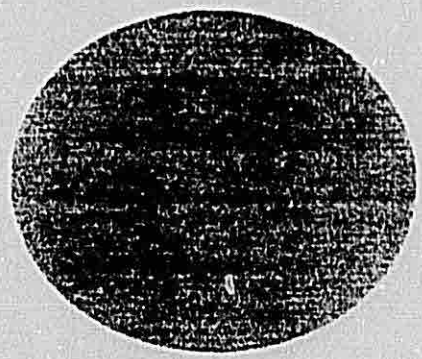

ATP INDEX

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BENDIX/KING
KN 72/KN 75
MAINTENANCE MANUAL

*** END OF INDEX ***

MFG.

INTRO

KN 72

INSTL

MANUAL

BENDIX/KING

GENERAL AVIATION AVIONICS DIVISION

INSTALLATION MANUAL

KN 72

VOR/LOC CONVERTER

MANUAL NUMBER 006-00142-0001
REVISION 1, JULY, 1978

Allied-Signal Aerospace Company

Allied Signal

RECORD OF REVISIONS

ATP

MFG REV NO	DESCRIPTION	ISSUE DATE	ATP REV DATE	INSERTED BY
1		JAN 1977		ATP

RECORD OF TEMPORARY REVISIONS

TEMP REV NO	DESCRIPTION	ISSUE DATE	ATP REV DATE	INSERT BY	DATE REMOVED	REV INCOR	REMOVE BY

HISTORY OF REVISIONS

REVISION 0

REVISION 1, JULY, 1978

Complete manual rewrite to update and add mounting hardware to installation kits in 1.4A and 1.4C. Installation procedures information extensively expanded to provide more detailed instructions.

KING

KN 72
VOR/LOC RECEIVER

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CHAPTER 01

SECTION I
GENERAL INFORMATION

1.1 INTRODUCTION

This manual contains information relative to the physical, mechanical and electrical characteristics of the King Radio Corporation Silver Crown KN 72.

1.2 EQUIPMENT DESCRIPTION

The KN 72 remote mounted VOR/LOC converter is designed to operate with a navigation receiver and VOR/LOC indicator to provide OMNI directional range or localizer information.

The KN 72 is designed to operate with virtually all navigation receivers. Three different composite inputs are provided:

A. .5VRMS Input

This input accepts VOR composite information at a .5VRMS nominal level. Phasing of the composite is such that the 30Hz variable signal is in phase with the 30Hz reference FM superimposed on the 9960Hz subcarrier on the 0° radial. This .5VRMS standard ARINC phasing input is compatible with all King Radio Corporation navigation receivers, the Collins VIR 351, the Narco NAV 14 (ARINC output) and many other navigation receivers.

B. .3VRMS Input

This input accepts VOR composite information at a .3VRMS level. Phasing of the composite applied to this input must have the 30Hz variable phase signal in phase with the 30Hz reference phase signal used to FM modulate the 9960Hz subcarrier on the 180° radial. This .3VRMS reversed ARINC phasing input is compatible with the following Narco navigation receivers: Mark 16, Mark 24, NAV 100, NAV 14, NAV 11, NAV 114, and NAV 111.

C. 3VRMS Input

This input accepts VOR composite information at a 3VRMS nominal level. Phasing of the VOR composite applied to this input must be reversed ARINC phasing. This 3V reversed ARINC phasing input (same as for 0.3VRMS described above) is compatible with the following Narco navigation receivers: Mark V, Mark 10, and Mark 12 series.

The KN 72 will provide DC voltages to drive ARINC type indicators. Converter drive capability is five 1000 ohm deviation loads, three 1000 ohm flag loads, and three 200 ohm TO/FROM loads directly, no harness jumpering or loading is required regardless of the number of driven loads.

Significant design features include improved VOR scalloping rejecting, versatile mounting, low power consumption, and externally adjustable VOR centering, localizer centering and course width.

The KN 72 is mechanically similar to the KN 75 glideslope receiver. Both units may be rigid mounted in any plane. Various dual installations of KN 72 and KN 75 are possible. Figure 2-6 shows several mounting configurations.

1.3 TECHNICAL CHARACTERISTICS

SPECIFICATION	CHARACTERISTIC
UNIT NO:	066-4009-00
PHYSICAL:	
Width:	1.1 in. (2.79 cm)
Height:	4.0 in. (10.16 cm)
Length:	11.75 in. (29.85 cm)
Weight:	1.31 lb (.59 Kg)
TSO:	
VOR:	FAA TSO C40a operation to 45,000 feet RTCA DO-114 (FAA Approval) System bearing error less than 2.7° when used with any TSO'd NAV receiver having less than 1.5° phase error.
LOC:	FAA TSO C36c Class D RTCA DO-131 System centering error less than 7ua when used with TSO'd NAV receiver
ENVIRONMENTAL CATEGORIES:	RTCA DO-138
Temperature, Altitude:	A
Humidity:	A
Vibration:	JN
AF Susceptibility:	A
RF Susceptibility:	A
RF Emission	A
TYPICAL ACCURACY:	
VOR:	Bearing error of less than 1.0° with precision track selector
LOC:	Centering error of less than 3ua
MOUNTING:	Rigid, any position, see installation drawing for details
POWER INPUT:	+13.75 OR 27.5VDC .05A Max.
COMPOSITE INPUT REQUIREMENTS:	
.5VRMS:	PHASING: Standard ARINC; LEVEL: .5VRMS ±20%; INPUT IMPEDANCE: 60K ohm
.3VRMS:	PHASING: Reversed ARINC; LEVEL: .3VRMS ±15%; INPUT IMPEDANCE: 30K ohm
3VRMS:	PHASING: Reversed ARINC; LEVEL: 3VRMS ±10%; INPUT IMPEDANCE: 350K ohm
TEMPERATURE RANGE:	Operating -55°C to +71°C Storage -55° to +85°C
MAXIMUM LOAD DRIVING CAPABILITY:	
Deviation:	5 1K ohm 150-0-150ua loads
Flag:	3 1K ohm 0-260ua loads
TO/FROM:	3 200 ohm 200-0-200ua loads
COURSE WIDTH:	
VOR:	150mv deflection for 10° course error
LOC:	90mv ±5mv deflection for .093ddm 4dB tone ratio

1.4 UNITS AND ACCESSORIES SUPPLIED

Three installation kits are available.

A. Installation Kit KPN 050-1550-00

Single unit installation (Horizontal/Vertical, No Rack)

KPN	DESCRIPTION	VENDOR P/N	QTY
030-1094-51	Connector	09-50-61-55 Molex	1
030-1107-30	Terminals (7 spares)	4366 Molex	1
088-0718-00	Connector Hood	KRC	1
089-2015-37	Nut Hex	KRC	4
089-5909-07	Scr, PHP 7/16 Lg.	KRC	4
089-6541-00	Scr, 4-40 PHP Special	KRC	2
089-8111-34	Washer, Split Lock #8	KRC	4
091-0109-01	Cable Tie	TY-25M TY-RAP	1

B. Installation Kit KPN 050-1555-01
Dual unit installation (Horizontal/Vertical, No Rack)

KPN	DESCRIPTION	VENDOR P/N	QTY
047-4216-01	Tie Strap	KRC	2 (not used on vertical mounting)
047-4217-01	Tie Strap	KRC	2
089-2148-22	Nut Hex Reduced	KRC	4 (not used on vertical mounting)
089-5909-07	Scr PHP 7/16 Lg.	KRC	4
089-8005-22	Washer Split Lock	KRC	4

C. Installation Kit KPN 050-1555-02
Single unit, vertical installation with mounting rack

KPN	DESCRIPTION	VENDOR P/N	QTY
047-4218-01	Hold Down Bar	KRC	2
047-4219-01	Mounting Rack	KRC	1
075-0021-01	Hold Down Clamp	KRC	1
078-0054-00	Compression Spring	KRC	1
089-2015-37	Nut Hex	KRC	1
089-5442-10	Scr 8-32 FHP	KRC	4
089-5529-32	Scr Fil Hd P	KRC	1
089-8111-34	Washer, Split Lock #8	KRC	1

To determine the type of installation and the installation kit(s) required see Figure 2-5.

1.5 ACCESSORIES REQUIRED, BUT NOT SUPPLIED

A. TSO'd navigation receiver having a composite output compatible with one of the KN 72 inputs.

B. VOR/LOC indicator having 1000 ohm deviation and flag meters and 200 ohm TO/FROM and an ARINC type resolver.

C. Cabling fabricated by installing agency.

1.6 LICENSE REQUIREMENTS

NONE

1.7 REQUIREMENTS FOR TSO'D VOR/ILS SYSTEM

The additional units used in conjunction with the KN 72 must meet the specifications listed below to comprise a completely TSO'd VOR/ILS system:

1.7.1 NAVIGATION RECEIVER REQUIREMENTS FOR USE WITH KN 72

A. The navigation receiver shall meet all applicable requirements of TSO C40a and TSO C36c.

B. VOR phase error shall not exceed 1.5^{o}.

C. Variation in VOR composite output to not exceed ±3dB from .500VRMS as the RF input level of a standard VOR test signal to the receiver is varied from 10 to 10,000uv.

D. Variation in the LOC composite output shall not exceed ±2dB from .333VRMS as the RF input level of a standard localizer centering signal is varied from 50 to 10,000uv.

E. A control line (ILS Energize) must be provided as a low impedance to ground when an ILS frequency is selected.

1.7.2 INDICATOR REQUIREMENTS FOR USE WITH KN 72

A. The indicator shall meet all applicable requirements of TSO C40a and TSO C36c.

B. Current required for a centered course deviation indicator shall be 0 ±3ua into a 1000 ohm load.

C. Current required for 3/8 inch deflection shall be 90 ±9ua into a 1000 ohm load.

D. Pointer deflection in inches proportional to current within 10%.

E. Current for a fully revealed warning flag shall be 125ua maximum into a 1000 ohm load.

CHAPTER 02

SECTION II
INSTALLATION

2.1 GENERAL INFORMATION

This section contains information needed to correctly install the KN 72. The installing agency must review this information prior to installation to assure best performance from the equipment.

2.2 UNPACKING AND INSPECTING EQUIPMENT

Exercise extreme care when unpacking the equipment. Make a visual inspection of the unit for evidence of damage incurred during shipment. If a claim for damage is to be made, save the shipping container to substantiate the claim. The claim should be promptly filed with the transportation company. It would be advisable to retain the container and packaging material after all equipment has been removed in the event that equipment storage or reshipment should become necessary.

2.3 EQUIPMENT INSTALLATION

The KN 72 should be installed in accordance with standards established by the customer's installing agency, and existing conditions as to unit location and type of installation. However, the following suggestions should be considered before installing the KN 72. Close adherence to these suggestions will assure a more satisfactory performance from the equipment. The installation agency will supply and fabricate all external cables. The connectors required are supplied by King Radio.

NOTE

1. Use good quality stranded wire with at least 600 volt insulation that will not support a flame.
2. Allow adequate space for installation of cable and connectors. Avoid sharp bends and placing the cables too near the aircraft control cables.
3. If more than one glideslope receiver is to be operated from a single antenna, an antenna coupler such as the Dorne and Margolin Inc. (Model DMH 24-1) or equivalent should be used.

2.3.1 SINGLE UNIT MOUNTED HORIZONTALLY (Installation Kit 050-1555-00)

A. Select the KN 72 location. The KN 72 is mounted rigid.

B. Refer to the outline and dimension drawing, Figure 2-2, for the KN 72 mounting dimensions.

C. Mark, punch, and drill four mounting holes.

D. Use four #8 screws and the four holes drilled in step C to secure the flanges of the KN 72 in place.

2.3.2 SINGLE UNIT MOUNTED VERTICALLY (Installation Kit 050-1555-00)

A. Select the KN 72 location. The KN 72 is mounted rigid.

B. Refer to the outline and dimension drawing, Figure 2-2, for the KN 72 mounting dimensions.

C. Mark, punch, and drill two mounting holes.

D. Use two #8 screws and the two holes drilled in step C to secure the flanges of the KN 72 in place.

2.3.3 SINGLE UNIT MOUNTED VERTICALLY IN MOUNTING RACK (Installation Kits 050-1555-00 and 050-1555-02)

A. Select the KN 72 location. The KN 72 is mounted rigid.

B. Using the mounting rack as as template, mark, punch, and drill four mounting holes.

C. Use four #8, 82° flat head screws and the four holes drilled in step C to secure the mounting rack firmly in place.

D. Slide the KN 72 into the rack. Using the hold down clamp on the front of the equipment rack, secure the KN 72 to the mounting rack.

2.3.4 TWO UNITS MOUNTED VERTICALLY (Installation Kit 050-1555-01; also required - one 050-1555-00 for each KN 72 and One 050-1627-00 for each KN 75)

A. Select the location for the two KN 72's (or KN 72 and KN 75) side by side with the front connectors facing the same direction.

B. Refer to the outline and dimension drawing, Figure 2-2, for the KN 72's mounting dimensions.

C. Mark, punch, and drill four mounting holes.

D. Use four #8 screws and the four holes drilled in step C to secure the flanges of the two side-by-side KN 72's in place.

E. Attach straps (047-4217-01) to the front and rear top as shown in Figure 2-6. Utilize the four lockwashers (089-8005-22) and the KN 72/75 panel screws to secure the two straps in place (047-4216-01 straps left over).

2.3.5 TWO UNITS MOUNTED HORIZONTALLY (Installation Kit 050-1555-01 and one kit, 050-1555-00 for each KN 72 and one 050-1627-00 for each KN 75)

A. Select the KN 72's (or KN 72 and KN 75) location. The KN 72's are mounted rigid.

B. Refer to the outline and dimension drawing, Figure 2-2, for the KN 72 mounting dimensions.

C. Mark, punch, and drill four mounting holes for one KN 72.

D. Use four #8 screws and the four holes drilled in step C to secure the flanges of one KN 72 in place.

E. Place the second KN 72 on top of the first KN 72 which is already secured in place. Be sure both front connectors face the same direction.

F. Attach straps (047-4217-01) to the front and rear top as shown in Figure 2-6. Utilize the four lockwashers (089-8005-22) and the KN 72/75 panel screws to secure the two straps in place.

G. Attach straps (047-4216-01) to the bottom of the front and rear flanges using four screws (039-5909-07) and four nuts (089-2148-22).

2.4 POST INSTALLATION CHECKOUT

Upon completion of the installation and before the aircraft is flown, the VOR/LOC navigation system should be fully checked out.

The KN 72 has externally accessible adjustements for VOR centering, localizer centering, and course width. These adjustments are made with a straight blade screwdriver with 1/8 inch blade. Location of the adjustments is shown in Figure 2-2.

When received from the factory, the KN 72 has been aligned using test equipment calibrated to less than .1 degree. Worst case error of the KN 72 at room temperature should not exceed 1 degree. Caution mut be exercised when resetting VOR and Localizer centering. If large corrections are required at the KN 72, another source of error may exist in the VOR/LOC navigation system.

The course width adjustment (see Figure 2-2 for location) allows for variations in the composite level of navigation receivers. It should be adjusted to give 150mv deflection voltage across a 1000 ohm load for a 10 degree VOR course error.

2.5 CABLE HARNESS AND CONNECTOR ASSEMBLY

The KN 72 uses a special connector that mates directly with the printed circuit board inside the unit. Assembly of the connector is as follows:

2.5.1 MOLEX CONNECTOR ASSEMBLY

A. Solderless Contact Terminal Assembly using Molex Crimper

Refer to instructions in Figure 2-1.

B. Solderless Contact Terminal Assembly using Pliers

1. Strip each wire 5/32" for contact terminal (KPN 030-1107-30). (The last two digits of the contact terminal part number indicate the number of terminals furnished).

2. Tin the exposed conductor.

3. Using needle nose pliers, fold over each conductor tab in turn, onto the exposed conductor. When both tabs have been folded, firmly press the tabs against the conductor.

4. Repeat step 3 for insulator tabs.

5. Apply a small amount of solder (using minimum heat) to the conductor/tab connection to assure a good electromechanical joint.

C. Contact Insertion into Molex Connector Housing

1. 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 (KPN 030-1094-51). 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.

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

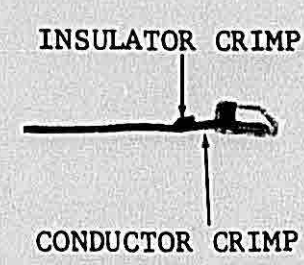
D. Extraction of Contact from Molex Connector

If a contact is inserted into the wrong connector position, or if an installation wiring change is desired, the Molex contact can be easily removed.

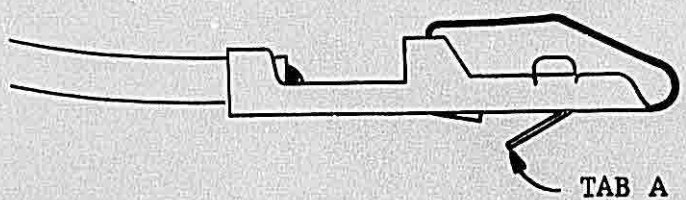
1. Slip the flat narrow blade of a Molex contact ejector tool, HT-1894 (KPN 005-2012-11), under the contact on the mating side of the connector. By turning the connector upside down one can see the blade slide into the stop.

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

3. Neither the contact or position is damaged by removing a contact; however, the contact should be checked visually before reinstalling in connector, to be certain that retaining tab "A" extends as shown (see Figure 2-1) for retention in connector.



SOLDERLESS CONTACT TERMINAL
KPN 030-1107-



HAND EJECTOR
KPN 005-2012-11
MOLEX PN HT-1884

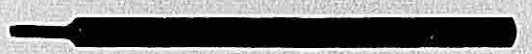
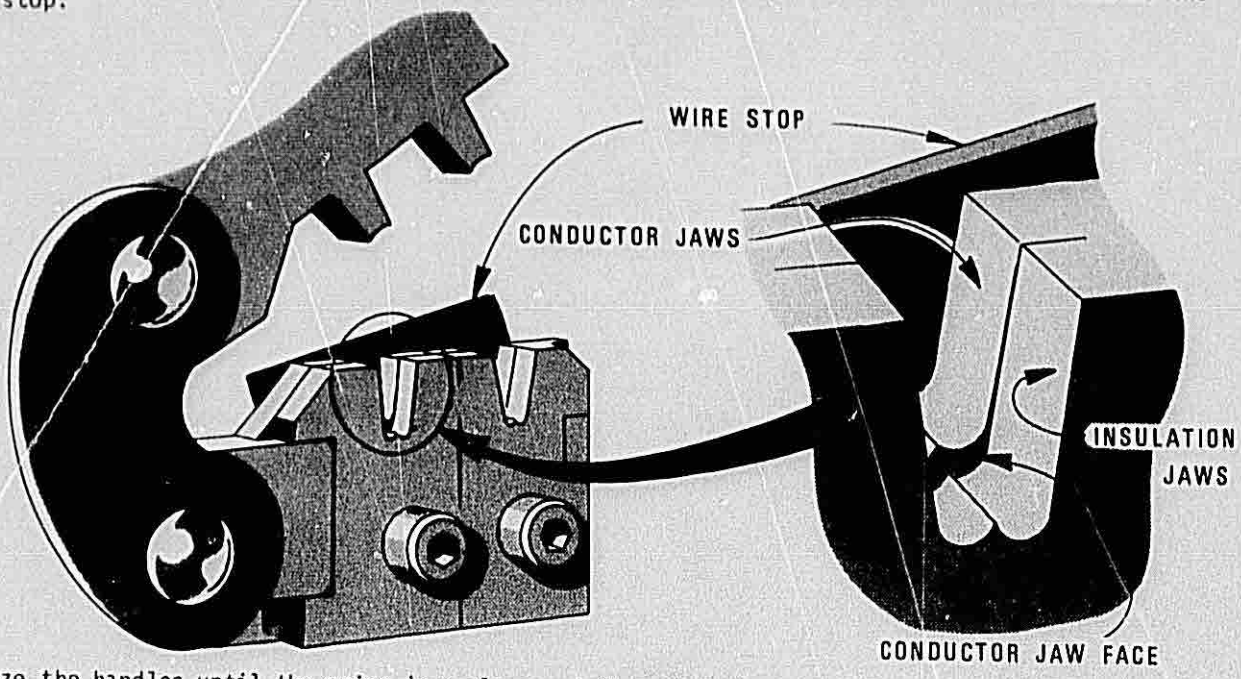


FIGURE 2-1 SOLDERLESS TERMINALS AND TOOLS
(Dwg. No. 696-6333-00, R-0)
(Sheet 1 of 3)

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

Strip the wire insulation back 1/8 inch 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.

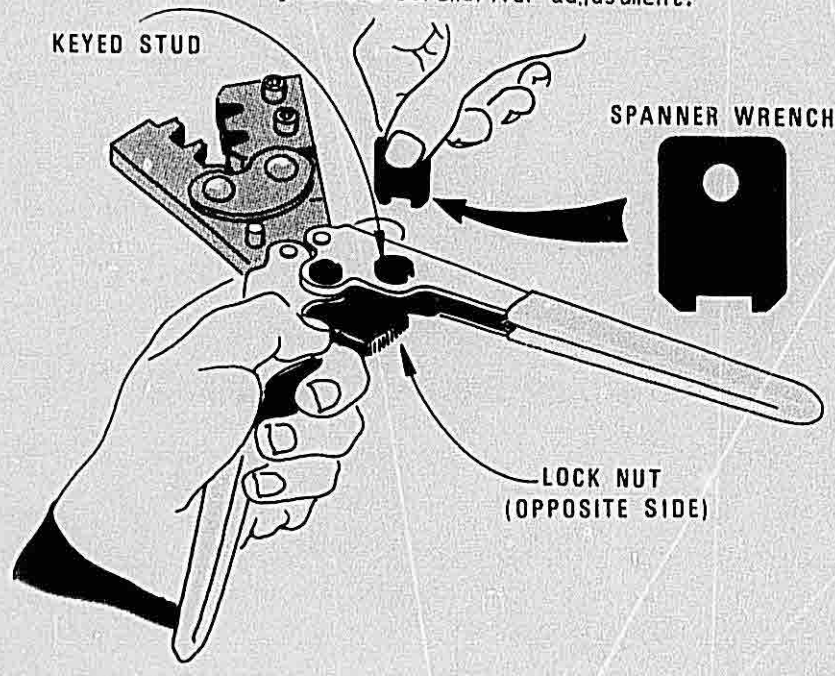
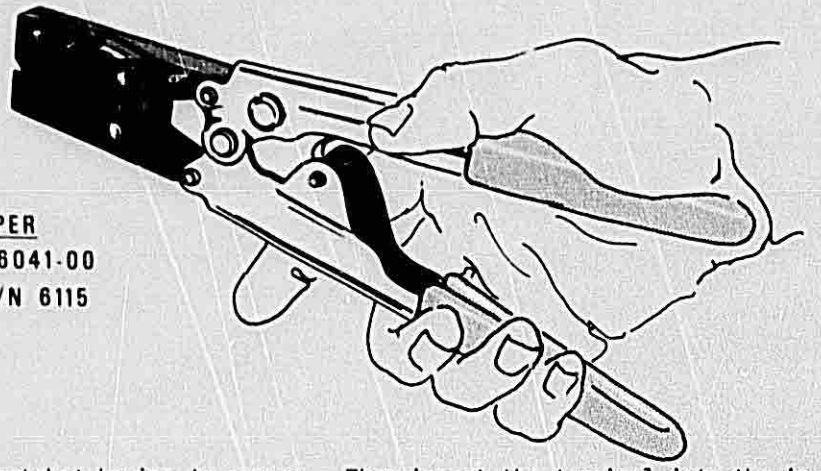


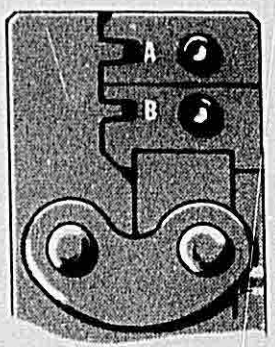
FIGURE 2-1 SOLDERLESS TERMINALS AND TOOLS
(Sheet 2 of 3)

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

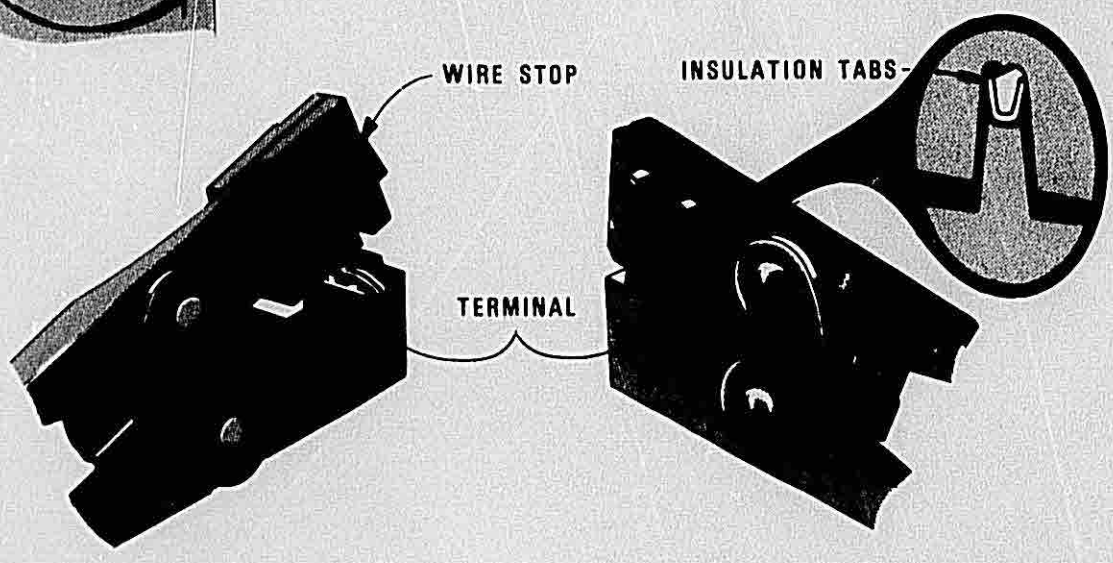


HAND CRIMPER
KPN 071-6041-00
MOLEX P/N 6115

Close crimpers until ratchet begins to engage. Then insert the terminal into the jaws from the back side. (See Figures at bottom of page) For 24 to 30AWG wire, it will be necessary to start the crimp in jaw A and then complete it in jaw B.



JAW	TERMINAL	WIRE SIZE	INSULATION RANGE
A	030-1107-	18 to 24 AWG	.110 to .055
B	030-1107-	24 to 30AWG	.055 to .030

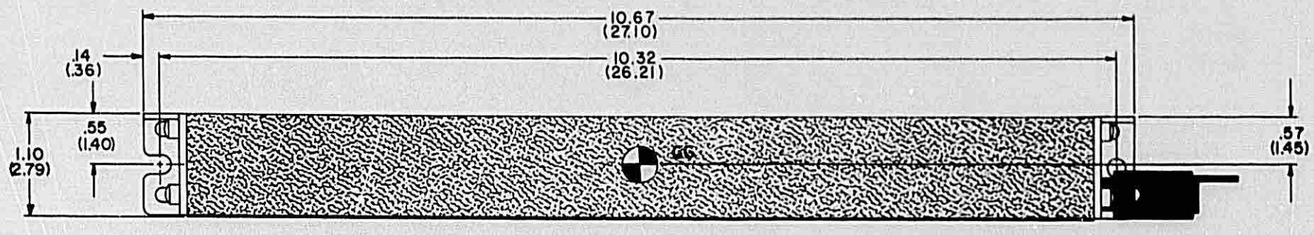


Terminal is in correct position when insulation tabs are flush with outside face of crimp jaws.

FIGURE 2-1 SOLDERLESS TERMINALS AND TOOLS
(Sheet 3 of 3)

KING

KN 72
VOR/LOC CONVERTER



NOTES:
1. DIMENSIONS IN ( ) ARE IN CENTIMETERS.
2. WEIGHT: 1.3 LBS. (.5897 Kg).

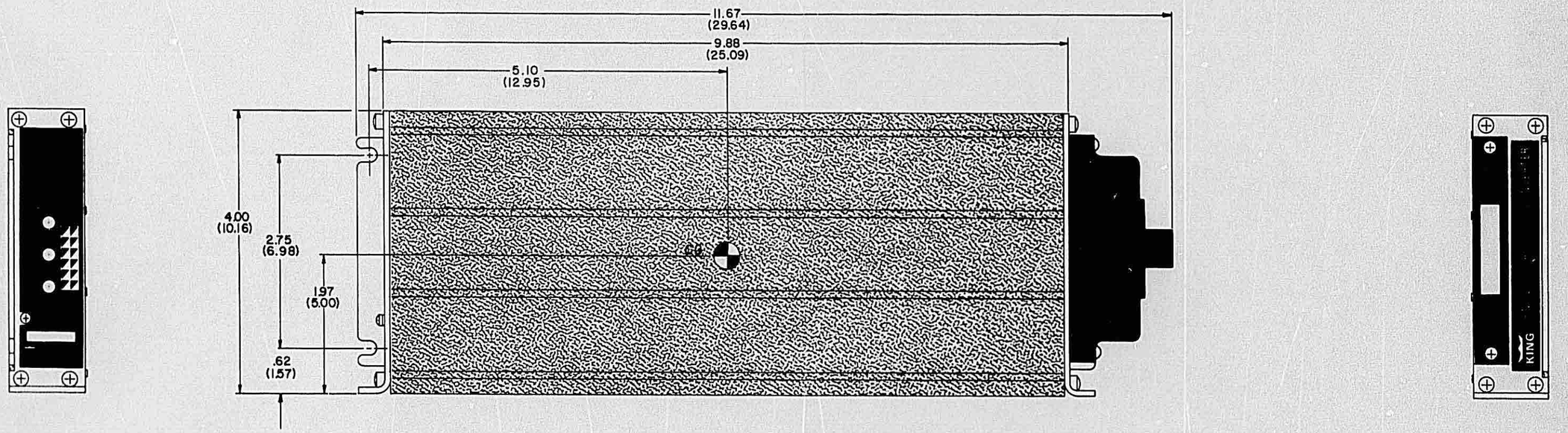
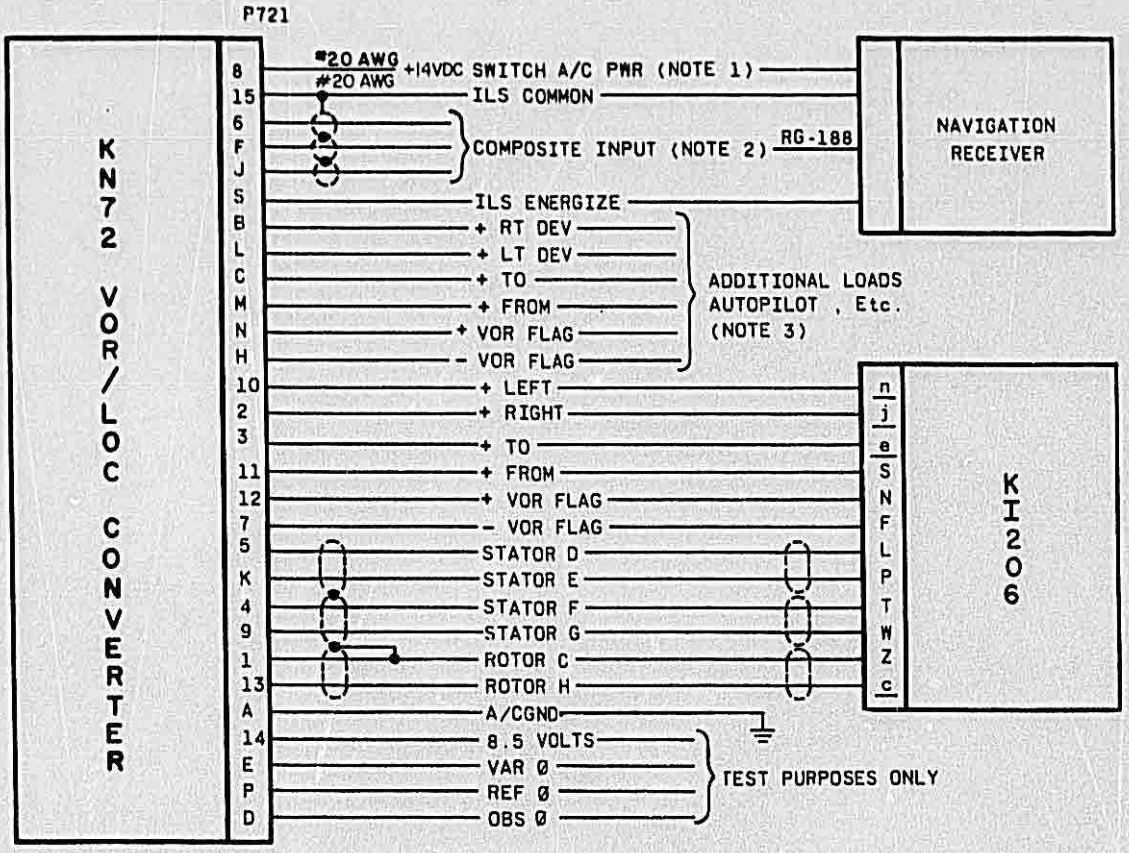


FIGURE 2-2 KN 72 INSTALLATION DRAWING
(Dwg. No. 155-5252-00, R-0)

KING

KN 72
VOR/LOC CONVERTER



NOTE; 1. PIN 8 IS 13.75 VDC INPUT, 27.5VDC INPUT IS PIN R.

2. COMPOSITE INPUTS ARE AS FOLLOWS:
   PIN 6= .5VRMS±10% ARINC PHASE COMPOSITE
   PIN F= 3VRMS±10% OUT OF PHASE COMPOSITE
   PIN J= .3VRMS±10% OUT OF PHASE COMPOSITE

3. EXTERNAL LOADS: DEVIATION=FIVE 1000 OHM LOADS
   FLAG= THREE 1000 OHM LOADS
   TO/FROM= THREE 200 OHM LOADS

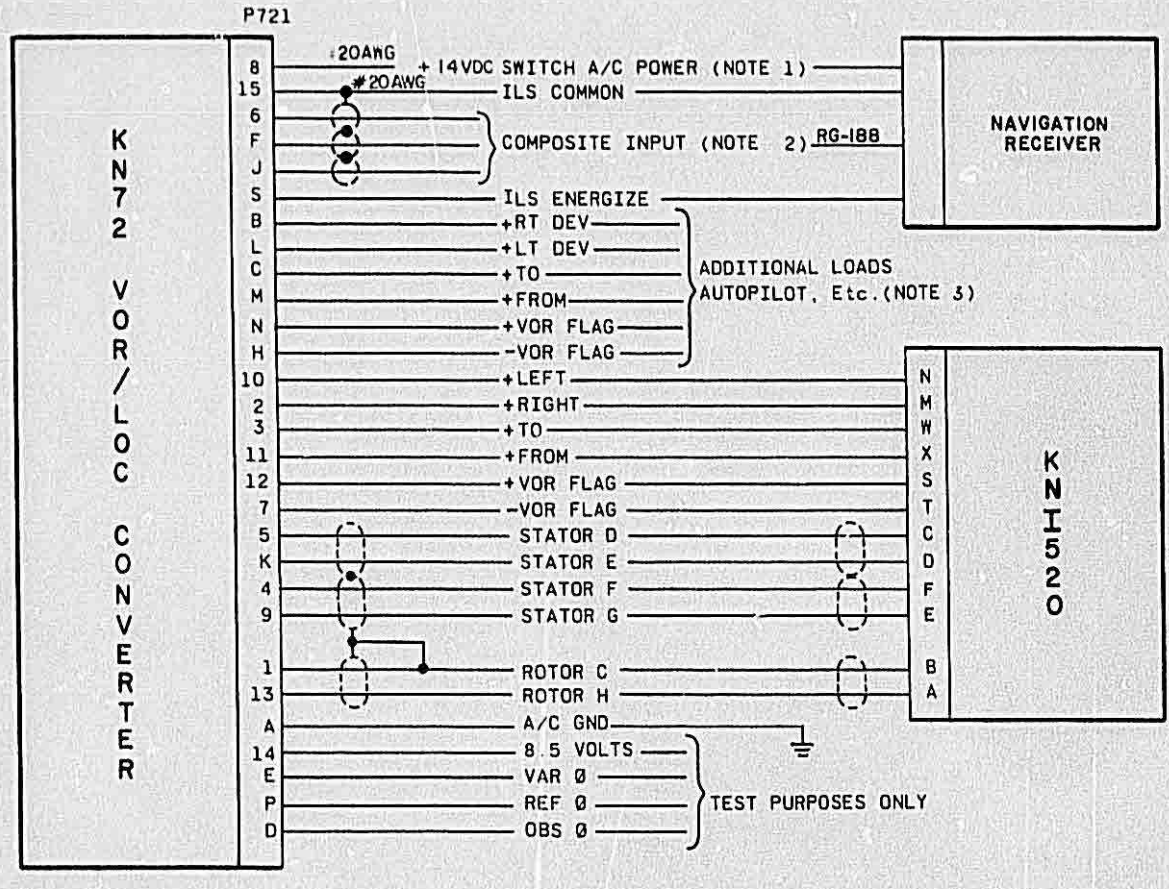
4. ALL WIRES NO. 24 AWG UNLESS NOTED.

5. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-3 KN 72 INTERCONNECT WIRING DIAGRAM
(Dwg. No. 155-1246-00, R-1)

KING

KN 72
VOR/LOC CONVERTER



NOTES:
1. PIN 8 is 13.75 VDC INPUT; 27.5 VDC INPUT IS PIN R.
2. COMPOSITE INPUTS ARE AS FOLLOWS: PIN 6-.5VRMS ±10% ARINC PHASE COMPOSITE
   PIN F- 3VRMS ±10% OUT OF PHASE COMPOSITE
   PIN J-.3VRMS ±10% OUT OF PHASE COMPOSITE
3. EXTERNAL LOADS: DEVIATION-FIVE 1000Ω LOADS
   FLAG-THREE 1000Ω LOADS
   TO-FROM.THREE 200Ω LOADS
4. ALL WIRES NO. 24AWG UNLESS NOTED.
5. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-4 KN 72/KNI 520 INTERCONNECT WIRING DIAGRAM
(Dwg. No. 155-1245-00, R-2)

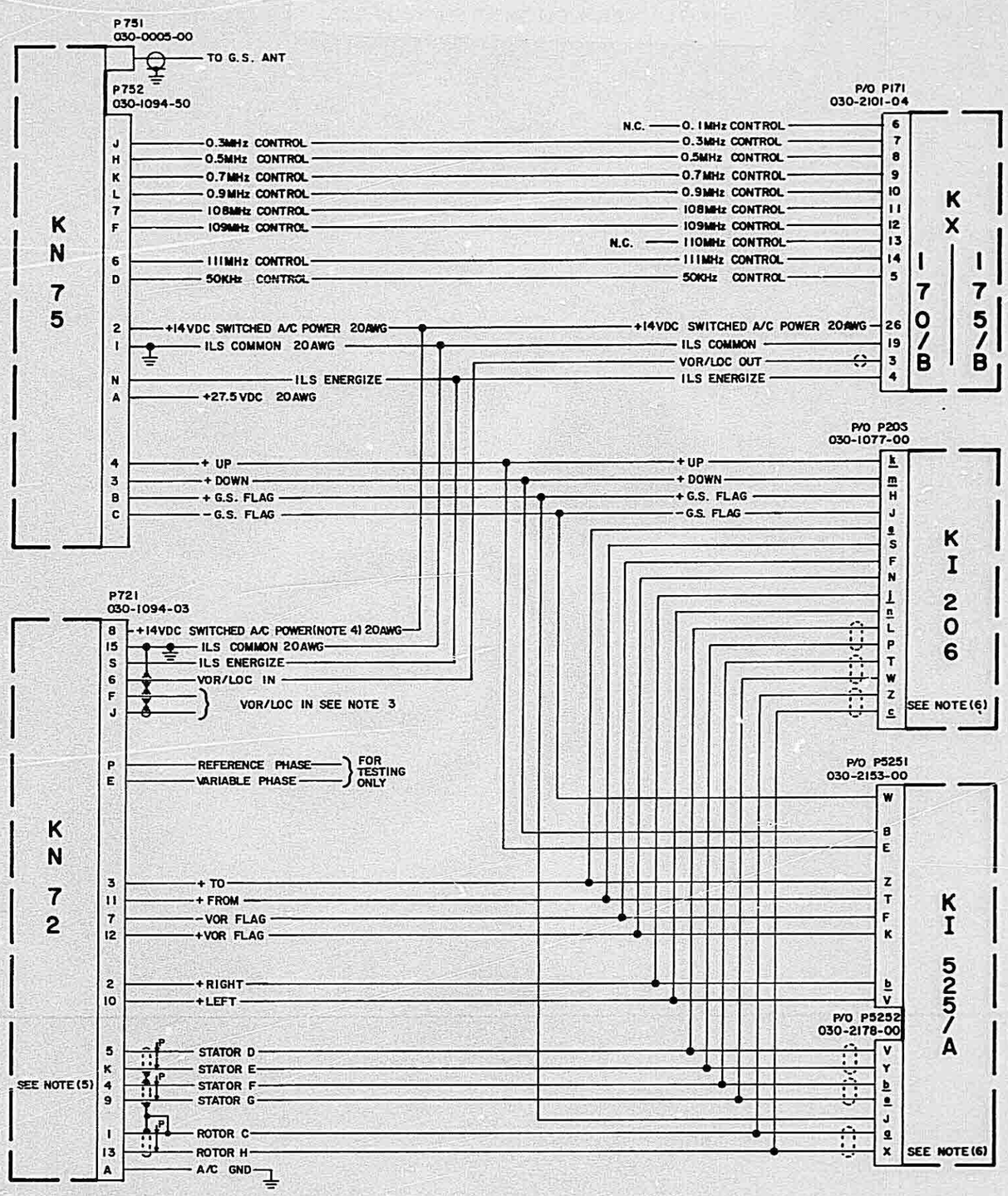
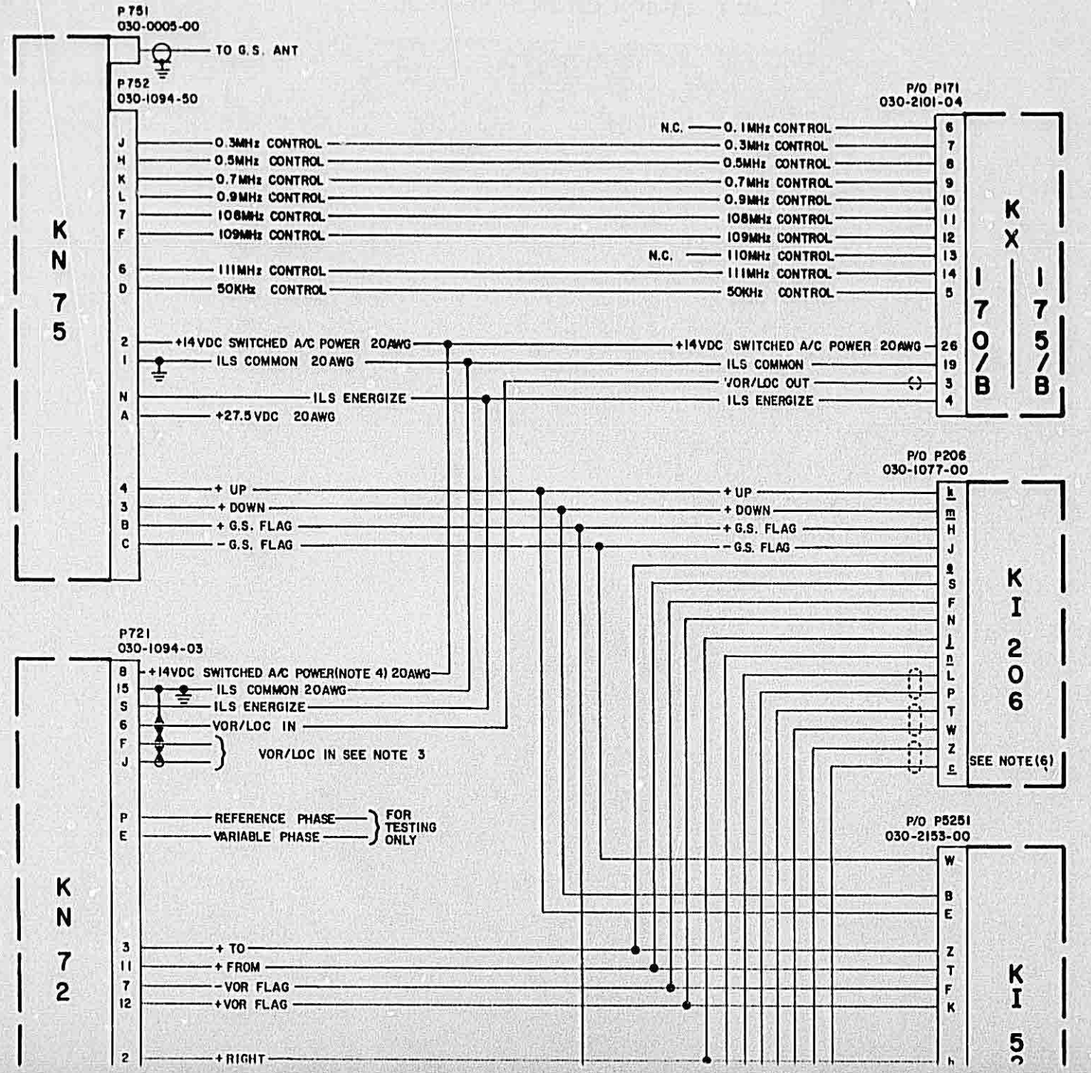


FIGURE 2-5 KN 72/KN 75 TO KX 170B, KX 175B, KI 206 INTERCONNECT
(Dwg. No. 155-1340-00, R-01)

NOTES:

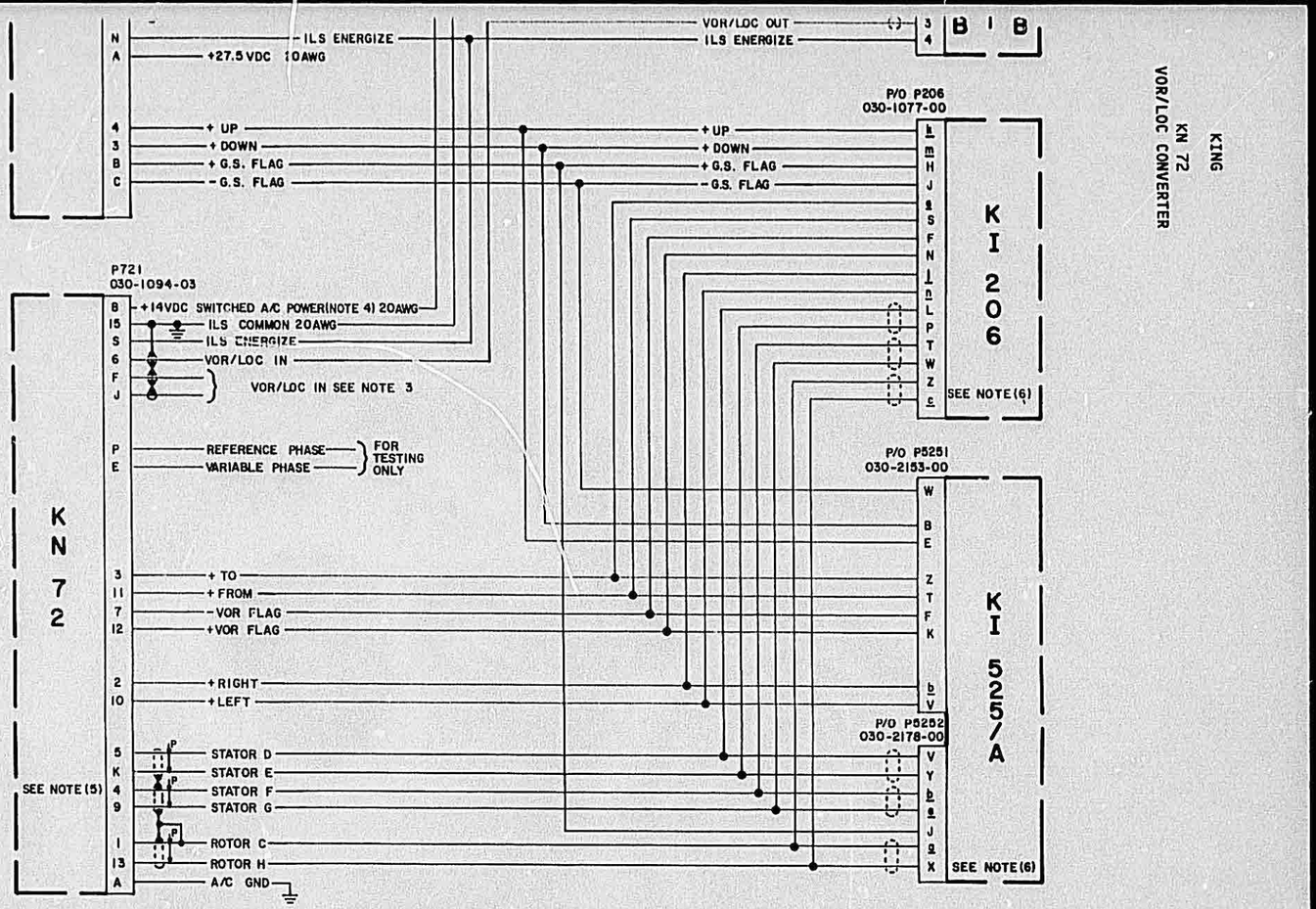
1. UNLESS NOTED, ALL WIRES TO BE 24 AWG MINIMUM.
2. UNLESS NOTED, ALL SYSTEM GROUNDS ARE AIRFRAME GROUNDS.
3. COMPOSITE INPUTS ARE AS FOLLOWS:
   PIN 6 = .5VRMS ±10% ARINC PHASE COMPOSITE.
   PIN F = 3VRMS ±10% OUT OF PHASE COMPOSITE.
   PIN J = .3VRMS ±10% OUT OF PHASE COMPOSITE.
4. PIN 8 IS 13.5 VDS INPUT, 27.5VDC INPUT IS PIN R.
5. RESOLVER PINS SHOWN CONNECTED TO BOTH KI 206 AND KI 525/A ARE FOR REFERENCE ONLY. IN ACTUAL INSTALLATION ONLY ONE RESOLVER WILL BE WIRED TO KN72.
6. SEE UNIT INSTALLATION MANUAL FOR WIRING OF THE OPTIONAL COURSE DATUM SYNCRO.

ALSO SEE THIS PAGE AS UPPER/LOWER (NEXT)



KING
KN 72
VOR/LOC CONVERTER

FIGURE 2-5 KN 72/KN 75 TO KX 170B, KX 175B, KI 206 INTERCONNECT
(Dwg. No. 155-1340-00, R-0)



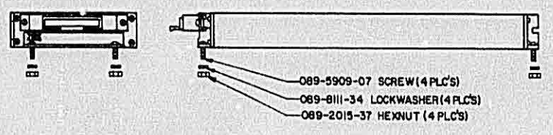
NOTES:

1. UNLESS NOTED, ALL WIRES TO BE 24 AWG MINIMUM.
2. UNLESS NOTED, ALL SYSTEM GROUNDS ARE AIRFRAME GROUNDS.
3. COMPOSITE INPUTS ARE AS FOLLOWS:
   PIN 6 = .5VRMS ±10% ARINC PHASE COMPOSITE.
   PIN F = 3VRMS ±10% OUT OF PHASE COMPOSITE.
   PIN J = .3VRMS ±10% OUT OF PHASE COMPOSITE.
4. PIN 8 IS 13.5 VDS INPUT, 27.5VDC INPUT IS PIN R.
5. RESOLVER PINS SHOWN CONNECTED TO BOTH KI 206 AND KI 525/A ARE FOR REFERENCE ONLY. IN ACTUAL INSTALLATION ONLY ONE RESOLVER WILL BE WIRED TO KN72.
6. SEE UNIT INSTALLATION MANUAL FOR WIRING OF THE OPTIONAL COURSE DATUM SYNCRO.

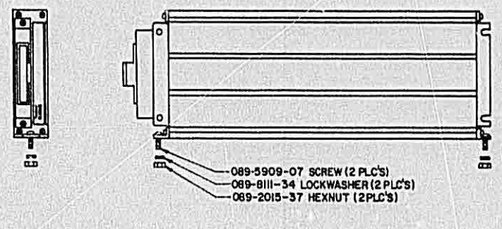
KING

KN 72
VOR/LOC CONVERTER

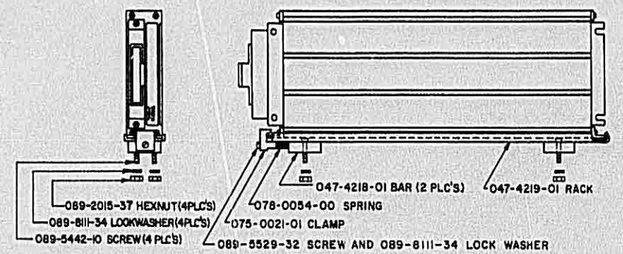
SINGLE UNIT MOUNTED HORIZONTALLY
REF. INSTALLATION KIT 050-1555-00



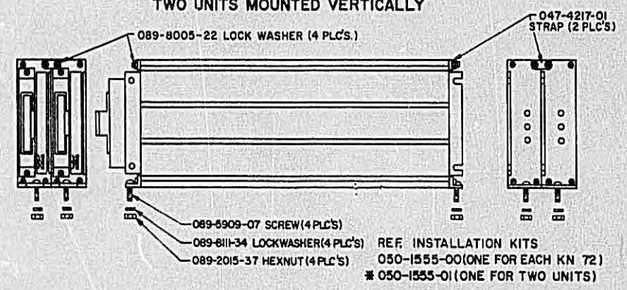
SINGLE UNIT MOUNTED VERTICALLY
REF. INSTALLATION KIT 050-1555-00



SINGLE UNIT MOUNTED VERTICALLY IN MOUNTING RACK
REF. INSTALLATION KITS 050-1555-00 & -02

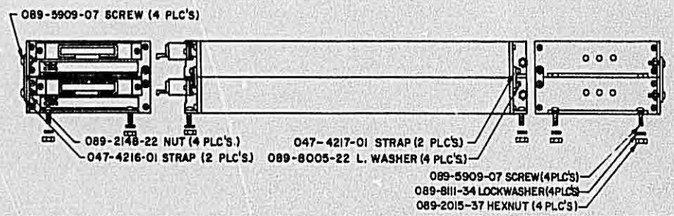


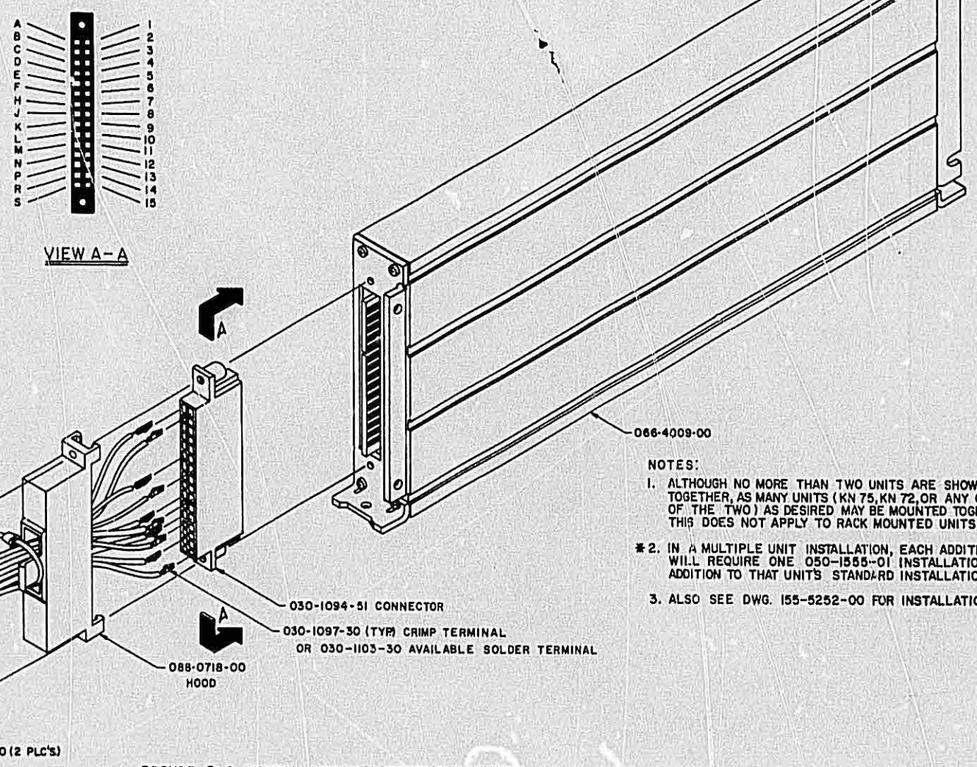
TWO UNITS MOUNTED VERTICALLY



REF. INSTALLATION KITS
050-1555-00 (ONE FOR EACH KN 72)
* 050-1555-01 (ONE FOR TWO UNITS)

TWO UNITS MOUNTED HORIZONTALLY
REF. INSTALLATION KITS 050-1555-00 (ONE FOR EACH KN 72)
* 050-1555-01 (ONE FOR TWO UNITS)





NOTES:

1. ALTHOUGH NO MORE THAN TWO UNITS ARE SHOWN MOUNTED TOGETHER, AS MANY UNITS (KN 75, KN 72, OR ANY COMBINATION OF THE TWO) AS DESIRED MAY BE MOUNTED TOGETHER THIS DOES NOT APPLY TO RACK MOUNTED UNITS.

*2. IN A MULTIPLE UNIT INSTALLATION, EACH ADDITIONAL UNIT WILL REQUIRE ONE 050-1555-01 INSTALLATION KIT IN ADDITION TO THAT UNITS STANDARD INSTALLATION KIT.

3. ALSO SEE DWG. 155-5252-00 FOR INSTALLATION.

FIGURE 2-6 INSTALLATION ASSEMBLY DRAWING
(Dwg. No. 300-2123-00, R-2)

CHAPTER 03

SECTION III
OPERATION

3.1 GENERAL

3.1.1 VOR OPERATION

Channel the NAV receiver to the desired VOR and monitor the audio to positively identify the station. To intercept a selected VOR radial, turn the OBS to set the desired radial under the lubber line. The left-right needle will now deflect in the direction of the desired radial. Flying toward needle deflection will bring the aircraft to the desired radial. To fly inbound toward the station, turn the OBS to center the left-right needle while the TO/FROM is indicating "TO". Read the bearing under the lubber line and fly that magnetic heading. When the aircraft passes over the station, the TO/FROM will momentarily disappear and then reappear as "FROM". This indicates the aircraft is outbound from the station.

3.1.2 LOC OPERATION

Localizer circuitry is energized when the NAV receiver is channeled to an ILS frequency. The VOR/LOC flag will be out of view when the signal is usable. Corrections for approach should be made toward the needle, as in VOR, but due to increased sensitivity, corrections are smaller. When flying inbound on a back course, deflection of the needle will be reversed.

3.2 UNIT CONTROL FUNCTIONS

The KN 72 is controlled entirely from the associated controls on the NAV receiver and VOR/LOC indicator.

KN 75

INSTL

MANUAL

BENDIX/KING

GENERAL AVIATION AVIONICS DIVISION

INSTALLATION MANUAL

KN 75

GLIDESLOPE RECEIVER

MANUAL NUMBER 006-00150-0001
REVISION 1, JULY, 1978

Allied-Signal Aerospace Company

Allied Signal

RECORD OF REVISIONS

ATP

MFG REV NO	DESCRIPTION	ISSUE DATE	ATP REV DATE	INSERTED BY
1		JAN 1977		ATP

RECORD OF TEMPORARY REVISIONS

TEMP REV NO	DESCRIPTION	ISSUE DATE	ATP REV DATE	INSERT BY	DATE REMOVED	REV INCOR	REMOVE BY

HISTORY OF REVISIONS

REVISION 0, JANUARY, 1977

REVISION 1, JULY, 1978

Complete manual rewrite to update and add mounting hardware to installation kits in 1.4.1B and 1.4.2B. Installation procedures information extensively expanded to provide more detailed instructions.

KING

KN 75
GLIDESLOPE RECEIVER

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SECTION I
GENERAL INFORMATION

SECTION II
INSTALLATION

SECTION III
OPERATION

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LIST OF ILLUSTRATIONS

CHAPTER 01

SECTION I
GENERAL INFORMATION

1.1 INTRODUCTION

This manual contains information relative to the physical, mechanical, and electrical characteristics of the King Radio Corporation Silver Crown KN 75. Information relative to the maintenance/alignment and procurement of replacement parts may be found in KN 75 maintenance/overhaul manual, King part number 006-5150-00.

1.2 EQUIPMENT DESCRIPTION

The King KN 75 glideslope receiver is a TSO'd 40 channel unit which can be used with many different navigation receivers which provide glideslope channeling. Two out of five, BCD, eleven or twelve wire codes may be used as well as KX 170/175 series codes. (Please refer to interconnect diagrams for the specific application). The unit is designed to work in conjunction with external indicators such as the KI 204/KI 206/209/KI 525A Horizontal Situation Indicator system as well as indicators of other manufacturers which have ARINC characteristics.

The KN 75 consists of a glideslope receiver enclosed in a remote mounted case. Connections to the KN 75 are made through a 24 pin connector on the front panel of the unit. The unit may be mounted in any position and requires no shock mounting. The KN 75 is mechanically similar to the KN 72 and various mounting combinations are possible. These units may be mounted alone in a vertical or horizontal position. A mounting rack option is available for the single unit mounted vertically. Dual mounting kits are available for two units mounted in either a vertical or horizontal position. In these configurations, two KN 75's or one KN 75 and one KN 72 may be mounted together.

The glideslope receiver is solid state and contains the circuitry necessary to receive glideslope signals and convert them into DC voltages to drive external ARINC characteristic indicators. The receiver is capable of driving eight 1000 ohm deviation loads and nine 1000 ohm alarm flag loads. External controls available are glideslope zero and course width.

1.3 TECHNICAL CHARACTERISTICS

Minimum performance requirements under standard conditions (ambient room temperature and humidity).

SPECIFICATION	CHARACTERISTIC
PHYSICAL DIMENSIONS (unit only):	
Width:	1.1 in. (2.79 cm)
Height:	4.00 in. (10.16 cm)
Depth:	10.67 in. (27.10 cm)
TSO CATEGORIES:	C34c Operation Performance Category II Class D DO-138 Env. Cat. BA/JN/AZAXXXXXX
OVERALL MOUNTING WITH CONNECTOR INCLUDED: (SOLID MOUNT)	
Width:	1.1 in. (2.79 cm)
Height:	4.00 in. (10.16 cm)
Depth:	11.67 in. (29.64 cm)
OVERALL MOUNTING WITH CONNECTOR AND OPTIONAL MOUNTING RACK INCLUDED:	
Width:	1.25 in. (3.175 cm)
Height:	4.36 in. (11.07 cm)
Depth:	11.75 in. (29.85 cm)
MOUNTING:	Rigid, any position

KING

KN 75
GLIDESLOPE RECEIVER

SPECIFICATION	CHARACTERISTIC
WEIGHT:	1.5 lbs (.68 Kg) (unit only) 1.6 lbs (.72 Kg) (mounting rack and connector included)
POWER REQUIREMENTS:	13.75V or 27.5VDC: 225ma max.
CENTERING ACCURACY:	Centering accuracy of less than +10ua under all service conditions (Operation Performance Category II, Class D)
DEFLECTION CHARACTERISTICS:	A difference in depth of modulation of 0.091ddm, or 2dB, shall produce a deflection of 78ua (typ.) The deviation under opposite polarity shall be 78 $\pm$ 3ua (typ.)
SELECTIVITY:	Less than 6dB variation when the frequency is varied +21KHz. At least 60dB down from 329.00MHz to 335.30MHz excluding the range from $\pm$129KHz of center frequency.
NUMBER OF CHANNELS:	40 (150KHz spacing)
FREQUENCY RANGE:	329.15MHz to 335.00MHz
INPUT IMPEDANCE:	50 ohms
SENSITIVITY:	20uv or less for 60% of standard deflection
SPURIOUS RESPONSE:	All responses in the range from 90KHz to 1500MHz at least 60dB below center frequency response, excluding the range from 329.00MHz to 335.30MHz.
TEMPERATURE:	-46°C to +55°C for continuous operation (Short time operation to 71°C)
ALTITUDE:	to 30,000 feet
VIBRATION:	Meets TSO requirements for fuselage mount and fuselage mounted equipment racks in piston and turbine engine rotary wing aircraft, turbo engine fixed wing aircraft, single and multiple engine aircraft.
DESIGN:	Solid state remote mounted unit. Capable of operating with standard ARINC meter loads.
DUTY CYCLE:	Continuous
LOADS:	Capable of operating eight 1000 ohm deviation loads and nine 1000 ohm alarm flag loads.

