
# Theta/100—200

# Converter Indicator

# *MAINTENANCE MANUAL*

## CONTENTS



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**General Aviation Electronics, Inc.**
4141 Kingman Dr.
Indianapolis, Indiana 46226
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# SECTION I
# GENERAL INFORMATION

## 1-1. INTRODUCTION

This service manual contains all of the information normally required to install, operate, and maintain the Genave THETA/100 & 200 Converter/Indicators.

## 1-2. DESCRIPTION

The THETA/100 and THETA/200 were designed to be companion equipment to the Genave ALPHA/360 NAV/COM transceiver. Both models are panel mounted converter/indicators. The THETA/100 displays VOR/LOC information only while the THETA/200 displays VOR/LOC plus glideslope information.

The THETA/200 utilizes 65 silicon transistors and the THETA/100 utilizes 52 silicon transistors in solid state computer circuitry to provide easily recognized course information. Both models feature VOR/LOC press-to-test, no-ambiguity TO-FROM-OFF lamps, left/right course deviation indicator, indicator backlighting, and a full visibility OBS dial. The THETA/200 also features glideslope deviation indication and definitive glideslope operational warning lights. Both converter/indicators incorporate a self-contained regulated power supply. Backlighting and indicator lamp dimming is provided. Left/Right autopilot outputs are provided by both units. The THETA/200, in addition, provides Up/Down autopilot outputs.

## 1-3. SPECIFICATIONS

### GENERAL

| | |
|---|---|
| WEIGHT: | 2 lbs. |
| FRONT PANEL: | Standard 3.125" round instrument hole. |
| DEPTH BEHIND PANEL: | 8.125" |
| INPUT POWER: | 0.43 Amps |
| NO. OF TRANSISTORS: | THETA/100: 52<br>THETA/200: 65 |

### INDICATOR

| | |
|---|---|
| VOR ACCURACY: | ±2 degrees |
| LOC ACCURACY: | ±½ dot |
| GLIDE SLOPE ACCURACY (THETA/200 only) | ±½ line |
| AUTOPILOT OUTPUT: | 150 MV for f.s. deflection (Standard) |
| VOR PUSH-TO-TEST | Yes |

## 1-4. EQUIPMENT SUPPLIED

a. 1—THETA/100 or THETA/200 Converter/Indicator

b. 1—Cable Connector, 12 Pin (THETA/200 only)

## 1-5. EQUIPMENT REQUIRED, BUT NOT SUPPLIED

a. 1—ALPHA/360 NAV/COM Transceiver (Companion Unit)

b. 1--250 ohm, 5 watt Dimmer Pot (Optional, See Installation Manual)

c. 1—Glideslope Receiver, THETA/200 only (If Glideslope Presentation Is Desired)

# SECTION II

# INSTALLATION MANUAL

The following Section

is reproduced

and included with every

**Theta/100–200**

**Conveter Indicator**

It is made a part of

this manual

for your permanent

reference


GENERAL AVIATION ELECTRONICS, INC.
4141 KINGMAN DRIVE, INDIANAPOLIS, INDIANA 46226

# INSTALLATION MANUAL

## Theta/100 and Theta/200

**Please Note:**

THIS UNIT MUST BE INSTALLED BY a properly certificated and authorized person in accordance with the Federal Aviation Regulations, Part 43. No responsibility for improper installation of this unit is either implied or assumed by the manufacturer. Units shown to be installed in violation of the FARs will not be covered by the warranty and will remove any and all responsibility from the manufacturer for such equipment.

# Warranty

Products bearing the trademark "GENAVE" or the trade name "GENERAL AVIATION ELECTRONICS, INC." have been fabricated by skillful technicians, under the strictest quality control conditions, using the finest materials and component parts available.

When properly adjusted and competently operated according to factory specifications and instructions, General Aviation Electronics, Inc. unconditionally guarantees and warrants all parts and bench service labor for one (1) full year from the date of the original installation of the unit.

This warranty shall not apply to malfunction, which in the opinion of General Aviation Electronics, Inc. is the result of abusive use, accident, willful destruction, improper or unauthorized repair or installation. All service under this warranty must be performed by an Authorized Genave Distributor, or by returning the unit or units, freight pre-paid, to the factory at Indianapolis, Indiana.

GENERAL AVIATION ELECTRONICS, INC.

By _____
Elmore W. Rice, III, President

The Company offers no other guarantees or warranties expressed or implied

## Proper Installation Will Assure Quality

The unit you are installing is a high quality, rugged, complex piece of electronic equipment. It has been manufactured under rigid quality control and has been fully tested and operated at high temperatures to stabilize the component parts.

Proper installation of the unit into your customer's aircraft is essential to complete the quality assurance program under which the unit was manufactured.

# Specifications:



**GENERAL**

| | |
|---|---|
| WEIGHT: | 2 lbs. |
| FRONT PANEL: | Standard 3.125" round instrument hole. |
| DEPTH BEHIND PANEL: | 6.125" |
| INPUT POWER: | 0.43 Amps |
| | 14VDC (Supplied from A 360) |
| NO. OF TRANSISTORS | Theta 100: 52 |
| | Theta 200: 55 |

**INDICATOR**

| | |
|---|---|
| VOR ACCURACY | ±2 degrees |
| LOC ACCURACY | ½ dot |
| GLIDE SLOPE ACCURACY (Theta 200 only) | ± ½ line |
| AUTOPILOT OUTPUT: | 150MV for f.s. deflection (Standard) |
| VOR PUSH TO TEST: | Yes |

# Unpacking

CAREFULLY REMOVE the unit and its mounting accessories from the shipping container by removing the staples from the top of the carton and lifting the contents straight out. The carton should be saved until the installation is complete in the event that damage is discovered or return of the unit is necessary for some reason. Any damage due to shipping should be reported and a claim filed as soon as possible with the shipping company. (If it is necessary to re-ship, use our container which is specifically designed for that purpose.)

# Pre-Installation Check

VISUALLY INSPECT the unit for any obvious external damage, such as dents, loose wires, etc. Any damage not related to shipping should be reported to General Aviation Electronics, Inc., 4141 Kingman Drive, Indianapolis, Indiana (46226), Area Code 317-546-1111, as soon as possible.

Damage due to shipping should be reported to and a claim should be filed promptly with the transportation company.

All units are shipped in perfect operating condition. However, a pre-installation electrical test may be performed to assure that the unit has suffered no internal damage during shipment. For a detailed test procedure, refer to the Maintenance Section of the Service Manual. DO NOT ATTEMPT to bench test the unit without proper equipment as specified in the Service Manual.

# Installation Planning

THE LOCATION of the Unit in the aircraft should be carefully selected with due consideration to the following:

1. The unit generates only a very small amount of heat and, as such, does not require any type of cooling. However, the unit must NOT be mounted directly above a vacuum tube device or any other equipments that generate a large amount of heat unless such equipments have cooling provisions installed to keep the heat generated therein from coming in contact with other equipments mounted in close proximity to them.

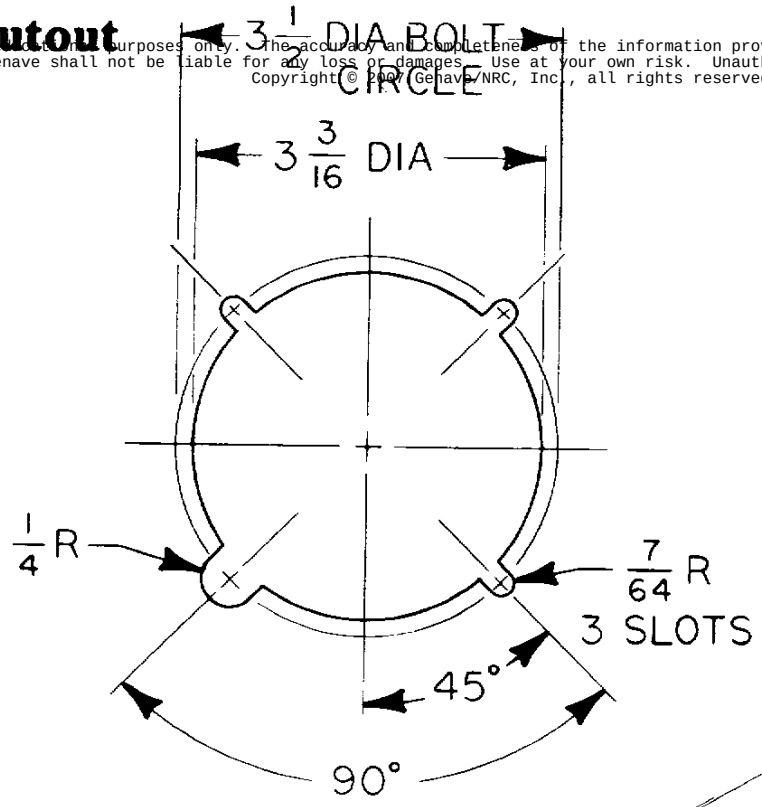
   MOUNTING THE UNIT DIRECTLY OVER UNCOOLED VACUUM TUBE EQUIPMENT OR IN THE HOT AIR BLAST OF ANY DEVICE, INCLUDING CABIN HEATERS, WILL AUTOMATICALLY VOID THE WARRANTY

2. The placement of the unit should be such that all controls are easily accessible.

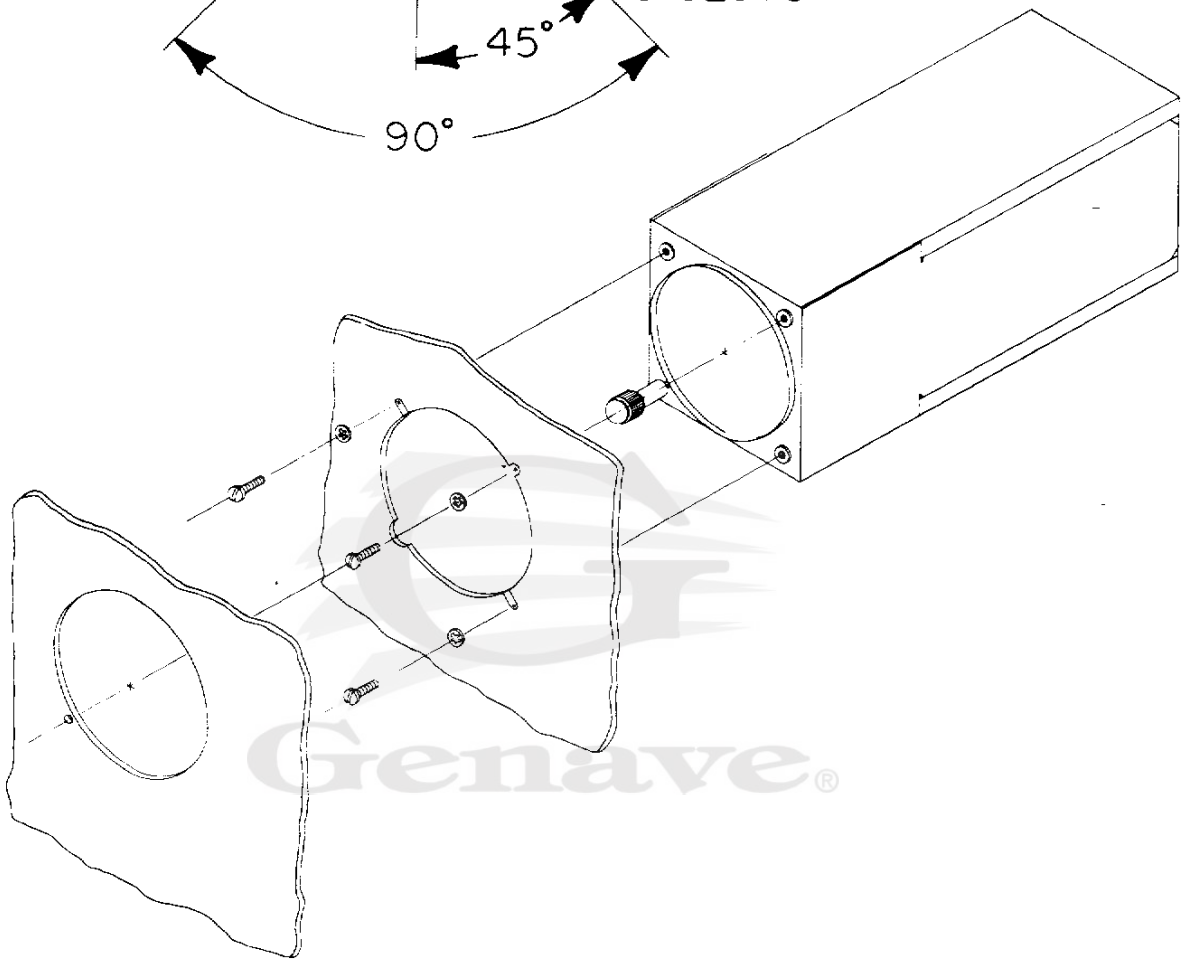
# Installation

1. The aircraft panel cutout for the THETA/100 and THETA/200 is the standard round instrument hole shown in this manual.
2. Install the indicator in the aircraft panel, using #6-32 Binder head screws and lock-washers.
3. Connect the power cable to the ALPHA/360 Nav-Com. Mechanically secure the cable at appropriate support points.
4. Update the appropriate logs and papers of the aircraft.
5. Fill out and return the bottom section of the warranty card.
6. Give the remainder of the warranty card to your customer. The proper sections of the warranty card MUST be completed and returned to Genave by both the dealer and the customer for the warranty to be in effect.

## Panel Cutout

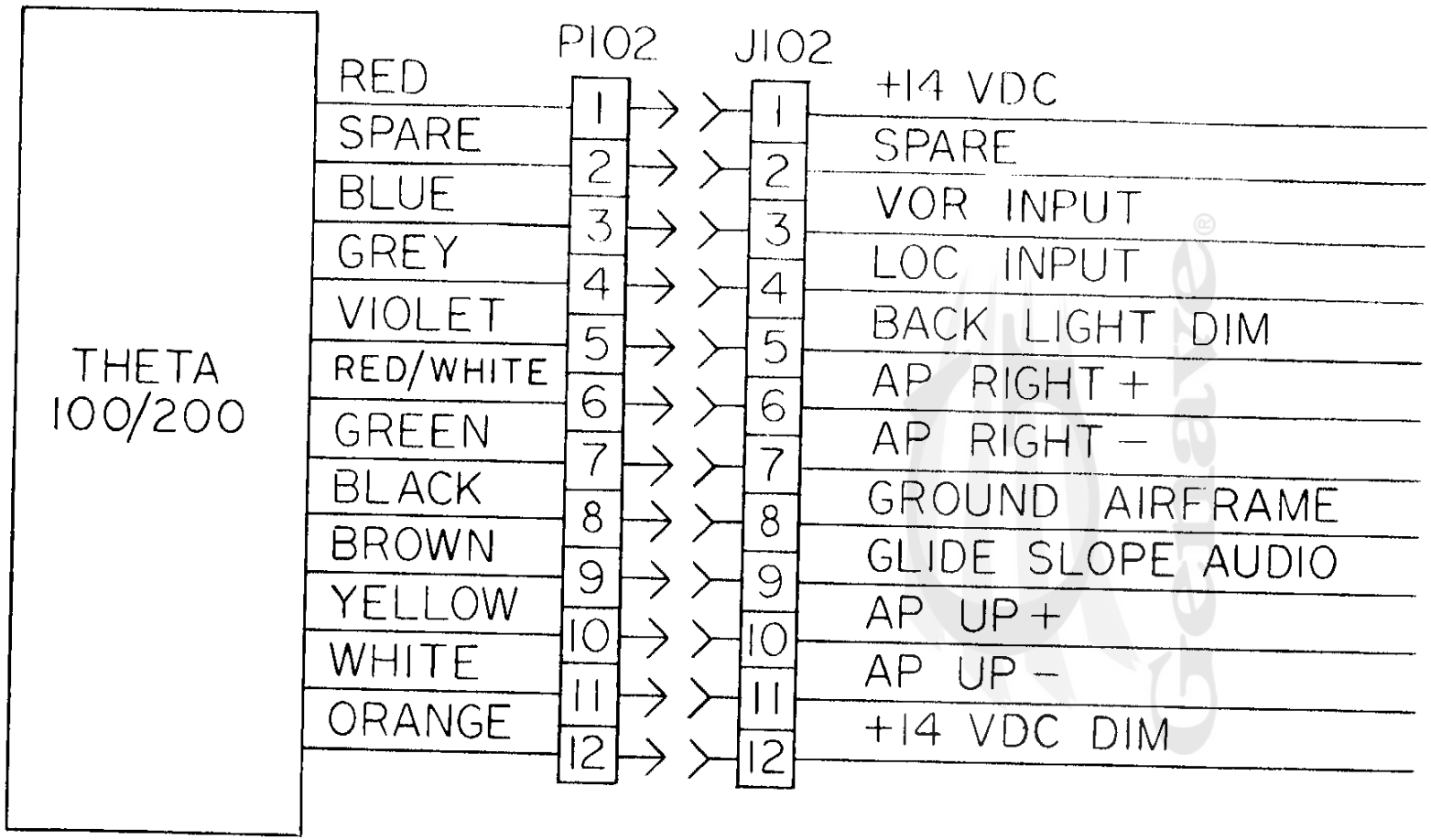



## Unit



## Post Installation Check

UPON COMPLETION of the installation, a flight test is desirable to insure that the unit is operating properly.




