SECTION III
OPERATION

3.1 GENERAL

The KTS 147 Flight Control System Component Tester has been specifically designed to provide signal sources and switching operations to check the individual components of King Radio Corporation's KFC 300 Flight Control System. It has a built-in digital meter plus logic annunciators to make testing as simple and rapid as possible. For most testing, there will not be any other equipment required.

The KTS 147 has been housed in a standard rack cabinet such that it is self-contained, but may be removed and mounted in a console rack if so desired. All required test points of the units to be tested are brought out to a test adapter panel that plugs into the bottom of the KTS 147. This test adapter also provides the necessary interface between the unit and the KTS 147 main panel.

The front panel of the KTS 147 has been divided into functional blocks that facilitate quick location and definitions of the many controls. The main panel switches are either of the rotary, paddle type toggle or pushbutton type with the pushbutton switches being lit when they are activated to make locating an unwanted switch position quite easy. All switches simulating valid signals are green in color to stand out from the white function switches. The Mode Annunciation are blue to be easily detectable from the white and green switch annunciators. The pushbutton switches have their legend printed on the switch button. The clear switch button allows reading of the legend before activation of the switch. The Annunciators located across the top of the test panel are shared by all units and are renamed each time an adapter is changed by use of an overlay that identifies the annunciator's function. The digital multimeter circuit is designed such that it may be connected to common test points through use of the meter selector switches. The three-position level switch may be used to transfer the meter from the input to output meter selectors to make testing faster. The center position of the transfer selector connects the meter to external jacks and makes the meter available for unit troubleshooting. Procedures for use with specific components of the KFC 300 Flight Control System can be found in the individual maintenance/overhaul manuals.

3.2 CONTROLS

The controls for the KTS 147 Bench Tester are described in this section. Figures 3-1 to 3-3 should be used in conjunction with appropriate sections for referencing control operation to control location. The sections are as follows:

3.2.1 Master Panel	Use Figure 3-1
3.2.2 Adapter Panel #1	Use Figure 3-2
3.2.3 Adapter Panel #2	Use Figure 3-3

3.2.1 MAIN FRAME CONTROLS

Indicators

All indicators in Locations 1 and 2 are used to show the presence of various modes and situations which the unit under test is in. The indication being presented depends upon the particular adapter panel being used. Separate indicator nomenclature panels are supplied with each adapter panel (except Panel #1) and easily clip onto the main frame to customize the tester for the adapter panel being used.

The first description of each indicator is for use with Adapter Panel #1. The nomenclature for this adapter is silk-screened on the main frame thus eliminating the need for a nomenclature panel. The second description is for use with Adapter Panel #2. All descriptions apply for the case when the indicator is illuminated.

1A

"PFT VALID" indicator lights with signal from KAC 325 when unit is in pre-flight test mode.
"GA" indicator lights when KCP 320 is in go around mode.

1B

"AP ANN" indicator lights with signal from KAC 325 to KAP 315 when in autopilot mode.
"AP/GA" indicator lights with KCP 320 go around signal to the KAC 325.

1C

"AP INT" indicator lights with signal from KAC 325 when in autopilot mode.
"GST" indicator lights with KCP 320 signal when in glideslope track mode.

1D

"Pitch Mon" indicator lights with signal from KAC 325 when the pitch axis monitor is sensing an invalid.
"GS CPLD" indicator lights with signal from KCP 320 when unit is in the glideslope captured mode.

1E

"Roll Mon" indicator lights with signal from KAC 325 when the roll axis monitor is sensing an invalid.
"ALT Arm" indicator lights with signal from KCP 320 when unit is in the altitude arm mode.

1F

"Yaw Mon" indicator lights with signal from KAC 325 when the yaw axis monitor is sensing an invalid.
"Vnav Eng" indicator lights with signal from KCP 320 to KVN 395 when in the VNAV mode.

1G

"YD ANN" indicator lights with signal from KAC 325 when unit is in the yaw damper mode.
"VNAV CPLD" indicator lights with signal from KCP 320 to KAP 315 when unit is in the VNAV mode.

1H

"ELEV FAIL" indicator lights with signal from KAC 325 when unit has detected a failure in the pitch axis electronics.
"EXT REV LOC" indicator lights with signal from KCP 320 to KCI 310 when back course has been detected.

1J	"RUD FAIL" indicator lights with signal from KAC 325 when unit has detected a failure in the yaw axis electronics. "MACH ENG" indicator lights with signal from KCP 320 to KDC 380 when unit is in the mach hold mode.
1K	"AIL FAIL" indicator lights with signal from KAC 325 when unit has detected a failure in the roll axis electronics. "IAS ENG" indicator lights with signal from KCP 320 to KDC 380 when unit is in the IAS hold mode.
1L	"PWR MON" indicator lights with signal from KAC 325 when unit has detected a failure in the power supply. "ALT ENG" indicator lights with signal from KCP 320 to KDC 380 when unit is in the ALT hold mode.
1M	Not used with Adapter #1 "APPR CPLD" indicator lights with signal from KCP 320 to KAP 315 when unit is in the approach coupled mode.
1N	Not used with Adapter #1 "NAV CPLD" indicator lights with signal from KCP 320 to KAP 315 when unit is in the NAV coupled mode.
1P	Not used with Adapter #1 "REV LOC" indicator lights with signal from KCP 320 to KAP 315 when back course has been detected.
1Q	"VNAV CPLD" indicator lights with signal from KVN 395 to KCP 320 as long as the VNAV CPLD switch on the unit is depressed. Not used with Adapter #2

1R

" Δh_S" indicator lights with signal from KVN 395 to KCP 320 when any digit on the altitude select dials has been moved on the KVN 395.
"FLT DIR" indicator lights with signal from KMC 340 to KCP 320 only as long as the flight director button on KMC 340 is depressed.

1S

"ALT SELECT VALID" indicator lights with signal from KVN 395 to KCP 320 when an altitude select valid signal is present.
"HDG SEL SLEW" indicator lights with signal from KMC 340 to KCP 320 when heading select slew control is being used.

1T

"VNAV VALID" indicator lights with signal from KVN 395 to KCP 320 when an altitude select valid signal is present.
"NAV" indicator lights with signal from KMC 340 to KCP 320 only as long as the NAV button on KMC 340 is depressed.

1U

"ENG ALT" indicator lights with signal from KVN 395 to KCP 320 when an altitude hold pulse is generated in the KVN 395.
"APPR" indicator lights with signal from KMC 340 to KCP 320 only as long as the approach button on the KMC 340 has been depressed.

1V

"VNAV ENG" indicator lights with signal from KVN 395. when unit is in VNAV mode.
"HDG SEL" indicator lights with signal from KMC 340 to KCP 320 only as long as the heading select button on the KMC 340 has been depressed.

1W

"ALT ALERT" indicator lights with signal from KVN 395 to external annunciator while aircraft is within warning bands.
"ALT HOLD" indicator lights with signal from KMC 340 to KCP 320 only as long as the altitude hold button on the KMC 340 has been depressed.

1X

"MDA" indicator lights with signal from KVN 395 to KCI 310 when Minimum Descent Altitude has been reached.
"MACH HOLD" indicator lights with signal from KMC 340 to KCP 320 only as long as the mach hold button on the KMC 340 has been depressed.

1Y	"ALT ARM" indicator lights with signal from KVN 395 to KCP 320 only as long as the altitude arm button is depressed on the KVN 395. "IAS HOLD" indicator lights with signal from KMC 340 to KCP 320 only as long as the IAS hold button on the KMC 340 has been depressed.
2A	Not used with Adapter #1 Not used with Adapter #2
2B	"FD ENG" indicator lights with signal to KAC 325 from FD ENG switch (123). "INTERLK" indicator lights with interlock signal from KMC 340 to KCP 320.
2C	"RUD CLUTCH" indicator lights with Rudder arm signal from KAC 325. "RUD CLUTCH" indicator lights with Rudder clutch engage signal from the KMC 340.
2D	"AIL CLUTCH" indicator lights with Aileron arm signal from KAC 325. "AIL CLUTCH" indicator lights with Aileron clutch engage signal from the KMC 340.
2E	"ELEV CLUTCH" indicator lights with Elevator arm signal from KAC 325. "ELEV CLUTCH" indicator lights with Elevator clutch engage signal from the KMC 340.
2F	"YD ENG SOL" indicator lights with signal from the KAC 325 to the KMC 340. "YD ENG SOL" indicator lights with signal from the KMC 340.
2G	"AP ENG SOL" indicator lights with signal from the KAC 325 to the KMC 340. "AP ENG SOL" indicator lights with signal from the KMC 340.
2H	"TRIM RELAY UP" indicator lights with signal from the KAC 325. "VERT TRIM UP" indicator lights with signal from the KMC 340.

2J	"TRIM RELAY ON" indicator lights with signal from the KAC 325. "VERT TRIM DN" indicator lights with signal from the KMC 340.
2K	"TRIM FAIL" indicator lights with signal from the KAC 325. "TELELIGHT AP" indicator lights with signal from the KMC 340.
2L	"TRIM CLUTCH HI" indicator lights with signal from the KAC 325 denoting that the high side trim clutch transistor is on. "TELELIGHT YD" indicator lights with signal from the KMC 340.
2M	"TRIM CLUTCH LO" indicator lights with signal from the KAC 325 denoting that the low side trim clutch transistor is on. "LBT + PST" indicator lights with signal from KCP 320 indicating presence of lateral beam track or psuedo track modes.
2N	"TRIM ARM UP" indicator lights with signal from the KAC 325. "LBT" indicator lights with signal from KCP 320 indicating presence of lateral beam track mode.
2P	"TRIM ARM ON" indicator lights with signal from the KAC 325. "BARS RETRACT" indicator lights with signal from KCP 320 to KCI 310.
2Q	"TRIM MOTOR #1" indicator lights with signal from KAC 325. "CWS" indicator lights with signal from KCP 320 to KAC 325.
2R	"TRIM MOTOR #2" indicator lights with signal from KAC 325. "INVALID COMP" indicator lights with signal from KCP 320 to KCI 310.
2S	Not used with Adapter #1 "FLT DIR EXT" indicator lights with signal from KCP 320 to KAC 325.

2T	Not used with Adapter #1 "CONE SENSOR" indicator lights with signal from KCP 320 only if a problem exists within the cone sensor circuitry.
2U	Not used with Adapter #1 Not used with Adapter #2
2V	Not used with Adapter #1 "IAS LIMIT" indicator lights with signal from KDC 380 to KCP 320.
2W	Not used with Adapter #1 "ALT VALID" indicator lights with signal from KDC 380 to KCP 320 and KMC 340.
2X	Not used with Adapter #1 "MACH VALID" indicator lights with signal from KDC 380 to KCP 320 and KMC 340.
2Y	Not used with Adapter #1 "IAS VALID" indicator lights with signal from KDC 380 to KCP 320 and KMC 340.

