



BELL 212 Pilot Training Manual

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CREW COMPARTMENT
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Crew Compartment



INTRODUCTION

The crew compartment contains all the necessary flight controls, flight and navigation instruments, engine instruments, warning and caution lights, electrical system control switches, circuit breakers, all necessary radio control panels, and switches to satisfactorily and safely operate the Model 212 helicopter.

Pilot's Station

General

The pilot's station is to the right hand side of the airframe. Standard helicopter controls, consisting of cyclic stick, collective stick and tail rotor pedals are located at the pilot's station.

Pilot's Seat

The pilot's seat is of tubular construction with a nylon net covering for better ventilation. The seats are located on tracks for fore and aft adjustment and are also adjustable on the vertical plane. The fore and aft adjustment lock for the seat is on the forward left side. The vertical adjustment lock is located on the forward right side. Seat adjustment allows the pilot to adjust himself to the cyclic and collective controls. In addition, the pedal position may be adjusted to accommodate the pilot's leg length. A hand wheel on the floor just aft of the cyclic stick base is used to adjust the pedals.

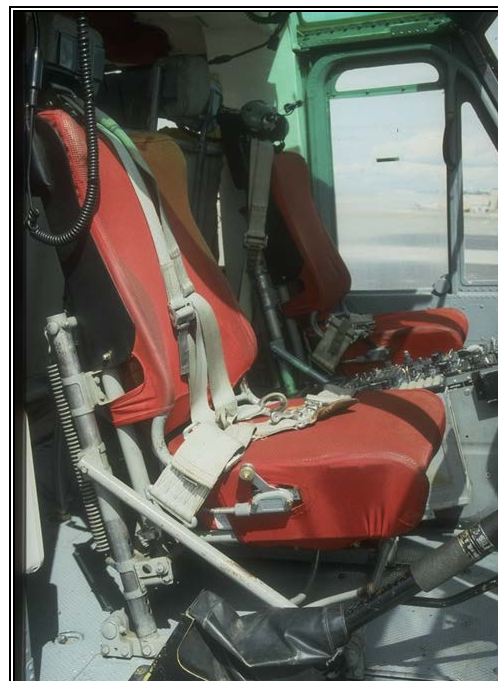


Figure 3-1 Pilot Seat

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To operate, the hand wheel must be pushed down to engage the adjuster assembly.

Attached to the seat there is a standard seat belt and shoulder harness restraint system. The shoulder harness utilizes an inertia reel to provide inertia locking of the harness with a manual lock control located on the left side of the seat.

Cyclic Stick

The pilot's cyclic stick has a friction adjustment collar on the stick shaft. (ON IFR configurations a clamp above the friction collar prevents all friction from being removed from the cyclic stick. This small amount of friction is required for SCAS operation). The co-pilot's cyclic stick does not have a friction adjustment.



Figure 3-2 Cyclic Stick

Cyclic Grip

Incorporated in the handgrip are a number of switches. The two-position trigger switch is for ICS/radio transmitter control. On the lower left forward side of the grip is a button type switch (red) used for cargo hook electrical release. On most VFR machines the button type push switch (red) halfway up

on the left side is not utilized and in this case the button (red) on the top left side is used to momentarily disengage the force trim. The four-way switch on the top right (a.k.a the "chinese hat") is used to activate the siren. (One IFR machines - On the left side about half way up the grip is a button type push switch (red) that is used to momentarily disengage the force trim or AFCS system. The button on the top left side of the grip is for SCAS and AFCS disconnect on Bell IFR 212s and flight director disconnect on Sperry 212s. The remaining switch on the top right side is a four way switch used for trimming the lateral and longitudinal axis when the AFCS is engaged).

Collective

The collective control stick, located to the left of the pilot's seat, contains the following items; collective switch box, Float arm switch, Water Bucket operation switch, two twist grips with individual friction controls, collective system friction control and collective system down lock.

Immediately below the twist grips on the collective stick is located the collective system friction collar. Rotating the collar to the left increases friction. Rotating it to the right removes friction from the system.

Two twist grip controls are installed on the collective stick, one for each engine. The upper twist grip is for engine No.1 and the lower twist grip is for engine No.2. Each twist grip has it's own friction adjustment Engine No.1 twist grip is longer than No.2. The No.1 twist grip is a cork type texture while No.2 is a rough grit type texture so the pilot will always knows which twist grip he is controlling.

The pilot's collective switch box contains the following items: flight idle stop release switch, searchlight control switch, and landing light control switches, N2 beep actuator switch, and the engine starter switch. On the upper left corner of the

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Figure 3-4A Co-Pilot Station

In addition, the collective stick head does not incorporate all the switches as on the pilot's side. Normally the only switches on the co-pilot's collective are the RPM increase-decrease switch, however, most Campbell helicopters have been modified with a Starter switch, idle stop release switch, long line hook master switch and longline release switch.

These switches will facilitate starts and long line operations from the left-hand seat including opening the remote hook on a long line or releasing the water in a Bambi bucket.



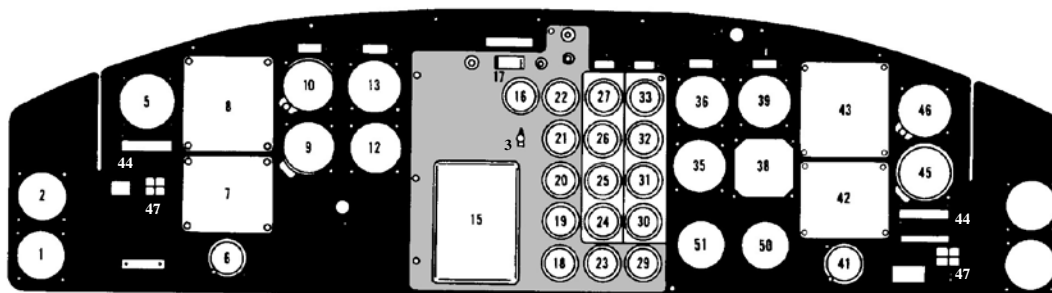
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Figure 3-4B Co-Pilot collective (top) & Door (bottom)



