Honeywell

INSTALLATION MANUAL

BENDIX/KING®

KR 87

AUTOMATIC DIRECTION FINDER

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REVISION HISTORY

KR 87

KR 87 Installation Manual

Part Number: 006-00184-XXXX

For each revision, add, delete, or replace as indicated.

Revision 6, May 2006

ITEM	ACTION
Full Reprint	Replaces all previous revisions. Specific changes are denoted by revision bar.

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SECTION I
GENERAL INFORMATION

1.1 INTRODUCTION

This manual contains information relative to the physical, mechanical, and electrical characteristics of the Honeywell KR 87 Automatic Direction Finder, the KI 227 and KI 228 ADF Indicators, and the KA 44 and KA 44B ADF Antennas. Installation and operating instructions are also included. Information concerning the maintenance and repair of this equipment may be found in the KR 87/KI 227/KI 228 Maintenance/Overhaul Manual, P/N 006-05184-XXXX, and the KA 44/KA 44B/KTS 156 Maintenance/Overhaul Manual, P/N 006-05535-XXXX.

1.2 EQUIPMENT DESCRIPTION

The KR 87 Automatic Direction Finder is a digitally tuned solid state receiver which provides bearing information to stations in the 200 KHz to 1799 KHz frequency band and which also provides audio reception to enable the pilot to identify stations and listen to transcribed weather broadcasts or commercial radio stations in the AM broadcast band. The unit features a gas discharge display that displays the active ADF frequency in the left window. The right window will display either the standby frequency (which can be transferred to the active window) or a flight timer or programmable elapsed timer. The flight timer will keep track of the total flight time, while the independent programmable elapsed timer can be reset to count up from zero or preset to a value and count down to zero. This feature will prove especially valuable for non-precision timed approaches, fuel management, dead reckoning navigation, etc.

An automatic dimming circuit adjusts the brightness of the display to compensate for changes in ambient light level. A single-chip microprocessor is used to control the display, provide the timer functions, control the tuning circuitry, and provide timing reference signals. A non-volatile electrically alterable memory (EAROM) is used to store the active and standby frequencies even after the unit is turned off. The tuning circuitry utilizes a single reference frequency crystal and a large scale integrated circuit (LSI).

The KR 87 is an extremely compact ADF, requiring only 1.3 inches of panel height. Power consumption is only 12 watts at any input voltage, therefore, forced air cooling is not required.

The KI 227 is a single needle ADF Indicator and is the basic indicator used with the KR 87. The KI 227 is available with a manually rotatable compass card or with a slaved compass card that can be interfaced to the stepper motor output of the KCS 55/55A Pictorial Navigation System. The KI 228 is a dual needle ADF Indicator and is also available with manual or slaved compass cards.

The KA 44 and KA 44B ADF Antennas contain both loop and sense amplifiers, preamplifiers, and modulators which combine the loop and sense antenna signals into a single RF signal which is output to the KR 87 via a triaxial cable of non-critical length.

A complete system includes the KR 87 ADF Receiver, a KA 44 or KA 44B ADF Antenna, and an ADF Indicator such as the KI 227 or KI 228. The KR 87 may also be interfaced to the Honeywell KI 229 or KNI 582 RMI's.

1.3 TECHNICAL CHARACTERISTICS

1.3.1 KR 87 ADF RECEIVER

SPECIFICATION	CHARACTERISTIC
TSO COMPLIANCE:	TSO C41c Class A DO-160 Env. Cat A1D1/A/SKP/XXXXXX/ZBABA
APPLICABLE DOCUMENTS:	RTCA DO-142
ENVIRONMENTAL SPECIFICATIONS:	
Temperature	-20°C to +55°C
Altitude	Up to 50,000 feet
Humidity	95% + RH at 50°C for 48 hours
PHYSICAL DIMENSIONS:	See FIGURE 2-12 KR 87 OUTLINE AND MOUNTING DRAWING
WEIGHT:	See FIGURE 2-12 KR 87 OUTLINE AND MOUNTING DRAWING
POWER REQUIREMENTS:	
066-1072-00/01/02/03/04/05/06/07/17:	27.5 +/- 0.5 VDC 0.45A max w/ one load
066-1072-00/01/03/04/06/07/17:	13.75 +/- 0.5 VDC 0.9A max w/ one load
066-1072-02/05:	27.5 +/- 0.5 VDC 0.56A max w/ two loads
066-1072-14:	13.75 +/- 0.5 VDC 1.031A max
066-1072-02/05:	27.5 +/- 0.5 VDC 0.45A max w/ one load
066-1072-14/15:	27.5 +/- 0.5 VDC 0.515A max w/ one load
066-1072-15:	27.5 +/- 0.5 VDC 0.625A max w/ two loads
MAXIMUM LIGHTING CURRENT	
066-1072-00/01/02/03/04/05:	13.75 VDC +/- 0.5 VDC applied @ Pin L, and Pin 9 grounded; .252Amps Max
	27.5 VDC +/- 0.5VDC applied @ Pin 9, and Pin L open; .126Amps Max
066-1072-06/07:	4.5 VDC +/- 0.1VDC applied @ Pin L and Pin 9 grounded; .635 Amps Max
066-1072-14/15:	13.75 VDC +/- 0.5 VDC applied @ Pin L, and Pin 9 grounded; .383 Amps Max
	27.5 VDC +/- 0.5 VDC applied @ Pin 9, and Pin L open; .191 Amps Max
066-1072-17:	4.5 VDC +/- 0.1 VDC applied @ Pin L, and Pin 9 grounded; 1.031 Amps Max

SPECIFICATION	CHARACTERISTIC
DISPLAY INFORMATION:	
Left Window	Active ADF frequency (displayed at all times)
Right Window (FRQ Mode)	Standby frequency
Right Window (FLT Mode)	Flight timer
Right Window (ET Mode)	Elapsed timer
Right Window (ET SET Mode)	Preset value for timer countdown
FREQUENCY RANGE:	200 KHz to 1799 KHz in 1 KHz increments.
RECEIVER SENSITIVITY:	
ADF Mode	150uV/m max for s+n/n = 6dB
ANT Mode	70uV/m max for s+n/n = 6dB
RECEIVER SELECTIVITY:	
6dB Bandwidth	2 KHz max off center frequency
80dB Bandwidth	7 KHz max off center frequency
SPURIOUS RESPONSE:	80dB down +/- 12KHz from center frequency
CROSS MODULATION/ INTER MODULATION:	
50 to 550 KHz	66dB min.
550 KHz to 150 MHz	72dB min.
ADF BEARING ACCURACY:	+/- 3° from 70uV/m to 0.5V/m RF input signal level
ADF INDICATOR SPEED:	7 sec max with indicator 175° off bearing and 70uV/m to 0.5V/m RF input signal level
INDICATOR DRIVE:	DC sine and cosine voltages 4.5 +/- 3.0VDC at 150mA max
AUDIO OUTPUT:	50mW across 500Ω
ALARM OUTPUT:	Maximum current 1.0A. Maximum open circuit voltage 33VDC.
SUPER FLAG OUTPUT:	
14 VDC A/C	Valid=12VDC @ 250mA
28VDC A/C	Valid=26VDC @ 250mA

1.3.2 KI 227 ADF INDICATOR

SPECIFICATION	CHARACTERISTIC
TSO COMPLIANCE:	TSO C41c Class A DO-160 Env. Cat A1D1/A/SKP/XXXXXX/ZBABA
ENVIRONMENTAL SPECIFICATIONS:	
Temperature	-20°C to +55°C
Altitude	Up to 50,000 feet
Humidity	95% + RH at 50°C for 48 hours
PHYSICAL DIMENSIONS:	See FIGURE 2-14 KI 227 OUTLINE AND MOUNTING DRAWING
WEIGHT:	See FIGURE 2-14 KI 227 OUTLINE AND MOUNTING DRAWING
POWER REQUIREMENTS:	
Lighting	14VDC at 0.16A or 28VDC at 0.08A
Compass Card Drive	12VDC at 0.12A
ADF BEARING INPUT:	DC sine and cosine voltages, +/- 3.0VDC max across each winding
COMPASS CARD INPUT: (066-3063-01 only)	2 phase digital stepper motor signals from KCS 55/55A Compass System
HEADING SELECTOR:	
066-3063-00	Manual
066-3063-01	Manually synchronized stepper motor drive

1.3.3 KI 228 ADF INDICATOR

SPECIFICATION	CHARACTERISTIC
TSO COMPLIANCE:	TSO C41c Class A DO-160 Env. Cat A1D1/A/SKP/XXXXXX/ZBABA
ENVIRONMENTAL SPECIFICATIONS:	
Temperature	-20°C to +55°C
Altitude	Up to 50,000 feet
Humidity	95% + RH at 505C for 48 hours
PHYSICAL DIMENSIONS:	See FIGURE 2-15 KI 228 OUTLINE AND MOUNTING DRAWING
WEIGHT:	See FIGURE 2-15 KI 228 OUTLINE AND MOUNTING DRAWING
POWER REQUIREMENTS:	
Lighting	14VDC at 0.16A or 28VDC at 0.08A
Compass Card Drive	12VDC at 0.12A
ADF BEARING INPUT:	DC sine and cosine voltages, +/- 3.0VDC max across each winding for each pointer
COMPASS CARD INPUT: (066-3059-01 only)	2 phase digital stepper motor signals from KCS 55/55A Compass System
HEADING SELECTOR:	
066-3059-00	Manual
066-3059-01	Manually synchronized stepper motor drive

1.3.4 KA 44 ADF ANTENNA

SPECIFICATION	CHARACTERISTIC
TSO COMPLIANCE:	TSO C41c Class A DO-160 Env. Cat B2D2/A/LJY/XXXXXX/ABABA
ENVIRONMENTAL SPECIFICATIONS:	
Temperature	-20°C to +55°C
Altitude	Up to 50,000 feet
Humidity	95% + RH at 50°C for 48 hours
PHYSICAL DIMENSIONS:	See FIGURE 2-16 KA 44 OUTLINE AND MOUNTING DRAWING
WEIGHT:	See FIGURE 2-16 KA 44 OUTLINE AND MOUNTING DRAWING
POWER REQUIREMENTS:	9VDC at 80mA max (supplied by KR 87)

1.3.5 KA 44B ADF ANTENNA

SPECIFICATION	CHARACTERISTIC
TSO COMPLIANCE:	See TSO APPENDIX
ENVIRONMENTAL SPECIFICATIONS:	See TSO APPENDIX
PHYSICAL DIMENSIONS:	See FIGURE 2-17 KA 44B OUTLINE AND MOUNTING DRAWING / FIGURE 2-18 KA 44B OUTLINE AND MOUNTING DRAWING W/ GROUND PLANE
WEIGHT:	See FIGURE 2-17 KA 44B OUTLINE AND MOUNTING DRAWING / FIGURE 2-18 KA 44B OUTLINE AND MOUNTING DRAWING W/ GROUND PLANE
POWER REQUIREMENTS:	9VDC at 80mA max (supplied by KR 87)

1.4 UNITS AND ACCESSORIES SUPPLIED

1.4.1 KR 87 ADF RECEIVER

The KR 87, P/N 066-1072-XX, is available in the following versions:

066-1072-	-00	-01	-02	-03	-04	-05	-06	-07	-14	-15	-17
14/28 VOLT	X	X	-	X	X	-	X	X	X	-	X
28 VOLT ONLY	-	-	X	-	-	X	-	-	-	X	-
STD LENS	X	-	X	-	X	X	N/A	X	X	X	X
SHINY LENS	-	X	-	X	-	-	N/A	-	-	-	-
SNGL IND	X	X	-	X	X	-	X	X	X	-	X
DUAL IND	-	-	X	-	-	X	-	-	-	X	-
SUPER FLAG	-	-	-	-	X	X	X	X	X	X	X
5V LAMPS	-	-	-	-	-	-	X	X	-	-	X
14/28 V LAMPS	X	X	X	X	X	X	-	-	X	X	-
CLR LIGHT	X	X	X	X	X	X	-	-	X	X	-
BLUE LIGHT	-	-	-	-	-	-	X	X	-	-	X
BACKLIT NOMENCLATURE	-	-	-	-	-	-	-	-	X	X	X

1.4.2 KI 227 ADF INDICATOR

The KI 227, P/N 066-3063-XX, is a single needle ADF Indicator and is the standard indicator for the KR 87. The KI 227, P/N 066-3063-00, has a manually rotatable compass card. KI 227, P/N 066-3063-01, has a slaved compass card which may be interfaced to the stepper motor output of the KCS 55/55A Compass System.

1.4.3 KI 228 ADF INDICATOR

The KI 228, P/N 066-3059-XX, is a dual needle ADF Indicator which will accept ADF bearing information from two KR 87's. The KI 228, P/N 066-3059-00, has a manually rotatable compass card. The KI 228, P/N 066-3059-01, has a slaved compass card which may be interfaced to the stepper motor output of the KCS 55/55A Compass System.

1.4.4 KA 44 ADF ANTENNA

The KA 44, P/N 071-1196-00, is a blade type ADF Antenna which contains both loop and sense antennas, preamplifiers, and modulators which combine the antenna signals into a single RF signal which is output to the KR 87 via a triaxial cable of non-critical length. This antenna is NO LONGER AVAILABLE.

1.4.5 KA 44B ADF ANTENNA

The KA 44B, P/N 071-1234-XX, is a low profile ADF Antenna which contains both loop and sense antennas, preamplifiers, and modulators which combine the antenna signals into a single RF signal which is output to the KR 87 via a triaxial cable of non-critical length. The KA 44B is available in three versions. KA 44B antenna P/N 071-1234-00 includes a mounting plate. KA 44B P/N 071-1234-01 includes a grounding ring. KA 44B P/N 071-1234-02 has no mounting plate and has the QE adjust accessible vertically.

1.4.6 KR 87 INSTALLATION KIT

The KR 87 Installation Kit, P/N 050-01756-XXXX, is available is seven versions which contain antenna cable assemblies in 12, 24, 36, or 48 foot lengths. Antenna cable length is not critical and any of the cable assemblies may be shortened as required by a particular installation. Kit identification and contents are shown below.

PN	DESCRIPTION	REV
050-01756-0000	INSTALLATION KIT	AA
050-01756-0001	INSTALLATION KIT	AA

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	-0000	-0001
	006-00538-0000		IS KR87	EA	1.00	1.00
	006-08126-0000		KR 87 INSTR SHT	EA	1.00	1.00
	030-00101-0000		PANEL MNT PLUG	EA	1.00	1.00
	030-01094-0051		CONN W/KEY	EA	1.00	1.00
	030-01107-0030		CONNECTOR TERM 30T	EA	1.00	1.00
	057-02259-0000		ANT MTG TEMPLATE	EA	1.00	1.00
	076-01042-0001		FERRULE W/F	EA	1.00	1.00
	089-02051-0024		NUT SPEED U 6-32	EA	4.00	4.00
	089-02191-0022		NUT LOCK 6-32	EA	1.00	1.00
	089-02353-0001		NUT CLIP 6-32	EA	6.00	6.00
	089-05878-0007		SCR PHP 4-40 X 7/16	EA	2.00	2.00
	089-05907-0006		SCR PHP 6-32X3/8	EA	1.00	1.00
	089-06012-0008		SCR FHP 6-32X1/2	EA	6.00	6.00
	090-00019-0007		RING RTNR .438	EA	1.00	1.00
	091-00031-0005		NY CA CLAMP .312	EA	1.00	1.00
	155-05340-0000		INST DWG KR87	RF	.00	.00
	200-02586-0000		ANTENNA CABLE ASSY 12 FT	EA	1.00	.
	200-02586-0001		ANTENNA CABLE ASSY 24 FT	EA	.	1.00

PN	DESCRIPTION	REV
050-01756-0002	INSTALLATION KIT	AA
050-01756-0003	INSTALLATION KIT	AA

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	-0002	-0003
	006-00538-0000		IS KR87	EA	1.00	1.00
	006-08126-0000		KR 87 INSTR SHT	EA	1.00	1.00
	030-00101-0000		PANEL MNT PLUG	EA	1.00	1.00
	030-01094-0051		CONN W/KEY	EA	1.00	1.00
	030-01107-0030		CONNECTOR TERM 30T	EA	1.00	1.00
	057-02259-0000		ANT MTG TEMPLATE	EA	1.00	1.00
	076-01042-0001		FERRULE W/F	EA	1.00	1.00
	089-02051-0024		NUT SPEED U 6-32	EA	4.00	4.00
	089-02191-0022		NUT LOCK 6-32	EA	1.00	1.00
	089-02353-0001		NUT CLIP 6-32	EA	6.00	6.00
	089-05878-0007		SCR PHP 4-40 X 7/16	EA	2.00	2.00
	089-05907-0006		SCR PHP 6-32X3/8	EA	1.00	1.00
	089-06012-0008		SCR FHP 6-32X1/2	EA	6.00	6.00
	090-00019-0007		RING RTNR .438	EA	1.00	1.00
	091-00031-0005		NY CA CLAMP .312	EA	1.00	1.00
	155-05340-0000		INST DWG KR87	RF	.00	.00
	200-02586-0002		ANTENNA CABLE ASSY 36 FT	EA	1.00	.
	200-02586-0003		ANTENNA CABLE ASSY 48 FT	EA	.	1.00

PN	DESCRIPTION	REV
050-01756-0004	INSTL KIT 48 FT	AA
050-01756-0005	INSTL KIT CITATION	AA

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	-0004	-0005
	006-00538-0000		IS KR87	EA	1.00	.
	006-08126-0000		KR 87 INSTR SHT	EA	1.00	1.00
	030-00101-0000		PANEL MNT PLUG	EA	1.00	1.00
	030-01094-0051		CONN W/KEY	EA	1.00	1.00
	030-01107-0030		CONNECTOR TERM 30T	EA	1.00	1.00
	047-05657-0011		GRNDG RING .015 THK	EA	.	1.00
	047-10794-0001		ADAPTER PLATE	EA	.	1.00
	057-02259-0000		ANT MTG TEMPLATE	EA	1.00	1.00
	076-01042-0001		FERRULE W/F	EA	1.00	1.00
	089-02051-0024		NUT SPEED U 6-32	EA	4.00	4.00
	089-02191-0022		NUT LOCK 6-32	EA	1.00	1.00
	089-02353-0001		NUT CLIP 6-32	EA	6.00	6.00
	089-05534-0020		SCR FLHP 1/4-28	EA	.	2.00
	089-05534-0036		SCR FLHP 1/4-28	EA	.	2.00
	089-05878-0007		SCR PHP 4-40 X 7/16	EA	2.00	2.00
	089-05907-0006		SCR PHP 6-32X3/8	EA	1.00	1.00
	089-06012-0008		SCR FHP 6-32X1/2	EA	6.00	6.00
	090-00019-0007		RING RTNR .438	EA	1.00	1.00
	091-00031-0005		NY CA CLAMP .312	EA	1.00	1.00
	155-05340-0000		INST DWG KR87	RF	.00	.00
	200-02586-0004		ANTENNA CABLE ASSY 48 FT	EA	1.00	1.00

PN	DESCRIPTION	REV
050-01756-0006	INSTL KIT W/PLATE & RING	AA

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	-0006
	006-08126-0000		KR 87 INSTR SHT	EA	1.00
	030-00101-0000		PANEL MNT PLUG	EA	1.00
	030-01094-0051		CONN W/KEY	EA	1.00
	030-01107-0030		CONNECTOR TERM 30T	EA	1.00
	047-04956-0003		BACKUP PLATE	EA	1.00
	047-05657-0001		GRNDG RING W/F	EA	1.00
	057-02259-0000		ANT MTG TEMPLATE	EA	1.00
	076-01042-0001		FERRULE W/F	EA	1.00
	089-02051-0024		NUT SPEED U 6-32	EA	4.00
	089-02191-0022		NUT LOCK 6-32	EA	1.00
	089-02353-0001		NUT CLIP 6-32	EA	6.00
	089-05534-0020		SCR FLHP 1/4-28	EA	2.00
	089-05534-0036		SCR FLHP 1/4-28	EA	2.00
	089-05878-0007		SCR PHP 4-40 X 7/16	EA	2.00
	089-05907-0006		SCR PHP 6-32X3/8	EA	1.00
	089-06012-0008		SCR FHP 6-32X1/2	EA	6.00
	090-00019-0007		RING RTNR .438	EA	1.00
	091-00031-0005		NY CA CLAMP .312	EA	1.00
	155-05340-0000		INST DWG KR87	RF	.00
	200-02586-0004		ANTENNA CABLE ASSY 48 FT	EA	1.00

1.4.7 KI 227/228 INSTALLATION KIT

PN	DESCRIPTION	REV
050-01808-0000	INSTALLATION KIT	1
050-01808-0001	INSTALLATION KIT CRIMP	0

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	-0000	-0001
	030-01008-0000		LVR/PVT ASSY	EA	2.00	2.00
	030-01009-0000		HOOD CONN	EA	1.00	1.00
	030-01280-0001		CONNECTOR SOCKET	EA	.	14.00
	030-02000-0000		CONN 14 PIN FEM	EA	1.00	.
	030-03248-0000		CONN RCPT HOUSING	EA	.	1.00
	090-00348-0000		CONN ACCESSORY, GUIDE SCKT	EA	.	1.00
	090-00348-0001		CONN ACCESSORY, GUIDE PILOT	EA	.	1.00

1.5 ACCESSORIES REQUIRED BUT NOT SUPPLIED

A. Alarm Device (Sonalert), P/N 038-00008-0000, with bracket, P/N 047-03748-0001, or equivalents are required if the system is to be configured with an audible alarm.