Vertical Gyro Simulator

3. Pitch X, Y, Z, DC, and GND Test Jacks	The pitch test jacks enable monitoring the pitch attitude signal source. The X, Y, Z test jacks connect directly to the X, Y, Z windings of the pitch attitude synchro and will display a standard 11.8VRMS ARINC type signal. The DC test jack is the demodulated pitch attitude signal and is a ±9VDC maximum output. The ground test jack is the reference for the DC pitch attitude.
4. Pitch Attitude Dial	The pitch attitude dial indicates the angular position of a synchro used to generate the simulated pitch attitude signal. When the dial indicates 0 the output to the unit under test should be at zero volts or indicate level flight. When the dial is rotated counterclockwise, (increasing dial reading) the indication shall be a nose up attitude or out of phase signal on (X) with reference to (Y) as compared to the 26VAC. The AC output scale factor is

	Pitch Attitude Dial (Con't)	206mVRMS per degree. The output is also demodulated and converted into DC to provide a DC output that is minus for a counterclockwise (increasing dial reading) at a scale factor of 158mv per degree. This DC voltage is supplied out to the adapters as DC pitch attitude voltage for units requiring DC inputs and is also used as a DC pitch command control for autopilot computers.
5.	Roll X, Y, Z, DC, and GND Test Jacks	The roll test jacks enable monitoring the roll attitude signal source. The X, Y, and Z Test Jacks connect directly to the X, Y, and Z windings of the roll attitude synchro and will display a standard 11.8VRMS ARINC type signal. The DC test jack is the demodulated roll attitude signal and is a ±9VDC maximum output. The ground test jack is the reference for the DC roll attitude.
6.	Roll Attitude Dial	The roll attitude dial indicates the angular position of a synchro used to generate the simulated roll attitude signal. When the dial indicates 0 the output to the unit under test should be at zero volts or indicate level flight. When the dial is rotated counterclockwise, (increasing dial reading) the indication shall be a roll right attitude or out of phase signal on (X) with reference to (Y) as compared to the 26VAC. The AC output scale factor is 206mVRMS per degree. The output is also demodulated and converted into DC to provide a DC output that is minus for a counterclockwise (increasing dial reading) at a scale factor of 158mv per degree. This DC voltage is supplied out to the adapters as a DC roll attitude voltage for system requiring DC inputs and is also used as a DC roll command control for autopilot computers. The roll attitude AC signal also is buffered and used as an AC simulated yaw rate gyro signal for autopilot computers requiring an AC input.

7. Pitch Att Input Switch

The pitch attitude input switch is a 5 pole 2 position latching pushbutton switch that opens the three X, Y, Z lines and the DC pitch attitude input line to provide a zero input in the deactivated position. In the deactivated position the X, Y, Z wires going to the unit under test are shorted together and the DC line is connected to ground through 100K. The 5th pole of the switch is used to route 28VDC to the lamp inside the switch such that the switch will be lit whenever the switch is activated, (supplying a pitch attitude signal).

8. V. G. Ref Switch

The V. G. Ref switch is a 2 pole 2 position latching pushbutton switch that supplies a 26VAC reference signal for phase demodulation or power of units that operate from the pitch and roll synchros signal inputs. The second pole is used to power the internal lamp indicating when the switch is activated (supplying the 26VAC reference voltage).

9. V. G. Valid Switch

The V. G. Valid switch is a 2 pole 2 position latching pushbutton switch that provides an open switch contact for an invalid condition and 28VDC when valid. The valid condition is present when the switch is in the depress condition. The second pole of the switch is used to light the internal lamp when the switch is activated, (valid position).

10. Roll Att Input Switch

The roll attitude input switch is a 5 pole 2 position latching pushbutton switch that opens the three X, Y, Z lines, and the DC roll attitude input line to provide a zero input in the deactivated position. In the deactivated position, the X, Y, Z wires going to the unit under test are shorted together and the DC line is connected to ground through 100K. The 5th pole of the switch is used to light the internal lamp when the switch is activated.

Annunciator Tester

11. Annunciator Selector "A" Tester

Selector "A" is a 12 position 2 pole rotary switch that alternately supplies a ground output to the annunciator panel under test to check for proper operation. The corresponding annunciator in the unit will light when the switch is placed to its indicated position.

Annunciator Selector "A" Tester(Con't)

There is a 1Ω sense resistor in series with the switch to ground that can be switched to the test panel meter by placing the output meter selector to the Annunciator Mon position and used to measure the current being drawn by the annunciator or annunciators that is activated. In position 9 the 1, 3, 5, and 7 positions will all be active. The number 12 position is inactive or OFF, (all lines open).

12. Annunciator Selector "B" Tester

Selector "B" provides the exact same function as Selector A except that it provides grounds to different annunciators in the unit under test.

Mode Controller Tester

13. Test Select Switches

The test selector is a 4 pole 3 position rotary switch that is used to select the voltage or ground that will be supplied to the test panel annunciators for the test being run. The mode controllers switches have 2 positions and to check both positions requires that in one case 28VDC is supplied to the circuit and in the other case that ground be supplied. The third position, (AP/FD test), of the selector switch provides the proper connection to the annunciators for all other operations.

14. Voltage Adj

The voltage adjusts allows the power into the controller to be adjusted to check for drop out of solenoid held switches.

15. ELV LED
16. AIL LED Switches
17. RUD LED

These switches are a 2 pole 2 position switch that provides a ground to the Mode Controllers Elevator LED, Aileron LED, or Rudder LED respectively when the switch is activated, and an open in the deactivated position. The 2nd pole is used to power the internal lamp to annunciate the activated switch position.

18. AP Eng Sol Switch

The autopilot engage solenoid switch is a 2 pole 2 position latching pushbutton switch that provides a ground output in the activated position to sink the current for the solenoid. In the deactivated position the switch provides an open circuit. The second pole is used to power the internal lamp to annunciate the activated position.

19. YD Eng Sol Switch

The yaw damper engage solenoid switch is a 2 pole, 2 position latching pushbutton switch that provides a ground output in the activated position to sink the current for the solenoid. In the deactivated position the switch provides an open circuit. The second pole is used to annunciate the activated position.

20. AP Disc Switch

The autopilot disconnect switch is a 2 pole 2 position latching pushbutton switch that provides the voltage from the voltage from the voltage adjust control to the autopilot engage switch holding solenoid in the unit under test in the activated position. In the deactivated position the switch presents an open circuit to the solenoid. The 2nd pole of the switch is used to power the internal lamp to annunciate the activated position.

21. AP/YD Disc Switch

The autopilot, yaw damper disconnect switch is a 2 pole 2 position latching pushbutton switch that provides the voltage from the voltage adjust control to both the autopilot and yaw damper engage switches holding solenoids. In the deactivated position the switch presents an open circuit to both solenoids. The second pole of the switch is used to power the internal lamp to power the internal lamp to annunciate the activated position.

Test Set Power

22. 28VDC Power On Annunciator

This annunciator is located after the 28VDC power switch and will be lit whenever the 28VDC power switch is on and the 28VDC fuse good.

23. 28VDC ON/OFF Switch

Supplies 28VDC to the test set and to the test adapters.

24. 28VDC Fuse

5 amp fuse that is in series with the main 28VDC input power.

25. 28VDC Adjust

DC pot adjustment with an emitter follower power transistor that can vary the 28VDC through a range of near zero to 27VDC. This is supplied to the test adapters and used as the 28VDC power for units requiring this function.

26.	115VAC 400Hz Power On Annunciator	This is a 28 volt annunciator that is mounted across a secondary transformer winding of the Input 400Hz transformer. The annunciator is lit whenever 115VAC power switch is on and fuse is good.
27.	115VAC 400Hz ON/OFF Switch	Supplies 115VAC, 400Hz to the test set, and out to the test adapter. The ±15 and +10VDC for the test panel and the power for the multimeter are made from this source.
28.	115VAC 400 Hz Fuse	2 amp fuse that is in series with the main 115VAC, 400Hz input power.
29.	115VAC 400 Adjust	A variac that adjusts the amplitude of the 115VAC 400Hz supplied to the various units under test.
30.	Unit Lights Voltage ON/OFF	Supplies 28VDC power to operate the lighting circuits.
31.	Unit Lights Voltage ADJ	This is a DC pot control that varies an emitter follower power transistor to give a variable output from zero volts to maximum of voltage selected by the unit lights voltage selector.
32.	Unit Lights Voltage Select	This is a 3 position selector switch that changes the ranges to the three different voltages normally used in panel mounted aircraft equipment.
33.	400 Hz (square wave) ON/OFF	Supplies 400Hz square wave 40 volts peak to peak to power units requiring square wave power.
34.	Gyro Excite	Provides excitation voltage to the vertical gyro simulator synchros. In the ∿ (sine) position. The synchros are excited with 26VAC sine wave. In ⊓⊔ (square wave) position they are excited with a selected level signal to give desired output.
35.	400 VAR Test Jack	Used to measure the input 115VAC power to the units under test. Voltage present whenever 115VAC 400Hz power switch on.

36.	26VAC Test Jack	Used to measure the 26VAC input to units requiring 26VAC. Also is used inside the test panel wherever 26VAC is required. Present whenever 115VAC 400Hz power switch is on.
37.	400 wave Test Jack	Used to measure the 400Hz square wave power. This power is generated in the test adapter of the unit that requires square wave power and is otherwise open.
38.	+15VDC Test Jack	Used to measure the +15VDC used inside the test panel. This voltage is made inside the KTS 147 from the 115V 400Hz. Shall be present whenever 115VAC 400Hz switch is on.
39.	+10VDC Test Jack	Used to measure the +10VDC used inside the test panel. This voltage is made from the +15VDC inside the KTS 147. Present whenever 115VAC 400Hz switch is ON.
40.	-15VDC Test Jack	Used to measure the -15VDC used inside the test panel. This voltage is made inside the KTS 147 from the 115V 400Hz. Present whenever 115VAC 400Hz switch is ON.
41.	AC Lo Test Jack	Used as the low reference for the 115VAC 400Hz power.
42.	28VDC Test Jack	Used to measure the input 28VDC to the KTS 147 as well as to units requiring 28VDC not variable. Present whenever 28VDC power switch ON.
43.	GND Test	Used for ground reference for all the voltages measured in the power section except 115V 400Hz.
44. 45.	Signal Ground Test Jacks Signal Ground Test Jacks	Used for ground reference for all signals which pass from the units through the KTS 147.
46.	400 VAR Switch	With the switch in the depressed position (activated the switch button shall be lit and there will be a 1Ω resistor in series with the 115VAC variable line. When the switch is deactivated, the 1Ω resistor is shorted.

