Honeywell

MAINTENANCE MANUAL

BENDIX/KING®

KA 57

AUTOPILOT ADAPTER

MANUAL NUMBER 006-15629-0007
REVISION 7 DECEMBER, 2001

WARNING
Prior to the export of this document, review for export license requirement is needed.

REVISION HISTORY

KA 57 Maintenance Manual

Part Number: 006-15629-XXXX

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

REVISION No. 7, December 2001

ITEM	ACTION
All pages	Full Reprint, new manual

Revision 7 creates a new stand-alone manual for the KA 57 which was extracted from revision 6 of the KCS 55/55A maintenance manual, (P/N 006-05111-0006). Any revisions to the KA 57, beginning with revision 7, will not be a part of the KCS 55/55A manual.

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SECTION IV
THEORY OF OPERATION

4.1 GENERAL

The KA 57 Autopilot Adapter interfaces the DC course and heading output signals of the KI 525 PNI to autopilots that require AC course and heading inputs. The KA 57 has four basic sections: an input buffer for a high impedance input; a modulator which converts the DC input signal into an AC signal; a logic section which selects the proper input signal and output phase; and an output stage which fixes the output amplitude and also provides a tracer signal for logic switching. Each of these sections is described below. Refer to KA 57 schematic, Figure 6-4.

4.2 INPUT BUFFER

The input to the KA 57 is through a parallel combination of two FET analog switches I106A and B) connected to the inverting input of a differential amplifier (I101A pin 2). The differential amplifier provides a high impedance isolating input while the logic circuitry selects either the course or heading signal for the amplifier input by placing a ground potential on the gate of the appropriate FET switch.

4.3 MODULATOR

The modulator converts the DC output of the input buffer into an AC signal to drive the output stage. The active components of the modulator are Q107 which is driven by a 5KHz square wave from the logic section, and FET Q101 which is switched between full on and pinch off by the signal from the collector of Q107. As Q101 switches from full off to full on it alternately presents a high impedance and then ground to the junction of R105 and C106. This produces a square wave at this junction alternating at a 5KHz rate between ground and the buffer output voltage level. The two capacitors C106 and C107 remove the DC component of the square wave so the input to the output stage is a square wave centered around zero volts whose peak-to-peak amplitude is equal to the DC voltage of the buffer output.

4.4 LOGIC SECTION

The logic section selects the proper buffer input signal and output loop gain by monitoring the Radio Coupler output for the presence of the tracer signal. Similarly from the high (open) or low (ground) state of the LOCALIZER ENERGIZED and LOCALIZER. NORMAL lines the logic section determines the proper phase for the output signal.

The presence of the tracer signal on the radio coupler output is detected by the high pass active filter and envelope detector formed by I104 and its associated parts and the diode and resistor-capacitor combination of CR101, R116 and C105. When the tracer signal is present in sufficient amplitude, it passes through the filter and the detector converts it into a DC signal keeping Q106 in the ON state. The resulting low state at the collector of Q106 is passed through I103 and is seen as a low at the gates of I106A and I107A. A low signal at these gates connects the heading signal into the buffer amplifier (I101A) and closes the loop around the output stage amplifier (I101B) with R108 setting the loop gain.

The logic section determines the KA 57 output phase by using the 5KHz reference signal and the high or low state of the LOCALIZER ENERGIZED and LOCALIZER NORMAL lines. The output signal phase is referenced to the REF AC MODULATOR DRIVE which is coupled into the logic circuit by transformer T101.

This signal is reduced in amplitude by the voltage divider R122 and R123, clipped by CR102, and applied to one side of a two input "exclusive or" logic circuit (pins 5 and 8 of I102).

It is the characteristic of an "exclusive or" circuit that the output is high only when just one of the inputs is high. For any other condition, two low inputs, two high inputs, the "exclusive or" output is low. In the logic section by controlling the second input to the "exclusive or", the output can be made to switch in phase with the applied reference signal or 180 deg. out of phase with the reference signal.

For example, when the second input to the "exclusive or' circuit is low the output will be high when the reference square wave is high, and low when the reference signal is low. However, when the second input to the circuit is high and the reference input is high the output is low and when the reference input is low the output is high. In this way, the "exclusive or" output is in or out of phase with the reference input according to the state of the second "exclusive or" input.

The second input to the "exclusive or" circuit is the logical AND of the LOC ENG, LOC NORMAL, and course position of the Radio Coupler selector switch. When the LOC ENG line is low (ground) and the LOC NORMAL line is high (open) and the coupler selector switch is in the LOC REV position the second input to the "exclusive or" circuit (I102 pins 1 and 2) will be high and the "exclusive or" circuit output (I102 pin 11) will be the reverse of the reference signal input.

The output of the "exclusive or" circuit is applied to the base of Q107 which in turn drives the FET modulator Q101 which produces the square wave drive for the output stage.

4.5 OUTPUT STAGE

The output stage consists of a variable gain amplifier connected to a complementary emitter follower pair which drives the output transformer, and an oscillator coupled to the secondary of the output transformer which produces the tracer signal for the heading logic.

The input to the variable gain amplifier (I101B) is the 5KHz square wave from the modulator section. This signal is amplified by a factor determined by the setting of one of the two variable resistors in the feedback loop (R108 or R109). Which of the two variable resistors will be connected in the feedback loop is determined by the logic circuitry which places a ground on the gate of the appropriate FET switch (I107A for Heading, I107B for Course). The emitter follower complimentary pair Q102, Q103 drives the output transformer.

Amplifier 1105 forms the tracer oscillator and is coupled to the output circuit through C110. The oscillator frequency is determined by RC components R112 and C108. Hysteresis adjustment is performed with R132 which is used to adjust the oscillator output amplitude during system calibration.

4.6 NAV-0-MATIC OPERATION

The following is a brief description of the operation of the KA 57 when it is the interface between the KCS 55 and the NAV-0-MATIC 400.

The KA 57 wired for operation with the Nav-0-Matic 400 Autopilot has a jumper wire connecting J101 pin 1 to pin D of the KA 57. The jumper connects the base of Q106 to +5VDC through R131 and causes Q106 to conduct. The resulting low state of the collector of Q106 reflected through the logic of 1103 places a ground at the gates of the FET analog switched I106A and I107A closing the switches. This connects the Heading input into the Buffer amplifier I101A and sets the gain of the Output stage by closing the loop around I101B and R108. The Course input switches into the KA 57 when J101 pin C is switched to ground through the INTERCEPT -TRK-HDG switch of the Nav-O-Matic 400 Controller box. A ground on pin C reduces the base voltage of Q106 below the turn on level and Q106 stops conduction.

The collector potential of Q106 rises to +10VDC which when reflected through the logic of I103 places a ground at the gates of the FET analog switches I106B and I107B. This closes the switch and connects the Course input into the buffer amplifier and sets the gain of the output stage by closing the loop around I101B with R109.

The Tracer-Oscillator (I105) and the logic switching section Q105, Q104) of the KA 57 are not used with the Nav-O-Matic 400 Autopilot system and may be disabled by removing CJ101.

A similar interface situation occurs with the Mitchell Century IC388 Radio Couplers above serial number 6000. In this system, the tracer oscillator and the sense amplifier I104 are deactivated. Pin A of J101 is grounded and a jumper is connected between J101 pins D and 1. Oscillator I105 is deactivated by adjusting the wiper of R132 at the ground side of the potentiometer. A control switch is connected to pin J101-C such that an OPEN appears at pin C during Heading Operation and a GROUND appears during NAV operation. On Mitchell Century systems with radio couplers IC388, IC388M and IC388P, an additional circuit consisting of C116, L101, and R133 is provided to supply the proper DG excitation load to the system.

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SECTION V
MAINTENANCE

5.1 GENERAL INFORMATION

This section covers the testing, overhaul, and troubleshooting procedures for the KA 57 Autopilot adapter.

5.2 PURPOSE

The following establishes the performance requirements that this unit must meet before it can be used as part of an operational system.

5.2.1 General Requirements

Unless otherwise specified, all test shall be conducted with the unit in its normal position, at normal room temperature (25 deg. ±5 deg. C), and at a relative humidity less than 80%.

Electrical Output Signals

a. HDG/CRS SIG: either the Heading or Course Datum signal as determined by the radio coupler selector switch.

Electrical Input Signals

a. HEADING ERROR: a dc input from the KI 525 scaled at 0.6v/deg with positive voltages representing increasing heading commands.

b. COURSE DATUM ERROR: a dc input from the KI 525 scaled at 0.3v/deg with positive voltages representing increasing course commands.

c. REF AC MODULATOR DRIVE: a 5KHz square wave from the aircraft autopilot system.

d. LOC NORMAL: a ground at this input indicates that the radio coupler is in the LOC normal mode.

e. LOC ENERGIZE: a ground at this point indicates that the radio is turned to a localizer frequency.

Power Input

a. +15v at 30mA

b. -15v at 10mA

Signal Test Sources and Test Equipment

a. Electronic test circuitry as shown in Figure 5-1

b. Test Equipment

DC Voltmeter: Hewlett Packard model 412A or equivalent.

AC Voltmeter: Ballantine Lab, Inc. model 300G or equivalent.

Oscilloscope: Tektronix model 516 or equivalent.

5.2.2 Test Requirements

Remove the cover from the KA 57 and connect the unit to the Test Set as shown in Figure 5-1.