B. Pressure Sensor, P/N 071-01247-0000, may be used to control flight timer operation. See SECTION II INSTALLATION of this manual for further information.

1.6 LICENSE REQUIREMENTS

NONE

1.7 REQUIREMENTS FOR A FULLY TSO'D SYSTEM

The KR 87 with a KA 44 or KA 44B ADF Antenna and an appropriate indicator comprise a fully TSO'd ADF system. Compatible indicators include the following:

A. Honeywell KI 227 ADF Indicator

B. Honeywell KI 228 ADF Indicator

C. Honeywell KI 229 RMI

D. Honeywell KNI 582 RMI

1.8 CONTINUED AIRWORTHINESS INSTRUCTIONS

1.8.1 EQUIPMENT

The instructions for continued airworthiness given in the TC or STC approvals for this product supplements or supersedes the instructions for continued airworthiness in this manual.

Most Honeywell products are designed and manufactured to allow "on condition maintenance". On condition maintenance is described as follows; There are no periodic service requirements necessary to maintain continued airworthiness. No maintenance is required until the equipment does not properly perform its intended function. When service is required, a complete performance test should be accomplished following any repair action. Consult the appropriate unit Maintenance/Overhaul Manual for complete performance test information.

14 CFR Part 25.1529 Instructions for Continued Airworthiness is met per the following instructions:

A. The removal of the KR 87 is on the condition of failure. There is no required maintenance

1.8.2 WIRES/COAX CABLES

During on-condition or regularly scheduled maintenance, inspect the wires and coax cables following the guidelines listed in AC 43,13-1 Chapter 15 as necessary.

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SECTION II
INSTALLATION

2.1 GENERAL INFORMATION

This section contains suggestions and factors to consider before installing the KR 87 ADF System. Close adherence to these suggestions will assure a more satisfactory level of performance from the system. Read this section carefully before attempting the installation.

The conditions and test required for the TSO and MOPS approval of this article are minimum performance standards. It is the responsibility of those installing this article either on or with a specified type or class of aircraft to determine that the aircraft installation conditions are within the TSO and MOPS standards. These articles must have separate approval for installation in an aircraft. Any features in this equipment outside the requirements of this applicable TSO and MOPS must be evaluated and approved as part of the installation approval. The article may be installed only if performed under 14 CFR part 43 or the applicable airworthiness requirements.

2.2 UNPACKING AND INSPECTING EQUIPMENT

Unpack the equipment carefully and inspect each item for evidence of damage incurred during shipment. If a damage claim must be filed, save the shipping container and all packing materials to substantiate your claim. The claim should be filed as soon as possible. The shipping container and packing material should be saved in any case in the event that storage or reshipment of the equipment is necessary.

2.3 EQUIPMENT INSTALLATION

2.3.1 COOLING CONSIDERATIONS

The most important contribution to improved reliability of avionics equipment is to limit the maximum operating temperature of each unit. While modern designs consume less total energy, the heat dissipated per unit volume (Watts/cubic inch) remains much the same due to contemporary high density packaging techniques. While each individual unit may or may not require forced air cooling, the combined heat generated by several units operating in a typical panel or rack can significantly degrade the reliability of the equipment if provisions for adequate cooling are not incorporated in the initial installation.

2.3.2 KR 87 MOUNTING TRAY INSTALLATION

A. Select a location on the instrument panel that is clearly visible and readily accessible to the pilot. The KR 87 must be mounted at least 12 inches from the magnetic compass. Remember to allow adequate space at the rear of the unit for installation of cables and connectors. Avoid sharp bends in the cables and be careful not to route cables where they might interfere with aircraft control cables.

CAUTION:

Avoid mounting the unit near heater vents or other high heat sources, or near alternator wiring, inverter supplies, or 400 Hz compass system cabling.

B. Refer to FIGURE 2-12 KR 87 OUTLINE AND MOUNTING DRAWING for the panel cutout dimensions. Mark and cut the panel opening.

C. Install the mounting rack in the aircraft panel using six (6) 6-32 X 1/2" flat head phillips screws (P/N 089-06012-0008) and six (6) 6-32 clip nuts (P/N 089-02353-0001) as shown in FIGURE 2-13 KR 87 RECEIVER INSTALLATION DRAWING. Note that the screws are inserted from the inside through holes in the side of the rack.

2.3.3 KI 227/228 INSTALLATION

A. Select a location on the instrument panel that is clearly visible to the pilot with the least practicable deviation from his normal position and from his line of vision when looking forward along the flight path. Remember to allow adequate space at the rear of the unit to allow installation and removal of the rear connector.

CAUTION:
Avoid mounting the KI 227 or KI 228 close to heater vents or other high heat sources.

B. Cut the panel cutout and drill mounting holes as shown in FIGURE 2-14 KI 227 OUTLINE AND MOUNTING DRAWING or FIGURE 2-15 KI 228 OUTLINE AND MOUNTING DRAWING.

C. Secure the indicator to the instrument panel using three (3) 6-32 X 1/2" flat head screws (installer supplied). The indicator may be secured from the front or rear of the instrument panel.

2.3.4 KA 44/44B INSTALLATION

A. Location Considerations

The antenna installation will determine to a large extent whether or not the KR 87 will give optimum performance. The KA 44/44B contains both the loop and sense antennas, and the following considerations should be taken into account before selecting a location for the antenna:

(1) Mount the antenna on the centerline of the aircraft fuselage.

(2) Keep the antenna at least 4 feet away from DME or transponder antennas to minimize L-band interference.

(3) The antenna should be well removed from any projections such as the engines and propellers, as well as landing gear doors, access doors, or other openings which will break the antenna ground plane.

(4) If the antenna is to be top mounted, select a location where shadowing from the wings, etc., is minimized.

(5) If the antenna is to be mounted on an aircraft with floats, the antenna should be top mounted to avoid interference by floats and steel cables.

(6) When installing the antenna on a fabric covered aircraft, a metal ground plane as large as physically practical (but at least 3 feet in diameter) should be used.

(7) The antenna should be mounted well clear of the aircraft alternator/generator. The antenna cable must not be routed with alternator cables, 400 Hz cables, or high level transmitting cables.

(8) Insure that the antenna cable does not interfere with any aircraft control cables

(9) If the antenna is a KA 44 or a KA 44B, serial number 8799 or below, be sure to plug the drain hole at the rear of the antenna with a good caulking compound or sealant such as RTV 3116 (available under P/N 016-01021-0000). KA 44B's, serial number 8800 and above, no longer have a drain hole.

(10) If the antenna is top mounted, be sure to fill the mounting screw holes with sealant such as RTV 3116 (P/N 016-01021-0000) to prevent water from standing in the holes.

B. Installation Procedures

(1) Using the template included in the installation kit mark the antenna mounting holes on the aircraft skin.

(2) Punch and drill the mounting holes.

(3) Sand the area on the inside of the aircraft skin on which the doubler plate is to be mounted with fine sandpaper or emery cloth.

(4) Carefully following the directions on the container, apply Alumiprep No. 33 (available under P/N 016-01127-0000) to both the inside surface of the aircraft skin and the back of the doubler plate to cleanse the metal of any residue.

(5) Apply Alodine No. 1001 (available under P/N 016-01128-0000) to both locations following the directions on the container to insure good bonding and prevent oxidation.

(6) Rivet the antenna doubler plate in place. It is imperative that the doubler plate make good electrical contact with the ground plane. It is also imperative that the four (4) star washers (P/N 089-08018-0037) that are supplied with the antenna be used underneath the heads of the four (4) antenna mounting bolts in order to insure proper grounding.

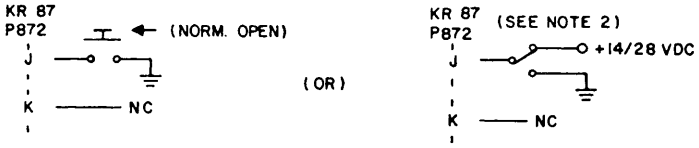
(7) Refer to FIGURE 2-16 KA 44 OUTLINE AND MOUNTING DRAWING, FIGURE 2-17 KA 44B OUTLINE AND MOUNTING DRAWING, and FIGURE 2-18 KA 44B OUTLINE AND MOUNTING DRAWING W/ GROUND PLANE and mount the antenna.

2.3.5 FLIGHT TIMER RESET SWITCH INSTALLATION

A. KR-87's, Serial Number 10,999 and below (Without Mod 3)

The flight timer within the KR 87 is automatically reset to zero when the unit is turned on. Additionally, the timer can be reset externally if it is wired to accept an external reset line. As an example, the reset line could be wired to the landing gear retraction switch to initiate counting immediately after takeoff. It could also be wired to an external reset switch, allowing the pilot to reset it after he switches fuel tanks, for instance. In any event, the owner or operator of the aircraft should be consulted as to how the reset switch is to be configured. If no external reset feature is desired, leave pins K and J of the KR 87 rear connector open. If, however, the external reset feature is desired, it can be wired in one of two ways:

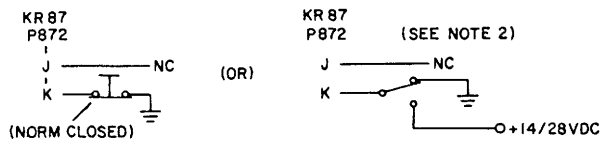
(1) A momentary or prolonged ground on pin J will reset the timer. To reset the timer after a prolonged ground on pin J, the connection must be momentarily opened and then re-grounded. This can be wired in a number of ways, examples of which are shown in FIGURE 2-1 EXTERNAL RESET WIRING USING NORMALLY OPEN SWITCH. If desired, a pressure sensor (P/N 071-01247-0000 or equivalent) can be used as the flight timer reset switch. Refer to FIGURE 2-20 PRESSURE SENSOR INSTALLATION for further information.



NOTES:
1. Switches are shown in an inflight condition. Timer will not start until these conditions are met.
2. KR 87 must have Mod 1 incorporated in order to accommodate a positive voltage on pin J or K.

FIGURE 2-1 EXTERNAL RESET WIRING USING NORMALLY OPEN SWITCH

(2) If pin K is normally connected to ground, a momentary or prolonged breaking (opening) of that connection will reset the flight timer. A prolonged opening of the connection requires that the line be momentarily grounded and then reopened to reset the timer. This can also be wired a number of ways, examples of which are shown in FIGURE 2-2 EXTERNAL RESET WIRING USING NORMALLY CLOSED SWITCH.



NOTES:
1. Switches are shown in an inflight condition. Timer will not start until these conditions are met.
2. KR 87 must have Mod 1 incorporated in order to accommodate a positive voltage on pin J or K.

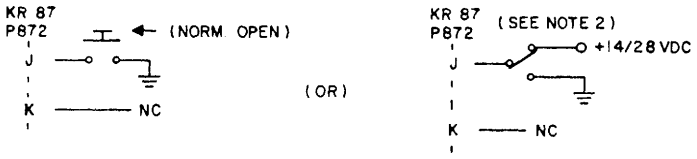
FIGURE 2-2 EXTERNAL RESET WIRING USING NORMALLY CLOSED SWITCH

B. KR 87's Serial Number 11,000 and above (or any KR 87 with Mod 3)

KR 87's serial number 11,000 and above, or any unit that has had Mod 3 installed in accordance with Service Bulletin KR 87-3 (P/N 600-01690-0030), have incorporated a change in flight timer operation. Instead of having the flight timer reset to zero whenever an external switch is activated, the flight timer will now "stop and hold" the accumulated time. The only way to reset the flight timer to zero in such units is to turn the KR 87 off and then back on. This method of operation will enable those who have the flight timer connected to the landing gear or "squat" switch to be able to note their flight time after landing. If the "stop and hold" feature is not desired, leave pins J and K on the KR 87 rear connector open.

This will cause the flight timer to begin counting when the KR 87 is turned on and will continue until it is turned off or the power removed. If, however, the "stop and hold" feature is desired, it may be wired in one of two ways:

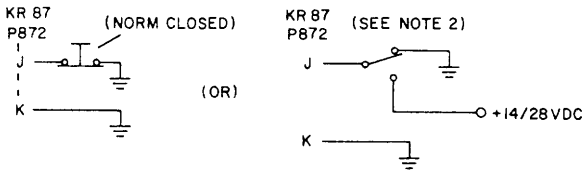
(1) A ground on pin J will "stop and hold" the flight timer. Opening the switch again will cause the timer to continue until the switch is closed again. This can be wired in a number of ways, examples of which are shown in FIGURE 2-3 EXTERNAL STOP & HOLD WIRING USING NORMALLY OPEN SWITCH. If desired, a pressure sensor (P/N 071-01247-0000 or equivalent) can be used as the flight timer "stop and hold" switch. See FIGURE 2-20 PRESSURE SENSOR INSTALLATION for further information.



NOTES:
1. Switches are shown in an inflight condition. Timer will not start until these conditions are met.
2. KR 87 must have Mod 1 incorporated in order to accommodate a positive voltage on pin J or K.

FIGURE 2-3 EXTERNAL STOP & HOLD WIRING USING NORMALLY OPEN SWITCH

(2) An open on pin J will "stop and hold" the flight timer. Closing the switch again will cause the timer to continue until the switch is opened again. This can be wired in a number of ways, examples of which are shown in FIGURE 2-4 EXT. STOP & HOLD WIRING USING NORMALLY CLOSED SWITCH below.



NOTES:
1. Switches are shown in an inflight condition. Timer will not start until these conditions are met.
2. KR 87 must have Mod 1 incorporated in order to accommodate a positive voltage on pin J or K.

FIGURE 2-4 EXT. STOP & HOLD WIRING USING NORMALLY CLOSED SWITCH

2.3.6 ELAPSED TIMER ALARM INSTALLATION

The elapsed timer feature of the KR 87 enables the pilot to enter a time of up to 59 minutes, 59 seconds, and have the timer count down to zero. The display will commence flashing when zero is reached and will continue flashing for 15 seconds. In addition, an output is provided at pin 11 of the rear connector which may be used to activate an external horn, light, or other alarm device for 1 second when zero is reached. A Sonalert audible alarm which can be used for this purpose is available under P/N 038-00008-0000. The owner or operator of the aircraft should be consulted prior to installation to determine the desirability of an alarm, the type of alarm preferred, and the location. If no external alarm is desired, pin 11 should be left open.

The alarm output is the open collector of an NPN transistor. The alarm output will sink up to 1.0A of current (max) when active and can tolerate a voltage of 33VDC (max) when inactive. The alarm device should be wired to pin 11 of the KR 87 as shown in FIGURE 2-5 EXTERNAL ALARM WIRING.

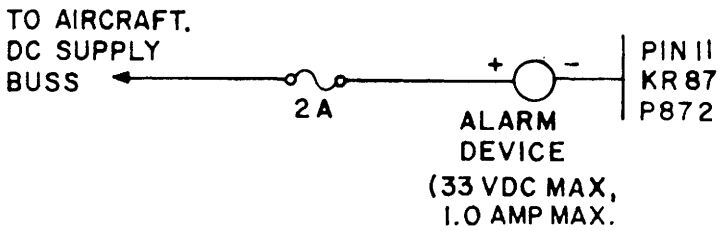


FIGURE 2-5 EXTERNAL ALARM WIRING

2.3.7 CABLE HARNESS AND CONNECTOR ASSEMBLY

The KR 87 uses a special connector fastened to the mounting rack that mates directly to the printed circuit board inside the unit. Refer to the KR 87 Interconnect Diagrams, FIGURE 2-21 KR 87/KI 227-00 INTERCONNECT, FIGURE 2-22 KR 87/KI 227-01 INTERCONNECT, FIGURE 2-23 DUAL KR 87/KI 228 INTERCONNECT. FIGURE 2-24 DUAL KR 87/DUAL KI 227/KCS 55A INTERCONNECT, and FIGURE 2-25 DUAL KR 87/DUAL KI 228/KCS 55A INTERCONNECT and consider the following items when fabricating the cable harness:

A. The KR 87 antenna connector is designed to connect all the cables to the antenna, including the triaxial cable. This connector is supplied in the installation kit with the antenna end pre-terminated at the factory in order to facilitate proper installation and minimize installation-related service problems. The connector assembly is shown in FIGURE 2-19 ANTENNA CABLE ASSEMBLY. The triaxial cable and signal wires are supplied with the connector and are available in 12, 24, 36, or 48 foot lengths. These wires should be cut to a convenient length for the particular installation and terminated at the receiver connector. THEIR LENGTH IS NOT CRITICAL. Refer to the KR 87 Interconnect Diagrams, , FIGURE 2-21 KR 87/KI 227-00 INTERCONNECT, FIGURE 2-22 KR 87/KI 227-01 INTERCONNECT, FIGURE 2-23 DUAL KR 87/KI 228 INTERCONNECT. FIGURE 2-24 DUAL KR 87/DUAL KI 227/KCS 55A INTERCONNECT, and FIGURE 2-25 DUAL KR 87/DUAL KI 228/KCS 55A INTERCONNECT for the proper receiver pin connections and color code.

B. The bare drain wire of the shield that surrounds the four 24AWG wires in the 6 conductor antenna cable should be grounded at the receiver end. It has been left open at the antenna connector end.

C. Refer to FIGURE 2-13 KR 87 RECEIVER INSTALLATION DRAWING for instructions on installing the right angle coaxial BNC connector to the receiver end of the triaxial cable.

D. The signal cable and the triaxial cable leading to the antenna should be tie-wrapped together to facilitate handling and routing.

E. The audio output line should be a shielded wire with its shield grounded at the load end. The audio output of the KR 87 is designed to drive a 500 ohm load, so it should be wired to the proper input of an audio panel isolation amplifier or a 500 ohm headphone jack.

F. Use 22AWG or heavier wire for the DC power to the KR 87 and for the output lines to the KI 227 or KI 228 indicator.

G. For a top-mounted antenna leave pin E on the KR 87 rear connector open. For a bottom mounted antenna ground pin E.

H. The rear connector of the KR 87 uses solderless Molex pins. Assembly of the connector is as follows:

(1) Contact Terminal Assembly using Molex Crimper (FIGURE 2-6 CRIMPING TOOLS (MOLEX))

a. Strip each wire 5/32" for contact terminal (P/N 030-01107-XXXX). Note: The last four digits of the contact terminal part number indicate the number of terminals furnished.

b. Open the Molex hand crimper (See FIGURE 2-6 CRIMPING TOOLS (MOLEX)) with the engraved side toward the operator. Place the conductor tab section of a contact terminal on Anvil B with the contact portion facing away from the operator. Close the crimper slightly until the contact tabs touch the female jaw.

c. Insert the stripped conductor until the insulation is even with the side of the crimper facing the operator. Crimp the conductor tabs by squeezing the handles together until the jaws are fully closed or a sufficient crimp is obtained.

d. Move the lead to Anvil A. Place the insulating tab section on Anvil A. Crimp again until the jaws are fully closed or a sufficient crimp is obtained.

(2) Contact Insertion into Molex Connector Housing

a. After the contact terminals have been installed on the wiring harness, the contact terminals can be inserted into the proper location in the connector housing (P/N 030-01094-0051). The terminal cannot be inserted upside down. Be sure to push the terminal all the way in until a click can be felt or heard.

b. The self-locking feature can be tested by gently pulling on the wire.

(3) Location of Polarizer Key in Housing

a Prior to insertion of connector into rear of unit, check the polarizing key position between contacts 5 and 6.

b. Refer to FIGURE 2-13 KR 87 RECEIVER INSTALLATION DRAWING to check the correct position of the polarizing key.

(4) Extraction of Contact from Molex Connector

a. Slip the flat narrow blade of a Molex contact ejection tool, P/N 047-05099-0001, under the contact on the mating side of the connector. By turning the connector upside down one can see the blade slide into the stop.

b. When the ejection is slid into place, the locking key of the contact is raised, allowing the contact to be removed by pulling moderately on the lead.

c. Neither the contact or position is damaged by removing a contact; however, the contact should be checked visually before reinstalling in the connector to be certain that retaining tab A extends as shown (See FIGURE 2-6 CRIMPING TOOLS (MOLEX)) for retention in the connector.

l. After the harness has been fabricated and is ready for installation, secure the antenna coax connector and the circuit board connector to the rear of the mounting rack as shown in the KR 87 Installation Drawing, FIGURE 2-13 KR 87 RECEIVER INSTALLATION DRAWING.