47.	28VDC VAR Current	With the switch in the depressed position, (activate)the switch button shall be lit and there will be a 1Ω resistor in series with the 28VDC variable line. When the switch is deactivated the 1Ω resistor is shorted.
48.	400Hz Current Test Jack	These jacks are across the 1Ω resistor used to convert the 400Hz current into an AC voltage equal to the current. (1maRMS will give 1mvRMS).
49.	28VDC Current Test Jacks	These jacks are across the 1Ω resistor used to convert the 28VDC current into an equivalent DC voltage. (1ma DC will give 1mv DC).
50.	Digital Multimeter	Data Precision Model 245 Multimeter. Power to the unit is supplied from the tester.
51.	Input Selector	A twelve position rotary switch which selects the source of the input voltage read on the digital multimeter when the Mode Selector is in the input position.
52.	Input Selector Test Jacks	Test jacks which can be used to monitor the input signals chosen by the Input Selector switch (S1) with a scope or more accurate meter.
53.	External Input Test Jacks	Test jacks used to route signals from any test point on the adapter into the digital multimeter.
54.	Mode Selector	Three position slide switch which determines origin of input signal to digital multimeter.
55.	Output Selector Test Jacks	Test jacks which can be used to monitor the output signals chosen by the Output Selector switch (56) with a scope or more accurate meter.
56.	Output Selector	A twelve position rotary switch which selects the origin of the signal to be read by the digital voltmeter when the mode selector is in the output position.

Compass Simulator

57. Course Datum Sel.

The course datum selector is a 4 pole 4 position rotary switch that changes the signal source of the course datum to simulate the different type synchros that may be encountered. Position 1 of the selector opens the SINE (+) and SINE (-) lines and connects them togethe r through a 2K resistor to provide a zero input. In position 1 the cosine (+) and cosine (-) lines are connected to the cosine winding of the synchro. Position 2 of the selector provides a typical 4 wire synchro input to the unit under test. Position 3 of the selector provides a typical 3 wire synchro input to the unit under test. In position 4 of the selector the cosine lines are open and the Sine (+) and Sine (-) is connected to a ramp source that will simulate a constant rate change of the AC input amplitude.

58. Heading X, Y, Z Test Jacks

The heading X, Y, and Z test jacks are connected directly to the X, Y and Z windings of the heading synchro, and provide monitoring of the standard 11.8VRMS ARINC output of the synchro.

59. Heading/Course Heading Select Dial

The Heading Dial indicates the angular position of a synchro used to generate the simulated heading gyro signal as well as the heading select and course datum signals. The X, Y, Z wires are routed to the Test Adapter as the basic heading information and to the X, Y, Z legs of a locked differential transformer that generates the sine/cosine 4 wire information for course datum. The sine winding of the locked differential transformer is also used as the heading select error signal. All the heading signals are routed through their own switches that control their application to the test adapters.

60. Sine (+) and (-)
61. Cosine (+) and (-) Test Jacks

These jacks provide test points of the 4 wire input to the unit under test and will only be connected to the sine and cosine output of the differential synchro when the course datum selector is in the 4 wire position.

62. DG Ref Switch

The DG reference switch is a 2 pole 2 position latching pushbutton switch that supplies a 26VAC reference voltage to the unit under test when the switch is activated. The second pole of the switch is used to power the lamp inside the switch to annunciate the activated position.

DG Ref Switch (Con't)

In the deactivated position the switch provides an open circuit to the unit under test on the D. G. Reference line.

63. D. G. Valid 28VDC Switch
64. D. G. Valid GND Switch

The DG valid switches are mechanically interlocked pushbutton switches such that only one can be activated at a time. The DG valid line is an open circuit when neither switch is depressed and will be connected to 28VDC when the 28VDC valid switch is depressed or connected to ground when the GND valid switch is depressed. Both switches have a second contact that is used to light the internal lamp to annunciate when the switch is activated. To create an invalid DG signal, depress both switches at the same time.

65. HDG Input Switch

The heading input switch is a 4 pole 2 position latching pushbutton switch that grounds all three heading (X, Y and Z) lines in the deactivated position and connects them to the heading synchro in the activated position. The 4th pole of the switch is used to light the internal lamp to annunciate when the switch is activated.

66. HDG SEL Input Switches

The heading select input switch is a 3 pole 2 position latching pushbutton switch that grounds the 2 heading select input lines in the deactivated position and connects them to the sine windings of the differential synchro when the switch is activated. The 3rd pole of the switch is used to light the internal lamp to annunciate when the switch is activated.

67. CRS Datum REF Switch

The course datum reference switch is a 2 pole 2 position latching pushbutton switch that supplies the 26VAC reference voltage to the unit under test when the switch is activated. The 2nd pole of the switch is used to power the lamp inside the switch to annunciate the activated position. In the deactivated position the switch provides an open circuit to the unit under test on the course datum reference line.

VNAV Tester

68. Altitude Reference and
69. Altitude Reference Multiplier Switches

These switches are single pole rotary switches that provide selectable steps on a precision resistor ladder network to use in a ratio type measurement for increased accuracy on VNAV testing. When the range multiplier is set to the sea level position it will provide a 0 Alt reference (+0.600VDC) to the meter, in position 1 thru 9. The low side of the meter shall be referenced to a selected tap of the precision ladder network that will provide a voltage that represents that altitude. The range selector changes the voltage supplied to the range multiplier to change complete range of operation. When the multiplier switch is set to the absolute volts position it provides a precisions ground reference to the meter.

70. ALT CRS ADJ
71. ALT Fine Adj

The Alt course and Alt Fine Adjust controls are 5K, 10 turns, infinite resolution potentiometers connected such that very precise settings may be made. The fine adjust should be set to mid-range and the course adjust used to set the voltage near the desired level and the fine adjust used to achieve the desired value.

72. Servoed Alt Valid Switch

The servoed altimeter valid switch is a 2 pole, 2 position latching pushbutton switch. The switch supplies a 28VDC when invalid, deactivated, and ground output when activated to the valid position. The 2nd pole of the switch is used to power the internal lamp to annunciate the activated position.

D. C. Input

73. DC Input Vertical Sel #1

The vertical selector number 1 is a 6 pole, 5 position switch that allows the vertical DC adjust voltage to be routed to the following signal inputs. Position 1 is off and all inputs are grounded. Position 2 routes the signal to the altitude select input. Position 3 routes the signal to the VNAV steering input. Position 4 routes the signal to the altitude rate input and at the same time applies a 10 volt signal for common mode testing to the altitude select and VNAV steering inputs. Position 5 routes the signal to the IAS rate input.

74. D. C. Input Vertical Sel #2

The vertical selector number 2 is a 7 pole 5 position switch that allows the vertical DC adjust voltage to be routed to the following signal inputs. Position 1 supplies a ground for an off condition. Position 2 routes the signal to the mach or speed profile input. Position 3 routes the signal to the IAS input. Position 4 routes the signal to the Δh input.

75. D. C. Input Vertical DC ADJ

The vertical DC adjust control is a pot input into a voltage follower to provide a variable D. C. low output impedance source. This source is used for the vertical input signals.

76. D. C. Input Lateral DC ADJ

The lateral DC adjust control is a pot input into a voltage follower to provide a variable D. C. Low output impedance source. This source is used for the lateral input signals.

77. D. C. Input Vertical DC SENS HI Switch

The veritical D. C. sensitivity switch is a 3 pole 2 position latching pushbutton switch that changes the authority of the vertical D. C. source from ±14 volts in the Hi Sens, activated position to ±4 volts in the Lo sens, deactivated position. When the switch is activated it will be annunciated by the switch being illuminated.

78. D. C. Input Lateral DC SENS HI Switch

The lateral D. C. sensitivity switch is a 3 pole 2 position latching pushbutton switch that changes the authority of the lateral DC source from ±14 volts in the Hi Sens, activated position to ±4 volts in the Lo Sens, deactivated position. When the switch is activated it will be annunciated by the switch being illuminated.

Servo/Trim Tester

79. Voltage Torque Limiter Selector

The Servo VTL, (voltage torque limit) Selector is a 1 pole 4 position rotary switch that provides the necessary connections for strapping of the voltage torque limits on the KSA 370 Servo. When placed in the open position there will not be any voltage torque limiting.

80. Command Adjust

The Command adjust control is routed to internal amplifiers that will give the correct output drive signals to the servo or pitch trim circuit being tested.

81.	Trim A Trim B Trim C Trim D Switches	Four three position slide switches which simulate Pitch Trim motor signals into the KAC 325. Each switch can provide an open, a +28V signal or a ground signal.
85.	Spare Switch	This switch is not used in the Master Panel at this time.
86.	Clutch Arm Switch	The clutch arm switch is a 2 pole 2 position latching pushbutton switch. One contact of the switch is used to supply 28VDC through 10K as a clutch arm enable signal when the switch is activated. In the deactivated position the switch provides a ground signal through 10K to the unit under test. The 2nd pole of the switch provides power to the internal lamp to annunciate the activated position.
87.	Clutch Eng Switch	The clutch engage switch is a 2 pole 2 position latching pushbutton switch. One contact of the switch is used to provide 28VDC through a 1 ohm resistor to the servo clutch whenever the switch is activated. The 1 ohm resistor is used to sense the current drawn by the clutch. The 2nd pole is used to power the internal lamp to annunciate the activated position.
88.	Command Switch	The Command input switch is a 2 pole 2 position latching pushbutton switch. In the activated position it connects the command input adjust pot to the servo and trim amplifier circuit. In the deactivated position it provides a zero input into the amplifiers. The 2nd pole is used to power an internal lamp to annunciate the activated position.
89.	Servo/Trim Sel (Servo) Switch	The Servo/Trim Sel (Servo) switch is a 3 pole 2 position latching pushbutton switch. In the activated position it routes the servo simulator signal to the servo under test, and provides an open circuit to the trim. In the deactivated position the switch routes the simulated trim signal to the unit under test and provides an open circuit to the servo inputs. The 3rd pole of the switch is used to power the internal lamp to annunciate the activated position.
90.	Servo/Trim SENS HI Switch	The Servo/Trim Sensitive switch is a 2 pole 2 position switch that changes the gain of the sign amplifier by a factor of 7 to 1 to give a finer adjustment capability in the Lo

	Servo/Trim SENS HI Switch (Con't)	sensitivity position. The 2nd pole of the switch is used to power the internal lamp to annunciate the activated (Hi Sens) position.
91.	Servo Tach in Switch	The Servo Tach Input switch is a 5 pole 2 position latching pushbutton switch. It provides the capability of opening and closing of both lines of the KSA 370 or KSA 270 servo feedback. In the activated position the switches shall be closed and the feedback from the unit under test shall be routed back to the simulator. The 5th pole is used to power the internal lamp to annunciate the activated position.
	Auxiliary Switches	
92.	CNTL Wheel Trim Switch	The control wheel trim switch is a spring loaded center off slide switch that can provide an output as strapped in the adapter panel. In the KCP 320 Adapter, the switch is connected such that it gives a ± 22 volts to the control wheel vertical trim input of the KCP 320.
93.	GA Switch	The GA (Go Around), switch is a 2 pole 2 position momentary pushbutton switch that shall light when held in the depressed, (activated) position. The switch provides an open circuit when deactivated and a ground when depressed. A 2nd pole is used to power the internal lamp and annunciate the switch is activated.
94.	CWS Switch	The CWS, (Control Wheel Steering) switch is a 2 pole 2 position momentary pushbutton switch that shall light when held in the depressed, (activated) position. The switch provides an open circuit when deactivated and a ground when depressed. A 2nd pole is used to power the internal lamp and annunciate when the switch is activated.
95.	PFT Test Switch	The PFT, (pre-flight test), switch is a 2 pole 2 position latching pushbutton switch. The switch provides a ground input to the unit under test in the deactivated position and 28VDC when activated. This input is routed to all units requiring the pre-flight test input. The 2nd pole of the switch is used to power the internal lamp to annunciate when the switch is activated.