Set the following switches and potentiometers as noted:

KA 57 CRS pot	Midway between end stops.	
HDG pot.	Midway between end stops.	
TEST SET	LOC NOR	OPEN
	LOC ENG	OPEN
	INPUT	FULL CCW
	HDG/CRS	HDG

Turn on the power to the test set and measure the following voltages:

+15v ±0.4v at pin 5 referred to pin F

-15v ±0.4v at pin K referred to pin F

10v ±2vpp at 5KHz ±500Hz between pins 4 and E

Function Check

Set the following switches as indicated:

LOC NOR	OPEN
LOC ENG	OPEN
HDG/CRS	HDG
NAV JUMPER	OPEN
NAV SIG	OPEN

a) With the oscilloscope vertical calibration set at 5v/cm observe the waveform at pin 2. Slowly vary the INPUT potentiometer from full CCW to full CW. The voltage at pin 2 should remain at +0.7v ±0.3v through the full range of the potentiometer.

b) Using the INPUT potentiometer set the voltage at pin 10 to 0.0v ±0.20vdc. The voltage at pin 2 should be 0.7v ±0.3v.

c) With the voltage at pin 10 set as in step b above, observe the voltage at pin 2. Change the HDG /CRS switch to CRS. The voltage at pin 2 should go from 0.7v to 5.0v ±0.25v.

d) Observe the voltage at pin 2 with the oscilloscope and vary the input potentiometer from full CCW to full CW. The voltage at pin 2 should remain at 5.0v ±0.25v.

e) Switch the NAV JUMPER switch closed. The voltage at pin 2 should be 0.7v ±0.3v.

f) Switch the NAV SIG switch closed. The voltage at pin 2 should be 5.0 ±0.25v. Return NAV JUMPER and NAV SIG to OPEN.

Phase Check

a) Set the following switches as indicated.

LOC ENG	CLOSED
LOC REV	CLOSED
HDG/CRS	CRS
NAV JUMPER	OPEN
NAV SIG	OPEN

b) Using the External Sync of the oscilloscope trigger the oscilloscope sweep with the positive going edge of the 5KHz Ref Drive available at test point 1 of the test set. With the oscilloscope observe the waveform at pin C. The leading edge of the observed signal should be positive going.

c) Observe the waveform at pin H with respect to pin J. The waveform should be a positive going square wave.

d) Change the LOC REV switch to the OPEN position. ' The phase of the observed waveform should be reversed with the leading edge of the waveform negative going.

SAMPLE TEST DATA SHEET

Power:

+15v ±1.0v at pin 5 referenced to pin F	_____	volts
-15v ±1.0v at pin K referenced to Pin E	_____	volts
10v ±2v pp, 5KHz ±500Hz pin 4 to pin E	_____	volts
	_____	Hz

Function:

a)	pin 2 at 0.7v ±0.3v for full rotation of INPUT pot.	_____	volts +0.7 ±0.3v
b)	pin 2 voltage with 0.0v ±0.20v at pin 10	_____	volts +0.7 ±0.3v
c)	pin 2 voltage with HDG/CRS switch at HDG	_____	volts +0.7 ±0.3v
d)	pin 2 voltage with HDG/CRS switch at CRS	_____	volts +5.0 ±0.25v
e)	pin 2 at 5.0v ±0.5v for full rotation INPUT pot.	_____	volts +5.0 ±0.25v
f)	NAV JUMPER closed	_____	volts +0.7 ±0.3v
g)	NAV SIG closed	_____	volts +5.0 ±0.25v

Phase

a)	Signal at pin E in phase (positive going) with reference signal	_____
b)	Signal at pin J in phase (positive going) with reference signal - LOC REV - CLOSED	_____
c)	Signal at pin J out of phase (negative going) with reference signal - LOC REV - OPEN	_____

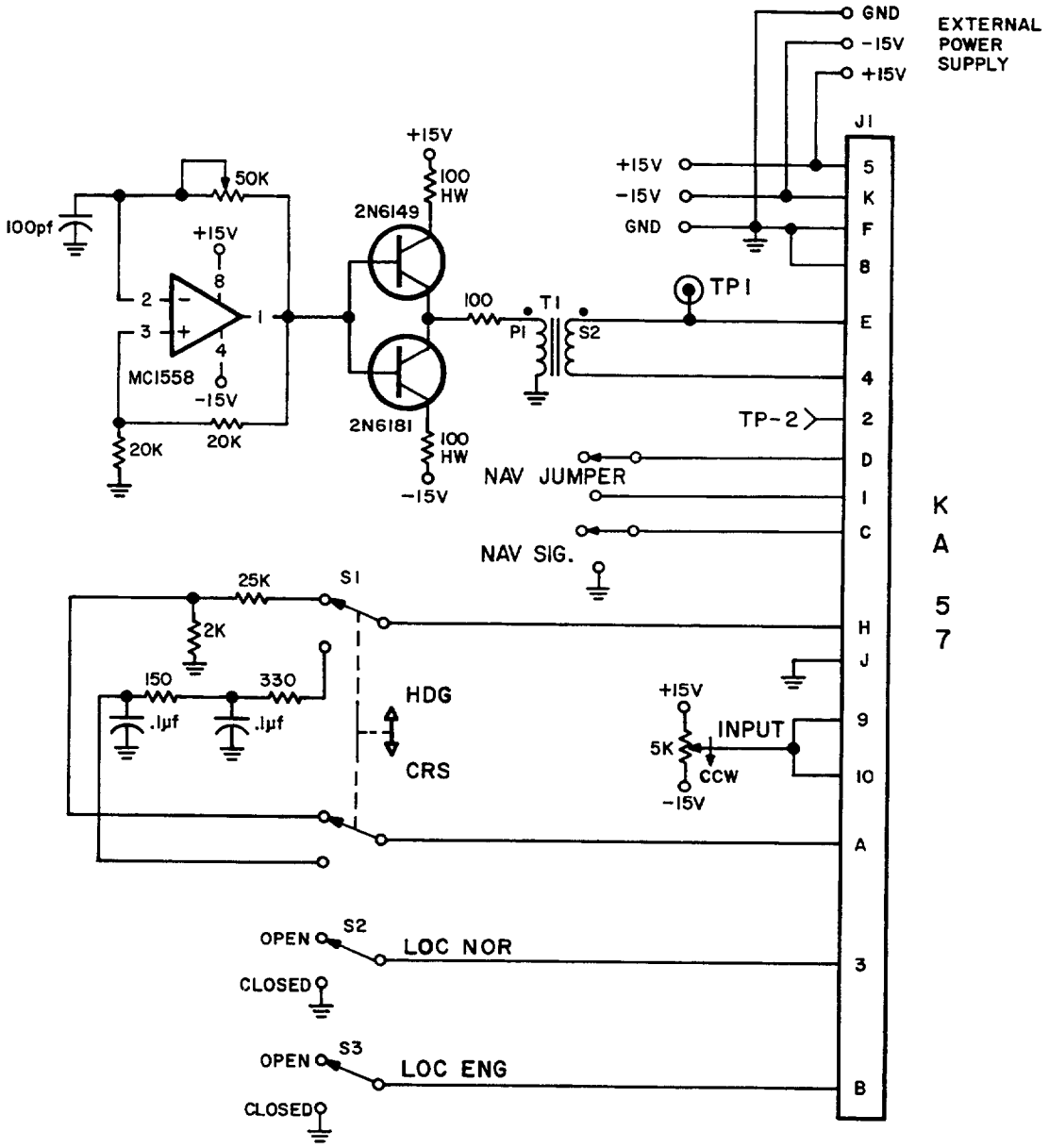


FIGURE 5-1 KA 57 TEST SET SCHEMATIC

5.3 OVERHAUL

5.3.1 VISUAL INSPECTION

This section contains instructions and information to assist in determining, by visual inspection, the condition of the units major assemblies and subassemblies. These inspection procedures will assist in finding defects resulting from wear, physical damage, deterioration, or other causes. To aid inspection, detailed procedures are arranged in alphabetical order.

A. Capacitors, Fixed

Inspect capacitors for case damage, body damage, and cracked, broken, or charred insulation. Check for loose, broken, or corroded terminal studs, lugs, or leads. Inspect for loose, broken, or improperly soldered connections. On chip caps, be especially alert for hairline cracks in the body and broken terminations.

B. Capacitors, Variable

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

C. Chassis

Inspect the chassis for loose or missing mounting hardware, deformation, dents, damaged fasteners, or damaged connectors. In addition, check for corrosion or damage to the finish that should be repaired.

D. Circuit Boards

Inspect for loose, broken, or corroded terminal connections; insufficient solder or improper bonding; fungus, mold, or other deposits; and damage such as cracks, burns, or charred traces.

E. Connectors

Inspect the connector bodies for broken parts; check the insulation for cracks, and check the contacts for damage, misalignment, corrosion, or bad plating. Check for broken, loose, or poorly soldered connections to terminals of the connectors. Inspect connector hoods and cable clamps for crimped wires.

F. Covers and Shields

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

G. Flex Circuits

Inspect flex circuits for punctures, and badly worn surfaces. Check for broken traces, especially near the solder contact points.

H. Front Panel

Check that name, serial, and any plates or stickers are secure and hardware is tight. Check that the handle is functional, securely fastened, and handle casting is not damaged or bent.

I. Fuse

Inspect for blown fuse and check for loose solder joints.

J. Insulators

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

K. Jacks

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

L. Potentiometers

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

M. Resistors, Fixed

Inspect the fixed resistors for cracked, broken, blistered, or charred bodies and loose, broken, or improperly soldered connections. On chip resistors, be especially alert for hairline cracks in the body and broken terminations.