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1. Air Vent	18. Amp Meter	40. Master Caution Light
2. Air Vent	19. Gear Box Oil	41. Clock
3. Fuel Quantity Selector	20. Transmission Oil	42. Horizontal Situation Ind.
4. Marker Lights	21. Fuel Quantity	43. Attitude Director Indicator ADI
5. Airspeed	22. Hydraulic Ind. No. 2	44. Marker Beacon Lights
6. Clock	23.-29 Voltmeter	45. Rate of Climb
7. Horizontal Situation Ind.	24 - 30 Fuel Pressure	46. Altimeter
8. Attitude Director Indicator ADI	25 - 31 Engine Oil	47 AFCS Lights
9. Rate of Climb	26 -32 Temp Ind.	48. AFCS Lights
10. Altimeter	27 - 33 Gas Producer N1	49.
11. Master Caution Light	28. Engine Out No. 1	50. Radar Altimeter (Kit)
12. Torquemeter	34. Engine Out No. 2	51.
13. RPM Light	35. Torquemeter	52.
14. RPM Light	36. Triple Tach. (Tachometer)	53.
15. Master Caution Panel	37. RPM Light	54.
16. Hydraulic Ind. No. 1	38. DME Ind.	55.
17. Baggage Fire Ind.	39. Airspeed Indicator	56.

Figure 3-5 Instrument Panel and List of Instruments



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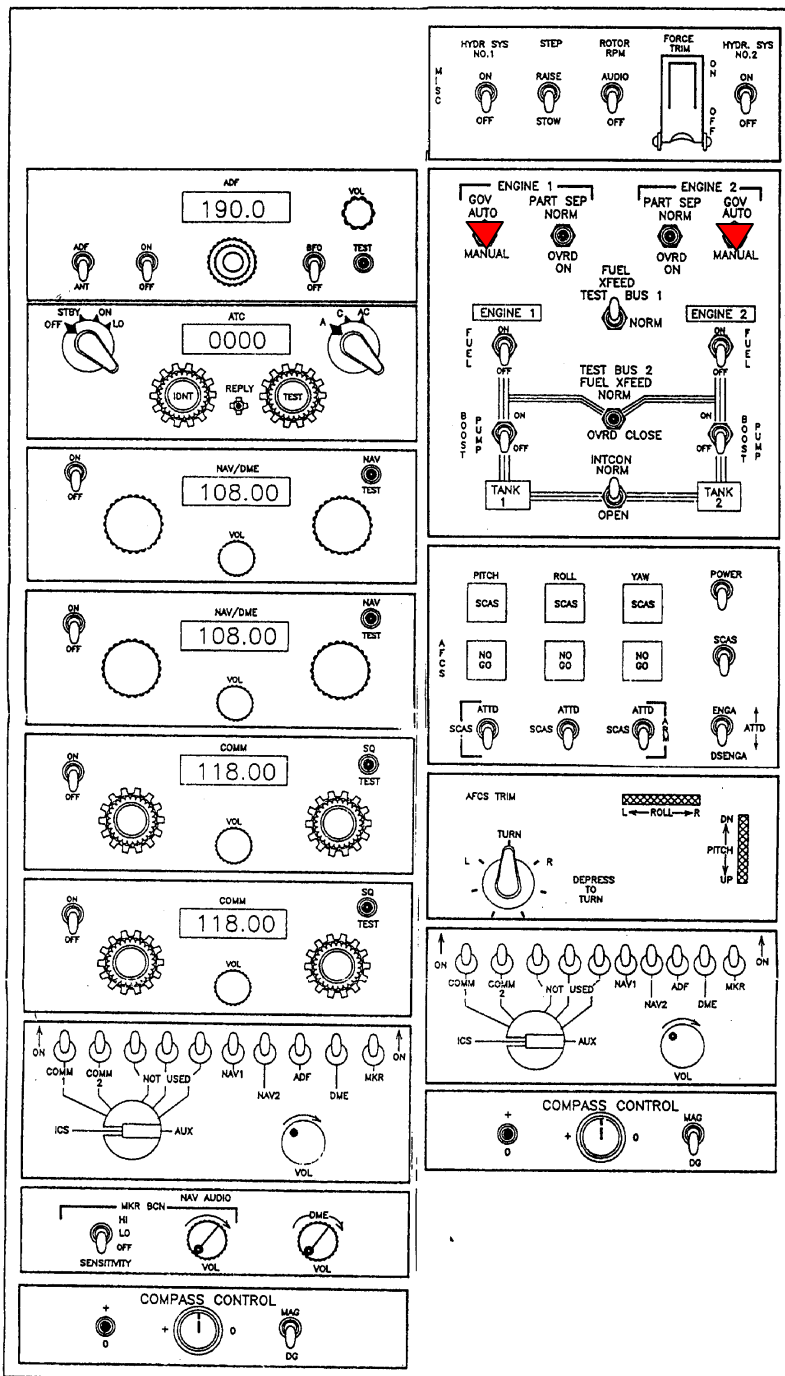


Figure 3-6 Pedestal Console (Varies by aircraft)



