# KING RADIO--KN 73
## GLIDESCOPE RECEIVER
## GENERAL INDEX

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# MAINTENANCE/OVERHAUL MANUAL

# KN 73
# GLIDESCOPE RECEIVER

# KN 77
# VOR/LOC CONVERTER


| | |
|---|---|
| MANUAL NUMBER | 006-5080-02 |
| 1st PRINTING | MARCH, 1972 |
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**KING RADIO CORPORATION®**

400 NORTH ROGERS ROAD OLATHE, KANSAS, U.S.A.

# ATP
## RECORD OF REVISIONS

| REV. NO. | SECTIONS COVERED IN REVISION | REV. DATE | INSERTION DATE | BY | NOTES |
|---|---|---|---|---|---|
| 1 | KN 73-Installation Man | July /73 | | | |
| 1 | KN 73-All Sections | July /73 | | | |
| 1 | KN 77-Installation Man | July /73 | | | |
| 1 | KN 77-All Sections | July /73 | | | |
| 2 | KN 73-Maintenance Man. | June /75 | | | |
| 2 | KN 77-Maintenance Man. | June /75 | | | |
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# KING RADIO MAINTENANCE MANUAL REVISION INSTRUCTIONS AND HISTORY

**MANUAL** KN 73

**REVISION** 2, June, 1975

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 |
|---|---|---|
| Title | R&R | Denotes New Revision |
| Section V (Parts List) | R&R | Parts List Updated |
| 6-10 | R&R | KN 73 Test Set Revised |
| 6-15 | Add | Revised Schematic |

# KING RADIO MAINTENANCE MANUAL REVISION INSTRUCTIONS AND HISTORY

**MANUAL** KN 77

**REVISION** 2, June, 1975

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 |
|---|---|---|
| Title | R & R | Denotes New Revision |
| Table of Contents | R & R | |
| Section v) | | 6. Flag Board B/M Added |
| (Diagrams and Illust. ) | | 6-12 Flag PC Board Assembly and Schematic |
| 4-8 | R & R | 4.5 Added S/N 8700 and above info. |
| 4-15 | R & R | 4.5.5 Added S/N 6700 and above info. |
| Section V | R & R | Parts List Updated |
| 6-8 | R & R | 6.8.4 1. Added S/N 6700 and above info |
| 6-25 | Add | Revised Assembly Dwg. and Schematic |
| 6-27 | Add | New Assembly Dwg. and schematic |
| 6-12 | R & R | Revised Dwg. |
| 6-13 | R & R | Revised Dwg |
| 6-14 | R & R | Revised Dwg |

# KING RADIO MAINTENANCE MANUAL REVISION INSTRUCTIONS AND HISTORY

**MANUAL** KN 73

**REVISION** 1, July, 1973

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 |
|---|---|---|
| Inst. Manual Tab | Add | Manual Format Changed |
| Maint. Manual Tab | Add | Manual Format Changed |
| Title | R&R | Denotes New Revision |
| Record of Rev. | Destroy | Manual Format Changed |
| Serv. Bull. Rec. | Destroy | Manual Format Changed |
| Manual Revision | Destroy | Manual Format Changed |
| Inst. & History | Add | Manual Format Changed |
| Serv. Bull. | Add | Manual Format Changed |
| Table of Contents | R&R | Manual Format Changed |
| Section V (parts list) | R&R | Parts List Updated |
| 6-7 | R&R | Para. 6.8.7D Changed |
| 6-15 | Add | Latest Revision Ass'y Dwg. & Schematic |

# HISTORY OF REVISIONS

Revision 1, July, 1973

| Page | Reason for Change |
|---|---|
| Title Page | Denotes New Revision |
| Contents | Table of Contents Added |
| History of Rev. | History of Revision Added |
| 2-4 | Interconnect Corrected and Updated |

# KING RADIO MAINTENANCE MANUAL REVISION INSTRUCTIONS AND HISTORY

**MANUAL** KN 77

**REVISION** 1, July, 1973

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 |
|---|---|---|
| Installation Manual Tab | Add | Manual Format Changed |
| Maintenance Manual Tab | Add | Manual Format Changed |
| Title | R&R | Denotes New Revision |
| Record of Revision | Destroy | Manual Format Changed |
| Service Bull. Record | Destroy | Manual Format Changed |
| Manual Rev. Instructions & History | Add | Manual Format Changed |
| Service Bull. | Add | Manual Format Changed |
| Table of Contents (All pages) | R&R | Manual Format Changed |
| Section V (Parts List) | R&R | Parts List Updated |
| 6-5 | R&R | 6. 6 Test Equipment "e" & "f" changed |
| 6-6 | R&R | Typographical Error |
| 6-7 | R&R | Alternate Adjustment in NOTE changed. |
| 6-8 | R&R | "1" changed |
| 6-10 | R&R | $150H_2$ pot level changed |
| 6-11 | R&R | Flag current meter indication changed |
| 6-13 | R&R | Flag & Deviation meter ranges corrected |
| 6-14 | R&R | Flag & Deviation meter ranges corrected |
| 6-25 | Add | New Ass'y Dwg. & Schematic |

# HISTORY OF REVISIONS

Revision 1, July, 1973

| Page | Reason for Change |
|---|---|
| Title Page | Denotes New Revision |
| Contents | Table of Contents Added |
| History of Rev. | History of Revision Added |
| 1-2 | Technical Characteristics Changed |
| 2-2 | Sub-paragraph "l" Deleted |
| 2-3 | Drawing Number Moved |
| 2-5 | Interconnect Updated |

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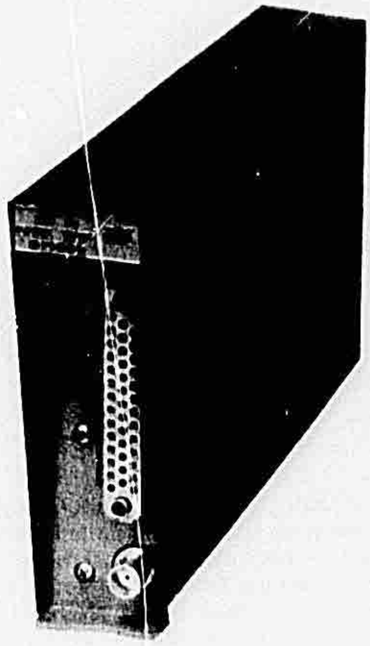

# KN 73
# GLIDESCOPE RECEIVER

## INSTALLATION MANUAL
## 006-0065-01

REV 1 JULY, 1973

## ONE FULL YEAR WARRANTY

General Aviation Avionic products manufactured by King Radio Corporation (hereinafter called King) are warranted against defects in design, workmanship and material under normal use for which intended for one year after warranty registration provided such registration occurs within eighteen months of the factory shipping date.

King's limit of liability hereunder shall be to provide necessary parts and labor to repair said product, transportation charges prepaid at either King factory or an authorized King Service Center. King shall not be liable for consequential or other damage or expense whatsoever therefore or by reason thereof.

This warranty shall not apply to any product which has not been installed by an authorized King Installation Facility in accordance with the installation manual, or which has been repaired or altered in any way so as to adversely effect its performance or reliability, or which has been subject to misuse, contamination, negligence or accident.

This warranty is in lieu of all other General Aviation Avionics guarantees or warranties expressed or implied. King reserves the right to make design changes, additions to and improvements in its products without obligation to install such in products previously manufactured.

KING
KN 73
GLIDESLOPE RECEIVER

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## SECTION I GENERAL INFORMATION



## SECTION II INSTALLATION



## SECTION III OPERATION



## DIAGRAMS & ILLUSTRATIONS

# 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 73. Information relative to the maintenance, alignment and procurement of replacement parts may be found in KN 73 Maintenance/Overhaul Manual, King Part No. 006-5057-00.

## 1.2 PURPOSE OF EQUIPMENT

The King KN 73 Glideslope Receiver is a TSO'd 40 channel unit designed to be used in conjunction with the KX 170, KX 170A and KX 175 NAV-COMM unit and external ARINC type indicator(s) such as the KNI 520 and KPI 550A Horizontal Situation Indicator system. When an ILS channel is selected with the NAV receiver, the KN 73 provides glideslope steering information to the pilot.

The KN 73 consists of a Glideslope Receiver enclosed in a remote mounted case. Connections to the KN 73 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 Glideslope Receiver is solid state and contains the circuitry necessary to receive glideslope signals and convert them into DC voltages to drive external ARINC type indicators. The receiver is capable of driving three 1,000 ohm deviation loads and two 1,000 ohm alarm flag loads.

## 1.3 TECHNICAL CHARACTERISTICS

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

KN 73 GENERAL INFORMATION

| SPECIFICATIONS | CHARACTERISTICS |
|---|---|
| Physical Dimensions:<br>(Unit only) | Width: 1. 55 inches (3. 94cm)<br>Height: 5. 20 inches (13. 20cm)<br>Depth: 11. 25 inches (28. 60cm) |
| TSO Categories: | C34c Operation Performance Category II<br>Class D<br>Env. Cat. (DO-138) C/DANAAAXXXXXX |
| (Overall Mounting Rack and Connector Included) | Width: 3. 26 inches (8. 28cm)<br>Height: 5. 40 inches (13. 77cm)<br>Depth: 11. 25 inches (28. 56cm) |
| Mounting: | Rigid, any position |
| Weight: | 2. 0 lbs. (. 9Kgm) (Unit only)<br>2. 5 lbs. (1. 1Kgm) (Mounting Rack and Connector included) |
| Power Requirements: | 13. 75V or 27. 5VDC: 200ma max. |

| SPECIFICATIONS | CHARACTERISTICS |
|---|---|
| Centering Accuracy: | Centering accuracy of less than ±10μa 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 78μa. The deviation under opposite polarity shall be 78 ±3μa. |
| 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 ±129KHz of center frequency. |
| Number of Channels: | 40, 150KHz spacing |
| Frequency Range: | 329.15MHz to 335.00MHz |
| Input Impedance: | 50 ohms |
| Sensitivity: | 40μv (hard) for 60% of standard deflection |
| Spurious Response: | All responses in the range from 90KHz to 1,500MHz at least 60db below center frequency response, excluding the range from 329.00MHz to 335.30MHz. |
| Temperature: | -40°C to +55°C for continuous operation. (Short time operation to +70°C.) |
| Design: | Solid state remote mounted unit. Capable of operating with standard ARINC type meter loads. |
| Duty Cycle: | Continuous |
| Loads: | Capable of operating three 1,000 ohm deviation loads and two 1,000 ohm alarm flag loads. |

## 1.4 UNITS AND ACCESSORIES SUPPLIED

A. King KN 73 (066-1033-00).

B. King KN 73 Installation Kit 050-1242-01 includes mounting rack and connector. This kit consists of:

| KPN | DESCRIPTION | QTY. | VENDOR |
|---|---|---|---|
| 030-0005-00 | Connector BNC, Antenna | 1 | TED 4-10-4 |
| 030-2153-00 | Connector Receptacle 24 Pin | 1 | Positronic Industrial GM41/24F-0N0-VL |
| 030-2154-00 | Connector Hood 24 Pin | 1 | Positronic Industrial GM41000J |
| 030-1008-00 | Lever and Pivot Assembly | 2 | Winchester MRA-VL |
| 071-4015-00 | Mounting Rack (Accepts either or both KN 77 and KN 73) | 1 | |

C. Dual installation of both KN 77 and KN 73 require Installation Kit (050-1242-02).

## 1.5 ACCESSORIES REQUIRED, BUT NOT SUPPLIED

A. Glideslope Antenna and Cable.
B. King KX 175 NAV/COMM unit.
C. 1. King KNI 520 Navigation Indicator
   or
   2. King KPI 550A Horizontal Situation Indicating System.

## 1.6 LICENSE REQUIREMENT

No special Federal Communications License is required to operate the KN 73.

# SECTION II

# INSTALLATION

## 2.1 GENERAL

Installations of the KN 73 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. When equipment has been removed, place in the shipping container all packing, bracing, and filler used in the original packing. Save the packing material for use in unit storage or reshipment.

## 2.3 INSTALLATION PROCEDURES

The KN 73 should be installed in accordance with standards established by the customer, installing agency, and existing conditions as to unit location and type of installation. However, the following suggestions should be considered before installing the KN 73. Close adherence to these suggestions will assure a more satisfactory performance from the equipment.

**-NOTE-**

The KN 73 is supplied with a dual unit mounting rack. This type of rack accommodates either a dual KN 73 or a KN 77/KN73 installation. A single unit mounting rack is not available.

a. Select the KN 73 location. The KN 73 may be mounted rigid. Allow one inch of free air space around top and rear of the unit. Allow one-half inch on each side.

b. Refer to the outline and dimension drawing, Figure 2-2 for the KN 73 mounting dimensions.

**-NOTE-**

Allot adequate space for installation of cables and connectors.

c. Mark, punch, and drill the mounting holes. Care must be taken to avoid damage to adjacent equipment or cables.

d. Use six #6-32 screws and the holes drilled in step c to secure the mounting rack (KPN 071-4015-00) firmly in place.

e. Slide the KN 73 into the rack. Using the hold down clamp on the front of the equipment rack, secure the KN 73 to the mounting rack.

f. The installing agency will supply and fabricate all external cables. The plug required is supplied by King Radio, Figure 2-1.

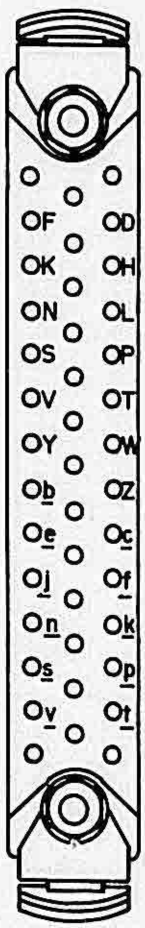
g. The length and routing of the external cables must be carefully studied and planned before attempting actual installation. Avoid sharp bends and routing the cable near transmitter coax cables and power buss cables.

**—NOTE—**

The KN 73 provides external pin connections for each internal deviation and flag load. Before completing the installation, a check should be made to insure that the proper combination of jumper wires are used as required for the number of external loads. (Refer to KN 73 Interconnect diagram, Figure 2-3.)

h. Fabricate the external cables in accordance with Figure 2-3.

i. Use a suitable glideslope antenna and insure that its mounting location is in a clear, unobstructed line to the glideslope ground station while on the glide path.




NOTE: PLUG VIEWED FROM CABLE END.

P101
KPN 030-2153-00

FIGURE 2-1 CONNECTOR PIN LOCATIONS
(696-1536-00)

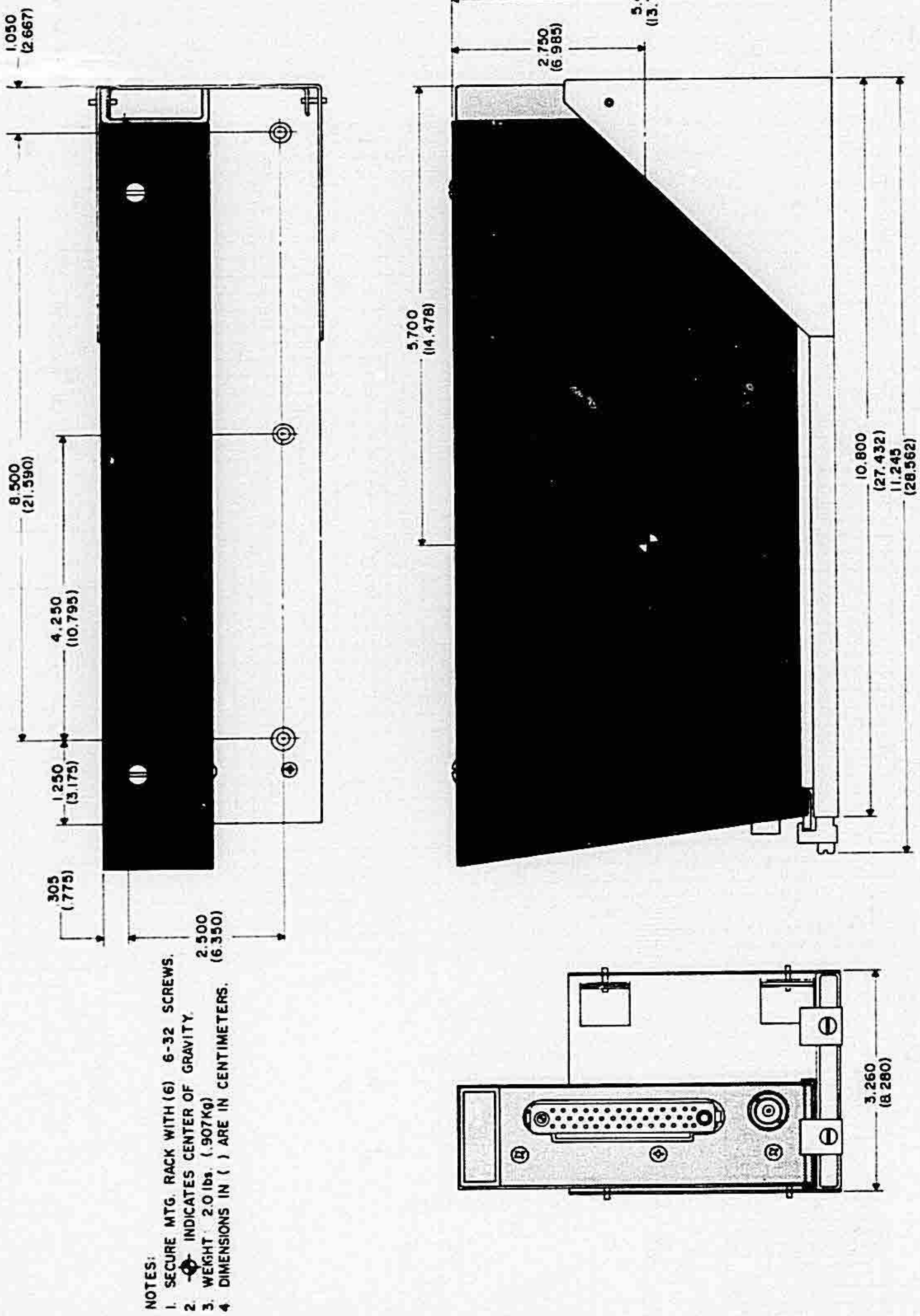
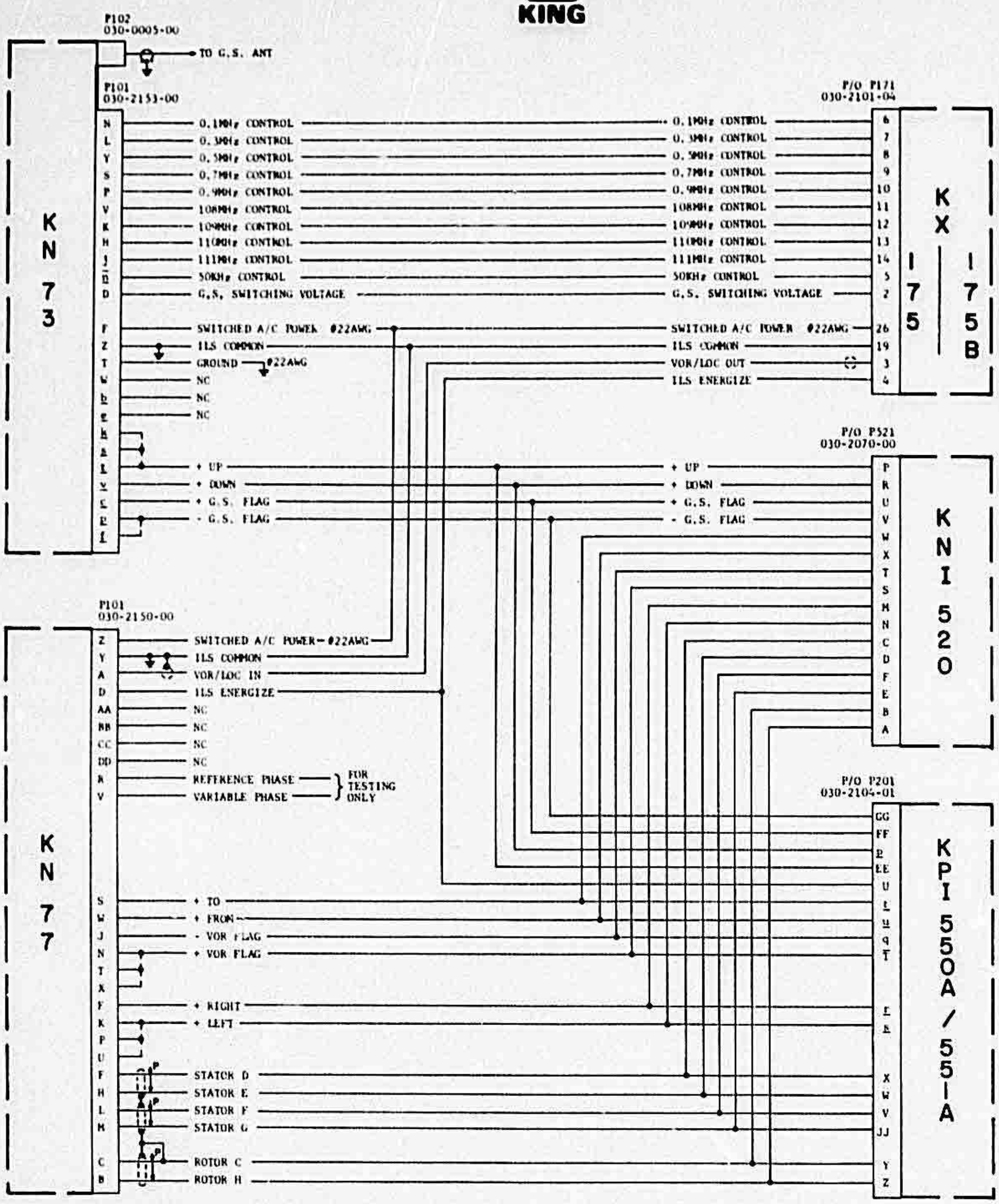



FIGURE 2-2 KN 73 OUTLINE AND MOUNTING DRAWING
155-5093-00



SEE BLOWUP




NOTES:

1. UNLESS NOTED, ALL WIRES TO BE #26AWG MINIMUM.
2. UNLESS NOTED, ALL SYSTEM GROUNDS ARE AIRFRAME GROUNDS.
3. JUMPER KN 77 PINS AS INDICATED FOR REQUIRED NUMBER OF EXTERNAL LOADS.

| NUMBER OF EXTERNAL LOADS | VOR/LOC | |
|---|---|---|
| | DEV | FLAG |
| 1 | KPU | NTX |
| 2 | KP | NT |
| 3 | NONE | NONE |

4. JUMPER KN 73 PINS AS INDICATED FOR REQUIRED NUMBER OF EXTERNAL LOADS.

| NUMBER OF EXTERNAL LOADS | GLIDESLOPE | |
|---|---|---|
| | DEV | FLAG |
| 1 | tks | f p |
| 2 | t k | NONE |
| 3 | NONE | |

5. RESOLVER PINS SHOWN CONNECTED TO BOTH KNI 520 AND KPI 550A ARE FOR REFERENCE ONLY. IN ACTUAL INSTALLATION ONLY ONE RESOLVER WILL BE WIRED TO KN 77.

FIGURE 2-3 KN 73 INTERCONNECT DIAGRAM
(Dwg. No. 155-1117-00, R-3 )

# SECTION III

# OPERATION

The KN 73 is energized by its associated VOR/LOC receiver such as the KX 175. 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 concealed, the descent steering information presented on the horizontal meter of an indicator such as the KNI 520 is usable. A centered horizontal meter indicates that the aircraft is on a proper glidepath and usually occurs 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.

# MAINTENANCE/OVERHAUL MANUAL

# KN 73
# GLIDESCOPE RECEIVER

| | |
|---|---|
| MANUAL NUMBER | 006-5057-02 |
| 1st PRINTING | MARCH, 1973 |
| REVISION NUMBER | 2 |

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

KING
KN 73
GLIDESLOPE RECEIVER

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## SECTION V ILLUSTRATED PARTS LIST



## SECTION VI MAINTENANCE



## DIAGRAMS & ILLUSTRATIONS



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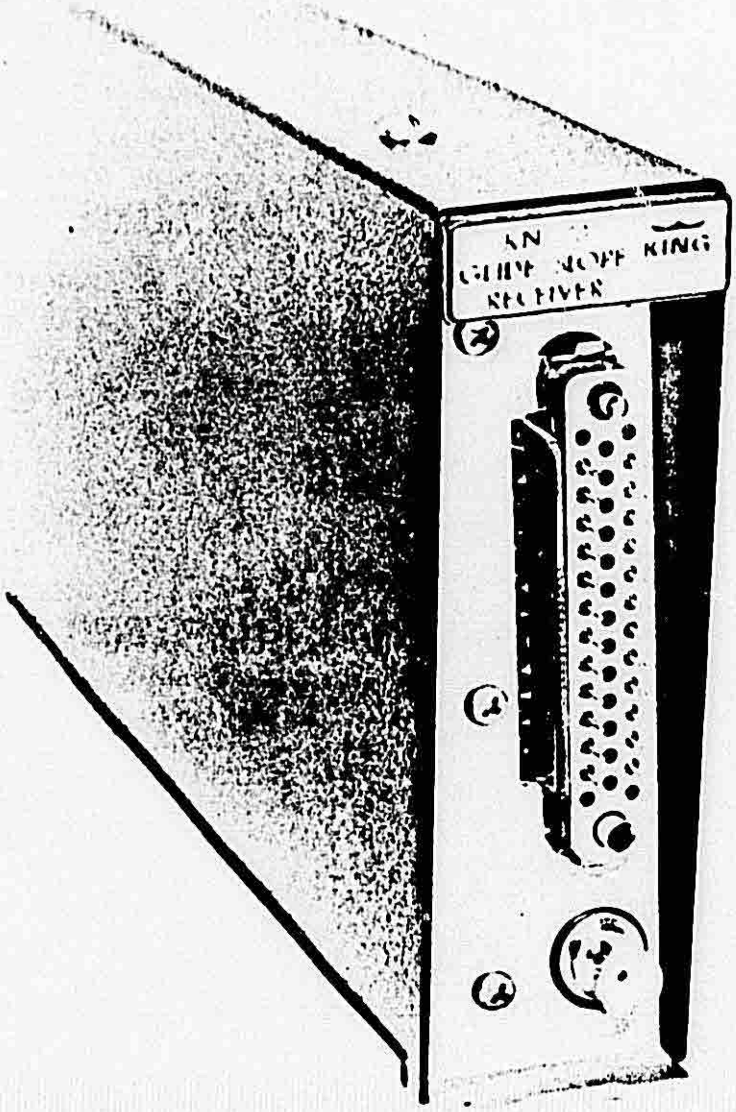



FIGURE 1-1 KN 73
(Dwg. No. 696-1544-00)

KING
KN 73
GLIDESLOPE RECEIVER

# CONTENTS

## SECTION IV

## THEORY OF OPERATION

# SECTION IV

# THEORY OF OPERATION

## 4.0 GENERAL

The KN 73 Glideslope Receiver, Theory of Operation is discussed in functional segments. A discussion of the principles of the glideslope system preceeds the circuit theory.

## 4.1 PRINCIPLES OF THE GLIDESLOPE SYSTEM (Figure 4-1)

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.

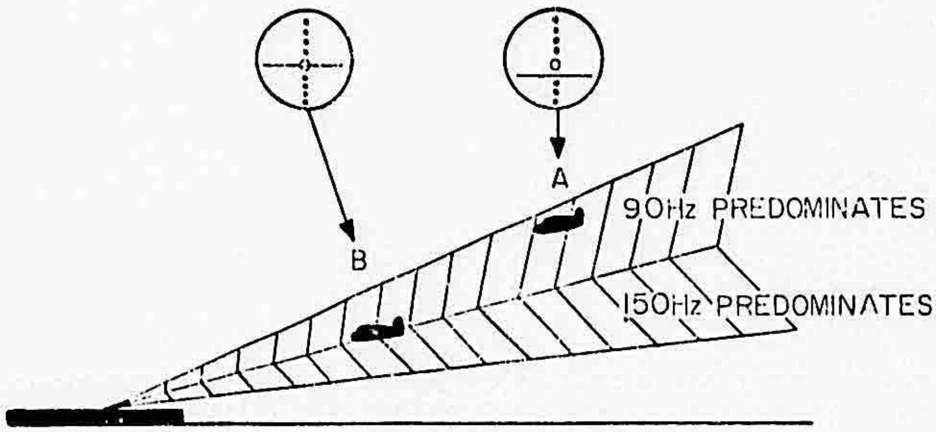



FIGURE 4-1 GLIDEPATH
(696-1539-00)

## 4.2 BLOCK DIAGRAM CIRCUIT THEORY (Figure 4-2)

### 4.2.1 RECEIVER

The glideslope signals in the range of 329.15MHz to 335.00MHz are coupled from the antenna through a 3 pole preselector to the first mixer. In the first mixer the incoming signal is mixed with the tripled output of the first oscillator to yield one of four discrete first intermediate frequencies in the range from 73.775MHz to 74.225MHz. This signal is then coupled to the second mixer where it is combined with the output of the second oscillator to produce the second intermediate frequency of 21.400MHz.

The first and second oscillators have, respectively, 10 crystals and 4 crystals. The proper 2 crystals for a given channel are switched into the oscillator circuits by RF switching diodes. These diodes are controlled by a matrix of resistors and DC switching diodes which decodes the frequency selector information at the input of this receiver.

The 21.400MHz second mixer output is coupled through a crystal filter to provide adjacent channel selectivity and then to the I. F. amplifiers.

Two integrated circuit I. F. amplifiers provide the required gain to drive the detector and are also gain-controlled by the AGC voltage.

A transistor active detector recovers the composite modulation signal and generates a DC voltage proportional to its input level for the AGC amplifier. This DC level is compared with a fixed reference voltage in the AGC circuitry to set the level at which the AGC takes effect.

### 4.2.2 DEVIATION CONVERTER

Composite video from the detector is coupled through the course width adjustment, R194, to two active filters tuned at 90Hz and 150Hz respectively. The outputs of these filters, which are proportional to the amplitudes of the two tones in the composite signal are peak detected, filtered and fed through buffer amplifiers to prevent loading of the detectors. These two outputs are combined in resistive summing junctions to drive the deviation and warning flag indicators.

### 4.2.3 POWER SUPPLY

Input power to the radio, +11 to +33 volts DC, is regulated down to +10.0 volts DC in a conventional series regulator. R222 allows precise adjustment of the regulated voltage.

## 4.3 DETAIL CIRCUIT THEORY

### 4.3.1 RECEIVER

#### 4.3.1, a PRESELECTOR

L101, L102, and L103 are inductors in the form of paths etched directly on the printed circuit material. They have the correct inductance to resonate with C102, C105, and C107 at 332.00MHz. L117 and L118 are the reactive coupling elements between the sections of the filter. L101 and L103 are tapped at their approximate 50 ohm points for input and output matching of the preselector.

#### 4.3.1, b FIRST MIXER

The received signal is coupled from the preselector to the base of Q101, the first mixer. Local oscillator injection is coupled to the emitter of Q101 from the first oscillator. Mixing action yields one of four discrete first intermediate frequencies, 73.775MHz, 73.925MHz, 74.075MHz, and 74.225MHz. Reference to the LOC/Glideslope Frequency Chart, Table 4-1, will allow computation of the correct frequency for each channel. T101 and T102 form a double-tuned circuit at the output of the first mixer for selectivity.

| LOC FREQ. (MHz) | GLIDESLOPE FREQ. (MHz) | FIRST OSC. CRYSTAL | SECOND OSC. CRYSTAL | 0.1MHz PIN +10VDC | 1.0MHz PIN GROUNDED | 0.05MHz PIN GROUNDED |
|---|---|---|---|---|---|---|
| 108.10 | 334.70 | Y110 | Y112 | N | V | |
| 108.15 | 334.55 | Y110 | Y111 | N | V | n |
| 108.30 | 334.10 | Y109 | Y112 | L | V | |
| 108.35 | 333.95 | Y109 | Y111 | L | V | n |
| 108.50 | 329.90 | Y102 | Y112 | Y | V | |
| 108.55 | 329.75 | Y102 | Y111 | Y | V | n |
| 108.70 | 330.50 | Y103 | Y112 | S | V | |
| 108.75 | 330.35 | Y103 | Y111 | S | V | n |
| 108.90 | 329.30 | Y101 | Y112 | P | V | |
| 108.95 | 329.15 | Y101 | Y111 | P | V | n |
| 109.10 | 331.40 | Y104 | Y114 | N | K | |
| 109.15 | 331.25 | Y104 | Y113 | N | K | n |
| 109.30 | 332.00 | Y105 | Y114 | L | K | |
| 109.35 | 331.85 | Y105 | Y113 | L | K | n |
| 109.50 | 332.60 | Y106 | Y114 | Y | K | |
| 109.55 | 332.45 | Y106 | Y113 | Y | K | n |
| 109.70 | 333.20 | Y107 | Y114 | S | K | |
| 109.75 | 333.05 | Y107 | Y113 | S | K | n |
| 109.90 | 333.80 | Y108 | Y114 | P | K | |
| 109.95 | 333.65 | Y108 | Y113 | P | K | n |
| 110.10 | 334.40 | Y109 | Y114 | N | H | |
| 110.15 | 334.25 | Y109 | Y113 | N | H | n |
| 110.30 | 335.00 | Y110 | Y114 | L | H | |
| 110.35 | 334.85 | Y110 | Y113 | L | H | n |
| 110.50 | 329.60 | Y101 | Y114 | Y | H | |
| 110.55 | 329.45 | Y101 | Y113 | Y | H | n |
| 110.70 | 330.20 | Y102 | Y114 | S | H | |
| 110.75 | 330.05 | Y102 | Y113 | S | H | n |
| 110.90 | 330.80 | Y103 | Y114 | P | H | |
| 110.95 | 330.65 | Y103 | Y113 | P | H | n |
| 111.10 | 331.70 | Y105 | Y112 | N | j | |
| 111.15 | 331.55 | Y105 | Y111 | N | j | n |
| 111.30 | 332.30 | Y106 | Y112 | L | j | |
| 111.35 | 332.15 | Y106 | Y111 | L | j | n |
| 111.50 | 332.90 | Y107 | Y112 | Y | j | |
| 111.55 | 332.75 | Y107 | Y111 | Y | j | n |
| 111.70 | 333.50 | Y108 | Y112 | S | j | |
| 111.75 | 333.35 | Y108 | Y111 | S | j | n |
| 111.90 | 331.10 | Y104 | Y112 | P | j | |
| 111.95 | 330.95 | Y104 | Y111 | P | j | n |

TABLE 4-1 LOC/GLIDESLOPE FREQUENCY CHART

4.3.1,c SECOND MIXER AND CRYSTAL FILTER

Q102, the second mixer, receives the desired signal from a winding on T102 and second oscillator injection through C172 simultaneously at its base. The tuned circuit consisting of L104, C117 and R110 performs the dual function of providing the collector load for Q102 and impedance matching for the crystal filter, FL101, at the second intermediate frequency of 21.400MHz. FL101 provides the required adjacent channel selectivity for 150KHz channel spacing.

4.3.1,d I.F. AMPLIFIER

Integrated circuits I101 and I102 provide the majority of the overall gain of the receiver. The filter output matching network C119, L105, and R113, and the coupling transformers T103 and T104 are broadly tuned at 21.400MHz. The integrated circuits I101 and I102 amplify the weak signal at the output of the crystal filter to a level sufficient to drive the detector Q103. These two amplifiers may be gain controlled by driving current into their gain control terminals, pin 5.

4.3.1,e DETECTOR AND AGC

Q103 is used as an active detector to provide detected audio and AGC drive. The voltage divider consisting of R121, CR102, and R120 establishes a DC bias level on the base of Q103 through the secondary of T104. CR102 compensates the change in base-emitter voltage of Q103 over temperature. On the negative going peaks of the I.F. signal, Q103 conducts and on the positive going peaks it is cut off providing detector action. C189 bypasses any remaining I.F. signal and C133 bypasses high frequency audio noise leaving only the desired 90Hz and 150Hz composite video.

I103B is connected as a unity gain voltage follower to isolate the AGC circuit from the detector. I103B charges C134 to the peak DC voltage of the composite signal through R125. This DC voltage, which is proportional to the detector output, is connected to the noninverting input of I103A. the inverting input is connected to a reference voltage established by the voltage divider consisting of R224, CR175, CR177, and R126. CR175 and CR177 provide temperature compensation for the AGC by varying the reference voltage with temperature. R128 and R127 determine the DC gain of the AGC amp and C190 and C191 eliminate any AC gain. When the DC voltage on C124 exceeds the reference voltage, the output of I103A begins to rise. This voltage is fed to the I.F. amplifiers and to the first mixer. As the AGC voltage increases, the gain of the I.F. amplifiers and first mixer is reduced until the detected audio drops to the level of the reference voltage, where a stable point is reached.

4.3.1,f FIRST OSCILLATOR AND FREQUENCY SELECTOR

Q104, the first oscillator, is connected in a conventional Colpitts oscillator circuit with diode switching to select one of ten crystals. C137 and C138 form the feedback network. L106 and R131 are connected parallel with the crystal bank to cancel out stray capacity. The output of Q104 is fed through a tuned buffer amplifier, Q105, and used to drive the tripler, Q106. The collector load for Q106 is in the form of two inductors, L109 and L110, etched on the printed circuit board. Q106 drives a low impedance tap on L109. C147 tunes L109 to the third harmonic of the first oscillator frequency. L110, tuned by C151, provides additional selectivity for the third harmonic energy coupled through by C149. A low impedance tap on L110 provides the local oscillator injection for the first mixer through C146.

Crystals Y101 through Y110 are connected to the first oscillator, Q104, through RF switching diodes CR103 through CR112. These diodes are normally reverse biased and provide only a very low capacitance connection between the crystal and oscillator transistor. When one diode, and only one diode, is forward biased by the frequency selector matrix, it becomes effectively an extremely low resistance. This connects one crystal to the oscillator transistor and it operates. Resistors R226 through R235 provide a reverse leakage current path for the reverse biased diodes.

For an example of typical operation of the frequency selector matrix, assume a localizer frequency of 109.30MHz, 332.00MHz glideslope, has been selected. Refer to Table 4-1 and note that the 1.0MHz pin K is grounded and the 0.1MHz pin L has +10 volts DC applied. +10 volts DC is applied to one end of R167, R170, R175, and R178. Also note that with none of the 1.0MHz pins grounded, Q112, Q113, Q114, and Q115 are normally saturated. When pin K is grounded, Q113 is cut off while Q112, Q114, and Q115 remain saturated.

Now trace the possibility of current flow through the four resistors mentioned previously and into a crystal switching diode. R178 is clamped to ground through CR152 and Q114. R175 is clamped to ground through CR146 and Q112. R170 is clamped to ground through CR136 and Q115. R167, however, is not clamped to ground since Q113 is cut off. Current can flow through R167, CR129 R143, and CR107 to switch Y105, the desired crystal, into the circuit. On the same crystal switching line note that even though CR132 is clamped to ground through Q115, CR131 is reverse biased and effectively out of the circuit. Since the oscillator receives its base bias through the switching network, the oscillator will be inactive when an ILS frequency is not selected because either Q112, Q113, Q114, and Q115 will all be saturated or +10VDC will not be applied to one of the 0.1MHz control lines

4.3.1,g SECOND OSCILLATOR AND FREQUENCY SELECTOR

Q107, the second oscillator is also connected as a Colpitts oscillator with diode switching to select one of four crystals. C167 and C168 form the feedback network. Q108 is a buffer for the second oscillator. Two tuned circuits, C170-L112 and C145-L116, at the output of the buffer, Q108, attenuate spurious frequencies before C172 applies local oscillator injection to the second mixer.

Crystals Y111 through Y114 are connected to the second oscillator by diodes CR153 through CR156.

As an example, again assume a localizer frequency of 109.30MHz, 332.00MHz glideslope, has been selected. From Table 4-1 note that the 1.0MHz pin K is grounded and that the 0.05MHz pin n is not grounded. Q109 is saturated due to base drive through R192 and R193. Resistors R188 and R190 have one side clamped to ground by Q109, while resistors R187 and R189 are connected to +10VDC through R192. The other side of R189 is clamped to ground by CR161, while R187 is not grounded. Current flows through R192, R187, R158, and CR156 connecting Y114 to the second oscillator. As with the first oscillator, Q107 receives its base bias through the switching matrix. However, Q107 may be active when an ILS frequency is not selected since it is possible that none of the 1.0MHz control lines may be grounded.

4.3.2 DEVIATION CONVERTER

Composite video from the detector, Q103, is coupled through the course width adjustment control, R194, into two active filters. I104A and its associated components C173, C174, C175, R202, R203, and R204 form a bridged-T type active filter tuned to 90Hz. I104B and C176, C178, C179, R196, R197, and R209 form an active filter tuned to 150Hz. The composite video applied to each filter is separated into its component parts and amplified. A DC reference voltage is established for the entire converter by zener diode CR167 and R207. By connecting the noninverting inputs of the filter amplifiers, I104A and I104B, the quiescent level of their outputs approximately equals the DC reference voltage.

The detector filter capacitors C183 and C184 also rest at the DC reference voltage with no signal applied.

Now assume AC signals are present at the active filter outputs. Capacitors C181 and C182 couple the signals to the detector diodes, CR165 and CR166 for 90Hz and CR168 and CR169 for 150Hz. When the signals swing positive from the reference voltage by an amount greater than the gap voltage of CR166 and CR169, the diodes conduct and charge C184 and C183 respectively, to the peak values of the AC signals. On the negative portions of the swing, CR165 and CR168 conduct and maintain the proper voltage polarity on C181 and C182.

C183 and C184 are now charged to a voltage higher than the DC reference of CR167. The voltage dividers of R195 and R210 for 90Hz and R200 and R201 for 150Hz serve dual purposes. First, they are discharge paths for the higher voltage on C183 and C184. However, the discharge time constant is longer than the period of the applied AC signal, so C183 and C184 are kept charged until the signal is removed. Second, the division ratio on the 90Hz side is fixed while the 150Hz side is variable with R200. This is a centering adjustment to compensate for slight variations in the two channels.

I105A and I105B are connected as unity gain voltage followers for isolation to prevent the deviation outputs from loading the detectors.

The deviation loads are connected directly between the outputs of I105A and I105B. Current may flow through R213, the deviation loads, and R219 in either direction depending upon which tone amplitude is greater. CR172 and CR173 limit the maximum current which may flow in the deviation loads by limiting the maximum voltage across them.

The warning flag loads are driven by summing current flow from both sides through R214 and R218, the flag load, R211, CR170, and using the DC reference as a return point. R211 adjusts flag current and CR171 and CR174 limit maximum current. Thermistor RT101 provides temperature compensation for the flag circuit.

The converter is adjusted to drive a specific number of loads. When the number of external loads is less than the required number, simulated loads in the form of resistors internal to the unit are connected across the external loads. R216 and R217 are deviation loads and R215 is a flag load.

### 4.3.3 POWER SUPPLY

The power supply regulator is a conventional series pass regulator. By varying the base drive to Q110, the pass transistor, its total collector to emitter voltage drop may be varied. R222 allows adjustment of the regulated voltage. Assume that the circuit is producing a given voltage on the regulated line. If the regulated voltage increases slightly, part of the increase will appear at the base of Q111 through the voltage divider consisting of R222 and R223. Since the emitter of Q111 is connected to a stable voltage reference, zener diode CR176, the increase in base voltage will cause an increase in base current and hence an increase in collector current. This increases the voltage drop across R220 and lowers the base drive for Q110 which lowers its emitter voltage. The regulator has compensated for the initial change in voltage.

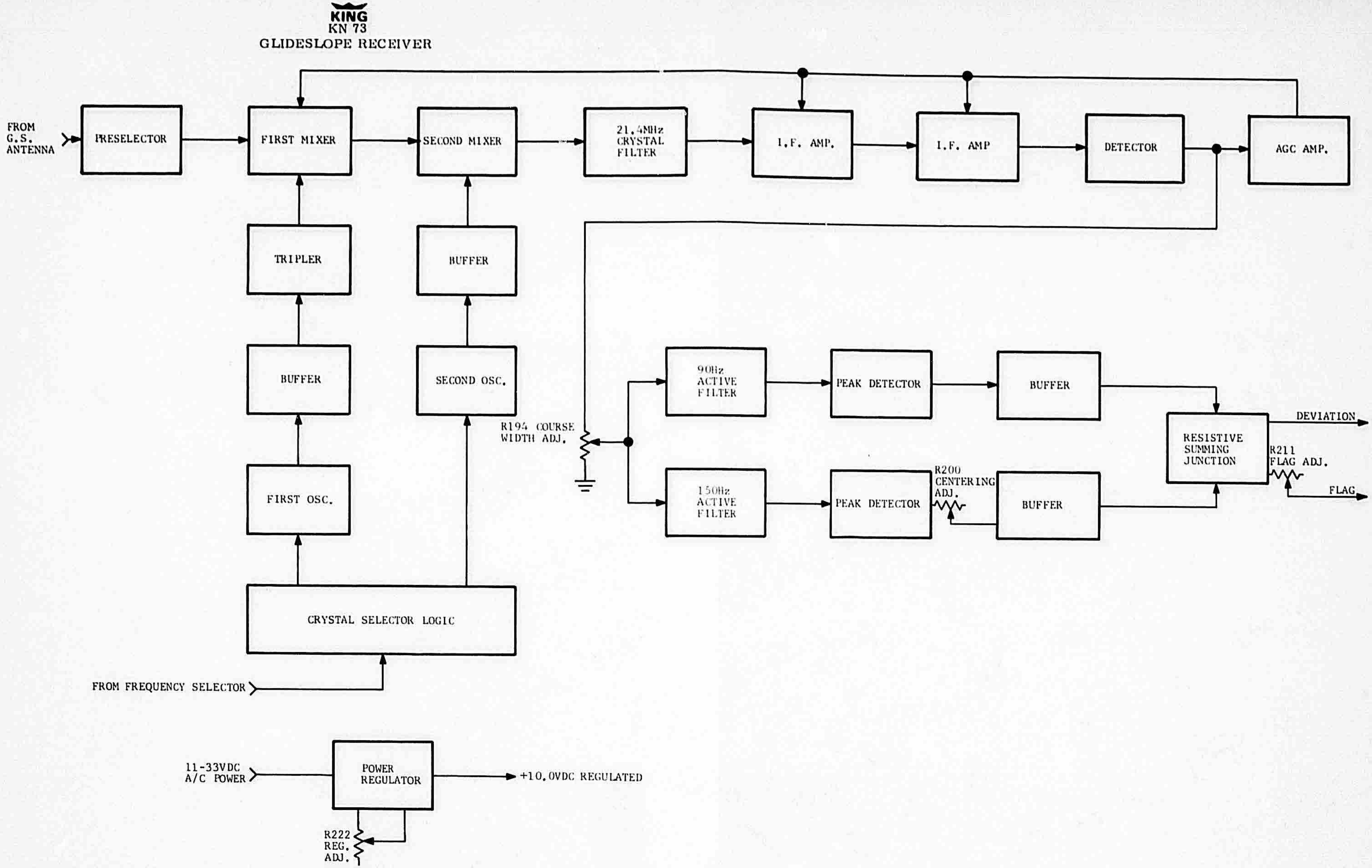



FIGURE 4-2 KN 73 BLOCK DIAGRAM
(696-1540-00)

KING
KN 73
GLIDESLOPE RECEIVER

# CONTENTS

## SECTION V

## ILLUSTRATED PARTS LIST

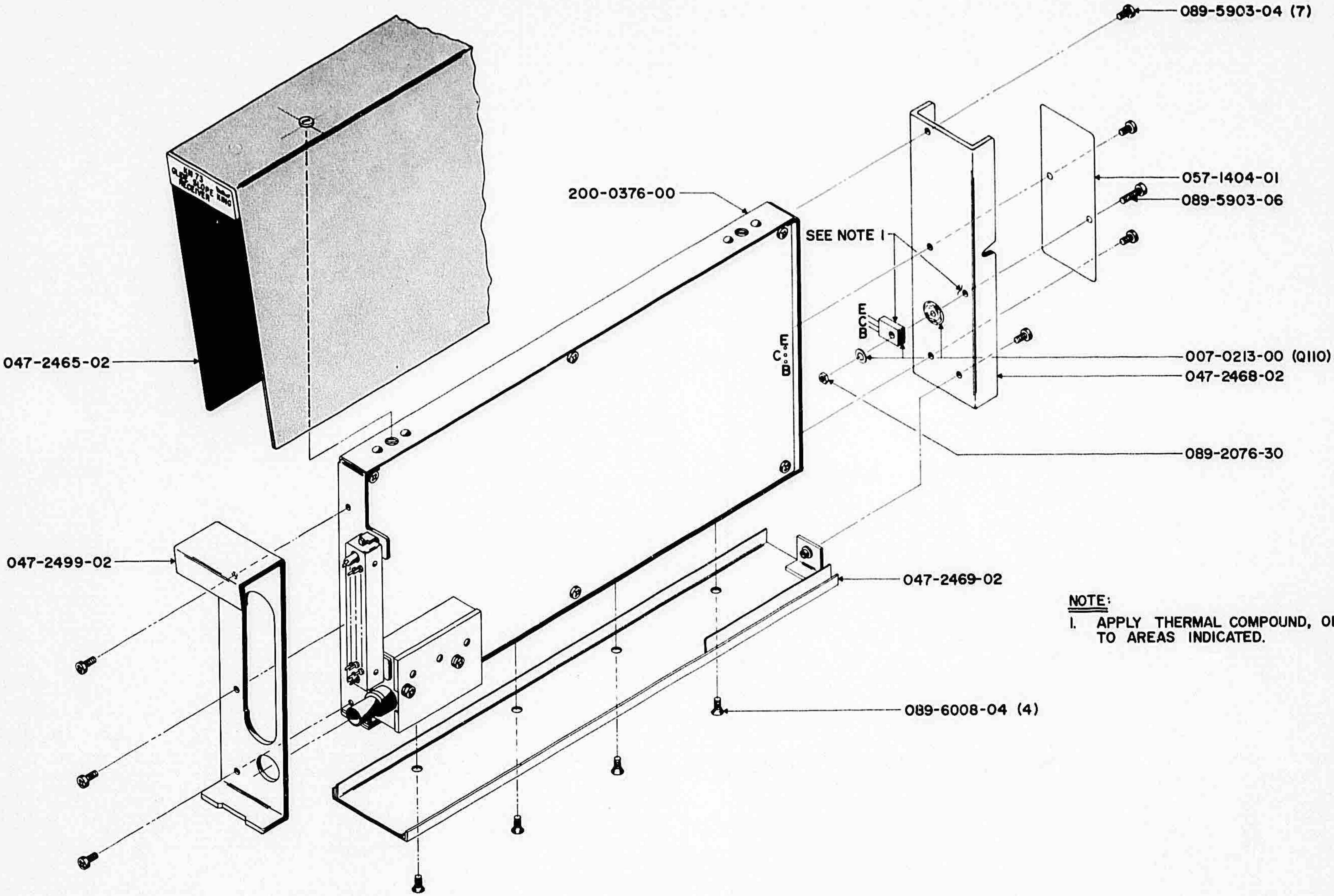
ASSEMBLY NO. 066-1033-00
DESCRIPTION FINAL ASSY
UNIT KN 73
B/MRL 1
USED ON ASSEMBLY 066-1033-00
ASSEMBLY DRAWING NO. 300-0504-00

| SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|
| | 016-1004-00 | Thermal Compound | AR |
| | 047-2465-02 | Equipment Cover | 1 |
| | 047-2468-02 | Rear Plate | 1 |
| | 047-2469-02 | Bottom Panel | 1 |
| | 047-2499-02 | Front Plate | 1 |
| | 057-1404-01 | Rear Nameplate | 1 |
| | 089-2076-30 | Nut, Hex #4-40 | 1 |
| R1 | 089-5436-04 | Screw, FHP #4-40X1/4 | 4 |
| | 089-5903-04 | Screw, PHP 4-40X1/4 | 7 |
| | 089-5903-06 | Screw, PHP 4-40X3/8 | 1 |
| | 200-0376-00 | Chassis Assembly | 1 |
| Q110 | 007-0213-00 | Transistor, NPN Silicon 2N5191 | 1 |

Parts List Revisions Record

Assembly No. 066-1033-00 Manual Revision No.

| ACTION | SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| Changed | | 089-6008-04 | Screw, FHP 4-40 x 1/4, 100° | 4 |




NOTE:
1. APPLY THERMAL COMPOUND, 016-1004-00, TO AREAS INDICATED.

FIGURE 5-1 FINAL ASSEMBLY
(Dwg. No. 300-0504-00, R-1)

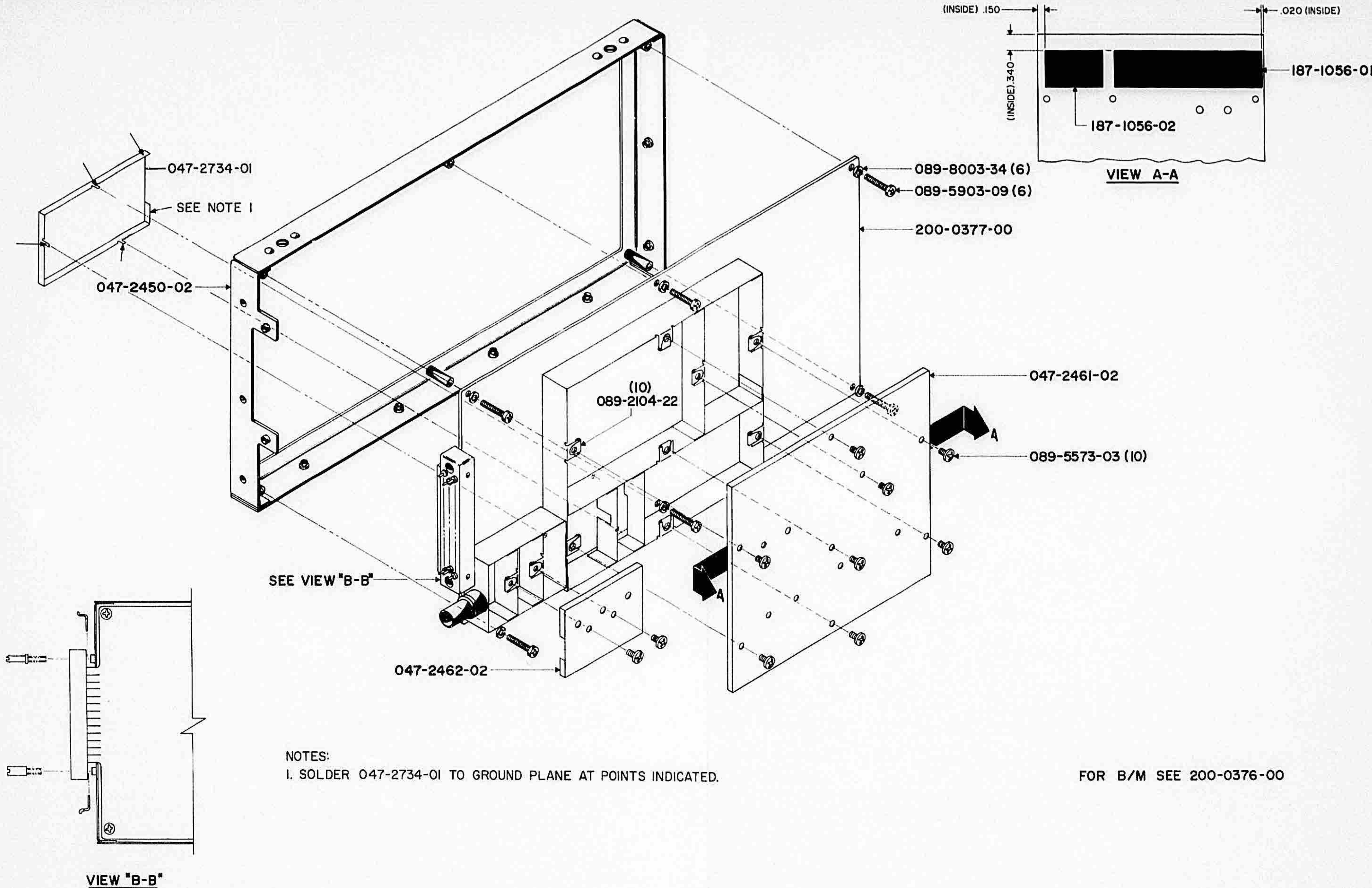
ASSEMBLY NO. 200-0376-00
DESCRIPTION CHASSIS ASSY
UNIT KN 73
B/MRL 2
USED ON ASSEMBLY 066-1033-00
ASSEMBLY DRAWING NO. 300-0505-00

| SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|
| | 047-2450-02 | Chassis | 1 |
| | 047-2461-02 | Cover, Osc. & I. F. | 1 |
| | 047-2462-02 | Cover, Preselector | 1 |
| R1 | 047-2472-01 | Shield, Mixer | 1 |
| | 089-2104-22 | Speednut #4 | 10 |
| R1 | 089-5573-03 | Screw, Fillister #4-40X3/16 | 10 |
| | 089-5903-09 | Screw, PHP #4-40X9/16 | 6 |
| | 089-8003-34 | Washer S/L #4 | 6 |
| | 187-1056-01 | Crystal Cushion | 1 |
| | 187-1056-02 | Crystal Cushion | 1 |
| | 200-0377-00 | P. C. Board Assy | 1 |

Parts List Revisions Record

Assembly No. 200-0376-00 Manual Revision No. 1

| ACTION | SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| Changed | | 047-2734-01 | Shield, Mixer | 1 |
| Changed | | 089-5573-02 | Screw, Truss 4-40 x 1/4 | 10 |




NOTES:
1. SOLDER 047-2734-01 TO GROUND PLANE AT POINTS INDICATED.

