SERIAL TO ARINC 561/568
2 SYNCHRO/HEADING REFERENCE OPTION CONVERTER

PRODUCT P/N: 934000-14A

INSTALLATION MANUAL

REV B

Shadin Avionics
6831 Oxford Street
St. Louis Park, MN 55426
USA

Sales: (800)-328-0584
Technical Support: (800)-388-2849

MANUAL P/N: IM4000-14A

PAGE CONTROL CHART

Drawing No.	Description/Part Number	Date	Rev
4040-019	Installation, P/N 934000-14A Serial to ARINC 561/568, 2 Synchros Conv.	3-6-2000	C
4036-097	Installation Wiring DWG, Serial Data to ARINC 561 Distance and Synchro Course/Bearing Converter	3-6-2000	A
4076-001	Installation Drawing, P/N 937600 Synchro to RS-232 Conv.	3-16-1999	A
N/A	Parts List, Install Kit, P/N IK9340	5-17-2005	B

REVISION LOG

REV.	DATE	APP'D	CHANGE
–	3/09/00	PG	Baseline Release
A	05/17/05	ZK	ECO 0504/027: Updated Shadin and product names and §2.4.2 pinout table, adding FreeFlight 2101. Updated sections 1.1 to 1.4 and Install Kit Parts List.
B	10/28/08	BM	ECO 0808/006 updated manual to Shadin Avionics logo

The information in this manual is subject to change without notification. To ensure complete and current updates, note the Revision Log above and call Technical Assistance for updated information.

1. OVERVIEW

1.1 The Manual

This manual is intended to assist the installer in the proper installation and configuration of the Serial to ARINC-561/568, 2 Sync/Hdg Ref Opt Converter. References to equipment provided by other manufacturers is provided for the installer's convenience and should be verified by the installer for accuracy and the latest information. Installation instructions should be read and followed.

1.2 Product Description

The Serial to ARINC-561/568, 2 Sync/Hdg Ref Opt Converter receives serial data from a GPS receiver and from an aircraft heading source through the Synchro to Serial Converter, Shadin P/N 937600 (See Fig. 1). The serial input data is converted to ARINC 561/568 data to drive the distance to go display on the HSI. Use SW 1 to select the normal labels or the alternate labels for the various navigational receivers installed (Table 3). The serial input data is also converted to Waypoint Bearing and Desired Track synchro output signals, (Table 4) for SW2 selection options. In summary, the three available settings for ARINC 561/568 output are as follows.

Table 1
ARINC 561 Normal Label List

LABEL	Description	Tx Interval
001	Distance to "TO" Way point	200 msec
002	Time to go	200 msec
003	Crosstrack Distance	200 msec
012	Ground Speed	200 msec
031	Magnetic Variation	200 msec
110	Status Word	200 msec
275	LRN Status Word	200 msec
115	Bearing to Waypoint (True)	200 msec
155	Display Deviation (DOTS: 1 dot = 3.75 nm)	200 msec
156	Distance to Nth Waypoint	1 second
157	Desired Course to Nth Waypoint (True)	1 second
160	Way point Identifier Word 1	1 second
161	Way point Identifier Word 2	1 second

ARINC 561 Alternate Label List

LABEL	Description	TX Interval
001	Distance to "TO" Way point	200 msec
002	Time to go	200 msec
003	Crosstrack Distance	200 msec
004	Desired Track (True)	200 msec
010	Present Position Latitude	200 msec
011	Present Position Longitude	200 msec
013	Track Angle	200 msec
275	LRN Status Word	200 msec
024	Way point Leg	200 msec
040	Latitude Waypoint 1	200 msec
041	Longitude Waypoint 1	200 msec
042	Latitude Waypoint 2	200 msec
043	Longitude Waypoint 2	200 msec
044	Latitude Waypoint 3	200 msec
045	Longitude Waypoint 3	200 msec
046	Latitude Waypoint 4	200 msec
047	Longitude Waypoint 4	200 msec
050	Latitude Waypoint 5	200 msec
051	Longitude Waypoint 5	200 msec
052	Latitude Waypoint 6	200 msec
053	Longitude Waypoint 6	200 msec
054	Latitude Waypoint 7	200 msec
055	Longitude Waypoint 7	200 msec
056	Latitude Waypoint 8	200 msec
057	Longitude Waypoint 8	200 msec
060	Latitude Waypoint 9	200 msec
061	Longitude Waypoint 9	200 msec