N. RF Coils

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

O. Terminal Connections Soldered

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

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

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

(4) Inspect for corrosion at the terminal.

P. Transformers

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

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

Q. Wiring/Coaxial Cable

Inspect wiring in chassis for breaks in insulation, conductor breaks, cut or broken lacing and improper dress in relation to adjacent wiring or chassis.

5.3.2 CLEANING

A. General

This section contains information to aid in the cleaning of the component parts and subassemblies of the unit.

WARNING:
GOGGLES ARE TO BE WORN WHEN USING PRESSURIZED AIR TO BLOW DUST AND DIRT FROM EQUIPMENT. ALL PERSONNEL SHOULD BE WARNED AWAY FROM THE IMMEDIATE AREA.

WARNING:
OPERATIONS INVOLVING THE USE OF A CLEANING SOLVENT SHOULD BE PERFORMED UNDER A VENTILATED HOOD. AVOID BREATHING SOLVENT VAPOR AND FUMES; AVOID CONTINUOUS CONTACT WITH THE SOLVENT. WEAR A SUITABLE MASK, GOGGLES, GLOVES, AND AN APRON WHEN NECESSARY. CHANGE CLOTHING UPON WHICH SOLVENTS HAVE BEEN SPILLED.

WARNING:
OBSERVE ALL FIRE PRECAUTIONS FOR FLAMMABLE MATERIALS. USE FLAMMABLE MATERIALS IN A HOOD PROVIDED WITH SPARK-PROOF ELECTRICAL EQUIPMENT AND AN EXHAUST FAN WITH SPARKPROOF BLADES.

B. Recommended Cleaning Agents

Table 5-1 lists the recommended cleaning agents to be used during overhaul of the unit.

NOTE:
EQUIVALENT SUBSTITUTES MAY BE USED FOR LISTED CLEANING AGENTS.

TYPE	USED TO CLEAN
Denatured Alcohol	Various, exterior and interior
DuPont Vertrel SMT	Various, interior
PolaClear Cleaner (Polaroid Corp.) or Texwipe TX129 (Texwipe Co.)	CRT display filter, LCD displays, and general purpose lens/glass cleaner.
KimWipes lint-free tissue (Kimberly Clark Corp.)	Various
Cloth, lint-free cotton	Various
Brush, flat with fiber bristles	Various
Brush, round with fiber bristles	Various
Dishwashing liquid (mild)	Nylon, Rubber Grommets

TABLE 5-1 RECOMMENDED CLEANING AGENTS

C. Recommended Cleaning Procedures

CAUTION:
DO NOT ALLOW SOLVENT TO RUN INTO SLEEVES OR CONDUIT THAT COVERS WIRES CONNECTED TO INSERT TERMINALS.

1. Exterior
   (a) Wipe dust cover and front panel with a lint-free cloth dampened with denatured alcohol.
   (b) For cleaning connectors, use the following procedure.
      (1) Wipe dust and dirt from bodies, shells, and cable clamps using a lint-free cloth moistened with denatured alcohol.
      (2) Wipe parts dry with a clean, dry lint-free cloth.
      (3) Remove dirt and lubricant from connector inserts, insulation, and terminals using a small soft bristled brush moistened with denatured alcohol.
      (4) Dry the inserts with an air jet.
   (c) Remove cover(s).
   (d) If necessary, open any blocked ventilation holes by first saturating the debris clogging the apertures with denatured alcohol and then blowing the loosened material out with an air stream.
2. Interior

   The following solvents are no longer recommended for benchtop or rework cleaning of printed circuit boards, modules, or sub-assemblies.

FREON TF, IMC	TRICHLOROETHANE
CARBON TETRACHLORIDE	DETERGENT (ALL™ AND EQUIVALENTS)
CHLOROFORM	METHYLENE CHLORIDE
TRICHLOROETHYLENE	GENESOLV 2004/2010
PROPYL ALCOHOL	METHYL ALCOHOL
ETHYL ALCOHOL	BUTYL ALCOHOL
XYLENE	PRELETE (CFC-113)

TABLE 5-2 UNSAFE CLEANING AGENTS

CAUTION:

DO NOT USE SOLVENT TO CLEAN PARTS COMPOSED OF OR CONTAINING NYLON OR RUBBER GROMMETS. CLEAN THESE ITEMS WITH MILD LIQUID DISHWASHING DETERGENT AND WATER. USE DETERGENT FOR THIS PURPOSE ONLY.

CAUTION:

DUPONT VERTREL SMT DOES HAVE GENERAL MATERIAL COMPATIBILITY PROBLEMS WITH POLYCARBONATE, POLYSTYRENE, AND RUBBER. IT IS RECOMMENDED THAT THESE MATERIALS BE CLEANED WITH DENATURED ALCOHOL.

CAUTION:

DO NOT ALLOW EXCESS CLEANING SOLVENT TO ACCUMULATE IN ANY OF THE ADJUSTMENT SCREW CREVICES AND THEREBY SOFTEN OR DISSOLVE THE ADJUSTMENT SCREW EPOXY SEALANT.

CAUTION:

AVOID AIR-BLASTING SMALL TUNING COILS AND OTHER DELICATE PARTS BY HOLDING THE AIR NOZZLE TOO CLOSE. USE BRUSHES CAREFULLY ON DELICATE PARTS.

CAUTION:

IMPROPER CLEANING CAN RESULT IN SURFACE LEAKAGE AND CONDUCTIVE PARTICULATES, SUCH AS SOLDER BALLS OR METALLIC CHIPS, WHICH CAN CAUSE ELECTRICAL SHORTS. SEVERE IONIC CONTAMINATION FROM HANDLING AND FROM ENVIRONMENTAL CONDITIONS CAN RESULT IN HIGH RESISTANCE OR OPEN CIRCUITS.

CAUTION:

ULTRASONIC CLEANING CAN DAMAGE CERTAIN PARTS AND SHOULD GENERALLY BE AVOIDED.

NOTE:

Solvents may be physically applied in several ways including agitation, spraying, brushing, and vapor degreasing. The cleaning solvents and methods used shall have no deleterious effect on the parts, connections, and materials being used. If sensitive components are being used, spray is recommended. Uniformity of solvent spray flow should be maximized and wait-time between soldering and cleaning should be minimized.

NOTE:

Clean each module subassembly. Then remove any foreign matter from the casting.

Remove each module subassembly. Then remove any foreign matter from the casting.

(a) Casting covers and shields should be cleaned as follows:

(1) Remove surface grease with a lint-free cloth.

(2) Blow dust from surfaces, holes, and recesses using an air stream.

(3) If necessary, use a solvent, and scrub until clean, working over all surfaces and into all holes and recesses with a suitable non-metallic brush.

(4) Position the part to dry so the solvent is not trapped in holes or recesses. Use an air stream to blow out any trapped solvent.

(5) When thoroughly clean, touch up any minor damage to the finish.

(b) Assemblies containing resistors, capacitors, rf coils, inductors, transformers, and other wired parts should be cleaned as follows:

(1) Remove dust and dirt from all surfaces, including all parts and wiring, using soft-bristled brushes in conjunction with air stream.

(2) Any dirt that cannot be removed in this way should be removed with a brush (not synthetic) saturated with an approved solvent, such as mentioned above. Use of a clean, dry air stream (25 to 28 psi) is recommended to remove any excess solvent.

(3) Remove flux residue, metallic chips, and/or solder balls with an approved solvent.

(c) Wired chassic devices containing terminal boards, resistor and capacitor assemblies, rf coils, switches, sockets, inductors, transformers, and other wired parts should be cleaned as follows:

NOTE:

When necessary to disturb the dress of wires and cables, note the positions before disturbing and restore them to proper dress after cleaning.

(1) Blow dust from surfaces, holes, and recesses using an air jet.

(2) Finish cleaning chassis by wiping finished surfaces with a lint-free cloth moistened with solvent.

(3) Dry with a clean, dry, lint-free cloth.

(4) When thoroughly clean, touch-up any minor damage to the finish.

(5) Protect the chassis from dust, moisture, and damage pending inspection.

(d) Ceramic and plastic parts should be cleaned as follows:

(1) Blow dust from surfaces, holes, and recesses using an air jet.

(2) Finish cleaning chassis by wiping finished surfaces with a lint-free cloth moistened with solvents.

(3) Dry with a clean, dry, lint-free cloth.

5.3.3 REPAIR

A. General

This section contains information required to perform limited repairs on the unit. The repair or replacement of damaged parts in airborne electronic equipment usually involves standard service techniques. In most cases, examination of drawings and equipment reveals several approaches to perform a repair. However, certain repairs demand following an exact repair sequence to ensure proper operation of the equipment. After correcting a malfunction in any section of the unit, it is recommended that a repetition of the functional test of the unit be performed.

B. Repair Precautions

1. Ensure that all ESDS and MOS handling precautions are followed.
2. Perform repairs and replace components with power disconnected from equipment.
3. Use a conductive table top for repairs and connect table to ground conductors of 60Hz and 400Hz power lines.
4. Replace connectors, coaxial cables, shield conductors, and twisted pairs only with identical items.
5. Reference “component side” of a printed circuit board in this manual means the side on which components are located; “solder side” refers to the other side. The standard references are as follows: nearside is the component side; farside is the solder side; on surface mount boards with components on both sides, the nearside is the side that has the J#### and P#### connector numbers.
6. When repairing circuits, carefully observe lead dress and component orientation. Keep leads as short as possible and observe correct repair techniques.