96. PFT Valid Switch

The PFT Valid (pre-flight test valid) switch is a 2 pole 2 position latching pushbutton switch. In the activated position it will provide a ground output to the unit under test. In the deactivated position the output will be a 28VDC signal. The 2nd pole of the switch is used to power an internal lamp to annunciate the activated position.

Navigational Instrument Inputs

97. NAV Function Select

The Nav function select switch is a 4 pole 6 position rotary switch. The switch provides grounds through a diode to the unit under test. In position 1 a ground signal is supplied to the LOC ENG #2 position only. In position 2 a ground signal is supplied to both #1 and #2 LOC ENG inputs. In position 3 a ground signal is supplied to the LOC #1 input only. In position 4 a ground signal is supplied to the RNAV ENR input only. In position 5 a ground signal is supplied to the RNAV APPR input only. In position 6 all positions are open indicating the VOR mode has been selected.

98. MRKR Select

The MRKR, (marker) select switch is a 1 pole 3 position rotary switch that provides the switching of the single marker signal source to the three separate marker annunciator inputs, and to the middle marker gain change inputs when in the MID position.

99. Waypoint Input Select

The waypoint input selector is a 4 pole 3 position rotary switch that routes the distance to the waypoint signal to the 20mv per nautical mile or 40mv per nautical mile input. The Null Set position provides a short across the 20mv per nautical mile Hi and Lo input and an open circuit to the 40mv per nautical mile input.

100. DME Select

The DME Selector switch is a 3 pole 6 position rotary switch that provides the following functions. In position 1, (Analog ZERO) the analog DME signal high and low are both shorted to ground the third input is open. In position 2, (Analog ADJ) the analog DME input is connected to the DME adjust control and the third line is open. In position 3, (DGTL $<$ 40) all three inputs are at ground simulating a digital low on each line. In position 4, (DGTL $>$ 40) the 100NM line and 80NM lines are low and the 40NM line is high.

DME Select (Con't)

In position 5, (DGTL > 80), 80NM line is high and the 40 and 100NM lines are low. In position 6 (DGTL > 100) the 100NM line is high and the 40 and 80NM lines are low.

101. CDI Valid Select

The CDI, (course deviation indicator) valid selector is a 5 pole 5 position rotary switch that routes the valid test signal source to the number 1 or number 2 CDI valid inputs. The 5th pole is used to apply a common mode voltage of 10 volts to the signal source for common mode testing. Position #1,CDI #1 Valid only. Position #2,CDI #1 and #2 valid. Position #3,CDI #2 valid only. Position #4, CDI #1 and #2 valid at 10 volts CMR. Position #5, CDI #1 and #2 invalid at 10 volts CMR.

102. G.S. Valid Select

The G.S. (Glideslope) valid selector is a 5 pole 5 position rotary switch that routes the valid test signal source to the number 1 or number 2 G.S. valid inputs. The 5th pole is used to apply a common mode voltage of 10 volts to the signal source for common mode testing. Position 1 of the switch connects only #1 G.S. Valid input to the valid source. Position 2 of the switch connects #1 and #2 G.S. valid inputs to the valid source. Position 3 of the switch connects only #2 GS valid input to the valid source. Position 4 of the switch connects #1 and #2 GS valid inputs to the valid source at a +10 volts common mode voltage. Position 5 of the switch connects #1 and #2 GS valid inputs to zero differential and to a common mode voltage of +10 volts.

103. CDI/GS DEV Select #1

The CDI/GS deviation selector #1 is a 4 pole 3 position rotary switch. The number 1, (Norm) position connects the number 1 CDI and number 2 GS inputs to the output of the ramp generator output amplifier. The ramp generator supplies fixed inputs and ramps or may be varied for any desired value. Position number 2 grounds the inputs for a zero check. Position 3 provides Glideslope #1 information into the Adapters while shorting the Nav inputs to ground. Position 4 connects all 4 inputs together and to a +10 volt common mode voltage.

104. To/From (+ To) Switch

The To/From switch is a 3 pole 2 position latching pushbutton switch. In the activated position the input will be +300mv positive on the (+) To input with respect to the (+) from input with a common mode voltage of +14VDC with respect to ground. In the de-activated position, the input will be +300mv positive on the (+) from input with respect to the (+) to input with a common mode voltage of +14VDC with respect to ground. The 3rd pole of the switch is used to power an internal lamp to annunciate when the switch is in the (+) To, activated position.

105. G. S. T. Test Switch

The G. S. T. test switch is a 2 pole 2 position momentary pushbutton switch. The switch provides an open circuit to theunit under test in the deactivated position and a ground when activated. The switch is used to ground the glideslope signal to check that glideslope rate gain is not present in glideslope track. The 2nd pole is used to power an internal lamp to annunciate the activated position.

106. MRKR Engage

The MRKR (marker) Engage switch is a 2 pole 2 position latching pushbutton switch. The switch provides a ground source to the unit under test when in the deactivated position and connects the input to an adjustable 2Hz low impedance source when in the activated position. The 2nd pole is used to power an internal lamp to annunciate the activated position.

107. Marker Adj

The Marker Adj control varies the amplitude of the 2Hz marker signal that is applied to the unit under test.

108. Δ Dist Adj

The Δ Dist Adj control varies the analog DC distance to the waypoint voltage. The maximum range is +2. 5 volts or 62. 5 nautical miles when on the 40mv per nautical mile range or 125 nautical miles in the 20mv per nautical mile range.

109. DME Adj

The DME adjust control varies the analog DME signal supplied to the DME inputs when the DME selector is set to the Analog Adj position.

110. CDI Valid Adj

The CDI valid adjust control varies the amplitude of the valid signal supplied to the unit under test.

111. G.S. Valid Adj

The G.S. valid adjust control varies the amplitude of the valid signal supplied to the unit under test.

112. CDI/GS Dev Select #2

The CDI/GS deviation selector #2 is a 4 pole 3 position rotary switch that provides the same input switching for number 2 CDI and number 1 GS inputs as the #1 selector for the #1 inputs.

Ramp Generator

113. Function Sel #1

The function sel #1 is a 2 pole 12 position rotary switch that provides the proper initial voltage and rate to the various circuit requiring this type signal. It also provides one position where the voltage can be varied to any desired level for gain checks and any desired rate for rate checks. Position 1 allows setting a variable start-voltage and a variable ramp to any of the inputs of which the ramp generator is connected. Position 2 of the selector sets the ramp generator to the initial condition of zero and an increasing amplitude of inphase AC signal to test for the proper OBS trip points. Position 3 of the selector reverses the phase of the signal to check the out-of-phase polarity. Position 4 and 5 of the selector sets the initial condition of the ramp generator to ±10 volts and ramps the signal for altitude captures. Position 6 of the selector provides a -240mv G.S. signal to check G.S. capture. Position 7 of the selector provides a +240mv G.S. signal to check the negative rate capture. Position 8 sets a -100mv CDI signal and positive ramp to check lateral beam capture. Position 9 checks the opposite polarity lateral beam capture. Position 10 of the selector sets the cone rate IC to 0 volts and a ramp rate to check for cone sensor trip. Position 11 checks the opposite polarity cone trip point 11.

114. Function Select #2

The Function Selector #2 is a 2 pole 3 position rotary switch that provides the following functions. Position 1, (operate) provides continuity to the ramp generators ramp control and allows the ramp generator to operate whenever the Set IC/Integrate switch is activated. Position 2 (Hold) allows the operator to stop the integrator ramp at any time. Position 3 (Auto Hold) provides an automatic trip to the Hold position whenever the altitude capture, glideslope capture, or lateral beam capture occurs. Glideslope and Alt Select captures must be made from the IAS hold position to get the auto hold function.

115. IC Adjust

The Initial Condition adjust control allows adjustment to any desired level of the output of the ramp generator when the function #1 selector is set to position #1 or #2, GS/NAV/ALT SEL ADJ and Adj IC/Rate position respectively.

116. Ramp Adjust

The Ramp Adjust control allows the selection of any rate of change desired of the ramp generator when the function #1 selector is set to the IC/Rate position.

117. Set IC/Integrate (Intergrate) Switch

The set initial condition/integrate switch connects the ramp generator to the I. C. voltage when in the deactivated position and when activated allows the integrator to ramp. The initial condition voltage and rate being determined by the function #1 selector position. The function selector #2 must also be set to the operate or auto hold position for the integrator to operate. The switch has a separate pole that is used to power an internal lamp to annunciate when the switch is activated.

118. OBS Rate Hi Switch

The OBS rate Hi switch is a 3 pole 2 position latching pushbutton switch that changes the rate of the ramp generator. In the deactivated position, (low rate) the OBS sensor should not trip. With the OBS rate switch activated, (Hi rate) the rate will be sufficient to trip the sensor.

119. Cone Rate Hi Switch

The cone rate Hi switch is a 3 pole 2 position latching pushbutton switch that changes the rate of the ramp generator. In the deactivated position, (low rate) the cone sensor should not trip. With the cone rate switch activated, (Hi rate) the rate will be sufficient to trip the sensor.

