AIRPLANE FLIGHT MANUAL

FOR

SENECA II

WARNING

EXTREME CARE MUST BE EXERCISED TO LIMIT THE USE OF THIS MANUAL TO APPLICABLE AIRCRAFT. THIS MANUAL REVISED AS INDICATED BELOW OR SUBSEQUENTLY REVISED IS VALID FOR USE WITH THE AIRPLANE IDENTIFIED BELOW WHEN APPROVED BY PIPER AIRCRAFT CORPORATION: SUBSEQUENT REVISIONS SUPPLIED BY PIPER AIRCRAFT CORPORATION MUST BE PROPERLY INSERTED.

MODEL PA-34-200T 52MC

AIRCRAFT SERIAL NO. 34-7570084 REGISTRATION NO. ~~N12GA~~

AIRPLANE FLIGHT MANUAL, REPORT NUMBER VB-628 REVISION 8

PIPER AIRCRAFT CORPORATION
APPROVAL SIGNATURE AND STAMP James McGraw James McGraw
Piper AircraftCorporation

DUPLICATE

NOTE

THIS MANUAL MUST BE KEPT IN THE AIRPLANE AT ALL TIMES

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APPROVAL BASIS: FAR 23 AND FAR PART 21, SUBPART J.

REPORT: VB-628
MODEL: PA-34-200T

APPLICABILITY

This manual is applicable to Piper Model PA-34-200T aircraft commencing with serial number 34-7570001 through 34-7670371. Contact Piper Customer Services for specific information on the application of this manual.

REVISIONS

The information compiled in the Pilot's Operating Manual will be kept current by revisions distributed to the airplane owners.

Revision material will consist of information necessary to update the text of the present manual and/or to add information to cover added airplane equipment.

I. Revisions

Revisions will be distributed whenever necessary as complete page replacements or additions and shall be inserted into the manual in accordance with the instructions given below:

1. Revision pages will replace only pages with the same page number.
2. Insert all additional pages in proper numerical order within each section.
3. Page numbers followed by a small letter shall be inserted in direct sequence with the same common numbered page.

II. Identification of Revised Material

Revised text and illustrations shall be indicated by a black vertical line along the left hand margin of the page, opposite revised, added or deleted material. A line opposite the page number or section title and printing date, will indicate that the text or illustration was unchanged but material was relocated to a different page or that an entire page was added.

Black lines will indicate only current revisions with changes and additions to or deletions of existing text and illustrations. Changes in capitalization, spelling, punctuation or the physical location of material on a page will not be identified by symbols.

III. Original Pages Issued

The original pages issued for this manual prior to revision are given below:

1-1 through 1-4, 2-1 through 2-31, 3-1 through 3-30, 5-1 through 5-42, 7-1 through 7-17, 8-1 through 8-2, 9-1 through 9-16, 10-1 through 10-13.

PILOT'S OPERATING MANUAL LOG OF REVISIONS

Current Revisions to the PA-34-200T Seneca II Pilot's Operating Manual, 761 593 issued July 15, 1974.

Revision	Revised Pages	Description	Date
Rev. 1 - 761 593 (PR740718)	A F/M	Added Rev. 1 to Report: VB-628.	July 18, 1974
Rev. 2 - 761 593 (PR740805)	A F/M	Added Rev. 2 to Report: VB-628.	August 5, 1974
Rev. 3 - 761 593 (PR741211)	1-1	Revised 65% Cruise altitude; revised 55% Range figures .	Dec. 11, 1974
	2-3	Revised alternate air control info.	
	A F/M	Added Rev. 3 to Report: VB-628.	
	W/B	Added Rev. 1 to Report: VB-629.	
	7-2	Added item 1. p.; added new item 2. a.; revised existing item letters; revised new item 2. j.	
	7-3	Revised existing item letters (2. u. thru 2. x.); under Starting Engines - revised items 3. and 7.; added new item 10.; revised existing item nos. 10. thru 13. and revised new item 12.	
	7-6	Revised items 2. e. and 2. i.	
	7-9	Revised info. under Normal Cruise.	
	7-14	Revised info. under VMC.	
	8-2	Added items 14. and 15.	
	9-i	Revised Range Chart Title; added Power Setting Tables.	
	9-10	Revised Time, Fuel and Distance to Climb Chart completely.	
	9-11	Revised Range Chart completely.	
	9-12	Revised Power altitude limits on Speed Power Chart.	
	9-17	Added page (Power Setting Table - 45%, 55%).	
	9-18	Added page (Power Setting Table - 65%, 75%).	
Rev. 4 - 761 593 (PR750129)	2-9	Added gear warning info.	Jan. 29, 1975
	2-25	Revised Stall Warning info.	

PILOT'S OPERATING MANUAL LOG OF REVISIONS (cont)

Revision	Revised Pages	Description	Date
Rev. 5 - 761 593 (PR750530)	1-1	Revised Range figures.	May 30, 1975
	1-2	Revised fuel consumption and fuel capacity figures.	
	2-1	Revised fuel capacity - The Airplane.	
	2-11	Revised fuel capacity and usable fuel - Fuel System.	
	2-21	Revised fuel quantity gauges - Instrument Panel.	
	A F/M	Added Rev. 4 to Report: VB-628.	
	W/B	Added Rev. 2 to Report: VB-629.	
	9-11	Revised Range Chart.	
	10-8	Revised fuel capacities - Filling Fuel Tanks.	
Rev. 6 - 761 593 (PR750716)	1-2	Revised Empty Weight and Useful Load; deleted footnote.	July 16, 1975
	2-i	Revised Electrical System page no.	
	2-9	Revised gear warning info.	
	2-12	Revised fuel pump callout.	
	2-12a	Added page (Fuel System info.).	
	2-12b	Added page (info from page 2-13 and 2-16).	
	2-13	Relocated info to page 2-12b; added revised Alt. and Starter Schematic from page 2-14.	
	2-14	Relocated schematic to page 2-13; added new Switch Panel illustration.	
	2-15	Revised Switch Panel title.	
	2-16	Relocated info to page 2-12b; revised annunciator panel desc.; added footnote.	
	2-17	Added radio power switch desc. to instrument panel info.	
	2-21	Added primer lights to annunciator; added radio power switch; revised callouts.	
	2-22	Revised heater info.	
	2-25	Revised Stall Warning info.	
	2-30	Revised fuel pump switches.	
	A F/M	Added Rev. 5 to Report: VB-628.	
	W/B	Added Rev. 3 to Report: VB-629.	
	7-3	Revised items 2 and 7 under Starting Engines; deleted existing item 10; added new item 10 and 11; revised existing item nos.; added footnote.	
	7-4	Revised item 6 under Flooded Start.	
	7-6	Revised Pretakeoff Check items 2. c. and 2. d.	

PILOT'S OPERATING MANUAL LOG OF REVISIONS (cont)

Revision	Revised Pages	Description	Date
Rev. 6 (cont)	7-7	Revised Pretakeoff Check item 23.	
	7-11	Revised Approach and Landing item 5.	
	7-16	Revised ELT info.	
	8-2	Added item 16.	
	9-i	Added Introduction to Performance.	
	9-iii, 9-iv, 9-v, 9-vi	Added pages (Introduction to Performance and Flight Plan).	
	9-11	Revised Range graph.	
	9-12	Revised Speed Power graph.	
Rev. 7 - 761 593 (PR751020)	1-1	Added Range figures for Optional Fuel Fuel Capacity.	Oct. 20, 1975
	1-2	Added Optional Fuel Tank Capacity.	
	2-1	Revised the Airplane desc.; revised Airframe desc.	
	2-2	Added optional fuel tank info to wing desc.	
	2-11	Added optional fuel tank info to Fuel System desc.	
	2-12	Added optional fuel tanks to Fuel System Schematic.	
	2-12a	Revised Fuel System info.	
	2-16	Revised auxiliary fuel pump annunciator light desc.	
	A F/M	Added Rev. 6 to Report: VB-628.	
	W/B	Added Rev. 4 to Report: VB-629.	
	7-6	Revised RPM figure in item 2. e.	
	8-1	Revised item 10.	
	8-2	Revised item 15.	
	9-i	Revised existing Range graph title; added new Range graph item and page no.	
	9-11	Revised Range graph.	
	9-12	Added Range graph for optional fuel tanks; relocated Speed Power graph to page 9-12a.	
	9-12a	Added page (Speed Power graph relocated from page 9-12).	
	9-12b	Added intentionally left blank page.	
Rev. 8 - 761 593 (PR751209)	W/B	Added Rev. 5 to Report: VB-629.	Dec. 9. 1975
	7-8	Revised Manifold Pressure Overboost Lights info.	
	7-17	Revised ELT info.	
	10-8	Revised Filling Fuel Tanks info.	

PILOT'S OPERATING MANUAL LOG OF REVISIONS (cont)

Revision	Revised Pages	Description	Date
Rev. 9 - 761 593 (PR760319)	2-2	Added Winterization info. to Engines.	March 19, 1976
	A F/M	Added Rev. 7 to Report: VB-628.	
	W/B	Added Rev. 6 to Report: VB-629.	
	7-i	Added Starting Engines in Cold Weather.	
	7-3	Revised item 10. (Starting Engines); added NOTE from page 7-4.	
	7-4	Relocated NOTE to page 7-3; added Starting Engines in Cold Weather.	
	7-5	Added CAUTION (Cold Start).	
	9-14, 9-15, 9-16	Added note below graph.	
	10-i	Added Winterization.	
	10-10a	Added page (Winterization info.)	
	10-10b	Added page.	
Rev. 10 - 761 593 (PR760513)	A F/M	Added Rev. 8 to Report: VB-628.	May 13, 1976
	W/B	Added Rev. 7 to Report: VB-629.	
	10-7	Revised Propeller Chamber Pressure Table.	
Rev. 11 - 761 593 (PR761119)	2-17	Revised Pitot Static System info.	Nov. 19, 1976
	2-19	Revised illus. title.	
	2-19a	Added new illus.	
	2-19b	Added new page.	
	2-21	Revised illus. callouts.	
	W/B	Added Rev. 8 to Report: VB-629.	
	7-16	Revised ELT info; relocated NOTE to page 7-17.	
	7-17	Revised ELT pilot's remote switch info.	
Rev. 12 - 761 593 (PR770330)	2-3	Revised fuel injection system info.	March 30, 1977
	2-19b	Added material from page 2-20; revised heated pitot head info.	
	2-20	Relocated material to previous page; added manifold pressure line drain info and NOTE.	
	A F/M	Added Rev. 9 to Report: VB-628.	
	7-6	Added item 2. d.; renumbered items in 2 accordingly.	
	7-17	Revised ELT test transmission NOTE.	
	8-2	Added item 17.	
	10-10	Revised tire pressure in Tire Inflation.	

PILOT'S OPERATING MANUAL LOG OF REVISIONS (cont)

Revision	Revised Pages	Description	Date
Rev. 13 - 761 593 (PR770808)	7-9	Revised Climb info.	August 8, 1977
Rev. 14 - 761 593 (PR790118)	1-2	Revised Power Plant info.	Jan. 18, 1979
	2-3	Deleted engine designation.	
	2-7	Revised Landing Gear Elect. Schematic.	
	A F/M	Added Rev. 10 to Report: VB-628.	
	7-7	Added Caution to Pretakeoff Check.	
	7-8	Relocated material.	
	7-9	Deleted engine designation from Normal Cruise.	
	7-16	Revised E.L.T. info.	
Rev. 15 - 761 593 (PR830610)	iii	Added serial numbers.	June 10, 1983
	2-29	Added Caution.	
	A F/M	Added Rev. 11 to Report: VB-628.	
	W/B	Added Rev. 9 to Report: VB-629.	
Rev. 16 - 761 593 (PR871130	2-1	Revised airframe info.	Nov. 30, 1987
	7-2	Revised Walk-Around Inspection checklist.	

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GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS

PERFORMANCE

Published figures are for standard airplanes flown at gross weight* under standard conditions at sea level, unless otherwise stated. Performance for a specific airplane may vary from published figures depending upon the equipment installed, the condition of engine, airplane and equipment, atmospheric conditions and piloting technique. Each performance figure below is subject to the same conditions as on the corresponding performance chart from which it is taken in the Performance Charts Section.

Gross Weight (pounds)	4570
Takeoff Run, flaps up, sea level (ft)	1100
Takeoff Distance Over 50-ft Obstacle, flaps up, sea level	1460
Takeoff Run (ft) (short field effort, flaps 25°)	900
Takeoff Distance Over 50-ft Barrier (ft) (short field effort, flaps 25°)	1240
Minimum Controllable Single Engine Speed (mph)	80
Rate of Climb, sea level (ft per min)	1340
Rate of Climb, sea level, single engine (ft per min)	225
Best Rate of Climb Speed (mph)	105
Best Rate of Climb Speed, sea level, single engine (mph)	105
Best Angle of Climb Speed, sea level (mph)	90
Best Angle of Climb Speed, sea level, single engine (mph)	93
Max Speed, sea level (mph)	197
Max Speed, 12,000 ft, (mph)	225
Max Speed Optimum Alt, 20,000 ft, 75% power (TAS) (mph)	218
Service Ceiling (ft)	25,000**
Service Ceiling, engine out (ft)	13,400
Absolute Ceiling (ft)	25,000**
Absolute Ceiling, engine out (ft)	14,800
Cruise Speed at best power mixture (mph)	
65% power, 24,000 ft	208
55% power, 25,000 ft	189

	STANDARD FUEL CAPACITY	OPTIONAL FUEL CAPACITY
Range at best power mixture (mi)		
75% power, 16,000 ft		
With 45 min. reserve	626	900
No reserve	742	1020
55% power, 16,000 ft		
With 45 min. reserve	701	1010
No reserve	830	1140

*4570 lbs Maximum Takeoff Weight; 4342 lbs Maximum Landing Weight
**Maximum Operating Altitude

PERFORMANCE (cont)

Stalling Speed, gear and flaps down, power off (mph)	69
Stalling Speed, gear down and flaps up, power off (mph)	76
Fuel Consumption, 75% power, both engines (gph)	23.6
Fuel Consumption, 65% power, both engines (gph)	20.5
Landing Roll (flaps down) (ft)	1380*
Landing Over 50-ft Barrier (flaps down) (short field effort) (ft)	2090*

*4342 lb G.W., Maximum Landing Weight

WEIGHTS

Gross Weight (lbs) Max. Takeoff	4570
Max. Landing	4342
Max Zero Fuel Weight (lbs)	4000
Standard Empty Weight (lbs)	2788
Maximum Useful Load (lbs) (All weight in excess of 4000 lbs must consist of fuel.)	1782

POWER PLANT

Right Engine (Continental)	LTSIO-360-E or LTSIO-360-EB
Left Engine (Continental)	TSIO-360-E or TSIO-360-EB
Rated Horsepower (sea level)	200
(12,000 ft)	215
Rated Speed (rpm)	2575
Max Manifold Pressure (in. Hg.)	40
Bore (in.)	4.438
Stroke (in.)	3.875
Displacement (cubic in.)	360
Compression Ratio	7.5:1

FUEL AND OIL

Fuel Capacity (U.S. gal)	
Standard	98
Optional	128
Unusable fuel (U.S. gal)	5
Fuel, Aviation Grade (minimum octane)	100/130
Oil Capacity (qts) (each engine)	8