7. There are certain soldering considerations with surface mount components. The soldering iron tip should not touch the ceramic component body. The iron should be applied only to the termination-solder filet.
8. Observe cable routing throughout instrument assembly, prior to disassembly, to enable a proper reinstallation of cabling during reassembly procedures.

CAUTION

THIS EQUIPMENT CONTAINS ELECTROSTATIC DISCHARGE SENSITIVE (ESDS) DEVICES. EQUIPMENT MODULES AND ESDS DEVICES MUST BE HANDLED IN ACCORDANCE WITH SPECIAL ESDS HANDLING PROCEDURES.

C. Electrostatic Sensitive Devices (ESDS) Protection

1. Always discharge static before handling devices by touching something that is grounded.
2. Use a wrist strap grounded through a 1MΩ resistor.
3. Do not slide anything on the bench. Pick it up and set it down instead.
4. Keep all parts in protective cartons until ready to insert into the board.
5. Never touch the device leads or the circuit paths during assembly.
6. Use a grounded tip, low wattage soldering station.
7. Keep the humidity in the work environment as high as feasibly possible.
8. Use grounded mats on the work station unless table tops are made of approved antistatic material.
9. Do not use synthetic carpet on the floor of the shop. If a shop is carpeted, ensure that a grounded mat is placed at each workstation.
10. Keep common plastics out of the work area.

D. MOS Device Protection

MOS (Metal Oxide Semiconductor) devices are used in this equipment. While the attributes of MOS type devices are many, characteristics make them susceptible to damage by electrostatic or high voltage charges. Therefore, special precautions must be taken during repair procedures to prevent damaging the device. The following precautions are recommended for MOS circuits, and are especially important in low humidity or dry conditions.

1. Store and transport all MOS devices in conductive material so that all exposed leads are shorted together. Do not insert MOS devices into conventional plastic “snow” or plastic trays used for storing and transporting standard semiconductor devices.

2. Ground working surfaces on workbench to protect the MOS devices.
3. Wear cotton gloves or a conductive wrist strap in series with a 200KΩ resistor connected to ground.
4. Do not wear nylon clothing while handling MOS devices.
5. Do not insert or remove MOS devices with power applied. Check all power supplies to be used for testing MOS devices. and be sure that there are no voltage transients present.
6. When straightening MOS leads, provide ground straps for the apparatus for the device.
7. Ground the soldering iron when soldering a device.
8. When possible, handle all MOS devices by package or case, and not by leads. Prior to touching the device, touch an electrical ground to displace any accumulated static charge. The package and substrate may be electrically common. If so, an electrical discharge to the case would cause the same damage as touching the leads.
9. Clamping or holding fixtures used during repair should be grounded, as should the circuit board, during repair.
10. Devices should be inserted into the printed circuit boards such that leads on the back side do not contact any material other than the printed circuit board (in particular, do not use any plastic foam as a backing).
11. Devices should be soldered as soon as possible after assembly. All soldering irons must be grounded.
12. Boards should not be handled in the area around devices, but rather by board edges.
13. Assembled boards must not be placed in conventional, home-type, plastic bags. Paper bags or antistatic bags should be used.
14. Before removing devices from conductive portion of the device carrier, make certain conductive portion of carrier is brought in contact with well grounded table top.

E. PC Board, Two-Lead Component Removal (Resistors, Capacitors, Diodes, etc.)

1. Heat one lead from component side of board until solder flows, and lift one lead from board; repeat for other lead and remove component (note orientation).
2. Melt solder in each hole, and using a desoldering tool, remove solder from each hole.
3. Dress and form leads of replacement component; insert leads into correct holes.
4. Insert replacement component observing correct orientation.

F. PC Board, Multi-Lead Component Removal (IC's, etc.)

1. Remove component by clipping each lead along both sides. Clip off leads as close to component as possible. Discard component.
2. Heat hole from solder side and remove clipped lead from each hole.

3. Melt solder in each hole, and using a desoldering tool, remove solder from each hole.
4. Insert replacement component observing correct orientation.
5. Solder component in place from farside of board. Avoid solder runs. No solder is required on contacts where no traces exist.

G. Replacement of Power Transistors

1. Unsolder leads and remove attaching hardware. Remove transistor and hard-coat insulator.
2. Apply Thermal Joint Compound Type 120 (Wakefield Engineering, Inc.) to the mounting surface of the replacement transistor.
3. Reinstall the transistor insulator and the power transistor using hardware removed in step (1).
4. After installing the replacement transistor, but before making any electrical connections, measure the resistance between the case of the transistor and the chassis, to ensure that the insulation is effective. The resistance measured should be greater than 10MΩ.
5. Reconnect leads to transistor and solder in place.

H. Replacement of Printed Circuit Board Protective Coating

WARNING
CONFORMAL COATING CONTAINS TOXIC VAPORS! USE ONLY WITH ADEQUATE VENTILATION.

1. Clean repaired area of printed circuit board per instructions in the Cleaning section of this manual.
2. Apply Conformal Coating, Humiseal #1B-31 HYSOL PC20-35M-01 (Humiseal Division, Columbia Chase Corp., 24-60 Brooklyn Queens Expressway West, Woodside, N.Y., 11377) P/N 016-01040-0000.
3. Shake container well before using.
4. Spray or brush surfaces with smooth, even strikes. If spraying, hold nozzle 10-15 inches from work surface.
5. Cure time is ten minutes at room temperature.

I. Programmable Read Only Memory (PROM) Replacement

The read only memory packages are specially programmed devices to provide specific logic outputs required for operation in the unit. The manufacturer's part (type) number is for the un-programmed device, and cannot be used. The Honeywell part number must be used to obtain the correctly programmed device. Refer to the "Illustrated Parts List" (IPL).

5.3.3.1 REPLACEMENT OF COMPONENTS

This section describes the procedure, along with any special techniques, for replacing damaged or defective components.

A. Connectors

When replacing a connector, refer to the appropriate PC board assembly drawing, and follow the notes, to ensure correct mounting and mating of each connector.

B. Crystal

The use of any crystal, other than a Honeywell crystal, is considered an unauthorized modification.

C. Diodes

Diodes used are silicon and germanium. Use long-nose pliers as a heat sink, under normal soldering conditions. Note the diode polarity before removal.

D. Integrated Circuits

Refer to the applicable reference for removal and replacement instructions.

E. Wiring/Coaxial Cable

When repairing a wire that has broken from its terminal, remove all old solder, and pieces of wire from the terminal, re-strip the wire to the necessary length, and resolder the wire to the terminal. Replace a damaged wire or coaxial cable with one of the same type, size and length.

5.3.4 DISASSEMBLY/ASSEMBLY PROCEDURES

The following instructions included the procedures that are necessary to remove and disassemble the subassemblies of the KA 57.

It is assumed that the unit has been tested in accordance with Section 5.2 to locate the source of the malfunction. The unit should be disassembled only to the point where the malfunction can be corrected by repair, cleaning, or adjustment. Do not disassemble any parts or wiring unnecessarily as repeated tear downs can be detrimental to the life of the unit.

The KA 57 is comprised of a final assembly and one major subassembly. Disassembly instructions are provided to separate the subassembly from the basic unit. Reassembly can be accomplished by reversing the disassembly procedures. Refer to the subassembly drawings in Section VI during disassembly or assembly.

5.3.4.1 P.C. BOARD REMOVAL

A. Remove the two screws on the sides of the dust cover and remove the dust cover.

B. The printed circuit board and its components are accessible in this state of disassembly.

C. To remove the printed circuit board from the chassis, remove the four corner screws and separate the board from the chassis.

5.4 TROUBLESHOOTING

Refer to the troubleshooting flow chart, figure 5-2.

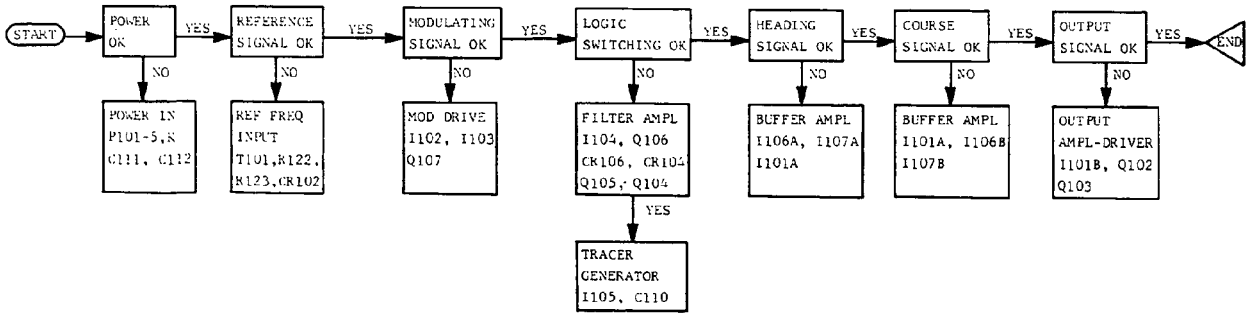


FIGURE 5-2 KA 57 TROUBLESHOOTING FLOW CHART

ILLUSTRATED PARTS LIST

6.1 General

The Illustrated Parts List (IPL) is a complete list of assemblies and parts required for the unit. The IPL also provides for the proper identification of replacement parts. Individual parts lists within this IPL are arranged in numerical sequence starting with the top assembly and continuing with the sub-assemblies. All mechanical parts will be separated from the electrical parts used on the sub-assembly. Each parts list is followed by a component location drawing.