ARINC 568 Label List

LABEL	Description	TX Interval
201	Distance to "TO" Waypoint	200 msec

Table 2

The converter interfaces with the following navigational receivers as serial data source:

ARNAV
Bendix/King
GARMIN 155/165
IIMorrow NMS 2001, IIMorrow 800 or 820
Northstar (M1 or M2 Formats)
Trimble 2000/3000 Series, FreeFlight 2000/2101/3000 Series

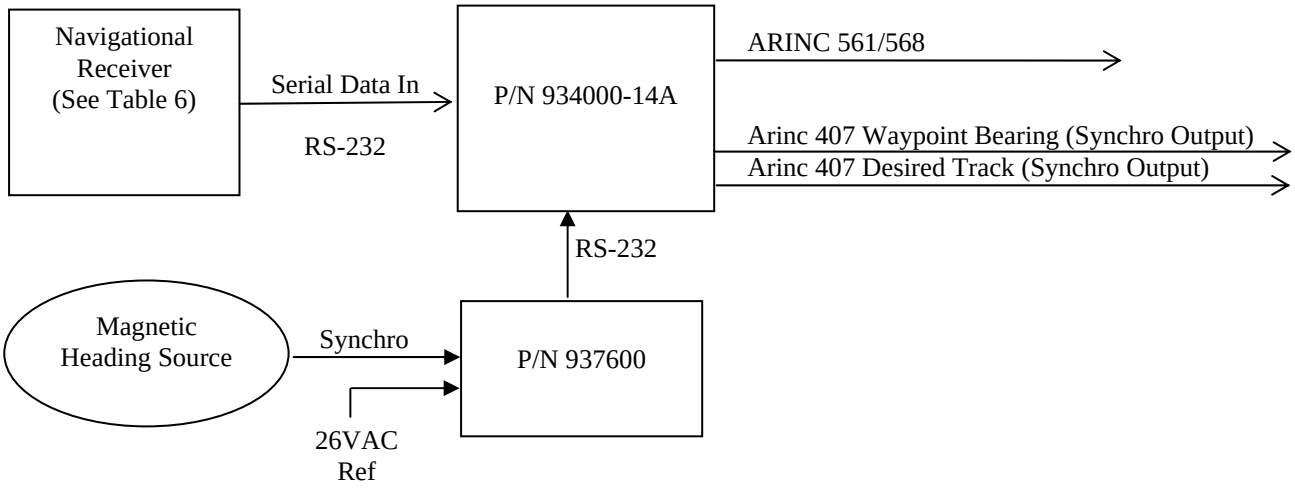


FIGURE 1.
ARINC 561 TO SYNCHRO CONV/HEADING REF BLOCK DIAGRAM

1.3 Figure 1. is a functional block diagram of the Serial to ARINC 561/568, 2 Sync/Hdg Ref Opt Converter system. The Synchro to RS-232 Converter, P/N 937600, is ***optional***. When the 937600 is installed the Bearing to Waypoint Synchro output is referenced to Magnetic Heading rather than True Heading. The unit looks for this data and when it is present it automatically changes the Waypoint to Bearing output to Magnetic Heading Reference. No operator action is required. The serial data coming from the navigational receiver and the Magnetic Heading converter connect to J2 of the Serial to Arinc 561/568, 2 Sync Converter. The output of the Serial to ARINC-561/568, 2 Sync/Hdg Ref Opt Converter connects to the HSI or DME on P1 and P5.