Autopilot

120. Function Select

The function selector is a 7 pole 10 position rotary switch that provides signal routing of the signal sources to the proper input of the autopilot. In position 1 all the inputs are grounded. In position 2 of the selector the pitch rate input is connected to the vertical DC signal source. In position 3, the pitch command input of the autopilot is connected to the DC output of the pitch attitude synchro. In position 4 both pitch rate and pitch command inputs are connected to the test signal source. In position 5 the pitch trim input of the autopilot is connected to the vertical DC source. In position 6 the yaw trim input of the autopilot is connected to the lateral DC source. In position 7 the roll trim input of the autopilot is connected to the lateral DC source. In position 8 the roll rate input of the autopilot is connected to the lateral DC source. In position 9 the roll command input of the autopilot is connected to the DC output of the roll attitude synchro. In position 10 both the roll rate and roll command inputs are connected to their signal sources. Whenever the selector is set to any position all other than that position noted input shall be connected to signal ground.

121. Ail Mon Switch

The Ail Mon switch is a 2 pole 2 position latching pushbutton switch. In the deactivated position the switch provides a +12.6VDC reference level. In the activated position one contact of the switch is used to supply 28VDC to power the internal lamp to annunciate the activated position and the other contact switches the airleron monitor input of the autopilot from the +12.6VDC reference to the actuator monitor adjust which can provide a signal from 0 to +28VDC.

122. Ail RDBK Switch

The Ail FDBK switch is a 2 pole 2 position latching pushbutton switch used to switch the simulated aileron feedback signal to the autopilot computer. The lateral DC input is used as the signal source and can provide a variable voltage from +15 to -15VDC. In the deactivated position the input is grounded and in the activated position connected to the signal source. The second pole of the switch is used to power the internal lamp to annunciate the activated position.

123. FD Eng Switch

The FD Eng Switch is a 2 pole 2 position latching pushbutton switch. The switch provides the Flight Directorengaged logic signal to the autopilot computer. The switch provides an open circuit in the deactivated position and a ground input signal in the activated position. The 2nd pole of the switch is used to power an internal lamp to annunciate the activated position.

124. IAS Limit Switch

The IAS Limit switch is a 2 pole 2 position latching pushbutton switch. The switch provides an open input to the autopilot computer when the switch is deactivated and a ground when the switch is activated. The 2nd pole of the switch is used to power an internal lamp to annunciate the activated position.

125. Elev Mon Switch

The Elev Mon switch is a 2 pole 2 position latching pushbutton switch. The function is the same for the elevator axis as the Ail Mon switch previously discussed.

126. Elev FDBK Switch

The Elev FDBK switch is a 2 pole 2 position latching pushbutton switch used to switch the simulated elevator feedback signal to the autopilot computer. The switch functions the same as the Ail FDBK switch previously discussed.

127. AP Eng Switch

The AP Eng switch is a 2 pole 2 position latching pushbutton switch. The switch provides a ground input to the autopilot computer in the deactivated position and a voltage determined by the adapter used, (28VDC with KAC 325) when in the activated position. The 2nd pole of the switch is used to power the internal lamp to annunciate the activated position.

128. Yaw Rate Step Switch

The yaw rate step switch is a 2 pole 2 position latching pushbutton switch that provides a zero, ground, input to the autopilot computer in the deactivated position and applies the signal selected by the yaw rate gyro AC/DC switch when activated. The second pole of the switch is used to power an internal lamp to annunciate the activated switch position.

129. Rud Mon Switch

The Rud Mon switch is a 2 pole 2 position latching pushbutton switch. The function is the same for the rudder axis as the Ail Mon switch previously discussed.

130. Rud FDBK Switch

The Rud FDBK switch is a 2 pole 2 position latching pushbutton switch used to switch the simulated rudder feedback signal to the autopilot computer. The switch functions the same as the Ail FDBK switch previously discussed.

131. YD Eng Switch

The YD Eng switch is a 2 pole 2 position latching pushbutton switch. The switch provides a ground input to the autopilot computer in the deactivated position and a voltage determined by the adapter used, (28VDC with KAC 325) when in the activated position. The 2nd pole of the switch is used to power the internal lamp to annunciate the activated position.

132. Roll Crossfeed Switch

The Roll Crossfeed switch is a 2 pole 2 position latching pushbutton switch that provides a zero ground, input to the autopilot computer in the deactivated position. In the activated position the switch connects the roll crossfeed input of the autopilot computer to the lateral DC input source. The 2nd pole of the switch powers an internal lamp to annunciate the activated switch position.

133. Actuator Mon Adj

The Actuator Mon adjust is a 10K 10T variable resistor connected such that its wiper can vary the input from 0 to 28VDC. This input is routed to the autopilot computer through the Ail, Elev, and Rud Mon switches.

134. Yaw Rate Gyro AC/DC Switch

The yaw rate gyro AC/DC switch is a double pole double throw paddle switch that connects the yaw rate input to the lateral DC input source in the DC position and to the roll attitude synchro source in the AC position. The second pole of the switch provides a 26VAC phase reference signal for demodulation purposes when in the AC position.

Air Data

135. IAS In/Open/Out Switch

The IAS switch is a double pole double throw center off paddle switch. Only one pole is used and it provides an open input to the IAS input of computers being tested in the center position. In the out position it provides a ground IAS input and in the "IN" position it connects the IAS input of the computer being tested to the low output impedance IAS adjust source.

136. IAS ADJ

The IAS Adjust control varies the IAS input source from +13.5 to -13.5VDC.

137. IAS Valid Switch

The IAS valid switch is a 2 pole 2 position latching pushbutton switch that provides a ground output when in the invalid, (deactivated position) and 28VDC when activated. The output of the switch is also routed through a transistor to give an inverted output such that either a ground/28VDC directly from the switch or an open/ground output from the transistor is available to the unit under test. The second pole of the switch is used to power an internal lamp to annunciate the activated (valid) position.

138. Alt Valid Switch

The Alt Valid switch is a 2 pole 2 position latching pushbutton switch that provides a ground output when in the invalid, (deactivated position) and 28VDC when activated. The output of the switch is also routed through a transistor to give an inverted output such that either a ground/28VDC directly from the switch or an open/ground output from the transistor is available to the unit under test. The 2nd pole of the switch is used to power an internal lamp to annunciate the activated (valid) position.

139. Mach Valid Switch

The Mach Valid switch is a 2 pole 2 position latching pushbutton switch that provides a ground output when in the invalid (Deactivated position) and 28VDC when activated. The output of the switch is also routed through a transistor to give an inverted output such that either a ground/28VDC directly from the switch or an open/ground output from the transistor is available to the unit under test. The 2nd pole of the switch is used to power an internal lamp to annunciate the activated (valid) position.

140. IAS Eng Switch

The IAS Eng switch is a 2 pole 2 position latching pushbutton switch that provides an open output when in the deactive position and a ground when in the activated position. The 2nd pole of the switch is used to power an internal lamp to annunciate the activated (engaged) position.

141. Alt Eng Switch

The Alt Eng switch is a 2 pole 2 position latching pushbutton switch that provides an open output when in the deactivated position and a ground when in the activated position. The 2nd pole of the switch is used to power an internal lamp to annunciate the activated (engaged) position.

142. Mach Eng Switch

The Mach Eng switch is a 2 pole 2 position latching pushbutton switch that provides an open output when in the deactivated position and a ground when in the activated position. The 2nd pole of the switch is used to power an internal lamp to annunciate the activated (engaged) position.

Flight Computer

143. RA Select Selector

The RA, Radar Altimeter selector is a 2 pole 3 position rotary switch. In the RA zero position both the Hi and Lo inputs are grounded. In position 2, ARINC, the Hi input is connected to the wiper of a variable resistor that can supply a variable voltage from -0.6VDC to +28VDC and the low side is connected to ground. In position 3, (non-ARINC) the signal is inverted such that the Hi side is connected to a source that will vary from +0.3VDC to -12VDC and the low side is connected to ground.

144. Vertical Trim Up/Dn

The vertical trim Up/Dn control is a 2 pole 2 position center off slide switch that provides an open circuit output in the center position. In the up position it provides a +15VDC to simulate the mode controller trim switch input to the flight computer. The 2nd pole of the switch is not used.

145. RA Adj

The RA Adj provides a variable output simulated Radar Altimeter signal whose characteristic is dependent on the setting of the RA Select control.

146. FD,
147. NAV,
148. HDG SEL,
149. APPR,
150. IAS HOLD,
151. MACH/SPD PRF,
152. ALT HOLD,
153. ALT ARM and
154. VNAV CPLD Switches

These 9 switches simulate the mode engagement switches of the flight control system and are 2 pole 2 position momentary pushbutton switches. The switch provides a ground input to the flight computer logic in the deactivated position and a voltage of a magnitude determined by the adapter used when in the activated position. The 2nd pole of the switch is not used. The internal lamp is connected such that it will be lit when the mode is engaged and will thus annunciate the status of the mode that a particular switch controls.

155. Pitch Rate Test and
156. Roll Rate Test Switches

These switches are not used in the Master Panel at this time.

157. HDG Sel Slew Switch

The HDG SEL Slew switch is a 3 pole 2 position latching pushbutton switch. In the deactivated position it provides a ground logic output to the flight computer. In the active position the switch provides a 28VDC logic signal and the analog output is from the lateral DC input source. The 3rd pole of the switch is used to power an internal lamp to annunciate the activated position of the switch.

158. Mode Controller Valid Switch

The mode controller valid switch is a 2 pole 2 position latching pushbutton switch. In the deactivated position the switch provides an open output and in the activated position it provides a ground output. The 2nd pole the switch is used to power an internal lamp to annunciate the activated position.

159. VNAV Valid Switch

The VNAV valid switch is a 2 pole 2 position latching pushbutton switch. The switch provides a ground output in the invalid position and a 28VDC output in the valid position. The signal is routed into a transistor in the KCP 320 Adapter to invert the signal for proper polarity. The 2nd pole is used to power an internal lamp to annunciate the activated position.

160. RA Valid Switch

The RA, (Radar Altimeter), valid switch is a 2 pole 2 position latching pushbutton switch. The switch provides a ground output in the deactivated position and a 28VDC input in the activated (valid) position. The 2nd pole is used to power an internal lamp to annunciate the activated position.

161. Alt Sel Valid Switch

The Alt Sel Valid switch is a 2 pole 2 position latching pushbutton switch. The switch provides a ground output in the invalid position and a 28VDC in the valid position. The signal is routed into a transistor in the KCP 320 adapter to invert the signal for proper polarity. The second pole is used to power an internal lamp to annunciate the activated position.

162. Alt Eng and Δh Sel Switches

The Alt Eng and Δh Sel switches are 2 pole 2 position momentary pushbutton switches. The switch provides a ground output in the deactivated position and a 28VDC output in the activated position. The switch signal is routed through a transistor in the KCP 320 Adapter to invert the signal input. The 2nd pole of the switches are used to power an internal lamp to annunciate the activated position.