Parts identified in this IPL by Honeywell part number meet design specifications for this equipment and are the recommended replacement parts. Warranty information concerning Honeywell replacement parts is contained in Service Memo #1, P/N 600-08001-00XX.

Some part numbers may not be currently available. Consult the current Honeywell catalog or contact a Honeywell representative for equipment availability.

6.2 Revision Service

The manual will be revised as necessary to reflect current information.

6.3 List of Abbreviations

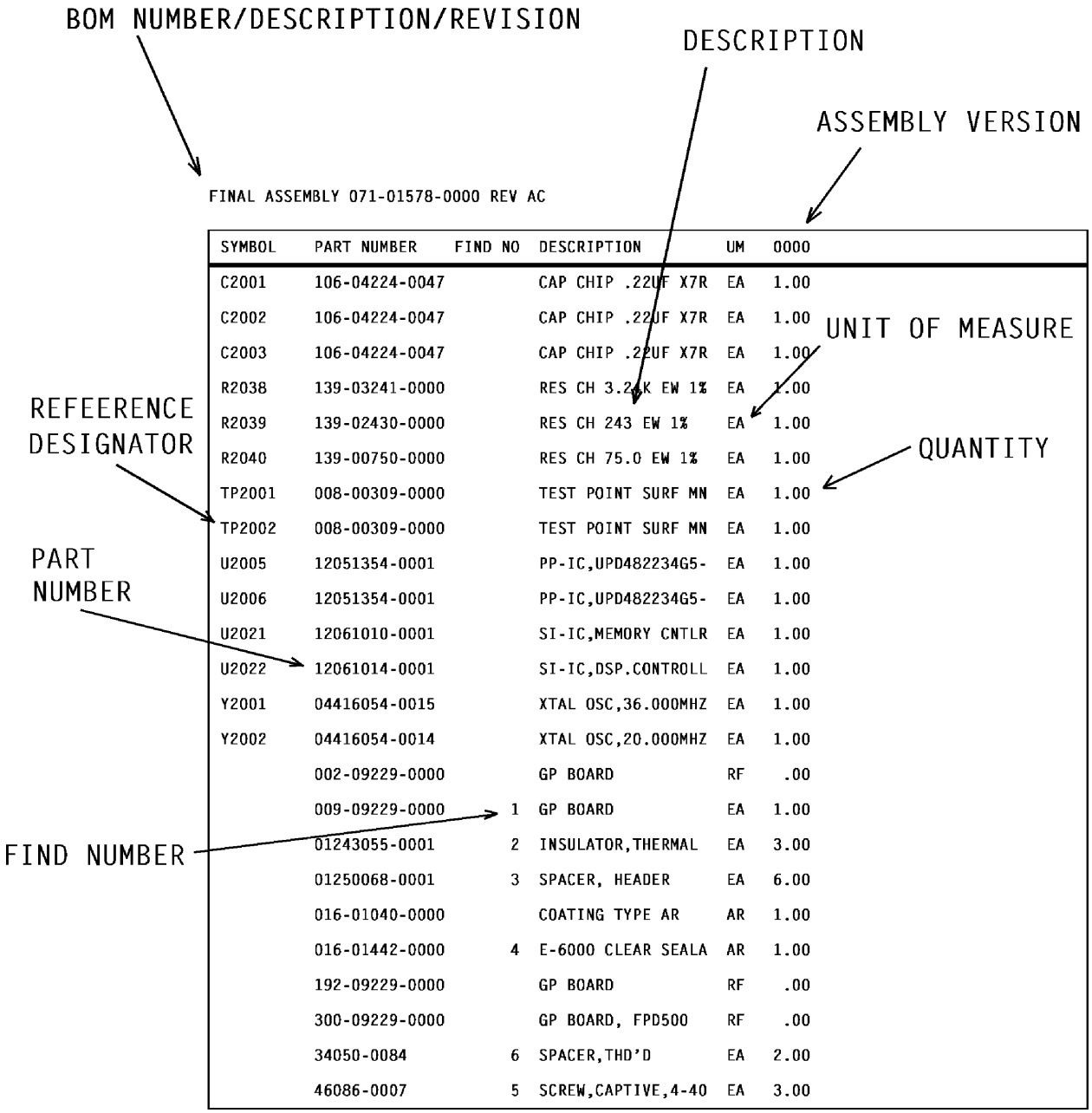
Abbreviation	Name
B	Motor or Synchro
C	Capacitor
CJ	Circuit Jumper
CR	Diode
DS	Lamp
E	Voltage or Signal Connect Point
F	Fuse
FL	Filter
FT	Feedthru
I	Integrated Circuit
J	Jack or Fixed Connector
L	Inductor
M	Meter
P	Plug

Table 1
Abbreviations

Abbreviation	Name
Q	Transistor
R	Resistor
RT	Thermistor
S	Switch
T	Transformer
TP	Test Point
U	Component Network, Integrated Circuit, Circuit Assembly
V	Photocell/Vacuum Tube
W	Waveguide
Y	Crystal

Table 1 (Continued)
Abbreviations

6.4 Sample Parts List



FINAL ASSEMBLY 071-01578-0000 REV AC

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0000
C2001	106-04224-0047		CAP CHIP .22UF X7R	EA	1.00
C2002	106-04224-0047		CAP CHIP .22UF X7R	EA	1.00
C2003	106-04224-0047		CAP CHIP .22UF X7R	EA	1.00
R2038	139-03241-0000		RES CH 3.24K EW 1%	EA	1.00
R2039	139-02430-0000		RES CH 243 EW 1%	EA	1.00
R2040	139-00750-0000		RES CH 75.0 EW 1%	EA	1.00
TP2001	008-00309-0000		TEST POINT SURF MN	EA	1.00
TP2002	008-00309-0000		TEST POINT SURF MN	EA	1.00
U2005	12051354-0001		PP-IC,UPD482234G5-	EA	1.00
U2006	12051354-0001		PP-IC,UPD482234G5-	EA	1.00
U2021	12061010-0001		SI-IC,MEMORY CNTLR	EA	1.00
U2022	12061014-0001		SI-IC,DSP.CONTROLL	EA	1.00
Y2001	04416054-0015		XTAL OSC,36.000MHZ	EA	1.00
Y2002	04416054-0014		XTAL OSC,20.000MHZ	EA	1.00
	002-09229-0000		GP BOARD	RF	.00
	009-09229-0000	1	GP BOARD	EA	1.00
	01243055-0001	2	INSULATOR,THERMAL	EA	3.00
	01250068-0001	3	SPACER, HEADER	EA	6.00
	016-01040-0000		COATING TYPE AR	AR	1.00
	016-01442-0000	4	E-6000 CLEAR SEALA	AR	1.00
	192-09229-0000		GP BOARD	RF	.00
	300-09229-0000		GP BOARD, FPD500	RF	.00
	34050-0084	6	SPACER,THD'D	EA	2.00
	46086-0007	5	SCREW,CAPTIVE,4-40	EA	3.00

The above is only a sample. The actual format and style may vary slightly. A 'Find Number' column, when shown, references selected items on the BOM's accompanying Assembly Drawing. This information does not apply to every BOM. Therefore, a lack of information in this column, or a lack of this column, should not be interpreted as an omission.

Figure 6-1
Sample Parts List

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6.5 KA 57 FINAL ASSEMBLY

071-00017-0000 Rev. 8

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0000
REF1	300-01517-0000		FINAL ASSY	RF	.00
REF2	002-00357-0000		SCH KA57	RF	.00
REF3	000-00123-0000		FLOW CHT KA 0057	RF	.00
REF4	004-00164-0000		MPS KA 57	RF	.00
	016-01008-0004		GLYPTAL 7526 BL	AR	.00
	047-02936-0002		PLATE MTG W/HDW	EA	1.00
	047-03164-0002		COVER DUST	EA	1.00
	057-01585-0001		S/N TAG, KA 57	EA	1.00
	057-02076-0000		ID TAG	EA	1.00
	057-02203-0000		FLAVOR STCKR	EA	1.00
	057-03511-0001		DECAL, CAUTION	EA	1.00
	089-02154-0055		NUT LOCK 4-40	EA	2.00
	089-05903-0003		SCR PHP 4-40X3/16	EA	4.00
	089-05903-0007		SCR PHP 4-40X7/16	EA	2.00
	090-00991-0000		PROTECTIVE CLOSURE	EA	1.00
	091-00286-0000		INSUL XSTR .437	EA	2.00
	091-00307-0000		SPACER INSUL .050	EA	2.00
	200-01518-0010		AUTOPILOT ADPT BD	EA	1.00