1.4 UNITS AND ACCESSORIES

1.4.1 UNITS AND ACCESSORIES SUPPLIED

A. King KN 75 (066-1063-00)

B. King KN 75 (single unit) Installation Kit 050-1627-00 consists of:
(Refer to Figure 2-4 and Figure 2-5)

KPN	DESCRIPTION	QTY	VENDOR
030-0005-00	BNC connector	1	TED
030-1094-50	Card edge connector with polarizer	1	King Radio Corp.
030-1107-24	Terminals (9 spares)	4366	Molex
088-0752-00	Connector hood	1	KRC
089-2015-37	Nut Hex	4	KRC
089-5909-07	Screw PHP	4	KRC
089-6541-00	Screw 4-40 PHP special	2	KRC
089-8111-34	Washer, Split Lock #8	4	KRC
091-0109-01	Cable Tie	1	Thomas and Betts

1.4.2 OPTIONAL ACCESSORIES

A. King KN 75 Dual Mounting Installation Kit 050-1555-01 consists of:
(Refer to Figure 2-4 and Figure 2-5)

KPN	DESCRIPTION	QTY
047-4216-01	Tie Strap	2 (not used on vertical mounting)
047-4217-01	Tie Strap	2
089-2148-22	Nut, Hex, Reduced	4 (not used on vertical mounting)
089-5909-07	Screw 8-32 x 7-16 Lg.	4 (not used on vertical mounting)
089-8005-22	Washer, Split-lock	4

NOTE

One Installation Kit, 050-1627-00, required per unit.

B. King KN 75 (single unit, vertical, rack mounted) Installation Kit 050-1555-02 consists of:
(Refer to Figure 2-4 and Figure 2-5)

KPN	DESCRIPTION	QTY
047-4218-01	Hold Down Bar	2
047-4219-01	Mounting Rack	1
075-0021-01	Hold Down Clamp	1
078-0054-00	Compression Spring	1
089-2015-37	Nut Hex	4
089-5442-10	Screw 8-32 FHP	4
089-5529-32	Fil Hd P	1
089-8111-34	Washer, Split Lock #8	1

NOTE

One Installation Kit, 050-1627-00, required per unit.

1.5 ACCESSORIES REQUIRED, BUT NOT SUPPLIED

Glideslope Antenna, Cable, and GS Indicator

1.6 LICENSE REQUIREMENTS

No special Federal Communications License is required to operate the KN 75.

1.7 REQUIREMENTS FOR TSO'D GLIDESLOPE SYSTEM

Indicators used in conjunction with the King KN 75 must meet the specifications listed below to comprise a completely TSO'd glideslope receiver system.

A. The Indicator shall meet all applicable requirements of TSO C34c.

B. Centering current to be 0 ± 6ua with 95% probability under all environmental conditions listed in RTCA Paper DO-132, Minimum Performance Standards -- Airborne ILS Glideslope Receiving Equipment Paragraph 2.1 sub-paragraph b, Centering Accuracy.

C. The Course Deviation Pointer shall visibly deflect at least ±5/8 inch along its scale when the input current is changed from zero to ±150ua.

D. Deflection linearity over the deflection range from zero to 150ua shall be within 10% of being proportional to the input current. Additionally, as the current is increased beyond that producing full scale deflection to a value of ±685.7ua, the indicator deflection shall not decrease.

E. When the input current is abruptly changed from any value from zero to ±150ua, the pointer shall reach 67% of its ultimate deflection within 2 seconds and pointer overshoot shall not exceed 5%.

F. The input impedance shall be 1 K ohms ±5% for both the deviation indicator and warning signal.

G. A warning signal input current of 150ua or less shall produce a fully visible warning flag. A warning signal input current of 260ua or greater shall produce a fully concealed warning flag.

CHAPTER 02

SECTION II
INSTALLATION

2.1 GENERAL INFORMATION

Installation of the KN 75 will differ according to the number of indicators installed, equipment location and other factors. Cable harnesses will be fabricated by the installing agency to fit these various requirements. This section contains interconnect diagrams, mounting dimensions and information pertaining to installation.

2.2 UNPACKING AND INSPECTING EQUIPMENT

Exercise extreme care when unpacking the equipment. Make a visual inspection of the unit for evidence of damage incurred during shipment. If a claim for damage is to be made, save the shipping container to substantiate the claim. The claim should be promptly filed with the transportation company. It would be advisable to retain the container and packaging material after all equipment has been removed in the event that equipment storage or reshipment should become necessary.

2.3 EQUIPMENT INSTALLATION

The KN 75 should be installed in accordance with standards established by the customer's installing agency, and existing conditions as to unit location and type of installation. However, the following suggestions should be considered before installing the KN 75. Close adherence to these suggestions will assure a more satisfactory performance from the equipment. The installing agency will supply and fabricate all external cables. The connectors required are supplied by King Radio.

NOTE

1. Use good quality stranded wire with at least 600 volt insulation that will not support a flame.
2. Allow adequate space for installation of cable and connectors. Avoid sharp bends and placing the cables too near the aircraft control cables.
3. If more than one glideslope receiver is to be operated from a single antenna, an antenna coupler such as the Dorne and Margolin Inc. (Model DMH 24-1) or equivalent should be used.

2.3.1 SINGLE UNIT MOUNTED HORIZONTALLY (Installation Kit 050-1627-00)

A. Select the KN 75 location. The KN 75 is mounted rigid.

B. Refer to the outline and dimension drawing, Figure 2-3, for the KN 75 mounting dimensions.

C. Mark, punch, and drill four mounting holes.

D. Use four #8 screws and the four holes drilled in step C to secure the flanges of the KN 75 in place.

2.3.2 SINGLE UNIT MOUNTED VERTICALLY (Installation Kit 050-1627-00)

A. Select the KN 75 location. The KN 75 is mounted rigid.

B. Refer to the outline and dimension drawing, Figure 2-3, for the KN 75 mounting dimensions.

C. Mark, punch, and drill two mounting holes.

D. Use two #8 screws and the two holes drilled in step C to secure the flanges of the KN 75 in place.

2.3.3 SINGLE UNIT MOUNTED VERTICALLY IN MOUNTING RACK (Installation Kits 050-1555-02 and 050-1627-00)

A. Select the KN 75 location. The KN 75 is mounted rigid.

B. Using the mounting rack as as template, mark, punch, and drill four mounting holes.

C. Use four #8, 82° flat head screws and the four holes drilled in step C to secure the mounting rack firmly in place.

D. Slide the KN 75 into the rack. Using the hold down clamp on the front of the equipment rack, secure the KN 75 to the mounting rack.

2.3.4 TWO UNITS MOUNTED VERTICALLY (Installation Kit 050-1555-01; also required - one 050-1627-00 for each KN 75 and one 050-1627-00 for each KN 75)

A. Select the location for the two KN 75's (or KN 75 and KN 75) side by side with the front connectors facing the same direction.

B. Refer to the outline and dimension drawing, Figure 2-3, for the KN 75's mounting dimensions.

C. Mark, punch, and drill four mounting holes.

D. Use four #8 screws and the four holes drilled in step C to secure the flanges of the two side-by-side KN 75's in place.

E. Attach straps (047-4217-01) to the front and rear top as shown in Figure 2-6. Utilize the four lockwashers (089-8005-22) and the KN 75/75 panel screws to secure the two straps in place (047-4216-01 straps left over).

2.3.5 TWO UNITS MOUNTED HORIZONTALLY (Installation Kit 050-1555-01 and one kit, 050-1627-00 for each KN 75 and one 050-1627-00 for each KN 75)

A. Select the KN 75's (or KN 75 and KN 75) location. The KN 75's are mounted rigid.

B. Refer to the outline and dimension drawing, Figure 2-3, for the KN 75 mounting dimensions.

C. Mark, punch, and drill four mounting holes for one KN 75.

D. Use four #8 screws and the four holes drilled in step C to secure the flanges of one KN 75 in place.

E. Place the second KN 75 on top of the first KN 75 which is already secured in place. Be sure both front connectors face the same direction.

F. Attach straps (047-4217-01) to the front and rear top as shown in Figure 2-6. Utilize the four lockwashers (089-8005-22) and the KN 72/75 panel screws to secure the two straps in place.

G. Attach straps (047-4216-01) to the bottom of the front and rear flanges using four screws (089-5909-07) and four nuts (089-2148-22).

2.3.6. KN 75 Connectors

The KN 75 uses a special connector that mates directly with the printed circuit boards inside the unit. Assembly of the connector is as follow:

A. Solderless Contact Terminal Assembly using Molex Crimper

Refer to instructions in Figure 2-1.

B. Solderless Contact Terminal Assembly using Pliers

1. Strip each wire 5/32" for contact terminal (KPN 030-1107-24). (The last two digits of the contact terminal part number indicate the number of terminals furnished).

2. Tin the exposed conductor.

3. Using needle nose pliers, fold over each conductor tab in turn, onto the exposed conductor. When both tabs have been folded, firmly press the tabs against the conductor.

4. Repeat step 3 for insulator tabs.

5. Apply a small amount of solder (using minimum heat) to the conductor/tab connection to assure a good electromechanical joint.

C. Contact Insertion into Molex Connector Housing

CAUTION

EACH WIRE MUST BE ROUTED THROUGH THE CONNECTOR HOOD (KPN 088-0752-00) PRIOR TO INSERTION INTO THE CONNECTOR.

1. 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, (030-1094-50). The terminal connot be inserted upside down. Be sure to push the terminal all the way in, until a click can be felt or heard.

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

3. After all terminals have been secured in the connector, push the hood over the connector until a click can be felt or heard, and secure hood to harness with a cable tie as shown in Figure 2-1.

D. Extraction of Contact from Molex Connector

If a contact is inserted into the wrong connector position, or if an installation wiring change is desired, the Molex contact can be easily removed.

1. Slip the flat narrow blade of a Molex contact ejector tool, HT-1884 (KPN 005-2012-11), 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.

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

3. Neither the contact nor position is damaged by removing a contact; however, the contact should be checked visually before reinstalling in connector, to be certain that retaining tab "A" extends as shown (see Figure 2-1) for retention in connector.

KN 75
GLIDESLOPE RECEIVER

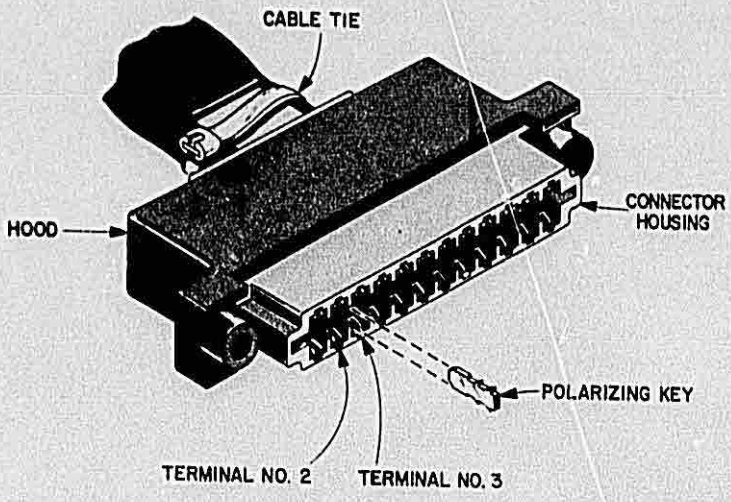
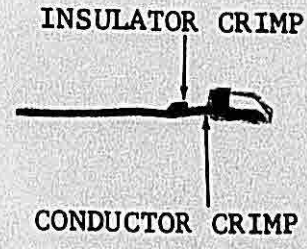
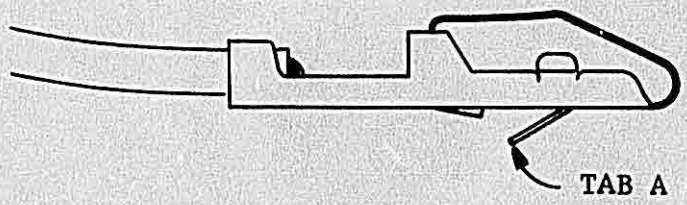


FIGURE 2-1 CONNECTOR ASSEMBLY



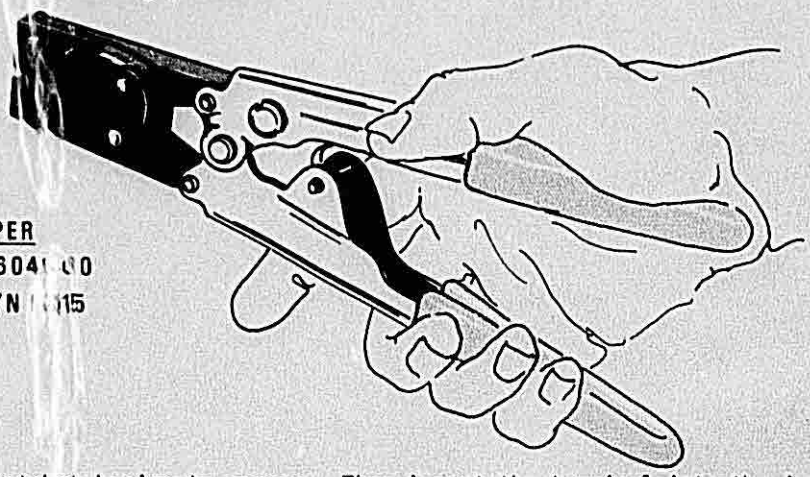
SOLDERLESS CONTACT TERMINAL
KPN 030-1107-30



HAND EJECTOR
KPN 005-2012-11
MOLEX PN HT-1884

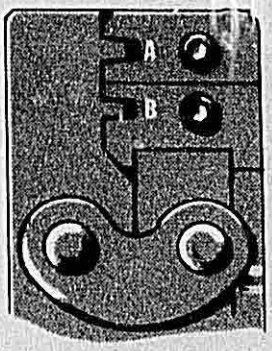
FIGURE 2-2 SOLDERLESS TERMINALS AND TOOLS
(Dwg. No. 696-6333-00, R-0)
(Sheet 1 of 3)

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

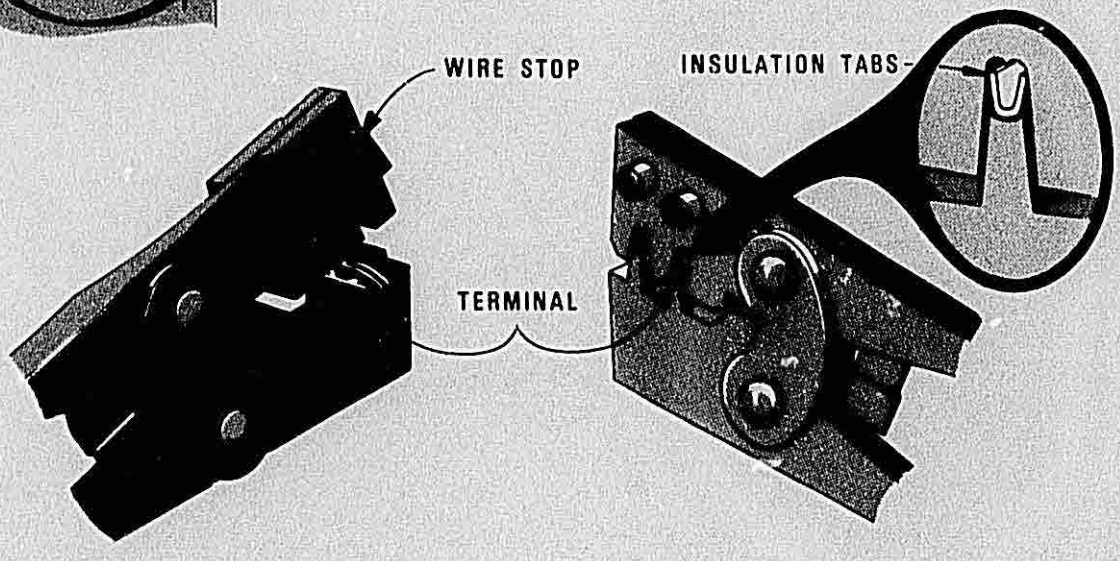


HAND CRIMPER
KPN 071-6041-00
MOLEX P/N 63815

Close crimpers until ratchet begins to engage. Then insert the terminal into the jaws from the back side. (See Figures at bottom of page) For 24 to 30AWG wire, it will be necessary to start the crimp in jaw A and then complete it in jaw B.



JAW	TERMINAL	WIRE SIZE	INSULATION RANGE
A	030-1107-30	18 to 24 AWG	.110 to .055
B	030-1107-30	24 to 30AWG	.055 to .030

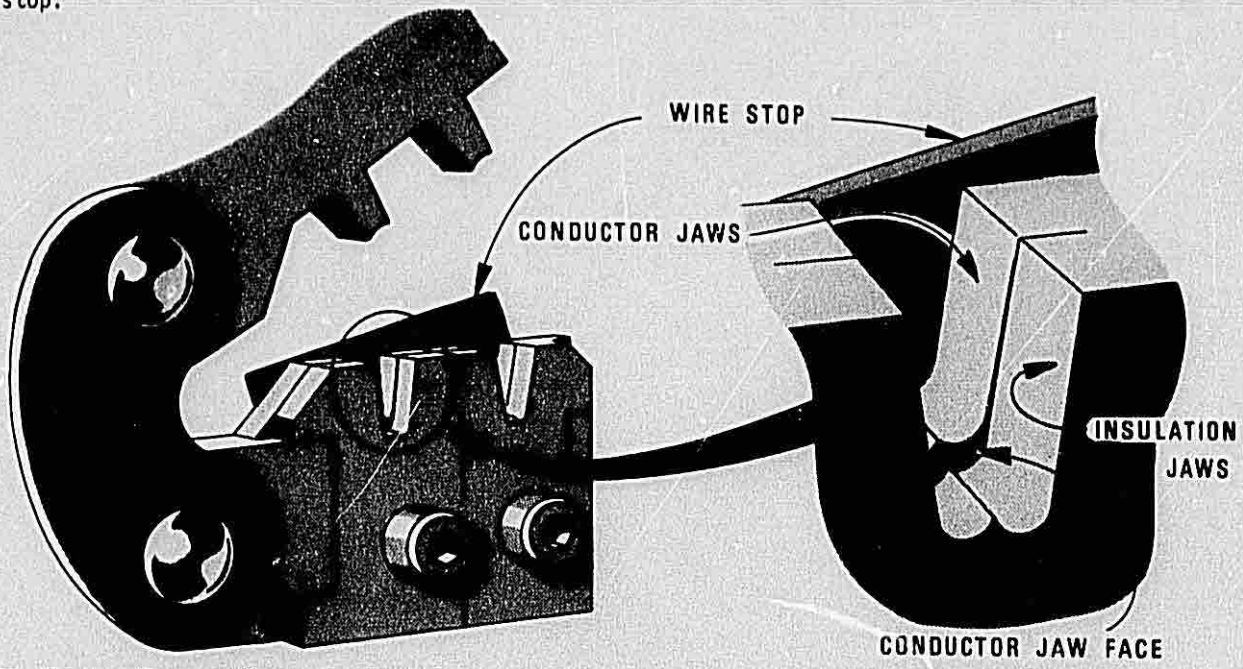


Terminal is in correct position when insulation tabs are flush with outside face of crimp jaws.

FIGURE 2-2 SOLDERLESS TERMINALS AND TOOLS
(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 wire stop down so that it rests snugly behind the contact portion of the terminal.

Strip the wire insulation back 1/8 inch 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.

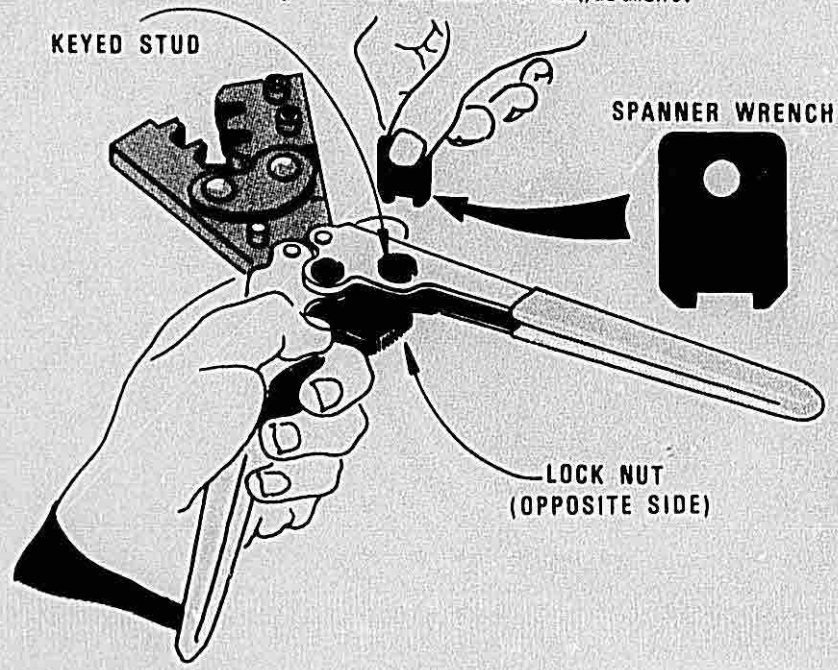
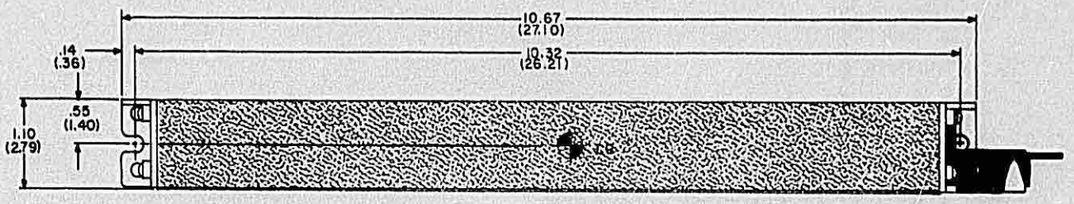


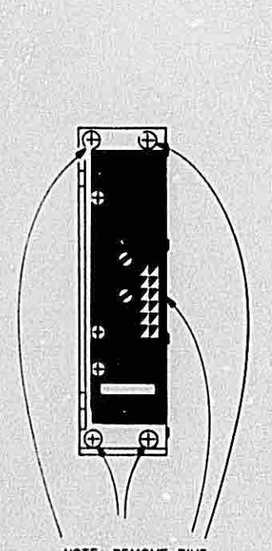
FIGURE 2-2 SOLDERLESS TERMINALS AND TOOLS
(Sheet 3 of 3)

KING

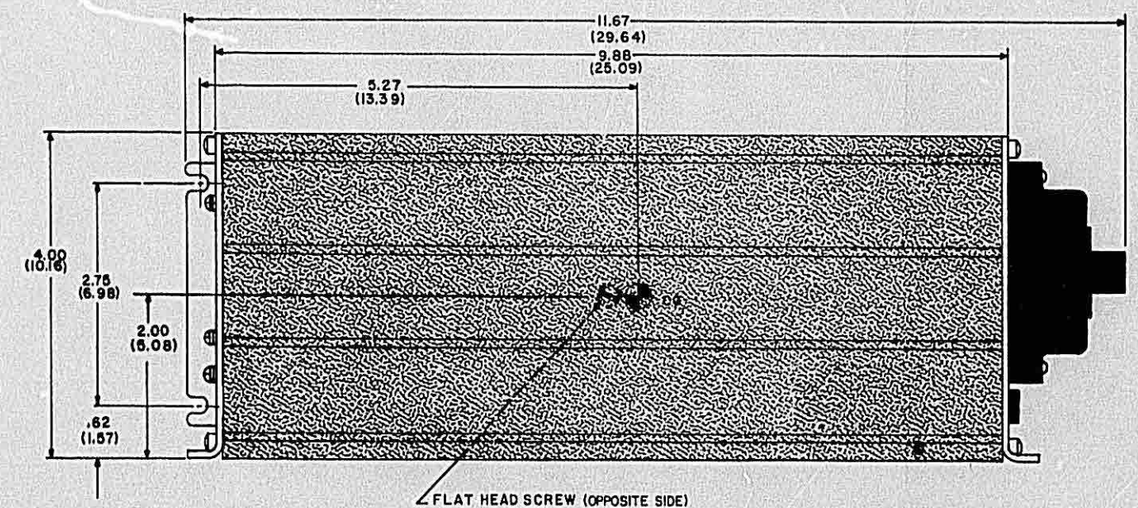
KN 75
GLIDESLOPE RECEIVER



NOTES:
1. DIMENSIONS IN ( ) ARE IN CENTIMETERS.
2. WEIGHT: 1.5LBS. (.6804Kg).
3. WHEN THE P.C. BOARD IS REMOVED FROM THE UNIT, A SLIGHT RESISTANCE WILL BE FELT. THIS IS DUE TO AN INTERFERENCE FIT CAUSED BY THE HEAD OF A NYLON SCREW RUBBING AGAINST THE CHASSIS EXTRUSION WHICH ENSURES GROUNDING AT THE EDGE OF THE P.C. BOARD TO THE CHASSIS.



NOTE: REMOVE FIVE SCREWS TO REMOVE UNIT FROM CASE.



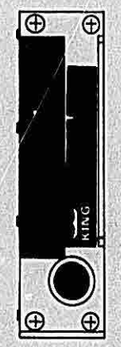


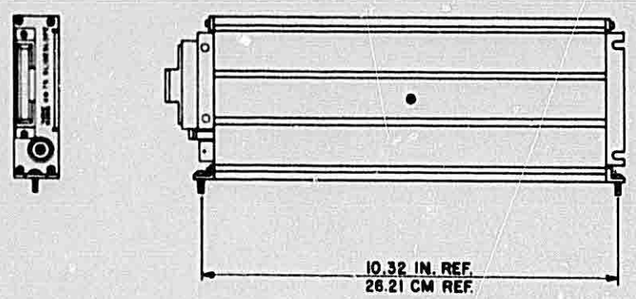
FIGURE 2-3 KN 75 OUTLINE AND MOUNTING DRAWING
(Dwg. No. 155-5259-00, R-0)
(Sheet 1 of 2)

KING

KN 75
GLIDESLOPE RECEIVER

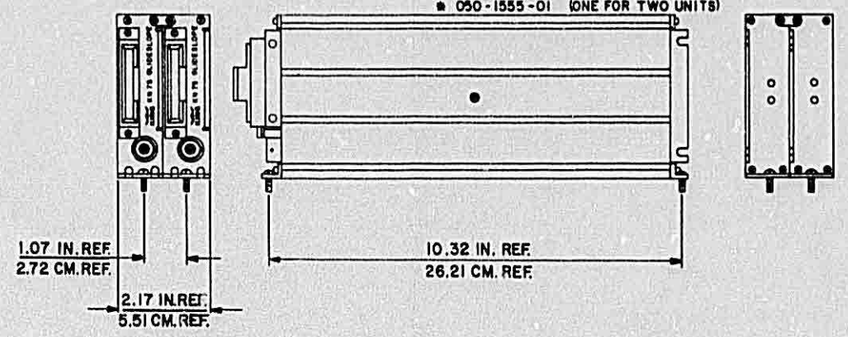
SINGLE UNIT MOUNTED VERTICALLY

INSTALLATION KIT -050-1627-00



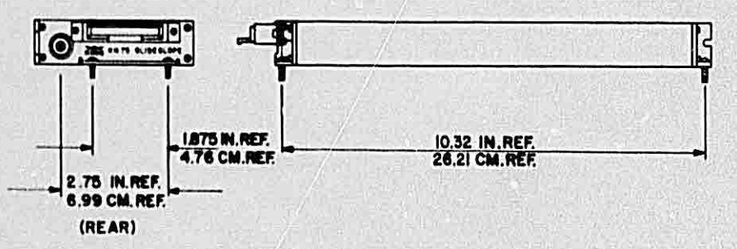
TWO UNITS MOUNTED VERTICALLY

INSTALLATION KITS - 050-1627-00 (ONE FOR EACH KN 75)
050-1555-00 (ONE FOR EACH KN 72)
* 050-1555-01 (ONE FOR TWO UNITS)



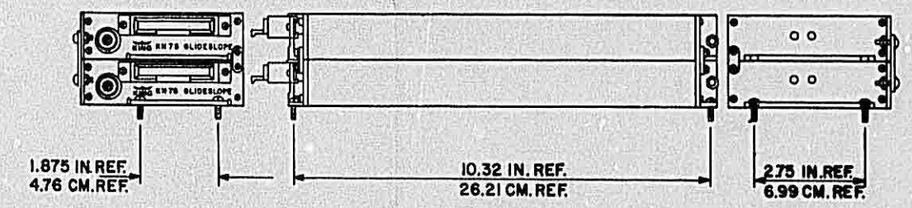
SINGLE UNIT MOUNTED HORIZONTALLY

INSTALLATION KIT 050-1627-00



TWO UNITS MOUNTED HORIZONTALLY

INSTALLATION KITS 050-1627-00 (ONE FOR EACH KN 75)
050-1555-00 (ONE FOR EACH KN 72)
* 050-1555-01 (ONE FOR TWO UNITS)

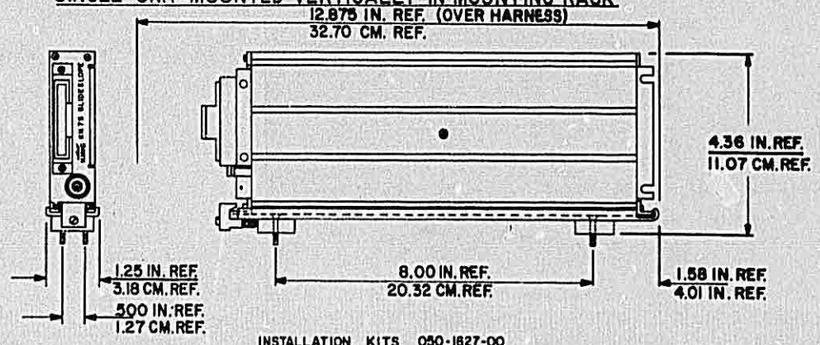


NOTES

1. ALTHOUGH NO MORE THAN TWO UNITS ARE SHOWN MOUNTED TOGETHER, AS MANY UNITS (KN75, KN72, OR ANY COMBINATION OF THE TWO) AS DESIRED MAY BE MOUNTED TOGETHER. THIS DOES NOT APPLY TO RACK MOUNTED UNITS.

* 2. IN A MULTIPLE UNIT INSTALLATION, EACH ADDITIONAL UNIT WILL REQUIRE ONE 050-1555-01 INSTALLATION KIT IN ADDITION TO THAT UNIT'S STANDARD INSTALLATION KIT.

SINGLE UNIT MOUNTED VERTICALLY IN MOUNTING RACK



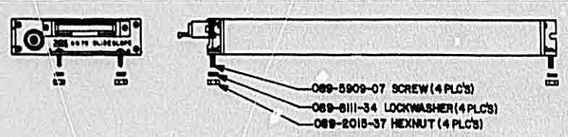
INSTALLATION KITS 050-1627-00
050-1555-02

FIGURE 2-3 KN 75 OUTLINE AND MOUNTING DRAWING
(Dwg. No. 155-5259-00, R-0)
(Sheet 2 of 2)

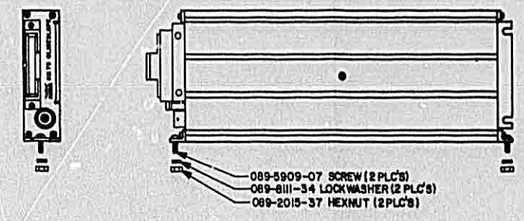
KING

KN 75
GLIDESLOPE RECEIVER

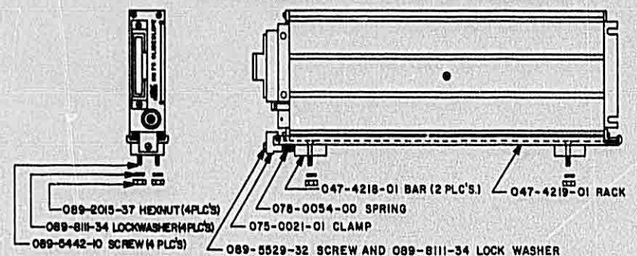
SINGLE UNIT MOUNTED HORIZONTALLY
REF. INSTALLATION KIT 050-1627-00



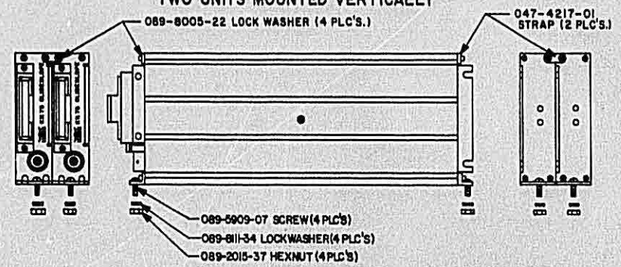
SINGLE UNIT MOUNTED VERTICALLY
REF. INSTALLATION KIT 050-1627-00



SINGLE UNIT MOUNTED VERTICALLY IN MOUNTING RACK
REF. INSTALLATION KITS 050-1627-00 & 050-1555-02

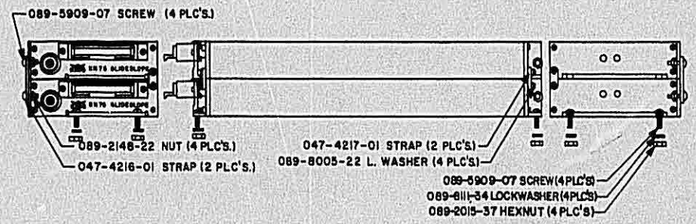


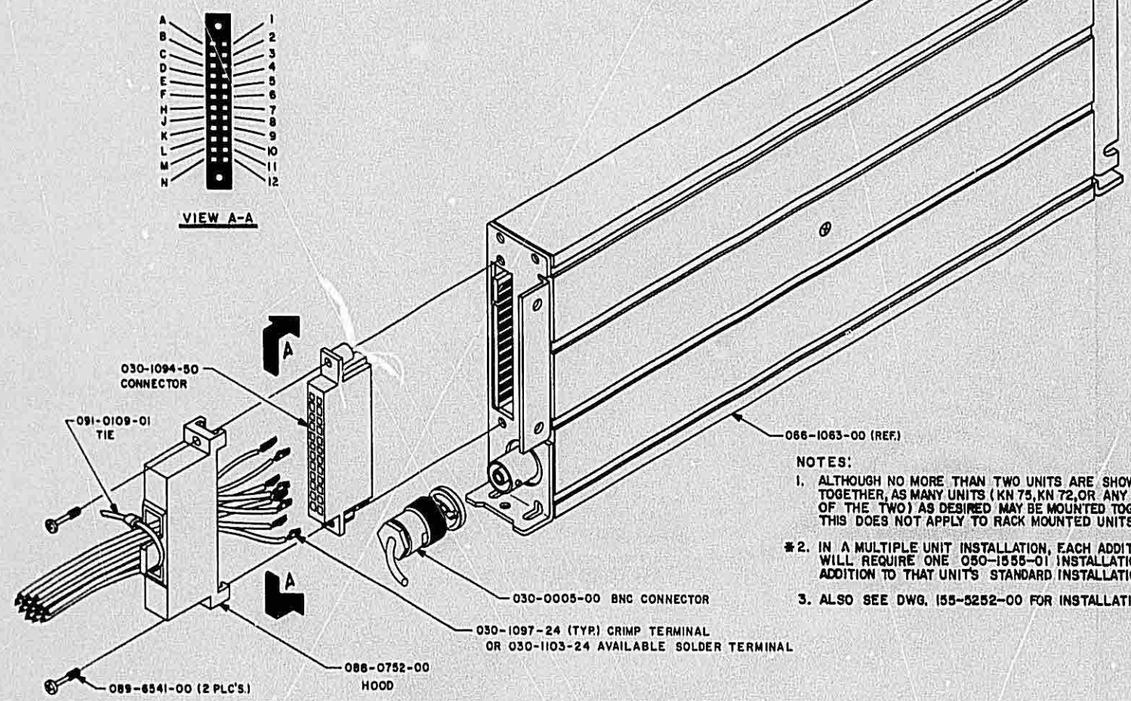
TWO UNITS MOUNTED VERTICALLY



REF. INSTALLATION KITS
050-1627-00 (ONE FOR EACH KN 75)
050-1555-00 (ONE FOR EACH KN 72)
* 050-1555-01 (ONE FOR TWO UNITS)

TWO UNITS MOUNTED HORIZONTALLY
REF. INSTALLATION KITS 050-1627-00 (ONE FOR EACH KN 75)
050-1555-00 (ONE FOR EACH KN 72)
* 050-1555-01 (ONE FOR TWO UNITS)





NOTES:

1. ALTHOUGH NO MORE THAN TWO UNITS ARE SHOWN MOUNTED TOGETHER, AS MANY UNITS (KN 75, KN 72, OR ANY COMBINATION OF THE TWO) AS DESIRED MAY BE MOUNTED TOGETHER. THIS DOES NOT APPLY TO RACK MOUNTED UNITS.
2. * IN A MULTIPLE UNIT INSTALLATION, EACH ADDITIONAL UNIT WILL REQUIRE ONE 050-1555-01 INSTALLATION KIT IN ADDITION TO THAT UNIT'S STANDARD INSTALLATION KIT.
3. ALSO SEE DWG. 155-5252-00 FOR INSTALLATION.

FIGURE 2-4 INSTALLATION DRAWING
(Dwg. No. 300-2186-00, R-2)

2.4 INTERCONNECT DIAGRAMS

The King KN 75 Glideslope Receiver contains channeling logic, including a 256 x 4 BIT ROM, which allows it to work with many different navigational receivers which provide glideslope channeling. Two out of five, BCD, eleven and twelve wire codes may be used. Codes such as the King 170/175 series are also compatible. The KN 75 uses a ground for logic low. Logic high can either be +5 volts or an open circuit (internal pull up resistors accomplish this function). For a logic high greater than +5 volts, isolation diodes must be used. (1N270 series) Refer to Figure 2-6 for typical installation.

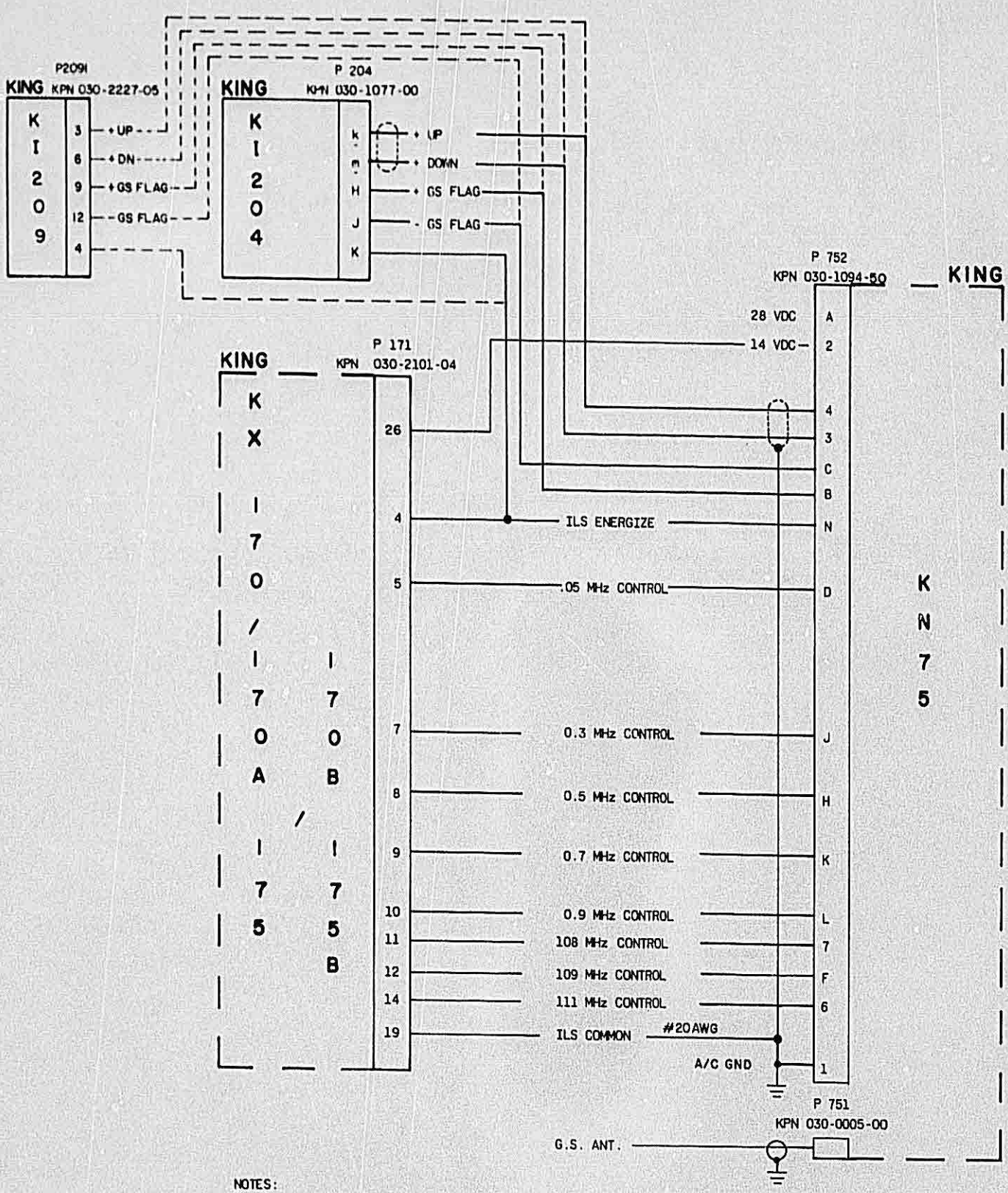
Refer to figures 2-31 through 2-34 for pin coding.

note

24 Molex Crimp Terminals (KPN 030-1097-24) are supplied. In most installations not all of the terminals will be required.

NOTICE

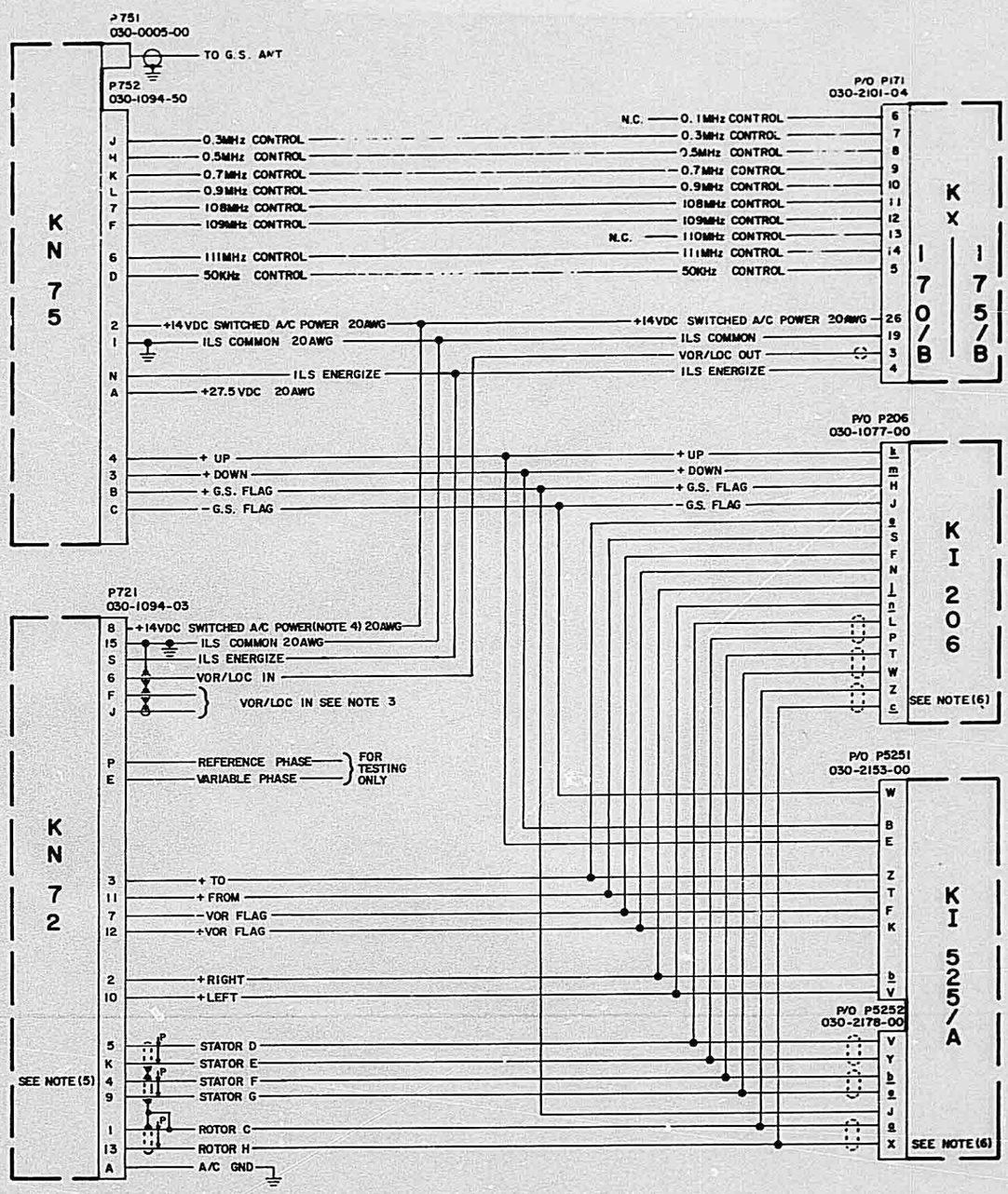
TO THE BEST OF KING RADIO'S KNOWLEDGE THE INTERCONNECT DIAGRAMS SHOWN FOR OTHER THAN KING EQUIPMENT ARE ACCURATE AS OF THE DATE OF THIS PUBLICATION. NO GUARANTEE OR RESPONSIBILITY IS INTENDED OR IMPLIED AS TO WHETHER THE INTERCONNECT DIAGRAMS WILL REMAIN CORRECT DUE TO CHANGES MADE TO OTHER EQUIPMENT OF WHICH WE MAY NOT BE AWARE.



NOTES:

1. KN 75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS +13.75 VDC.
2. WIRE SIZES: 14V, 28V, AND ILS COMMON ARE 20 AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-5 KN 75 TO KING KX 170, KX 170A, KX 170B, KX 175 AND KX 175B (KING CODE) INTERCONNECT DIAGRAM
(Dwg. No. 155-1278-00, R-3)



KING
KN 75
GLIDESLOPE RECEIVER

FIGURE 2-5A KN 72/KN 75 TO KX 170/B, KX 175/B, KI 206 INTERCONNECT DIAGRAM
(Dwg. No. 155-1340-00, R-0)

NOTES:

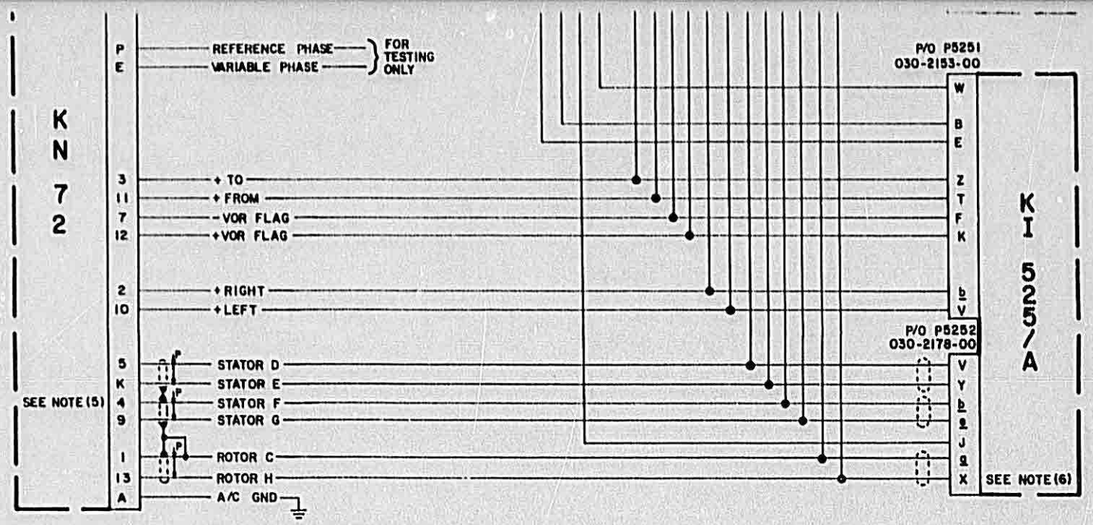
1. UNLESS NOTED, ALL WIRES TO BE 24 AWG MINIMUM.
2. UNLESS NOTED, ALL SYSTEM GROUNDS ARE AIRFRAME GROUNDS.
3. COMPOSITE INPUTS ARE AS FOLLOWS:
   PIN 6 = .5VRMS ±10% ARINC PHASE COMPOSITE.
   PIN F = .3VRMS ±10% OUT OF PHASE COMPOSITE.
   PIN J = .3VRMS ±10% OUT OF PHASE COMPOSITE.
4. PIN 8 IS 13.5 VDS INPUT, 27.5VDC INPUT IS PIN R.
5. RESOLVER PINS SHOWN CONNECTED TO BOTH KI 206 AND KI 525/A ARE FOR REFERENCE ONLY. IN ACTUAL INSTALLATION ONLY ONE RESOLVER WILL BE WIRED TO KN72.
6. SEE UNIT INSTALLATION MANUAL FOR WIRING OF THE OPTIONAL COURSE DATUM SYNCRO.

ALSO SEE THIS PAGE AS UPPER/LOWER (NEXT)

KING
KN 75
GLIDESLOPE RECEIVER

FIGURE 2-5A KN 72/KN 75 TO KX 170/B, KX 175/B, KI 206 INTERCONNECT DIAGRAM
(Dwg. No. 155-1340-00, R-D)

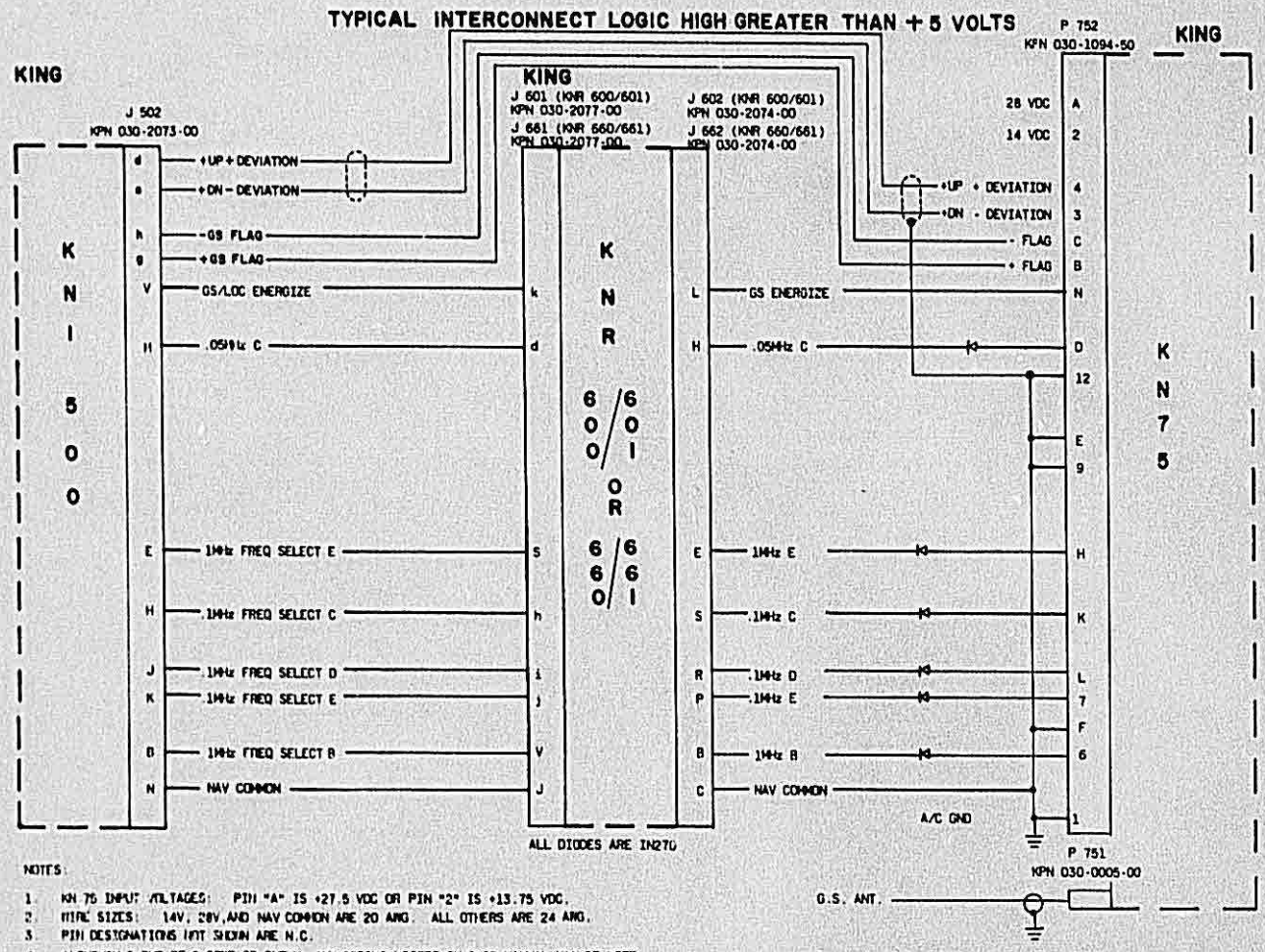
UPPER



NOTES:

1. UNLESS NOTED, ALL WIRES TO BE 24 AWG MINIMUM.
2. UNLESS NOTED, ALL SYSTEM GROUNDS ARE AIRFRAME GROUNDS.
3. COMPOSITE INPUTS ARE AS FOLLOWS:
   PIN 6 = .5VRMS ±10% ARINC PHASE COMPOSITE.
   PIN F = 3VRMS ±10% OUT OF PHASE COMPOSITE.
   PIN J = .3VRMS ±10% OUT OF PHASE COMPOSITE.
4. PIN 8 IS 13.5 VDS INPUT, 27.5VDC INPUT IS PIN R.
5. RESOLVER PINS SHOWN CONNECTED TO BOTH KI 206 AND KI 525/A ARE FOR REFERENCE ONLY. IN ACTUAL INSTALLATION ONLY ONE RESOLVER WILL BE WIRED TO KN72.
6. SEE UNIT INSTALLATION MANUAL FOR WIRING OF THE OPTIONAL COURSE DATUM SYNCRO.