FOR B/M SEE 200-0376-00

FIGURE 5-2 CHASSIS ASSEMBLY
(Dwg. No. 300-0505-00, R-2)

ASSEMBLY NO. 200-0377-00
DESCRIPTION P.C. BOARD
UNIT KN 73
B/MRL 15
USED ON ASSEMBLY 200-0376-00
ASSEMBLY DRAWING NO. (See Figure 6-4)

| SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|
| R1 | 009-5198-00 | P. C. Board | 1 |
| | 016-1008-04 | Adhesive, Glyptal | |
| | 016-1040-00 | Clear Urethane Seal Coat | |
| | 026-0003-00 | Wire, Tinned Copper #22 | .1 |
| | 047-2458-01 | Fence, Osc. & I. F. | 1 |
| | 047-2459-01 | Fence, Preselector | 1 |
| | 076-0243-00 | Swage Bushing | 1 |
| | 088-0066-00 | Crystal Spacer | 14 |
| | 089-8033-55 | Washer, Interlock | 1 |
| C101 | 113-5471-00 | Cap D/C 470pf X5F | 1 |
| C102 | 102-0009-33 | Cap Var 7-25pf N300 | 1 |
| C104 | 113-5102-00 | Cap D/C .001μf X5F | 1 |
| C105 | 102-0009-33 | Cap Var 7-25pf N300 | 1 |
| C107 | 102-0009-33 | Cap Var 7-25pf N300 | 1 |
| C108 | 113-3015-00 | Cap D/C 1.5pf | 1 |
| C109 | 104-0001-09 | Cap D/M 47pf 5% | 1 |
| C110 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C111 | 113-3220-00 | Cap D/C 22pf N150 | 1 |
| C112 | 113-5102-00 | Cap D/C .001μf X5F | 1 |
| C113 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C115 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C116 | 113-5102-00 | Cap D/C .001μf X5F | 1 |
| C117 | 102-0009-37 | Cap Var 9-35pf N650 | 1 |
| C118 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C119 | 102-0009-37 | Cap Var 9-35pf N650 | 1 |
| C120 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C121 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C122 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C123 | 113-3047-01 | Cap D/C 4.7pf N470 | 1 |
| C124 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C125 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C126 | 113-3330-00 | Cap D/C 33pf N150 | 1 |
| C127 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C128 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C129 | 113-3100-00 | Cap D/C 10pf N150 | 1 |
| C130 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C131 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C132 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C133 | 114-7104-00 | Cap D/C 0.1μf X5R | 1 |
| C134 | 096-1005-09 | Cap Tant 1μf 35V 20% | 1 |
| C135 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C136 | 096-1005-00 | Cap Tant 1μf 35V 20% | 1 |
| C137 | 104-0001-44 | Cap D/M 56pf 5% | 1 |

ASSEMBLY NO. 200-0377-00
DESCRIPTION P. C. BOARD
UNIT KN 73
B/MRL 15
USED ON ASSEMBLY 200-0376-00
ASSEMBLY DRAWING NO. (See Figure 6-4)

| SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|
| C138 | 104-0001-45 | Cap D/M 43pf 5% | 1 |
| C139 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C140 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C141 | 113-3100-00 | Cap D/C 10pf N150 | 1 |
| C142 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C143 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C144 | 113-5471-00 | Cap D/C 470pf X5F | 1 |
| C145 | 113-3068-00 | Cap D/C 6.8pf N150 | 1 |
| C146 | 113-3220-00 | Cap D/C 22pf N150 | 1 |
| C147 | 102-0009-33 | Cap Var 7-25pf N300 | 1 |
| C148 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C149 | 106-0001-33 | Cap F/C 4.7pf 5% | 1 |
| C150 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C151 | 102-0009-33 | Cap Var 7-25pf N300 | 1 |
| C152 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C153 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C154 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C155 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C156 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C157 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C158 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C159 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C160 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C161 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C162 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C163 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C164 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C165 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C166 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| R1 C167 | 104-0001-17 | Cap D/M 39pf 5% | 1 |
| C168 | 104-0001-45 | Cap D/M 43pf,5% | 1 |
| C169 | 109-0007-03 | Cap D/C 0.05uf 25V 30% | 1 |
| C170 | 113-3068-00 | Cap D/C 6.8pf N150 | 1 |
| C171 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C172 | 113-3068-00 | Cap D/C 6.8pf N150 | 1 |
| C173 | 108-5016-74 | Cap P/C 0.1μf 5% | 1 |
| C174 | 108-5016-74 | Cap P/C 0.1μf 5% | 1 |
| C175 | 108-5016-68 | Cap P/C 0.068μf 5% | 1 |
| C176 | 108-5016-68 | Cap P/C 0.068μf 5% | 1 |
| C177 | 096-1005-00 | Cap Tant 1μf 35V 20% | 1 |
| C178 | 108-5016-74 | Cap P/C 0.1μf 5% | 1 |
| C179 | 108-5016-74 | Cap P/C 0.1μf 5% | 1 |
| C180 | 096-1005-00 | Cap Tant 1μf 35V 20% | 1 |

ASSEMBLY NO. 200-0377-00
DESCRIPTION P. C. BOARD
UNIT KN 73
B/MRL 17
USED ON ASSEMBLY 200-0376-00
ASSEMBLY DRAWING NO. (See Figure 6-4)

| SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|
| C181 | 096-1007-00 | Cap Tant 2.2μf 20V 20% | 1 |
| C182 | 096-1007-00 | Cap Tant 2.2μf 20V 20% | 1 |
| R2 C183 | 096-1003-00 | Cap Tant 4.7μf 10V 20% | 1 |
| R2 C184 | 096-1003-00 | Cap Tant 4.7μf 10V 20% | 1 |
| C185 | 096-1005-00 | Cap Tant 1μf 35V 20% | 1 |
| C186 | 097-0057-34 | Cap Elect 470μf 25V | 1 |
| C187 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C188 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C189 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C190 | 096-1007-00 | Cap Tant 2.2μf 20V 20% | 1 |
| C191 | 096-1007-00 | Cap Tant 2.2μf 20V 20% | 1 |
| C192 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C193 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C194 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C195 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C196 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C197 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C198 | 113-6103-00 | Cap D/C 0.01μf 50V Z5U | 1 |
| C199 | 109-0007-00 | Cap D/C 0.01μf 25V 30% | 1 |
| C200 | 096-1007-00 | Cap Tant 2.2μf 20V 20% | 1 |
| C201 | 113-3220-00 | Cap D/C 22pf N150 | 1 |
| R1 CJ101 | 026-0048-00 | Circuit Jumper | 1 |
| R1 CJ102 | 026-0048-00 | Circuit Jumper | 1 |
| R1 CJ103 | 026-0048-00 | Circuit Jumper | 1 |
| R1 CJ104 | 026-0048-00 | Circuit Jumper | 1 |
| R1 CJ105 | 026-0048-00 | Circuit Jumper | 1 |
| R1 CJ106 | 026-0048-00 | Circuit Jumper | 1 |
| CR101 | 007-6029-00 | Diode Sil 1N457 | 1 |
| R1 CR102 | 007-6035-00 | Diode Sil 1N816 | 1 |
| CR103 | 007-6070-00 | Diode Sil MPN3401 | 1 |
| CR104 | 007-6070-00 | Diode Sil MPN3401 | 1 |
| CR105 | 007-6070-00 | Diode Sil MPN3401 | 1 |
| CR106 | 007-6070-00 | Diode Sil MPN3401 | 1 |
| CR107 | 007-6070-00 | Diode Sil MPN3401 | 1 |
| CR108 | 007-6070-00 | Diode Sil MPN3401 | 1 |
| CR109 | 007-6070-00 | Diode Sil MPN3401 | 1 |
| CR110 | 007-6070-00 | Diode Sil MPN3401 | 1 |
| CR111 | 007-6070-00 | Diode Sil MPN3401 | 1 |
| CR112 | 007-6070-00 | Diode Sil MPN3401 | 1 |
| CR113 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR114 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR115 | 007-6033-00 | Diode Gérm 1N270 | 1 |
| CR116 | 007-6033-00 | Diode Germ 1N270 | 1 |

ASSEMBLY NO. 200-0377-00
DESCRIPTION P. C. BOARD
UNIT KN 73
B/MRL 15
USED ON ASSEMBLY 200-0376-00
ASSEMBLY DRAWING NO. (See Figure 6-4)

| SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|
| CR117 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR118 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR119 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR120 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR121 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR122 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR123 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR124 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR125 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR126 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR127 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR128 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR129 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR130 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR131 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR132 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR133 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR134 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR135 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR136 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR137 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR138 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR139 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR140 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR141 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR142 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR143 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR144 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR145 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR146 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR147 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR148 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR149 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR150 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR151 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR152 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR153 | 007-6070-00 | Diode Sil MPN3401 | 1 |
| CR154 | 007-6070-00 | Diode Sil MPN3401 | 1 |
| CR155 | 007-6070-00 | Diode Sil MPN3401 | 1 |
| CR156 | 007-6070-00 | Diode Sil MPN3401 | 1 |
| CR157 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR158 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR159 | 007-6033-00 | Diode Germ 1N270 | 1 |

ASSEMBLY NO. 200-0377-00
DESCRIPTION P. C. BOARD
UNIT KN 73
B/MRL 17
USED ON ASSEMBLY 200-0376-00
ASSEMBLY DRAWING NO. (See Figure 6-4)

| SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|
| CR160 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR161 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR162 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR163 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR164 | 007-6033-00 | Diode Germ 1N270 | 1 |
| CR165 | 007-6029-00 | Diode Sil 1N457 | 1 |
| CR166 | 007-6029-00 | Diode Sil 1N457 | 1 |
| R2 CR167 | 007-5011-06 | Diode Zener 4.7U | 1 |
| CR168 | 007-6029-00 | Diode Sil 1N457 | 1 |
| CR169 | 007-6029-00 | Diode Sil 1N457 | 1 |
| CR170 | 007-6029-00 | Diode Sil 1N457 | 1 |
| CR171 | 007-6029-00 | Diode Sil 1N457 | 1 |
| CR172 | 007-6029-00 | Diode Sil 1N457 | 1 |
| CR173 | 007-6029-00 | Diode Sil 1N457 | 1 |
| CR174 | 007-6029-00 | Diode Sil 1N457 | 1 |
| CR175 | 007-6035-00 | Diode Sil 1N816 | 1 |
| CR176 | 007-5011-13 | Diode Zener 5.6V | 1 |
| FL101 | 017-0039-00 | Filter XTAL 21.400MHz | 1 |
| I101 | 120-3020-00 | I.C. IF Amp MC1350P | 1 |
| I102 | 120-3020-00 | I.C. IF Amp MC1350P | 1 |
| R2 I103 | 120-3022-01 | I.C. Dual OP-AMP S5558T | 1 |
| R2 I104 | 120-3022-01 | I.C. Dual OP-AMP S5558T | 1 |
| R2 I105 | 120-3022-01 | I.C. Dual OP-AMP S5558T | 1 |
| J101 | 030-2152-00 | Conn. Plug 24 Pin | 1 |
| J102 | 030-0004-00 | Conn. BNC | 1 |
| L104 | 019-2084-27 | Ind Molded 1.8μh 10% | 1 |
| L105 | 019-2084-23 | Ind Molded 1.2μh 10% | 1 |
| L106 | 019-2084-09 | Ind Molded .33μh 10% | 1 |
| L107 | 019-2084-15 | Ind Molded .56μh 10% | 1 |
| L108 | 019-2084-01 | Ind Molded .15μh 10% | 1 |
| L111 | 019-2084-47 | Ind Molded 12μh 10% | 1 |
| L112 | 019-2084-21 | Ind Molded 1μh 10% | 1 |
| L113 | 019-2084-47 | Ind Molded 12μh 10% | 1 |
| L115 | 019-2084-35 | Ind RF 3.9μh 10% | 1 |
| L116 | 019-2084-17 | Ind Molded .68μh 10% | 1 |
| L117 | 019-2084-05 | Ind Molded .22μh 10% | 1 |
| L118 | 019-2084-05 | Ind Molded .22μh 10% | 1 |
| Q101 | 007-0028-00 | TSTR Sil SE3001 | 1 |
| Q102 | 007-0196-00 | TSTR Sil MPS-H20 | 1 |
| Q103 | 007-0119-00 | TSTR Sil 2N4917 | 1 |

ASSEMBLY NO. 200-0377-00
DESCRIPTION P. C. BOARD
UNIT KN 73
B/MRL15
USED ON ASSEMBLY 200-0376-00
ASSEMBLY DRAWING NO. (See Figure 6-4)

| SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|
| R1Q104 | 007-0134-00 | TSTR Sil SE3005 | 1 |
| R1Q105 | 007-0028-00 | TSTR Sil SE3001 | 1 |
| Q106 | 007-0028-00 | TSTR Sil SE3001 | 1 |
| R1Q107 | 007-0134-00 | TSTR Sil SE3005 | 1 |
| R1Q108 | 007-0028-00 | TSTR Sil SE3001 | 1 |
| Q109 | 007-0078-00 | TSTR Sil 2N3415 | 1 |
| R1Q111 | 007-0135-00 | TSTR Sil 2N5307 | 1 |
| Q112 | 007-0078-00 | TSTR Sil 2N3415 | 1 |
| Q113 | 007-0078-00 | TSTR Sil 2N3415 | 1 |
| Q114 | 007-0078-00 | TSTR Sil 2N3415 | 1 |
| Q115 | 007-0078-00 | TSTR Sil 2N3415 | 1 |
| R101 | 130-0222-25 | Res F/C 2.2K 10% QW | 1 |
| R102 | 130-0333-25 | Res F/C 33K 10% QW | 1 |
| R103 | 130-0682-25 | Res F/C 6.8K 10% QW | 1 |
| R104 | 130-0752-23 | Res F/C 7.5K 5% QW | 1 |
| R105 | 130-0102-25 | Res F/C 1K 10% QW | 1 |
| R106 | 130-0102-25 | Res F/C 1K 10% QW | 1 |
| R107 | 130-0472-25 | Res F/C 4.7K 10% QW | 1 |
| R108 | 130-0392-25 | Res F/C 3.9K 10% QW | 1 |
| R109 | 130-0103-25 | Res F/C 10K 10% QW | 1 |
| R110 | 130-0432-23 | Res F/C 4.3K 5% QW | 1 |
| R111 | 130-0471-25 | Res F/C 470 10% QW | 1 |
| R112 | 130-0102-25 | Res F/C 1K 10% QW | 1 |
| R113 | 130-0242-23 | Res F/C 2.4K 5% QW | 1 |
| R114 | 130-0101-25 | Res F/C 100 10% QW | 1 |
| R115 | 130-0332-25 | Res F/C 3.3K 10% QW | 1 |
| R116 | 130-0333-25 | Res F/C 33K 10% QW | 1 |
| R117 | 130-0333-25 | Res F/C 33K 10% QW | 1 |
| R118 | 130-0101-25 | Res F/C 100 10% QW | 1 |
| R119 | 130-0332-25 | Res F/C 3.3K 10% QW | 1 |
| R120 | 130-0272-25 | Res F/C 2.7K 10% QW | 1 |
| R121 | 130-0151-23 | Res F/C 150 5% QW | 1 |
| R122 | 130-0471-25 | Res F/C 470 10% QW | 1 |
| R123 | 130-0103-25 | Res F/C 10K 10% QW | 1 |
| R124 | 130-0472-25 | Res F/C 4.7K 10% QW | 1 |
| R125 | 130-0104-25 | Res F/C 100K 10% QW | 1 |
| R126 | 130-xxxx-23 | Sel Value (See Res. List) | |
| | 130-0392-23 | Res F/C 3.9K 5% QW | 1 |
| | 130-0432-23 | Res F/C 4.3K 5% QW | 1 |
| | 130-0472-23 | Res F/C 4.7K 5% QW | 1 |
| | 130-0512-23 | Res F/C 5.1K 5% QW | 1 |
| | 130-0562-23 | Res F/C 5.6K 5% QW | 1 |
| | 130-0622-23 | Res F/C 6.2K 5% QW | 1 |
| | 130-0682-23 | Res F/C 6.8K 5% QW | 1 |



Rev. 1, July., 1973

ASSEMBLY NO. 200-0377-00
DESCRIPTION P. C. BOARD
UNIT KN 73
B/MRL 15
USED ON ASSEMBLY 200-0376-00
ASSEMBLY DRAWING NO. (See Figure 6-4)

| SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|
| R127 | 130-0103-25 | Res F/C 10K 10% QW | 1 |
| R128 | 130-0105-25 | Res F/C 1Meg 10% QW | 1 |
| R1 R129 | 130-0101-25 | Res F/C 100 10% QW | 1 |
| R130 | 130-0272-25 | Res F/C 2.7K 10% QW | 1 |
| R131 | 130-0221-23 | Res F/C 220 5% QW | 1 |
| R132 | 130-0331-25 | Res F/C 330 10% QW | 1 |
| R133 | 130-0391-25 | Res F/C 390 10% QW | 1 |
| R134 | 130-0102-25 | Res F/C 1K 10% QW | 1 |
| R135 | 130-0101-25 | Res F/C 100 10% QW | 1 |
| R136 | 130-0102-25 | Res F/C 1K 10% QW | 1 |
| R1 R137 | 130-0104-25 | Res F/C 100K 10% QW | 1 |
| R138 | 130-0101-25 | Res F/C 100 10% QW | 1 |
| R139 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R140 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R141 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R142 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R143 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R144 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R145 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R146 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R147 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R148 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R149 | 130-0332-25 | Res F/C 3.3K 10% QW | 1 |
| R150 | 130-0101-25 | Res F/C 100 10% QW | 1 |
| R151 | 130-0101-25 | Res F/C 100 10% QW | 1 |
| R1 R152 | 130-0331-25 | Res F/C 330 10% QW | 1 |
| R153 | 130-0391-25 | Res F/C 390 10% QW | 1 |
| R154 | 130-0331-25 | Res F/C 330 10% QW | 1 |
| R155 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R156 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R157 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R158 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R159 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R160 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R161 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R162 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R163 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R164 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R165 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R166 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R167 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |

ASSEMBLY NO. 200-0377-00
DESCRIPTION P. C. BOARD
UNIT KN 73
B/MRL 15
USED ON ASSEMBLY 200-0376-00
ASSEMBLY DRAWING NO. (See Figure 6-4)

| SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|
| R168 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R169 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R170 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R171 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R172 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R173 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R174 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R175 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R176 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R177 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R178 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R179 | 130-0103-25 | Res F/C 10K 10% QW | 1 |
| R180 | 130-0103-25 | Res F/C 10K 10% QW | 1 |
| R181 | 130-0103-25 | Res F/C 10K 10% QW | 1 |
| R182 | 130-0103-25 | Res F/C 10K 10% QW | 1 |
| R183 | 130-0102-25 | Res F/C 1K 10% QW | 1 |
| R184 | 130-0102-25 | Res F/C 1K 10% QW | 1 |
| R185 | 130-0102-25 | Res F/C 1K 10% QW | 1 |
| R186 | 130-0102-25 | Res F/C 1K 10% QW | 1 |
| R187 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R188 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R189 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R190 | 130-0152-25 | Res F/C 1.5K 10% QW | 1 |
| R191 | 130-0102-25 | Res F/C 1K 10% QW | 1 |
| R192 | 130-0102-25 | Res F/C 1K 10% QW | 1 |
| R193 | 130-0103-25 | Res F/C 10K 10% QW | 1 |
| R194 | 133-0072-15 | Res Var 10K 20% | 1 |
| R195 | 136-3922-22 | Res PF 39.2K 1% QW | 1 |
| R196 | 136-1051-72 | Res PF 1.05K 1% EW | 1 |
| R197 | 136-1073-22 | Res PF 107K 1% QW | 1 |
| R198 | 136-8061-22 | Res PF 8.06K 1% QW | 1 |
| R199 | 136-8061-22 | Res PF 8.06K 1% QW | 1 |
| R200 | 133-0072-21 | Res Var 50K 20% | 1 |
| R201 | 136-1213-22 | Res PF 121K 1% QW | 1 |
| R202 | 136-6041-72 | Res PF 6.04K 1% EW | 1 |
| R203 | 136-1741-77 | Res PF 1.74K 1% EW | 1 |
| R204 | 136-1783-22 | Res PF 178K 1% QW | 1 |
| R205 | 130-0101-25 | Res F/C 100 10% QW | 1 |
| R206 | 136-8061-22 | Res PF 8.06K 1% QW | 1 |
| R207 | 130-0221-23 | Res F/C 220 5% QW | 1 |
| R208 | 136-8061-22 | Res PF 8.06K 1% QW | 1 |
| R209 | 136-3481-72 | Res PF 3.48K 1% EW | 1 |

ASSEMBLY NO. 200-0377-00
DESCRIPTION P. C. BOARD
UNIT KN 73
B/MRL 15
USED ON ASSEMBLY 200-0376-00
ASSEMBLY DRAWING NO. (See Figure 6-4)

| SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|
| R210 | 136-1213-22 | Res PF 121K 1% QW | 1 |
| R211 | 133-0072-09 | Res Var 1K 20% | 1 |
| R212 | 130-0101-25 | Res F/C 100 10% QW | 1 |
| R213 | 136-7500-22 | Res PF 750 1% QW | 1 |
| R214 | 136-2370-22 | Res PF 237 1% QW | 1 |
| R215 | 130-0102-23 | Res F/C 1K 5% QW | 1 |
| R216 | 130-0102-23 | Res F/C 1K 5% QW | 1 |
| R217 | 130-0102-23 | Res F/C 1K 5% QW | 1 |
| R218 | 136-2370-22 | Res PF 237 1% QW | 1 |
| R219 | 136-7500-22 | Res PF 750 1% QW | 1 |
| R220 | 130-0471-35 | Res F/C 470 10% HW | 1 |
| R221 | 130-0391-25 | Res F/C 390 10% QW | 1 |
| R222 | 130-0072-15 | Res Var 10K 20% | 1 |
| R223 | 130-0103-25 | Res F/C 10K 10% QW | 1 |
| R224 | 130-0682-25 | Res F/C 6.8K 10% QW | 1 |
| R225 | 130-0221-23 | Res F/C 220 5% QW | 1 |
| R226 | 130-0105-25 | Res F/C 1Meg 10% QW | 1 |
| R227 | 130-0105-25 | Res F/C 1Meg 10% QW | 1 |
| R228 | 130-0105-25 | Res F/C 1Meg 10% QW | 1 |
| R229 | 130-0105-25 | Res F/C 1Meg 10% QW | 1 |
| R230 | 130-0105-25 | Res F/C 1Meg 10% QW | 1 |
| R231 | 130-0105-25 | Res F/C 1Meg 10% QW | 1 |
| R232 | 130-0105-25 | Res F/C 1Meg 10% QW | 1 |
| R233 | 130-0105-25 | Res F/C 1Meg 10% QW | 1 |
| R234 | 130-0105-25 | Res F/C 1Meg 10% QW | 1 |
| R235 | 130-0105-25 | Res F/C 1Meg 10% QW | 1 |
| R236 | 130-0105-25 | Res F/C 1Meg 10% QW | 1 |
| R237 | 130-0105-25 | Res F/C 1Meg 10% QW | 1 |
| R238 | 130-0105-25 | Res F/C 1Meg 10% QW | 1 |
| R239 | 130-0105-25 | Res F/C 1Meg 10% QW | 1 |
| RT101 | 134-1009-00 | TMTR 500 10% | 1 |
| T101 | 019-3048-00 | Trans 75MHz RF | 1 |
| T102 | 019-3048-00 | Trans 75MHz RF | 1 |
| T103 | 019-8042-00 | Trans 10.7MHz IF | 1 |
| T104 | 019-8042-00 | Trans 10.7MHz IF | 1 |
| TP101 | 010-0022-07 | Test Point Yellow | 1 |
| TP102 | 010-0022-04 | Test Point Green | 1 |
| TP103 | 010-0022-12 | Test Point Violet | 1 |
| TP104 | 010-0022-13 | Test Point Grey | 1 |
| TP105 | 010-0022-02 | Test Point Red | 1 |
| TP106 | 010-0022-06 | Test Point Orange | 1 |

ASSEMBLY NO. 200-0377-00
DESCRIPTION P. C. BOARD
UNIT KN 73
B/MRL 15
USED ON ASSEMBLY 200-0376-00
ASSEMBLY DRAWING NO. (See Figure 6-4)

| SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|
| Y101 | 044-0048-00 | XTAL 85.125MHz | 1 |
| Y102 | 044-0048-01 | XTAL 85.325MHz | 1 |
| Y103 | 044-0048-02 | XTAL 85.525MHz | 1 |
| Y104 | 044-0048-03 | XTAL 85.725MHz | 1 |
| Y105 | 044-0048-04 | XTAL 85.925MHz | 1 |
| Y106 | 044-0048-05 | XTAL 86.125MHz | 1 |
| Y107 | 044-0048-06 | XTAL 86.325MHz | 1 |
| Y108 | 044-0048-07 | XTAL 86.525MHz | 1 |
| Y109 | 044-0048-08 | XTAL 86.725MHz | 1 |
| Y110 | 044-0048-09 | XTAL 86.925MHz | 1 |
| Y111 | 044-0047-00 | XTAL 52.375MHz | 1 |
| Y112 | 044-0047-01 | XTAL 52.525MHz | 1 |
| Y113 | 044-0047-02 | XTAL 52.675MHz | 1 |
| Y114 | 044-0047-03 | XTAL 52.825MHz | 1 |

Parts List Revisions Record

Assembly No. 200-0377-00 — Manual Revision No. 1

| ACTION | SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| Changed | | 009-5198-01 | P. C. Board | 1 |
| Changed | C167 | 104-0001-44 | Cap DM 56pf 5% | 1 |
| Changed | CJ101 | 026-0018-00 | Circuit Jumper | 1 |
| Changed | CJ102 | 026-0018-00 | Circuit Jumper | 1 |
| Changed | CJ103 | 026-0018-00 | Circuit Jumper | 1 |
| Changed | CJ104 | 026-0018-00 | Circuit Jumper | 1 |
| Changed | CJ105 | 026-0018-00 | Circuit Jumper | 1 |
| Changed | CJ106 | 026-0018-00 | Circuit Jumper | 1 |
| Changed | Q104 | 007-0195-00 | Tstr sil MPS-H10 | 1 |
| Changed | Q105 | 007-0195-00 | Tstr sil MPS-H10 | 1 |
| Changed | Q107 | 007-0195-00 | Tstr sil MPS-H10 | 1 |
| Changed | Q108 | 007-0195-00 | Tstr silMPS-H10 | 1 |
| Changed | I103 | 120-3022-02 | Int Ckt Dual Op-Amp S5558T | 1 |
| Changed | I104 | 120-3022-02 | Int Ckt Dual Op-Amp S5558T | 1 |
| Changed | I105 | 120-3022-02 | Int Ckt Dual Op-Amp S5558T | 1 |
| Delete | R129 | | Not Used | |
| Changed | R137 | 130-0303-23 | Res FC 30K 5% QW | 1 |
| Changed | R152 | 130-0221-25 | Res FC 220 10% QW | 1 |
| Added | | 012-1064-00 | Insulator, Filter | 1 |
| Added | C202 | 109-0003-00 | Cap DC 2. 2pf N750 | 1 |
| Changed | CR102 | 007-6035-02 | Diode Sil 1N816 | 1 |

Manual Revision No. 2

| ACTION | SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| Delete | CR167 | 007-5011-06 | Dio. Zen. 4. 7V | 1 |
| Added | CR167 | 007-5011-13 | Dio. Zen. 5. 6V | 1 |
| Changed | I103 | 120-3022-01 | IC Dual Op Amp MPS5558T | 1 |
| | I104 | 120-3022-01 | IC Dual Op Amp MPS5558T | 1 |
| | I105 | 120-3022-01 | IC Dual Op Amp MPS5558T | 1 |
| Changed | C183 | 096-1030-05 | Cap. Tant 10μf 20V 10% | 1 |
| | C184 | 096-1030-05 | Cap. Tant 10μf 20V 10% | 1 |

# CONTENTS

## SECTION VI

## MAINTENANCE

# SECTION VI

# MAINTENANCE

## 6.1 GENERAL

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

## 6.2 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.

## 6.3 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 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.

## 6.4 SEMICONDUCTOR REPLACEMENT

It is recommended that semiconductors not be tested or replaced until unsatisfactory performance is observed.

## 6.5 SEMICONDUCTOR MAINTENANCE

### 6.5.1 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 resistances, an instrument very accurate in the low resistance ranges must be used, and when measuring values of capacitors, an instrument accurate in the high ranges must be employed. Capacitor polarity must be observed when measuring resistance. Usually more accurate measurements can be obtained if the semiconductors are removed or disconnected from the circuit.

### 6.5.2 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 paragraphs.

#### 6.5.2.1 TRANSFORMERLESS POWER SUPPLIES

Test equipment with transformerless power supplies is one cource of high current. However, this type of test equipment can be used by employing an isolation transformer in the AC power line.

#### 6.5.2.2 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 semiconductor. To eliminate this condition, connect a ground wire from the chassis of the equipment under test before making any other connections.

#### 6.5.2.3 LOW-SENSITIVITY MULTIMETERS

Another cause of semiconductor damage is a multimeter that requires excessive current to provide adequate indications. Multimeter with sensitivities of less than 20,000-ohms-per-volt should not be used on semiconductors. A multimeter with low sensitivity will draw too much current through many types of small semiconductors, causing damage. When in doubt as to the amount of current supplied by a multimeter, check the multimeter circuits on all scales with an external low-resistance multimeter connected in series with the multimeter leads. If more than one milliampere is drawn by the multimeter on any range, this range cannot be safely used on small semiconductors.

#### 6.5.2.4 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.

### 6.5.3 SEMICONDUCTOR VOLTAGE AND RESISTANCE MEASUREMENT

When measuring voltage or resistances 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 (especially in audio, servo, or power circuits) time is required to charge these capacitors when an ohmmeter is connected to a circuit in which 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.

### 6.5.4 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 preceding paragraph 6.5.2.3.

6.5.4.1 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. 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 a resistance value of 500 ohms or less should be obtained. When the positive lead is connected to the collector a value of 500 ohms or less should be likewise obtained.

6.5.4.2 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 th base and the collector should be high. With the positive lead of the multimeter connected to the base, the value of resistance between the base and the collector 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.

6.5.4.3 TRANSISTOR BIASING

Always check the value of the bias resistors in series with the various transistor elements. A transistor is very sensitive to improper bias voltage; therefore, a short or open circuit in the bias resistance may damage the transistor. For this reason, do not troubleshoot by shorting the various points in the circuit to ground and listening for clicks.

6.5.5 REPLACING SEMICONDUCTORS

Never remove or replace a plug-in 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.

6.5.5.1 Use only a low heat soldering iron when installing or removing soldered-in-parts. Use care in the handling of printed circuit boards. When removing a part from a printed circuit board, first unbend the crimped leads. Use only the necessary amount of heat to unsolder the part. Clear excess solder from mounting eyelets, making sure that mounting holes are clear before installing new parts. When removing a transformer or other part having a multiple number of leads, straighten (unbend) all leads first and then heat leads one at a time, working around the part, until the part can be gently "rocked out".

6.5.5.2 When installing or removing a 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.

6.5.5.3 When soldering is required to remove a component from a semiconductor socket, remove the semiconductor to prevent damage to the semiconductor.

6.5.5.4 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. Often, this insulating is accomplished by means of insulating washers made of fiber and mica. When replacing transistors mounted in this manner, be sure that the insulating washers are replaced in proper order. Before installing the mica washers, treat them with a film of thermal compound. This treatment helps in the transfer of heat. 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.

## 6.6 ASSEMBLY/DISASSEMBLY PROCEDURES

6.6.1 DISASSEMBLY

1. Loosen two Dzus screws on the cover and remove cover.
2. Remove eight screws holding the Oscillator/IF cover to the P.C. board and remove cover.
3. Remove two screws holding the Preselector cover to the P.C. board and remove cover.
4. Remove five screws holding the bottom plate to the chassis and rear plate and remove bottom plate.
5. Remove three screws holding the front plate to the chassis and remove front plate.
6. Remove the two locating pins holding the power/control connector to the chassis. Note their positions and sequence of hardware with the connector.
7. Remove the screw holding Q110 to the rear plate. Note the special torque washer on the screw. Take care to protect the mica washer between Q110 and the rear plate. Coat the mica washer with heat sink compound, KPN 016-1004-00, before re-assembly.
8. Remove six screws holding P.C. board to the chassis and remove the P.C. board.

6.6.2 ASSEMBLY

Re-assembling the unit is accomplished by reversing the procedure outlined in paragraph 6.6.1, Disassembly.

## 6.7 TEST EQUIPMENT

The following test equipment, or equivalent, is required to properly align the KN 73. All test equipment must be properly calibrated before adjustments are started.

| DESCRIPTION | CHARACTERISTICS REQUIRED | REPRESENTATIVE TYPE |
|---|---|---|
| a. KN 73 Test Fixture | See Figure 6-1 | |
| b. D.C. Power Supply | 0-50VDC, 1.5 amp | Heath IP-27 |

| DESCRIPTION | CHARACTERISTICS REQUIRED | REPRESENTATIVE TYPE |
|---|---|---|
| c. D.C. VTVM | Input Impedance: 2 megohms or greater. Voltage range: 1 volt to 100 volts | Digitec Model 201 |
| d. A.C. VTVM | Input Impedance: 2 megohms or greater. Voltage range: 1 millivolt to 100 volts. Scale calibrated in decibels. | Hewlett Packard Model 3400A |
| e. R.F. VTVM | Voltage range: 10 millivolts to 10 volts. Frequency range: 1MHz to 500MHz | Hewlett Packard Model 411A. |
| f. Glideslope Signal Generator | Frequency Range: 329.3MHz to 335.0MHz | Boonton Model 232A |
| g. R.F. Signal Generator | Frequency Range: 10MHz to 480MHz | Hewlett Packard Model 608E |
| h. 6db Attenuator | Input-Output Impedance: 50 ohms Attenuation: 6.0db | Texcan Corporation Model FP-5016 |
| i. Coaxial Cable, 50 ohms | BNC connector to open end with small alligator clips. | |
| j. Oscilloscope | Dual Trace | Tektronix 454 |

## 6.8 ALIGNMENT PROCEDURES

6.8.1 INITIAL SETTINGS

A. Preset Potentiometers as listed below.

1. R200 and R222 - center of range
2. R194 and R211 - maximum ccw

B. Preset Transformers as listed below.

1. T101, 102, 104 - top of slug approximately 1/8 inch from top of transformer.
2. T103 - top of slug even with top of transformer.

6.8.2 REGULATED 10VDC ADJUSTMENT

A. Connect unit to test fixture through cable to J101.

B. Adjust D.C. power supply source for 13.75 ±0.1VDC. Turn on power to unit.

C. Connect DC voltmeter to TP6 (orange test point) and adjust R222 for a reading of 10 ±0.1VDC on meter.

6.8.3 21.4MHz IF ALIGNMENT

A. Connect audio voltmeter to TP1 (yellow test point) and select 1 volt RMS range.

B. Set 608E generator to 21.4MHz modulated 30% at 1000Hz. Connect cable (item i) to 608E generator.

C. Following procedure is done with signal insertion, adjusting generator level to maintain one third scale reading on audio voltmeter.

1. Clip center conductor of cable from generator to body of C126 (cable shield to chassis ground). Adjust T104 for maximum audio at TP1.

2. Clip center conductor of cable to body of C104 and adjust T103 for maximum audio at TP1.

3. Clip center conductor of cable to body of C116 and adjust C119 and C117 for maximum audio.

6.8.4 74.2MHz IF ALIGNMENT

A. Adjust frequency selector on test fixture to 109.30MHz. (Leave selector on this frequency for balance of alignment).

B. Connect cable (item i) to 608E gen. and adjust frequency to 74.225MHz, modulated 30% at 1000Hz.

C. Connect audio voltmeter to TP1 (yellow test point) and use signal insertion procedure as in paragraph 6.8.3 as follows:

1. Clip center conductor of cable to body of C112 and adjust T102 for maximum audio.

2. Clip center conductor of cable to body of C109 and adjust T101 for maximum audio.

NOTE: At this point it may be necessary to adjust 1st oscillator capacitors C147 and C151 to get adequate signal level through 1st mixer. If increase in audio is not obtained, connect RF millivoltmeter to junction of C146 and L110 and adjust C147/C151 for maximum RF.

6.8.5 PRESELECTOR ALIGNMENT

A. Connect 232A generator through 6db pad to J102 on unit.

B. Adjust generator frequency to 332.0MHz, modulate 40% each with 90Hz and 150Hz and set tone ratio to 0db.

C. While metering audio at TP1 (yellow test point) as in paragraph 6.8.3 and 6.8.4, adjust C102, 105 and 107 for maximum audio.

6.8.6 1st OSCILLATOR AND FINAL ALIGNMENT

A. With 232A set as in paragraph 6.8.5 and preselector and OSC/IF covers installed make following adjustments.

1. Adjust C147 and C151 for maximum audio.
2. Adjust T101, 102, 103 and 104 for maximum. Adjust C102, 105, 107, 117, 119, 147, and 151 for maximum. Repeat these adjustments until no further improvement is noted.

6.8.7 R126 SELECTION (Note: R126 should be selected whenever the detector, Q103, has been replaced).

A. Connect audio voltmeter to TP1 (yellow test point) adjust 232A generator to 700 microvolts. Reduce RF level until audio has decreased 3db. This shall be less than 30 microvolts RF input. (Hard $\mu$v)

B. If Step A is met, proceed to Section 6.8.8. If Step A is not met, proceed to Step C of this Section 6.8.7.

C. Connect DC voltmeter to TP2 (green test point) and set on 15VDC scale.

D. AGC quiescent voltage with no signal input will be approximately +0.7VDC. With decade resistance box or alternate methods set R126 at 6.8K resistance. Reduce resistance in 5% steps until AGC abruptly changes. Note this resistance and install next 5% larger value of resistor that does not affect AGC quiescent voltage. Typically, a 5.1K or 5.6K is optimum.

E. Repeat Step A.

6.8.8 CENTERING, DEFLECTION AND FLAG ADJUSTMENTS

A. Recheck modulation levels on 232A generator (40% at 90Hz and 150Hz). Adjust RF level to 700 microvolts.

B. Set tone ratio to 0db and adjust R200 for 0 on test fixture deflection meter.

C. Set tone ratio to 2db 150Hz over 90Hz and adjust R194 for 78$\mu$a on deflection meter.

D. Due to interaction of controls, repeat steps B and C until readings are correct.

E. Set tone ratio to 2db 90Hz over 150Hz and check that deflection is 78 $\pm 3\mu$a.

F. Adjust R211 for 350$\mu$a on test fixture flag meter. Readjust R194 and R200 if necessary.

G. With tone ratio set at 2db 150Hz over 90Hz slowly decrease RF generator level until 60% of 78$\mu$a is obtained (47$\mu$a). RF level shall be less than 30 microvolts.

## 6.9 FINAL TEST DATA

6.9.1 GLIDESLOPE RECEIVER　　　　Serial Number__________

The following specifications (*) are 100% checked. R. F. signal levels are specified with a 6db, 50 ohm, attenuator between the signal generator and receiver (hard μv).

1. Current drain at 13.75VDC__________ma. ( 175ma)

2. Centering characteristic (±10μa maximum)

| (329.15MHz) | RF Level | Centering Current |
|---|---|---|
| | 100μv | __________μa |
| | 700μv | __________μa |
| | 5,000μv | __________μa |
| | 10,000μv | __________μa |

| *(332.3MHz) | RF Level | Centering Current |
|---|---|---|
| | 100μv | __________μa |
| | 700μv | __________μa |
| | 5,000μv | __________μa |
| | 10,000μv | __________μa |

| (335.0MHz) | RF Level | Centering Current |
|---|---|---|
| | 100μv | __________μa |
| | 700μv | __________μa |
| | 5,000μv | __________μa |
| | 10,000μv | __________μa |

3. Receiver Sensitivity ( 40μv for 47μa Dev.)

| Channel | *90Hz | *150Hz |
|---|---|---|
| 329.15MHz | __________μv | __________μv |
| 329.90MHz | __________μv | __________μv |
| 330.80MHz | __________μv | __________μv |
| 331.40MHz | __________μv | __________μv |
| 331.85MHz | __________μv | __________μv |
| 332.30MHz | __________μv | __________μv |
| 333.20MHz | __________μv | __________μv |
| 333.80MHz | __________μv | __________μv |
| 334.10MHz | __________μv | __________μv |
| 335.00MHz | __________μv | __________μv |

4. Deflection Characteristic (67μa to 89μa)

| RF Level | Deflection Current 90Hz/150Hz | | |
|---|---|---|---|
| | 329.15MHz | *332.3MHz | 335.0MHz |
| 100μv | ____μa/____μa | ____μa/____μa | ____μa/____μa |
| 10,000μv | ____μa/____μa | ____μa/____μa | ____μa/____μa |

5. Deflection Balance (±3μa) 700μv RF Level

| | 90Hz Predominent | 150Hz Predominent |
|---|---|---|
| 329.15MHz | ____μa | ____μa |
| *332.30MHz | ____μa | ____μa |
| 335.00MHz | ____μa | ____μa |

6. Alarm Signal (332.30MHz)

| Condition | Flat Current |
|---|---|
| RF OFF | ____μa (25μa max.) |
| 90 & 150Hz Mod. OFF | ____μa (25μa max.) |
| 90Hz Mod. OFF | ____μa (190μa max.) |
| 150Hz Mod. OFF | ____μa (190μa max.) |
| 20% Mod. of 90 and 150Hz | ____μa (190μa max.) |
| 50% Standard Deflection | ____μa (175μa max.) |
| 100μv RF | ____μa (250μa min.) |
| 700μv RF | ____μa (250μa min.) |
| 5,000μv RF | ____μa (250μa min.) |
| 30,000μv RF | ____μa (250μa min.) |

7. D. C. Regulation (10VDC -.15VDC, +.25VDC)

| DC Power Source | Regulated DC |
|---|---|
| 12.35VDC | ____VDC |
| 33.00VDC | ____VDC |

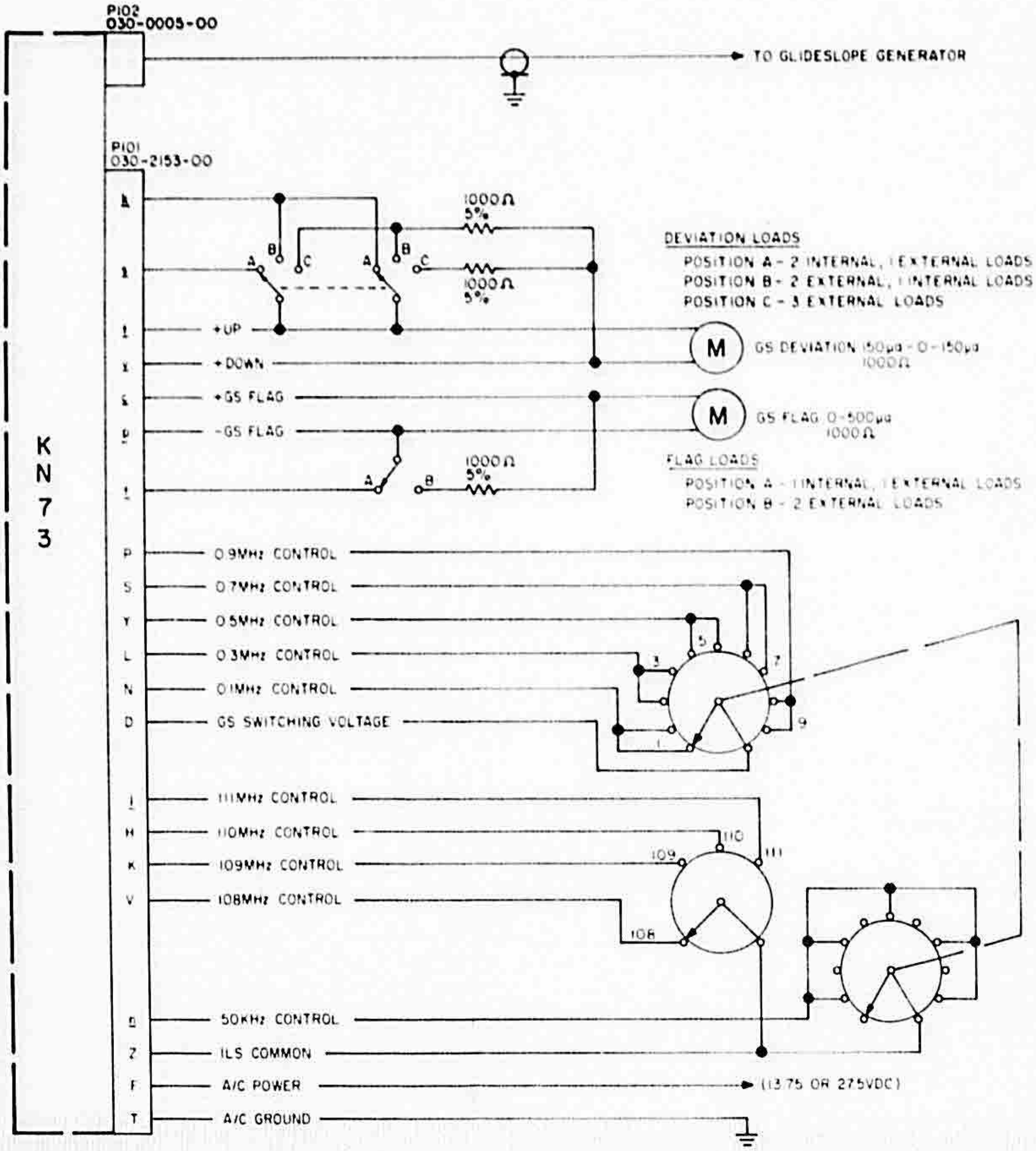



FIGURE 6-1 KN 73 TEST SET
(696-1541-00)



SEE BLOWUP

## 6.10 TROUBLESHOOTING

Figure 6-2 is a troubleshooting flow chart designed to aid the technician in localizing malfunctions in the KN 73.

As a further aid, Table 6-1 is a list of possible problem indications together with their associated causes and remedies.

Figure 6-3 illustrates certain waveforms which are necessary for proper operation of the KN 73.

Malfunctions are most easily located using these aids together with the schematic diagram and nominal operating voltage overlay.

| INDICATION | PROBABLE CAUSE | REMEDY |
|---|---|---|
| Entire unit inoperative | No A+ voltage | Check interconnect |
| +10 volt regulator output incorrect | R222 misadjusted | Adjust R222 |
| | +10 volt line shorted | Check for shorts |
| | Defective regulator | Check Q110, Q111, and associated components. |
| Low sensitivity on all channels | Receiver improperly aligned | Align receiver |
| | Defective first mixer | Check Q101 and associated components |
| | Defective second mixer | Check Q102 and associated components |
| | Defective first oscillator, buffer or tripler | Check Q104, Q105 and Q106 and associated components |
| | Defective second oscillator or buffer | Check Q107, Q108 and associated components |
| | Defective I. F. amplifiers | Check I101, I102, and associated components |
| Low sensitivity on certain channels | Crystal(s) not properly switched | Check frequency selector interconnect |
| | | Check crystal selector logic |

TABLE 6-1 TROUBLESHOOTING SEQUENCE TABLE
(Continued)

| INDICATION | PROBABLE CAUSE | REMEDY |
|---|---|---|
| | | Check crystal switching diodes, CR 103 through CR112 and CR153 through CR156. |
| | Defective crystal(s) | Replace crystal(s) |
| Deflection and flag vary excessively with changes in RF input level | Defective AGC | Check I103 and associated components |
| Upward deflection only | 90Hz channel defective | Check I104A, I105A, and associated components |
| Downward deflection only | 150Hz channel defective | Check I104B, I105B, and associated components |
| Excessive flag and deflection | Deviation converter misaligned | Align deviation converter |
| Insufficient flag and deflection | Incorrect number of internal and/or external loads in use | Check interconnect: 3 deviation loads, 2 flag loads |
| No flag deflection correct | CR171 or CR174 shorted<br>CR170 open | Replace |
| No deflection, Flag correct | CR172 or CR173 shorted | Replace |

TABLE 6-1 TROUBLESHOOTING SEQUENCE TABLE

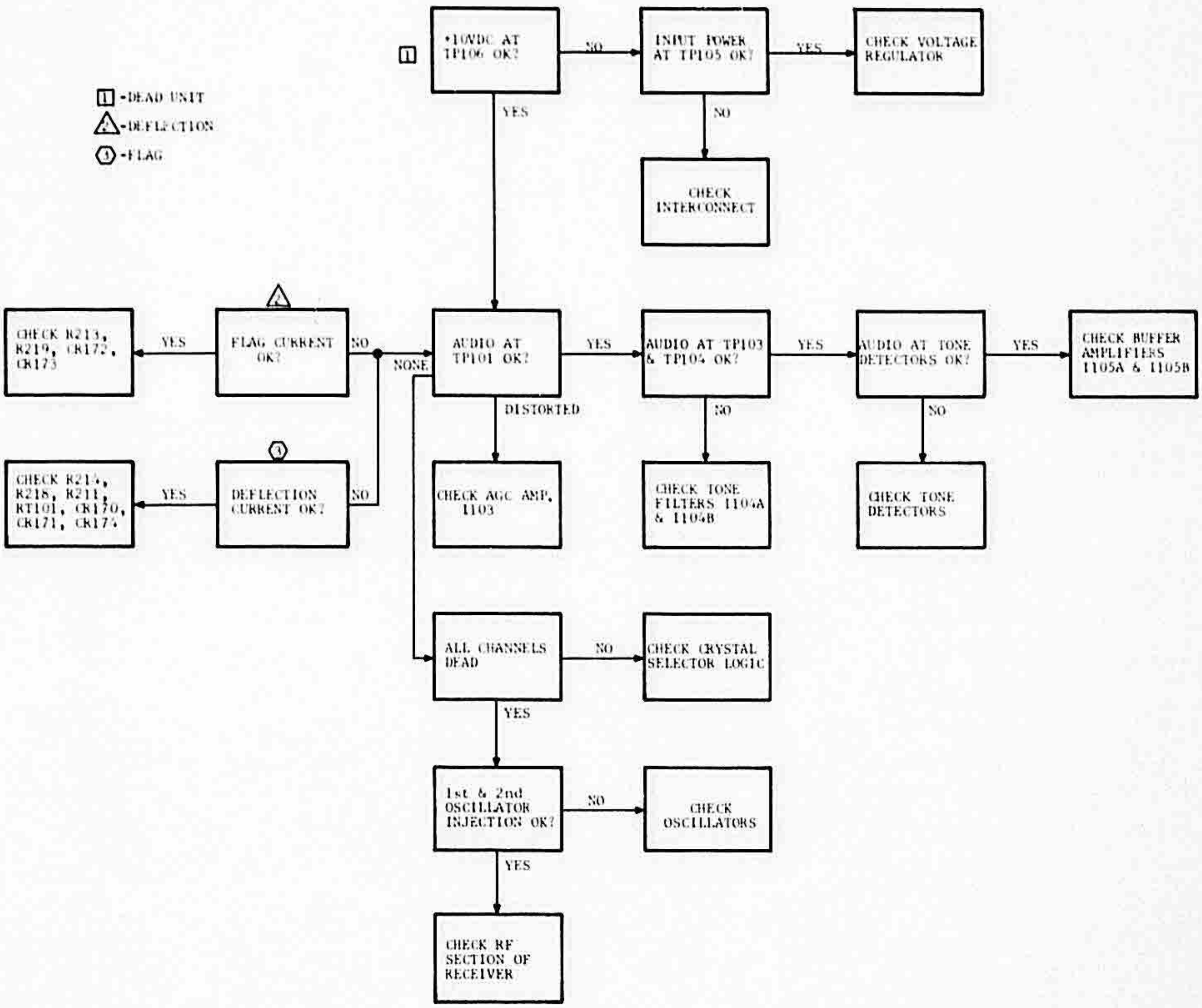


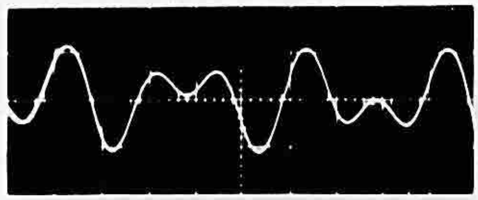

FIGURE 6-2 TROUBLESHOOTING FLOW CHART
(696-1542-00)



SEE BLOWUP

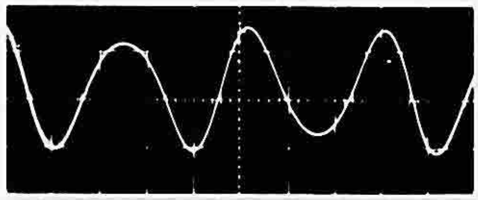
A. Detector Output

TP: 101
Vert: 0.5 volt/div
Horiz: 4 msec/div
Coupling: AC
Sync: Line



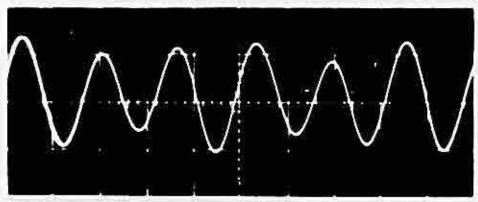
B. 90Hz Filter Output

TP: 103
Vert: 2.0 volts/div
Horiz: 4 msec/div
Coupling: AC
Sync: Line



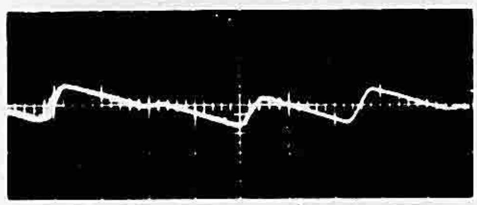
C. 150Hz Filter Output

TP: 104
Vert: 2.0 volts/div
Horiz: 4 msec/div
Coupling: AC
Sync: Line



D. 90Hz Detector Output

TP: Junction, C184-R208
Vert: 0.05 volt/div
Horiz: 5 msec/div
Coupling: AC
Sync: Line



E. 150Hz Detector Output

TP: Junction, C183-R199
Vert: 0.05 volt/div
Horiz: 5 msec/div
Coupling: AC
Sync: Line

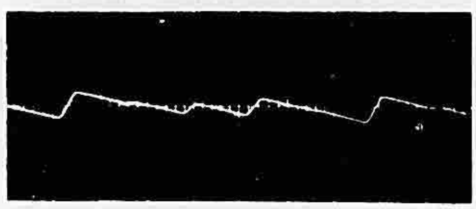
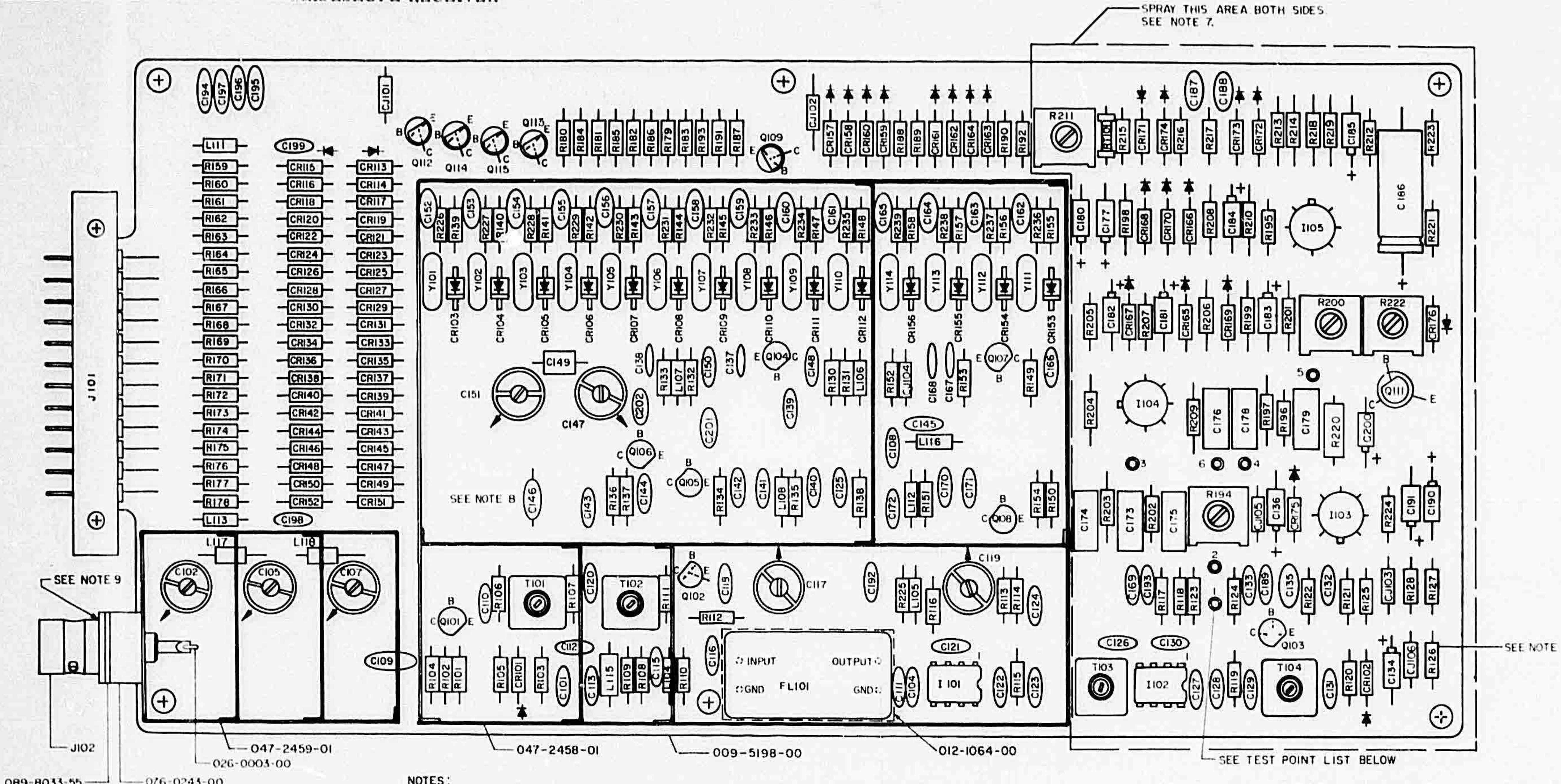
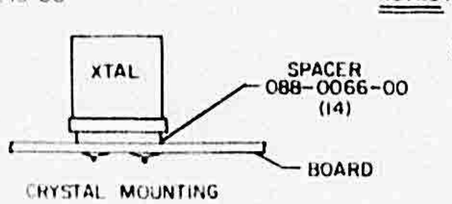


FIGURE 6-3 WAVEFORMS
(696-1543-00)

KING
KN 73
GLIDESLOPE RECEIVER




NOTES:

1. FOR COMPONENT VALUES, SEE BILL OF MATERIAL 200-0377-00
2. BOARDS MUST BE FREE OF FLUX AND OTHER FOREIGN PARTICLES AFTER ASS'Y IS COMPLETED. RECOMENDED CLEANING PROCEEDURE: UTILIZING A SHALLOW PAN (APPROX. 1 1/2" DEEP) AND APPROX. 1 PINT OF FLUX MANUFACTURES' RECOMMENDED FLUX REMOVER, SCRUB BOTH SIDES OF CARD THOROUGHLY WITH SOFT BRISTLED BRUSH. DRY THOROUGHLY WITH AIR BLAST.
3. SOME TRACES OF FLUX AND REMOVER MAY REMAIN AS A WHITE RESIDUE.
4. ALIGN ARROWS ON C102, C105, C107, C117, C119, C147, C151 WITH ARROW ON BOARD.
5. COMPONENT VALUE OF R126 TO BE SELECTED BY ELECT. TEST.
6. APPLY GLYPTAL TO CONNECTOR THREADS BEFORE ASSEMBLY.
7. MASK VARIABLE RES. R194, R200, R211, R222, TRANS. T103 & T104, MOUNTING HOLES BOTH SIDES & ALL TEST POINTS; THEN EVENLY SPRAY PORTION OF BOARD ENCLOSED BY DASHED LINES WITH CLEAR URETHANE SEAL COATING 016-1040-00 AFTER CLEANING. COATING IS 95% CURED AFTER 48 HOURS AIR DRYING OR OVEN DRYED AT 150°F FOR 24 HOURS. COATING TO BE THICK ENOUGH TO SEAL SURFACES, BUT FREE OF RUNS.
8. ADD 150-0005-10 TUBING TO BOTH LEADS OF C146.
9. APPLY SMALL AMOUNT OF SOLDER TO J102 TO ASSURE CONNECTOR NOT TO LOOSEN.

| TP NO. | PART NO. | COLOR |
|---|---|---|
| 1 | 010-0022-07 | YEL |
| 2 | 010-0022-04 | GRN |
| 3 | 010-0022-12 | VIO |
| 4 | 010-0022-13 | GRY |
| 5 | 010-0022-02 | RED |
| 6 | 010-0022-06 | ORN |

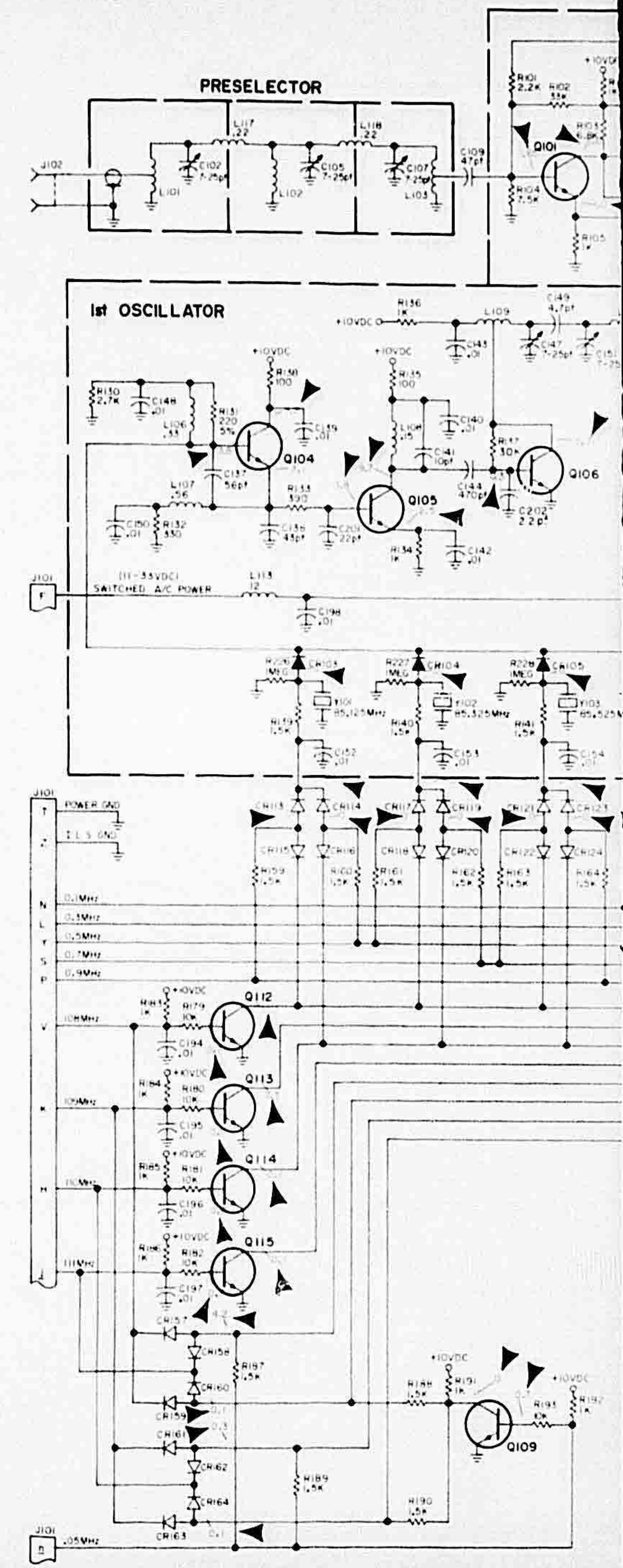
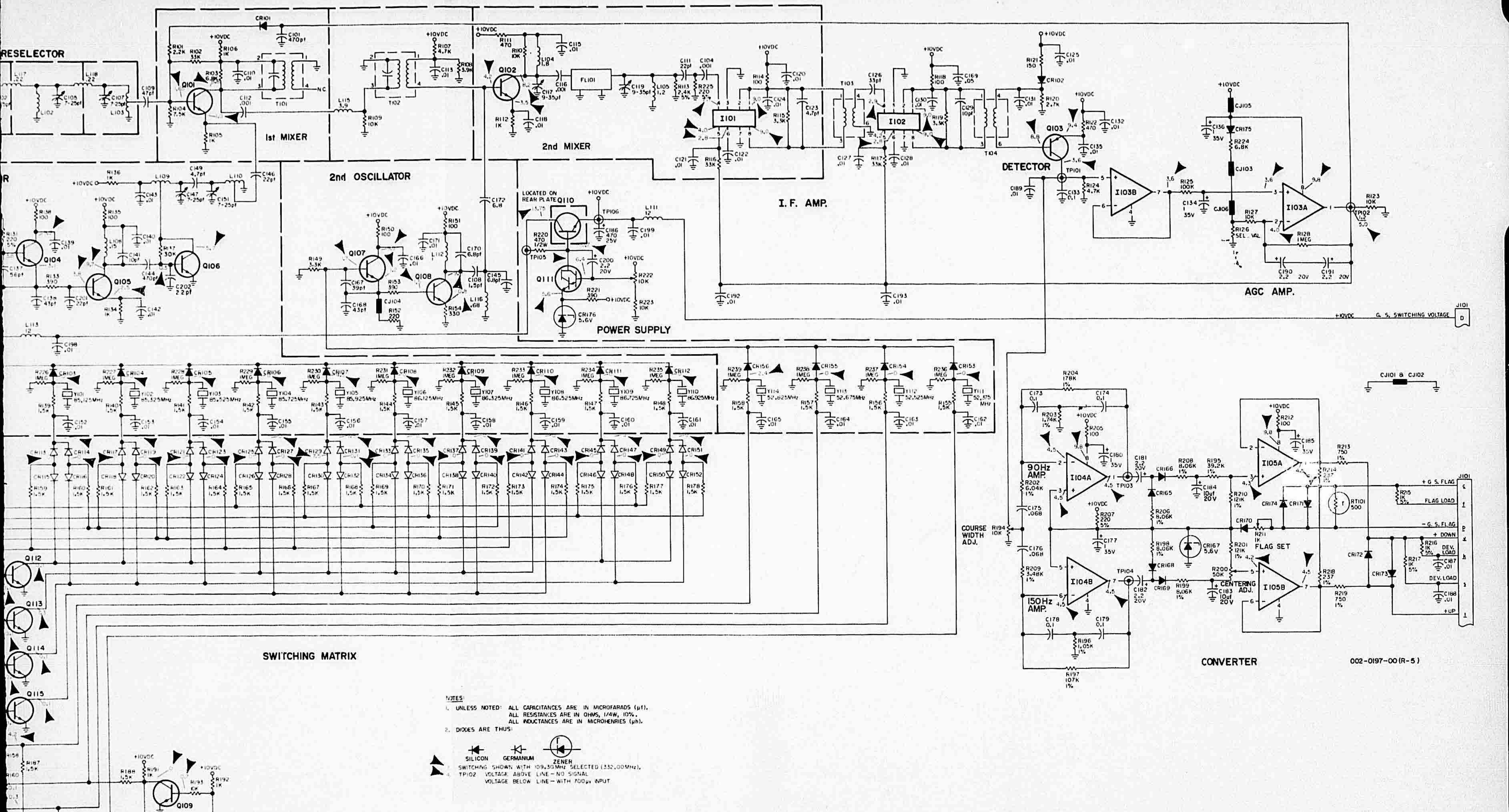



FIGURE 6-4 GLIDESLOPE RECEIVER ASSEMBLY AND SCHEMATIC
(Dwg. No's 300-0506-00, R-11; 002-0197-00, R-10)



SEE BLOWUP

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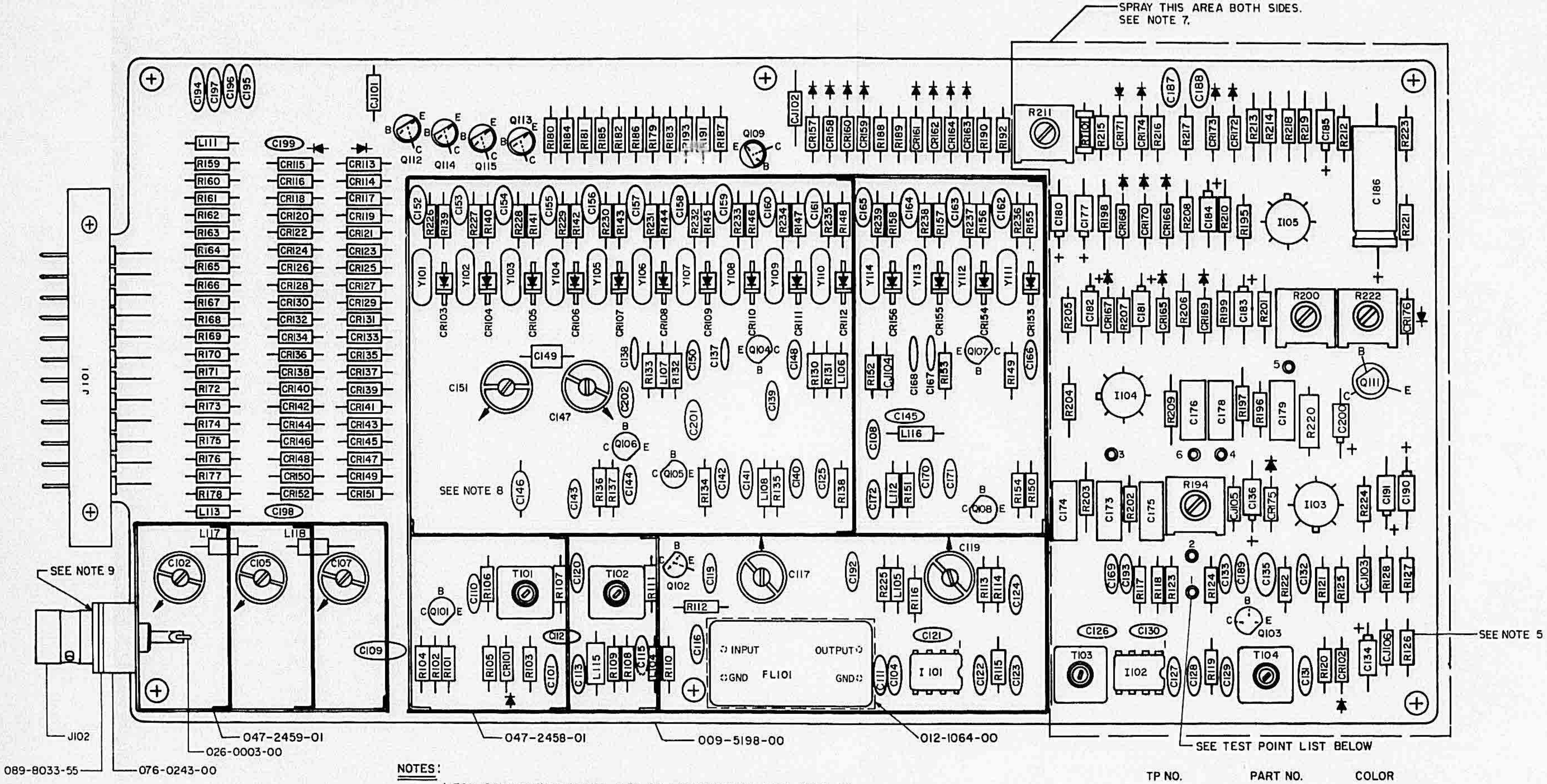
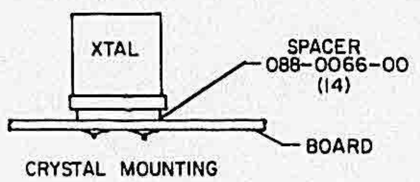
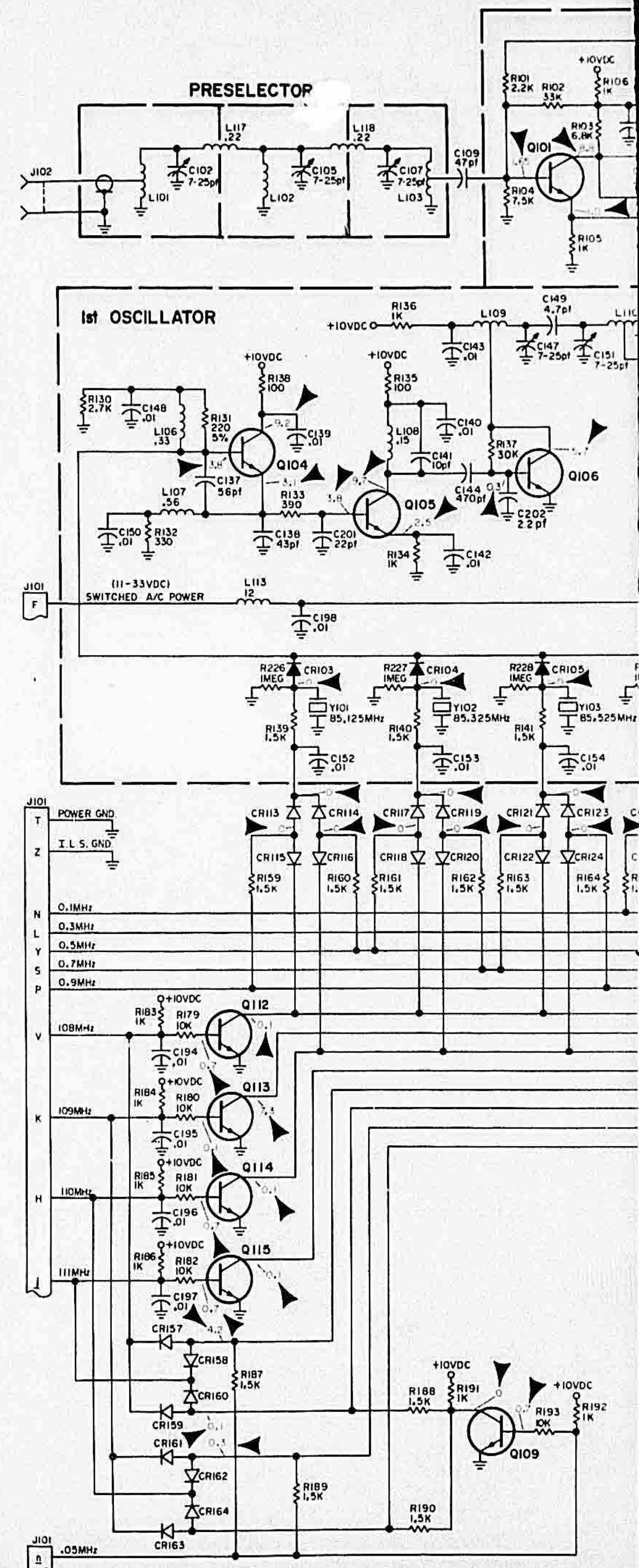



| TP NO. | PART NO. | COLOR |
|---|---|---|
| 1 | 010-0022-07 | YEL |
| 2 | 010-0022-04 | GRN |
| 3 | 010-0022-12 | VIO |
| 4 | 010-0022-13 | GRY |
| 5 | 010-0022-02 | RED |
| 6 | 010-0022-06 | ORN |

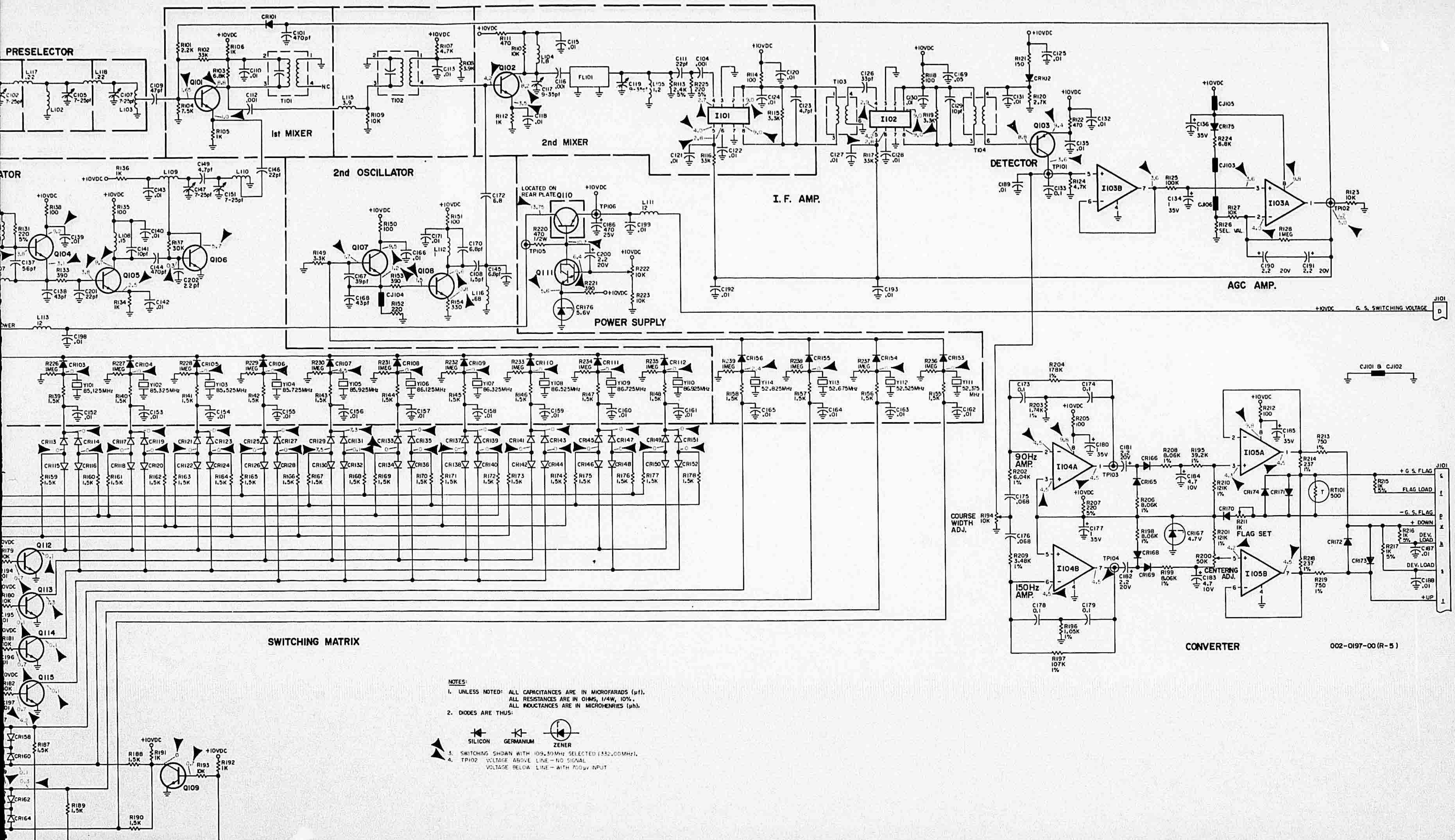
NOTES:

1. FOR COMPONENT VALUES, SEE BILL OF MATERIAL 200-0377-00
2. BOARDS MUST BE FREE OF FLUX AND OTHER FOREIGN PARTICLES AFTER ASS'Y IS COMPLETED. RECOMENDED CLEANING PROCEEDURE: UTILIZING A SHALLOW PAN (APPROX. 1 1/2" DEEP) AND APPROX. 1 PINT OF FLUX MANUFACTURES' RECOMMENDED FLUX REMOVER, SCRUB BOTH SIDES OF CARD THOROUGHLY WITH SOFT BRISTLED BRUSH. DRY THOROUGHLY WITH AIR BLAST.
3. SOME TRACES OF FLUX AND REMOVER MAY REMAIN AS A WHITE RESIDUE.
4. ALIGN ARROWS ON C102, C105, C107, C117, C119, C147, C151 WITH ARROW ON BOARD.
5. COMPONENT VALUE OF R126 TO BE SELECTED BY ELECT. TEST.
6. APPLY GLYPTAL TO CONNECTOR THREADS BEFORE ASSEMBLY.
7. MASK VARIABLE RES. R194, R200, R211, R222, TRANS. T103 & T104, MOUNTING HOLES BOTH SIDES & ALL TEST POINTS; THEN EVENLY SPRAY PORTION OF BOARD ENCLOSED BY DASHED LINES WITH CLEAR URETHANE SEAL COATING 016-1040-00 AFTER CLEANING COATING IS 95% CURED AFTER 48 HOURS AIR DRYING OR OVEN DRYED AT 150°F FOR 24 HOURS. COATING TO BE THICK ENOUGH TO SEAL SURFACES, BUT FREE OF RUNS.
8. ADD 150-0005-10 TUBING TO BOTH LEADS OF C146.
9. APPLY SMALL AMOUNT OF SOLDER TO J102 TO ASSURE CONNECTOR NOT TO LOOSEN.

FIGURE 6-4 GLIDESLOPE RECEIVER ASSEMBLY AND SCHEMATIC
(Dwg. No's 300-0506-00, R-11; 002-0197-00, R-8)



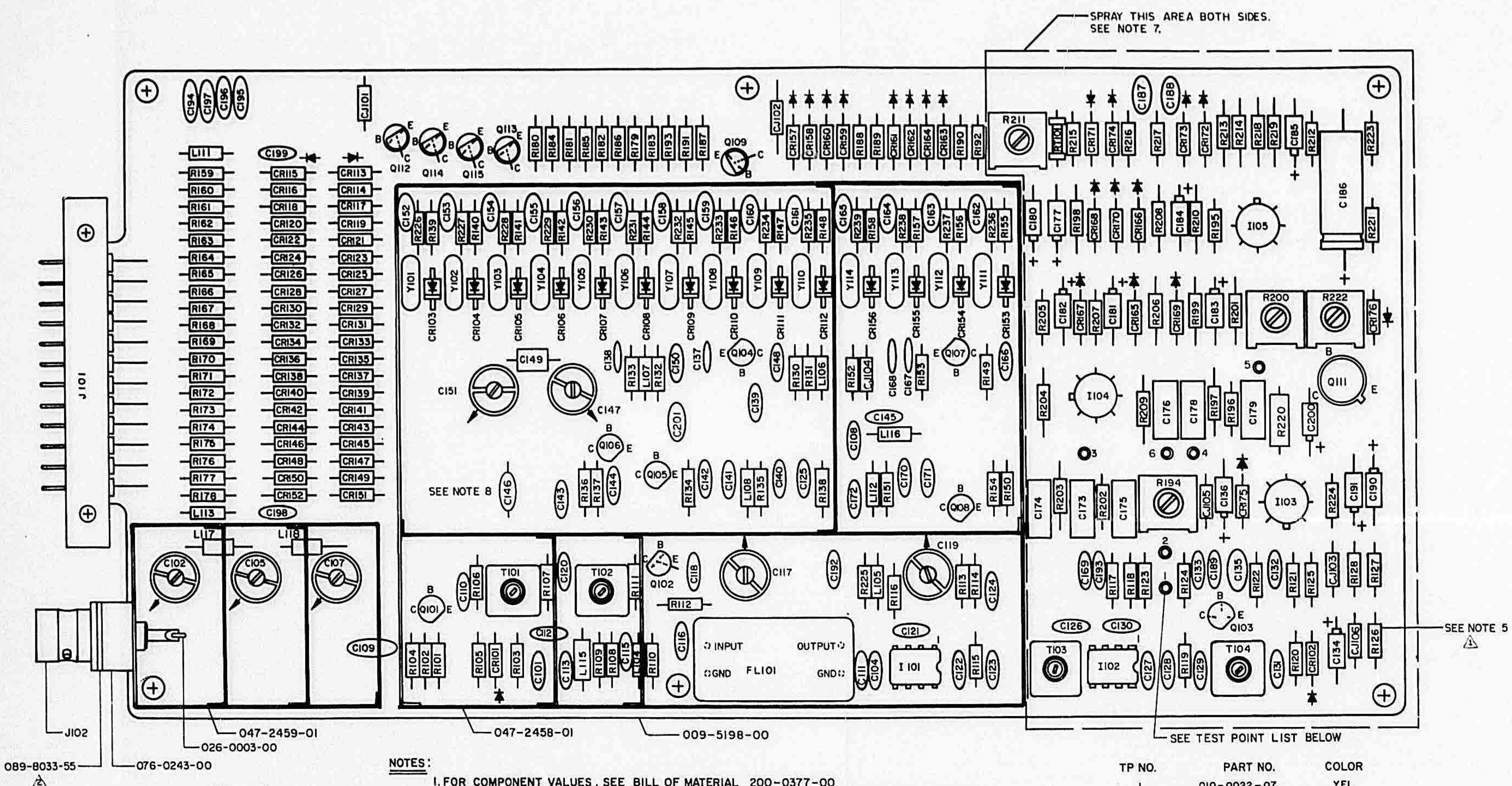
SEE BLOWUP

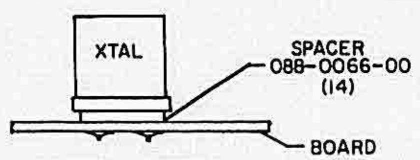



SEE BLOWUP

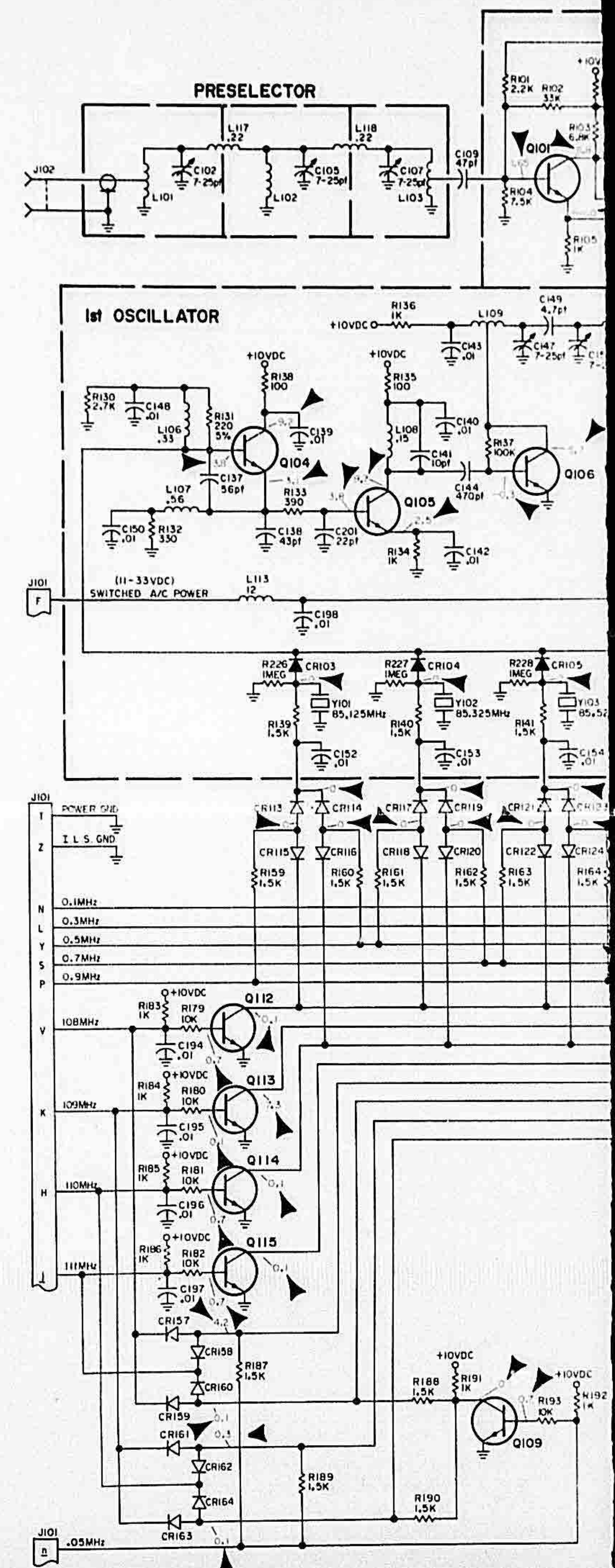
SEE BLOWUP

KING



CRYSTAL MOUNTING




NOTES:

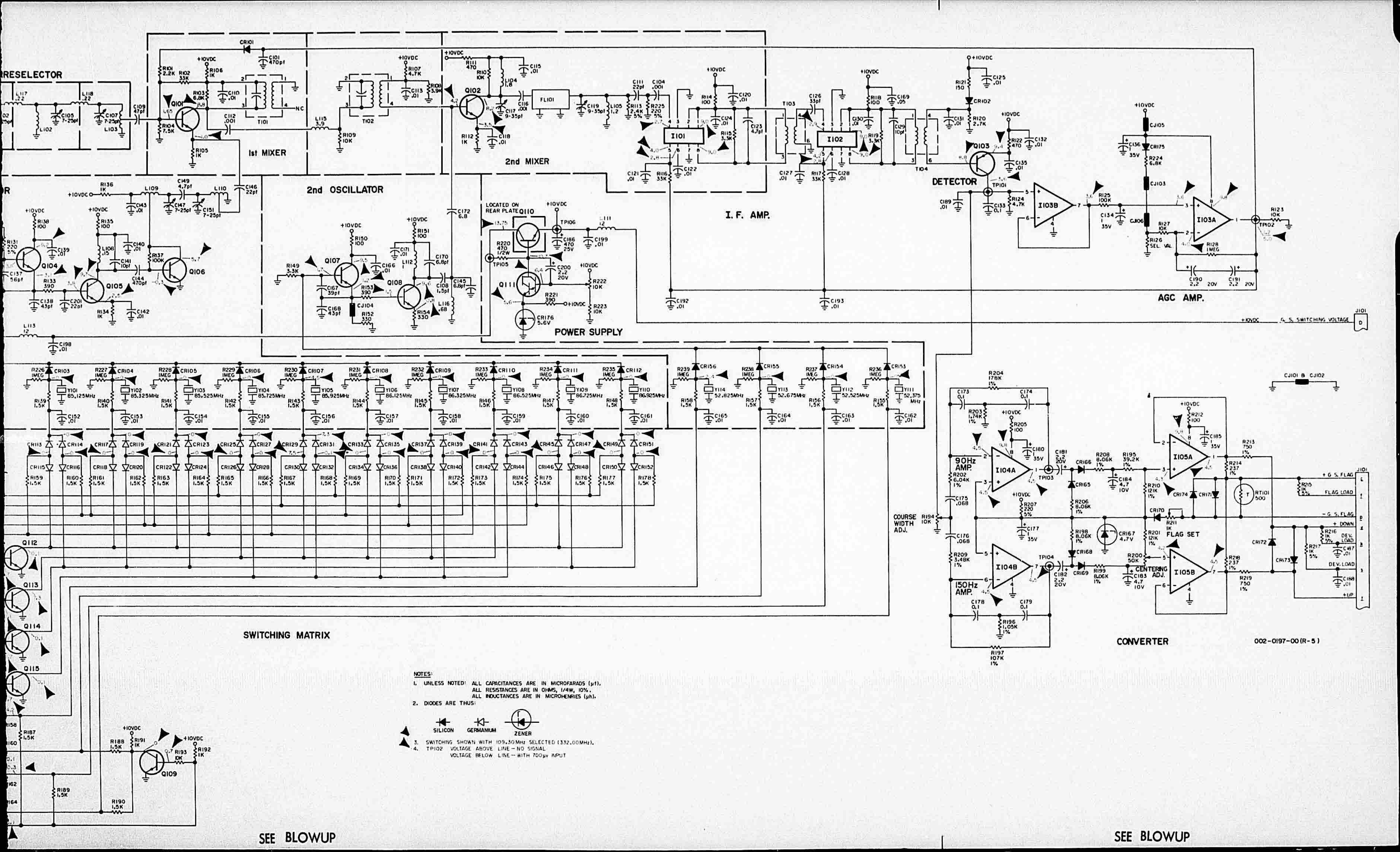
1. FOR COMPONENT VALUES, SEE BILL OF MATERIAL 200-0377-00
2. BOARDS MUST BE FREE OF FLUX AND OTHER FOREIGN PARTICLES AFTER ASS'Y IS COMPLETED. RECOMENDED CLEANING PROCEEDURE: UTILIZING A SHALLOW PAN (APPROX. 1 1/2" DEEP) AND APPROX. 1 PINT OF FLUX MANUFACTURES' RECOMMENDED FLUX REMOVER, SCRUB BOTH SIDES OF CARD THOROUGHLY WITH SOFT BRISTLED BRUSH. DRY THOROUGHLY WITH AIR BLAST.
3. SOME TRACES OF FLUX AND REMOVER MAY REMAIN AS A WHITE RESIDUE.
4. ALIGN ARROWS ON C102, C105, C107, C117, C119, C147, C151 WITH ARROW ON BOARD.
5. COMPONENT VALUE OF R126 TO BE SELECTED BY ELECT. TEST.
6. APPLY GLYPTAL TO CONNECTOR THREADS BEFORE ASSEMBLY.
7. MASK VARIABLE RES. R194, R200, R211, R222, TRANS. T103 & T104, MOUNTING HOLES BOTH SIDES & ALL TEST POINTS; THEN EVENLY SPRAY PORTION OF BOARD ENCLOSED BY DASHED LINES WITH CLEAR URETHANE SEAL COATING 016-1040-00 AFTER CLEANING COATING IS 95% CURED AFTER 48 HOURS AIR DRYING OR OVEN DRYED AT 150°F FOR 24 HOURS. COATING TO BE THICK ENOUGH TO SEAL SURFACES, BUT FREE OF RUNS.
8. ADD 150-0005-10 TUBING TO BOTH LEADS OF C146.

| TP NO. | PART NO. | COLOR |
|---|---|---|
| 1 | 010-0022-07 | YEL |
| 2 | 010-0022-04 | GRN |
| 3 | 010-0022-12 | VIO |
| 4 | 010-0022-13 | GRY |
| 5 | 010-0022-02 | RED |
| 6 | 010-0022-06 | ORN |

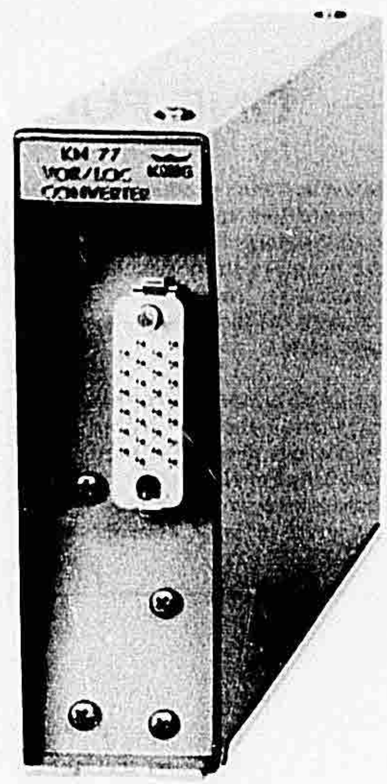
FIGURE 6-4 GLIDESLOPE RECEIVER SCHEMATIC AND ASSEMBLY
(002-0197-00 R-0)
(300-0506-00 R-0)



SEE BLOWUP


PRESELECTOR
1st MIXER
2nd MIXER
2nd OSCILLATOR
I. F. AMP.
DETECTOR
AGC AMP.
POWER SUPPLY
LOCATED ON REAR PLATE Q110
SWITCHING MATRIX
CONVERTER
90Hz AMP.
150Hz AMP.
COURSE WIDTH ADJ.
CENTERING ADJ.
FLAG SET
G. S. SWITCHING VOLTAGE
+ G. S. FLAG
FLAG LOAD
− G. S. FLAG
+ DOWN
DEV. LOAD
+ UP
NOTES:
1. UNLESS NOTED: ALL CAPACITANCES ARE IN MICROFARADS (µf).
ALL RESISTANCES ARE IN OHMS, 1/4W, 10%.
ALL INDUCTANCES ARE IN MICROHENRIES (µh).
2. DIODES ARE THUS:
SILICON
GERMANIUM
ZENER
3. SWITCHING SHOWN WITH 109.30MHz SELECTED (332.00MHz).
4. TP102 VOLTAGE ABOVE LINE – NO SIGNAL
VOLTAGE BELOW LINE – WITH 700µv INPUT
002-0197-00 (R-5)
SEE BLOWUP
SEE BLOWUP

KING®




# KN 77
# VOR/LOC CONVERTER

## INSTALLATION MANUAL
## 006-0064-01

REV 1 JULY, 1973

## ONE FULL YEAR WARRANTY

General Aviation Avionic products manufactured by King Radio Corporation (hereinafter called King) are warranted against defects in design, workmanship and material under normal use for which intended for one year after warranty registration provided such registration occurs within eighteen months of the factory shipping date.

King's limit of liability hereunder shall be to provide necessary parts and labor to repair said product, transportation charges prepaid at either King factory or an authorized King Service Center. King shall not be liable for consequential or other damage or expense whatsoever therefore or by reason thereof.

This warranty shall not apply to any product which has not been installed by an authorized King Installation Facility in accordance with the installation manual, or which has been repaired or altered in any way so as to adversely effect its performance or reliability, or which has been subject to misuse, contamination, negligence or accident.

This warranty is in lieu of all other General Aviation Avionics guarantees or warranties expressed or implied. King reserves the right to make design changes, additions to and improvements in its products without obligation to install such in products previously manufactured.

This equipment manufactured under the following U.S. Patent: 3,281,846.

# TABLE OF CONTENTS

## SECTION I GENERAL INFORMATION



## SECTION II INSTALLATION



## SECTION III OPERATION



## DIAGRAMS & ILLUSTRATIONS

# SECTION I
# GENERAL INFORMATION

## 1.1 INTRODUCTION

This manual contains information relative to the physical, mechanical, and electrical characteristics of the King Radio Corporation Silber Crown KN 77. Information relative to the maintenance, alignment and procurement of replacement parts may be found in KN 77 Maintenance/Overhaul Manual, King Part No. 006-5060-00.

## 1.2 PURPOSE OF EQUIPMENT

The King KN 77 VOR/LOC Converter is designed to be used in conjunction with the KX 175 NAV COMM unit and external ARINC type indicator(s) such as the KNI 520 and KPI 550A Horizontal Situation Indicator system. When unilized with a NAV receiver and indicator, the KN 77 provides manual VOR instrumentation for the omni channels. Localizer steering information is presented to the pilot when an ILS channel is selected.

The KN 77 consists of a VOR/LOC Converter enclosed in a remote mounted case. Connections to the KN 77 are made through a 26 pin connector on the front panel of the unit. The unit may be mounted in any position and requires no shock mounting.

The KN 77 can be used with NAV receivers providing ARINC video and is also capable of displaying ILS information on a Horizontal Situation Indicating System such as the King KPI 550A.

The VOR/LOC Converter is solid state and contains the circuitry necessary to convert navigation receiver output signals into DC voltages to drive external ARINC type indicators. The converter is capable of driving three 1,000 ohm deviation loads, three 1,000 ohm flag alarm loads, and two ohm to-from meter movements.

## 1.3 TECHNICAL CHARACTERISTICS

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

KN 77 GENERAL INFORMATION

| SPECIFICATIONS | CHARACTERISTICS |
|---|---|
| Physical Dimensions:<br>(Unit only) | Width: 1. 55 inches (3. 94 cm)<br>Height: 5. 20 inches (13. 20 cm)<br>Depth: 11. 25 inches (28. 60 cm) |
| (Overall Mounting Rack & Connector Included) | Width: 3. 26 inches (8. 28 cm)<br>Height: 5. 40 inches (13. 77 cm)<br>Depth: 11. 25 inches (28. 56 cm) |
| Mounting: | Rigid, any position |
| Weight: | 2. 2 lbs (1. 0Kgm) (Unit only)<br>2. 7 lbs (1. 227Kgm) (Mounting Rack and Connector included) |

| SPECIFICATIONS | CHARACTERISTICS |
|---|---|
| Power Requirements: | 13.75V or 27.5VDC: 100ma max. |
| Accuracy: | VOR: Azimuth error of less than ±1.0° under standard test conditions using precision track selector. |
| Input Impedance: | 100K ohms Emitter Follower |
| Input Level: | VOR: 0.50 VRMS<br>LOC: 0.35 VRMS |
| Temperature: | -40°C to +55°C for continuous operation. (Short time operation to +70°C). |
| Design: | Solid state remote mounted unit. Capable of operating with standard ARINC type meter loads and resolver. |
| Duty Cycle: | Continuous |
| Loads: | Capable of operating three 1,000 ohm deviation loads and three 1,000 ohm alarm flag loads, and two 200 ohm TO-FROM meter loads. |
| Deflection Characteristics: | VOR: Course width shall be 20 ±1.0°. Deflection balance shall be with 10%.<br>LOC: A difference in depth of modulation of 0.091dbm or 4db shall produce a deflection of 90μa. The deviation under opposite polarity shall be 90 ±5μa. |

## 1.4 UNITS AND ACCESSORIES SUPPLIED

A. King KN 77 VOR/LOC Converter (066-4004-00).

B. King KN 77 Installation Kit 050-1242-00 includes mounting rack and connector. This kit consists of:

| KPN | DESCRIPTION | QUANTITY | VENDOR |
|---|---|---|---|
| 030-1008-00 | Lever & Pivot Assembly | 2 | Winchester MRA-VL |
| 030-2150-00 | Connector Plug 26 Pin | 1 | U.S. Components MI 26F |
| 030-2151-00 | Connector Hood 26 Pin | 1 | U.S. Components MI 26HR |
| 071-4015-00 | Mounting Rack (Accepts either or both KN 77 and KN 73) | 1 | |

C. Dual installation of both KN 77 and KN 73 require Installation Kit (050-1242-02).

## 1.5 ACCESSORIES REQUIRED, BUT NOT SUPPLIED

A. Navigation Antenna and Cable.
B. King KX 175 NAV/COMM unit.
C. 1. King KNI 520 Navigation Indicator
or
2. King KPI 550A Horizontal Situation Indicating System.

## 1.6 LICENSE REQUIREMENTS

No special Federal Communications License is required to operate the KN 77.

# SECTION II
# INSTALLATION

## 2.1 GENERAL

Installations of the KN 77 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. When equipment has been removed, place in the shipping container all packing, bracing, and filler used in the original packing. Save the packing material for use in unit storage or reshipment.

## 2.3 INSTALLATION PROCEDURES

The KN 77 should be installed in accordance with standards established by the customer, installing agency, and existing conditions as to unit location and type of installation. However, the following suggestions should be considered before installing the KN 77 VOR/LOC Converter. Close adherence to these suggestions will assure a more satisfactory performance from the equipment.

**—NOTE—**

The KN 77 is supplied with a dual unit mounting rack. This type of rack accommodates either a dual KN 77 or a KN 77/KN 73 (Glideslope) installation. A single unit mounting rack is not available.

a. Select the KN 77 VOR/LOC Converter location. The KN 77 may be mounted rigid. Allow one inch of free air space around top and rear of the unit. Allow one-half inch on each side.

b. Refer to the outline and dimension drawing, Figure 2-2 for the KN 77 mounting dimensions.

**—NOTE—**

Allot adequate space for installation of cables and connectors.

c. Mark, punch, and drill the mounting holes. Care must be taken to avoid damage to adjacent equipment or cables.

d. Use six #6-32 screws and the holes drilled in step c to secure the mounting rack (KPN 071-4015-00) firmly in place.

e. Slide the KN 77 into the rack. Using the hold down clamp on the front of the equipment rack, secure the KN 77 to the mounting rack.

f. The installing agency will supply and fabricate all external cables. The plug required is supplied by King Radio, Figure 2-1.

g. The length and routing of the external cables must be carefully studied and planned before attempting actual installation. Avoid sharp bends and routing the cable near transmitter coax cables and power buss cables.

**—NOTE—**

The KN 77 provides external pin connections for each internal deviation and flag load. Before completing the installation, a check should be made to insure that the proper combination of jumper wires are used as required for the number of external loads. (Refer to KN 77 Interconnect diagram, Figure 2-3.)

h. Fabricate the external cables in accordance with Figure 2-3.

P101
KPN 030-2150-00


NOTE:
PLUG VIEWED FROM CABLE END.

FIGURE 2-1 CONNECTOR PIN LOCATIONS
(Dwg. No. 696-2801-00)

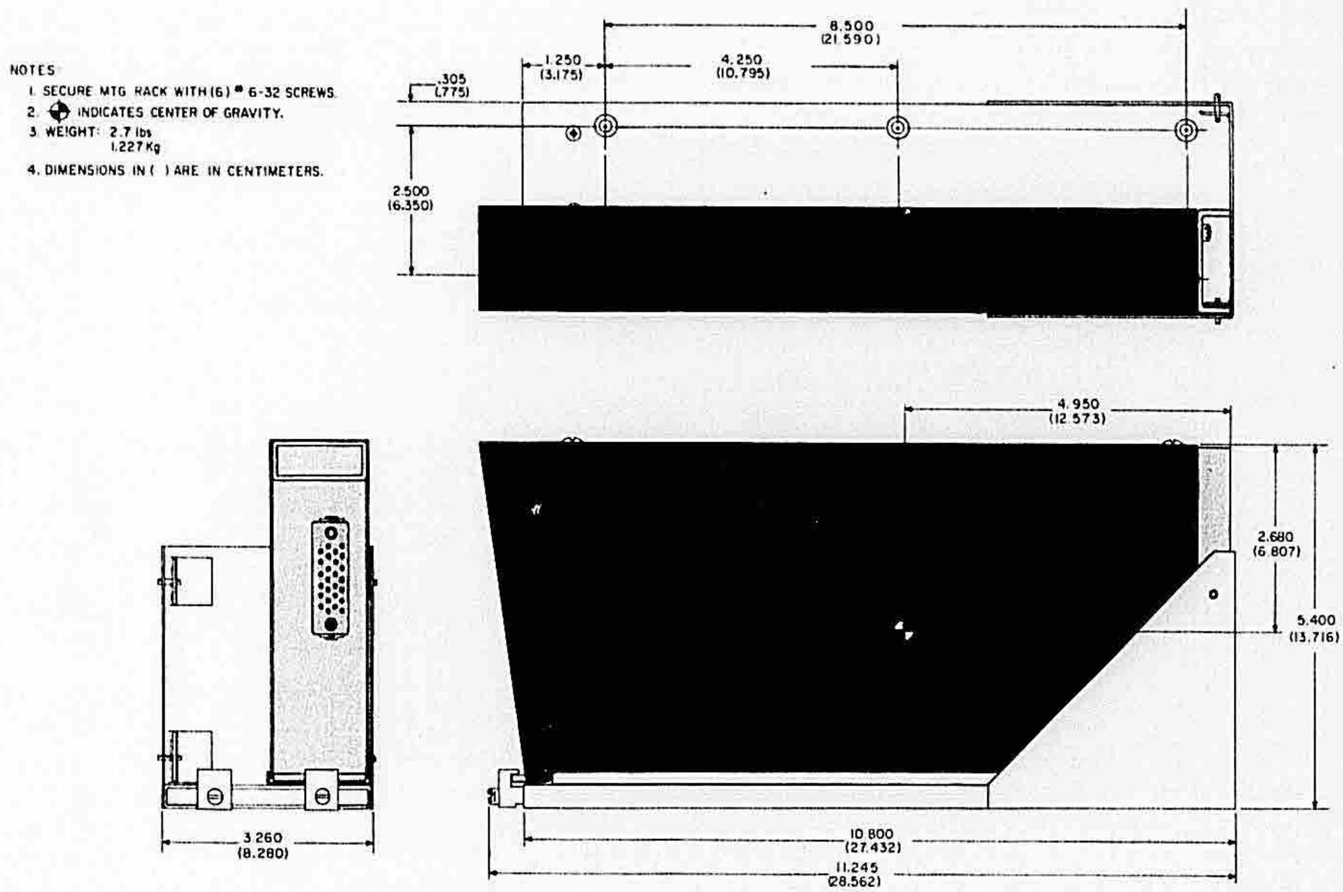
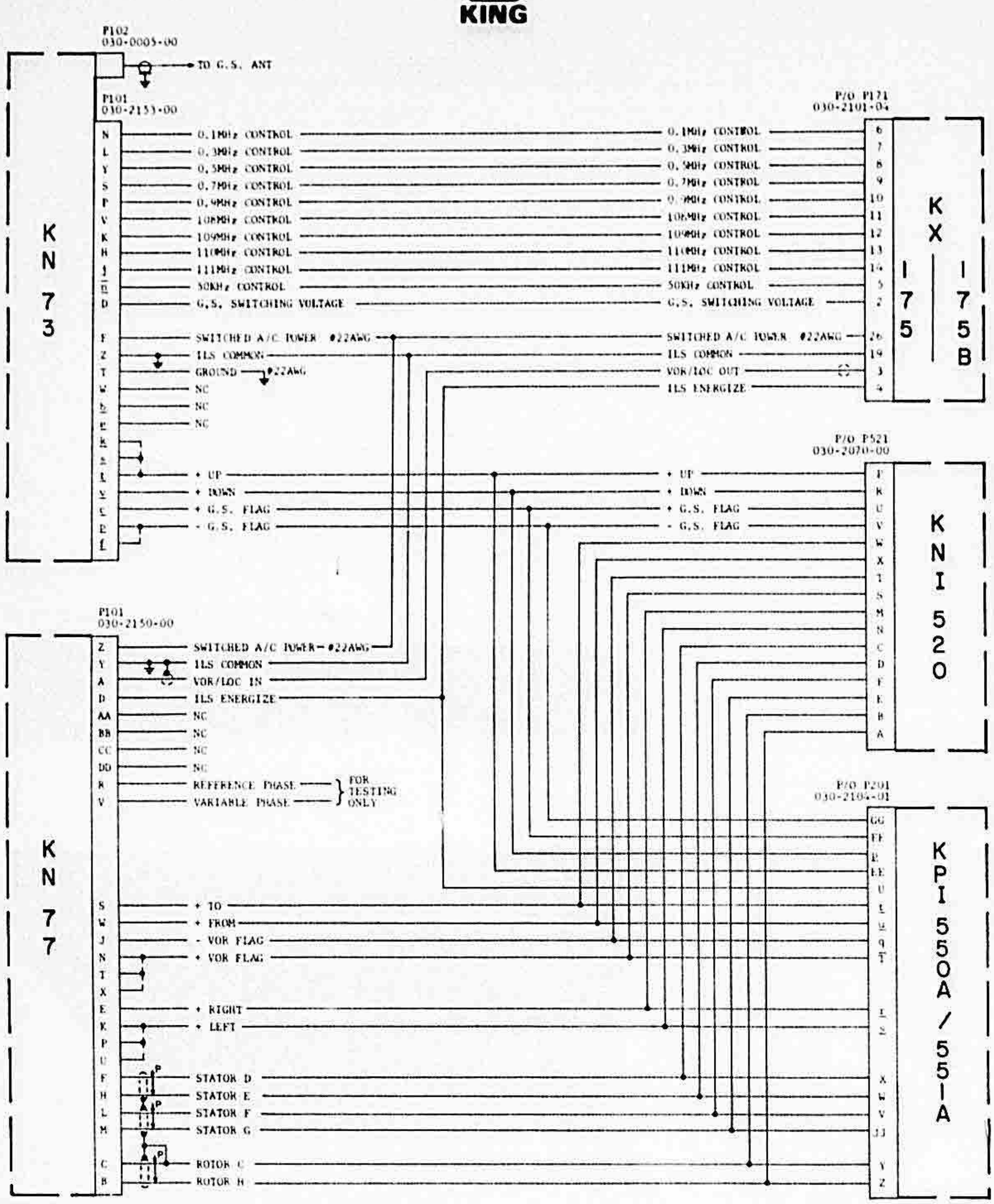



FIGURE 2-2 KN 77 OUTLINE AND MOUNTING DRAWING
(Dwg. No. 155-5093-00, R-0)



SEE BLOWUP




NOTES:

1. UNLESS NOTED, ALL WIRES TO BE #26AWG MINIMUM.
2. UNLESS NOTED, ALL SYSTEM GROUNDS ARE AIRFRAME GROUNDS.
3. JUMPER KN 77 PINS AS INDICATED FOR REQUIRED NUMBER OF EXTERNAL LOADS.

| NUMBER OF EXTERNAL LOADS | VOR/LOC | |
|---|---|---|
| | DEV | FLAG |
| 1 | KPU | NTX |
| 2 | KP | NT |
| 3 | NONE | NONE |

4. JUMPER KN 73 PINS AS INDICATED FOR REQUIRED NUMBER OF EXTERNAL LOADS.

| NUMBER OF EXTERNAL LOADS | GLIDESLOPE | |
|---|---|---|
| | DEV | FLAG |
| 1 | t k s | f e |
| 2 | t k | NONE |
| 3 | NONE | |

5. RESOLVER PINS SHOWN CONNECTED TO BOTH KNI 520 AND KPI 550A ARE FOR REFERENCE ONLY. IN ACTUAL INSTALLATION ONLY ONE RESOLVER WILL BE WIRED TO KN 77.

FIGURE 2-3 KN 77 INTERCONNECT DIAGRAM
(Dwg. No. 155-1117-00, R-3)



SEE BLOWUP

# SECTION III

# OPERATION

## 3.1 GENERAL

Power is normally supplied to the KN 77 through a master avionics power switch or, as in the case of combining with a KX 175 through the KX 175 on-off switch.

## 3.2 VOR OPERATION

After the ground station has been positively identified, a navigation instrument such as the King KNI 520 will provide the necessary information to navigate utilizing the VOR ground station signal. If the KN 77 is operating properly, the warning flag should be out of view, To determine the omni radial on which the aircraft is positioned, rotate the OBS control knob until the vertical pointer is centered. If the to-from flag indicates "from", the aircraft is on the radial indicated on the omni-bearing reading. This is the radial outbound from the VOR station. If the to-from flag indicates "to", the selected reading is the inbound bearing to the station.

Flying inbound to a VOR station is accomplished by first rotating the OBS knob to center the vertical deviation indicator causing the "to" flag to appear. The aircraft is then turned to the magnetic heading which is the same as the selected radial course or as indicated by the OBS readout. The vertical pointer will be centered as long as the aircraft remains on this track. If the aircraft track moves off course, the deviation indicator moves from the center position and flying in the direction of pointer deflection (left or right) is required to reintercept the course. The procedure for flying outbound from a VOR station is the same as flying inbound, except that OBS knob is first rotated to cause a "from" indication to appear with the pointer centered.

To intercept a given course, first determine the present position of the aircraft as above. Set the desired course on the omni-bearing readout by rotating the OBS knob, then turn the aircraft to a heading which will establish a proper intercept angle. The vertical pointer will be centered as the radial is intercepted. Flying "to" or "from the VOR ground station is then accomplished as described above.

## 3.3 LOCALIZER OPERATION

To utilize the localizer function the following procedure is recommended. Select the desired localizer frequency and observe that the localizer warning flag is concealed. The "to-from" flag is not functional during localizer operation. When flying inbound on the front course or outbound on the back course make corrections toward the localizer (Vertical) needle deflection. Remember: corrections required to center the needle during localizer operation are smaller than for VOR. The localizer path narrows as the approach end of the runway becomes closer. When flying inbound on the back course or outbound on the front course, the corrections are made away from the direction of needle deflection. (Helpful Hint: When flying the localizer, set the localizer heading on the omni-bearing readout for quick reference, and as a reminder).

# MAINTENANCE/OVERHAUL MANUAL

# KN 77
# VOR/LOC CONVERTER


| | |
|---|---|
| MANUAL NUMBER | 006-5060-02 |
| 1st PRINTING | JANUARY, 1972 |
| REVISION NUMBER | 2 |



KING RADIO CORPORATION®

400 NORTH ROGERS ROAD OLATHE, KANSAS, U.S.A.

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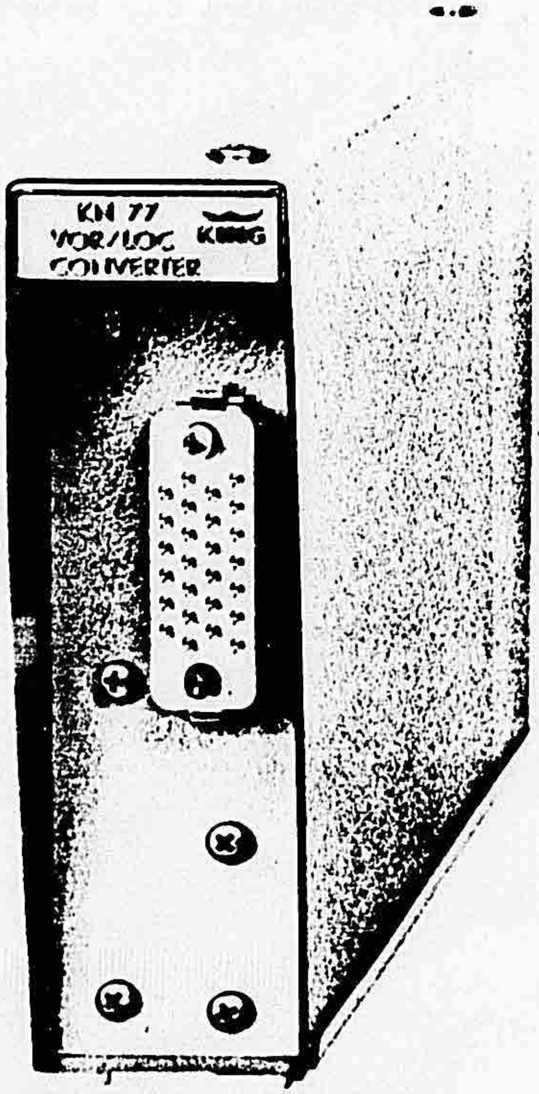


FIGURE 1-1 KN 77
(Dwg. No. 696-1530-00)

KING
KN 77
VOR/LOC CONVERTER

# CONTENTS

## SECTION IV

## THEORY OF OPERATION

# SECTION IV

# THEORY OF OPERATION

## 4.1 GENERAL

The KN 77 VOR/LOC Converter is an all solid state device. First the Theory of Operation of the VOR system is presented. Simplified and detailed explanations are presented. The LOC system is discussed in the same manner.