BAGGAGE AREA

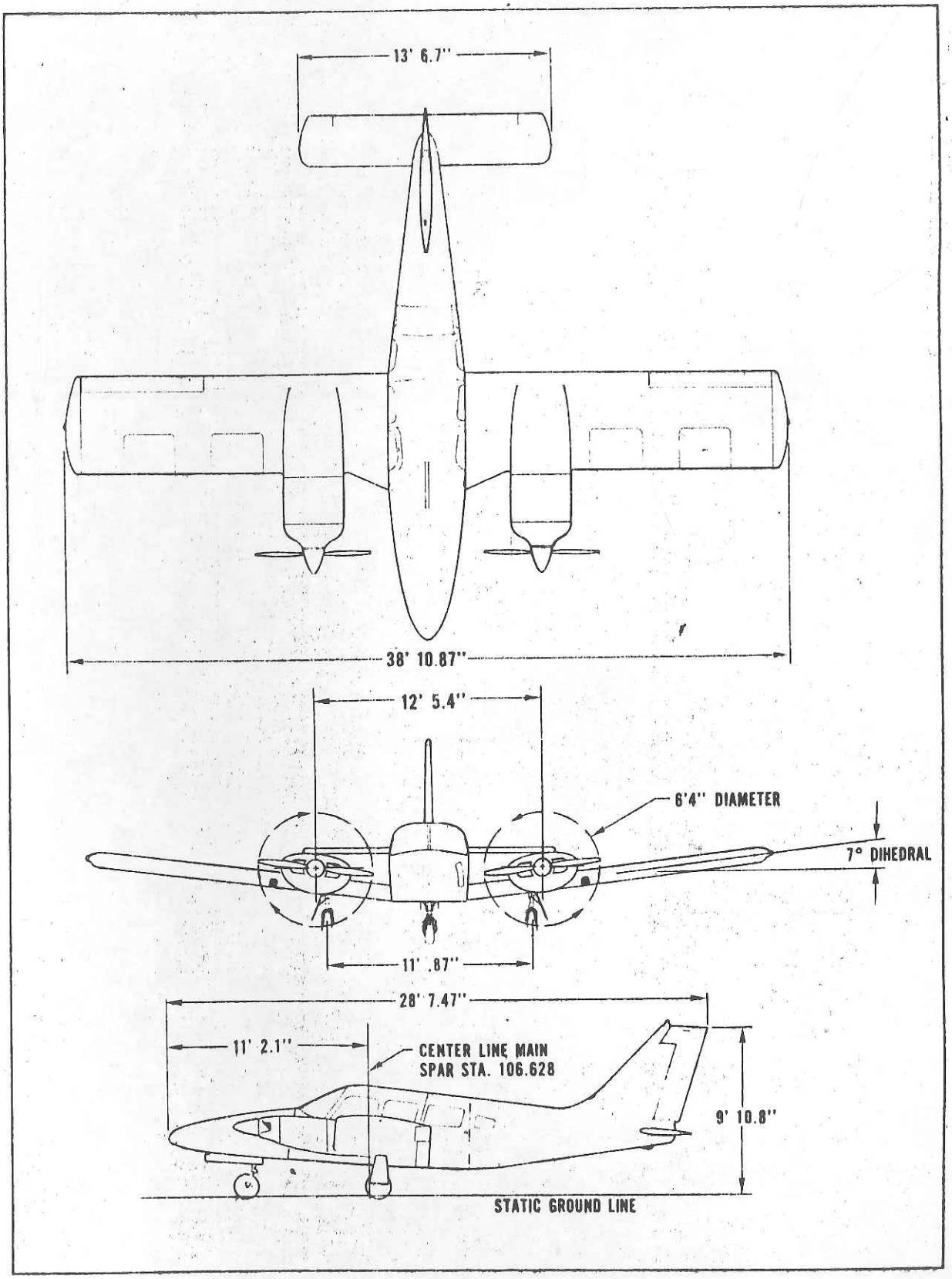
Maximum Baggage (lbs) Forward Compartment	100
Maximum Baggage (lbs) Rear Compartment	100
Baggage Space (cubic ft) Forward Compartment	15.3
Baggage Space (cubic ft) Rear Compartment	20
Baggage Door Size (in.) Forward Compartment	24 x 21

DIMENSIONS

Wing Span (ft)	38.9
Wing Area (sq ft)	208.7
Length (ft)	28.5
Height (ft)	9.9
Wing Loading (lbs per sq ft)	22
Power Loading (lbs per hp) (sea level)	11.4
(12,000 ft)	10.6
Propeller Diameter (in.)	76
Turn Radius (ft)	33.2

LANDING GEAR

Wheel Base (ft)		7.0
Wheel Tread (ft)		11.1
Tire Pressure (psi)	Nose	31
	Main	50
Tire	Nose (six-ply rating)	6.00 x 6
	Main (eight-ply rating)	6.00 x 6


13' 6.7"
38' 10.87"
12' 5.4"
6'4" DIAMETER
7° DIHEDRAL
11' .87"
28' 7.47"
11' 2.1"
CENTER LINE MAIN
SPAR STA. 106.628
9' 10.8"
STATIC GROUND LINE

DESCRIPTION
AIRPLANE AND SYSTEMS

DESCRIPTION

AIRPLANE AND SYSTEMS

THE AIRPLANE

The Seneca II is a twin-engine, all metal, retractable landing gear, turbocharged airplane which combines multi-engine safety and efficiency with a spacious and comfortable cabin and Piper's traditional smooth, easy handling characteristics.

Seating for up to seven occupants, two separate one hundred pound luggage compartments, and a fuel capacity of ninety-eight gallons give the Seneca II a high degree of flexibility. As with any aircraft, the Seneca II requires proper loading; however a simple-to-use weight and balance calculator provided with each airplane makes the determination of acceptable fuel and payload combinations easy and uncomplicated. Large floor space, easily removable seats, a broad, well-placed cabin door and a nose section baggage compartment make the Seneca II a versatile aircraft for transporting passengers or cargo or a combination of both.

The simplicity of the Seneca II will be appreciated by both the novice multi-engine pilot and the veteran pilot experienced in flying many types of aircraft. Advantages of the Seneca II include, for example, its ability to get in and out of small airports, paved and unpaved; dependable flight characteristics; a back-up gear extension system which provides dependable gear extension by gravity free-fall; and counter-rotating propellers which eliminate the "P" factor and asymmetric forces which occur in airplanes with both propellers turning in the same direction.

AIRFRAME

With the exception of the steel engine mounts and landing gear, the reinforced fiberglass nose cone and cowling nose bowls, and the lightweight plastic extremities (tips of wings, tail fin, rudder and stabilator), the basic airframe is of heat treated, corrosion resistant aluminum alloy. Aerobatics are prohibited in this airplane since the structure is not designed for aerobatic loads.

The fuselage is a semi-monocoque structure. There is a front door on the right side and a rear door on the left. A cargo door is installed aft of the rear passenger door. When both rear doors are open, large pieces of cargo can be loaded through the extra-wide opening. A door on the left side of the nose section gives access to the nose section baggage compartment. The key can be removed from the nose section baggage compartment door only when in the locked position.

The wing is of a conventional design and employs a laminar flow NACA 65_2-415 airfoil section. The main spar is located at approximately 40% of the chord aft of the leading edge. The wings are attached to the fuselage by the insertion of the butt ends of the spar into a spar box carry-through, which is an integral part of the fuselage structure. The bolting of the spar ends into the spar box carry-through structure, which is located under the center seats, provides in effect a continuous main spar. The wings are also attached fore and aft of the main spar by an auxiliary front spar and a rear spar. The rear spar, in addition to taking torque and drag loads, provides a mount for flaps and ailerons. The four-position wing flaps are mechanically controlled by a handle located between the front seats. When fully retracted, the right flap locks into place to provide a step for cabin entry. Each wing contains two fuel tanks as standard equipment. An optional third tank may be installed on each side. The tanks on one side are filled through a single filler neck located well outboard of the engine nacelle.

A vertical stabilizer, an all-movable horizontal stabilator, and a rudder make up the empennage. The stabilator incorporates an anti-servo tab which improves longitudinal stability and provides longitudinal trim. This tab moves in the same direction as the stabilator, but with increased travel. Rudder effectiveness is increased by an anti-servo tab on the rudder.

ENGINES

The Seneca II is powered by two Teledyne Continental six-cylinder turbocharged engines, each rated at 200 horsepower at 2575 RPM at sea level. The engines are air cooled and fuel injected and are equipped with oil coolers with low temperature bypass systems and engine mounted oil filters. A winterization plate is provided to restrict air during winter operation (see Winterization in Handling and Servicing Section). Asymmetric thrust during takeoff and climb is eliminated by the counter-rotation of the engines, the left engine rotating in a clockwise direction when viewed from the cockpit, and the right engine rotating counterclockwise.

The engines are easily accessible through doors in the cowlings, one on either side of each engine cowling. The cowlings are designed for maximum aerodynamic efficiency. Engine mounts are constructed of steel tubing, and dynafocal engine mounts are provided to reduce vibration.

A Ray-Jay turbocharger on each engine is operated by exhaust gases. Exhaust gases rotate a turbine wheel, which in turn drives an air compressor. Induction air is compressed (supercharged) and distributed into the engine air manifold, and the exhaust gases which drive the compressor are discharged overboard. Engine induction air is taken from within the cowling, is filtered, and is then directed into the turbocharger compressor inlet. Each engine cylinder is supplied with pressurized air in operation from sea level to maximum operating altitude. The pressure relief valve protects the engine from inadvertently exceeding 42 inches Hg; 40 inches Hg is manually set with the throttles. The turbo bypass orifice is preset for 40 inches Hg at 12,000 feet density altitude at full throttle.

The intake filter air box incorporates a manually operated two-way valve designed to allow induction air either to pass into the compressor through the filter or to bypass the filter and supply heated air directly to the turbocharger. There is a suck in door which opens in the event that the primary air source becomes blocked. **Alternate air** selection insures induction air flow should the filter become blocked. Since the air is heated, the alternate air system offers protection against induction system blockage caused by snow or freezing rain, or by the freezing of moisture accumulated in the induction air filter. Alternate air is unfiltered; therefore, it should not be used during ground operation when dust or other contaminants might enter the system. The primary (through the filter) induction source should always be used for takeoffs.

The **fuel injection system** incorporates a metering system which measures the rate at which turbocharged air is being used by the engine and dispenses fuel to the cylinders proportionally. Fuel is supplied to the injector pump at a greater rate than the engine requires. The fuel injection system is a "continuous flow" type which allows excess fuel and fuel vapor separated in the injector pump to be returned to the fuel tanks.

To obtain maximum efficiency and time from the engines, follow the procedures recommended in the Teledyne Continental Operator's Manual provided with the airplane.

Engine controls consist of a throttle, a propeller control and a mixture control lever for each engine. These controls are located on the **control quadrant** on the lower center of the instrument panel where they are accessible to both the pilot and the copilot. The controls utilize teflon-lined control cables to reduce friction and binding.

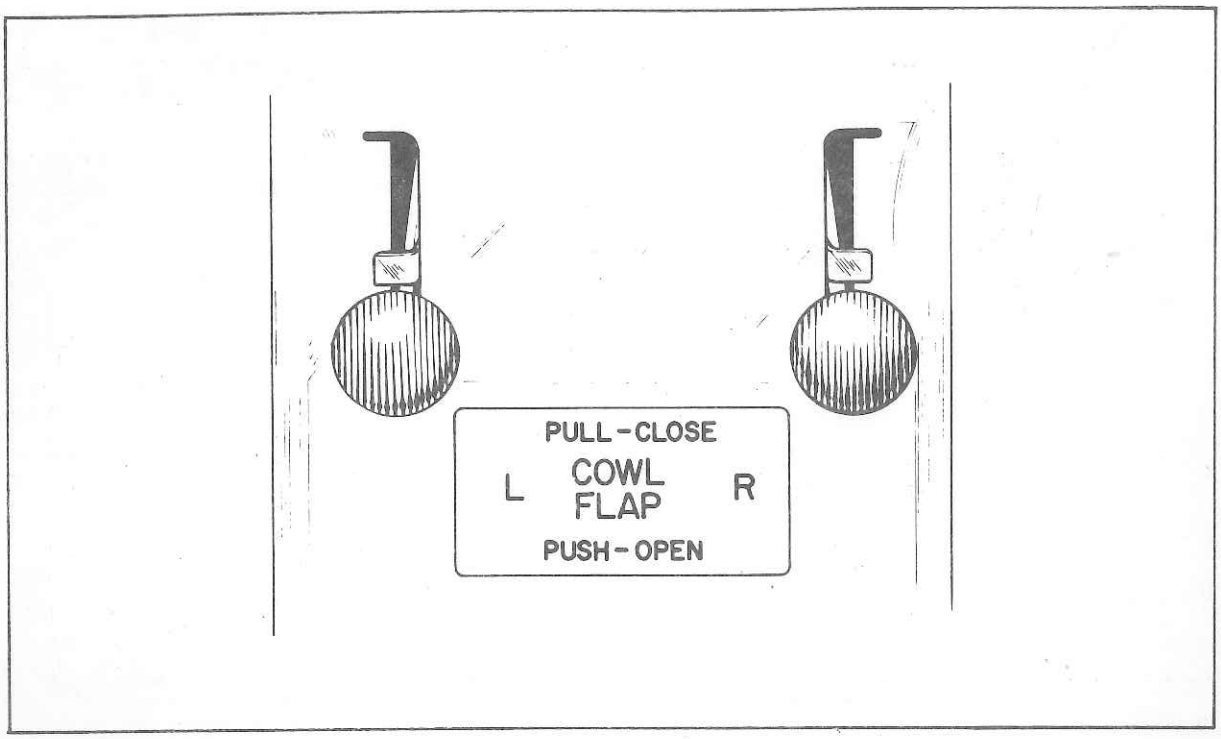
The **throttle levers** are used to adjust the manifold pressure. They incorporate a gear up warning horn switch which is activated during the last portion of travel of the throttle levers to the low power position. If the landing gear is not locked down, the horn will sound until the gear is down and locked or until the power setting is increased. This is a safety feature to prevent an inadvertent gear up landing.

The **propeller control levers** are used to adjust the propeller speed from high RPM to feather.

The **mixture control levers** are used to adjust the air to fuel ratio. An engine is shut down by the placing of the mixture control lever in the full lean position.

The **friction adjustment lever** on the left side of the control quadrant may be adjusted to increase or decrease the friction holding the throttle, propeller, and mixture controls or to lock the controls in a selected position.

The **alternate air controls** are located on the control quadrant just below the engine control levers. When an alternate air lever is in the up, or off, position the engine is operating on filtered air; when the lever is in the down, or on, position the engine is operating on unfiltered, heated air. Should the primary air source become blocked the suck in door will automatically select unfiltered heated air.



Cowl Flap Control

The **cowl flap control levers**, located below the control quadrant, are used to regulate cooling air for the engines. The levers have three positions: full open, full closed, and intermediate. A lock incorporated in each control lever locks the cowl flap in the selected position. To operate the cowl flaps, depress the lock and move the lever toward the desired setting. Release the lock after initial movement and continue movement of the lever. The control will stop and lock into place at the next setting. The lock must be depressed for each selection of a new cowl flap setting.

All throttle operations should be made with a smooth, not too rapid movement to prevent unnecessary engine wear or damage to the engines, and to allow time for the turbocharger speed to stabilize.

PROPELLERS

Counter-rotation of the propellers provides balanced thrust during takeoff and climb and eliminates the "critical engine" factor in single-engine flight.