1. PIN 5 IS DIMMER FOR OBS DIAL AND METER FACE. PIN 12 IS DIMMER FOR INDICATOR – OTF AND ON/OFF FOR GLIDE SLOPE.
2. IF DIMMING IS NOT REQUIRED, CONNECT PINS 5 AND 12 TO +14 VDC.



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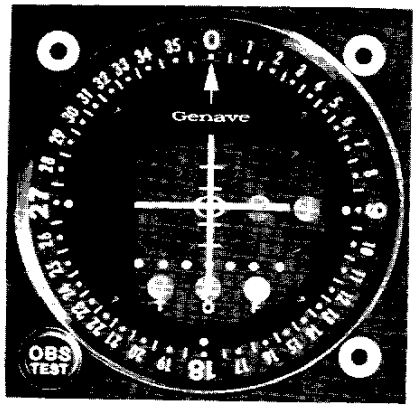
# SECTION III
# OPERATING MANUAL




## 3-1. OPERATING CONTROLS AND INDICATORS

NOTE: The only difference between the two THETA models is that The THETA/200 contains the additional capability of GLIDE SLOPE information display when coupled to a Genave Glide Slope receiver.

14 VDC primary power for the converter/indicator is usually supplied by means of the Nav/Com receiver's switched A+; therefore, the Nav/Com receiver must be on or in order to make the converter/indicator operational.

The THETA/200 has five operating controls and indicators; while the THETA/100 has only three operating controls and indicators. These controls and indicators are as follows:

### 1. Omni Bearing Selector (OBS)

Adjusts OMNI to desired radial, and tests OMNI system.

Turn knob clockwise or counter-clockwise to desired bearing displayed at the arrow on the upper portion of the compass rose.

To test the OMNI system, set your ALPHA/360 to receive an OMNI station. Rotate the OBS knob until 0° on the compass rose is opposite the arrow. Depress the OBS knob, and read the system accuracy. From a centered needle to the first dot is approximately 2° and each dot thereafter is approximately two more degrees.

### 2. To-From-Off Lights

Provide pilot with TO-FROM-OFF information in relation to course deviation display.

GREEN: (to) Illuminates when OMNI signal of adequate strength is received, and the bearing selected on the OMNI Bearing Selector (OBS) is (or is close to) the reciprocal of the radial on which aircraft is located. Illuminates when the Localizer signal of the frequency shown in the NAV digital readout window is of adequate strength. Illuminates when the push to test function is performed.

YELLOW: (from) Illuminates when OMNI signal of adequate strength is received, and the bearing selected on the OMNI Bearing Selector (OBS) is the same as (or close to) the radial on which the aircraft is located.

RED: (off) Illuminates when microphone button is depressed.
Illuminates when the OMNI or the Localizer signal strength is too low. Illuminates in the cone of silence over an OMNI station to indicate station passage.

NOTE: Needle deflections of course deviation display meter should not be used when off light (Red) is partially or fully illuminated.

**3. Omni/Localizer Needle.**
Solid white bar.

**4. Glide slope Needle. (On THETA/200 only):**
Dashed white and black bar.

**5. Glide Slope On-Off Lights. (On THETA/200 only):**

GREEN: Illuminates when G/S signal is of adequate strength.

RED: Illuminates when G/S signal is too low.

In addition to these controls and indicators, external back-light and indicator lamp dimming controls may be utilized.

# SECTION IV

# MAINTENANCE MANUAL

## 4-1. INTRODUCTION

This section provides the basic information required for electronic testing, aligning, and repair of the THETA/100 and THETA/200 converter-indicators. It is assumed that the person working on the unit has a reasonable familiarity with the principles and terminology of avionics.

## 4-2. THEORY OF OPERATION

### 1. General

The THETA/200 and THETA/100 employ 65 and 52 silicon transistors respectively in an all solid state design. Both units operate on 14 VDC which is usually switched by the Nav/Com transceiver. An internal 5.8 volt regulated power supply is employed in both converter/indicators.

The converter/indicator circuitry is unique in design due to the absence of transformers of any type. The utilization of analog computer circuits and techniques has eliminated the need for transformers. Similarly, there are no "Twin-T" or "Bridge-T" circuits in the design which eliminates one of the major sources of aging error prevalent in most converter/indicators.

The circuitry of the THETA/200 and THETA/100 converter/ indicators is vastly different from most systems presently on the market with the exception of GENAVE's ALPHA/200, ALPHA/200A, and ALPHA/300 Nav/Com transceivers. The operation of the THETA/200 and THETA/100 circuitry is similar to the operation of the converter/indicator circuitry employed in the forementioned equipment.

NOTE: The glideslope and localizer circuitry are identical with the exception of the lamp circuitry. When discussing those circuits which are identical information enclosed in parenthesis pertains to the glideslope circuitry.

### 2. Detailed Theory

A. *Omni Circuitry*—When an omni signal is applied to the converter/indicator it is fed to two individual channels. One of these channels is the AM channel while the other is the FM channel.

The AM channel consists of a 30 Hz amplifier/splitter, a 90° phase shifting circuit, an amplifier/splitter, and the OBS potentiometer. The 30 Hz amplifier/splitter consisting of Q704, Q705, Q706, and associated circuitry removes the 30 Hz AM component of the 9960 Hz carrier. The amplifier is tuned to 30 Hz by means of R711 and C705 which form a resonant feedback network. This tuned amplifier/splitter provides one output in-phase and one output 180° out-of-phase with the input signal.

These two outputs are applied to the 90° and 270° terminals of the OBS potentiometer, respectively, and to an RC phase shifting network consisting of C707, R715, and R716. R716 allows the shift to be set at exactly 90°.

Output from the 90° phase shifting network is applied to an amplifier/splitter consisting of Q707, Q708, and associated circuitry. This amplifier/splitter provides two outputs, one which is in-phase with the input and one which is 180° out-of-phase. These two outputs are applied to the 0° and 180° terminals of the OBS potentiometer, respectively. The wiper on the OBS potentiometer, R720, will provide a 30 Hz AM signal whose phase may be selected.

The FM channel consists of two 9960 Hz amplifier/limiters, the first of which is LC tuned and the second which is RC tuned; a 50 microsecond one-shot multivibrator; a phase trimming circuit; and a 30 Hz RC tuned amplifier.

The omni input is first applied to the 9960 Hz LC amplifier/limiter consisting of Q709, Q710, and associated circuitry. This amplifier/limiter is tuned to 9960 HZ by means of L701, C712, and C713. C712 is a selected value used to trim the circuit to 9960 Hz.

Output from the first amplifier/limiter is fed to the second 9960 Hz RC tuned amplifier/limiter consisting of Q711, Q712, and associated circuitry. R728 and C715 are used to tune the circuit to 9960 Hz.

The limited second amplifier/limiter output is used to trigger the 50 microsecond one-shot multivibrator consisting of Q713, Q714, and associated circuitry. The 50 microsecond pulses which are

generated are fed to a phase trimming circuit comprised of C719, R738, R739, and R740. R739 is adjusted to compensate for any incidental phase shifts induced by the amplifier/limiters or the 50 microsecond multivibrator.

Once this phase compensation has been accomplished the 50 microsecond pulses are applied to a 30 Hz amplifier/splitter consisting of Q715, Q716, and associated circuitry. R744 and C721 form a resonant feedback circuit which tunes the amp/splitter to 30 Hz. With the feedback network tuned to 30 Hz the charge and discharge time of the capacitor is such that the output level of the amp/splitter is dependent upon the input pulse spacing. The result is that the 30 Hz FM modulating signal is reproduced at the amp/splitter outputs. One of the amp/splitter outputs is in-phase with the 30 Hz FM modulating signal while the other output is 180° out-of-phase.

These two FM channel outputs along with the AM channel output are then applied to the omni/localizer summing amplifiers.

B. *Localizer (Glideslope) Circuitry*—When a localizer (glideslope) signal is applied to the converter/indicator it is processed down two separate channels. One channel is the active processing channel while the other is the passive balance channel.

The active processing channel is comprised of a two-stage RC active filter and a 115 Hz amp/splitter. The two stage RC active filter consists of Q717(Q736), Q718(Q737), and associated circuitry. The RC active filter provides an approximate 90° phase shift to both the 90 Hz and 150 Hz components of the localizer (glideslope) signal.

The RC active filter output is then fed to the 115 Hz amp/splitter consisting of Q719(Q738), Q720(Q739), and associated circuitry. Since the amp/splitter is RC tuned to 115 Hz by means of C728(C750) and R757(R803), the 90 Hz component of the localizer (glideslope) signal tends to lead the 150 Hz component through this circuit. This action shifts the 90 Hz component ahead by approximately 10° and delays the 150 Hz component approximately the same amount. The output of the amp/splitter will be two composite signals (both 90 Hz and 150 Hz components with their respective phase shifts) one of which is inverted. These two outputs are each applied to one of the summing amplifiers.

C. *Omni/Loc/GS Summing Amplifiers*—The summing amplifiers are used to convert the processed omni, localizer, or glideslope signal to a directional signal. This conversion is done by means of a summing process.

Three signals from the omni circuitry are applied to the summing amplifiers. The omni summing amplifiers are comprised of Q721, Q722, and associated circuitry; and Q723, Q724, and associated circuitry. Each of the omni summing amplifiers receives one of the FM omni channel outputs and the AM channel output.

The summing amplifiers perform a vector addition of the omni inputs and provide an output which is a composite waveform. The amplitude of the summing amplifier outputs are dependent upon the phase of the input signals. When the AM channel input is exactly 90° out-of-phase with the FM channel inputs the amplitude of the summing amplifier outputs will be exactly the same. Any deviation from this 90° phase difference will cause one summing amplifier output to increase in amplitude while the other output decreases. These two outputs are fed to the metering circuits.

Three signals from the localizer (glideslope) circuitry are applied to the omni/localizer (glideslope) summing amplifiers. The omni/localizer summing amplifiers are comprised of Q721, Q722, and associated circuitry; and Q723, Q724, and associated circuitry (Q740, Q741, and associated circuitry; and Q742, Q743, and associated circuitry). Each summing amplifier has two inputs: one from the 115 Hz amplifier/splitter and one from the balance circuit. The vector addition which takes place provides one summing amplifier output which is predominately 90 Hz and one summing amplifier output which is predominately 150 Hz. These two outputs are fed to the metering circuits.

D. *Omni/Loc/GS Metering*—The outputs from each of the summing amplifiers are fed to the metering circuits, here the directional signal is converted to a visual indication. The omni and localizer indication is provided via M1 the vertical indicator needle, while the glideslope indication is provided via M2 the horizontal indicator needle.

The omni/localizer (glideslope) summing amplifier outputs are rectified by means of CR707 and CR708 (CR710 and CR711). The rectifier

outputs, varying DC levels, are applied to the meter drivers Q725 and Q726 (Q724 and Q727). The meter drivers function similar to a differential amplifier and any difference between rectified summing amplifier output levels will cause more current flow through one meter driver transistor. This action will cause current flow through the meter and therefore a meter deflection. The capacitor paralleling the meter controls the impulse sensitivity of the meter. (A deflection sensitivity adjustment, R835, is provided for the glideslope meter.)

E. *Omni/Loc Lamp Circuitry*—Two fixed 90° phase shift networks, R779 and C739, and R780 and C738, are connected to the outputs of the two summing amplifiers. The outputs of these networks have the same dependence upon the relative phase of the input signals as the summing amplifier outputs except that the amplitude response is shifted 90°. Therefore, when the outputs of the summing amplifiers are equal, the output of one of the phase shift networks is at maximum and the output of the other network is at minimum. The outputs of these networks are rectified to DC by Q727 and Q728. C740 and C741 filter out the rectification ripple and the signals obtained are applied to the TO and FROM DC amplifier transistors, Q732 and Q731 respectively. R784, R785, and R787 are connected to the DC signal inputs of the TO and FROM DC amplifiers and to the base of the OFF DC amplifier. These resistors preferentially bias Q730 "on" unless the difference in DC signal levels exceeds the threshold voltage determined by their ratio.

The outputs of the DC amplifiers are fed to the bases of the TO, OFF, and FROM lamp driver transistors Q733, Q734, and Q735 respectively, which in turn control the front panel indicator lamps.

When utilizing the converter/indicator for localizer operation, the signal at the collector of Q720 is rectified by CR709 and amplified by Q729. The resulting DC current is filtered by C740 and applied to the TO lamp DC amplifier Q732. The output of Q732 is applied to the TO lamp driver Q733 which "turns-on" the TO lamp whenever the localizer signal is flyable.

F. *Glideslope Lamp Circuitry*—The glideslope lamp circuitry is very similar to the localizer lamp circuitry. There are, however, a few changes which make the glideslope lamp circuitry quite different from that of the localizer.

The signal at the collector of Q730 is rectified by CR710, C742, and C743 and amplified by Q748. The resulting DC current is filtered by C763 and applied to the ON DC amplifier Q750.

The signal threshold level is set by resistors R827 and R829, which set the base bias on the OFF DC amplifier Q749. The DC amplifier outputs are fed to the ON and OFF lamp drivers Q765 and Q752 respectively.

Q749 and Q750 the OFF and ON DC amplifiers are connected in a logic configuration such that the ON lamp will only illuminate when the input to the ON DC amplifier reaches a level greater than the threshold level set on the base of Q749.

When no localizer signal is being received the localizer input terminal, which is normally held at the AGC output level when a localizer signal is present, is allowed to float upward with respect to DC level. This action "turns-off" Q747, the first stage of a two stage lamp blanker circuit. When Q747 "turns-off" Q745 is "turned-on" which forces the collector of Q749 to nearly ground potential and thus "turns-off" the OFF lamp. This entire operation prevents the glideslope OFF lamp from illuminating when the glideslope is not in use.

G. *Regulated Power Supply*—All circuitry within the THETA/100 and THETA/200 converter/indicators are operated from the internal 8.5 volt regulated power supply consisting of Q701, Q702, Q703, and Q753. CR702 determines the necessary reference voltage on the base of Q701. The output level of the regulator, 8.5 volts, is set on R705 which determines the base bias of Q703. The differential amplifier formed by Q701 and Q703 applies regulating current to Q753 and Q702, which in a Darlington configuration form the regulating element. R833 supplies a portion of the load current which allows Q702 to operate well within its dissipation characteristics.

CR701, although not a direct part of the regulated supply, limits the maximum input to the supply to about 16 volts. This protects the supply from over-voltage spikes on the input line.

## 4-3. TEST EQUIPMENT REQUIRED

a. Genave Alpha/360 NAV/COM Transceiver

b. Genave Phi/20 Glideslope Receiver (for G/S alignment)

c. NAV/COM Generator or Simulator
Tel-Instruments T-12A with T-12-1A Head or ARC II-14 or Equivalent

d. Glideslope Generator or Simulator: Tel-Instrument T-12A with T-12-2A lead or Equivalent (for G/S alignment)

e. Power Supply 14.00 VDC @ 3 amps, filtered

f. VOM

## 4-4. ALIGNMENT PROCEDURES

A. *Omni Alignment*

1. Connect the converter/indicator to the Alignment and Test Setup shown in figure 4-4-2.

2. Set the Omni/Localizer Simulator to a convenient Omni frequency. Do not use a Localizer frequency. Adjust the RF output to 500 microvolts. Set the course selector for Omni modulation at 90°. Adjust the modulation of the carrier to the proper level.

3. Connect the ohmmeter between the gray and the blue wire of the OBS potentiometer (see figure 4-4-3). Set the ohmmeter to Rx1. Adjust the OBS control for a minimum resistance reading. The resistance will be less than 10 ohms. The minimum should occur within ½ degree of the 270° mark on the OBS dial. If it is further off than this, loosen the set screw in the collar of the OBS drum and set the dial to 270° with a minimum resistance reading on the ohmmeter. Tighten the set screw. Disconnect the ohmmeter.

4. Turn on the Nav/Com receiver. Tune the radio the frequency selected in step 2. Set the OBS dial to 90°.

5. Delete the 9960 Hz modulation of the carrier. Adjust R721, AM BALANCE, for a centered meter (see figure 4-4-3).

6. Delete the 30 Hz modulation from the carrier and apply the 9960 Hz. Adjust R745, FM BALANCE, for a centered meter.

7. Rotate the OBS dial on the converter/indicator to 270°. Readjust the FM BALANCE control for ½ of the indicated error if any.

8. Apply both 30 Hz and 9960 Hz modulation to the carrier. Set the OBS dial to 90°. Adjust R739, PHASE CORRECT, for a centered meter. The "TO" light should be on.