LOWER



NOTES:

1. KN 75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS +13.75 VDC.
2. WIRE SIZES: 14V, 28V, AND NAV COMMON ARE 20 AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. ALTHOUGH 2 OUT OF 5 CODE IS SHOWN, ANY CODING LISTED IN THIS MANUAL MAY BE USED.
5. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-6 KN 75 TO KING KNI 500 AND KNR 601/661 OR KNR 660/661 (2 OUT OF 5 CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1279-00, R-3)

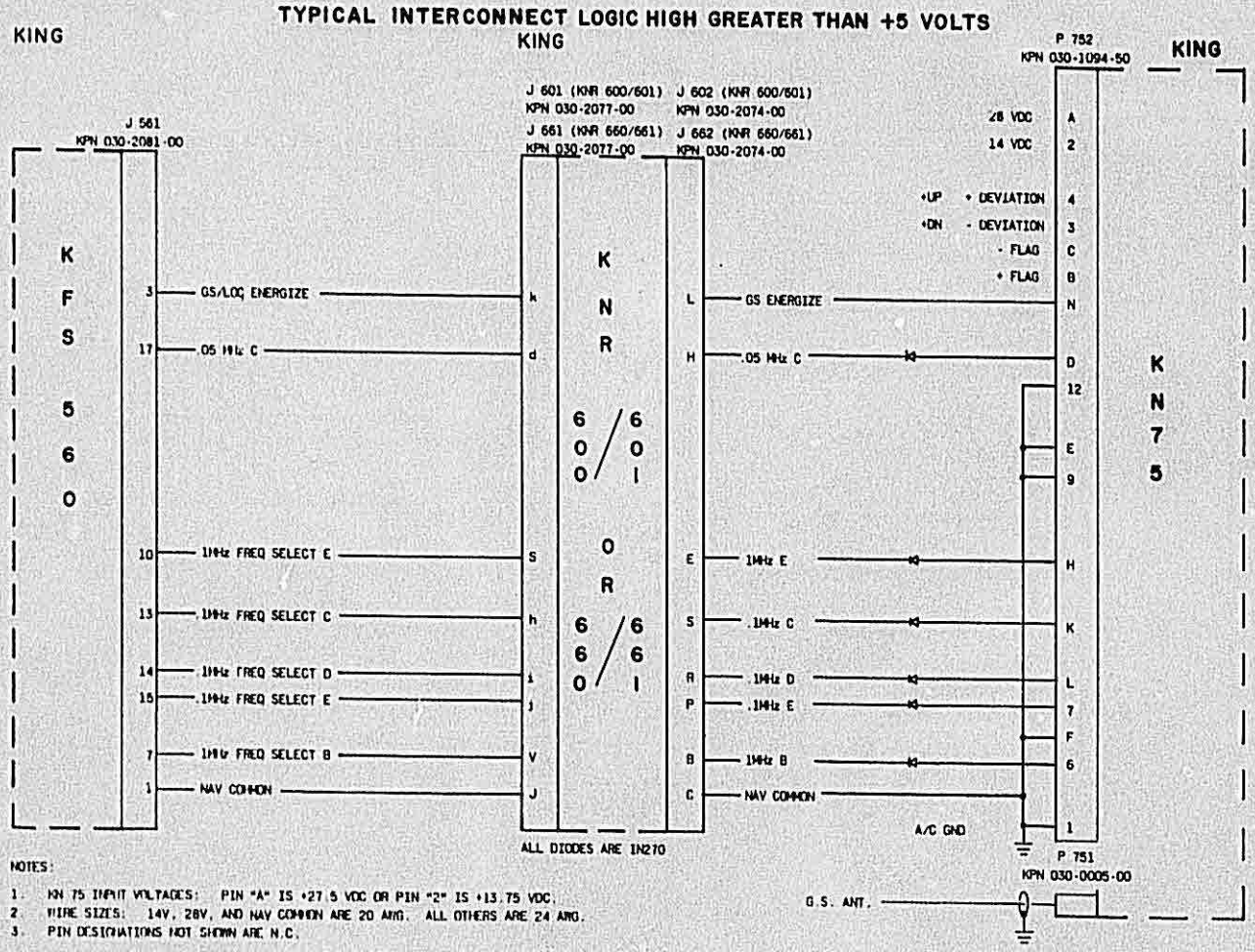
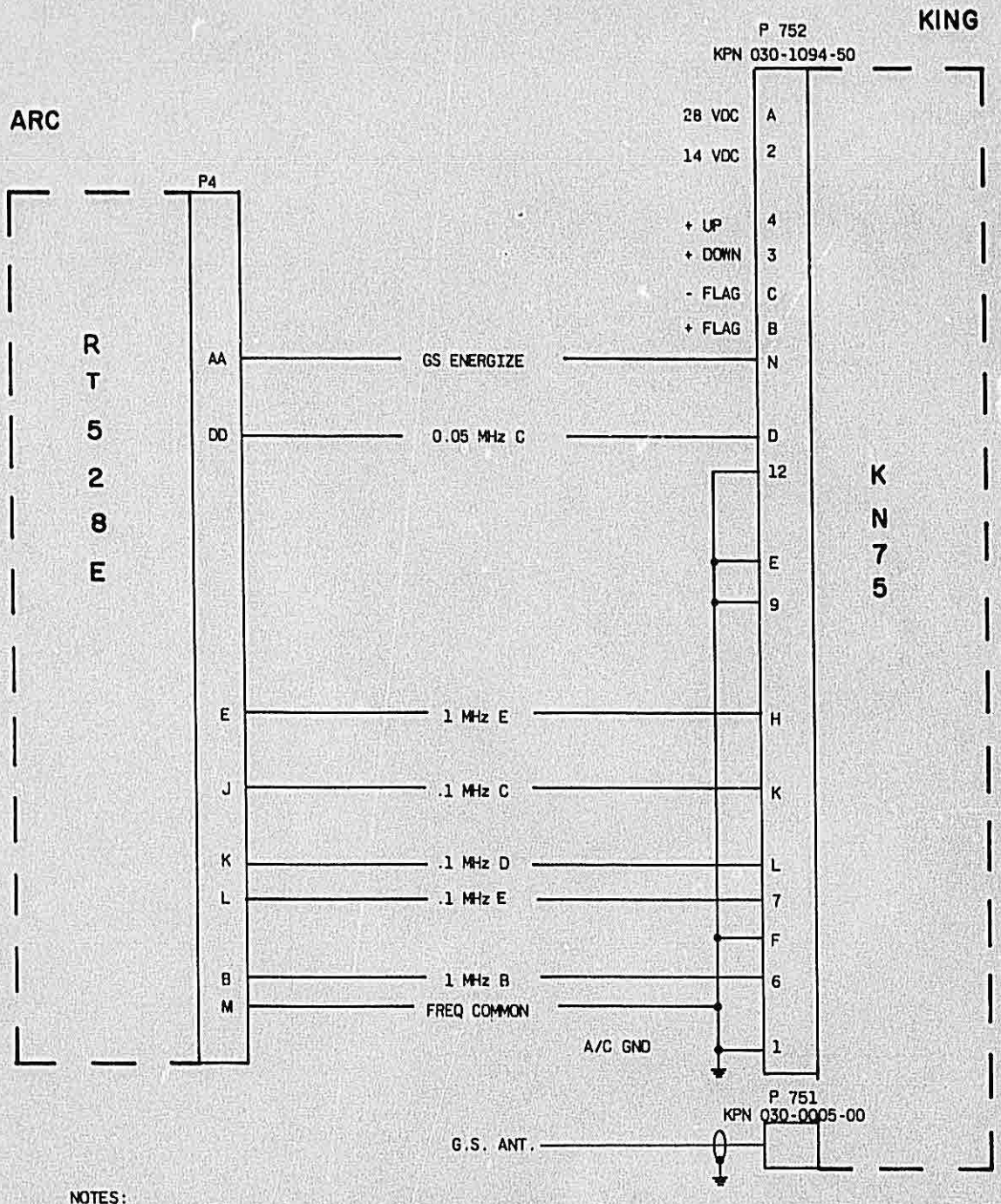


FIGURE 2-7 KN 75 TO KING KFS 560, KNR 601/661 OR KNR 660/661 (2 OUT OF 5 CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1280-00, R-1)



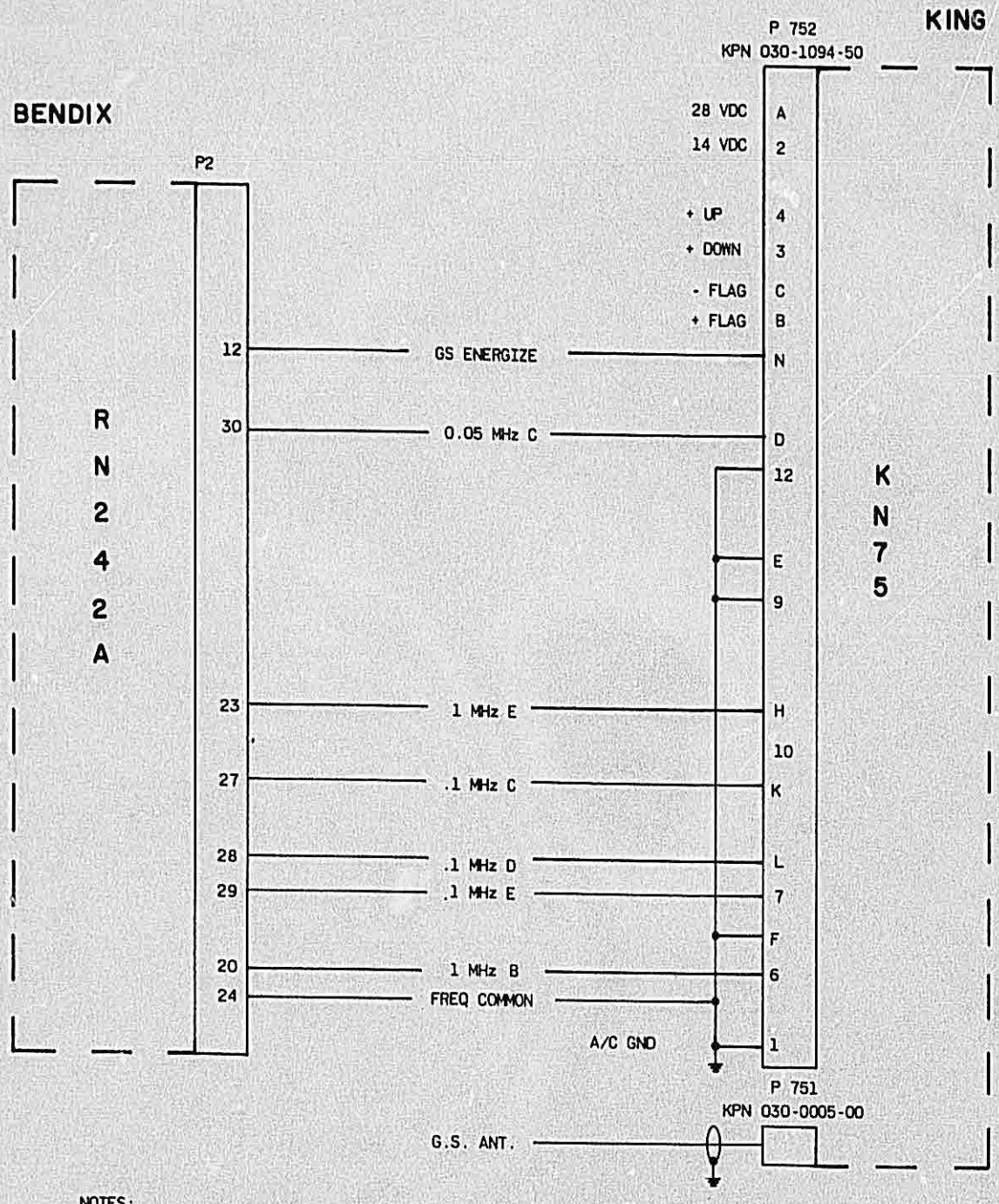
NOTES:

1. KN 75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS +13.75 VDC.
2. WIRE SIZES: 14V, 28V, AND FREQ. COMMON ARE 20AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-8 KN 75 TO ARC RF 528E (2 OUT OF 5 CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1261-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



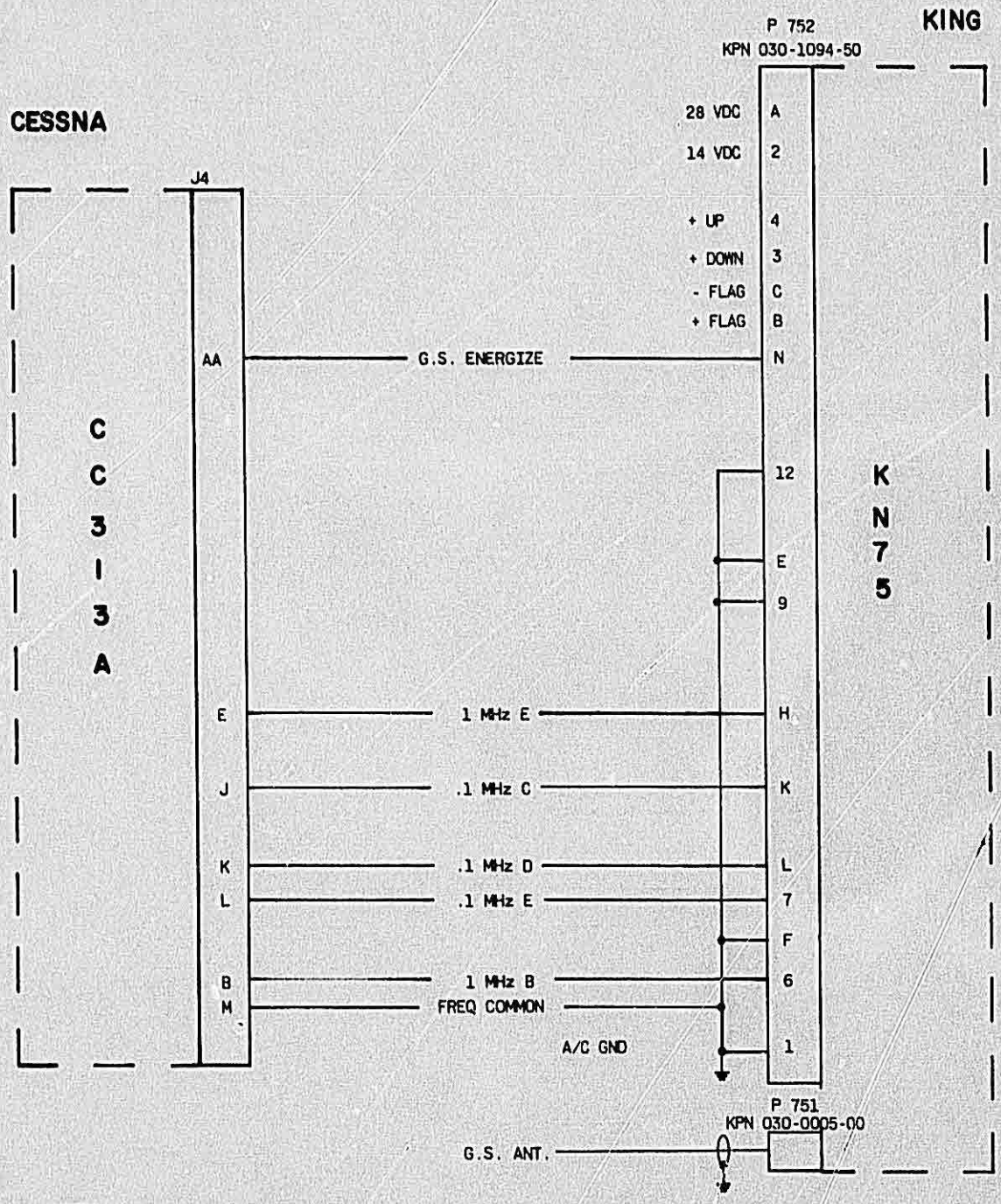
NOTES:

1. KN 75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS +13.75 VDC.
2. WIRE SIZES: 14V, 28V, AND FREQ. COMMON ARE 20AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-9 KN 75 TO BENDIX RN 242A (2 OUT OF 5 CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1262-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



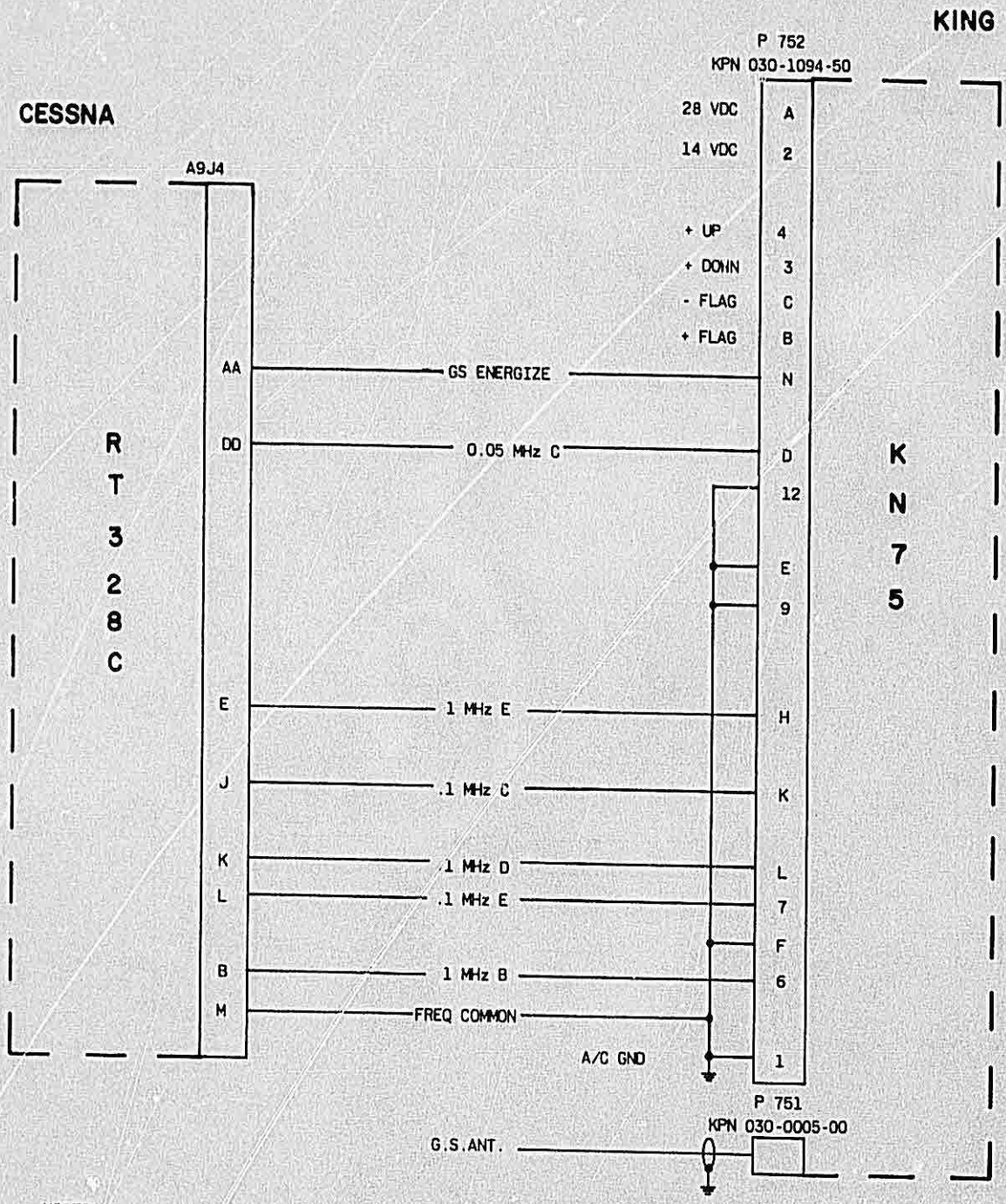
NOTES:

1. KN 75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS +13.75 VDC.
2. WIRE SIZES: 14V, 28V, AND FREQ.COMMON ARE 20AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-10 KN 75 TO CESSNA CC 313 A (2 OUT OF 5 CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1263-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



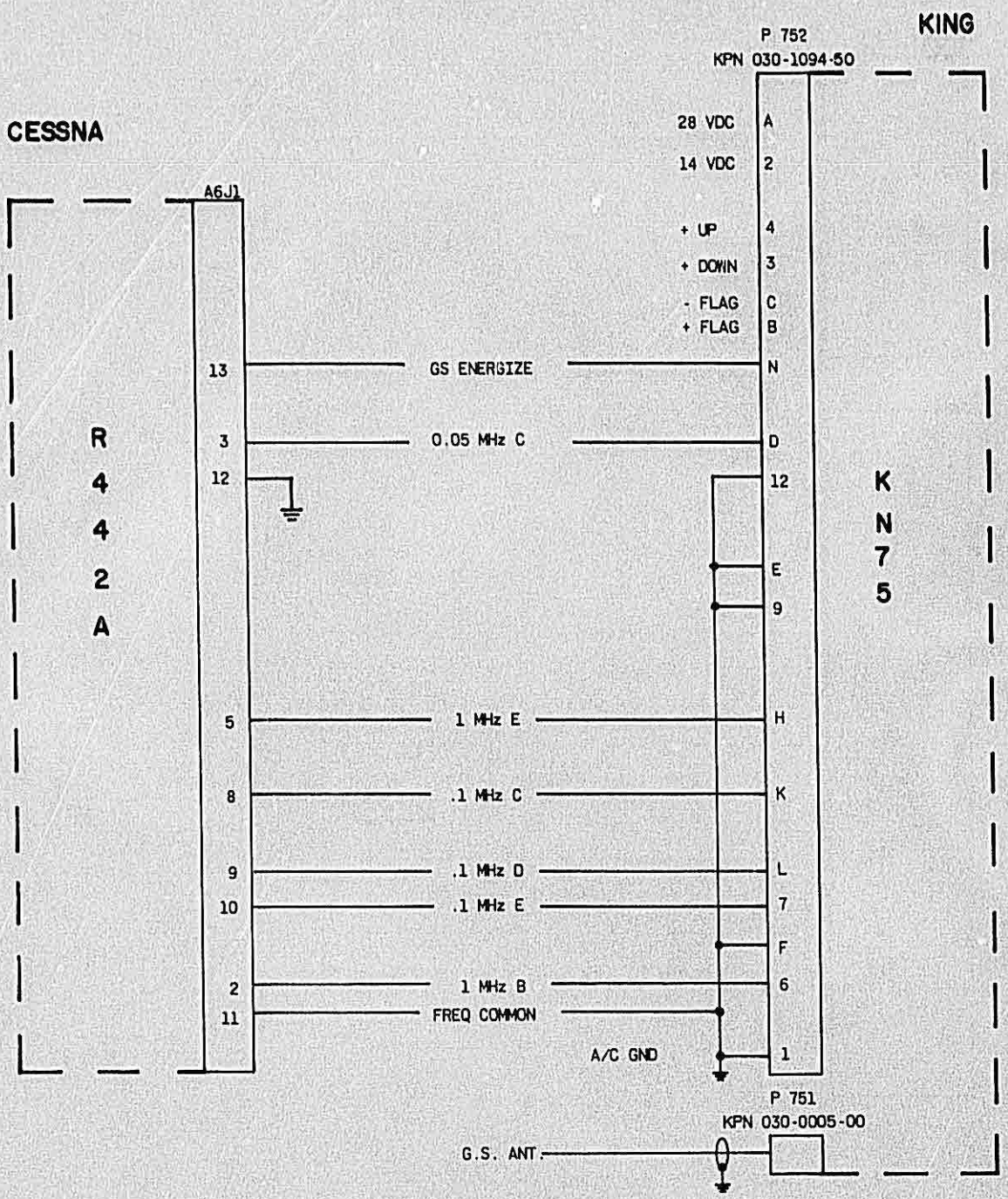
NOTES:

1. KN 75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS +13.75 VDC.
2. WIRE SIZES. 14V, 28V, AND FREQ. COMMON ARE 20AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-11 KN 75 TO CESSNA RT 328C (2 OUT OF 5 CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1264-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



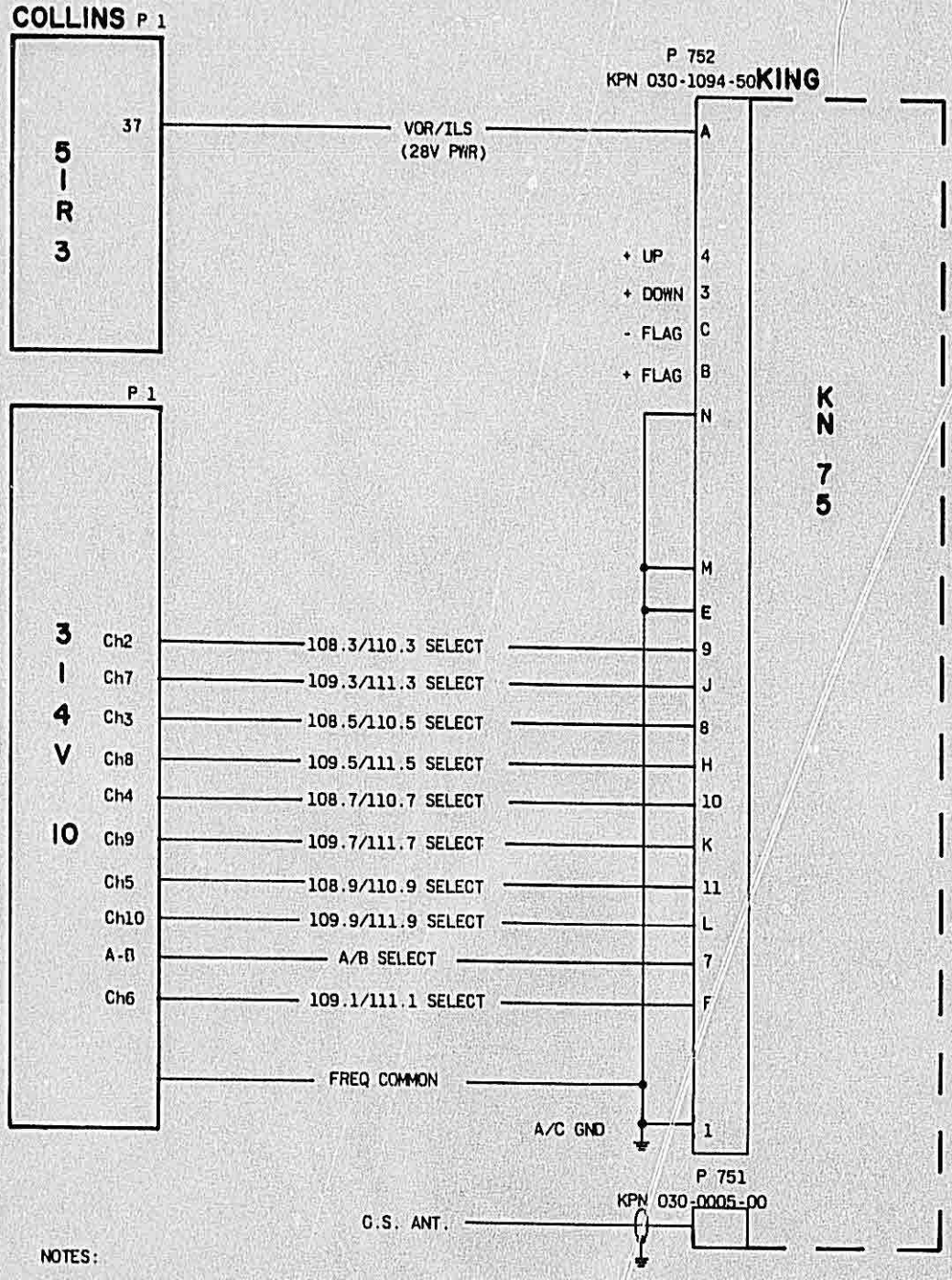
NOTES:

1. KN 75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS +13.75 VDC.
2. WIRE SIZES: 14V, 28V, AND FREQ. COMMON ARE 20AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-12 KN 75 TO CESSNA R442A/RT422A (2 OUT OF 5 CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1265-00, R-3)

KING

KN 75
GLIDESLOPE RECEIVER



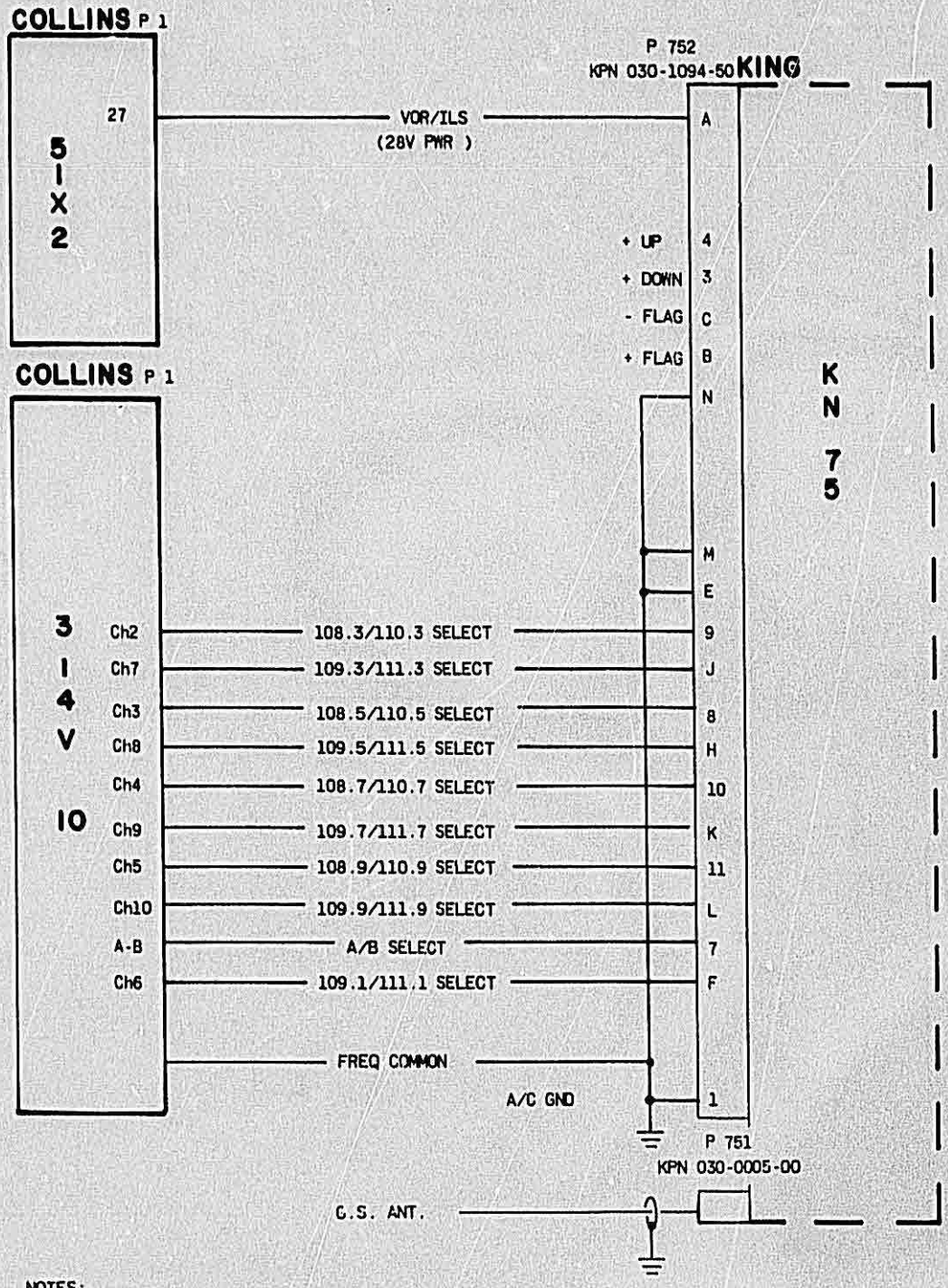
NOTES:

1. KN 75 INPUT VOLTAGE : PIN "A" IS +27.5 VDC
2. WIRE SIZES: 14V, 28V, AND FREQ. COMMON ARE 20AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-13 KN 75 TO COLLINS 51-R3 & 314V-10 (11 WIRE CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1266-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



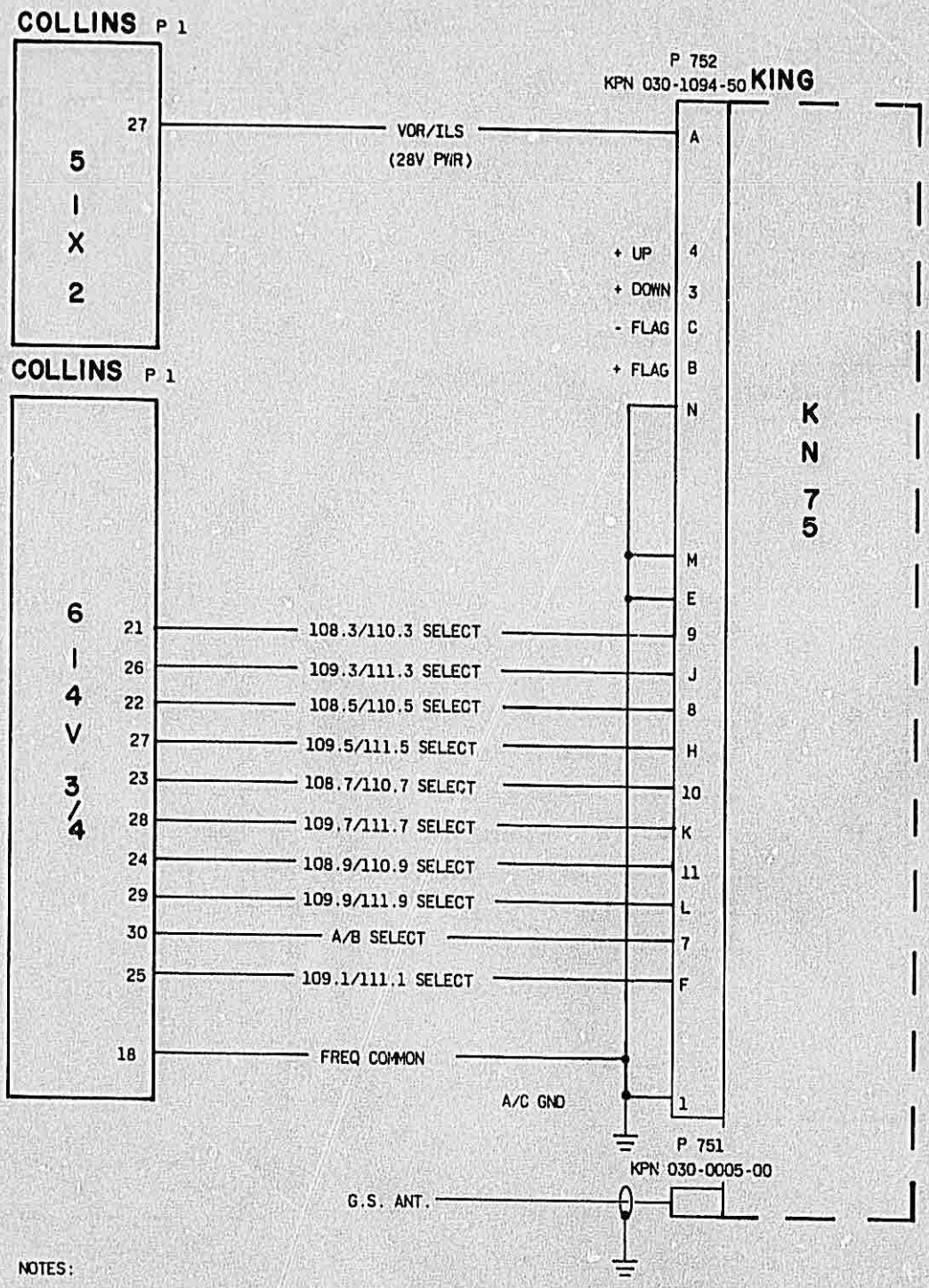
NOTES:

1. KN 75 INPUT VOLTAGE : PIN "A" IS 27.5 VDC
2. WIRE SIZES: 14V, 28V, AND FREQ. COMMON ARE 20AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-14 KN 75 TO COLLINS 51X-2 & 314V-10 (11 WIRE CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1267-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



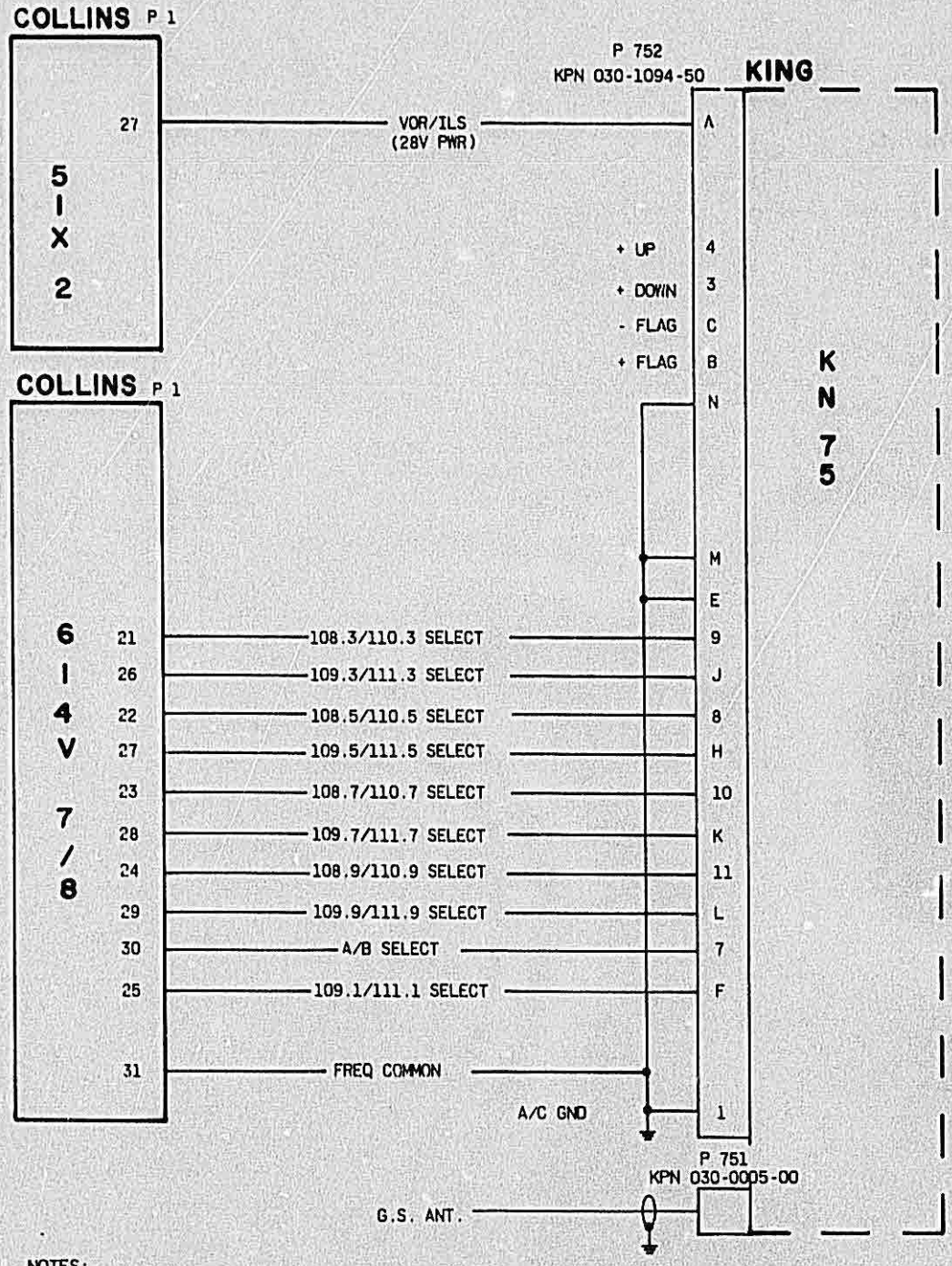
NOTES:

1. KN75 INPUT VOLTAGE : PIN "A" IS +27.5 VDC
2. WIRE SIZES: 14V, 28V, AND FREQ.COMMON ARE 20AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-15 KN 75 TO COLLINS 51X-2 & 614V-3/4 (11 WIRE CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1268-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



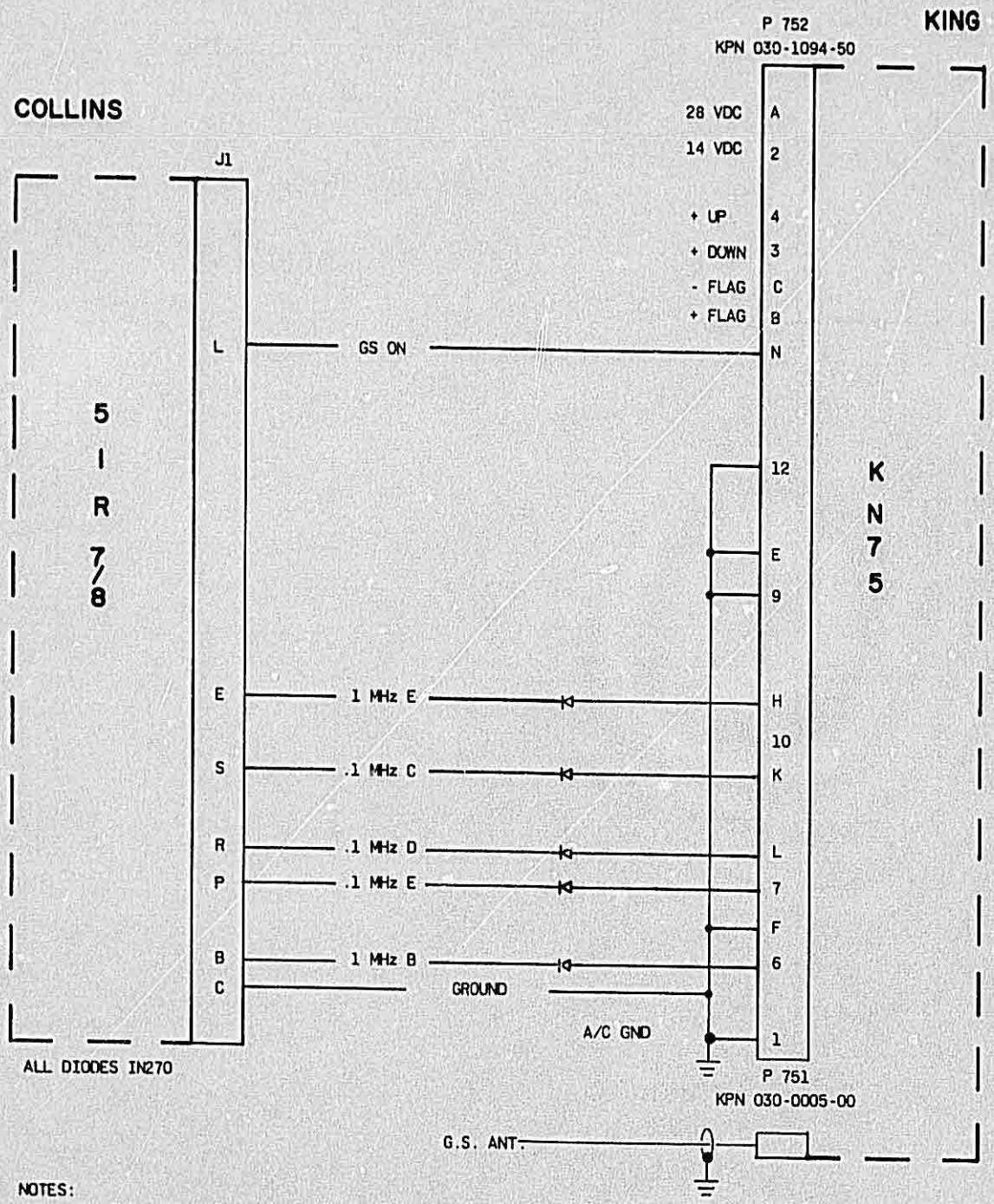
NOTES:

1. KN75 INPUT VOLTAGE : PIN "A" IS +27.5 VDC
2. WIRE SIZES: 14V, 28V, AND FREQ. COMMON ARE 20AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-16 KN 75 TO COLLINS 51X-2 & 614V-7/8 (11 WIRE CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1269-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



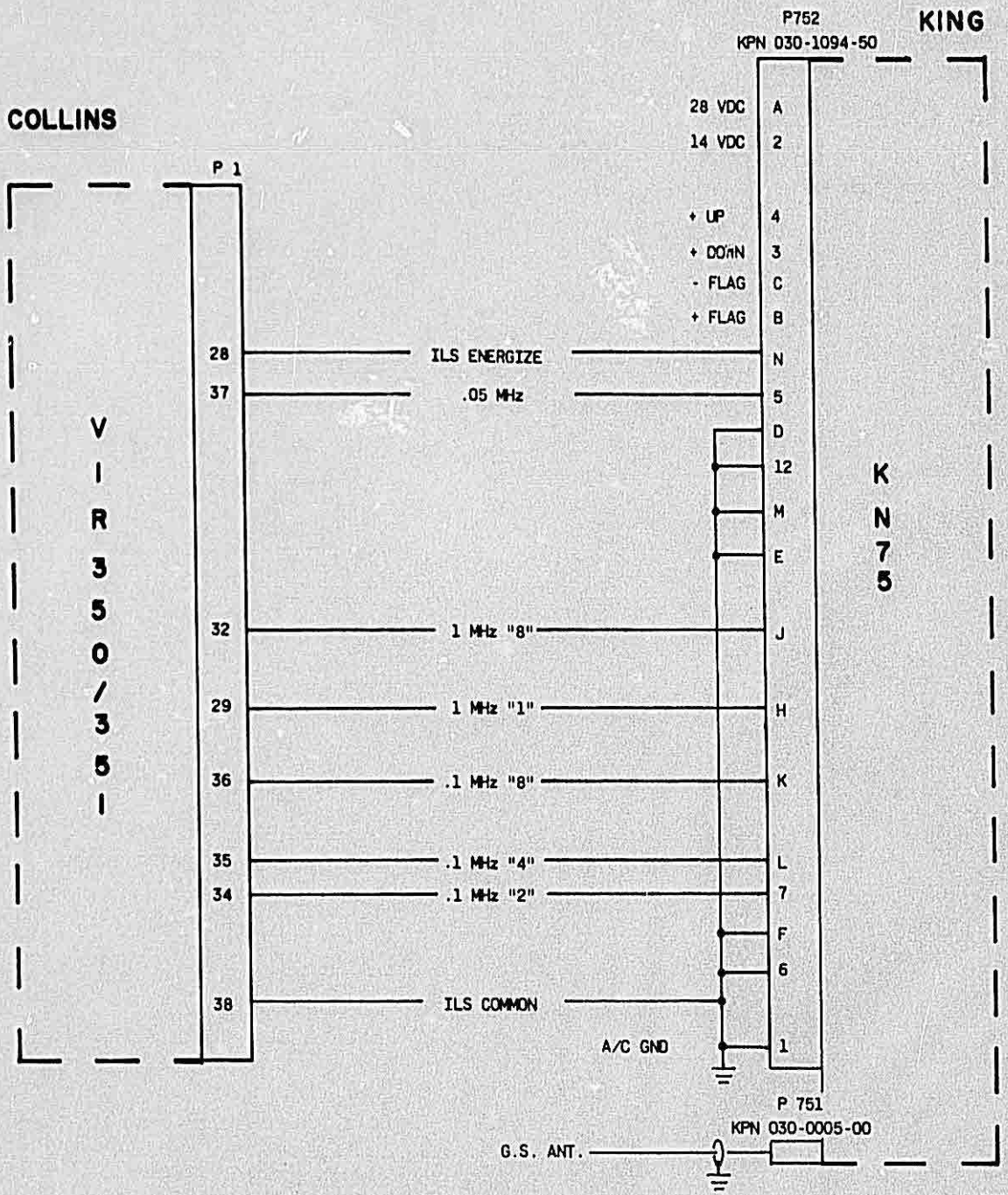
NOTES:

1. KN75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS +13.75 VDC.
2. WIRE SIZES: 14V, 28V, AND GROUND ARE 20 AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-17 KN 75 TO COLLINS 51R-7/8 (2 OUT OF 5 CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1270-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



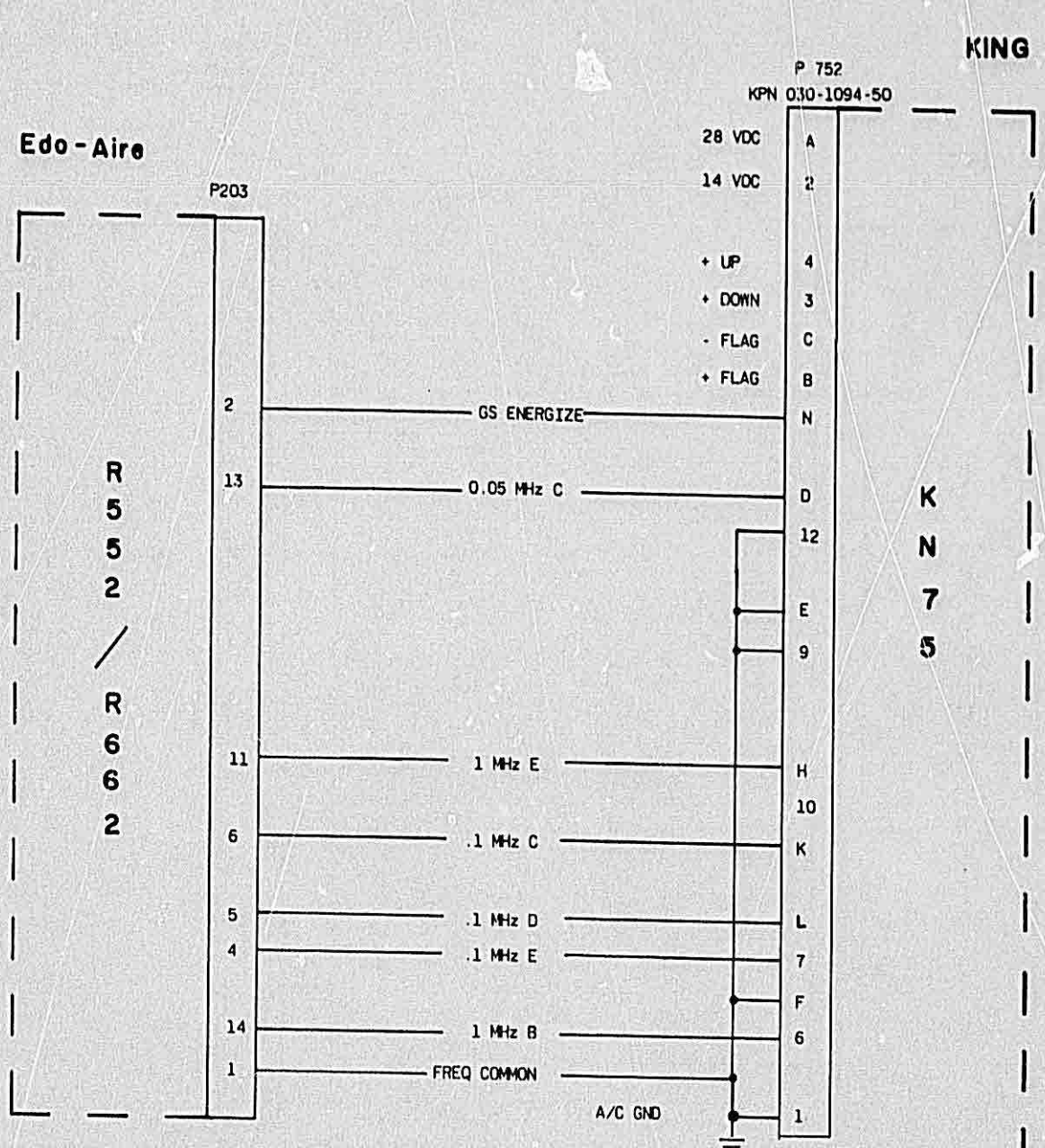
NOTES :

1. KN 75 INPUT VOLTAGES : PIN "A" IS +27.5 VDC OR PIN "2" IS +13.75 VDC.
2. WIRE SIZES : 14V, 28V, AND ILS COMMON ARE 20 AWG ; ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-18 KN 75 TO COLLINS VIR 350/351 (BCD CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1271-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



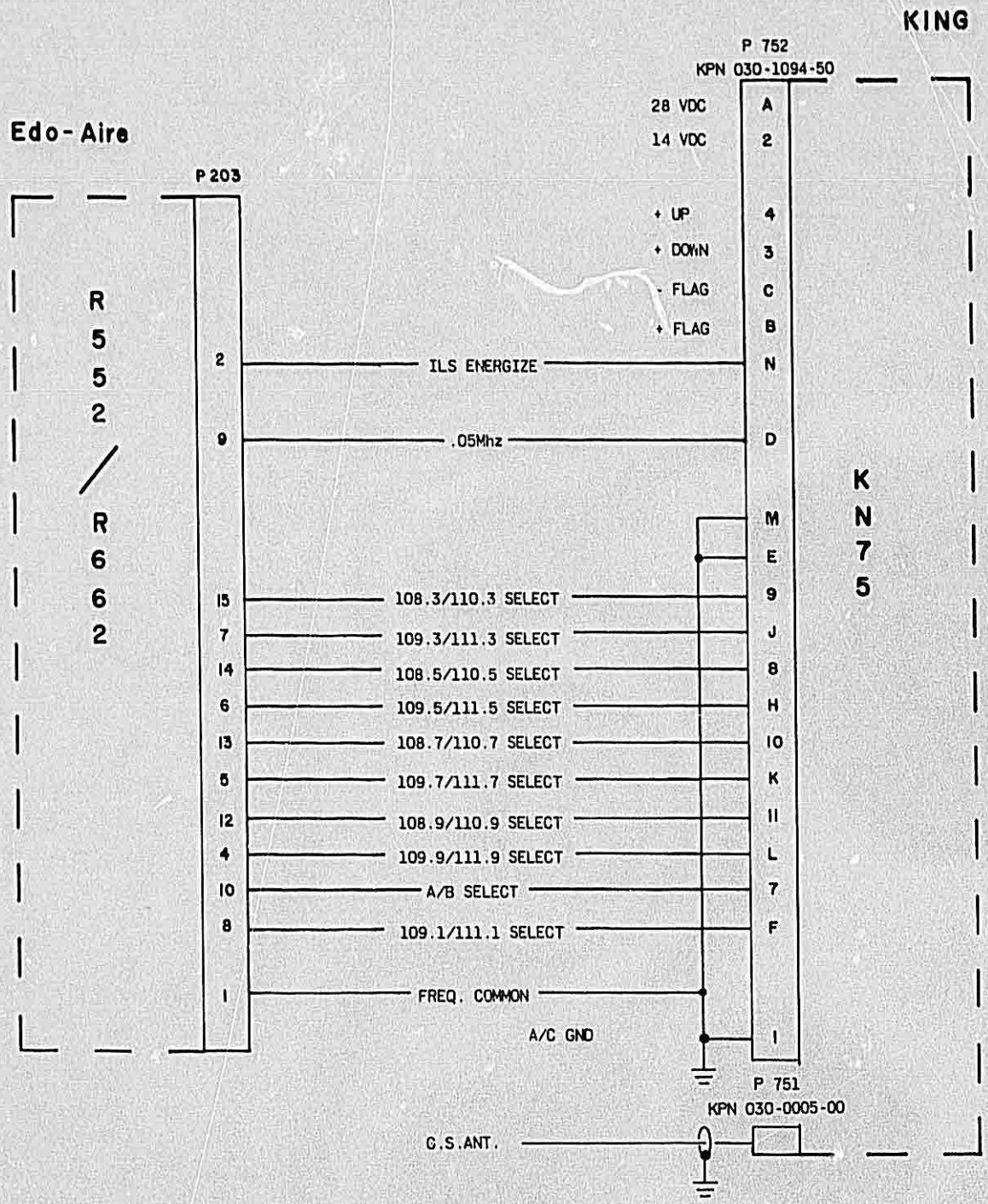
NOTES:

1. KN75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS 13.75 VDC.
2. WIRE SIZES: 14V, 28V, AND FREQ. COMMON ARE 20AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-19 KN 75 TO EDO AIRE R552/662 (2 OUT OF 5 CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1272-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



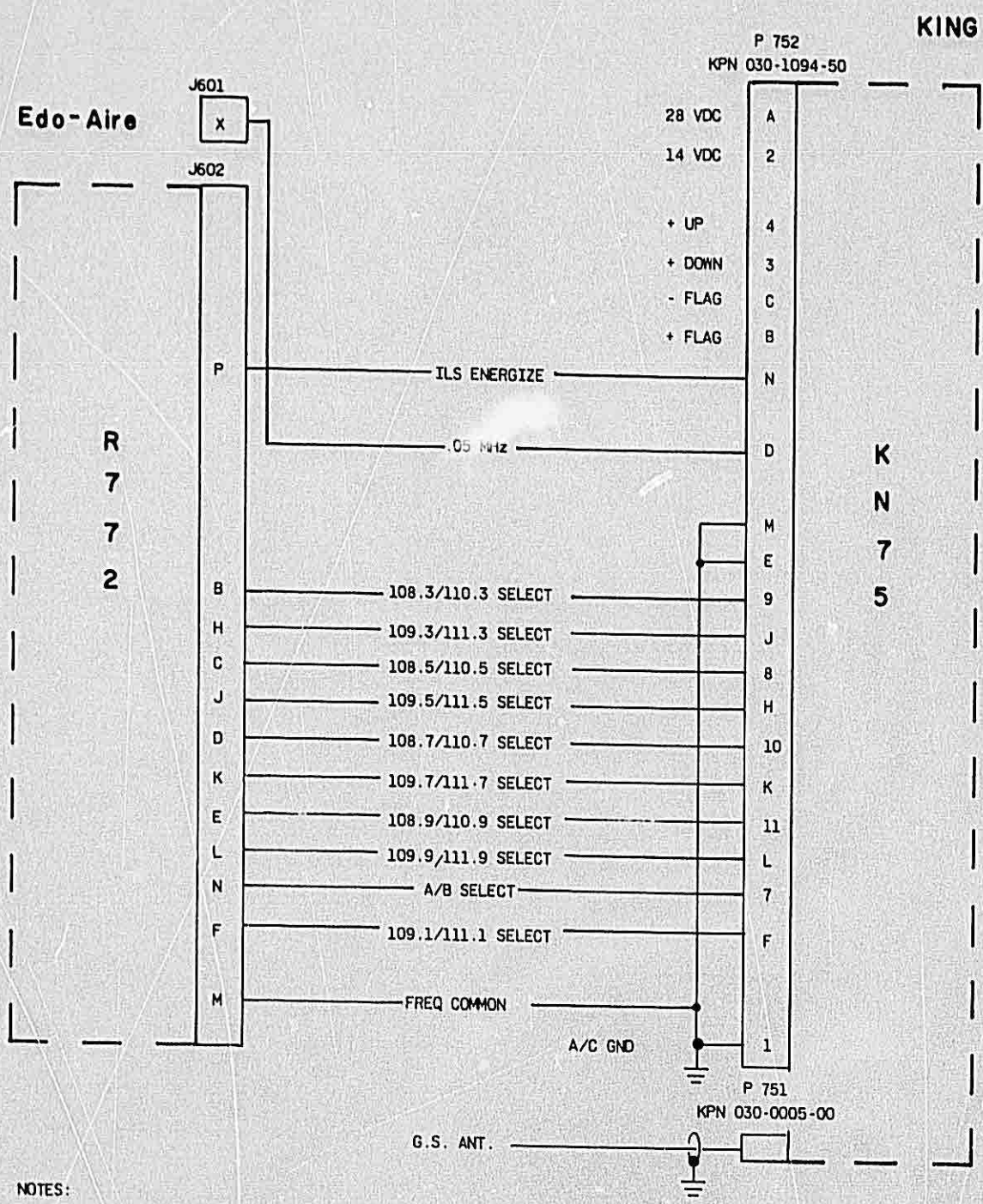
NOTES:

1. KN 75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS +13.75 VDC.
2. WIRE SIZES: 14V, 28V, AND FREQ. COMMON ARE 20 AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-20 KN 75 TO EDO AIRE R552/662 (12 WIRE CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1273-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



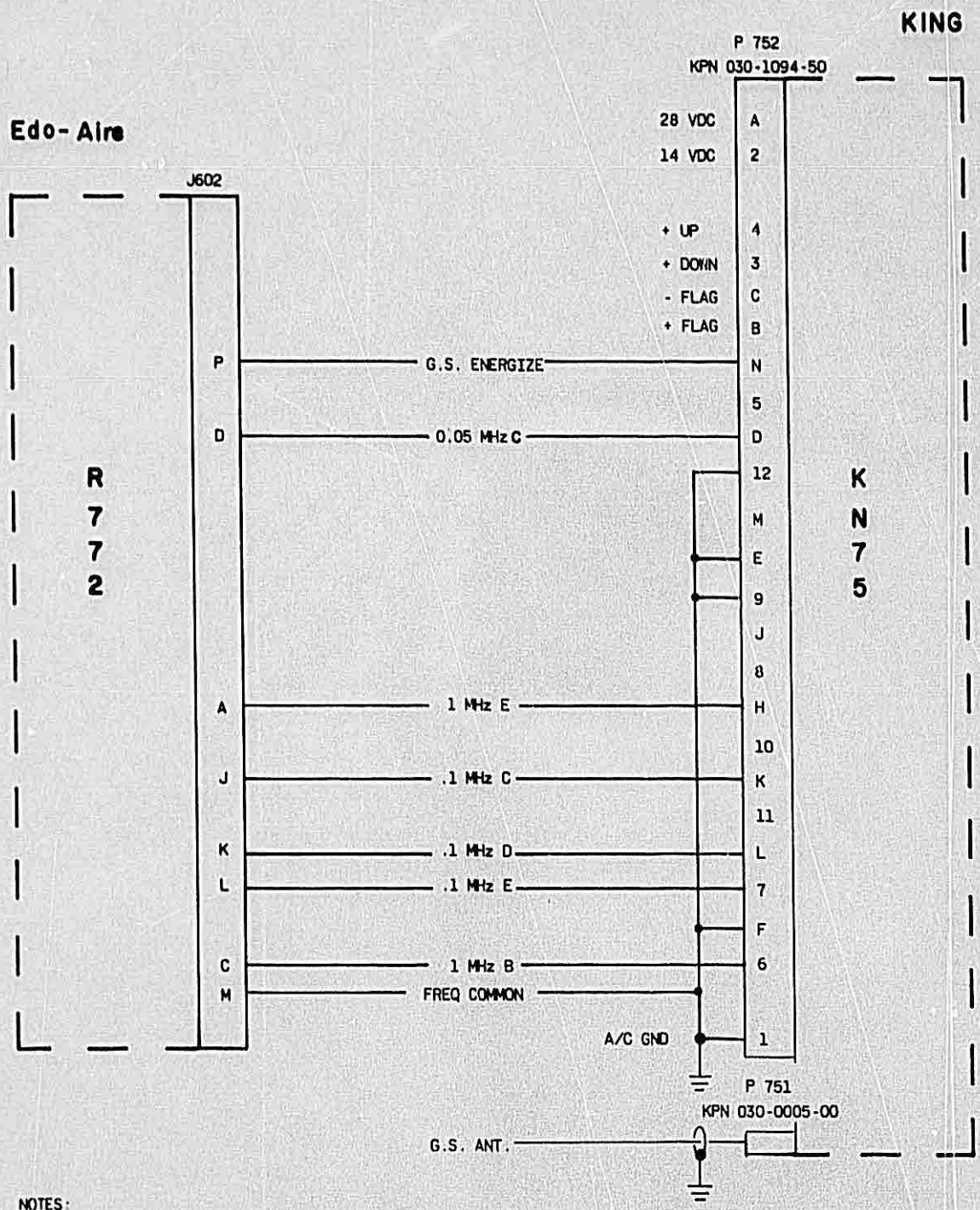
NOTES:

1. KN 75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS +13 VDC.
2. WIRE SIZES: 14V, 28V, AND FREQ. COMMON ARE 20AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-21 KN 75 TO EDO AIRE R772 (11 WIRE CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1274-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



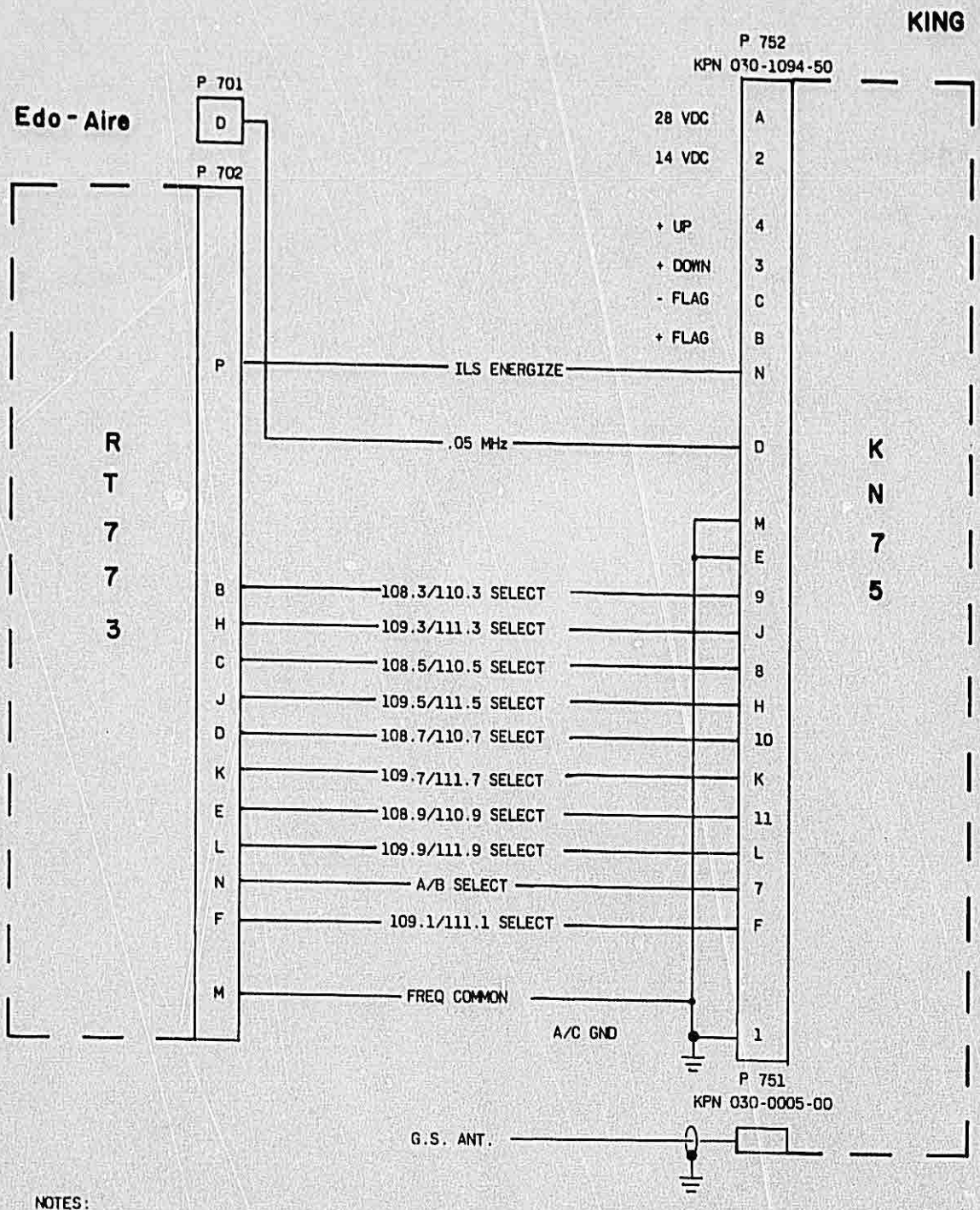
NOTES:

1. KN 75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS +13.75 VDC.
2. WIRE SIZES: 14V, 28V, AND FREQ.COMMON ARE 20 AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-22 KN 75 TO EDO AIRE R772 (2 OUT OF 5 CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1275-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



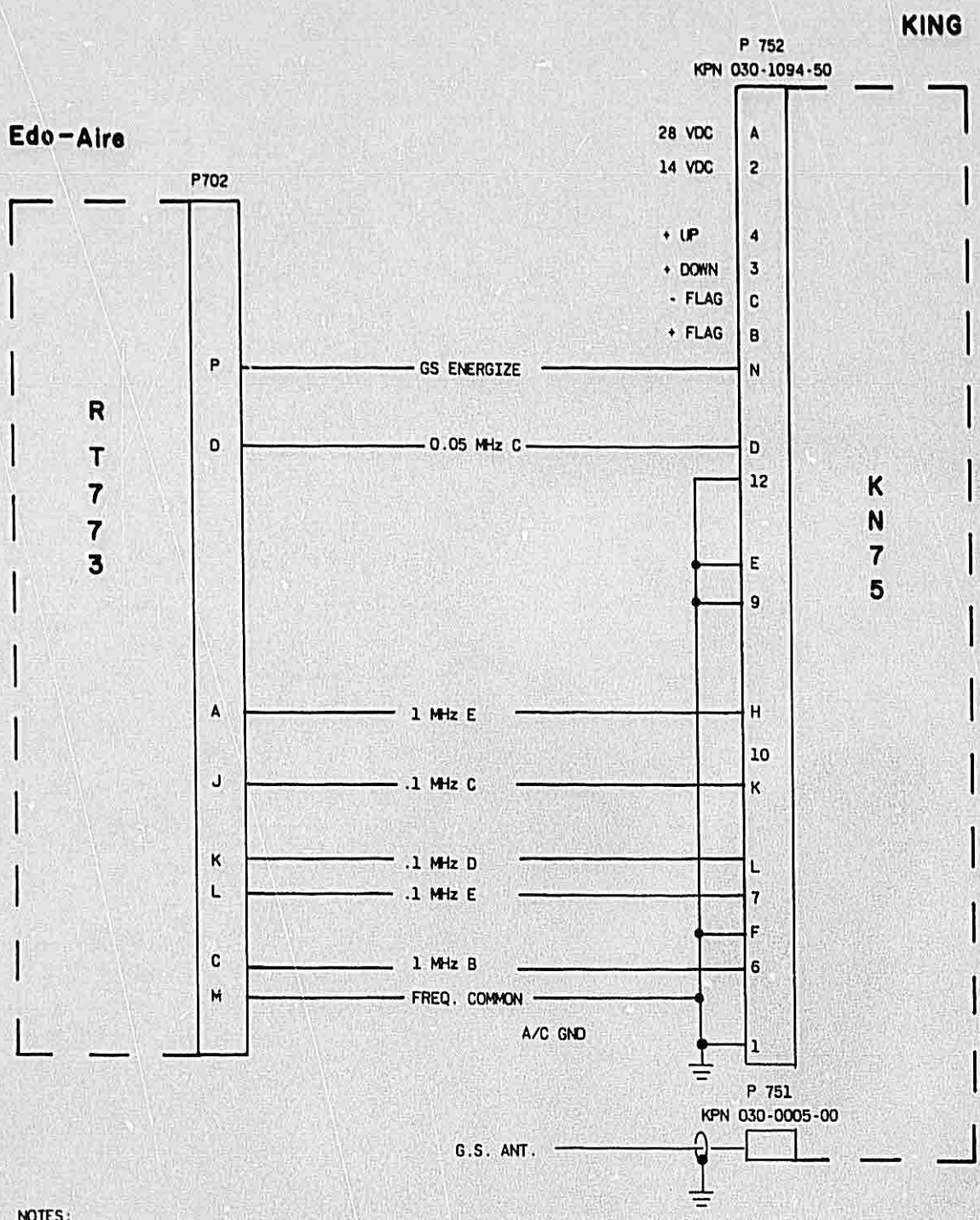
NOTES:

1. KN 75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS +13.75 VDC.
2. WIRE SIZES: 14V, 28V,AND FREQ. COMMON ARE 20 AWG.ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-23 KN 75 EDO AIRE RT773 (12 WIRE CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1276-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



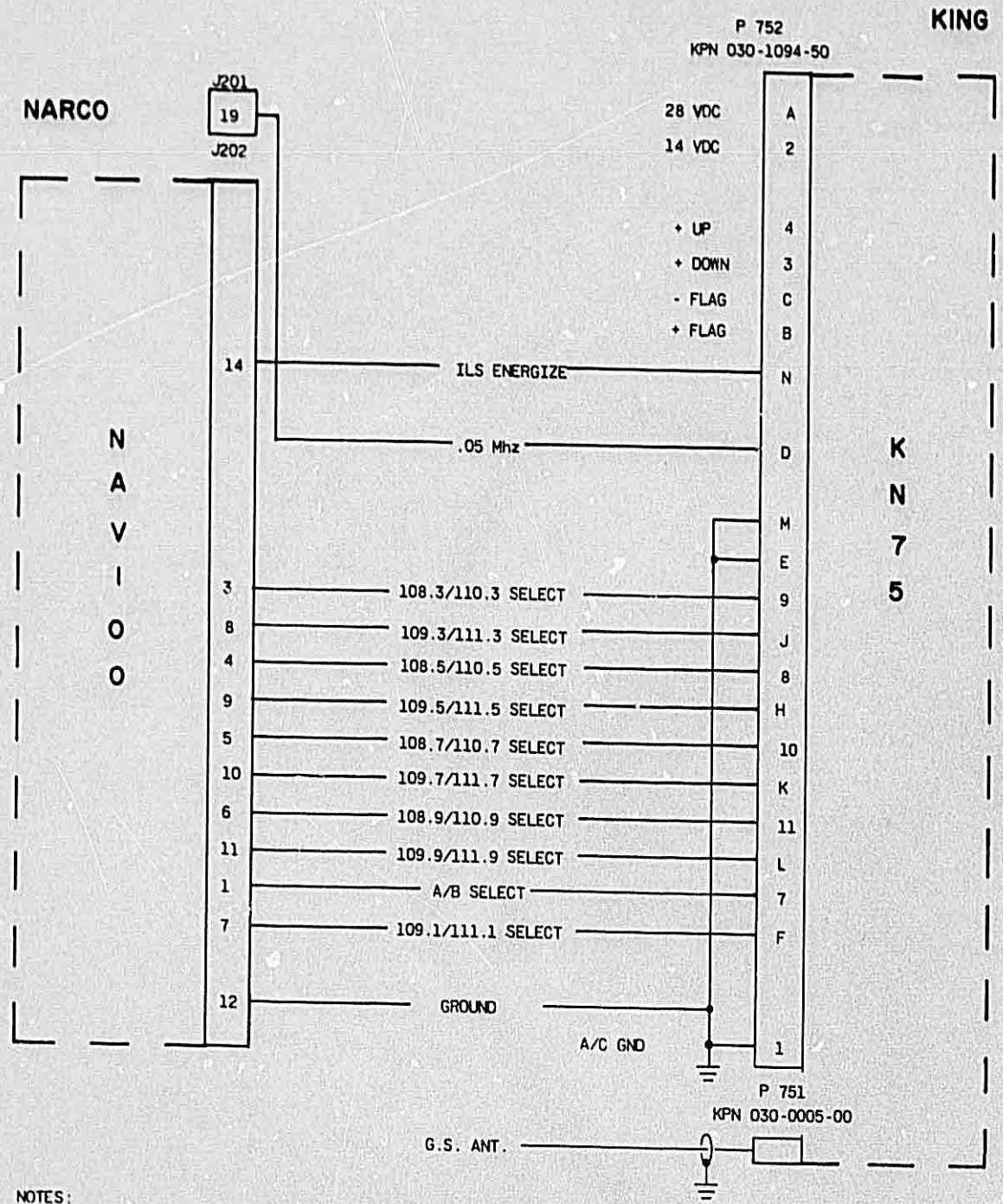
NOTES:

