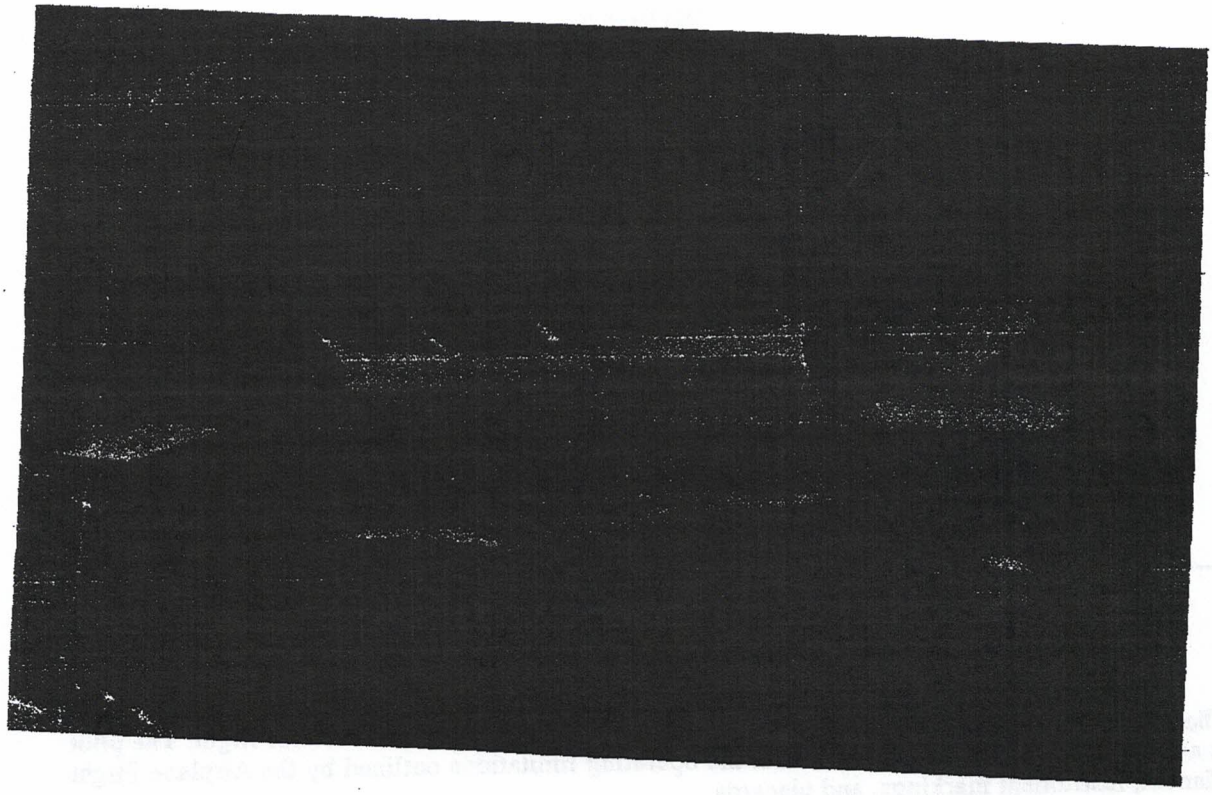
PILOT'S OPERATING MANUAL



BY

PIPER

This manual is incomplete without an APPROPRIATE FAA APPROVED AIRPLANE FLIGHT MANUAL and an APPROPRIATE WEIGHT AND BALANCE REPORT.

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-28-180

AIRCRAFT SERIAL NO. 28-7405237 REGISTRATION NO. N992TF

PILOT'S OPERATING MANUAL, PART NUMBER 761 556 REVISION 8

PIPER AIRCRAFT CORPORATION
APPROVAL SIGNATURE AND STAMP

Assurance that the airplane is in an airworthy condition is the responsibility of the owner. The pilot in command is responsible for determining that the airplane is safe for flight. The pilot is also responsible for remaining within the operating limitations outlined by the Airplane Flight Manual, instrument markings, and placards.

This Pilot's Operating Manual is not designed as a substitute for adequate and competent flight instruction, knowledge of the current airworthiness directives, applicable federal air regulations, or advisory circulars. It is not intended to be a guide for basic flight instruction or a training manual for transition from single to multi-engine flying.

If an inconsistency of information exists between the Pilot's Operating Manual and the Airplane Flight Manual approved by the FAA, the Airplane Flight Manual shall be the authority.

A complete or partial replacement of this manual, Part No. 761 556, may be obtained only from Piper Customer Services.