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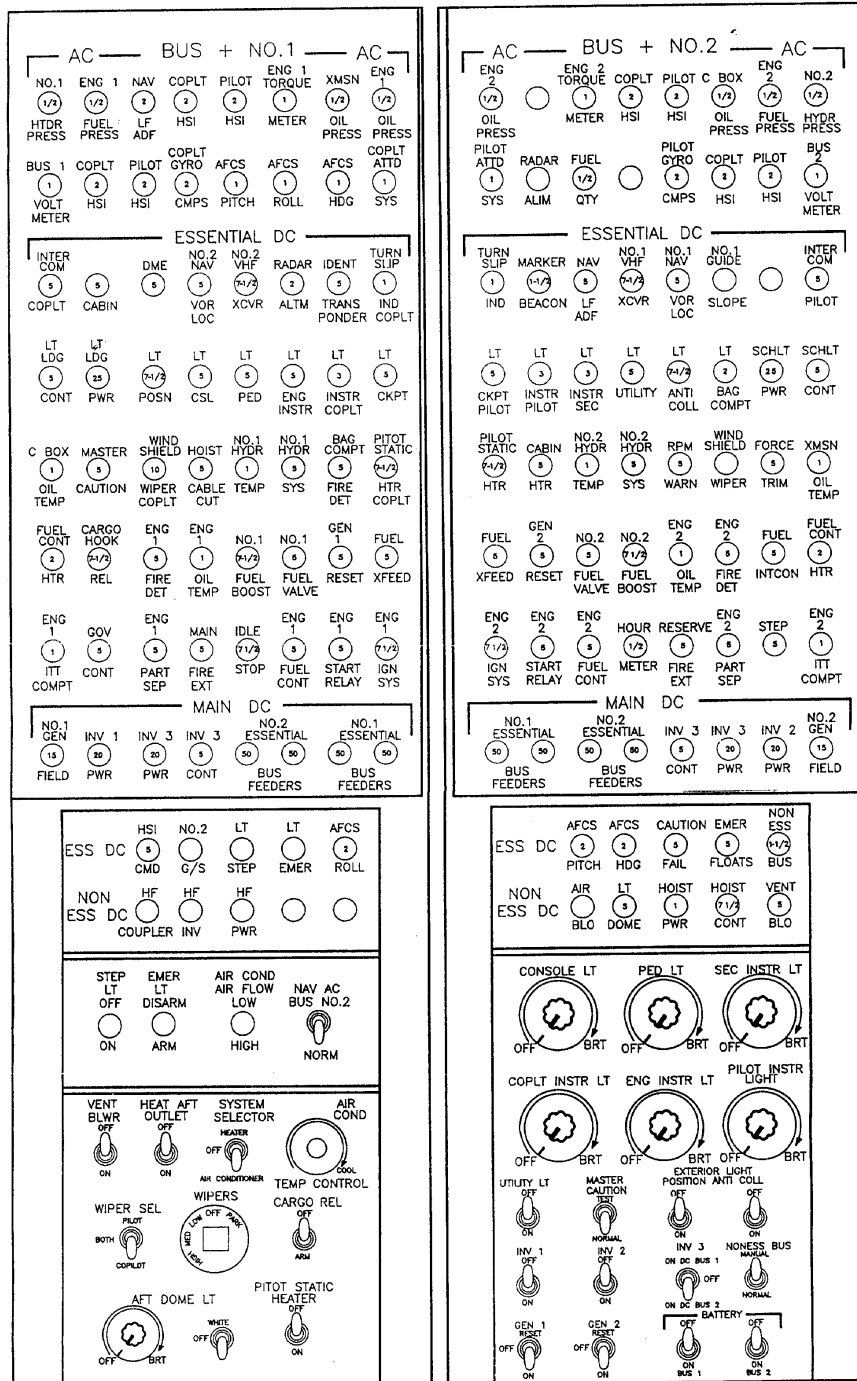


Figure 3-7 Overhead Console

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Instrument Panel

General

The main instrument panel can be subdivided into four major divisions which are; pilot's flight instruments, co-pilot's flight instruments, engine/systems instruments and warning/caution lights.



Figure 3-8 Instrument Panel

Pilot's Instruments

The pilot's flight instruments are located to the right side of the main instrument panel. They consist of the following:

Altimeter - Standard adjustable aviation altimeter. Located in the upper right corner of instrument panel.

Vertical Speed Indicator - The VSI is located directly below altimeter.

Attitude Director Indicator - Located to left of Altimeter. Commonly called an ADI. The attitude information to power this instrument is provided by a remotely mounted gyro package (Sperry TARSYN 444) located in left rear electrical/avionics compartment. Instrument provides pitch and roll information by means of instrument ball rotation. Knobs located at lower left and right corners of instrument give pilot the ability to adjust ball inclination to any given helicopter attitude. As part of the basic instrument face

presentation there is incorporated a turn and slip indicator which has a separate DC power source. Malfunction of the ADI, or loss of AC power, will not affect turn and slip indications.

Horizontal Situation Indicator - located directly below the ADI. Normally called an HSI. Coupled to and operated by the same gyro package as the ADI. The HSI functions as a basic gyro magnetic compass set with additional radio navigational functions incorporated to work with the required radio sets (kits) when they are installed. The control panel, which controls slaving of the HSI to a magnetic heading, is located on the pedestal console between the pilots' seats.

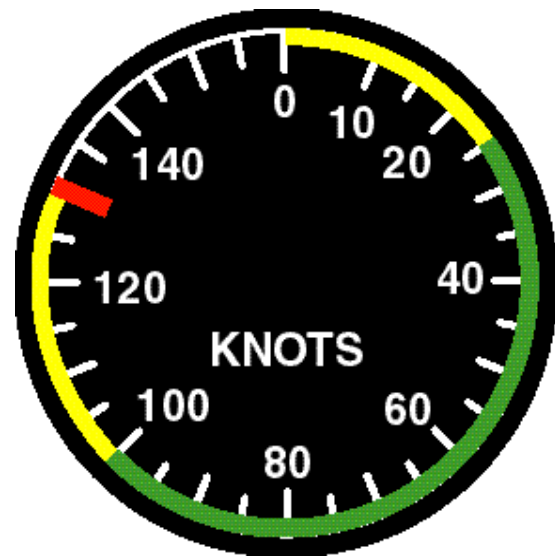


Figure 3-9 Airspeed Indicator (VFR)

Clock – Standard 8 day or digital clock.

Airspeed Indicator - located to the left of the ADI. Instrument is calibrated in knots.