1. KN75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS +13.75 VDC.
2. WIRE SIZES: 14V, 28V, AND FREQ. COMMON ARE 20 AWG.ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-24 KN 75 TO EDO AIRE RT773 (2 OUT OF 5 CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1277-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



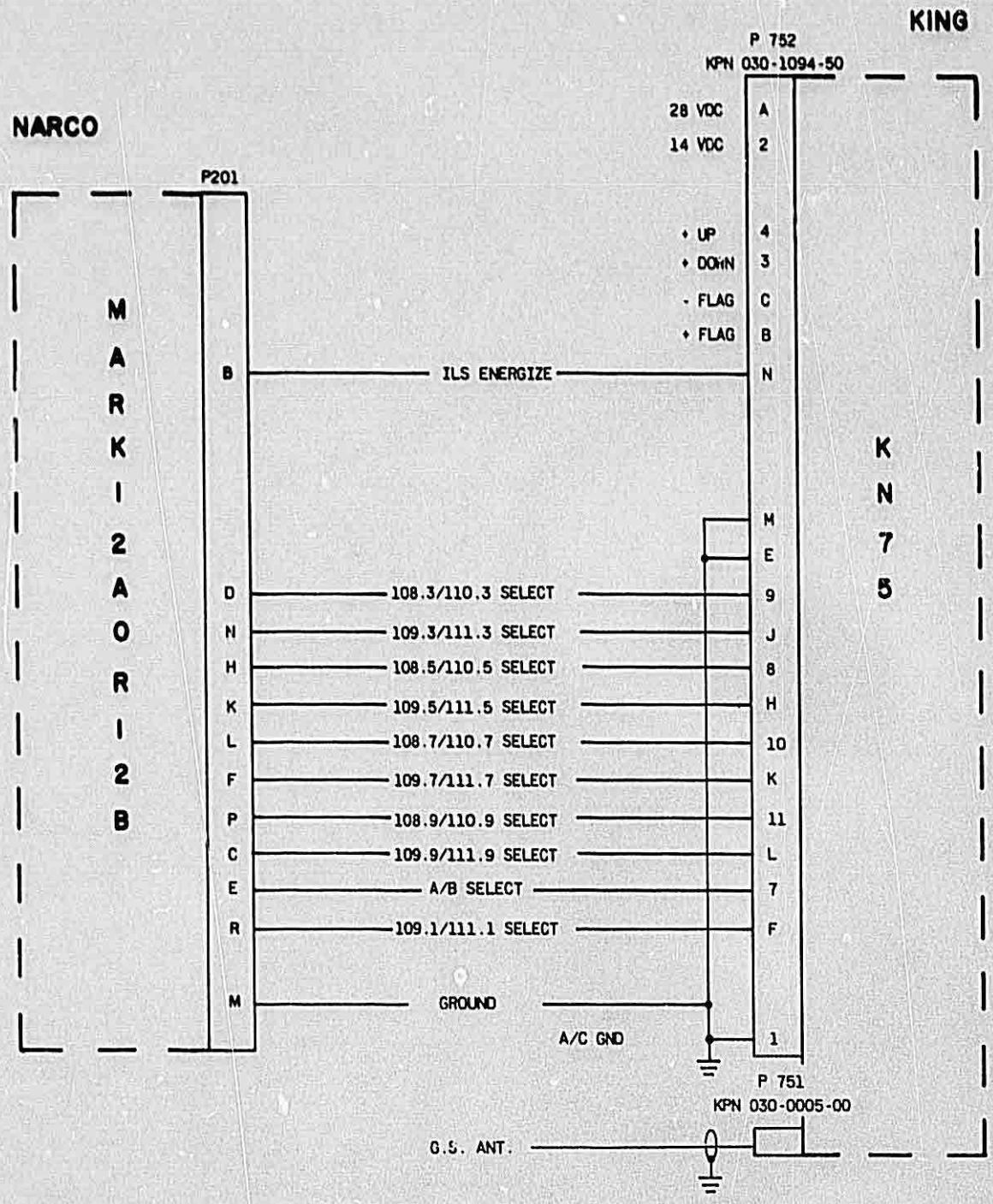
NOTES:

1. KN 75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS +13.75 VDC.
2. WIRE SIZES: 14V, 28V, AND GROUND ARE 20 AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-25 KN 75 TO NARCO NAV 10/100 (12 WIRE CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1281-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



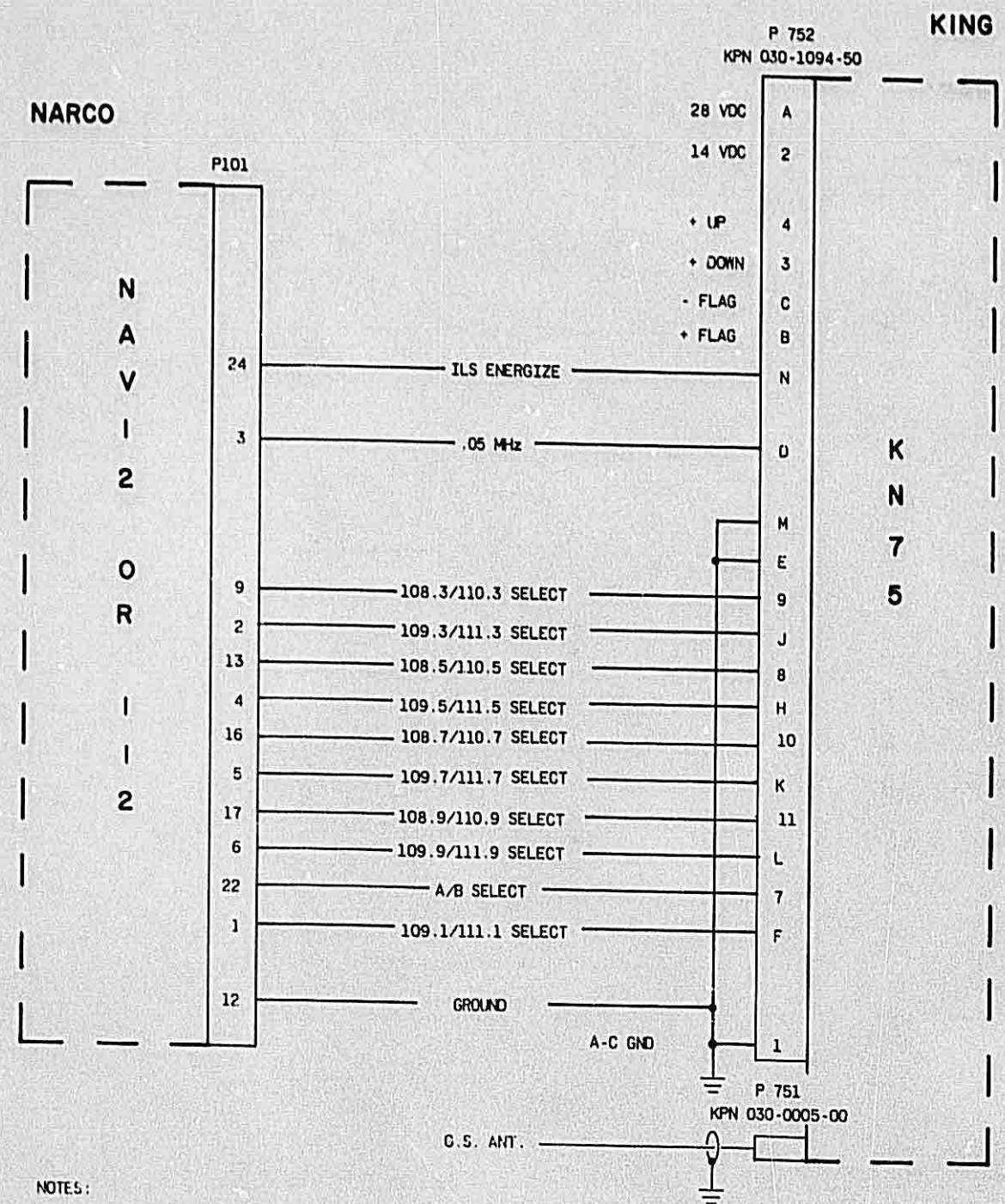
NOTES:

1. KN 75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS +13.75 VDC.
2. WIRE SIZES: 14V, 28V, AND GROUND ARE 20 AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-26 KN 75 TO NARCO MARK 12 A OR B (11 WIRE CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1282-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



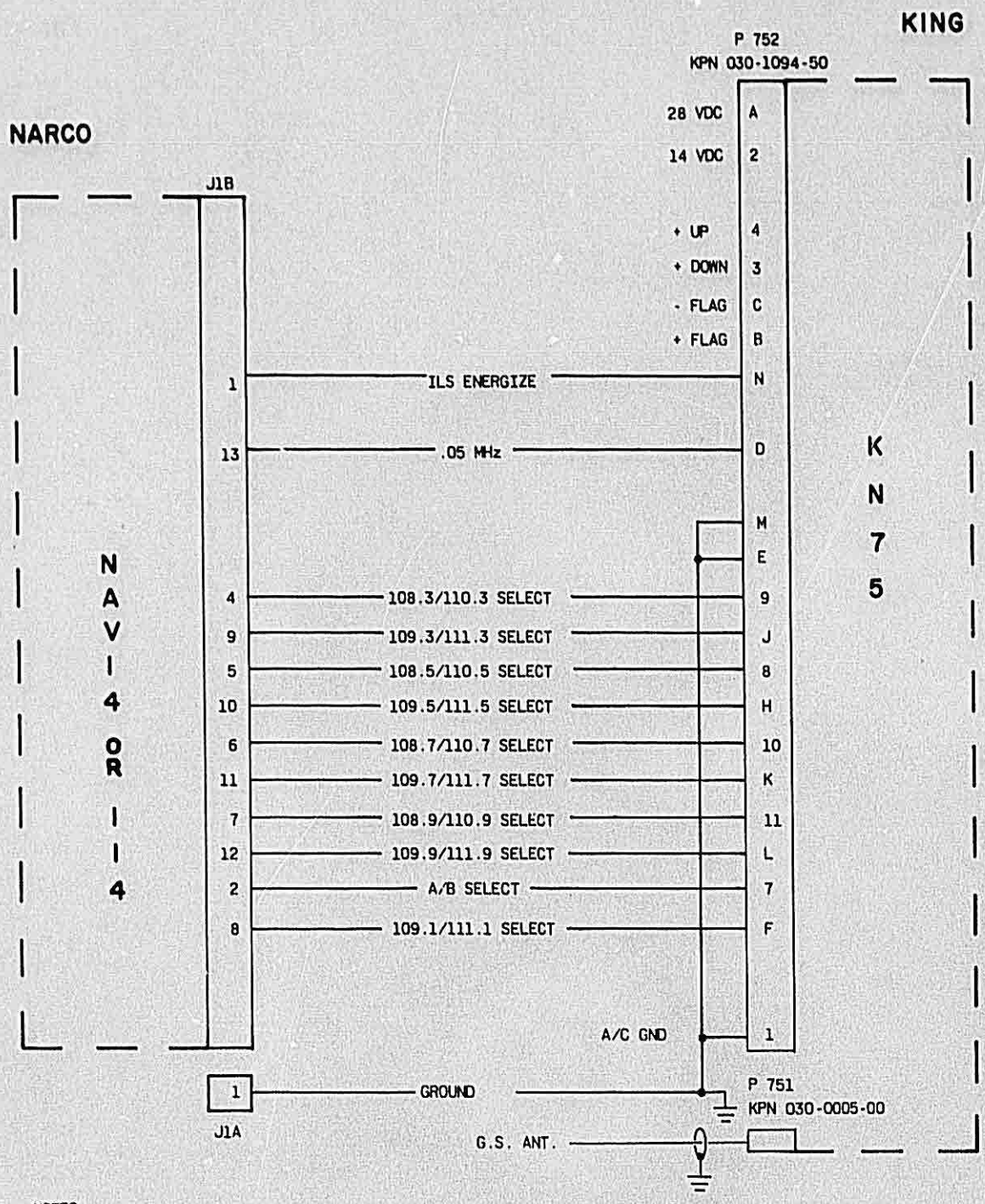
NOTES:

1. KN 75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS +13.75 VDC.
2. WIRE SIZES: 14V, 28V, AND GROUND ARE 20 AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-27 KN 75 TO NARCO NAV 12 OR 112 (12 WIRE CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1283-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



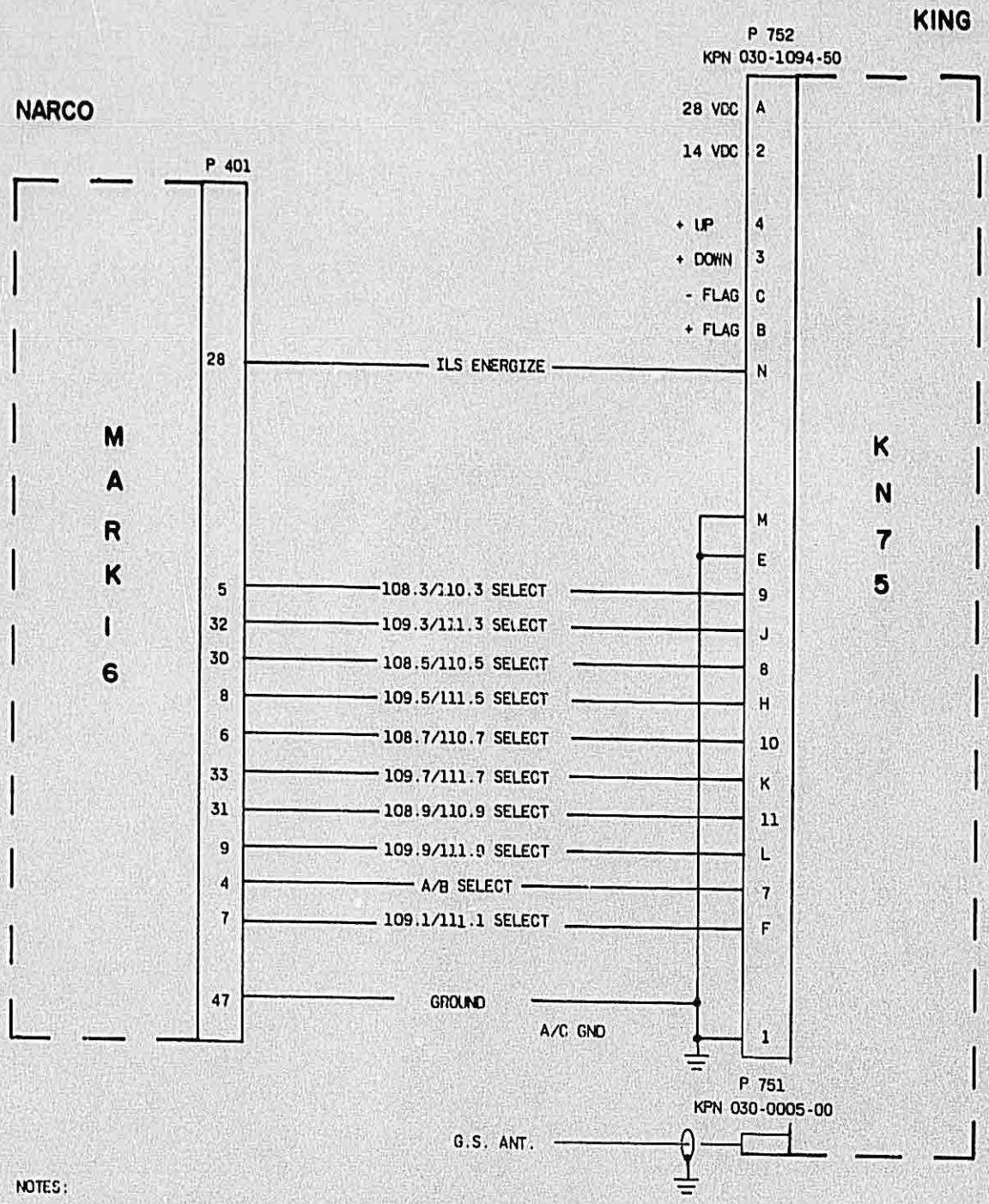
NOTES:

1. KN 75 INPUT VOLTAGES: PIN "A" IS + 27.5 VDC OR PIN"2" IS + 13.75 VDC.
2. WIRE SIZES : 14V, 28V, AND GROUND ARE 20 AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-28 KN 75 TO NARCO NAV 14 OR 114 (12 WIRE CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1284-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



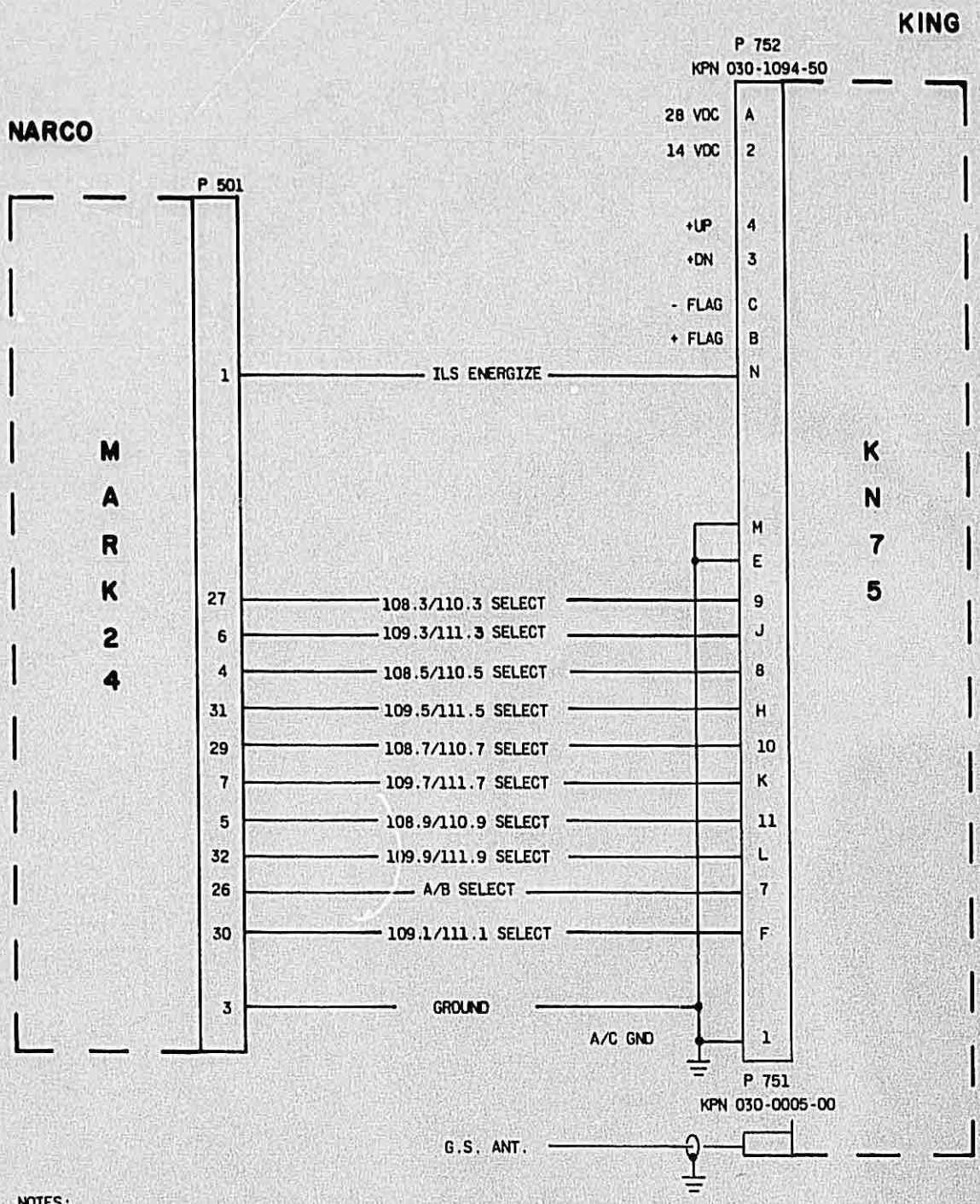
NOTES:

1. KN 75 INPUT VOLTAGES: PIN"A" IS + 27.5 VDC OR PIN "2" IS + 13.75 VDC .
2. WIRE SIZES: 14V, 28V, AND GROUND ARE 20 AWG. ALL OTHERS ARE 24 AWG.
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-29 KN 75 TO NARCO MARK 16 (11 WIRE CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1285-00, R-2)

KING

KN 75
GLIDESLOPE RECEIVER



NOTES:

1. KN 75 INPUT VOLTAGES: PIN "A" IS +27.5 VDC OR PIN "2" IS +13.75 VDC
2. WIRE SIZES: 14V, 28V, & GROUND ARE 20 AWG. ALL OTHERS ARE 24 AWG .
3. PIN DESIGNATIONS NOT SHOWN ARE N.C.
4. COMPLETE INTERCONNECT INFORMATION FOR UNITS SHOWN ON THIS DRAWING MAY BE FOUND IN THE RESPECTIVE INSTALLATION MANUALS.

FIGURE 2-30 KN 75 TO NARCO MARK 24 (11 WIRE CODE)
INTERCONNECT DIAGRAM
(Dwg. No. 155-1286-00, R-2)

BCD CODE

MHZ \ PIN	5	7	K	L
0.10	X	X	X	X
0.15		X	X	X
0.30	X		X	X
0.35			X	X
0.50	X	X	X	
0.55		X	X	
0.70	X		X	
0.75			X	
0.90	X	X		X
0.95		X		X

MHZ \ PIN	H	J	N
108	X		X
109			X
110	X	X	X
111		X	X

X INDICATES GROUND
BLANK INDICATES OPEN

PINS

GROUND - 1, 6, 12, D, E, F, M
OPEN - 8, 9, 10, 11

FIGURE 2-31 PIN CODING

KING CODE

MHZ \ PIN	D	J	K	L	H
0.10					
0.15	X				
0.30		0			
0.35	X	0			
0.50					0
0.55	X				0
0.70			0		
0.75	X		0		
0.90				0	
0.95	X			0	

MHZ \ PIN	6	7	F	N
108		X		X
109			X	X
110				X
111	X			X

X INDICATES GROUND
0 INDICATES +5V
BLANK INDICATES OPEN

PINS

GROUND - 1
OPEN - 5, 8, 9, 10, 11, 12, E, M

FIGURE 2-32 PIN CODING

2 OUT OF 5 CODE

MHZ \ PIN	7	D	K	L
0.10				
0.15		X		
0.30			X	
0.35		X	X	
0.50			X	X
0.55		X	X	X
0.70	X			X
0.75	X	X		X
0.90	X			
0.95	X	X		

MHZ \ PIN	6	H	N
108			X
109		X	X
110	X	X	X
111	X		X

PINS

GROUND - 1, 9, 12, E, F
OPEN - 5, 8, 10, 11, J, M

BLANK INDICATES OPEN

X INDICATES GROUND

FIGURE 2-33 PIN CODING

12 WIRE CODE

MHZ \ PIN	8	9	10	11	D	F	H	J	K	L
108.10/110.10										
108.15/110.15					X					
108.30/110.30		X								
108.35/110.35		X			X					
108.50/110.50	X									
108.55/110.55	X				X					
108.70/110.70			X							
108.75/110.75			X		X					
108.90/110.90				X						
108.95/110.95				X	X					
109.10/111.10						X				
109.15/111.15					X	X				
109.30/111.30								X		
109.35/111.35					X			X		
109.50/111.50							X			
109.55/111.55					X		X			
109.70/111.70									X	
109.75/111.75					X				X	
109.90/111.90										X
109.95/111.95					X					X

MHZ \ PIN	7	N
108	X	X
109		X
110		X
111	X	X

PINS

GROUND - 1, E, M
OPEN - 5, 6, 12

X INDICATES GROUND

BLANK INDICATES OPEN

NOTE: FOR 11 WIRE CODE, PIN D IS OPEN

FIGURE 2-34 PIN CODING

2.5 SUBSTITUTION OF KN 75 FOR OTHER EQUIPMENT

The KN 75 may be used in place of certain pieces of equipment by the application of the following tables:

2.5.1 TO REPLACE A KING KN 73 WITH A KING KN 75:

KN 73 PIN NO.	BECOMES	KN 75 PIN NO.	
t		4	
v		3	
c		B	
p		C	PIN 2 to 14 VDC
n		D	or
r		J	PIN A to 28 VDC
Y		H	
S		K	
P		L	
V		7	
K		F	
j		6	
T		1	
Z		1	
KX 170/175 SERIES			
4		N	

2.5.2 TO REPLACE A COLLINS GLS-350 WITH A KN 75:

GLS-350 P2 PIN NO.	BECOMES	KN 75 PIN NO.	
10		4	
9		3	
11		C	PIN 2 TO 14 VDC
12		B	or
13		N	PIN A TO 28 VDC
22		5	
17		J	
14		H	
21		K	
20		L	
19		7	
25		1,6,F,E,M,12,D	

2.5.3 TO REPLACE A NARCO UGR-2, UGR-2A, UGR-3 WITH A KN 75:

UGR-2A P102 PIN NO.	BECOMES	PIN 75 PIN NO.	
14		4	
18		3	
23		C	
19		B	
24		N	PIN 2 TO 14 VDC
3		D*	or
9		9	PIN A TO 28 VDC
2		J	
13		8	*Not used with UGR-2.
4		H	Leave Open.
16		10	
5		K	
17		11	
6		L	
22		7	
1		F	
12		1,E,M	

2.5.4 TO REPLACE A CESSNA R-433A WITH A KN 75

R-443A P6 Pin No.	BECOMES	KN 75 Pin No.	
V		N	
M		D	Pin 2 to 14 VDC
D		H	or
S		K	Pin A to 28 VDC
T		L	
AA		7	
B		6	
E		12, E, 9, F, 1	

2.5.5 TO REPLACE A BENDIX GM-427A GLIDESLOPE WITH A KING KN 75

GM-427A PIN NO.	BECOMES	KN 75 PIN NO.	
10		N	
33		D	
30		H	PIN 2 to 14 VDC
14		K	or
32		L	PIN A TO 28 VDC
15		7	
29		6	
28		12, E, 9, F, 1	

CHAPTER 03

section iii
operation

3.1 operation

The KN 75 is energized by its associated VOR/LOC receiver such as the KX 175, Series, KNR 600 Series, Collins VIR 351, or Narco Nav 11. The glideslope frequencies are paired with localizer frequencies such that both signals are received simultaneously when the localizer frequency is selected.

When the glideslope warning flag is fully cooncealed, the descent steering information presented on the horizontal meter of an indicator such as the KI 204/206/209/525A is usable. A centered horizontal meter indicates that the aircraft is on a proper glide path and usually is accomplished in the vicinity of the outer marker. An aircraft descent angle is then established to maintain the centered meter presentation. An up or down deflection requires a corresponding descent adjustment to remain on the glide path.

MFG.

INTRO

BENDIX/KING

GENERAL AVIATION AVIONICS DIVISION

MAINTENANCE MANUAL

KN 72

VOR/LOC CONVERTER

KN 75

GLIDESLOPE RECEIVER

MANUAL NUMBER 006-05142-0002
REVISION 2, AUGUST, 1978

Allied-Signal Aerospace Company

Allied Signal

RECORD OF REVISIONS

MFG REV NO	DESCRIPTION	ISSUE DATE	ATP REV DATE	INSERTED BY
2		AUG 1978	3-2-90	ATP/GM

RECORD OF TEMPORARY REVISIONS

TEMP REV NO	DESCRIPTION	ISSUE DATE	ATP REV DATE	INSERT BY	DATE REMOVED	REV INCOR	REMOVE BY
KN 72-1	6-13	OCT 31/77		ATP	10/12/95	2	ATP
KN 72-2	"	JULY 15/78		"	"	"	"
KN 75-2	6-23	AUG 9/78		"	"	"	"
KN 72-3	6-13	JAN 25/79		"	"	"	"
KN 75-3	6-23	AUG 1/78		"	"	"	"
KN 75-4	"	AUG 18/78		"	"	"	"

KING RADIO MAINTENANCE MANUAL REVISION INSTRUCTIONS AND HISTORY

MANUAL KN 72/75 KPN 006-5142-02

REVISION 2, August, 1978

Where R&R appears in the action column, remove the page now in the maintenance manual and replace it with the enclosed page; otherwise, ADD or DESTROY pages as listed. Retain these instructions in the front of the maintenance manual as a Record of Revisions.

PAGE	ACTION	REASON FOR CHANGE
Cover	R & R	Corrected errors and updated B/M, assembly drawings, and schematics to latest revision levels.
Revision History	ADD	
4-8	R & R	
4-10	R & R	
5-1	R & R	
5-2	R & R	
5-3	R & R	
5-5	R & R	
5-6	R & R	
5-7	R & R	
5-8	R & R	
5-9	R & R	
5-10	R & R	
5-11	R & R	
5-12	ADD	
5-13	ADD	
6-1	R & R	
6-4	R & R	
6-4A	ADD	
6-13	ADD	
KN 75		
5-1	R & R	
5-2	R & R	
5-3	R & R	
5-5	R & R	
5-6	R & R	
5-7	R & R	
5-8	R & R	
5-10	R & R	
5-11	R & R	
5-12	R & R	
5-13	R & R	
5-14	R & R	
5-15	R & R	
5-16	R & R	
5-17	ADD	
6-5	R & R	
6-6	R & R	
6-22	R & R	
6-23	ADD	

KN 72

MAINT MANUAL

BENDIX/KING

GENERAL AVIATION AVIONICS DIVISION

MAINTENANCE MANUAL

KN 72

VOR/LOC CONVERTER

Allied-Signal Aerospace Company

Allied Signal

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CHAPTER 04

SECTION IV
THEORY OF OPERATION

4.1 GENERAL

This section contains Theory of Operation for the KN 72 VOR/LOC Converter. Block Diagram Theory is presented first followed by Detailed Circuit Theory.

4.2 PRINCIPLES OF VOR SYSTEM

4.2.1 GENERAL

The basic function of VOR is to provide a means to determine an aircraft's position with reference to a VOR ground station and also to follow a certain path toward or away from the station. This is accomplished by indicating when the aircraft is on a selected VOR station radials or by determining which radial the aircraft is on. A means to differentiate between radials and identify them is necessary. For this purpose, advantage is taken of the fact that the phase difference between two signals can be accurately determined. The phase difference between two signals which are generated by the VOR station is varied as the direction relative to the station changes so that a particular radial is represented by a particular phase difference. Refer to Figure 4-1. One non-directional reference signal is generated with a phase that at any instant is the same in all directions. A second signal is generated with a phase that at any instant is different in different directions. The phase of the variable phase signal is the same as the phase of the reference signal only at the 0° radial (North). As the angle measured from the 0° radial increases, the phase of the variable phase signal lags the phase of the reference signal by the number of degrees of the angle from 0°. The reference and variable phase signals, which are 30Hz voltages, are carried by rf to make radio transmission and reception possible. The VOR receiving equipment must separate the 30Hz reference and variable phase signals from the rf carrier and compare the phase of the two signals. The phase difference is indicated on a course indicator or RMI.

4.2.2 VOR GENERATION

The VOR electromagnetic field is composed of the radiation from two ground based antennas radiating at the same carrier frequency. The first is a non-directional antenna radiating an amplitude modulated carrier. The frequency of the modulating signal varies from 9,480Hz to 10,440Hz back to 9,480Hz 30 times per second. That is, a 9,960Hz subcarrier amplitude modulates the rf carrier and is frequency modulated by 30Hz.

The second antenna is a horizontal dipole which rotates at the rate of 30 revolutions per second. The dipole produces a figure 8 field pattern. The rf voltages within the two lobes are 180° out of phase with each other. The rf within one of the lobes is exactly in phase with the rf radiated from the non-directional field. The rotating figure 8 pattern reinforces the non-directional pattern on the side. See Figure 4-1. This results in a cardioid field pattern which rotates at the rate of 30 revolutions per second, the rate at which the dipole antenna rotates.

The signal at an aircraft within radio range of the VOR station is an rf carrier with amplitude varying at the rate of 30Hz because of the rotation of the cardioid pattern. The carrier is also amplitude modulated at the station by the 9,960Hz signal which is, in turn, frequency modulated on a sub-carrier so that it may be separated from the 30Hz variable phase signal.

4.3 PRINCIPLES OF LOCALIZER SYSTEM

The localizer facility provides a visual display of the aircraft's position relative to a straight approach line to the runway. The ground based localizer antenna system generates two patterns. Refer to Figure 4-2. One pattern is directed toward the right side of the runway, the second to the left. The two patterns have the same carrier frequency but different audio modulating signals. The pattern to the left of the runway (in normal approach) is 90Hz amplitude modulated while the pattern to the right is 150Hz amplitude modulated.

The ratio of 90Hz to 150Hz audio, after demodulation, is dependent only upon the position of the aircraft within the patterns. The patterns are adjusted so they are of equal strength on a vertical plane extending out from the runway centerline. When the aircraft is on this plane, the 90Hz and 150Hz voltages will be equal.

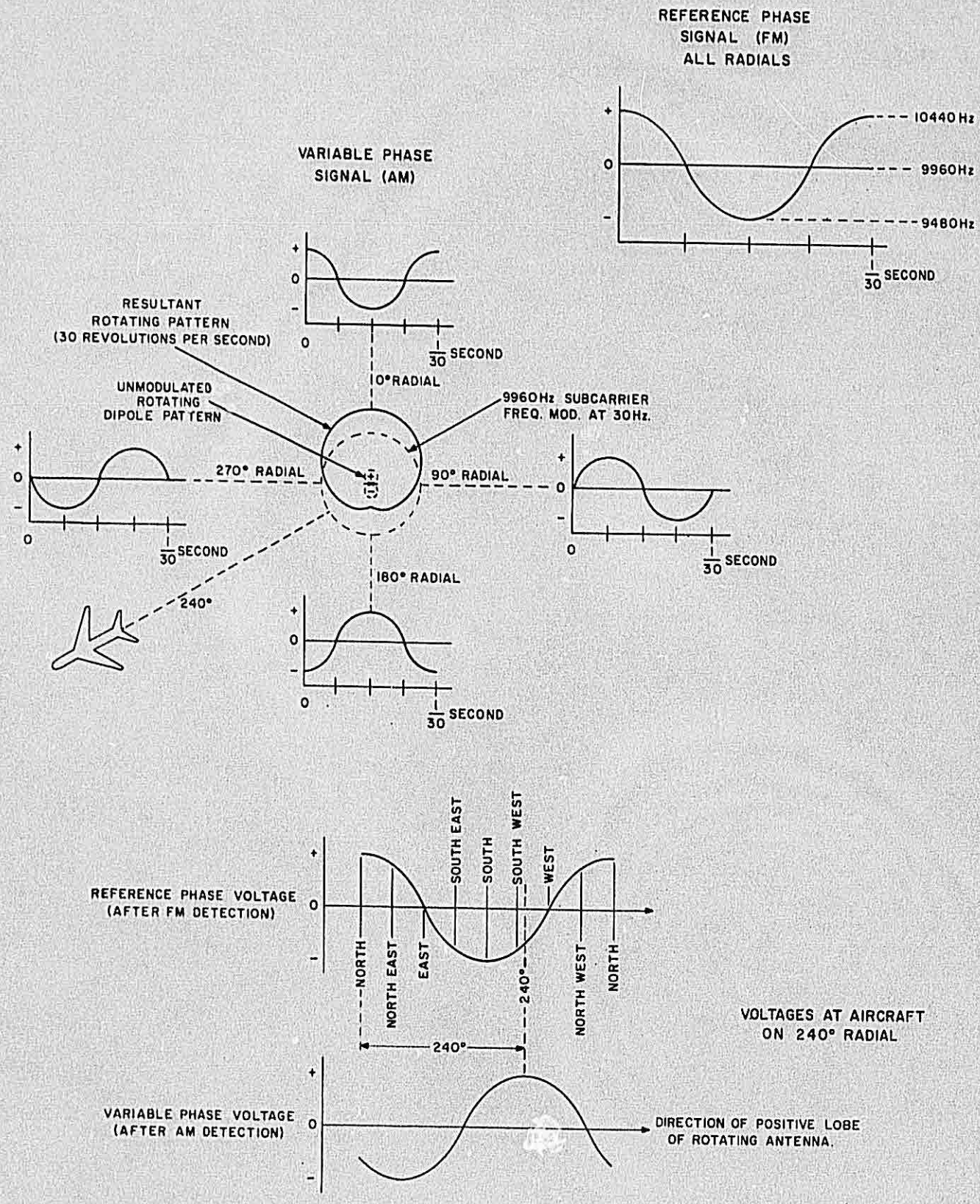


FIGURE 4-1 LOCALIZER SIGNAL GENERATION

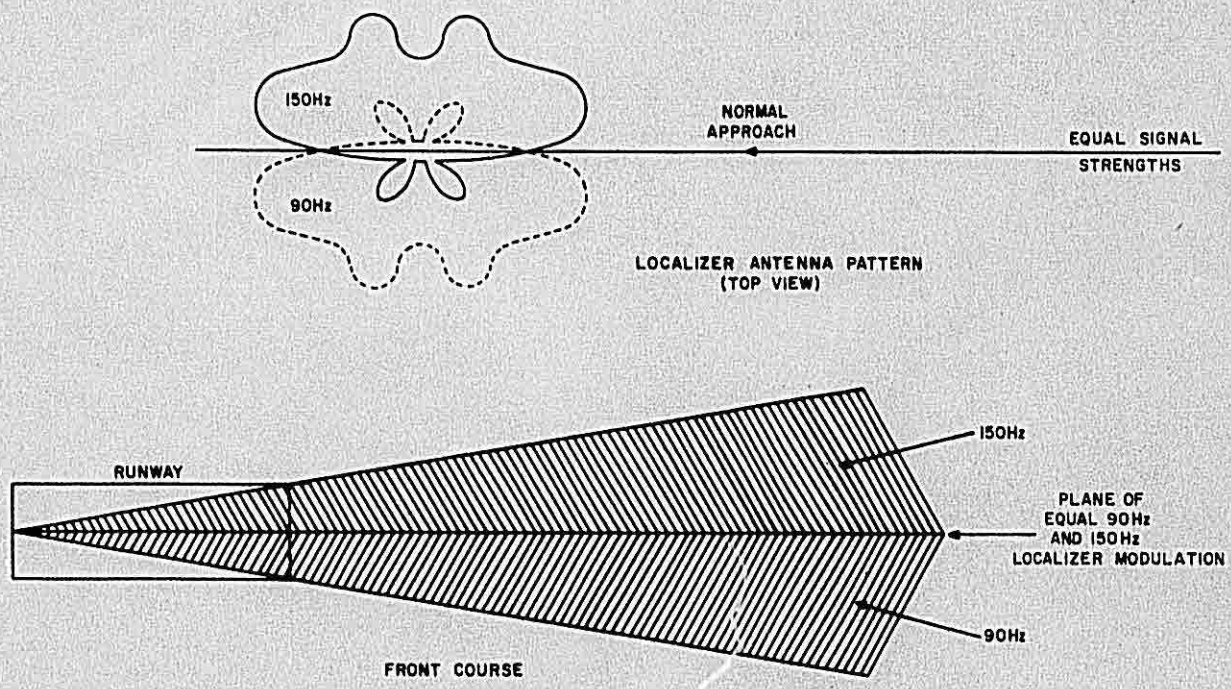


FIGURE 4-2 LOCALIZER SIGNAL GENERATION

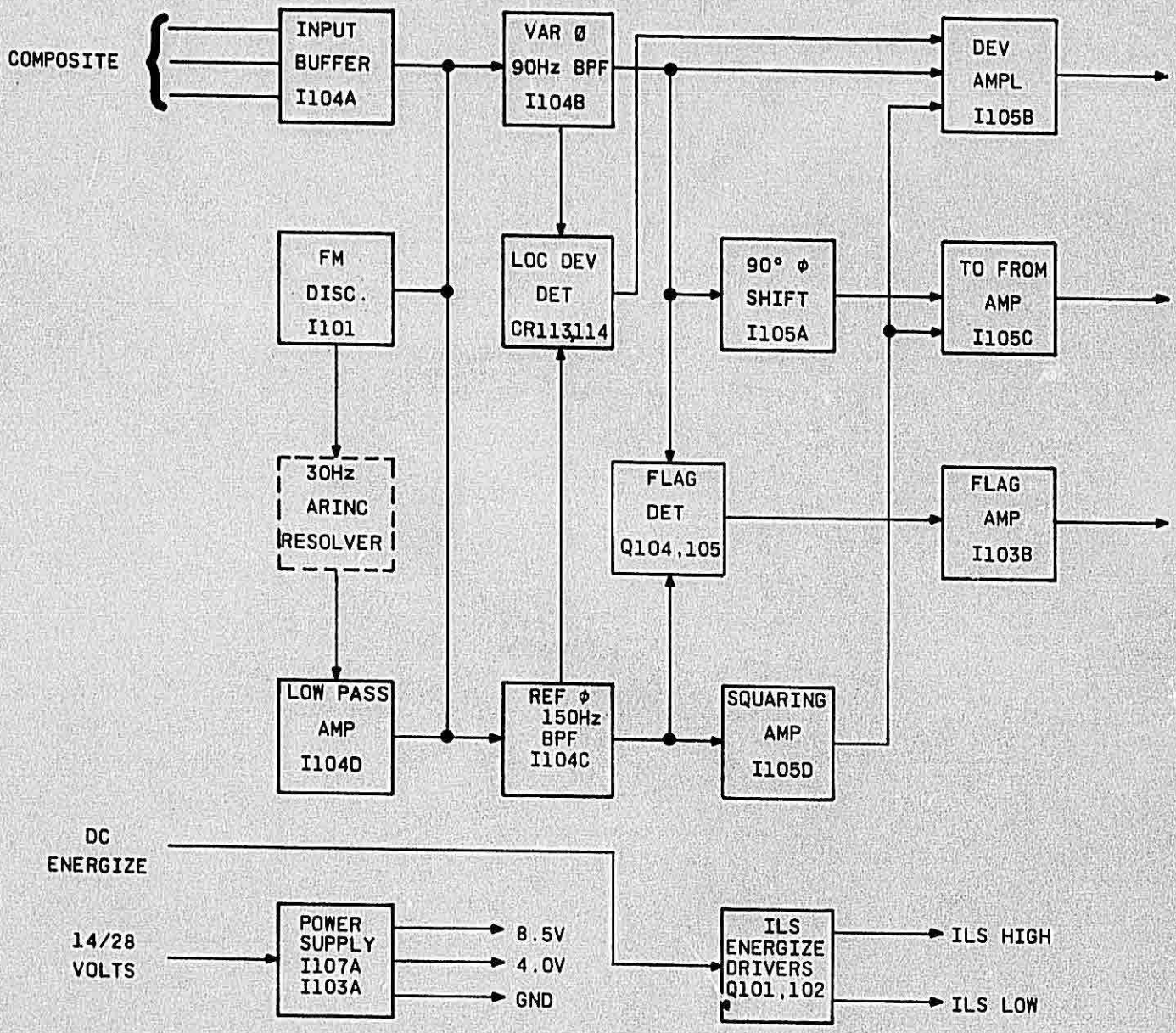


FIGURE 4-3 KN 72 BLOCK DIAGRAM
(Dwg. No. 696-1551-00, R-0)

4.4 BLOCK DIAGRAM THEORY OF OPERATION

The navigation receiver used in conjuntion with the KN 72 receives the radio frequency energy transmitted by a VOR or ILS ground station. This radio frequency energy is demodulated and the modulation information is sent to the KN 72. The VOR/LOC composite signal from the navigation receiver consists of the 9960Hz frequency modulated Reference Phase signal and the 30Hz Variable Phase signal if a VOR frequency is selected for the navigation receiver or 90Hz and 150Hz audio if an ILS frequency is selected.

The VOR/LOC composite is buffered by an operational amplifier, I104A. For .5VRMS composite, it is connected as an inverting amplifier. For .3VRMS and 3VRMS, it is used in a non-inverting configuration. This is necessary to correct the phase of the .3 and 3 volt composite. The gain is adjustable to correct for slight variations in composite levels from different NAV receivers.

4.4.1 VOR OPERATION

If a VOR frequency is selected by the navigation receiver, the KN 72 separates the Variable Phase 30Hz signal from the 9960 frequency modulated reference by passing the buffered VOR/LOC composite through a 30Hz band pass filter, I104B and associated components. This Variable Phase filter removes all the Reference Phase modulation from the Variable Phase signal.

The buffered VOR/LOC composite is also fed to the FM discriminator, I101, which recovers the 30Hz Reference Phase signal from the frequency modulated 9960Hz signal.

The 30Hz Reference Phase signal output from Q106 is fed to the rotor winding of an OBS Resolver.

By turning the OBS knob, the pilot also turns the azimuth card and the rotor of the resolver. Output of the stator windings of the resolver is amplitude dependent upon the mechanical position of the resolver rotor. By connecting both stator windings to an R-C network, R144, R133 and C135, an output voltage that is constant amplitude but phase dependent upon the position of the resolver rotor is derived. This constant amplitude variable phase signal is amplified by a low pass amplifier, I104D and then again by a 30Hz band pass filter, I104C. Output of the Reference Phase Band Pass filter is squared by I105D.

Output from the squaring amplifier is phase compared with the output of the Variable Phase Band Pass Filter. The difference in phase of the two signals is converted to a DC voltage by the Deviation Amplifier, I105B, which drives the external Course Deviation Indicator.

To compare the phase of the two band pass filter outputs, the Reference Phase Band Pass Filter output is squared and used to drive a field effect transistor switch, I102C, which is connected from the output of the Variable Band Pass Filter to an AC (signal) ground. When the output of the squaring amplifier is a large positive voltage, the switch is closed and the Variable Phase Band Pass Filter output is shorted to the AC ground. As the output voltage of the squaring amplifier approaches zero, the switch opens and the voltage output of the Variable Band Pass Filter is integrated by a resistor and capacitor. For zero voltage out of the integrator circuit, the phase difference between the Variable Phase Band Pass Filter output and the Reference Phase Band Pass Filter must be ninety degrees.

Voltage from the integrator is fed to the Deviation Amplifier, I105B, which in VOR mode is connected as a voltage follower and drives the external Course Deviation Indicator.

In order to provide TO/FROM information to the pilot, the two band pass filter outputs are again phase compared. However, the Variable Phase Band Pass Filter output is passed through an additional ninety degree phase shift network so that when minimum voltage is present on the Deviation Amplifier Output, output voltage of the TO/FROM phase comparator will be maximum. Integration of the TO/FROM phase comparator output is accomplished by the TO/FROM amplifier, I105C which functions as an integrator for 30Hz signals.

Output voltages from both band pass filters are monitored for usuable signal levels by the Flag Detector Circuit. As long as the output voltage of each band pass filter is above the threshold set by the Flag Detector Circuit, the Flag Amplifier will provide enough voltage to pull the VOR/LOC warning flag from view. When the output of either band pass filter falls below the threshold, the Flag Amplifier output decreases and the VOR/LOC warning flag appears in the window.

4.4.2 LOCALIZER OPERATION

When an ILS frequency is selected by the navigation receiver, the ILS Energize line from the receiver will be a low impedance to ground. This control line switches the KN 72 from the configuration for VOR operation to the configuration required for Localizer operation.

Output LOC composite from the input buffer amplifier passes to the Variable Phase Band Pass Filter as in VOR operation. The center frequency of the filter is now 90Hz. Changing the center freqeuncy is accomplished by sensing the ILS Energize input from the navigation receiver. The FM discriminator, I101 is disabled so there is no output to the resolver rotor.

In Localizer configuration, buffered composite is input directly to the Reference Phase Band Pass Filter. By sensing the ILS Energize input, center frequency of the Reference Phase Band Pass Filter is switched to 150Hz.

Proper steering information in Localizer mode is obtained by comparing the difference in output levels of the two band pass filters. The difference in amplitude of the two filters is detected by the Localizer Detector Circuit, CR113, CR114 and I106B and I106D. Output from the Localizer Detector is connected to I106B and D, a field effect transistor switch that is controlled by the ILS Energize input from the navigation receiver. In Localizer operation, the control input to I106B, D causes the switch to be closed which results in the output of the Localizer Detector being applied to the Deviation Amplifier. For Localizer operation, the Deviation Amplifier integrates the output of the Localizer Detector. Thus, a DC voltage proportional to the ratio of 90Hz and 150Hz in the input LOC composite is formed.

Output of both band pass filters is summed together in Localizer operation to provide voltage to pull the VOR/LOC warning flag from view. If the summed voltage from the band pass filters falls below a usuable level, output voltage of the flag amplifier will not be great enough to pull the warning flag from view.

The squaring amplifier and the TO/FROM amplifier are both disabled in Localizer operation by the ILS Energize input.

4.4.3 POWER SUPPLY

An integrated circuit voltage regulator, I107 provides a regulated 8.5 volts DC for input voltages ranging from 10 to 35 volts. An operational amplifier, I103A, connected as a voltage follower, provides a 4.0 volt reference voltage used as an AC (Signal) ground within the KN 72.

4.5 DETAILED CIRCUIT THEORY

The KN 72 contains all circuitry on one printed circuit board. Components are all 100 series designators. The components are in numerical order across the board to facilitate their location for troubleshooting.

4.5.1 INPUT BUFFER I104A

The KN 72 has three composite inputs to I104A. The .5VRMS input only will be discussed as all three inputs are similar.

VOR/LOC composite from the navigation receiver is capacitively coupled through C122 to the input buffer, I104A. Resistor R150 in series with variable resistor R106, controls the gain of the amplifier. R147 sets the Input impedance. R152 provides bias for the non-inverting input of the amplifier from the 4.0 volt line. R149 minimizes crossover distortion of the amplifier.

4.5.2 BAND PASS FILTER DETAILED CIRCUIT THEORY

The band pass filters utilized in the KN 72 are of the multiple feedback type. Figure 4-4 shows a typical multiple feedback band pass filter.

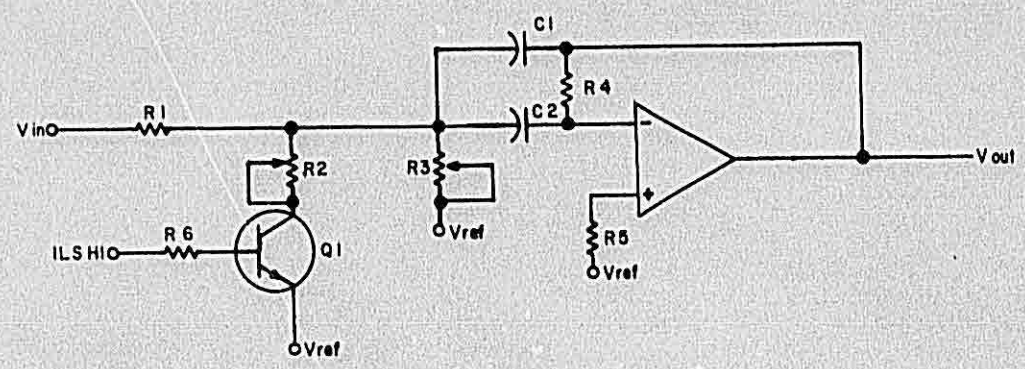


FIGURE 4-4 BAND PASS FILTER

In VOR operation, Q1 is turned off and looks like a high impedance which effectively removes R2 from the circuit. Center frequency of the circuit is dependent upon the parallel combination of R1 and R3 along with R4, C1 and C2. Center frequency is set to 30Hz by varying R3. Gain of the filter is set by the ratio of R4 to R1.

In Localizer operation, Q1 will be saturated and places R2 in parallel with R3 to change the center frequency of the filter.

Both the Variable Phase/90Hz and Reference Phase/150Hz filters utilize the same configuration and method for switching center frequency. In the Reference Phase/150Hz filter, I106C and R175 are required to provide equal filter "Q"s in Localizer mode. I102A, a FET switch, is turned on in LOC mode to apply LOC composite to the Reference Phase/150Hz filter. R123 controls LOC centering. A Hi on pin 5, I101, disables the F.M. Discriminator in LOC.

4.5.3 F.M. DISCRIMINATOR I101

The 9960Hz F.M. is coupled through C112 to the limiter, Q103. The limiter removes any amplitude variations from the 9960Hz which might affect F.M. detection. The 9960Hz is coupled into I101 by C113. I101 contains an input amp, phase comparator, VCO, source follower output and requires two external capacitors and three resistors. C114 and R122 determine the VCO frequency range while R120 and R127 set the VCO center frequency. C124 and R124 form a low pass filter. The low pass filter connected to the output of the phase comparator supplies the averaged voltage to the VCO and the source follower output stage. Since the signal into I101 is varying in frequency at a 30Hz rate, the source follower output varies in amplitude at 30Hz. Q106 amplifies this 30Hz signal to drive the resolver.

4.5.4 30Hz RESOLVER AND LOW PASS AMP (I104D) DETAILED CIRCUIT THEORY

The external 30Hz resolver couples a signal from rotor to stators by transformer action. The stators by physical placement will have signals phase shifted by 90 degrees from each other, the amplitudes of which are dependent on the mechanical position of the resolver rotor. By varying the resolver rotor position, the amount of coupling between the rotor winding and both stator windings is varied. When one stator winding is at maximum coupling, the other stator will be at minimum coupling. These signals from the two stator windings are applied to the constant amplitude phase shifter network, R144, R133, and C135. In this network, one signal is shifted 45^{0} leading while the other is shifted 45^{0} lagging. The vector addition of these signals results in a constant amplitude signal with a phase dependent on the rotor position. Adjustments of R133 will balance the phase shift of the two signals. The output of this network will ideally be shifted 45^{0} from the input. However, driving into other than an infinite impedance may affect this phase shift.

The Low Pass Amp receives the signal from the phase shift network and amplifies it to a usable signal level while removing much of the noise picked up at the resolver. The amp, I104D, also corrects for some of the phase shift from the resolver and phase network. R172 and C137 determine the cutoff frequency and phase shift at 30Hz. The ratio of the impedance of C137 in parallel with R172 to R171 and R146 sets the gain for 30Hz signals. R173 provides DC bias for the amplifier from the 4.0 volt line.

4.5.5 REFERENCE PHASE SQUARING AMP I105D DETAILED CIRCUIT THEORY

The reference signal from I104C is capacitively coupled through C140 to I105D. Since the amp is operated essentially open loop (with no feedback), the output will switch from 8.5 volts to ground as the input crosses the reference voltage level. The resistive voltage divider comprised of R183 and R185 sets the minimum output level of the Reference Band Pass Filter required to cause the squaring amplifier to switch. This helps prevent an active D-Bar while the warning flag is in view. This square wave drives the field effect transistor switches used in the deviation and TO/FROM phase detectors. CR115 is turned on in LOC mode to disable I105D and drive its output high.

In LOC mode, the ILS ENG (Low) line is pulled nearly to ground when Q102 saturates. This causes the cathode of CR115 to be pulled nearly to ground also. Since the cathode of CR115 is grounded, Pin 13 of I105D is pulled within .6 volts of ground. By pulling the inverting input toward ground, the output of the amplifier increases toward the positive supply until the amplifier output stage saturates. In VOR mode, CR115 is reverse biased and normal DC bias for the amplifier is provided by R183 and R185.

4.5.6 LOCALIZER DEVIATION DETECTOR CR113, CR114, I106B,I106D DETAILED CIRCUIT THEORY

In LOC mode, the difference in signal levels between the 90 and 150Hz filters is detected by the currents through CR113, R165, R166 and CR114. The center of this network is connected to the deviation amplifier by I106B,D.

4.5.7 90^{o} PHASE SHIFT NETWORK I105A DETAILED CIRCUIT THEORY

The Variable Phase Signal from I104B is sent to the low pass amplifier consisting of R162, R160, R161, R159, C125, C131 and I105A. The phase shift of the filter for 30Hz signals and cutoff frequency is controlled by R160 and R161. Phase shift at 30Hz is approximately 87 degrees. Gain of the amplifier is controlled by the ratio of the impedance of R161 in paralleled with R160 to R162.

4.5.8 TO/FROM AMP I105C DETAILED CIRCUIT THEORY

The signal from I105A is coupled through C130 and R128 to I105C. I102B is driven by the square wave from I105D to chop the signal input to I105C. Since this signal is phase shifted 87^{o} from the deviation signal, the TO/FROM signal is maximum with a centered course deviation indicator.

The chopped waveform at the junction of R128 and R129 is integrated by the circuit consisting of I105C, C141, R129, R186 and R187. The ratio of R129 to R186 sets the DC gain of the integrator. Since R187 is inside the feedback loop, it does not affect circuit performance except to provide short circuit protection for the amplifier and current limit for the TO/FROM meter. Diodes CR116 and CR117 provide overvoltage protection for the TO/FROM meter. R184 provides DC bias for the amplifier from the 4.0 volt line.

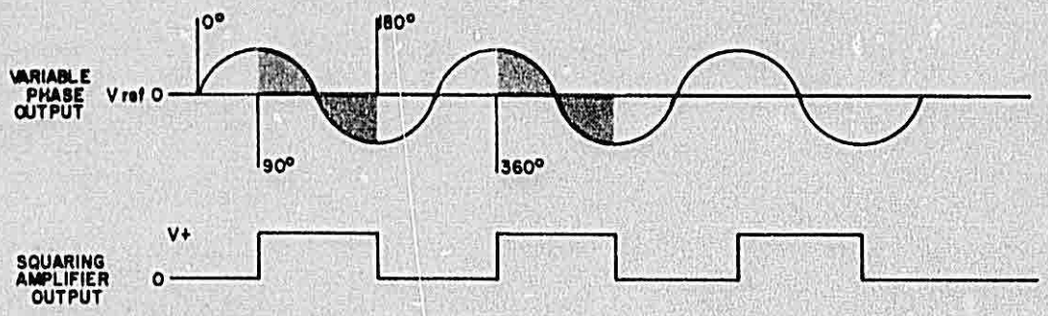
4.5.9 DEVIATION AMPLIFIER DETAILED CIRCUIT THEORY

4.5.9.1 VOR OPERATION

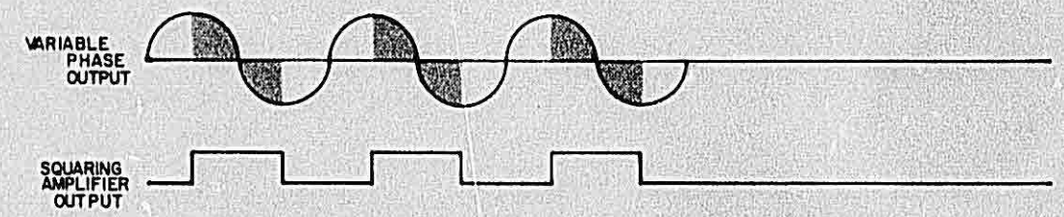
Output from the Variable Phase Band Pass Filter is capacitively coupled by C129 to the phase detector consisting of R126, R167, C134, C132 and I102C. The output of the Variable Phase Filter is chopped by I102C, a field effect transistor switch that shorts the juntion of R125 and R126 to the 4.0 volt line when the squaring amplifier output is positive. R125 limits the current through the switch. The combination of R167 and C134 is used to integrate the chopped waveform. R167 and C132 further integrate the chopped waveform. This two section low pass filter provides superior rejection to high frequency VOR scalloping signals than a single section filter. This filter also sets the response time of the VOR deviation indicator.

When the Variable Phase Band Pass Filter Output and the Squaring Amplifier Output are exactly ninety degrees out of phase, the average voltage of the chopped waveform at the input of the two section filter will be zero. If the phase shift between the Variable Phase Filter and the Squaring Amplifier is not ninety degrees, the average voltage of the chopped waveform will not be zero. The average voltage of the chopped waveform is directly related to the phase difference between the Variable Phase Filter Output and the Squaring Amplifier Output. Figure 4-5 illustrates operation of the phase detector.

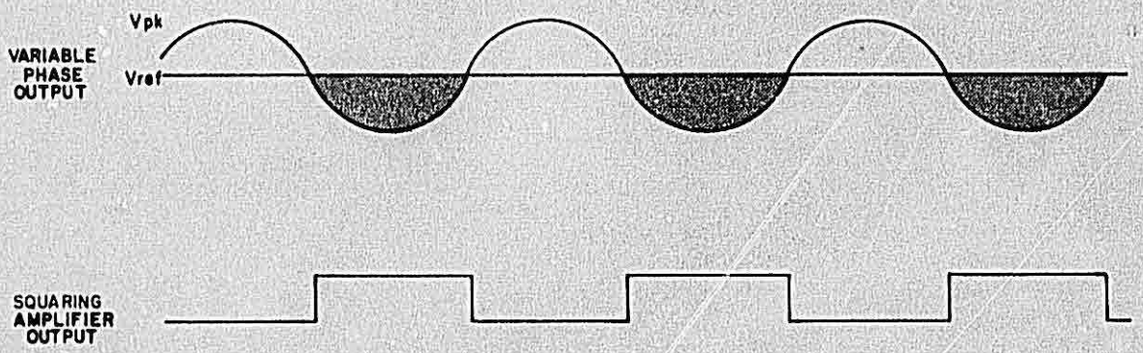
Output from the chopper is referenced to the 4.0 volt line when the switch is closed. If the average voltage of the chopped waveform is zero, the output of the integrating low pass filter at the junction



REFERENCE AND VARIABLE SEPERATED 90° AVERAGE = 0, D-BAR OUTPUT = 0



REFERENCE AND VARIABLE SEPERATED 80° D-BAR OUTPUT — 5 DOTS DEFLECTION



REFERENCE AND VARIABLE SEPERATED 180°, AVERAGE VOLTAGE = .318Vpk
D-BAR OUTPUT — MAXIMUM

FIGURE 4-5 VOR PHASE COMPARATOR OUTPUT

of R167 and C132 will be 4.0 volts. If the average of the chopped waveform is not zero, the output of the low pass filter will be 4.0 volts plus or minus the average voltage of the chopped waveform.

Amplifier I105B is connected as a voltage follower in VOR mode. I106B,D is open circuit so components R121 and C133 do not affect circuit performance. R164 makes the amplifier a voltage follower. R188 provides current limit protection for the external meter while CR119 and CR120 provide overvoltage protection. Diodes CR118 and CR121 temperature compensate the deviation time constant switch circuit.

Purpose of the Deviation Time Constant switch is to allow the pilot to more rapidly center the course deviation indicator by turning the OBS knob. The output voltage of the Deviation Amplifier is sensed by transistors Q111 and Q112. If the deviation output voltage exceeds the voltage established on the emitter of Q111 (by the resistive divider comprised of R193 and R194), the transistor starts to conduct. If the deviation output voltage is large enough to saturate Q111, Q110 is also saturated. This causes I106A to effectively short circuit R167. With R167 shorted out, the time constant of the Deviation Filter is greatly reduced. Capacitor C142 discharges through R190 to keep the filter time constant shortened after the deviation amplifier output is reduced below the threshold of Q112. Q112 is turned on for negative output of the deviation amplifier. Threshold voltage for Q112 is established by R168 and Q169. When the output voltage of the deviation amplifier decreases below the reference voltage established on the base of Q112, the transistor begins to conduct and will eventually turn on Q112. Resistors R192 and R195 protect Q111 and Q112.