## 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 radial 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

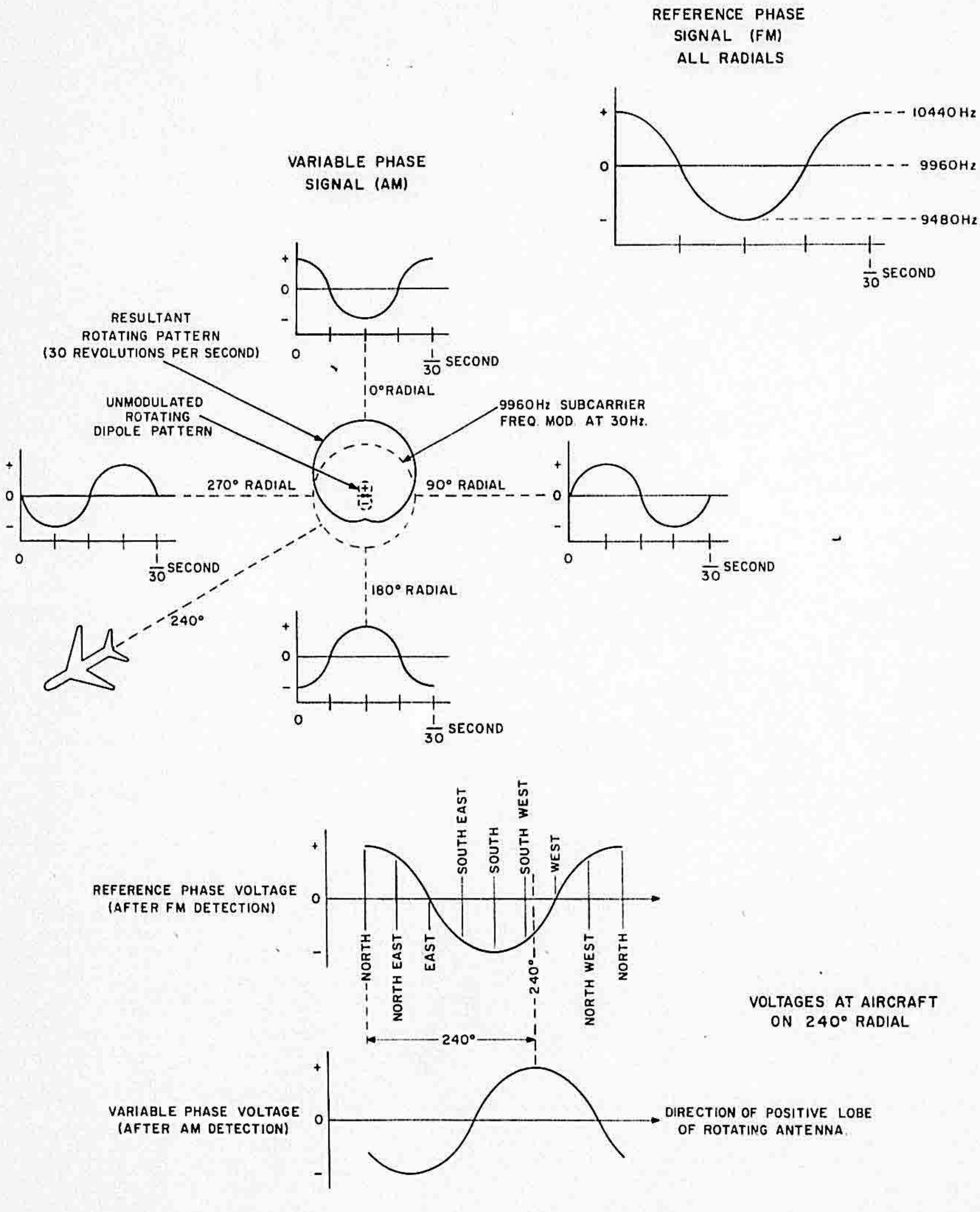


FIGURE 4-1 VOR SIGNAL GENERATION
(696-0714-00)



SEE BLOWUP

exactly in phase with the rf radiated from the non-directional antenna and the rf within the other lobe is 180° out of phase with the non-directional field. The rotating figure 8 pattern reinforces the non-directional pattern on the in phase side of the dipole and subtracts from the non-directional pattern on the out of phase 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.

4.2.3 VOR RECEPTION

4.2.3.1 Manual VOR Reception. The signal from the receiving antenna must be separted into variable phase and reference phase channels before information can be extracted. Refer to figure 4-2. The rf carrier is amplified and AM detected. The output from the AM detector is the 30Hz variable phase signal and the 9, 960Hz signal which is frequency modulated by the 30Hz reference phase signal. The detector output is fed to a variable phase channel and a reference phase channel. The frequency modulated 9, 960Hz signal is eliminated from the variable phase channel by a low-pass filter. The 30Hz variable phase signal then enters a phase comparator as one of the two inputs. The reference phase signal, on its 9, 960Hz subcarrier passes through a AM limiter to eliminate the 30Hz variable phase signal. A FM detector recovers the 30Hz reference voltages from the subcarrier. The 30Hz reference voltage enters a phase shifting circuit. The amount of phase shift is controlled by the resolver of the course selector. The output from the phase shifter enters the phase comparator to be compared with the variable phase signal. The dc output of the phase comparator drives the VOR-LOC course deviation needle.

Since a phase difference of 90° can be more accurately measured than 0° phase difference, the phase comparator is designed to give zero output when the phase difference is 90°. To compensate for this, the receiver circuits shift the reference signal 90° more than the course selector dial indicates. Therefore, when the reference signal is 90° or 270° ahead of the variable phase signal (after the phase shift in the resolver), the deviation needle is centered. The actual course of the aircraft is then the course indicated below either the course index or reciprocal course index, depending on the "to-from" indication. When the phase difference is slightly less than 90° or 270°, the comparator gives a dc output driving the VOR-LOC needle in one direction. If the phase difference is slightly more than 90° or 270°, the comparator gives a dc output of the opposite polarity, driving the VOR-LOC needle in the opposite direction.

To illustrate the operation, suppose the aircraft is heading due north from a VOR station. The reference and variable phase signals reaching the aircraft are in phase. The 0°

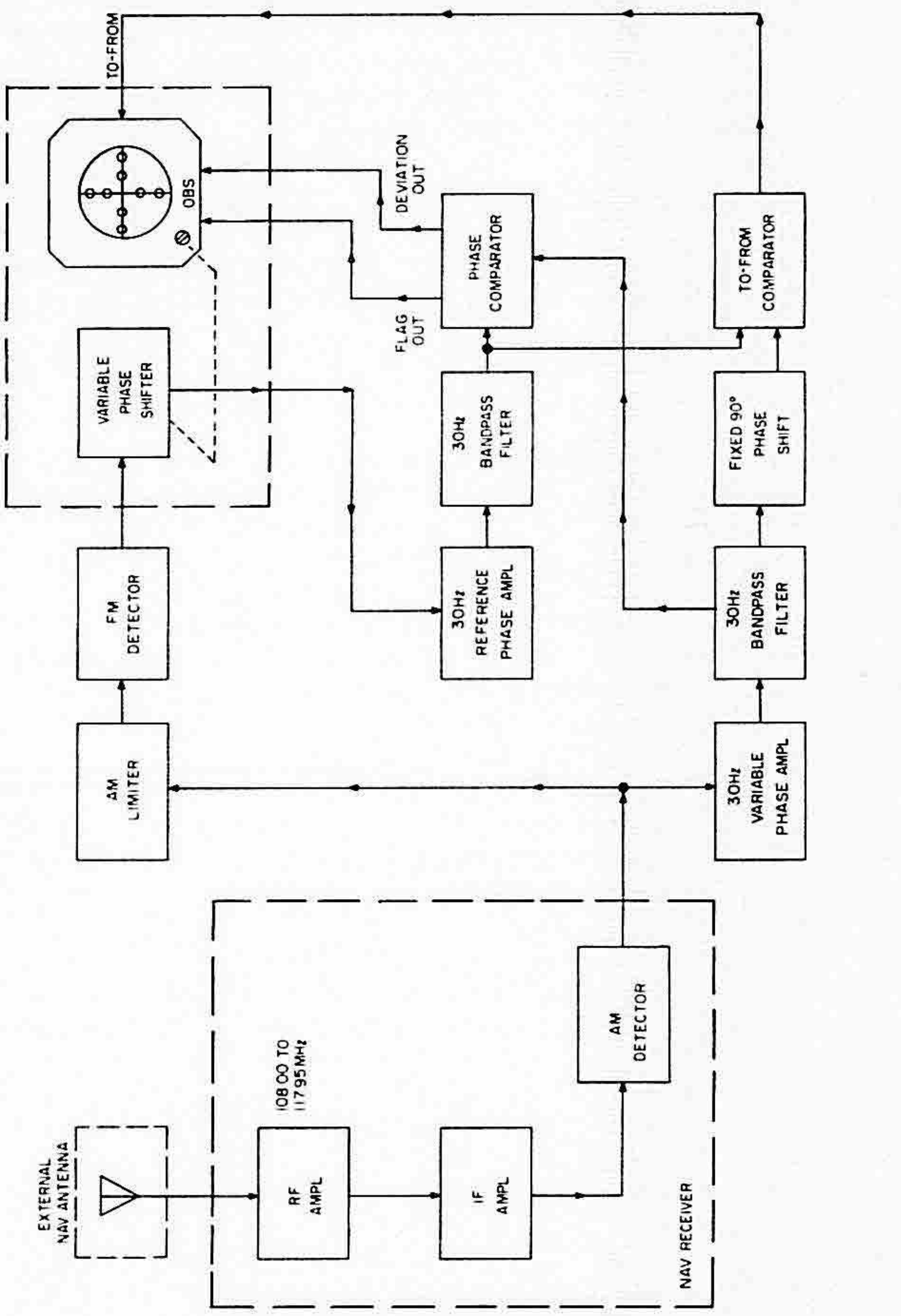


FIGURE 4-2 MANUAL VOR RECEPTION, FUNCTIONAL DIAGRAM
(696-1512-00)



SEE BLOWUP

radial of the indicator course card is beneath the course index, giving a 90° phase difference into the comparator and a zero output from the comparator. The VOR-LOC needle is centered. If the aircraft deviates to the 359° radial, the signals reaching the aircraft are 359° (1°) out of phase. Since the phase shift in the resolver circuit is the same as for the 0° radial, the inputs to the comparator are 91° out of phase. An output from the comparator results, and the VOR needle deviates to the right. If the aircraft deviates to the 2° radial, the reference signal requires a 92° phase shift to center the needle. The reference signal receives only a 90° shift in the circuit so the signals into the comparator are 88° out of phase. An output results, causing the needle to deviate to the left. When the aircraft is heading south from a station, the course card would normally be set so the 180° radial is beneath the course index. The resolver phase shift would then be 270°. If the aircraft drifted off course, the phase shift required to center the VOR needle would be less than or greater than 270° depending on direction of drift. An output from the phase comparator and a VOR-LOC needle deviation results.

Refer to figure 4-2. The 30Hz reference phase signal from the variable phase shifter, is also tapped to a fixed 90° phase shifter. If the VOR needle is centered, the reference phase signal and variable phase signal entering the to-from phase comparator will be either in phase or 180° out of phase. The to-from phase comparator has a dc output of proper polarity to pull the "to" indication into view when the signals are in phase, while the "from" indication is in view when the signals are 180° out of phase. If the signals into the comparator are not in phase or 180° out of phase, the output will be less than maximum. The output decreases to zero at 90° or 270° phase difference and the to-from window is blank. The relative phase of the two signals is dependent upon the direction of the aircraft from the station with respect to the direction set beneath the course index. When a heading of the direction given beneath the course index would direct the aircraft toward the station, a "to" indication is given. When the heading of the direction given beneath the course index would direct the aircraft away from the station, a "from" indication is given. Only the direction of the aircraft from the station affects the to-from indicator, not the heading of the aircraft with respect to the station.

The VOR-LOC warning flag is visible when no signal or less than normal signal is present, enough voltage is applied to the flag movement to conceal the flag.

## 4.3 PRINCIPLES OF LOCALIZER SYSTEM

### 4.3.1 GENERAL

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 4-3. 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.

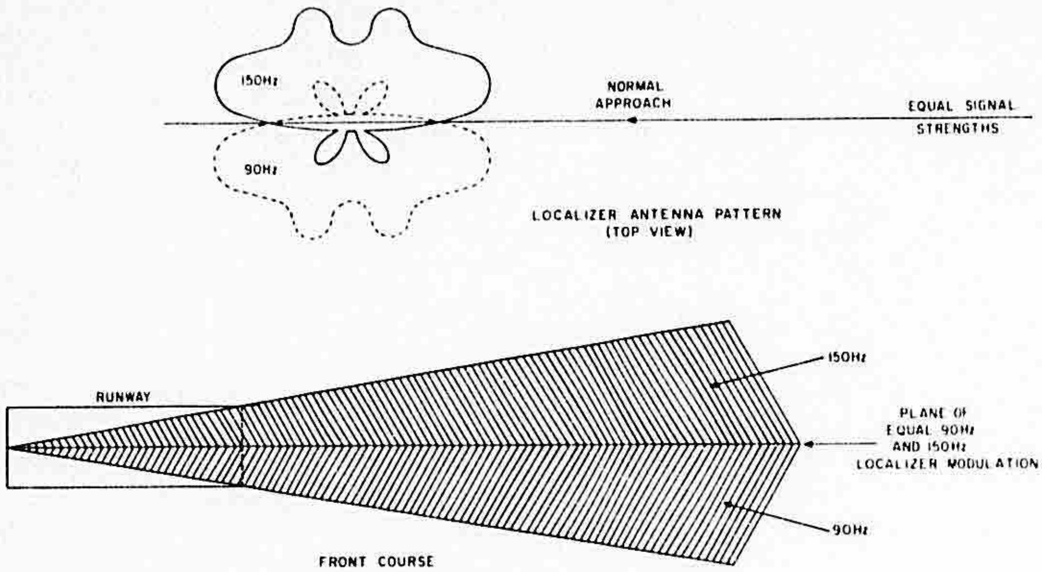


FIGURE 4-3 LOCALIZER SIGNAL GENERATION
(696-0705-00)

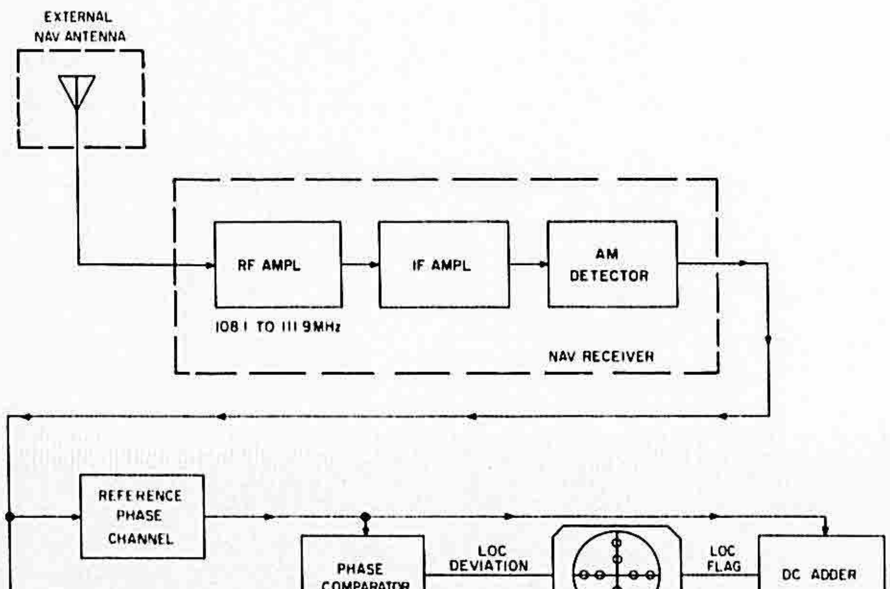


FIGURE 4-4 LOCALIZER RECEPTION, FUNCTIONAL DIAGRAM
(696-1500-00)



SEE BLOWUP

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

4.3.2 LOCALIZER RECEPTION

The localizer signal, after being processed, drives an indicating needle. The localizer controls the vertical needle of the course selector when a localizer frequency is selected by the NAV receiver. A localizer warning flag indicates when either signal is too weak for reliable operation or when a malfunction develops in the receiver. The localizer carrier is selected and amplified in the NAV receiver circuits. Refer to figure 4-4. After being suitably processed in the same phase comparator utilized by the VOR signals. The dc output of the comparator is zero when the 90Hz and 150Hz signals are equal. If the signals are not equal, the dc output will be positive or negative, depending on which has the greater amplitude. The comparator drives the VOR-LOC needle to the left if the 150Hz predominates and to the right if the 90Hz signal is greater.

## 4.4 VOR/LOC CONVERTER BLOCK DIAGRAM CIRCUIT THEORY

4.4.1 MANUAL CONVERTER BLOCK DIAGRAM (Figure 4-11)

The manual VOR instrumentation circuitry has two separate channels, the reference phase and variable phase channels. The composite signal from the receiver is applied to both channels and LOC AMP Q111. However, in the VOR mode, Q111 is non-conducting.

The 30Hz variable phase signal is amplified by the variable phase amplifier, driver, and variable phase output before being applied to the deviation phase comparator. The feedback filter from output to input of the variable phase channel tunes the circuit to 30Hz.

The reference phase channel processes the 30Hz reference modulation of the 9,960Hz subcarrier. The amplitude modulation is removed by the limiter, amplified by Q102 and applied to the FM discriminator where the 30Hz reference signal is recovered. After phase shifting, Q103 feeds the signal to the rotor of an external 30Hz resolver. The desired radial is selected by positioning the resolver rotor shaft (OBS). The two resolver stators, in conjunction with circuitry in the converter, shift the phase of the 30Hz reference signal is amplified by the VOR Amp, reference phase amplifier, driver and reference phase output. The feedback filter tunes the circuit to 30Hz.

The signals to the phase comparator consist of the two 30Hz inputs. When the signals are of the proper phase relationship, the deviation comparator provides a centered needle condition indicating the aircraft is on the selected radial (or its reciprocal). If the phase changes, the comparator senses the difference and provides a deviation current indicating the magnitude of course error. An additional ourput from the comparator operates an alarm flag when the signal is considered to be unreliable.

Operation of the to-from comparator requires that one of the 30Hz signals be shifted in phase by 90 degrees. The 30Hz signals are then applied to the to-from phase comparator. The circuit indicates whether the aircraft is on a selected radial or its reciprocal by deflecting a dc meter movement to the "to" or "from" direction.

4.4.2 LOCALIZER BLOCK DIAGRAM (Figure 4-11)

The VOR-LOC Converter utilizes circuitry which is common to both VOR and LOC operation with suitable modifications. When an ILS signal (90 and 150Hz) is received, the LOC Energize line is grounded by the NAV receiver. The limiter is disabled by CR105 (VOR Disable switch) which prevents the signal from entering the reference phase amplifier (Q105, Q106) via this route. The composite 90/150Hz signal is amplified and phase inverted by the LOC Amp Q111 which is energized by CR107. The composite localizer signal is amplified by the reference phase amplifier, driver, and reference phase output and applied to the deviation phase comparator. The feedback filter is modified by a switch circuit consisting of CR108 and Q110. Basically the amplifier is then broadbanded and passes both frequencies equally.

The other input to deviation phase comparator is through the variable phase amplifier circuitry. In localizer operation the variable phase feedback filter is tuned to 120Hz by the operation of CR110. The phase characteristics of 90Hz and 150Hz are changed when passing through the amplifier.

The phase comparator output is a dc current which is zero when the aircraft is positioned along the runway centerline. When the aircraft is to the left or right of the runway centerline, the needle deflects proportionately. The to-from phase comparator is disabled in the LOC mode.

## 4.5 VOR/LOC DETAILED CIRCUIT THEORY

4.5.1 VOR-LOC SWITCHING (Figure 4-5)

Switching from the VOR to LOC mode is accomplished by applying a ground to the LOC energize line J101-D. When an ILS channel is selected by the NAV receiver, this line is grounded. The cathodes of CR105, CR106, CR107, CR108, CR110 and CR123 are grounded and K101 and K102 are energized. Since the anodes are connected to positive voltages through resistors, they are turned "ON" and switch the circuitry for localizer operation. The circuitry changes are covered in the circuit explanations.

With K102 energized C148 and C144 are removed from the left/right meter circuit giving a fast time constant in LOC.

In the VOR mode the anodes are returned to positive voltages of 10 volts or less. Since the ILS ground is removed, the aircraft buss voltage is applied to the cathodes through R163. This voltage is greater than 10 volts (typically 13.75V) therefore the diodes are back biased and act as open circuits. K101 is not energized because CR122 is reverse biased.

S/N 8700 and Above
or MOD. Status #3

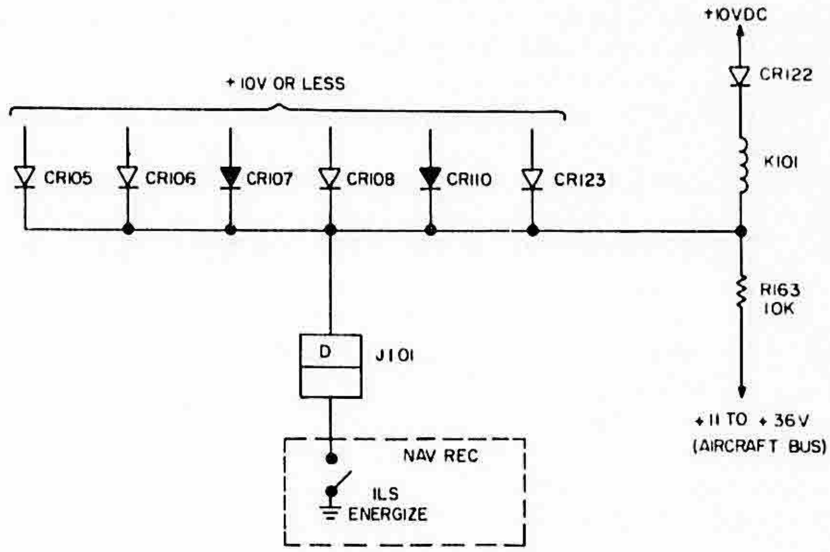


FIGURE 4-5 VOR-LOC SWITCHING
(696-1523-00)

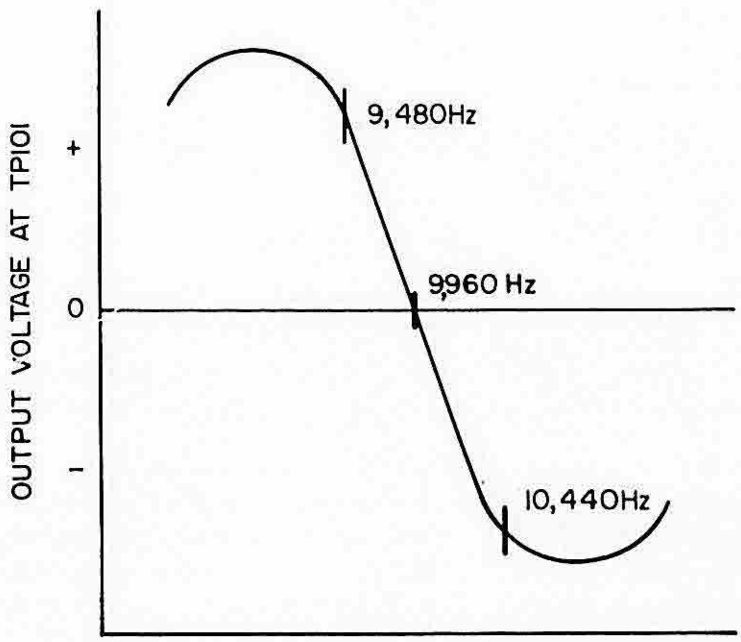


FIGURE 4-6 "S" SHAPED DISCRIMINATOR CURVE
(696-1524-00)



SEE BLOWUP

4.5.2 VOR REFERENCE PHASE CHANNEL (Figure 6-9)

The VOR signal from the NAV receiver is fed to both reference and variable channels of the converter. The reference channel processes the 9960Hz subcarrier as follows. The signal is coupled through C101 to the limiter circuit consisting of CR101 and Q101. The limiter recovers the 9,960Hz subcarrier and its sidebands and maintains the level constant over a wide range of input signal levels. RT101 and R102 form a voltage divider at the emitter of Q101 which keeps the limited output nearly constant over the equipment operating temperature range by compensating for the characteristics of diode CR101. The limited FM is coupled through C102 to amplifier Q102 which drives the primary of T101.

The FM discriminator consists of T101 and diodes CR102 and CR103. Both primary and secondary circuits of T101 are tuned to the 9,960Hz subcarrier center frequency. This type of discriminator has a typical "S" output curve (see figure 4-6). As the instantaneous frequency deviates between 9,480Hz and 10,440Hz, the DC level at TP101 varies between a positive and negative level as shown in the figure. Since the FM deviates at a 30Hz rate, the reference 30Hz signal is recovered at TP101. C105 and C106 filter out the 9,960Hz.

The demodulated 30Hz reference signal is then phase shifted by a RC network consisting of C138, R108, R109 and C107. R1009 is the VOR Zero adjustment which allows an adjustment range for calibration purposes. C138 increases the range of R109. The signal is then coupled through C108 with very little phase shift to the base of emitter follower Q103. The emitter voltage of Q103 is applied to an external resolver rotor through a 1.8K resistor.

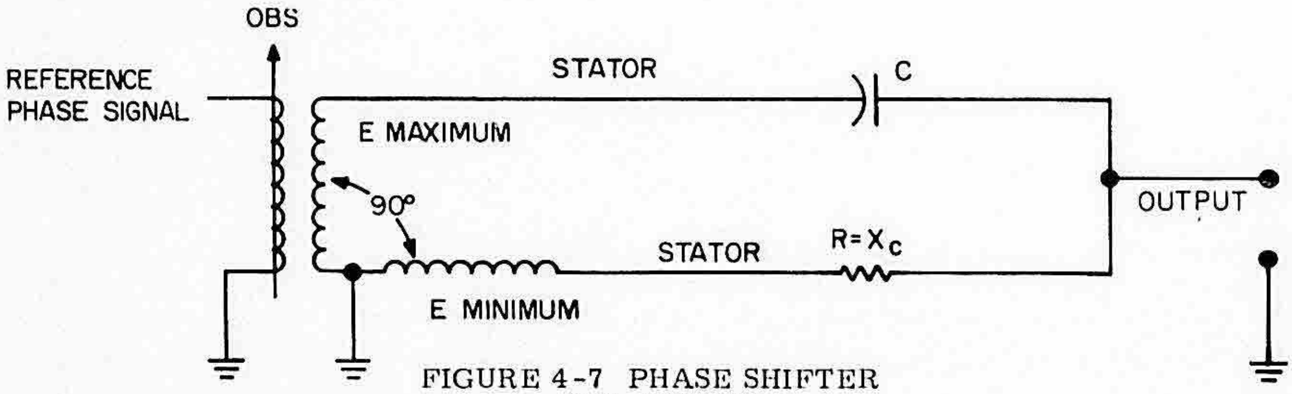


FIGURE 4-7 PHASE SHIFTER
(696-1525-00)

The OBS (Omni Bearing Selector Circuitry) consists of a 30Hz resolver and an RC network. The resolver (figure 407) can be considered a transformer whose primary (rotor) can be rotated varying the coupling into the two stator windings. Notice that the stators are wound at right angles so that when the stator voltage of one winding is maximum, the other will be at a minimum. The amplitude from the stator windings will then vary as the sine and cosine of the coupling angle. Since the resolver acts as a transformer, the stator outputs will either be in phase or 180° out of phase with each other.

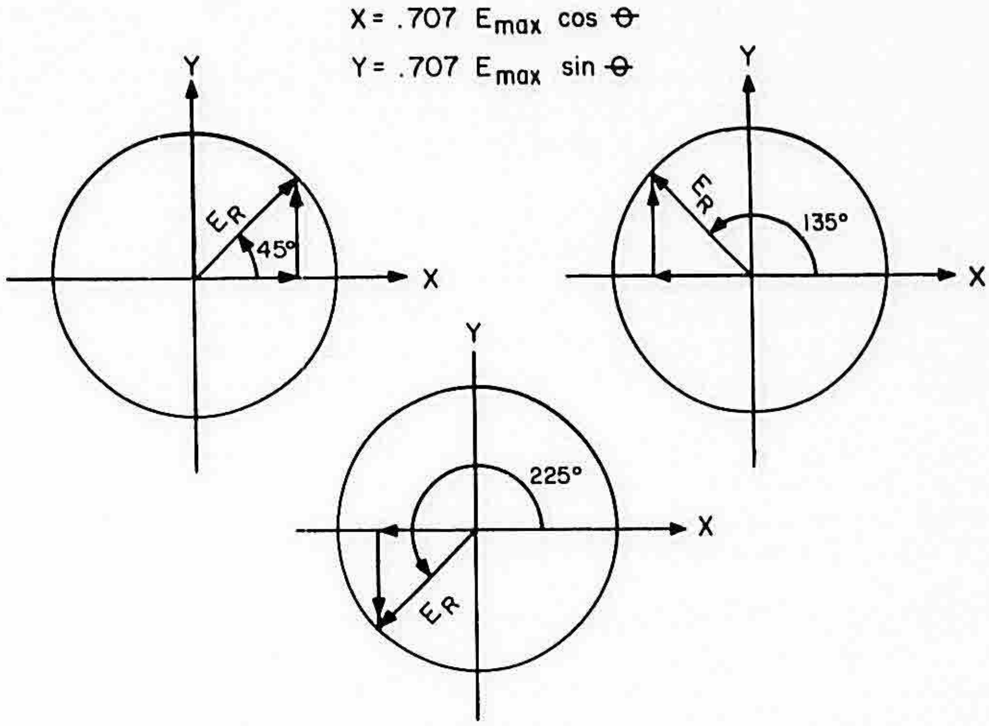


FIGURE 4-8 PHASE SHIFTER VECTOR
(696-1526-00)

To make a constant amplitude phase shifter requires vector addition of two voltages in phase quadrature (90° phase difference). By the addition of an RC network, one signal is shifted 45° leading while the other is shifted 45° lagging at the output terminals. When these quadrature voltages of varying amplitude add vectorically, the result will be a constant amplitude output with a phase dependent on the rotor position.

See the circle diagrams (figure 4-8) which show graphically how the amplitude variations are transformed into a resultant voltage $E_r$ of constant amplitude and varying phase. Notice that the individual vector components are always in a horizontal or vertical direction indicating either an in phase or out of phase condition.

The signal from the phase shifter is coupled to Q104 base circuit. R115 and C110 form a low pass filter to pass the 30Hz reference phase signal and attenuate unwanted higher frequencies. The gain of Q104 remains constant over the temperature range due to diode(CR125) temperature stabilization. Base bias for the stage flows through R116. R116 and R118 provide ac and dc stability for Q104. The amplified signal at the collector Q104 is adjustable by the VOR reference level potentiometer and is used to set the level of the 30Hz reference signal fed to the comparator. C111 attenuates unwanted signals.

The signal from Q104 is fed through isolation resistor R119 and coupling capacitor C112 to the Q105 base of the differential amplifier. R120 and R121 form a voltage divider bias network for Q105. Q105's collector current flows through the emitter-base junction of Q107. Q107 amplifies the signal which is fed to the push-pull complimentary output stage Q108 and Q109. C113 prevents high frequency oscillation. Diode CR104 tends to eliminate crossover distortion due to non-linearities of the output stage.

The 30Hz reference output signal is coupled to the phase comparator circuitry through T102. The purpose of C116 is dc isolation and it presents a low impedance to the ac signal. The amplifier combination is tuned to 30Hz by a bridge "T" feedback circuit which feeds back a portion of the output signal to the Q106 base of the differential amplifier. A bridge "T" circuit has the property that it has minimum feedback at the "notch" frequency and maximum degenerative feedback at other frequencies.

In the VOR mode, CR108 is not grounded. Switch transistor Q110 is biased "on" by bias current through R127 and R128. The emitter to collector becomes a low impedance which effectively shorts out R125. The bridge "T" feedback filter then consists primarily of C114, C115, R124 and the parallel equivalent resistance of R126 and R129.

### 4.5.3 VOR VARIABLE PHASE CHANNEL (Figure 6-9)

Except for differences in the input circuitry, the 30Hz variable phase amplifier operation is basically the same as the reference phase 30Hz amplifier. The variable channel is tuned to 30Hz and thus rejects the FM modulation.

In the VOR mode CR106 is back biased and acts as an open circuit. The voltage divider, R136 in series with R130 and R137, presents negligible loading effect of the signal due to the high impedance of R130. A phase shift network consisting of R136, C119, R139, R138 and C118 is intended primarily for localizer centering. Q111 is disabled so the variable 30Hz does not pass into the reference channel.

The input to the variable phase amplifier is adjustable by R135 (VOR VAR LEVEL) and is fed through R136 and C121 to the base of Q112. The 30Hz variable signal is amplified successively by differential amplifier Q112 and Q113, driver amplifier Q114 and the complimentary output stage Q115 and Q116. The signal is then fed to the T103 input of the phase comparator. TP104 is used to monitor the amplifier output voltage.

### 4.5.4 DEVIATION PHASE COMPARATOR (Figure 4-9)

The phase comparator consists of transformer T102 and T103 and two associated bridge circuits which compare the phase difference between the 30Hz reference and the 30Hz variable phase signals.

Secondary windings (terminals 3 and 4) of T102 and T103 are connected series aiding and supply a 30Hz voltage to the upper full-wave bridge rectifier. DC current $I_1$ flows

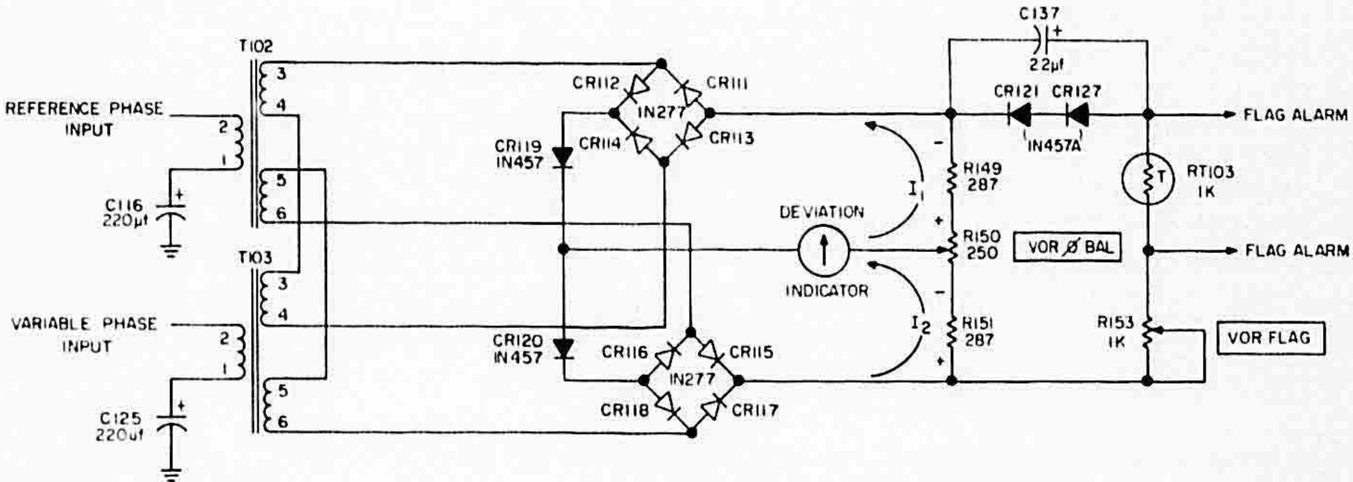


FIGURE 4-9 SIMPLIFIED DEVIATION PHASE COMPARATOR
(696-1501-00)



SEE BLOWUP

through the deviation indicator, R150 and R149 in the direction indicated. Secondary windings (terminal 5 and 6) of T102 and T103 are connected in phase opposition so that the voltage addition of these two windings is effectively applied to the lower bridge consisting of CR115 through CR118. DC current $I_2$ flows through the deviation meter in a direction opposite to that of $I_1$. The deviation output is the difference between these two currents with the larger determining left or right needle deflection.

For the case where the two 30Hz signals are in phase, the voltages induced in secondary terminal 5 or 6 cancel and no resultant ac voltage is fed to the lower bridge. The ac voltage of T102 (terminals 3 and 4) in series with T103 (terminals 3 and 4) adds and is applied to the upper bridge rectifier. In this case, the deviation current is maximum and is determined solely by the upper rectifier.

When the 30Hz voltages are 180° out of phase rather than in phase, the voltages induced into T102 and T103 (terminals 3 and 4) cancel. and the voltages across both transformers (terminals 5 and 6) add. The deviation current is then $I_2$, the current from the lower bridge only.

As the input phase changes from the in phase or out of phase condition, the voltages induced into the secondaries do not completely add or completely cancel. The voltages across the two bridges become more nearly equal until at 90° or 270°, they are equal. The deviation indicator has no net current and is centered.

Alarm flag current always flows in one direction and is proportional to the sum of the individual bridge voltages due to its placement in the circuit.

4.5.5 TO-FROM FLAG CIRCUITRY (Figure 4-10)

In VOR mode, Q119 is biased "on" due to base current through R160. The emitter to collector acts as a switch which effectively grounds the junction of R161 and R162 allowing the flag to become operative.

Both the to-from and the deviation phase comparators provide maximum output when the phase difference between their respective inputs is 90°. When the deviation needle is centered (input signal phase difference of 90°), the to-from output must be a maximum. Since both comparators utilize the same channels, a 90° phase shift is required for correct response by the to-from comparator.

The to-from comparator (Q117 and Q118) receives its inputs from separate secondary winding (terminals 7-9). C126, R148 and T102 secondary winding terminals (7-9) form a 90° phase shift circuit for the 30Hz reference signal while the secondary voltage of the variable phase is unshifted. Therefore, when the deviation phase comparator output is zero, the voltages to one of the transistors add and the voltages to the base of the other transistor, cancel resulting in a maximum unbalance across R161 and R16s. The to-from meter, bridged across these resistors senses the polarity and deflects accordingly.

When the deviation current is maximum Q117 and Q118 conduct equally and there is no net voltage to drive the to-from flag. In the Localizer mode, Q119 is turned "off" and the emitter circuits of Q117 and Q118 are opened which disables the to-from flag.

The flagboard provides a more positive warning flag operation by sensing the reference and variable 30Hz signals. The 30Hz signals are detected by Q201 and Q203, gated by diodes CR201 and CR202 and used to control transistor switches Q202 and Q204. When a localizer channel is selected, diode CR203 disables the flagboard circuit.

4.5.6 LOCALIZER THEORY (Figure 6-9)

The localizer circuitry is protected by U.S. Patent No. 3,281,846 and utilizes the same phase comparator plus circuitry common to VOR. The amplitude ratio of the modulation signals is dependent on the aircraft position relative to the runway center line. To utilize the VOR phase comparator, the 90Hz and 150Hz signals are converted to signals bearing a known phase relationship.

When an ILS channel is selected, the Localizer energize line is grounded and the circuitry is modified to process the localizer signals. The limiter is disabled by grounding the collector of Q101 through CR105. The reference channel 30Hz bridge "T" feedback is disabled by turning switch transistor Q110 "off". The reference channel circuitry is then broadbanded and both 90 and 150Hz signals are passed with essentially no phase shift. The variable channel feedback filter is tuned to 120Hz by grounding CR110. The response of the 120Hz bridge "T" filter causes the 90Hz output signal to lead and the 150Hz signal to lag the input.

The localizer composite input signal is felt at the wiper arm of R135. CR106 is grounded in localizer mode so R136 and R137 (LOC FLAG) form a voltage divider. The amplitude of the composite signal fed into the variable phase channel is used to adjust the flag current. This signal is coupled through C121, amplified and fed to the T103 input of the comparator. With the exception that the variable channel is tuned to 120Hz, amplifier operation is the same as in the VOR mode.

The combination of R136, R138, R139, C118 and C119 form a phase shift network for the signal fed into the reference channel. R139 (LOC CENTERING) is adjusted to center the deviation needle when the tone amplitudes are equal. The composite signal is coupled through C120 to the base of Q111. Q111's emitter is grounded in LOC mode by CR107. The composite signal is amplified and inverted at the collector of Q111. Adjustment of R133 (LOC SENS) determines the localizer deviation when the tones are unequal. The localizer composite signal is amplified by the broadbanded reference channel and applied to T102.

If a 90Hz signal is fed to the converter input, the artificially generated phase difference in the two channels causes maximum needle deflection to the right. With a 150Hz signal only the phase difference tends to cause maximum left needle deflection. Simultaneous application of both 90 and 150Hz signals of equal amplitude will cause the needle to remain centered since the two tones cause opposite responses of the comparator. As the amplitude ratio of the two signals varies, the deviation needle will indicate the difference of the signals.

S/N 6700 and Above
or MOD. Status #2

4.5.7 REGULATED POWER SUPPLY (Figure 6-9

The function of the regulator is to supply +10VDC to the VOR-LOC Converter. The regulator is designed to operate on any supply voltage between the limits of 11 and 36VDC.

The regulator consists of an error sensing network, Q121 and Q122 amplifiers, and series regulator transistor, Q120. C130 and C131 are filter capacitors. CR124 is a 6.8V zener used as a reference element. R164 (REGULATOR VOLTAGE ADJUST) and R165 form the error sensing network.

If the regulator output tends to go positive, Q122 is turned on harder, reducing the base drive to Q121 which reduces the emitter current of the series regulator Q120. The series impedance of Q120 increases and maintains the voltage at the 10 volt level.

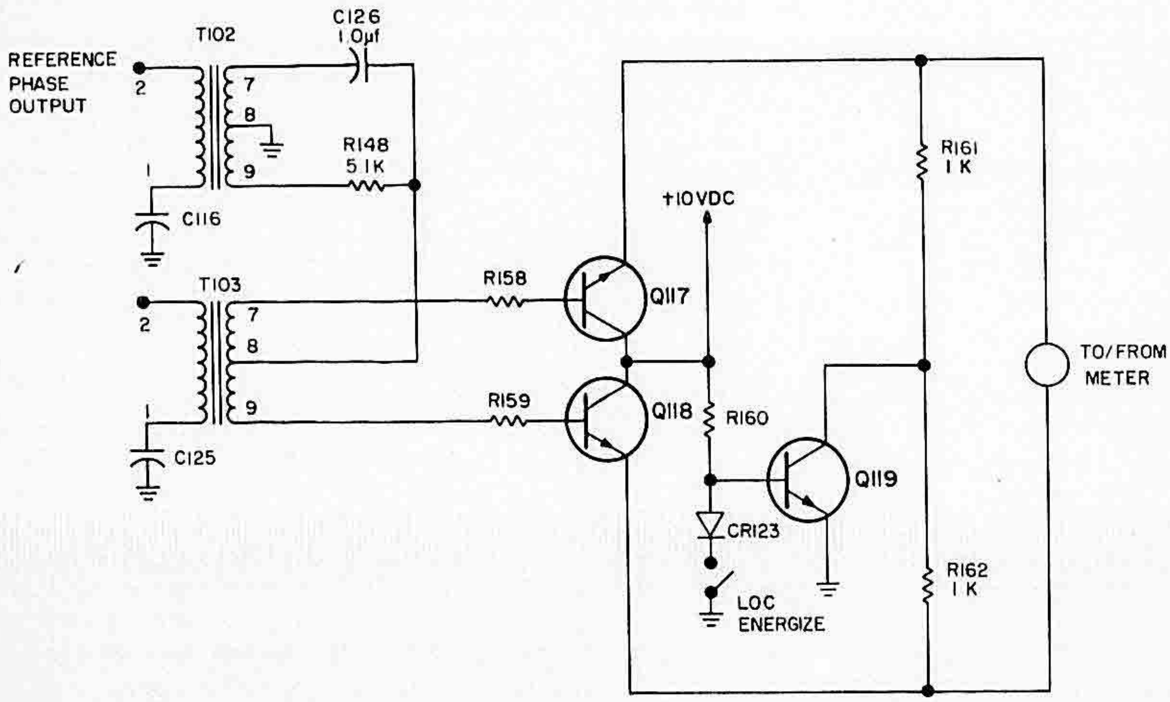


FIGURE 4-10 TO-FROM COMPARATOR
(696-1502-00)

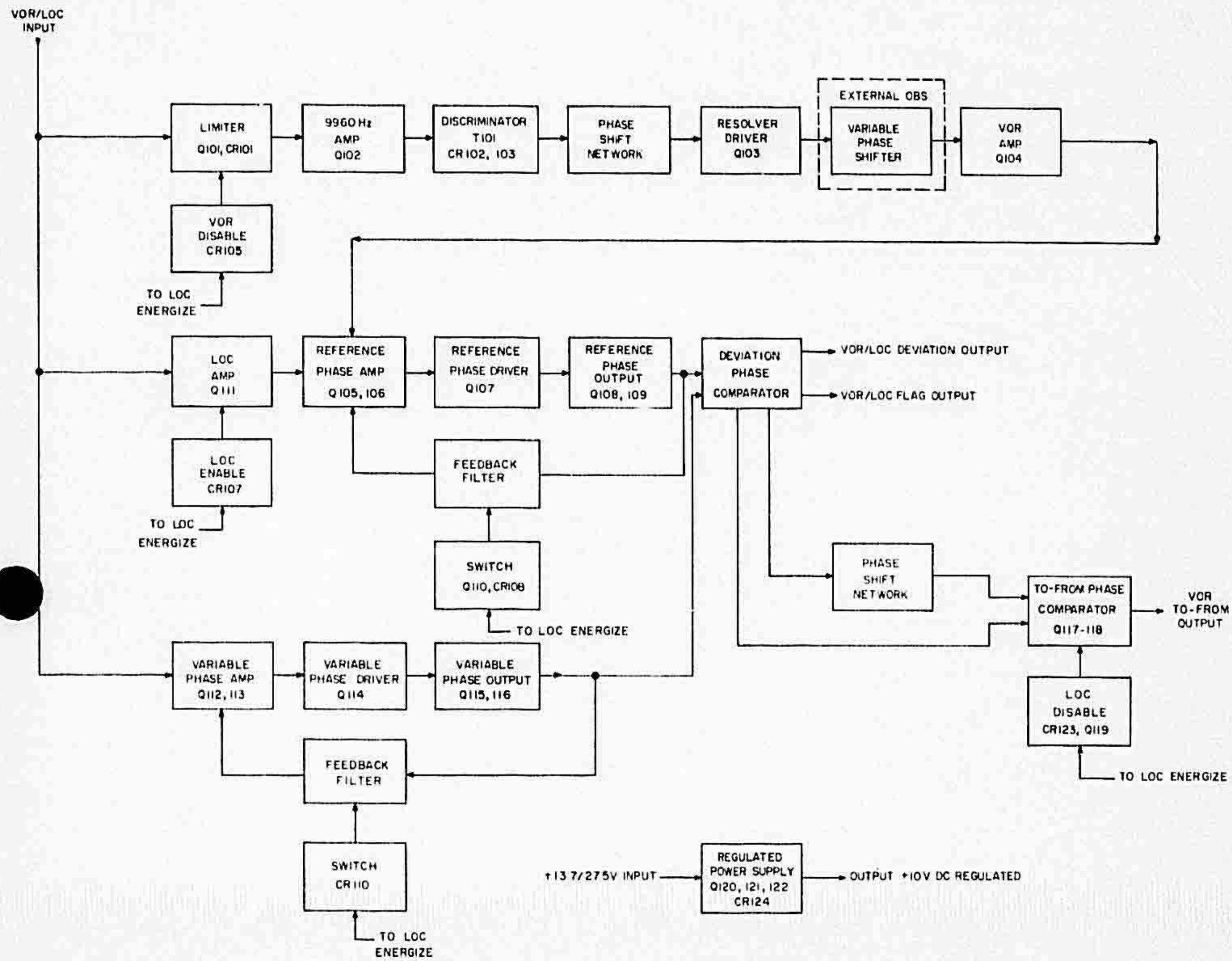


FIGURE 4-11 VOR-LOC CONVERTER BLOCK DIAGRAM
(696-1510-00)



SEE BLOWUP

# CONTENTS

## SECTION V

## ILLUSTRATED PARTS LIST

ASSEMBLY NO. 066-4004-00
DESCRIPTION OMNI LOC CONVERTER
UNIT KN 77
B/MRL 2
USED ON ASSEMBLY 066-4004-00
ASSEMBLY DRAWING NO.

| SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|
| | 047-2410-02 | Cover Equipment | 1 |
| | 200-0368-00 | Unit Final Assembly | 1 |
| | 150-0018-10 | Shrink Tubing | .2 |

Parts List Revisions Record

Assembly No. 066-4004-00 Manual Revision No. 0

| ACTION | SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| | | | Manual Revision No. 2 | |
| Added | | 088-0578-00 | Connector Cover | 1 |





ASSEMBLY NO. 200-0368-00
DESCRIPTION UNIT FINAL ASSY
UNIT KN 77
B/M RL 8
USED ON ASSEMBLY 066-4004-00
ASSEMBLY DRAWING NO. 300-0495-00

| | SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| | | 047-2411-02 | Front Plate | 1 |
| | | 047-2412-02 | Rear Plate | 1 |
| | | 047-2413-02 | Bottom Panel | 1 |
| | | 057-1383-01 | Rear Nameplate | 1 |
| R1 | | 089-5436-04 | SCR FHP 4-40 X 1/4 | 4 |
| | | 200-0370-00 | Chassis Assy | 1 |
| | | 200-0371-00 | Harness Assy | 1 |
| | L 0101 | 019-2091-00 | Inductor Torroid | 1 |
| | | 089-5903-04 | SCR PHP 4-40 X 1/4 | 8 |
| | | 089-5903-07 | SCR PHP 4-40 X 7/16 | 1 |

Parts List Revisions Record

Assembly No. 200-0368-00

Manual Revision No. 1

| ACTION | SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| Changed | | 089-6008-04 | Scr FHP 4-40 x 1/4 100° | 4 |
| Added | | 016-1007-05 | Locktite | AR |
| Added | | 025-0018-95 | Wire CW26 Wht/Grn | .2 ft |
| Added | | 025-0018-00 | Wire CW26 Blk | .2 ft |
| Added | | 025-0018-33 | Wire CW26 Orn | .2 ft |
| Added | | 009-0030-01 | Tml Strip | 1 |
| Added | C139 | 113-3151-00 | Cap DC 150pf 500V | 1 |
| Added | C140 | 096-1030-38 | Cap Tant 100µf 15V | 1 |
| Added | Q123 | 007-0033-00 | Tstr Sil A337 | 1 |
| Added | R166 | 130-0104-23 | Res FC 100K 5% QW | 1 |
| Added | R167 | 130-0104-23 | Res FC 100K 5% QW | 1 |
| Added | R168 | 130-0473-23 | Res FC 47K 5% QW | 1 |

Manual Revision No. 2

| ACTION | SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| Added | | 091-0109-00 | Plastic Ties | 5 |

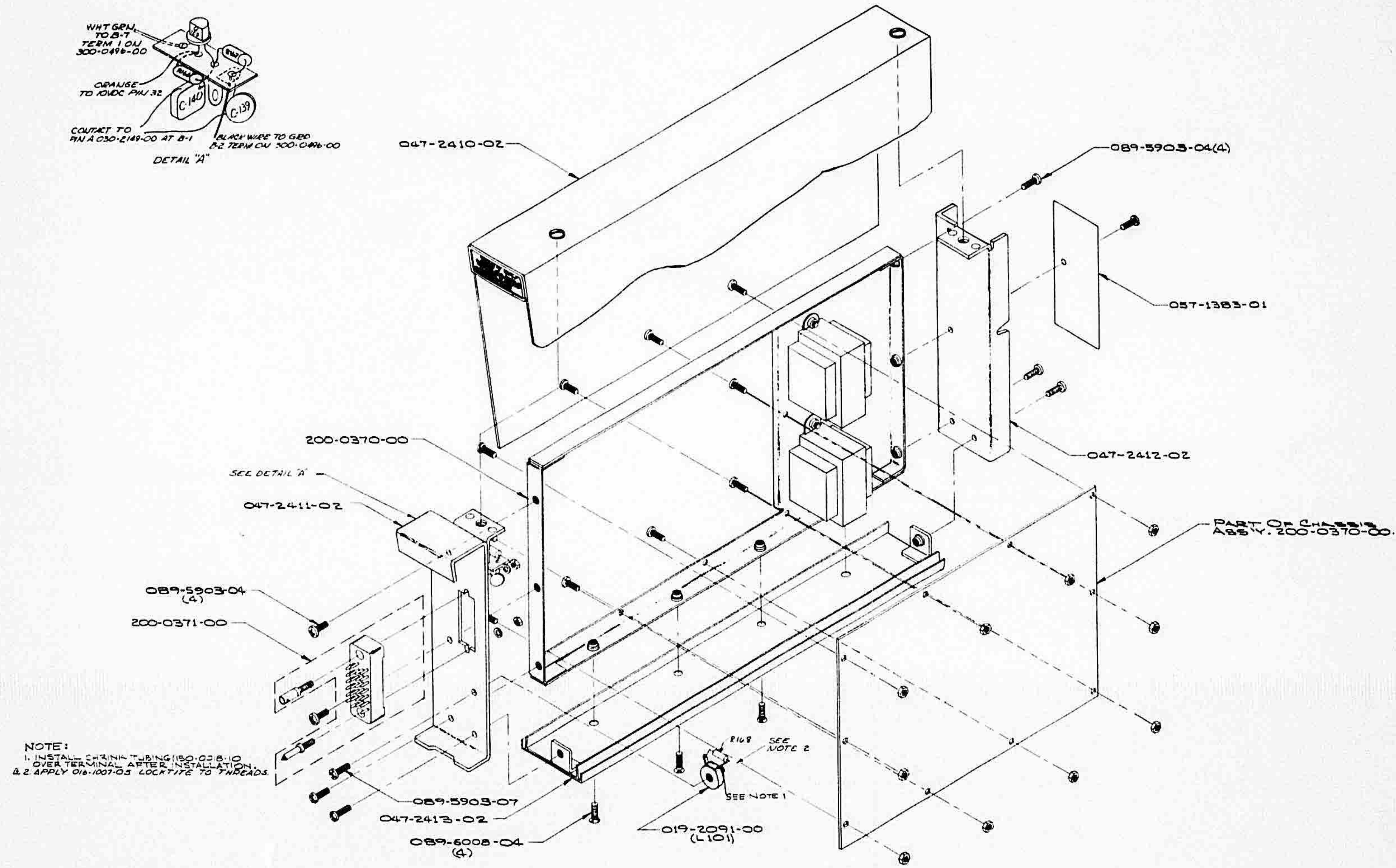


FIGURE 5-1 UNIT FINAL ASSEMBLY
(Dwg. No. 300-0495-00, R-7)



SEE BLOWUP

ASSEMBLY NO. 200-0369-00
DESCRIPTION PC BOARD ASSY
UNIT KN 77
B/MRL 11
USED ON ASSEMBLY 200-0370-00
ASSEMBLY DRAWING NO. 300-0496-00

| | SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| | | 008-0048-00 | Ground Terminal | 36 |
| | | 009-5181-00 | PC Board | 1 |
| | | 091-0025-00 | Washer Trans Insul | 4 |
| | | 187-1025-00 | Gasket Insul | 1 |
| | C 0101 | 105-0018-20 | Cap Poly .0015 10P | 1 |
| | C 0102 | 108-5013-03 | Cap Poly .22µf 100V | 1 |
| | C 0103 | 108-5012-12 | Cap Poly .01 5P | 1 |
| | C 0107 | 108-5013-03 | Cap Poly .22µf 100V | 1 |
| | C 0108 | 096-1030-06 | Cap Tant 47µf 15V | 1 |
| | C 0109 | 108-5013-03 | Cap Poly .22µf 100V | 1 |
| | C 0110 | 108-5013-03 | Cap Poly .22µf 100V | 1 |
| | C 0111 | 108-5013-07 | Cap Poly 1.0µf 100V | 1 |
| | C 0112 | 108-5013-04 | Cap Poly .33µf 10P | 1 |
| | C 0113 | 113-7471-00 | Cap 470PF 20PC X5F | 1 |
| | C 0114 | 108-5017-39 | Cap Poly 0.1µf 50V | 1 |
| | C 0115 | 108-5017-39 | Cap Poly 0.1µf 50V | 1 |
| | C 0120 | 108-5013-04 | Cap Poly .33µf 10P | 1 |
| | C 0121 | 108-5013-04 | Cap Poly .33µf 10P | 1 |
| | C 0122 | 113-7471-00 | Cap 470PF 20PC X5F | 1 |
| | C 0123 | 108-5017-39 | Cap Poly 0.1µf 50V | 1 |
| | C 0124 | 108-5017-39 | Cap Poly 0.1µf 50V | 1 |
| | C 0126 | 108-5013-07 | Cap Poly 1.0µf 100V | 1 |
| R2 | C 0127 | 097-0057-33 | Cap Elec 2200µf 4V | 1 |
| | C 0128 | 097-0056-05 | Cap Elec 470µf 4V | 1 |
| | C 0129 | 097-0056-05 | Cap Elec 470µf 4V | 1 |
| | C 0133 | 096-1030-10 | Cap Tant 10µf 35V | 1 |
| | C 0135 | 108-5012-16 | Cap Poly .022 5P | 1 |
| | C 0136 | 108-5012-16 | Cap Poly .022 5P | 1 |
| | C 0137 | 096-1030-22 | Cap Tant 22µf 20V | 1 |
| R1 | C 0138 | 108-5016-80 | Cap Poly .15µf 50V | 1 |
| | CJ0101 | 026-0018-00 | Wire Cir Jumper | 1 |
| | CR0101 | 007-6029-00 | Diode Sil 1N457A | 1 |
| | CR0102 | 007-6023-00 | Diode Germ 1N277 | 1 |
| | CR0103 | 007-6023 00 | Diode Germ 1N277 | 1 |
| | CR0104 | 007-6029-00 | Diode Sil 1N457A | 1 |
| | CR0105 | 007-6023-00 | Diode Germ 1N277 | 1 |
| | CR0106 | 007-6023-00 | Diode Germ 1N277 | 1 |
| | CR0107 | 007-6029-00 | Diode Sil 1N457A | 1 |
| | CR0108 | 007-6023-00 | Diode Germ 1N277 | 1 |
| | C 0103 | 108-5016-38 | Cap Poly .01 5P | 1 |
| | C 0104 | 108-5016-38 | Cap Poly .01 5P | 1 |