1.4 Specifications

Physical Specifications including mounting tray

Dimensions:	3.39H" x 6.28"L x 3.04"W
Weight:	1.5 lbs
Mounting:	Rack

Electrical

Power Supply Voltage:	+14 to + 28 VDC
Supply Current:	200 mA
Excitation Ref:	26Vac 400Hz

Protection — Not internally fused

Inputs

RS-232/422 Navigational Interface	1200/9600 baud, 8 bits, no parity, 1 stop bit, "ABCD" Format

Magnetic Heading (Synchro to Serial)

Outputs

ARINC 561 / 568

2 Synchro Data Outputs:

Desired Track	ARINC 407 3-wire Synchro
Bearing to Waypoint	ARINC 407 3-wire Synchro

Environmental

Operating Temperature:	-20° to +55° C
Storage Temperature	-55^{o} to $+85^{o}$ C
Operating Altitude	Up to 50,000 ft

2. INSTALLATION PROCEDURE

2.1 Unpacking and Inspecting Equipment

2.1.1 Physical Inspection

Before unpacking the unit look for any obvious damages which may have occurred during shipping. If damage has occurred immediately notify the shipping company. Save the shipping container and packaging material should it become necessary for you to ship the unit or for extended storage.

2.1.2 Electrical Inspection

Inspect all of the input/output connectors to assure that none of the pins were damaged during shipment. No electrical testing is performed prior to installation.

2.1.3 Packing List

Verify you have received the items identified in the attached parts list in section 3.

2.2 Mounting

The converter may be mounted in horizontal position on a rigid surface. Avoid locations where the unit could be exposed to hot air, cold air or water. The converter has to be installed in a temperature-controlled environment. Fasten the mounting tray provided in the Install Kit to the aircraft using installation drawing No. 4040-019. Use screws, with locking type washers, and nuts to secure against vibration. Attach the unit on the tray by using the knurled knob after electrical connections are completed.

2.3 Configuration Setting

There are two 16 position rotary switches (SW1 and SW2) for configuring the operation of the converter. SW1 provides the user with the ability to select the type of navigational interface and whether normal or alternate labels are to be transmitted. SW2 provides the user with the ability to select the synchro output requirements. See table 3 for the SW1 selections and table 4 for SW2 selections.

Table 3.
INPUT/OUTPUT OPTIONS CONTROL (SW1)

Switch Position	Input/Output *
F	NST/568
E	ANV/568
D	BEN/568
C	FFL/568
B	NST/561 Alternate
A	ANV/561 Alternate
9	BEN/561 Alternate
8	FFL/561 Alternate
7	NMS/561 Alternate
6	NMS/561 Normal
5	NMS/568
4	Not Used
3	NST/561 Normal
2	ANV/561 Normal
1	BEN/561 Normal
0	FFL/561 Normal

* NST — Northstar
ANV — ARNAV
BEN — Bendix
FFL — FreeFlight

Table 4.
SYNCHRO OPTIONS CONTROLLED BY SW2

Switch Position	Desired Track	Bearing to Waypoint
F	SIN/COS, REV	SIN/COS, REV
E	X/Y, REV	SIN/COS, REV
D	SIN/COS, REV	X/Y, REV
C	X/Y, REV	X/Y, REV
B	SIN/COS, NORM	SIN/COS, REV
A	X/Y, NORM	SIN/COS, REV
9	SIN/COS, NORM	X/Y, REV
8	X/Y, NORM	X/Y, REV
7	SIN/COS, REV	SIN/COS, NORM
6	X/Y, REV	SIN/COS, NORM
5	SIN/COS, REV	X/Y, NORM
4	X/Y, REV	X/Y, NORM
3	SIN/COS, NORM	SIN/COS, NORM
2	X/Y, NORM	SIN/COS, NORM
1	SIN/COS, NORM	X/Y, NORM
0	X/Y, NORM	X/Y, NORM

2.4 Electrical Connections

Use Installation Kit IK9340 to make a wiring harness. Refer to the installation drawings No. 4040-019 and No. 4036-076 for the harness wiring at the Serial to ARINC-561/568, 2 Sync/Hdg Ref Opt Converter. Care must be exercised in the routing of the cables. Avoid sharp bends and routing of cables near aircraft controls. Avoid running of cables near high-powered wiring and when possible route cables at right angles to high power wiring to minimize interference between these equipment and the converter.

2.4.1 Connecting the Serial to ARINC-561/568, 2 Sync/Hdg Ref Opt Converter

Connect the Serial to ARINC-561/568, 2 Sync/Hdg Ref Opt Converter to aircraft power in accordance with Table 5. The unit is not fused, and protection must be provided by the installer.