9. Set the simulator course selector to 270°. Readjust the PHASE CORRECT control for ½ of the indicated error if any. The "FROM" light should be on.

10. Set the simulator course selector and the OBS dial to 0°. Adjust R716, PHASE SHIFT, for a centered meter. The "TO" light should be on.

11. Set the simulator course selector to 180°. Readjust the PHASE SHIFT control for ½ of the indicated error if any. The "FROM" light should be on.

12. Check the accuracy of the Omni at the cardinal points. The accuracy should be within 2°. An error greater than this at any one point can be reduced by "trimming" the PHASE CORRECT or PHASE SHIFT controls.

13. Set the simulator course selector to 90°.

14. Adjust the OBS to the 0° position.

15. Depress the Test Knob and adjust R834, OMNI TEST, to center the course deviation indicator.

B. *Localizer Alignment*

1. With the converter/indicator connected to the Alignment and Test Setup shown in figure 4-4-2, set the Omni/Localizer Simulator to a convenient Localizer frequency. Do not use an Omni frequency.

2. Adjust the RF output of the simulator to 500 microvolts. Set the modulation control for a centering signal. Adjust the modulation of the carrier to the proper level.

3. Turn the Nav/Com receiver on. Tune the receiver to the frequency selected in step 1. The "TO" lamp should illuminate.

4. Adjust R758, LOCALIZER BALANCE, for a centered meter.

5. Set the modulation control on the generator to +4 dB. The meter should deflect to approximately the third dot left of meter center. There is no adjustment for deflection sensitivity. A deflection within ⅛" to ¼" of this dot is normal.

6. Set the modulation control on the generator to −4 dB. The meter should deflect to approximately the third dot right of meter center. The same tolerances apply as in step 5.

C. *Glideslope Alignment* (THETA/200 Only)

1. With the converter/indicator connected to the Alignment and Test Setup shown in figure 4-4-2, set the Omni/Localizer/Glideslope Simulator to a convenient Glideslope channel.

2. Adjust the RF output of the simulator to 500 microvolts. Set the modulation control for a centering signal. Adjust the modulation of the carrier to the proper level.

3. Tune the Glideslope receiver to the proper channel. (To tune G/S receiver with automatic G/S channeling, tune the Nav/Com receiver to the corresponding Localizer frequency.) The G/S "ON" lamp should illuminate.

4. Adjust R804, GLIDESLOPE BALANCE, for a centered meter.

5. Set the modulation control on the generator to the +2 dB position. Adjust R835, GLIDESLOPE DEFLECTION, until the needle deflects to the second bar above meter center.

6. Set the modulation control on the simullator to the −2 dB position. The needle should deflect to the second bar below meter center. If the needle does not deflect to the second bar below meter center repeat steps 4, 5, and 6.

## SPECIALIZED PROCEDURES

A. *Meter Head Assembly Removal*—To be performed only when meter assembly is to be repaired or shipped for repair. The meter assembly, which is an integral part of the meter head assembly, consists of the meter(s), the "To-Off-From" lamps, the G/S "Off-On" lamps (THETA/200 only), and the meter back lights. None of these items are recommended for field repair.

1. Remove top and bottom converter-indicator panels.

2. Disconnect meter head assembly leads from circuit board(s). See figure 4-4-5.

3. Remove cable bindings as necessary to allow meter assembly leads to pull through shaft of OBS pot. See figure 4-4-4.

4. Remove setscrews from OBS/Test knob and remove OBS/Test knob from OBS shaft.

5. Remove the four (4) meter assembly retaining screws in the side panels and remove the meter head assembly. The OBS shaft will become detached from the unit. Be careful not to loose any of the OBS shaft spacers or bearings.

6. Press the front OBS shaft bearing out of the converter-indicator front panel.

**CAUTION:** Breaking the seal between the meter housing and the dial lense may allow dust particles to enter the meter cavity and promote future meter failure.

7. To install new meter head assembly reverse the above steps. When reassembling be sure that no slack exists in the meter assembly leads between the meter assembly and the OBS pot.

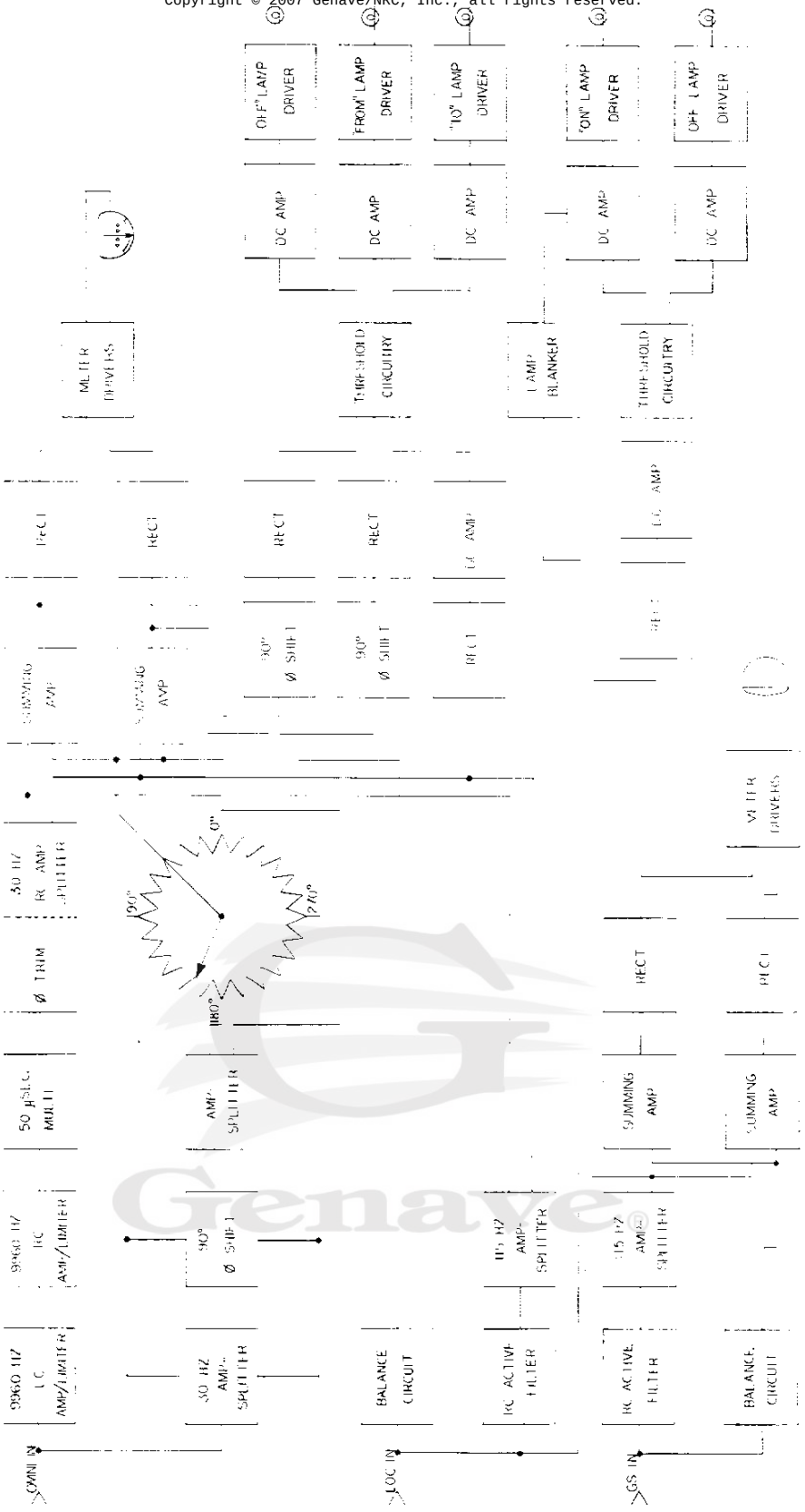



**Figure 4-4-1**
**THETA/100—200 BLOCK DIAGRAM**

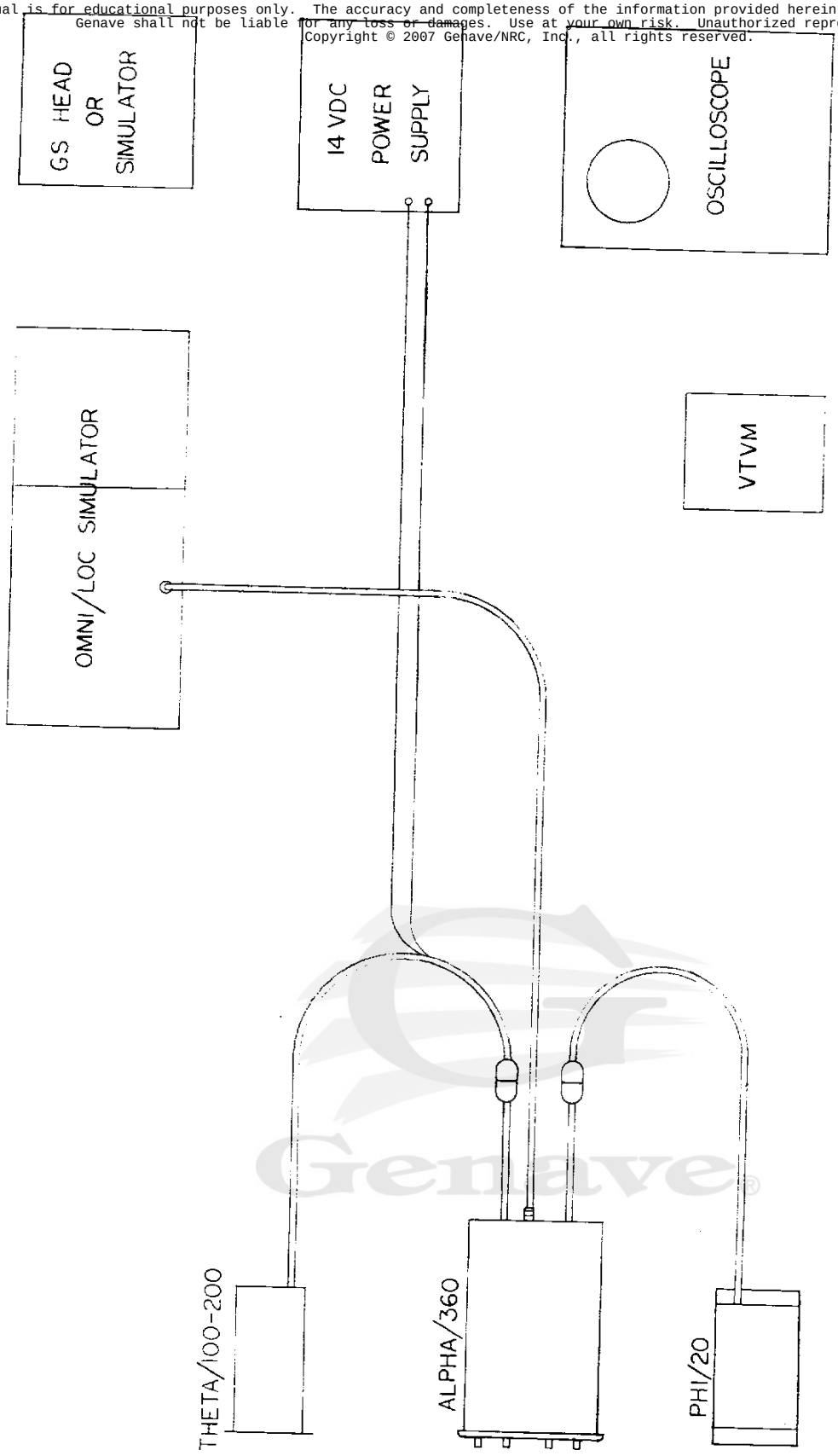



**Figure 4-4-2**
**ALIGNMENT AND TEST SETUP**



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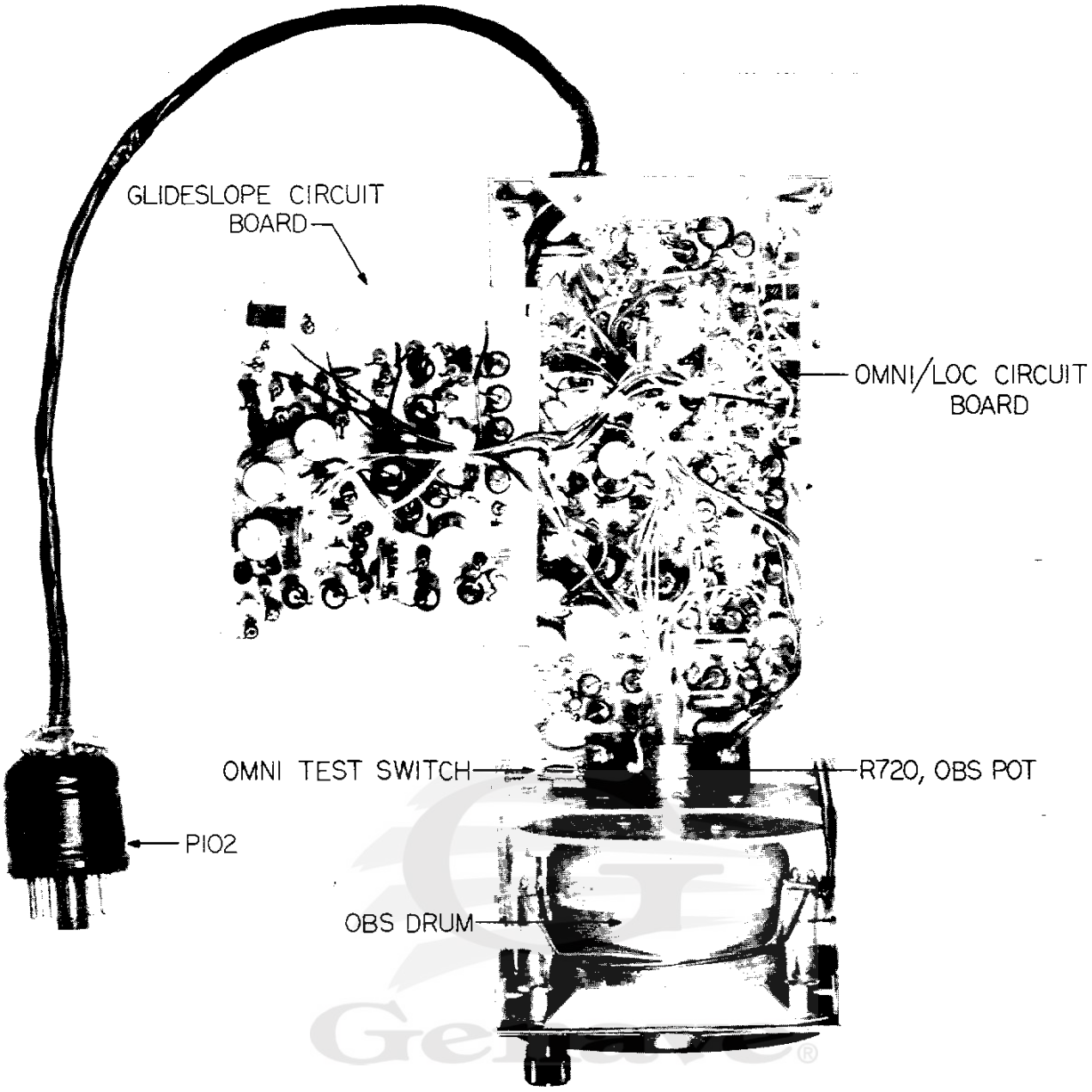