Constant speed, controllable pitch and feathering Hartzell **propellers** are installed as standard equipment. The propellers mount directly to the engine crankshafts. Pitch is controlled by oil and nitrogen pressure. Oil pressure sends a propeller toward the high RPM or unfeather position; nitrogen pressure sends a propeller toward the low RPM or feather position and also prevents propeller overspeeding. **Governors**, one on each engine, supply engine oil at various pressures through the propeller shafts to maintain constant RPM settings. A governor controls engine speed by varying the pitch of the propeller to match load torque to engine torque in response to changing flight conditions. The recommended nitrogen pressure to be used when charging the unit is listed on placards on the propeller domes and inside the spinners. This pressure varies with ambient temperature at the time of charging. Although dry nitrogen gas is recommended, compressed air may be used provided it contains no moisture. For more detailed instructions, see "Propeller Service" in the Handling and Servicing Section of this Manual.

Each propeller is controlled by the **propeller control levers** located in the center of the power control quadrant. Feathering of a propeller is accomplished by moving the control fully aft through the low RPM detent, into the "FEATHER" position. Feathering takes place in approximately six seconds. Unfeathering is accomplished by moving the propeller control forward and engaging the starter until the propeller is windmilling.

A **feathering lock**, operated by centrifugal force, prevents feathering during engine shut down by making it impossible to feather any time the engine speed falls below 800 RPM. For this reason, when airborne, and the pilot wishes to feather a propeller to save an engine, he must be sure to move the propeller control into the "FEATHER" position before the engine speed drops below 800 RPM.

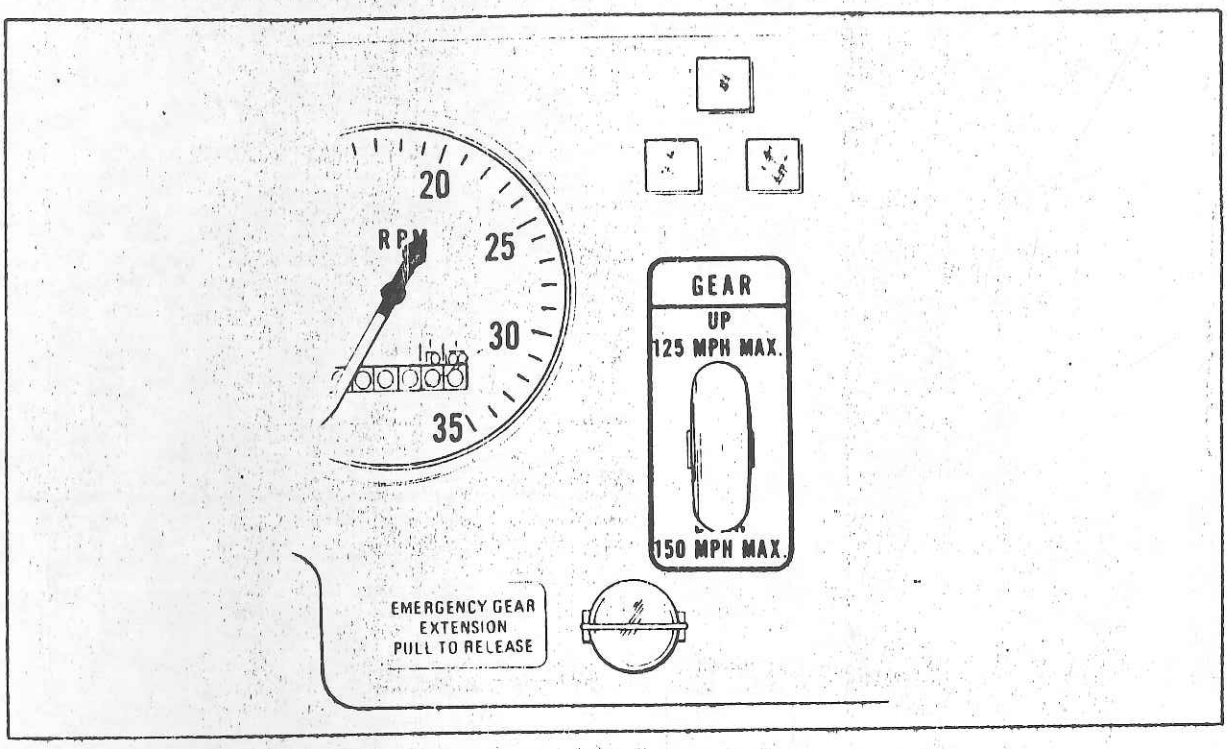
LANDING GEAR

To increase cruise speed, climb and other performance, the Seneca II is equipped with hydraulically operated, fully retractable, tricycle **landing gear**. Rugged gear construction and a heavy duty braking system permit operation on a wide variety of ground surfaces.

Hydraulic pressure for gear operation is furnished by an electrically powered, reversible **hydraulic pump**. The pump is activated by a two-position **gear selector switch** located to the left of the control quadrant on the instrument panel. The gear selector switch, which has a wheel-shaped knob, must be pulled out before it is moved to the "UP" or "DOWN" position. When hydraulic pressure is exerted in one direction, the gear is retracted; when it is exerted in the other direction, the gear is extended. Gear extension or retraction normally takes six to seven seconds.

CAUTION

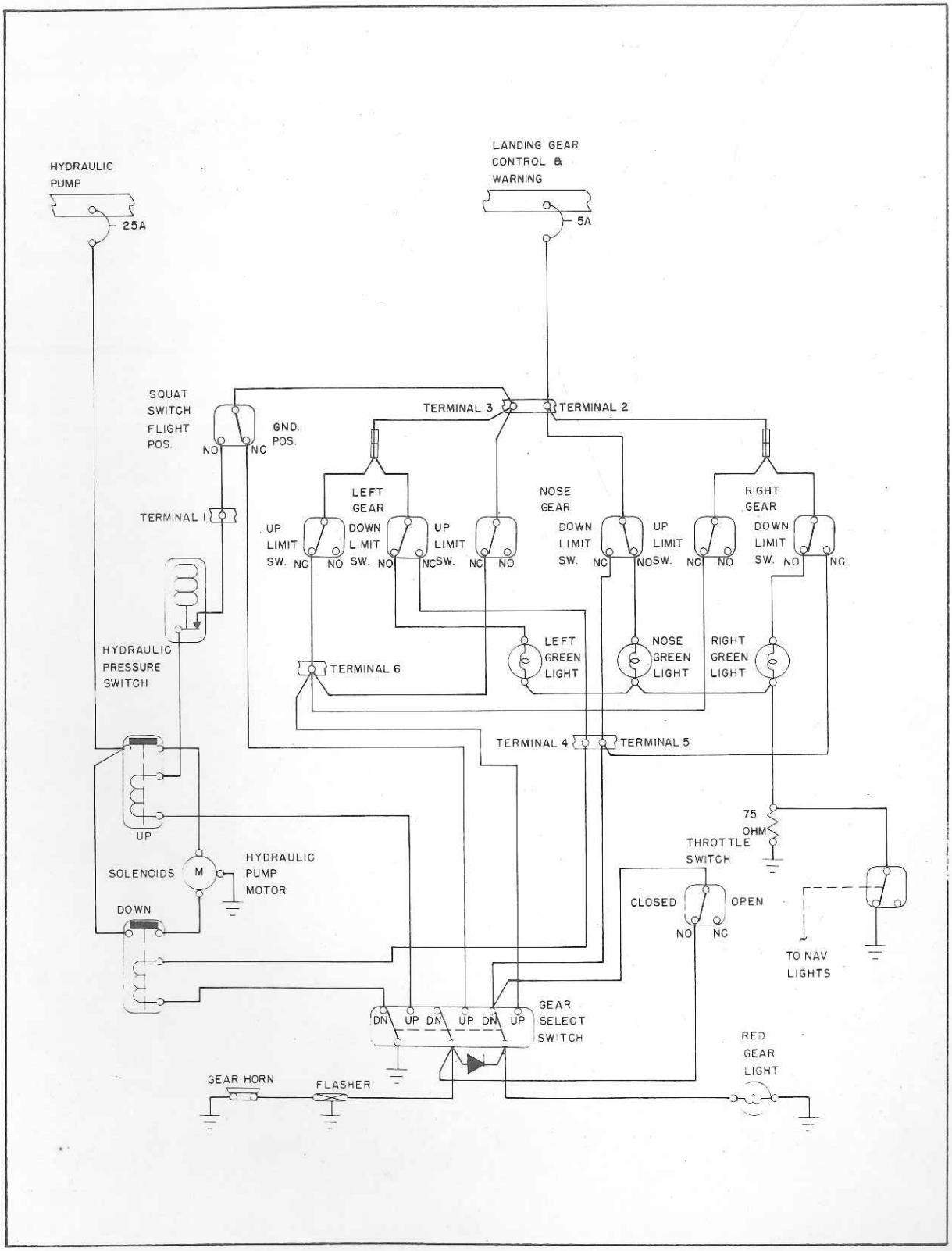
If the landing gear is in transit, and the hydraulic pump is running, it is NOT advisable to move the gear selector switch to the opposite position before the gear has reached its full travel limit, because a sudden reversal may damage the electric pump.



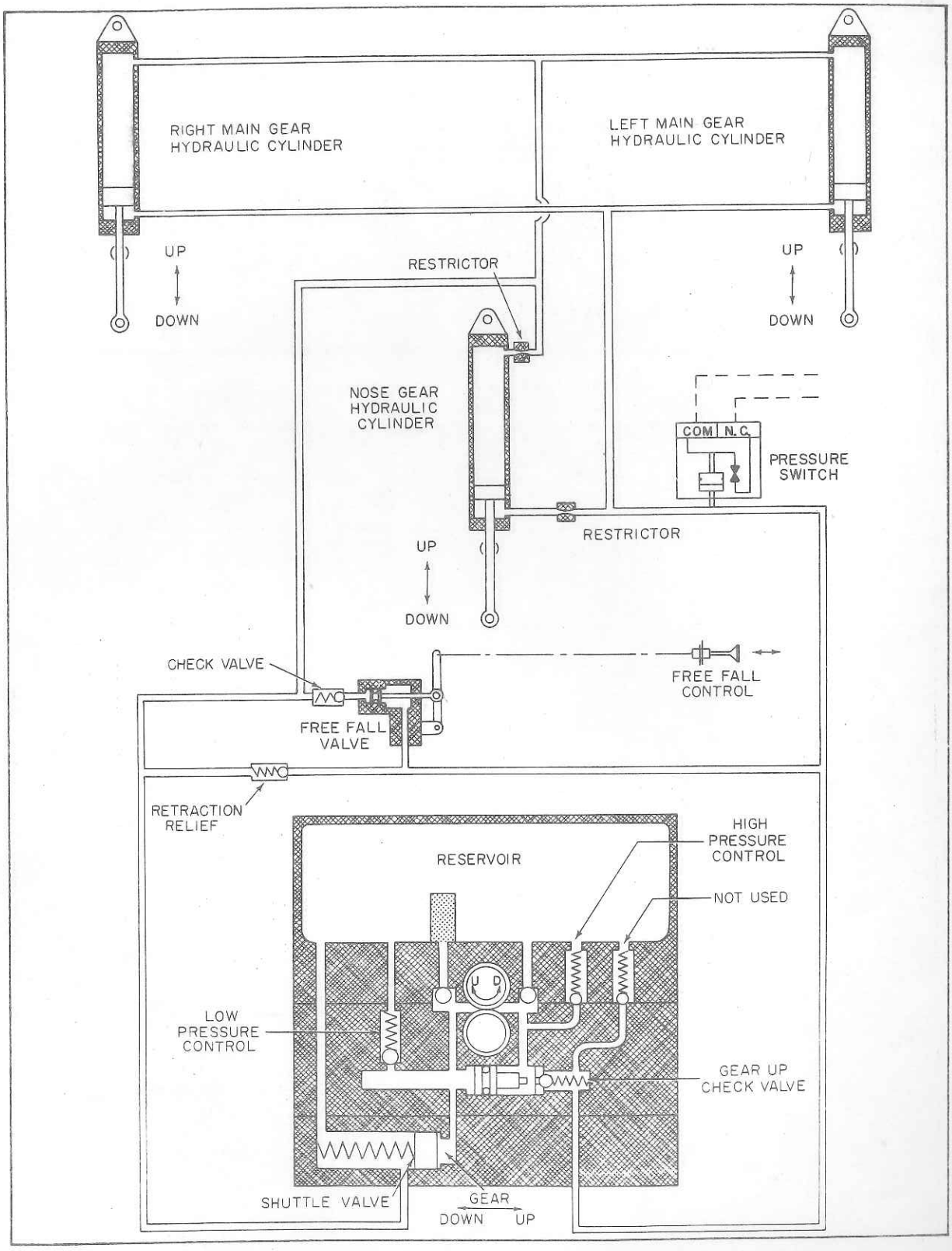
Landing Gear Selector

The landing gear system incorporates a number of safety features to insure gear extension even in the event of hydraulic failure. Since the gear is held in the retracted position by hydraulic pressure, should the hydraulic system fail for any reason, gravity will allow the gear to extend. When the landing gear is retracted, the main wheels retract inboard into the wings and the nose wheel retracts forward into the nose section. Aerodynamic loads and springs assist in gear extension and in locking the gear in the down position. During gear extension, once the nose gear has started toward the down position, the airstream pushes against it and assists in moving it to the downlocked position. After the gears are down and the downlock hooks engage, springs maintain force on each hook to keep it locked until it is released by hydraulic pressure.

To extend and lock the gears in the event of hydraulic failure, it is necessary only to relieve the hydraulic pressure. Emergency gear extension must not be attempted at airspeeds in excess of 100 MPH. An emergency gear extension knob, located directly beneath the gear selector switch is provided for this purpose. Pulling this knob releases the hydraulic pressure holding the gear in the up position and allows the gear to fall free. During normal operation, this knob is covered by a guard to prevent inadvertent extension of the gear. Before pulling the emergency gear extension knob, place the landing gear selector switch in the "DOWN" position to prevent the pump from trying to raise the gear. If the emergency gear knob has been pulled out to lower the gear by gravity, it may be pushed in again after the landing is completed and the source of the problem is corrected. Be sure that the landing gear selector switch is in the "DOWN" position before the knob is pushed in.



Landing Gear Electrical System Schematic



Landing Gear Hydraulic System Schematic

When the gear is fully extended or fully retracted and the gear selector is in the corresponding position, electrical limit switches stop the flow of current to the motor of the hydraulic pump. The **three green lights** directly above the landing gear selector switch illuminate to indicate that each of the three landing gears is down and locked. A convex mirror on the left engine nacelle both serves as a taxiing aid and allows the pilot to visually confirm the condition of the nose gear. If the gear is in neither the full up nor the full down position, a **red warning light** on the instrument panel illuminates. Should the throttle be placed in a low setting - as for a landing approach - while the gear is retracted, a **warning horn** sounds to alert the pilot that the gear is retracted. The gear warning horn emits a continuous sound on earlier models and a 90 cycles per minute beeping sound on later models.

To add to the pilot's night vision comfort, the green gear lights are dimmed automatically when the navigation lights are turned on. For this reason, if the navigation lights are turned on in the daytime, it is difficult to see the landing gear lights. If the green lights are not observed after the landing gear selector switch is placed in the "DOWN" position, the first thing to check is the position of the navigation lights switch.

If one or two of the three green lights do not illuminate when the gear down position has been selected, any of the following conditions could exist for each light that is out:

1. The gear is not locked down.
2. A bulb is burned out.
3. There is a malfunction in the indicating system.

In order to check the bulbs, the square indicator lights can be pulled out and interchanged.

A **micro switch** incorporated in the throttle quadrant activates the gear warning horn under the following conditions:

1. The gear is up and the manifold pressure has fallen below 14 inches on either one or both engines.
2. The gear selector switch is in the "UP" position when the airplane is on the ground.