4.5.9.2 LOCALIZER OPERATION

In localizer mode, I102C is turned on continuously by the squaring amplifier. This effectively shorts one end of R126 to the 4.0 volt line. DC bias from the 4.0 volt line through R126 and R167 is provided to I105B. I106A is switched off through Q110 and the ILS ENG (Low) line to minimize the offset voltage of the amplifier.

Field effect transistor switch I106B,D is turned on in Localizer Mode. Outputs of the two band pass filters are halfwave rectified by CR113 and CR114. The connections of CR113, CR114, R165 and R166 are arranged so that the output of the 90Hz filter is subtracted from the output of the 150Hz filter. This AC voltage difference is integrated by I105B along with R121, R164 and C133. Gain of the amplifier is set by R121 while the combination of R164 and C133 set the response time of the VOR/LOC Course Deviation Indicator in the Localizer Mode.

4.5.10 FLAG DETECTOR DETAILED CIRCUIT THEORY

4.5.10.1 VOR OPERATION

In VOR mode, the outputs of both band pass filters are DC coupled to R131 and R136. Diode CR104 along with C116 detects the negative peak voltage of the Variable Phase Band Pass Filter Output. As long as the negative peak voltage at the base of the Q105 is less than the reference voltage produced on the emitters of Q105 and Q104, Q105 will not conduct. If the negative peak voltage on the base of Q104 is enough to keep it turned off also, current flows through R114 into the inverting input of I103B. This causes the output voltage of I103B to go negative which puts a voltage across the warning flag and keeps it concealed. Resistors R108 and R113 will turn on Q104 and Q105 if there is no signal output from the band pass filters. This causes Q104 and Q105 to saturate and reverse bias CR109. Output voltage of I103B now becomes the same as the voltage on the positive input and no voltage is present across the warning flag so it is revealed in the window. C126 and R139 set the response time of the flag amplifier while R140 provides DC bias. CR111 and CR112 along with R141 provide protection for the flag meter.

4.5.10.2 LOCALIZER OPERATION

In localizer mode, the output of the band pass filters is connected through CR105 and CR108 to CR106 and CR107. Resistors R132 and R137 bias CR105 and CR108 as voltage followers in localizer mode. These diodes temperature compensate the rectifier diodes, CR106 and CR107. The output from the rectifier diodes is current summed by R134 and R135. Amplifier I103B integrates the halfwave rectified signals from CR106 and CR107. If the signals are large enough, the output of the flag amplifier will be negative enough to conceal the warning flag. CR105 and CR108 provide temperature compensation for CR106 and CR107 and allow the localizer flag circuit to be disabled in VOR mode.

KING
KN 72
VOR/LOC CONVERTER

4.5. 11 ILS ENERGIZE DRIVER DETAILED CIRCUIT THEORY

When an ILS station is selected by the navigation receiver, the cathode of CR101 is grounded. This causes Q101 to saturate which in turn causes Q102 to saturate. Voltage of the ILS ENG (Hi) line is within one transistor's Vce sat of the 8.5 volt line while the ILS ENG LOW line is within one transistor Vce sat of ground. R102 keeps Q101 turned off in VOR mode.

4.5.12 POWER SUPPLY DETAILED CIRCUIT THEORY

Input power from the aircraft is on pin 2 I107. The input for 28 volt aircraft is through R197 to reduce the voltage on pin 2, I107 and lower the power dissipated by I107. C119 provides filtering for I107's input. R142, R143 and R196 set the output for 8.5 volts while C111 filters the 8.5 volt line. R116 and R117 are a resistor divider to 4.0 volts for the input to I103A. R115 makes I103A a voltage follower to drive the Vref line. C117 and C118 are filtering for the Vref line.

CHAPTER

05

NAME	ASS'Y. NO.
Final Assembly	066-4009-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	047-4008-02	Front Panel		1				
	047-4323-01	Rear Panel		1				
	057-1834-00	Name Plate		1				
	057-1903-01	Serial Tag		1				
	075-5002-01	Chassis Extrusion		1				
	089-2005-37	#2 Hex Nut		1				
	089-5874-04	Screw 2-56 x 1/4 PHP		1				
	089-6294-03	Screw 4-40 x 3/16 PHP T.T.		2				
	089-6540-05	Screw 6-32 x 5/16 PHP T.T		8				
	091-0285-00	Dome Head Fastner		1				
	200-5876-00	PC Board Assembly		1				

PARTS LIST REVISION HISTORY				ENGR. APPROVAL
NAME Final Assembly				ASS'Y. NO. 066-4009-00
ASS'Y. DWG. 300-2088-00			UNIT KN 72	USED ON 000-0189-00
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
1 2 3				
				KN 72 Maintenance/Overhaul Manual Rev. 0, September, 1976
4 5			047-4323-01 091-0285-00	P/N changed from 047-4010-01 Added to B/M
				KN 72/KN 75 Maintenance/Overhaul Manual Rev. 2, August, 1978

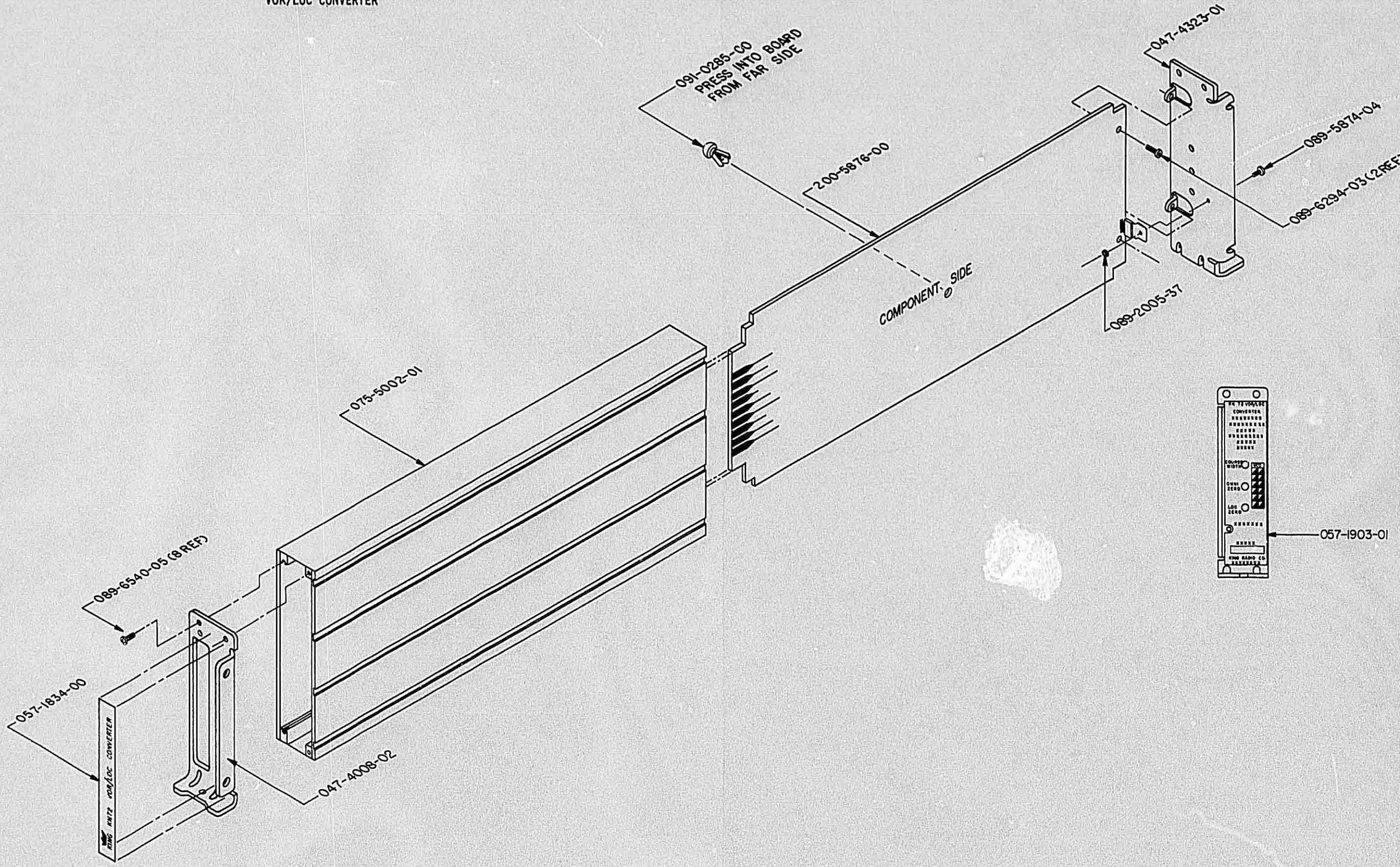


FIGURE 5-1 KN 72 FINAL ASSEMBLY
(Dwg. No. 300-2088-00, R-1)

NAME	P/C Board Assembly	ASS'Y. NO.	200-5876-00

KING RADIO CORP. PARTS LISTING			CODE	QUANTITY				
SYMBOL	PART NUMBER	DESCRIPTION		-00	-01	-02	-03	-04
	009-5876-01	P/C Board W/H'ware	A	1				
Q101	007-0065-00	Tstr Si 2N3906 PNP		2				
Q102	007-0078-00	Tstr Si 2N3415 NPN		9				
Q103	007-0078-00	Tstr Si 2N3415 NPN		-				
Q104	007-0078-00	Tstr Si 2N3415 NPN		-				
Q105	007-0078-00	Tstr Si 2N3415 NPN		-				
Q106	007-0187-00	Tstr Si 2N5089 NPN		1				
Q107	007-0078-00	Tstr Si 2N3415 NPN		-				
Q108	007-0078-00	Tstr Si 2N3415 NPN		-				
Q109	007-0078-00	Tstr Si 2N3415 NPN		-				
Q110	007-0065-00	Tstr Si 2N3906 PNP		-				
Q111	007-0078-00	Tstr Si 2N3415 NPN		-				
Q112	007-0078-00	Tstr Si 2N3415 NPN		-				
Q113	007-0267-00	Tstr E113 FET		1				
CR101	007-6024-00	Diode Si 1N4001		1				
CR102	007-6016-00	Diode Si 1N4154		18				
CR103	007-6016-00	Diode Si 1N4154		-				
CR104	007-6016-00	Diode Si 1N4154		-				
CR105	007-6023-00	Diode GE 1N277		2				
CR106	007-6016-00	Diode Si 1N4154		-				
CR107	007-6016-00	Diode Si 1N4154		-				
CR108	007-6023-00	Diode GE 1N277		-				
CR109	007-6016-00	Diode Si 1N4154		-				
CR110	007-6016-00	Diode Si 1N4154		-				
CR111	007-6016-00	Diode Si 1N4154		-				
CR112	007-6016-00	Diode Si 1N4154		-				
CR113	007-6016-00	Diode Si 1N4154		-				
CR114	007-6016-00	Diode Si 1N4154		-				
CR115	007-6016-00	Diode Si 1N4154		-				
CR116	007-6016-00	Diode Si 1N4154		-				
CR117	007-6016-00	Diode Si 1N4154		-				
CR118	007-6016-00	Diode Si 1N4154		-				
CR119	007-6016-00	Diode Si 1N4154		-				
CR120	007-6016-00	Diode Si 1N4154		-				
CR121	007-6016-00	Diode Si 1N4154		-				
L101	013-0028-00	Ferrite Bead/Wire		17				
L102	013-0028-00	Ferrite Bead/Wire		-				
L103	013-0028-00	Ferrite Bead/Wire		-				
L104	013-0028-00	Ferrite Bead/Wire		-				
L105	013-0028-00	Ferrite Bead/Wire		-				
L106	013-0028-00	Ferrite Bead/Wire		-				
L107	013-0028-00	Ferrite Bead/Wire		-				
L108	013-0028-00	Ferrite Bead/Wire		-				
L109	013-0028-00	Ferrite Bead/Wire		-				

NAME	ASS'Y. NO.
P/C Board Assembly	200-5876-00

KING RADIO CORP. PARTS LISTING			CODE	QUANTITY				
SYMBOL	PART NUMBER	DESCRIPTION		-00	-01	-02	-03	-04
L110	013-0028-00	Ferrite Bead/Wire		-				
L111	013-0028-00	Ferrite Bead/Wire		-				
L112	013-0028-00	Ferrite Bead/Wire		-				
L113	013-0028-00	Ferrite Bead/Wire		-				
L114	013-0028-00	Ferrite Bead/Wire		-				
L115	013-0028-00	Ferrite Bead/Wire		-				
L116	013-0028-00	Ferrite Bead/Wire		-				
L117	013-0028-00	Ferrite Bead/Wire		-				
C101	113-3121-00	Cap D/C 120pf X5F		18				
C102	113-3121-00	Cap D/C 120pf X5F		-				
C103	113-3121-00	Cap D/C 120pf X5F		-				
C104	113-3121-00	Cap D/C 120pf X5F		-				
C105	113-3121-00	Cap D/C 120pf X5F		-				
C106	113-3121-00	Cap D/C 120pf X5F		-				
C107	113-3121-00	Cap D/C 120pf X5F		-				
C108	113-3121-00	Cap D/C 120pf X5F		-				
C109	113-3121-00	Cap D/C 120pf X5F		-				
C110	113-3121-00	Cap D/C 120pf X5F		-				
C111	096-1030-00	Cap Tant 1uf 20V		3				
C112	113-5561-00	Cap D/C 560pf X5F		1				
C113	109-0007-00	Cap D/C .01uf		1				
C114	104-0001-18	Cap Mica 2000pf		2				
C115	096-1030-11	Cap Tant 4.7uf 20V 20%		3				
C116	096-1030-11	Cap Tant 4.7uf 20V 20%		-				
C117	096-1030-00	Cap Tant 1uf 20V		-				
C118	096-1030-00	Cap Tant 1uf 20V		-				
C119	097-0056-62	Cap Alum 15uf 63V		1				
C120	108-5013-07	Cap My 1uf 100V 10%		1				
C121	096-1014-00	Cap Tant 40uf 10V 20%		6				
C122	096-1014-00	Cap Tant 40uf 10V 20%		-				
C123	096-1030-38	Cap Tant 100uf 15V 10%		1				
C124	104-0001-18	Cap Mica 2000pf		-				
C125	105-0033-64	Cap my .47uf 10%		1				
C126	096-1030-11	Cap Tant 4.7uf 20V 20%		-				
C127	108-5022-10	Cap P/C .1uf Tracking		1				
C128	108-5022-10	Cap P/C .1uf Tracking		-				
C129	096-1014-00	Cap Tant 40uf 10V 20%		-				
C130	096-1036-00	Cap Tant 15uf 20V 20%		2				
C131	105-0032-41	Cap My .047uf 5%		1				
C132	096-1030-05	Cap Tant 10uf 20V 10%		2				
C133	096-1030-12	Cap Tant 3.3uf 15V 10%		1				
C134	096-1030-42	Cap Tant 33uf 15V 10%		1				
C135	108-5013-03	Cap P/C .22uf		1				
C136	096-1030-05	Cap Tant 10uf 20V 10%		-				
C137	105-0031-39	Cap My .015uf		1				
C138	108-5022-10	Cap P/C .1uf Tracking		-				
C139	108-5022-10	Cap P/C .1uf Tracking		-				
C140	096-1014-00	Cap Tant 40uf 10V 20%		-				
C141	096-1036-00	Cap Tant 15uf 20V 20%		-				
C142	096-1030-27	Cap Tant 15uf 15V 20%		1				

NAME	ASS'Y. NO.
P/C Board Assembly	200-5876-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
C143	113-3121-00	Cap D/C 120pf X5F		-				
C144	113-3121-00	Cap D/C 120pf X5F		-				
C145	113-3121-00	Cap D/C 120pf X5F		-				
C146	113-3121-00	Cap D/C 120pf X5F		-				
C147	113-3121-00	Cap D/C 120pf X5F		-				
C148	113-3121-00	Cap D/C 120pf X5F		-				
C149	113-3121-00	Cap D/C 120pf X5F		-				
C150	113-3121-00	Cap D/C 120pf X5F		-				
C151	096-1014-00	Cap Tant 40uf 10V 20%		-				
C152	096-1014-00	Cap Tant 40uf 10V 20%		-				

NAME	ASS'Y. NO.
P/C Board Assembly	200-5876-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
I101	120-6038-01	I/C 4046		1				
I102	120-6012-01	I/C 4016		2				
I103	120-3022-01	I/C LM 1558		1				
I104	120-3052-05	I/C LM224		2				
I105	120-3052-05	I/C LM224		-				
I106	120-6012-01	I/C 4016		-				
I107	120-3066-02	I/C uA78GUIC		1				
R101	130-0103-25	Res F/C 10K 10% QW		5				
R102	130-0103-25	Res F/C 10K 10% QW		-				
R103	130-0103-25	Res F/C 10K 10% QW		-				
R104	130-0392-25	Res F/C 3.9K 10% QW		2				
R105	130-0392-25	Res F/C 3.9K 10% QW		-				
R106	133-0072-20	Res Vari 50K		2				
R107	130-0363-23	Res F/C 36K 5% QW		1				
R108	130-0105-25	Res F/C 1Meg 10% QW		4				
R109	133-0096-27	Res Vari 200		2				
R110	136-1821-72	Res M/F 1.82K 1%		1				
R111	136-5491-72	Res M/F 5.49K 1%		1				
R112	133-0072-08	Res Vari 1K		1				
R113	130-0105-25	Res F/C 1Meg 10% QW		-				
R114	130-0434-23	Res F/C 430K 5% QW		1				
R115	130-0272-23	Res F/C 2.7K 5% QW		1				
R116	130-0432-23	Res F/C 4.3K 5% QW		1				
R117	130-0512-23	Res F/C 5.1K 5% QW		1				
R118	130-0202-23	Res F/C 2.0K 5% QW		1				
R119	130-0102-25	Res F/C 1.0K 10% QW		3				
R120	136-6812-72	Res M/F 68.1K 1%		1				
R121	133-0113-24	Res Vari 100K		1				
R122	136-1473-72	Res M/F 147K 1%		3				
R123	133-0072-20	Res Vari 50K		-				
R124	136-1373-72	Res M/F 137K 1%		1				
R125	130-0682-25	Res F/C 6.8K 10% QW		2				
R126	130-0183-25	Res F/C 18K 10% QW		1				
R127	133-0096-37	Res Vari 200K		1				
R128	130-0103-23	Res F/C 10K 5% QW		1				
R129	130-0393-23	Res F/C 39K 5% QW		3				
R130	136-3653-72	Res M/F 365K 1%		1				
R131	130-0222-25	Res F/C 2.2K 10% QW		3				
R132	130-0473-25	Res F/C 47K 10% QW		2				
R133	133-0096-31	Res Vari 5K		2				
R134	136-6042-72	Res M/F 60.4K 1%		4				
R135	136-6042-72	Res M/F 60.4K 1%		-				
R136	130-0222-25	Res F/C 2.2K 10% QW		-				
R137	130-0473-25	Res F/C 47K 10% QW		-				
R138	133-0096-27	Res Vari 200		-				
R139	136-3572-72	Res M/F 35.7K 1%		1				
R140	133-0113-22	Res Vari 50K		1				
R141	130-0271-25	Res F/C 270 Ohm 10% QW		2				
R142	130-0302-23	Res F/C 3.0K 5% QW		5				
R143	130-0472-25	Res F/C 4.7K 10% QW		4				

NAME	ASS'Y. NO.
P/C Board Assembly	200-5876-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
R144	136-2152-72	Res M/F 21.5K 1%		1				
R145	136-3243-72	Res M/F 324K 1%		1				
R146	133-0096-36	Res Vari 100K		1				
R147	136-6042-72	Res M/F 60.4K 1%		-				
R148	136-3922-72	Res M/F 39.2K 1%		2				
R149	130-0222-25	Res F/C 2.2K 10% QW		-				
R150	136-5112-72	Res M/F 51.1K 1%		1				
R151	136-1102-72	Res M/F 11.0K 1%		1				
R152	136-2212-72	Res M/F 22.1K 1%		2				
R153	130-0564-25	Res F/C 560K 10% QW		2				
R154	136-5363-92	Res M/F 536K 1%		2				
R155	136-5231-92	Res M/F 5.23K 1%		1				
R156	136-8252-72	Res M/F 82.5K 1%		1				
R157	136-5900-72	Res M/F 590 1%		1				
R158	130-0472-25	Res F/C 4.7K 10% QW		-				
R159	136-1103-72	Res M/F 110K 1%		2				
R160	136-6042-72	Res M/F 60.4K 1%		-				
R161	130-0683-25	Res F/C 68K 10% QW		1				
R162	136-1502-72	Res M/F 15.0K 1%		1				
R163	130-0103-25	Res F/C 10K 10% QW		-				
R164	136-1103-72	Res M/F 110K 1%		-				
R165	136-1473-72	Res M/F 147K 1%		-				
R166	136-1473-72	Res M/F 147K 1%		-				
R167	136-1003-72	Res M/F 100K 1%		1				
R168	130-0302-23	Res F/C 3.0K 5% QW		-				
R169	130-0393-23	Res F/C 39K 5% QW		-				
R170	130-0472-25	Res F/C 4.7K 10% QW		-				
R171	136-2212-72	Res M/F 22.1K 1%		-				
R172	136-9093-72	Res M/F 909K 1%		1				
R173	130-0914-23	Res F/C 910K 5% QW		1				
R174	130-0564-25	Res F/C 560K 10% QW		-				
R175	136-8063-72	Res M/F 806K 1%		1				
R176	136-5363-92	Res M/F 536K 1%		-				
R177	136-3922-72	Res M/F 39.2K 1%		-				
R178	136-8061-92	Res M/F 8.06K 1%		1				
R179	136-1132-92	Res M/F 11.3K 1%		1				
R180	136-2940-72	Res M/F 294 1%		1				
R181	130-0472-25	Res F/C 4.7K 10% QW		-				
R182	130-0102-25	Res F/C 1.0K 10% QW		-				
R183	130-0103-25	Res F/C 10K 10% QW		-				
R184	130-0123-25	Res F/C 12K 10% QW		1				
R185	130-0104-25	Res F/C 100K 10% QW		3				
R186	130-0203-23	Res F/C 20K 5% QW		1				
R187	130-0271-25	Res F/C 270 10% QW		-				
R188	130-0102-25	Res F/C 1.0K 10% QW		-				
R189	130-0682-25	Res F/C 6.8K 10% QW		-				
R190	130-0105-25	Res F/C 1Meg 10% QW		-				
R191	130-0104-25	Res F/C 100K 10% QW		-				
R192	130-0302-23	Res F/C 3.0K 5% QW		-				
R193	130-0302-23	Res F/C 3.0K 5% QW		-				
R194	130-0393-23	Res F/C 39K 5% QW		-				
R195	130-0302-23	Res F/C 3.0K 5% QW		-				
R196	133-0016-02	Res Vari 1K		1				

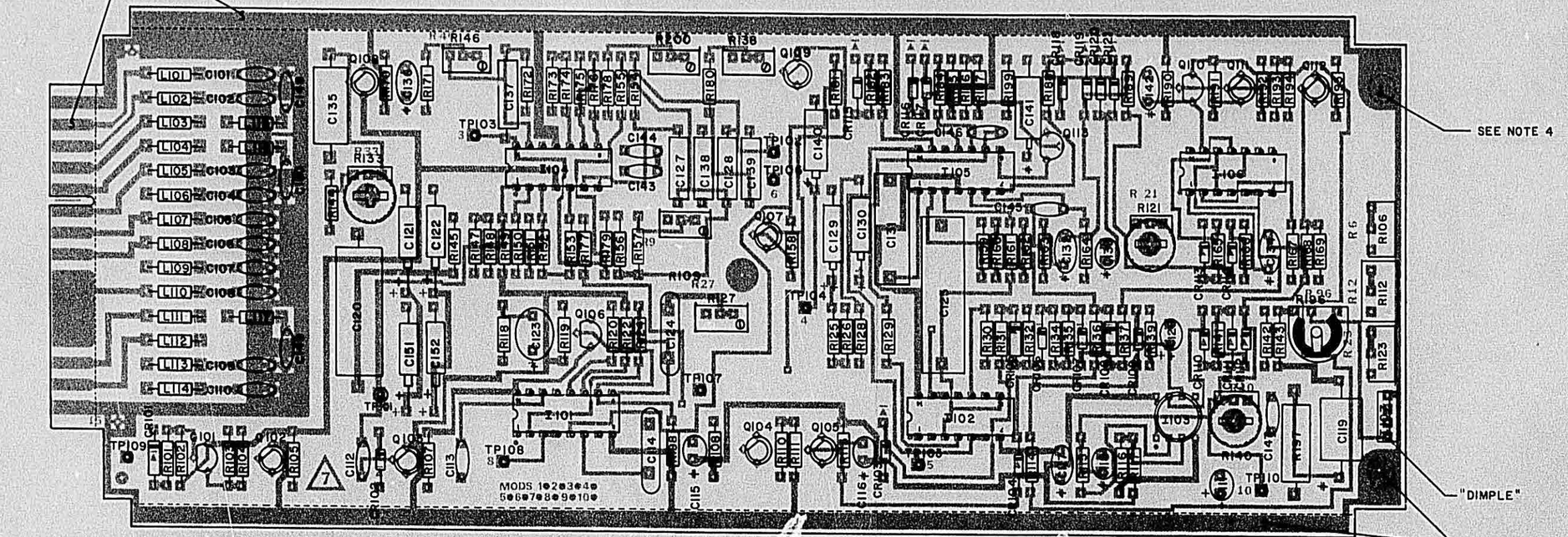
NAME	ASS'Y. NO.
P/C Board Assembly	200-5876-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
R197	130-0391-45	Res F/C 390 10% 1W		1				
R198	130-0104-25	Res F/C 100K 10% QW		-				
R199	130-0105-25	Res F/C 1 meg 10% QW		-				
R200	133-0096-31	Res Vari 5K		1				

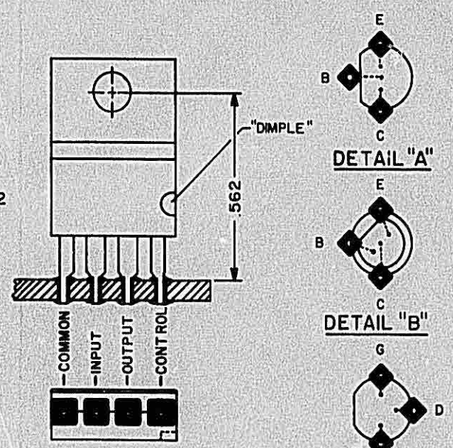
PARTS LIST REVISION HISTORY				ENGR. APPROVAL
NAME P/C Board Assembly				ASS'Y. NO. 200-5876-00
ASS'Y. DWG. 300-5876-00		UNIT KN 72		USED ON 066-4009-00
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
2(contd)				
3				
4				
5				
				KN 72 Maintenance/Overhaul Manual Rev. 0, September, 1976
6		L110	013-0028-00	Deleted from B/M
		R134	136-6002-72	Qty. changed from 3 to 4
		R152	136-2212-72	Qty. changed from - to 2
		R160	136-6002-72	Qty. changed from 1 to -
7		R178	136-8061-92	P/N changed from 136-1102-92
		R200	133-0113-16	Added to B/M
8		R134/135/ 147/160	136-6042-72	P/N changed from 136-6002-72, desc. from 60.0K to 60.4K
9		R151	136-1102-72	Qty. changed from 2 to 1
		R162	136-1502-72	P/N changed from 136-1102-72

PARTS LIST REVISION HISTORY				ENGR. APPROVAL
NAME P/C Board Assembly				ASS'Y. NO. 200-5876-00
ASS'Y DWG. 300-5876-00		UNIT KN 72		USED ON 066-4009-00
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
10		C121	108-5013-07	Qty. changed from 4 to 6
		C151,152	096-1014-00	Added to B/M
		R109	133-0096-27	P/N changed from 133-0113-08
		R121	133-0113-24	Qty. changed from 2 to 1
		R127	133-0096-37	P/N changed from 133-0113-26
		R133	133-0096-31	P/N changed from 133-0113-18
		R138	133-0096-27	P/N changed from 133-0113-08
		R146	133-0096-36	P/N changed from 133-0113-24
		R200	133-0096-31	P/N changed from 133-0113-16
		R144	136-2152-72	P/N changed from 136-1912-72
11		I107	120-3066-02	P/N changed from 120-3066-00
				KN 72/75 Maintenance/Overhaul Manual Rev. 2, August, 1978



NOTES:

1. TRANSISTORS Q101, Q106, & Q110 SEE DETAIL "A".
2. TRANSISTORS Q102 THRU Q105, Q107 THRU Q109, Q111, & Q112 SEE DETAIL "B".
3. TRANSISTOR Q113 SEE DETAIL "C".
4. MASK OFF TEST POINTS, R106, R109, R112, R121, R123, R127, R133, R140, R138, R200, R201, R202 R146, & R196, ALL MOUNTING HOLES, CIRCUIT FINGERS, & .150 WIDE STRIP ON EDGES OF BOARD ON BOTH SIDES. THEN SPRAY BOTH SIDES OF BOARD WITH CLEAR URETHANE SEAL COAT (016-1040-00).
5. INTEGRATED CIRCUIT I107 SEE DETAIL "D".
6. CAPACITORS C127, C128, C138, AND C139 ARE TO BE SPACED OFF THE PRINTED CIRCUIT BOARD.



DETAIL "D"

DETAIL "A"

DETAIL "B"

DETAIL "C"

FIGURE 5-2 KN 72 P/C BOARD ASSEMBLY
(Dwg. No. 300-5876-00, R-3)

SEE BLOW UP FICHE NO. KR2176. ITEM A

CHAPTER

06

SECTION VI
MAINTENANCE

6.1 GENERAL

This section contains maintenance information relating to the KN 72 VOR/LOC Converter. A trouble-shooting flow chart, alignment procedure, performance specifications and disassembly/reassembly instructions are included.

6.2 TEST AND ALIGNMENT

6.2.1 TEST EQUIPMENT REQUIRED

A. Power Supply 13 to 28 volts, 500mA
B. VOR/ILS signal generator Tic 20A or equivalent.
C. ACVTVM Ballantine 310 or equivalent.
D. DVM Fluke 8000 or equivalent.
E. Oscilloscope HP180A or equivalent.
F. Precision Track Selector Collins 479-V3 or equivalent.
G. KN 72 Test Panel
H. Frequency Counter Monsanto Model 100C or equivalent

6.2.2 ALIGNMENT PROCEDURE (Must be performed in the order given)

A. Mid-range all pots
B. Apply 13.750 volts DC to the unit, VOR mode
C. Set R196 for 8.5 ±.01 volts at TP9.
D. Set R127 for 9960 ±10Hz at TP8, no composite applied.
E. Set R200 for maximum voltage at TP104 (Units with Mod 1 only. For units prior to Mod 1, proceed to F.).
F. Set R146 for 1.5 ±VRMS at TP4 with composite applied. (Units prior to Mod 1.)
G. Set the OBS and VOR generator to 90° From.
H. Allow DBAR switch to time out, center needle with R112.
I. Set OBS and VOR generator to 0° From
J. Allow DBAR switch to time out; center needle with R133.
K. Repeat G, H, I, J until best centering is obtained.
L. Set a 10° difference between OBS and VOR generator.
M. Set R106 for a 150mV indication.
N. Switch the converter and generator to LOC mode.
O. Apply the 90Hz LOC tone only.
P. Set R109 for maximum AC out at TP2.
Q. Apply the 150Hz LOC tone only.
R. Set R138 for maximum AC out at TP4.
S. Apply standard LOC centering signal.
T. Set R123 for centered LOC needle.
U. Set the generator for 4db (.091ddm) with 90Hz predominate.
V. Set R121 for 90mV needle deflection.
W. Repeat S, T, U, V as necessary for compliance.
X. Apply the 90Hz tone only, then the 150Hz tone only.
Y. Determine which tone gives the strongest flag reading.
Z. Set R140 for 125mV of flag drive.
AA. Fly it.

6.2.3 KN 72 TEST DATA

A. Current Drain _____mA

B. Bearing Error

Radial	To	From	Radial	To	From
0			180		
30			210		
60			240		
90			270		
120			300		
150			330		

C. Deflection Characteristic

OBS set to 0^{o}, Generator set to 10^{o} _____mV 150mV ±10mV

D. Alarm Signal Voltage

Normal Composite input _____mV 325mV

Ref Ø only _____mV 125mV Max

Var Ø only _____mV 125mV Max

E. To-From Signal Voltage

Generator = OBS setting _____mV 400mV ±30%

F. LOC Centering Voltage

Normal composite 0db tone ratio _____mV 0 ±3mV

G. LOC Deflection Voltage

Tone Ratio	Predominate	Polarity	Voltage	
4db	150Hz	-	_____mV	90 ±10mV
4db	90Hz	+	_____mV	90 ±10mV

H. Alarm Signal Voltage

Normal LOC composite _____mV 325mV ±50mV

90Hz only _____mV 125mV Max

150Hz only _____mV 125mV Max

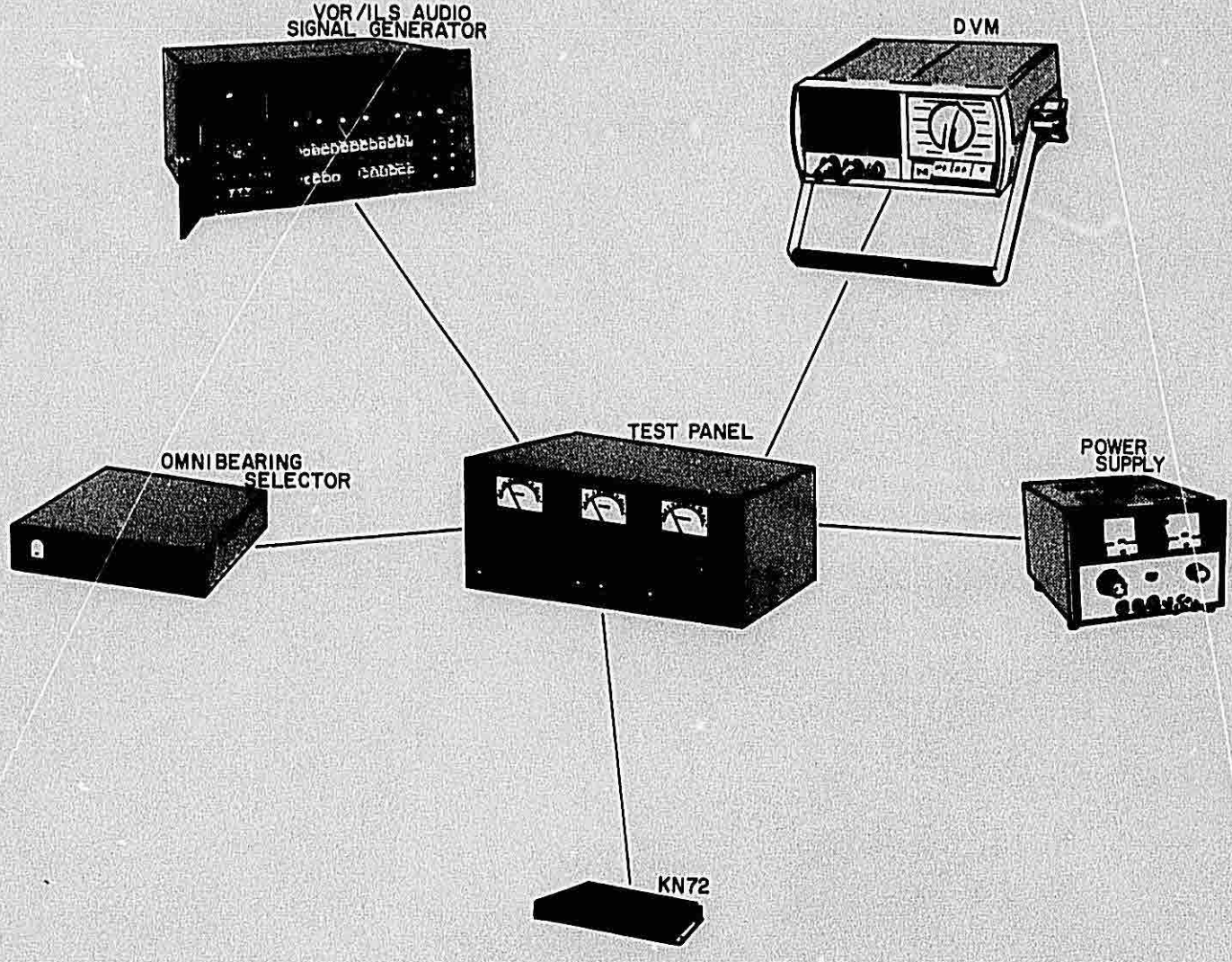


FIGURE 6-1 TEST SETUP

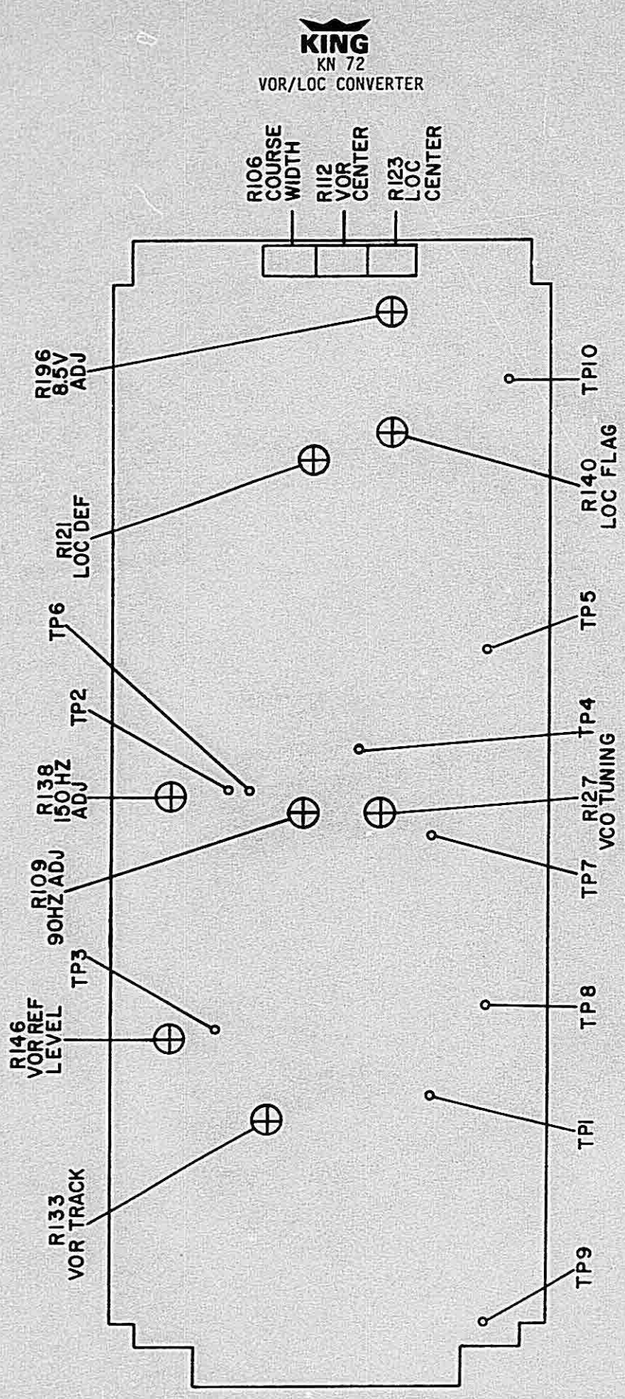


FIGURE 6-2 TEST POINT AND ADJUSTMENTS LOCATIONS, PRIOR TO MOD. 1

FIGURE 6-2A TEST POINT AND ADJUSTMENTS LOCATIONS, MOD. 1 VERSION

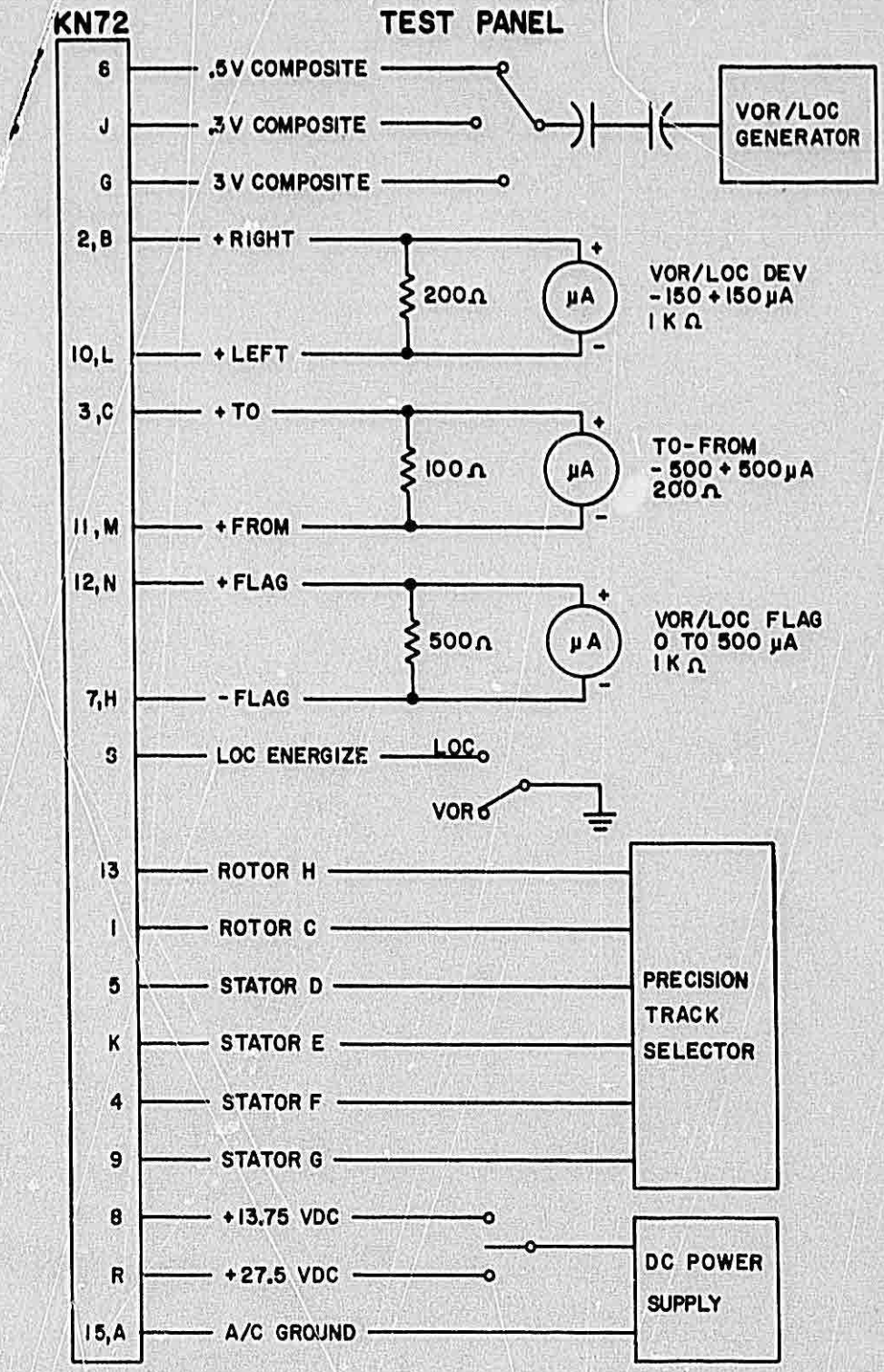


FIGURE 6-3 TEST PANEL

6.3 OVERHAUL

6.3.1 GENERAL

Maintenance information contained in this section includes inspection procedures, cleaning, semiconductor replacement, and troubleshooting procedures.

6.3.2 VISUAL INSPECTION

The following visual inspection procedures should be performed during the course of maintenance operations.

a. Inspect all wiring for frayed, loose, or burned wires.

b. Check cable connections, making sure the plugs are free from corrosion and are properly secured.

c. Check all components for evidence of overheating, breakage, vibration, corrosion, or loose connections.

d. Check all capacitors and transformers for leaks, bulges, or loose connections.

e. Inspect relay and switch contacts for pits or arcing.

6.3.3 CLEANING

a. Using a clean lint-free cloth, lightly moistened with an approved cleaning solvent, remove the foreign matter from the equipment case and unit front panels. Wipe dry using a clean, dry, lint-free cloth.

b. Using a hand controlled dry air jet (not more than 15 psi), blow the dust from inaccessible areas. Care should be taken to prevent damage by the air blast.

c. Clean electrical contacts with a burnishing tool or cloth lightly moistened with an approved contact cleaner.

d. Clean the receptacles and plugs with a hand controlled dry air jet (not more than 25 psi) and a clean lint-free cloth lightly moistened with an approved cleaning solvent. Wipe dry with a clean dry lint-free cloth.

6.3.4 DISASSEMBLY PROCEDURES

A. Remove four 6-32 x 5/16 PHP TT screws from the rear panel.

B. Remove the rear panel and circuit board from the chassis extrusion.

C. Remove two 4-40 x 3/16 PHP TT screws from the rear panel.

D. Remove one 2-56 x 1/4 PHP screw from the rear panel.

E. Remove the rear panel from the circuit board.

F. Remove four 6-32 x 5/16 PHP TT screws from the front panel.

G. Remove the front panel from the chassis extrusion.

H. Assembly is the reverse of disassembly.

6.4 TROUBLESHOOTING

For troubleshooting information, see Figure 6-4.

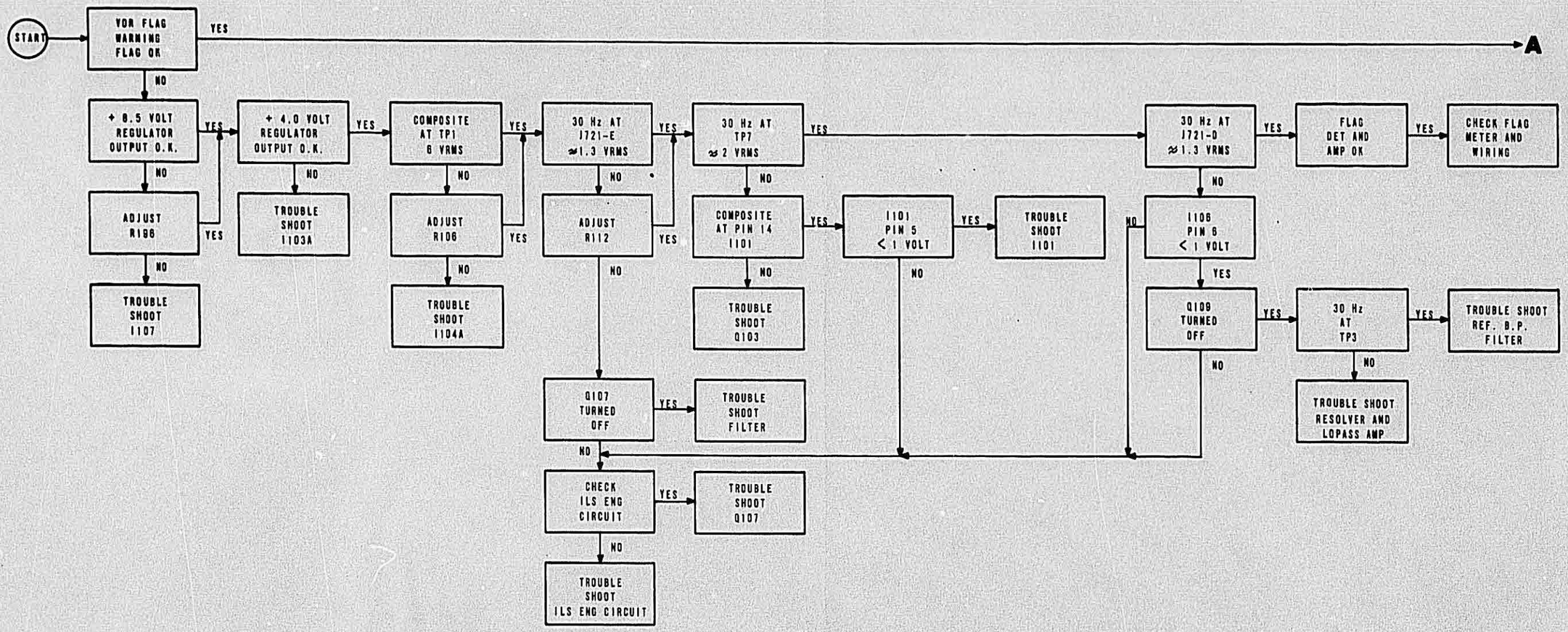


FIGURE 6-4 TROUBLESHOOTING FLOW CHART
(SHT 1 OF 2)
(Dwg. No. 696-1550-00, R-0)

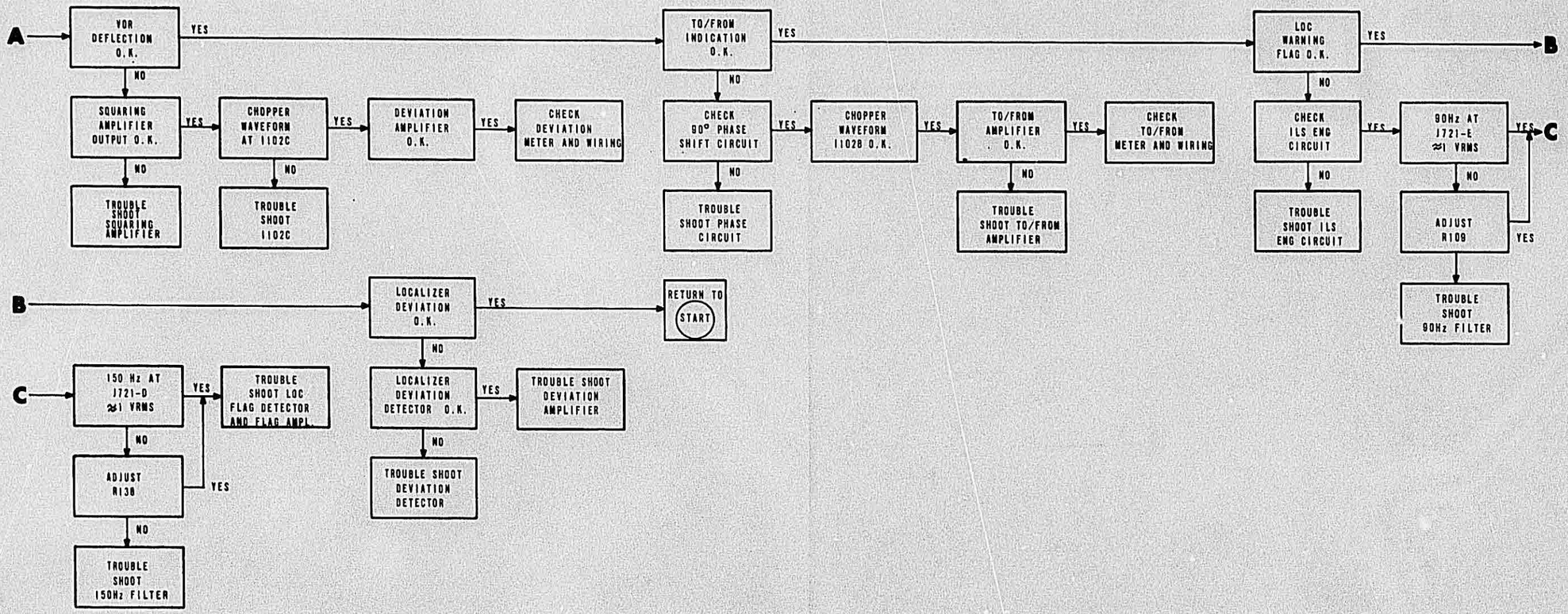
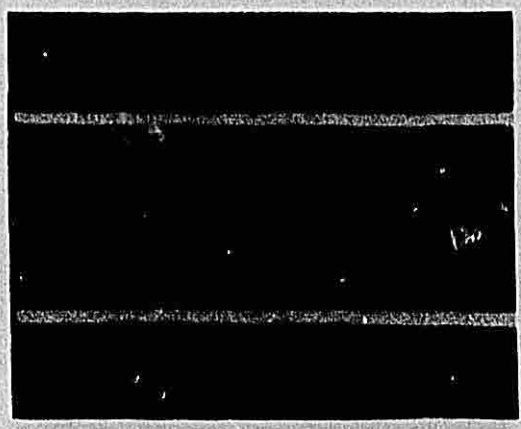
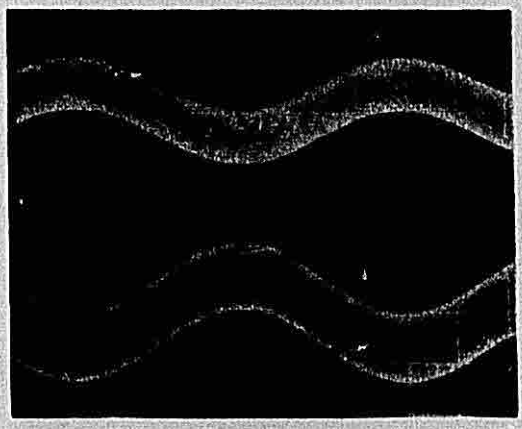


FIGURE 6-4 TROUBLESHOOTING FLOW CHART
(SHT 2 OF 2)
(Dwg. No. 696-1550-00, R-0)

TP9 (TOP) TP10 (BOTTOM)
VERT: 20mv/DIV
HORIZ: 5msec/DIV
COUPLING: AC
SYNC: LINE
DESC: POWER SUPPLY RIPPLE VOR MODE



J721 PIN 6(TOP) TP1 (BOTTOM)
VERT: 1 v/DIV
HORIZ: 5msec/DIV
COUPLING: AC
SYNC: EXTERNAL TP2
DESC: VOR COMPOSITE

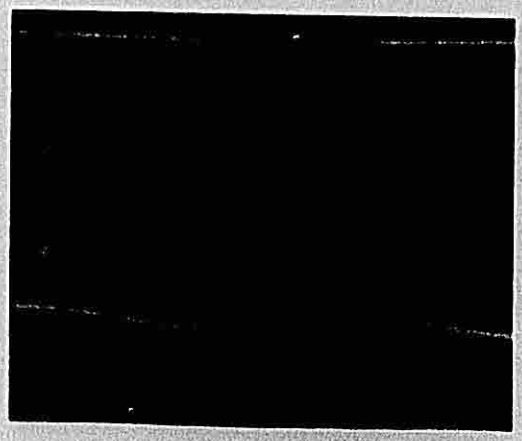


TP7 (TOP) TP3 (BOTTOM)
VERT: .5v/DIV (TOP) 20mv/DIV. (BOTTOM)
HORIZ: 5mv/DIV
COUPLING: AC
SYNC: EXTERNAL TP2
DESC: DEMODULATED REFERENCE PHASE AND PHASE SHIFTED REFERENCE 0 DEGREES FROM RADIAL. OBS = 0 DEGREES.

TP2 (TOP) TP4 (BOTTOM)
VERT: 2 v/DIV (TOP) 1v/DIV (BOTTOM)
HORIZ: 5msec/DIV
COUPLING:AC
SYNC:TP2
DESC:BANDPASS FILTER OUTPUTS 0 DEGREES FROM RADIAL
OBS = 0 DEGREES

FIGURE 6-5 WAVEFORMS
(Sht 1 of 2)

TP5 (TOP) PIN 9 I102 (BOTTOM)
VERT: 2v/DIV (TOP) 1v/DIV (BOTTOM)
HORIZ: 5msec/DIV
COUPLING: DC (TOP) AC (BOTTOM)
SYNC: TP5
DESC: SQUARING AMP OUTPUT (TOP)
DEVIATION PHASE DETECTOR (BOTTOM)
0 DEGREES FROM RADIAL OBS= 0
D-BAR CENTERED



TP J721 PIN 6 (TOP) TP2 (BOTTOM)
VERT: .5v/DIV
HORIZ: .2msec/DIV
COUPLING: AC
SYNC: EXTERNAL TP2
DESC: LOCALIZER COMPOSITE
TONE RATIO 0 db

TP2 (TOP) TP4 (BOTTOM)
VERT: 1 v/DIV
HORIZ: 2usec/DIV
COUPLING: AC
SYNC: TP2
DESC: BANDPASS FILTER OUTPUTS
LOC MODE 0 db TONE RATIO

TP2 (TOP) I106 PIN 10 (BOTTOM)
VERT: 1 v/DIV (TOP) .5v/DIV (BOTTOM)
HORIZ: 2msec/DIV UNCALIBRATED
COUPLING: AC
SYND: TP2
DESC: LOCALIZER DETECTOR OUTPUT
0 db TONE RATIO

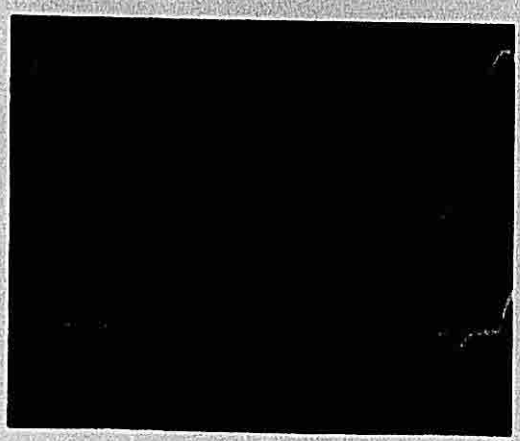
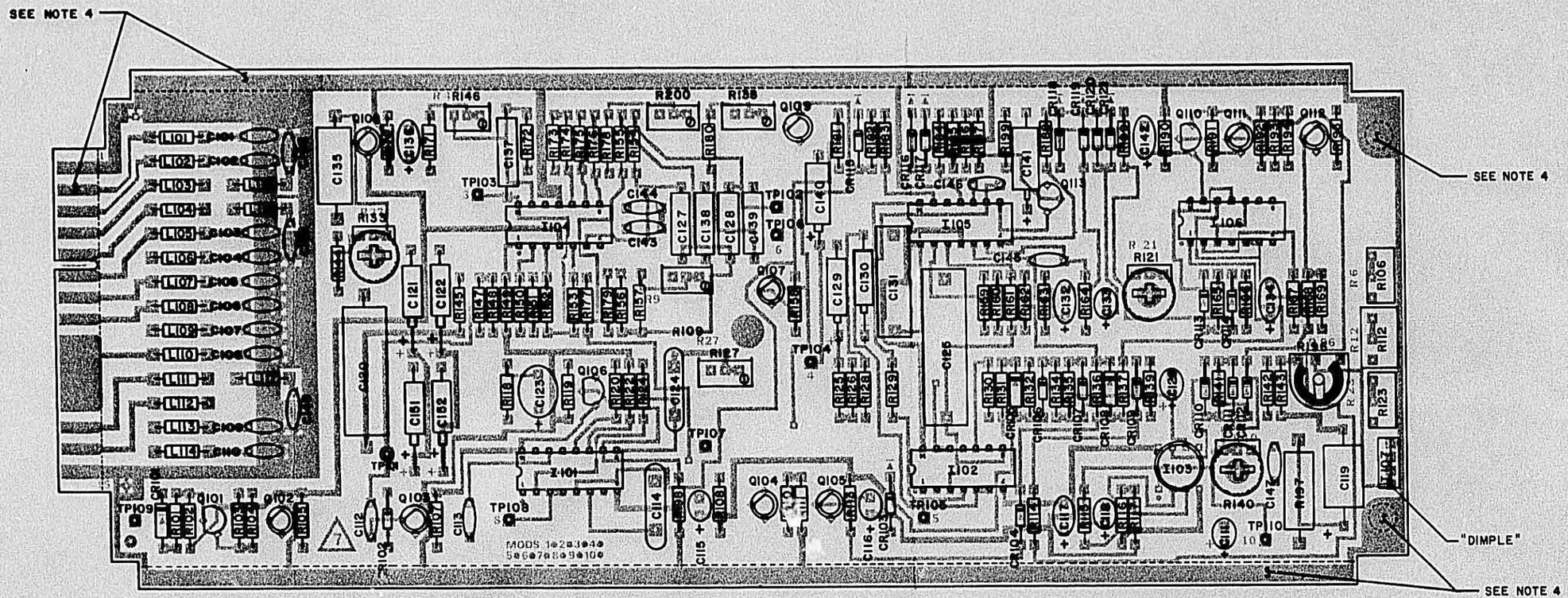
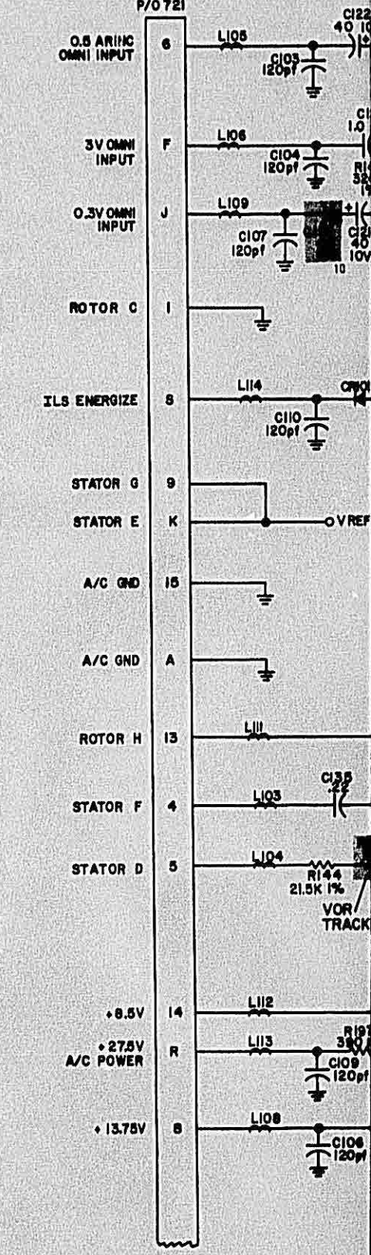
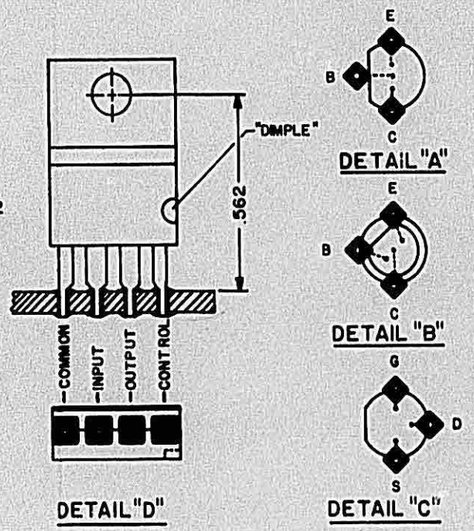


FIGURE 6-5 WAVEFORMS
(Sht 2 of 2)







NOTES:

1. TRANSISTORS Q101, Q106, & Q110 SEE DETAIL "A".
2. TRANSISTORS Q102 THRU Q105, Q107 THRU Q109, Q111, & Q112 SEE DETAIL "B".
3. TRANSISTOR Q113 SEE DETAIL "C".
4. MASK OFF TEST POINTS, R106, R109, R112, R121, R123, R127, R133, R140, R138, R200, R201, R202 R146, & R196, ALL MOUNTING HOLES, CIRCUIT FINGERS, & .150 WIDE STRIP ON EDGES OF BOARD ON BOTH SIDES. THEN SPRAY BOTH SIDES OF BOARD WITH CLEAR URETHANE SEAL COAT (016-1040-00).
5. INTEGRATED CIRCUIT I107 SEE DETAIL "D".
6. CAPACITORS C127, C128, C138, AND C139 ARE TO BE SPACED OFF THE PRINTED CIRCUIT BOARD.

FIGURE 6-6 P/C BOARD AND SCHEMATIC
(Dwg. No. 300-5876-00, R-3;
002-0440-00, R-5)

SEE BLOW UP FICHE NO. KR2176. ITEM E

THE BLUE SHADED AREAS REFER TO CHANGES COVERING 200-5876-00 REVISION 7 THROUGH 10.
REVISION NUMBERS BESIDE BLUE SHADED AREAS REFER TO REVISION LEVELS OF THE PC BOARD ASSEMBLY.