2.3.8 KR 87 RECEIVER INSTALLATION

Prior to installing the KR 87 into the mounting tray, make a careful point-to-point continuity check to verify proper wiring and to insure that aircraft power is applied only to the correct pins. Verify that the antenna and indicator connectors are in place.

With the rear connectors in place in the mounting rack, slide the KR 87 into the rack and secure it by turning the hold down screw clockwise with a 3/32" Allen wrench. The locking screw is accessible through a hole in the front panel. Continue turning until the unit is secure in the mounting rack, being careful not to overtighten the locking screw.

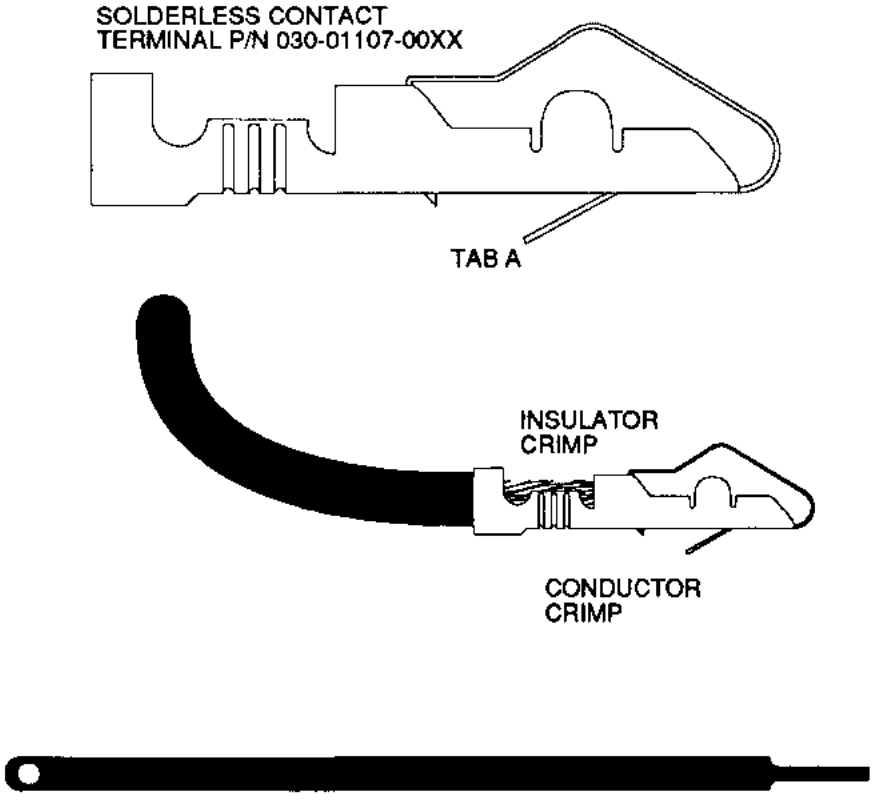
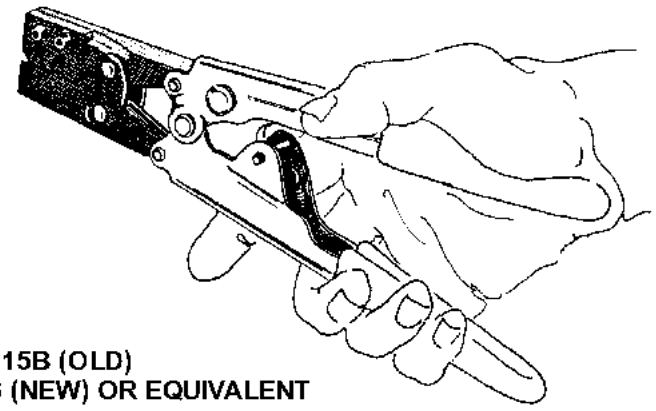


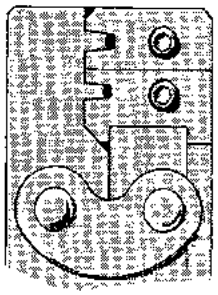
FIGURE 2-6 CRIMPING TOOLS (MOLEX)
(Sheet 1 of 3)

Holding the hand crimpers as shown, release the crimper's ratchet pawl and open by squeezing tightly on the handles, and then releasing pressure.

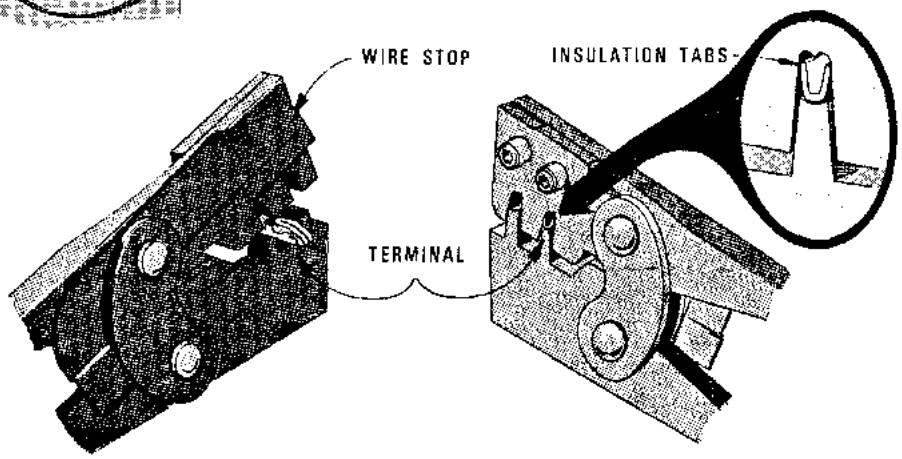


HAND CRIMPER
P/N 071-06041-0000
MOLEX P/N 6115/CR6115B (OLD)
MOLEX P/N 11-01-0203 (NEW) OR EQUIVALENT

Close crimpers until ratchet begins to engage. Then insert terminal into jaws from the back side. (See the following; Figure 2-1). For 24 to 30 AWG wire, it will be necessary to start the crimp in jaw A and then complete in jaw B.



JAW	TERMINAL	WIRE SIZE	INSULATION RANGE
A	030-01107-0030	18 to 24 AWG	.110 TO .055
B	030-01107-0030	24 to 30 AWG	.055 to .030

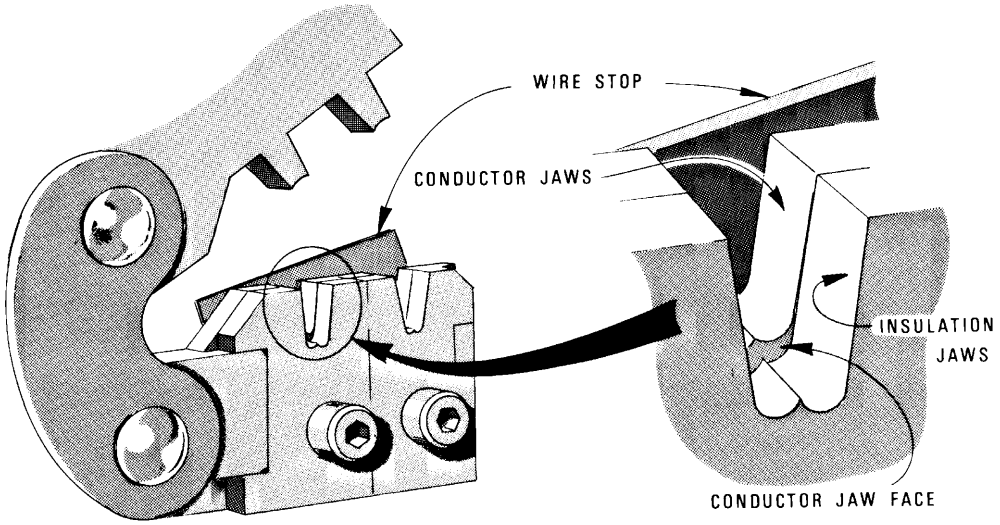


Terminal is in the correct position when insulation tabs are flush with outside face of crimp jaws.

FIGURE 2-6 CRIMPING TOOLS (MOLEX)
(Sheet 2 of 3)

Once the terminal is in the correct position, close the jaws gently until the terminal is held loosely in place. Push the wire stop down so that it rests snugly behind the contact portion of the terminal.

Strip off 1/8 inch of the wire insulation and insert the wire through the insulation tabs into the conductor tabs until the insulation hits the conductor jaw face or until the conductor touches the wire stop.



Squeeze the handles until the crimp jaws close and the ratchet releases.
Straighten the terminal if necessary, then release the plier grips and remove the crimped terminal.

CRIMPING PRESSURE ADJUSTMENT

If too much or too little pressure is needed to release the crimper's ratchet pawl at the end of the crimp stroke, the ratchet can be easily adjusted. A spanner wrench provided with the tool can be used to loosen the lock nut, and rotate the keyed stud clockwise for increased pressure and counter-clockwise for decreased pressure. Once the desired pressure has been set, the lock nut must be tightened again. Newer models may have a screwdriver adjustment.

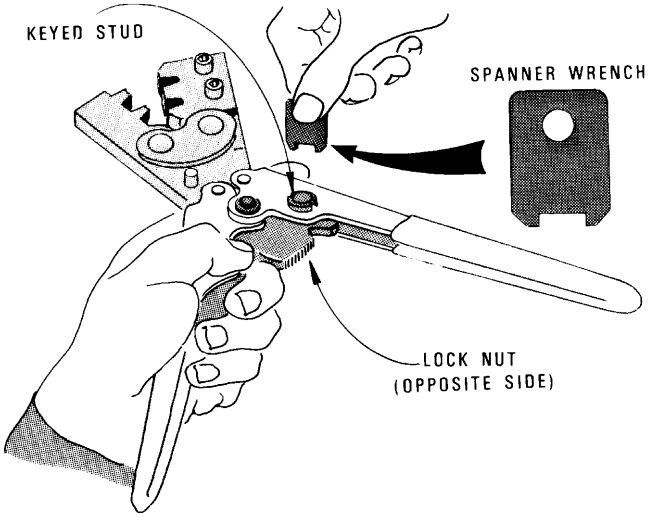


FIGURE 2-6 CRIMPING TOOLS (MOLEX)
(Sheet 3 of 3)

2.4 POST INSTALLATION CHECKS

2.4.1 SYSTEM CHECK

A quick preliminary check can be made by turning on the KR 87 and tuning it to a local AM broadcast station or strong NDB station. Check for satisfactory audio (this should be done where clear reception is possible, preferably outside of the hanger).

NOTE:

The KR 87 has an extremely sensitive receiver, and occasionally, when the unit is tuned to a weak station in the ADF mode, an erratic switching sound is heard on the audio. This sound is normal and is due to the following phenomena: As soon as the receiver locks onto the signal, the loop circuits are automatically activated and the added noise from the loop circuit is heard over the audio. This additional noise, coupled with the fact that the signal is very weak to begin with, causes the receiver to unlock from the signal, and the loop circuits are shut off immediately to boost the signal-to-noise ratio. This causes the audio to become slightly quieter. Now, without the added noise of the loop circuits, the receiver once again picks up enough signal to lock, and the process is repeated. The bearing information is generally good, however, as the receiver still acquires enough information while the loop circuits are turned on to determine the relative bearing to the station. This characteristic is actually desirable, as it greatly improves the range of the receiver by automatically shutting off the loop circuits in noisy conditions and then locking on to the signal. Therefore, the proper pilot technique for tuning the ADF is to tune and identify the station in the quieter ANT mode and then select the ADF mode for bearing information.

It should be noted that the KR 87 receiver will mute the audio in either the ANT or ADF modes whenever the signal becomes too weak to lock on to. Therefore, make sure that the receiver is tuned to a strong station before concluding that the unit may not be working properly. This audio muting feature may be overridden by selecting the BFO function, in which case the audio signal is passed uninterrupted to the audio system. A tone will be heard whenever the receiver is picking up a receivable signal.

2.4.2 QUADRANTAL ERROR ADJUSTMENT

The system has been factory adjusted to compensate for the average amount of quadrantal error (QE) that exists due to the shape of the airframe. Therefore, little or no QE compensation adjustment should be required. Nonetheless, the following procedure should be followed after the installation is complete in order to verify proper pointing. In the event that QE adjustment is required, follow the procedure outlined below.

A. Tune in a nearby broadcast station, NDB station, or compass locator that gives a strong, clear signal free of fading. Position the aircraft on the ramp in an area that is clear of surrounding buildings, such that the indicator points to 0° (i.e., the aircraft is heading directly toward the station). Note the aircraft heading.

B. Using the aircraft directional gyro or compass, turn the aircraft to the left 45°. Note the indicated relative bearing and the amount of error. Continue to turn the aircraft, stopping at each 45° point and noting the relative bearing error. The errors at the 90°, 180°, and 270° points should be within +/-5°. Average the absolute errors at the quadrantal points (45°; 135°, 225°, and 315°) to determine the amount of QE compensation required.

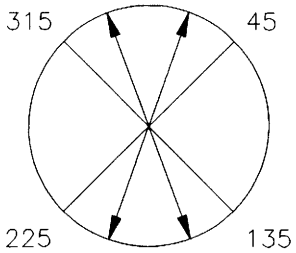
C. The QE compensation potentiometer is located to the side of the antenna connector on the KA 44 and KA 44B P/N 071-1234-00/01 antenna. The KA 44B P/N 071-1234-02 QE adjust potentiometer is accessible vertically from the surface just above and to the side of the connector. If the antenna is inaccessible from inside the aircraft the antenna will have to be unfastened and pulled away from the aircraft far enough to insert a jeweler's screwdriver into the adjustment hole. The adjustment hole is protected by a threaded cap which must first be removed.

NOTE:

Take care to not misplace the O-ring seal underneath the threaded cap. After QE adjustments have been completed this seal and the threaded cap must be reinstalled in the antenna to insure that the electronics compartment is environmentally sealed.

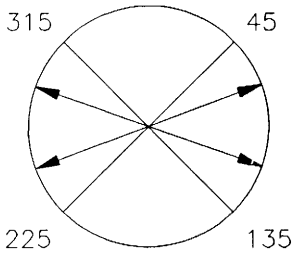
The QE adjustment pot has a sensitivity of approximately 1° per turn. Refer to FIGURE 2-7 QE COMPENSATION ADJUSTMENT to determine which direction to turn the pot.

If the relative bearings at the quadrantal points appear as below,



turn the Q.E. adjustment pot counter-clockwise.

If the relative bearings at the quadrantal points appear as below,



turn the Q.E. adjustment pot clockwise.

FIGURE 2-7 QE COMPENSATION ADJUSTMENT

D. Recheck the relative bearings and readjust the QE compensation pot as necessary to split the errors at the quadrantal points and obtain the lowest possible average error.

E. When QE adjustments are complete, reinstall the O-ring seal and the threaded cap in the adjustment hole to seal the antenna. No further ground adjustments are required.

2.4.3 OPERATIONAL CHECKS

The following operational checks are to verify proper operation of the various internal functions of the KR 87 and can be made with the aircraft in the parking area.

A. Turn the unit on and verify that the right hand side of the display shows either the standby frequency or the flight or elapsed timer. If the radio is in one of the timer modes press the FRQ button once to display the standby frequency. Verify that the tuning knobs will change the standby frequency and that pressing the FRQ button again transfers the active and standby frequencies.

B. Press the FLT/ET button and verify that the unit returns to one of the timer modes. The radio will return to whichever timer mode was active before the FRQ button was pressed in Step A above. If the unit has reentered the ET (Elapsed Timer) mode press the FLT/ET button once more to enter the FLT (Flight Timer) mode. Turn the unit off and then back on and verify that the flight timer has reset to zero.

C. Press the FLT/ET button to enter the ET mode and note that the timer is in the Count Up mode. Press the RESET button and verify that the timer resets to zero and then continues counting up.

NOTE:

Pressing the RESET button will reset the Elapsed Timer regardless of the information currently displayed.

D. Enter the Count Down mode by pressing and holding the RESET button for approximately 2 seconds until the ET annunciator on the display begins to flash and then enter any convenient time (up to 59 minutes and 59 seconds) with the tuning knobs. The timer will remain in the ET Set mode (as indicated by the flashing ET annunciator) for 15 seconds after the time is entered or until the RESET, FLT/ET, or FRQ button is pressed. The preset time will remain unchanged until the RESET button is pressed, at which time the Elapsed Timer will begin to count down. Verify the following conditions:

(1) The timer counts down to zero and then begins to count up.

(2) The display flashes for approximately 15 seconds after the counter reaches zero.

(3) External alarms (if installed) are activated for approximately 1 second after the counter reaches zero.

E. Verify that pressing the FLT/ET button exchanges the two timers in the display. Press the FRQ button and verify that the standby frequency is displayed in the right hand window of the display and that subsequent FRQ button cycles will cause the active and standby frequencies to be exchanged.

F. Place the KR 87 in the ANT mode and tune in several known stations. Verify that audio reception is satisfactory and that volume control operation is normal. Verify that the ADF indicator needle is parked at the 90^{o} position relative to the nose of the aircraft. Place the unit in the ADF mode and verify that the needle points to the station.

G. Press the BFO button to enter the BFO mode and verify that the BFO tone is present in the receiver audio (if a keyed CW station is used the tone heard will be the coded identifier).

H. For the KR 87 -14/15/17, verify that the lighting for the backlit nomenclature (ADF, STBY/TIMER, OFF, and VOL) is operating and dims in conjunction with the aircraft lighting dimmer control.

2.4.4 KI 227-01 AND KI 228-01 INDICATOR CHECKS

Following installation of the KI 227-01 or the KI 228-01 it is advisable to conduct the following checks to insure that the indicator has been properly installed and is functioning correctly under nominal conditions.

A. Compass Card Accuracy

With the KCS 55/55A Compass System operational, manually synchronize the compass card of the KI 227 or KI 228 with the SYNC knob until the heading of the KI 227/228 matches that of the compass system. Rotate the aircraft 90^{o} and verify that the KI 227/228 compass card matches that of the KCS 55/55A compass card within +/-2^{o}.

B. ADF Accuracy

Tune in an ADF station at a known magnetic heading and verify that the ADF pointer indicates the correct relative bearing within +/-3^{o}.