To prevent **inadvertent gear retraction** should the gear selector switch be placed in the "UP" position when the airplane is on the ground, a **squat switch** located on the left main gear will prevent the hydraulic pump from actuating if the master switch is turned on. On takeoff, when the landing gear oleo strut drops to its full extension, the safety switch closes to complete the circuit which allows the hydraulic pump to be activated to raise the landing gear when the gear selector is moved to the "UP" position. During the preflight check, be sure the landing gear selector is in the "DOWN" position and that the three green gear indicator lights are illuminated. On takeoff, the gear should be retracted before an airspeed of 125 MPH is exceeded. The landing gear may be lowered at any speed up to 150 MPH.

The **hydraulic reservoir** for landing gear operation is an integral part of the gear hydraulic pump. Access to the combination pump and reservoir is through a panel in the nose baggage compartment. For filling instructions, see the PA-34-200T Service Manual.

The nose gear is steerable through a 27 degree arc either side of center by use of a combination of full rudder pedal travel and brakes. A gear **centering spring**, incorporated in the nose gear steering system, prevents shimmy tendencies. A **bungee assembly** reduces ground steering effort and dampens shocks and bumps during taxiing. When the gear is retracted, the nose wheel centers as it enters the wheel well, and the steering linkage disengages to reduce pedal loads in flight. The landing light turns off automatically when the gear is retracted.

All three landing gears carry 6.00 x 6 **tires**. The nose wheel has a 6-ply tire and the main wheels have 8-ply tires. For information on servicing the tires, see "Tire Inflation" in the Handling and Servicing Section of this Manual.

Struts for the landing gear are **air-oil** assemblies. Strut exposure should be checked during each preflight inspection. If a need for service or adjustment is indicated, refer to the instructions printed on the units. Should more detailed landing gear service information be required, refer to the PA-34-200T Service Manual.

BRAKE SYSTEM

The brake system is designed to meet all normal braking needs and to assist in the short field landing capabilities of the Seneca II. Two single-disc, double puck **brake assemblies**, one on each main gear, are actuated either by **toe brake pedals** mounted on both the pilot's and the copilot's rudder pedals or by a **hand-operated brake lever** located below and behind the left center of the instrument panel. A brake system **hydraulic reservoir**, independent of the landing gear hydraulic reservoir, is located behind a panel in the rear top of the nose baggage compartment. Brake fluid should be maintained at the level marked on the reservoir. For further information see "Brake Service" in the Handling and Servicing Section of this Manual.

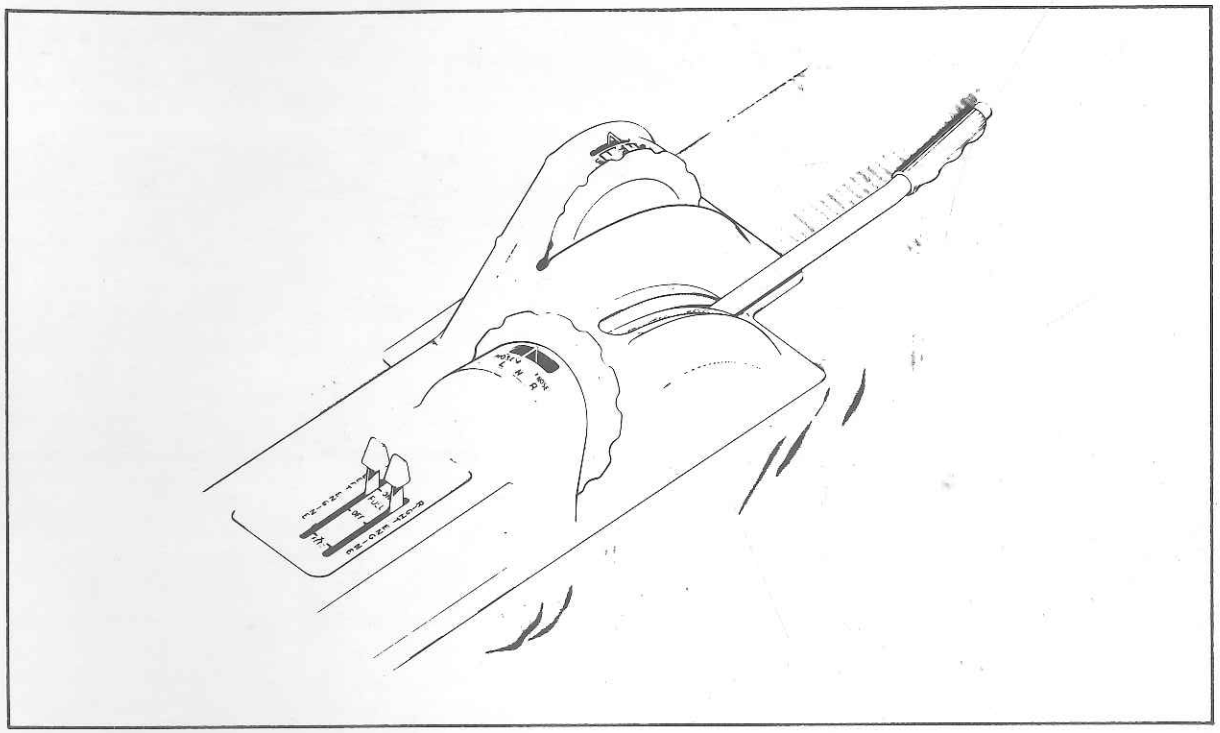
The **parking brake** is engaged by pulling back on the hand brake lever and depressing the button on the left of the handle. The parking brake is released by pulling back on the handle without touching the button and allowing the handle to swing forward.

FLIGHT CONTROL SYSTEM

Dual flight controls are installed in the Seneca II as standard equipment. The controls actuate the control surfaces through a cable system. The horizontal tail surface **(stabilator)** is of the all movable slab type with an anti-servo tab mounted on the trailing edge. This tab, actuated by a control mounted on the console between the front seats, also acts as a longitudinal trim tab.

The **ailerons** are of the Frise type. This design allows the leading edge of the aileron to extend further into the airstream to provide increased drag and improved roll control. The differential deflection of the ailerons tends to eliminate adverse yaw in turning maneuvers and to reduce the amount of coordination required in normal turns.

The vertical tail is fitted with a **rudder** which incorporates a combination rudder trim and anti-servo tab. The rudder trim control is located on the control console between the front seats.

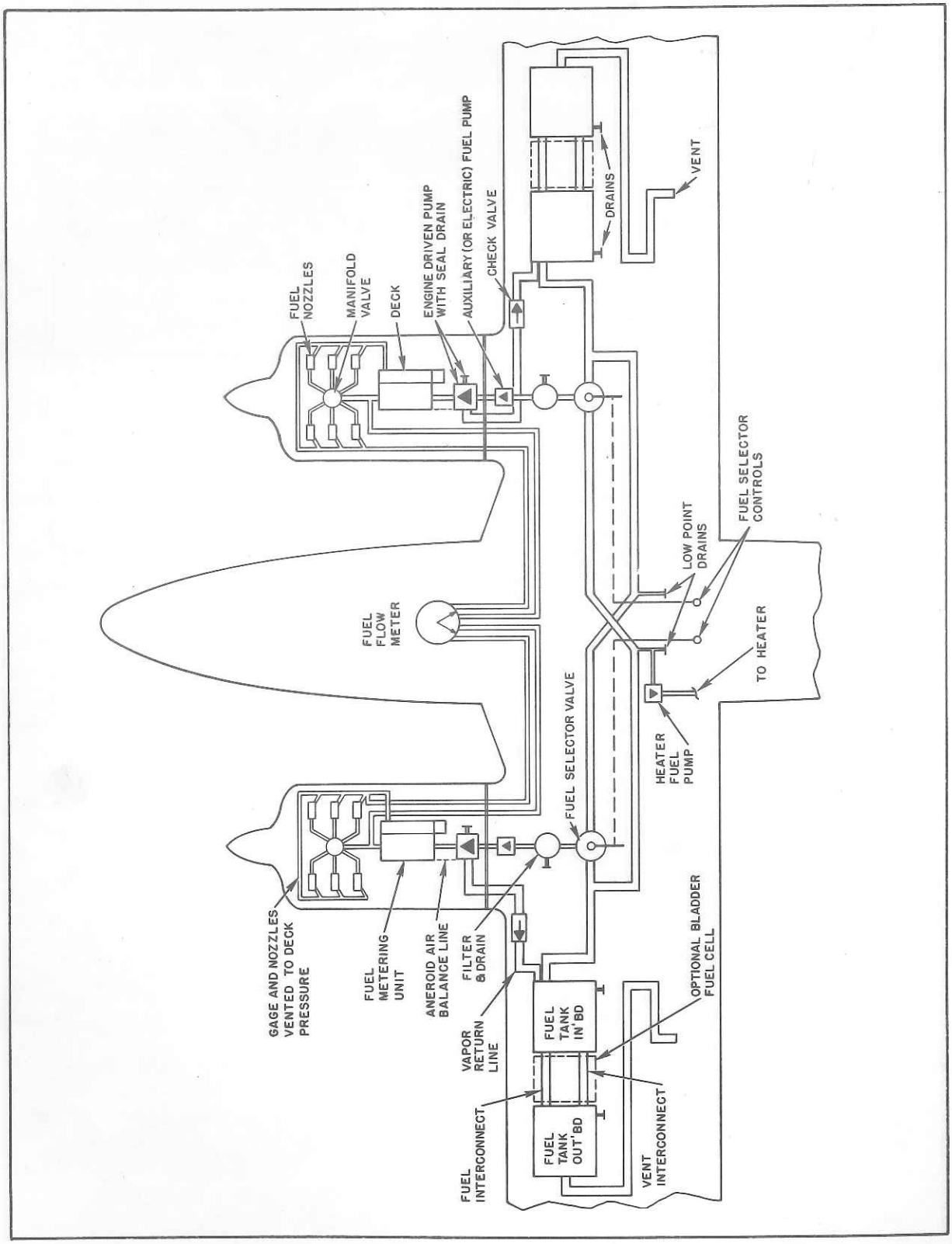


Console

The **flaps** are manually operated, aerodynamically balanced for light operating forces and spring loaded to return to the retracted position. A four-position flap control lever between the front seats adjusts the flaps for reduced landing speeds and a high degree of glide path control. The flaps have three extended positions - 10, 25 and 40 degrees - as well as the fully retracted position. A button on the end of the lever must be depressed before the control can be moved. A past center lock incorporated in the actuating linkage holds the flap when it is in the retracted position so that it may be used as a step on the right side. Since the flap will not support a step load except in the fully retracted position, the flaps should be retracted when people are entering or leaving the airplane.

FUEL SYSTEM

Fuel is stored in fuel tanks located in each wing. The tanks in each wing are interconnected to function as a single tank. All tanks on a side are filled through a single filler in the outboard tank, and as fuel is consumed from the inboard tank, it is replenished by fuel from outboard. Only two and one half gallons of fuel in each wing is unusable, giving the Seneca II a total of 93 usable gallons with standard fuel tanks or 123 usable gallons with the optional fuel tanks installed. The fuel must be 100/130 octane. The fuel tank vents, one installed under each wing, feature an anti-icing design to prevent ice formation from blocking the fuel tank vent lines.



Fuel System Schematic

The fuel injection system is a "continuous flow" type which utilizes a vapor return line leading back to the fuel tanks. This line provides a route back to the tanks for vapor laden fuel that has been separated in the injector pump swirl chamber. Each engine has an engine driven fuel pump that is a part of the fuel injection system. On models without a primer system* installation, switches for the electric fuel pumps are located on the switch panel to the left of the pilot. The electric fuel pumps pressurize fuel for priming and vapor suppression. An integral relief valve assures that activation of the electric fuel pump for vapor suppression will not flood the engine. On models with a primer system** installation an auxiliary fuel system is provided. The purpose of the electrically powered auxiliary fuel system is to supply fuel to the engine in case of engine driven fuel pump shaft failure or malfunction, for ground and inflight engine starting, and for vapor suppression. The two auxiliary fuel pump switches are located on the electrical side panel and are three position rocker switches; LO, HI and OFF. The LO auxiliary fuel pressure is selected by pushing the top of the switch. The HI auxiliary fuel pressure is selected by pushing the bottom of the switch, but this can be done only after unlatching the adjacent guard. When the HI auxiliary fuel pump is activated, an amber light near the annunciation panel is illuminated for each pump. These lights dim whenever the pump pressure reduces automatically and manifold pressure is below approximately 21 inches.

On models without a primer system* installation, in case of a failed engine-driven pump, partial (approximately 25%) power may be maintained by use of the corresponding electric fuel pump. This power will allow positive thrust which will result in better performance than can be obtained with the propeller feathered. On models with a primer system** installation, in case of a failed engine-driven fuel pump, auxiliary fuel pressure should be selected. Adequate pressure and fuel flow will be supplied for up to approximately 75% power. Manual leaning to the correct fuel flow will be required at altitudes above 15,000 feet and for engine speeds less than 2300 RPM. An absolute pressure switch automatically selects a lower fuel pressure when the throttle is reduced below 21" Hg manifold pressure and the HI auxiliary fuel pump is on.

NOTE

Excessive fuel pressure and very rich fuel/air mixtures will occur if the HI position is energized when the engine fuel injection system is functioning normally.

Low auxiliary fuel pressure is available and may be used during normal engine operation both on the ground and inflight for vapor suppression should it be necessary as evidenced by unstable engine operation during idle or at high altitudes.

Separate spring loaded OFF primer button switches, located adjacent to the starter switches are used to select HI auxiliary fuel pump operation for priming, irrespective of other switch positions. These primer buttons may be used for both hot or cold engine starts.

*Ser. nos. 34-7570001 through 34-7570308 when Piper Kit No. 760 926V is not installed.
**Ser. nos. 34-7570309 and up and 34-7570001 through 34-7570308 when Piper Kit No. 760 926V is installed.

Fuel management controls are located on the console between the front seats. There is a control lever for each of the engines, and each is placarded "ON" - "OFF" - "X FEED." During normal operation, the levers are in the "ON" position, and each engine draws fuel from the tanks on the same side as the engine. The two fuel systems are interconnected by crossfeed lines. When the "X FEED" position is selected, the engine will draw fuel from the tanks on the opposite side in order to extend range and keep fuel weight balanced during single-engine operation. The "OFF" position shuts off the fuel flow from a side.

NOTE

When one engine is inoperative and the fuel selector for the operating engine is on "X FEED" the selector for the inoperative engine must be in the "OFF" position. Do not operate with both selectors on "X FEED." Do not take off with a selector on "X FEED." Fuel and vapor are always returned to the tank on the same side as the operating engine.