Table 5

934000-14A (Connector J2)	Aircraft Power
J2-1	+28
J2-9	Ground

2.4.2 Connecting to the Navigational Receiver

Connect to the navigational receiver in accordance with Table 6. Note that the pin out information provided for the navigational receivers is for the installer's convenience and should be verified by the installer for its authenticity.

Table 6

934000-14A Connector J2	Arnav	Bendix/King KLN88, 90, 90A, 90B	Bendix/King KLX-135	Bendix/King KLN-35	Bendix/King KLN-89/89B	Bendix/King KLN-900	Garmin 155/165
J2-5 (RX-RS-232)	5	13	10	12	2	6	24
J2-14 (signal GND)	4	36	N/A	N/A	1	38	17

Table 6 (Continued)

934000-14A Connector J2	Northstar (M1 or M2 Format)	FreeFlight (formerly Trimble)		II Morrow NMS 2001	II Morrow 800 or 820	Reserved for future Expansion
		2000/3000	2100/3100/2101			
J2-5 (RX-RS-232)	11	5	6	19/37	6	
J2-14 (signal GND)	6	8	1	21/38	7	
J2-3 (RX+ RS-422)	NC	15	37	NC	NC	
J2-4 (RS - RS-422)	NC	3	5	NC	NC	

2.4.3 Connecting to the Synchro to RS-232 Converter

Connect to the Synchro Heading to RS-232 Converter, P/N 937600, in accordance with Table 7.

Table 7

934000-14A	937600
J2-15	Pin 14

2.4.4 Connections to the HSI/DME

Connections to the HSI/DME are shown for the converter only. The installer needs to obtain the latest information for connections to and configuring of the HSI/DME. The installer should also be aware that certain HSI/DME equipment require additional jumpering of the HSI/DME equipment to provide the correct synchro data. Consult the HSI/DME manuals for this information.

2.5 Installation Checkout

2.5.1 Continuity Checks

Using installation drawing 4040-019 and Table 5, 6 and 7 verify continuity of cabling for power, interfacing the navigational receiver and the synchro to serial converter. Using installation drawing 4040-019 and the installer provided interface to the HSI/DME, verify the continuity of the cabling.

2.5.1.1 Resistance Checks

If any appreciable resistance is detected during the continuity verification, the installer must detect the source of the resistance and rectify it prior to applying power to the system.

2.5.1.2 Shorts to Ground

The installer should verify a minimum of 10 MΩ of resistance to ground and all wiring.

2.5.1.3 Inter-wiring Shorts

The installer should verify a minimum of 10 MΩ of resistance between wires.

2.6 System Checkout

Prior to applying power verify that the system configurations switches are configured correctly for the installed system. With the system powered up verify the LEDs located on the opposite side of the configuration switches are flashing. There are two yellow LEDs and one green LED. The center LED indicates the converter is operating. The green LED indicates serial data coming from the navigational receiver. If the system is operating correctly all three LEDs should be should be illuminated and the center and green LEDs should be flashing.

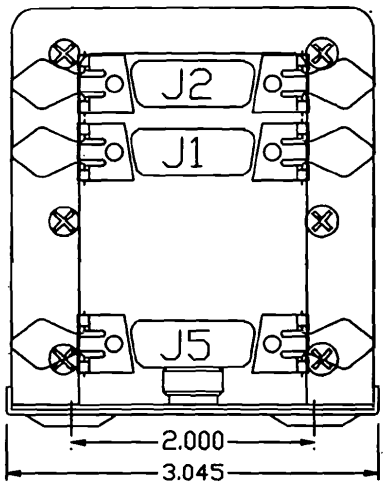
2.7 Trouble Shooting

- Ensure that all circuit breakers are on.
- Ensure that all connectors are seated correctly.
- Using an oscilloscope verify that serial data is being transmitted to the Serial to ARINC-561/568, 2 Sync/Hdg Ref Opt Converter, P/N 934000-14A, from the navigational receiver and from the Synchro to RS-232 Converter, P/N 937600, if installed. The signals should conform to RS-232 specifications.
- Ensure that the converter is outputting 561 data in accordance with 561 specifications.
- Ensure that 400 Hz 26 volts is being provided to the converter at both P1 and P5 locations.
- Ensure that 400 Hz synchro signals are being output at P5 by the converter.
- Verify the HSI/DME is powered, jumpered and configured correctly.
- If your Selected Course or Waypoint Bearing outputs are showing 180° out of alignment, refer to Table 4 and select a REV position to the current setting.
- If the incorrect Selected Course/Waypoint Bearing/Distance information is being displayed, make sure the correct RS-232/422 serial format (GPS) has been selected (Table 3).