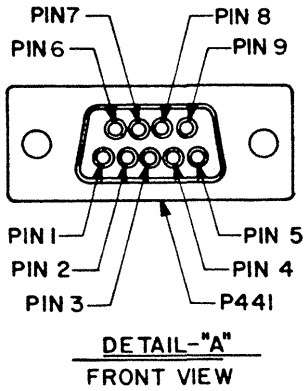


FIGURE 2-8 KA 44/44B PIN LOCATION DIAGRAM

PIN	I/O	SIGNAL NAME
1	I	ANTENNA POWER
2	I	LOOP ENABLE
3	O	RF INPUT
4	I	32Hz +/-90 DEG.
5	I	32Hz 0 DEG.
6		NO CONNECTION
7		GROUND
8		CENTER SHIELD GND
9		OUTER SHIELD GND

TABLE 2-1 KA 44/44B PIN FUNCTION DIAGRAM

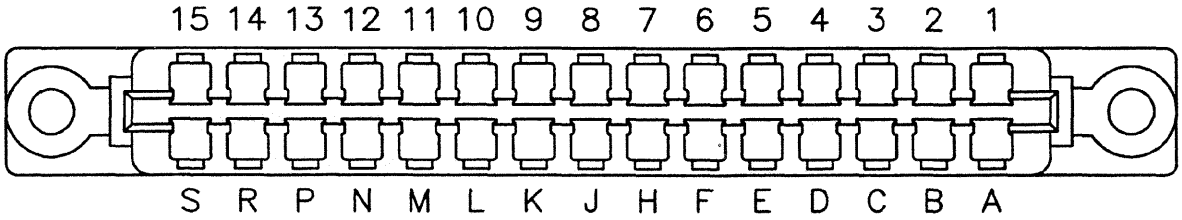


FIGURE 2-9 KR 87 PIN LOCATION DIAGRAM P871

PIN	I/O	SIGNAL NAME
A	O	DC SIN HI
B	O	DC COS HI
C	O	SUPER FLAG
D	O	4.5V REF
E	I	TOP/BOTTOM MOUNT
F	O	32Hz 0 DEG.
H		A/C GND
J	I	FLT TIMER CONTROL 1
K	I	FLT TIMER CONTROL 2
L	I	14V LIGHTING HI
M		A/C GND
N		NOT USED
P		A/C GND
R		A/C GND
S		A/C GND
1		NOT USED
2		NOT USED
3		NOT USED
4		NOT USED
5		NOT USED
6	O	32Hz 90 DEG.
7	O	32Hz VARIABLE OUT
8	O	LOOP ENABLE
9	I	28V LIGHTING HI
10	O	AUDIO OUT
11	O	ET ALARM OUT
12	O	ANTENNA POWER
13	I	A/C POWER
14		AGC OUT
15		ANTENNA GND

TABLE 2-2 KR 87 PIN FUNCTION DIAGRAM

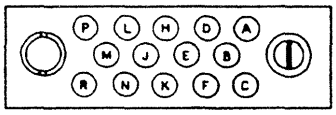


FIGURE 2-10 KI 227 PIN LOCATION DIAGRAM

PIN	I/O	SIGNAL NAME
A	I	28V LIGHTING HI
B	I	4.5V REF
C	I	DC SIN HI
D	I	14V LIGHTING HI
E	I	DC COS HI
F		NOT USED
H		A/C GND
J		NOT USED
K		NOT USED
L	I	DRIVE 2 (-01 ONLY)
M	I	STEPPER COMMON (-01 ONLY)
N	I	DRIVE 3 (-01 ONLY)
P	I	DRIVE 1 (-01 ONLY)
R	I	DRIVE 4 (-01 ONLY)

TABLE 2-3 KI 227 PIN FUNCTION DIAGRAM

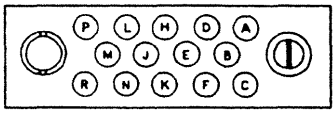
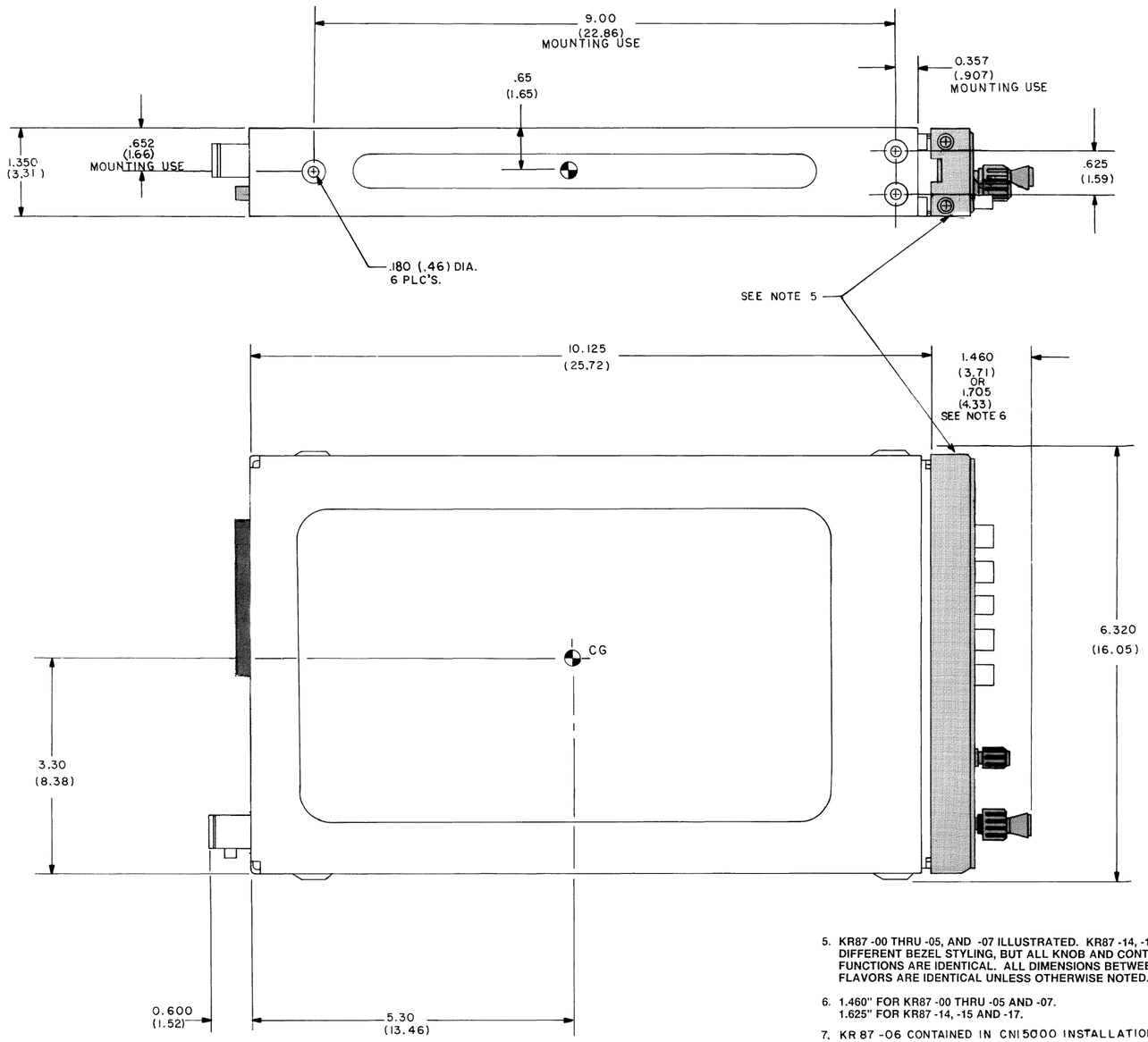


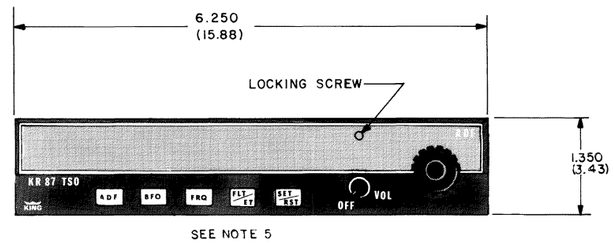
FIGURE 2-11 KI 228 PIN LOCATION DIAGRAM

PIN	I/O	SIGNAL NAME
A	I	28V LIGHTING HI
B	I	4.5V REF (SGL NEEDLE)
C	I	DC SIN HI (SGL NEEDLE)
D	I	14V LIGHTING HI
E	I	DC COS HI (SGL NEEDLE)
F	I	4.5V REF (DBL NEEDLE)
H		A/C GND
J	I	DC SIN HI (DBL NEEDLE)
K	I	DC COS HI (DBL NEEDLE)
L	I	DRIVE 2 (-01 ONLY)
M	I	STEPPER COMMON (-01 ONLY)
N	I	DRIVE 3 (-01 ONLY)
P	I	DRIVE 1 (-01 ONLY)
R	I	DRIVE 4 (-01 ONLY)

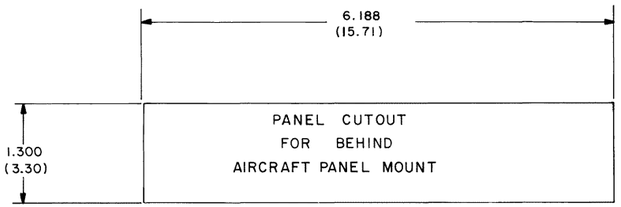
TABLE 2-4 KI 228 PIN FUNCTION DIAGRAM

THIS PAGE IS RESERVED



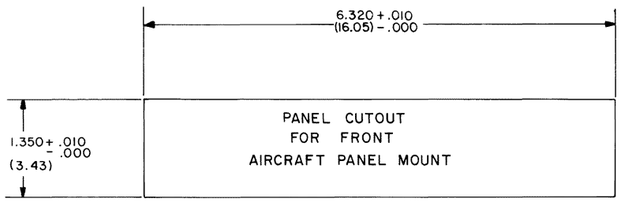


SEE NOTE 5



NOTES:

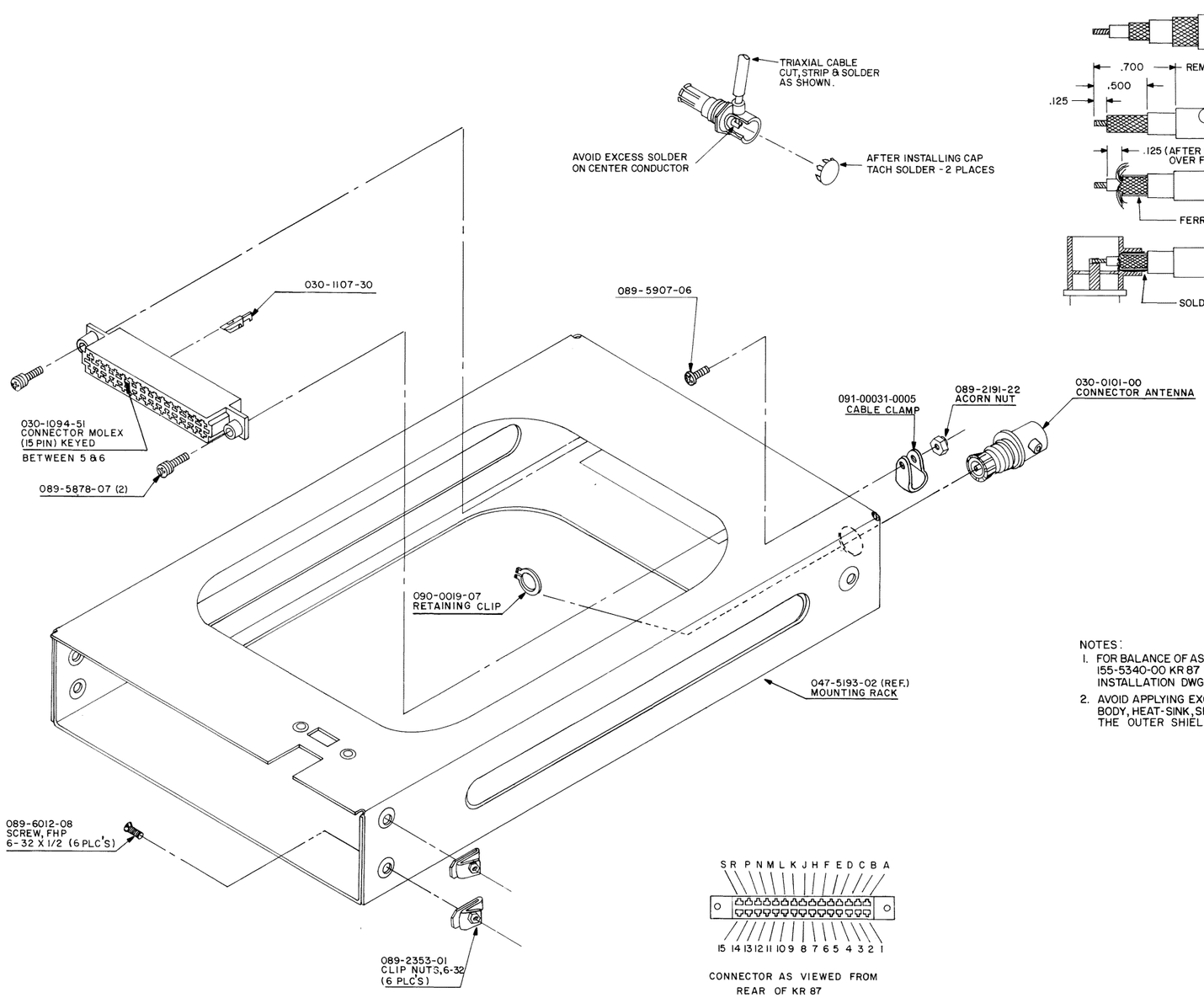
1. DIMENSIONS IN ( ) ARE IN CENTIMETERS.
2. NOMINAL WEIGHT: 3.2 LBS. (1.47 kg.)
3. WHEN INSTALLING TWO OR MORE PANEL MOUNTED UNITS IN A STACK, THE MOUNTING TRAYS SHALL BE SPACED .050 INCHES (.127 CM.) APART. NEWER STYLE MOUNTING TRAYS HAVE HAD .025 INCH (.063 CM) DIMPLES BUILT IN, TOP AND BOTTOM, BOTH SIDES, SO THAT TWO NEW STYLE TRAYS WILL AUTOMATICALLY BE SPACED PROPERLY.
4. TO DETERMINE STACK HEIGHT, USE THE HEIGHT DIMENSION FOR A FRONT AIRCRAFT PANEL MOUNT.



5. KR87 -00 THRU -05, AND -07 ILLUSTRATED. KR87 -14, -15 AND -17 HAVE DIFFERENT BEZEL STYLING, BUT ALL KNOB AND CONTROL LOCATIONS/ FUNCTIONS ARE IDENTICAL. ALL DIMENSIONS BETWEEN VARIOUS FLAVORS ARE IDENTICAL UNLESS OTHERWISE NOTED.
6. 1.460" FOR KR87 -00 THRU -05 AND -07.
   1.625" FOR KR87 -14, -15 AND -17.
7. KR 87 -06 CONTAINED IN CNI 5000 INSTALLATION MANUAL.
8. DIMENSIONS (EXCEPT PANEL CUTOUT OR MOUNTING USE) ARE REFERENCE ONY. REFERENCE DIMENSIONS MAY HAVE BEEN SHOWN SLIGHTLY OVERSIZE, TO ASSURE FIT OF UNIT.

050-1756-00/01 KR 87

FIGURE 2-12 KR 87 OUTLINE AND MOUNTING DRAWING
(Dwg. No. 155-05329-0000 Rev. AA)

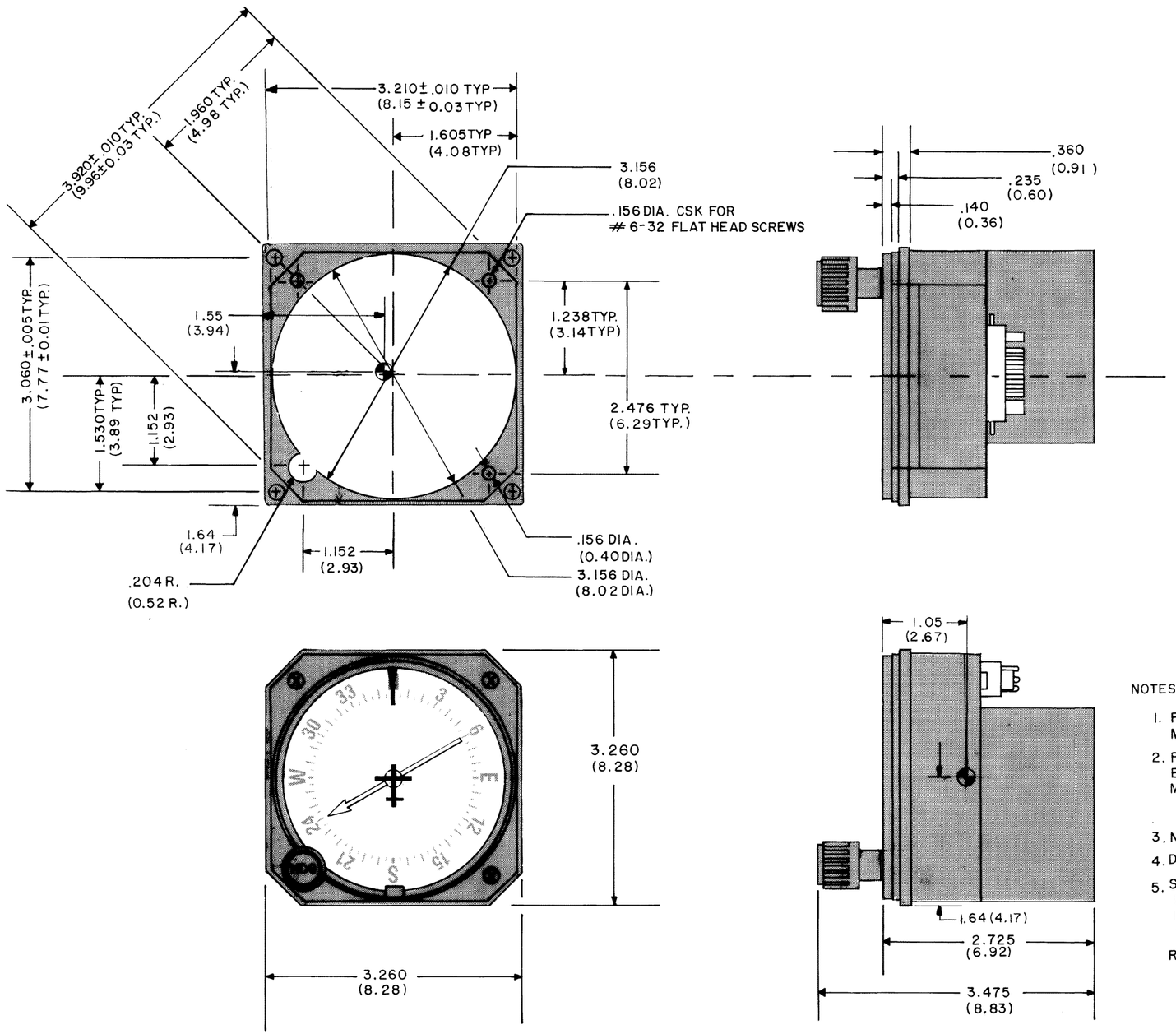


NOTES:

1. FOR BALANCE OF ASSEMBLY INFORMATION SEE 155-5340-00 KR 87 & 155-5341-00 KA 44 INSTALLATION DWG'S.
2. AVOID APPLYING EXCESSIVE HEAT TO CONNECTOR BODY, HEAT-SINK, SPRING CONTACTS DURING SOLDERING. THE OUTER SHIELD SHOULD NOT BE CONNECTED.

050-01756-0000/0006

FIGURE 2-13 KR 87 RECEIVER INSTALLATION DRAWING (Dwg No 155-05340-0000 R-AA)



NOTES:

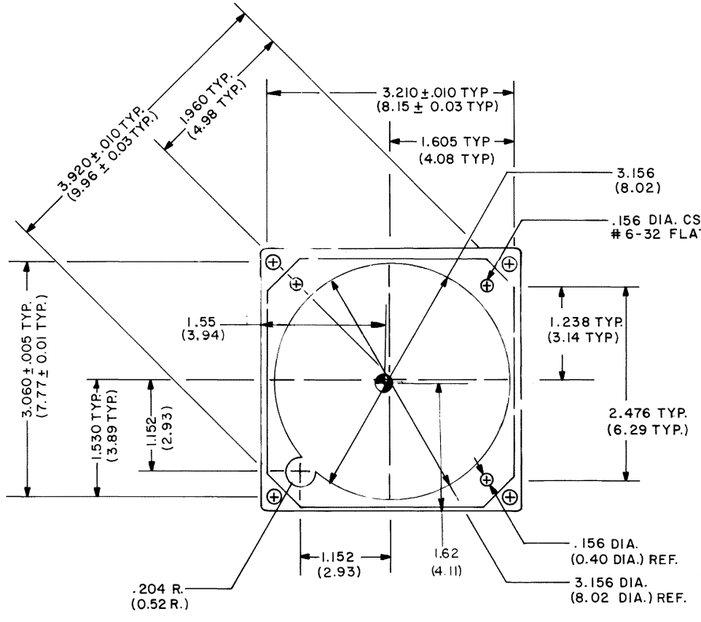
1. FOR A STANDARD 3" ATI SQUARE OPENING REAR MOUNT; MOORING PLATE (KPN 073-0044-01)
2. FOR A STANDARD 3" ATI SQUARE OPENING FRONT MOUNT; BACK ADAPTER PLATE (073-0045-00) WITH MOORING PLATE (073-0044-01).
3. NOMINAL WEIGHT KI227 - .7 LBS (.32Kg)
4. DIMENSIONS IN PARENTHESIS ARE IN CENTIMETERS
5. SQUARE MOUNT

PUNCH	# 071-6042-00
DECAL	# 057-2105-00
FILE TEMPLATE	# 071-6039-00

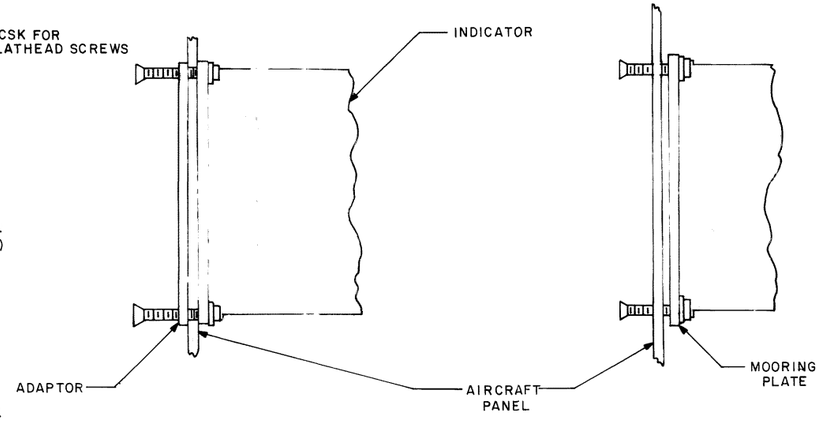
ROUND MOUNT

PUNCH	# 071-6042-07
DECAL	# 057-2105-08
FILE TEMPLATE	# 071-6039-08

FIGURE 2-14 KI 227 OUTLINE AND MOUNTING DRAWING (Dwg No 155-05342-0000 R-3)



FRONT MOUNTING



BACK MOUNTING

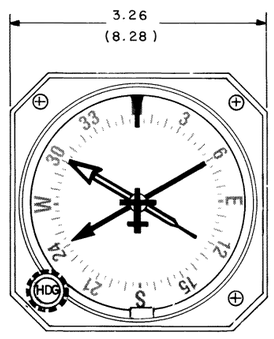
NOTES:

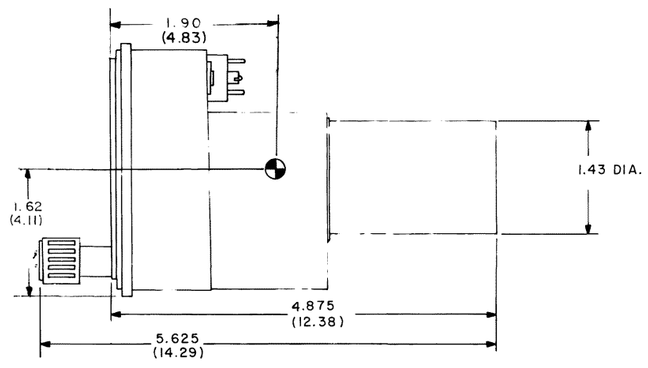
1. FOR A STANDARD 3" ATI SQUARE OPENING REAR MOUNT: MOORING PLATE (KPN 073-0044-01).
2. FOR A STANDARD 3" ATI SQUARE OPENING FRONT MOUNT: BACK ADAPTER PLATE (073-0045-00) WITH MOORING PLATE (073-0044-01).
3. NOMINAL WEIGHT; KI 228 - .91Kg (.41Kg)
4. DIMENSIONS IN PARENTHESIS ARE IN CENTIMETERS.
5. SQUARE MOUNT

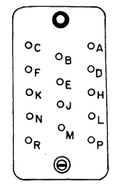
PUNCH	KPN 071-6042-00
DECAL	KPN 057-2105-00
FILE TEMPLATE	KPN 071-6039-00

ROUND MOUNT

PUNCH	KPN 071-6042-07
DECAL	KPN 057-2105-08
FILE TEMPLATE	KPN 071-6039-08

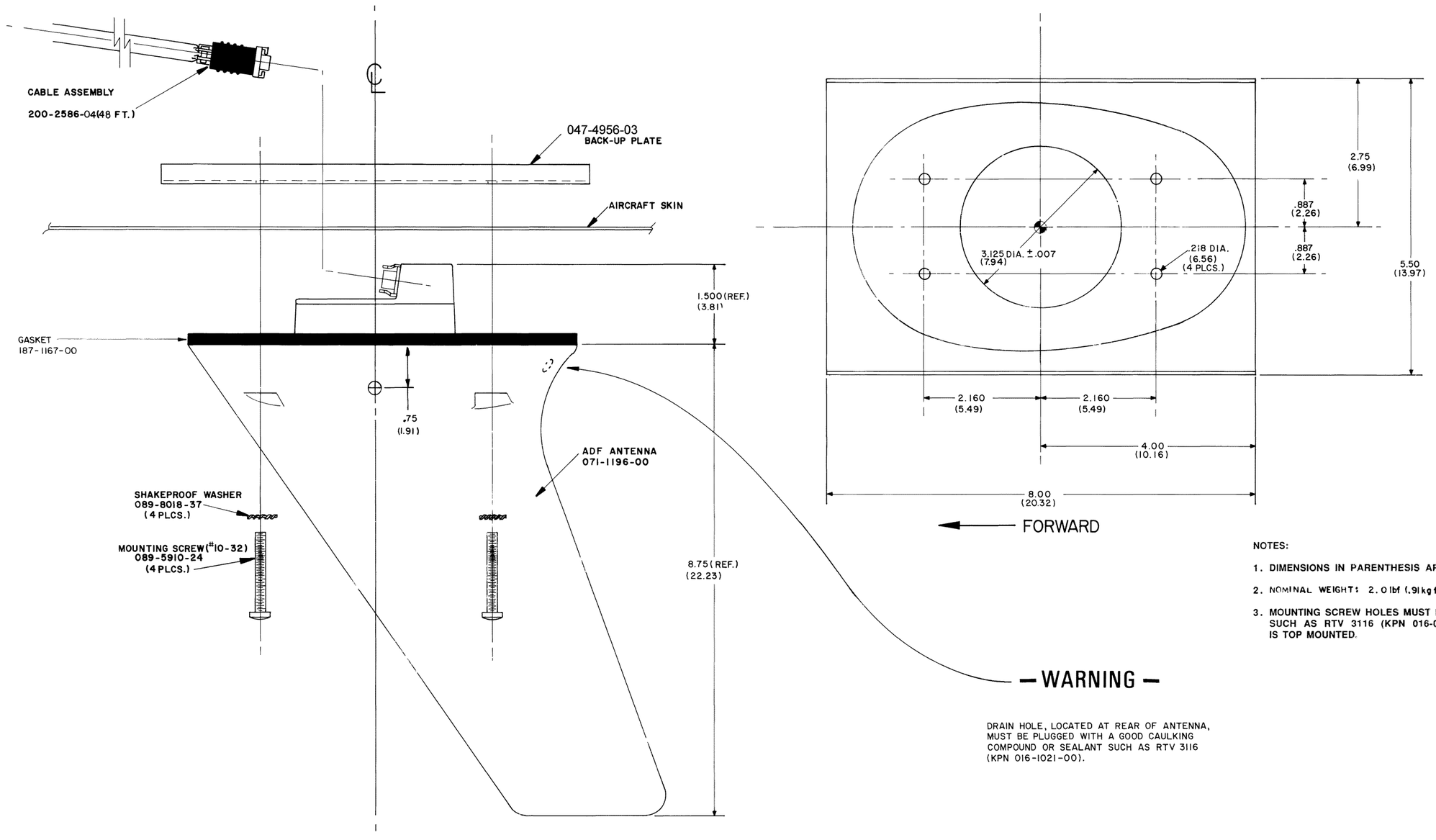






CONNECTOR
VIEWED FROM
REAR OF UNIT

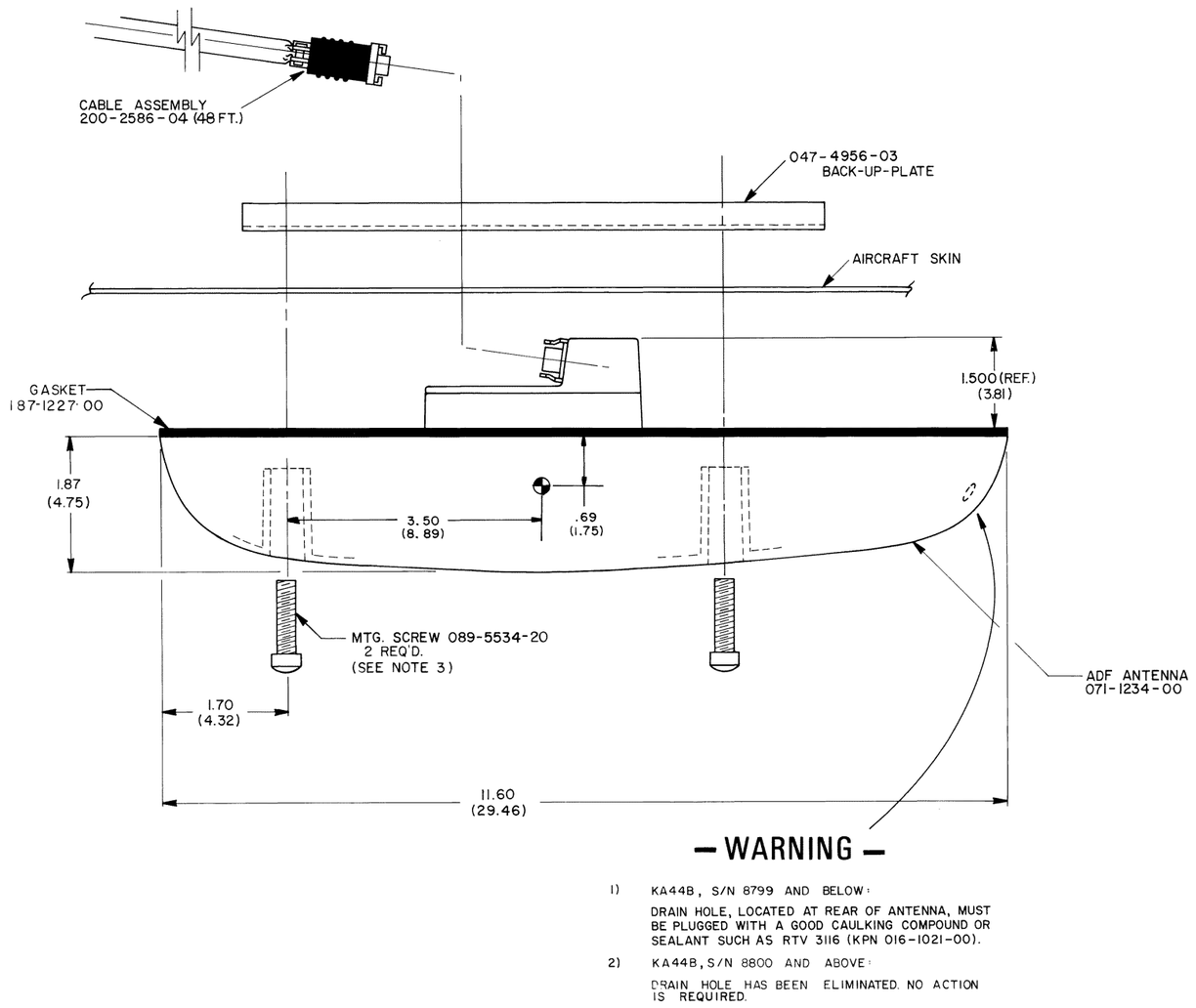
FIGURE 2-15 KI 228 OUTLINE AND MOUNTING DRAWING
(Dwg No 155-05355-0000 R-3)



NOTES:

1. DIMENSIONS IN PARENTHESIS ARE IN CENTIMETERS.
2. NOMINAL WEIGHT: 2.0 lbf (.91 kgf)
3. MOUNTING SCREW HOLES MUST BE FILLED WITH SEALANT SUCH AS RTV 3116 (KPN 016-01021-0000) IF THE ANTENNA IS TOP MOUNTED.

FIGURE 2-16 KA 44 OUTLINE AND MOUNTING DRAWING (Dwg No 155-05341-0000 R-AA)



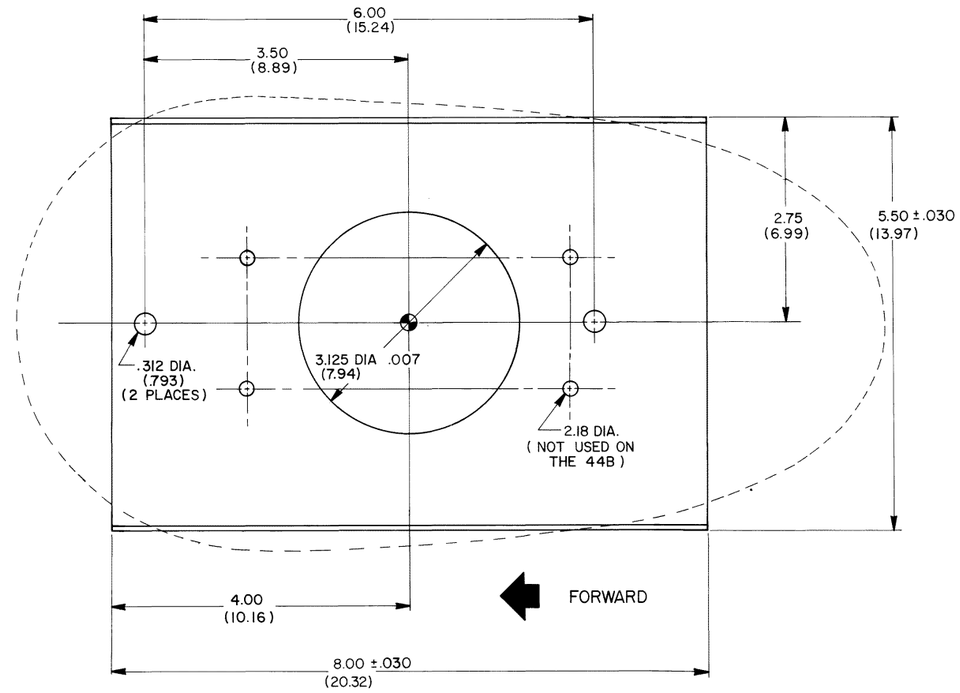
— WARNING —

1) KA44B, S/N 8799 AND BELOW:

DRAIN HOLE, LOCATED AT REAR OF ANTENNA, MUST BE PLUGGED WITH A GOOD CAULKING COMPOUND OR SEALANT SUCH AS RTV 3116 (KPN 016-1021-00).

2) KA44B, S/N 8800 AND ABOVE:

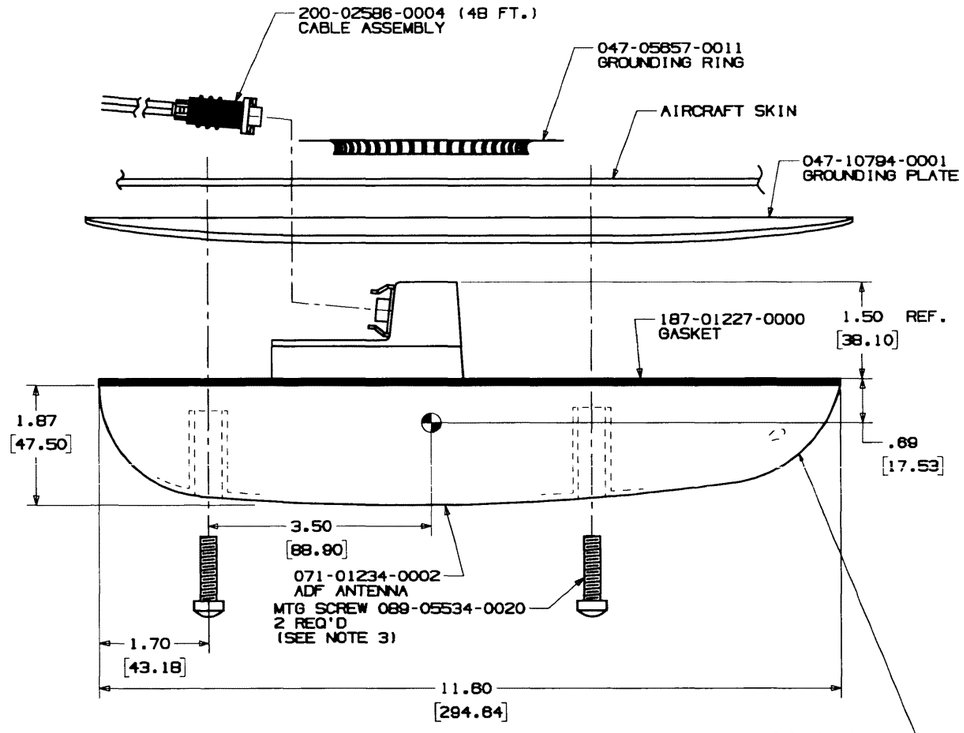
DRAIN HOLE HAS BEEN ELIMINATED. NO ACTION IS REQUIRED.

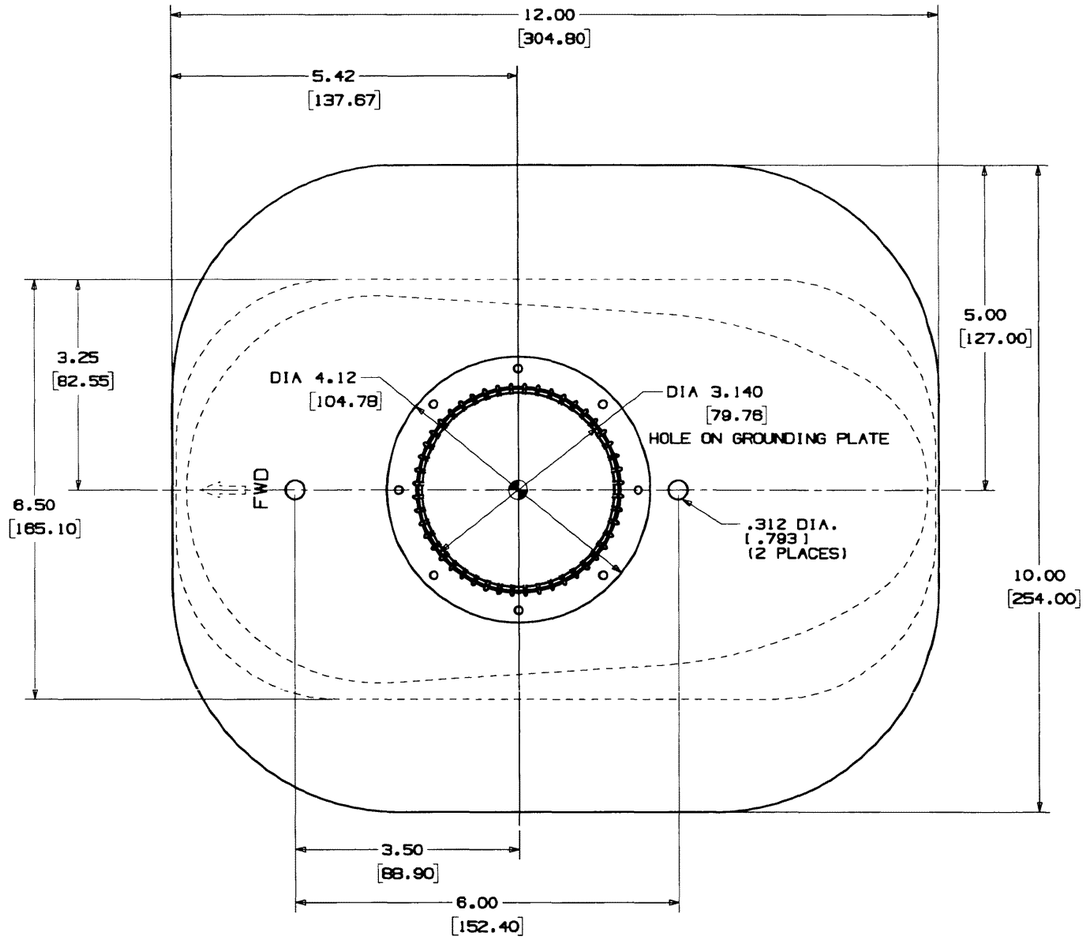


NOTES:

1. DIMENSIONS IN PARENTHESES ARE IN CENTIMETERS.
2. NOMINAL WEIGHT: 4.2 LBS. (1.89 Kg).
3. 2 EA. 089-05534-0036 SCREWS ARE ALSO SUPPLIED WITH ANTENNA FOR INSTALLATIONS THAT REQUIRE LONGER MOUNTING SCREWS.
4. MOUNTING SCREW HOLES MUST BE FILLED WITH SEALANT SUCH AS RTV 3116 (KPN 016-01021-0000) IF ANTENNA IS TOP MOUNTED.

FIGURE 2-17 KA 44B OUTLINE AND MOUNTING DRAWING (Dwg No 155-05334-0000 R-9)





NOTES:

1. DIMENSIONS ARE IN INCHES, [ ] IN MILLIMETERS.
2. NOMINAL WEIGHT: 4.2 LBS. (1.89 Kg).
3. SCREWS 089-05534-0038 (2 EACH) ARE ALSO SUPPLIED WITH ANTENNA FOR INSTALLATIONS THAT REQUIRE LONGER MOUNTING SCREWS.
4. MOUNTING SCREW HOLES MUST BE FILLED WITH SEALANT SUCH AS RTV 3118 (KPN 018-01021-0000) IF ANTENNA IS TOP MOUNTED.
5. GROUNDING RING (047-05657-0011) AND ADAPTER PLATE (047-10794-0001) ARE INSTALLED TO AIRCRAFT SKIN USING RIVETS. SUGGESTED RIVETS MS 2426 AD.