**Figure 4-4-3**
**TOP VIEW**

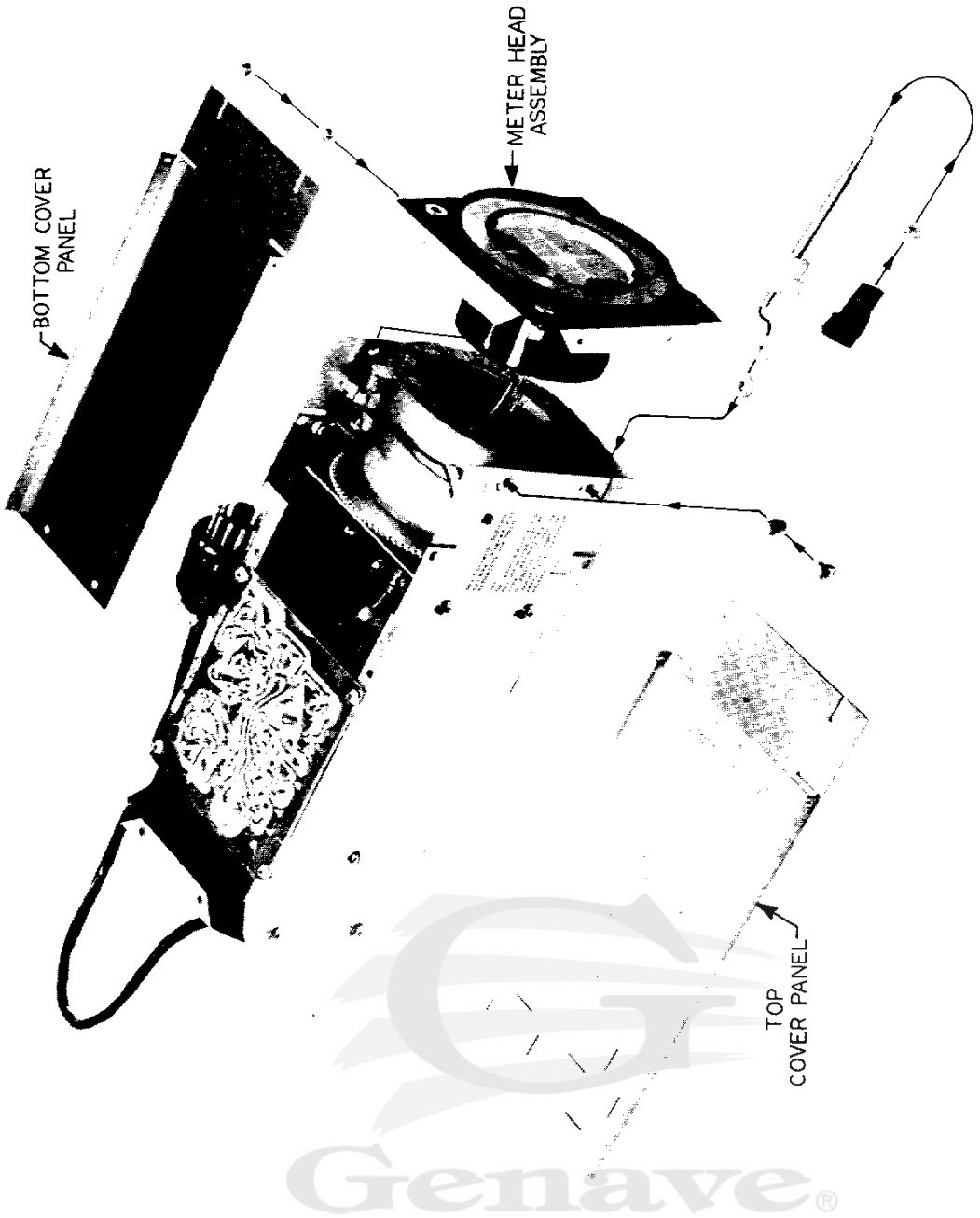


**Figure 4-4-4**
**Expanded View**

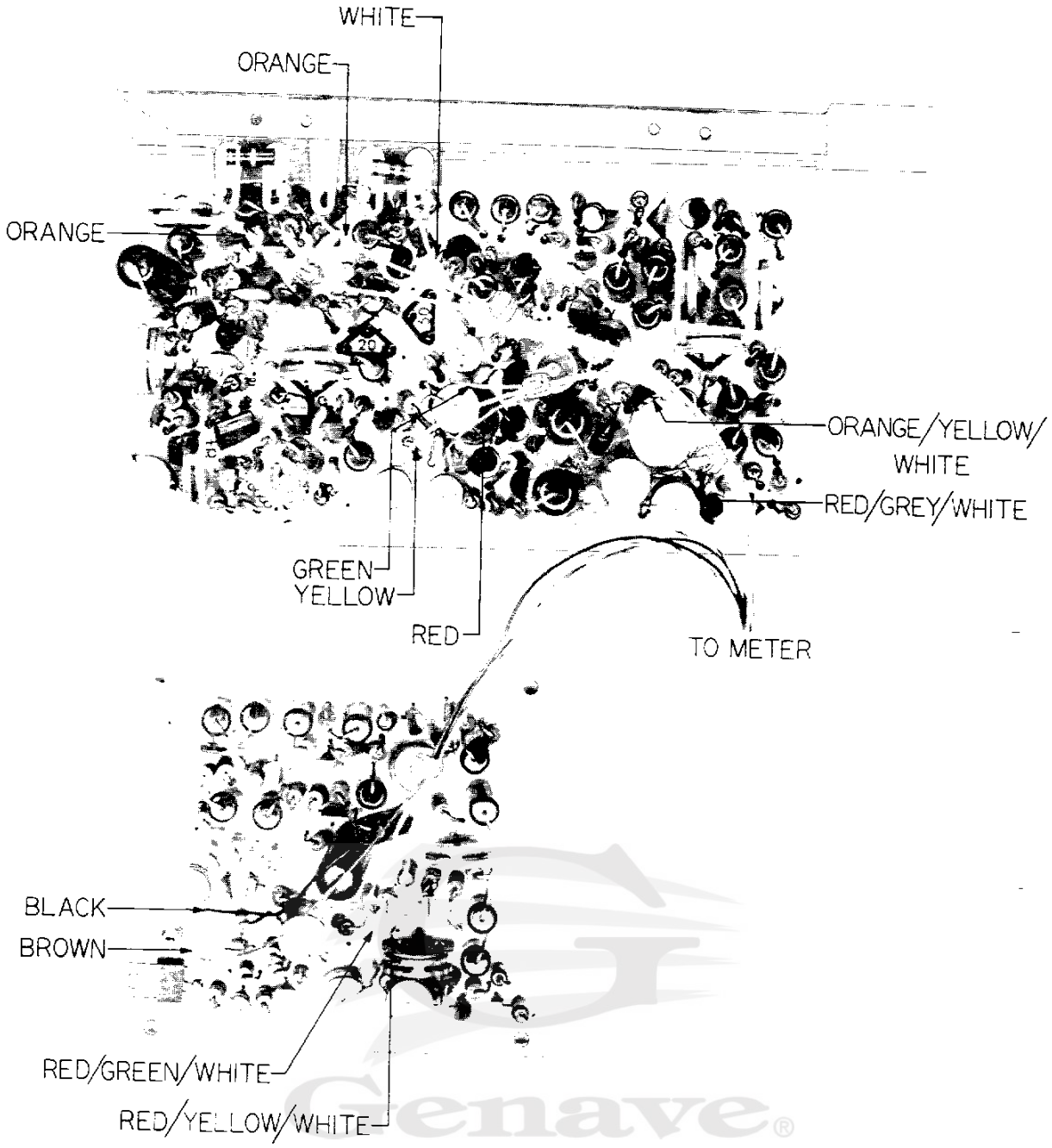




**Figure 4-4-5**
**Meter Assembly Wiring**

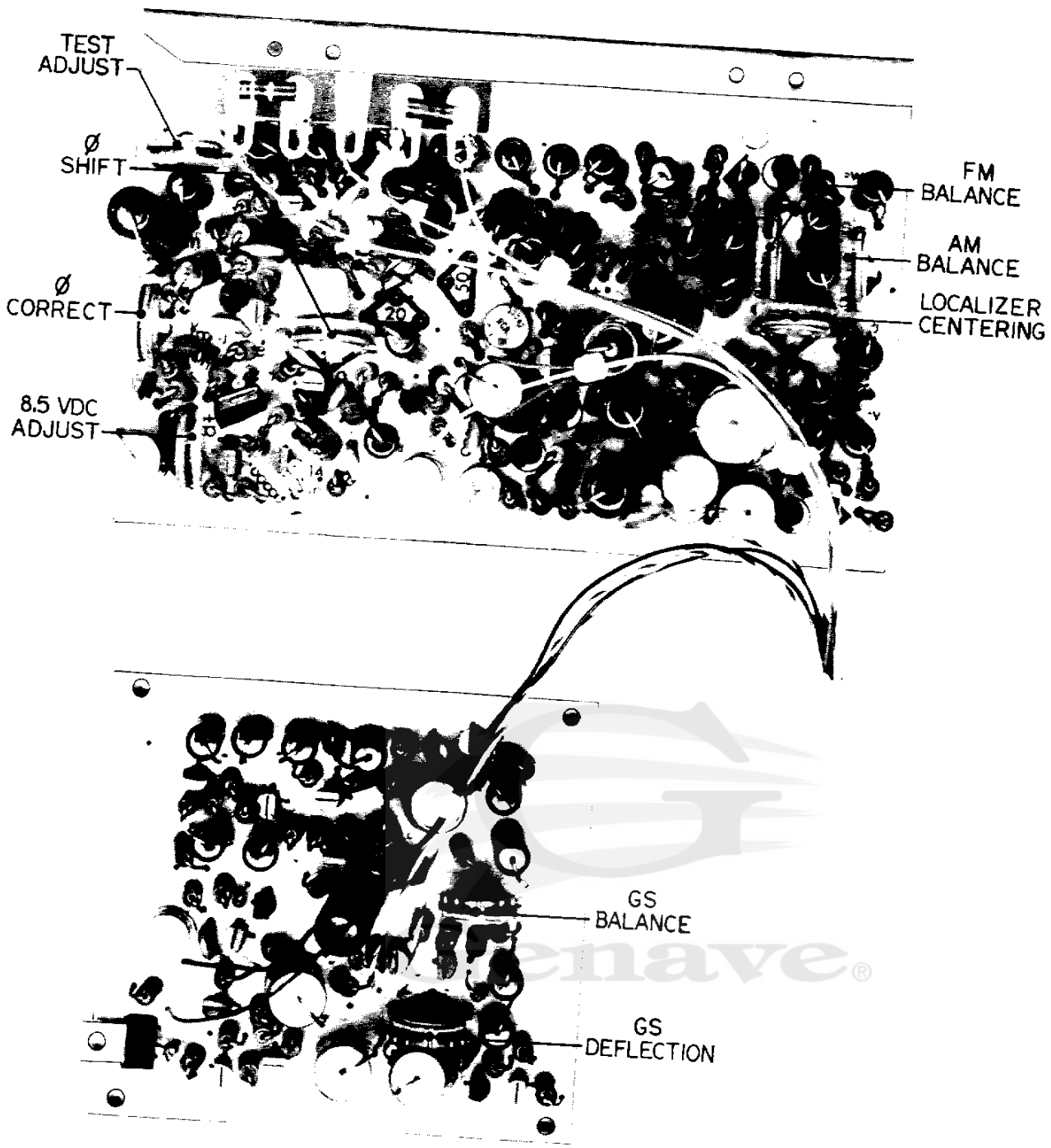


**Figure 4-4-6**
**Alignment Adjustments**

# 4-5. TROUBLESHOOTING INFORMATION



## A. General

It is assumed that the technician performing any troubleshooting or repair work on the unit is familiar with the principles of aviation electronics and the procedures of troubleshooting solid-state electronic equipment. It is further assumed that he has a working knowledge of transistorized circuitry and the use of all the normal test equipment found in the field.

The primary aids to troubleshooting the unit are the DC Voltage Measurements given in figure 4-5-1; the Omni Waveforms given in figures 4-5-2 through 4-5-10; the Localizer Waveforms given in figures 4-5-11 through 4-5-17; the Glideslope Waveforms given in figures 4-5-18 through 4-5-24; the Schematic Diagram, figure 4-5-25; the Omni/Loc Board Parts/Track Map, figure 4-5-27; and the Glideslope Board Parts/Track Map, figure 4-5-28.

## B. Tables of Figures

1. DC Voltage Measurements
   4-5-1 DC Voltage Measurements
2. Waveform Photos
   4-5-2 through 4-5-10 Omni Waveforms
   4-5-11 through 4-5-17 Localizer Waveforms
   4-5-18 through 4-5-24 Glideslope Waveforms
3. Schematic Diagrams
   4-5-25 THETA/100-200 Schematic Diagram
4. Table of Matched Components
   4-5-26 Table of Matched Components
5. Parts/Track Maps
   4-5-27 Omni-Loc Board Parts/Track Map
   4-5-28 Glideslope Board Parts/Track Map



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All voltages shown in this table must be measured with a VTVM. The input voltage to the converter/indicator should be set at 13.75 VDC and the 8.5 VDC power supply should be set to 8.50 VDC. A variation of ±20% of the measured voltages from those listed may be considered normal.

| Ref. No. | No Signal Condition | | | 500 Microvolt Signal On Appropriate Frequency With Omni "TO" Modulation Except As Noted. | | | Notes |
|---|---|---|---|---|---|---|---|
| | E | B | C | E | B | C | |
| Q701 | 4.7 | 5.4 | 12.3 | — | — | — | |
| Q702 | 13.5 | 12.6 | 8.5 | — | — | — | |
| Q703 | 4.7 | 5.4 | 8.5 | — | — | — | |
| Q704 | 0.0 | 0.40 | 2.8 | — | — | — | |
| Q705 | 2.3 | 2.8 | 5.4 | — | — | — | |
| Q706 | 6.1 | 5.5 | 2.3 | — | — | — | |
| Q707 | 1.7 | 2.2 | 6.1 | — | — | — | |
| Q708 | 6.7 | 6.1 | 1.7 | — | — | — | |
| Q709 | 8.5 | 7.9 | 6.6 | — | — | — | |
| Q710 | 7.3 | 6.6 | 0.0 | — | — | — | |
| Q711 | 8.5 | 7.9 | 6.8 | — | — | — | |
| Q712 | 7.4 | 6.8 | 0.0 | — | — | — | |
| Q713 | 8.5 | 8.6 | 8.0 | 8.5 | 8.7 | 8.0 | |
| Q714 | 8.5 | 8.0 | 4.6 | 8.5 | 8.0 | 4.9 | |
| Q715 | 0.0 | 0.42 | 5.0 | — | — | — | |
| Q716 | 5.6 | 4.9 | 2.8 | — | — | — | |
| Q717 | 3.8 | 3.2 | 0.0 | 2.6 | 1.9 | 0.0 | Localizer Modulation |
| Q718 | 4.8 | 4.2 | 0.0 | 3.7 | 3.0 | 0.0 | Localizer Modulation |
| Q719 | 0.0 | 0.44 | 5.4 | — | — | — | |
| Q720 | 6.0 | 5.4 | 2.3 | — | — | — | |
| Q721 | 0.0 | 0.44 | 3.6 | — | — | — | |
| Q722 | 4.2 | 3.6 | 0.0 | — | — | — | |
| Q723 | 0.0 | 0.44 | 3.6 | — | — | — | |
| Q724 | 4.2 | 3.6 | 0.0 | — | — | — | |
| Q725 | 7.7 | 7.1 | 0.2-1.3 | 7.0 | 6.6 | 1.4 | Centered Needle |
| Q726 | 7.7 | 7.1 | 0.2-1.3 | 7.0 | 6.6 | 1.4 | Centered Needle |
| Q727 | 4.0 | 4.4 | 0.7 | 2.9<br>4.9 | 4.5<br>4.3 | 0.8<br>0.8 | To signal<br>From signal |
| Q728 | 4.0 | 4.4 | 0.7 | 4.9<br>2.9 | 4.3<br>4.5 | 0.8<br>0.8 | To signal<br>From signal |

| Ref. No. | No Signal Condition | | | 500 Microvolt Signal On Appropriate Frequency With Omni "TO" Modulation Except As Noted. | | | Notes |
|---|---|---|---|---|---|---|---|
| | E | B | C | E | B | C | |
| Q729 | 0.0 | 0.0 | 4.9 | 0.0 | 0.2 | 0.2 | Localizer Modulation |
| Q730 | 4.4 | 3.8 | 0.7 | 3.6 | 3.7 | 0.0 | Either To or From sig |
| Q731 | 4.4 | 4.0 | <0.4 | 3.6 | 4.8 | 0.0 | To signal |
| | | | | 3.6 | 3.0 | 0.7 | From signal |
| Q732 | 4.4 | 4.0 | <0.4 | 3.6 | 3.0 | 0.7 | To signal |
| | | | | 3.6 | 4.8 | 0.0 | From signal |
| Q733 | 0.0 | <0.4 | 13.75 | 0.0 | 0.7 | <3.0 | To signal |
| Q734 | 0.0 | <0.4 | 13.75 | 0.0 | 0.7 | <3.0 | Either To or From sig |
| Q735 | 0.0 | 0.7 | <3.0 | 0.0 | 0.0 | 13.75 | From signal |
| Q736 | 3.8 | 3.2 | 0.0 | 2.6 | 1.9 | 0.0 | Glideslope Modulation |
| Q737 | 4.8 | 4.2 | 0.0 | 3.7 | 3.0 | 0.0 | Glideslope Modulation |
| Q738 | 0.0 | 0.44 | 5.4 | — | — | — | |
| Q739 | 6.0 | 5.4 | 2.3 | — | — | — | |
| Q740 | 0.0 | 0.44 | 3.6 | — | — | — | |
| Q741 | 4.2 | 3.6 | 0.0 | — | — | — | |
| Q742 | 0.0 | 0.44 | 3.6 | — | — | — | |
| Q743 | 4.2 | 3.6 | 0.0 | — | — | — | |
| Q744 | 7.7 | 7.1 | 0.2-1.3 | 7.0 | 6.6 | 1.4 | Centered Needle |
| Q745 | 7.7 | 7.1 | 0.2-1.3 | 7.0 | 6.6 | 1.4 | Centered Needle |
| Q746 | .6 | 0 | 0 | — | — | — | Both Lamps Off |
| Q747 | 8.5 | 8.4 | 0 | — | — | — | Both Lamps Off |
| Q748 | 0.0 | 0.0 | 4.9 | 0.0 | 0.2 | 0.2 | Glideslope Modulation |
| Q749 | 4.4 | 3.8 | 0.7 | — | — | — | |
| Q750 | 4.4 | 4.0 | <0.4 | — | — | — | |
| Q751 | 0 | 0 | 13.8 | — | — | — | |
| Q752 | 0 | .6 | 13.8 | — | — | — | |