KING

KTS 147

COMPONENT BENCH TESTER

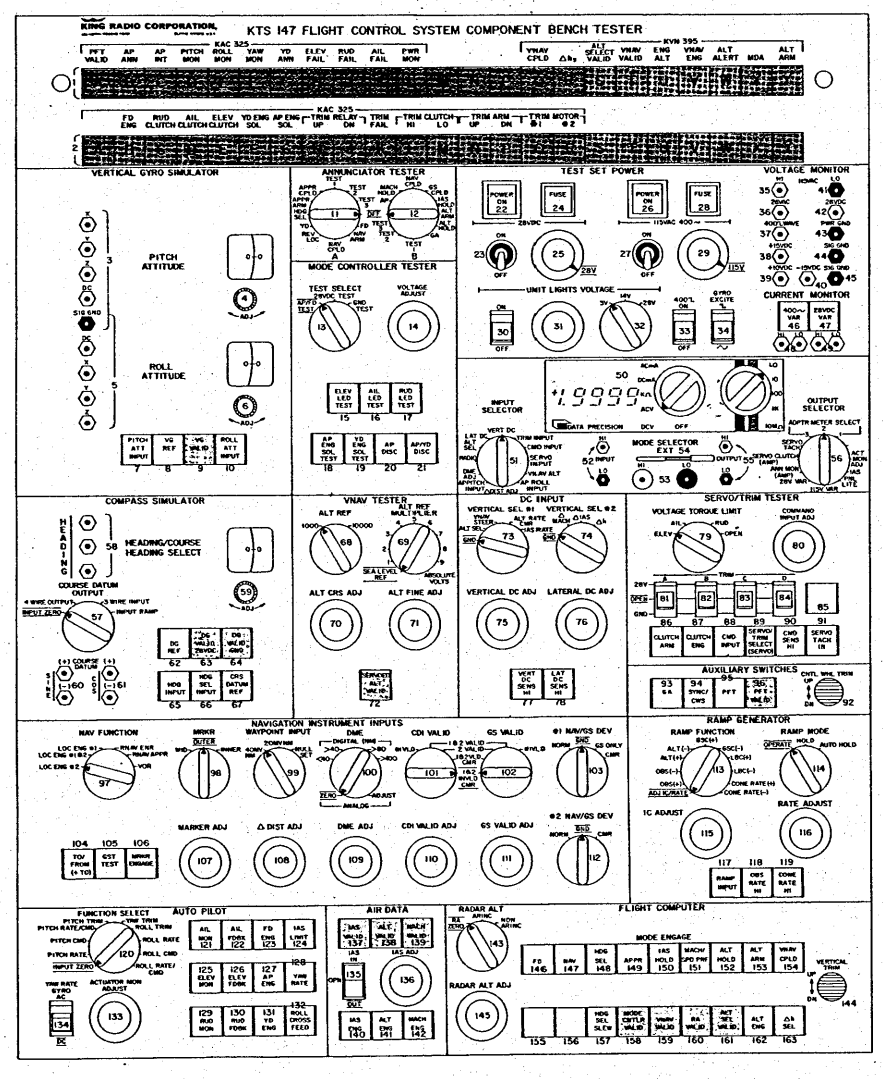


FIGURE 3-1 MASTER PANEL

1. ANNUNCIATOR SECTION 1
2. ANNUNCIATOR SECTION 2
3. PITCH X, Y, Z, D AND GND TEST JACKS
4. PITCH ATTITUD ADJUST
5. ROLL X, Y, Z, D AND GND TEST JACKS
6. ROLL ATTITUDE ADJUST
7. PITCH ATTITUDE INPUT SWITCH
8. VG REF SWITCH
9. VG VALID SWITCH
10. ROLL ATTITUDE INPUT SWITCH
11. ANNUNCIATOR SELECTOR "A" TESTER
12. ANNUNCIATOR SELECTOR "B" TESTER
13. TEST SELECT SWITCH
14. VOLTAGE ADJUST
15. ELEV LED SWITCH
16. AIL LED SWITCH
17. RUD LED SWITCH
18. AP ENG SOL SWITCH
19. YD ENG SOL SWITCH
20. AP DISC SWITCH
21. AP/YD DISC SWITCH
22. 28VDC POWER ON ANNUNCIATOR
23. 28VDC ON/OFF SWITCH
24. 28VDC FUSE
25. 28VDC ADJUST
26. 115VAC 400~ POWER ON ANNUNCIATOR
27. 115VAC 400~ ON/OFF SWITCH
28. 115VAC 400~ FUSE
29. 115VAC 400~ ADJUST
30. UNIT LIGHTS VOLTAGE ON/OFF
31. UNIT LIGHTS VOLTAGE ADJ
32. UNIT LIGHTS VOLTAGE SELECT
33. 400~L ON/OFF
34. GYRO EXCITE ~
35. 115VAC HI TEST JACK
36. 26VAC TEST JACK
37. 400~L WAVE TEST JACK
38. +15VDC TEST JACK
39. +10VDC TEST JACK
40. -15VDC TEST JACK
41. 115VAC LO TEST JACK
42. 28VDC TEST JACK
43. PWR GND TEST JACK
44. SIGNAL GND TEST JACK
45. SIGNAL GND TEST JACK
46. 400~ VAR SWITCH
47. 28VDC VAR CURRENT
48. 400Hz CURRENT TEST JACK
49. 28VDC CURRENT TEST JACK
50. DIGITAL MULTIMETER
51. INPUT SELECTOR
52. INPUT SELECTOR TEST JACKS
53. EXTERNAL INPUT TEST JACKS
54. MODE SELECTOR
55. OUTPUT SELECTOR TEST JACKS
56. OUTPUT SELECTOR
57. COURSE DATUM SELECT
58. HEADING X, Y, Z TEST JACKS
59. HEADING DIAL
60. SINE (+) AND (-) TEST JACKS
61. COSINE (+) AND (-) TEST JACKS
62. DG REF SWITCH
63. DG VALID 28VDC SWITCH
64. DG VALID GND SWITCH
65. HDG INPUT SWITCH
66. HDG SEL INPUT SWITCH
67. CRS DATUM REF SWITCH
68. ALT REF SELECT SWITCH
69. ALT REF MULTIPLIER SWITCH
70. ALT CRS ADJ
71. ALT FINE ADJ
72. SERVOED ALT VALID SWITCH

VERTICAL GYRO SIMULATOR

ANNUNCIATOR TESTER

MODE CONTROLLER TESTER

TEST SET POWER

VOLTAGE READOUT

COMPASS SIMULATOR

VNAV TESTER

73. VERTICAL SEL #1
74. VERTICAL SEL #2
75. VERTICAL DC ADJ
76. LATERAL DC ADJ
77. VERT DC SENS HI SWITCH
78. LAT DC SENS HI SWITCH
79. VOLTAGE TORQUE LIMIT SELECT
80. COMMAND INPUT ADJ
81. TRIM MOTOR A SWITCH
82. TRIM MOTOR B SWITCH
83. TRIM MOTOR C SWITCH
84. TRIM MOTOR D SWITCH
85. SPARE
86. CLUTCH ARM SWITCH
87. CLUTCH ENG SWITCH
88. CMD INPUT SWITCH
89. SERVO/TRIM SEL (SERVO) SWITCH
90. CMD SENS HI SWITCH
91. SERVO TACH IN SWITCH
92. CONTROL WHEEL TRIM SWITCH
93. GA SWITCH
94. SYNC/CWS SWITCH
95. PRE FLIGHT TEST SWITCH
96. PRE FLIGHT TEST VALID SWITCH
97. NAV FUNCTION SELECT
98. MARKER SELECT
99. WAYPOINT INPUT SELECT
100. DME SELECT
101. CDI VALID SELECT
102. GS VALID SELECT
103. CDI/GS DEV SELECT #1
104. TO/FROM (+ TO) SWITCH
105. GST TEST SWITCH
106. MRKR POLARITY (+)
107. MARKER ADJ
108. Δ DIST ADJ
109. DME ADJ
110. CDI VALID ADJ
111. GS VALID ADJ
112. CDI/GS DEV SELECT #2
113. RAMP FUNCTION
114. RAMP MODE
115. IC ADJUST
116. RAMP ADJUST
117. RAMP INPUT SWITCH
118. OBS RATE HI SWITCH
119. CONE RATE HI SWITCH
120. FUNCTION SELECT
121. AIL MON SWITCH
122. AIL FDBK SWITCH
123. FD ENG SWITCH
124. IAS LIMIT SWITCH
125. ELEV MON SWITCH
126. ELEV FDBK SWITCH
127. AP ENG SWITCH
128. YAW RATE SWITCH
129. RUD MON SWITCH
130. RUD FDBK SWITCH
131. YD ENG SWITCH
132. ROLL CROSSFEED SWITCH
133. ACTUATOR MON ADJ
134. YAW RATE GYRO AC/DC SWITCH
135. IAS IN/OPEN/OUT SWITCH
136. IAS ADJ
137. IAS VALID SWITCH
138. ALT VALID SWITCH
139. MACH VALID SWITCH
140. IAS ENG SWITCH
141. ALT ENG SWITCH
142. MACH ENG SWITCH

DC INPUT

SERVO/TRIM TESTER

AUXILIARY SWITCHES

NAVIGATIONAL INSTRUMENTS INPUTS

RAMP GENERATOR

AUTOPILOT

AIR DATA

143. RADAR ALT SELECTOR
144. VERTICAL TRIM UP/DN
145. RADAR ALT ADJ
146. FD MODE SWITCH
147. NAV MODE SWITCH
148. HDG SEL MODE SWITCH
149. APPR MODE SWITCH
150. IAS HOLD MODE SWITCH
151. MACH/SPD PRF MODE SWITCH
152. ALT HOLD MODE SWITCH
153. ALT ARM MODE SWITCH
154. VNAV CPLD MODE SWITCH
155. SPARE
156. SPARE
157. HDG SEL SLEW SWITCH
158. MODE CONTROLLER VALID SWITCH
159. VNAV VALID SWITCH
160. RA VALID SWITCH
161. ALT SEL VALID SWITCH
162. ALT ENG SWITCH
163. Δh SEL SWITCH

FLIGHT COMPUTER

3.2.2 ADAPTER #1

For use with KAC 325, KVN 395, KSA 370 and KAP 315.