ASSEMBLY NO. 200-0369-00
DESCRIPTION PC BOARD ASSY
UNIT KN 77
B/MRL 11
USED ON ASSEMBLY 200-0370-00
ASSEMBLY DRAWING NO. 300-0496-00

| SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|
| C 0117 | 108-5015-45 | Cap Poly .033µf 5P | 1 |
| C 0105 | 108-5013-01 | Cap Poly . 1µf 10P | 1 |
| C 0106 | 108-5013-01 | Cap Poly . 1µf 10P | 1 |
| CR0109 | 007-6029-00 | Diode Sil 1N457A | 1 |
| CR0110 | 007-6029-00 | Diode Sil 1N457A | 1 |
| CR0111 | 007-6023-00 | Diode Germ 1N277 | 1 |
| CR0112 | 007-6023-00 | Diode Germ 1N277 | 1 |
| CR0113 | 007-6023-00 | Diode Germ 1N277 | 1 |
| CR0114 | 007-6023-00 | Diode Germ 1N277 | 1 |
| CR0116 | 007-6023-00 | Diode Germ 1N277 | 1 |
| CR0117 | 007-6023-00 | Diode Germ 1N277 | 1 |
| CR0118 | 007-6023-00 | Diode Germ 1N277 | 1 |
| CR0119 | 007-6029-00 | Diode Sil 1N457A | 1 |
| CR0120 | 007-6029-00 | Diode Sil 1N457A | 1 |
| CR0121 | 007-6029-00 | Diode Sil 1N457A | 1 |
| CR0122 | 007-6023-00 | Diode Germ 1N277 | 1 |
| CR0123 | 007-6023-00 | Diode Germ 1N277 | 1 |
| CR0125 | 007-6023-00 | Diode Germ 1N277 | 1 |
| CR0126 | 007-6029-00 | Diode Sil 1N457A | 1 |
| CR0127 | 007-6029-00 | Diode Sil 1N457A | 1 |
| K 0101 | 032-0011-01 | Relay Reed 12VDC | 1 |
| Q 0101 | 007-0033-00 | TSTR Sil 2N2925 | 1 |
| Q 0102 | 007-0033-00 | TSTR Sil 2N2925 | 1 |
| Q 0103 | 007-0033-00 | TSTR Sil 2N2925 | 1 |
| Q 0104 | 007-0187-00 | TSTR Sil 2N5089 | 1 |
| Q 0105 | 007-0033-00 | TSTR Sil 2N2925 | 1 |
| Q 0106 | 007-0129-00 | TSTR Sil 2N5305 | 1 |
| Q 0108 | 007-0038-00 | TSTR Sil 2N3053 | 1 |
| Q 0109 | 007-0081-00 | TSTR Sil 2N4037 | 1 |
| Q 0110 | 007-0026-03 | TSTR Sil 2N3416 | 1 |
| Q 0111 | 007-0187-00 | TSTR Sil 2N5089 | 1 |
| Q 0112 | 007-0033-00 | TSTR Sil 2N5305 | 1 |
| Q 0113 | 007-0129-00 | TSTR Sil 2N5305 | 1 |
| Q 0115 | 007-0038-00 | TSTR Sil 2N3053 | 1 |
| Q 0116 | 007-0081-00 | TSTR Sil 2N4037 | 1 |
| R2 Q 0117 | 007-0031-00 | TSTR Sil 2N2712 | 1 |
| R2 Q 0118 | 007-0031-00 | TSTR Sil 2N2712 | 1 |
| Q 0119 | 007-0026-03 | TSTR Sil 2N3416 | 1 |
| R 0101 | 130-0103-25 | Res F/C 10K QW 10% | 1 |
| R 0102 | 130-0391-25 | Res F/C 390 QW 10% | 1 |
| R 0103 | 130-0473-25 | Res F/C 47K QW 10% | 1 |
| R 0104 | 130-0332-25 | Res F/C 3.3K QW 10% | 1 |

ASSEMBLY NO. 200-0369-00
DESCRIPTION PC BOARD ASSY
UNIT KN 77
B/MRL 7
USED ON ASSEMBLY 200-0370-00
ASSEMBLY DRAWING NO. 300-0496-00

| | SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| | R 0105 | 130-0221-25 | Res F/C 220 QW 10% | 1 |
| | R 0106 | 130-0221-25 | Res F/C 220 QW 10% | 1 |
| | R 0107 | 130-0273-25 | Res F/C 27K QW 10% | 1 |
| | Q 0107 | 007-0059-00 | TSTR Sil 2N3702 | 1 |
| | Q 0114 | 007-0059-00 | TSTR Sil 2N3702 | 1 |
| | R 0108 | 136-9761-22 | Res PF 9.76K QW 1% | 1 |
| | R 0109 | 133-0072-18 | Res Vari 25K HW | 1 |
| | R 0111 | 130-0274-25 | Res F/C 270K QW 10% | 1 |
| | R 0112 | 130-0182-23 | Res F/C 1.8K QW 5% | 1 |
| | R 0113 | 136-1912-22 | Res PF 19.1K QW 1% | 1 |
| | R 0114 | 133-0072-14 | Res Vari 10K HW | 1 |
| | R 0115 | 136-2742-22 | Res PF 27.4K QW 1% | 1 |
| | R 0116 | 136-2673-22 | Res PF 267K QW 1% | 1 |
| | R 0117 | 133-0072-14 | Res Vari 10K HW | 1 |
| | R 0118 | 130-0221-25 | Res F/C 220 QW 10% | 1 |
| | R 0119 | 136-4751-22 | Res PF 4.75K QW 1% | 1 |
| | R 0122 | 130-0103-25 | Res F/C 10K QW 10% | 1 |
| | R 0123 | 130-0102-25 | Res F/C 1K QW 10% | 1 |
| | R 0124 | 136-3573-22 | Res PF 357K QW 1% | 1 |
| | R 0125 | 136-1003-22 | Res PF 100K QW 1% | 1 |
| | R 0126 | 136-1302-22 | Res 13K 1PC QW | 1 |
| | R 0127 | 130-0223-25 | Res F/C 22K QW 10% | 1 |
| | R 0128 | 130-0223-25 | Res F/C 22K QW 10% | 1 |
| | R 0129 | 136-4642-22 | Res 46.4K 1PC QW | 1 |
| | R 0131 | 136-3573-22 | Res PF 357K QW 1% | 1 |
| | R 0132 | 130-0333-23 | Res F/C 33K QW 5% | 1 |
| | R 0133 | 133-0072-14 | Res Vari 10K HW | 1 |
| | R 0134 | 130-0221-25 | Res F/C 220 QW 10% | 1 |
| R1 | R 0135 | 133-0072-20 | Res Vari 50K HW | 1 |
| | R 0136 | 136-9761-22 | Res PF 9.76K QW 1% | 1 |
| | R 0137 | 133-0072-20 | Res Vari 50K HW | 1 |
| | R 0138 | 136-9761-22 | Res PF 9.76K QW 1% | 1 |
| | R 0139 | 133-0072-20 | Res Vari 50K HW | 1 |
| | R 0142 | 130-0103-25 | Res F/C 10K QW 10% | 1 |
| | R 0143 | 130-0102-25 | Res F/C 1K QW 10% | 1 |
| | R 0144 | 136-3573-22 | Res PF 357K QW 1% | 1 |
| | R 0145 | 133-0072-08 | Res Vari 1K HW | 1 |
| | R 0147 | 130-0272-25 | Res F/C 2.7K QW 10% | 1 |
| | R 0148 | 130-0512-23 | Res F/C 5.1K QW 5% | 1 |
| | R 0149 | 136-2870-22 | Res 287 1PC QW | 1 |
| | R 0150 | 133-0072-04 | Res Vari 200 HW | 1 |

ASSEMBLY NO. 200-0369-00
DESCRIPTION PC BOARD ASSY
UNIT KN 77
B/MRL 7
USED ON ASSEMBLY 200-0370-00
ASSEMBLY DRAWING NO. 300-0496-00

| | SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| | R 0151 | 136-2870-22 | Res 287 1PC QW | 1 |
| | R 0153 | 133-0072-08 | Res Vari 1K HW | 1 |
| | R 0110 | 130-0104-25 | Res F/C 100K QW 10% | 1 |
| | R 0120 | 130-0104-25 | Res F/C 100K QW 10% | 1 |
| | R 0121 | 130-0104-25 | Res F/C 100K QW 10% | 1 |
| | R 0130 | 130-0104-25 | Res F/C 100K QW 10% | 1 |
| | R 0158 | 130-0472-25 | Res F/C 4.7K QW 10% | 1 |
| | R 0159 | 130-0472-25 | Res F/C 4.7K QW 10% | 1 |
| | R 0160 | 130-0472-25 | Res F/C 4.7K QW 10% | 1 |
| | R 0163 | 130-0103-25 | Res F/C 10K QW 10% | 1 |
| | R 0164 | 133-0072-12 | Res Vari 5K HW | 1 |
| | R 0165 | 130-0472-25 | Res F/C 4.7K QW 10% | 1 |
| | RT0101 | 134-1004-00 | TMTR 1K 10% | 1 |
| | RT0102 | 134-1012-01 | TMTR 1K 10% | 1 |
| R1 | RT0103 | 134-1004-00 | TMTR 1K 10% | 1 |
| | T 0101 | 019-8029-00 | XMFR IF 9.960 HZ | 1 |
| | TP0101 | 026-0019-00 | Wire Test Point | 1 |
| | TP0102 | 026-0019-00 | Wire Test Point | 1 |
| | TP0103 | 026-0019-00 | Wire Test Point | 1 |
| | TP0104 | 026-0019-00 | Wire Test Point | 1 |
| | R 0152 | 136-7501-22 | Res PF 7.5K QW 1% | 1 |
| | R 0154 | 130-0102-23 | Res F/C 1K QW 5% | 1 |
| | R 0155 | 130-0102-23 | Res F/C 1K QW 5% | 1 |
| | R 0156 | 130-0102-23 | Res F/C 1K QW 5% | 1 |
| | R 0157 | 130-0102-23 | Res F/C 1K QW 5% | 1 |
| | R 0161 | 130-0102-23 | Res F/C 1K QW 5% | 1 |
| | R 0162 | 130-0102-23 | Res F/C 1K QW 5% | 1 |
| | C 0118 | 108-5013-01 | Cap Poly .1μf 10P | 1 |
| | C 0119 | 108-5013-01 | Cap Poly .1μf 10P | 1 |
| | R 0140 | 130-0104-25 | Res F/C 100K QW 10% | 1 |
| | R 0141 | 130-0104-25 | Res F/C 100K QW 10% | 1 |
| | R 0146 | 136-8061-22 | Res PF 8.06K QW 1% | 1 |

## Parts List Revisions Record

Assembly No. 200-0369-00

Manual Revision No. 1

| ACTION | SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| Changed | R135 | 133-0072-12 | Res Vari 5K HW | 1 |
| Changed | RT103 | 134-1012-01 | Tmtr 1K 10% | 1 |
| Added | | 010-0050-00 | Term F/T | 1 |
| Delete | C138 | | Not Used | |

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Manual Revision No. 2

| ACTION | SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| Added | | 016-1040-00 | Clear Urethane Seal Coat | |
| Changed | C127 | 097-0057-00 | Cap. Elec 1000µf 4V | 1 |
| Changed | Q117 | 007-0031-00 | TSTR. Sil 2N2923 | 1 |
| | Q118 | 007-0031-00 | TSTR. Sil 2N2923 | 1 |
| Added | C141 | 113-5102-00 | Cap. .001µf 10PCX5F | 1 |
| | C142 | 113-5102-00 | Cap. .001µf 10PCX5F | 1 |

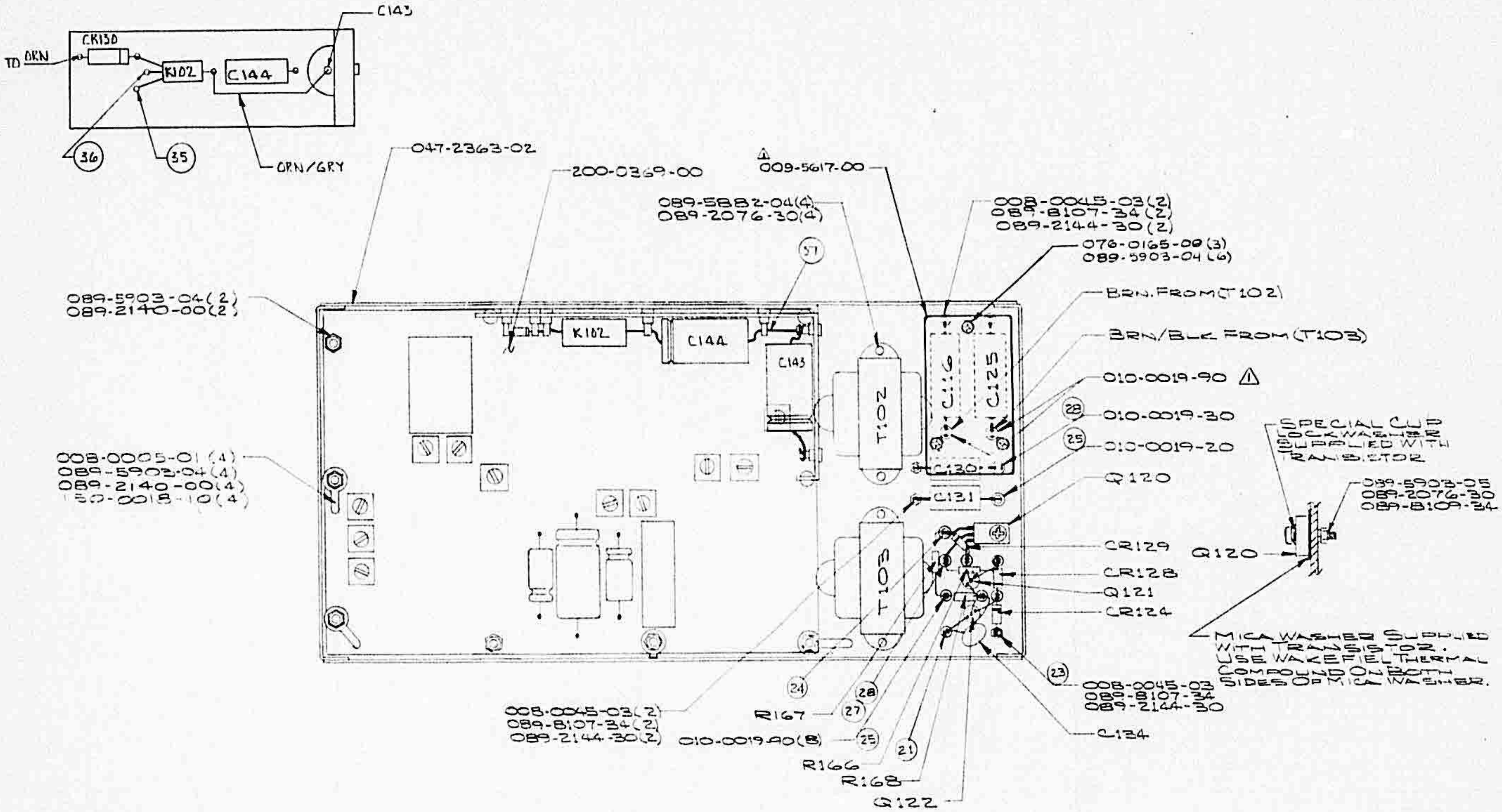
ASSEMBLY NO. 200-0370-00
DESCRIPTION CHASSIS ASSY
UNIT KN 77
B/MRL 5
USED ON ASSEMBLY 200-0368-00
ASSEMBLY DRAWING NO. 300-0497-00

| | SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| | | 008-0045-03 | Term Single Ended | 5 |
| | | 010-0019-30 | Term Standoff Red | 1 |
| | | 010-0019-30 | Term Tef Orange | 1 |
| | | 010-0019-90 | Term Standoff Wht | 10 |
| | | 047-2363-02 | Chassis | 1 |
| | | 089-2076-30 | Nut 4-40 | 1 |
| R2 | | 089-2140-00 | Nut #4 Esna | 10 |
| | | 089-2144-30 | Nut Hex 2-56 | 5 |
| | | 089-5882-04 | SCR PHP 6-32 x 1/4 | 4 |
| | | 089-8107-34 | Washer Lock #2 | 5 |
| R2 | | 089-8109-34 | Washer Lock #4 | 1 |
| | | 200-0369-00 | PC Board Assy | 1 |
| | C 0116 | 096-1065-12 | Cap Tant 220$\mu$f 10V | 1 |
| | C 0125 | 096-1065-12 | Cap Tant 220$\mu$f 10V | 1 |
| | C 0130 | 096-1024-00 | Cap Tant 47$\mu$f 20V | 1 |
| | C 0131 | 097-0056-49 | Cap Elect 47$\mu$f 40V | 1 |
| | C 0134 | 113-5102-00 | Cap DC 1KPF X5F | 1 |
| | CR0124 | 007-5011-14 | Diode Zener 6.8V | 1 |
| | CR0128 | 007-6035-00 | Diode Sil 1N816 | 1 |
| | CR0129 | 007-6029-00 | Diode Sil 1N457A | 1 |
| | Q 0120 | 007-0191-00 | TSTR Sil 2N5194 | 1 |
| | Q 0121 | 007-0026-03 | TSTR Sil 2N3416 | 1 |
| | Q 0122 | 007-0033-00 | TSTR Sil 2N2925 | 1 |
| | R 0166 | 130-0750-23 | Res F/C 75 QW 5% | 1 |
| | T 0102 | 019-5050-00 | Trans 30Hz Output | 1 |
| | T 0103 | 019-5050-01 | Trans 30Hz Output | 1 |
| | R 0167 | 130-0102-23 | Res F/C 1K QW 5% | 1 |
| | R 0168 | 130-0102-23 | Res F/C 1K QW 5% | 1 |
| | | 089-5903-05 | SCR PHP 4-40 x 5/16 | 1 |
| | | 089-5903-04 | SCR PHP 4-40 x 1/4 | 10 |
| | | 008-0005-01 | Binding Lug | 5 |
| | | 150-0018-10 | Shrink Tubing | .7 |

Parts List Revisions Record

Assembly No. 200-0370-00 Manual Revision No. 0

| ACTION | SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| | | | Manual Revision No. 2 | |
| Changed | | 089-8109-34 | Washer, Lock #4 | 7 |
| | | 089-5903-04 | Scr. PHP 4-40 x 1/4 | 12 |
| | | 089-2140-00 | Nut #4 Esna | 6 |
| Added | | 076-0165-09 | Spacer | 3 |
| | | 200-1588-00 | P. C. Board Ass'y | 1 |
| | | 047-3593-03 | Bracket | 1 |
| | | 089-5878-06 | Scr. PHP 4-40 x 3/8 w/loc | 4 |
| | | 091-0079-00 | Grommet | 1 |
| | R102 | 032-0031-01 | Relay, N.C. 12V | |
| | C143 | 097-0057-32 | Cap. Elec. 4700μf 4V | 1 |
| | C144 | 097-0057-33 | Cap. Elec. 2200μf 4V | 1 |
| | CR130 | 007-6023-00 | Dio. Germ. | 1 |




NOTES:
1. NUMBERS IN BALLOONS ARE WIRE * REF. FROM 300-0498-00.

REF. B/M 200-0370-00

FIGURE 5-2 CONVERTER CHASSIS ASSEMBLY
(300-0497-00 R-4)



SEE BLOWUP

ASSEMBLY NO. 200-0371-00
DESCRIPTION HARNESS ASSY
UNIT KN 77
B/MRL 7
USED ON ASSEMBLY 200-0368-00
ASSEMBLY DRAWING NO. 300-0498-00

| SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|
| R2 | 025-0003-00 | Wire CW22 Black | 1.6 |
| R2 | 025-0003-02 | Wire CW22 Red | 1.6 |
| | 025-0018-09 | Wire CW26 Blk/Wht | 1.2 |
| | 025-0018-22 | Wire CW26 Red | .3 |
| | 025-0018-25 | Wire CW26 Red/Grn | .6 |
| | 025-0018-29 | Wire CW26 Red/Wht | .6 |
| R2 | 025-0018-33 | Wire CW26 Orange | 1.2 |
| | 025-0018-34 | Wire CW26 Orn/Yel | .6 |
| | 025-0018-36 | Wire CW26 Orn/Blu | .8 |
| R2 | 025-0018-38 | Wire CW26 Orn/Gry | .7 |
| | 025-0018-39 | Wire CW26 Orn/Wht | 1.0 |
| | 025-0018-40 | Wire CW26 Yel/Blk | .6 |
| | 025-0018-42 | Wire CW26 Yel/Red | .6 |
| | 025-0018-56 | Wire CW26 Grn/Blu | .7 |
| | 025-0018-59 | Wire CW26 Grn/Wht | 1.1 |
| R2 | 025-0018-69 | Wire CW26 Blu/Wht | .7 |
| R2 | 025-0018-79 | Wire CW26 Vio/Wht | .7 |
| | 025-0018-89 | Wire CW26 Gry/Wht | .7 |
| | 025-0018-92 | Wire CW26 Wht/Red | .3 |
| | 025-0018-93 | Wire CW26 Wht/Orn | .6 |
| R1 | 025-0018-95 | Wire CW26 Wht/Grn | .7 |
| R2 | 025-0018-96 | Wire CW26 Wht/Blu | .6 |
| R2 | 025-0018-97 | Wire CW26 Wht/Vio | .4 |
| | 150-0020-00 | Tubing Shr 18 | 1.0 |
| J 0101 | 030-2149-00 | Conn Rec 26 Pin | 1 |
| | 025-0018-54 | Wire CW 26 Grn/Yel | .8 |

## Parts List Revisions Record

Assembly No. 200-0371-00 — Manual Revision No. 0

| ACTION | SYMBOL | PART NUMBER | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| Changed | | 025-0018-95 | Wire CW26 Wht/Grn | .5 |

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Manual Revision No. 2

| | | | | |
|---|---|---|---|---|
| Added | | 091-0109-00 | Plastic Ties | 20 |
| Changed | | 025-0003-00 | Wire CW22 Blk | 1.8 |
| | | 025-0003-02 | Wire CW22 Red | 1.8 |
| | | 025-0018-33 | Wire CW26 Orn | 1.6 |
| | | 025-0018-69 | Wire CW26 Blu/Wht | 1.5 |
| | | 025-0018-79 | Wire CW26 Vio/Wht | 1.5 |
| | | 025-0018-96 | Wire CW26 Wht/Blu | 1.5 |
| | | 025-0018-97 | Wire CW 26 Wht/Vio | 2.9 |
| | | 025-0018-38 | Wire CW26 Orn/Gry | 2.6 |

| NAME | ASS'Y. NO. |
| --- | --- |
| Flag Board | 200-1588-00 |

KING RADIO CORP. PARTS LISTING

| SYMBOL | PART NUMBER | DESCRIPTION | CODE | -00 | -01 | -02 | -03 | -04 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | 008-0048-00 | Ground Terminal | | 7 | | | | |
| | 009-5617-00 | P.C. Board | | 1 | | | | |
| Q201 | 007-0078-00 | Transistor 2N3415 | | 1 | | | | |
| Q202 | 007-0078-00 | Transistor 2N3415 | | 1 | | | | |
| Q203 | 007-0078-00 | Transistor 2N3415 | | 1 | | | | |
| Q204 | 007-0078-00 | Transistor 2N3415 | | 1 | | | | |
| CR201 | 007-6016-00 | Diode 1N4154 | | 1 | | | | |
| CR202 | 007-6016-00 | Diode 1N4154 | | 1 | | | | |
| CR203 | 007-6023-00 | Diode 1N277 | | 1 | | | | |
| C201 | 096-1030-03 | Cap Tant 2.2uf | | 1 | | | | |
| C202 | 096-1030-25 | Cap Tant 150uf | | 1 | | | | |
| C203 | 096-1030-03 | Cap Tant 2.2uf | | 1 | | | | |
| C204 | 096-1030-25 | Cap Tant 150uf | | 1 | | | | |
| R201 | 130-0102-25 | Res F/C 1K QW 10% | | 1 | | | | |
| R202 | 130-0333-25 | Res F/C 33K QW 10% | | 1 | | | | |
| R203 | 130-0472-25 | Res F/C 4.7K QW 10% | | 1 | | | | |
| R204 | 130-0102-25 | Res F/C 1K QW 10% | | 1 | | | | |
| R205 | 130-0333-25 | Res F/C 33K QW 10% | | 1 | | | | |
| R206 | 130-0472-25 | Res F/C 4.7K QW 10% | | 1 | | | | |
| R207 | 130-0222-25 | Res F/C 2.2K QW 10% | | 1 | | | | |
| R208 | 130-0102-25 | Res F/C 1K QW 10% | | 1 | | | | |
| R209 | 130-0102-25 | Res F/C 1K QW 10% | | 1 | | | | |

| PARTS LIST REVISION HISTORY | | | ENGR. APPROVAL [signature] | |
|---|---|---|---|---|
| NAME Flag Board | | | ASS'Y. NO. 200-1588-00 | |
| ASS'Y. DWG. 300-1588-00 | | UNIT KN 77 | USED ON 200-0370-00 | |

| REV | CHANGE | SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|---|---|
| 1 | 14957 | CR203 | 007-6023-00 | P/N changed from 007-6016-00 |

5-20 | SHT 1 OF 2

KING
KN 77
VOR/LOC CONVERTER

# CONTENTS

## SECTION VI

## MAINTENANCE

# SECTION VI

# MAINTENANCE

## 6.1 GENERAL

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

## 6.2 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 components for evidence of overheating, breakage, vibration, corrosion, or loose connections.

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

## 6.3 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 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.

## 6.4 SEMICONDUCTOR REPLACEMENT

It is recommended that semiconductors not be tested or replaced until unsatisfactory performance is observed.

## 6.5 SEMICONDUCTOR MAINTENANCE

### 6.5.1 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 tantalum type. Hence, when measuring resistances, an instrument very accurate in the low resistance ranges must be used, and when measuring values of capacitors, an instrument accurate in the high ranges must be employed. Capacitor polarity must be observed wh n measuring resistance. Usually more accurate measurements can be obtained if the semiconductors are removed or disconnected from the circuit.

### 6.5.2 SEMICONDUCTOR TEST EQUIPMENT

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

6.5.2.1 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.

6.5.2.2 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 act like a voltage divider and apply half voltage to the semiconductor. To eliminate this condition, connect a ground wire from the chassis of the test equipment to the chassis of the equipment under test before making any other connections.

6.5.2.3 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.

A multimeter with low sensitivity will draw too much current through many types of small semiconductors, causing damage. When in doubt as to the amount of current supplied by a multimeter, check the multimeter circuits on all scales with an external, low-resistance multimeter connected in series with the multimeter leads. If more than one milliampere is drawn by the multimeter on any range, this range cannot be safely used on small semiconductors.

| | | | |
|---|---|---|---|
| R 0139 | 133-0072-20 | Res Vari 50K HW | 1 |
| R 0142 | 130-0103-25 | Res F/C 10K QW 10% | 1 |
| R 0143 | 130-0102-25 | Res F/C 1K QW 10% | 1 |
| R 0144 | 136-3573-22 | Res PF 357K QW 1% | 1 |
| R 0145 | 133-0072-08 | Res Vari 1K HW | 1 |
| R 0147 | 130-0272-25 | Res F/C 2.7K QW 10% | 1 |
| R 0148 | 130-0512-23 | Res F/C 5.1K QW 5% | 1 |
| R 0149 | 136-2870-22 | Res 287 1PC QW | 1 |
| R 0150 | 133-0072-04 | Res Vari 200 HW | 1 |





6.5.2.4 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.

6.5.3 SEMICONDUCTOR VOLTAGE AND RESISTANCE MEASUREMENTS

When measuring voltages or resistances 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 (especially in audio, servo, or power circuits) time is required to charge these capacitors when an ohmmeter is connected to a circuit in which 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.

6.5.4 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 preceding paragraph 6.5.2.3.

6.5.4.1 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. Generally, a resistance reading of 50,000 ohms or more should be obtained. Reconnect the multimeter with a negative lead to the base. With the positive lead connected to the emitter, a resistance value of 500 ohms or less should be obtained. When the positive lead is connected to the collector, a value of 500 ohms or less should likewise be obtained.

6.5.4.2 NPN Transistor. Similar test 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 should be high. With the positive lead of the multimeter connected to the base, the value of resistance between the base and collector 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.

6.5.4.3 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 resistance may damage the transistor. For this reason, do not troubleshoot by shorting the various points in the circuit to ground and listening for clicks.

6.5.5 REPLACING SEMICONDUCTORS

Never remove or replace a plug-in semiconductor with the supply voltage turned on. Transients thus produced may damge the semiconductors 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.

6.5.5.1 Use only a low-heat soldering iron when installing or removing soldered-in parts. Use care in the handling of printed circuit boards. When removing a part from a printed circuit board, first unbend the crimped leads. Use only the necessary amount of heat to unsolder the part. Clear excess solder from mounting eyelets, making sure that mounting holes are clear before installing new part. When removing a transistor or other part having a multiple number of leads, straighten (unbend) all leads first and then heat leads one at a time, working around the part, until the part can be gently "rocked out".

6.5.5.2 When installing or removing a soldered-in semiconductor grasp the lead to which heat is applied 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.

6.5.5.3 When soldering is required to remove a component from a semiconductor socket, remove the semiconductor to prevent damage to the semiconductor.

6.5.5.4 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. Often, this insulating is accomplished by means of insulating washers made of fiber and mica. When replacing transistors mounted in this manner, be sure that the insulating washers are replaced in proper order. Before installing the mica washers, treat them with a film of silicon grease. This treatment helps in the transfer of heat. After the transistor is mounted, and before any connections, check from the case of the transistor is mounted, and before any connections, check from the case of the transistor to ground with a multimeter to see that the insulation if effective.

## 6.6 TEST EQUIPMENT

The following test equipment, or equivalent, is required to properly align and trouble-shoot the KN 77.

| | | |
|---|---|---|
| a. | Test Harness: | Similar to Figure 6-2 or 6-3 |
| b. | Power Supply: | Electro NFB, (Filtered 0-30VDC at 15 amps if KX 175 is used in the alignment. Or Heathkit IP-27 Low Voltage Regulated Power Supply if KX 175 is not used in the alignment. |
| c. | Signal Generator: | Boonton Type 211-A |
| d. | VOR-LOC Generator: | Collins 479S-3 |
| e. | Omni Bearing Selector: | Collins 479V-3 Precision Track Selector Digital ARINC Type indicator unit. |
| f. | Oscilloscope: | Techtronix 454 |
| g. | VTVM: | RCA Senior Voltohmyst |
| h. | ACVTVM: | Ballentine 310-A |

## 6.7 TROUBLESHOOTING

To aid the technician in localizing sources of trouble within the unit, typical DC voltage measurement are recorded on the schematic diagram (Figure 6-9).

For specific malfunctions, the following troubleshooting flow charts have been compiled.

<u>VOR-LOC</u>

| | |
|---|---|
| No indication | Figure 6-4 |
| No Flag | Figure 6-5 |
| No Deviation | Figure 6-6 |
| No Localizer-omni satisfactory | Figure 6-7 |
| No to-from flag | Figure 6-8 |

## 6.8 ADJUSTMENT PROCEDURES

6.8.1 GENERAL INFORMATION

Because of circuitry common to both VOR and LOC functions of the converter, a certain amount of interaction occurs. Therefore the following adjustment sequence should be adhered to when alignment is performed.

(1) Perform VOR ADJUSTMENTS AND CHECKS
(2) Make LOCALIZER CIRCUITRY ADJUSTMENTS
(3) Recheck (1) for optimum performance and adjustments

The converter section of the KN 77 may be adjusted utilizing the NAV receiver output from a KX 175 or by using the MOD OUTPUT from a 479S-3 VOR-LOC generator. Test configurations are shown in Figure 6-2 and 6-3.

6.8.2 PRELIMINARY PROCEDURE (CONVERTER)

a. Remove the dust cover from the KN 77.

b. Connect the unit to the appropriate test harness.

6.8.3 REGULATED SUPPLY VOLTAGE

a. After performing the preliminary procedures, apply the required power (13.75 or 27.5VDC) to the unit.

b. Check for 10 ± 0.25VDC across C130 (Orange terminal). See Figure 6-1 for voltage check point and regulated voltage adjustment.

**NOTE**

If the regulator is functioning properly, it is not desirable to readjust the voltage to exactly 10 volts since this may require readjustment of the converter for optimum performance.

6.8.4 VOR ADJUSTMENTS AND CHECKS

Procede to 6.8.5, perform steps a thru d (Figure 6-3). If the input to the converter is not 0.35VRMS (Localizer Composite Signal Level) adjust R425 in the KX 175.

Connect the test equipment as shown in Figure 6-3. If the alternate test configuration (Figure 6-4) is used, procede to the note, skipping steps a through d.

a. Set the KX 175 NAV frequency selector to 114.9MHz. Set the 211-A OSC SEL to XTAL. Set the 211-A XTAL switch to 114.9MHz, adjust the frequency dial for a maximum on the RF monitor meter and set the RF level to the red line. Set the RF attenuator to 100 microvolts. Set the 211-A MOD switch to EXT.

b. Set the 479S-3 FUNCTION SELECTOR switch to CAL. Set the 479S-3 SPECIFIC SIGNAL SELECTOR to 30Hz VAR Φ. Adjust 30Hz VAR Φ potentiometer on the 479S-3 (under the hinge) for 1.5 volts on the OUTPUT METER. Adjust the 211-A MOD LEVEL for 30% modulation.

c. Set the SPECIFIC SIGNAL SELECTOR of the 479S-3 to 9,960 FM. Adjust the 9,960 FM potentiometer (under the hinge) for 30% modulation on the 211-A PER CENT MODULATION METER.

d. Set the 479S-3 FUNCTION SELECTOR to ODR. Set the SPECIFIC SIGNAL SELECTOR to the 9,960 FM 30Hz VAR Φ position. The PER CENT MODULATION meter on the 211-A should indicate approximately 52%.

**NOTE**

1. If the KX 175 is not used as a signal source, connect the KN 77 directly to the 479S-3 DE-MOD output.
2. Make voltage measurement at Pin A (Wht/Grn) of KN 77.
3. Use Ballantine 310B, 314 or equivalent high impedance AC Voltmeter.
4. Set the 479S-3 function selector to Cal position.
5. Set Specific Signal Selector to 30Hz VAR.
6. Adjust 30Hz VAR Pot (under the hinge) for 0.40VRMS output at Pin A KN 77.
7. Set Specific Signal Selector to 9960 FM.
8. Adjust 9960 FM Pot (under the hinge) for 0.40VRMS output at Pin A KN 77.
9. Set Function Selector to Specific Sig Position and adjust Master Attenuator for an output at Pin A of exactly 0.50VRMS.

f. Adjust the first slug (primary) of T101 for zero VDC as measured with a VTVM at TP101. See Figure 6-1 for test point and adjustment locations.

g. Adjust the other slug (secondary) of T101 for a maximum positive voltage (approximately 3.5.-4.0VDC) at TP102.

h. Repeat steps f and g as necessary to complete the discriminator alignment.

i. Set the 479V-3 BEARING DEGREES control to 90 degrees and the 479S-3 PHASE ANGLE SELECTOR to 270 degrees.

j. With the ACVTVM at TP103, tentatively adjust the VOR REF LEVEL control R117 to 1.5VRMS.

k. With the ACVTVM at TP104, tentatively adjust the VOR VAR LEVEL control R135 to 1.5VRMS.

l. Adjust VOR FLAG control R153 to obtain a 350μa indication on the flag meter.
Adjust VOR FLAG control R153 to obtain a 400μa indication on the flag meter.

m. With the 479V-3 at 90 degrees and the 479S-3 at 270 degrees, adjust VOR ZERO control R109 to obtain a zero center indication on the deviation meter.

**NOTE**

The VOR ZERO adjustment will affect the Reference Channel Output at TP103. Readjust VOR LEVEL R117 for 1.5VRMS at TP103 as required. The 1.5VRMS setting in steps j and l are only approximate, and used for preliminary adjustments. The final voltage at TP104 will be generally more or less than 1.5VRMS.

n. Set the 479V-3 BEARING DEGREES to 270 degrees. Note the deviation meter needle position. Adjust VOR Ø BALANCE control R150 to move the deviation meter needle half the distance it is displaced from zero center.

o. Repeat steps m and n until there is no change from zero center when the 479V-3 BEARING DEGREES is switched from 90° to 270°.

p. Set the 479V-3 BEARING DEGREES Control to 150 degrees. Set the 479S-3 PHASE ANGLE SELECTOR to 330 degrees. Adjust VOR TRACK control R114 to obtain a zero center on the deviation meter.

q. Repeat steps m and p until there is no deviation from zero center on the deviation meter when the controls are set as indicated in steps m and p.

r. Set the 479V-3 BEARING DEGREES control to 90 degrees and the 479S-3 PHASE ANGLE SELECTOR to 270 degrees. The 479V-3 to-from meter should be in the "to" position. Set the 479V-3 BEARING DEGREES control to 270 degrees. The 479V-3 to-from meter needle should be in the "from" position.

s. Set the 479S-3 FUNCTION SELECTOR to CAL. Set the 479S-3 SPECIFIC SIGNAL SELECTOR to 9960 FM. The flag meter reading should be approximately 220 micro-amperes.

t. Set the 479S-3 SPECIFIC SIGNAL SELECTOR to 30Hz VAR Ø. The flag meter reading should be approximately 220 microamperes.

u. Set the 479V-3 BEARING DEGREES control to 90 degrees. Set the 479S-3 FUNCTION SELECTOR to ODR. Set the 479S-3 SPECIFIC SIGNAL SELECTOR to 9,960 FM 30Hz VAR Ø. Set the 479S-3 PHASE ANGLE SELECTOR for a zero

S/N 6700 and Above
or MOD. Status #2

center indication (approximately 270 degrees) on the deviation meter. Note the PHASE ANGLE SELECTOR reading degrees. Increase the PHASE ANGLE SELECTOR reading 10 degrees. Adjust the VOR VAR LEVEL control R135 to obtain 150 microamperes on the deviation meter. Adjustmeter of R135 controls the VAR channel gain and determines the course sensitivity. Check the course width by decreasing the 479S-3 PHASE ANGLE SELECTOR degrees to obtain a deviation current of 150 microamperes of the opposite sense. The course width (difference between 479S-3 PHASE ANGLE SELECTOR settings) should be 20 ±1°.

v. Adjust the 479V-3 BEARING DEGREES from 0 to 360 degrees in 30 degree increments and for each BEARING DEGREES setting, adjust the 479S-3 PHASE ANGLE SELECTOR to obtain zero center on the deviation meter. The 479S-3 PHASE ANGLE SELECTOR reading should be within 1.0 degree of the 479V-3 BEARING DEGREES control setting at each 30 degree interval.

w. If the runout error is consistently positive or consistently negative, the runout errors can be shifted by adjustment of the VOR ZERO control R109. Adjust the least runout error.

6.8.5 LOCALIZER CIRCUITRY ADJUSTMENTS

Before performing the localizer adjustments, make sure the VOR functions satisfactorily. If the alternate test configuration (without the KX 175) is utilized, proceed to the note skipping steps a through d.

a. Set the KX 175 NAV frequency selector to 110.1MHz. Set the 211-A OSC SEL to XTAL. Set the 211-A XTAL switch to 110.1MHz, adjust the frequency dial for a maximum on the RF MONITOR METER and set the RF LEVEL to the red line. Set the RF attenuator to 100 microvolts. Set the 2---A MOD switch to EXT.

b. Set the 479S-3 FUNCTION SELECTOR switch to TONE LOC. Set the 479S-3 SPECIFIC SIGNAL SELECTOR to 90-150Hz. Set the TONE LOCALIZER switch to CAL 90Hz. Adjust the 90Hz potentiometer (under the hinge) on the 479S-3 for 20% modulation as indicated on the 211-A PER CENT MODULATION METER.

c. Set the TONE LOCALIZER switch to CAL 150Hz. Adjust the 150Hz potentiometer (under the hinge) on the 479S-3 for 20% modulation as indicated on the 211-A PER CENT MODULATION meter.

d. Set the TONE LOCALIZER switch to 0 (zero db). The input to the converter from the KX 175 should be 0.35 ±.01 VRMS.

**NOTE**

If the KX 175 is not used as a localizer signal source, the MOD OUTPUT of the 479S-3 can drive the converter input directly. (An ILS channel must be selected by the test harness). Set the 479S-3 FUNCTION SELECTOR to SPECIFIC SIGNAL, SPECIFIC SIGNAL SELECTOR to 90-150Hz and the TONE LOCALIZER to CAL 150Hz. Set the MASTER ATTENUATOR to mid-range. Adjust the 150Hz potentiometer (under the hinge) for .66VRMS as measured with an ACVTVM at the VOR-LOC signal input. Set the 479S-3 TONE LOCALIZER to CAL 90Hz. Adjust the 90Hz potentiometer (under the hinge) for .66VRMS on the ACTVM. Set the 479S-3 TONE LOCALIZER to a 0 (zero db) tone ratio and adjust the MASTER ATTENUATOR for a composite signal of 0.35VRMS on the ACVTVM.

e. Monitor the voltage at TP104 with an ACVTVM. Alternately set the 479S-3 TONE LOCALIZER control at CAL 90Hz and CAL 150Hz. Adjust the 120Hz LOC ADF R145 to equalize the 90 and 150Hz amplitudes in both CAL position.

**NOTE**

Step f will not be required unless the localizer is badly out of adjustment.

f. To minimize the interaction in the following steps, the following approximate voltage levels should be checked. If necessary, adjust LOC FLAG R137 for approximately 1.0VRMS at TP104. If necessary, adjust LOC SENS R133 for approximately 0.25 VRMS at TP103.

g. With the 479S-3 TONE LOCALIZER control at 0 (zero db) adjust LOC CENTERING R139 for a zero center indication on the deviation meter. Adjust the LOC FLAG R137 for 325 microamperes on the flag meter. Repeat these two adjustments until both conditions are met.

h. Set the 479S-3 TONE LOCALIZER control to 4db (towards CAL 150Hz). Adjust LOC SENS R133 for 90 microamperes on the deviation meter.

i. Repeat steps g and h as required.

j. To check deviation balance, set the 479S-3 TONE LOCALIZER control to 4db (towards CAL 90Hz). Deviation should be within 5 microamperes of the opposite deflection.

**NOTE**

If 90 and 150Hz deflection are unequal in the 4db position, the 120Hz LOC ADF R145 can be adjusted to offset the unbalance.

k. Set the 479S-3 TONE LOCALIZER control to CAL 150Hz. The flag current meter indication should be less than 200 microamperes.

l. Set the 479S-3 TONE LOCALIZER control to CAL 90Hz. The flag indication should be less than 200 microamperes.

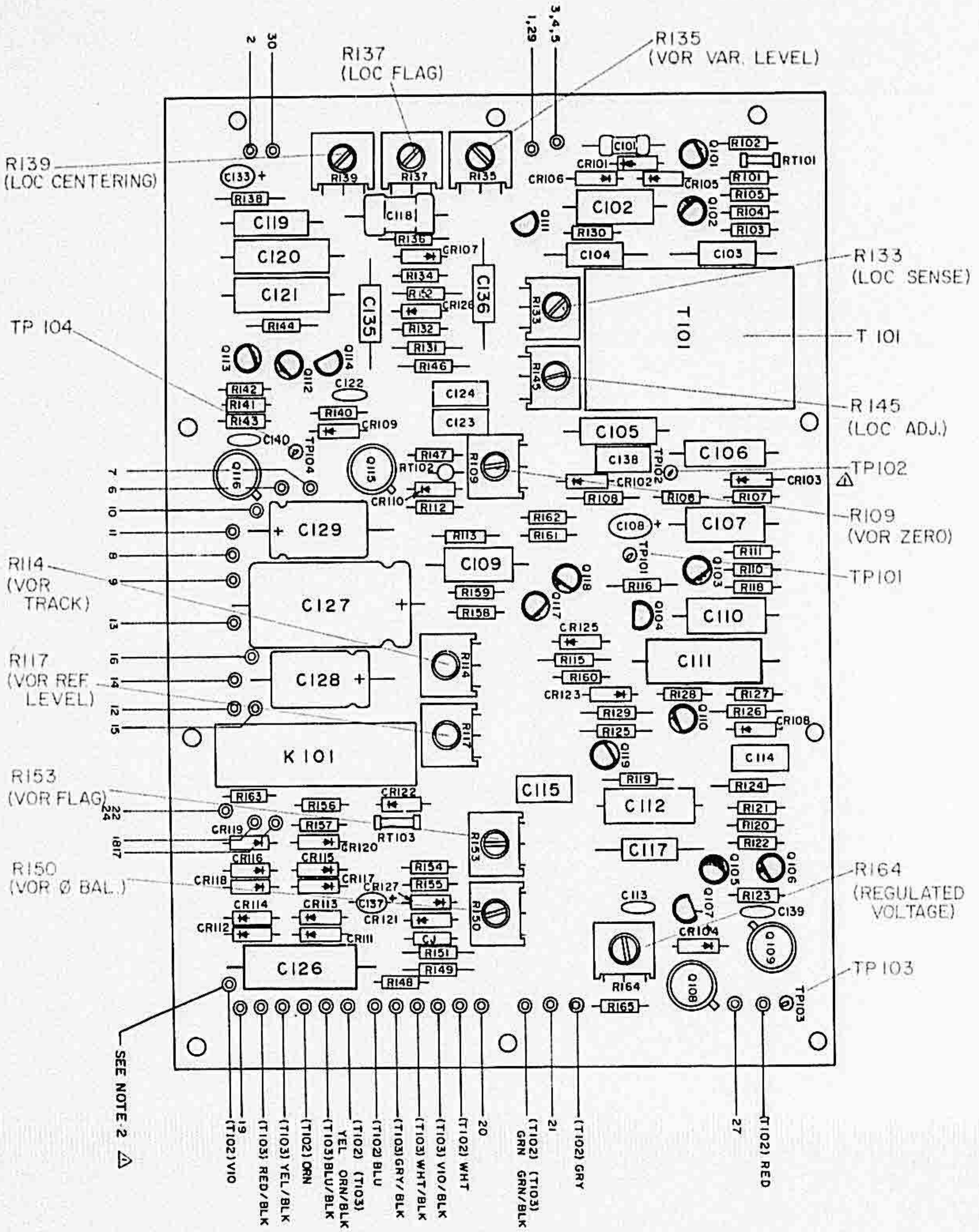
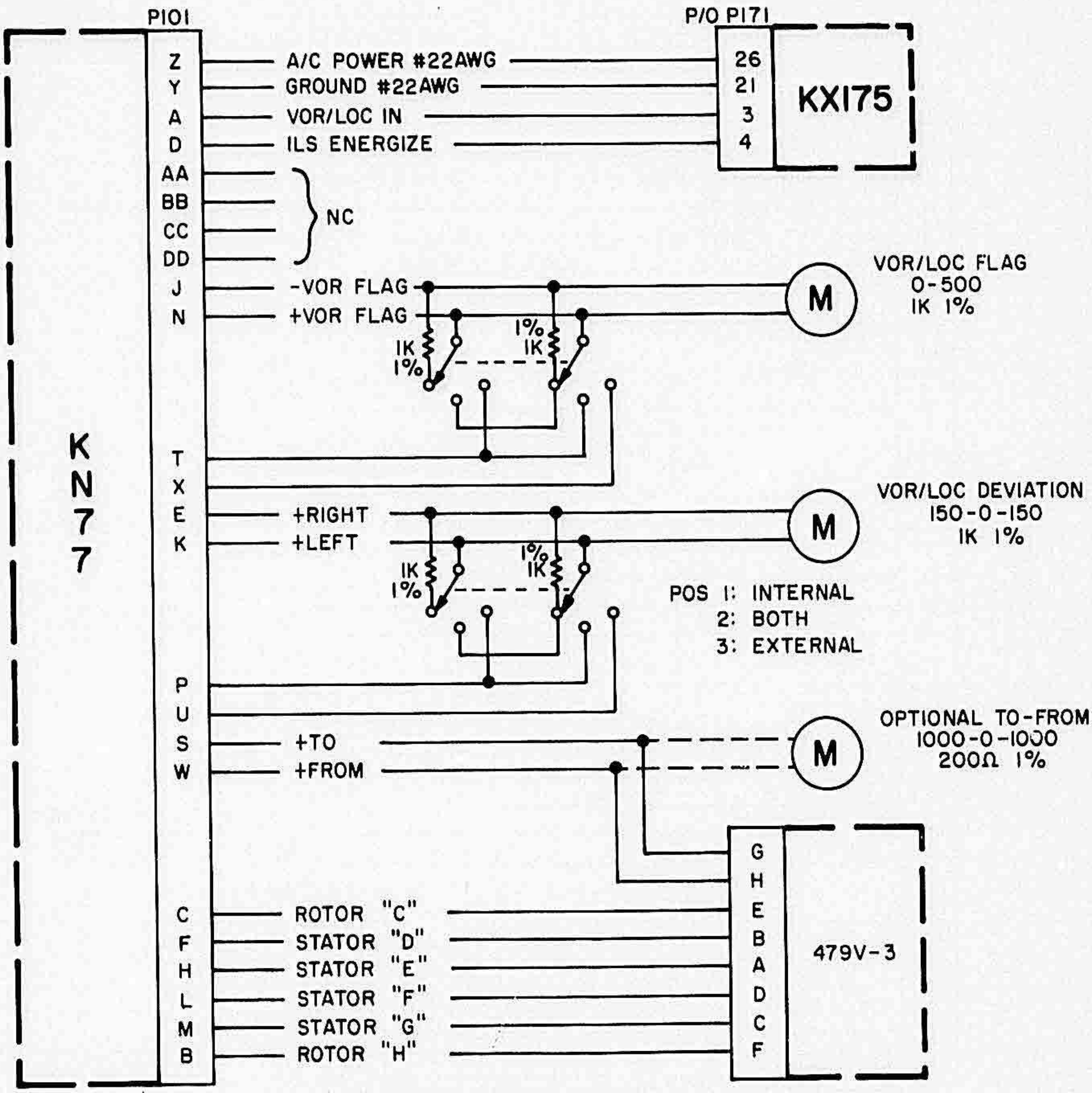



FIGURE 6-1 KN 77 VOR-LOC CONVERTER
TEST POINT AND ADJUSTMENT LOCATIONS
(696-1527-00)



SEE BLOWUP




NOTE: DEVIATION AND FLAG METERS SHOULD BE WESTON 901 OR EQUIVALENT.