## Omni Waveform Photographs

The OMNI waveform photographs were taken under the following conditions:

Frequency: Any Omni channel
RF Input: 500 microvolts
Modulation: Standard Omni 0°
OBS Pot: Set at 0°

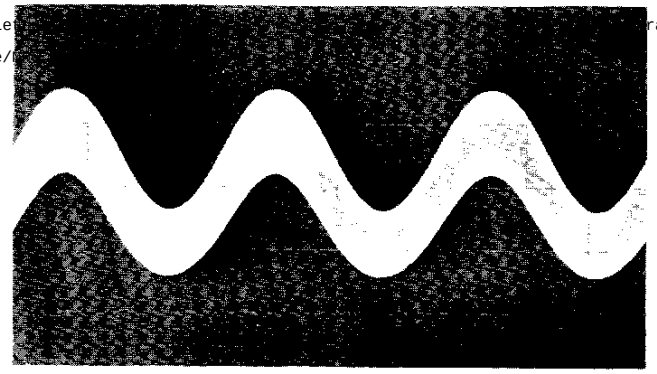


Figure 4-5-2
Omni Input

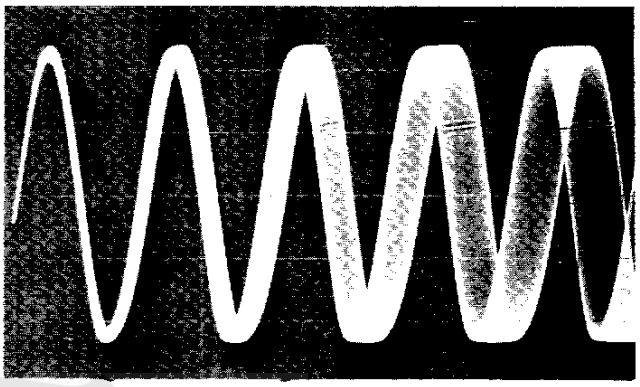


Figure 4-5-3
Emitter, Q710

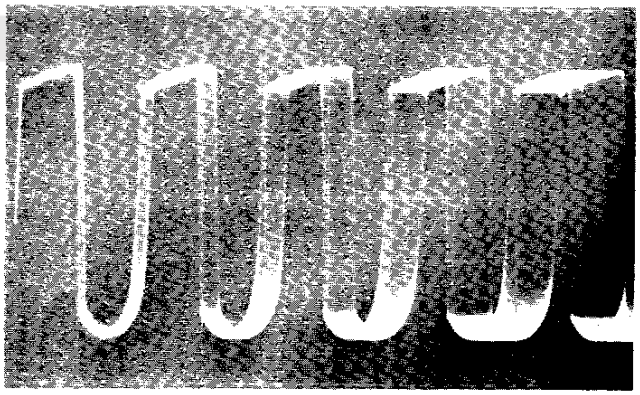


Figure 4-5-4
Emitter, Q712

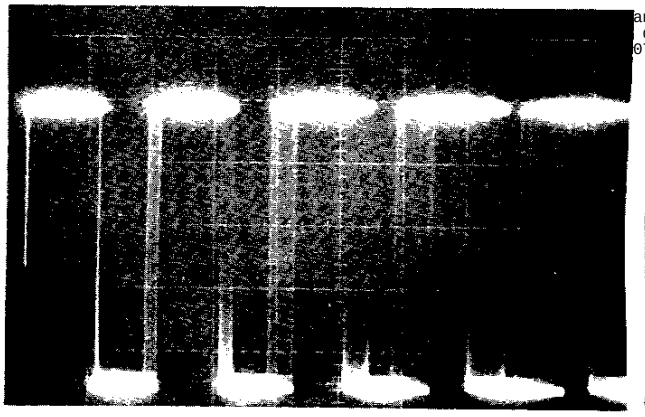


Figure 4-5-5
Collector, Q714

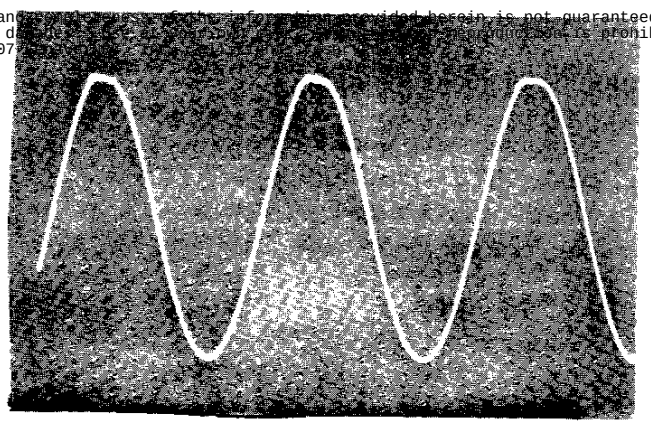


Figure 4-5-8
Emitters, Q722 & Q724
Bases, Q725 & Q726

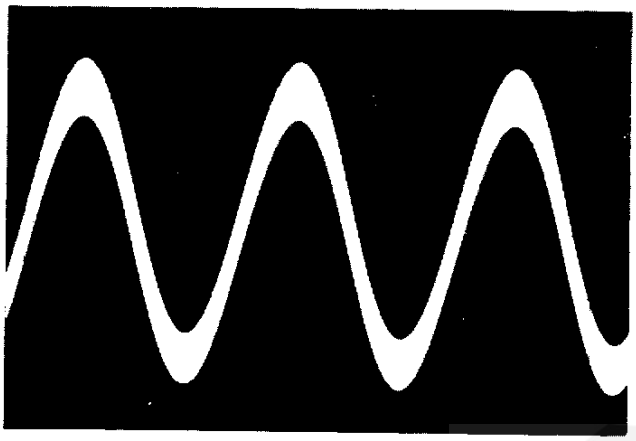


Figure 4-5-6
Collector or Emitter, Q716

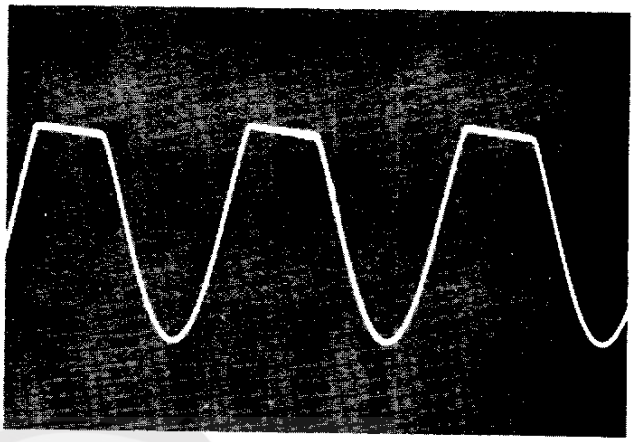


Figure 4-5-9
Emitters, Q725 & Q726

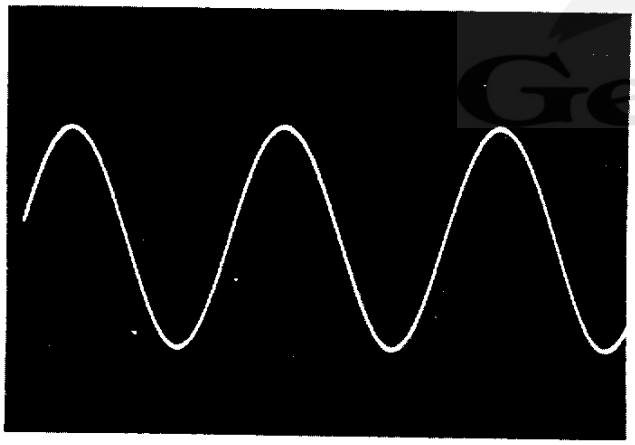


Figure 4-5-7
R720, OBS Pot Wiper, Any Position

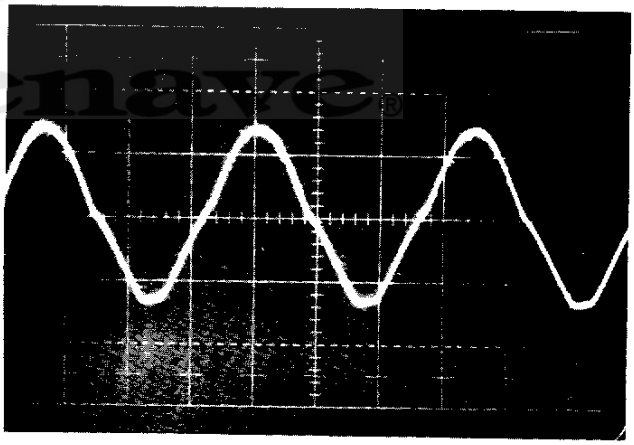


Figure 4-5-10
Collectors, Q725 & Q726

## Localizer Waveform Photographs

The Localizer waveform photographs were taken under the following conditions:

Frequency: Any Localizer channel

RF Input: 500 microvolts

Modulation: Standard Localizer centering signal.

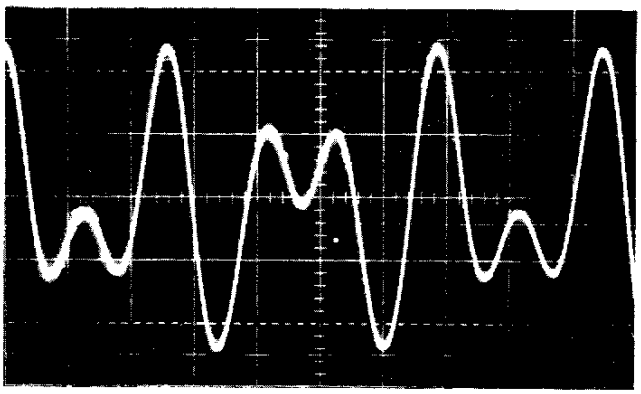


**Figure 4-5-11**
**Localizer Input**

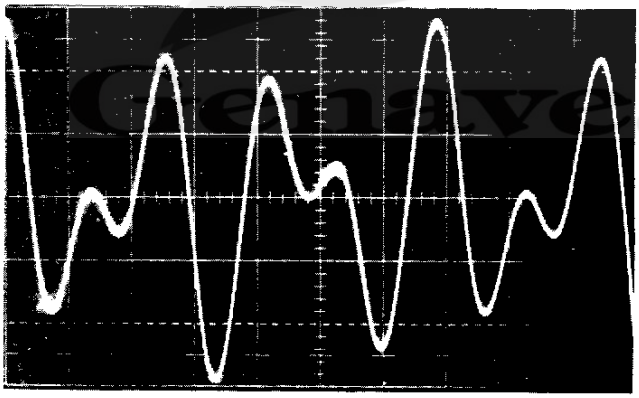


**Figure 4-5-12**
**Emitter, Q720**

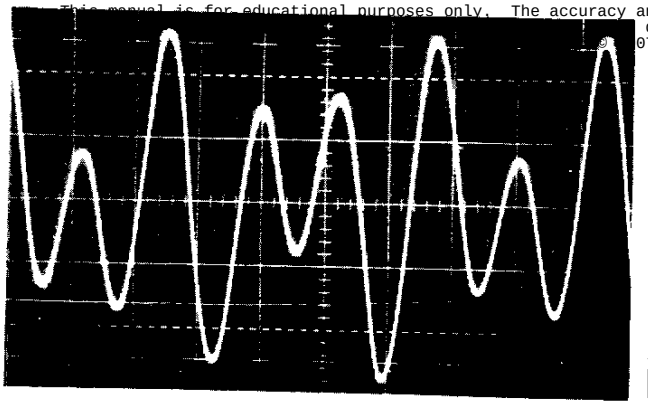


Figure 4-5-13
Emitter, Q722

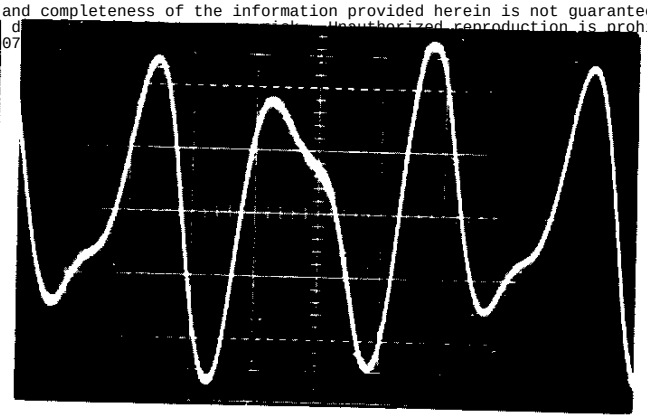


Figure 4-5-14
Emitter, Q724

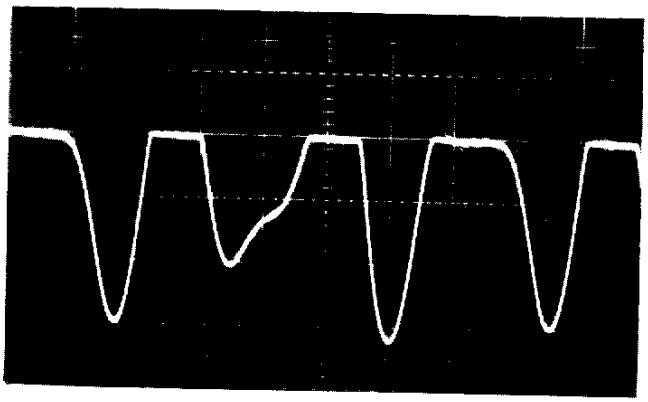


Figure 4-5-15
Emitter, Q725

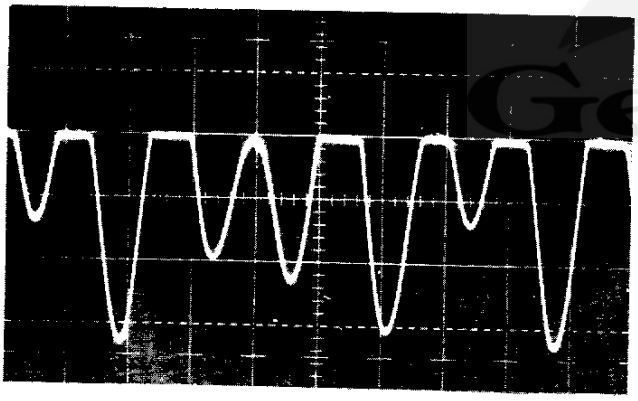


Figure 4-5-16
Emitter, Q726

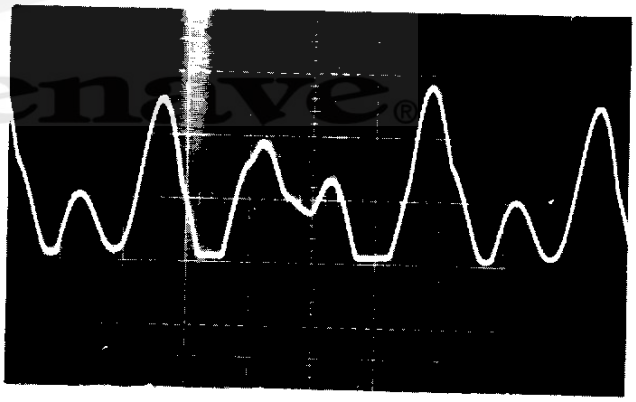


Figure 4-5-17
Collectors, Q725 & Q726

## Glideslope Waveform Photographs

The Glideslope waveform photographs were taken under the following conditions:

Frequency: Any Localizer channel

RF Input: 500 microvolts

Modulation: Standard Glideslope centering signal.