P/O J721

0.5 ARINC OMNI INPUT (6)
3V OMNI INPUT (F)
0.3V OMNI INPUT (J)
ROTOR C (1)
ILS ENERGIZE (S)
STATOR G (9)
STATOR E (K)
A/C GND (15)
A/C GND (A)
ROTOR H (13)
STATOR F (4)
STATOR D (5)
+8.5V (14)
+27.5V A/C POWER (R)
+13.75V (8)

VOR COURSE WIDTH
90 HZ ADJUST
OMNI ZERO
VAR. Ø-90 HZ B.P. FILTER
VCO TUNING
LOCALIZER CENTERING
REFERENCE LEVEL
VOR TRACKING
150 HZ ADJ.
REF. Ø-150 HZ B.P. FILTER
8.5V ADJ.
D-BAR SWITCH
LOCALIZER COURSE WIDTH
SQUARING AMPLIFIER
LOC. FLAG SET

P/O J721

+ LEFT
+ LEFT
+ RIGHT
+ RIGHT
REF Ø
+ TO
+ TO
OBS REF Ø
+ FROM
+ FROM
+ FLAG
+ FLAG
VAR Ø
- FLAG
- FLAG

NOTES:
1) UNLESS NOTED: ALL RESISTANCE VALUES ARE IN OHMS, Q.W., 10%. ALL CAPACITANCE VALUES ARE IN MICROFARADS (uf).
2) VOLTAGE TOLERANCES: +8.5V ±.01VDC.
3) UNLESS NOTED: VOLTAGE MEASUREMENTS ARE TAKEN WITH AN RMS METER.
VOR { VOR VOLTAGE MEASUREMENTS WITH .5VRMS INPUT.
LOC { LOC VOLTAGE MEASUREMENTS WITH .33VRMS INPUT.

KN 75

MAINT MANUAL

KN 75

GLIDESLOPE RECEIVER

Allied-Signal Aerospace Company

Allied Signal

KING
KN 75
GLIDESLOPE RECEIVER

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SECTION IV
THEORY OF OPERATION

4.1 GENERAL

One of the outstanding features of the KN 75 is the channeling logic which allows any of four different input codes from many different manufacturers equipment to be used. Another outstanding feature is the ability to drive a number of deviation and flag loads. The stabilized master oscillator utilizes only one crystal, yet it is able to generate 40 different frequencies.

4.1.1 PRINCIPLES OF THE GLIDESLOPE SYSTEM

The glideslope signal is radiated by a directional antenna array located near the approach end of the runway. The signal consists of two intersecting lobes of RF energy. The upper lobe contains 90Hz modulation and the lower lobe contains 150Hz modulation. The equal tone amplitude intersection of these two lobes forms the glide path. A typical glide angle is 2.5 degrees. If the aircraft is on the glide path, equal amplitudes of both tones will be received and the deviation bar will be centered. If the aircraft is above the glide path, 90Hz modulation predominates and the visual display is displaced downward. If below the glide path, 150Hz predominates and the display is displaced upward.

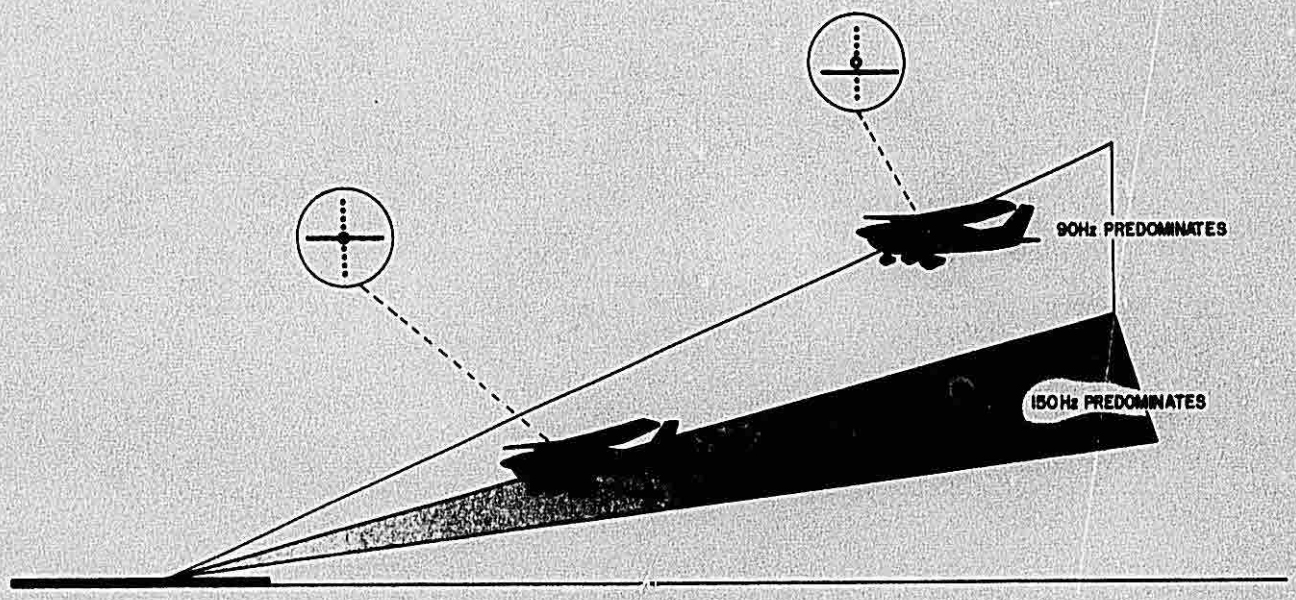


FIGURE 4-1 GLIDEPATH

4.2 BLOCK DIAGRAM CIRCUIT THEORY (Refer to Block Diagram on Page 4-9)

4.2.1 STABILIZED MASTER OSCILLATOR

The voltage controlled oscillator (VCO) generates the signal which is used as the injection for the active RF mixer in the receiver. Before entering the mixer the signal passes through the receiver buffer amplifier. This serves a dual purpose of isolation of the VCO and increasing the signal strength to the mixer.

Another buffer amplifier is connected to the VCO output. This serves the same dual purpose of the receiver buffer amplifier except its output goes to the stabilized master oscillator (SMO) mixer. The other signal for the active mixer is taken from the 18.000867MHz reference oscillator. The oscillator runs at the fundamental frequency and the ninth harmonic (162.0078MHz) is used to mix with the VCO's output frequencies of 164.558Mhz to 167.483Mhz to produce frequencies of 2.5502Mhz to 5.475Mhz. The mixer's output signal is then fed into the squaring amplifier which produces a square wave with the proper shape and level shift to switch the programmable divider that divides by 34 to 73 depending on which desired channel is chosen. The output frequency to the phase comparator is approximately 75KHz. The reference oscillator signal travels through a squaring amplifier which has the same purpose as the amplifier following the SMO mixer. Its output is fed to the reference divider which divides the frequency by 240 yielding a frequency of 75.003613KHz. This signal is then compared to the output of the programmable divider. The phase comparator produces a positive or negative pulse depending upon the phase and frequency difference of its two inputs. The output is then fed through an integrating amplifier which produces a DC level proportional to the duty cycle of its input. The low pass filter on its output removes any remaining ripple on the DC voltage. This voltage then adjusts the frequency out of the VCO to the desired frequency. I104 contains an oscillator as well as the phase comparator. The oscillator is used to produce frequency modulation of the VCO for the purpose of eliminating the possibility of zero beating in the receiver.

4.2.2 RECEIVER

The glideslope signals in the range of 329.15MHz to 335.00MHz are coupled from the antenna to the first RF amplifier. The desired signal is amplified in this tuned RF amplifier and coupled to the second tuned RF amplifier. The signal again receives amplification. The combination of the two RF amplifiers provide the necessary preselection before passing on to the active mixer. The signal from the SMO is then mixed with the incoming signal producing the intermediate frequency of 34KHz in this single conversion receiver. The signal is now passed into the first IF amplifier where the signal strength is then increased. From this point there are two signal paths: The first path is to the RF AGC detector where a DC level is generated by the input signal. The DC level has some ripple on it which is removed by the RF AGC amplifier. This amplifier provides the proper RF AGC voltage for the first two RF amplifiers. The second path is into a three section low pass elliptic filter which removes the unwanted frequencies from the IF signal. The IF signal is then directed through two more IF amplifiers before being applied to the detector. In the detector the 150Hz and 90Hz modulation is removed from the 34KHz IF. Then there are two signal paths again. One path is to the IF AGC circuitry and the second path is to the deviation converter.

4.2.3 DEVIATION CONVERTER

The composite 150 and 90Hz signal is now applied to the course width amplifier which has a gain less than one. From here the composite signal is separated into the 90Hz and 150Hz components by the two active filters.

The two separated signals are passed through their own individual peak detectors and then are summed and fed through the deviation-bar driver. A DC voltage is provided by the driver to the indicator. The DC voltage is proportional to the amount of voltage created by the presence of various amounts of 150Hz and 90Hz signals.

The outputs of the 90Hz and 150Hz active filters are also passed into two more peak detectors. There is a separate peak detector for each frequency. The outputs of the two peak detectors are summed and fed into the flag driver. Again the DC voltage output of the driver is used to drive a visual indicator which provides a warning indication when signal strength is too weak or when only one of the two modulation components is present.

4.2.4 CHANNELING LOGIC

Four different codes can be accommodated by the channeling logic. The input gates provide the proper address for the ROM (read-only-memory). The output from the input gates also provides the proper address for the data selector/multiplexer. With the correct address the desired code for the SMO's programmable dividers is obtained from the ROM and data selectors after passing through the buffers. For the 50KHz channels a 50KHz switching transistor reprograms the programmable dividers without changing the ROM or data selector.

4.2.5 POWER SUPPLY

The power supply will operate on +27.5 or +13.75 volts DC. The input voltage in either case is applied to a four terminal positive voltage regulator. This is an adjustable regulator which has its output set to +8.5 volts. The +8.5 volts then provides the input voltage for a second voltage regulator of the same type as the first. The second regulator's output is +5 volts. A dropping resistor is used to hold down power dissipation on the 8.5VDC regulator when operating from 27.5VDC.

4.3 DETAIL CIRCUIT THEORY (Refer to Schematic Figure 6-8 and Block Diagram Figure 4-3)

4.3.1 STABILIZED MASTER OSCILLATOR

4.3.1.1 General

The stabilized master oscillator (SMO) or frequency synthesizer provides a stable source of injection signal for the active mixer in the receiver. It provides all the various frequencies necessary as the receiver is channeled to its 40 different channel allocations with only one crystal required.

4.3.1.2 Voltage Controlled Oscillator

Q111 is the active device used in this Colpitts oscillator circuit. C171 and C172 are used to provide feedback between the emitter and the base. L108 provides the inductive reactance necessary for the parallel resonant circuit with C167, C168 and CR111 providing the capacitive reactance. CR111 is a voltage variable capacitance diode. The diode is reversed biased. As the DC voltage across it is varied its capacitance changes. This varying capacitance changes the frequency of the series resonant circuit thereby changing the output frequency of the oscillator. R180, R181, R184 and R183 provide the biasing of Q111. R182, C166 and C170 provide a filtering or decoupling function from the supply voltage to insure a clean DC level.

4.3.1.3 Receiver Buffer Amplifier

Q113 provides the amplification of the VCO signal. Q112 is connected to provide the bias on the base. Q112 and Q113 are the same type of transistors so Q112 will temperature compensate the variation of V_{BE} of Q113. C175 is used to impedance match the buffer amplifier to the mixer as well as couple the injection signal.

4.3.1.4 Mixer Buffer Amplifier

Q118 is the active device in this amplifier circuit. This amplifier increases the signal level enough to facilitate proper mixing in the next stage. It also isolates the VCO from the SMO mixer.

4.3.1.5 Reference Oscillator

Transistor Q120 is the active device used in the Colpitts oscillator circuit. C193 and C194 provide the feedback from emitter to base. Y101 provides the inductive reactance for the series resonant circuit with C195 and C196. The oscillator runs at 18.000867MHz which is the fundamental frequency of Y101. L113 provides a larger reactance for the ninth harmonic of the fundamental while providing less reactance for lower harmonies. This accentuates the ninth harmonic which is used by the SMO mixer.

4.3.1.6 SMO Active Mixer

C186 couples the signal from the reference oscillator to the mixer. Q117 is a dual gate, N-channel depletion type insulated-gate field-effect transistor. The sum and difference frequencies are generated within Q117. One gate is biased less positive than the source by R197 source resistor. L111 and C182 comprise a low pass filter with a cutoff frequency of approximately 5.5MHz. C180 couples the difference frequency to the squaring amplifier.

4.3.1.7 Squaring Amplifier

Q115 and Q116 work in conjunction with one another to form the squaring amplifier. When the current flow through Q116 is very small the voltage is set high enough to switch the programmable divider to a high condition and when the current flow increases in Q116, it also increases the current flow through R192, thereby increasing the voltage level on the base of Q115. This causes the voltage at the collector of Q115 to decrease to a low enough value to switch the programmable divider to a low condition. There must also be a fast enough rise time provided by the waveform to clock the programmable dividers. The squaring amplifier provides this function.

4.3.1.8 Programmable Divider (Refer to Programmable Divider Timing Diagram, Figure 4-2, Page 4-8)

The programmable divider is comprised of I106 and I107. I107 is a 16 count binary counter and I106 is a 10 count binary counter. The counters contain four flip-flops. The Q outputs represent the individual outputs of each flip-flop. The P's represent the programming outputs. The programming can set the initial state of the counters. With a preset both counters can be preset to their initial states. The three input nand gate I108A is used to sense the states of the counters. I105B is used as an inverter. When Q of I107 reaches a low level (0), Q3 is a high level (1) and at the same instant Q2 of I106 is a 1, the counters receive a low level on their parallel enable pins which presets both counters to their initial state. Divide ratios of 34 to 73 are accomplished when the channeling logic provides the correct code for the desired channel.

4.3.1.9 Reference Oscillator Squaring Amplifier

The output from the reference oscillator as described in paragraph 4.3.1.5 is coupled from Q120's emitter by C190 to the base of Q119. Q119 again performs the double function of providing proper high to low level shifts and causing these shifts to occur at a fast enough rate to accomplish the switching of the counters I110 and I109.

4.3.1.10 Reference Dividers

Counters I110 and I109 provide a similar function to I106 and I107 except the frequency division is fixed to a division by 240 and the method of presetting is not as complicated. A high on the normally low terminal count of I109 is sensed and used to preset I109. I110 always divides by 16 and I109 is preset at such a time as to cause it to divide by 15.

4.3.1.11 Phase Comparator

The signals from both the programmable divider and the reference divider are compared in phase and frequency within I104. Both inputs should be approximately 75KHz, but if they aren't, the phase comparator generates outputs which tend to cause the VCO to change its frequency until both input frequencies are the same. Likewise if the phase is not the same, the comparator generates the appropriate output to cause the phase difference to be zero.

4.3.1.12 FM Oscillator

I104 also produces an oscillation of 1000Hz which passes through an integrator comprised of R176 and C163. This takes the square wave output of I104 and transforms it into a triangular waveform. This is applied to the VCO causing a variation in the capacitance of CR111. This gives a frequency modulation of the VCO output with a deviation of $\pm$5KHz. This eliminates any possible zero beat problems that could occur with an off frequency ground or airborne station.

4.3.1.13 Integrating Amplifier

Q110 and its associated passive components comprise the integrating amplifier. R172 and C159 integrate the positive or negative pulse output of I104. The output of Q110 is a DC level with some ripple voltage.

4.3.1.14 Low Pass Filter

Q110's output is fed into the one section elliptic low pass filter composed of L107, C161, C160 and C162. This is designed to remove the ripple, especially any 75KHz present. The filter has a notch at 75KHz giving a minimum of 80dB of attenuation.

4.3.2 RECEIVER

4.3.2.1 Tuned FET RF Amplifier

Q101 is the active device used by this first stage of RF amplification. It is a dual gate, N channel, enhancement mode, field effect transistor. Q102 is the same type of device and is used in the second RF amplifier immediately following. Since these are enhancement mode devices their gates must be biased positive for proper operation. Both transistors are AGC'd on Gate 2. The AGC on both transistors provide a 50dB range of attenuation. L101 and Q101's internal capacitance, L102 and C106, and including L103 and C113 are all tuned to resonate at approximately 332MHz. These tuned circuits provide the necessary preselection for the receiver. Q101 has about 10dB of gain and Q102 has approximately the same gain giving a total of 20dB of gain before reaching the mixer.

4.3.2.2 Active Mixer

C112 couples the input signal from the drain of the second RF amplifier to Gate 1 of Q103. Q103 is a dual gate, N channel, depletion type insulated-gate field effect transistor. The source is biased up to a voltage higher than its gates by source resistor R112. The signal from the receiver buffer amplifier in the SMO is coupled into Gate 2. The difference frequency is taken from the drain and coupled into the next stage which is the IF amplifier.

4.3.2.3 Intermediate Frequency Amplifier (1)

The intermediate frequency (IF) is 34KHz. Q104 is the active bipolar device. This amplifier provides approximately 37dB of gain. There are two signal paths from the collector of Q104. One path is into the RF AGC detector and the other path is into the elliptic IF filter.

4.3.2.4 RF AGC Detector

Q106 is the active device used for the detector. Q105 biases up the base of Q106 and provides temperature compensation. The detector creates a DC level on the collector of Q106 which is proportional to the amount of 34KHz signal entering its base. The DC voltage has some ripple which is removed by the RF AGC amplifier.

4.3.2.5 RF AGC Amplifier

I102D is the active device which works in conjunction with its associated passive components to provide RF AGC. R127 is the variable resistor which is used to set the RF AGC attack point. As signal level changes, the DC level changes on Pin 13 of I102D. The small differential across Pins 13 and 12 is then amplified to the proper DC level for AGC on Gate 2 of both of the RF amplifiers.

4.3.2.6 Elliptic IF Filter

This is a three section low pass filter with three tuned circuits. L104, L105 and L106 must be tuned to provide three distinct notches in the frequency response. L104 is tuned for a notch at 162KHz. L105 is tuned for a notch at 83.6KHz. L106 is tuned for a notch at 97.7KHz. The filter has a 6dB point at 62.5KHz. The 60dB point is 79.5KHz. The ultimate of the filter is better than 70dB.

4.3.2.7 Intermediate Frequency Amplifier (2)

C132 couples the signal from the elliptic filter into I101, a monolithic IF amplifier.

4.3.2.8 Intermediate Frequency Amplifier (3)

Q107 is the final IF amplifier. R133 and R134 are the base bias resistors of Q107. C141 couples the signal from Q107 to the detector.

4.3.2.9 Detector

Q109 is the active component of this circuit. C142 and R140 determine the frequency response of the detector. Q108 biases up the base of Q109 and provides temperature compensation.

4.3.2.10 Intermediate Frequency AGC Amplifier

The DC level and detected 90Hz and 150Hz is directly coupled through R137 to the AGC operational amplifier.

4.3.3 CONVERTER

4.3.3.1 Course Width Amplifier

I102A is the operational amplifier used in this circuit. R149 and R142 determine the gain. R149 may be adjusted to give the desired gain to provide the correct course width indication. Its gain is less than unity.

4.3.3.2 90Hz Active Filter

The output from the course width amplifier is applied to R153. R153 is the centering potentiometer which determines how much of the detected signal goes to the 90Hz filter or 150Hz filter. The bandwidth of this filter is determined by R157 and C144. The gain of the filter is determined by R157 and R152. One fourth of a quad operational amplifier integrated circuit is used (I103A).

4.3.3.3 150Hz Active Filter

The 150Hz filter is the same type of filter as the 90Hz filter except component values have been changed in some instances to provide the 150Hz signal to pass. Gain of this filter is determined by R158 and R154. The bandwidth is specified by R158 and C146. Another one fourth of the quad operational amplifier IC is used (I103B).

4.3.3.4 Peak Detector (90Hz) (1)

CR101 rectifies the 90Hz signal and passes the positive portion of the sine wave, charging C150 in the positive direction. This is a DC voltage with some ripple still unfiltered by R163 and C150. The time constant of R163 and C150 is chosen to dampen noise.

4.3.3.5 Peak Detector (150Hz) (1)

CR104 rectifies the 150Hz signal and passes the negative portion of the sine wave, charging C150 in the negative direction. Low pass filtering is done by R164 and C150. The time constant of R164 and C150 chosen to provide damping to noise, so no jumping of the indicator needle is seen by the pilot.

4.3.3.6 Deviation Bar Driver

I103C is the operational amplifier used as the low pass filter and driver for the deviation indicator. Gain of the amplifier is set by R166 and R165. C151 and R166 are chosen to provide damping of noise also. I103C provides a voltage source, thereby allowing the addition of more than one indicator load without changing the indicator's position.

4.3.3.7 Peak Detector (90Hz) (2)

This is the second peak detector connected to the 90Hz active filter. This detector is for the flag indicator. CR106 provides the rectification while CR105 is used to compensate for variations in the voltage across CR106 over temperature changes.

4.3.3.8 Peak Detector (150Hz) (2)

This is the second peak detector connected to the 150Hz active filter. This detector is also for the flag indicator. CR103 provides the rectification while CR102 provides the temperature compensation.

4.3.3.9 Flag Driver

I103D is the operational amplifier used for the flag indicator driver. The driver provides a voltage source so that several flag loads may be used simultaneously without adversely affecting the indicators. A summing of the detected 90Hz and 150Hz generated voltages occurs at the input to I103D. C153 and R168 are chosen to provide a time constant which gives damping for noise, thus eliminating erratic motion of the indicator.

4.3.3.10 Converter Reference Voltage Amplifier

I102B provides a voltage source for the converter. The output voltage is determined by the divider action of R145, R146, and R147.

4.3.4 CHANNELING LOGIC

4.3.4.1 Input Gates

I113 and I114 comprise the input gate logic. These gates provide the necessary combinational logic to address the read only memory.

4.3.4.2 Data Selector/Multiplexer

I116 is the CMOS dual 4-channel data selector/multiplexer. This device is addressed directly be the inputs from the connector. Some of its data inputs are also from the connector, but the outputs from the input gates also determine the data inputs. When the proper combination of address inputs and data inputs occur, a predetermined output is obtained. The dual outputs are connected to an "exclusive-or" gate, then through a buffer to the SMO's programmable dividers.

4.3.4.3 Read Only Memory

I115 is a 1024 bit CMOS memory. When certain combinations of highs and lows are placed on its inputs, a unique output is obtained. The combination of inputs is called an address. For each of 256 addresses there is a unique output. The outputs provide the correct codes for the programmable counters of the SMO along with the output from the data selector and 50KHz switching transistor.

4.3.4.4 Programmable Divider Buffers

I108 contains buffers for interfacing the CMOS logic to the transistor-transistor logic.

4.3.4.5 50KHz Switch Transistor

Q121 is the switching transistor for the 50KHz input. The collector of Q121 provides the input to the programmable divider. If the 50KHz control line is an open as a ground it is connected to the anode of CR117. If the 50KHz control line is a ground or a +5 volts, it is connected directly to the collector, and the anode of CR117 is grounded. The above conditions are true only if the proper code is provided to the transistor.

4.3.5 POWER SUPPLY

The power supply is comprised of two 4 terminal adjustable voltage regulators and their associated passive components. Either +13.75 volts or +27.5 volts may be used with the KN 75. R209 and R210 determine the output voltage of the 8.5 volt regulator. I111 is the +8.5 volt regulator while I112 is the +5 volt regulator. R223 is a power resistor which absorbs some of the power dissipation when the radio is operated from +27.5VDC.

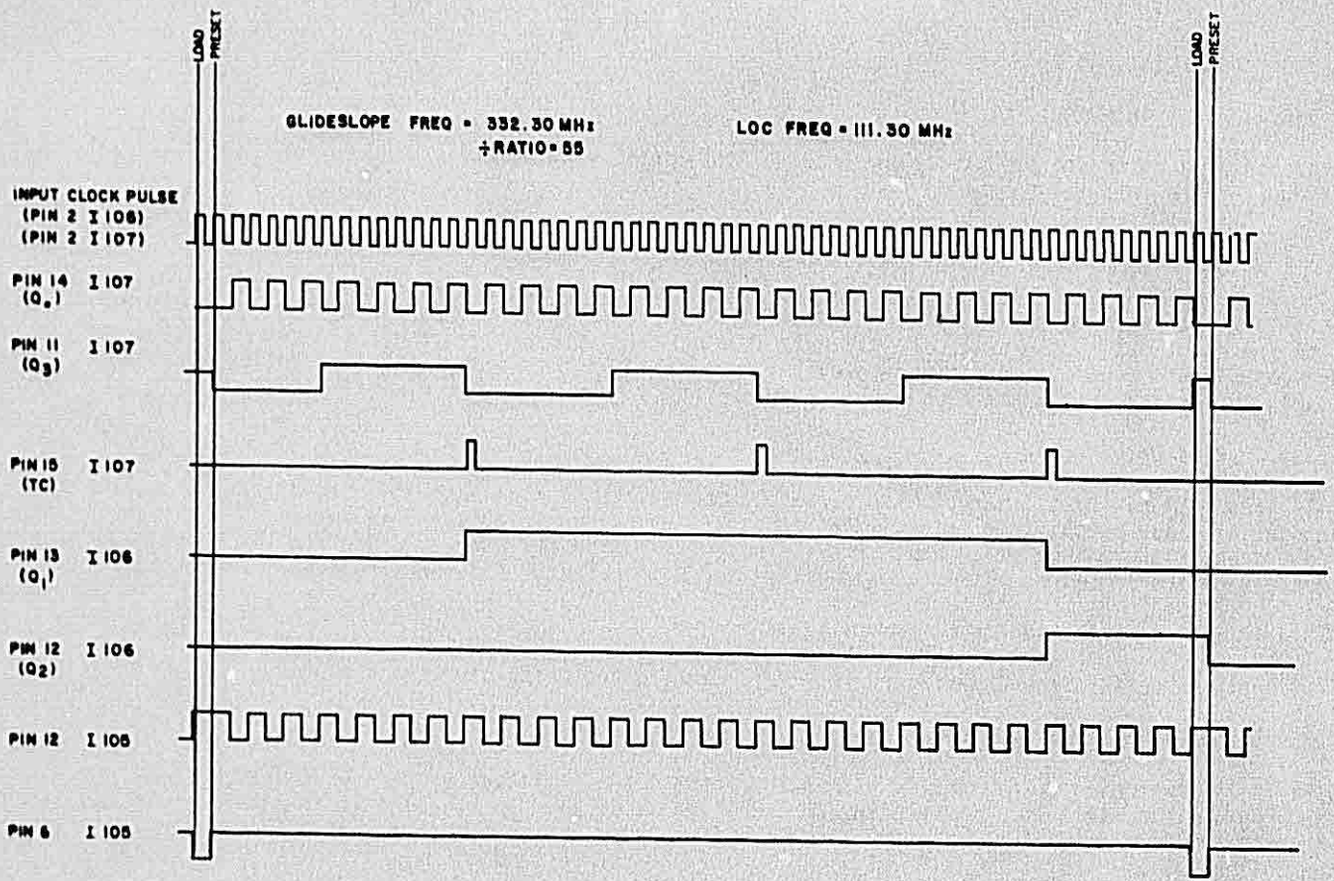


FIGURE 4-2 KN 75 PROGRAMMABLE DIVIDER TIMING DIAGRAM
(Dwg. No. 696-1553-00, R-0)

KING

KN 75
GLIDESLOPE RECEIVER

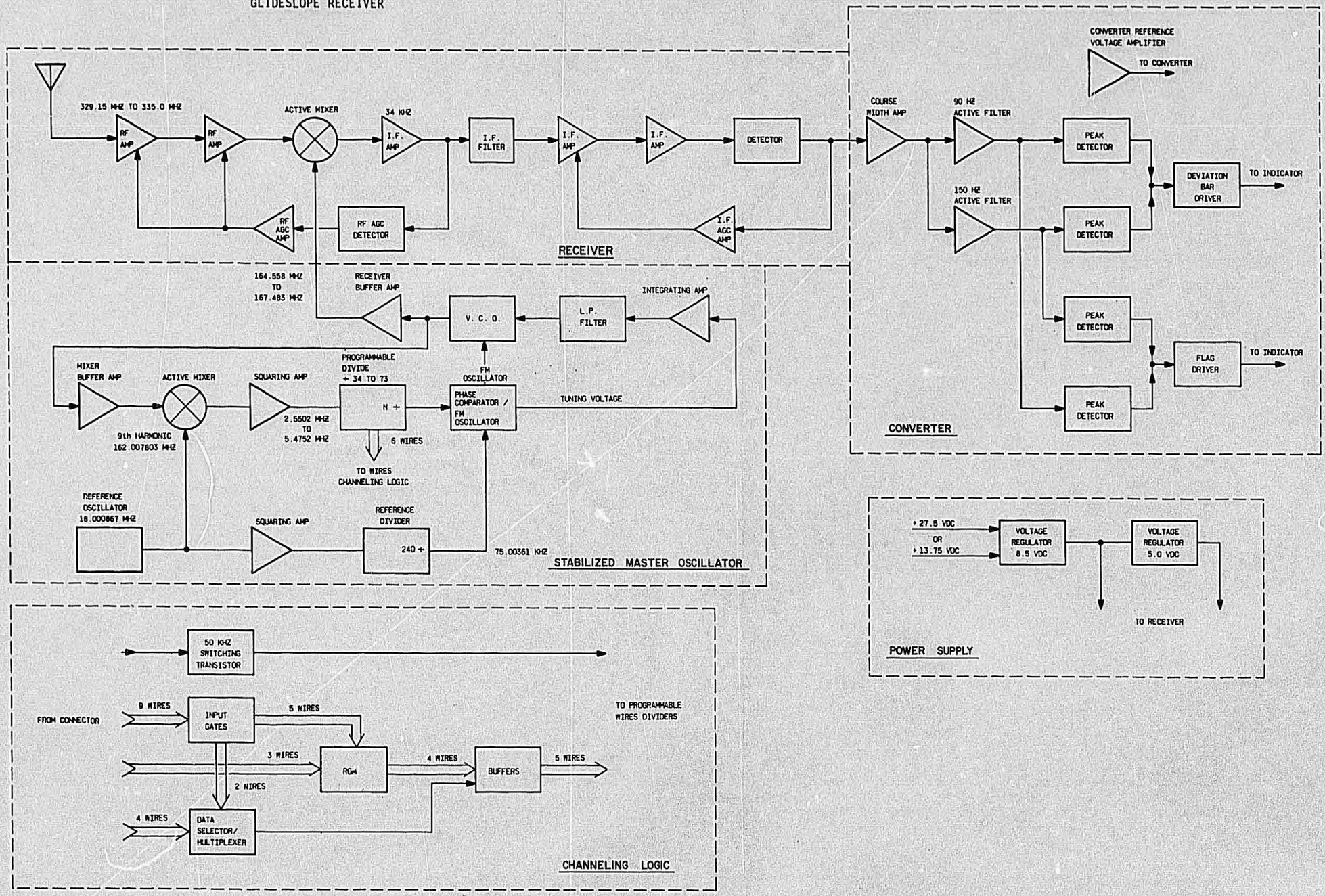


FIGURE 4-3 KN 75 BLOCK DIAGRAM
(Dwg. No. 696-1557-00, R-O)

CHAPTER

05

CONTENTS

SECTION V
ILLUSTRATED PARTS LIST

LIST OF ILLUSTRATIONS

NAME	ASS'Y. NO.
FINAL ASSEMBLY	066-1063-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	047-4322-02	Front Panel	A	1				
	047-4323-01	Rear Panel		1				
	047-4324-01	Resistor Clip		1				
	047-4327-01	Preselector Cover		1				
	047-4330-01	VCO Cover		1				
	047-4332-01	Buffer Cover		1				
	047-4334-01	Mixer Cover		1				
	057-1961-00	Name Plate		1				
	057-2040-01	Serial Tag		1				
	075-5002-03	Chassis Extrusion		1				
	089-2005-37	#2 Hex Nut		3				
	089-5874-04	Screw 2-56 x 1/4 PHP		3				
	089-6294-03	Screw 4-40 x 3/16 PHP T.T.		2				
	089-6540-05	Screw 6-32 x 5/16 FILHP T.T.		8				
	089-5436-04	Screw 4-40 x 1/4 FHP		1				
	200-5882-00	PC Board Assembly	A	1				
	089-5853-08	Set Screw 2-56 x 1/4		1				
	057-2006-00	Decal		1				

PARTS LIST REVISION HISTORY				ENGR. APPROVAL
NAME FINAL ASSEMBLY				ASS'Y. NO. 066-1063-00
ASS'Y. DWG 300-2185-00		UNIT KN-75		USED ON
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
1				
2				
3				
4				
				KN 72/ KN 75 Maintenance/Overhaul Manual Rev. 1 , Jan. 1977
5			057-2040-01	P/N changed from 057-1962-01
				KN 72/KN 75 Maintenance/Overhaul Manual Rev. 2, August, 1978

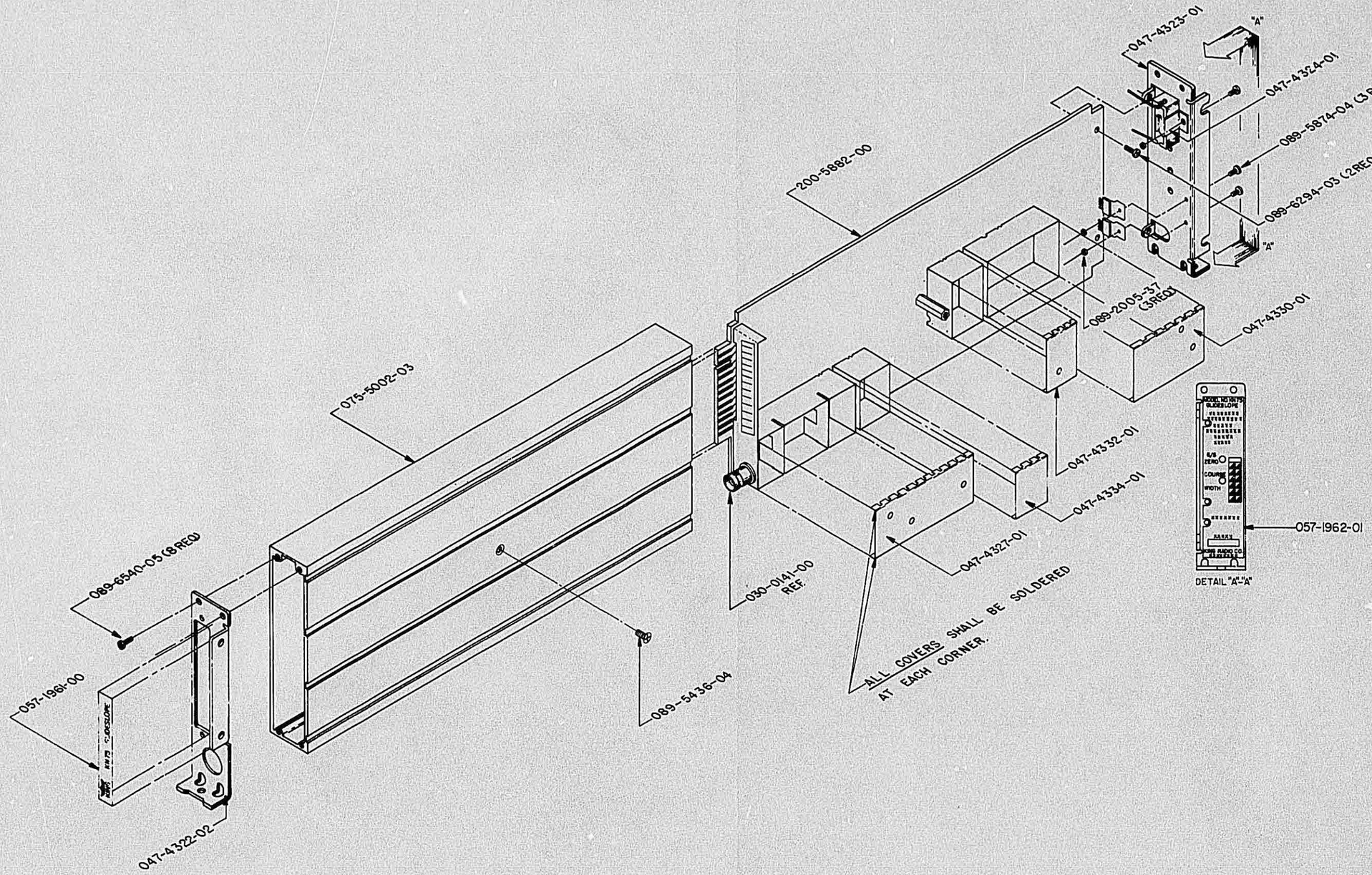


FIGURE 5-1 FINAL ASSEMBLY DRAWING
(Dwg. No. 300-2185-00, R-2)

NAME	ASS'Y. NO.
G/S P.C. BOARD Assy.	200-5882-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	009-5882-01	P.C. Board	A	1				
	047-4325-01	Preselector Fence		1				
	047-4326-02	Preselector Fence	A	1				
	047-4328-02	Shield, VCO	A	1				
	047-4329-01	VCO Fence		2				
	047-4331-01	Buffer Fence		2				
	047-4333-01	Mixer Fence		2				
	047-4334-01	Divider Fence		2				
	047-4336-02	Shield, Preselector	A	1				
	047-2154-00	Can, Choke		4				
	076-0253-08	Spacer		1				
	089-5878-04	Screw 4-40 x 1/4 PHP SPRT		1				
	088-0066-00	Crystal Pad		1				
	091-0015-00	Grommet Rubber		2				
	025-0018-22	Wire #26 Red		.33				
	026-0002-00	Wire Tinned Copper #24		AR				
	026-0013-00	Coax RG-178 Blu		AR				
Q101	007-0317-01	FET, SD306		2				
Q102	007-0317-01	FET, SD306		-				
Q103	007-0281-00	FET, 3N225		2				
Q104	007-0187-00	TSTR, MPS 5089		1				
Q105	007-0238-00	TSTR, FPN 4917		2				
Q106	007-0238-00	TSTR, FPN 4917		-				
Q107	007-0179-00	TSTR, 2N3904		3				
Q108	007-0179-00	TSTR, 2N3904		-				
Q109	007-0078-00	TSTR, 2N3415		3				
Q110	007-0129-00	TSTR, 2N5305		1				
Q111	007-0195-00	TSTR, MPSH10		5				
Q112	007-0195-00	TSTR, MPSH10		-				
Q113	007-0195-00	TSTR, MPSH10		-				
Q114	007-0065-00	TSTR, 2N3906		2				
Q115	007-0179-00	TSTR, 2N3904		-				
Q116	007-0065-00	TSTR, 2N3906		-				
Q117	007-0281-00	FET, 3N225		-				
Q118	007-0195-00	TSTR, MPSH10		-				
Q119	007-0151-01	TSTR, FPN4275		1				
Q120	007-0195-00	TSTR, MPSH10		-				
Q121	007-0078-00	TSTR, 2N3415		-				
Q122	007-0078-00	TSTR, 2N3415		-				

NAME G/S P.C. BOARD Assy.			ASS'Y. NO. 200-5882-00					
KING RADIO CORP. PARTS LISTING			CODE	QUANTITY				
SYMBOL	PART NUMBER	DESCRIPTION		-00	-01	-02	-03	-04
CR101	007-6016-00	Dio, 1N4154		17				
CR102	007-6033-00	Dio, 1N270		2				
CR103	007-6016-00	Dio, 1N4154		-				
CR104	007-6016-00	Dio, 1N4154		-				
CR105	007-6033-00	Dio, 1N270		-				
CR106	007-6016-00	Dio, 1N4154		-				
CR107	007-6016-00	Dio, 1N4154		-				
CR108	007-6016-00	Dio, 1N4154		-				
CR109	007-6016-00	Dio, 1N4154		-				
CR110	007-6016-00	Dio, 1N4154		-				
CR111	007-4025-00	Dio, MV109		1				
CR112	007-6025-00	Dio, 1N4003		2				
CR113	007-6016-00	Dio, 1N4154		-				
CR114	007-6016-00	Dio, 1N4154		-				
CR115	007-6016-00	Dio, 1N4154		-				
CR116	007-6016-00	Dio, 1N4154		-				
CR117	007-6025-00	Dio, 1N4003		-				
CR118	007-6016-00	Dio, 1N4154		-				
CR119	007-6016-00	Dio, 1N4154		-				
CR120	007-6016-00	Dio, 1N4154		-				
CR121	007-6016-00	Dio, 1N4154		-				
CR122	007-6016-00	Dio, 1N4154		-				
U101	015-0039-00	Resistor Module, 10K		1				
U102	015-0040-00	Resistor Module, 47K		1				
L101	019-2268-00	Coil, R.F.		4				
L102	019-2268-00	Coil, R.F.		-				
L103	019-2268-00	Coil, R.F.		-				
L104	019-2266-00	Coil, 7mh		1				
L105	019-2265-00	Coil, 6 mh		2				
L106	019-2265-00	Coil, 6mh		-				
L107	019-2109-00	Coil, 22mh		1				
L108	019-2268-00	Coil, R.F.		-				
L109	019-2084-21	Choke, 1uh		1				

NAME G/S P. C. BOARD Assy.	ASS'Y. NO. 200-5882-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
L110	019-2269-00	Coil, R. F.			1			
L111	019-2084-55	Choke, 27uh			1			
L112	019-2084-23	Choke, 1.2uh			1			
L113	019-2099-02	Choke, .1 uh			1			
L114	013-0006-03	Ferrite Bead			14			
L115	013-0006-03	Ferrite Bead			-			
L116	013-0006-03	Ferrite Bead			-			
L117	013-0006-03	Ferrite Bead			-			
L118	013-0006-03	Ferrite Bead			-			
L119	013-0006-03	Ferrite Bead			-			
L120-	013-0006-03	Ferrite Bead			-			
L121	013-0006-03	Ferrite Bead			-			
L122	013-0006-03	Ferrite Bead			-			
L123	013-0006-03	Ferrite Bead			-			
L124	013-0006-03	Ferrite Bead			-			
L125	013-0006-03	Ferrite Bead			-			
L126	013-0006-03	Ferrite Bead			-			
L127		Note Used						
L129	013-0006-03	Ferrite Bead			-			
L130	019-2099-01	Choke, .13uh			1			
CJ101	026-0018-00	Circuit Jumper			3			
CJ102	026-0018-00	Circuit Jumper			-			
CJ103	026-0018-00	Circuit Jumper			-			
Y101	044-0069-00	Crystal, 18.000867MHz			1			
C101	113-3027-00	CAP D/C 2.7pf			3			
C102	113-3680-00	CAP D/C 68pf			7			
C103	113-3680-00	CAP D/C 68pf			-			
C104	113-3121-00	CAP D/C 120pf			28			
C105	113-3680-00	CAP D/C 68pf			-			
C106	113-5019-01	CAP D/C 1.9pf			1			
C107	113-5033-00	CAP D/C 3.3pf			2			
C108	113-3680-00	CAP D/C 68pf			-			
C109	111-0001-09	CAP M/C .15uf			1			
C110	113-3680-00	CAP D/C 68pf			-			
C111	113-3680-00	CAP D/C 68pf			-			
C112	113-5033-00	CAP D/C 3.3pf			-			
C113	113-3027-00	CAP D/C 2.7pf			-			
C114	113-3121-00	CAP D/C 120pf			-			
C115	097-0068-00	CAP AL 10uf 16v			10			
C116	111-0001-11	CAP M/C .047uf			5			
C117	097-0068-00	CAP AL 10uf 16v			-			
C118	096-1030-00	CAP T 1. uf 10%			3			
C119	111-0001-11	CAP M/C .047uf			-			

NAME	ASS'Y. NO.
G/S P.C. Board Assy.	200-5882-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY				
				-00	-01	-02	-03	-04
C120	114-7104-00	CAP D/C .1uf			3			
C121	096-1030-12	CAP T 3.3uf 15v			1			
C122	111-0001-11	CAP M/C .047uf			-			
C123	113-3151-00	CAP D/C 150pf			2			
C124	118-0035-00	CAP D/C 1800pf			1			
C125	113-5681-00	CAP D/C 680pf			1			

NAME G/S P.C. BOARD Assy.	ASS'Y. NO. 200-5882-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
C126	114-5222-01	CAP D/C 2200pf		1				
C127	113-5471-00	CAP D/C 470pf		1				
C128	118-0036-00	CAP D/C 2000pf		1				
C129	114-5152-00	CAP D/C 1500pf		1				
C130	096-1030-33	CAP T .47uf 50v		1				
C131	109-0007-00	CAP D/C .01uf		4				
C132	111-0001-11	CAP M/C .047uf		-				
C133	097-0068-00	CAP AL 10uf 16v		-				
C134	113-7503-00	CAP D/C .05uf		3				
C135	113-5102-00	CAP D/C .001uf		4				
C136	096-1030-00	CAP T 1uf 10%		-				
C137	097-0068-00	CAP AL 10uf 16v		-				
C138	111-0001-03	CAP M/C .22uf		1				
C139	096-1030-45	CAP T 2.2uf 35v		1				
C140	097-0068-00	CAP AL 10uf 16v		-				
C141	111-0001-07	CAP M/C .022uf		1				
C142	111-0001-11	CAP M/C .047uf		-				
C143		Not Used						
C144	108-6004-00	CAP P/S .1uf 2 %		4				
C145	108-6004-00	CAP P/S .1uf 2 %		-				
C146	108-6004-00	CAP P/S .1uf 2 %		-				
C147	108-6004-00	CAP P/S .1uf 2 %		-				
C148		Not Used						
C149		Not Used						
C150	096-1030-06	CAP T 47uf 15v		1				
C151	096-1030-05	CAP T 10uf 20v		1				
C152		Not Used						
C153	097-0068-00	CAP AL 10uf 16v		-				
C154		Not Used						
C155	113-3121-00	CAP D/C 120pf		-				
C156	097-0068-10	CAP AL 1uf 25v		1				
C157	113-3121-00	CAP D/C 120pf		-				
C158	114-7104-00	CAP D/C .1uf		-				
C159	096-1030-00	CAP T 1uf 10%		-				
C161	113-5221-01	CAP D/C 220pf		1				
C162	113-5102-00	CAP D/C .001uf		-				
C163	111-0001-13	CAP M/C .1uf		2				
C164	113-3121-00	CAP D/C 120pf		-				
C165	113-3151-00	CAP D/C 150pf		-				
C166	097-0068-00	CAP AL 10uf 16v		-				
C167	104-0002-01	CAP D/M 12pf		1				
C168	104-0001-55	CAP D/M 15pf		1				
C169	113-3820-00	CAP D/C 82pf		2				

NAME	ASS'Y. NO.
G/S P.C. BOARD Assy.	200-5882-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
C170	113-3151-00	CAP D/C 150pf		-				
C171	113-3100-00	CAP D/C 10pf		2				
C172	113-3100-00	CAP D/C 10pf		-				
C173	113-3047-00	CAP D/C 4.7pf		1				
C174	113-3680-00	CAP D/C 68pf		-				
C175	113-3390-00	CAP D/C 39pf		2				
C176		Not Used						
C177	113-5102-00	CAP D/C .001uf		-				
C178	097-0068-00	CAP AL 10uf 16v		-				
C179	114-7104-00	CAP D/C .1uf		-				
C180	113-5331-00	CAP D/C 330pf		1				
C181	113-7503-00	CAP D/C .05uf		-				
C182	113-3390-00	CAP D/C 39pf		-				
C183	113-7503-00	CAP D/C .05uf		-				
C184	109-0007-00	CAP D/C .01uf		-				
C185	113-5151-01	CAP D/C 150pf		3				
C186	106-0001-07	CAP MDP .24 pf		1				
C187	113-5151-01	CAP D/C 150pf		-				
C188	113-5102-00	CAP D/C .001uf		-				
C189	109-0007-00	CAP D/C .01uf		-				
C190	113-5151-01	CAP D/C 150pf		-				
C191	109-0007-00	CAP D/C .01uf		-				
C192	113-3015-00	CAP D/C 1.5pf		1				
C193	104-0001-01	CAP D/M 120pf		1				
C194	104-0001-28	CAP D/M 240pf		1				
C195	102-0024-09	CAP Variable 7-35pf		1				
C196	104-0001-14	CAP D/M 33pf		1				
C197	113-3121-00	CAP D/C 120pf		-				
C198	113-3121-00	CAP D/C 120pf		-				
C199	096-1030-10	CAP T 10uf 35v		1				
C200	097-0068-03	CAP AL 47uf 16v		1				
C201	097-0068-00	CAP AL 10uf 16v		-				
C202	113-3820-00	CAP D/C 82pf		-				
C203	113-3121-00	CAP D/C 120pf		-				
C204	113-3121-00	CAP D/C 120pf		-				
C205	113-3121-00	CAP D/C 120pf		-				
C206	113-3121-00	CAP D/C 120pf		-				
C207	113-3121-00	CAP D/C 120pf		-				
C208	113-3121-00	CAP D/C 120pf		-				
C209	113-3121-00	CAP D/C 120pf		-				
C210	113-3121-00	CAP D/C 120pf		-				
C211	113-3121-00	CAP D/C 120pf		-				
C212	113-3121-00	CAP D/C 120pf		-				
C213	113-3121-00	CAP D/C 120pf		-				
C214	113-3121-00	CAP D/C 120pf		-				
C215	113-3121-00	CAP D/C 120pf		-				
C216	113-3121-00	CAP D/C 120pf		-				

NAME G/S P. C. BOARD Assy.	ASS'Y. NO. 200-5882-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
C217	113-3121-00	CAP D/C 120pf			-			
C218	113-3121-00	CAP D/C 120pf			-			
C219	113-3121-00	CAP D/C 120pf			-			
C220		Not Used						
C221		Not Used						
C222	097-0068-00	CAP AL 10uf 16v			-			
C223	113-3121-00	CAP D/C 120pf			-			
C224	113-3121-00	CAP D/C 120pf			-			
C225	113-3121-00	CAP D/C 120pf			-			
C226	113-3027-00	Cap D/C 2.7pf			-			
C227	111-0001-13	Cap M/C .1uf			1			
I101	120-3020-00	I. C. MC 1350			1			
I102	120-3052-00	I. C. LM 324N			2			
I103	120-3052-00	I. C. LM324N			-			
I104	120-6038-01	I. C. SCL 4046AC+			1			
I105	120-0003-00	I. C. Sn 7410			1			
I106	120-0087-00	I. C. 74LS162			1			
I107	120-0088-00	I. C. 74LS163			3			
I108	120-6026-01	I. C. 4050			1			
I109	120-0088-00	I. C. 74LS163			-			
I110	120-0088-00	I. C. 746S163			-			
I111	120-3066-01	I. C. 78GU1C			2			
I112	120-3066-01	I. C. 78GU1C			-			
I113	120-6047-01	I. C. SCL4081AC+			1			
I114	120-6019-01	I. C. SCL4030AC+			1			
I115	120-2027-00	I. C. MCM14524			1			
I116	120-6050-01	I. C. MC14539BAL			1			
R101	130-0103-23	Res F/C 10K 5%			16			
R102	130-0101-23	Res F/C 100 5%			10			
R103		Not Used						
R104	130-0103-23	Res F/C 10K 5%			-			
R105	130-0101-23	Res F/C 100 5%			-			
R106	130-0123-23	Res F/C 12K 5%			2			
R107	130-0682-23	Res F/C 6.8K 5%			1			
R108	130-0223-23	Res F/C 22K 5%			4			
R109	130-0683-23	Res F/C 68K 5%			1			
R110	130-0123-23	Res F/C 12K 5%			-			
R111	130-0471-23	Res F/C 470 5%			5			
R112	130-0271-23	Res F/C 270 5%			6			
R113	130-0223-23	Res F/C 22k 5%			-			
R114	130-0101-23	Res F/C 100 5%			-			
R115	130-0563-23	Res F/C 56K 5%			2			
R116	130-0273-23	Res F/C 27K 5%			1			
R117	130-0101-23	Res F/C 100 5%			-			
R118	130-0272-23	Res F/C 2.7K 5%			2			

NAME	ASS'Y. NO.
G/S PC BOARD Assy.	200-5882-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
R119	130-0182-23	Res F/C 1.8K 5%			1			
R120	130-0272-23	Res F/C 2.7K 5%			-			
R121	130-0473-23	Res F/C 47K 5%			2			
R122	130-0104-23	Res F/C 100K 5%			3			
R123	130-0101-23	Res F/C 100 5%			-			
R124	130-0472-23	Res F/C 4.7K 5%			9			
R125		Not Used						
R126	130-0513-23	Res F/C 51K 5%			1			
R127	133-0072-15	Res Vari 10K			1			
R128	130-0223-23	Res F/C 22K			-			
R129	130-0101-23	Res F/C 100 5%			-			
R130	130-0102-23	Res F/C 1K 5%			7			
R131	130-0752-23	Res F/C 7.5K 5%			2			
R132	130-0752-23	Res F/C 7.5K 5%			-			
R133	130-0103-23	Res F/C 10K 5%			-			
R134	130-0162-23	Res F/C 1.6K 5%			1			
R135	130-0102-23	Res F/C 1K 5%			-			
R136	130-0471-23	Res F/C 470 5%			-			
R137	130-0104-23	Res F/C 100K 5%			-			
R138	130-0473-23	Res F/C 47K 5%			-			
R139	130-0472-23	Res F/C 4.7K 5%			-			
R140	130-0472-23	Res F/C 4.7K 5%			-			
R141	130-0201-23	Res F/C 200 5%			1			
R142	136-1003-72	Res PF 100K 1%			1			
R143	136-1821-72	Res PF 1.82K 1%			1			
R144	136-3651-72	Res PF 3.65K 1%			1			
R145	136-5621-72	Res PF 5.62K 1%			1			
R146	136-1100-72	Res PF 110 1%			1			
R147	136-3571-72	Res PF 3.57K 1%			2			
R148		Not Used						
R149	133-0072-20	Res Vari 50K						
R150	130-0103-23	Res F/C 10K 5%			-			
R151	130-0103-23	Res F/C 10K 5%			-			
R152	136-7501-72	Res PF 7.5K 1%			2			
R153	133-0072-08	Res Vari 1K÷			1			
R154	136-4421-72	Res PF 4.42K 1%			1			
R155	136-1401-72	Res PF 1.4K 1%			1			
R156	136-8660-72	Res PF 866 1%			1			
R157	136-2613-72	Res PF 261K 1%			1			
R158	136-1543-72	Res PF 154K 1%			1			
R159	130-0203-23	Res F/C 20K 5%			2			
R160	130-0203-23	Res F/C 20K 5%			-			
R161	136-6812-72	Res PF 68.1K 1%			2			
R162	136-6812-72	Res PF 68.1K 1%			-			
R163	136-1502-72	Res PF 15.0K 1%			2			

NAME	ASS'Y. NO.
G/S P C BOARD Assy.	200-5882-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
R164	136-1502-72	Res PF 15.0K 1%			-			
R165	136-7501-72	Res PF 7.5K 1%			-			
R166	136-1692-72	Res PF 16.9K 1%			1			
R167	130-0102-23	Res F/C 1K 5%			-			
R168	136-4322-72	Res PF 43.2K 1%			1			
R169	130-0331-23	Res F/C 330 5%			1			

NAME	ASS'Y. NO.
G/S PC BOARD Assy.	200-5882-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
R170	130-0163-23	Res F/C 16K 5%		2				
R171	130-0163-23	Res F/C 16K 5%		-				
R172	130-0471-23	Res F/C 470 5%		-				
R173	130-0472-23	Res F/C 4.7K 5%		-				
R174	130-0122-23	Res F/C 1.2K 5%		2				
R175	130-0512-23	Res F/C 5.1K 5%		1				
R176	130- 0104-23	Res F/C 100K 5%		-				
R177	130-0134-23	Res F/C 130K 5%		1				
R178	130-0122-23	Res F/C 1.2K 5%		-				
R179	130-0563-23	Res F/C 56K 5%		-				
R180	130-0103-23	Res F/C 10K 5%		-				
R181	130-0822-23	Res F/C 8.2K 5%		1				
R182	130-0101-23	Res F/C 100 5%		-				
R183	130-0470-23	Res F/C 47 5%		1				
R184	130-0681-23	Res F/C 680 5%		1				
R185	130-0222-23	Res F/C 2.2K 5%		3				
R186	130-0101-23	Res F/C 100 5%		-				
R187	130-0103-23	Res F/C 10K 5%		-				
R188	130-0103-23	Res F/C 10K 5%		-				
R189	130-0271-23	Res F/C 270 5%		-				
R190	130-0820-23	Res F/C 82 5%		1				
R191	130-0271-23	Res F/C 270 5%		-				
R192	130-0271-23	Res F/C 270 5%		-				
R193	130-0152-23	Res F/C 1.5K 5%		1				
R194	130-0332-23	Res F/C 3.3K 5%		2				
R195	130-0101-23	Res F/C 100 5%		-				
R196	130-0102-23	Res F/C 1.0K 5%		-				
R197	130-0271-23	Res F/C 270 5%		-				
R198	130-0471-23	Res F/C 470 5%		-				
R199	130-0223-23	Res F/C 22K 5%		-				
R201	130-0472-23	Res F/C 4.7K 5%		-				
R202	130-0821-23	Res F/C 820 5%		1				
R203	130-0103-23	Res F/C 10K 5%		-				
R204	130-0271-23	Res F/C 270 5%		-				
R205	130-0471-23	Res F/C 470 5%		-				
R206	130-0332-23	Res F/C 3.3K 5%		-				
R207	130-0472-23	Res F/C 4.7K 5%		-				
R208	130-0101-23	Res F/C 100 5%		-				
R209	136-3571-72	Res PF 3.57K 1%		-				
R210	136-5111-72	Res PF 5.11K 1%		1				
R211	130-0472-23	Res F/C 4.7K 5%		-				
R212	130-0472-23	Res F/C 4.7K 5%		-				
R213	130-0103-23	Res F/C 10K 5%		-				
R214	130-0103-23	Res F/C 10K 5%		-				
R215	130-0103-23	Res F/C 10K 5%		-				
R216	130-0103-23	Res F/C 10K 5%		-				
R217	130-0103-23	Res F/C 10K 5%		-				
R218	130-0471-14	Res F/C 470 1/10W 20%		10				

NAME	ASS'Y. NO.
G/S PC BOARD Assy.	200-5882-00

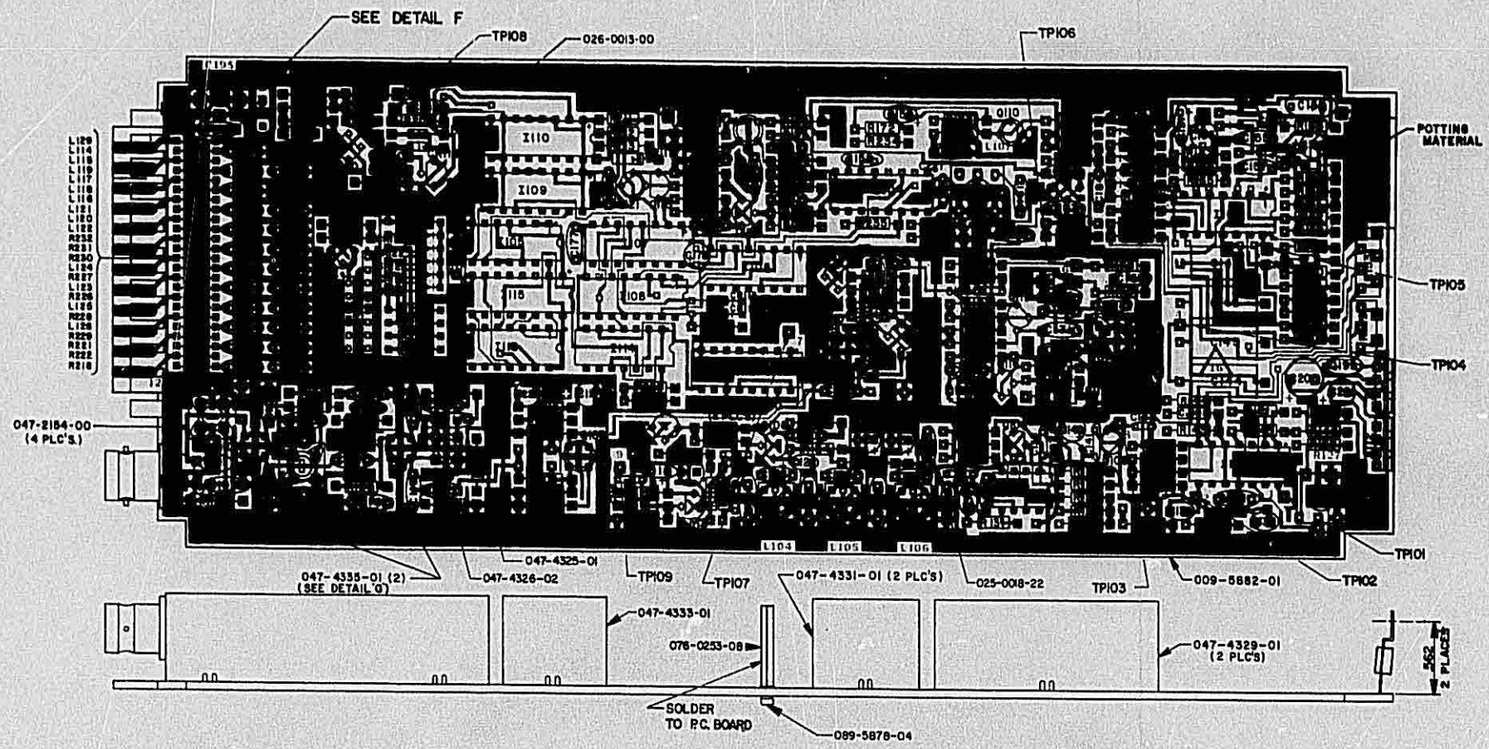
KING RADIO CORP. PARTS LISTING

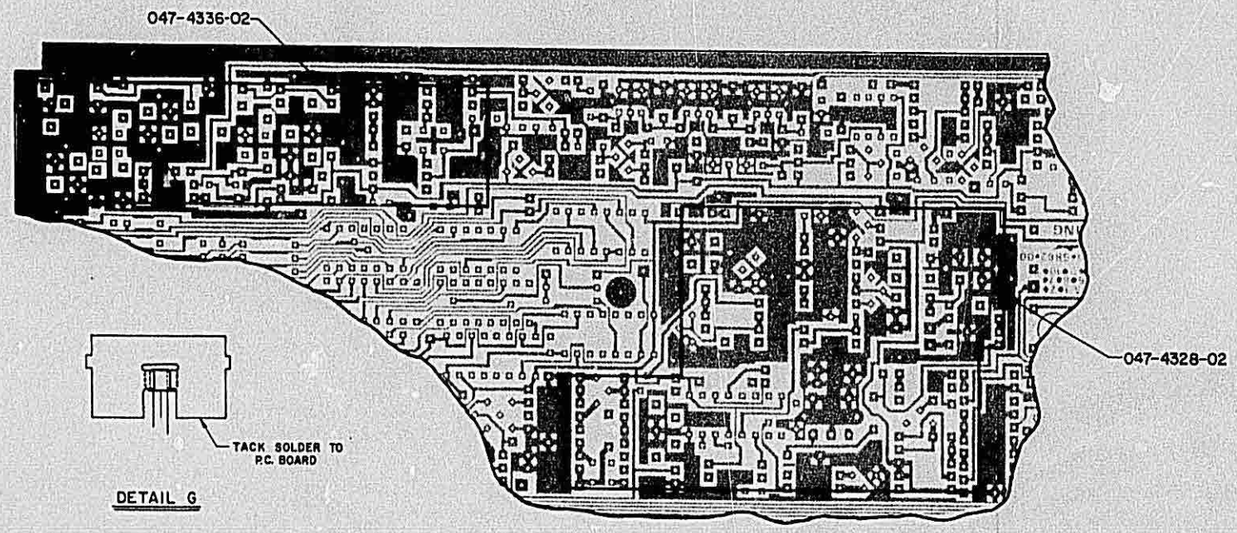
SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
R219	130-0103-23	Res F/C 10K 5%		-				
R220	130-0103-23	Res F/C 10K 5%		-				
R221	130-0471-14	Res F/C 470 1/10W 20%		-				
R222	130-0471-14	Res F/C 470 1/10W 20%		-				
R223	130-0102-23	Res F/C 1K 5%		-				
R224	130-0472-23	Res F/C 4.7K 5%		-				
R225	130-0102-23	Res F/C 1K 5%		-				
R226	130-0471-14	Res F/C 470 1/10W 20%		-				
R227	130-0471-14	Res F/C 470 1/10W 20%		-				
R228	130-0471-14	Res F/C 470 1/10W 20%		-				
R229	130-0471-14	Res F/C 470 1/10W 20%		-				
R230	130-0471-14	Res F/C 470 1/10W 20%		-				
R231	130-0471-14	Res F/C 470 1/10W 20%		-				
R232	130-0471-14	Res F/C 470 1/10W 20%		-				
R233	132-0115-01	Res Pwr 47 5W		1				
R234	130-0222-23	Res F/C 2.2K 5%		-				
R235	130-0222-23	Res F/C 2.2K 5%		-				
R236	130-0154-23	Res F/C 150K 5%		1				
R237	130-0102-23	Res F/C 1.0K 5% QW		-				

PARTS LIST REVISION HISTORY				ENGR. APPROVAL
NAME P.C. BOARD				ASS'Y. NO. 200-5882-00
ASS'Y. DWG.		UNIT		USED ON

REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
5				
				KN 72 Maintenance/Overhaul Manual Rev. 1, January, 1977
6		C167	104-0002-01	P/N changed from 113-3120-00
		C168	104-0001-55	P/N changed from 113-3150-00
7		R124	130-0472-23	Qty. changed from 10 to 9
		R194	130-0332-23	Qty. changed from 2 to 3
		R206	130-0332-23	P/N changed from 130-0472-23
8		L113	019-2099-01	P/N changed from 019-2099-00
		L130	019-2099-02	Added to B/M
		C123	113-3151-00	Qty. changed from 3 to 2
		C185	113-5151-01	Qty. changed from 4 to 3
		C186	106-0001-07	P/N changed from 113-5151-01
		C192	113-3015-00	P/N changed from 113-3200-00
		C226	113-3027-00	Added to B/M
		R108	130-0223-23	Qty. changed from 5 to 4
		R176	130-0393-23	P/N changed from 130-0822-23
		R177	130-0104-23	P/N changed from 130-0105-23
		R200	130-0223-23	Deleted from B/M
		R218	130-0471-14	20% added to Desc.
		R181	130-0822-23	Qty. changed from - to 1
		R221,222	130-0471-14	20% added to Desc.
		R226,227,	"	" "
		228,229,	"	" "
		230,231	"	" "
		R232	"	" "
9		R176	130-0563-23	P/N changed from 130-0822-23, desc. from 8.2K 5% to 56K 5%, qty from 2 to -
		R177	130-0134-23	P/N changed from 130-0105-23, desc. from 1M 5% to 130K 5%
		R181	130-0822-23	Qty changed from - to 1
		R130	130-0102-23	Qty. changed from 5 to 6
		R196	130-0102-23	P/N changed from 130-0332-23
		R194	130-0332-23	Qty. changed from 3 to 2
10		C120	114-7104-00	Qty. changed from 4 to 3
		C163	111-0001-13	P/N changed from 114-7104-00,Qty.2
		C226	111-0001-13	Added to B/M
11		I115	120-6061-00	P/N changed from 120-2020-00
12		C226	113-3027-00	P/N changed from 111-0001-13
		C227	111-0001-13	Added to B/M
13			026-0013-00	Added to B/M
14		I106	120-0087-00	P/N changed from 120-0050-01
		I107	120-0088-00	P/N changed from 120-0050-03
		I109	120-0088-00	P/N changed from 120-0050-03
		I110	120-0088-00	Qty. changed from 1 to -
15		I115	120-2027-00	P/N changed from 120-6061-00
16		R127	133-0072-15	P/N changed from 133-0124-03

PARTS LIST REVISION HISTORY				ENGR. APPROVAL
NAME G/S P.C. Board Assy.				ASS'Y. NO. 200-5882-00
ASS'Y. DWG. 300-5882-00		UNIT KN 75		USED ON
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
17		R115	130-0563-23	Qty. changed from 3 to 2
		R122	130-0104-23	Qty. changed from 2 to 3
		R176	130-0104-23	P/N changed from 130-0563-23
18		L130	019-2099-01	P/N changed from 019-2099-02
		C160	113-5821-00	Deleted from B/M
19		R237	130-0102-23	Added to B/M
		R130	130-0102-23	Qty from 6 to 7
20		Q101	007-0317-01	P/N changed from 007-0310-00
		Q102	007-0317-01	P/N changed from 007-0310-00
		L114	013-0006-03	Qty. changed from 15 to 14
		L128	013-0006-03	Deleted from B/M
		C101	113-3027-00	P/N changed from 113-3015-00
		C106	113-5019-01	P/N changed from 113-5022-00
		C107	113-5033-00	P/N changed from 113-5019-01
		C112	113-5033-00	P/N changed from 113-5019-01
		C113	113-3027-00	P/N changed from 113-5033-00
		C226	113-3027-00	Deleted from B/M(Sht. 11)
		C226	113-3027-00	Qty. changed from 1 to -
		R107	130-0682-23	P/N changed from 130-0133-23
21		Q119	007-0151-01	P/N changed from 007-0151-00
22		I111	120-3066-01	P/N changed from 120-3066-00
		I112	120-3066-01	P/N changed from 120-3066-00
				KN 75 Maintenance/Overhaul Manual Rev. 2, August, 1978

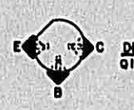




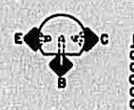
DETAIL G

TOP VIEWS

DETAIL A
Q109
Q110
Q121
Q122

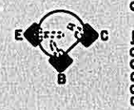


DETAIL D
Q119

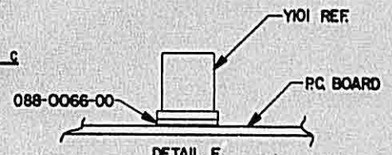


DETAIL B
Q104 Q205
Q105 Q206
Q106
Q107
Q108
Q114
Q115
Q116

DETAIL E
Q101
Q102
Q103
Q117



DETAIL C
Q111
Q112
Q113
Q118
Q120



DETAIL F

NOTES

1. FOR COMPONENT VALUES SEE BILL OF MATERIAL 200-5882-00.
2. MASK VARIABLE RESISTORS R149,R153,R127 COILS L101,L102,L103,L104,L105,L106,L110,L108,AND P.C. BOARD EDGE CONNECTOR. MASK FOR 047-4336-02 & 047-4328-02 INSTALL AFTER POST COATING. THEN EVENLY SPRAY POST COATING 016-1040-00 TO BOTH SIDES OF THE BOARD.