KAC 325

201.	AP/28VDC Fuse	1 Amp fuse that is in series with the 28VDC input to the KAC 325.
202.	AP 115VAC Fuse	1 Amp fuse that is in series with the 115VAC 400Hz input to the KAC 325.
203.	Trim 28VDC Fuse	1 Amp fuse that is in series with the 28VDC input to the pitch autotrim section of the KAC 325.
204.	Yaw Gyro INTLK Out/In Switch	The yaw gyro INTLK, (interlock) switch is a double pole throw switch that provides a ground signal to the KAC 325 gyro interlock line when in the IN position and provides an open circuit when switched to the out position.
205.	Trim MTR/RLY GND Switch	The Trim MTR/RLY, switch is a double pole double position toggle switch that provides a ground to the emitters of the trim drive transistors when in the down position, (pins J1TP1 and 2) and an open to Pin J1TP3 and 4. When in the UP position the switch provides a ground to the relay drive diodes pins J1TP3 and 4 and an open to J1TP1 and 2.
206.	Trim Fail Rly Test Switch	The Trim Fail Rly, test swtich provides 28VDC to J1TP56 the normal closed contact of the trim fail relay when in the DOWN position and supplies 28VDC to J1TP55 the normal open contact of the trim fail relay when in the UP position.
207.	Yaw Gyro Ext Load Switch	The Yaw Gyro Ext Load switch provides a 50 ohm load to the 26VAC yaw rate gyro excitation when in the UP position and an open circuit no load when in the DOWN, OFF position.
208.	115VAC Ø Shift Switch	The 115VAC Ø SHFT, (phase shift) switch provides a 2.7K ohm load to the 115VAC phase shifted output when in the UP position and an open circuit, no load to the output when in the DOWN, OFF position.

209 and 218. AP Strap Select #1 and #2	The AP strap selector switches simulate the different strapping combination of all adapter cards to allow testing of the KAC 325 with any adapter.
210. AP Power On/ 211. Off Switches	The left-hand switch supplies the 28VDC to the KAC 325 in the ON position. The right-hand switch supplies the 115VAC 400Hz to the KAC 325 when in the ON position.
212. Trim Power On/Off Switch	The trim power switch supplies the 28VDC to the autotrim section of the KAC 325.
213. Flaps Up/Dn Switch	The flaps Up/Dn Switch provides a 28VDC input on the flaps switch input to the KAC 325 when in the UP position and a ground input when switch to the DOWN position. This is used to test the pitch axis gain change and autotrim delay change with flap setting: (This is not applicable to all KAC 325's).
214. 215. Clutch Monitor Switches 216.	The Clutch Monitor Switches are double pole center OFF toggle switches that provide a means of switching the simulated servo clutch engage transistors inside the test adapter to the ON position, switch in the UP position to simulate a shorted clutch transistor. When in the DOWN (normal) position the simulated clutch transistor is controlled by the KAC 325 clutch arm line. When set to the center OFF position the switch provides an open circuit to the base of the simulated clutch transistor. The switches provide the same function for each respective axis.
217. Yaw Ind In/Out Switch	The Yaw Ind In/Out test switch applies a 5 up filter to the yaw indicator output when the switch is in the IN position and an open circuit when in the OUT position to enable the measurement of step responses.

KVN 395

219. VNAV Power On/Off Switch	The VNAV Power On/Off switch supplies 28VDC to the VNAV unit. The 28VDC power switch on the master panel has to be on before there is any power to the test adapter.

220.	VNAV 28VDC Fuse	This is a 1 amp fuse that is in series with the 28VDC input power to the KVN 385. If the fuse is bad the power on annunciator will not light when the power switch is turned on.
221.	Power On Annunciator	This annunciator is across the 28VDC input power line to the KVN 395 and shall be illuminated whenever the VNAV power switch is on and the VNAV 28VDC fuse is good.

KSA 370

222.	Servo 28VDC Fuse	The Servo 28VDC fuse is a 5 amp fuse in series with the 28VDC power input to the servo.
223.	Servo Clutch Monitor	The Servo Clutch Monitor is a 28VDC annunciator that will be illuminated when 28VDC power is supplied to the KSM 370 and the servo's clutch is not engaged. This annunciator should be illuminated whenever the servo clutch arm switch on the master panel is deactivated indicating a good servo clutch transistor.
224.	Servo Power On/Off Switch	The Servo Power On/Off switch supplies the 28VDC to the servo amplifier. There will be no signal power present to the servo even with this switch in the OFF position.

KAP 315

225.	Ann GND Fuse	This 0.25 amp fuse is located in the ground line of the KAP 315 and is used to protect against damage to a KSA 370 Servo if it is connected by error to a KAP 315 test cable.
226.	Fuse Monitor	This annunciator is activated by a circuit that is across the ANN GND fuse to annunciate a blown fuse and wrong hook up of a KSA 370 Servo to a KAP 315 test cable.
227.	Annunciator Power On/Off Switch	The annunciator power On/Off switch supplies the 28VDC input power to the KAP 315.

Meter Selectors

228. Meter Select Meter Select #1

The Meter Select #1 is a 2 pole 12 position rotary switch that enables the routing of the indicated test signals to the master adapter's test meter for measuring purposes whenever the #1 meter selector has been selected on the master panel.

229. Meter Select Meter Select #2

The Meter Select #2 is a 2 pole 12 position rotary switch that enables the routing of the indicated test signals to the master adapters test meter for measuring purposes whenever the #2 meter selector has been selected on the master panel.

Test Jacks

230. Test Jacks KAC 325 T1TP

The 57 Test Jacks 1 through 57 provide pin for pin test points for J1 top plug of the KAC 325 autopilot computer.

232. Test Jacks KVN 395 J1

All 55 pins of the KVN 395 mating connector are routed to the test jacks pin for pin.

233. Test Jacks KSA 370 J1

The 13 test jacks made available on the test panel are the ones normally used in testing of a KSA 370 servo, and connect pin for pin with the designated pins.

234. Test Jacks KAP 315 J1

The two test jacks are to measure the 28VDC input into the KAP 315.

235. Speaker

The 8 ohm speaker mounted in the panel is used to indicate the aural alert output of the KVN 395.

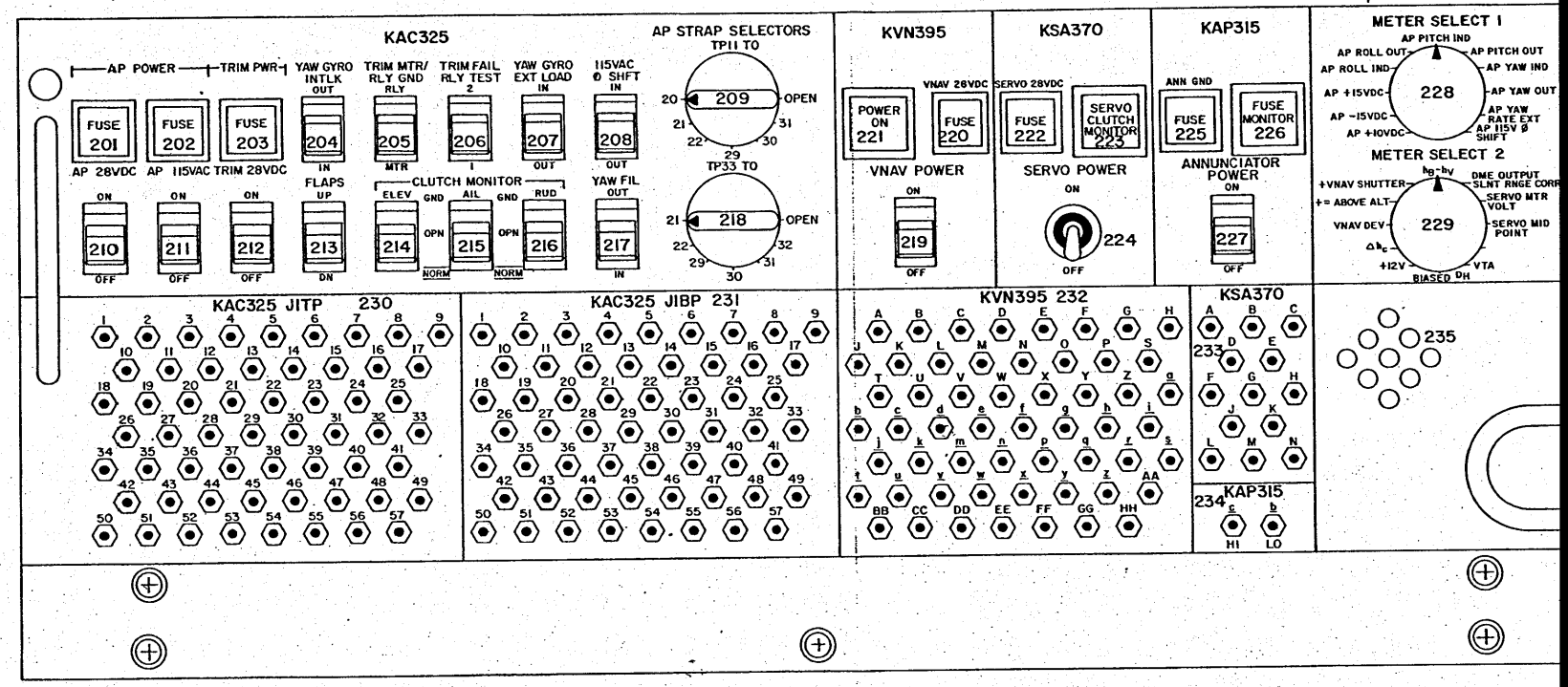


FIGURE 3-2 ADAPTER PANEL #1

201. AP/28VDC FUSE
202. AP 115VAC FUSE
203. TRIM 28VDC FUSE
204. YAW GYRO INTLK OUT/IN SWITCH
205. TRIM MTR/RLY GND SWITCH
206. TRIM FAIL RLY TEST SWITCH
207. YAW GYRO EXT LOAD SWITCH
208. 115VAC SHIFT SWITCH
209. AP STRAP SELECT #1
210. AP 28VDC POWER ON/OFF SWITCH
211. AP 115VAC POWER ON/OFF SWITCH
212. TRIM 28VDC POWER ON/OFF SWITCH
213. FLAPS UP/DN SWITCH
214. CLUTCH MONITOR SWITCH-ELEV
215. CLUTCH MONITOR SWITCH-AIL
216. CLUTCH MONITOR SWITCH-RUD
217. YAW IND IN/OUT SWITCH
218. AP STRAP SELECT #2
219. VNAV POWER ON/OFF SWITCH
220. VNAV 28VDC FUSE
221. POWER ON ANNUNCIATOR
222. SERVO 28VDC FUSE
223. SERVO CLUTCH MONITOR
224. SERVO POWER ON/OFF SWITCH
225. ANN GND FUSE
226. FUSE MONITOR
227. ANNUNCIATOR POWER ON/OFF SWITCH
228. METER SELECT #1
229. METER SELECT #2
230. KAC325 J3251TP
231. KAC325 J3251BP
232. KVN395 J3951
233. KSA370 J3701
234. KAP315 J3151
235. SPEAKER

KAC325

KVN395

KSA370

KAP315

METER SELECTORS

TEST JACKS

3.2.3 ADAPTER #2

For use with KCP 320, KDC 380/381, KMC 340, KPI 552/553, and KCI 310.