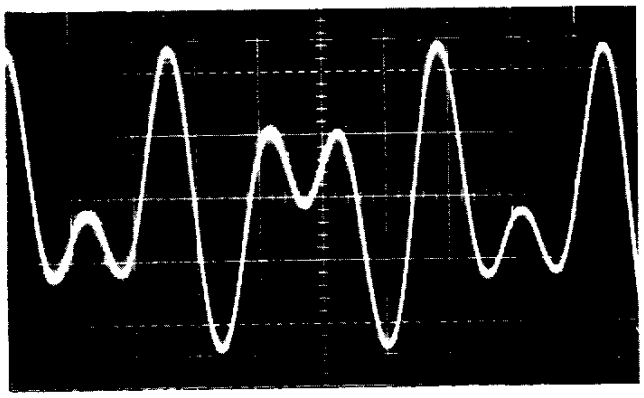


**Figure 4-5-18**
**Glideslope Input**

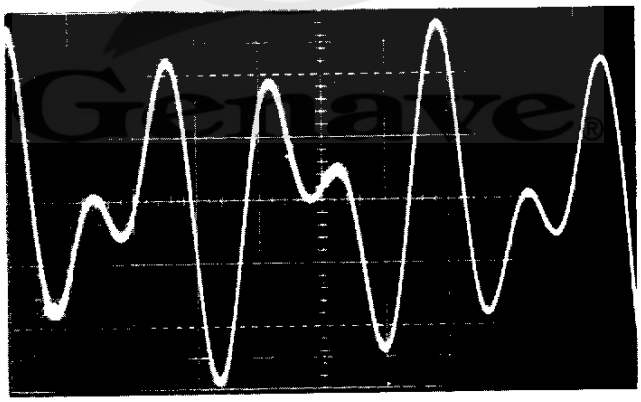


**Figure 4-5-19**
**Emitter, Q739**

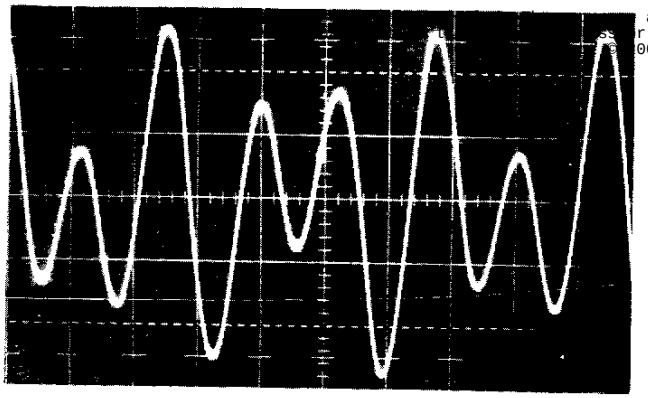


Figure 4-5-20
Emitter, Q741

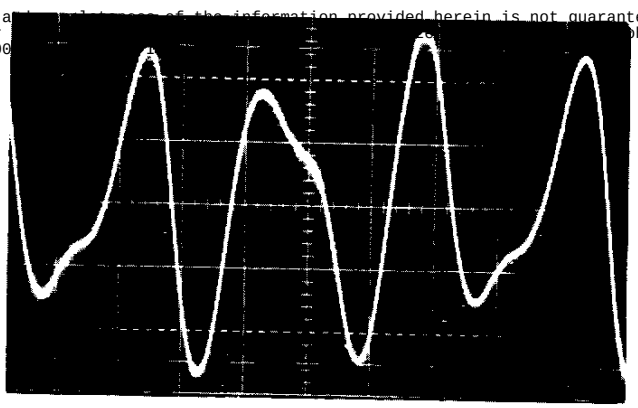


Figure 4-5-21
Emitter, Q743

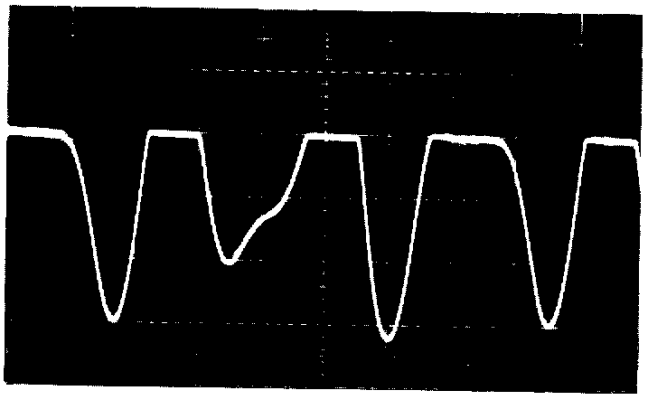


Figure 4-5-22
Emitter, Q744

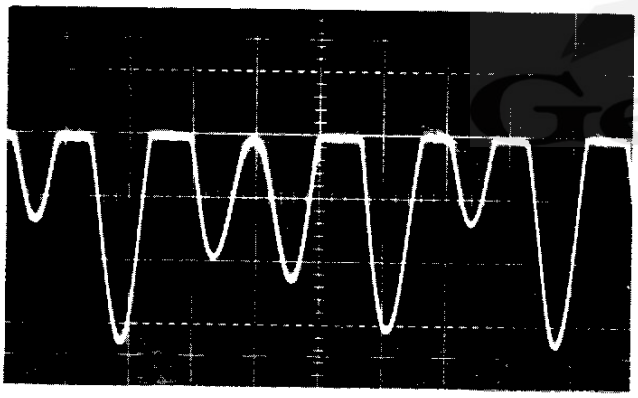


Figure 4-5-23
Emitter, Q745

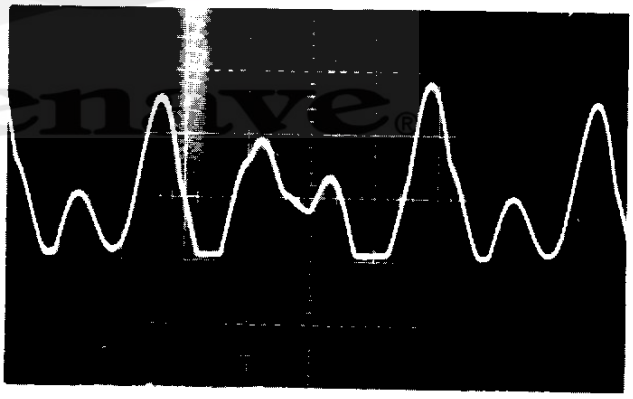


Figure 4-5-24
Collectors, Q744 & Q745

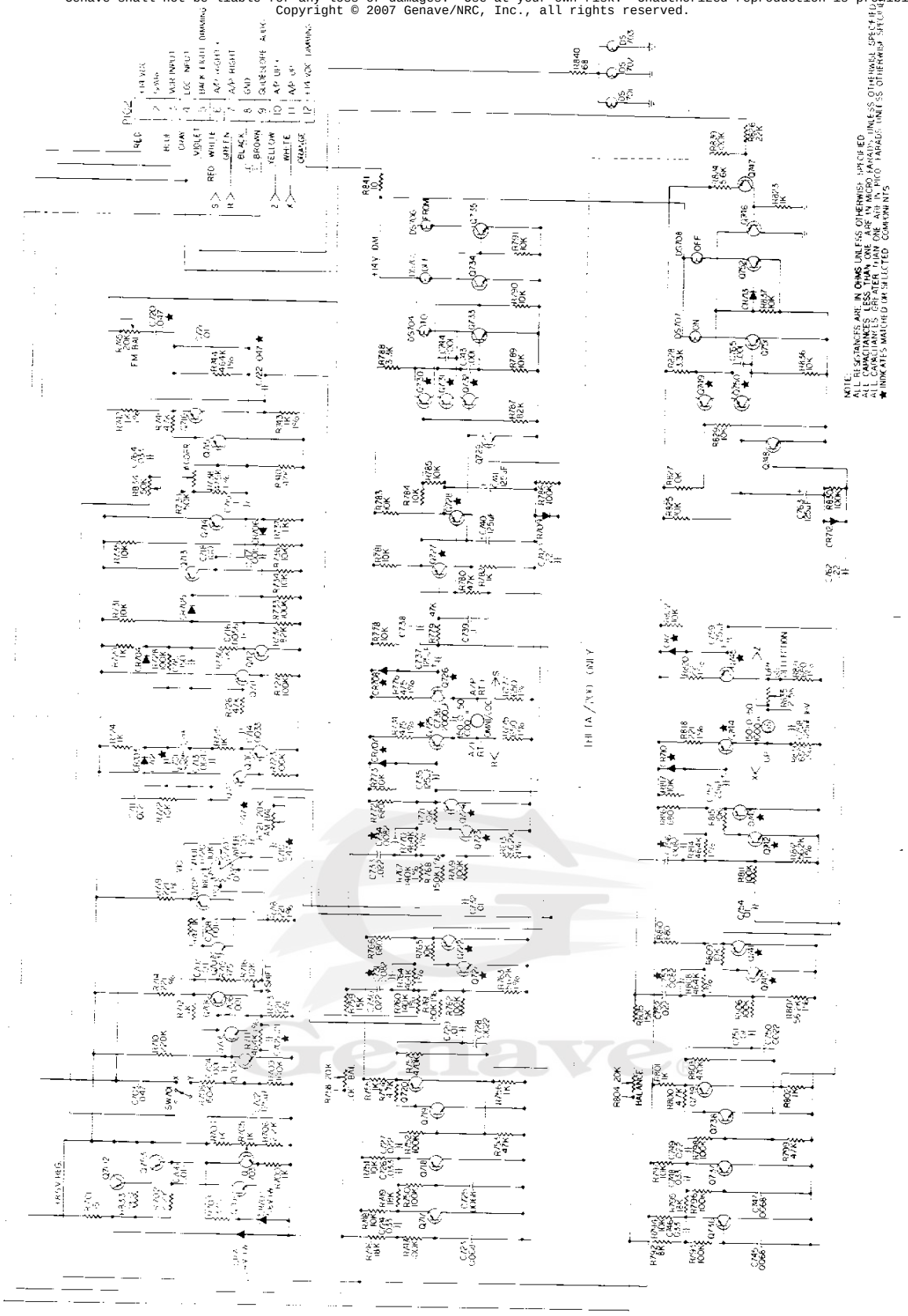


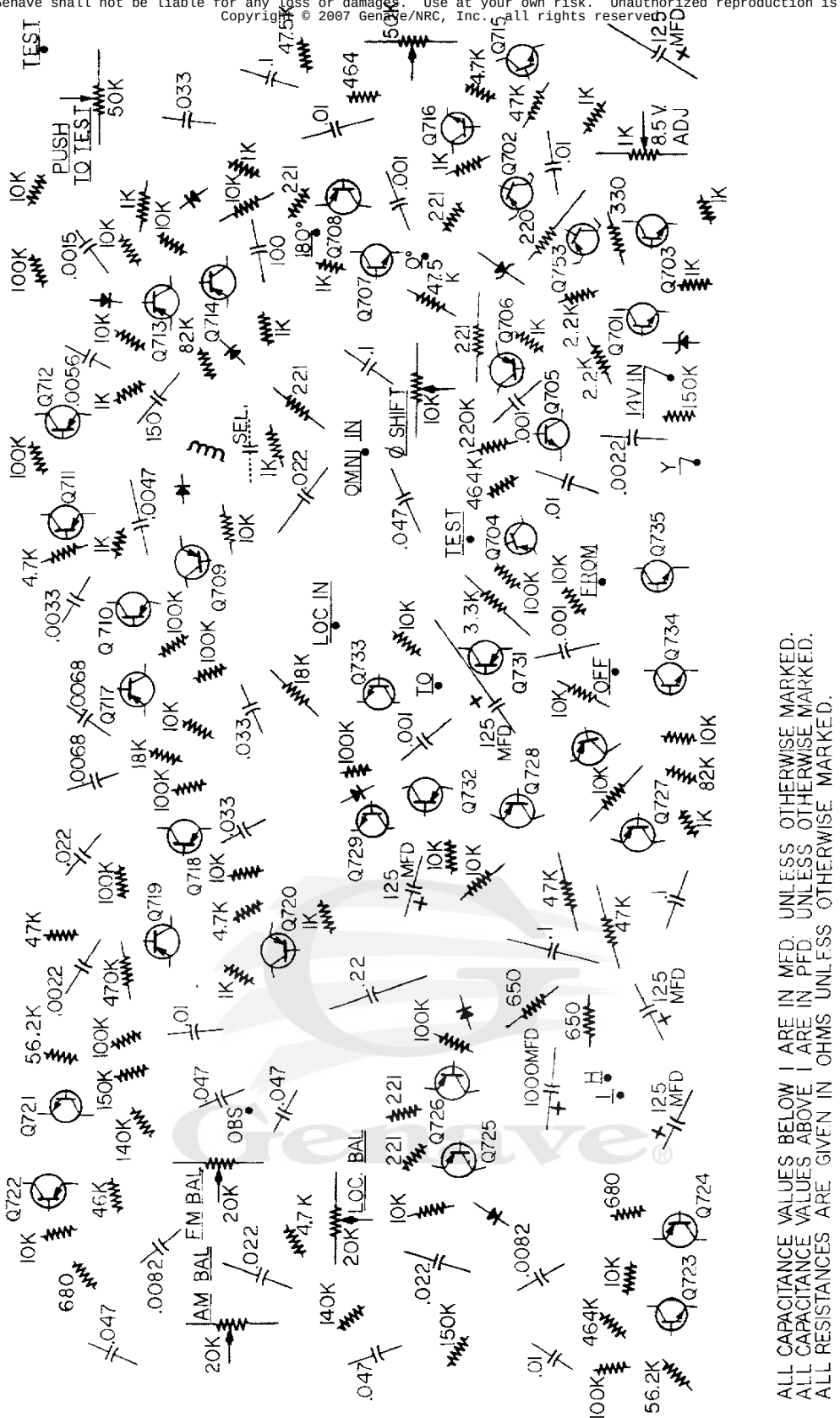


**Figure 4-5-25**
**THETA/100—200 Schematic Diagram**

## Figure 4-5-26

## MATCHED COMPONENTS

| Part | Mate(s) | Matching Criterion |
|---|---|---|
| C709 | C710 | Capacitance to ± 2% |
| C710 | C709 | Capacitance to ± 2% |
| C720 | C722 | Capacitance to ± 2% |
| C722 | C720 | Capacitance to ± 2% |
| C731 | C734 | Capacitance to ± 2% |
| C734 | C731 | Capacitance to ± 2% |
| C753 | C756 | Capacitance to ± 2% |
| C756 | C753 | Capacitance to ± 2% |
| CR707 | CR708 | Forward voltage at 20 ma to ± .05 VDC |
| CR708 | CR707 | Forward voltage at 20 ma to ± .05 VDC |
| CR710 | CR711 | Forward voltage at 20 ma to ± .05 VDC |
| CR711 | CR710 | Forward voltage at 20 ma to ± .05 VDC |
| Q721 | Q723 | DC Beta at + 6 V and 0.1 ma to ± 10% |
| Q722 | Q724 | DC Beta at − 6 V and 4 ma to ± 10% |
| Q723 | Q721 | DC Beta at + 6 V and 0.1 ma to ± 10% |
| Q724 | Q722 | DC Beta at − 6 V and 4 ma to ± 10% |
| Q725 | Q726 | DC Beta at − 6 V and 4 ma to ± 10% |
| Q726 | Q725 | DC Beta at − 6 V and 4 ma to ± 10% |
| Q727 | Q728 | DC Beta at − 6 V and 4 ma to ± 10% |
| Q728 | Q727 | DC Beta at − 6 V and 4 ma to ± 10% |
| Q730 | Q731, Q732 | DC Beta at − 6 V and 4 ma to ± 10% |
| Q731 | Q730, Q732 | DC Beta at − 6 V and 4 ma to ± 10% |
| Q732 | Q730, Q731 | DC Beta at − 6 V and 4 ma to ± 10% |
| Q740 | Q742 | DC Beta at + 6 V and 0.1 ma to ± 10% |
| Q741 | Q743 | DC Beta at − 6 V and 4 ma to ± 10% |
| Q742 | Q740 | DC Beta at + 6 V and 0.1 ma to ± 10% |
| Q743 | Q741 | DC Beta at − 6 V and 4 ma to ± 10% |
| Q744 | Q745 | DC Beta at − 6 V and 4 ma to ± 10% |
| Q745 | Q744 | DC Beta at − 6 V and 4 ma to ± 10% |
| Q749 | Q750 | DC Beta at − 6 V and 4 ma to ± 10% |
| Q750 | Q749 | DC Beta at − 6 V and 4 ma to ± 10% |




ALL CAPACITANCE VALUES BELOW 1 ARE IN MFD. UNLESS OTHERWISE MARKED.
ALL CAPACITANCE VALUES ABOVE 1 ARE IN PFD. UNLESS OTHERWISE MARKED.
ALL RESISTANCES ARE GIVEN IN OHMS UNLESS OTHERWISE MARKED.