FIGURE 6-2 KN 77 TEST HARNESS UTILIZING KX 175
(Dwg. No. 696-1528-00)

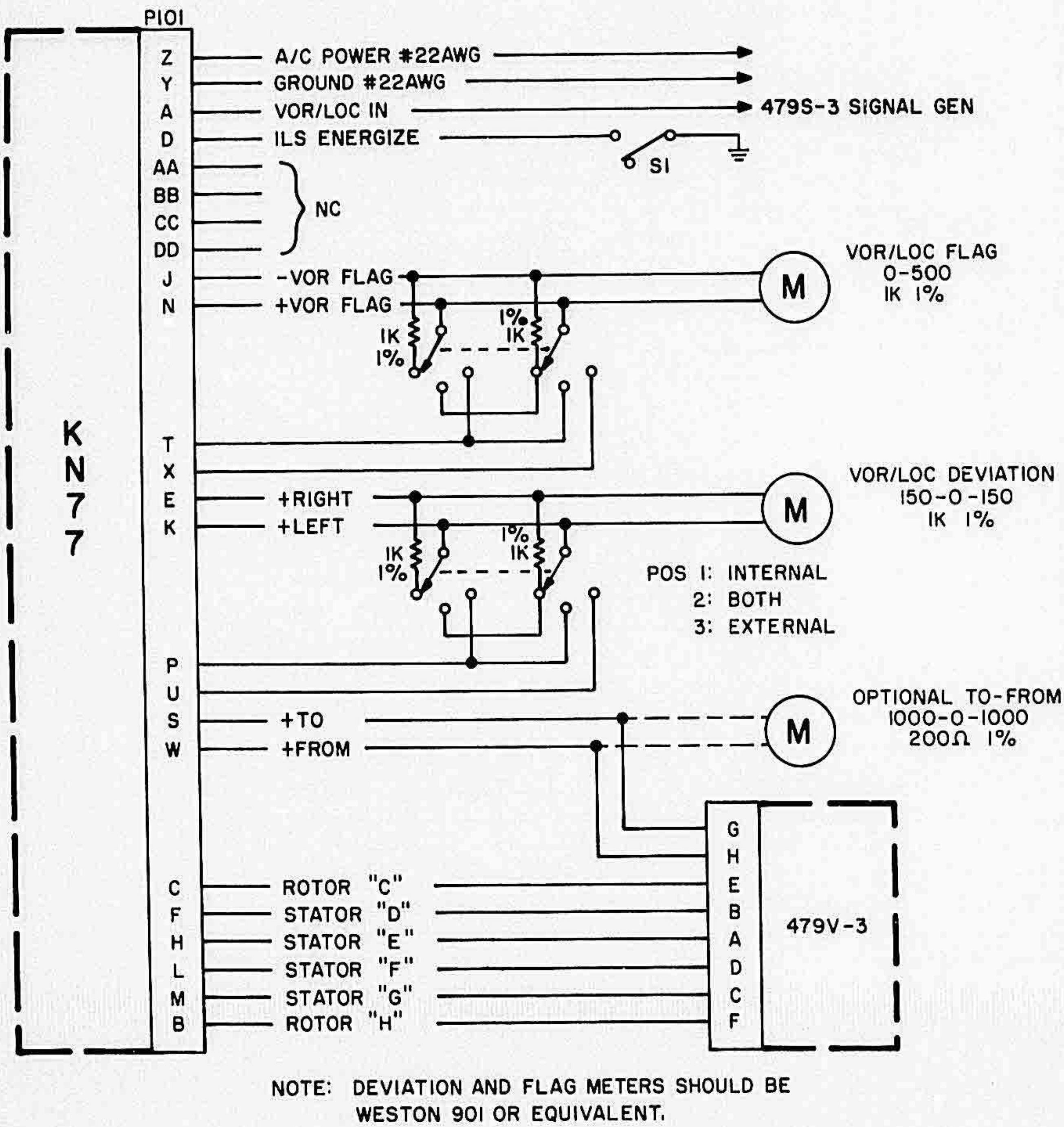



FIGURE 6-3 KN 77 TEST PANEL SCHEMATIC
(Dwg. No 696-1529-00)

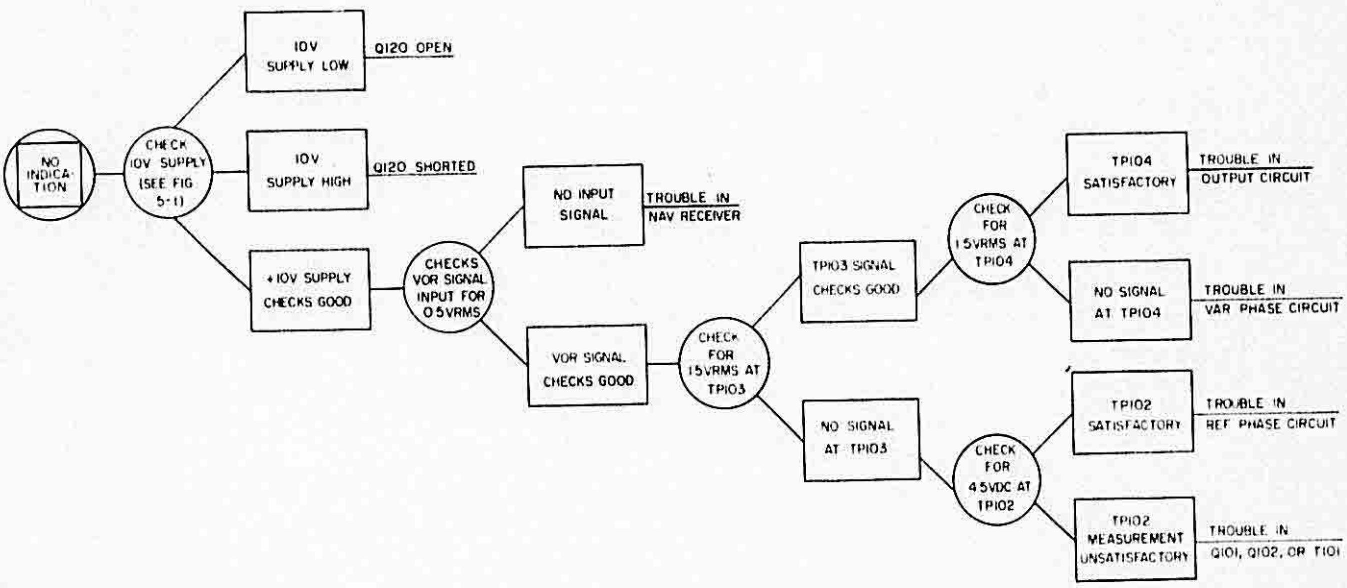



FIGURE 6-4 VOR-LOC. NO INDICATION
(696-1517-00)



SEE BLOWUP

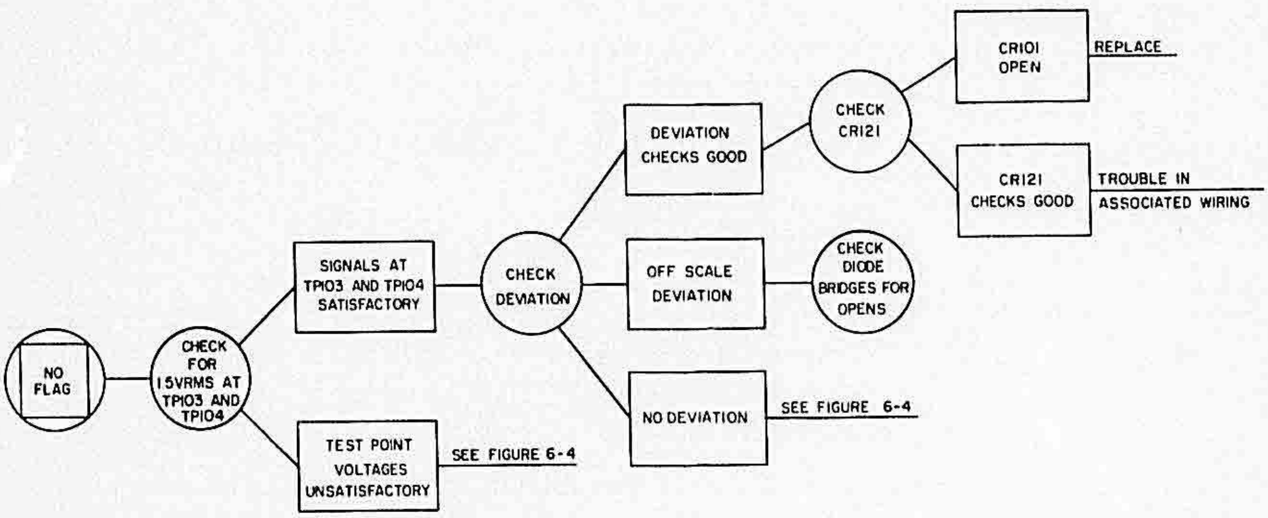



FIGURE 6-5 VOR-LOC, NO FLAG
(696-1503-00)



SEE BLOWUP

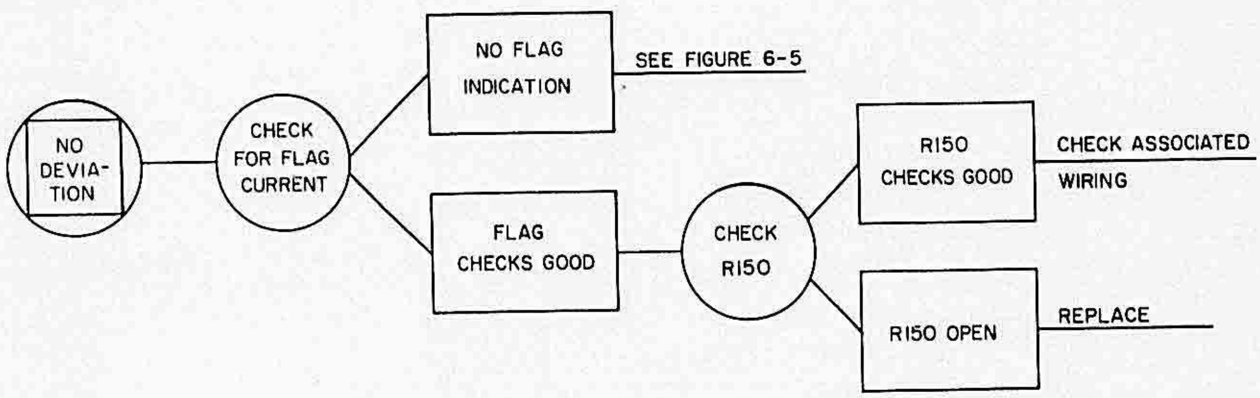



FIGURE 6-6 VOR-LOC, NO DEVIATION
(696-1504-00)

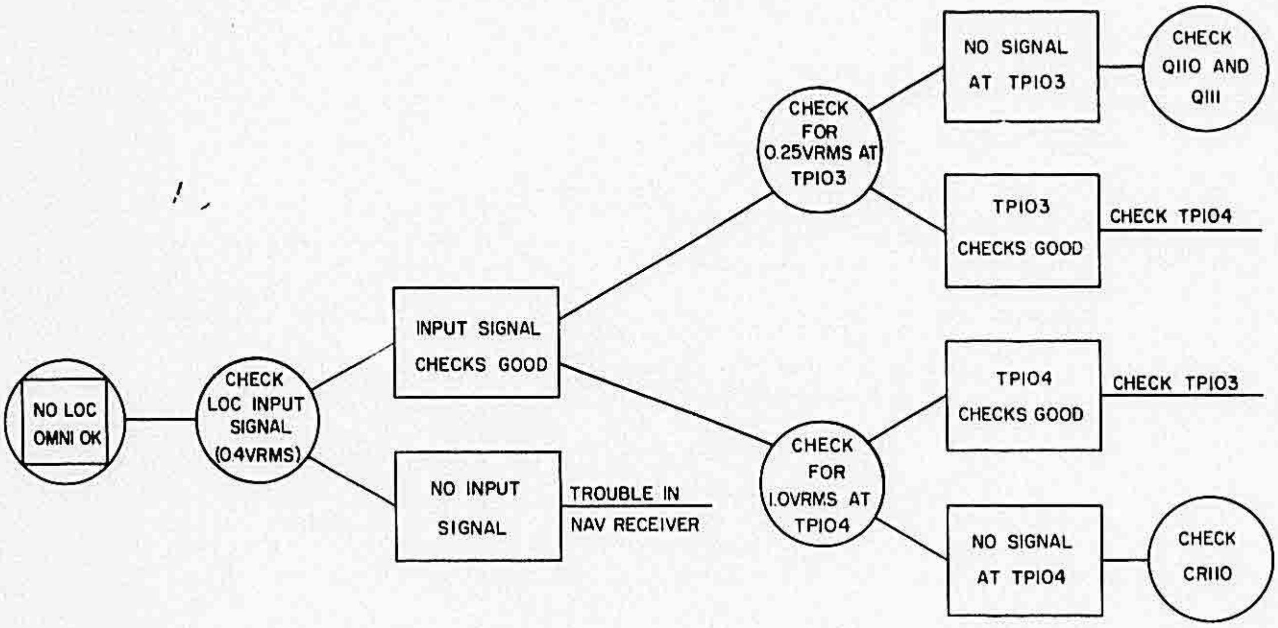



FIGURE 6-7 VOR-LOC, NO LOCALIZER-OMNI SATISFACTORY
(696-1505-00)

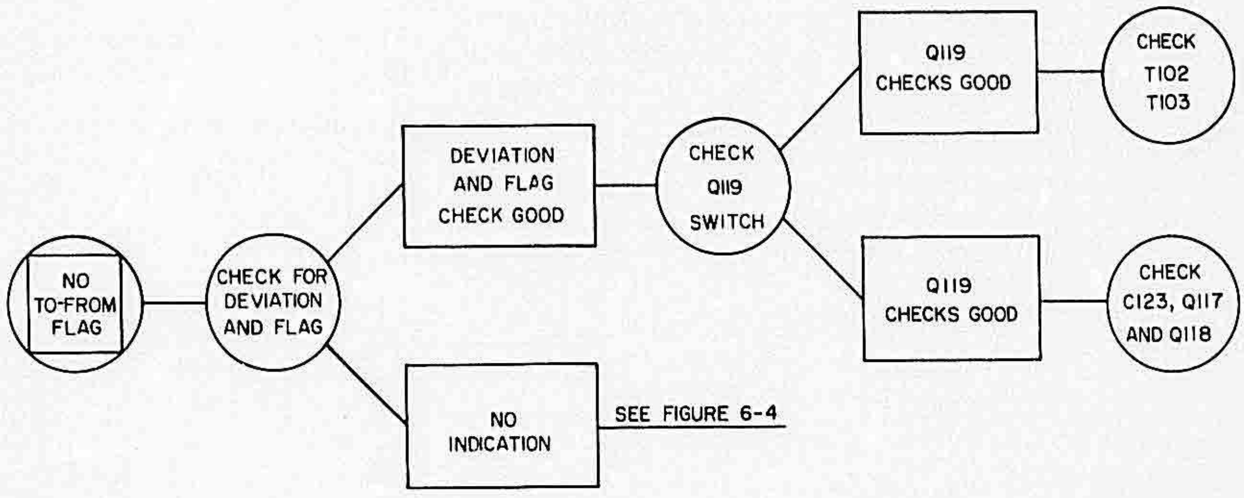



FIGURE 6-8 VOR-LOC, NO TO-FROM FLAG
(696-1506-00)

6.9. OMNI/LOC

1. Regulator Characteristic (13.75VDC input; adjust to 10VDC)

Regulated Voltage ________ VDC (13.75V input) ________ VDC (27.5V input)

Current drain ________ ma max. (13.75VDC input)

2. Deflection Characteristic 200 microvolts HARD

VOR (479V-3 at 270°)

Degrees for 150μa left deflection - ________ 10°
Degrees for 150μa right deflection + ________ 10°
Total Course Width
(Course width 19.0 to 21.0 minimum standard)

LOC

| Tone Radio | Deflection | | |
|---|---|---|---|
| 4db (90Hz Predominant) | + ________ | μa | 90 ± 10μa |
| 0db | ________ | μa | 0 ± 4μa |
| 4db (150Hz Predominant | - ________ | μa | 90 ± 10μa |

3. VOR Accuracy: ± 1.0 degree

(Composite VOR Test Signal of 0.45V rms.)

| Radial in Degrees | Bearing Dondition | Bearing Error in Degrees |
|---|---|---|
| 0 | To | |
| | From | |
| 30 | To | |
| | From | |
| 60 | To | |
| | From | |
| 90 | To | |
| | From | |
| 120 | To | |
| | From | |
| 150 | To | |
| | From | |
| 180 | To | |
| | From | |
| 210 | To | |
| | From | |
| 240 | To | |
| | From | |

| Radial in Degrees | Bearing Condition | Bearing Error in Degrees |
|---|---|---|
| 270 | To | |
| | From | |
| 300 | To | |
| | From | |
| 330 | To | |
| | From | |

4. Alarm Signal

| VOR Mode | Flag Current | |
|---|---|---|
| Composite VOR signal | + ______ $\mu$a | 300$\mu$a |
| Reference phase removed | + ______ $\mu$a | 220$\mu$a |
| Variable phase removed | + ______ $\mu$a | 220$\mu$a |

| LOC Mode | Flag Current | |
|---|---|---|
| Composite LOC signal | + ______ $\mu$a | 325$\mu$a |
| 90Hz only | + ______ $\mu$a | 175$\mu$a |
| 150Hz only | + ______ $\mu$a | 175$\mu$a |

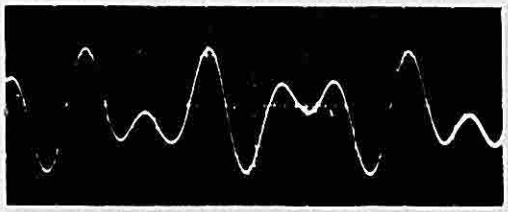
To-From

0° phase difference ______ $\mu$a (from) NLT 500$\mu$a
180° phase difference ______ $\mu$a (to)

TESTED BY: ______________________ DATE: ______________________

INSPECTED BY: ______________________ DATE: ______________________

TP: Input
Vert: .5v/Div
Horiz: 5 ms/cm
Coupling: AC
Sync: Line



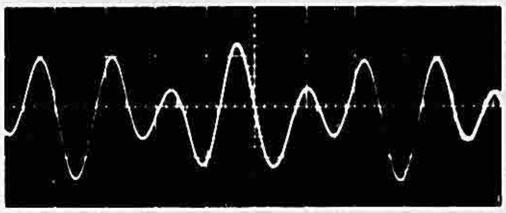
TP: 101
Vert:
Horiz:
Coupling:
Sync:

NO PHOTO

TP: 102
Vert:
Horiz:
Coupling:
Sync:

NO PHOTO

TP: 103
Vert: .5v/Div
Horiz: 5 ms/cm
Coupling: AC
Sync: Line



TP: 104
Vert: 2v/Div
Horiz: 5 ms/cm
Coupling: AC
Sync: Line

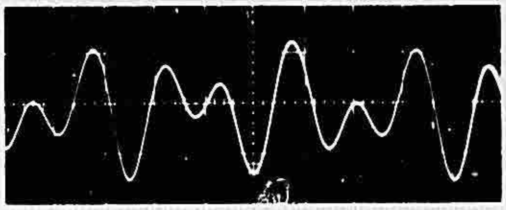
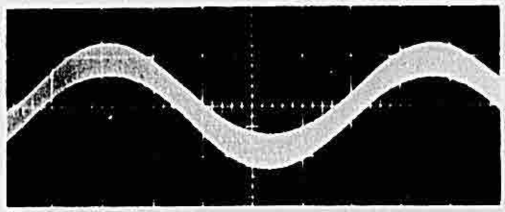
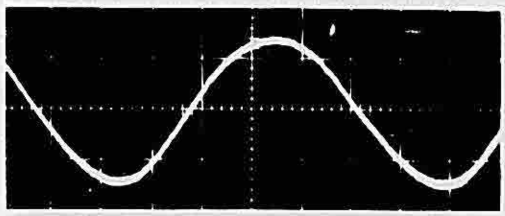


FIGURE 6-9 WAVEFORMS-LOCALIZER MODE
(696-1531-00)

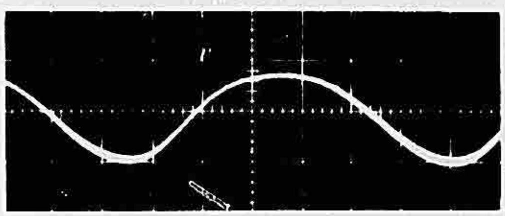
TP: Input
Vert: .05v/Div
Horiz: 5 ms/cm
Coupling: AC
Sync: Line



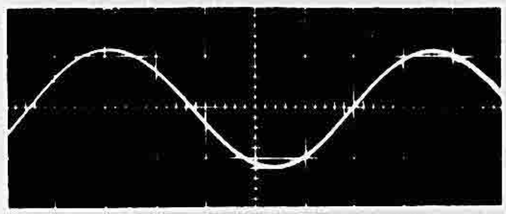
TP: 101
Vert: 2v/Div
Horiz: 5 ms/cm
Coupling: AC
Sync: Line



TP: 102
Vert: 1v/Div
Horiz: 5 ms/cm
Coupling: AC
Sync: Line



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



TP: 104
Vert: 2v/Div
Horiz: 5 ms/cm
Coupling: AC
Sync: Line

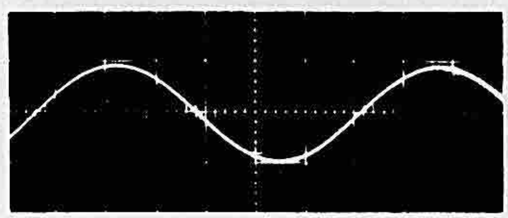
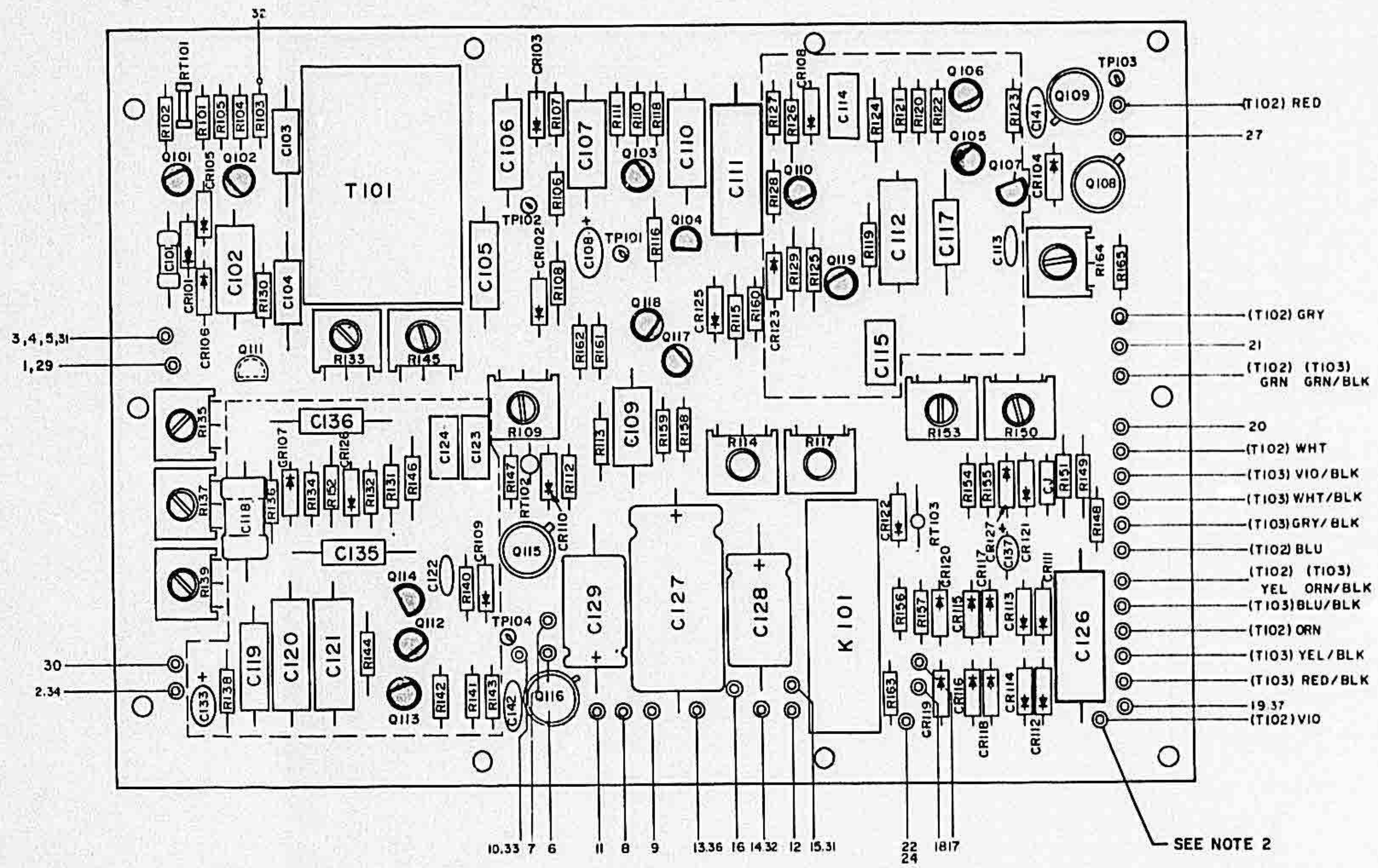
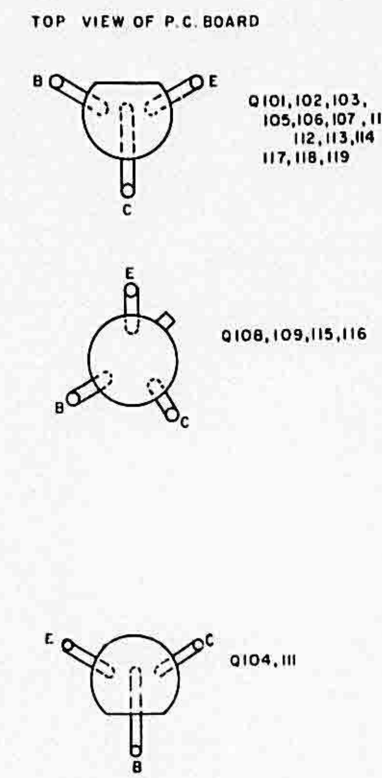


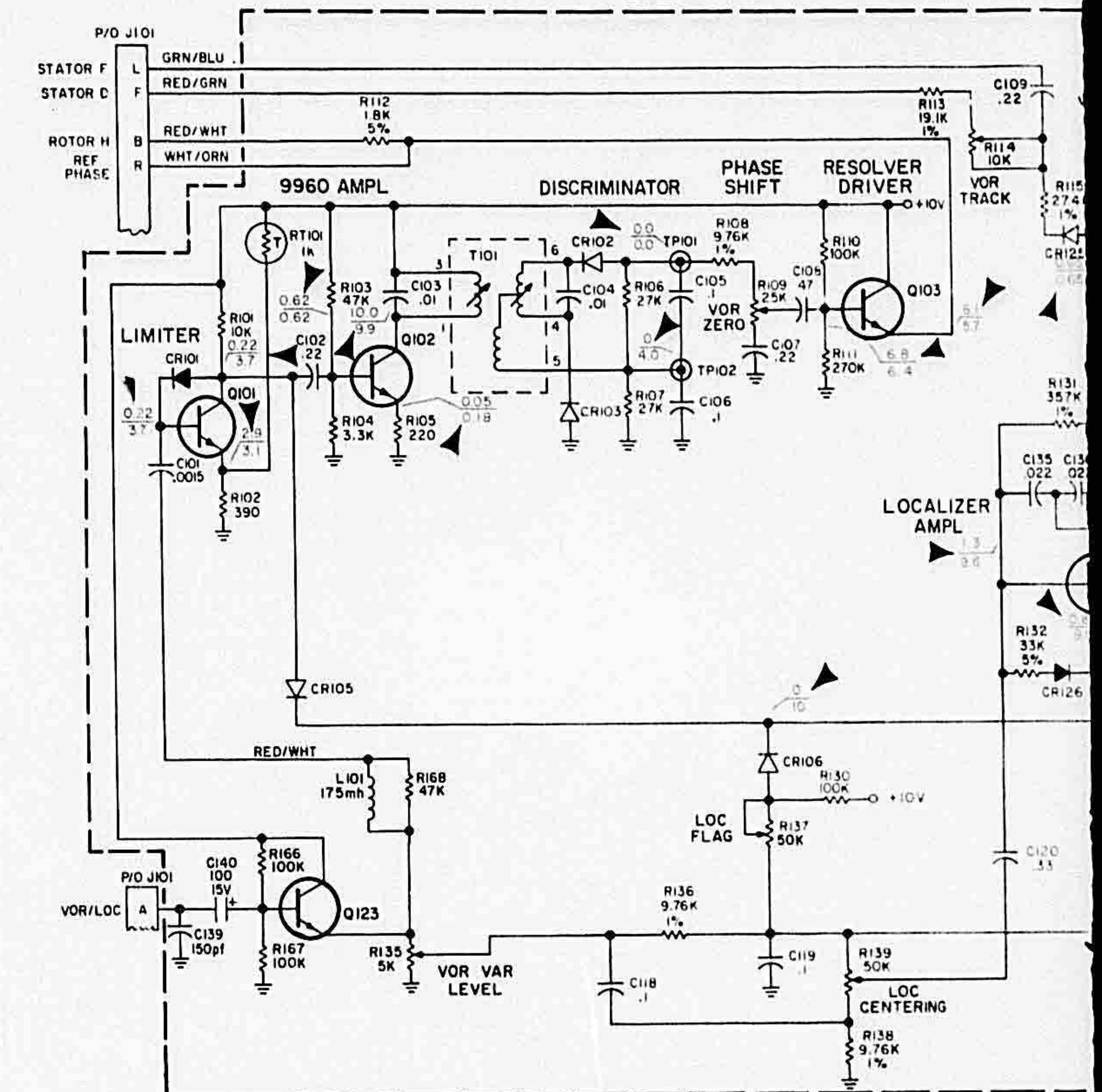
FIGURE 6-10 WAVEFORMS-VOR MODE
(696-1532-00)




NOTES:

1. TERMINAL NUMBERS ON THIS DWG. CORRESPOND WITH WIRE NUMBERS ON HARNESS ASS'Y. 300-0498-00.
2. TERMINALS ARE 008-0048-00.
3. EVENLY SPRAY PORTION OF BOARD ENCLOSED BY DASHED LINES BOTH SIDES WITH CLEAR URETHANE SEAL COATING 016-1040-00 AFTER CLEANING. COATING IS 95% CURED AFTER 48HRS AIR DRYING OR OVEN DRIED AT 150°F FOR 24HRS. COATING TO BE THICK ENOUGH TO SEAL SURFACES BUT FREE OF RUNS.



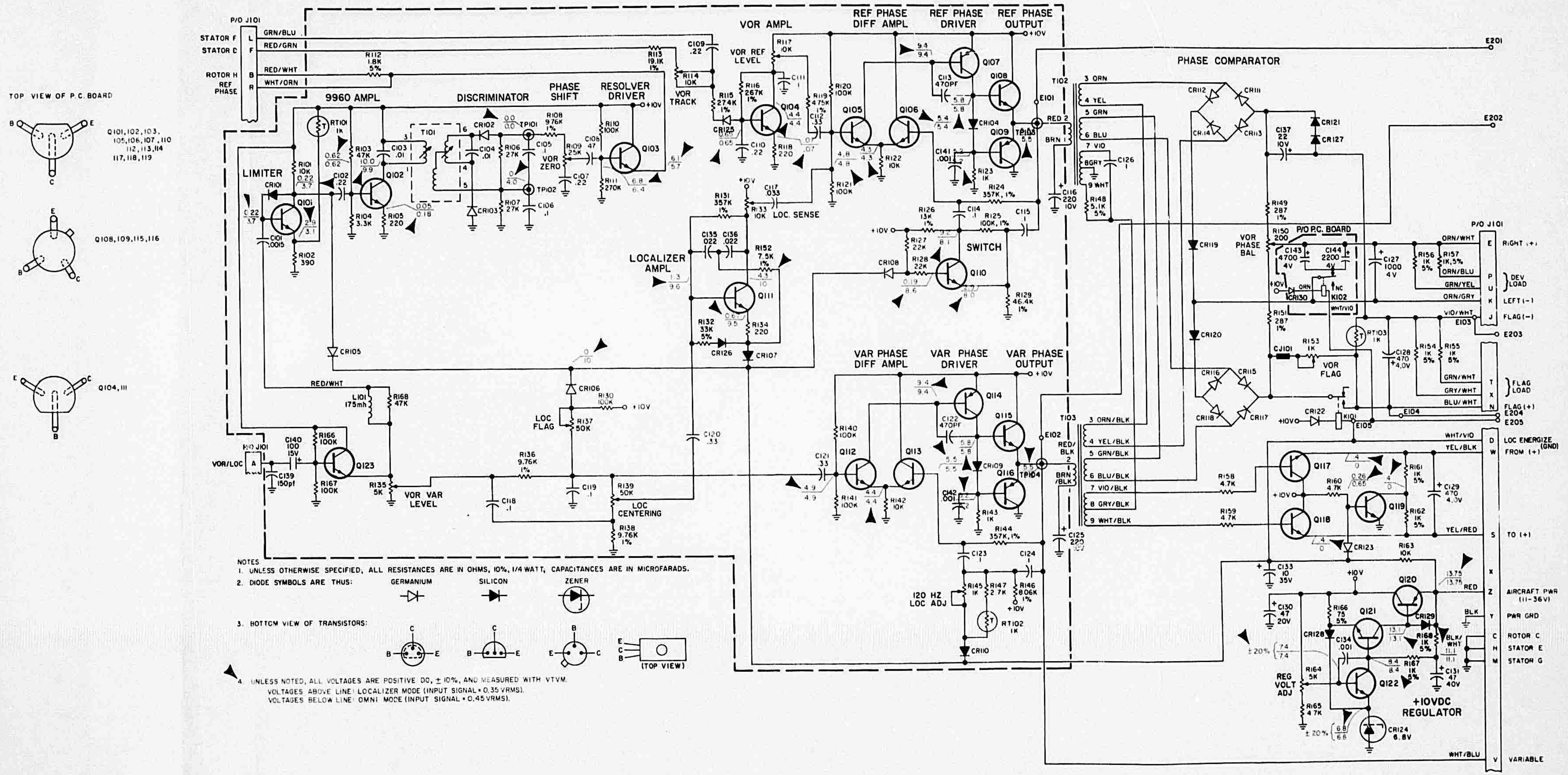

NOTES

1. UNLESS OTHERWISE SPECIFIED, ALL RESISTANCES ARE IN OHMS, 10%, 1/4 WATT, CAPACITANCES ARE IN MICROFARADS.
2. DIODE SYMBOLS ARE THUS: GERMANIUM SILICON ZENER
3. BOTTOM VIEW OF TRANSISTORS: (TOP VIEW)
4. UNLESS NOTED, ALL VOLTAGES ARE POSITIVE DC, ± 10%, AND MEASURED WITH VTVM. VOLTAGES ABOVE LINE: LOCALIZER MODE (INPUT SIGNAL = 0.35 VRMS). VOLTAGES BELOW LINE: OMNI MODE (INPUT SIGNAL = 0.45 VRMS).

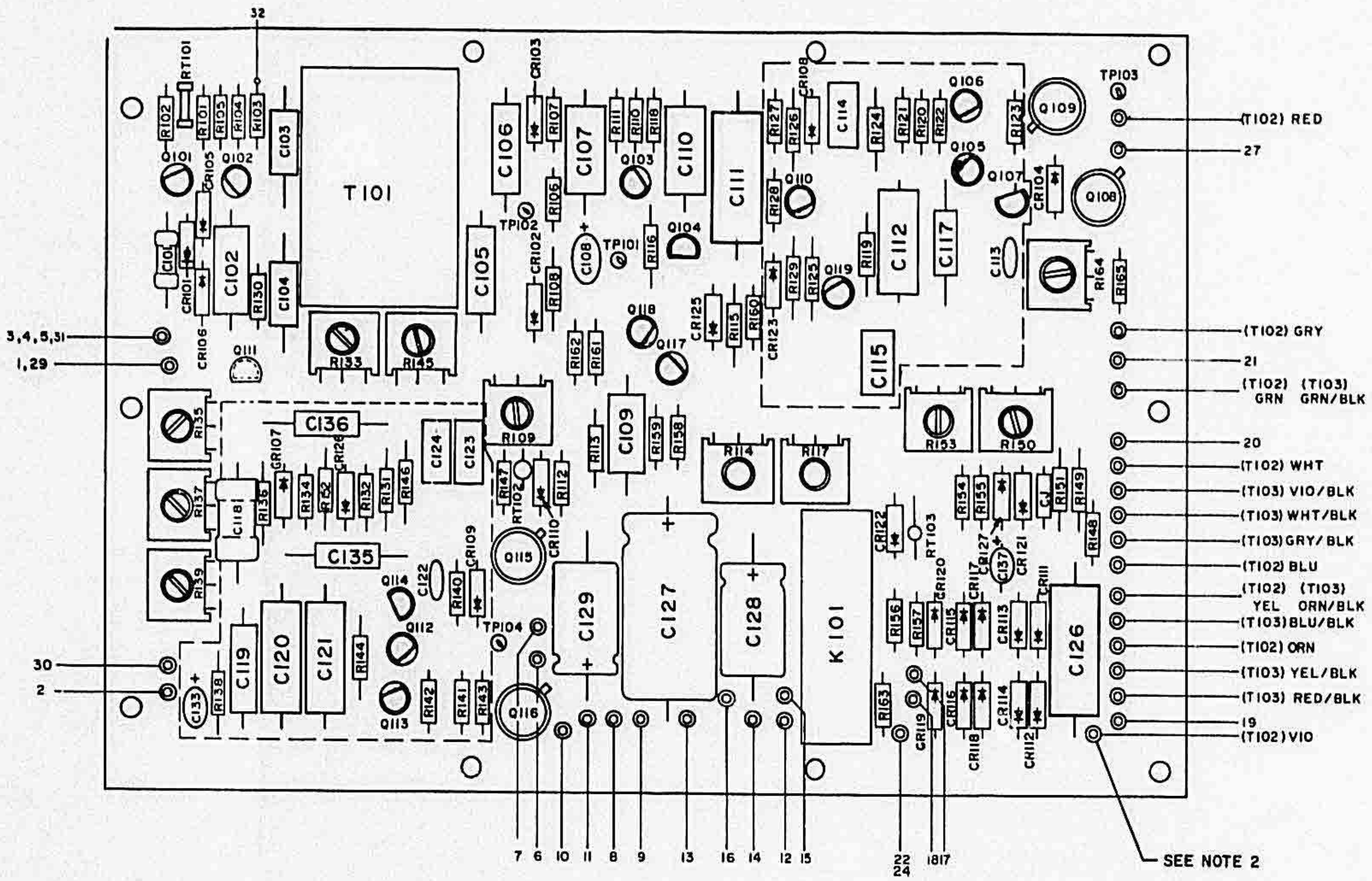
FIGURE 6-11 VOR/LOC CONVERTER ASSEMBLY AND SCHEMATIC
(Dwg. No's. 300-0496-00, R-12; 002-0195-01, R-7)

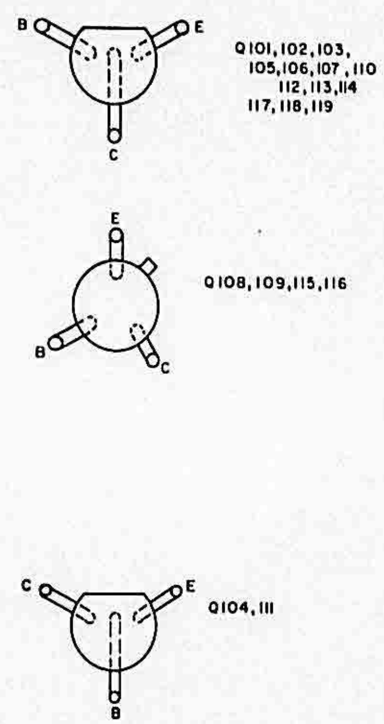


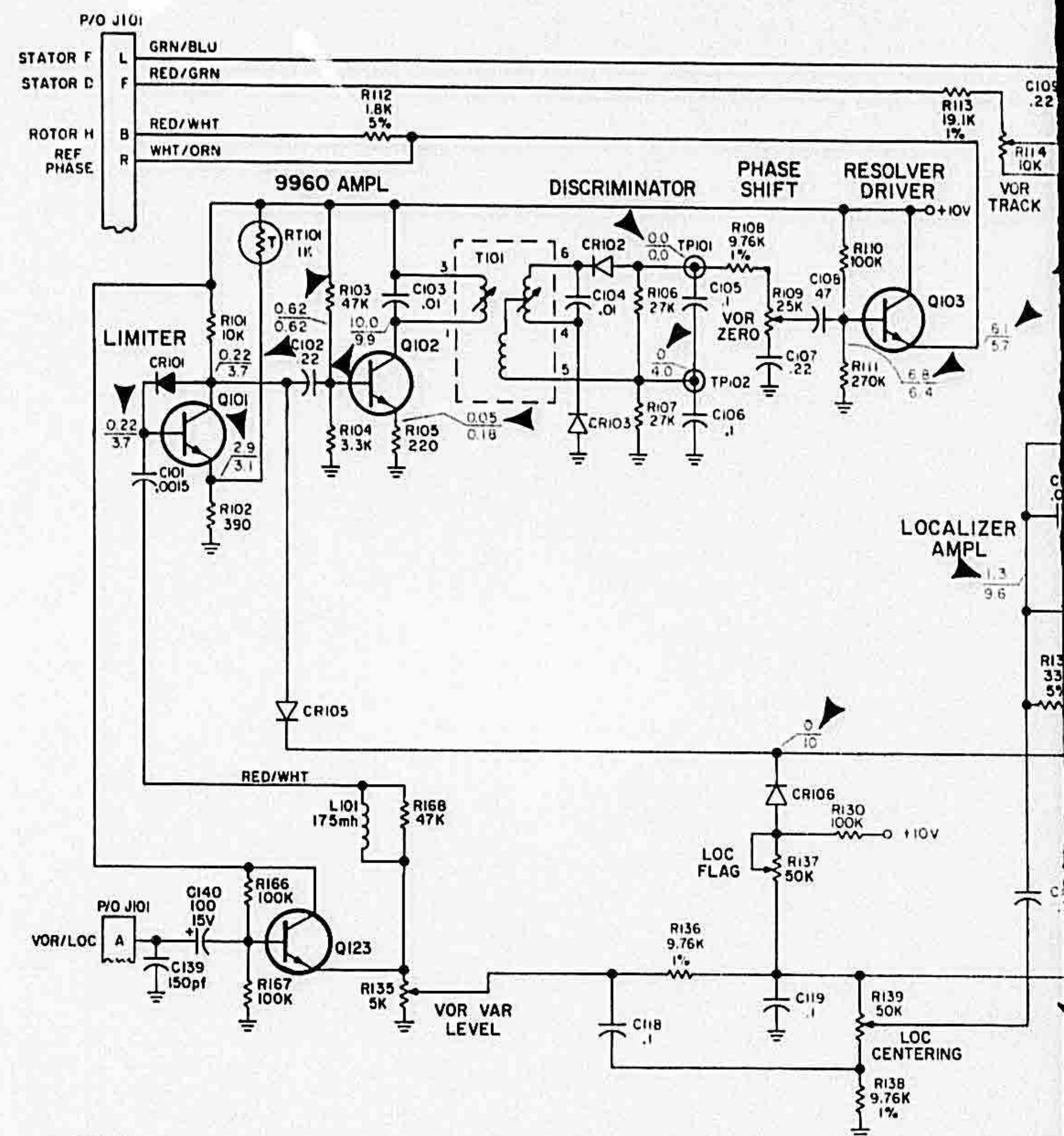
SEE BLOWUP


TOP VIEW OF P.C. BOARD
Q101,102,103, 105,106,107,110 112,113,114 117,118,119
Q108,109,115,116
Q104,111
P/O J101
STATOR F
STATOR C
ROTOR H
REF PHASE
GRN/BLU
RED/GRN
RED/WHT
WHT/ORN
9960 AMPL
LIMITER
DISCRIMINATOR
PHASE SHIFT
RESOLVER DRIVER
VOR ZERO
VOR AMPL
VOR REF LEVEL
VOR TRACK
LOC. SENSE
LOCALIZER AMPL
REF PHASE DIFF AMPL
REF PHASE DRIVER
REF PHASE OUTPUT
SWITCH
PHASE COMPARATOR
VOR PHASE BAL
P/O P.C. BOARD
VOR FLAG
LOC FLAG
VOR VAR LEVEL
LOC CENTERING
VAR PHASE DIFF AMPL
VAR PHASE DRIVER
VAR PHASE OUTPUT
120 HZ LOC ADJ
REG VOLT ADJ
+10VDC REGULATOR
VOR/LOC
E201
E202
E203
E204
E205
RIGHT (+)
DEV LOAD
LEFT (-)
FLAG (-)
FLAG LOAD
FLAG (+)
LOC ENERGIZE (GND) FROM (+)
TO (+)
AIRCRAFT PWR (11-36V)
PWR GRD
ROTOR C
STATOR E
STATOR G
VARIABLE
NOTES
1. UNLESS OTHERWISE SPECIFIED, ALL RESISTANCES ARE IN OHMS, 10%, 1/4 WATT, CAPACITANCES ARE IN MICROFARADS.
2. DIODE SYMBOLS ARE THUS: GERMANIUM SILICON ZENER
3. BOTTOM VIEW OF TRANSISTORS: (TOP VIEW)
4. UNLESS NOTED, ALL VOLTAGES ARE POSITIVE DC, ± 10%, AND MEASURED WITH VTVM.
VOLTAGES ABOVE LINE: LOCALIZER MODE (INPUT SIGNAL = 0.35 VRMS).
VOLTAGES BELOW LINE: OMNI MODE (INPUT SIGNAL = 0.45 VRMS).

SEE BLOWUP



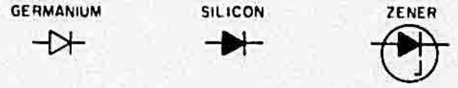




NOTES:

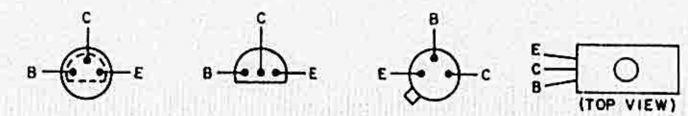
1. TERMINAL NUMBERS ON THIS DWG. CORRESPOND WITH WIRE NUMBERS ON HARNESS ASS'Y. 300-0498-00.
2. TERMINALS ARE 008-0048-00.
3. EVENLY SPRAY PORTION OF BOARD ENCLOSED BY DASHED LINES BOTH SIDES WITH CLEAR URETHANE SEAL COATING 016-1040-00 AFTER CLEANING. COATING IS 95% CURED AFTER 48HRS AIR DRYING OR OVEN DRIED AT 150°F FOR 24HRS. COATING TO BE THICK ENOUGH TO SEAL SURFACES BUT FREE OF RUNS.

NOTES

1. UNLESS OTHERWISE SPECIFIED, ALL RESISTANCES ARE IN OHMS, 10%, 1/4 WATT; CAPACITANCES ARE IN MICROFARADS.
2. DIODE SYMBOLS ARE THUS:




3. BOTTOM VIEW OF TRANSISTORS:

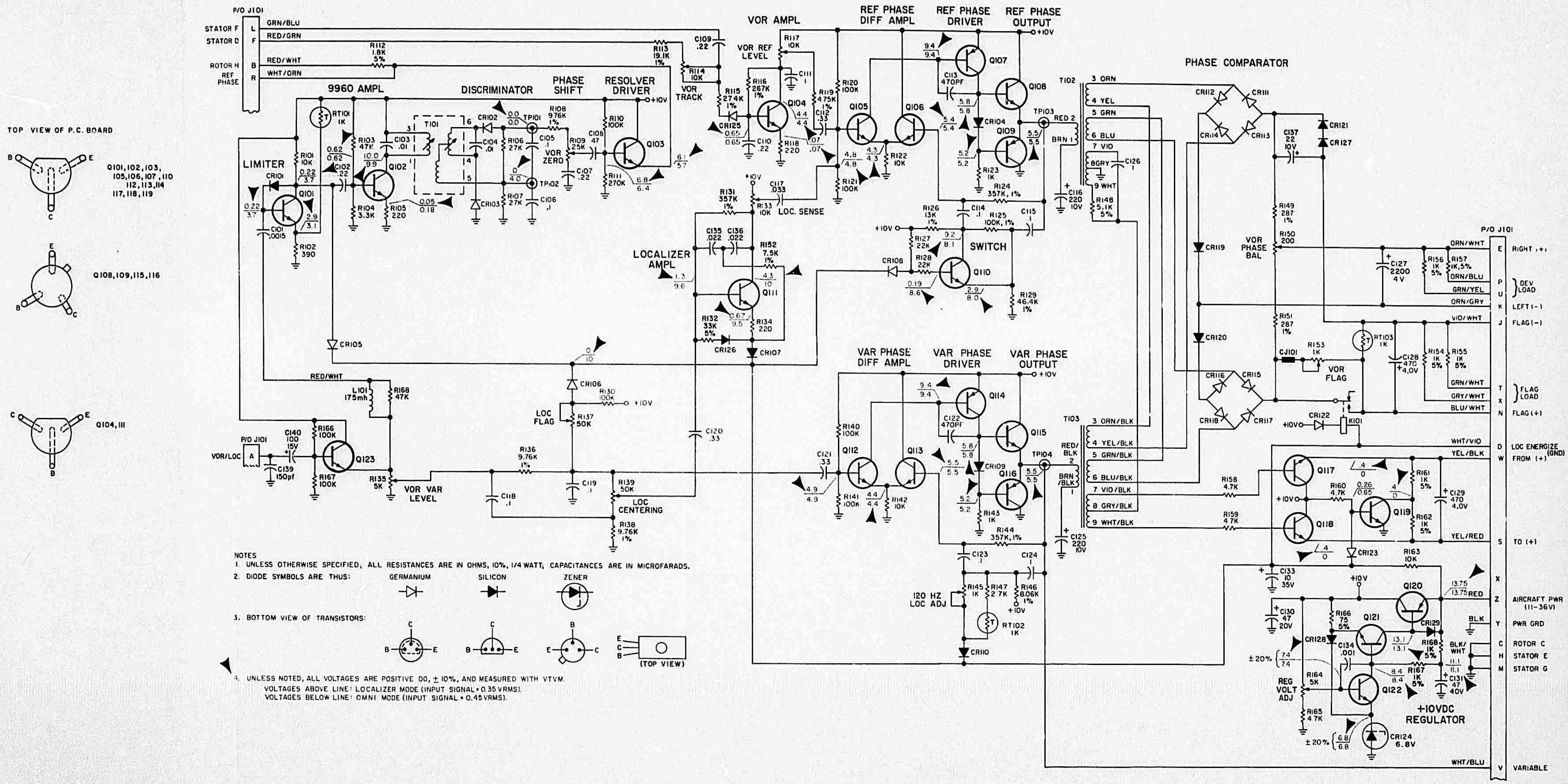



4. UNLESS NOTED, ALL VOLTAGES ARE POSITIVE DC, ± 10%, AND MEASURED WITH VTVM. VOLTAGES ABOVE LINE: LOCALIZER MODE (INPUT SIGNAL = 0.35 VRMS). VOLTAGES BELOW LINE: OMNI MODE (INPUT SIGNAL = 0.45 VRMS).

FIGURE 6-11 VOR/LOC CONVERTER ASSEMBLY AND SCHEMATIC
(Dwg. No's. 300-0496-00, R-10; 002-0195-01, R-4)



SEE BLOWUP

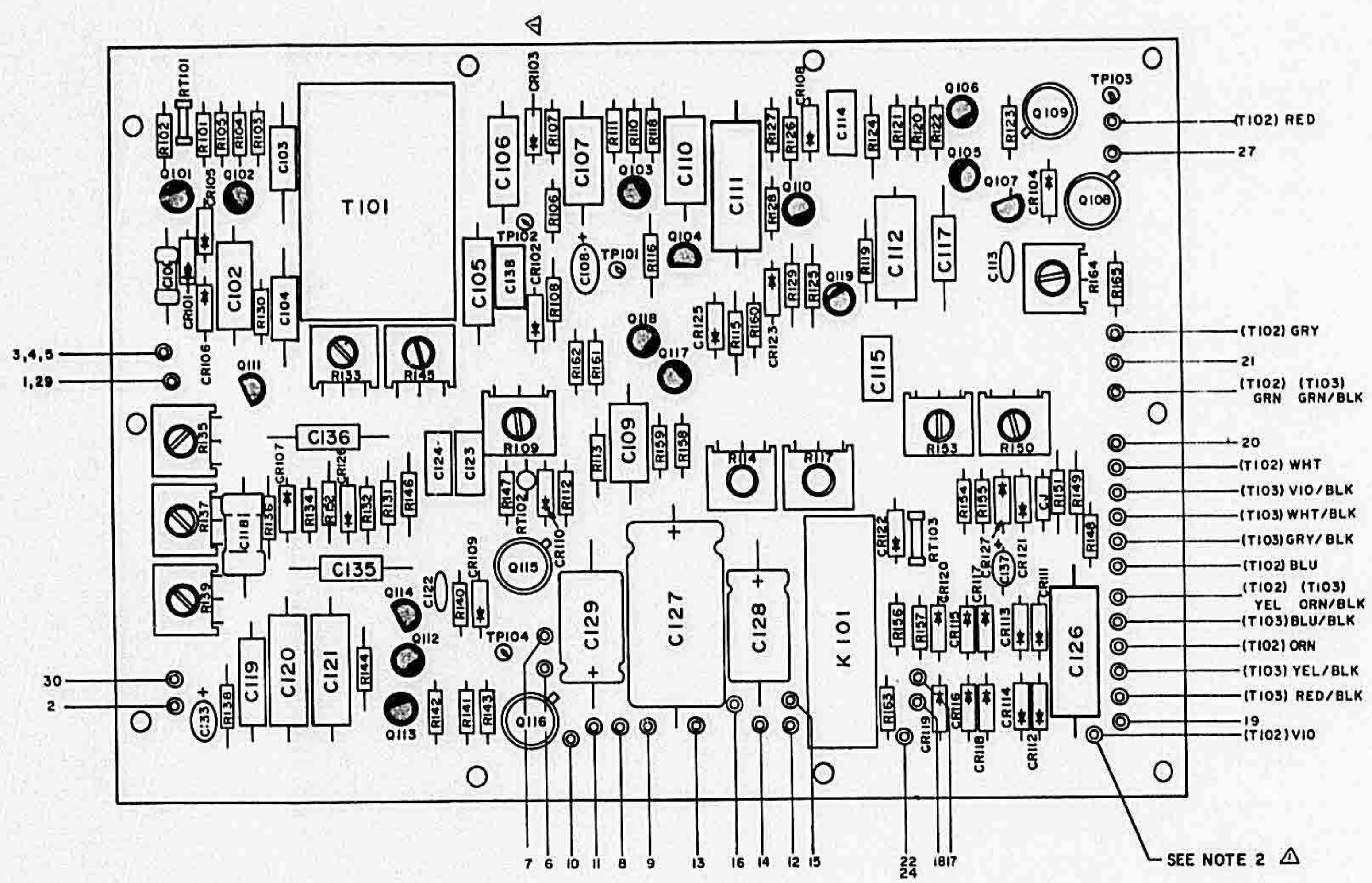



NOTES

1. UNLESS OTHERWISE SPECIFIED, ALL RESISTANCES ARE IN OHMS, 10%, 1/4 WATT; CAPACITANCES ARE IN MICROFARADS.
2. DIODE SYMBOLS ARE THUS: GERMANIUM SILICON ZENER
3. BOTTOM VIEW OF TRANSISTORS: (TOP VIEW)
4. UNLESS NOTED, ALL VOLTAGES ARE POSITIVE DC, ± 10%, AND MEASURED WITH VTVM.
   VOLTAGES ABOVE LINE: LOCALIZER MODE (INPUT SIGNAL = 0.35 VRMS).
   VOLTAGES BELOW LINE: OMNI MODE (INPUT SIGNAL = 0.45 VRMS).

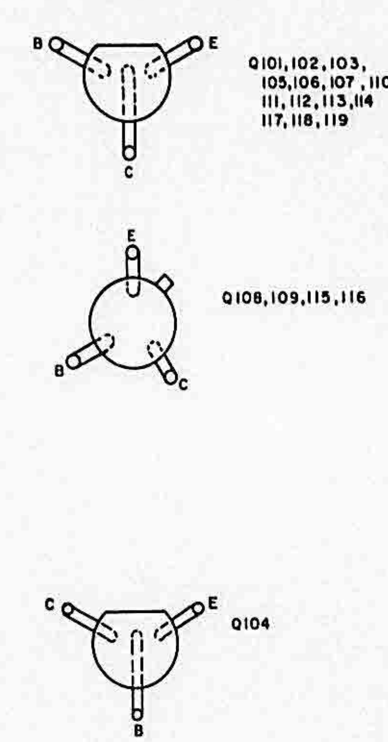
SEE BLOWUP

KING

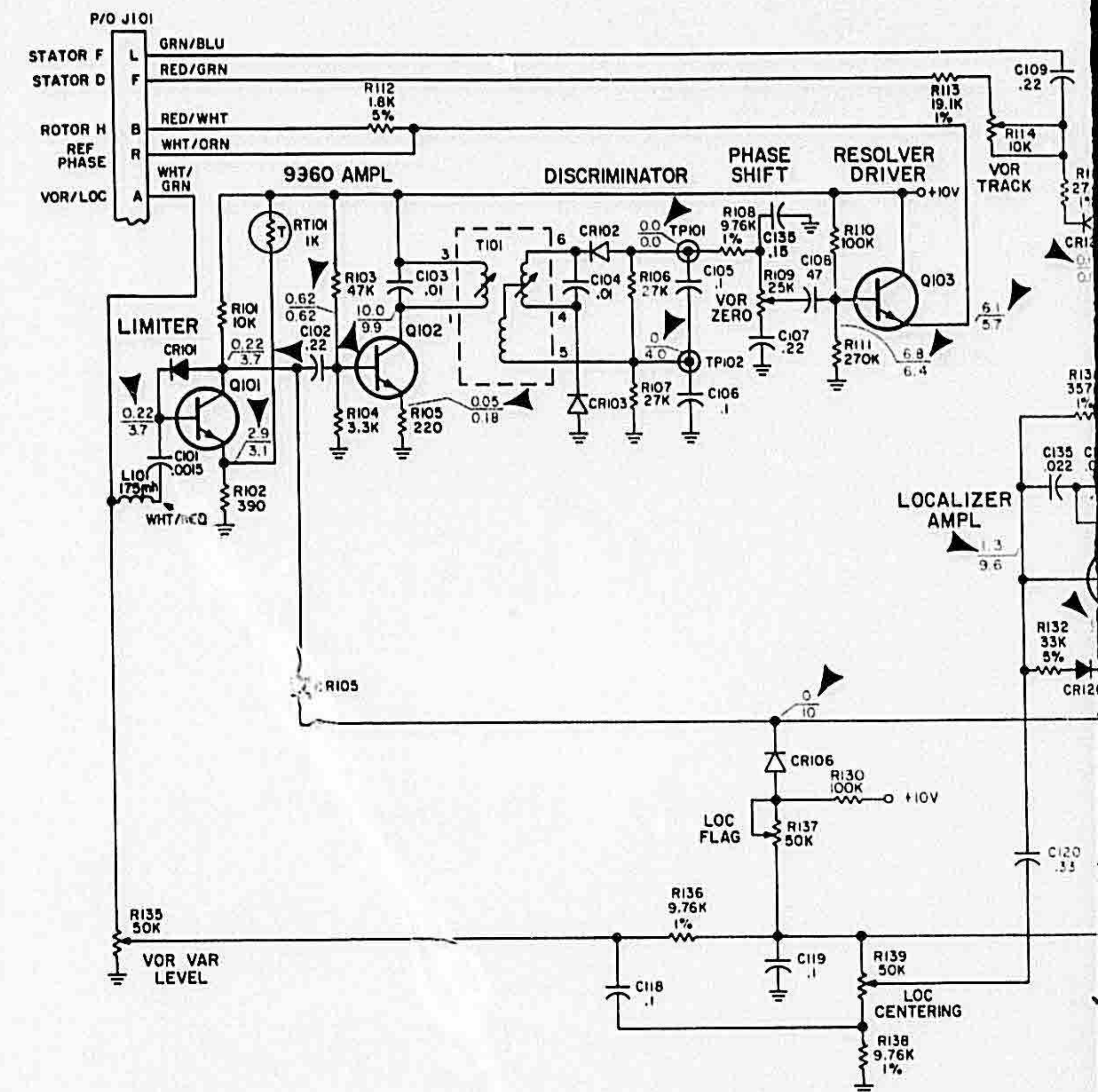



NOTES:
1. TERMINAL NUMBERS ON THIS DWG. CORRESPOND WITH WIRE NUMBERS ON HARNESS ASS'Y. 300-0498-00.
2. TERMINALS ARE 008-0048-00.

TOP VIEW OF P.C. BOARD




REF. B/M 200-0369-00

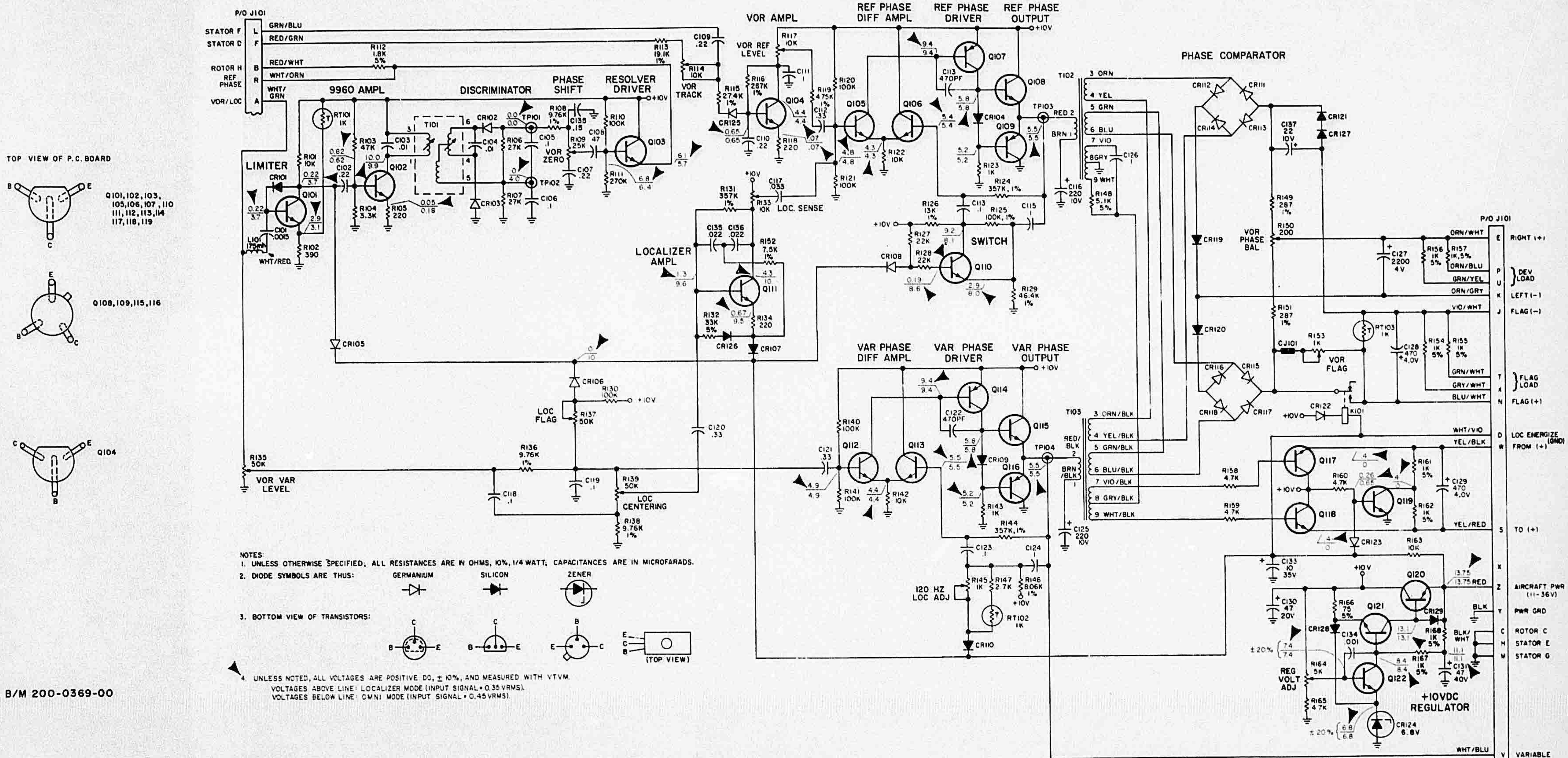



NOTES:
1. UNLESS OTHERWISE SPECIFIED, ALL RESISTANCES ARE IN OHMS, 10%, 1/4 WATT, CAPACITANCES ARE IN MICROFARADS.
2. DIODE SYMBOLS ARE THUS: GERMANIUM SILICON ZENER
3. BOTTOM VIEW OF TRANSISTORS: (TOP VIEW)
4. UNLESS NOTED, ALL VOLTAGES ARE POSITIVE DC, ±10%, AND MEASURED WITH VTVM.
VOLTAGES ABOVE LINE: LOCALIZER MODE (INPUT SIGNAL = 0.35 VRMS).
VOLTAGES BELOW LINE: OMNI MODE (INPUT SIGNAL = 0.45 VRMS).