FIGURE 5-2 P.C. BOARD ASSEMBLY DRAWING
(Dwg. No. 300-5882-00, R-13)

SEE BLOW UP FICHE NO. KR2176. ITEM I

CHAPTER

06

SECTION VI
MAINTENANCE

LIST OF ILLUSTRATIONS

TABLES

section vi
maintenance

6.1 GENERAL INFORMATION

Before maintenance of the KN 75 is attempted, a thorough understanding of the theory of operation (Section IV) as well as the information on transistor and integrated circuit maintenance is needed. This material is in Appendix A. Detailed information on the various integrated circuit packages used in the KN 75 is also found in this reference.

The following sections will provide test and alignment procedures as well as aids to troubleshooting.

6.2 TEST AND ALIGNMENT

6.2.1 GENERAL INFORMATION

A. Standard Glideslope Test Signal

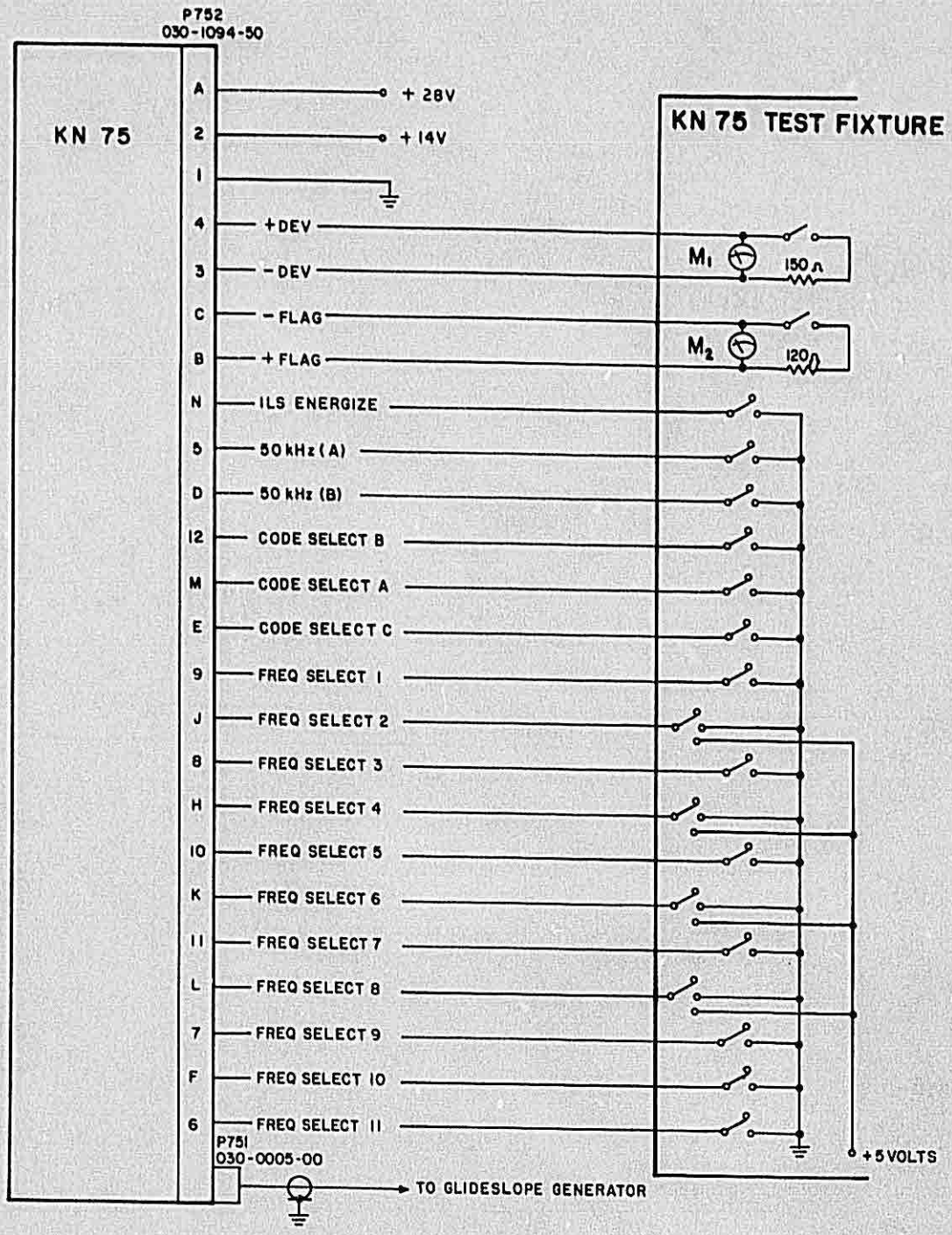
An RF carrier amplitude modulated simultaneously with 90 and 150Hz ± .3% signals of such levels that, when each signal is applied independently, the carrier is modulated 40 ± 2% at 700uv (hard).

B. Standard Glideslope Centering Signal

A standard glideslope test signal is one in which the difference in depth of modulation of of the 90 and 150Hz signals is less than .002 (700uv hard). Difference in depth of modulation (DDM) is the percentage modulation depth of the larger signal minus the percentage modulation depth of the smaller signal divided by 100.

6.2.2 TEST EQUIPMENT REQUIRED

ITEM DESCRIPTION	CHARACTERISTICS REQUIRED	REPRESENTATIVE TYPE
A. KN 75 Test Fixture	(See Figure 6-1)	
B. DC Power Supply	0-50VDC, 1.5 Amps	Heath SP-27
C. Digital Voltmeter	Input Impedance: 2 Megohms Voltage Range: 200mv to 1200V	Fluke Model 8000A
D. AC VTVM	Input Impedance: 2 Megohms Voltage Range: 1 Millivolt to 100 Volts. Scale calibrated in decibels.	Hewlett Packard Model 3400A
E. Glideslope Signal Generator	Frequency Range 329.2MHz to 335.0MHz	Boonton Model 232A
F. Frequency Counter	Frequency Range 1Hz to 500MHz	Hewlett Packard 5245L with 5253B Plug In
G. RF Signal Generator	Frequency Range 10MHz to 480MHz	Hewlett Packard Model 608E
H. Oscilloscope	Dual Trace Bandwidth 30MHz min	Tektronix Model 465
I. Wide Range Oscillator	Frequency Range 10KHz to 200KHz	Hewlett Packard Model 200CD
J. 6db Attenuator	Input-Output Impedance 50 Ohms. Attenuation 6.0db	Texcan Corporation Model FP-5016
K. Coaxial Cable	BNC Connector to open end with small alligator clips. Impedance = 50 ohms	



M_1 - G.S. DEVIATION 150 μa - 0 - 150 μa 1000 Ω KPN 023-0113-00

M_2 - G.S. FLAG 0 - 500 μa 1000 Ω KPN 023-0114-00

NOTE: WITH APPROPRIATE SWITCH SELECTION, THE KN 75 TEST FIXTURE CAN SELECT AND CHANNEL ANY OF THE CODES LISTED FOR THE KN 75 GLIDESLOPE RECEIVER. SEE TABLES FOR SWITCH POSITIONING FOR EACH CODE. (FIGURES 2-31 THROUGH 2-33)

FIGURE 6-1 TEST FIXTURE
(Dwg. No. 696-1552-00, R-0)

MHz \ PIN	7	D	K	L
0.10				
0.15		X		
0.30			X	
0.35		X	X	
0.50			X	X
0.55		X	X	X
0.70	X			X
0.75	X	X		X
0.90	X			
0.95	X	X		

MHz \ PIN	6	H	N
108			X
109		X	X
110	X	X	X
111	X		X

PINS

GROUND - 1, 9, 12, E, F
OPEN - 5, 8, 10, 11, J, M

X INDICATES GROUND

BLANK INDICATES OPEN

FIGURE 6-2 PIN CODING, 2 OUT OF 5 CODE

MHz \ PIN	8	9	10	11	D	F	H	J	K	L
108.10/110.10										
108.15/110.15					X					
108.30/110.30		X								
108.35/110.35		X			X					
108.50/110.50	X									
108.55/110.55	X				X					
108.70/110.70			X							
108.75/110.75			X		X					
108.90/110.90				X						
108.95/110.95				X	X					
109.10/111.10						X				
109.15/111.15					X	X				
109.30/111.30								X		
109.35/111.35					X			X		
109.50/111.50							X			
109.55/111.55					X		X			
109.70/111.70									X	
109.75/111.75					X				X	
109.90/111.90										X
109.95/111.95					X					X

MHz \ PIN	7	N
108	X	X
109		X
110		X
111	X	X

PINS

GROUND - 1, E, M
OPEN - 5, 6, 12

X INDICATES GROUND

BLANK INDICATES OPEN

NOTE: FOR 11 WIRE CODE, PIN D IS OPEN

FIGURE 6-3 PIN CODING, 12 WIRE CODE

MHz \ PIN	5	7	K	L
0.10	X	X	X	X
0.15		X	X	X
0.30	X		X	X
0.35			X	X
0.50	X	X	X	
0.55		X	X	
0.70	X		X	
0.75			X	
0.90	X	X		X
0.95		X		X

MHz \ PIN	H	J	N
108	X		X
109			X
110	X	X	X
111		X	X

X INDICATES GROUND

BLANK INDICATES OPEN

PINS

GROUND - 1, 6, 12, D, E, F, M
OPEN - 8, 9, 10, 11

FIGURE 6-4 PIN CODING, BCD CODE

MHz \ PIN	D	J	K	L	H
0.10					
0.15	X				
0.30		0			
0.35	X	0			
0.50					0
0.55	X				0
0.70			0		
0.75	X		0		
0.90				0	
0.95	X			0	

MHz \ PIN	6	7	F	N
108		X		X
109			X	X
110				X
111	X			X

X INDICATES GROUND

0 INDICATES +5V

BLANK INDICATES OPEN

PINS

GROUND - 1

OPEN - 5, 8, 9, 10, 11, 12, E, M

FIGURE 6-5 PIN CODING, KING CODE

6.2.3 ALIGNMENT PROCEDURE

A. Initial Settings

Before applying power to the equipment, preset potentiometers as follows:

R149	Course Width - Midrange
R153	Centering - Midrange

Apply power and reset potentiometer R127 for maximum voltage at TP101.

NOTE

All receiver RF input voltages are expressed with a 6dB attenuator connected to generator output.

B. Synthesizer Alignment

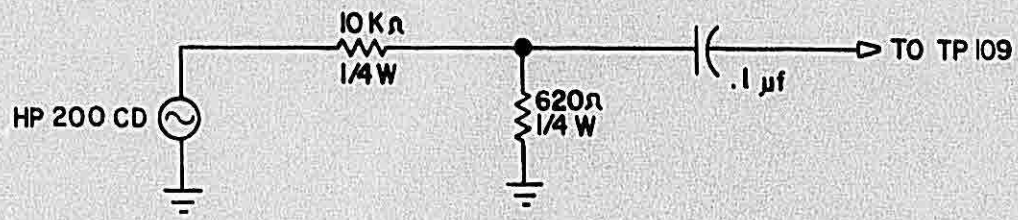
1. Connect a digital voltmeter to TP106. Channel the receiver to 332.2MHz. Adjust L108 for 4 volts ± .5 volts on TP106. Channel the receiver to 335.00MHz. Check that voltage is less than 6.5 volts on TP106. Rechannel the receiver to 329.15MHz. Check that voltage is greater than 1.5 volts on TP106.

2. Connect a frequency counter to Gate Q103 and adjust C195 for 166.1335Mhz with receiver channeled to 332.300MHz.

3. Connect a frequency counter to TP107. Channel all 21 channels as shown on Table 6-2. Do this for ARINC, King Narco and BDC codes. At each channel observe the frequency at TP107. Refer to Table 6-1 for TP107 frequency for each channel selected.

C. Elliptic Low Pass Filter Tuning Procedure

1. Connect a HP200CD Wide Range Oscillator to TP109 through the following network:



2. Connect a digital voltmeter to TP102.

3. Set the HP200CD for 162KHz on frequency counter.

4. Observe the no signal voltage at TP102. Adjust the HP200CD for a voltage reading of 2.5 to 4.00 volts above the no signal voltage at TP102.

5. Adjust L104 for a minimum voltage at TP102.

CAUTION

NEVER ALLOW THE VOLTAGE AT TP102 TO GO WITHIN .5 VOLTS OF NO INPUT SIGNAL LEVEL.

6. Set the HP200CD for 83.6KHz.

7. Repeat Step 4.

8. Adjust L105 for a minimum voltage at TP102.

CAUTION

NEVER ALLOW THE VOLTAGE AT TP102 TO GO WITHIN .5 VOLTS OF NO INPUT SIGNAL LEVEL.

9. Set the HP200DC for 97.7KHz.

10. Repeat Step 4.

11. Adjust L106 for a minimum voltage at TP102.

CAUTION

NEVER ALLOW THE VOLTAGE AT TP102 TO GO WITHIN .5 VOLTS OF NO INPUT SIGNAL LEVEL.

D. Preselector and Buffer Alignment

1. Connect a digital voltmeter to TP102.

2. Apply a 332.000MHz signal with sufficient input level to produce a .1 volt increase in IF AGC voltage at TP102.

3. Adjust L101, L102 and L103 for a maximum voltage at TP102.

4. Adjust L110 for maximum flag current at lowest possible input level.

E. RF AGC Adjustment

1. Connect a digital voltmeter to TP101.

2. Apply a 332.00MHz signal with 40% modulation by 90Hz and 40% modulation by 150Hz. Increase signal level until flag current drops 10ua (approx. 400uv hard). Reduce signal level by 6dB (1/2).

3. Adjust R127 until RF AGC voltage at TP101 drops 0.5 volts.

F. Converter Alignment

1. Apply a 332.00MHz signal with 40% modulation by 90Hz and 40% modulation by 150Hz at 700uv.

2. Set a 0dB tone ratio and adjust R153 for 0 ua on the deviation meter.

3. Adjust R149 for 300ua of flag current.

4. Due to interaction of controls, repeat Steps 2 and 3 until readings of both are correct.

5. Set a 2dB tone ratio with 150Hz predominant and observe deviation current to be +78ua ± 8ua. Set a 2dB tone ratio with 90Hz predominant and observe diviation current to be -78 ± 8ua.

6.2.4 GLIDESLOPE RECEIVER TEST DATA

The following specifications (*) are 100% checked. RF signal levels are specified with a 6dB, 50 ohm attenuator between the signal generator and receiver (hard uv).

A. Current drain at 13.75VDC_____ma (225 ma. MAX.)

Current drain at 27.50VDC_____ma (225 ma. MAX.)

B. Centering characteristic (±10ua max) with 0dB tone ratio

(329.15MHz)	RF Level	Centering Current
	100uv	_____ua
	700uv	_____ua
	5,000uv	_____ua
	10,000uv	_____ua

*(332.3MHz)	RF Level	Centering Current
	100uv	_____ua
	700uv	_____ua
	5,000uv	_____ua
	10,000uv	_____ua

(335.0MHz)	RF Level	Centering Current
	100uv	_____ua
	700uv	_____ua
	5,000uv	_____ua
	10,000uv	_____ua

C. Receiver Sensivity (20uv for 47ua Deviation)

Apply 700uv, 2dB tone ratio signal and reduce signal level until a 47ua deflection is obtained on the meter. Record RF signal level at the frequencies listed.

Channel	*90Hz	*150Hz
329.15MHz	_____uv	_____uv
329.90MHz	_____uv	_____uv
330.80MHz	_____uv	_____uv
331.40MHz	_____uv	_____uv
332.80MHz	_____uv	_____uv
333.20MHz	_____uv	_____uv
333.80MHz	_____uv	_____uv
334.10MHz	_____uv	_____uv
335.00MHz	_____uv	_____uv

D. Receiver Selectivity

Apply a signal at 332.0MHz with a 2dB tone ratio. Adjust the signal to provide 47ua deviation. Note this signal level, then increase 6dB. Increase frequency until 47ua deviation is again obtained. Record this frequency. Repeat the procedure for the lower 6dB frequency and the 60dB frequencies.

f_1	(Upper 6dB frequency)_____MHz	}	Not less than 27.7KHz
f^1	(Lower 6dB frequency)_____MHz	}	
f^2	(Upper 60dB frequency)_____MHz	}	Not greater than 122.3KHz
f^3	(Upper 60dB frequency)_____MHz	}	
f_4			

E. Deflection Characteristic (67ua to 89ua)

Apply 2dB tone ratio and vary RF signal level. Record deflection current.

RF Level	Deflection Current 90Hz/150Hz		
	329.15MHz	*332.3MHz	335.0MHz
100uv	_____ua/_____ua	_____ua/_____ua	_____ua/_____ua
10,000uv	_____ua/_____ua	_____ua/_____ua	_____ua/_____ua

F. Alarm Signal (332.30MHz)

Apply the conditions shown below and record the flag current. For 50% standard deflection, apply a 2dB tone ratio and reduce RF signal level to obtain 39ua deviation current. Record flag current.

Condition	Flag Current
RF OFF	_____ua (25ua max)
90 & 150Hz Mod OFF	_____ua (25ua max)
90Hz Mod OFF	_____ua (150ua max)
150Hz Mod OFF	_____ua (150ua max)
20% Mod of 90 and 150Hz	_____ua (150ua max)
50% Standard Deflection	_____ua (150ua max)
100uv RF	_____ua (275ua min)
700uv RF	_____ua (275ua min)
5,000uv RF	_____ua (275ua min)
30,000uv RF	_____ua (275ua min)

6.3 OVERHAUL

6.3.1 Overhaul information contained in this section includes inspection procedures, cleaning, and assembly/disassembly procedures

6.3.2 VISUAL INSPECTION

This section contains instructions to assist in determining, by inspection, the condition of the KN 75 assemblies. Defects resulting from wear, physical damage, deterioration, or other causes can be found by these inspection procedures. To aid inspection, detailed procedures are arranged in alphabectical order.

6.3.2.1 Chassis

Inspect the chasis for deformation, dents, punctures, badly worn surfaces, damaged connectors, damaged fastener devices, loose or missing hardware, component corrosion, and damage to the finish.

6.3.2.2 Connectors

Inspect connector for broken parts, deformed shells or clamps, and other irregularities. Inspect for cracked or broken insulation and for contacts that are broken, deformed, or out of alignment. Also, check for corroded or damaged plating on contacts and for loose, improperly soldered, broken or corroded terminal connections.

6.3.2.4 Capacitors, Fixed

Inspect capacitors for case damage, body damage, and cracked, broken or charred insulation. Check for loose, broken or improperly soldered connections.

6.3.2.5 Capacitors, Variable

Inspect trimmers for chipped and cracked bodies, damaged dielectrics and damaged contacts.

6.3.2.6 Covers and Shields

Inspect covers and shields for punctures, deep dents, and badly worn surfaces. Also, check for damaged fastener devices, corrosion, and damage to finish.

6.3.2.7 Fuse and Clips

Inspect for blown fuse and check clips for loose or corroded connection.

6.3.2.8 Insulators

Inspect all insulators for evidence of damage, such as broken or chipped edges, burned areas, and presence of foreign matter.

6.3.2.9 Jacks

Inspect all jacks for corrosion, rust, deformations, loose or broken parts, cracked insulation, bad contacts, or other irregularities.

6.3.2.10 Potentiometers

Inspect all potentiometers for evidence of damaged or loose terminals, cracked insulation or other irregularities.

6.3.2.11 Relay

Inspect enclosure for physical damage and contacts for improper alignment, damaged plating or corrosion.

6.3.2.12 RF Coils

Inspect all RF coils for broken leads, loose mountings, and loose improperly soldered, or broken terminal connections. Check for crushed, scratched, cut or charred windings. Inspect the windings, leads, terminals, and connections for corrosion or physical damage. Check for physical damage to forms and tuning slug adjustment screws.

6.3.2.13 Resistors, Fixed

Inspect the fixed resistors for cracked, broken, blistered, or charred bodies and loose, broken, or improperly soldered connections.

6.3.2.14 Terminal Connections Soldered

a. Inspect for cold-soldered or resin joints. These joints present a porous or dull, rough appearance. Check for strength of bond using the points of a tool.

b. Examine the terminals for excess solder, protrusions from the joint, pieces adhering to adjacent insulation, and particles lodged between joints, conductors, or other components.

c. Inspect for insufficient solder and unsoldered strands of wire protruding from conductor at the terminal. Check for insulation that is stripped back too far from the terminal.

d. Inspect for corrosion at the terminal.

6.3.2.15 Transformers

Inspect for signs of excessive heating, physical damage to case, cracked or broken insulation, and other abnormal conditions.

Inspect for corroded, poorly soldered, or loose connecting leads or terminals.

6.3.2.16 Wiring/Coaxial Cable

Inspect open and laced wiring of chassis, subassembly chassis, and parts of equipment for breaks in insulation, conductor breaks, cut or broken lacing and improper dress in relation to adjacent wiring or chassis.

6.3.3 CLEANING

A. Using a clean lint-free cloth lightly moistened with a mild cleaning detergent, remove foreign matter from the equipment case and unit front panels. Wipe dry using a clean, lint-free cloth.

B. Using a hand controlled dry air jet (not more than 15psi), blow the dust from inaccessible areas. Care should be taken to prevent damage by the air blast.

C. Clean the receptacle and plugs with a hand controlled dry air jet (not more than 25psi) and a clean lint-free cloth lightly moistened with an approved mild cleaning solvent. Wipe dry with a clean, dry, lint-free cloth.

6.3.4 DISASSEMBLY/ASSEMBLY PROCEDURES

6.3.4.1 Disassembly of the KN 75

a. Disconnect the KN 75 from its power source, channeling source and indicator by loosening the two capture screws on the female connector and removing the female connector from the card edge connector on the front of the receiver.

b. Disconnect the antenna coax connector from the receiver's BNC connector.

c. Remove the four corner 6-32 screws at rear plate, and the 4-40 in the center of the cover (See Figure 2-2, Page 2-5 of the KN 75 Installation Manual). The printed circuit board and the attached rear plate will now slide backward out of the cover.

d. The mixer, voltage controlled oscillator, and Mixer buffer coaxes are spot soldered in place. The preselector cover is sealed with solder on the front end. Heat and clean the solder spots and front end of the preselector to remove covers.

6.3.4.2 Assembly of the KN 75

a. Replace the covers on the preselector, voltage controlled oscillator and mixer buffer. Spot solder all in place and completely seal front end of the preselector with solder.

b. Slide the rear plate with attached printed circuit board into the cover.

c. Replace the four 6-32 screws in the rear plate and the 4-40 in the center of the cover.

NOTE

When the PC board is removed from the unit, a slight resistance will be felt. This is due to an interference fit caused by the head of a nylon screw rubbing against the chassis extrusion which ensures grounding at the end of the PC board to the chassis.

6.4 TROUBLESHOOTING

6.4.1 SEQUENCE CHART

If nothing is found defective under possible cause proceed to the next step.

SECTION	SYMPTOM	POSSIBLE CAUSE
Power Supply	+8.5V and +5.0V missing	An open or a short before I111. I111 and I112 both defective I111 only defective.
Power Supply	+8.5V incorrect voltage, but +5V correct	I111 defective R209 wrong value R210 wrong value
Power Supply	+5V. incorrect voltage but +8.5V correct	I112 defective
Converter	No deflection of deviation indicator with a 2dB tone ratio, but flag is out of view.	I103C-defective R167, R166, R165 or C151 defective CR101 or CR104 open C150 shorted
Converter	Single tone modulation doesn't produce less than 150ua flag current	Voltage at pin 5 of I103C not greater than pin 3 of I103D -I102B defective
Converter	Flag won't pull out of view with 2dB tone ratio, but deviation deflection is correct.	I103D faulty R168 wrong value CR109, or CR102 open.
Converter	Deviation indicator needle will not center on 0dB tone ratio as R153 is adjusted	More than 40% modulation of either 90Hz or 150Hz. R157, R156, or R154 wrong value C144, C145, or C147 wrong value.
Converter	No signal seen at TP104 with 0dB tone ratio	I103A defective C144 or C145 open R157, R155 or R152 faulty.
Converter	No signal seen at TP105 with 0dB tone ratio	I103B defective C146 or C147 open R158, R156, or R154 faulty
Converter	No signal seen at pin 7 I102A	I102A defective R149, R142 or R148 open.
Receiver Sensitivity	No signal seen at TP103 (90Hz and 150Hz composite signal)	Synthesizer unlocked (see synthesizer section) Input coax open or shorted Q109 defective.
Receiver Sensitivity	No 34KHz seen at collector of Q107	Q107 defective C141 open R133 or R134 wrong value
Receiver Sensitivity	Voltage at TP102 doesn't increase as input signal level is increased	I101 defective L104, L105 or L106 open
Receiver Sensitivity	Voltage at TP101 doesn't decrease as input signal level is increased.	Q101, Q102, Q103, Q104, or Q106 defective I102D defective

continued

SECTION	SYMPTOM	POSSIBLE CAUSE
Receiver Sensitivity	No change in voltage at TP101 with adjustment of R127	I102D defective R127 open
Frequency Synthesizer	Frequency at TP108 isn't 18.000867MHz or no signal	Y101 defective Q120 or Q119 defective C195 faulty
Frequency Synthesizer	Frequency at pin 11 of I109 isn't 75KHz.	I110, I109, or I105C defective
Frequency Synthesizer	Frequency at gate 2 of Q117 isn't the same as the frequency in Table 6-1.	C171, C172 or C168 wrong value CR111 defective Q111
Frequency Synthesizer	Frequency at TP107 isn't the same as Table 6-1 for frequency channeled or no signal.	Q117, Q120, Q118 or their associated circuitry is defective.
Frequency Synthesizer	The frequency of pin 13 of I106 isn't 75KHz	I106, I107, or I105 defective Improper code on programming inputs of I106 and I107. (See Table 6-2)
Frequency Synthesizer	Voltage at TP106 doesn't increase steadily as higher glideslope frequencies are channeled.	I104 or Q110 defective. L107 open
Channeling Logic	Level of pins 3-6 for I106 and I107 don't agree with Table 6-1.	Q121 or I108 defective
Channeling Logic	Level of pins 3-6 of I115 don't agree with Table 6-2 for the given inputs	I115 defective
Channeling Logic	The input pins of I115 don't agree with Table 6-2 for a given channel.	I113, I114 or Q122 defective Input connector is wired incorrectly
Channeling Logic	Level of pin 4 of I107 is wrong	Input connector is wired incorrectly I113, I114, I108 or I116 defective
Channeling Logic	Level of pin 3 of I107 is wrong	Q121 defective CR117 open. Input connector is wired incorrectly.

Should it be desired to break the synthesizer loop, disconnect C187 at the junction of C187, C173, R183, and Q111. A signal of the appropriate frequency can be injected through C187. Appropriate frequencies versus channel selection are listed in table 6-1.

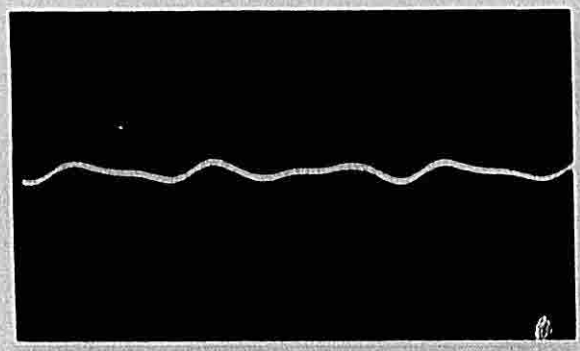
KING

KN 75
GLIDESLOPE RECEIVER

CHANNEL - 332.3MHz
0dB TONE RATIO
LEVEL - 700mv (HARD)

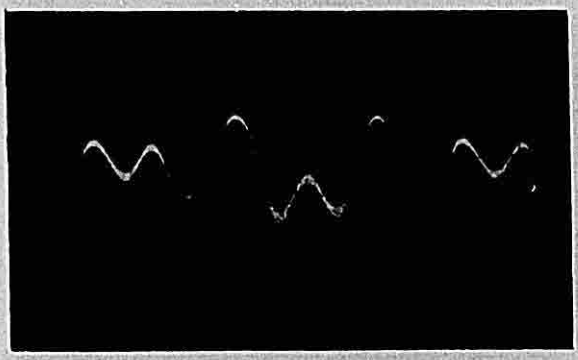
IF AGC

TP: 102
Vert: 50mv/Div
Horiz: 5ms/cm
Coupling: AC
Sync: Line



DETECTOR OUTPUT

TP: 103
Vert: 1V/Div
Horiz: 5ms/cm
Coupling: AC
Sync: Line



90Hz FILTER OUTPUT

TP: 104
Vert: 1V/Div
Horiz: 5ms/cm
Coupling: AC
Sync: Line

150Hz FILTER OUTPUT

TP: 105
Vert: 1V/Div
Horiz: 5ms/cm
Coupling: AC
Sync: Line

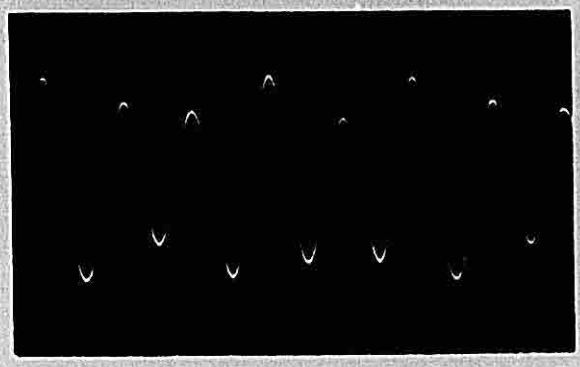


FIGURE 6-6A WAVEFORMS

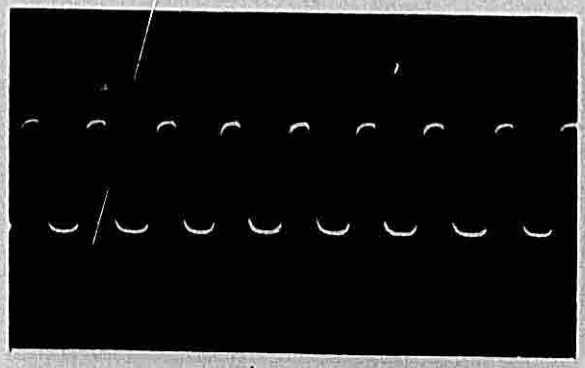
KING

KN 75
GLIDESLOPE RECEIVER

CHANNEL - 332.3
0dB TONE RATIO
LEVEL - 700mv (HARD)

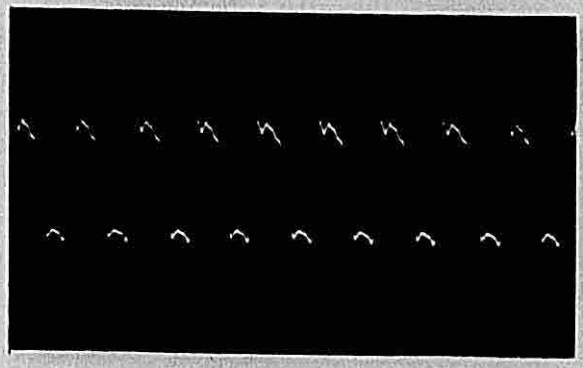
SQUARING AMP - VAR

TP: 107
Vert: 2V/Div
Horiz: .2μs/cm
Coupling: AC
Sync: Norm



SQUARING AMP-REF

TP: 108
Vert: 1V/Div
Horiz: .05μs/cm
Coupling: AC
Sync: Norm



REC MIXER OUTPUT

TP: 109
Vert: 50mv/Div
Horiz: .005μs/cm
Coupling: AC
Sync: Norm

IF OUTPUT

Pin 1,1101
Vert: 10mv/Div
Horiz: 5ms/cm
Coupling: AC
Sync: Line

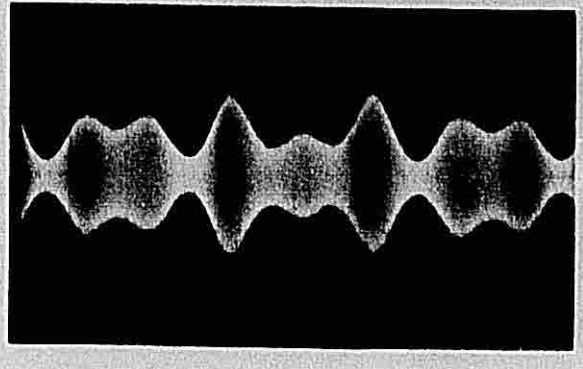


FIGURE 6-6B WAVEFORMS

KING

KN 75
GLIDESLOPE RECEIVER

CHANNEL - 332.3MHz
0dB TONE RATIO
LEVEL - 700mv (HARD)

PARALLEL ENABLE

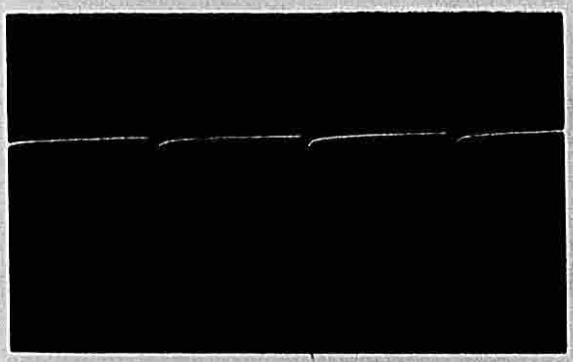
I105, Pin 6

Vert: 2V/Div

Horiz: 5μs/cm

Coupling: AC

Sync: Norm



REF FREQ

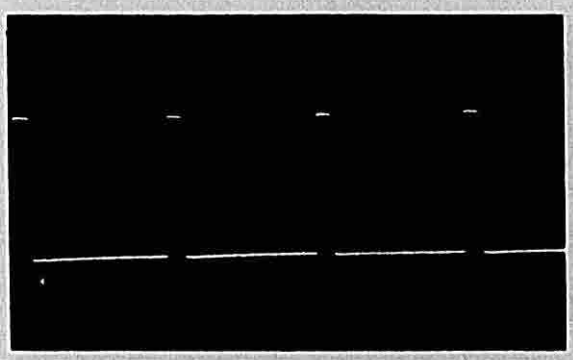
I109, Pin 11

Vert: 2V/Div

Horiz: 5μsec/cm

Coupling: AC

Sync: Norm



* REF FREQ

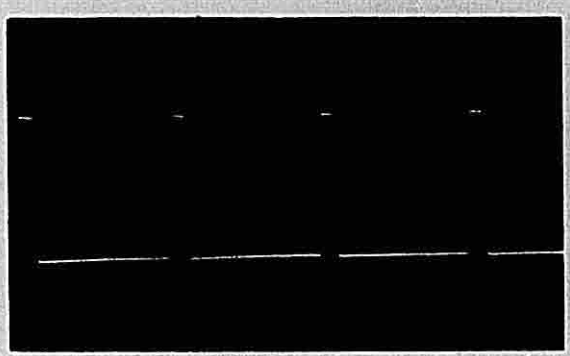
I115, pin 3, 5, & 6

Vert: 2V/Div

Horiz: 5μs/cm

Coupling: AC

Sync: Norm



*NOTE

0's of ROM output have narrow (1.9 to 3.9us width) 5V spikes causing a DC voltmeter to read .1V above ground.
ROM outputs don't change for 50KHz channeling.

FIGURE 6-6C WAVEFORMS

KING
KN 75
GLIDESLOPE RECEIVER

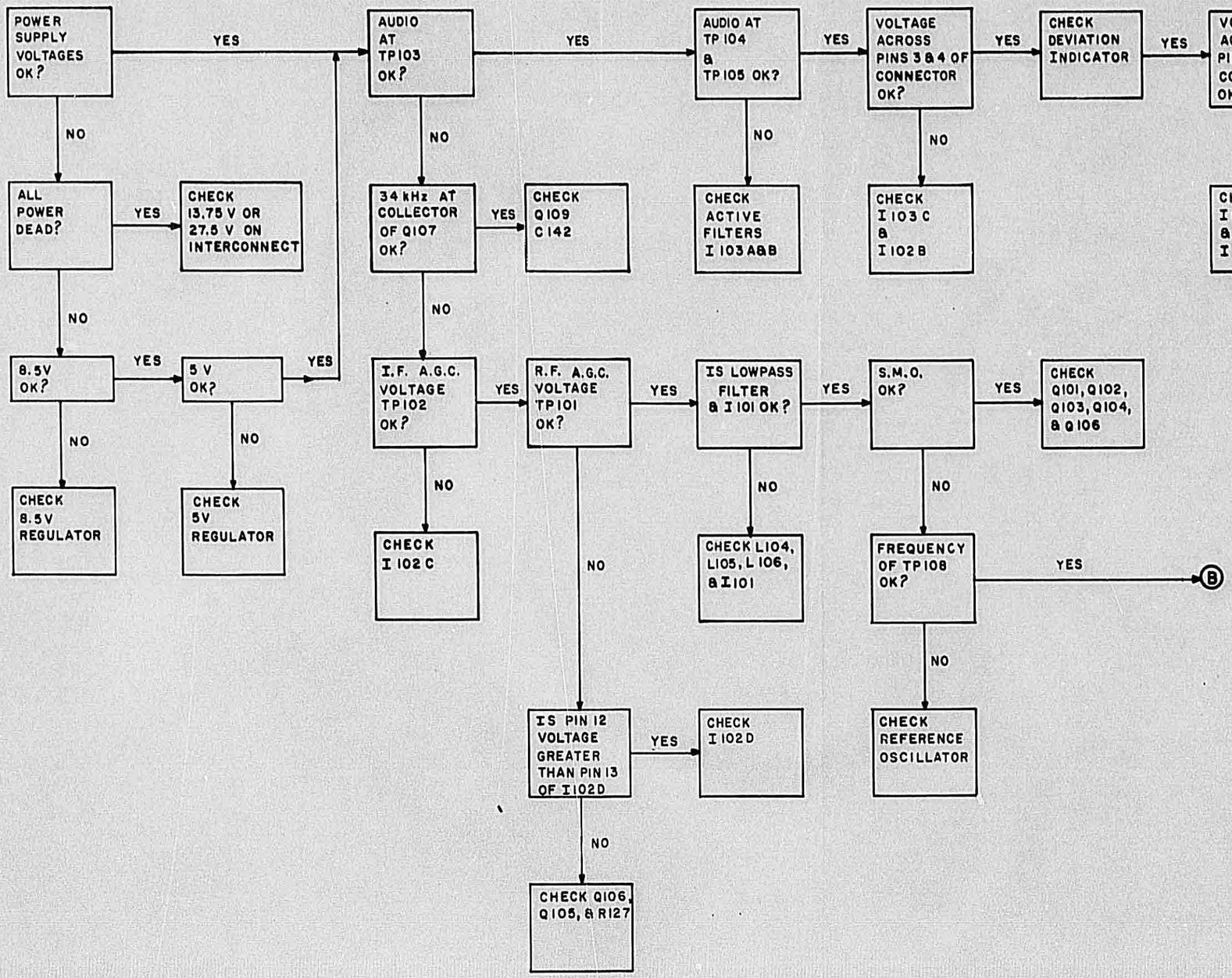


FIGURE 6-7A TROUBLESHOOTING FLOW CHART
(Dwg. No. 696-1554-00, R-0, Sheet 1 of 2)

KING
KN 75
GLIDESLOPE RECEIVER

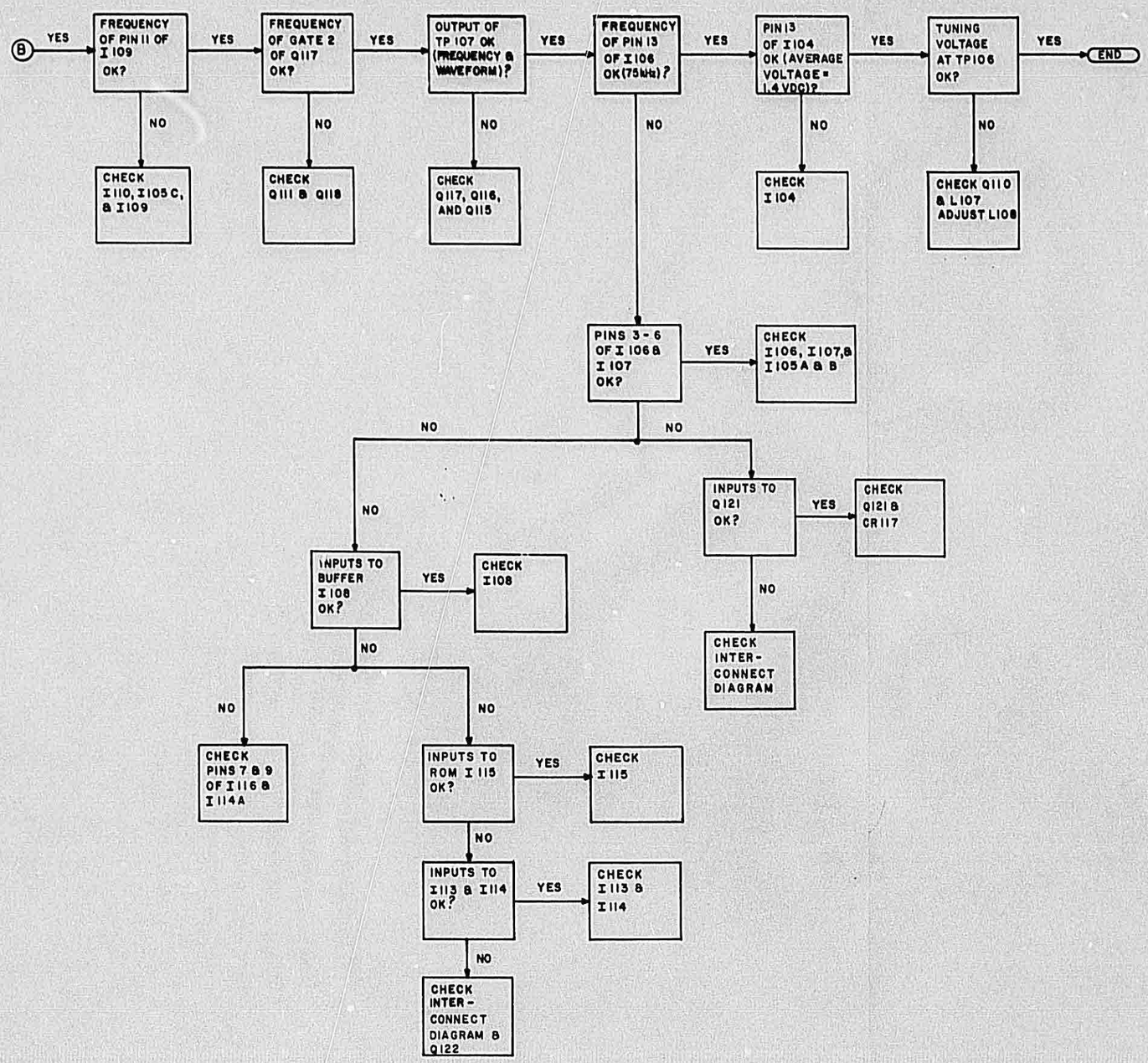


FIGURE 6-7B TROUBLESHOOTING FLOW CHART
(Dwg. No. 696-1554-00, R-0, Sheet 2 of 2)

Localizer Frequency (MHz)	Glideslope Frequency (MHz)	VCO Frequency (MHz)	SMO Mixer Frequency (TP107) (MHz)	Pin I107 3 4 5 6	Pin I106 3 4 5 6
108.10	334.70	167.333	5.3252	0 1 0 0	0 0 0 0
108.15	334.55	167.258	5.2502	1 1 0 0	0 0 0 0
108.30	334.10	167.033	5.0252	0 1 1 0	0 0 0 0
108.35	333.95	166.958	4.9502	1 1 1 0	0 0 0 0
108.50	329.90	164.933	2.9252	0 1 0 0	0 1 0 0
108.55	329.75	164.858	2.8502	1 1 0 0	0 1 0 0
108.70	330.50	165.233	3.2252	0 1 1 1	1 0 0 0
108.75	330.35	165.158	3.1502	1 1 1 1	1 0 0 0
108.90	329.30	164.633	2.6252	0 1 1 0	0 1 0 0
108.95	329.15	164.558	2.5502	1 1 1 0	0 1 0 0
109.10	331.40	165.683	3.6752	0 0 0 1	1 0 0 0
109.15	331.25	165.608	3.6002	1 0 0 1	1 0 0 0
109.30	332.00	165.983	3.9752	0 0 1 0	1 0 0 0
109.35	331.85	165.908	3.9002	1 0 1 0	1 0 0 0
109.50	332.60	166.283	4.2752	0 0 0 0	1 0 0 0
109.55	332.45	166.208	4.2002	1 0 0 0	1 0 0 0
109.70	333.20	166.583	4.5752	0 0 1 1	0 0 0 0
109.75	333.05	166.508	4.5002	1 0 1 1	0 0 0 0
109.90	333.80	166.883	4.8752	0 0 0 1	0 0 0 0
109.95	333.65	166.808	4.8002	1 0 0 1	0 0 0 0
110.10	334.40	167.183	5.1752	0 0 1 0	0 0 0 0
110.15	334.25	167.108	5.1002	1 0 1 0	0 0 0 0
110.30	335.00	167.483	5.4752	0 0 0 0	0 0 0 0
110.35	334.85	167.408	5.4002	1 0 0 0	0 0 0 0
110.50	329.60	164.783	2.7752	0 0 1 0	0 1 0 0
110.55	329.45	164.708	2.7002	1 0 1 0	0 1 0 0
110.70	330.20	165.083	3.0752	0 0 0 0	0 1 0 0
110.75	330.05	165.008	3.0002	1 0 0 0	0 1 0 0
110.90	330.80	165.383	3.3752	0 0 1 1	1 0 0 0
110.95	330.65	165.308	3.3002	1 0 1 1	1 0 0 0
111.10	331.70	165.833	3.8252	0 1 1 0	1 0 0 0
111.15	331.55	165.758	3.7502	1 1 1 0	1 0 0 0
111.30	332.30	166.133	4.1252	0 1 0 0	1 0 0 0
111.35	332.15	166.058	4.0502	1 1 0 0	1 0 0 0
111.50	332.90	166.433	4.4252	0 1 1 1	0 0 0 0
111.55	332.75	166.358	4.3502	1 1 1 1	0 0 0 0
111.70	333.50	166.733	4.7252	0 1 0 1	0 0 0 0
111.75	333.35	166.658	4.6502	1 1 0 1	0 0 0 0
111.90	331.10	165.553	3.5252	0 1 0 1	1 0 0 0
111.95	330.95	165.458	3.4502	1 1 0 1	1 0 0 0

TABLE 6-1 FREQUENCY CHART

1112

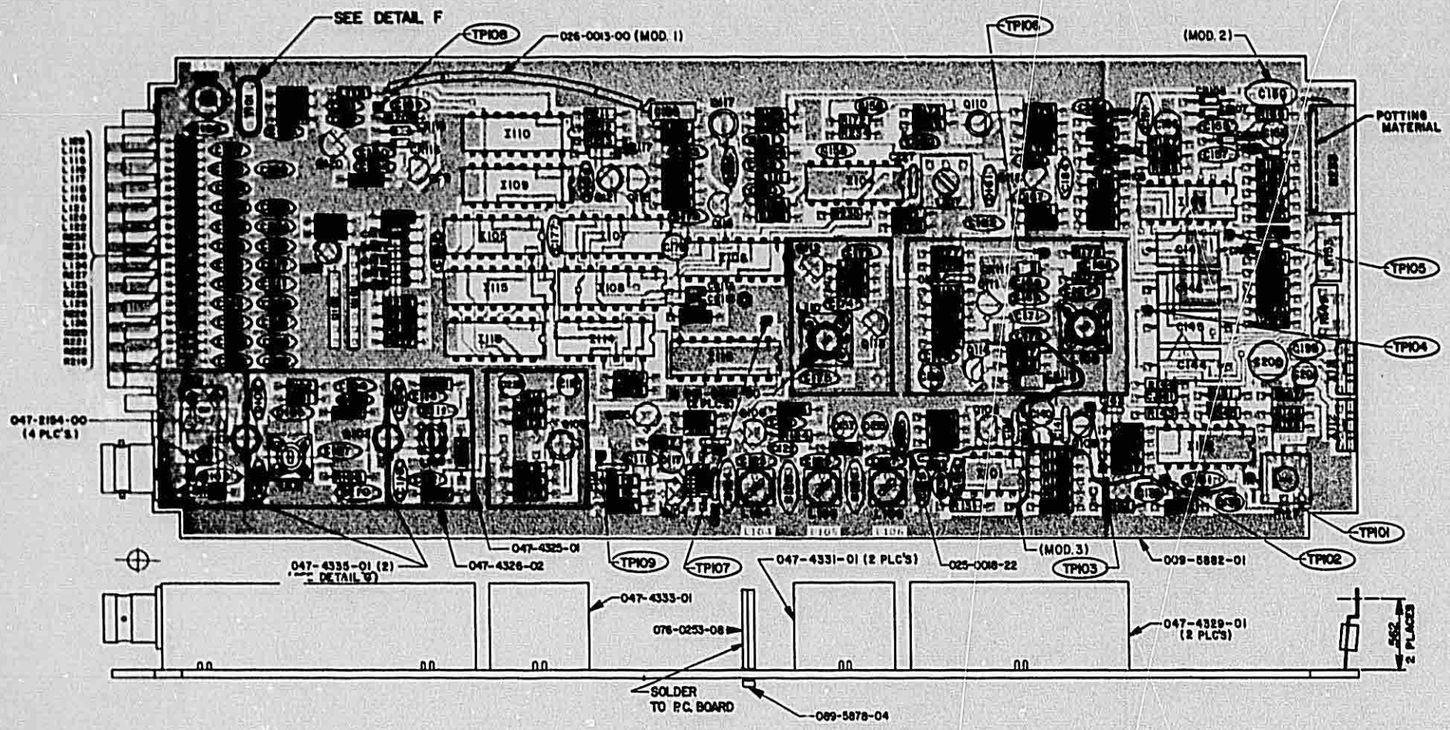
TABLE 6-2 FREQUENCY TO CODE

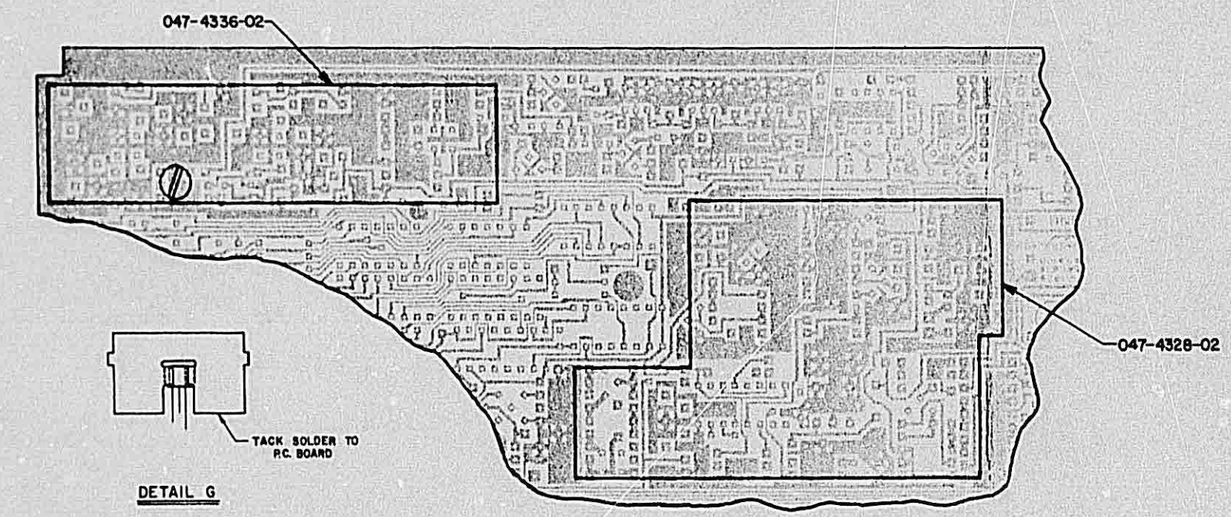
PINS / FREQ.	2 out of 5 15 14 7 9 10 11 12 13	KING 15 14 7 9 10 11 12 13	12 WIRE 15 14 7 9 10 11 12 13	BCD 15 14 7 9 10 11 12 13	ROM OUTPUT* 3 4 5 6
108.1	0 1 1 1 1 0 1 1	0 0 0 0 0 1 1 0	1 1 1 1 0 1 1 0	1 0 0 0 0 0 0 0	0 0 0 0
108.3	0 1 0 1 1 0 1 1	1 0 0 0 0 1 1 0	0 1 1 1 0 1 1 1	1 0 0 0 1 0 0 0	0 0 0 1
108.5	0 1 0 0 1 0 1 1	0 1 0 0 0 1 1 0	1 0 1 1 0 1 1 1	1 0 0 1 0 0 0 0	1 0 0 0
108.7	0 1 1 0 0 0 1 1	0 0 1 0 0 1 1 0	1 1 0 1 0 1 1 1	1 0 0 1 1 0 0 0	0 1 1 1
108.9	0 1 1 1 0 0 1 1				
108.9	0 1 1 1 0 0 1 1	0 0 0 1 0 1 1 0	1 1 1 0 0 1 1 1	1 0 1 0 0 0 0 0	1 0 0 1
109.1	0 0 1 1 1 0 1 1	0 0 0 0 1 0 1 0	1 1 1 1 1 0 1 0	1 1 0 0 0 0 0 0	0 1 1 0
109.3	0 0 0 1 1 0 1 1	1 0 0 0 1 0 1 0	0 1 1 1 1 1 1 0	1 1 0 0 1 0 0 0	0 1 0 1
109.5	0 0 0 0 1 0 1 1	0 1 0 0 1 0 1 0	1 0 1 1 1 1 1 0	1 1 0 1 0 0 0 0	0 1 0 0
109.7	0 0 1 0 0 0 1 1	0 0 1 0 1 0 1 0	1 1 0 1 1 1 1 0	1 1 0 1 1 0 0 0	0 0 1 1
109.9	0 0 1 1 0 0 1 1	0 0 0 1 1 0 1 0	1 1 1 0 1 1 1 0	1 1 1 0 0 0 0 0	0 0 1 0
110.1	0 0 1 1 1 0 0 1	0 0 0 0 1 1 1 0	0 1 1 1 1 1 1 1	0 0 0 0 1 0 0 0	0 0 0 0
110.3	0 0 0 1 1 0 0 1	1 0 0 0 1 1 1 0	0 1 1 1 1 1 1 1	0 0 0 1 0 0 0 0	0 0 0 0
110.5	0 0 0 0 1 0 0 1	0 1 0 0 1 1 1 0	1 0 1 1 1 1 1 1	0 0 0 1 0 00 0 0	1 0 0 1
110.7	0 0 1 0 0 0 0 1	0 0 1 0 1 1 1 0	1 1 0 1 1 1 1 1	0 0 0 1 1 0 0 0	1 0 0 0
110.9	0 0 1 1 0 0 0 1	0 0 0 1 1 1 1 0	1 1 1 0 1 1 1 1	0 0 1 0 0 0 0 0	0 1 1 1
111.1	0 1 1 1 1 0 0 1	0 0 0 0 1 1 0 0	1 1 1 1 0 0 1 0	0 1 0 0 0 0 0 0	0 1 0 1
111.3	0 1 0 1 1 0 0 1	1 0 0 0 1 1 0 0	0 1 1 1 0 1 1 0	0 1 0 0 1 0 0 0	0 1 0 0
111.5	0 1 0 0 1 0 0 1	0 1 0 0 1 1 0 0	1 0 1 1 0 1 1 0	0 1 0 1 0 0 0 0	0 0 1 1
111.7	0 1 1 0 0 0 0 1	0 0 1 0 1 1 0 0	1 1 0 1 0 1 1 0	0 1 0 1 1 0 0 0	0 0 1 0
111.9	0 1 1 1 0 0 0 1	0 0 0 1 1 1 0 0	1 1 1 0 0 1 1 0	0 1 1 0 0 0 0 0	0 1 1 0
111.95	0 1 1 1 0 0 0 1	0 0 0 1 1 1 0 0	1 1 1 0 0 1 1 0	0 1 1 0 0 0 0 0	0 1 1 0

*0's of ROM output have narrow (1.8 to 3.9us width) 5V spikes causing a DC voltmeter to read .1V above ground.

ROM outputs don't change for 50KHz channeling.

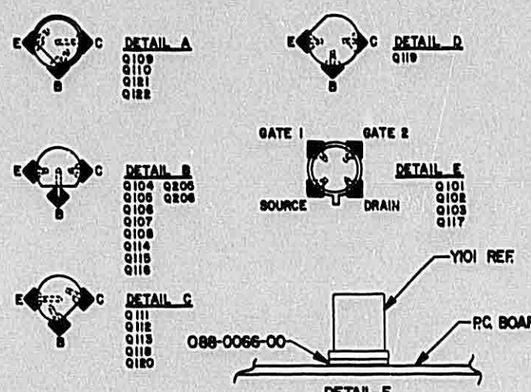
KING
KN 75
GLIDESLOPE RECEIVER





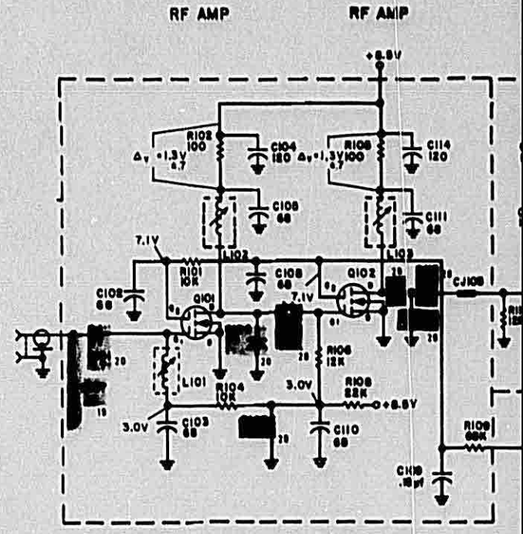
DETAIL G

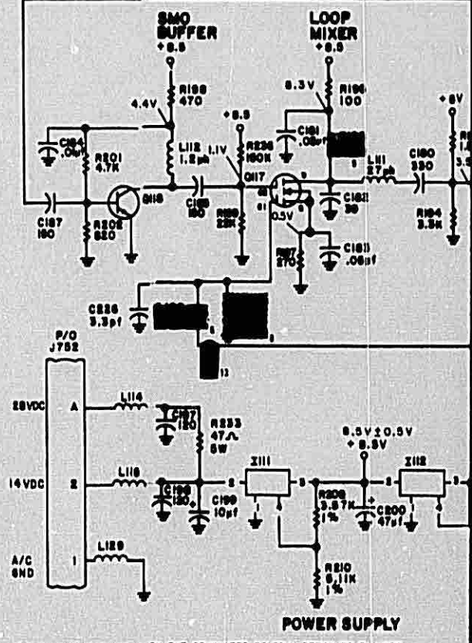
TOP VIEWS



NOTES

1. FOR COMPONENT VALUES SEE BILL OF MATERIAL 200-5882-00.
2. MASK VARIABLE RESISTORS R149, R153, R127 COILS L101, L102, L103, L104, L105, L106, L110, L108, AND P.C. BOARD EDGE CONNECTOR. MASK FOR 047-4336-02 & 047-4328-02 INSTALL AFTER POST COATING. THEN EVENLY SPRAY POST COATING 016-1040-00 TO BOTH SIDES OF THE BOARD.