-WARNING-

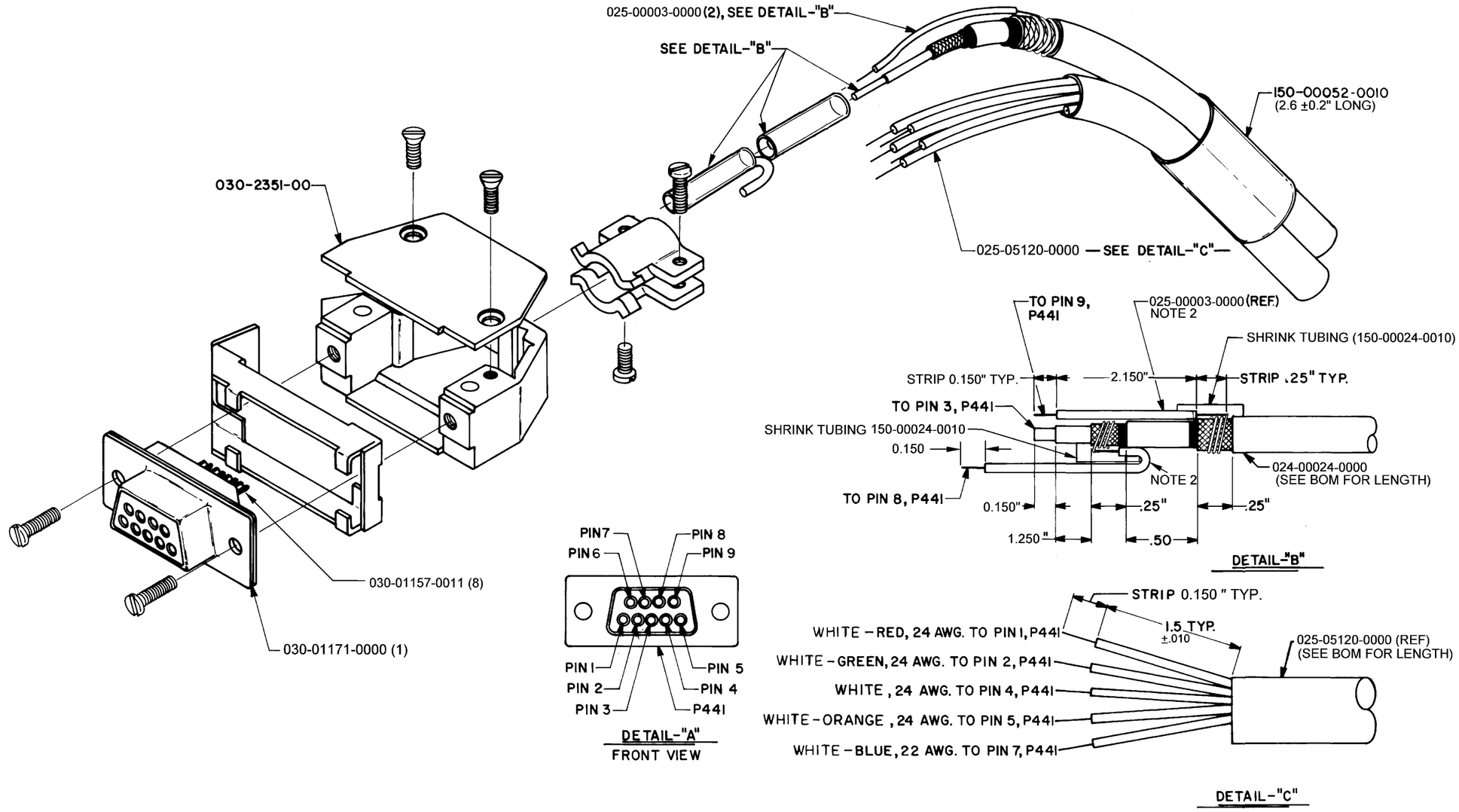
1. KA44B, S/N 8799 AND BELOW:

   DRAIN HOLE, LOCATED AT REAR OF ANTENNA, MUST BE PLUGGED WITH A GOOD CAULKING COMPOUND OR SEALANT SUCH AS RTV 3118 (KPN 018-01021-0000).

2. KA 44B, S/N 8800 AND ABOVE:

   DRAIN HOLE HAS BEEN ELIMINATED. NO ACTION IS REQUIRED.

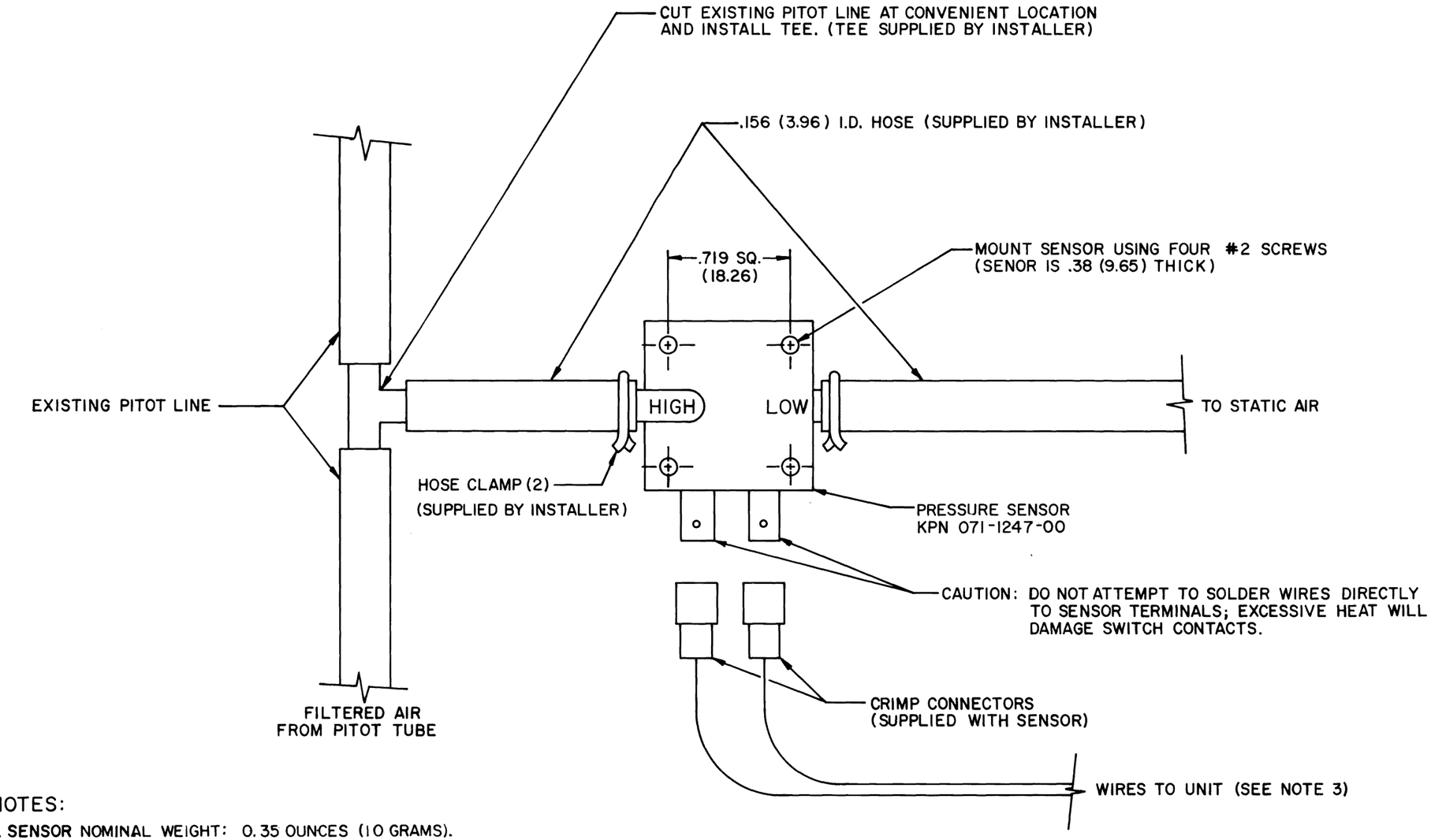
FIGURE 2-18 KA 44B OUTLINE AND MOUNTING DRAWING W/ GROUND PLANE
(Dwg No 155-05334-0010 R-3)



NOTES:

1. TOLERANCE ON OVERALL LENGTH – ± 2" PER 12' LENGTH.
2. WIND 3 ± 0.2 TURNS OF 025-00003-0000 OVER BRAID, THEN LAY WIRE BACK OVER THESE TURNS AND SOLDER WIRE TO BRAID. COVER WITH SHRINK SLEEVING.

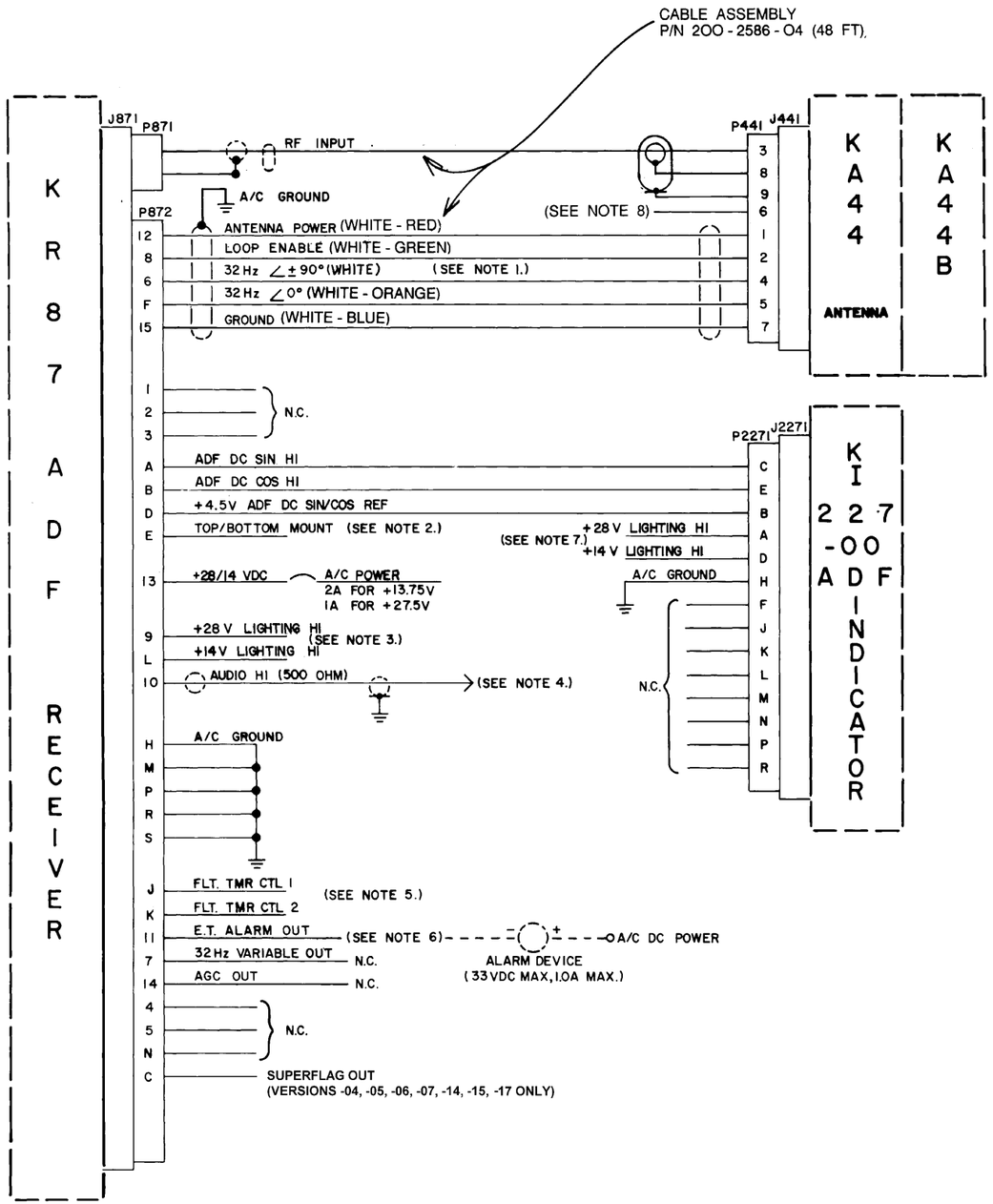
FIGURE 2-19 ANTENNA CABLE ASSEMBLY
(Dwg No 300-02586-0000 R-AE)



NOTES:

1. SENSOR NOMINAL WEIGHT: 0.35 OUNCES (10 GRAMS).
2. DIMENSIONS ARE INCHES (MILLIMETERS).
3. PRESSURE SENSOR 071-1247-00 IS A SINGLE POLE, SINGLE THROW (SPST) NORMALLY OPEN SWITCH. THE SWITCH CONTACTS CLOSE AT AN INDICATED AIRSPEED OF APPROX. 60 KNOTS. THE SENSOR IS OFFERED AS A NON-PRECISION ON/OFF SWITCH FOR SPEED RELATED FUNCTIONS. EXAMPLES OF ITS USE ARE WITH THE KR 87 ADF; TO PROVIDE AUTOMATIC SWITCHING OF THE KR 87 FLIGHT TIMER, OR WITH THE KRA 10 RADAR ALTIMETER; TO PROVIDE POWER TO THE KRA 10 AFTER AIRSPEED IS ATTAINED.
4. CURRENT RATING: 10 MA, RESISTIVE, DC NOMINAL.
5. CONTACT RESISTANCE: LESS THAN 1 OHM.

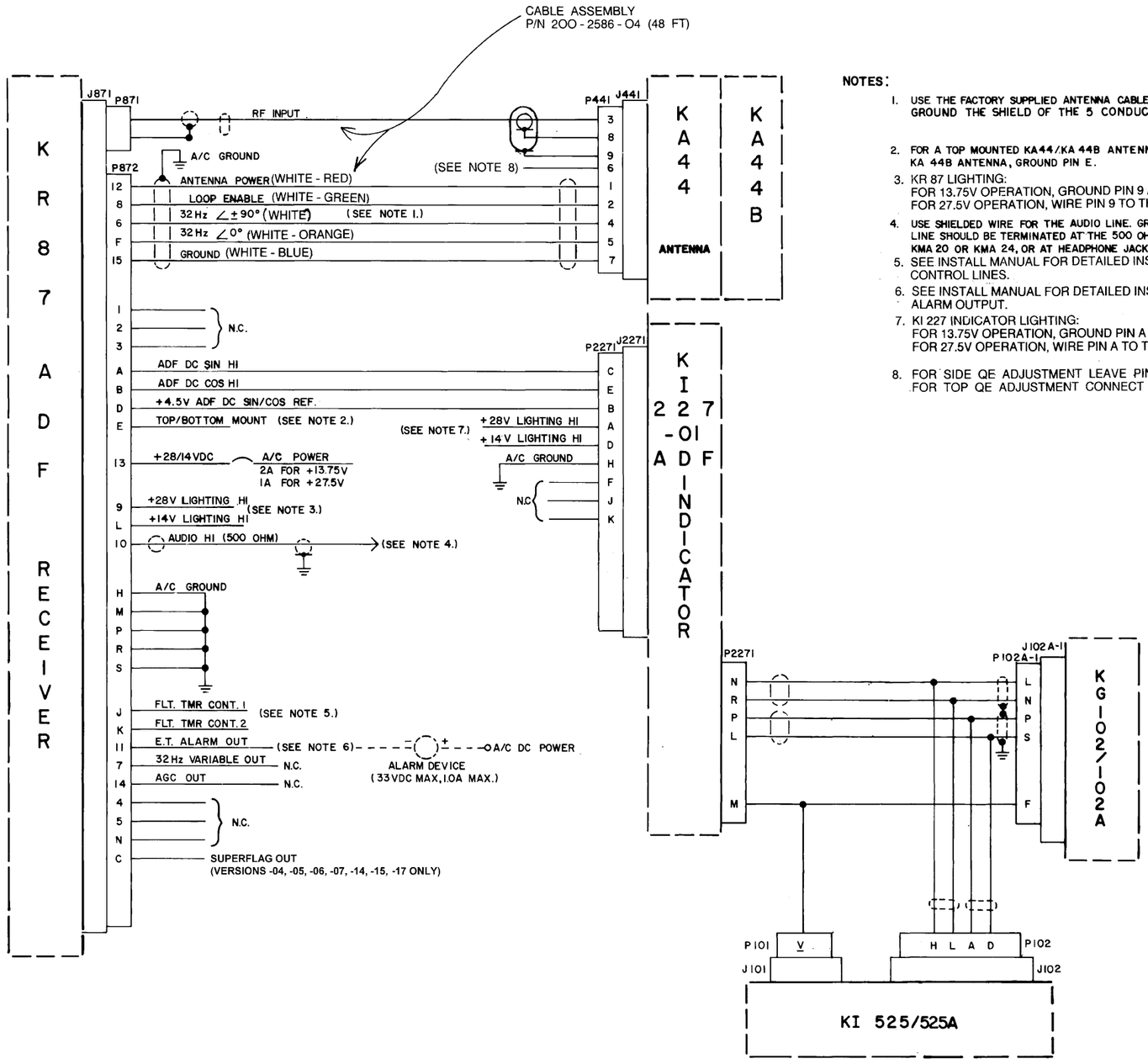
FIGURE 2-20 PRESSURE SENSOR INSTALLATION
(Dwg No 155-05387-0000 R-2)



NOTES:

1. USE THE FACTORY SUPPLIED ANTENNA CABLE ASSEMBLY AND FOLLOW THE COLOR CODE IN DIAGRAM. GROUND THE SHIELD OF THE 5 CONDUCTOR CABLE AT THE RECEIVER END.
2. FOR A TOP MOUNTED KA44/KA 44B ANTENNA, LEAVE PIN E OPEN. FOR A BOTTOM MOUNTED KA 44/ KA 44B ANTENNA, GROUND PIN E.
3. KR87 LIGHTING:
   FOR 13.75V OPERATION, GROUND PIN 9 AND WIRE PIN L TO THE +13.75V DIMMER LINE.
   FOR 27.5V OPERATION, WIRE PIN 9 TO THE +27.5V DIMMER LINE AND LEAVE PIN L OPEN.
4. USE SHIELDED WIRE FOR THE AUDIO LINE. GROUND THE SHIELD AT THE LOAD END ONLY. THE AUDIO LINE SHOULD BE TERMINATED AT THE 500 OHM INPUT OF AN ISOLATION AMPLIFIER SUCH AS THE KMA 20 OR KMA 24, OR AT HEADPHONE JACK.
5. SEE INSTALL MANUAL FOR DETAILED INSTALLATION INFORMATION ON FLIGHT TIMER RESET LINES.
6. SEE INSTALL MANUAL FOR DETAILED INSTALLATION INFORMATION ON ELAPSED TIMER ALARM OUTPUT.
7. KI 227 INDICATOR LIGHTING:
   FOR 13.75V OPERATION, GROUND PIN A AND WIRE PIN D TO THE 13.75V DIMMER LINE.
   FOR 27.5V OPERATION, WIRE PIN A TO THE 27.5V DIMMER LINE AND LEAVE PIN D OPEN.
8. FOR SIDE QE ADJUSTMENT LEAVE PIN 6 OPEN.
   FOR TOP QE ADJUSTMENT CONNECT PIN 6 TO PIN 7.