**Figure 4-5-27**
**Omni/Loc Board Parts/Track Map**

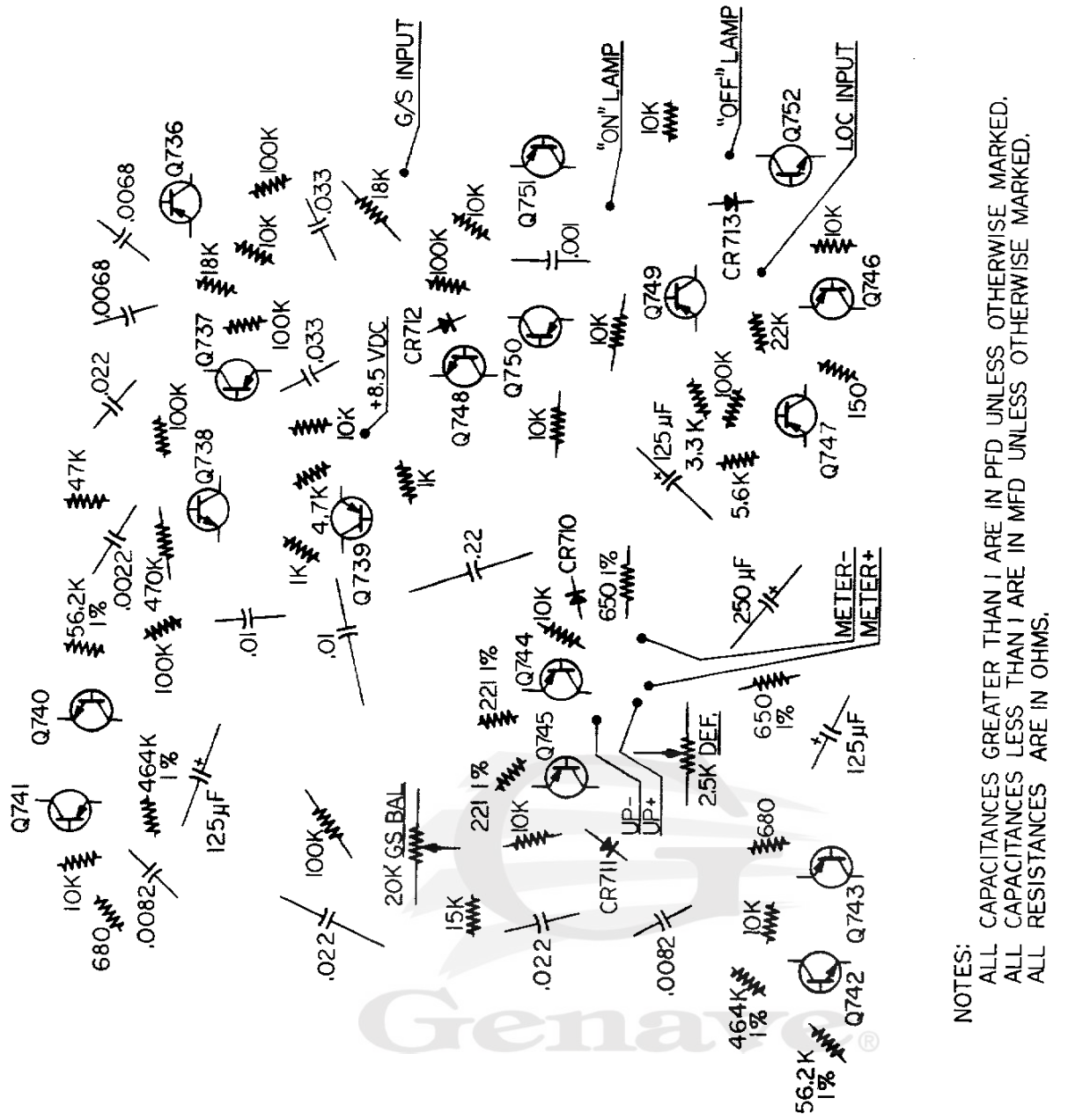



**Figure 4-5-28**
**Glideslope Board Parts/Track Map**

# THETA/100 PARTS LIST

| Ref. No. | Genave Part No. TH-100- | DESCRIPTION |
|---|---|---|
| | | **CAPACITORS** |
| C701 | 3 | Disc, .001 mfd, 10 V, Z5P |
| C702 | 18 | Aluminum Electrolytic, 125 mfd, 16 V |
| C703 | 14 | Mylar, .047 mfd, 100 V |
| C704 | 22 | Polycarbonate, .0022 mfd. |
| C705 | 11 | Mylar, .01 mfd, 100 V |
| C706 | 3 | Disc, .001 mfd, 10 V, Z5P |
| C707 | 17 | Metallized Film, .1 mfd, 10 V |
| C708 | 3 | Disc, .001 mfd, 10 V, Z5P |
| C709 | 14 | Mylar, .047 mfd, 100 V |
| C710 | 14 | Mylar, .047 mfd, 100 V |
| C711 | 12 | Mylar, .022 mfd, 100 V |
| C712 | | Selected Value |
| C713 | 7 | Mylar, .0047 mfd, 100 V |
| C714 | 6 | Mylar, .0033 mfd, 100 V |
| C715 | 2 | Disc, 150 pf, 10 V, N1500 |
| C716 | 8 | Mylar, .0056 mfd, 100 V |
| C717 | 4 | Mylar, .0015 mfd, 100 V |
| C718 | 1 | Disc, 100 pf, 10 V, N1500 |
| C719 | 16 | Mylar, .1 mfd, 100 V |
| C720 | 14 | Mylar, .047 mfd, 100 V |
| C721 | 11 | Mylar, .01 mfd, 100 V |
| C722 | 14 | Mylar, .047 mfd, 100 V |
| C723 | 9 | Mylar, .0082 mfd, 100 V |
| C724 | 13 | Mylar, .033 mfd, 100 V |
| C725 | 9 | Mylar, .0082 mfd, 100 V |
| C726 | 13 | Mylar, .033 mfd, 100 V |
| C727 | 12 | Mylar, .022 mfd, 100 V |
| C728 | 5 | Mylar, .0022 mfd, 100 V |
| C729 | 11 | Mylar, .01 mfd, 100 V |
| C730 | 12 | Mylar, .022 mfd, 100 V |
| C731 | 10 | Mylar, .0082 mfd, 100 V |
| C732 | 11 | Mylar, .01 mfd, 100 V |
| C733 | 12 | Mylar, .022 mfd, 100 V |
| C734 | 10 | Mylar, .0082 mfd, 100 V |
| C735 | 18 | Aluminum Electrolytic, 125 mfd, 16 V |
| C736 | 21 | 2000 mfd, 1 V |
| C737 | 18 | Aluminum Electrolytic, 125 mfd, 16 V |
| C738 | 16 | Mylar, .1 mfd, 100 V |
| C739 | 16 | Mylar, .1 mfd, 100 V |
| C740 | 18 | Aluminum Electrolytic, 125 mfd, 16 V |
| C741 | 18 | Aluminum Electrolytic, 125 mfd, 16 V |
| C742 | 15 | Mylar, .22 mfd, 50 V |
| C743 | 3 | Disc, .001 mfd, 10 V, Z5P |
| C744 | 3 | Disc, .001 mfd, 10 V, Z5P |
| C745 | | Unassigned |
| C765 | 13 | Mylar, .033 mfd, 100 V |
| C766 | 24 | .01 mfd, 10V, −20% |
| C767 | 3 | Disc, .001 mfd, 10 V, Z5P |
| C768 | | Unassigned |
| | | **DIODES** |
| CR701 | 27 | Zener, 24 V, 1 W, 10% |
| CR702 | 28 | Zener, 5.6 V, 1 W, 10% |
| CR703 | 29 | Silicon, High Frequency Switching, FD1936 |
| CR704 | 29 | Silicon, High Frequency Switching, FD1936 |
| CR705 | 29 | Silicon, High Frequency Switching, FD1936 |
| CR706 | 29 | Silicon, High Frequency Switching, FD1936 |
| CR707 | 30 | Germanium, General Purpose, IN34A |
| CR708 | 30 | Germanium, General Purpose, IN34A |
| CR709 | 30 | Germanium, General Purpose, IN34A |
| CR710 | | Unassigned |
| | | **LAMPS** |
| DS701 | 101 | 14 VDC, 80 Ma, Clear |
| DS702 | 101 | 14 VDC, 80 Ma, Clear |
| DS703 | | Part of M1A Assembly |
| DS704 | | Part of M1A Assembly |
| DS705 | | Part of M1A Assembly |
| DS706 | | Part of M1A Assembly |
| | | **COILS** |
| L701 | 25 | 50 MHy −10% |
| | | **TRANSISTORS** |
| Q701 | 78 | Silicon, NPN, Orange, MPS 6514 S |
| Q702 | 79 | Silicon, PNP, MPS U51 |
| Q703 | 78 | Silicon, NPN, Orange, MPS 6514 S |
| Q704 | 76 | Silicon, NPN, LF, Red, 2N3566 |
| Q705 | 78 | Silicon, NPN, Orange, MPS 6514 S |
| Q706 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q707 | 76 | Silicon, NPN, LF, Red, 2N3566 |
| Q708 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q709 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q710 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q711 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q712 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q713 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q714 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q715 | 76 | Silicon, NPN, LF, Red, 2N3566 |
| Q716 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q717 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q718 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q719 | 76 | Silicon, NPN, LF, Red, 2N3566 |
| Q720 | 75 | Silicon, PNP, LF, Black, 2N5086 |

| Ref. No. | Genave Part No. TH-100- | DESCRIPTION |
|---|---|---|
| Q721 | 76 | Silicon, NPN, LF, Red, 2N3566 |
| Q722 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q723 | 76 | Silicon, NPN, LF, Red, 2N3566 |
| Q724 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q725 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q726 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q727 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q728 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q729 | 78 | Silicon, NPN, Orange, MPS 6514 S |
| Q730 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q731 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q732 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q733 | 77 | Silicon, NPN, RCA 39940 |
| Q734 | 77 | Silicon, NPN, RCA 39940 |
| Q735 | 77 | Silicon, NPN, RCA 39940 |
| Q736 | | Unassigned |
| Q753 | 75 | Silicon, PNP, LF, Black, 2N5086 |
| Q754 | | Unassigned |
| | | **RESISTORS** |
| R700 | 47 | 1K, ½ W, 10% |
| R701 | 43 | 15 ohms, 1 W, 10% |
| R702 | 48 | 2.2K, ½ W, 10% |
| R703 | 44 | 330 ohms, ½ W, 10% |
| R704 | 47 | 1K, ½ W, 10% |
| R705 | 35 | Trimmer, 1K, 20% |
| R706 | 48 | 2.2K, ½ W, 10% |
| R707 | | Unassigned |
| R708 | 57 | 150K, ½ W, 10% |
| R709 | 56 | 100K, ½ W, 10% |
| R710 | 58 | 220K, ½ W, 10% |
| R711 | 70 | Precision, 464K, 1% |
| R712 | 47 | 1K, ½ W, 10% |
| R713 | 63 | Precision, 221 ohm, 1% |
| R714 | 63 | Precision, 221 ohm, 1% |
| R715 | 66 | Precision, 47.5K, 1% |
| R716 | 36 | Trimmer, 10K, 20% |
| R717 | 47 | 1K, ½ W, 10% |
| R718 | 63 | Precision, 221 ohm, 1% |
| R719 | 63 | Precision, 221 ohm, 1% |
| R720 | 37 | Variable, 10K, OBS Pot |
| R721 | 38 | Trimmer, 20K, 20% |
| R722 | 51 | 10K, ½ W, 10% |
| R723 | 56 | 100K, ½ W, 10% |
| R724 | 47 | 1K, ½ W, 10% |
| R725 | 47 | 1K, ½ W, 10% |
| R726 | 50 | 4.7K, ½ W, 10% |
| R727 | 56 | 100K, ½ W, 10% |
| R728 | 56 | 100K, ½ W, 10% |
| R729 | 47 | 1K, ½ W, 10% |
| R730 | 47 | 1K, ½ W, 10% |
| R731 | 51 | 10K, ½ W, 10% |
| R732 | 56 | 100K, ½ W, 10% |
| R733 | 55 | 82K, ½ W, 10% |
| R734 | 51 | 10K, ½ W, 10% |
| R735 | 51 | 10K, ½ W, 10% |
| R736 | 51 | 10K, ½ W, 10% |
| R737 | 47 | 1K, ½ W, 10% |
| R738 | 66 | Precision, 47.5K, 1% |
| R739 | 39 | Trimmer, 50K, 20% |
| R740 | 54 | 47K, ½ W, 10% |
| R741 | 50 | 4.7K, ½ W, 10% |
| R742 | 65 | Precision, 1K, 1% |
| R743 | 65 | Precision, 1K, 1% |
| R744 | 70 | Precision, 464K, 1% |
| R745 | 38 | Trimmer, 20K, 20% |
| R746 | 52 | 18K, ½ W, 10% |
| R747 | 56 | 100K, ½ W, 10% |
| R748 | 51 | 10K, ½ W, 10% |
| R749 | 52 | 18K, ½ W, 10% |
| R750 | 56 | 100K, ½ W, 10% |
| R751 | 51 | 10K, ½ W, 10% |
| R752 | 56 | 100K, ½ W, 10% |
| R753 | 54 | 47K, ½ W, 10% |
| R754 | 50 | 4.7K, ½ W, 10% |
| R755 | 47 | 1K, ½ W, 10% |
| R756 | 47 | 1K, ½ W, 10% |
| R757 | 60 | 470K, ½ W, 10% |
| R758 | 38 | Trimmer, 20K, 20% |
| R759 | 59 | 15K, ½ W, 10% |
| R760 | 68 | Precision, 140K, 1% |
| R761 | 69 | Precision, 150K, 1% |
| R762 | 56 | 100K, ½ W, 10% |
| R763 | 67 | Precision, 56.2K, 1% |
| R764 | 70 | Precision, 464K, 1% |
| R765 | 51 | 10K, ½ W, 10% |
| R766 | 46 | 680 ohms, ½ W, 10% |
| R767 | 68 | Precision, 140K, 1% |
| R768 | 69 | Precision, 150K, 1% |
| R769 | 56 | 100K, ½ W, 10% |
| R770 | 70 | Precision, 464K, 1% |
| R771 | 51 | 10K, ½ W, 10% |
| R772 | 46 | 680 ohms, ½ W, 10% |
| R773 | 51 | 10K, ½ W, 10% |
| R774 | 71 | 455 ohms, ¼ W, 1% |
| R775 | 64 | Precision, 650 ohm, 1% |
| R776 | 71 | 455 ohms, ½ W, 1% |
| R777 | 64 | Precision, 650 ohm, 1% |

| Ref. No. | Genave Part No. TH-100- | DESCRIPTION |
|---|---|---|
| R778 | 51 | 10K, ½ W, 10% |
| R779 | 54 | 47K, ½ W, 10% |
| R780 | 54 | 47K, ½ W, 10% |
| R781 | 51 | 10K, ½ W, 10% |
| R782 | 47 | 1K, ½ W, 10% |
| R783 | 51 | 10K, ½ W, 10% |
| R784 | 51 | 10K, ½ W, 10% |
| R785 | 51 | 10K, ½ W, 10% |
| R786 | 56 | 100K, ½ W, 10% |
| R787 | 55 | 82K, ½ W, 10% |
| R788 | 49 | 3.3K, ½ W, 10% |
| R789 | 51 | 10K, ½ W, 10% |
| R790 | 51 | 10K, ½ W, 10% |
| R791 | 51 | 10K, ½ W, 10% |
| R792 | | Unassigned |
| R813 | 67 | Precision, 56.2K, 1% |
| R814 | | Unassigned |
| R833 | 45 | 560 ohm, ½ W, 10% |
| R834 | 39 | Trimmer, 50K, 20% |
| R835 | | Unassigned |
| R840 | 73 | 68 ohms, ½ W, 10% |
| R841 | 72 | 10 ohms, ½ W, 10% |
| R842 | | Unassigned |

| Ref. No. | Genave Part No. TH-100- | DESCRIPTION |
|---|---|---|
| | | **METER** |
| M1A | MH1 | METER HEAD Assembly (see figure 4-4-4) |
| | | **MISCELLANEOUS** |
| | 82 | Clip, lamp, Spring |
| | 83 | Switch, Test |
| | 84 | Panel, Side |
| | 85 | Cover, Top and Bottom |
| | 86 | Panel, Rear |
| | 87 | Panel, Switch |
| | 91 | Shaft, Drive, OBS |
| | 92 | Knob, OBS/TEST |
| | 95 | Drum Assembly, OBS |
| | 96 | Dial, OBS |
| | 98 | Gear, OBS Drum |
| | 99 | Gear, Spur |
| | 100 | Spring, Leaf, Test Switch |
| | 102 | Bearing, OBS Drive Shaft, (2 Req'd.) |
| | 105 | Grommet, Rubber |
| | 107 | Terminal Strip |
| | 108 | Connector, 12 pin, Male |
| | 109 | Connector, 12 pin, Female |
| | 110 | Cover, Connector |