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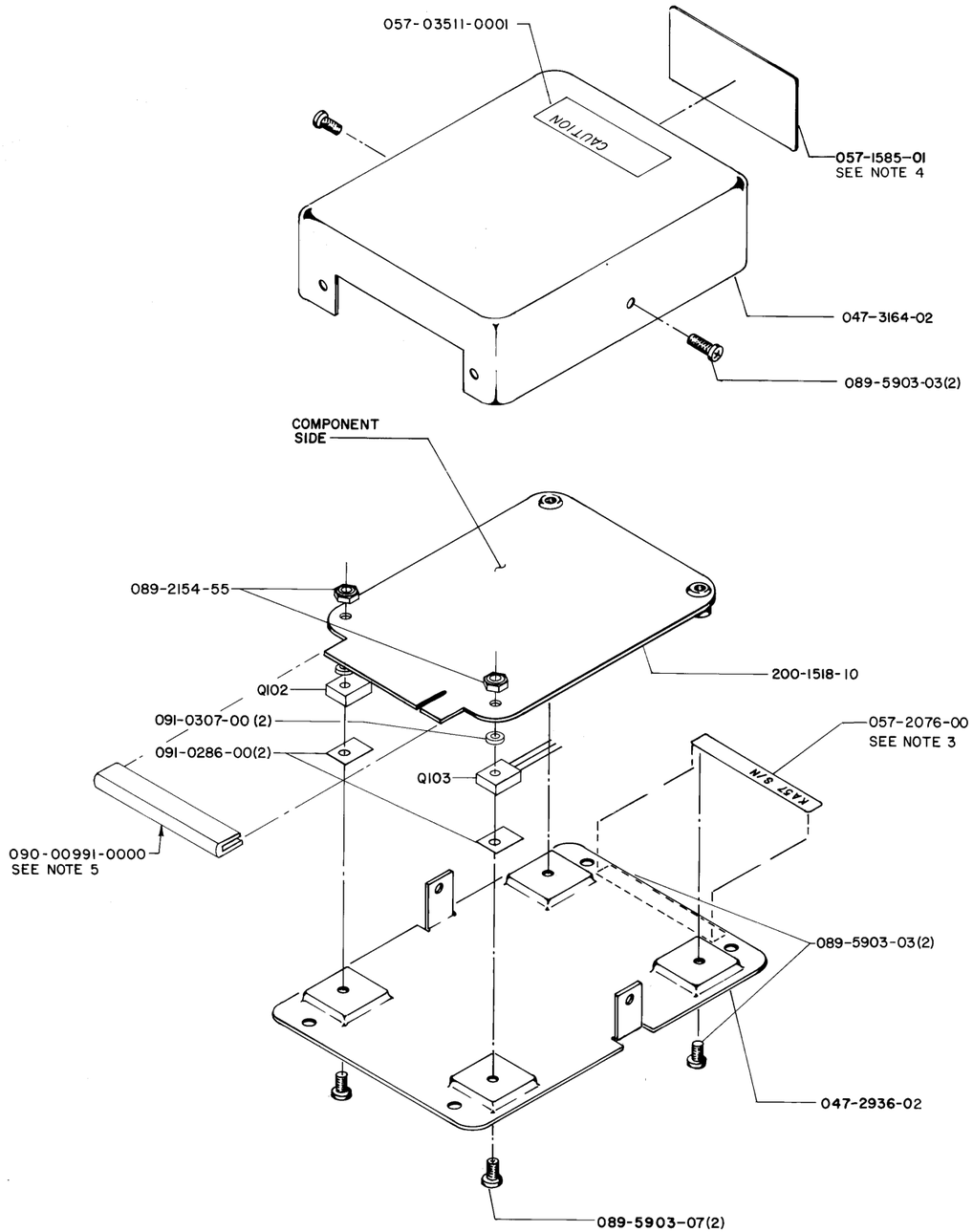
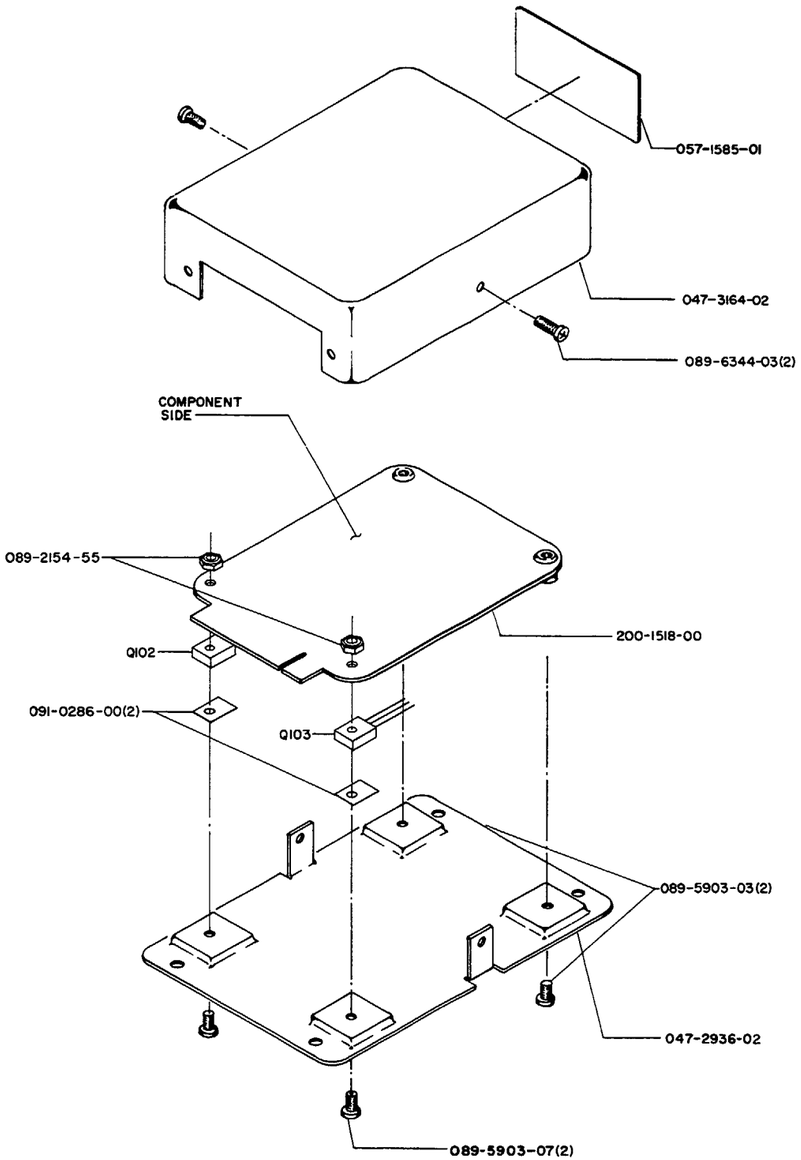


FIGURE 6-2 KA 57 FINAL ASSEMBLY DRAWING
(Dwg. 300-01517-0000 Rev. 8)

NOTES:

1. FOR COMPLETE ITEM DESCRIPTION SEE B/M 071 - 00017 - 0000.
2. SECURE ALL THREADED FASTNERS PER 001 - 01080 - 0000.
3. SERIAL NUMBER SHOWN ON 057 - 01585 - 0001 MUST MATCH SERIAL NUMBER ON 057 - 02076 - 0000.
4. ADD FLAVOR STICKER (057-02203-0000) TO SERIAL TAG (057-01585-0001).
5. TRIM MATERIAL (090-00991-0000) TO 1.625 INCHES TO COVER THE P.C. BOARD CONNECTOR FINGERS.



NOTE
1. FOR COMPLETE ITEM DESCRIPTION SEE B/M 071-0017-00
2. APPLY GLYPTAL 016-1008-05 TO THREADS OF 089-5903-03.

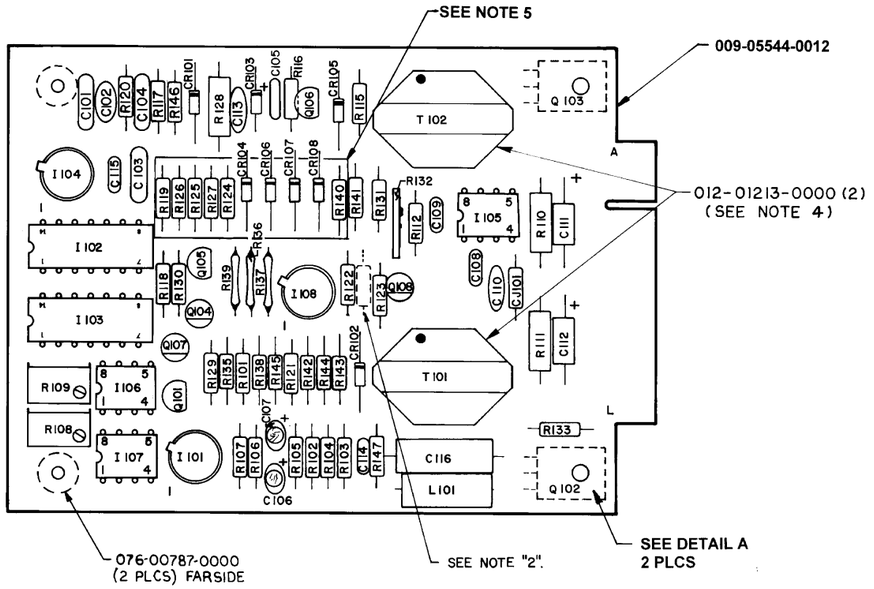
FIGURE 6-2A KA 57 FINAL ASSEMBLY DRAWING
(Dwg. 300-01517-0000 Rev. 2)