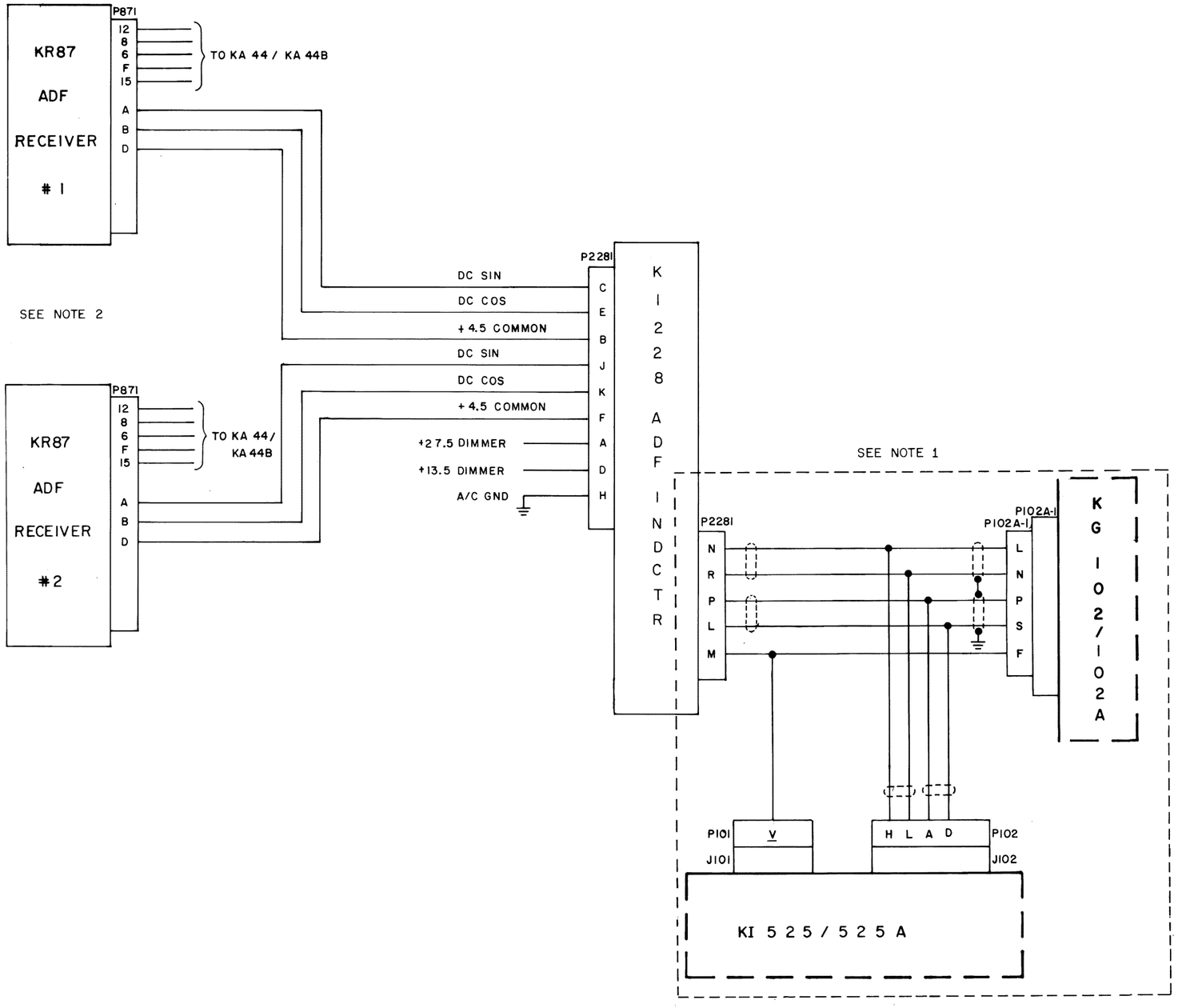
FIGURE 2-21 KR 87/KI 227-00 INTERCONNECT
(Dwg No 155-01360-0000 R-AA)



NOTES:

1. USE THE FACTORY SUPPLIED ANTENNA CABLE ASSEMBLY AND FOLLOW THE COLOR CODE IN DIAGRAM. GROUND THE SHIELD OF THE 5 CONDUCTOR CABLE AT THE RECEIVER END.
2. FOR A TOP MOUNTED KA44/KA 44B ANTENNA, LEAVE PIN E OPEN. FOR A BOTTOM MOUNTED KA 44/ KA 44B ANTENNA, GROUND PIN E.
3. KR 87 LIGHTING:
   FOR 13.75V OPERATION, GROUND PIN 9 AND WIRE PIN L TO THE +13.75V DIMMER LINE.
   FOR 27.5V OPERATION, WIRE PIN 9 TO THE +27.5V DIMMER LINE AND LEAVE PIN L OPEN.
4. USE SHIELDED WIRE FOR THE AUDIO LINE. GROUND THE SHIELD AT THE LOAD END ONLY. THE AUDIO LINE SHOULD BE TERMINATED AT THE 500 OHM INPUT OF AN ISOLATION AMPLIFIER SUCH AS THE KMA 20 OR KMA 24, OR AT HEADPHONE JACK.
5. SEE INSTALL MANUAL FOR DETAILED INSTALLATION INFORMATION ON FLIGHT TIMER CONTROL LINES.
6. SEE INSTALL MANUAL FOR DETAILED INSTALLATION INFORMATION ON ELAPSED TIMER ALARM OUTPUT.
7. KI 227 INDICATOR LIGHTING:
   FOR 13.75V OPERATION, GROUND PIN A AND WIRE PIN D TO THE 13.75V DIMMER LINE.
   FOR 27.5V OPERATION, WIRE PIN A TO THE 27.5V DIMMER LINE AND LEAVE PIN D OPEN.
8. FOR SIDE QE ADJUSTMENT LEAVE PIN 6 OPEN.
   FOR TOP QE ADJUSTMENT CONNECT PIN 6 TO PIN 7.

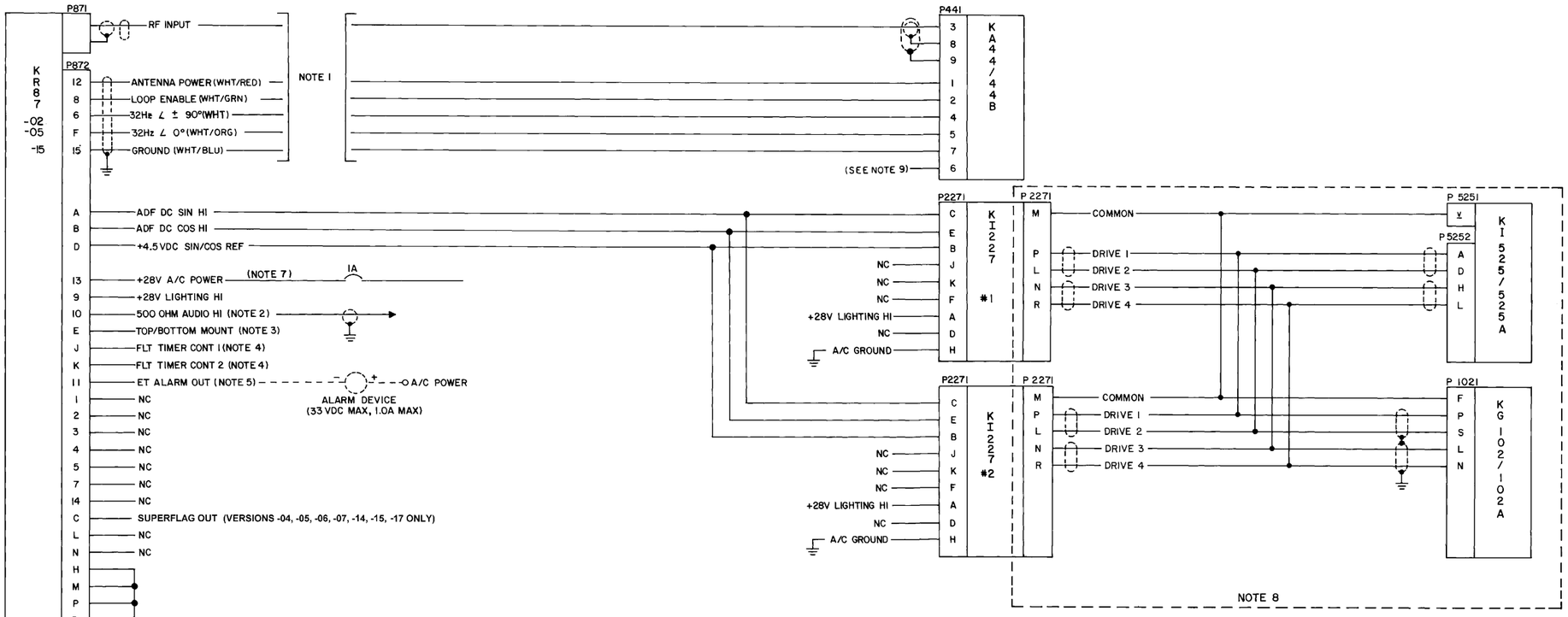
FIGURE 2-22 KR 87/KI 227-01 INTERCONNECT
(Dwg No 155-01360-0001 R-AA)



NOTES:

1. CONNECTIONS INSIDE DASHED LINES APPLICABLE TO KI 228-01 ONLY.
2. THIS INTERCONNECT ONLY SHOWS CONNECTIONS EXCLUSIVE TO THE KI 228. FOR REMAINING CONNECTIONS, REFER TO THE KR 87/KI 227 INTERCONNECT DWG KPN 155-1360-00 OR -01.

FIGURE 2-23 DUAL KR 87/KI 228 INTERCONNECT
(Dwg No 155-01365-0000 R-4)



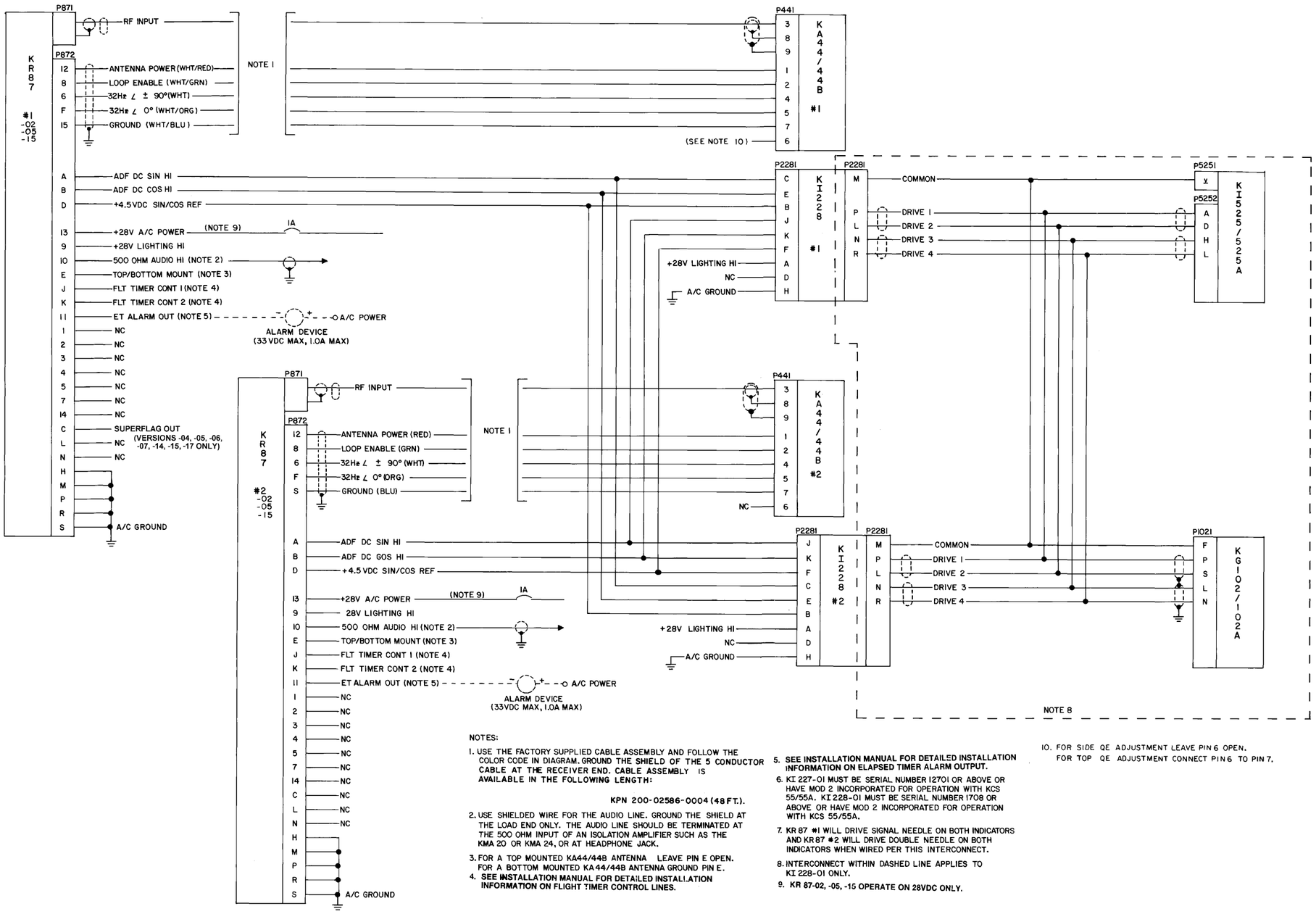
NOTES:

1. USE THE FACTORY SUPPLIED CABLE ASSEMBLY AND FOLLOW THE COLOR CODE IN DIAGRAM. GROUND THE SHIELD OF THE 5 CONDUCTOR CABLE AT THE RECEIVER END. CABLE ASSEMBLY IS AVAILABLE IN THE FOLLOWING LENGTH:

   KPN 200-02586-0004 (48 FT.).

2. USE SHIELDED WIRE FOR THE AUDIO LINE. GROUND THE SHIELD AT THE LOAD END ONLY. THE AUDIO LINE SHOULD BE TERMINATED AT THE 500 OHM INPUT OF AN ISOLATION AMPLIFIER SUCH AS THE KMA 20 OR KMA 24, OR AT HEADPHONE JACK.
3. FOR A TOP MOUNTED KA44/44B ANNTENNA LEAVE PIN E OPEN. FOR A BOTTOM MOUNTED KA 44/44B ANTENNA GROUND PIN E.
4. SEE INSTALLATION MANUAL FOR DETAILED INSTALLATION INFORMATION ON FLIGHT TIMER CONTROL LINES.
5. SEE INSTALLATION MANUAL FOR DETAILED INSTALLATION INFORMATION ON ELAPSED TIMER ALARM OUTPUT.
6. KI 227-01 MUST BE SERIAL NUMBER 12701 OR ABOVE OR HAVE MOD 2 INCORPORATED FOR OPERATION WITH KCS 55/55A. KI 228-01 MUST BE SERIAL NUMBER 1708 OR ABOVE OR HAVE MOD 2 INCORPORATED FOR OPERATION WITH KCS 55/55A.
7. KR 87-02, -05, -15 OPERATE ON 28VDC ONLY.
8. INTERCONNECT WITHIN DASHED LINE APPLIES TO KI 227-01 ONLY.
9. FOR SIDE QE ADJUSTMENT LEAVE PIN 6 OPEN. FOR TOP QE ADJUSTMENT CONNECT PIN 6 TO PIN 7.

FIGURE 2-24 DUAL KR 87/DUAL KI 227/KCS 55A INTERCONNECT (Dwg No 155-01360-0002 R-AA)



NOTES:

1. USE THE FACTORY SUPPLIED CABLE ASSEMBLY AND FOLLOW THE COLOR CODE IN DIAGRAM. GROUND THE SHIELD OF THE 5 CONDUCTOR CABLE AT THE RECEIVER END. CABLE ASSEMBLY IS AVAILABLE IN THE FOLLOWING LENGTH:

   KPN 200-02586-0004 (48 FT.).

2. USE SHIELDED WIRE FOR THE AUDIO LINE. GROUND THE SHIELD AT THE LOAD END ONLY. THE AUDIO LINE SHOULD BE TERMINATED AT THE 500 OHM INPUT OF AN ISOLATION AMPLIFIER SUCH AS THE KMA 20 OR KMA 24, OR AT HEADPHONE JACK.

3. FOR A TOP MOUNTED KA44/44B ANTENNA LEAVE PIN E OPEN. FOR A BOTTOM MOUNTED KA44/44B ANTENNA GROUND PIN E.

4. SEE INSTALLATION MANUAL FOR DETAILED INSTALLATION INFORMATION ON FLIGHT TIMER CONTROL LINES.

5. SEE INSTALLATION MANUAL FOR DETAILED INSTALLATION INFORMATION ON ELAPSED TIMER ALARM OUTPUT.

6. KI 227-01 MUST BE SERIAL NUMBER 12701 OR ABOVE OR HAVE MOD 2 INCORPORATED FOR OPERATION WITH KCS 55/55A. KI 228-01 MUST BE SERIAL NUMBER 1708 OR ABOVE OR HAVE MOD 2 INCORPORATED FOR OPERATION WITH KCS 55/55A.

7. KR 87 #1 WILL DRIVE SIGNAL NEEDLE ON BOTH INDICATORS AND KR 87 #2 WILL DRIVE DOUBLE NEEDLE ON BOTH INDICATORS WHEN WIRED PER THIS INTERCONNECT.

8. INTERCONNECT WITHIN DASHED LINE APPLIES TO KI 228-01 ONLY.

9. KR 87-02, -05, -15 OPERATE ON 28VDC ONLY.

10. FOR SIDE QE ADJUSTMENT LEAVE PIN 6 OPEN. FOR TOP QE ADJUSTMENT CONNECT PIN 6 TO PIN 7.

FIGURE 2-25 DUAL KR 87/DUAL KI 228/KCS 55A INTERCONNECT (Dwg No 155-01360-0003 R-AA)

SECTION III
OPERATION

3.1 OPERATING PROCEDURES

It is recommended that the KR 87 unit be turned off when the aircraft engine is started in order to prevent possible voltage transient damage to the radio. The unit is turned on by rotating the volume control clockwise past the detent. The volume control is used to adjust the audio output for a comfortable listening level.

NOTE:

The audio muting feature of the KR 87 will cause the audio output to be muted unless the receiver is locked onto a valid station. This reduces interstation noise and aids the pilot in identifying usable stations.

3.1.1 OPERATING MODES

The KR 87 Automatic Direction Finder has two operational modes. In the ANT (Antenna) mode (ADF button out) the loop antenna is disabled, and the unit simply acts as a receiver, allowing audio reception through the speaker or headphones. The indicator needle will remain parked at the 90° relative position and the ANT message on the left side of the display will be lighted. This mode provides slightly clearer audio reception, and is used for station identification. In various parts of the world, some L/MF stations use an interrupted carrier for identification purposes. A Beat Frequency Oscillator (BFO) function is provided to permit these stations to be more easily identified. pushing the BFO switch will cause a 1000Hz tone to be heard whenever there is a radio carrier signal present at the selected frequency. It will also light the BFO message in the center of the display.

With the ADF button depressed, the unit is placed into the ADF mode and the loop antenna is enabled. The ADF message on the left side of the display will be lighted and the indicator needle will point to the relative bearing of the selected station. In order to tell if there is a sufficient signal for navigational purposes, the pilot can place the KR 87 back in the ANT mode, parking the indicator needle at 90°. When the unit is then switched to the ADF mode, the needle should slew to the station bearing in a positive manner, without excessive sluggishness, wavering, or reversals.

3.1.2 FREQUENCY CONTROL

A Active Frequency (The frequency to which the ADF is tuned).

The active frequency is displayed in the left hand window. This frequency may be changed with the concentric knobs when either timer mode (FLT or ET) is being displayed in the right hand window. The exception to this is when the ET message is flashing (see C. Elapsed Timer). To set the 10's digit push the small knob in and rotate it. Clockwise rotation will increment the digit. The digit will roll over at 9 to 0 and roll under (when turning the knob counterclockwise) at 0 to 9. With the small knob pulled out the 1's digit may be set. Its operation is the same as for the 10's digit.

Turning the large knob changes the 100's digit and the 1000's digit. The 100's digit carries to the 1000's digit from 9 to 10 and borrows from 10 to 9. The two digits roll over from 17 to 02 and under from 02 to 17 thus limiting the frequencies to the range of 200KHz to 1799KHz.

B. Standby Frequency

The standby frequency is displayed in the right window when the FRQ message is lighted. When this is the case, this frequency may be changed with the knobs in a manner similar to that explained above for the active frequency.

If the standby frequency is not being displayed it may be called to the window by pressing the FRQ button. Pressing this button when the standby frequency is displayed causes the current standby and active frequencies to be exchanged.

3.1.3 TIMERS

A. FLT/ET Button

If elapsed time (ET) is currently displayed the FLT/ET button will cause the flight timer to be displayed. Pressing this button again will exchange the two timers in the display. If the standby frequency is displayed the FLT/ET button will cause the timer which was last displayed to reappear in the window. (Note: When power is first applied, the flight timer is displayed).

B. Flight Timer

The flight timer is displayed in the right hand window when the FLT message is lit. This timer will count up to 59 hours, 59 minutes, 59 seconds. When the unit is first turned on this timer is automatically started at 0. Minutes and seconds will be displayed until a value of 59 minutes and 59 seconds is reached. On the next count the display will shift to hours and minutes.

See Section 2.3.5 FLIGHT TIMER RESET SWITCH INSTALLATION of this manual for additional information.

C. Elapsed Timer

This timer has two modes; Count Up and Count Down. When power is applied it is in the Count Up mode starting at 0. As is true with the flight timer, the elapsed timer will count to 59 hours, 59 minutes, 59 seconds, displaying minutes and seconds until one hour has elapsed, then displaying hours and minutes. When in the Count Up mode the timer may be reset to 0 by pressing the reset button. (Note: Pressing the reset button will reset the elapsed timer regardless of what is currently being displayed).

To enter the Count Down mode, the Reset (RST) button is held depressed for approximately 2 seconds until the ET message begins to flash (this may be done regardless of current display). While the ET message is flashing the timer is in the ET Set mode. In this mode a number up to 59 minutes, 59 seconds may be preset into the elapsed timer with the concentric knobs. With the small knob pressed in the 10's of seconds digit may be changed; it will roll over from 5 to 0 and under 0 to 5. With the knob pulled out the 1's of seconds digit may be changed. It rolls over from 9 to 0 and under from 0 to 9. The larger knob modifies the minutes. It rolls over from 59 to 0 and under from 0 to 59. The timer will remain in the ET Set mode (ET message flashing) for 15 seconds after a number is set in or until the RST, FLT/ET, or FRQ button is pressed. The number preset will remain unchanged until the RST button is pressed. When the RST button is pressed after a number is preset, the elapsed timer will start counting down. (Note: The timer will start when RST is pressed regardless of the current display). When the timer reaches 0 it changes to the Count Up mode and continues up from 0. Also the right hand display will flash for 15 seconds and the timer alarm line will be pulled low for 1 second.

While the elapsed timer is counting down, pressing the RST button will have no effect unless it is held for approximately 2 seconds. This will cause the timer to stop and enter the Set mode (ET message flashing).

3.1.4 INDICATOR OPERATION

The KI 227-00 and the KI 228-00 have a manually rotatable compass card which the pilot can set to a selected bearing reference with the HDG knob. If a KI 227-01 or a KI 228-01 is installed in conjunction with the KCS 55/55A Compass System, the compass card on the KI 227/228 is synchronized to the KI 525/525A compass card by rotating the SYNC knob of the KI 227/228 until the heading matches that of the KI 525/525A. This may be done with both, either, or neither system energized. Once aligned, the KI 227/228 compass card will track the KI 525/525A compass card.