Triple Tachometer - located to the left of the airspeed indicator. The instrument incorporates three individual needles and two scales, inner and outer. Two long needles, marked 1 and 2 point to the outer scale and show individual engine N2 RPM with the scale marker in percentage of allowable. The short needle points to the inner scale

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and shows rotor RPM in percentage of allowable.



Figure 3-10 Triple Tachometer & other

Dual Torque Pressure Indicator - located directly below the triple tachometer. The instrument incorporates two needles and a triangular shaped cursor, with two scales, inner and outer. The two needles, marked 1 and 2, show individual engine torque output and point to markings on the inner scale. Inner scale (Red and Yellow) markings show maximum single engine limitations. The triangular cursor points to markings on the outer scale and sums the two engine torques together to give the total torque being transmitted to the transmission. Outer scale markings (Green, Yellow, and Red) are Twin engine (Transmission) limitations.



Figure 3-11 Torque Gauge

Co-pilot's Instruments

The co-pilot's primary flight instruments are completely independent of the pilot's instruments. The co-pilot's altimeter, vertical speed indicator, and airspeed indicator are hooked to their own pitot-static system. The co-pilot's triple tachometer and torque indicator receive signals from the same transmitter as the pilot's side.

Engine/Systems Instruments

The engine and systems instruments displays are located in the center portion of the instrument panel between the pilot and co-pilot instruments. The display consists of three vertical columns of instruments plus one additional instrument and selector switch to the left of the three columns.

The upper four gauges of the two right hand columns basically pertain to engine operation and are duplicated right-left down the columns. The left-hand column pertains to engine No. 1 and the right hand column pertains to engine No. 2. The instruments from top to bottom are as follows:

Gas Producer Tachometer Indicator - normally referred to as N1 RPM (Sometimes also call Ng RPM). Instrument is marked in percentage.

Inter-turbine Temperature Indicator - normally referred to as ITT. Marked in degrees Celsius.

Engine Oil Temperature and Pressure Indicator - a dual type instrument displaying engine oil temperature in degrees Celsius on the left-hand scale and engine oil pressure in psi on right hand scale.

Fuel Pressure Indicator - instrument used to indicate boost pump pressure output and is marked in psi.

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AC / DC Voltmeters - Directly below the two columns of engine instruments are located the dual AC and DC voltmeters. The left instrument shows the voltage present on the No. 1 AC/DC buses and the right instrument indicates No. 2 bus voltages. Each instrument indicates AC voltage on the left scale and DC voltage on the right scale.

Reading from top to bottom of the third column of instruments the following instruments will be encountered. One instrument is located in the fourth column.

Hydraulic System Pressure and Temperature Indicators. Hydraulic System No.1 instrument is the one lone instrument located in the fourth column. Hydraulic System No.2 indicator is to the right of No.1 HYD SYS instrument at the top of the third column. Temperature is displayed on the left side of the instruments. Pressure is displayed on right side of the instruments.

Fuel Quality Indicator - located directly below No. 2 hydraulic system instrument, indicates fuel quantity in pounds.

Immediately to the left of the indicator there is located a fuel quantity selector switch. This switch is a three-position switch spring loaded to the center position where it selects total airframe fuel quantity. In the left or right positions it will select only contents of the left or right lower fuel cell (total fuel quantity for either left or right lower cell is 270 pounds).

Transmission Oil Temperature and Pressure Indicator - located below fuel quantity indicator. Left side indicates oil

temperature in degrees Celsius. Right side indicates oil pressure in psi.

Combining Gearbox (CBOX) Oil Temperature and Pressure Indicator - located directly below Transmission Oil Indicator. Left side indicates oil temperature in degrees Celsius. Right side indicates oil pressure in psi.

Generator Loadmeter - Located directly below CBOX Oil Indicator. Marked in Amperes, the Left side of instrument indicates load on No.1 or left generator. Right side indicates load on No. 2 or right generator.

Warning Caution Lights

General

The warning/caution light system used on the Model 212 is quite extensive and provides for continuous monitoring of all primary airframe systems.

Master Caution Panel

General

One panel known as the Master Caution Panel handles the majority of the caution and warning light functions.



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Figure 3-12 Engine Instruments



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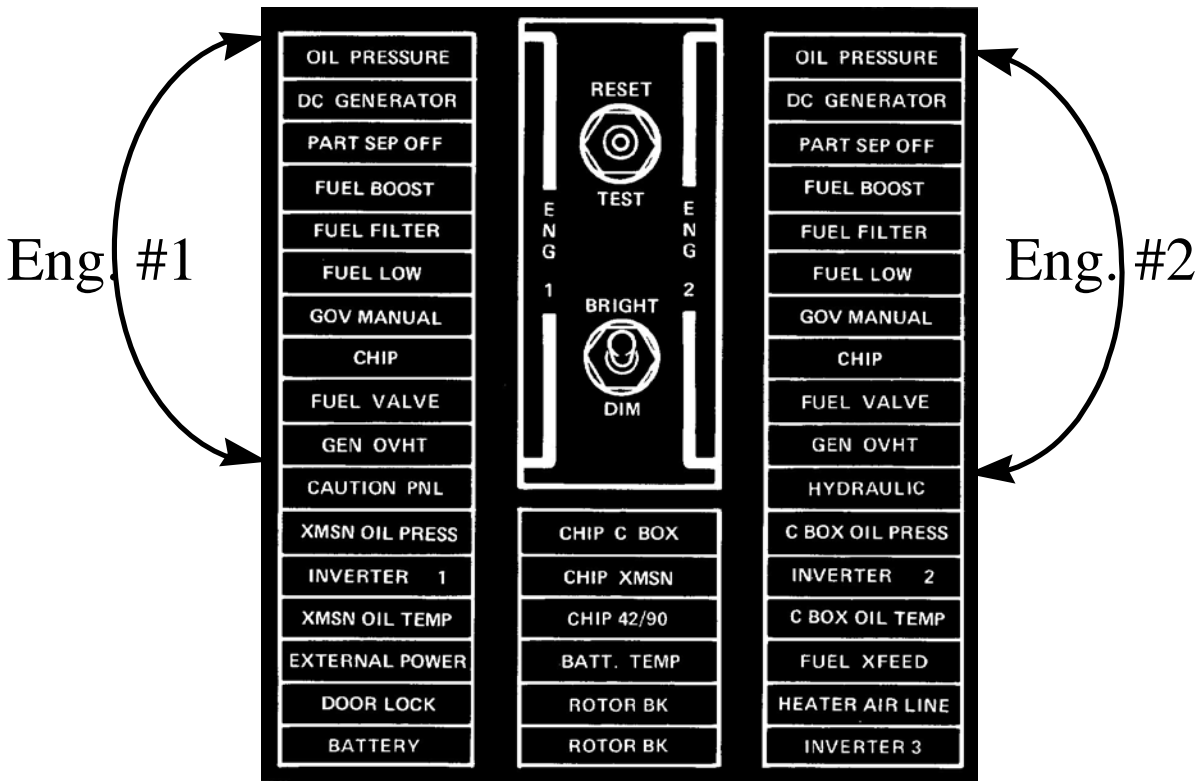