SECTION 3.0

INSTALLATION DRAWINGS AND INSTALL KIT PARTS LISTS

The following drawings are arranged in the sequence specified on page i of the Page Control Chart.



J2

POWER IN & COMM.

1. +28V DC POWER IN
9. POWER GND

1 3. RX+ RS-422
1 4. RX- RS-422
1 11. TX+ RS-422 (NOT USED)
1 12. TX- RS-422 (NOT USED)

1 5. RX RS-232
1 6. TX RS-232 (NOT USED)

HEAD CONV INPUT
15. RX RS-232 (2) 4
13. TX RS-232 (2) (NOT USED)

14. SIGNAL GND

2. N.C.
7. N.C.
8. N.C.
10. N.C.

J1

ARINC 561 SYNCHRO DRIVER

4. 26V 400 HZ REF. INPUT
11. 26V 400 HZ REF. RETURN

1. DATA SIG. ARINC561 OUTPUT
2. CLOCK SIG. ARINC561 OUTPUT
3. SYNC SIG. ARINC561 OUTPUT
9. SIG. GND

12. GND
14. GND

5. N.C.
6. N.C.
7. N.C.
8. N.C.
13. N.C.
15. N.C.
10. VALID DATA FLAG SIG. OUTPUT
+28V = ARINC 561 VALID
0-.8V = ARINC 561 NOT VALID

J5

POWER SYNCHRO DRIVER

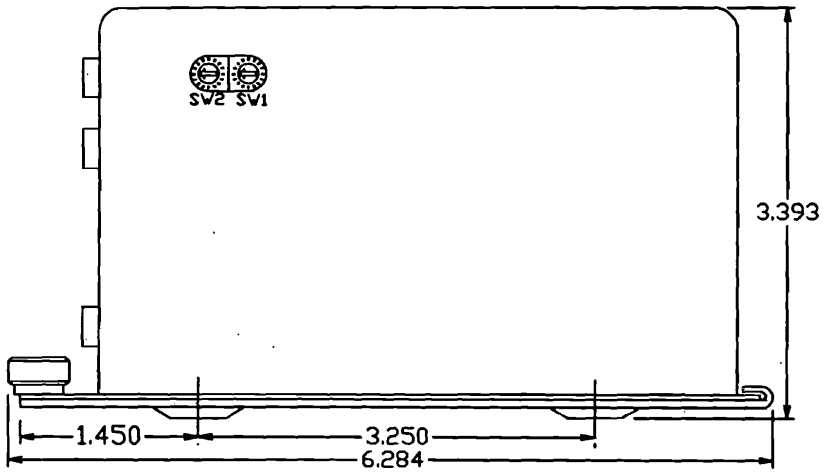
1. 26V 400HZ, POWER INPUT
9. 26V 400HZ, POWER RETURN

4. X DESIRED TRACK, POWER SYNCHRO OUTPUT/SIN 3
5. Y DESIRED TRACK, POWER SYNCHRO OUTPUT/COS 3
11. Z DESIRED TRACK, POWER SYNCHRO OUTPUT
12. DESIRED TRACK, GND
7. X BEARING TO WAYPOINT, POWER SYNCHRO OUTPUT/SIN 3
8. Y BEARING TO WAYPOINT, POWER SYNCHRO OUTPUT/COS 3
14. Z BEARING TO WAYPOINT, POWER SYNCHRO OUTPUT
15. BEARING TO WAYPOINT, GND

2. N.C.
3. N.C.
6. N.C.
10. N.C.
13. N.C.

MATING CONNECTORS AND ASSOCIATED PARTS ARE PROVIDEDED IN INSTALL KIT P/N IK9340

WEIGHT: 2 LBS.



IMPORTANT!