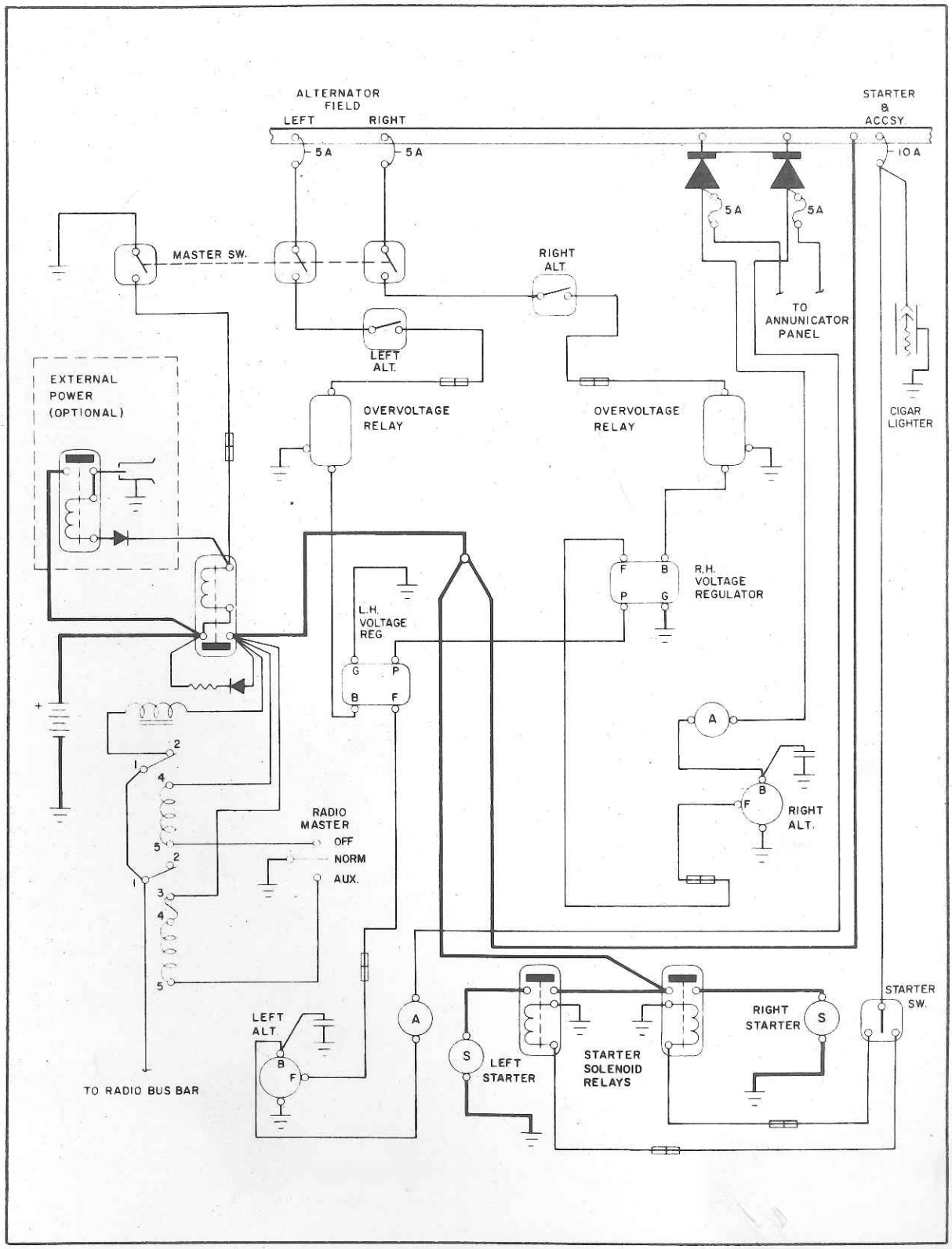
Before each flight, fuel must be drained from low points in the fuel system to ensure that any accumulation of moisture or sediment is removed from the system. **Fuel drains** are provided for each fuel filter (2), each fuel tank (4), and each crossfeed line(2). The fuel filter drains are located on the outboard underside of each engine nacelle; two fuel tank drains are located on the underside of each wing; fuel crossfeed drains are located at the lowest point in the fuel system, on the underside of the fuselage, just inboard of the trailing edge of the right wing flap.

ELECTRICAL SYSTEM

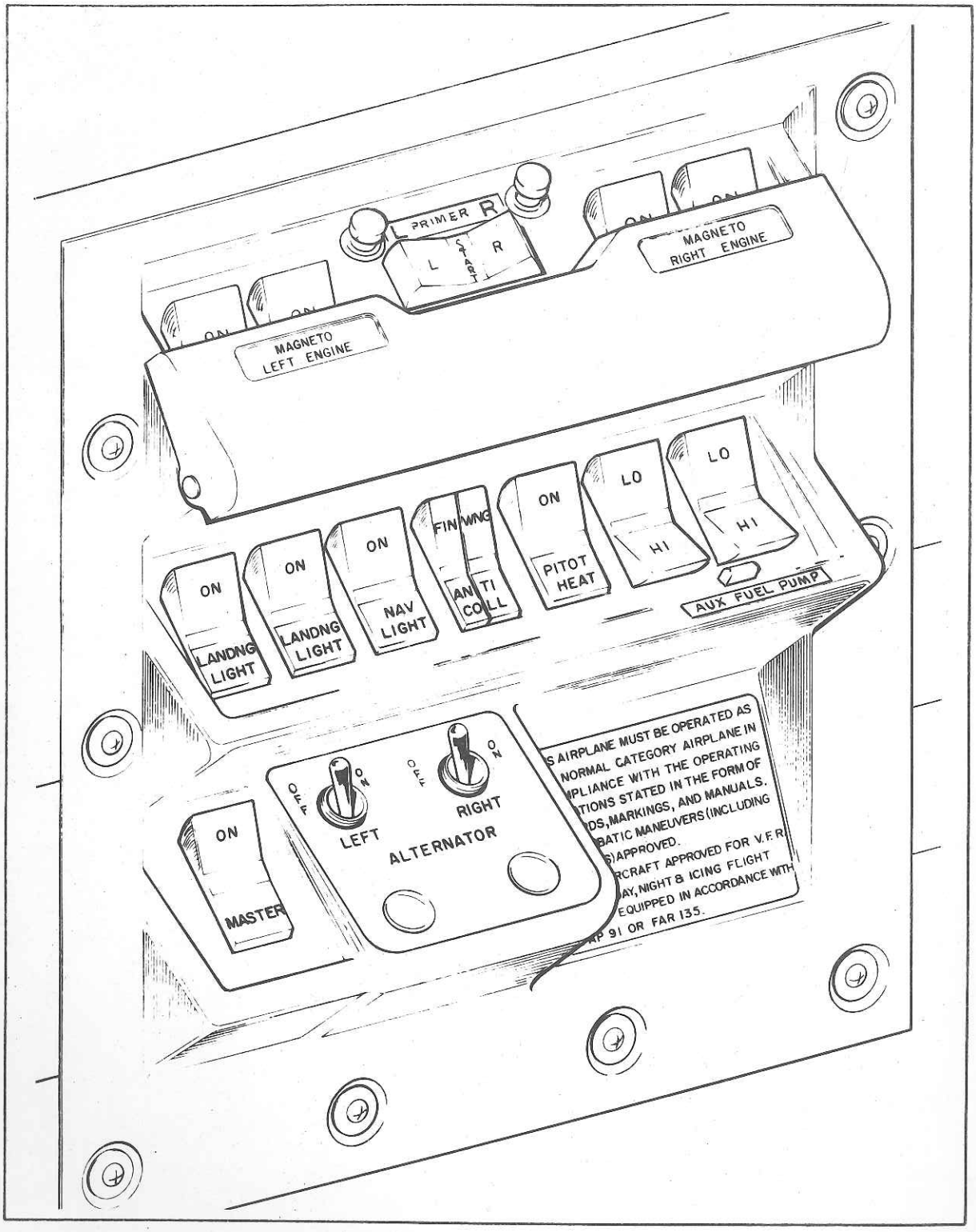
The **electrical system** of the Seneca II is capable of supplying sufficient current for complete night IFR equipment. Electrical power is supplied by two 65 ampere alternators, one mounted on each engine. A 35 ampere-hour, 12-volt battery provides current for starting, for use of electrical equipment when the engines are not running, and for a source of stored electrical power to back up the alternator output. The battery, which is located in the nose section and is accessible through the forward baggage compartment, is normally kept charged by the alternators. If it becomes necessary to charge the battery, it should be removed from the airplane.

When the optional **external power source plug** is installed, it is located on the lower left side of the nose section. While an external 12 or 14-volt power source is being plugged in or unplugged, the master switch should be turned off to prevent sparking. However, while the engine is being started with external power, the master switch should be turned on.

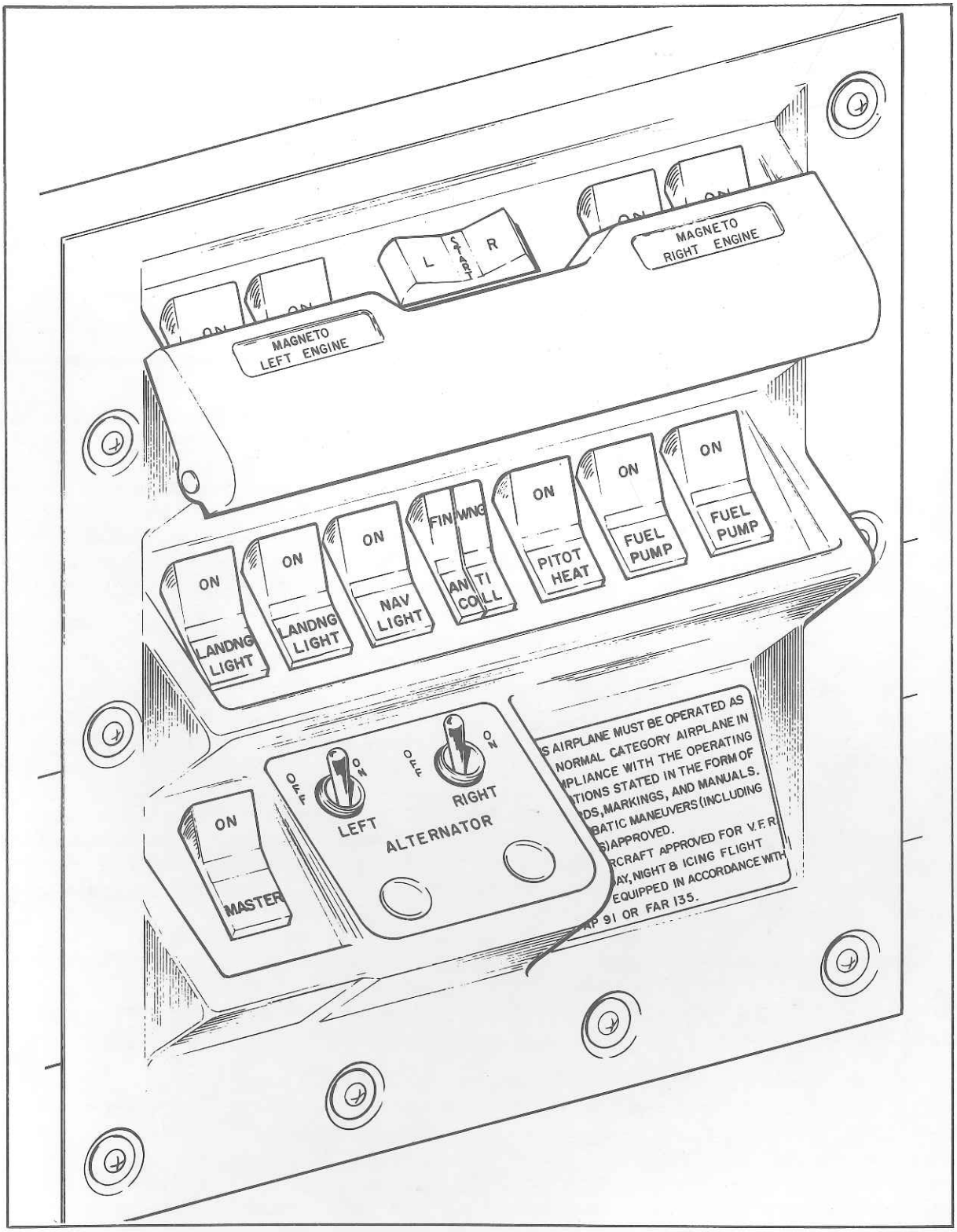
Two **solid state voltage regulators** maintain effective load sharing while regulating electrical system bus voltage to 14-volts. An **overvoltage relay** in each alternator circuit prevents damage to electrical and avionics equipment by taking an alternator off the line if its output exceeds 14-volts. If this should occur, the alternator light on the annunciator panel will illuminate. Voltage regulators and overvoltage relays are located forward of the bottom of the bulkhead separating the cabin section from the nose section.



Alternator and Starter Schematic



Switch Panel - With Primer System
(Ser. nos. 34-7570309 and up and 34-7570001 through 34-7570308
when Piper Kit No. 760 926V is installed.)



Switch Panel - Without Primer System
(Ser. nos. 34-7570001 through 34-7570308 when Piper Kit No. 760 926V is not installed.)

Approximately 2000 RPM or more is required to obtain full alternator output of 65 amperes. It is normal to have zero output at idle RPM. This is due to the reduced drive ratio from the engine. Dual ammeters and the ALT annunciator light provide an easy means of monitoring the electrical system operation. The two ammeters (load meters) indicate the output of the alternators. Should an ammeter indicate a load much higher than the known consumption of the electrical equipment in use, it should be suspected of a malfunction and turned off. In this event, the remaining alternator's ammeter should show a normal indication after approximately one minute. If both ammeters indicate a load much higher than the known consumption for more than approximately five minutes, an electrical defect other than the alternator system should be suspected because a discharged battery will reduce the alternator load as it approaches the charged conditions. A zero ammeter reading indicates an alternator is not producing current and should be accompanied by illumination of the ALT annunciator light. A single alternator is capable of supporting a continued flight in case of alternator or engine failure in most conditions; however, with deicing equipment and other high loads, care must be exercised to prevent the loads from exceeding the 65 ampere rating and subsequent depletion of the battery.

The annunciator panel on the upper left of the instrument panel is installed as an electrical accessory. It includes manifold pressure overboost, gyro pressure, oil pressure, and alternator indicator lights. Illumination of any light indicates that the pilot should monitor system gauges to determine if a failure has occurred and if corrective action is required. Light function may be tested with a "push to test" switch. In addition, on models with a primer system* installation, an amber light illuminates when the corresponding HI auxiliary fuel pump is energized. The auxiliary fuel pump annunciator lights will not illuminate when the "push to test" switch is actuated. Auxiliary fuel system light function is tested when the primer switches are actuated.

When all electrical equipment is turned off (except the master switch), the ammeters will indicate current being used to charge the battery and operate the instruments. If the sum of the two readings is significant, this is an indication that the battery has a low charge. The pilot should try to determine why it is low, and if no cause is apparent, the condition of the battery and the electrical system should be checked by a mechanic.

If both alternators should fail during flight, the battery becomes the only source of electrical power; therefore, all unnecessary electrical equipment should be turned off. The length of time the battery will be able to supply power to the necessary equipment depends on the current drained by the equipment, the time it took for the pilot to notice the dual failure and to execute protective procedures, and the condition of the battery.

During night or instrument flight, the pilot should continuously monitor the ammeters and warning light so that prompt corrective action may be initiated if an electrical malfunction occurs. Procedures for dealing with electrical malfunction are covered in detail in the Airplane Flight Manual Section.

The electrical system and equipment are protected by **circuit breakers** located on a circuit breaker panel on the lower right side of the instrument panel. The circuit breaker panel is provided with enough blank spaces to accommodate additional circuit breakers if extra electrical equipment is installed. In the event of equipment malfunctions or a sudden surge of current, a circuit breaker can trip automatically. The pilot can reset the breaker by pressing it in (preferably after a few minutes cooling period). The circuit breakers can be pulled out manually.

*Ser. nos. 34-7570309 and up and 34-7570001 through 34-7570308 when Piper Kit No. 760 926V is installed.

Most of the **electrical switches**, including the master switch and switches for magnetos, fuel pumps, starters, alternators, lights and pitot heat, are conveniently located on the switch panel to the left of the pilot.