KCP 320

301.	28VDC Fuse	The 28VDC 1/2 amp fuse is located in series with the 28VDC input to J2BP3 of the KCP 320 Flight Computer as well as supplying the 28VDC to the test adapter circuits used during a KCP 320 Test. The simulated mode controller switches on the master panel also receive their power from this source.
302.	115VAC Fuse	The 115VAC 1/2 amp fuse is located in series with the 115VAC 400Hz input power to J2BP6 of the KCP 320 Flight Computer.
303.	On/Off Switch Left-Hand	This switch supplies the 28VDC to the KCP 320 and associated test circuits.
304.	On/Off Switch Right-Hand	This switch supplies the 115VAC 400Hz power to the KCP 320.

KDC 380/381

305. 306.	21VDC Fuse and -21VDC Fuse	The + and -21VDC fuses are 1 amp fuses in series with the + and -21VDC input power to the KDC 380 or KDC 381.
307.	26VAC Fuse	The 26VAC fuse is a 1 amp fuse in series with the 26VAC input to the KDC 380/381 input power.
308.	21VDC Power On/Off Switch	The 21VDC power On/Off switch is a double pole switch that supplies both + and -21VDC to the KDC 380/381.
309.	26VAC Power On/Off Switch	The 26VAC power On/Off switch in the ON Position supplies the 26VAC 400Hz power to the KDC 380/381.
310.	Power On Annunciator	The KMC 340 Power On Annunciator is immediately after the KMC 340 On/Off switch and illuminates when power is applied to the KMC 340.

311. On/Off Switch

The KMC 340 On/Off switch supplies 28VDC to the KMC 340 when in the ON position.

Meter Selectors

312. Meter Select #1

The Meter Select #1 is a 2 pole 12 position rotary switch that applies the indicated selected signal to the master panel test meter whenever the #1 Meter Selector is selected on the master panel.

313. Meter Select #2

The Meter Select #2 is a 2 pole 12 position rotary switch that applies the indicated selected signal to the master panel test meter whenever the #2 Meter Selector is selected on the master panel.

314. Meter Select #3

The Meter Select #3 is a 2 pole 12 position rotary switch that applies the indicated selected signal to the master panel test meter whenever the #3 Meter Selector is selected on the master panel.

315 and
321. Test Connector KPI 552/553 J1

This connector provides a pin for pin interface with the comp portion (61 pin connector) of both the KPI 552 or 663. This provides a limited testing capability to test the compass card drive and meter movements inside the indicator. The high and low output of the heading select synchro and the sine +, sine -, cosine +, and cosine - outputs may be measured at the appropriate test jacks below the output connector.

316. Test Jacks KCP 320 J1

These 57 test jacks connect pin for pin to the designated KCP 320 J1 connector pins.

317. Test Jacks KCP 320 J2TP

These 57 test jacks connect pin for pin to the designated KCP 320 J2TP connector pins.

318. Test Jacks KCP 320 J2BP

These 57 test jacks connect pin for pin to the designated KCP 320 J2BP connector pins.

319. Test Jacks KDC 380/381 J1

The 26 test jacks provide pin for pin test points with the 26 pins on the KDC 380/381 connector as indicated.

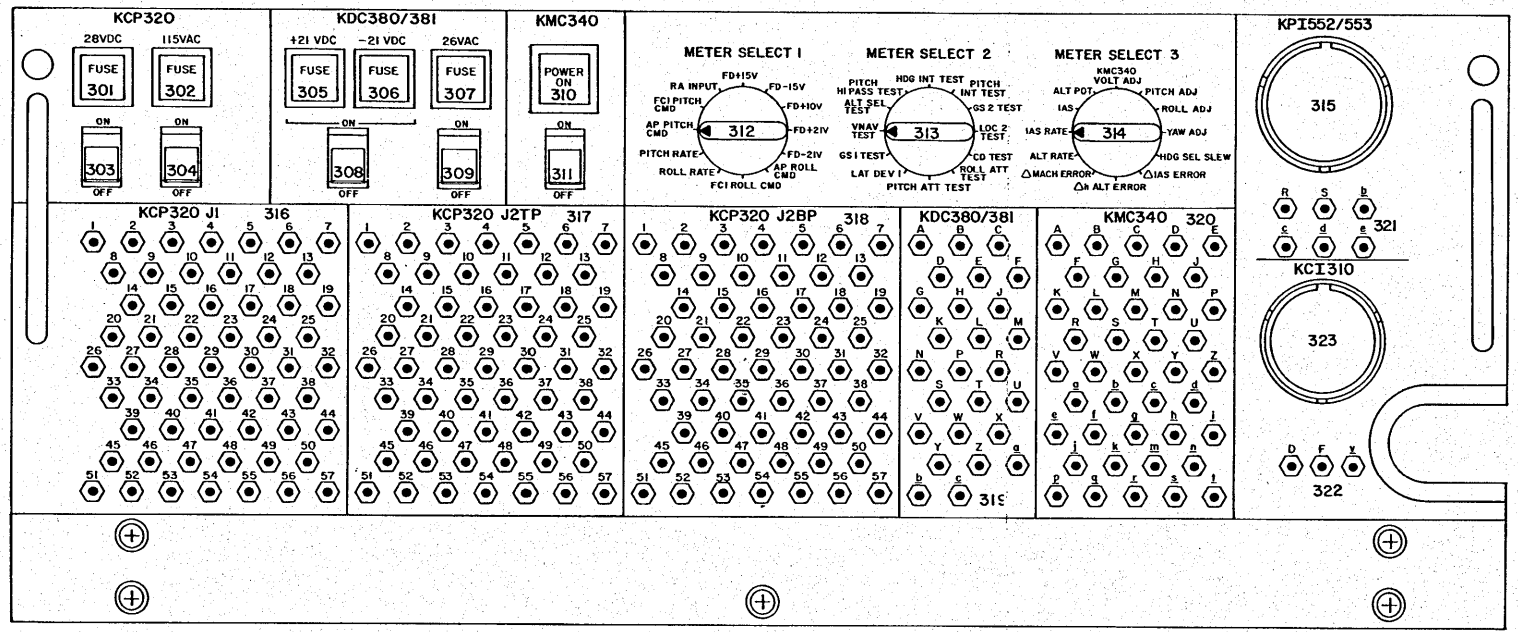
320. Test Jacks KMC 340 J1

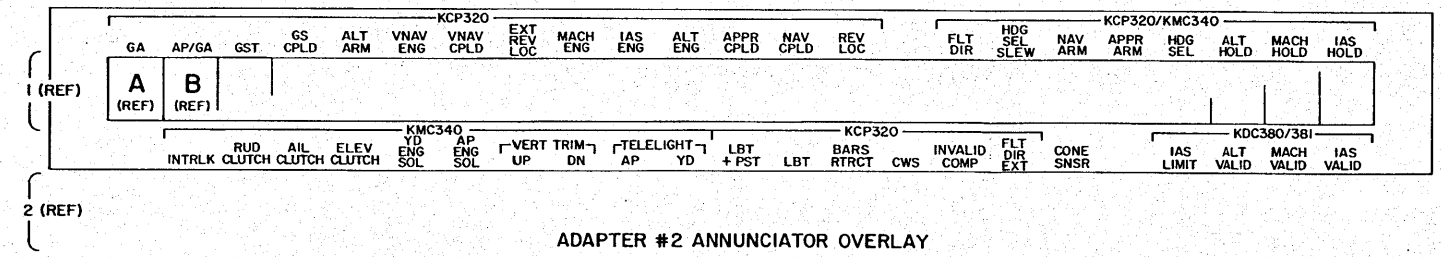
The 41 test jacks provide pin for pin test points with the 41 pins of the KMC 340 connector as indicated.

322 and
323. Test Connector KCI 310 J1

This connector provides a pin for pin interface with the KCI 310 Flight Command Indicator and may be used to connect a KCI 310 with its mating KCP 320 Flight Computer for a system type test. With a KCP 320 connected a more complete KCI 310 test may be run. The signals not common with the KCP 320 have been made available on the additional test jacks below the connector.

KING
KTS 147
COMPONENT BENCH TESTER

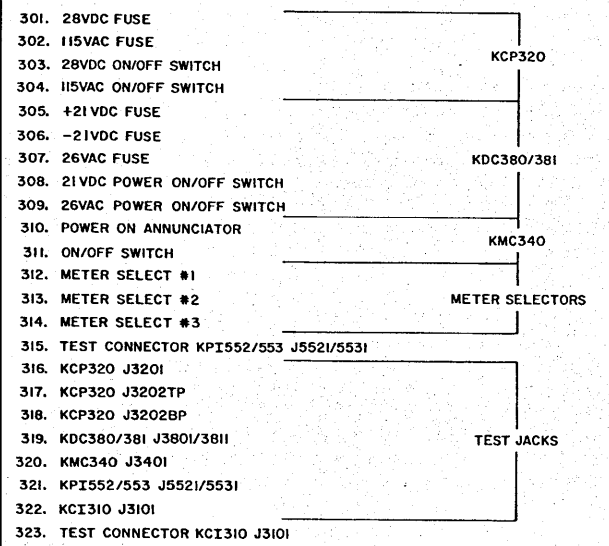




ADAPTER #2 ANNUNCIATOR OVERLAY

(INSTALL OVER ANNUNCIATORS AT TOP OF TESTER WHEN ADAPTER #2 IS USED)

FIGURE 3-3 ADAPTER PANEL #2


301. 28VDC FUSE
302. 115VAC FUSE
303. 28VDC ON/OFF SWITCH
304. 115VAC ON/OFF SWITCH
305. +21VDC FUSE
306. -21VDC FUSE
307. 26VAC FUSE
308. 21VDC POWER ON/OFF SWITCH
309. 26VAC POWER ON/OFF SWITCH
310. POWER ON ANNUNCIATOR
311. ON/OFF SWITCH
312. METER SELECT #1
313. METER SELECT #2
314. METER SELECT #3
315. TEST CONNECTOR KPI552/553 J5521/5531
316. KCP320 J3201
317. KCP320 J3202TP
318. KCP320 J3202BP
319. KDC380/381 J3801/3811
320. KMC340 J3401
321. KPI552/553 J5521/5531
322. KCI310 J3101
323. TEST CONNECTOR KCI310 J3101
KCP320
KDC380/381
KMC340
METER SELECTORS
TEST JACKS

1. (REF)
2. (REF)