1 –SYSTEM CAN USE RS-232 OR RS-422, BUT NOT BOTH

2 –TIE J5 PINS 9, 11, AND 14 TOGETHER

3 –FUNCTION VARIES BASED ON SWITCH 2 POSITION

4 –RS-232 INPUT FROM 937600 IS OPTIONAL, AND IF IT IS PRESENT IT WILL CAUSE THE BEARING TO WAYPOINT SYNCHRO OUTPUT TO BE REFERENCED TO MAGNETIC HEADING RATHER THAN TO TRUE NORTH.

ECO #	REV.	DATE	BY	APP'D	DESCRIPTION
9801/031	C	3/6/2000	DMD	PG	ADDED NOTE 4, NOTATIONS FOR J2, ADDED REFERENCE TO IK9340, ADDED SW1 & 2 MARKINGS
9602/064	B	2-29-96	WMP	SES	ADD NOTE 3
9510/015	A	10-26-95	DLR	SES	ADD SLOT
9508/026	-	8-15-95	WMP	SES	BASELINE RELEASE

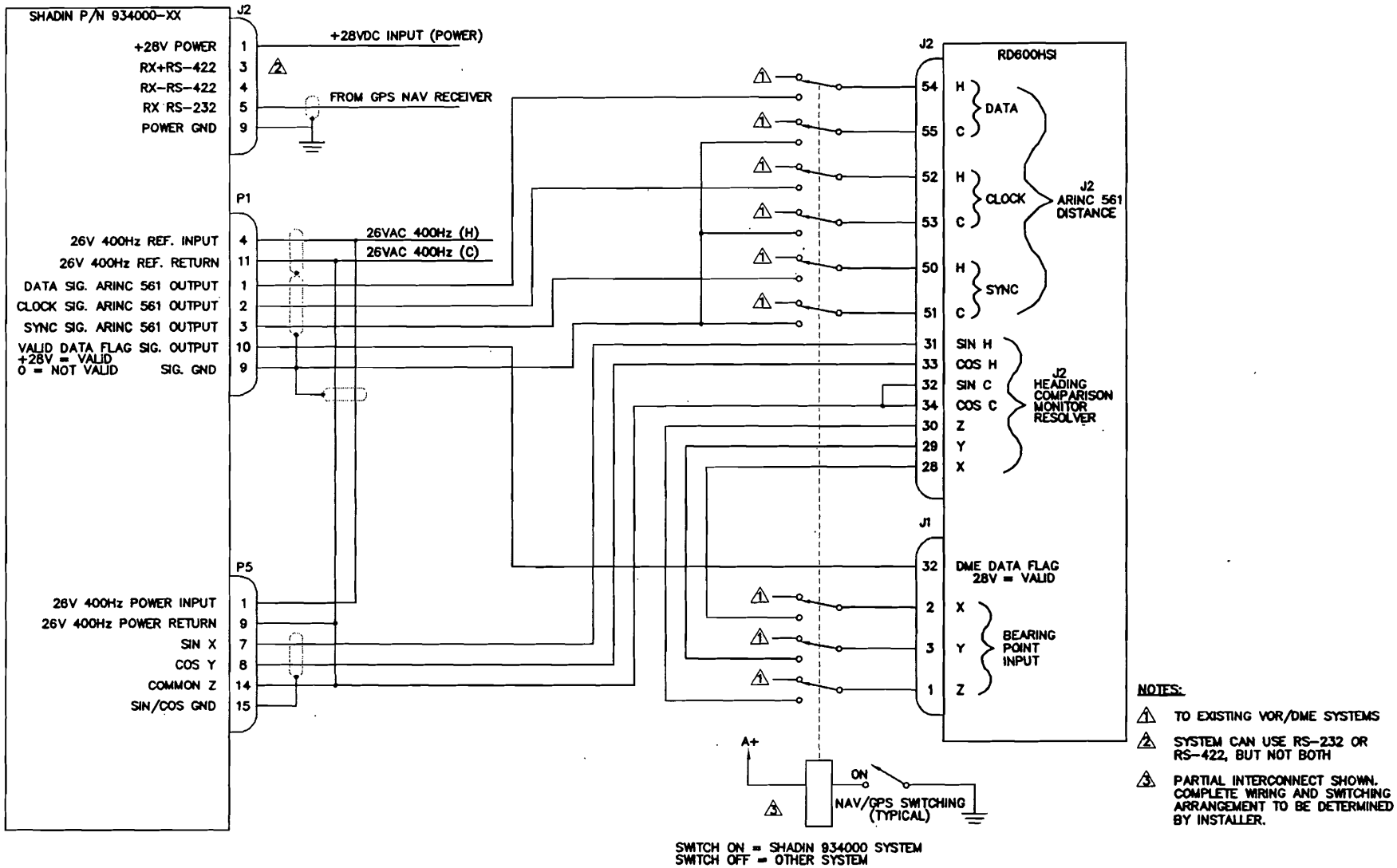
UNLESS OTHERWISE NOTED DIMENSIONS ARE IN INCHES
TOLERANCES: +/- 0.015
FINISH: N/A
MATERIAL: N/A