THE BLUE SHADED AREAS IN THE SCHEMATIC DIAGRAM REFER TO CHANGES COVERING 200-5882-00 REVISION 7 THROUGH 20.

SEE BLOW UP FICHE NO. KR2176. ITEM C

FIGURE 6-8 PC BOARD ASSEMBLY AND SCHEMATIC
(Dwg. No. 300-5882-00, R-13)
(Dwg. No. 002-0444-00, R-11)

THE BLUE SHADED AREAS REFER TO CHANGES COVERING 200-5882-00 REVISION 7 THROUGH 20

REVISION NUMBERS BESIDE BLUE SHADED AREAS REFER TO REVISION LEVELS OF THE PC BOARD ASSEMBLY.

RF AMP

RF AMP

ACTIVE MIXER

IF AMP

IF FILTER

IF AMP

IF AMP

DETECTOR

COURSE WIDTH AMP

90 Hz FILTER

PEAK DETECTORS

DEVIATION BAR DRIVER

FLAG DRIVER

150 Hz FILTER

RF AGC AMP

RF AGC DETECTOR

IF AGC AMP

SMO BUFFER

LOOP MIXER

SQUARING AMP

PROGRAMMABLE DIVIDERS

PHASE DETECTOR

INTEGRATOR

VOLTAGE CONTROLLED OSCILLATOR

RECEIVER BUFFER

50 KHz SWITCH

POWER SUPPLY

REFERENCE OSCILLATOR

SQUARING AMP

REFERENCE DIVIDER

ROM

CHANNELLING LOGIC

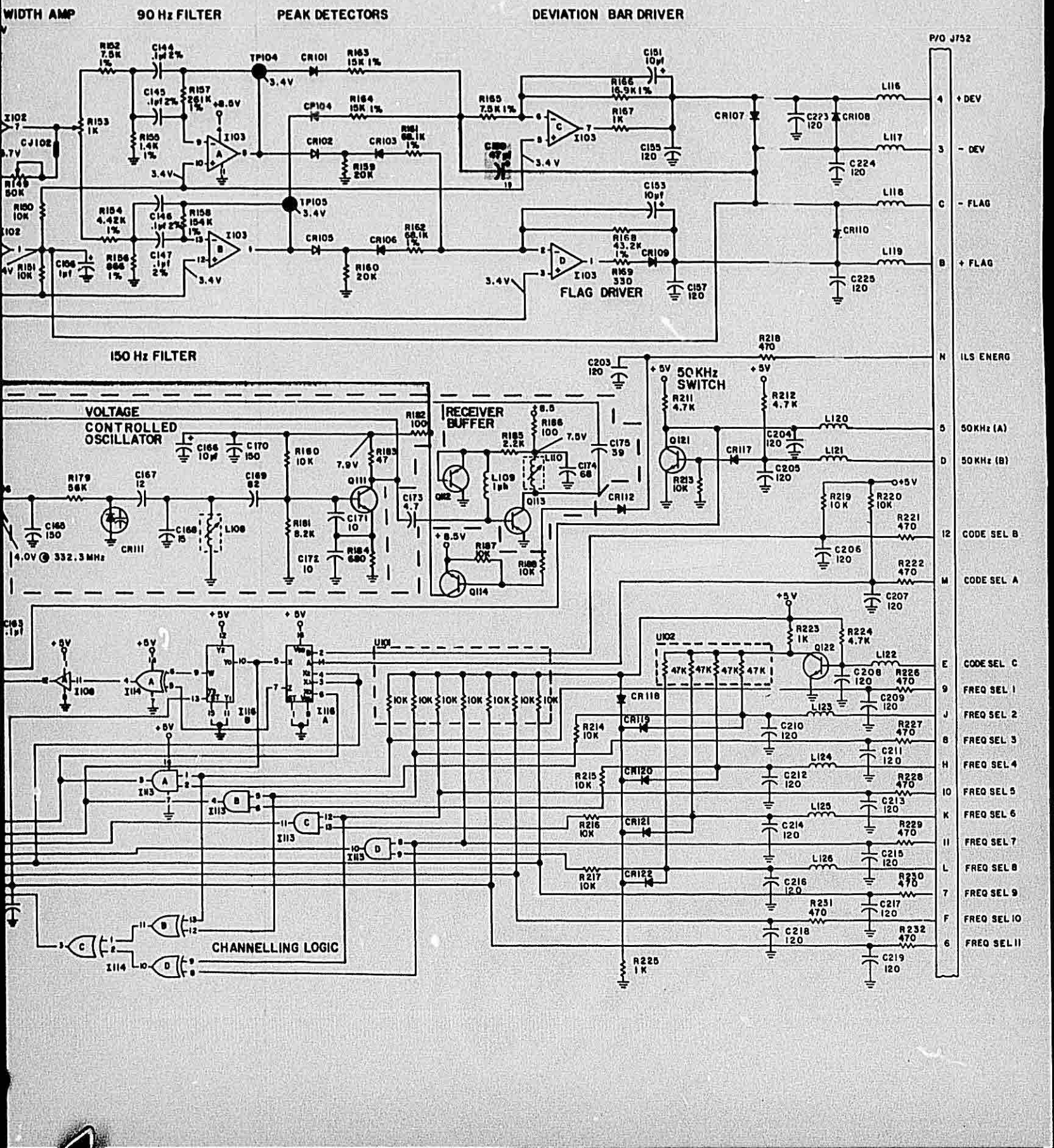
NOTE: ALL RESISTORS LISTED IN OHMS UNLESS OTHERWISE NOTED

ALL CAPACITORS LISTED IN PICOFARADS UNLESS OTHERWISE NOTED

THE BLUE SHADED AREAS IN THE SCHEMATIC DIAGRAM REFER TO CHANGES COVERING 200-5882-00 REVISION 7 THROUGH 20.

HANGES COVERING 200-5882-00 REVISION 7

DED AREAS REFER TO REVISION LEVELS OF THE



APPENDIX

APPENDIX "A"

SEMICONDUCTOR INTEGRATED CIRCUIT DATA

KING RADIO CORPORATION®
400 NORTH ROGERS ROAD
OLATHE, KANSAS, U.S.A.

KING

APPENDIX "A"

SEMICONDUCTOR AND INTEGRATED CIRCUIT DATA

TABLE OF CONTENTS

APPENDIX "A"

1.1 GENERAL

Due to the wide utilization of semiconductors in this electronic equipment, somewhat different techniques are necessary in maintenance procedures. In solid state circuits the impedances and resistances encountered are of much lower values than those encountered in vacuum-tube circuits. Therefore, a few ohms discrepancy can greatly affect the performance of the equipment. Also, coupling and filter capacitors are of larger values and usually are of the tantalum type. Hence, when measuring values of capacitors, an instrument accurate in the high ranges must be employed. Capicator polarity must be observed when measuring resistance. Usually more accurate measurements can be obtained if the semiconductors are removed or disconnected from the circuits.

1.1.1 SEMICONDUCTOR TEST EQUIPMENT

Damage to semiconductors by test equipment is usually the result of accidentally applying too much current or voltage to the elements. Common causes of damage from test equipment are discussed in the following paragraph.

(1) Transformerless Power Supplies. Test equipment with transformerless power supplies is one source of high current. However, this type of test equipment can be used by employing an isolation transformer in the AC power line.

(2) Line Filter. It is still possible to damage semiconductors from line current, even though the test equipment has a power transformer in the power supply, if the test equipment is provided with a line filter. This filter may function as a voltage divider and apply half voltage to the smiconductor. To eliminate this condition, connect a ground wire from the chassis fo the test equipment to the chassis of the equipment under test before making any other connections.

(3) Low-Sensitivity Multimeters. Another cause of semiconductor damage is a multimeter that requires excessive current to provide adequate indications. Multimeters with sensitivities of less than 20,000 ohms-per-volt should not be used on semiconductors. When in doubt as to the amount of current supplied by a multimeter, check the multimeter circuits on all scales with an external, low-resistnace multimeter connected in series with the multimeter leads. If more than one multiampere is drawn on any range, this range cannot be safely used on small semiconductors.

(4) Power Supply. When using a battery-type power supply, always use fresh batteries of the proper value. Make certain that the polarity of the power supply is correct for the equipment under test. Do not use power supplies having poor voltage regulation.

1.1.2 SEMICONDUCTOR VOLTAGE AND RESISTANCE MEASUREMENTS

When measuring voltage or resistance in circuits containing semiconductor devices, remember that these components are polarity and voltage conscious. Since the values of capacitors used in semiconductor circuits are usually large, time is required to charge these capacitors when they appear. Thus, any reading obtained is subject to error if sufficient time is not allowed for the capacitor to fully charge. When in doubt it may be best in some cases to isolate the components in question and measure them individually.

1.1.3 TESTING OF TRANSISTORS

A transistor checker should be used to properly evaluate transistors. If a transistor tester is not available, a good multimeter may be used. Make sure that the multimeter meets the requirements outlined in the preceding paragraph.

(1) PNP Transistor. To check a PNP transistor, connect the positive lead of the multimeter to the base of the transistor and the negative lead to the emitter or collector. Generally, a resistance reading of 50,000 ohms or more should be obtained. Reconnect the multimeter with the negative lead to the base. With the positive lead connected to the emitter or collector a resistance value of 500 ohms or less should be obtained.

(2) NPN Transistor. Similar tests made on an NPN transistor should produce the following results:

With the negative lead of the multimeter connected to the base of the transistor the value of resistance between the base and the collector or emitter should be high. With the positive lead of the multimeter connected to the base, the value of resistance between the base and the collector or emitter should be low. If these results are not obtained, the transistor is probably defective and should be replaced.

CAUTION

IF A TRANSISTOR IS FOUND TO BE DEFECTIVE, MAKE CERTAIN THAT THE CIRCUIT IS IN GOOD OPERATING ORDER BEFORE INSTALLING A REPLACEMENT TRANSISTOR. IF A SHORT CIRCUIT EXISTS IN THE CIRCUIT, PUTTING IN ANOTHER TRANSISTOR WILL MOST LIKELY RESULT IN BURNING OUT THE NEW COMPONENT. DO NOT DEPEND UPON FUSES TO PROTECT TRANSISTORS.

(3) Always check the value of the bias resistors in series with the various elements. A transistor is very sensitive to improper bias voltage; therefore, a short or open circuit in the bias resistors may damage the transistor.

1.1.4 REPLACING SEMICONDUCTORS

Never remove or replace a semiconductor with the supply voltage turned on. Transients thus produced may damage the semiconductor or others remaining in the circuit. If a semiconductor is to be evaluated in an external test circuit, be sure that no more voltage is applied to the semiconductor than normally is used in the circuit from which it came.

(1) Use only a low heat soldering iron when installing or removing soldered-in semiconductor. Grasp the lead to which heat is applied between the solder joint and the semiconductor with long nosed pliers.

This will dissipate some of the heat that would otherwise conduct into the semiconductor from the soldering iron. Make certain that all wires soldered to semiconductor terminals have first been properly tinned so that the necessary connection can be made quickly. Excessive heat will permanently damage a semiconductor.

(2) In some cases, power transistors are mounted on heat-sinks that are designed to dissipate heat away from them. In some power circuits, the transistor must also be insulated from ground. This insulating is accomplished by means of an insulating washer made of mica. When replacing transistors mounted in this manner, be sure that the insulating washers are replaced in proper order. After the transistor is mounted, and before making any connections, check from the case of the transistor to ground with a multimeter to see that the insulation is effective.

1.2 INTEGRATED CIRCUIT MAINTENANCE

1.2.1 GENERAL

A knowledge of integrated circuit fundamentals is as necessary in testing digital logic circuits involving I.C.'s as a knowledge of rectification fundamentals is needed to test a power supply.

1.2.2 TERMINOLOGY

Several terms are used whenever logic circuits are discussed:

(1) A logic state is defined as a high or low level voltage applied to the input or seen at the output of a device. A high level voltage is called a logic "1". A low level voltage is called a logic "0". Logic threshold voltage of a device is the input voltage required at an input to change the output state.

(2) A truth table is a list of input logic states that will yield certain output logic states. A digital logic element should be thought of as a circuit element with its output level being either HI or LO as programmed by the levels present on its inputs.

A logic element may be tested by verifying that it is performing per the Truth Table of that logic element.

(3) Logic elements which have multiple inputs and a single output are known as gates. The OR gate produces a HI output when one or more of the inputs are HI. With all inputs LO, the output is LO. The AND gate produces a HI output only when all inputs are HI. When any input is LO the output is LO. A small circle at the output of a gate on the schematics indicates "negation", which means that the sense of the gate logic is reversed. An OR gate with negation is called a NOR gate and an AND gate with negation is called a NAND gate. A NOR gate produces a LO output when one or more of the inputs are HI and a NAND gate produces a LO output only when all inputs are HI.

(4) The Flip-Flop logic element is the basic data storage element of digital logic. It has two outputs that are always at opposite logic levels. That is, when one output is HI the other is LO. The Flip-Flop will remain in a particular state until that state is changed by an input signal.

The operation of these Flip-Flops is controlled by the signals on their inputs, and is best understood by a careful study of their Truth Tables. It should be kept in mind that the small circle on either the input of the output indicates negation. Also, a circle on a clock input indicates that a HI to LO transition causes the Flip-Flop to function.

(5) Besides the gates and Flip-Flops, two other commonly used logic elements are inverters and expanders. Inverters are merely switching transistors such that if a logic "1" is the input to a device, a logic "0" will be the output and vice versa. An expander is a set of parallel switching transistors that depends upon another resistor to provide their supply voltage. Generally, these devices are used to expand the number of inputs available to a standard gate.

1.2.3 INTEGRATED CIRCUIT TEST EQUIPMENT

As with semiconductors, damage to integrated circuits by test equipment is usually the result of applying too much current or voltage to the elements. The same precautions as discussed in paragraph 1.1.1 apply here.

1.2.4 VOLTAGE MEASUREMENTS

Precise voltage measurements are not needed in testing digital I.C.'s other than to see that the voltage is a HI or a LO level. An oscilloscope is needed where the input levels are of short duration, either HI or LO. For instance, if a 10 microsecond pulse going from LO to HI was applied to one input of a NOR gate, while the other input stayed LO, the output would go LO for 10 microseconds and then return HI. This, of course, could not be seen without an oscilloscope.

1.2.5 TESTING INTEGRATED CIRCUITS

The fully loaded guaranteed minimum high and maximum low for the digital logic output levels are:

TTL (V_{CC} = +5V)		ECL (V_{CC} = +5.2V)	
High	Low	High	Low
2.4	0.5	4.25	3.48

The minimum high and maximum low input levels which are guaranteed to be correctly interpreted are:

TTL (V_{CC} = +5V)		ECL (V_{CC} = +5.2V)	
High	Low	High	Low
2.0	0.8	4.06	3.75

KING

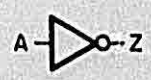
APPENDIX "A"

FIGURE 1. BUFFER

$Z = A$

A	Z
0	0
1	1

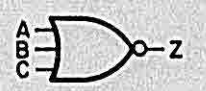
FIGURE 2. INVERTER



$Z = \overline{A}$

A	Z
0	1
1	0

FIGURE 3. NOR GATE



$Z = \overline{A+B+C}$

A	B	C	Z
0	0	0	1
1	0	0	0
0	1	0	0
1	1	0	0
0	0	1	0
1	0	1	0
0	1	1	0
1	1	1	0

FIGURE 4. NAND GATE

$Z = \overline{ABC}$

A	B	C	Z
0	0	0	1
1	0	0	1
0	1	0	1
1	1	0	1
0	0	1	1
1	0	1	1
0	1	1	1
1	1	1	0

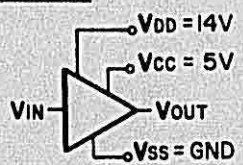
FIGURE 5. EXCLUSIVE OR GATE

$Z = A \oplus B$

A	B	Z
0	0	0
1	0	1
0	1	1
1	1	0

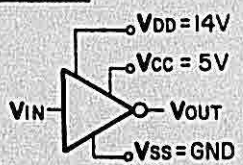
FIGURE 6. TTL TO CMOS VOLTAGE LEVEL TRANSLATORS

BUFFER



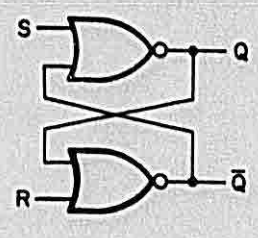
VIN	0V	14V
VOUT	0V	5V

INVERTER



VIN	0V	14V
VOUT	5V	0V

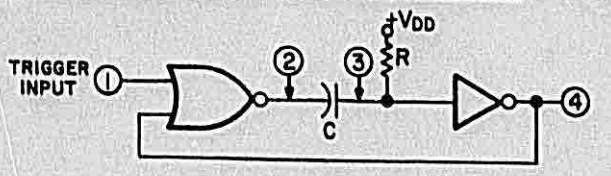
FIGURE 7. NOR GATE FLIP-FLOP



S	R	Next Q	$\overline{Q}$
1	1	0	0
0	1	1	0
0	0	NC	NC
1	0	0	1

NC = NO CHANGE

FIGURE 8. MONOSTABLE MULTIVIBRATOR (ONE-SHOT)



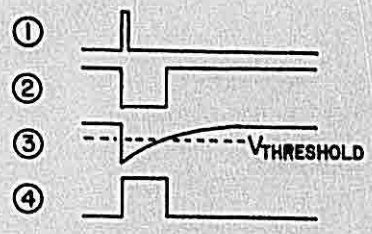
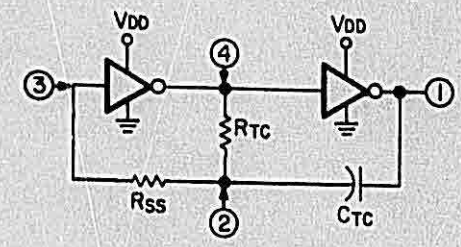
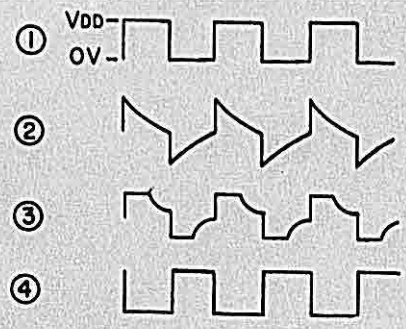


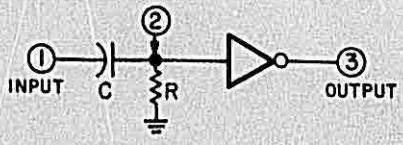
FIGURE 9. ASTABLE MULTIVIBRATOR (FREE-RUNNING)

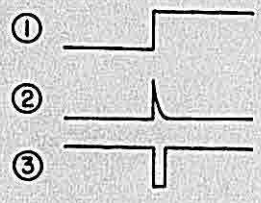




FREQUENCY OF OPERATION IS DETERMINED BY R_{TC} AND C_{TC}.
A NOR OR NAND GATE MAY BE USED IN PLACE OF THE FIRST INVERTER TO PERMIT GATING OF THE MULTIVIBRATOR.

FIGURE 10. DIFFERENTIATOR





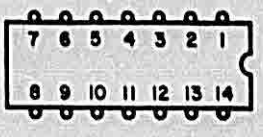
OFTEN USED TO CHANGE A STEP SIGNAL TO A SHORT PULSE SIGNAL.

APPENDIX "A"

INTEGRATED CIRCUIT PIN LOCATION DIAGRAMS

(Viewed From TOP of IC)

(1)



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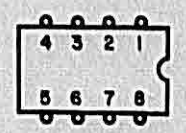

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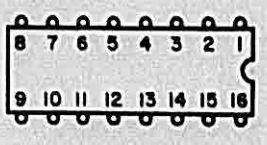

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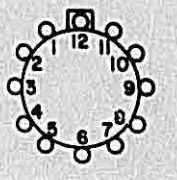

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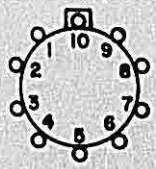
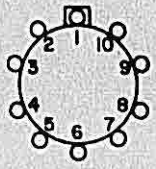


(5)



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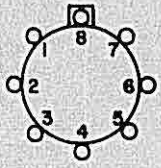
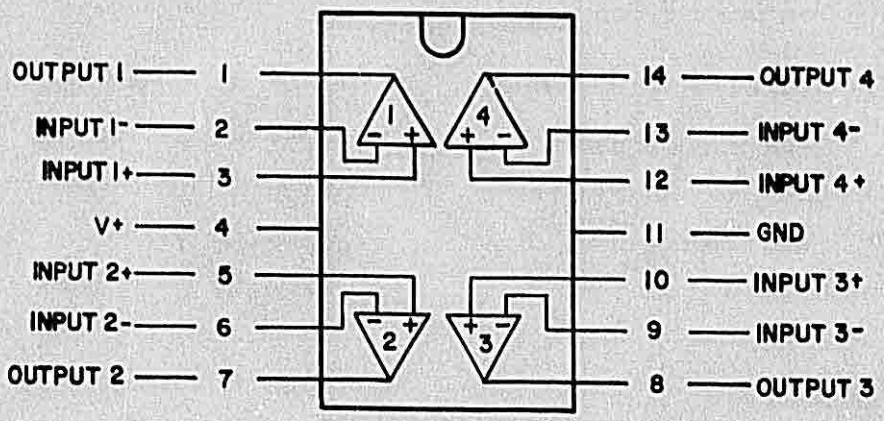


LM224 QUAD OPERATIONAL AMPLIFIER

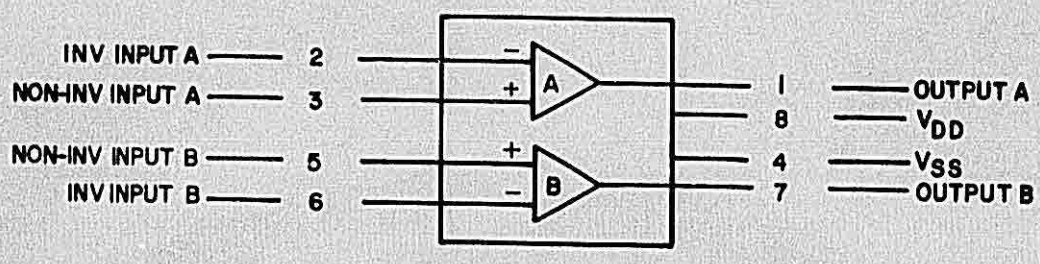
The LM 224 consists of four independent, high gain, internally frequency compensation operational amplifiers which were designed specifically to operate from a sinfle power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain in independent of the magnitude of the power supply voltage.

In the linear mode the input common-mode voltage range includes ground and the output voltage can also swing to ground, even though from only a single power supply voltage.



LM1558G DUAL OPERATIONAL AMPLIFIER

The LM1558G operational amplifier is designed for use as a summing amplifier, integrator, or amplifier with operating characteristics as a function of the external feedback components.

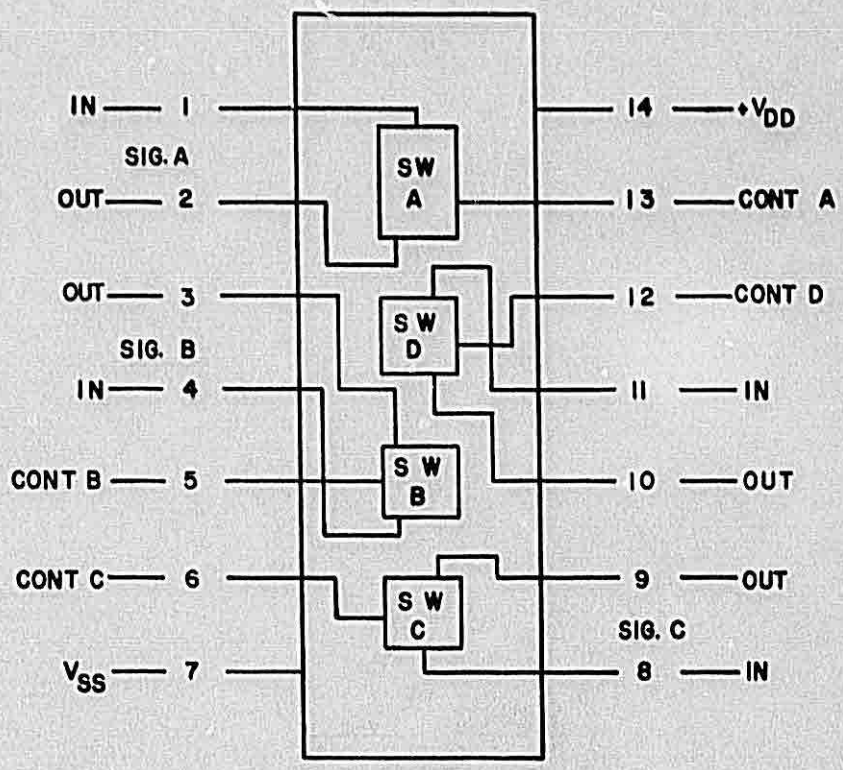


CD4016 QUAD BILATERAL SWITCH

NORMAL OPERATION:

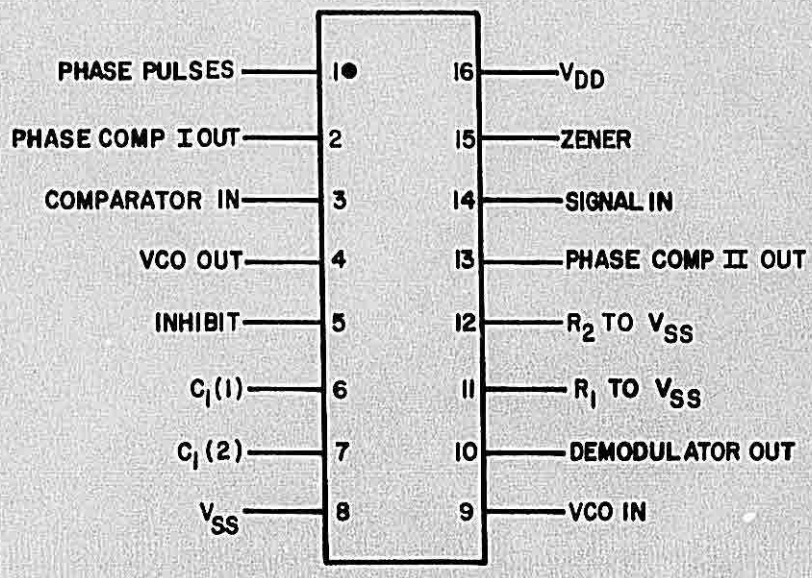
Control-Line Biasing

Switch "ON" : VC"1" = VDD
Switch "OFF" : VC"O" = VSS



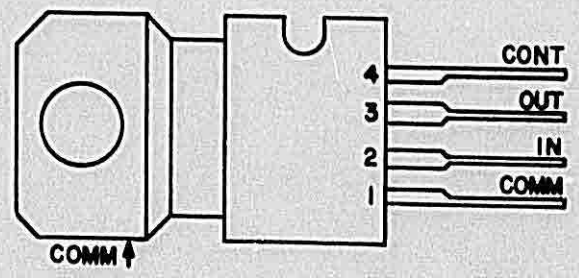
CD4046 PHASE-LOCKED LOOP

The CD4046 COS/MOS Micropower Phase-Locked Loop consists of a low-power. linear voltage-controlled oscillator (VCO) and two different phase comparators having a common signal-input amplifier and a common comparator input.
The VCO required one external capacitor C1 and one or two external resistors (R1 or R1 and R2). Resistor R1 and capacitorC1 determine the frequency range of the VCO and resistor R2 enables the VCO to have a frequency offset if required.
A logic O on the INHIBIT input "enables" the VCO and the source follower, while a logic 1 "turns off" both to minimize stand-by power consumption.

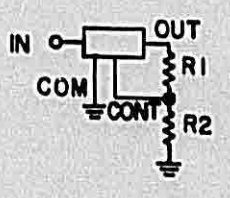


uA78MG ADJUSTABLE VOLTAGE REGULATOR

The 78MG is a selfcontained series pass voltage regulator which contains short circuit protection and thermal overload protection. By connecting a voltage divider between the output pin (3) and the control pin (4) and the common pin (1) the output voltage can be adjusted.



$$V_{OUT} = 5.0 \frac{(R1+R2)}{R2}$$

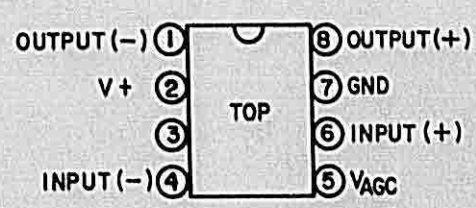


MC 1350 IF AMPLIFIER

GENERAL OPERATING INFORMATION

The input amplifiers (Q1 and A2) operate at constant emitter currents so that input impedance remains independent of AGC action. Input signals may be applied single-ended or differentially (for AC) with identical results. Terminals 4 and 6 may be driven from a transformer, but a DC path from either terminal to ground is not permitted.

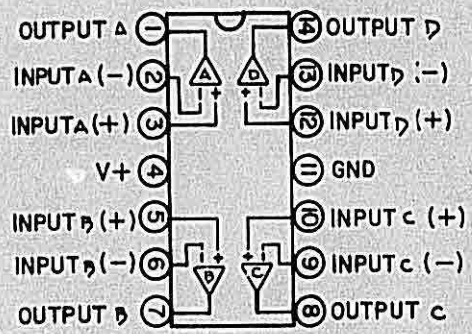
AGC actions occurs as a result of an increasing voltage on the base of Q4 and A5 causing these transistors to conduct more heavily thereby shunting signal current from the interstage amplifiers Q3 and A6. The output amplifiers are supplied from an active current source to maintain constant quiescent bias thereby holding output admittance nearly constant. Collector voltage for the output amplifier must be supplied through a center-tapped tuning coil to Pins 1 and 8. The 12-volt supply (V^{+}) at Pin 2 may be used for this purpose, but output admittance remains more nearly constant if a separate 15-volt supply (V^{++}) is used, because the base voltage on the output amplifier varies with AGC bias.



LM 324N QUAD OP AMPLIFIER

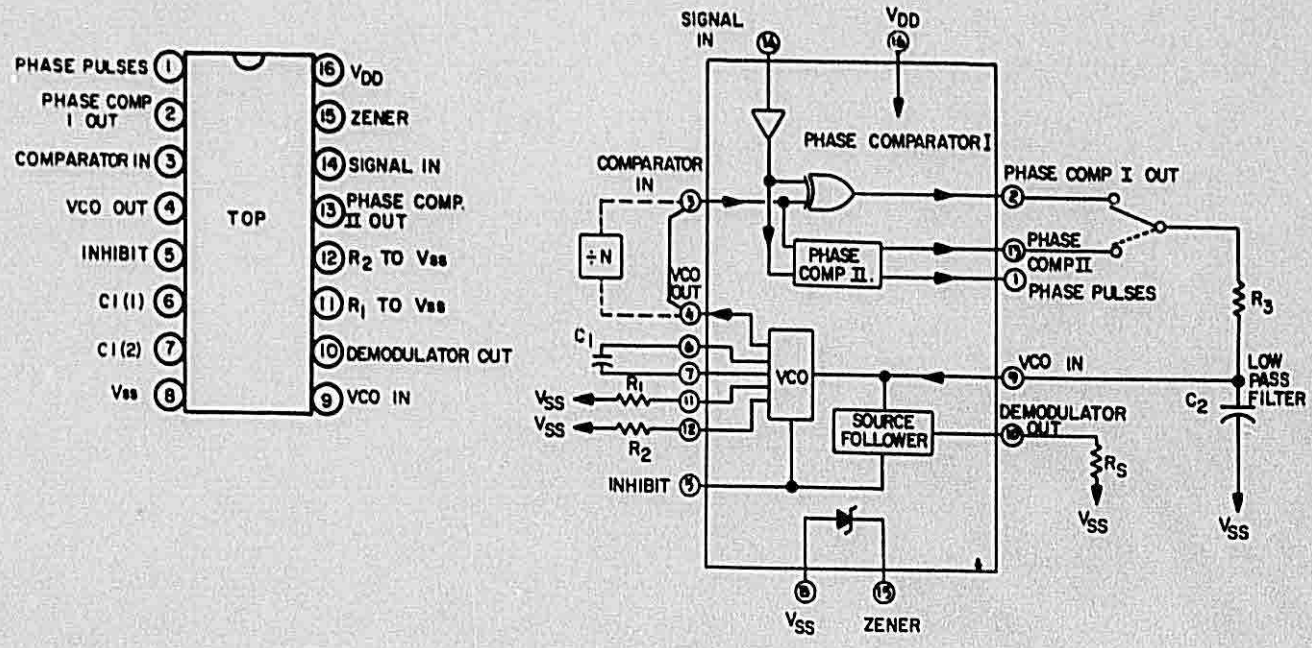
DESCRIPTION

The LM 324N series consists of four independent, high gain, internally frequency compensated operational amplifiers designed specifically to operate from a single power supply over a wide range of voltages. Operation from dual power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

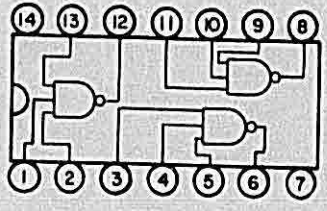


SCL 4046 AC+ (Package #2)

The SCL 4046 ABC+ COS/MOS Micropower Phase-Locked Loop (PLL) consists of a low power, linear voltage controlled oscillator (VCO) and two different phase comparators having a common signal input. A 5.2V zener diode is provided for supply regulation if necessary.



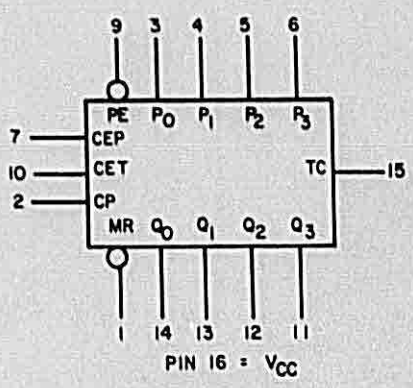
SN 7410 TRIPLE 3-INPUT NAND GATE

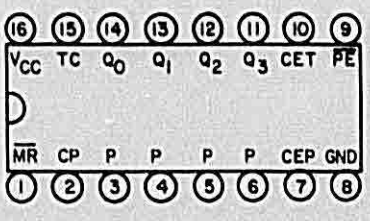


93L10, 93L16, 74LS163 HIGH SPEED COUNTERS

DESCRIPTION

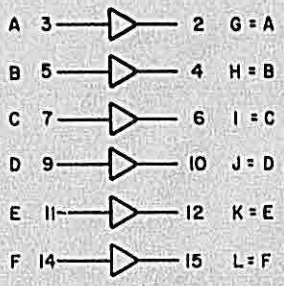
The 93L10 is a High Speed Synchronous BCD Decade Counter and the 93L16 is a High Speed Synchronous 4-Bit Binary Counter. They are synchronously presetable, multifunctional MSI building blocks useful in a large number of counting, digital integration and conversion applications. Several stages of synchronous operation are obtainable with no external gating packages required through an internal carry lookahead counting technique.



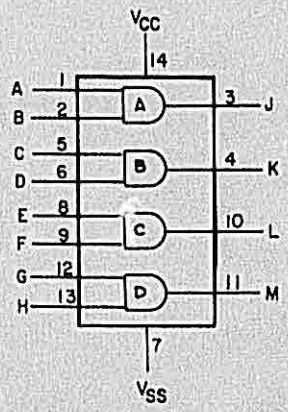


4050 NON-INVERTING HEX BUFFER (Package #2)

This device is a non-inverting hex buffer featuring logic-level conversion using only one supply voltage of +15VDC. The input-signal high level (V_{IH}) can exceed the supply voltage when the device is used for logic-level conversion

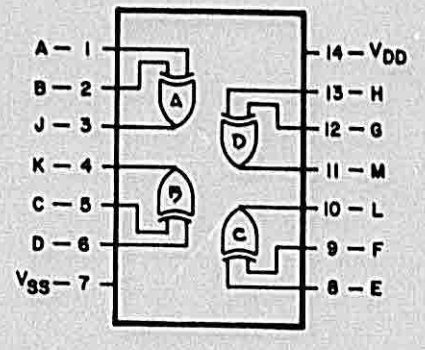


SCL 4081 AC+ QUAD 2 INPUT AND GATE



SCL 4030 AC+ COS/MOS QUAD EXCLUSIVE-OR GATE (Package #1)

The SCL 4030A types consist of four independent Exclusive-OR gates integrated on a single monolithic silicon chip. Each Exclusive-OR gate consists of four n-channel and four p-channel enhancement-type transistors. All inputs and outputs are protected against electrostatic effects.



TRUTH TABLE FOR ONE OF FOUR IDENTICAL GATES

A	B	J
0	0	0
1	0	1
0	1	1
1	1	0

WHERE "1" = HIGH LEVEL
"0" = LOW LEVEL

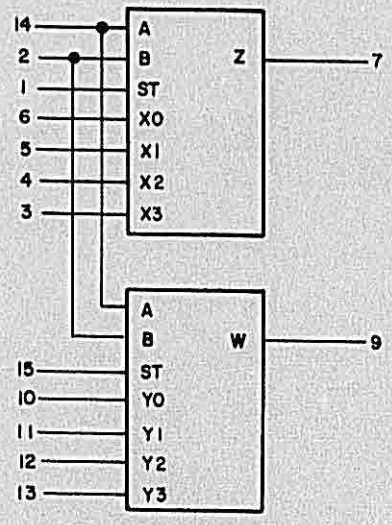
MC 14539 BAL DUAL 4-CHANNEL DATA SELECTOR MULTIPLEXER (Package #1)

DUAL 4-CHANNEL DATA SELECTOR/MULTIPLEXER

The MC1439B data selector/multiplexer is constructed with MOS P-channel and N-channel enhancement mode devices in a single monolithic structure. The circuit consists of two sections of four inputs each. One input from each section is selected by the address inputs A and B. A "high" on the Strobe input will cause the output to remain "low".

This device finds primary application in signal multiplexing functions. It permits multiplexing from N-lines to 1-line, and can also perform parallel-to-serial conversion. The Strobe input allows cascading of n-lines to n-lines.

BLOCK DIAGRAM



V_{DD} = PIN 16
V_{SS} = PIN 8

TRUTH TABLE

ADDRESS INPUTS		DATA INPUTS					
		X3	X2	X1	XO		OUTPUTS
B	A	Y3	Y2	Y1	YO	ST,S1	Z,W
X	X	X	X	X	X	1	0
0	0	X	X	X	0	0	0
0	0	X	X	X	1	0	1
0	1	X	X	0	X	0	0
0	1	X	X	1	X	0	1
1	0	X	0	X	X	0	0
1	0	X	1	X	X	0	1
1	1	0	X	X	X	0	0
1	1	1	X	X	X	0	1

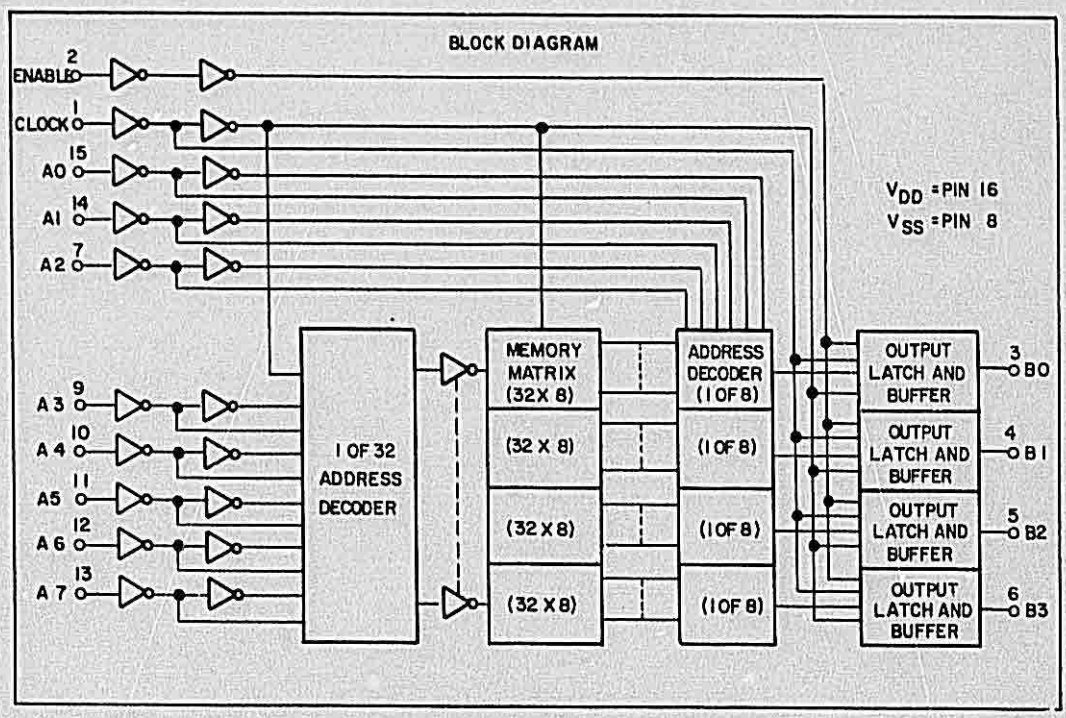
X = Doesn't Care

MCM 14524 ROM (Package #2)

Package may be ceramic or epoxy.

General description of the device.

--Read-Only-Memory
--256 x 4-Bit matrix
--Parallel address, Parallel output
--Latched output with reset (enable) capability



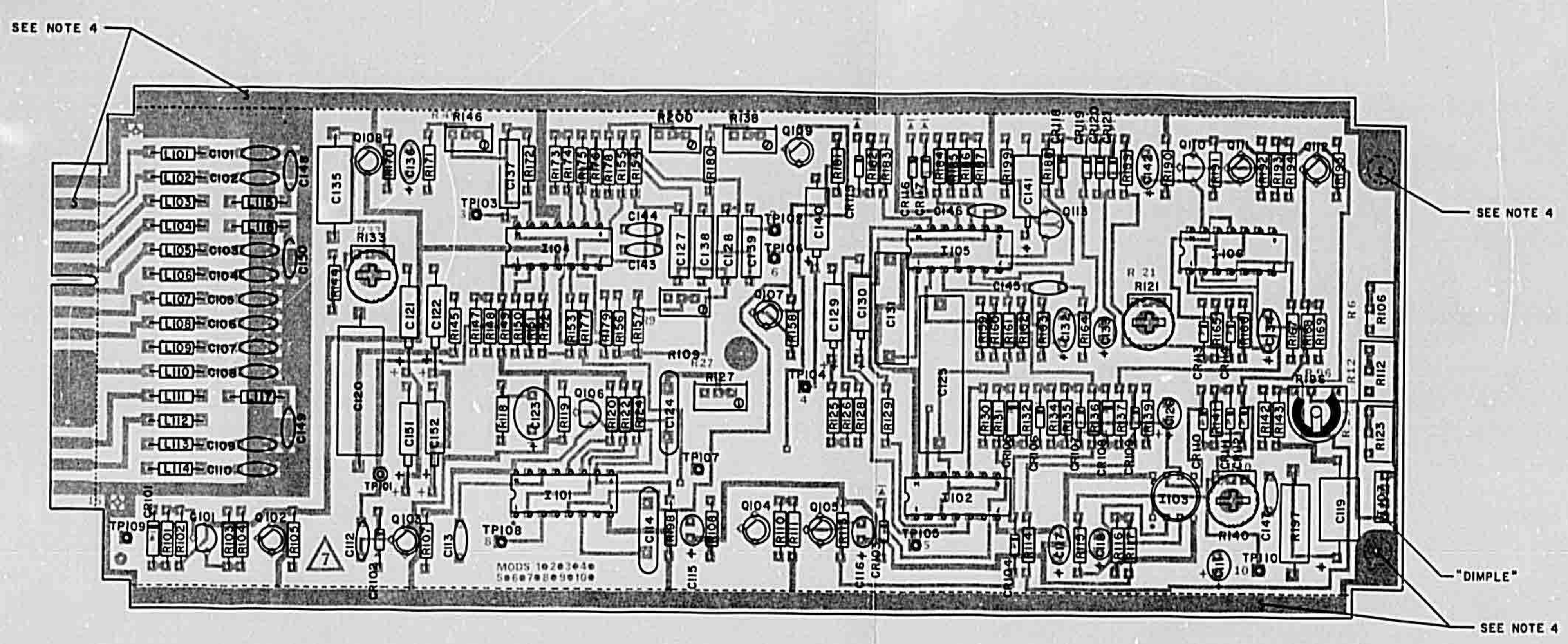
CLOCK	ENABLE	B0	B1	B2	B3
V_{DD} V_{SS}	1 *	ADDRESS *	ADDRESS *	ADDRESS *	ADDRESS *
V_{SS} V_{DD}	1	OUTPUT DATA LATCHES			
X	0	0	0	0	0

X = DON'T CARE

* INDICATES CONTENTS OF SPECIFIED ADDRESS WILL APPEAR AT OUTPUTS AS STATED ABOVE.

A

KING
KN 72
VOR/LOC CONVERTER



NOTES:

1. TRANSISTORS Q101, Q106, & Q110 SEE DETAIL "A".
2. TRANSISTORS Q102 THRU Q105, Q107 THRU Q109, Q111, & Q112 SEE DETAIL "B".
3. TRANSISTOR Q113 SEE DETAIL "C".
4. MASK OFF TEST POINTS, R106, R109, R112, R121, R123, R127, R133, R140, R138, R200, R201, R202 R146, & R196, ALL MOUNTING HOLES, CIRCUIT FINGERS, & .150 WIDE STRIP ON EDGES OF BOARD ON BOTH SIDES. THEN SPRAY BOTH SIDES OF BOARD WITH CLEAR URETHANE SEAL COAT (016-1040-00).
5. INTEGRATED CIRCUIT I107 SEE DETAIL "D".
6. CAPACITORS C127, C128, C138, AND C139 ARE TO BE SPACED OFF THE PRINTED CIRCUIT BOARD.

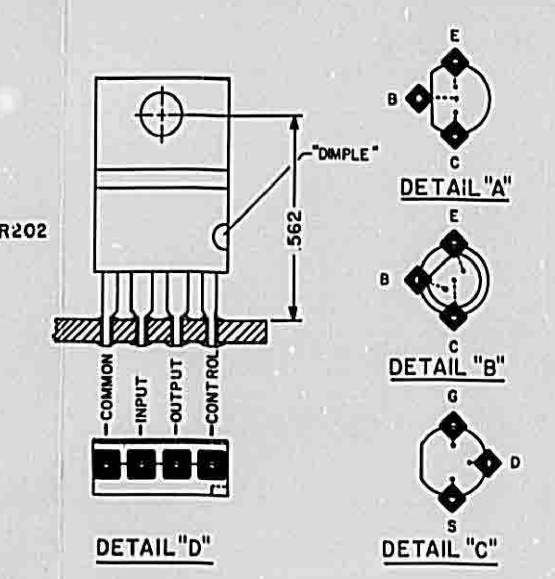
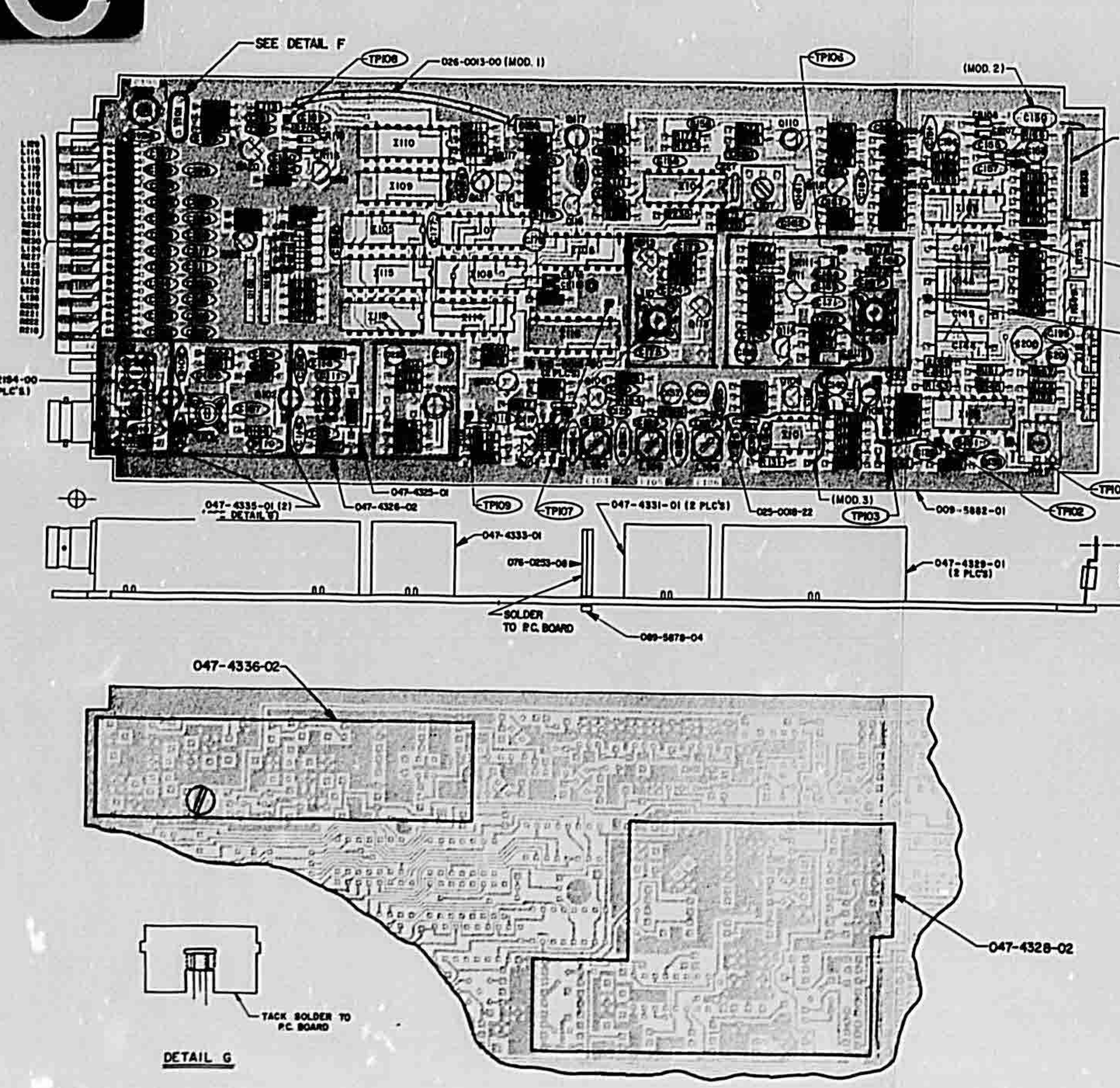
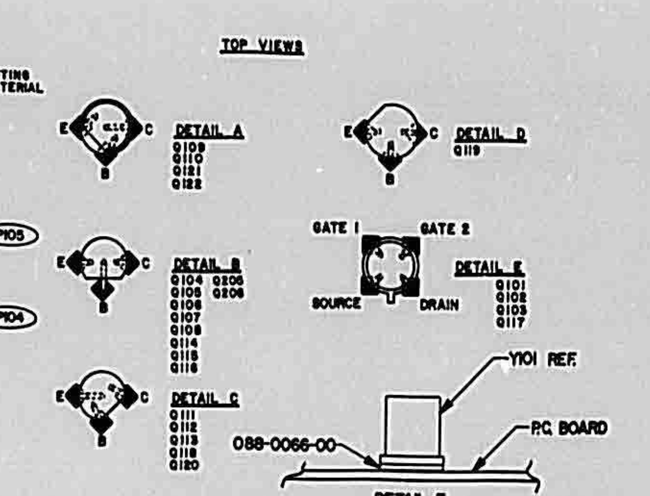


FIGURE 5-2 KN 72 P/C BOARD ASSEMBLY
(Dwg. No. 300-5876-00, R-3)

C

KING
KN 75
GLIDESLOPE RECEIVER





NOTES

1. FOR COMPONENT VALUES SEE BILL OF MATERIAL 200-5882-00.
2. MASK VARIABLE RESISTORS R149, R153, R127, COILS L101, L102, L103, L104, L105, L106, L110, L108, AND P.C. BOARD EDGE CONNECTOR. MASK FOR 047-4336-02 & 047-4328-02 INSTALL AFTER POST COATING. THEN EVENLY SPRAY POST COATING 016-1040-00 TO BOTH SIDES OF THE BOARD.

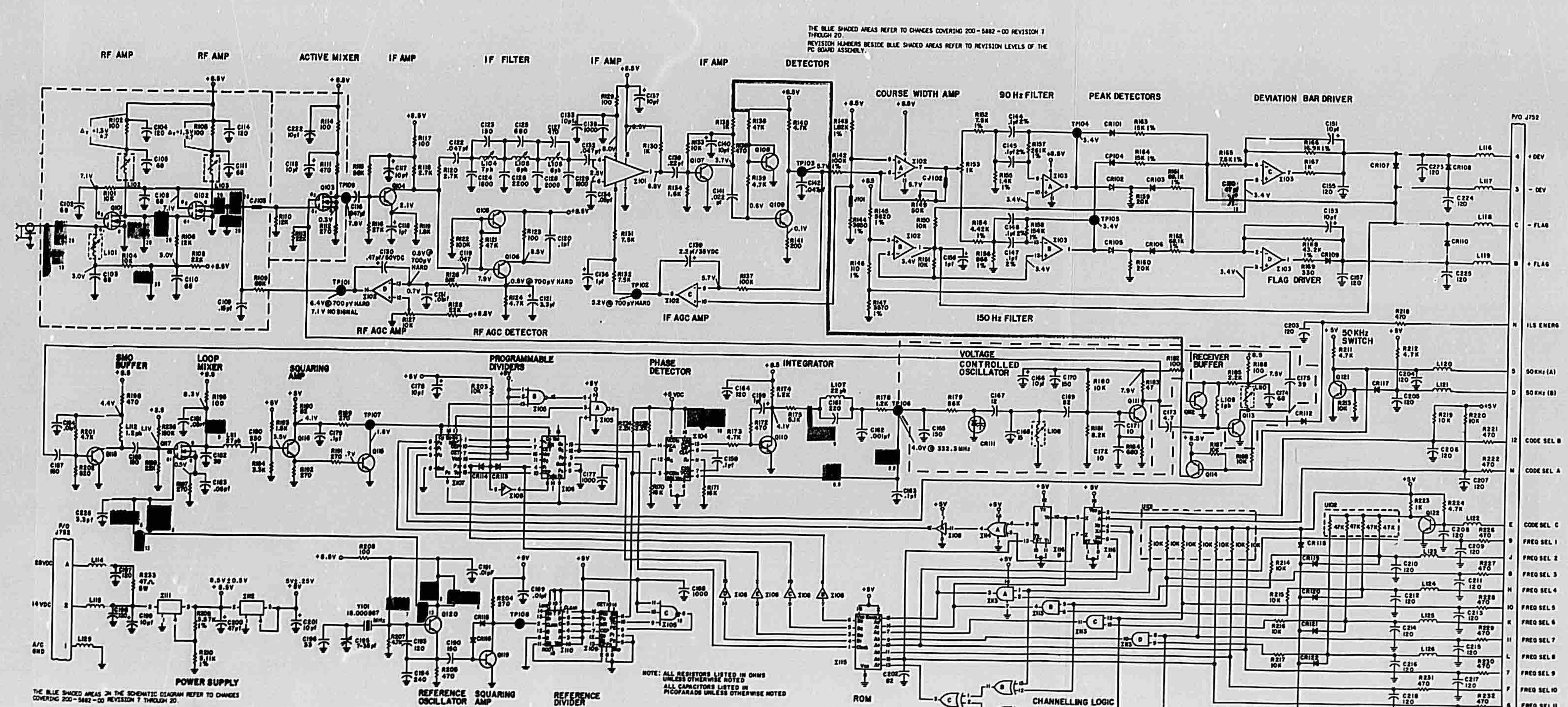
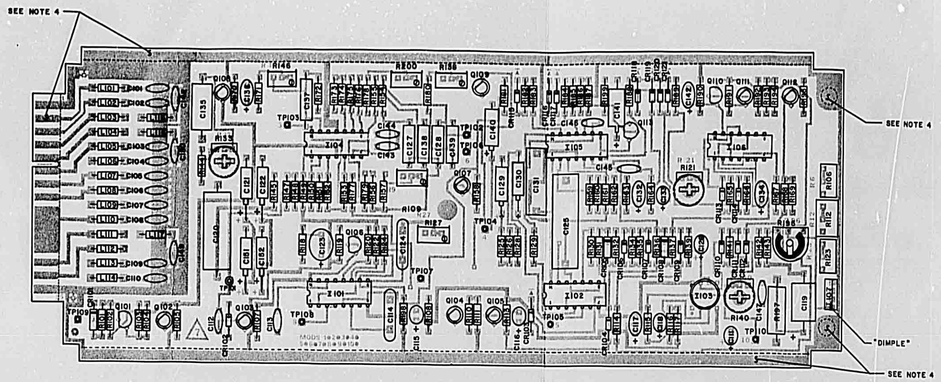


FIGURE 6-8 PC BOARD ASSEMBLY AND SCHEMATIC
(Dwg. No. 300-5882-00, R-13)
(Dwg. No. 002-0444-00, R-11)



NOTES:

1. TRANSISTORS Q101, Q106, & Q110 SEE DETAIL "A".
2. TRANSISTORS Q102 THRU Q105,Q107 THRU Q109,Q111, & Q112 SEE DETAIL "B".
3. TRANSISTOR Q113 SEE DETAIL "c".
4. MASK OFF TEST POINTS, R106, R109, R112, R121, R123, R127, R133, R140, R138, R200, R201, R202 R146, & R196, ALL MOUNTING HOLES, CIRCUIT FINGERS, & .150 WIDE STRIP ON EDGES OF BOARD ON BOTH SIDES. THEN SPRAY BOTH SIDES OF BOARD WITH CLEAR URETHANE SEAL COAT (016-1040-00).
5. INTEGRATED CIRCUIT Z107 SEE DETAIL "b".
6. CAPACITORS C127, C128, C138, AND C139 ARE TO BE SPACED OFF THE PRINTED CIRCUIT BOARD.

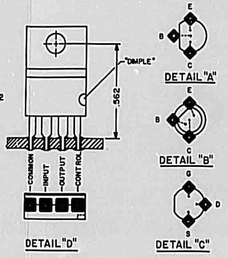
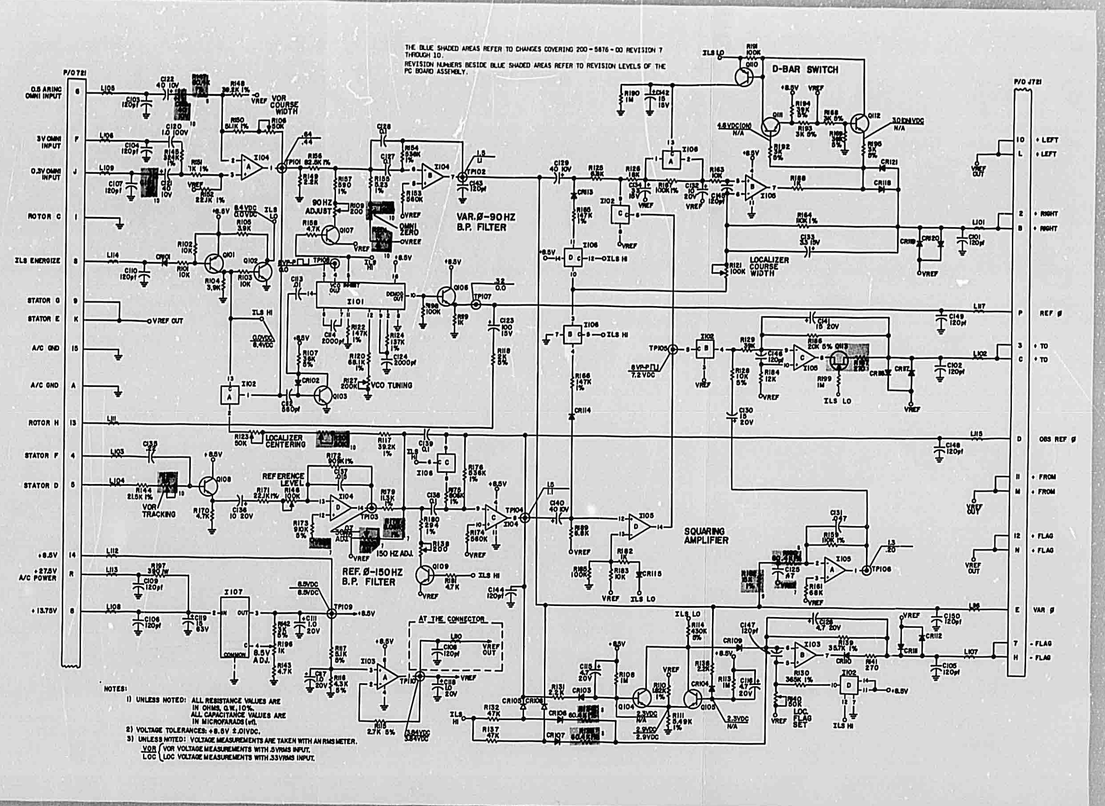
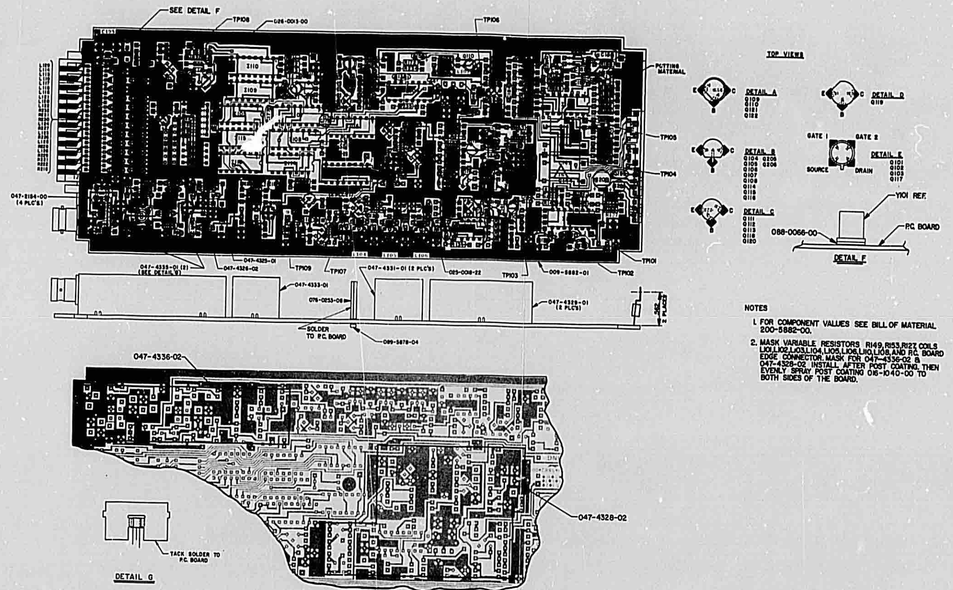


FIGURE 6-6 P/C BOARD AND SCHEMATIC
(Dwg. No. 300-5876-00, R-3;
002-0440-00, R-5)





NOTES

1. FOR COMPONENT VALUES SEE BILL OF MATERIAL 200-5882-00.
2. MASK VARIABLE RESISTORS R49,R53,R92 COILS L101,L102,L103,L104, L105, L106, L107, L108, AND P.C. BOARD EDGE CONNECTOR.MASK FOR 047-4336-02 & 047-4328-02. INSTALL AFTER POST COATING, THEN EVENLY SPRAY W/ POST COATING 016-1040-00 TO BOTH SIDES OF THE BOARD.

FIGURE 5-2 P.C. BOARD ASSEMBLY DRAWING
(Dwg. No. 300-5882-00, R-13)