Figure 3-13 Caution Panel

Incorporated within this single panel there are 40 individual light segments. There are also two control switches on the panel. The upper part of the left vertical column and the upper part of the right vertical column are identified for Engine 1 (left) and Engine 2 (right). These two portions of the caution panel have identical indications left and right. The rest of the caution panel indicates other airframe systems, Transmission and Combining Gearbox indications. The two control switches are located between the two vertical columns. The following is a listing of all segments and switches on the panel and a basic description of their operation or what they indicate when lighted.

segments of the caution panel should light along with the MASTER CAUTION light, the RPM Warning light, the ENGINE 1 OUT and



Figure 3-14 Caution Panel

the ENGINE 2 OUT lights. If any light fails to illuminate, this indicates a malfunction of the light.

Reset-Test Switch

Located at top center panel. Three position switch spring loaded to center/OFF position. When moved to the TEST position, all

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The MASTER CAUTION light, on both of the pilot's instrument panel, illuminates when any one or more of the panel segment illuminate to announce a fault or malfunction in a monitored system. The MASTER CAUTION light may be reset (extinguished) in readiness for the next fault by momentarily depressing the TEST-RESET switch to RESET position. The individual segment lights will remain illuminated as long as the fault condition exists. Reset of the master caution light may also be accomplished by pressing on either MASTER CAUTION light itself (not all models).



**Figure 3-15 Overhead Console
BRIGHT-DIM SWITCH**

The switch is located directly below the RESET-TEST switch. The caution lights system is designed so that after each initial application of power, all indicator lights, MASTER CAUTION light, RPM warning and ENG 1 OUT and ENG 2 OUT lights will illuminate bright. The BRIGHT-DIM switch

provides manual selection of a bright or dimmed condition. Momentarily placing the BRIGHT-DIM switch to DIM will momentarily dim the caution panel segment lights, MASTER CAUTION light, RPM and ENG 1 OUT, ENG 2 OUT lights. The lights will dim and remain dim if the pilot's INST LTS rheostat on the overhead console is rotated clockwise out of the OFF position. The lights can be reset to bright by momentarily placing the BRIGHT-DIM switch to BRIGHT or by rotating the pilot's INST LTS rheostat counterclockwise to OFF.

MASTER CAUTION Segments:

The following lighted segments pertain to ENGINE 1 and ENGINE 2 being duplicated left and right on the panel and are listed from top down on the panel.

DC GENERATOR - amber light. Indicates that the generator is not switched on or not operating (failure).

OIL PRESSURE - amber light. Indicates that engine oil pressure is below minimums.

PART SEP OFF - amber light. Indicates that particle separator door is not fully open and particle separator system is not functioning.

FUEL BOOST - amber light. Indicates that the electric boost pump system is not functioning properly.

FUEL FILTER - amber light. Indicates that engine mounted fuel filter is starting to clog and should be replaced.

FUEL LOW - amber light. Indicates approximately 140 lbs on the applicable side (10 minutes) fuel supply remaining in lower tank to supply that particular engine at cruise power setting.

GOV MANUAL - amber light. Indicates that governor control switch has been selected to the MANUAL position and the engine should be operating on the manual fuel control system.

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CHIP - amber light. Indicates that a magnetic particle has been picked up by one of the two magnetic chip plugs on the engine.

FUEL VALVE - amber light. Indicates that the fuel shut-off valve is in transit (not seated) or that it's not in the same position as the switch position would indicate, or DC power to the fuel valve is lost.

GEN OVHT - amber light. Indicates that an over temperature condition exists within the generator/AFCU compartment. Sensor in not on the generator itself.

The following segments pertain to various airframe and CBOX systems.

AMBER colored lights indicate malfunction.

RED colored lights indicates an emergency.

CAUTION PNL - amber light. Illuminates any time DC power to caution panel system is lost.

XMSN OIL PRESSURE - RED light. Illuminates when transmission oil pressure is below operational limits.

INVERTER 1 - amber light. Illuminates whenever inverter No. 1 is not supplying electrical power.

XMSN OIL TEMPERATURE - RED light. Illuminates when transmission oil temperature is in excess of operational limits.

EXTERNAL POWER - amber light. Illuminates any time the external power receptacle access door is open.

DOOR LOCK - amber light. Illuminates any time either cabin sliding door and/or baggage compartment door is not properly latched.

BATTERY - amber light. Illuminates any time both battery switches are on or off. Either condition is not a normal condition for flight.

CHIP C BOX - amber light. Illuminates any time a magnetic particle has been picked up by the combining gearbox magnetic chip detector.