DRAWING DATE 6-22-93
DRAFTER DAP
APPROVED SES
FILE NAME 93414AC.DWG
DIRECTORY 934000-14A
SHEET 1 OF 1

SHADIN MINNEAPOLIS, MN 55426

INSTALLATION, SERIAL TO ARINC 561/568, 2 SYNCHROS CONV

DRAWING NO. 4040-019 | SIZE A | P/N934000-14A | REV. C



NOTES:

1. TO EXISTING VOR/DME SYSTEMS
2. SYSTEM CAN USE RS-232 OR RS-422, BUT NOT BOTH
3. PARTIAL INTERCONNECT SHOWN. COMPLETE WIRING AND SWITCHING ARRANGEMENT TO BE DETERMINED BY INSTALLER.

ECO #	REV.	DATE	BY	APP'D	DESCRIPTION
9801/031	A	3/8/2000	PAB	PG	CORRECTED P/N REFERENCE
N/A	–	3/21/94	DAP	RR	BASELINE RELEASE

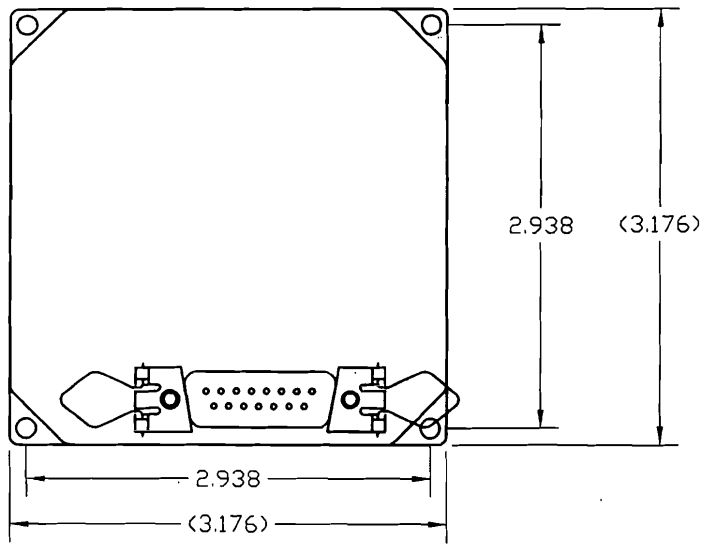
DO NOT SCALE

DRAWING DATE 3/21/94
DRAFTER DAP
APPROVED RR
FILE NAME 4036-097A1.DWG
DIRECTORY 4036
SHEET 1 OF 1

SHADIN MINNEAPOLIS, MN 55426

SERIAL DATA TO ARINC 561 DISTANCE AND SYNCHRO COURSE/BEARING CONVERTER SPERRY RD600 INTERCONNECT

DRAWING NO. 4036-097 | SIZE A | P/N — | REV A



- THE CONVERTER CAN BE MOUNTED IN ANY ORIENTATION
- 4" SPACING IS REQUIRED ABOVE CONNECTOR
- NO COOLING IS REQUIRED
- THE CONVERTER CAN BE INSTALLED IN A PRESSURIZED OR NON-PRESSURIZED AREA, PROVIDING TEMPERATURE DOES NOT DROP BELOW -20°C
- 1 AMP CIRCUIT BREAKER IS REQUIRED
- NO SHOCK MOUNT REQUIRED

WEIGHT: 16 oz.