GYRO PRESSURE SYSTEM

The directional gyros and attitude indicators are driven by positive air pressure. The pressure system consists of a pressure pump on each engine, plus plumbing and regulating equipment. Air for the system is taken from the engine nacelle area through inlet filters and passed through pressure pumps installed on the engines. Pressure regulators mounted on the fire walls maintain the air at constant pressure to prevent damage to the instruments. Check valves, a pressure air manifold, and inline filters are mounted in the cabin at the forward bulkhead. The check valves close to allow pressure instruments to function during single-engine operation or in the event of malfunction of one of the pressure pumps. The instruments receive air from the manifold. A pressure gauge on the instrument panel, to the left of the pilot's control wheel shaft, is connected to the manifold and indicates the pressure the gyros are receiving. After air has passed through the gyro instruments, it is exhausted overboard through the forward bulkhead.

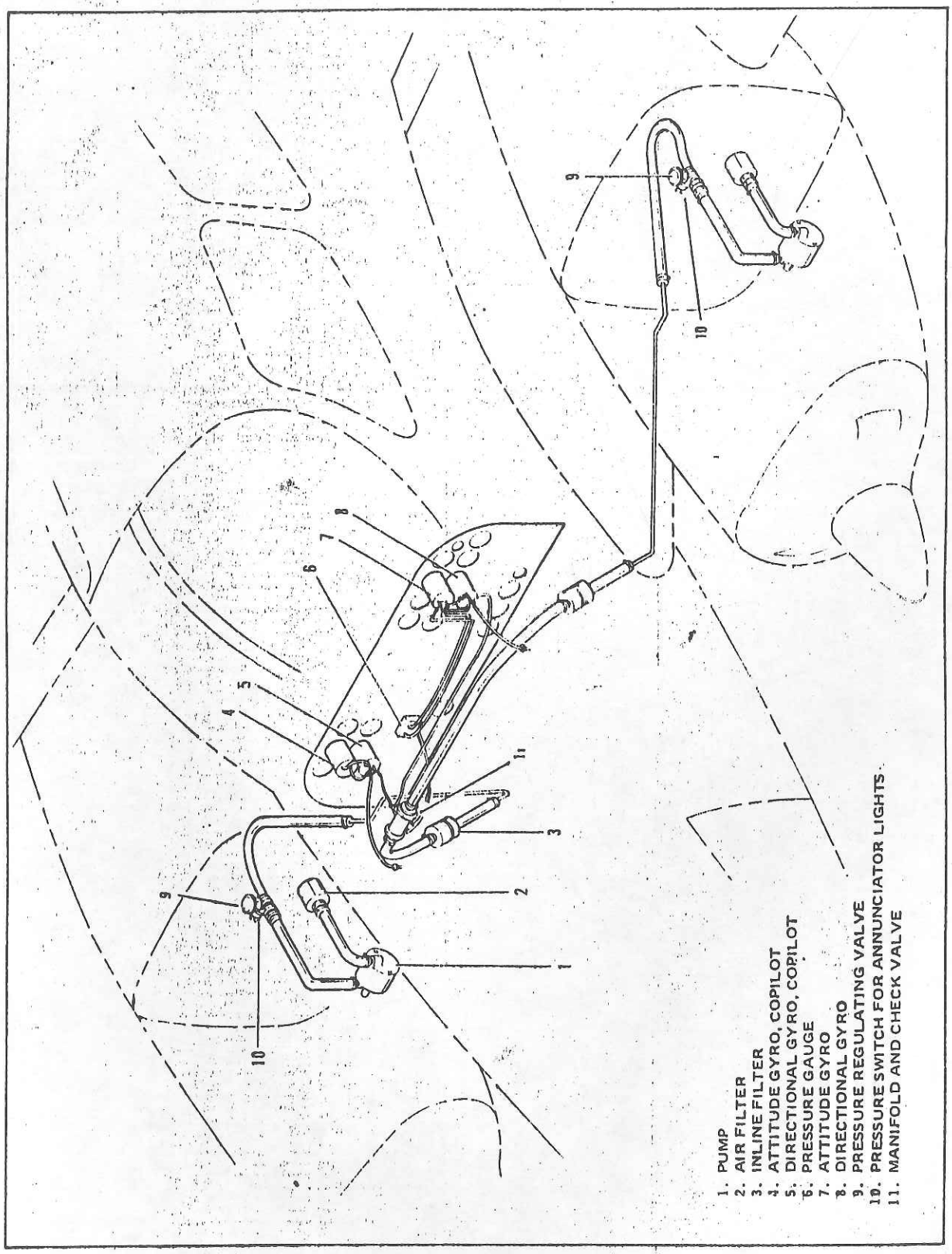
The operating limits for the gyro pressure system are 4.5 to 5.2 inches of mercury for all operations. Operation of the gyro pressure system can be monitored through a gyro pressure gauge mounted to the left of the copilot's control wheel. The two warning indicators mounted on the gauge serve to alert the pilot should one of the engines be producing less than sufficient pressure to operate the gyro instruments. Additional warning of a possible malfunction in the gyro pressure system is provided by a light in the annunciator panel.

PITOT STATIC SYSTEM

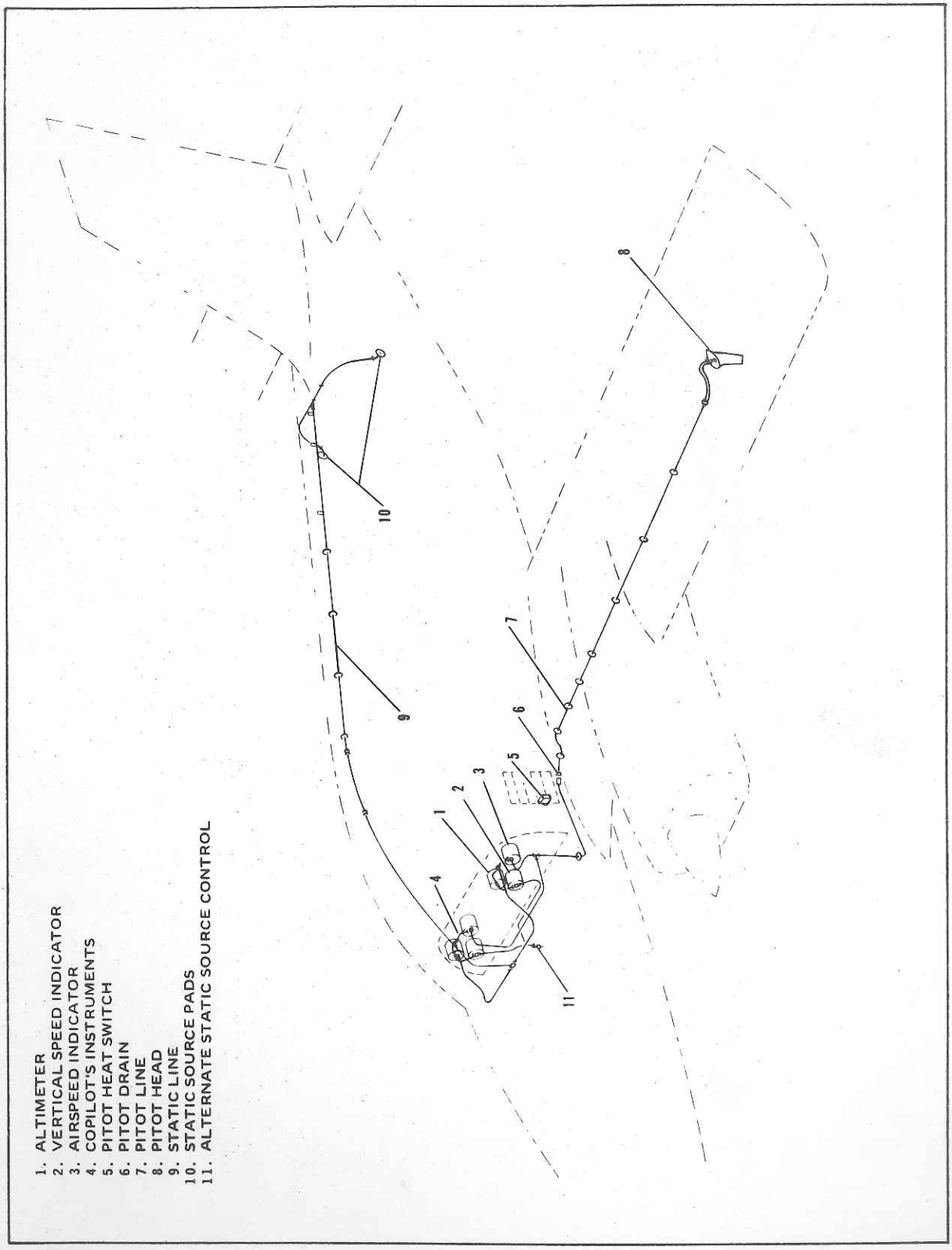
Pitot pressure for the airspeed indicator is sensed by an aluminum **pitot head** installed on the bottom of the left wing and carried through lines within the wing and fuselage to the gauge on the instrument panel. **Static pressure** for the altimeter, vertical speed and airspeed indicators is sensed by **two static source pads**, one on each side of the rear fuselage forward of the stabilator. They connect to a single line leading to the instruments. The dual pickups balance out differences in static pressure caused by side slips or skids.

An **alternate static source** control valve is located below the instrument panel to the right of the control quadrant. When the valve is set to the alternate position, the altimeter, vertical speed indicator and airspeed indicator will be using cabin air for static pressure. During alternate static source operation, these instruments may give slightly different reading, depending on conditions within the cabin. Airspeed, setting of heating and ventilating controls, or the position of the storm window can influence cabin air pressure. The pilot can determine the effects of the alternate static source on instrument readings by switching from standard to alternate sources at different airspeeds and heating and ventilating configurations (including open storm window below 150 MPH).

If one or more of the pitot static instruments malfunction, the system should be checked for dirt, leaks, or moisture. The pitot and the static lines may be drained through separate **drains**. A drain on the lower left front of the side panel may be used to drain moisture from the pressure line running from the pitot head to the instrument panel. Since the alternate static source control is at the low point in the system, selecting the alternate static source will drain the static pressure lines.



Gyro Pressure System



Pitot Static System

The holes in the sensors for pitot and static pressure must be fully open and free from dirt, bugs. or polish. Blocked sensor holes will give erratic or zero readings on the instruments.

A **heated pitot head**, which eliminates problems with icing and heavy rain, is available as optional equipment. Static source pads have been demonstrated to be non-icing; however, in the event icing does occur, selecting the alternate static source will alleviate the problem.

INSTRUMENT PANEL

The **instrument panel** is designed to be functional and professional. There is sufficient space for the pilot's flight instruments and complete engine instruments, plus optional copilot's flight instruments and a wide range of avionics and additional optional instruments. Equipment is available to allow the Seneca II to be uniquely suited to individual needs.

Flight instruments are grouped in the upper instrument panel; **engine and electrical system monitoring instruments**, the **autopilot**, and the **circuit breaker panel** are in the lower instrument panel. Left and right engine instruments are conveniently separated by the left control wheel shaft.

Radios are mounted in the center of the upper instrument panel. The **control quadrant** - throttles and propeller and mixture controls - is in the center of the lower instrument panel. To the left of the control quadrant is the **landing gear selector.** This arrangement makes these installations conveniently accessible to both pilot and copilot.

Various **warning lights** are located with the pilot's flight instruments on the left upper instrument panel. The **gear unsafe warning light** is to the left of the annunciator panel; and the **stall warning light** is to the far left of the pilot's flight instruments.

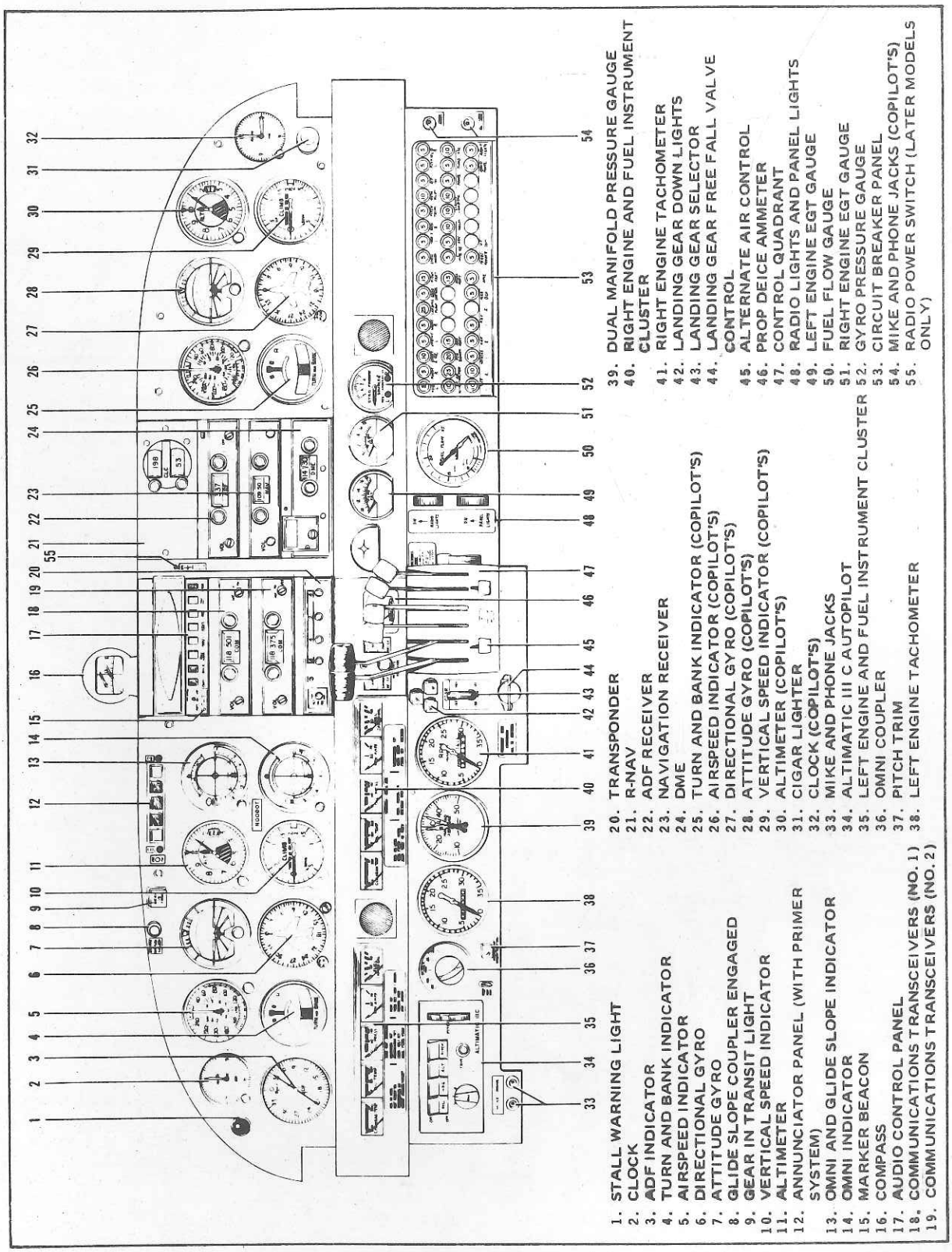
The **annunciator panel**, with manifold pressure overboost, oil pressure, gyro pressure and alternator lights, and incorporating a press-to-test feature, is located to the upper left of the radios. The illumination of these lights in flight is an indication of a possible system malfunction. The pilot should closely monitor instrument panel gauges to check the condition of a system whose corresponding light on the annunciator panel illuminates. Illumination of the manifold pressure overboost lights indicates manifold pressure at or above the maximum allowable 40 inches Hg. During preflight, the operational status of the annunciator panel, except auxiliary fuel pump lights, should be tested by use of the press-to-test button. When the button is depressed, all annunciator panel lights, execpt auxiliary fuel pump lights, should illuminate.