CHIP XMSN - amber light. Illuminates any time a magnetic particle has been picked up by the transmission magnetic chip detector.

CHIP 42-90 - amber light. Illuminates any time a magnetic particle has been picked up by the 42-degree or 90-degree gearboxes' magnetic chip detector plugs.

BATT TEMP - RED light. Illuminates any time battery case temperature exceeds 130 degrees F. Indicates to the pilot that he should remove the battery from the system by turning off the battery switch.

ROTOR BK - RED light. TWO segments one above the other. Illuminates any time rotor brake pucks are not fully retracted away from rotor brake disc. Each of the two Rotor brake pucks has its own lighted segment.

HYDRAULIC - amber light. Illuminates any time the Hydraulic oil pressure is Low, or Hydraulic Temperature is High in either of the two Hydraulic Systems.

INVERTER 2 - amber light. Illuminates whenever No. 2 Inverter is not supplying electrical power.

C BOX OIL TEMP - RED light. Illuminates whenever the combining gearbox oil temperature is above maximum limits.

FUEL X FEED - amber light. Illuminates any time the fuel Crossfeed valve is in transit or whenever the valve is not in the same position as dictated by system conditions, or when DC power to the XFEED valve is lost.

HEATER AIR LINE - amber light. Illuminates any time there is an over temperature condition existing in the heater system air ducts carrying hot air to the cabin.

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INVERTER 3 - amber light. Illuminates whenever No. 3 Inverter is not producing electrical power.

Master Caution Lights: This amber light is located directly in front of the pilot just above the airspeed indicator. As previously stated, if any segment of the master caution panel illuminates, the MASTER CAUTION light will also illuminate. To reset the light for further indication, the RESET-TEST switch can be pressed to the RESET position or the MASTER CAUTION light may be pressed. In either case, the MASTER CAUTION light will extinguish and the light segment on the Master Caution Panel will remain illuminated. The MASTER CAUTION light is now reset for further indications.

RPM Warning Light: This amber light is located in front of the pilot directly to the left of the MASTER CAUTION light. The light will illuminate any time the rotor RPM increases to above 103 +/- 2%. The light will also illuminate any time the rotor RPM decreases to below 91 +/- 2%. In addition, on the low side an audio tone will be heard in the headsets unless canceled by means of the audio switch on the pedestal console.

Engine Out Lights: Two red lights located directly above their respective Engine instruments. The lights are titled engine 1 OUT and Engine 2 OUT. Either light will illuminate when its respective engine N1 falls below 53 +/- 2% indicating failure or stoppage of that particular engine.

Fire Detection Warning Lights: Two lighted red "T" handles located at the top center area of the instrument panel. The left "T" is titled FIRE 1 PULL and the right handle is titled FIRE 2 PULL.

Located between the two "T" handles there is an "Engine Fire Detector" PRESS TO TEST switch that allows the pilot to check the fire detector circuits prior to flight to insure proper operation.

Each engine compartment has a fire warning circuit that is tied, through a fire detector amplifier, to the **RED** lighted "T" handle for that respective engine. If a fire or dangerously high over temperature condition exists in the engine compartment, the lights in the "T" handle will illuminate informing the pilot of the condition. The pilot's action will be to pull the "T" handle. Movement of the "T" handle operates a gang switch behind the instrument panel with the following resultant action.

- ◇ Fuel valve will close stopping engine.
- ◇ Cabin heater will shut off.
- ◇ Engine particle separator valve will close.
- ◇ Fire extinguisher bottles will be armed for discharge.

The pilot's next action will be to discharge the main, and, if necessary, the reserve fire bottles to put the fire out.



Figure 3-16 Fire Detection Test

Fire Extinguisher Selector Switch: located below the Press to Test switch. The FIRE Extinguisher discharge switch. This three position switch selects which Fire Extinguisher Bottle is discharged into the engine compartment. Center Position is OFF, up for MAIN bottle and down for RESERVE bottle.



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Baggage Fire Light

The BAGGAGE FIRE light is located directly below the left "T" handle and has a BAGGAGE FIRE TEST switch to the right of the light. The light is RED in color and will flash when illuminated. A smoke detector located in the baggage compartment roof operates the BAGGAGE FIRE light.



Figure 3-17 Baggage Fire Test

If sufficient smoke is present in the baggage compartment, the BAGGAGE FIRE light will illuminate (blinking). The BAGGAGE FIRE TEST switch is used to check the circuitry and light for operation. When the test switch is pushed, the light illuminating (blinking) will indicate normal operation.

Cargo Release Armed Light:

This is an amber light located to the left of the BAGGAGE FIRE light. Indicates to the pilot when the cargo hook electrical release has been armed and is ready for use.

Pedestal Console

General

The pedestal console is located between the pilot and co-pilot seats extending aft from the lower edge of the instrument panel. The following items are part of the console installation.

- ◇ Misc. Switch Panel
- ◇ Engine and Fuel Panel
- ◇ AFCS control panel (if installed)
- ◇ Cockpit voice recorder panel (if installed)
- ◇ Pilot and co-pilot's audio control panel
- ◇ Defrost control lever
- ◇ Communications radios
- ◇ Navigation radios (if installed)
- ◇ Pilot and co-pilot's compass control panel (if installed)

Misc. Switch Panel

The MISC Switch Panel is located on the upper right side of the console. The panel contains five switches that are from left to right:

Hydraulic System NO 1 ON-OFF switch

Three position Passenger STEP switch marked RAISE - OFF - STOW

ROTOR RPM AUDIO ON - OFF switch

FORCE TRIM ON - OFF switch w/Red Cover

Hydraulic System NO 2 ON-OFF switch



Figure 3-18 Fuel and Engine Panel



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Engine and Fuel Panel

General

The Engine and Fuel Panel is mounted directly below the Misc. Switch Panel. Switches on this panel give the pilot control of major engine functions and complete control of the helicopter fuel system.