FIGURE 6-11 VOR-LOC CONVERTER SCHEMATIC AND ASSEMBLY
(002-0195-01) (R-0)
(300-0496-00) R-3)



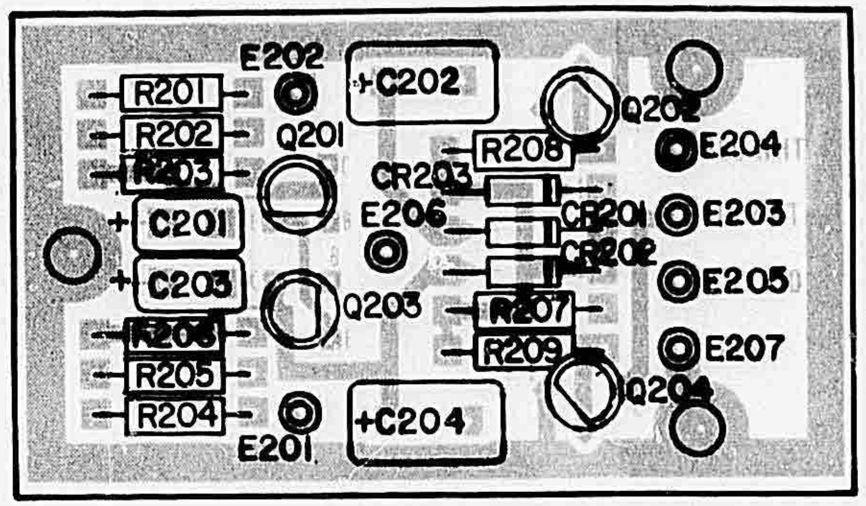
SEE BLOWUP

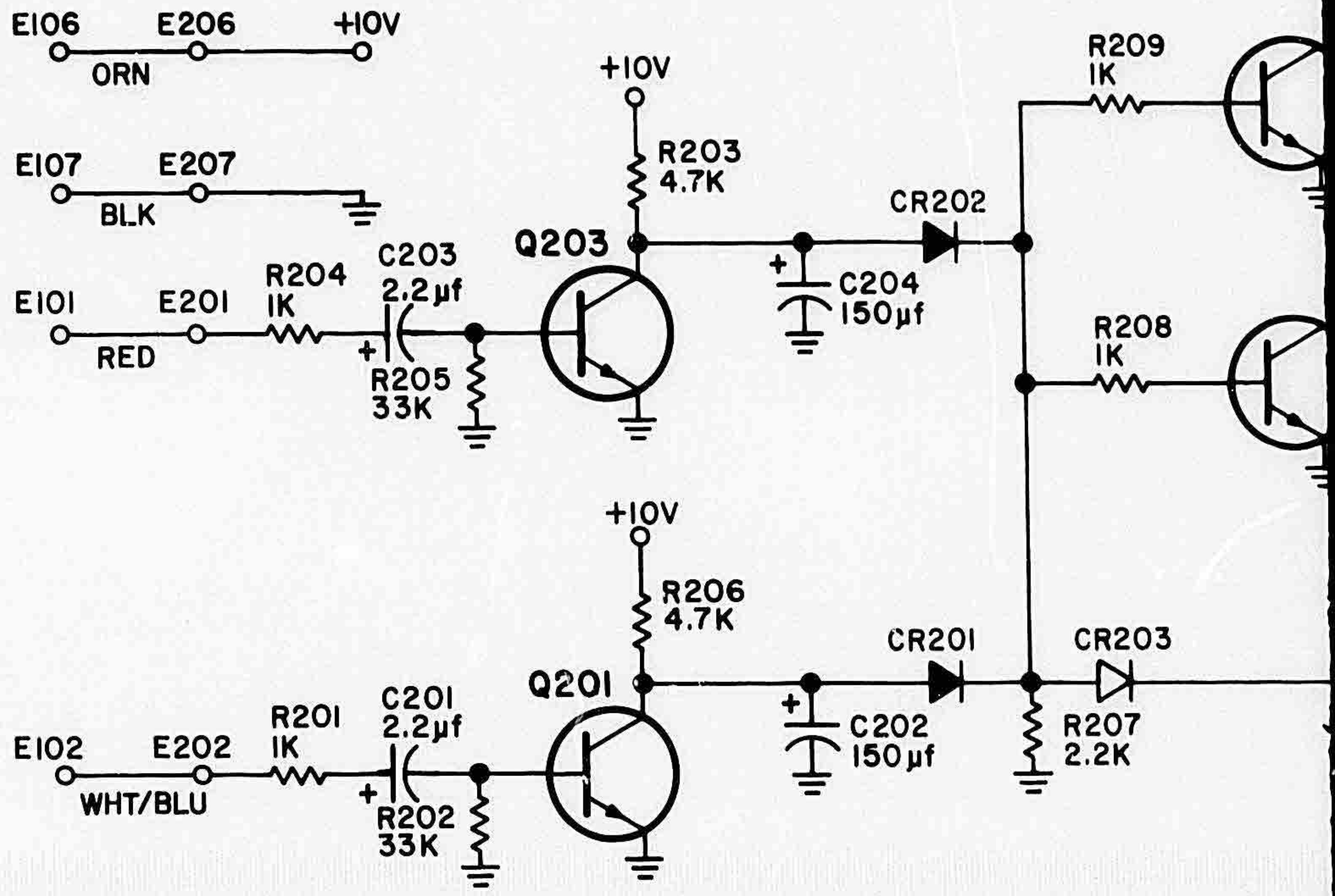



NOTES:
1. UNLESS OTHERWISE SPECIFIED; ALL RESISTANCES ARE IN OHMS, 10%, 1/4 WATT; CAPACITANCES ARE IN MICROFARADS.
2. DIODE SYMBOLS ARE THUS: GERMANIUM SILICON ZENER
3. BOTTOM VIEW OF TRANSISTORS:
4. UNLESS NOTED, ALL VOLTAGES ARE POSITIVE DC, ± 10%, AND MEASURED WITH VTVM.
VOLTAGES ABOVE LINE: LOCALIZER MODE (INPUT SIGNAL = 0.35 VRMS).
VOLTAGES BELOW LINE: OMNI MODE (INPUT SIGNAL = 0.45 VRMS).

F. B/M 200-0369-00

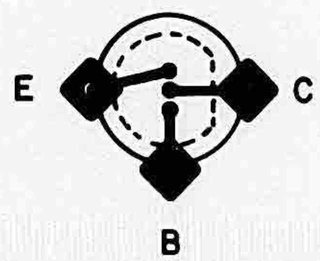
SEE BLOWUP




**WIRING GUIDE**

| WIRE # | FROM | TO | COLOR |
|---|---|---|---|
| — | E101 | E201 | RED |
| 33 | E102 | E202 | WHT/BLU |
| 32 | E103 | E203 | VIO/WHT |
| 31 | E104 | E204 | BLU/WHT |
| 34 | E105 | E205 | WHT/VIO |
| — | E106 | E206 | ORN |
| — | E107 | E207 | BLK |



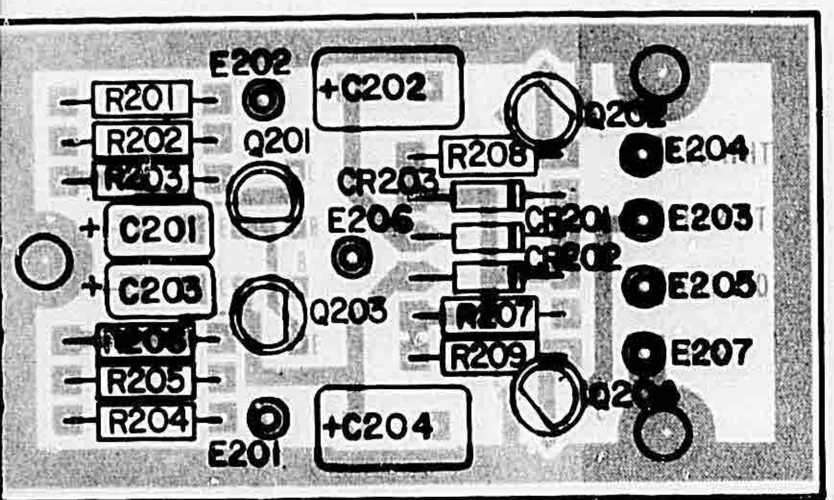

Q201, Q202, Q203, Q204

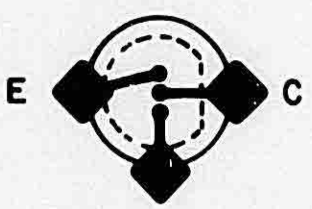
NOTES:

1. UNLESS NOTED, RESISTANCE VALUES ARE IN OHMS, QW, 10%.

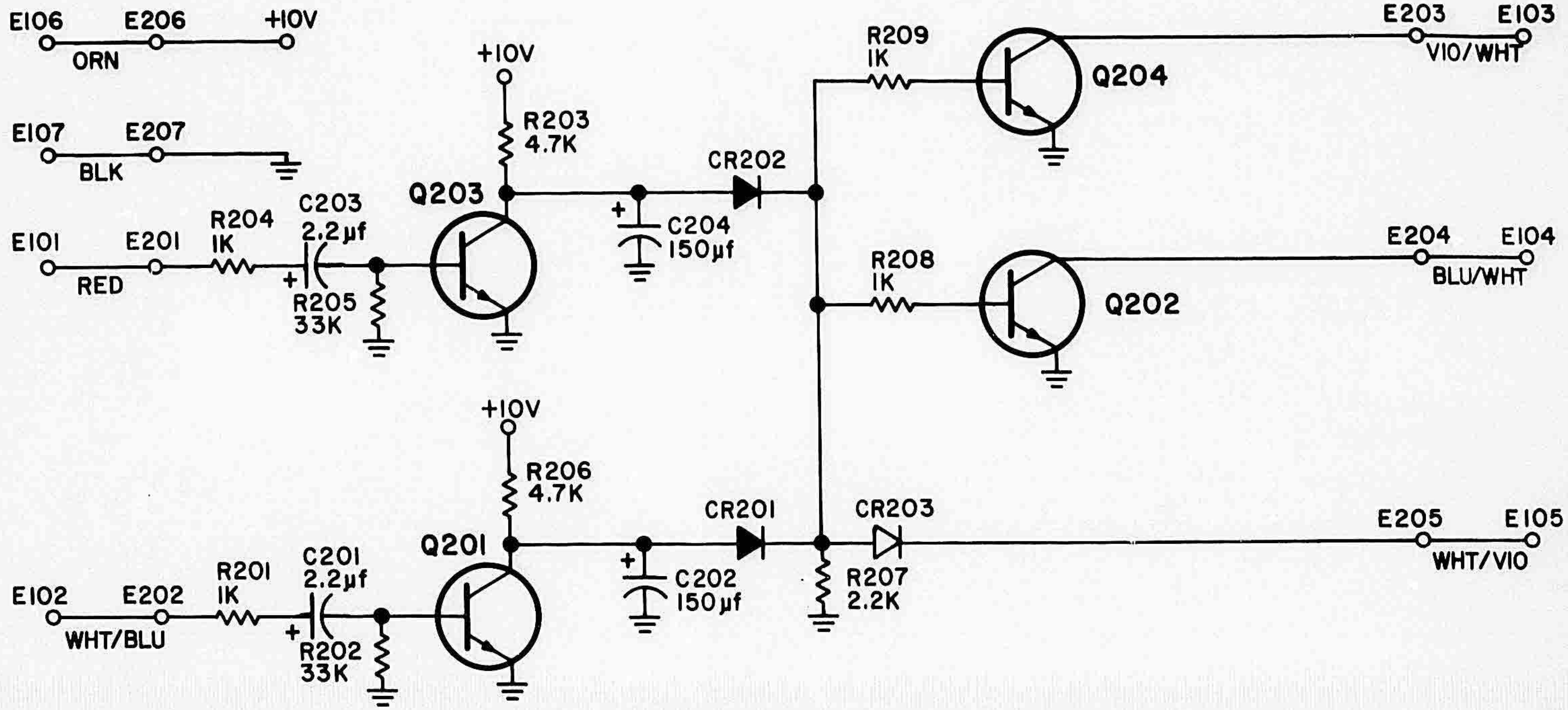
FIGURE 6-12 FLAG PC BOARD ASSEMBLY AND SCHEMATIC
(Dwg. Nos. 300-1588-00, R-1; 002-0374-00, R-1)

FLAG BOARD
ASSEMBLY AND SCHEMATIC



Q201, Q202, Q203, Q204




NOTES:

1. UNLESS NOTED, RESISTANCE VALUES ARE IN OHMS, QW, 10%.

**KING**
KN 73
GLIDESLOPE RECEIVER

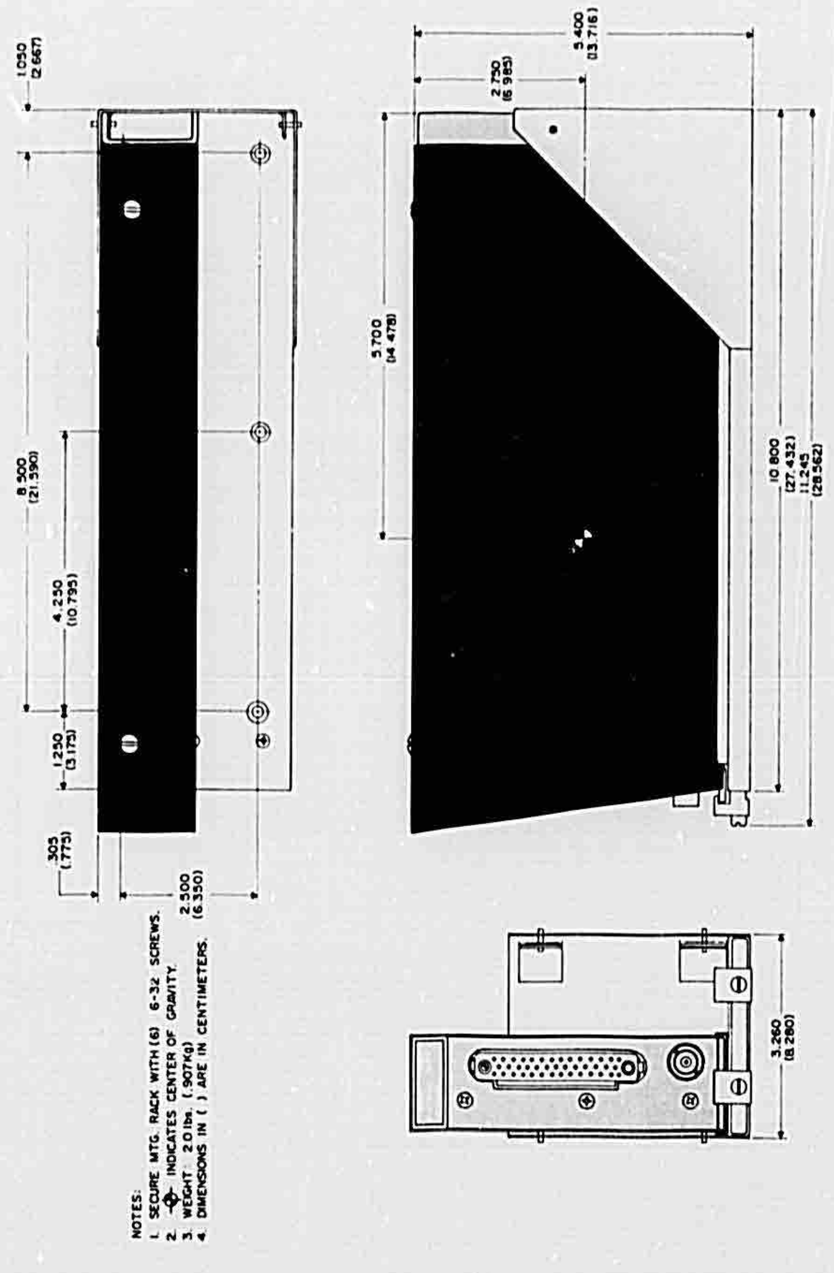
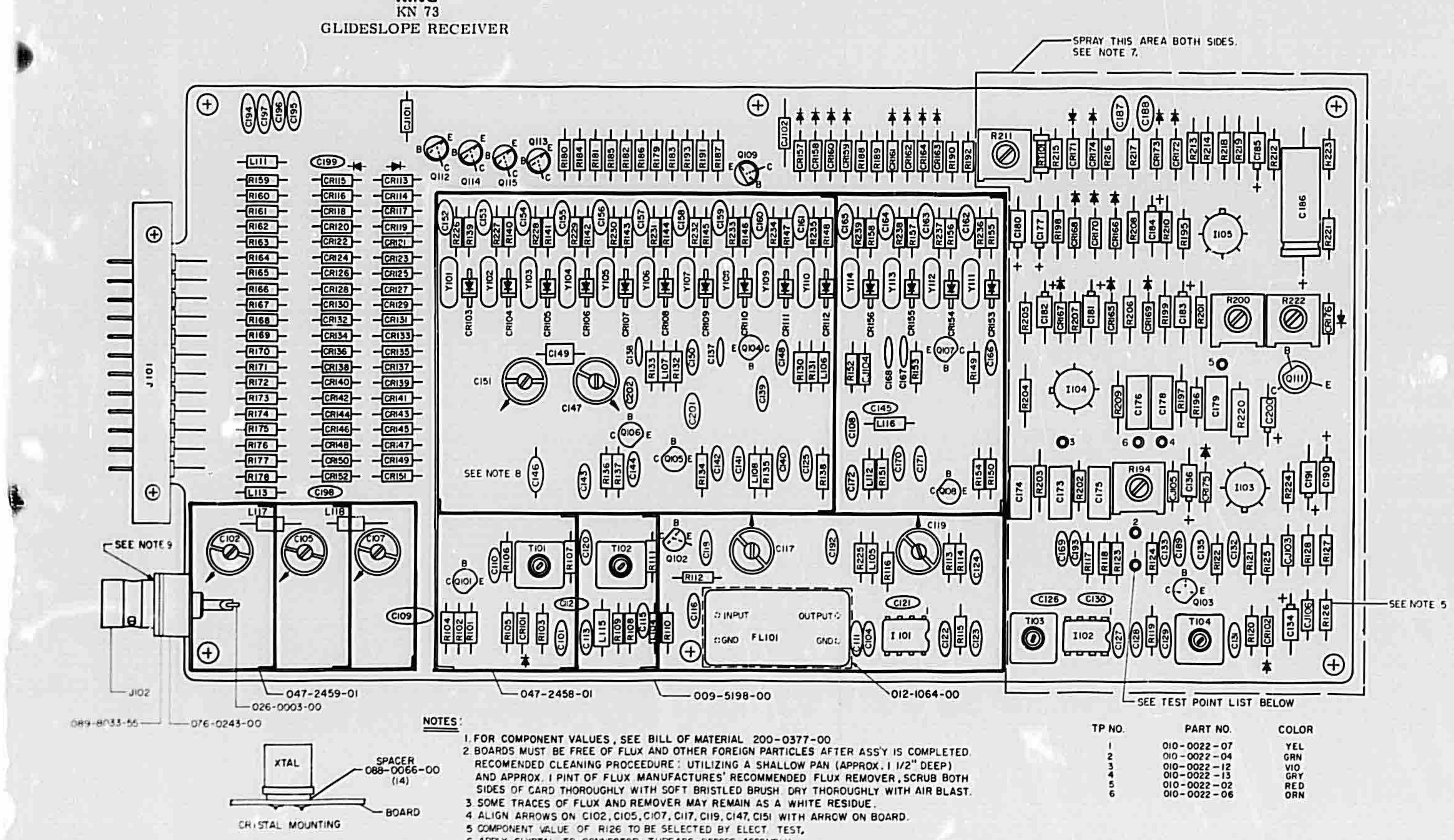


FIGURE 2-2 KN 73 OUTLINE AND MOUNTING DRAWING
155-5093-00



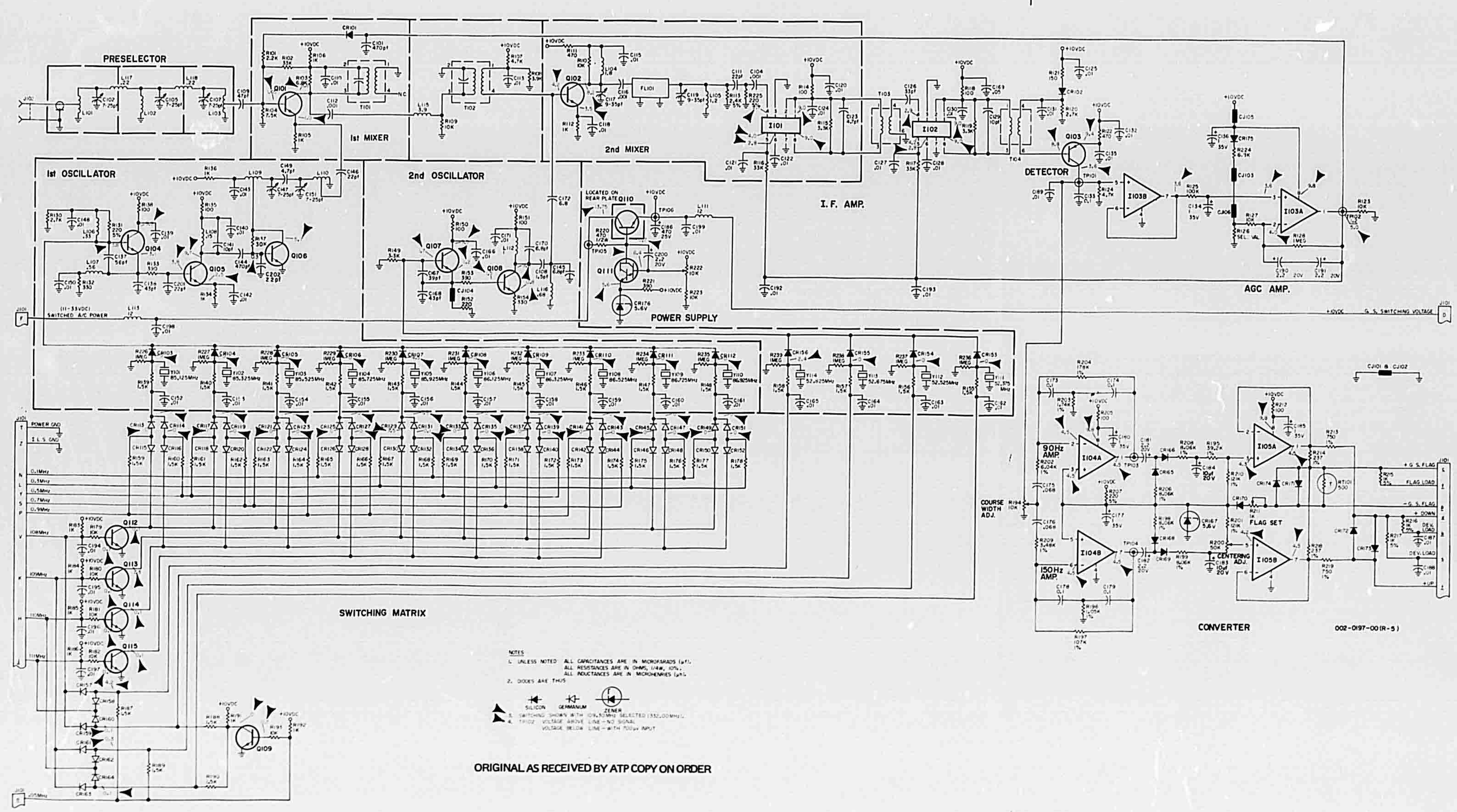
**KING**
KN 73
GLIDESLOPE RECEIVER




NOTES:

1. FOR COMPONENT VALUES, SEE BILL OF MATERIAL 200-0377-00
2. BOARDS MUST BE FREE OF FLUX AND OTHER FOREIGN PARTICLES AFTER ASS'Y IS COMPLETED. RECOMENDED CLEANING PROCEEDURE: UTILIZING A SHALLOW PAN (APPROX. 1 1/2" DEEP) AND APPROX. 1 PINT OF FLUX MANUFACTURES' RECOMMENDED FLUX REMOVER, SCRUB BOTH SIDES OF CARD THOROUGHLY WITH SOFT BRISTLED BRUSH. DRY THOROUGHLY WITH AIR BLAST.
3. SOME TRACES OF FLUX AND REMOVER MAY REMAIN AS A WHITE RESIDUE.
4. ALIGN ARROWS ON C102, C105, C107, C117, C119, C147, C151 WITH ARROW ON BOARD.
5. COMPONENT VALUE OF R126 TO BE SELECTED BY ELECT. TEST.
6. APPLY GLYPTAL TO CONNECTOR THREADS BEFORE ASSEMBLY.
7. MASK VARIABLE RES. R194, R200, R211, R222, TRANS. T103 & T104, MOUNTING HOLES BOTH SIDES & ALL TEST POINTS; THEN EVENLY SPRAY PORTION OF BOARD ENCLOSED BY DASHED LINES WITH CLEAR URETHANE SEAL COATING 016-1040-00 AFTER CLEANING. COATING IS 95% CURED AFTER 48 HOURS AIR DRYING OR OVEN DRYED AT 150°F FOR 24 HOURS. COATING TO BE THICK ENOUGH TO SEAL SURFACES, BUT FREE OF RUNS.
8. ADD 150-0005-10 TUBING TO BOTH LEADS OF C146.
9. APPLY SMALL AMOUNT OF SOLDER TO J102 TO ASSURE CONNECTOR NOT TO LOOSEN.

| TP NO. | PART NO. | COLOR |
|---|---|---|
| 1 | 010-0022-07 | YEL |
| 2 | 010-0022-04 | GRN |
| 3 | 010-0022-12 | VIO |
| 4 | 010-0022-13 | GRY |
| 5 | 010-0022-02 | RED |
| 6 | 010-0022-06 | ORN |




GLIDESLOPE RECEIVER
ASSEMBLY AND SCHEMATIC

FIGURE 6-4 GLIDESLOPE RECEIVER ASSEMBLY AND SCHEMATIC
(Dwg. No's 300-0506-00, R-11; 002-0197-00, R-10)

ORIGINAL AS RECEIVED BY ATP COPY ON ORDER

KING
KN 73
GLIDESLOPE RECEIVER

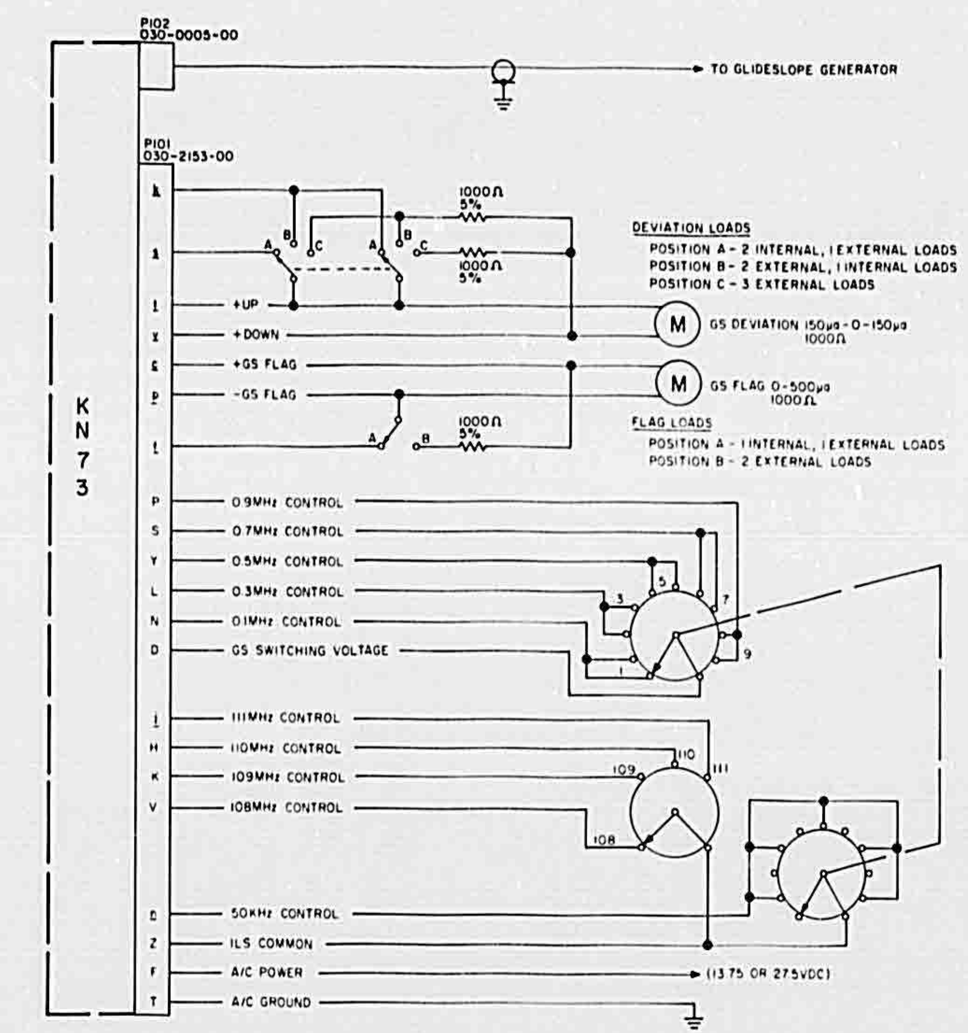
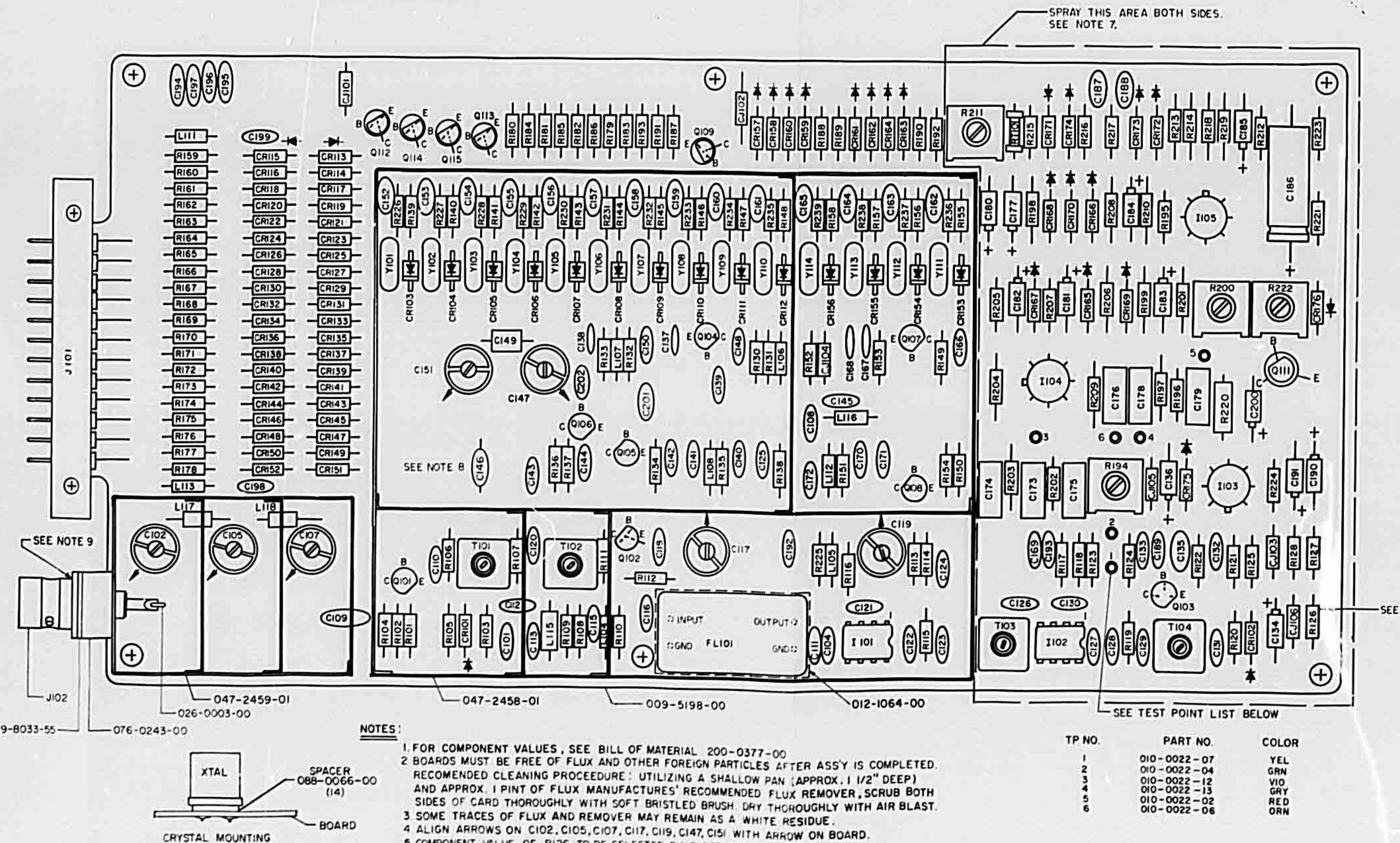



FIGURE 6-1 KN 73 TEST SET
(696-1541-00)





KING
KN 73
GLIDESLOPE RECEIVER




NOTES:

1. FOR COMPONENT VALUES, SEE BILL OF MATERIAL 200-0377-00
2. BOARDS MUST BE FREE OF FLUX AND OTHER FOREIGN PARTICLES AFTER ASS'Y IS COMPLETED. RECOMENDED CLEANING PROCEEDURE: UTILIZING A SHALLOW PAN (APPROX. 1 1/2" DEEP) AND APPROX. 1 PINT OF FLUX MANUFACTURES' RECOMMENDED FLUX REMOVER, SCRUB BOTH SIDES OF CARD THOROUGHLY WITH SOFT BRISTLED BRUSH. DRY THOROUGHLY WITH AIR BLAST.
3. SOME TRACES OF FLUX AND REMOVER MAY REMAIN AS A WHITE RESIDUE.
4. ALIGN ARROWS ON C102, C105, C107, C117, C119, C147, C151 WITH ARROW ON BOARD.
5. COMPONENT VALUE OF R126 TO BE SELECTED BY ELECT. TEST.
6. APPLY GLYPTAL TO CONNECTOR THREADS BEFORE ASSEMBLY.
7. MASK VARIABLE RES. R194, R200, R211, R222, TRANS. T103 & T104, MOUNTING HOLES BOTH SIDES & ALL TEST POINTS; THEN EVENLY SPRAY PORTION OF BOARD ENCLOSED BY DASHED LINES WITH CLEAR URETHANE SEAL COATING 016-1040-00 AFTER CLEANING COATING IS 95% CURED AFTER 48 HOURS AIR DRYING OR OVEN DRYED AT 150°F FOR 24 HOURS. COATING TO BE THICK ENOUGH TO SEAL SURFACES, BUT FREE OF RUNS.
8. ADD 150-0005-10 TUBING TO BOTH LEADS OF C146.
9. APPLY SMALL AMOUNT OF SOLDER TO J102 TO ASSURE CONNECTOR NOT TO LOOSEN.

| TP NO. | PART NO. | COLOR |
|---|---|---|
| 1 | 010-0022-07 | YEL |
| 2 | 010-0022-04 | GRN |
| 3 | 010-0022-12 | VIO |
| 4 | 010-0022-13 | GRY |
| 5 | 010-0022-02 | RED |
| 6 | 010-0022-06 | ORN |

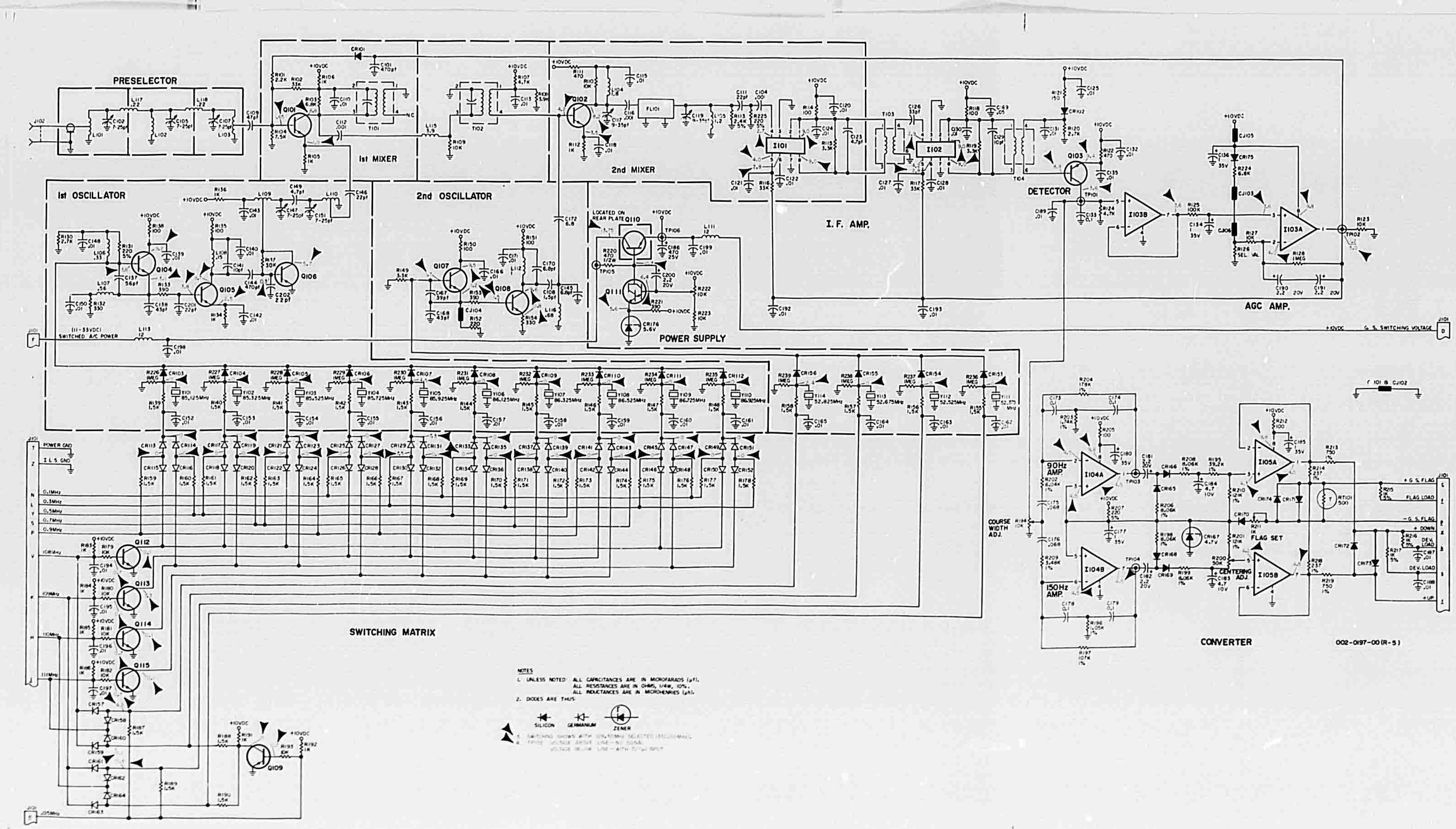



FIGURE 6-4 GLIDESLOPE RECEIVER ASSEMBLY AND SCHEMATIC
(Dwg. No's 300-0506-00, R-11; 002-0197-00, R-8)

KING
KN 73
GLIDESLOPE RECEIVER

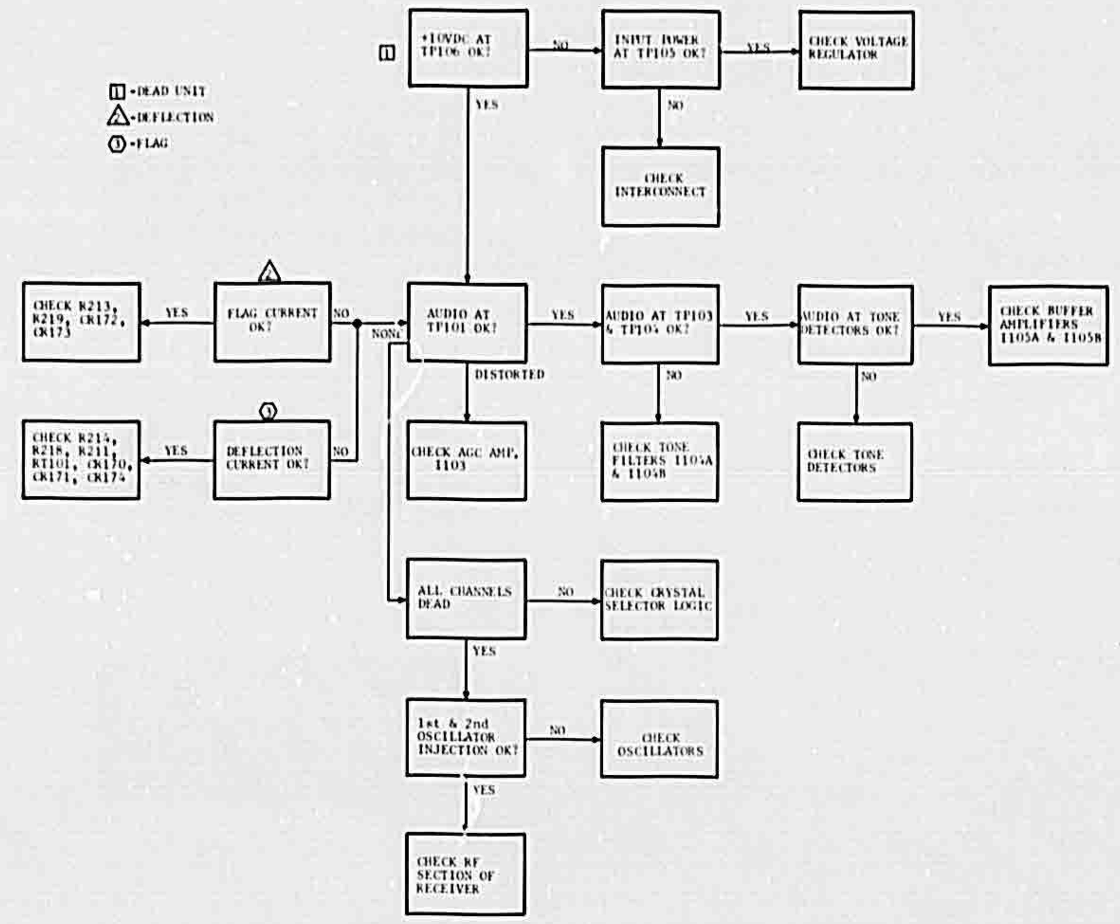
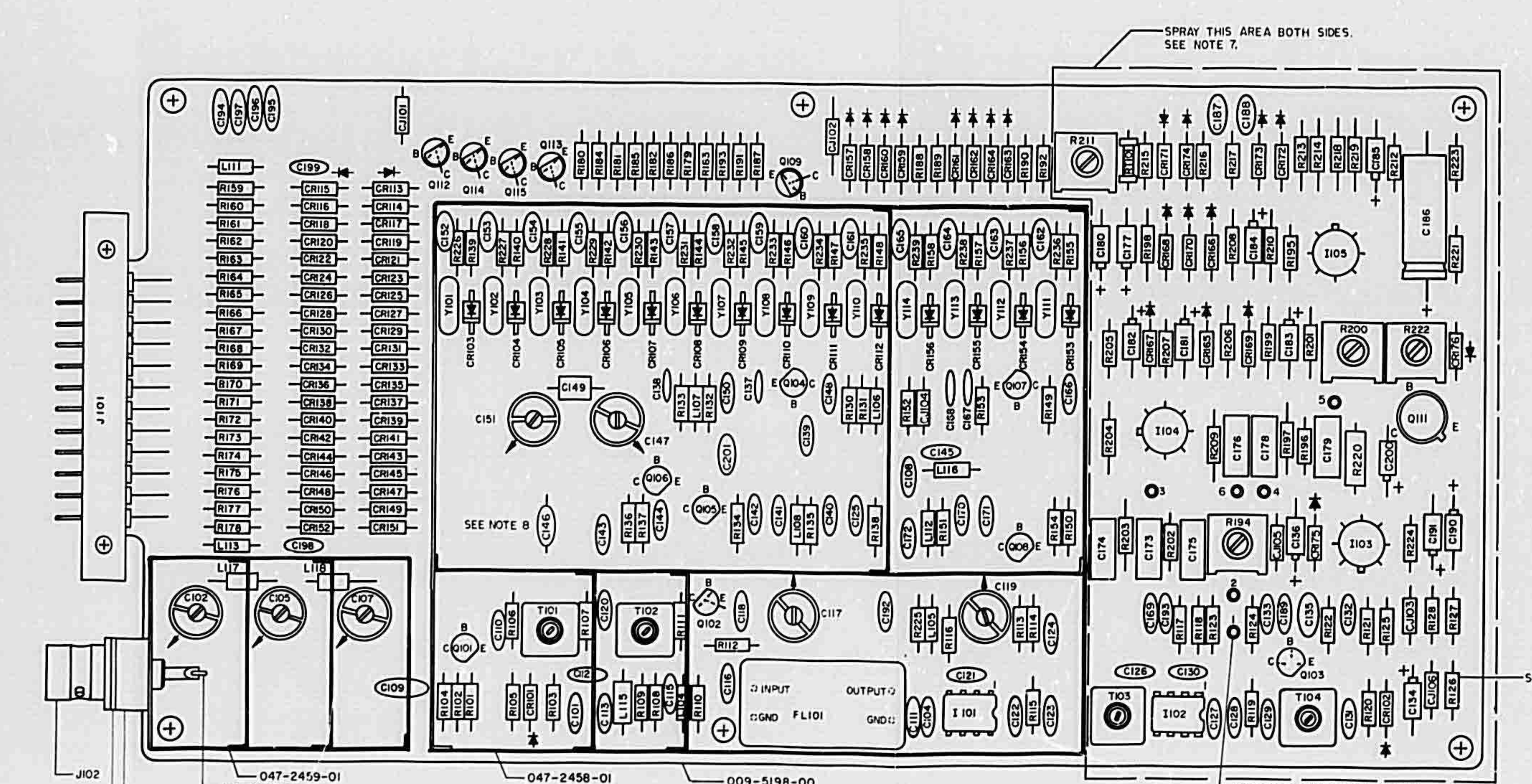
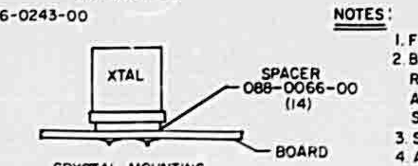



FIGURE 6-2 TROUBLESHOOTING FLOW CHART
(696-1542-00)



KING




NOTES:

1. FOR COMPONENT VALUES, SEE BILL OF MATERIAL 200-0377-00
2. BOARDS MUST BE FREE OF FLUX AND OTHER FOREIGN PARTICLES AFTER ASS'Y IS COMPLETED. RECOMENDED CLEANING PROCEEDURE: UTILIZING A SHALLOW PAN (APPROX. 1 1/2" DEEP) AND APPROX. 1 PINT OF FLUX MANUFACTURES' RECOMMENDED FLUX REMOVER, SCRUB BOTH SIDES OF CARD THOROUGHLY WITH SOFT BRISTLED BRUSH. DRY THOROUGHLY WITH AIR BLAST.
3. SOME TRACES OF FLUX AND REMOVER MAY REMAIN AS A WHITE RESIDUE.
4. ALIGN ARROWS ON C102, C105, C107, C117, C119, C147, C151 WITH ARROW ON BOARD.
5. COMPONENT VALUE OF R126 TO BE SELECTED BY ELECT. TEST.
6. APPLY GLYPTAL TO CONNECTOR THREADS BEFORE ASSEMBLY.
7. MASK VARIABLE RES. R194, R200, R211, R222, TRANS. T103 & T104, MOUNTING HOLES BOTH SIDES & ALL TEST POINTS; THEN EVENLY SPRAY PORTION OF BOARD ENCLOSED BY DASHED LINES WITH CLEAR URETHANE SEAL COATING 016-1040-00 AFTER CLEANING COATING IS 95% CURED AFTER 48 HOURS AIR DRYING OR OVEN DRYED AT 150°F FOR 24 HOURS. COATING TO BE THICK ENOUGH TO SEAL SURFACES, BUT FREE OF RUNS.
8. ADD 150-0005-10 TUBING TO BOTH LEADS OF C146.

| TP NO. | PART NO. | COLOR |
|---|---|---|
| 1 | 010-0022-07 | YEL |
| 2 | 010-0022-04 | GRN |
| 3 | 010-0022-12 | VIO |
| 4 | 010-0022-13 | GRY |
| 5 | 010-0022-02 | RED |
| 6 | 010-0022-06 | ORN |

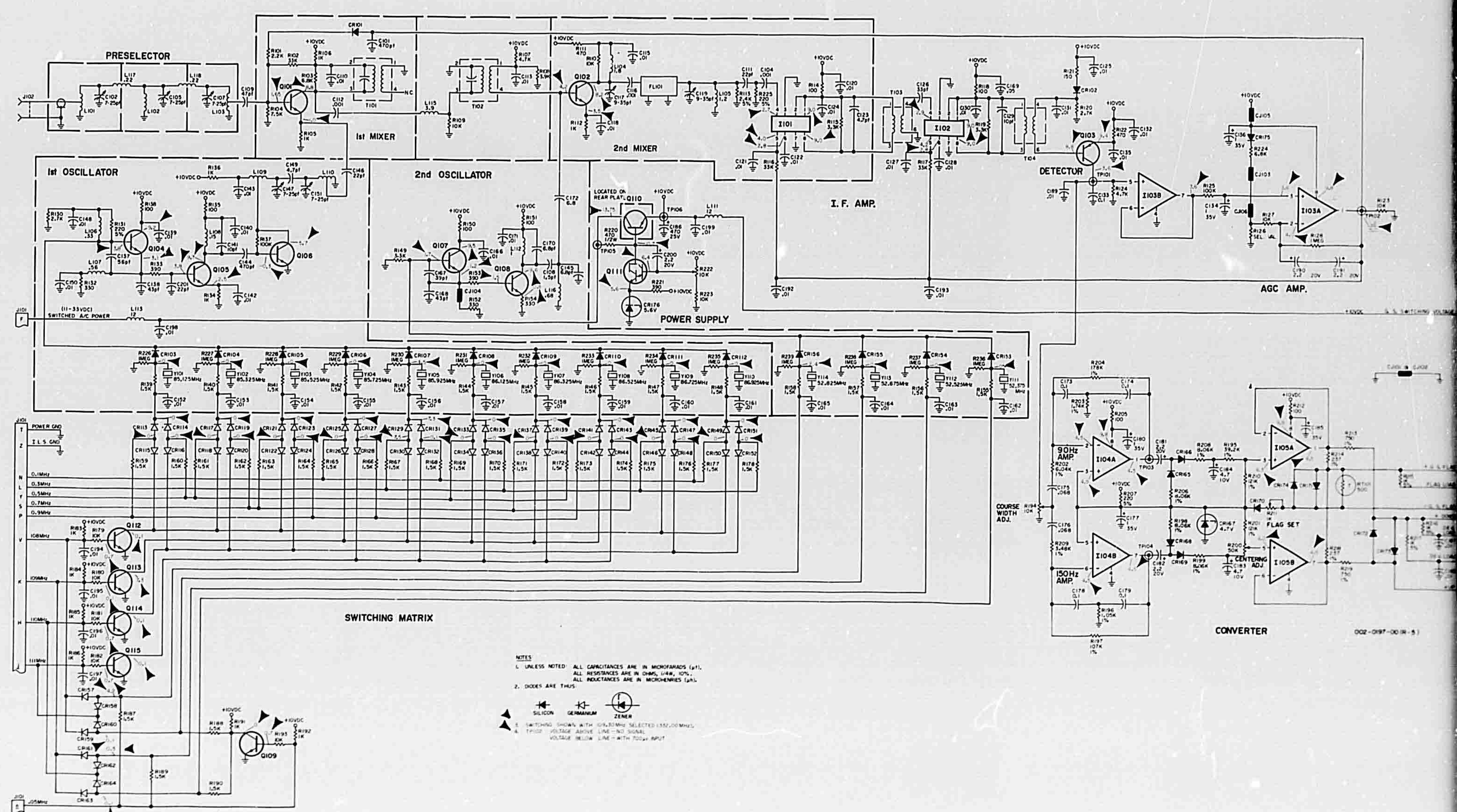



FIGURE 6-4 GLIDESLOPE RECEIVER SCHEMATIC AND ASSEMBLY
(002-0197-00 R-0)
(300-0506-00 R-0)

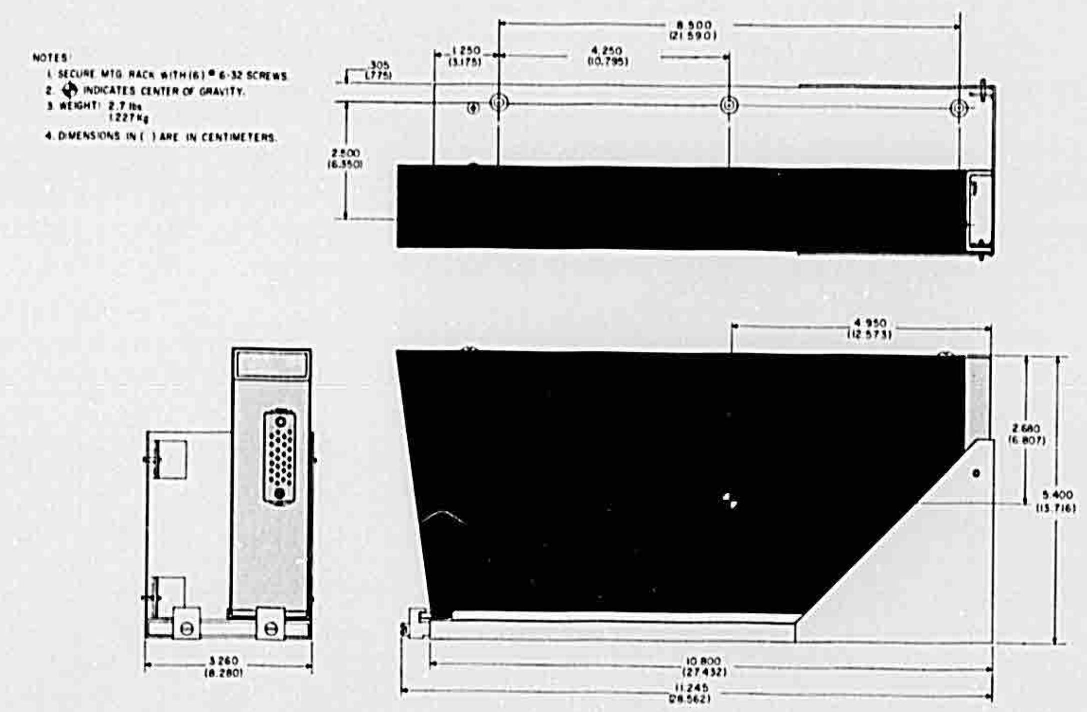


FIGURE 2-2 KN 77 OUTLINE AND MOUNTING DRAWING
(Dwg. No. 155-5093-00, R-0)





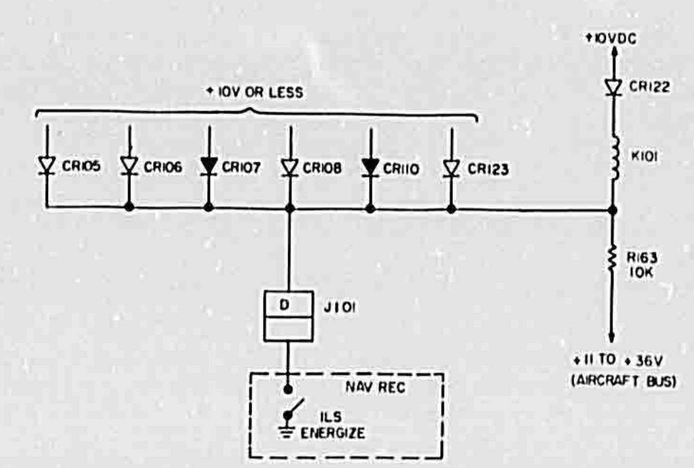



FIGURE 4-5 VOR-LOC SWITCHING
(696-1523-00)

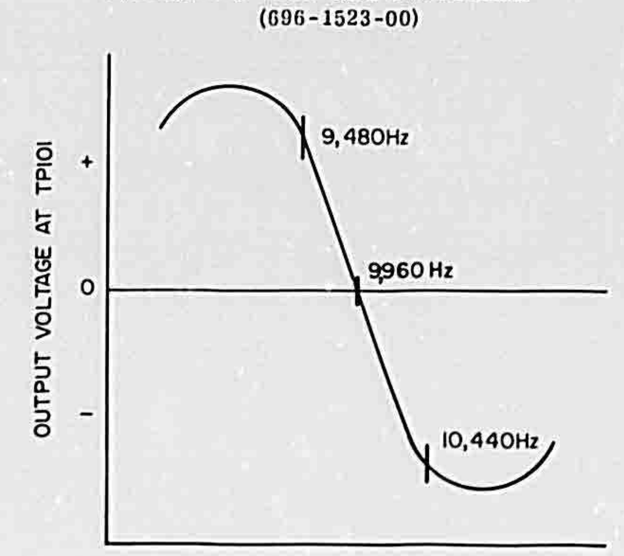



FIGURE 4-6 "S" SHAPED DISCRIMINATOR CURVE
(696-1524-00)