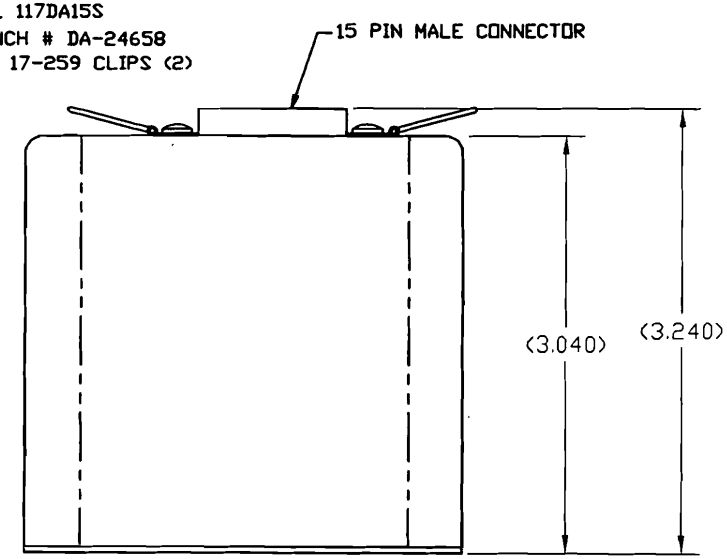
POWER CONSUMPTION: 210 ma. @ 28v DC

MATING CONNECTOR:

AMPHENOL 117DA15S

HOOD: CINCH # DA-24658

AMPHENOL 17-259 CLIPS (2)



CONNECTOR KEY			
PIN	FUNCTION	PIN	FUNCTION
1	N.C.	9	N.C.
2	Y SYNCHRO	10	H 26v 400 Hz REF.
3	X SYNCHRO	11	N.C.
4	Z SYNCHRO	12	N.C.
5	C REF. COMMON	13	N.C.
6	N.C.	14	TX RS-232
7	N.C.	15	POWER GND
8	18 - 28v DC POWER IN		

ECO #	REV.	DATE	BY	APP'D	DESCRIPTION
9903/009	A	3/16/99	DMD	KCL	CORRECTED TITLE BLOCK, SHOW REF DIMENSIONS
9412/008	-	12/28/94	DAP	SES	BASELINE RELEASE

UNLESS OTHERWISE NOTED DIMENSIONS ARE IN INCHES
TOLERANCES: X.X = ±0.1, X.XX = ±0.01, X.XXX = ±0.005

FINISH: N/A

MATERIAL: N/A

SCALE: NONE

DRAWING DATE: 12/28/94

DRAFTER: DAP

APPROVED: SES

FILE NAME: 937600A.DWG

DIRECTORY: 937600

SHEET 1 OF 1

SHADIN MINNEAPOLIS, MN 55426

INSTALLATION DWG, SYNCHRO TO RS-232 CONV.

DRAWING NO. 4076-001 | SIZE A | P/N 937600 | REV A

File Name: IK9340BP.doc
DIRECTORY: IKXXXX

Report: 4040
ECO Date: April 19, 2005
Rev: B
Sec.: IX

ECO # 0504/027
Release date: 5-17-05
Approved: ZK

PARTS LIST

Part #: **IK9340**

Drawing #s: n/a

Description: **INSTALL KIT, SERIAL TO ARINC, 2 SYNCHRO CONV**

FN	P/N	QTY.	DESCRIPTION	MFG.	MFG.#	DESIGNATION	COMMENTS
5	230019H-1	6	SPRING LATCH CLIP	SHA	4028-074		
10	230036	3	CONN, 15 Pin D-Sub Socket	APH	17D-A15S		
15	230038	3	CONN, Hood 15 Pin D Sub	CIN	DA-24658		
20	511002	4	SCREW, 4-40 x ¼"L, Phil Pan HD SS	MCM	91772A106		
25	512007	4	NUT, 4-40 3/16 x 1/16 SS	AFT	HNSP188 04C000		
30	512014-1	1	NUT, Knurled	SHA	4028-132		
35	541001	4	WASHER, #4 Split Lock SS	MCM	92147A005		
40	542801A	1	MOUNTING TRAY	SHA	4028-B05		
45	PK1009	1	BAG, 6 x 12, 4 MIL				

27 items