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# THETA/200 PARTS LIST

| Ref. No. | Genave Part No. TH-200- | Description |
|---|---|---|
| | | **CAPACITORS** |
| C701 | 3 | Disc, .001 mfd, 10 V, Z5P |
| C702 | 18 | Aluminum Electrolytic, 125 mfd, 16 V |
| C703 | 14 | Mylar, .047 mfd, 100 V |
| C704 | 22 | Polycarbonate, .0022 mfd |
| C705 | 11 | Mylar, .01 mfd, 100 V |
| C706 | 3 | Disc, .001 mfd, 10 V, Z5P |
| C707 | 17 | Metalized Film, .1 mfd, 10 V |
| C708 | 3 | Disc, .001 mfd, 10 V, Z5P |
| C709 | 14 | Mylar, .047 mfd, 100 V |
| C710 | 14 | Mylar, .047 mfd, 100 V |
| C711 | 12 | Mylar, .022 mfd, 100 V |
| C712 | | Selected Value |
| C713 | 7 | Mylar, .0047 mfd, 100 V |
| C714 | 6 | Mylar, .0033 mfd, 100 V |
| C715 | 2 | Disc, 150 pf, 10 V, N1500 |
| C716 | 8 | Mylar, .0056 mfd, 100 V |
| C717 | 4 | Mylar, .0015 mfd, 100 V |
| C718 | 1 | Disc, 100 pf, 10 V, N1500 |
| C719 | 16 | Mylar, .1 mfd, 100 V |
| C720 | 14 | Mylar, .047 mfd, 100 V |
| C721 | 11 | Mylar, .01 mfd, 100 V |
| C722 | 14 | Mylar, .047 mfd, 100 V |
| C723 | 9 | Mylar, .0068 mfd, 100 V |
| C724 | 13 | Mylar, .033 mfd, 100 V |
| C725 | 9 | Mylar, .0068 mfd, 100 V |
| C726 | 13 | Mylar, .033 mfd, 100 V |
| C727 | 12 | Mylar, .022 mfd, 100 V |
| C728 | 5 | Mylar, .0022 mfd, 100 V |
| C729 | 11 | Mylar, .01 mfd, 100 V |
| C730 | 12 | Mylar, .022 mfd, 100 V |
| C731 | 10 | Mylar, .0082 mfd, 100 V |
| C732 | 11 | Mylar, .01 mfd, 100 V |
| C733 | 12 | Mylar, .022 mfd, 100 V |
| C734 | 10 | Mylar, .0082 mfd, 100 V |
| C735 | 18 | Aluminum Electrolytic, 125 mfd, 16 V |
| C736 | 25 | 2000 mfd, 1 V |
| C737 | 18 | Aluminum Electrolytic, 125 mfd, 16 V |
| C738 | 16 | Mylar, .1 mfd, 100 V |
| C739 | 16 | Mylar, .1 mfd, 100 V |
| C740 | 18 | Aluminum Electrolytic, 125 mfd, 16 V |
| C741 | 18 | Aluminum Electrolytic, 125 mfd, 16 V |
| C742 | 15 | Mylar, .22 mfd, 100 V |
| C743 | 3 | Disc, .001 mfd, 10 V, Z5P |
| C744 | 3 | Disc, .001 mfd, 10 V, Z5P |
| C745 | 9 | Mylar, .0068 mfd, 100 V |
| C746 | 13 | Mylar, .033 mfd, 100 V |
| C747 | 9 | Mylar, .0068 mfd, 100 V |
| C748 | 13 | Mylar, .033 mfd, 100 V |
| C749 | 12 | Mylar, .022 mfd, 100 V |
| C750 | 5 | Mylar, .0022 mfd, 100 V |
| C751 | 11 | Mylar, .01 mfd, 100 V |
| C752 | 12 | Mylar, .022 mfd, 100 V |
| C753 | 10 | Mylar, .0082 mfd, 100 V |
| C754 | 11 | Mylar, .01 mfd, 100 V |
| C755 | 12 | Mylar, .022 mfd, 100 V |
| C756 | 10 | Mylar, .0082 mfd, 100 V |
| C757 | 18 | Aluminum Electrolytic, 125 mfd, 16 V |
| C758 | 21 | Aluminum Electrolytic, 250 mfd, 16 V |
| C759 | 18 | Aluminum Electrolytic, 125 mfd, 16 V |
| C760 | | Unassigned |
| C761 | | Unassigned |
| C762 | 15 | Mylar, .22 mfd, 100 V |
| C763 | 18 | Aluminum Electrolytic, 125 mfd, 16 V |
| C764 | 13 | Mylar, .033 mfd, 100 V |
| C765 | 3 | Disc, .001 mfd, 10 V, Z5P |
| C766 | 24 | .01 mfd, 10 V, +20% |
| C767 | 3 | Disc, .001 mfd, 10 V, Z5P |
| C768 | | Unassigned |
| | | **DIODES** |
| CR701 | 27 | Zener, 24 V, 1 W, 10% |
| CR702 | 28 | Zener, 5.6 V, 1 W, 10% |
| CR703 | 29 | Silicon, High Frequency Switching, FD1936 |
| CR704 | 29 | Silicon, High Frequency Switching, FD1936 |
| CR705 | 29 | Silicon, High Frequency Switching, FD1936 |
| CR706 | 29 | Silicon, High Frequency Switching, FD1936 |
| CR707 | 30 | Germanium, General Purpose, IN34A |
| CR708 | 30 | Germanium, General Purpose, IN34A |
| CR709 | 30 | Germanium, General Purpose, IN34A |
| CR710 | 30 | Germanium, General Purpose, IN34A |
| CR711 | 30 | Germanium, General Purpose, IN34A |
| CR712 | 30 | Germanium, General Purpose, IN34A |
| CR713 | | Unassigned |
| | | **LAMPS** |
| DS701 | 100 | 14 VDC, 80 Ma, Clear |
| DS702 | 100 | 14 VDC, 80 Ma, Clear |
| DS703 | | Part of M1B Assembly |
| DS704 | | Part of M1B Assembly |
| DS705 | | Part of M1B Assembly |
| DS706 | | Part of M1B Assembly |
| DS707 | | Part of M1B Assembly |
| DS708 | | Part of M1B Assembly |
| | | **COILS** |
| L701 | 23 | 50 Mhy, ±10% |

| Ref. No. | Genave Part No. TH-200- | Description |
|---|---|---|
| | | **TRANSISTORS** |
| Q701 | 78 | Silicon, NPN, Orange, MPS 6514 S |
| Q702 | 79 | Silicon, PNP, MPS U51 |
| Q703 | 78 | Silicon, NPN, Orange, MPS 6514 S |
| Q704 | 75 | Silicon, NPN, LF, Red, 2N3566 |
| Q705 | 78 | Silicon, NPN, Orange, MPS 6514 S |
| Q706 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q707 | 75 | Silicon, NPN, LF, Red, 2N3566 |
| Q708 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q709 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q710 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q711 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q712 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q713 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q714 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q715 | 75 | Silicon, NPN, LF, Red, 2N3566 |
| Q716 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q717 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q718 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q719 | 75 | Silicon, NPN, LF, Red, 2N3566 |
| Q720 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q721 | 75 | Silicon, NPN, LF, Red, 2N3566 |
| Q722 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q723 | 75 | Silicon, NPN, LF, Red, 2N3566 |
| Q724 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q725 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q726 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q727 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q728 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q729 | 78 | Silicon, NPN, Orange, MPS 6514 S |
| Q730 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q731 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q732 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q735 | 77 | Silicon, NPN, RCA 39940 |
| Q733 | 77 | Silicon, NPN, RCA 39940 |
| Q734 | 77 | Silicon, NPN, RCA 39940 |
| Q736 | 76 | Silicon, PNP, LF, Black, ZN5086 |
| Q737 | 76 | Silicon, PNP, LF, Black, ZN5086 |
| Q738 | 75 | Silicon, NPN, LF, Red, 2N3566 |
| Q739 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q740 | 75 | Silicon, NPN, LF, Red, 2N3566 |
| Q741 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q742 | 75 | Silicon, NPN, LF, Red, 2N3566 |
| Q743 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q744 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q745 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q746 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q747 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q748 | 78 | Silicon, NPN, Orange, MPS 6514 S |
| Q749 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q750 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q751 | 77 | Silicon, NPN, RCA 39940 |
| Q752 | 77 | Silicon, NPN, RCA 39940 |
| Q753 | 76 | Silicon, PNP, LF, Black, 2N5086 |
| Q754 | | Unassigned |
| | | **RESISTORS** |
| R700 | 47 | 1K, ½ W, 10% |
| R701 | 43 | 15 ohms, 1 W, 10% |
| R702 | 48 | 2.2K, ½ W, 10% |
| R703 | 44 | 330 ohm, ½ W, 10% |
| R704 | 47 | 1K, ½ W, 10% |
| R705 | 34 | Trimmer, 1K, 20% |
| R706 | 48 | 2.2K, ½ W, 10% |
| R707 | | Unassigned |
| R708 | 58 | 150K, ½ W, 10% |
| R709 | 57 | 100K, ½ W, 10% |
| R710 | 59 | 220K, ½ W, 10% |
| R711 | 71 | Precision, 464K, 1% |
| R712 | 47 | 1K, ½ W, 10% |
| R713 | 64 | Precision, 221 ohm, 1% |
| R714 | 64 | Precision, 221 ohm, 1% |
| R715 | 67 | Precision, 47.5K, 1% |
| R716 | 35 | Trimmer, 10K, 10% |
| R717 | 47 | 1K, ½ W, 10% |
| R718 | 64 | Precision, 221 ohm, 1% |
| R719 | 64 | Precision, 221 ohm, 1% |
| R720 | 36 | Pot, 10K, OBS |
| R721 | 37 | Trimmer, 20K, 20% |
| R722 | 51 | 10K, ½ W, 10% |
| R723 | 57 | 100K, ½ W, 10% |
| R724 | 47 | 1K, ½ W, 10% |
| R725 | 47 | 1K, ½ W, 10% |
| R726 | 50 | 4.7K, ½ W, 10% |
| R727 | 57 | 100K, ½ W, 10% |
| R728 | 57 | 100K, ½ W, 10% |
| R729 | 47 | 1K, ½ W, 10% |
| R730 | 47 | 1K, ½ W, 10% |
| R731 | 51 | 10K, ½ W, 10% |
| R732 | 57 | 100K, ½ W, 10% |
| R733 | 56 | 82K, ½ W, 10% |
| R734 | 51 | 10K, ½ W, 10% |
| R735 | 51 | 10K, ½ W, 10% |
| R736 | 51 | 10K, ½ W, 10% |
| R737 | 47 | 1K, ½ W, 10% |
| R738 | 67 | Precision, 47.5K, 1% |
| R739 | 38 | Trimmer, 50K, 20% |
| R740 | 55 | 47K, ½ W, 10% |
| R741 | 50 | 4.7K, ½ W, 10% |

| Ref. No. | Genave Part No. TH-200- | DESCRIPTION |
|---|---|---|
| R742 | 65 | Precision, 1K, 1% |
| R743 | 65 | Precision, 1K, 1% |
| R744 | 71 | Precision, 464K, 1% |
| R745 | 37 | Trimmer, 20K, 20% |
| R746 | 53 | 18K, ½ W, 10% |
| R747 | 57 | 100K, ½ W, 10% |
| R748 | 51 | 10K, ½ W, 10% |
| R749 | 53 | 18K, ½ W, 10% |
| R750 | 57 | 100K, ½ W, 10% |
| R751 | 51 | 10K, ½ W, 10% |
| R752 | 57 | 100K, ½ W, 10% |
| R753 | 55 | 47K, ½ W, 10% |
| R754 | 50 | 4.7K, ½ W, 10% |
| R755 | 47 | 1K, ½ W, 10% |
| R756 | 47 | 1K, ½ W, 10% |
| R757 | 60 | 470K, ½ W, 10% |
| R758 | 37 | Trimmer, 20K, 20% |
| R759 | 52 | 15K, ½ W, 10% |
| R760 | 69 | Precision, 140K, 1% |
| R761 | 70 | Precision, 150K, 1% |
| R762 | 57 | 100K, ½ W, 10% |
| R763 | 68 | Precision, 56.2K, 1% |
| R764 | 71 | Precision, 464K, 1% |
| R765 | 51 | 10K, ½ W, 10% |
| R766 | 46 | 680 ohm, ½ W, 10% |
| R767 | 69 | Precision, 140K, 1% |
| R768 | 70 | Precision, 150K, 1% |
| R769 | 57 | 100K, ½ W, 10% |
| R770 | 71 | Precision, 464K, 1% |
| R771 | 51 | 10K, ½ W, 10% |
| R772 | 46 | 680 ohm, ½ W, 10% |
| R773 | 51 | 10K, ½ W, 10% |
| R774 | 72 | 475 ohms, ¼ W, 1% |
| R775 | 66 | Precision, 650 ohm, 1% |
| R776 | 72 | 475 ohms, ¼ W, 1% |
| R777 | 66 | Precision, 650 ohm, 1% |
| R778 | 51 | 10K, ½ W, 10% |
| R779 | 55 | 47K, ½ W, 10% |
| R780 | 55 | 47K, ½ W, 10% |
| R781 | 51 | 10K, ½ W, 10% |
| R782 | 47 | 1K, ½ W, 10% |
| R783 | 51 | 10K, ½ W, 10% |
| R784 | 51 | 10K, ½ W, 10% |
| R785 | 51 | 10K, ½ W, 10% |
| R786 | 57 | 100K, ½ W, 10% |
| R787 | 56 | 82K, ½ W, 10% |
| R788 | 49 | 3.3K, ½ W, 10% |
| R789 | 51 | 10K, ½ W, 10% |
| R790 | 51 | 10K, ½ W, 10% |
| R791 | 51 | 10K, ½ W, 10% |
| R792 | 53 | 18K, ½ W, 10% |
| R793 | 57 | 100K, ½ W, 10% |
| R794 | 51 | 10K, ½ W, 10% |
| R795 | 53 | 18K, ½ W, 10% |
| R796 | 57 | 100K, ½ W, 10% |
| R797 | 51 | 10K, ½ W, 10% |
| R798 | 57 | 100K, ½ W, 10% |
| R799 | 55 | 47K, ½ W, 10% |
| R800 | 50 | 4.7K, ½ W, 10% |
| R801 | 47 | 1K, ½ W, 10% |
| R802 | 47 | 1K, ½ W, 10% |
| R803 | 60 | 470K, ½ W, 10% |
| R804 | 37 | Trimmer, 20K, 20% |
| R805 | 52 | 15K, ½ W, 10% |
| R806 | 57 | 100K, ½ W, 10% |
| R807 | 68 | Precision, 56.2K, 1% |
| R808 | 71 | Precision, 464K, 1% |
| R809 | 51 | 10K, ½ W, 10% |
| R810 | 46 | 680 ohm, ½ W, 10% |
| R811 | 57 | 100K, ½ W, 10% |
| R812 | 68 | Precision, 56.2K, 1% |
| R813 | 68 | Precision, 56.2K, 1% |
| R814 | 71 | Precision, 464K, 1% |
| R815 | 51 | 10K, ½ W, 10% |
| R816 | 46 | 680 ohm, ½ W, 10% |
| R817 | 51 | 10K, ½ W, 10% |
| R818 | 64 | Precision, 221 ohm, 1% |
| R819 | 66 | Precision, 650 ohm, 1% |
| R820 | 64 | Precision, 221 ohm, 1% |
| R821 | 66 | Precision, 650 ohm, 1% |
| R822 | 51 | 10K, ½ W, 10% |
| R823 | 63 | 150 ohm, ½ W, 10% |
| R824 | 62 | 5.6K, ½ W, 10% |
| R825 | 51 | 10K, ½ W, 10% |
| R826 | 61 | 22K, ½ W, 10% |
| R827 | 51 | 10K, ½ W, 10% |
| R828 | 49 | 3.3K, ½ W, 10% |
| R829 | 51 | 10K, ½ W, 10% |
| R830 | 57 | 100K, ½ W, 10% |
| R831 | | Unassigned |
| R832 | | Unassigned |
| R833 | 45 | 560 ohm, ½ W, 10% |
| R834 | 38 | Trimmer, 50K, 20% |
| R835 | 34 | Trimmer, 1K, 20% |
| R836 | 51 | 10K, ½ W, 10% |
| R837 | 51 | 10K, ½ W, 10% |
| R838 | 56 | 82K, ½ W, 10% |
| R839 | 57 | 100K, ½ W, 10% |
| R840 | 74 | 68 ohms, ½ W, 10% |
| R841 | 73 | 10 ohms, ½ W, 10% |
| R842 | | Unassigned |
| | | **METER** |
| M1B | MH2 | Meter Head Assembly (see figure 4-4-4) |
| | | **MISCELLANEOUS** |
| | 80 | Switch, Test |
| | 82 | Clip, Lamp, Spring |
| | 83 | Panel Side |
| | 84 | Cover, Top and Bottom |
| | 85 | Panel, Rear |
| | 86 | Panel, Switch |
| | 87 | Panel, Sub |
| | 90 | Shaft, Drive, OBS |
| | 91 | Knob, OBS/TEST |
| | 94 | Drum Assembly, OBS |
| | 95 | Dial, OBS |
| | 97 | Gear, OBS Drum |
| | 98 | Gear, Spur |
| | 99 | Spring, Leaf, Test Switch |
| | 101 | Bearing, OBS Drive Shaft, (2 Req'd.) |
| | 104 | Grommet, Rubber |
| | 106 | Terminal Strip |
| | 107 | Connector, 12 pin, Male |
| | 108 | Connector, 12 pin, Female |
| | 109 | Cover, Connector |