NOTE

When an engine is feathered, the alternator, gyro air and oil pressure annunciator lights will remain illuminated.

Instrument panel **lighting** can be dimmed or brightened by rheostat switches to the right of the control quadrant. Back-lights are standard equipment, and map lights, and reading lights are available as options. When instrument panel lights are turned on, annunciator lights are dimmed. However, they will not show dim when the press-to-test switch is depressed.

Most of the electrical switches are located on the switch panel on the left side of the cockpit. In later models a radio power switch is located near the top of the instrument panel between the radio stacks. It controls the power to all radios through the aircraft MASTER switch. The radio power switch has an OFF, NORMAL and AUXILIARY position. The AUXILIARY position provides a secondary power circuit for all radios.



1. STALL WARNING LIGHT
2. CLOCK
3. ADF INDICATOR
4. TURN AND BANK INDICATOR
5. AIRSPEED INDICATOR
6. DIRECTIONAL GYRO
7. ATTITUDE GYRO
8. GLIDE SLOPE COUPLER ENGAGED
9. GEAR IN TRANSIT LIGHT
10. VERTICAL SPEED INDICATOR
11. ALTIMETER
12. ANNUNCIATOR PANEL (WITH PRIMER SYSTEM)
13. OMNI AND GLIDE SLOPE INDICATOR
14. OMNI INDICATOR
15. MARKER BEACON
16. COMPASS
17. AUDIO CONTROL PANEL
18. COMMUNICATIONS TRANSCEIVERS (NO. 1)
19. COMMUNICATIONS TRANSCEIVERS (NO. 2)
20. TRANSPONDER
21. R-NAV
22. ADF RECEIVER
23. NAVIGATION RECEIVER
24. DME
25. TURN AND BANK INDICATOR (COPILOT'S)
26. AIRSPEED INDICATOR (COPILOT'S)
27. DIRECTIONAL GYRO (COPILOT'S)
28. ATTITUDE GYRO (COPILOT'S)
29. VERTICAL SPEED INDICATOR (COPILOT'S)
30. ALTIMETER (COPILOT'S)
31. CIGAR LIGHTER
32. CLOCK (COPILOT'S)
33. MIKE AND PHONE JACKS
34. ALTIMATIC III C AUTOPILOT
35. LEFT ENGINE AND FUEL INSTRUMENT CLUSTER
36. OMNI COUPLER
37. PITCH TRIM
38. LEFT ENGINE TACHOMETER
39. DUAL MANIFOLD PRESSURE GAUGE
40. RIGHT ENGINE AND FUEL INSTRUMENT CLUSTER
41. RIGHT ENGINE TACHOMETER
42. LANDING GEAR DOWN LIGHTS
43. LANDING GEAR SELECTOR
44. LANDING GEAR FREE FALL VALVE CONTROL
45. ALTERNATE AIR CONTROL
46. PROP DEICE AMMETER
47. CONTROL QUADRANT
48. RADIO LIGHTS AND PANEL LIGHTS
49. LEFT ENGINE EGT GAUGE
50. FUEL FLOW GAUGE
51. RIGHT ENGINE EGT GAUGE
52. GYRO PRESSURE GAUGE
53. CIRCUIT BREAKER PANEL
54. MIKE AND PHONE JACKS (COPILOT'S)
55. RADIO POWER SWITCH (LATER MODELS ONLY)

Instrument Panel

HEATING, VENTILATING AND DEFROSTING SYSTEM

Heated air for cabin heat and windshield defrosting is provided by a Janitrol combustion heater located in the aft fuselage behind the cabin baggage compartment close-off. Air from the heater is ducted forward along the cabin floor to outlets at each seat and to the windshield area.

Operation of the combustion heater is controlled by a three-position switch located on the control console between the front seats and labeled FAN, OFF and HEATER. Airflow and temperature are regulated by the two levers on the console. The right-hand lever regulates air intake and the left-hand lever regulates cabin temperature. Cabin comfort can be maintained as desired through various combinations of lever positions. Passengers have secondary control over heat output by individually adjustable outlets at each seat location.

For cabin heat, the air intake lever on the heater control console must be partially or fully open and the three-position switch set to the HEATER position. This simultaneously starts fuel flow and ignites the heater; and, during ground operation, it also activates the ventilation blower which is an integral part of the combustion heater. With instant starting and no need for priming, heat should be felt within a few seconds. When cabin air reaches the temperature selected on the cabin temperature lever, ignition of the heater cycles automatically to maintain the selected temperature. Two safety switches activated by the intake valve and located aft of the heater unit prevent both fan and heater operation when the air intake lever is in the closed position. A micro switch, which actuates when the landing gear is retracted, turns off the ventilation blower so that in flight the cabin air is circulated by ram air pressure only.

When the three-position switch is in the FAN position during ground operation, the ventilation fan blows fresh air through the heater ductwork for cabin ventilation and windshield defogging when heat is not desired. When the heater controls are used either for cabin heat or for ventilation, air is automatically ducted to the windshield area for defrosting.

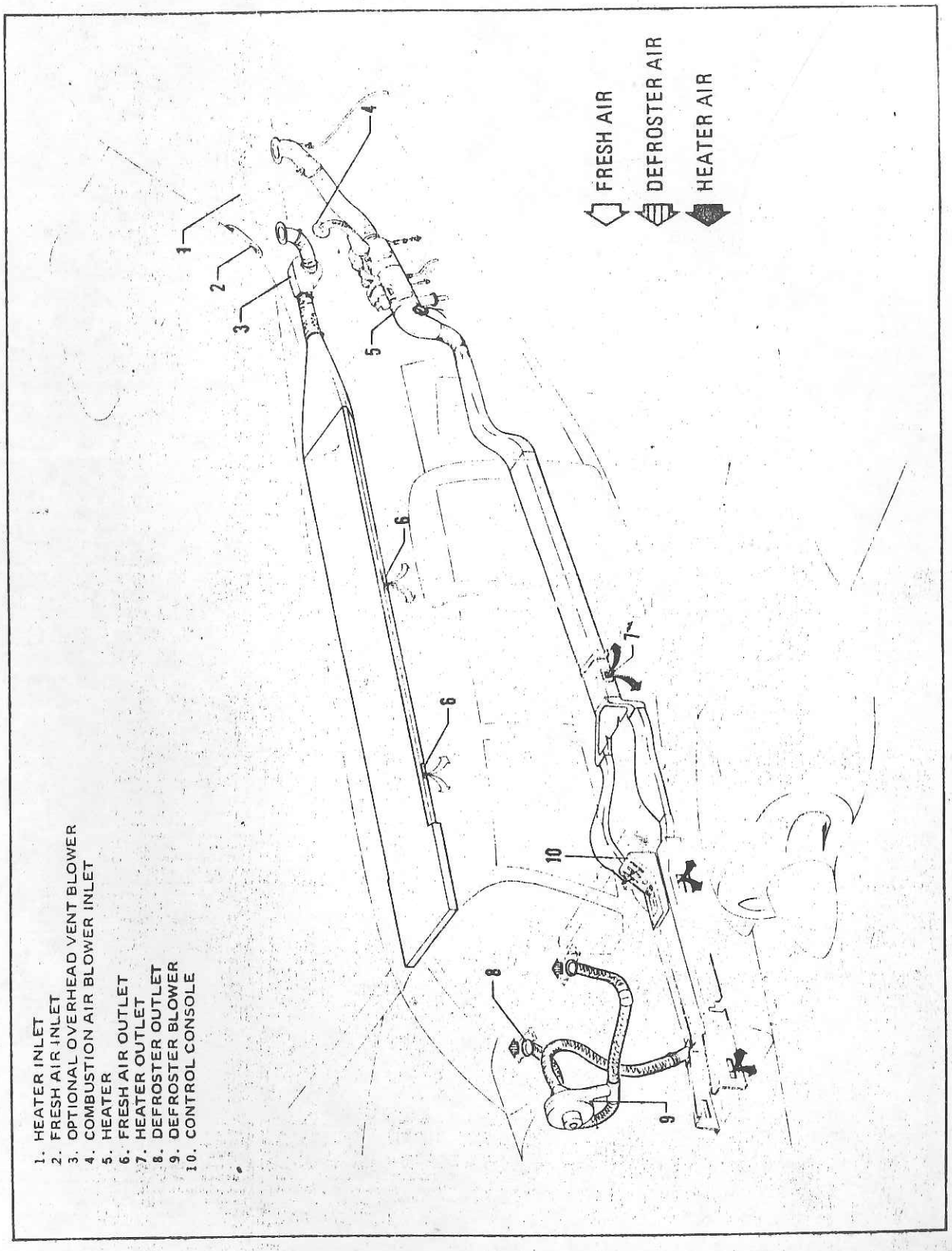
The flow of defroster air to the windshield area can be increased by the activation of a defroster fan. The fan is controlled by a defroster switch located on the control console between the two front seats.

To introduce fresh, unheated air into the cabin during flight, the air intake should be open and the heater off. Ram air enters the system and can be individually regulated at each floor outlet. Overhead outlets also supply fresh air for cabin ventilation. The occupant of each seat can manually adjust an outlet in the ceiling to regulate the flow of fresh air to that seat area. An optional fresh air blower may be installed in the overhead ventilation system to provide additional fresh air flow during ground operation.

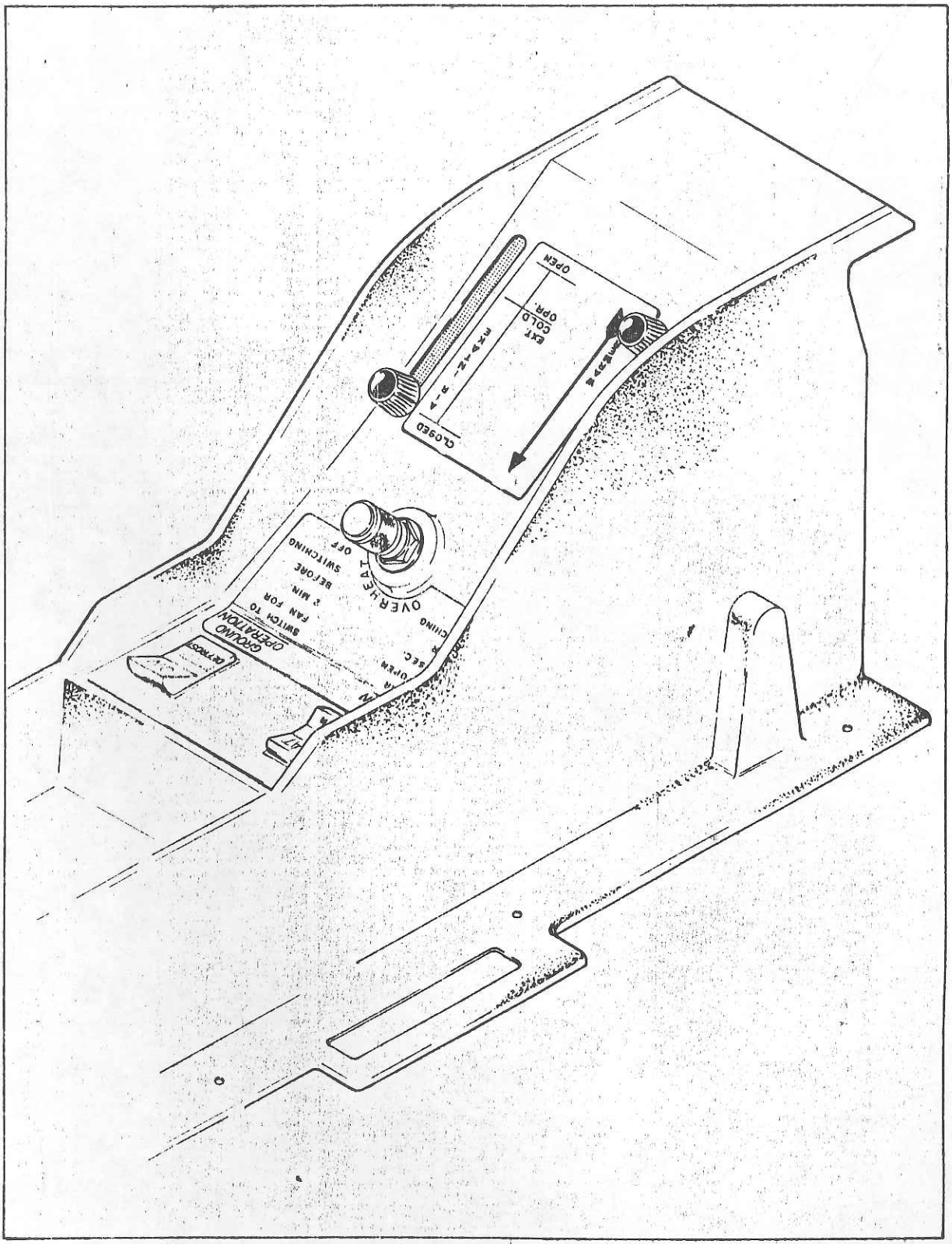
An overheat switch located in the heater unit acts as a safety device to render the heater inoperative if a malfunction should occur. Should the switch deactivate the heater, the OVERHEAT light on the control console will illuminate. The overheat switch is located on the forward outboard end of the heater vent jacket. The red reset button on the heater shroud can be reached through the bulkhead access panel in the aft cabin close-out panel.

To prevent activation of the overheat switch upon normal heater shutdown during ground operation, turn the three-position switch to FAN for two minutes with the air intake lever in the open position before turning the switch to OFF. During flight, leave the air intake lever open for a minimum of fifteen seconds after turning the switch to OFF.

The combustion heater uses fuel from the airplane fuel system. An electric fuel pump draws fuel from the left tank at a rate of approximately one-half gallon per hour. Fuel used for heater operation should be considered when planning for a flight.



Cabin Heating, Ventilating and Defrosting System



Heating, Ventilating and Defrosting Control Console

CABIN FEATURES

For pilot and passenger comfort, the front seats are adjustable fore and aft. To facilitate entry and exit through the cockpit door, an easily accessible latch on top of the right front seat allows the seat to be pushed forward. Each seat reclines and is provided with an armrest. The center and rear seats are easily removed to provide additional cargo space.

NOTE

To remove the center and rear seats, retainers securing the back legs of the seats must be unlocked. This is accomplished by turning the slotted head aft of each back leg ninety degrees with a coin or a screwdriver. In the locked position, the slot on the head runs fore to aft. Any time the seats are installed in the airplane, the retainers should be in the locked position.

An optional jump seat, which can be mounted between the two center seats, gives the Seneca II seven-place capabilities.

Seat belts are standard on all seats, and the front seats are equipped with shoulder harnesses and inertia reels. These shoulder harnesses are optionally available for the two center and the two rear seats. The shoulder harness is routed over the shoulder adjacent to the window and attached to the seat belt in the general area of the occupant's inboard hip. A check of the inertia reel mechanism is made by pulling sharply on the strap. The reel should lock in place and prevent the strap from extending. For normal body movements, the strap will extend or retract as required. Other seat options include headrests and push-button vertically adjustable pilot and copilot seats. The seat belt should be snuggly fastened over each unoccupied seat.

Standard cabin features include a pilot's storm window, ashtrays, map pockets, coat hooks and assist straps, a cigar lighter, sun visors, and pockets on the front and center seat backs. Among the options which may be added to suit individual needs are headrests, a fire extinguisher, and a special cabin sound-proofing package.