Figure 3-19 Fuel and Engine Panel

Engine Switches

Across the top of the panel there is a row of four switches. The two to the left are marked for ENGINE NO 1. The two to the right are marked for ENGINE NO 2.

The ENGINE NO 1 left-hand switch is marked GOV, AUTO-MANUAL. This switch is used to control switching from the Automatic Fuel Control to Manual Fuel Control. It is identified with a large triangular shaped knob, and has a detent at the AUTO position, to insure it will not be moved by mistake.

The ENGINE NO 1 right hand switch is marked PART SEP, NORM - OVRD ON. This switch relates to the operation of the Particle Separator system for the engine. With the switch in the Normal position, operation of the particle separator valve or door is automatic. If a malfunction should occur causing the door to close, movement of the switch to the OVRD ON (override on)

will cause the door to be opened and the particle separator system to be "turned on" again.

Fuel Switch

The lower portion of the Engine and Fuel Panel is concerned with the helicopter fuel system. A basic schematic of the fuel system is displayed on the face of the panel. At the lower edge of the panel, the two lower fuel cells, which are physically located below the cabin floor, are diagrammed and called Tank 1 (left) and Tank 2 (right). From each, fuel flows through a boost pump, through a fuel shut-off valve to the respective engines. The BOOST PUMP, ON - OFF switch controls the operation of the boost pump and the FUEL, ON - OFF switch controls the operation of the fuel shut-off valve.

The system also incorporates a Crossfeed system that will allow either or both engines to get fuel from either lower fuel tank. The switch marked FUEL XFEED, NORM - OVRD CLOSE is concerned with the operation of this system. Directly above the FUEL XFEED switch there is located another switch marked FUEL XFEED, TEST BUS 1 - NORM - TEST BUS 2. This switch is concerned with testing the electrical operation of the fuel Crossfeed system. A detailed description and operation of the fuel description is explained in the fuel system section.

Pilot and Co-pilot's Audio Control Panel

The audio control panel allows headset receivers to monitor audio signals and have volume control from the communications radios, navigation radios, and intercom system. The transmitter selector allows transmission on communication radios or ICS.



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Figure 3-20 Pedestal Console

VHF Communications Radio Control

Two VHF communications radios are standard equipment. The radio is mounted in the nose (depends on radio type) of the helicopter with a digital frequency control head used for control. (Figure 3-20)

Pilot and Co-pilot's Compass Control Panel

The compass control panel allows its respective HSI compass to be switched to a free gyro compass or gyro compass slaved to a magnetic input. It incorporates a synchronizing needle and a synchronizing switch. (Figure 3-22)

AFCS Control Panel (Bell IFR 212)

This panel controls the engaging and disengaging of SCAS and Attitude Mode of AFCS. (Figure 3-21)



Figure 3-21 AFCS Control Panel (Bell)

AFCS Trim Panel (Bell IFR 212)

The trim panel allows trimming of the pitch and roll axis while using AFCS. The panel also incorporates a turn knob. (Figure 3-21)

Sperry IFR Helipilot Controls

Allows visual display of actuator positions, selection of Attitude or SAS functions, Helipilot 1 and 2 On or Off, and Couple On Off function.



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Figure 3-22 Compass Control Panel

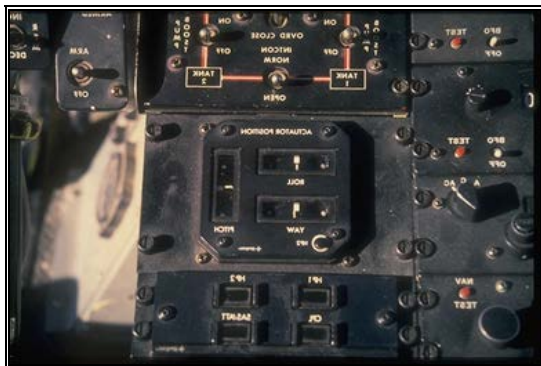


Figure 3-23 Sperry IFR Helipilot Controller Panel

Defrost Control Lever

The defrost control lever gives the pilot a single point selector for control of airflow to the defrost outlets (Lower Windshield) as well as an override of the Aft Heater Outlets. The control lever is attached to the forward right side of the pedestal console.



Figure 3-24 Defrost Control Lever

Overhead Console

General

The overhead console can be considered the central control panel for all aircraft electrical systems. The panel contains all necessary switches, rheostats and breakers to adequately protect and control the various electrical circuits.

Forward Right Hand Panel

The forward right hand panel contains all switches for the electrical system and lighting controls. Figure 3-25

Instrument Light Controls

The 5-volt instrument lights on the instrument panel, overhead console and pedestal console are controlled by rheostat switches. Rotation of the switch, clockwise, will apply power to the selected circuit and control the brightness. All switches operate identically with the PILOT INSTR switch controlling two additional circuits.

PILOTS INSTR LT

Controls light level in Pilots Instruments, and Dims Misc. System lights on Pilots panel. Rotating this Rheostat switch from the OFF position turns on the SEAT BELT/NO SMOKING cabin light, and allows the MASTER CAUTION panel to be dimmed by the dimming switch on the Caution Panel.

COPLT INSTR LT

Controls light level in Co-pilots Instruments, and Dims the Miscellaneous System indicator lights on Co-pilots panel.

ENG INSTR LT

Controls light level in Engine and Systems Instruments



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Figure 3-25 Forward Right Overhead Console

CONSOLE LT

Controls light level on the Overhead Panel.

PED LT

Controls light level on the Pedestal and back lights on the Radio Controls.

SEC INSTR LT

Controls light level of the Five lights mounted under the Glare Shield. *On the Sperry 212, the ON/OFF switch for these lights is also the "Standby Attitude Indicator" switch. In that configuration this switch controls only the light level.*

Utility Light SW

The utility light switch is a two position (ON/OFF) switch controlling the step light located on the lower left and right fuselage above the step.