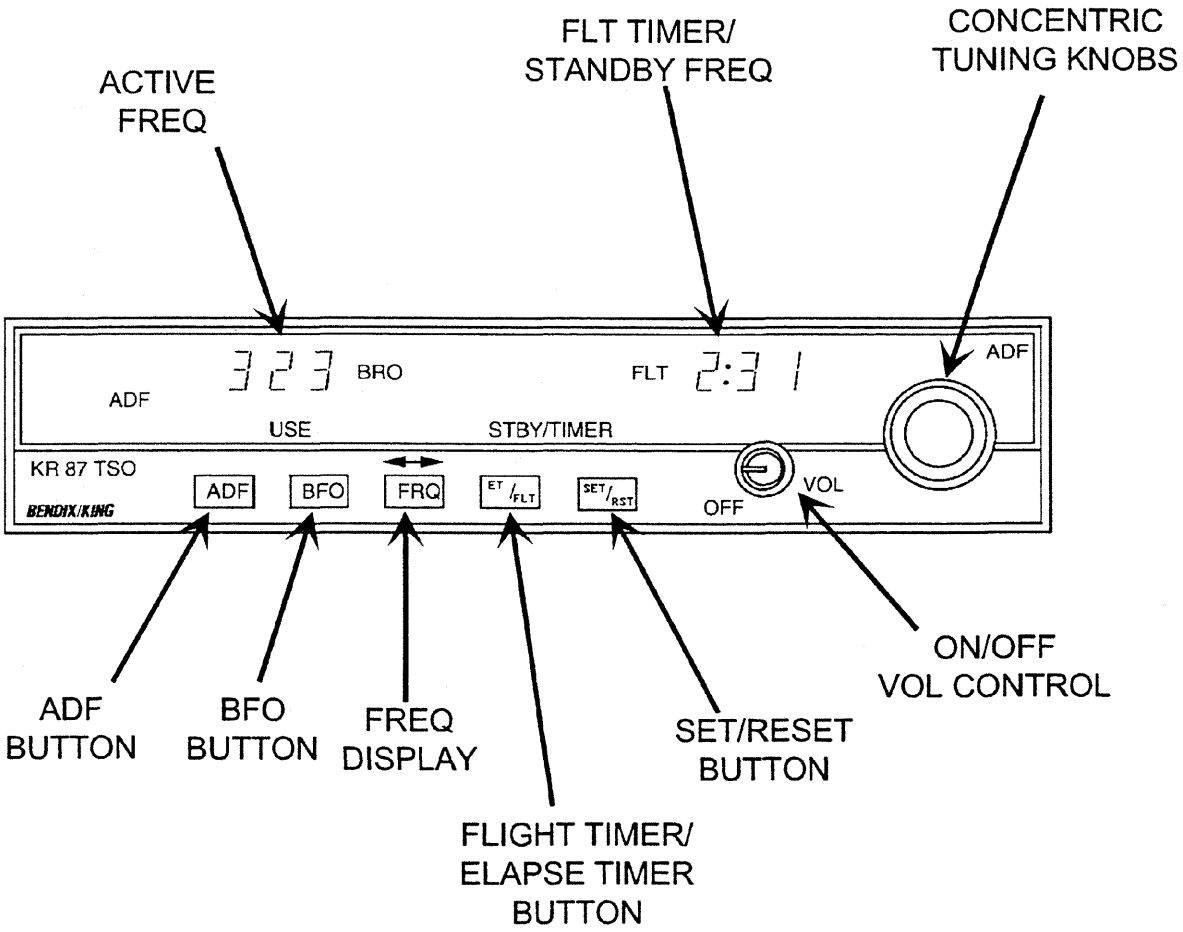


FIGURE 3-1 KR 87 CONTROL FUNCTIONS (-00 THRU -05, -07) (UNIT P/N 066-1072-00 THRU -05, -07)

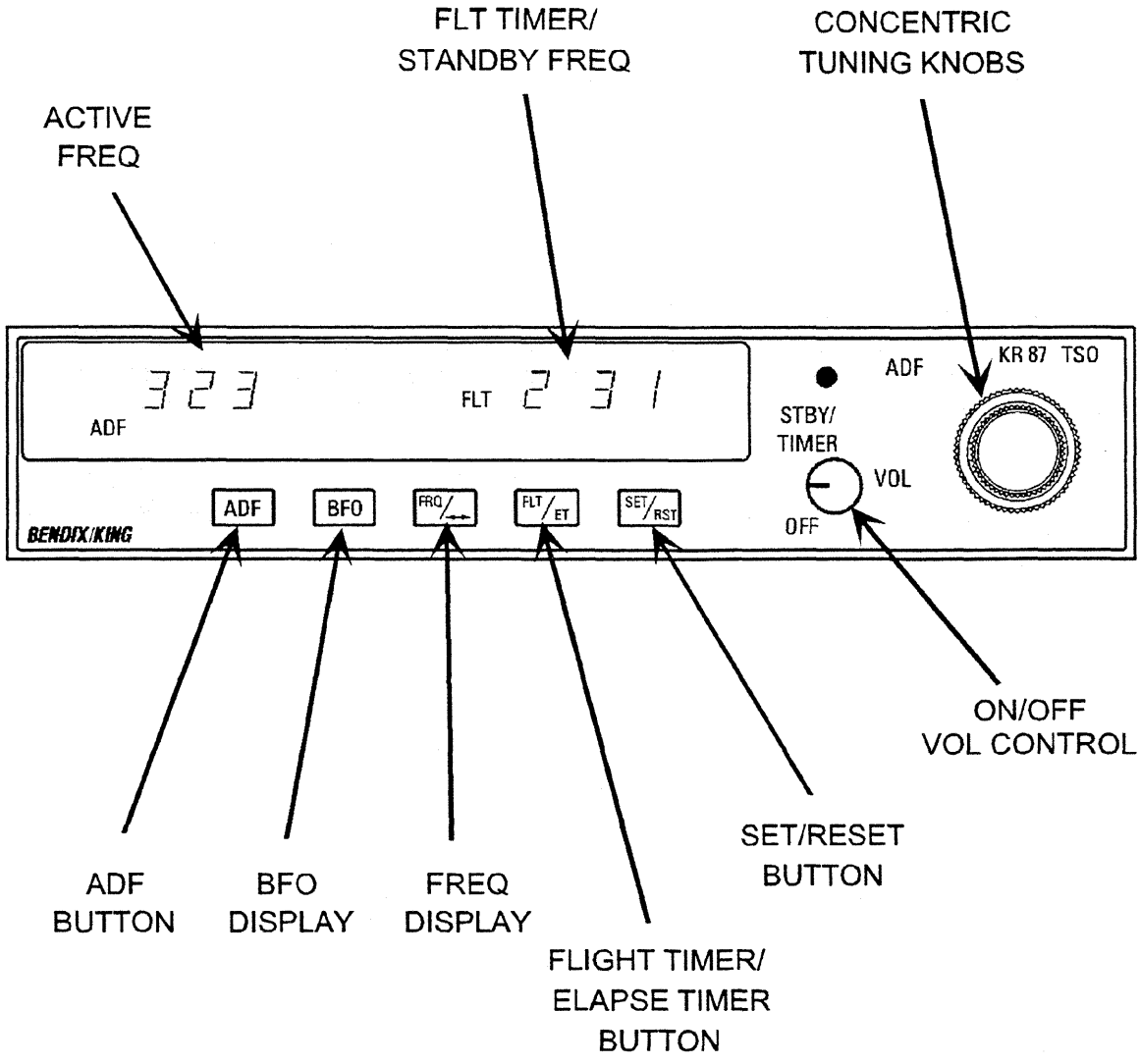


FIGURE 3-2 KR 87 CONTROL FUNCTIONS (-14, - 15, -17)
(UNIT P/N 066-1072-14, - 15, -17)

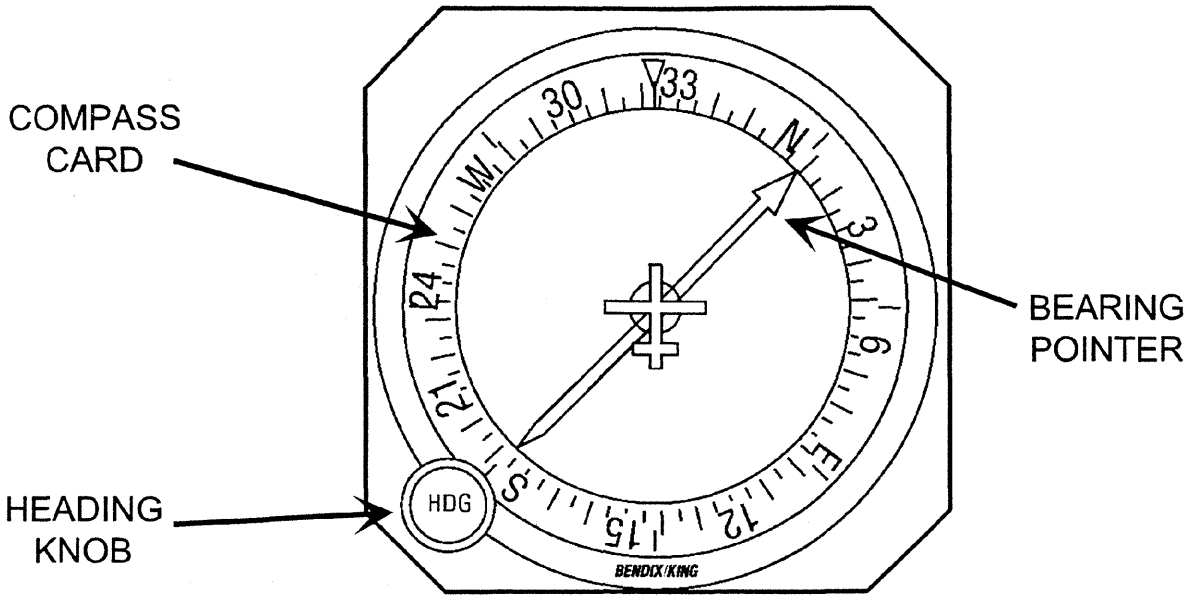


FIGURE 3-3 KI 227-00 CONTROL FUNCTIONS

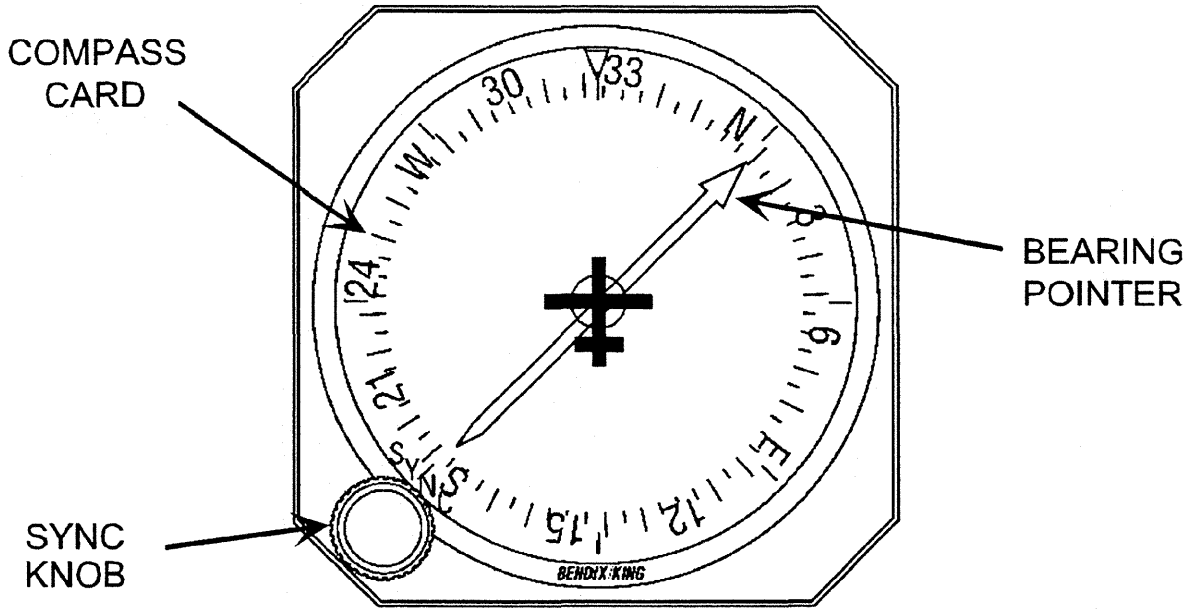


FIGURE 3-4 KI 227-01 CONTROL FUNCTIONS

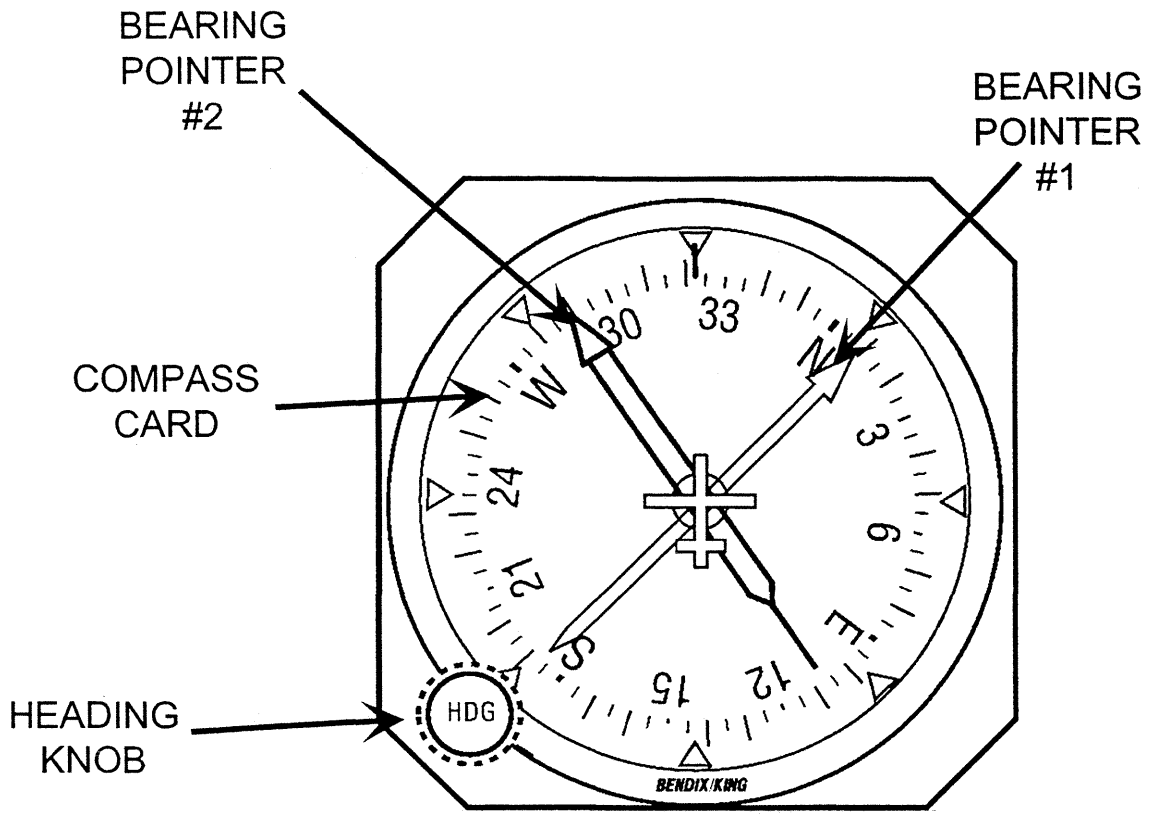


FIGURE 3-5 KI 228-00 CONTROL FUNCTIONS

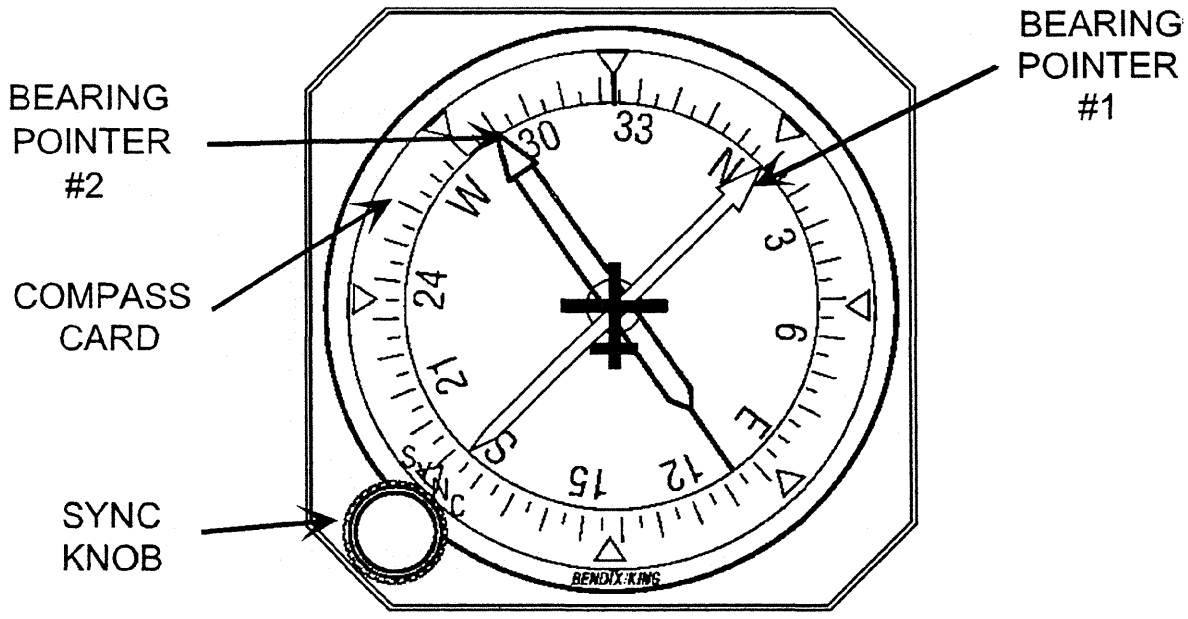


FIGURE 3-6 KI 228-01 CONTROL FUNCTIONS

TSO APPENDIX

ENVIRONMENTAL QUALIFICATION FORMS

THIS PAGE IS RESERVED

RTCA/DO-160D (Change 1, 2, 3)
ENVIRONMENTAL QUALIFICATION FORM

NOMENCLATURE: KA 44B ADF Antenna
PART NUMBER: 071-01234-0000/01/02
S/N: 81153 and above
TSO NUMBER: TSO-C41c

MANUFACTURER'S SPECIFICATION: MPS 004-00371-0000

MANUFACTURER: Honeywell International Inc.
ADDRESS: One Technology Center
23500 W. 105th Street
Olathe KS 66061 USA

DO-160D Section	Condition	Category	Description
4	Temperature and Altitude	F2	-55°C to +70°C operating; 55,000 ft
4.5.4	In-Flight Loss of Cooling		Not Applicable
5	Temperature Variation	A	10°C/min
6	Humidity	A	Standard Humidity
7	Operational Shocks and Crash Safety	B	Standard Operational Shock and Crash Safety
8	Vibration	S R	Fixed Wing, Zone 1 Curves C, L, M, and Y, Helicopter, Zone 1 Curve G
9	Explosion Proofness	E	
10	Waterproofness	X	Not Tested
11	Fluids Susceptibility	X	Not Tested
12	Sand and Dust	X	Not Tested
13	Fungus Resistance	X	Not Tested
14	Salt Spray	S	
15	Magnetic Effect	A	1° Deflection between 0.3m and 1.0m
16	Power Input	X	Not Tested (See System Qualifications)
17	Voltage Spike	X	Not Tested (See System Qualifications)
18	Audio Frequency Conducted Susceptibility - Power Inputs	X	Not Tested (See System Qualifications)
19	Induced Signal Susceptibility	A	Interference Free Operation
20	Radio Frequency Susceptibility (Radiated and Conducted)	TT	10 kHz to 400 MHz-Conducted Susceptibility Note: Square wave modulation was used to within ±480 kHz of the tuned frequency. From ±480 kHz to ±5 kHz of the tuned frequency, sine wave modulation was used. 100 MHz to 8 GHz-Radiated Susceptibility
21	Emission of Radio Frequency Energy	H	Standard Emission testing
22	Lightning Induced Transient Susceptibility	A3J33	Pin Injection and Cable Bundle testing
23	Lightning Direct Effects	2A	Externally mounted equipment
24	Icing	C	Half inch of ice
25	Electrostatic Discharge (ESD)	A	10 transients each polarity, 15 kV
	Other Test		Airspeed rated at 350 Knots

RTCA/DO-160D (Change 1, 2, 3)
ENVIRONMENTAL QUALIFICATION FORM

REVISION HISTORY

Rev.	PRN/CO No.	By	Date	Description of Change
-	757469	Ryan Konen	04/26/2005	Initial release
A	764221	Janet Eidam	10/2005	Clarification/Clerical Changes