STALL WARNING

An approaching stall is indicated by a stall warning indicator which is activated between five and ten miles per hour above stall speed. Mild airframe buffeting and gentle pitching may also precede the stall. Stall speeds are shown on a graph in the Performance Charts Section. The stall warning indicator consists of a red light located on the left side of the instrument panel and a continuous sounding horn located behind the instrument panel on earlier models. The stall warning red light is eliminated on later models. The stall warning horn has a different sound from that of the gear warning horn which also has a 90 cycles per minute beeping sound on later models. The stall warning indicators are activated by two lift detectors on the leading edge of the left wing, outboard of the engine nacelle. The inboard detector activates the indicators when the flaps are in the 25 and 40 degree positions, the outboard when the flaps are in other positions.

BAGGAGE AREA

The large amount of baggage space permits an exceptional flexibility of loading within the Seneca II weight and balance envelope. There are **two separate baggage compartments.** One, the **nose section baggage compartment**, is accessible through a baggage door on the left side of the nose section. It has a maximum weight capacity of 100 pounds and a volume of 15.3 cubic feet. The **cabin baggage compartment**, located aft of seats five and six has a weight capacity of 100 pounds and a volume of 20 cubic feet. This compartment is loaded and unloaded through the rear cabin door, and it is conveniently accessible during flight. Tie-down straps are provided and they should be used at all times. A cargo loading door, installed aft of the rear door, facilitates the loading of bulky items. All cargo, baggage compartment and passenger doors use the same key.

NOTE

It is the pilot's responsibility to be sure when baggage is loaded that the airplane C.G. falls within the allowable C.G. range. (See Weight and Balance Section.)

FINISH

All sheet aluminum components are carefully fininished to assure maximum service life. All exterior surfaces are finished with a **durable acrylic lacquer** which is available in a variety of colors and combinations. To keep the finish attractive, economy size spray cans of touch-up paint are available from Piper Dealers.

EMERGENCY LOCATOR TRANSMITTER*

An **Emergency Locator Transmitter** (ELT), located in the aft section of the fuselage just below the stabilator leading edge, is accessible through a removable plate on the right side of the fuselage. It is a self-contained transmitter which is automatically activated by impact force when the switch is in the ARMED position. It can also be manually activated, either from the cockpit by a remote switch on the left side panel or by a switch on the unit itself. When the ELT is removed from the airplane and the antenna attached to the side of the case is installed in place, the unit becomes a completely portable locator transmitter. For detailed information see "Emergency Locator Transmitter" in the Operating Instructions Section of this Manual.

PIPER EXTERNAL POWER*

An optional starting installation known as **Piper External Power (PEP)** allows the airplane engine to be started from an external battery without the necessity of gaining access to the airplane battery. The cable from the external battery can be attached to a receptacle under the left side of the nose section of the fuselage. Instructions on a placard located on the cover of the receptacle should be followed when starting with external power. For instructions on the use of the PEP, see "Starting Engines With Aid of External Electric Power" in the Operating Instructions Section of this Manual.

*Optional Equipment

ICE PROTECTION SYSTEM*

For flight into known icing conditions, a complete ice protection system is available as optional equipment on the Seneca II.

The ice protection system consists of the following components: pneumatic wing and empennage boots, wing ice detection light, electrothermal propeller deicer pads, electric windshield panel, heated stall warning transmitters, and heated pitot head.

The pneumatic wing and empennage boots are installed on the leading edges of the wings, the vertical stabilizer and the horizontal stabilator. During normal operation, when the surface deicer system is turned off, the engine-driven pressure pumps apply a constant suction to the deicer boots to provide smooth, streamlined leading edges.

Deicer boots are inflated by a momentary "ON"-type "SURFACE DE-ICE" switch located on the instrument panel directly above the control quadrant. Actuation of the surface deice switch activates a system cycle timer which energizes the pneumatic pressure control valves for six seconds. The boot solenoid valves are activated and air pressure is released to the boots, inflating all surface deicers on the airplane. A "Wing-Tail Deicer" indicator light, with a press-to-test feature, illuminates when the surface deicer boots inflate. When the cycle is complete, the deicer solenoid valves permit automatic overboard exhaustion of pressurized air. Suction is then reapplied to the deicer boots. The deicer boots do not inflate during the press-to-test cycle.

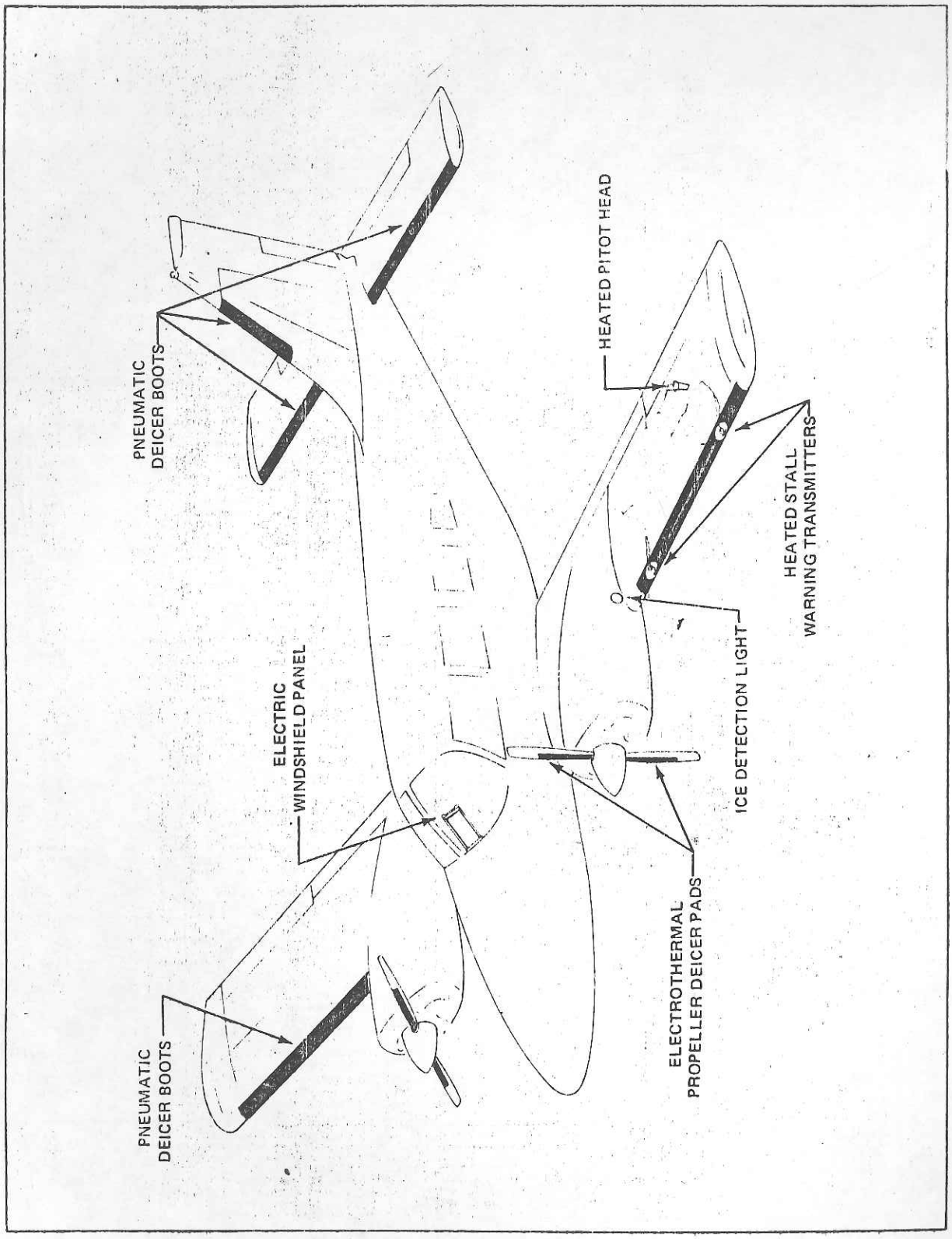
Circuit protection for the surface deicer system is provided by a "Wing-Tail De-icers" circuit breaker located on the circuit breaker panel.

Wing icing conditions may be detected during night flight by use of an ice detection light installed in the outboard side of the left engine nacelle. The light is controlled by an "ICE LIGHT" switch located on the instrument panel to the right of the surface deice switch. A "Wing Ice Light" circuit breaker located in the circuit breaker panel provides circuit protection.

Electrothermal propeller deicer pads are bonded to the leading edges of the propeller blades. Each deicer pad has two separate heaters, one for the outboard and one for the inboard half. The system is controlled by an "On-Off"-type "PROP DE-ICE" switch located to the right of the surface deice switch. Power for the propeller deicers is supplied by the airplane's electrical system through a "Prop De-ice" circuit breaker in the circuit breaker panel. When the prop deice switch is actuated, power is applied to a timer through the "Prop De-icer" ammeter which monitors the current through the propeller deicing system. With the propeller deicing system on, the prop deicer ammeter needle should indicate within the shaded portion of the ammeter for a normal reading.

Power from the timer is cycled to brush assemblies which distribute power to slip rings. The current is then supplied from the slip rings directly to the electrothermal propeller deicer pads.

*Optional Equipment



Ice Protection System

Deicing is accomplished by heating the outboard and then the inboard half of the deicer pads in a sequence controlled by the timer. The heating sequence of the deicer pads is according to the following cycle:

a. Outboard halves of the propeller deicer pads on the right engine.
b. Inboard halves of the propeller deicer pads on the right engine.
c. Outboard halves of the propeller deicer pads on the left engine.
d. Inboard halves of the propeller deicer pads on the left engine.

When the system is turned on, heating may begin on any one of the above steps, depending upon the positioning of the timer switch when the system was turned off from previous use. Once begun, cycling will proceed in the above sequence and will continue until the system is turned off.

A preflight check of the propeller deicers can be performed by turning the prop deice switch on and feeling the propeller deicer pads for proper heating sequence. The deicer pads should become warm to the touch.

The heat provided by the deicer pads reduces the adhesion between the ice and the propeller so that centrifugal force and the blast of airstream cause the ice to be thrown off the propeller blades in very small pieces.

A heated glass panel is installed on the exterior of the pilot's windshield to provide visibility in icing conditions. The panel is heated by current from the airplane's electrical power supply and controlled by an "On-Off" control switch/circuit breaker. The control switch/circuit breaker is located on the console directly below the control quadrant and placarded "WINDSHIELD PANEL HEAT - SEE ACFT FLIGHT MANUAL."

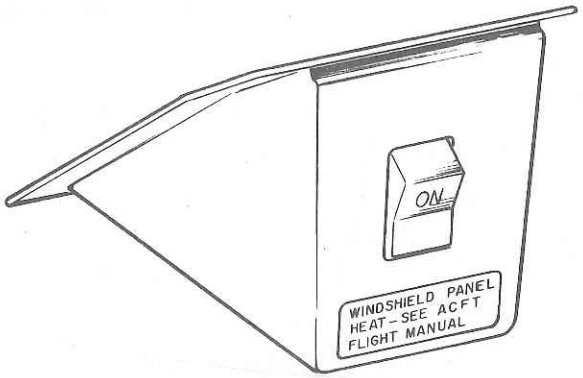
An operational check may be performed by turning the heated windshield panel switch on for a period not exceeding 30 seconds. Proper operation is indicated by the glass section being warm to the touch.

CAUTION

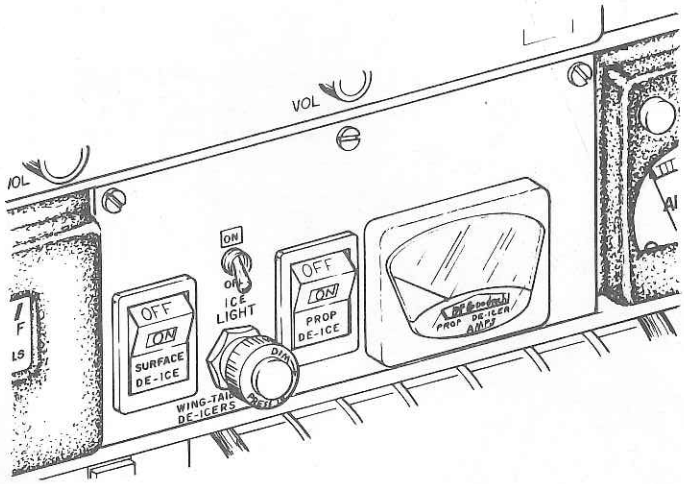
If the airplane is to be flown with the heated glass panel removed, rotate the receptacle plate 180° and replace it to cover the holes in the fuselage skin. Also replace the windshield collar screws.

Two heated lift detectors and a heated pitot head installed on the left wing are controlled by a single "On-Off"-type "HEATED PITOT" switch located on the switch panel to the left of the pilot.

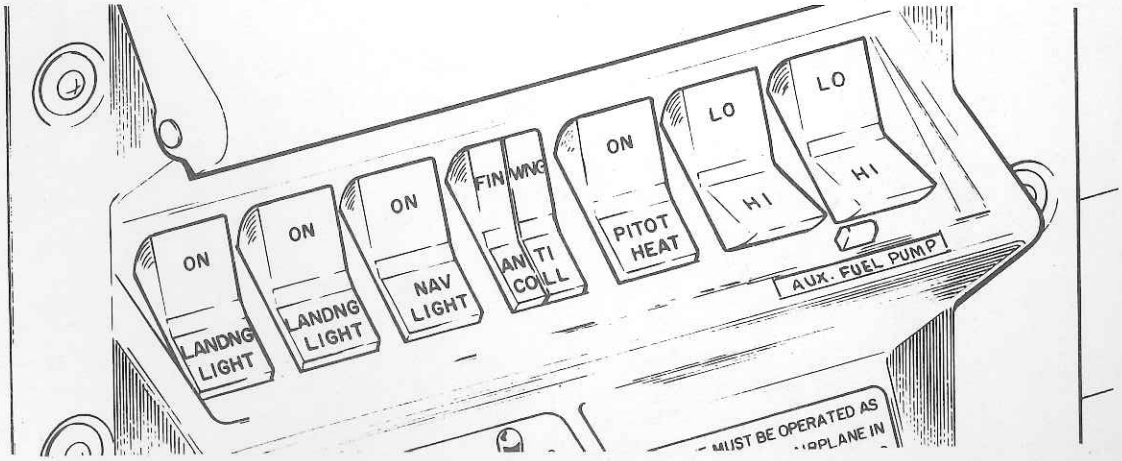
The heated lift detectors, one inboard and one outboard on the left wing, are installed to prevent icing conditions from interfering with operation of the stall warning transmitters. A "Stall Warn Heat" circuit breaker in the circuit breaker panel protects the system against an overvoltage condition. The stall warning system should not be depended on when there is ice on the wing.



HEATED WINDSHIELD PANEL CONTROL SWITCH



ICE DETECTION LIGHT, SURFACE DEICER AND PROPELLER DEICER CONTROL SWITCHES



HEATED PITOT AND HEATED STALL WARNING TRANSMITTER CONTROL SWITCHES
(Shown on model with primer system installation)

Ice Protection System Control Switches

A heated pitot head, mounted under the left wing, is installed to provide pitot pressure for the airspeed indicator with heat to prevent ice accumulation from blocking the pressure intake. The heated pitot head also has a separate circuit breaker located in the circuit breaker panel and labeled "Pitot Heat."

With the heated pitot switch on, check the heated pitot head and heated lift detector for proper heating.

CAUTION

Care should be taken when an operational check of the heated pitot head and the heated lift detectors is being performed. Both units become very hot.