6.6 KA 57 AUTOPILOT ADAPTER BOARD

200-01518-0010 Rev. BA

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0010
C101	104-00001-0010		CAP SM 750PF 100V	EA	1.00
C102	104-00001-0041		CAP SM 22PF 500V	EA	1.00
C103	104-00001-0010		CAP SM 750PF 100V	EA	1.00
C104	104-00001-0004		CAP SM 470PF 100V	EA	1.00
C105	096-01030-0018		CAP TN 27UF 20%15V	EA	1.00
C106	096-01030-0011		CAP TN 4.7UF20%20V	EA	1.00
C107	096-01030-0011		CAP TN 4.7UF20%20V	EA	1.00
C108	104-00001-0009		CAP SM 47PF 100V	EA	1.00
C109	104-00001-0030		CAP SM 18PF 500V	EA	1.00
C110	114-05222-0000		CAP DC 2200PF 500V	EA	1.00
C111	096-01008-0000		CAP TN 0.1UF 35V	EA	1.00
C112	096-01008-0000		CAP TN 0.1UF 35V	EA	1.00
C113	114-07203-0000		CAP DC .02UF 200V	EA	1.00
C114	104-00001-0014		CAP SM 33PF 100V	EA	1.00
C115	104-00001-0040		CAP SM 2PF 100V	EA	1.00
C116	105-00031-0074		CAP MY .15UF 80V	EA	1.00
CJ101	026-00018-0000		WIRE CKTJMPR 22AWG	EA	1.00
CR101	007-06045-0000		DIO HC FH1100	EA	1.00
CR102	007-06029-0000		DIO S 1N457A	EA	1.00
CR103	007-05011-0001		DIO Z 10V 1W 5%	EA	1.00
CR104	007-06029-0000		DIO S 1N457A	EA	1.00
CR105	007-06029-0000		DIO S 1N457A	EA	1.00
CR106	007-06029-0000		DIO S 1N457A	EA	1.00
CR107	007-06029-0000		DIO S 1N457A	EA	1.00
CR108	007-06029-0000		DIO S 1N457A	EA	1.00
I101	120-03022-0001		DUAL OP AMP, CAN,	EA	1.00
I102	120-06007-0000		IC CD4011AF	EA	1.00
I103	120-06007-0000		IC CD4011AF	EA	1.00
I104	120-03024-0000		IC LM301AN	EA	1.00
I105	120-03024-0000		IC LM301AN	EA	1.00
I106	120-03031-0000		IC IH5020	EA	1.00
I107	120-03031-0000		IC IH5020	EA	1.00
I108	120-03022-0001		DUAL OP AMP, CAN,	EA	1.00
L101	019-02083-0022		CH 2200UH 5%	EA	1.00
Q101	007-00143-0002		XSTR FET 2N5462	EA	1.00
Q102	007-00276-0000		XSTR MJE180	EA	1.00
Q103	007-00276-0001		XSTR MJE170	EA	1.00
Q104	007-00026-0003		XSTR S NPN 2N3416	EA	1.00
Q105	007-00246-0001		XSTR S NPN MPS5308	EA	1.00
Q106	007-00246-0001		XSTR S NPN MPS5308	EA	1.00
Q107	007-00026-0003		XSTR S NPN 2N3416	EA	1.00
Q108	007-00026-0003		XSTR S NPN 2N3416	EA	1.00
R101	131-00104-0023		RES CF 100K QW 5%	EA	1.00
R102	131-00104-0023		RES CF 100K QW 5%	EA	1.00
R103	131-00104-0023		RES CF 100K QW 5%	EA	1.00
R104	131-00104-0023		RES CF 100K QW 5%	EA	1.00

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0010
R105	131-00103-0023		RES CF 10K QW 5%	EA	1.00
R106	131-00303-0023		RES CF 30K QW 5%	EA	1.00
R107	131-00203-0023		RES CF 20K QW 5%	EA	1.00
R108	133-00096-0035		RES VA 50K HW 10%	EA	1.00
R109	133-00096-0036		RES VA 100K HW 10%	EA	1.00
R110	131-00101-0033		RES CF 100 HW 5%	EA	1.00
R111	131-00101-0033		RES CF 100 HW 5%	EA	1.00
R112	131-00273-0023		RES CF 27K QW 5%	EA	1.00
R115	131-00203-0023		RES CF 20K QW 5%	EA	1.00
R116	131-00474-0023		RES CF 470K QW 5%	EA	1.00
R117	131-00472-0023		RES CF 4.7K QW 5%	EA	1.00
R118	131-00472-0023		RES CF 4.7K QW 5%	EA	1.00
R119	131-00204-0023		RES CF 200K QW 5%	EA	1.00
R120	131-00472-0023		RES CF 4.7K QW 5%	EA	1.00
R121	131-00104-0023		RES CF 100K QW 5%	EA	1.00
R122	131-00104-0023		RES CF 100K QW 5%	EA	1.00
R123	131-00203-0023		RES CF 20K QW 5%	EA	1.00
R124	131-00203-0023		RES CF 20K QW 5%	EA	1.00
R125	131-00203-0023		RES CF 20K QW 5%	EA	1.00
R126	131-00203-0023		RES CF 20K QW 5%	EA	1.00
R127	131-00203-0023		RES CF 20K QW 5%	EA	1.00
R128	131-00101-0033		RES CF 100 HW 5%	EA	1.00
R129	131-00103-0023		RES CF 10K QW 5%	EA	1.00
R130	131-00682-0023		RES CF 6.8K QW 5%	EA	1.00
R131	131-00203-0023		RES CF 20K QW 5%	EA	1.00
R132	133-00113-0027		RES VA 200K 20% B	EA	1.00
R133	131-00151-0023		RES CF 150 QW 5%	EA	1.00
R135	136-01003-0072		RES PF 100K QW 1%	EA	1.00
R136	136-02553-0072		RES PF 255K QW 1%	EA	1.00
R137	136-01433-0072		RES PF 143K QW 1%	EA	1.00
R138	136-01003-0072		RES PF 100K QW 1%	EA	1.00
R139	136-02553-0072		RES PF 255K QW 1%	EA	1.00
R140	136-01003-0072		RES PF 100K QW 1%	EA	1.00
R141	136-06042-0072		RES PF 60.4K QW 1%	EA	1.00
R142	136-01003-0072		RES PF 100K QW 1%	EA	1.00
R143	136-01003-0072		RES PF 100K QW 1%	EA	1.00
R144	136-01003-0072		RES PF 100K QW 1%	EA	1.00
R145	136-01003-0072		RES PF 100K QW 1%	EA	1.00
R146	131-00513-0023		RES CF 51K QW 5%	EA	1.00
R147	131-00102-0023		RES CF 1K QW 5%	EA	1.00
REF1	002-00357-0000		SCH KA57	RF	.00
REF2	300-01518-0010		AUTOPILOT ADAPTER	RF	.00
REF3	192-01518-0010		KA 57 AUTOPILOT AD	RF	.00
T101	019-05060-0000		XFMR 400HZ	EA	1.00
T102	019-05060-0000		XFMR 400HZ	EA	1.00
	009-05544-0012		PC BOARD	EA	1.00
	012-01213-0000		XFMR INSULATOR	EA	2.00
	016-01040-0000		COATING TYPE AR	AR	.00
	076-00787-0000		SPACER	EA	2.00

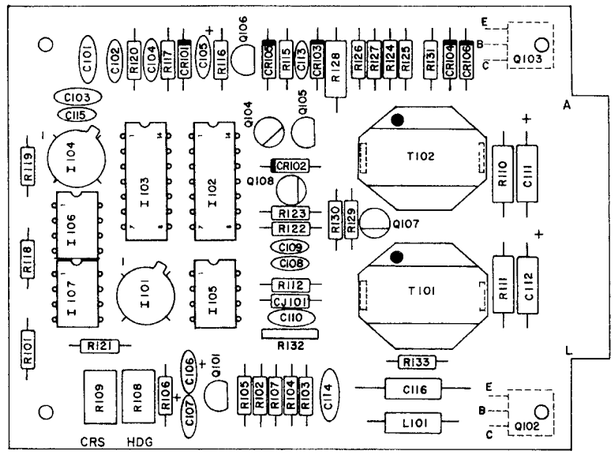


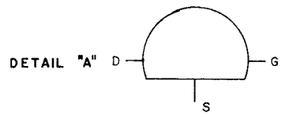
NOTES:

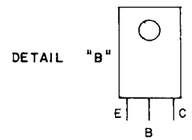
1. MASK OFF CONNECTOR FINGERS, R108, R109, R132, HEAT SINK SURFACES OF Q102 & Q103, AND FOUR MOUNTING AREAS, THEN POST COAT BOTH SIDES OF ASSEMBLY WITH CLEAR URETHANE COATING (016-1040-00).
2. FOR CERTAIN INSTALLATIONS R122 WILL BE LOCATED CONNECTING TO POINT "B". MOVEMENT OF THIS COMPONENT IS CONTROLLED BY FIELD SERVICE BULLETIN.
3. C116 AND L101 WILL NEED THEIR LEADS BENT TO FIT INTO THE SPACING ALLOWED ON THE PC BOARD.
4. INSTALL 012-01213-0000 XFMR INSULATOR UNDER T101 & T102.
5. **PRINTED CIRCUIT ASSEMBLY IDENTIFICATION MUST BE IN ACCORDANCE WITH SPEC. 001-01101-0000.**

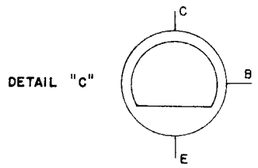
REF. B/M 200-01518-0010

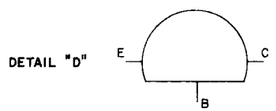
FIGURE 6-3 KA 57 PC BOARD ASSEMBLY DRAWING (Dwg. 300-01518-0010 Rev. AA)