Master Caution SW

The two-position switch, NORMAL/TEST, is used to test the Caution Panel failure warning system. Positioning the switch to the TEST position removes DC power from the Master Caution system, and will cause the "CAUTION PNL" segment light to illuminate.

Exterior Light SW

The exterior lights controlled by two switches, POSITION and ANTI COLL. The POSITION light switch controls the upper and lower red and green lights mounted on the forward fuselage and the two white lights mounted at the aft end of the tailboom. The ANTI COLL light switch controls the two rotating beacons, one on the top of the engine cowling.

Inverter Switches

The three inverter switches, INV 1, INV 2, INV 3, control the respective inverter. No.1 and NO. 2 inverter switches are two position, ON/OFF, and energize the inverter from the respective DC essential bus. The No. 3 inverter switch is a three-position switch, ON DC BUS1/OFF/ON DC BUS 2. Either MAIN DC bus may power the No. 3 inverter. For normal operation, inverter No. 3 should be powered by of the main DC bus No. 2 (priority bus).

Non-essential Bus SW

The NON ESS BUS switch is a two-position switch, MANUAL/NORMAL. With the switch in NORMAL position, when a generator failure occurs, the non-essential bus will be

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de-energized. Placing the switch to MANUAL will energize the non-essential bus.

Generator Switches

The two generator switches, GEN 1 and GEN 2, control the electrical output of the respective generator. The switches have three positions, ON/OFF/RESET. Placing the switch in the ON position connects the Generator to the respective main DC bus, OFF disconnects the Generator. In the event the generator is disconnected due to an over-voltage, positioning the switch to the RESET position will reset the trip coil of the voltage regulator and restore generator output to the main DC bus.

Battery Switches

The two battery switches, BAT 1 and BAT 2, connect the Battery Bus to the respective Main DC Bus, and allow the battery to be charged by either generator. The operation of the battery switches will be covered in detail with the electrical system.

Forward Left hand Panel

Heater Controls

Two switches, SYSTEM SELECTOR AND HEAT AFT OUTLET, control the bleed air heater and air distribution system. The SYSTEM SELECTOR switch is a three position, HEATER/OFF/AIR CONDITIONER, switch. Positioning the switch to HEATER opens the bleed air valve, allowing bleed air to be supplied to the mixing valve of the heater system. The air conditioner position is not used at this time. The HEAT AFT OUTLET switch is a two position switch, ON/OFF, the ON position opens the aft outlet valve of the distribution valve assembly allowing heated air to flow to the aft door post outlets (and the AFT Cabin area with a "Winterization Heater" installed). Figure 3-26.

Vent Blower Controls

The crew compartment ventilation system is controlled by a single two position, ON/OFF, switch. In the ON position blower air is supplied to the vent outlets on either side of the instrument panel, or to the windshield Defog Nozzles (depending on the position of the Defog Lever).



Figure 3-26 Forward Left Overhead Console

Windshield Wiper Control

Two switches control the operation of the pilot and co-pilot windshield wipers. The WIPER switch is a five position, HIGH/MED/LOW/OFF/PARK, rotary switch. The HIGH/MED/LOW positions control the wiper operation speed, the OFF position de-energizes the wipers. The PARK position is spring loaded to return the switch to the OFF



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position. When held to the PARK position the wiper arms will return to the upper most position edge of the windshield, out of the pilot's line of sight. The WIPER SEL switch is a three position, PILOT - BOTH - CO-PILOT, switch which controls wiper selection.

Cargo Release Switch

The standard Model 212 contains the mechanical and electrical wiring for installation of the optional external cargo hook kit. The CARGO REL switch electrically arms the cargo hook release system and allows the external load to be released by the cyclic mounted CARGO RELEASE switch. The CARGO REL switch, on the overhead console, is a two-position switch, OFF/ARM. Placing the switch in the Arm position closes circuitry and illuminates the CARGO RELEASE ARM light on the instrument panel.

Aft Dome Light Controls

The two aft dome light switches control the light color and brightness. The aft dome lights can be illuminated red or white by placing the AFT DOME LTS switch to RED or WHITE position. The AFT DOME LTS rheostat determines the brightness level of the aft dome lights.

Pitot Static Heater Switch

The PITOT STATIC HEATER switch is a two-position switch, ON/OFF, controlling the heater in the forward end of the Pitot tube and in the Static ports. If the optional dual control kit is installed, the single switch controls the heater in both, pilot and co-pilot, Pitot and Static systems.

Aft Circuit Breaker Panels



Figure 3-27 Aft Circuit Breaker Panel

The circuit breakers are grouped as to their bus arrangement. Starting at the aft end of the overhead console, the circuit breakers are AC bus No. 1 and No. 2, ESSENTIAL DC bus No. 1 and No. 2, MAIN DC bus No. 1 and No. 2. Just forward of the main circuit breaker panels are two additional panels containing ESS DC bus No. 1 and No. 2 circuit breakers and the NON ESS DC bus No. 1 and No. 2 breakers.

Nav. AC Switch - (Bell IFR 212 Only)

The NAV AC switch is used to connect the pilot's HSI, co-pilot's HSI, No.1 VOR, and No.2 VOR to the same AC power source.

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When this Model was certificated it was thought necessary to have all navigation homing needles and electric gyrocompasses on the same AC bus for synchronization of the compass card and navigation homing needles to prevent erroneous readings.

With the NAV AC switch in normal, the pilots HSI, co-pilots HSI, VOR No.1 needle, and VOR No.2 needle are on the No.1 AC bus. If a failure of the No.1 AC bus occurred, the

pilot could switch to No.2 bus position and restore these instruments. The ADF needles will NOT be restored in case of a No.1 AC bus failure.

In case of a No.1 AC bus failure both the CDI's on these instruments will continue to operate because they are DC powered. The Course Setting interconnect will be lost.

This switch is not found in the VFR 212 or Sperry 212.



Figure 3-28 Overhead Console Forward Panel

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