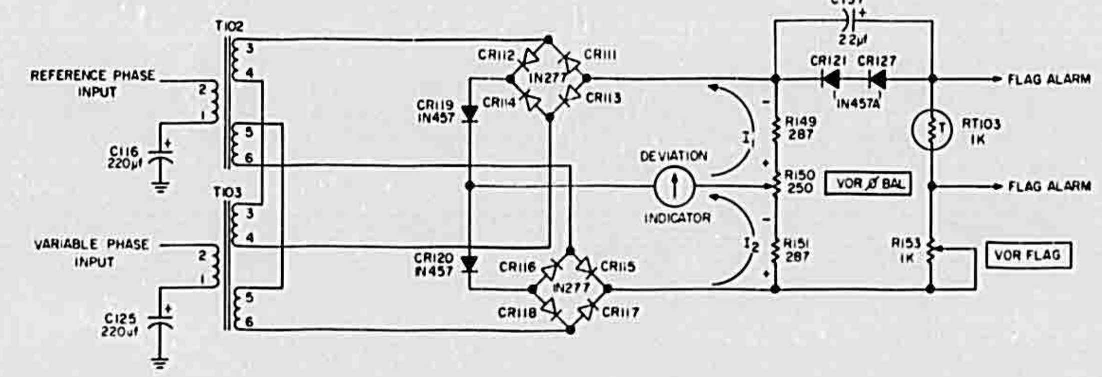



FIGURE 4-9 SIMPLIFIED DEVIATION PHASE COMPARATOR
(696-1501-00)

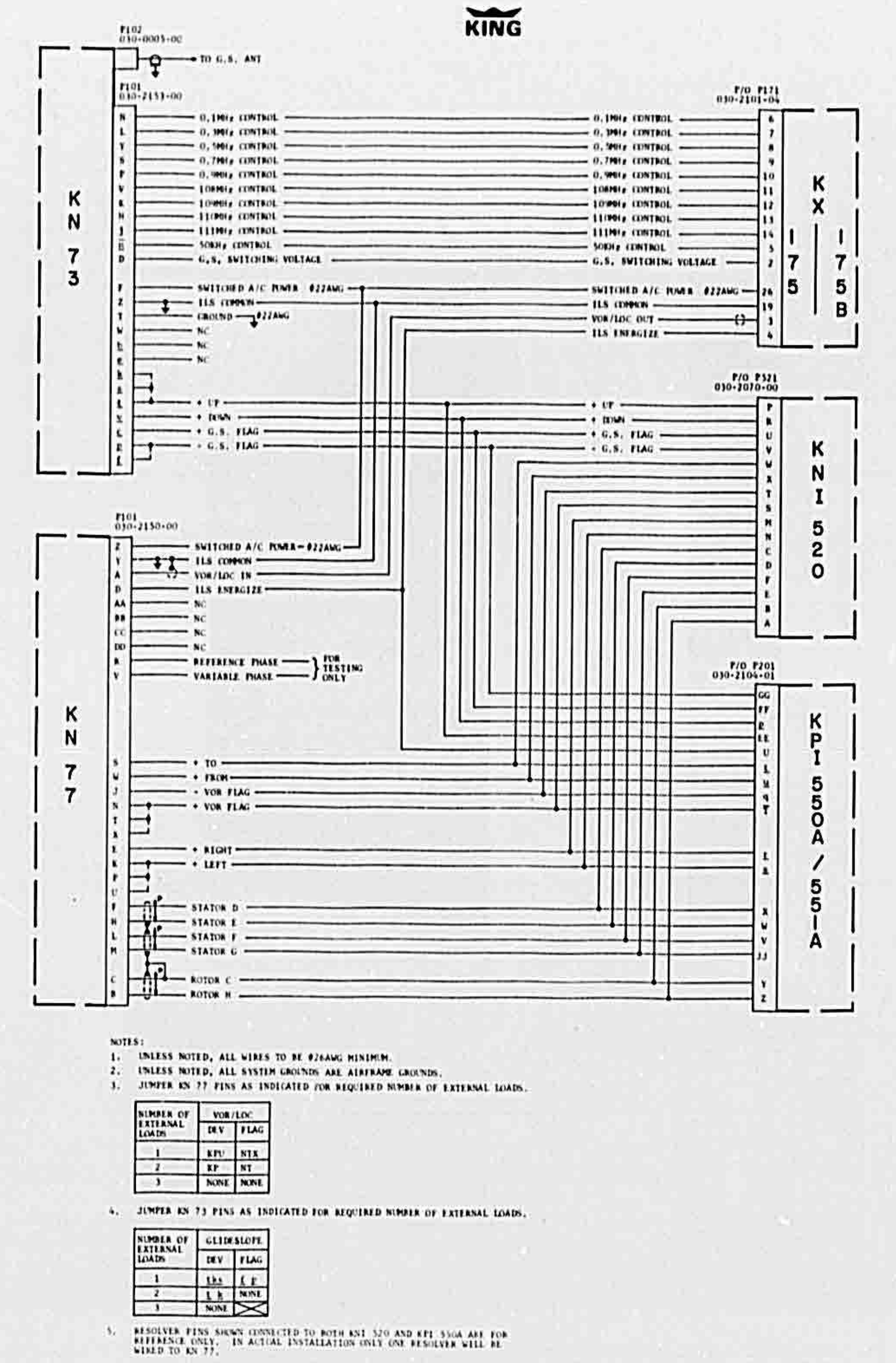


FIGURE 2-3 KN 73 INTERCONNECT DIAGRAM
(Dwg. No. 155-1117-00, R-3 )





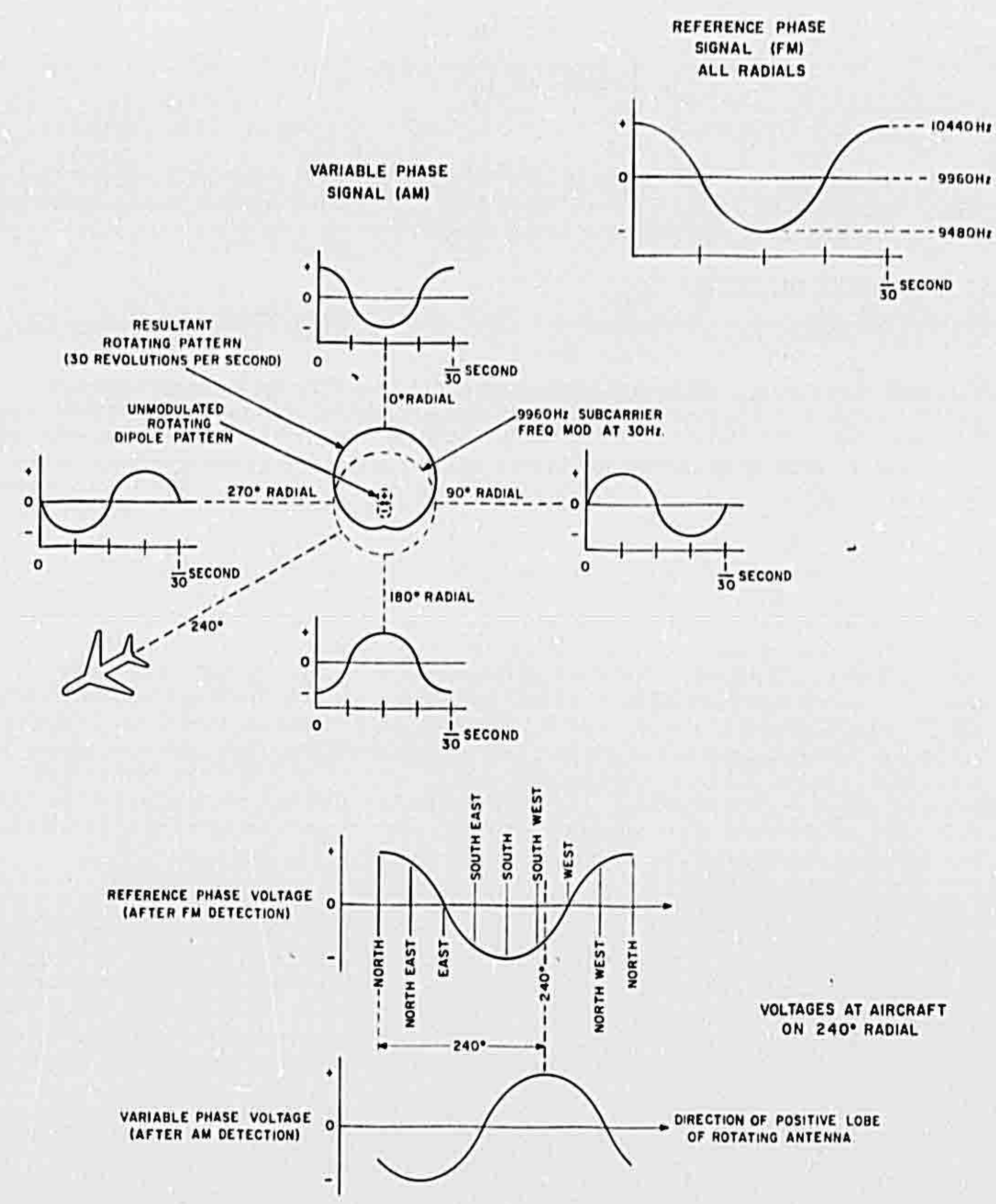



FIGURE 4-1 VOR SIGNAL GENERATION
(696-0714-00)





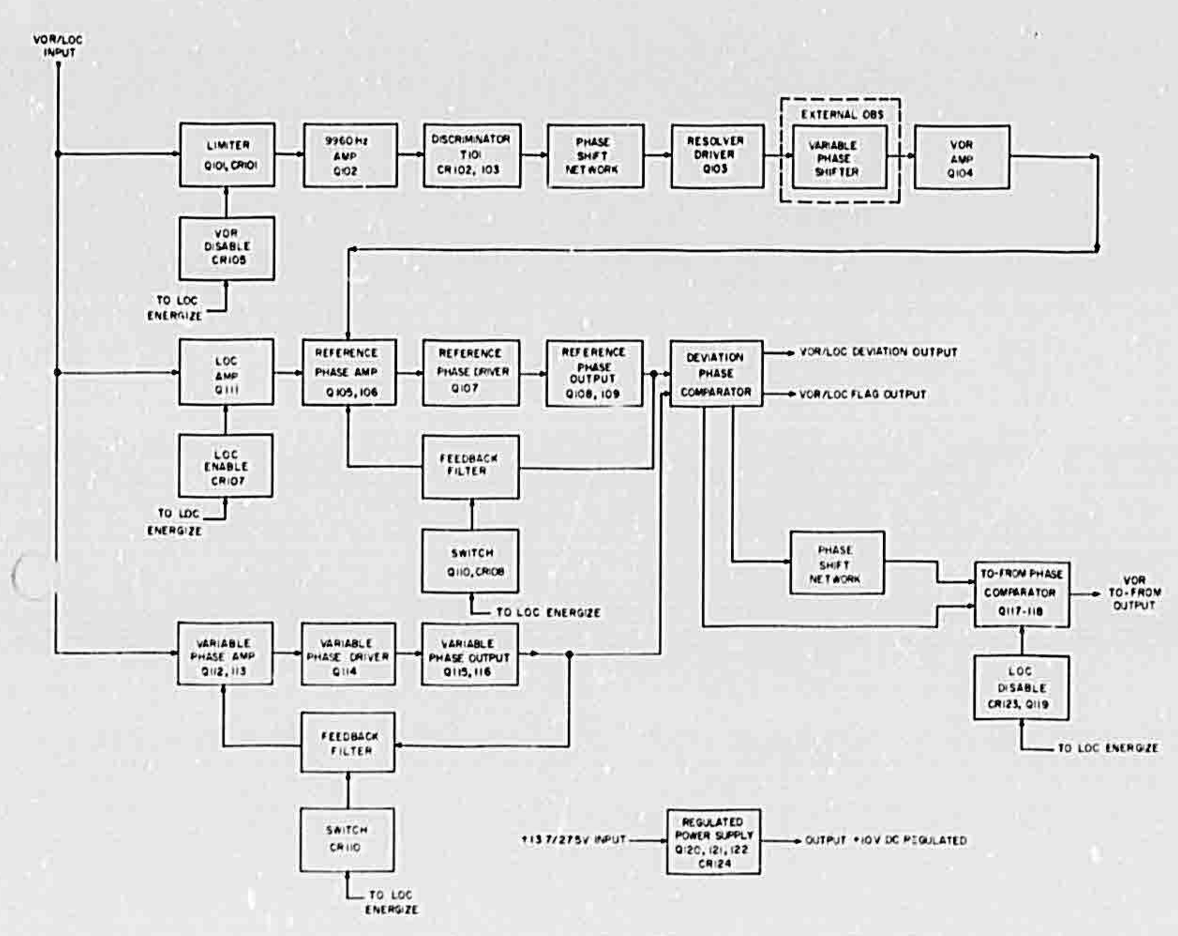


FIGURE 4-11 VOR-LOC CONVERTER BLOCK DIAGRAM
(696-1510-00)





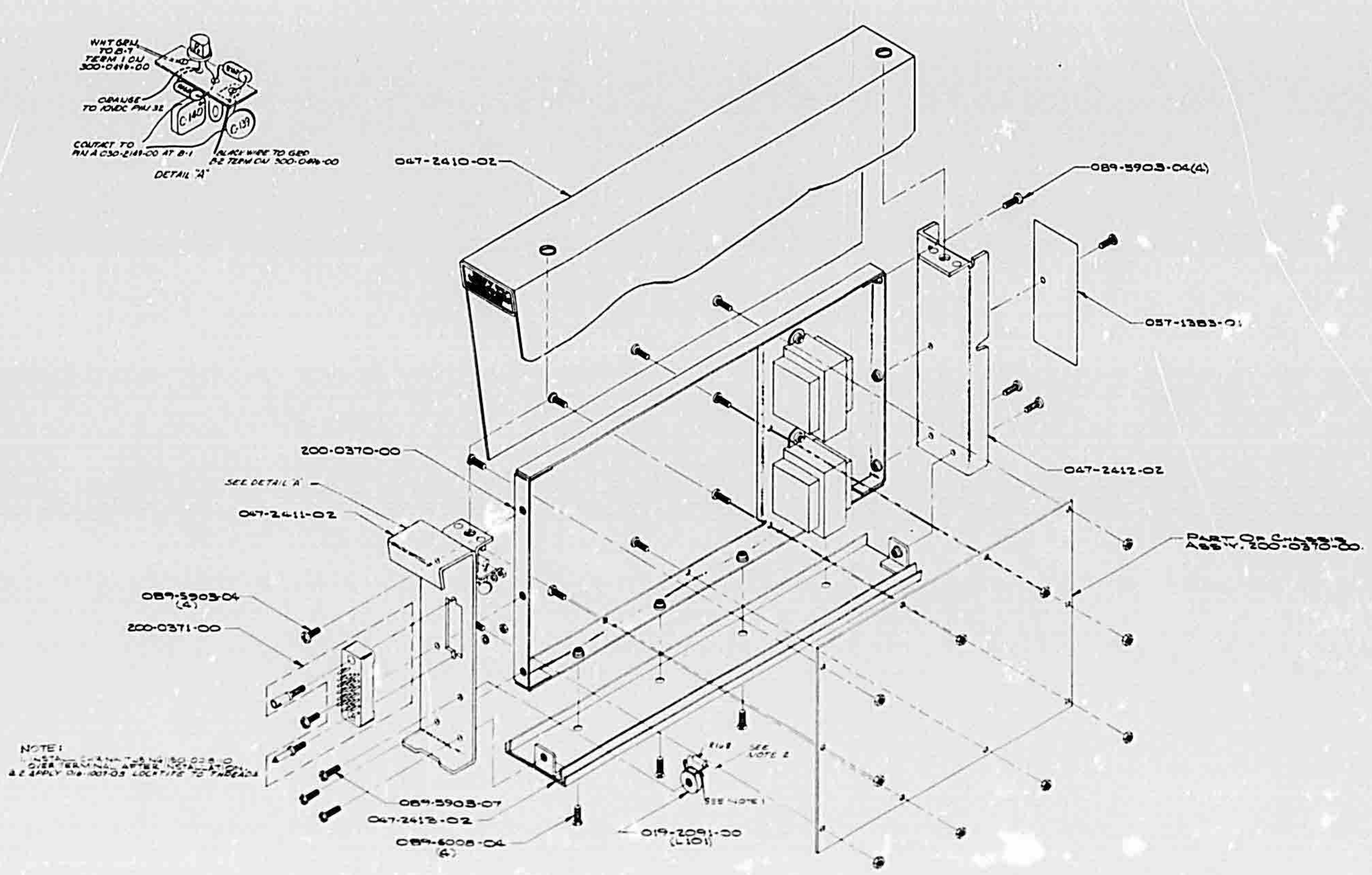



FIGURE 5-1 UNIT FINAL ASSEMBLY
(Dwg. No. 300-0495-00, R-7)

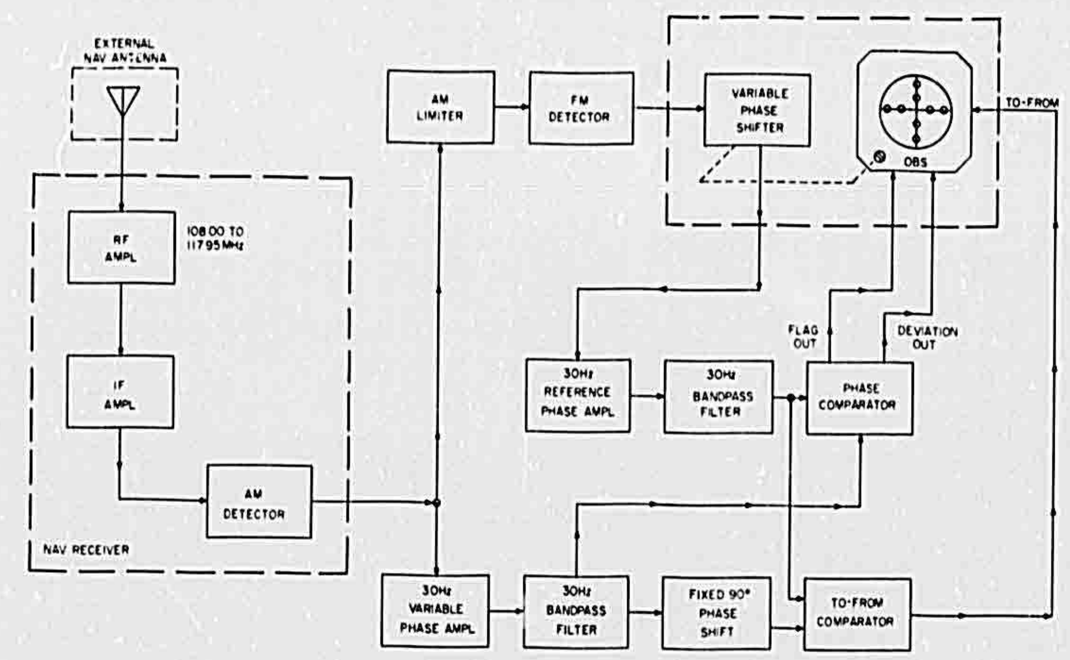



FIGURE 4-2 MANUAL VOR RECEPTION, FUNCTIONAL DIAGRAM
(696-1512-00)





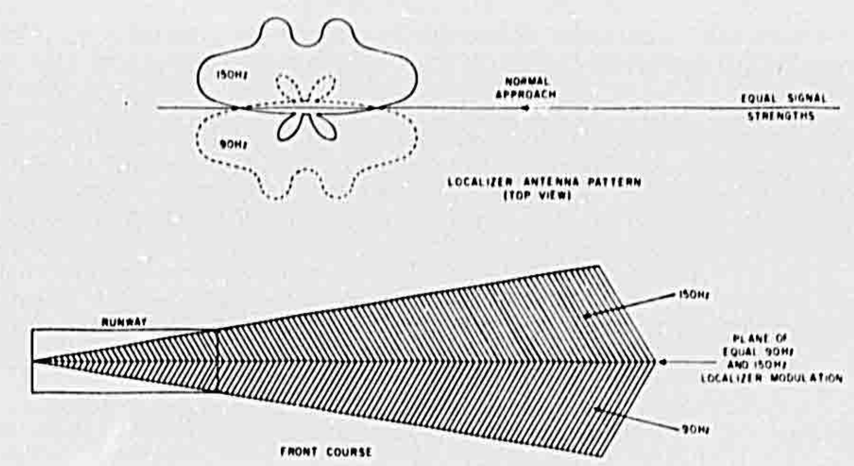



FIGURE 4-3 LOCALIZER SIGNAL GENERATION
(696-0705-00)

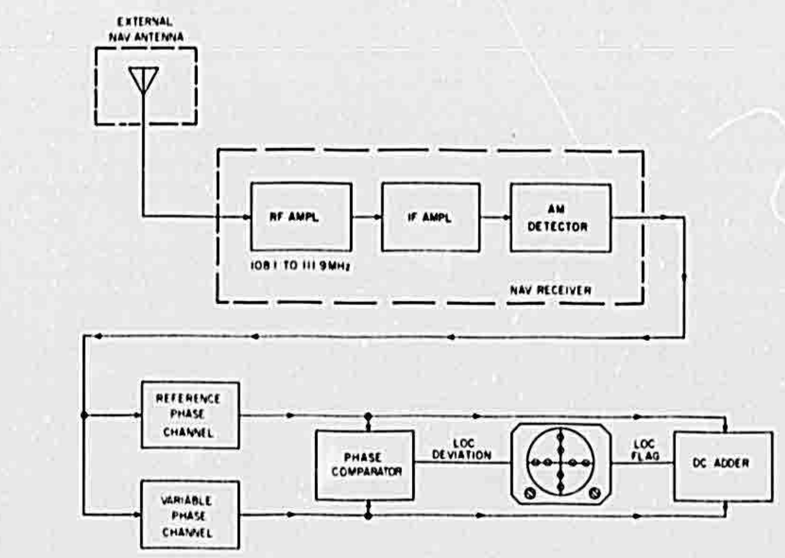



FIGURE 4-4 LOCALIZER RECEPTION, FUNCTIONAL DIAGRAM
(696-1500-00)





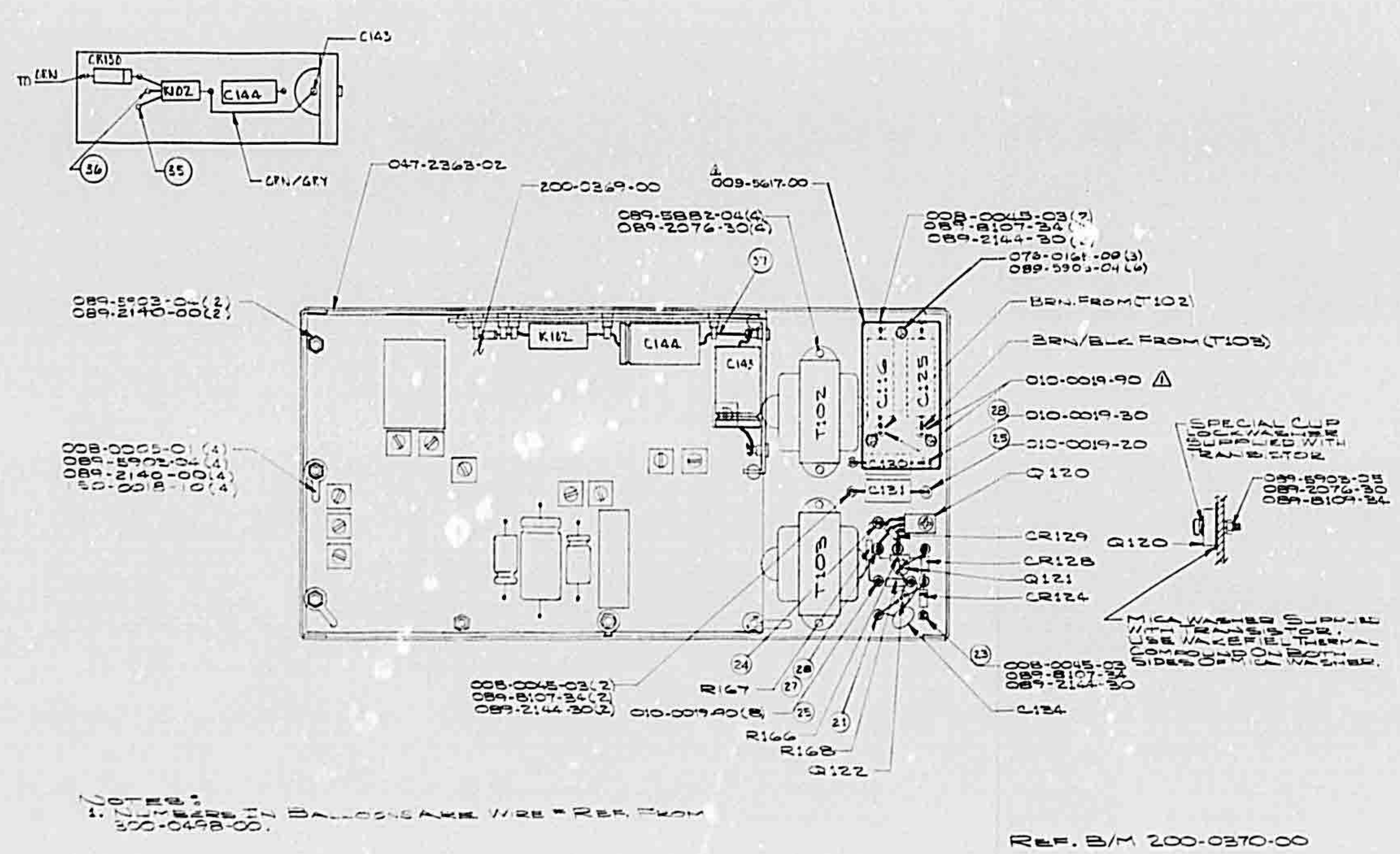



FIGURE 5-2 CONVERTER CHASSIS ASSEMBLY
(300-0497-00 R-4)





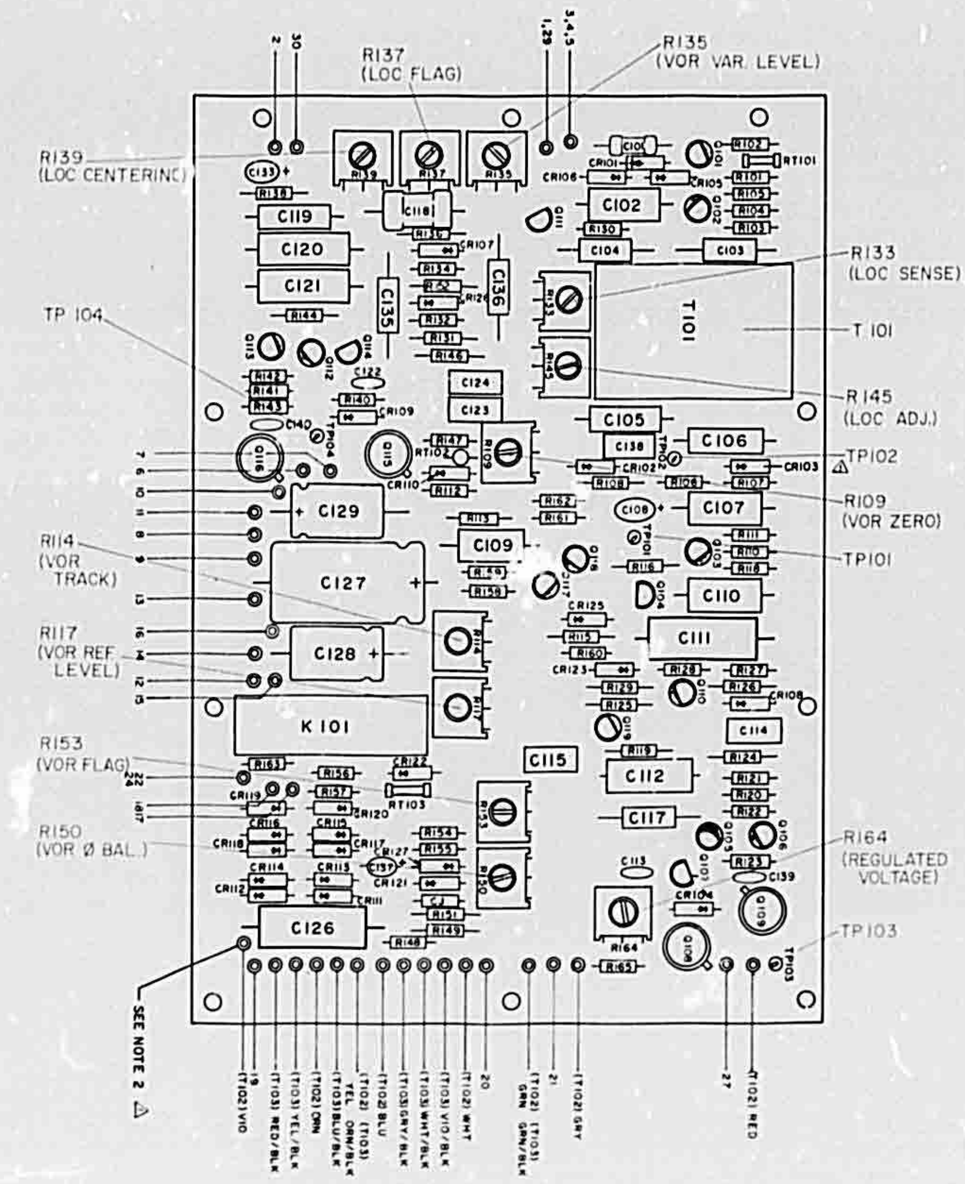



FIGURE 6-1 KN 77 VOR-LOC CONVERTER
TEST POINT AND ADJUSTMENT LOCATIONS
(696-1527-00)

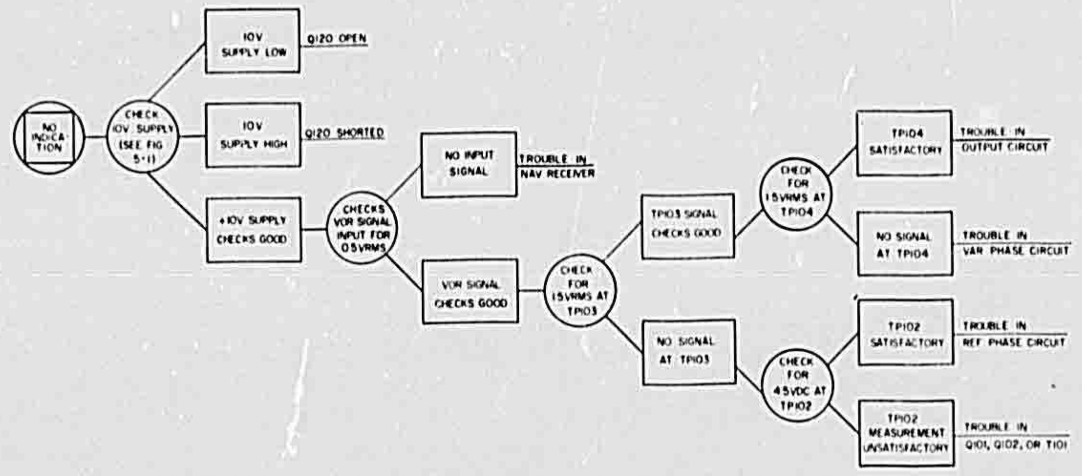
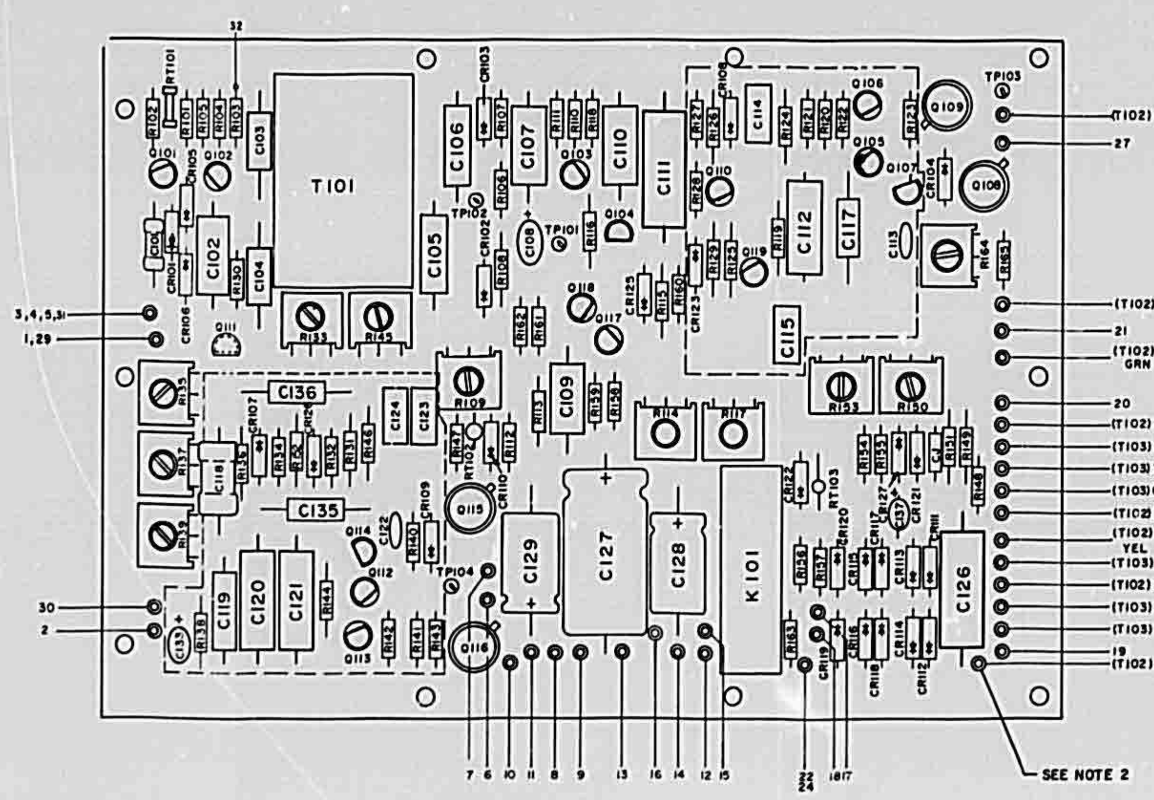
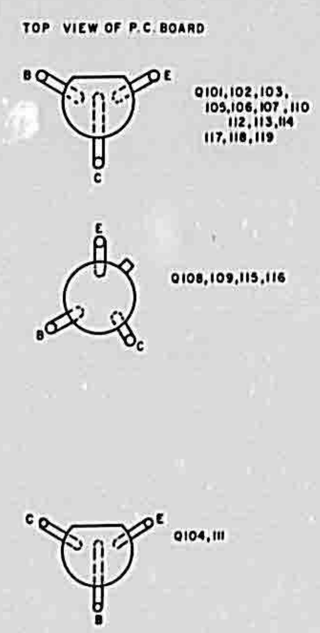



FIGURE 6-4 VOR-LOC, NO INDICATION
(696-1517-00)

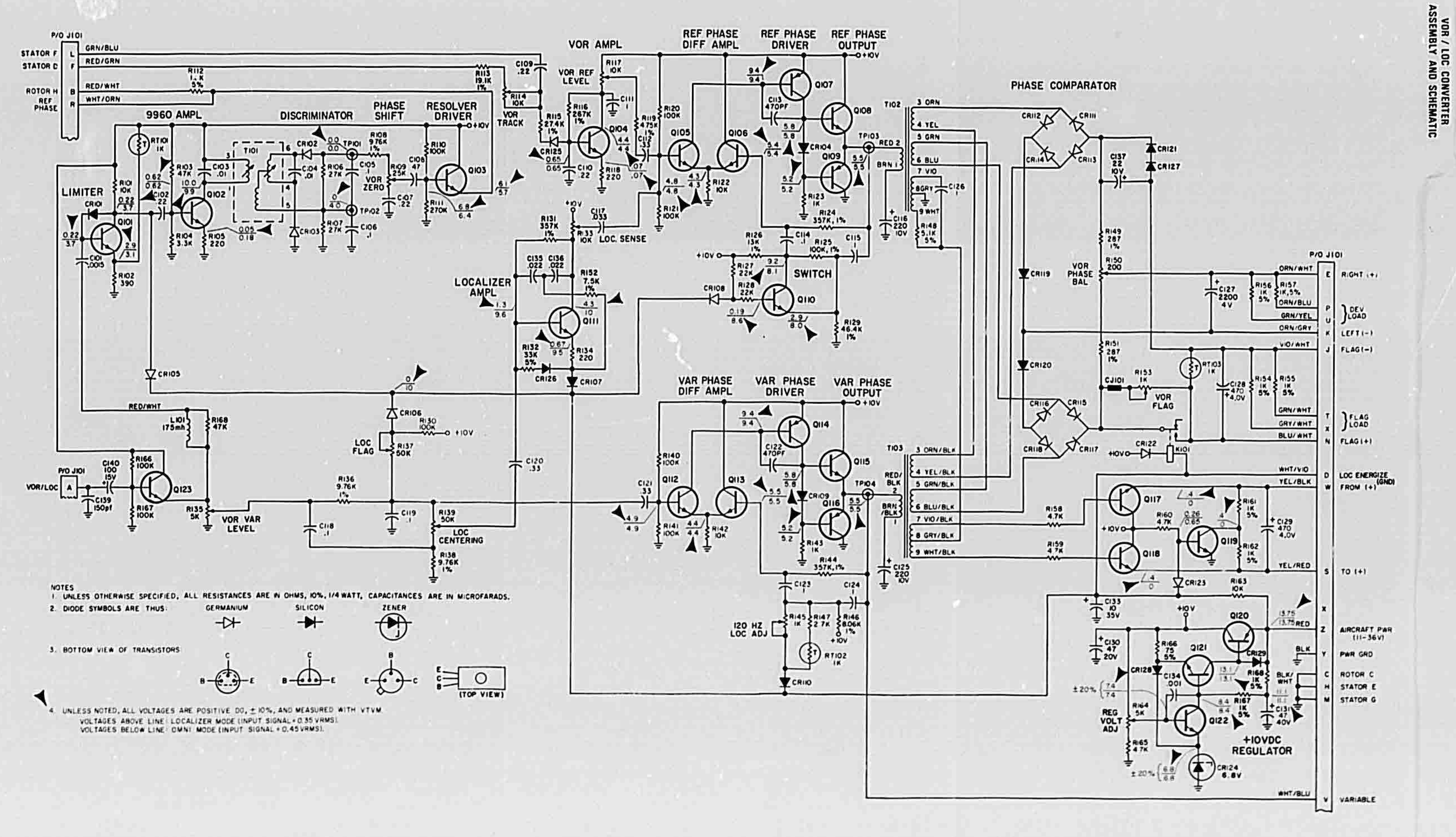







NOTES:
1. TERMINAL NUMBERS ON THIS DWG. CORRESPOND WITH WIRE NUMBERS ON HARNESS ASS'Y. 300-0498-00.
2. TERMINALS ARE 008-0048-00.
3. EVENLY SPRAY PORTION OF BOARD ENCLOSED BY DASHED LINES BOTH SIDES WITH CLEAR URETHANE SEAL COATING 016-1040-00 AFTER CLEANING. COATING IS 95% CURED AFTER 48HRS AIR DRYING OR OVEN DRIED AT 150°F FOR 24HRS. COATING TO BE THICK ENOUGH TO SEAL SURFACES BUT FREE OF RUNS.




NOTES
1. UNLESS OTHERWISE SPECIFIED, ALL RESISTANCES ARE IN OHMS, 10%, 1/4 WATT, CAPACITANCES ARE IN MICROFARADS.
2. DIODE SYMBOLS ARE THUS: GERMANIUM SILICON ZENER
3. BOTTOM VIEW OF TRANSISTORS (TOP VIEW)
4. UNLESS NOTED, ALL VOLTAGES ARE POSITIVE DC, ± 10%, AND MEASURED WITH VTVM.
VOLTAGES ABOVE LINE: LOCALIZER MODE (INPUT SIGNAL = 0.35 VRMS).
VOLTAGES BELOW LINE: OMNI MODE (INPUT SIGNAL = 0.45 VRMS).

FIGURE 6-11 VOR/LOC CONVERTER ASSEMBLY AND SCHEMATIC
(Dwg. No's. 300-0496-00, R-10; 002-0195-01, R-4)

KING
KN 77
VOR/LOC CONVERTER

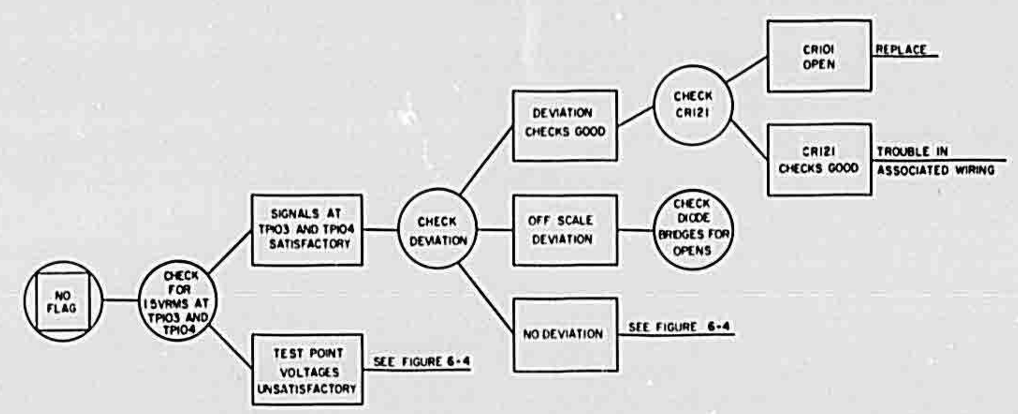
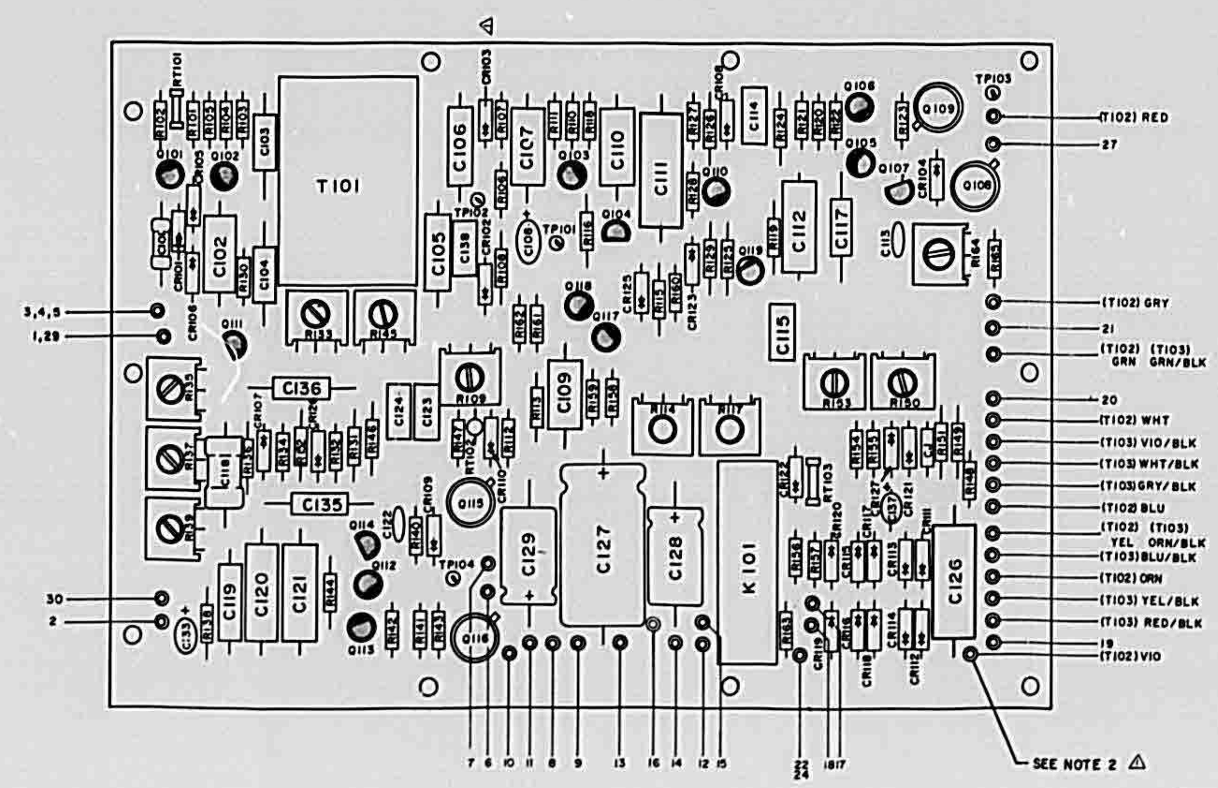



FIGURE 6-5 VOR-LOC, NO FLAG
(696-1503-00)



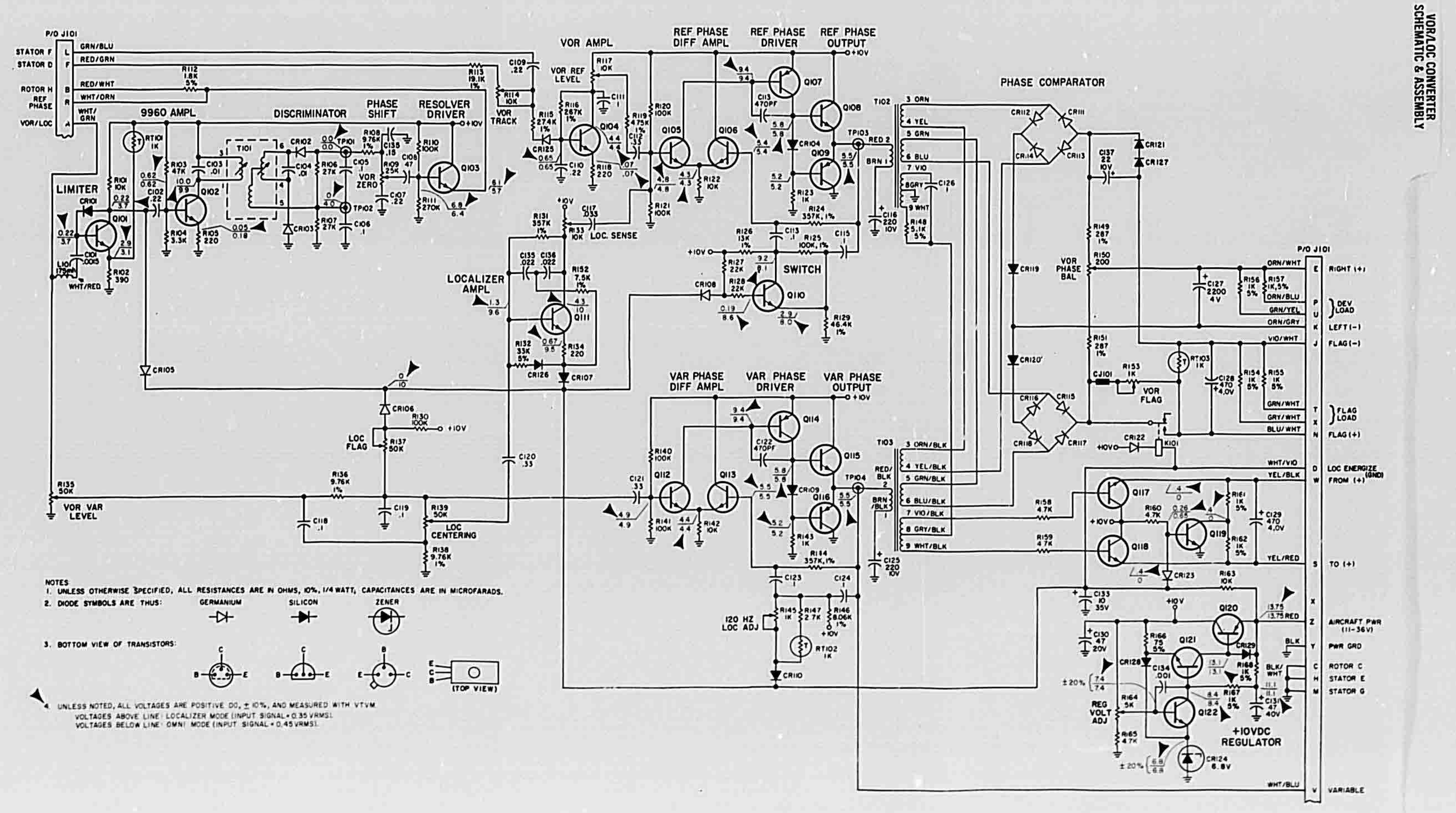
KING



NOTES:
1. TERMINAL NUMBERS ON THIS DWG. CORRESPOND WITH WIRE NUMBERS ON HARNESS ASS'Y. 300-0498-00.
2. TERMINALS ARE 008-0048-00.

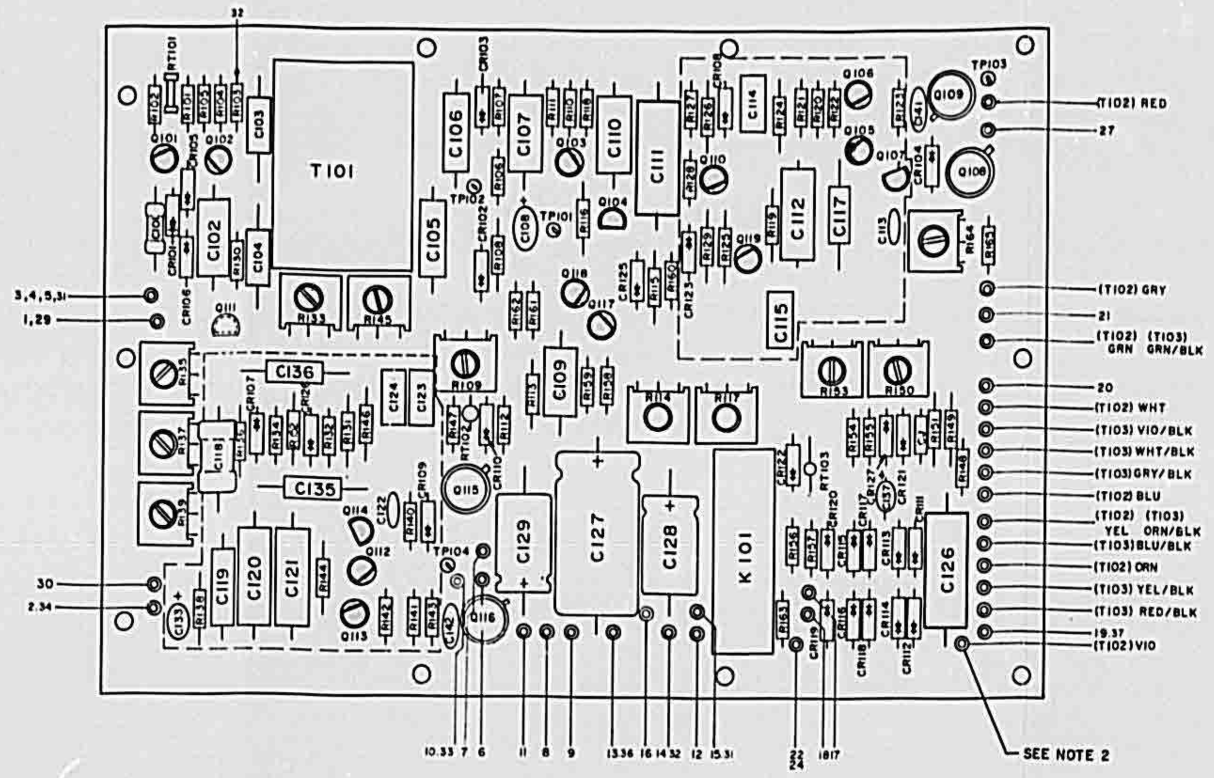
TOP VIEW OF P.C. BOARD


REF. B/M 200-0369-00



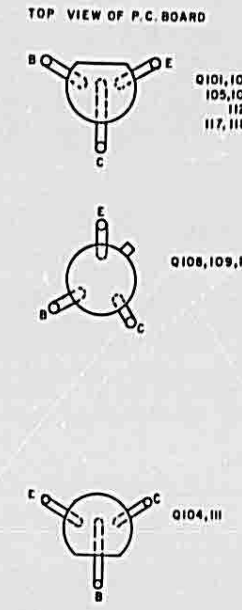

NOTES
1. UNLESS OTHERWISE SPECIFIED, ALL RESISTANCES ARE IN OHMS, 10%, 1/4 WATT; CAPACITANCES ARE IN MICROFARADS.
2. DIODE SYMBOLS ARE THUS: GERMANIUM SILICON ZENER
3. BOTTOM VIEW OF TRANSISTORS: (TOP VIEW)
4. UNLESS NOTED, ALL VOLTAGES ARE POSITIVE DC, ± 10%, AND MEASURED WITH VTVM.
VOLTAGES ABOVE LINE: LOCALIZER MODE (INPUT SIGNAL = 0.35 VRMS).
VOLTAGES BELOW LINE: OMNI MODE (INPUT SIGNAL = 0.45 VRMS).

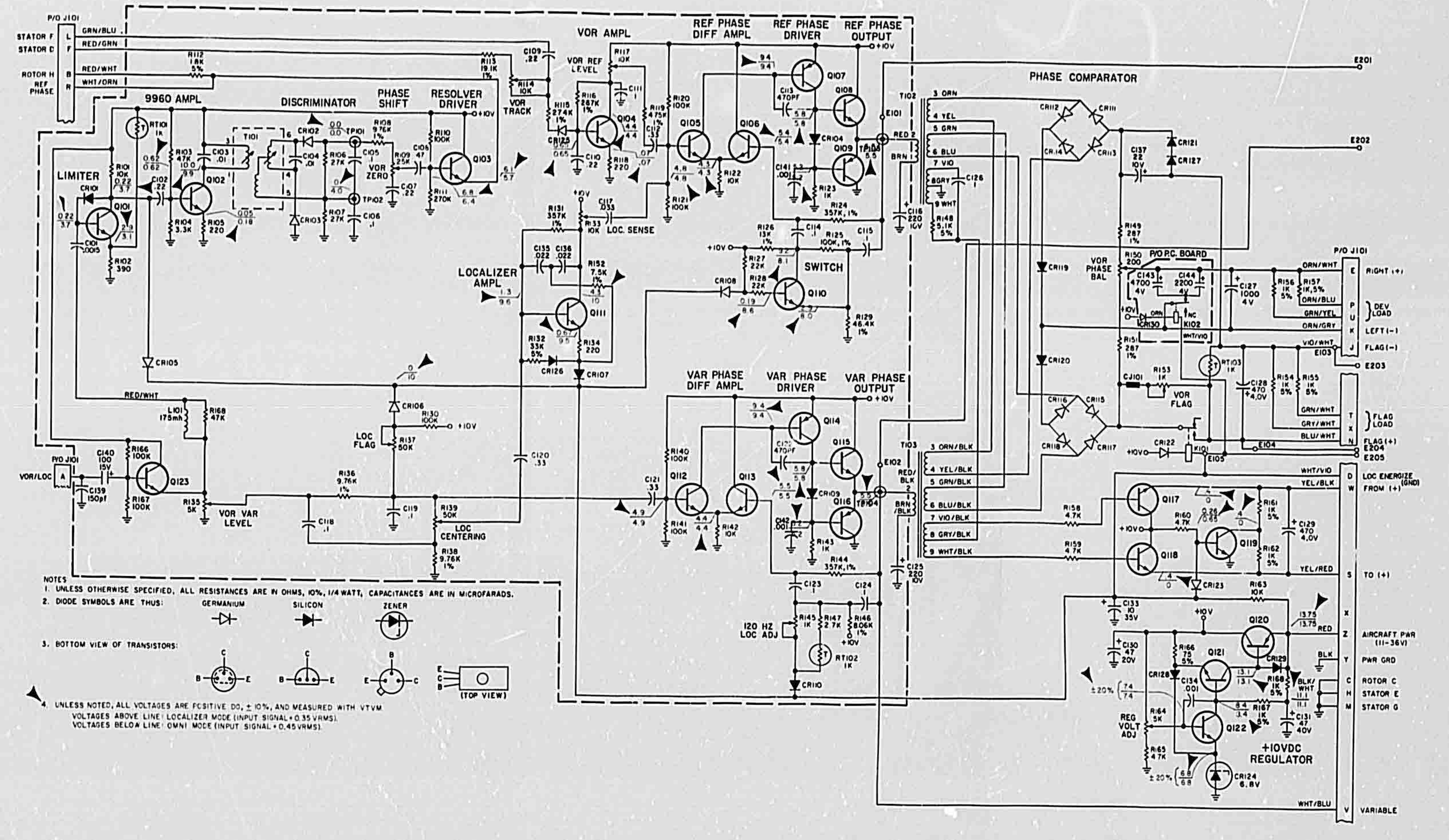
FIGURE 6-11 VOR-LOC CONVERTER SCHEMATIC AND ASSEMBLY
(002-0195-01) (R-0)
(300-0496-00) R-3)



NOTES:

1. TERMINAL NUMBERS ON THIS DWG. CORRESPOND WITH WIRE NUMBERS ON HARNESS ASS'Y. 300-0498-00.
2. TERMINALS ARE 008-0048-00.
3. EVENLY SPRAY PORTION OF BOARD ENCLOSED BY DASHED LINES BOTH SIDES WITH CLEAR URETHANE SEAL COATING 016-1040-00 AFTER CLEANING. COATING IS 95% CURED AFTER 48HRS AIR DRYING OR OVEN DRIED AT 150°F FOR 24HRS. COATING TO BE THICK ENOUGH TO SEAL SURFACES BUT FREE OF RUNS.





NOTES

1. UNLESS OTHERWISE SPECIFIED, ALL RESISTANCES ARE IN OHMS, 10%, 1/4 WATT, CAPACITANCES ARE IN MICROFARADS.
2. DIODE SYMBOLS ARE THUS: GERMANIUM SILICON ZENER
3. BOTTOM VIEW OF TRANSISTORS: (TOP VIEW)
4. UNLESS NOTED, ALL VOLTAGES ARE POSITIVE DC, ± 10%, AND MEASURED WITH VTVM.
   VOLTAGES ABOVE LINE: LOCALIZER MODE (INPUT SIGNAL = 0.35 VRMS).
   VOLTAGES BELOW LINE: OMNI MODE (INPUT SIGNAL = 0.45 VRMS).

VOR / LOC CONVERTER ASSEMBLY AND SCHEMATIC

FIGURE 6-11 VOR/LOC CONVERTER ASSEMBLY AND SCHEMATIC
(Dwg. No's. 300-0496-00, R-12; 002-0195-01, R-7)