NOTES

1 TRANSISTOR Q101, SEE DETAIL "A"

2 TRANSISTORS Q102, Q103, SEE DETAIL "B"

3 TRANSISTORS Q104, Q107, Q108, SEE DETAIL "C"

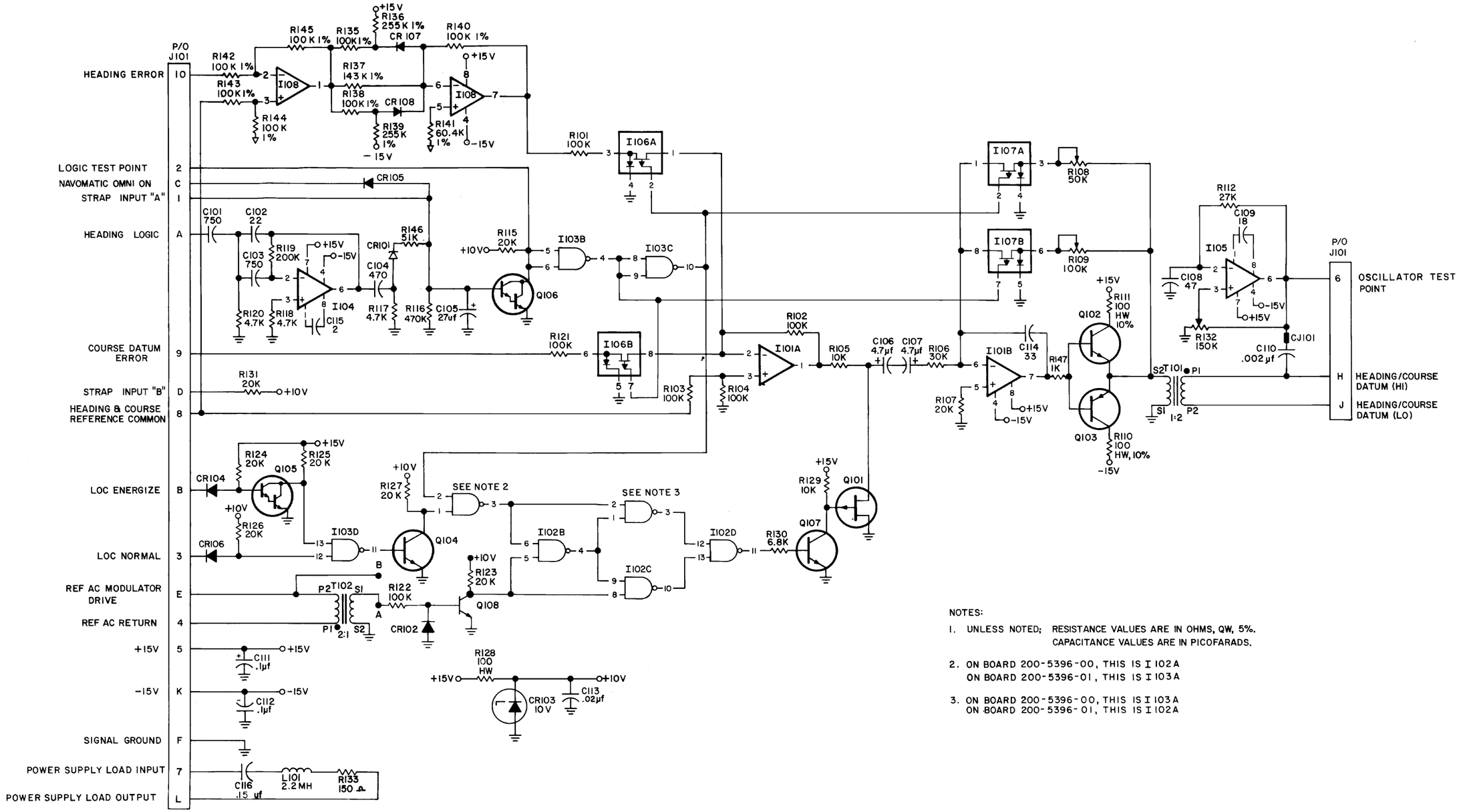
4 TRANSISTORS Q105, Q106, SEE DETAIL "D"

5 MASK OFF CONNECTOR FINGERS, R108, R109, R132, HEAT SINK SURFACES OF Q102 & Q103, AND FOUR MOUNTING AREAS, THEN POST COAT BOTH SIDES OF ASSEMBLY WITH CLEAR URETHANE COATING (016-1040-00)

TEST MPS 004-0164-00

REF B/M 200-1518-00

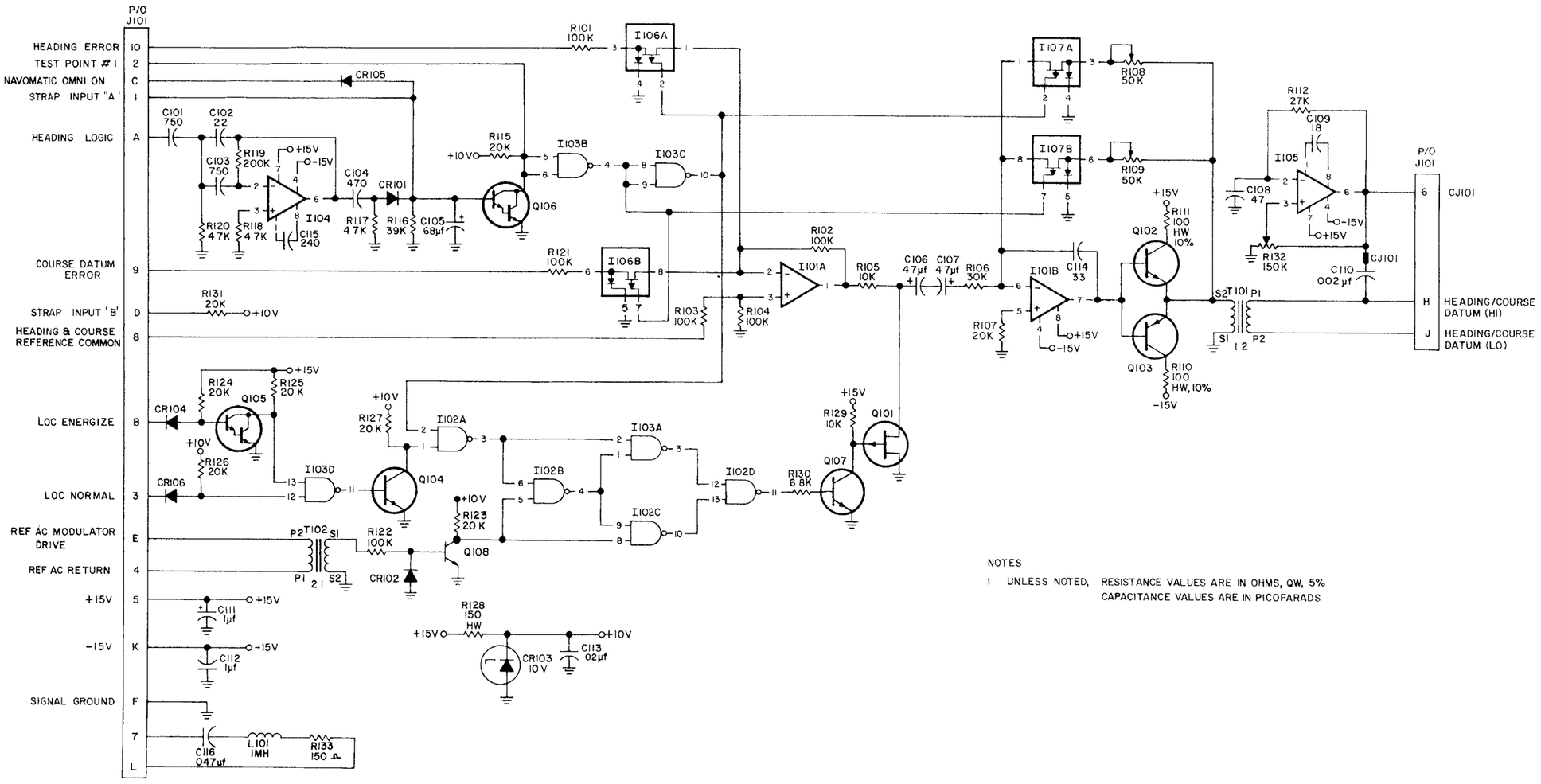
FIGURE 6-3A KA 57 PC BOARD ASSEMBLY DRAWING
(Dwg. 300-01518-0000 Rev. 8)



NOTES:

1. UNLESS NOTED; RESISTANCE VALUES ARE IN OHMS, QW, 5%.
   CAPACITANCE VALUES ARE IN PICOFARADS.
2. ON BOARD 200-5396-00, THIS IS I 102A
   ON BOARD 200-5396-01, THIS IS I 103A
3. ON BOARD 200-5396-00, THIS IS I 103A
   ON BOARD 200-5396-01, THIS IS I 102A

FIGURE 6-4 KA 57 PC BOARD SCHEMATIC
(Dwg. 002-00357-0000 Rev. 18)



NOTES

1 UNLESS NOTED, RESISTANCE VALUES ARE IN OHMS, QW, 5%
CAPACITANCE VALUES ARE IN PICOFARADS

FIGURE 6-4A KA 57 PC BOARD SCHEMATIC
(Dwg. 002-00357-0000 Rev. 11)