Published by
PUBLICATIONS DEPARTMENT
Piper Aircraft Corporation
761 556
Issued: July 1973

AIRCRAFT OPERATIONS

Hangaring Aircraft:

- Upon arrival at Club Office, call TacAir at 870-773-6969 to have aircraft towed from hangar. Wing-walk aircraft with TacAir line personnel when towing aircraft from hangar.
- When taxing to hangar, do not turn plane as to allow prop-wash to blow into open hangar.
- Call TacAir to have aircraft returned to designated area within hangar. When returning after 10:00 p.m. use discretion/common sense. If you can safely push plane back in hangar without any chance of hitting other aircraft, do so.
- Wing-walk aircraft with TacAir line personnel when returning aircraft to hangar.
- Do not push on the prop spinner when pushing the plane. Do not push or pull on the prop except at the hub (within about one hand's width from spinner).

Starting Aircraft:

Carburetor Engines (PA28-140, 180, 181):

- Fuel pump on
- Mixture full rich
- One squirt of primer - two if its really cold (first start of the day only)
- Key to "start"
- While cranking, pump the throttle briskly 2-3 times, then leave it about 1/4 open.
- Once it catches, bring the mixture back to about halfway and the throttle to idle.
- Fuel pump off

Once it's really running smooth (almost immediately in the summer, maybe 30 seconds in the winter), bring the mixture back further, just to the point where it starts to run rough, then nudge it back just a little bit richer. If it sounds rough when you advance the throttle for taxi, go just a little bit richer on the mixture. The idea of leaning for taxi is to prevent fouled spark plugs.

Flooded - Carburetor Engines (PA28-140, 180, 181):

- Fuel pump off
- Throttle - wide open
- Mixture lean
- Key to "start"
- Once it catches, immediately bring throttle back and mixture up

Fuel Injected (Arrow, Cherokee Six):

Cold Start:

- Fuel pump on
- Crack throttle 1/2 inch
- Mixture full rich.
- At first sign of fuel-flow - mixture lean
- Key to "start"
- Once it catches, bring mixture up and throttle back
- Fuel pump off

Hot Start (Fuel Injected):

- Fuel pump on
- Crack throttle 1/2 inch
- Mixture full rich
- At first sign of fuel-flow - mixture lean
- Fuel pump off
- Key to "start"
- Once it catches, bring mixture up and throttle back

Flooded (Fuel Injected):

- Fuel pump off
- Throttle - wide open
- Mixture lean
- Key to "start"
- Once it catches, immediately bring throttle back and mixture up

All Planes:

- NEVER grind on a starter for more than 10 or 15 secon without giving the starter some time to cool down. Grinding on a starter until the battery runs down will ru both the starter and the battery.
- If the plane starts fine when cold and you are having a problem with hot-starts, it is most likely a starting technique problem and not an aircraft problem.
- If you are having trouble starting the aircraft, please, stop grinding on the starter and immediately contact a Club instructor or mechanic and see what the problem is.

Taxiing:

- Lean mixture to rough then advance to smooth engine operatio
- Only use enough power to taxi at a speed equal to a brisk walk
- Control taxi speed with power - not brakes. Brakes are made fo stopping - not speed control.

Lycoming Engine Shutdown:

- Lean mixture & operate at 1200 rpm for 1-minute.
- Operate at 1800 rpm for 20-seconds
- Reduce to 1200 rpm and kill with mixture.

Following the proper engine shutdown procedure will reduce the build-up of lead on the sparkplugs which causes rough mag checks.

Rough Mags:

- Run engine up to 1800 to 2000 rpm.
- Aggressively lean mixture and run engine for several seconds.
- Repeat mag check.
- If one mag continues to run rough, repeat above procedure.
- If mag check continues to be rough, return plane to hangar and contact mechanic.

Checking Oil:

- Use AeroShell 100W only. (55 gal drum in hangar)
- The nominal oil level is 6 quarts (except the Cherokee 6 which is 10 quarts). Any additional oil above this level will soon be blown out the breather tube onto the belly of the aircraft.
- Add oil at 5 quarts (except Cherokee 6 which should have oil added at 8 quarts)

Checking Tires:

Tire Air Pressure (Archer, ArcherII, Cherokee 140):

- Nose Tire – 24 psi
- Main Tires – 24 psi

Tire Air Pressure (Arrow):

- Nose Tire – 30 psi
- Main Tires – 27 psi

Tire Air Pressure (Cherokee Six):

- Nose Tire – 30 psi
- Main Tires – 40 psi

GENERAL TROUBLE SHOOTING

_ Check the aircraft circuit breaker or fuses.
_ Is there an aircraft voltage problem?
_ Could water have leaked onto the avionics?
_ Could a connector be loose or wires broken from recent maintenance?
_ Is the unit seated correctly in its mount?
_ Do you hear alternator or magneto noise?
_ Are any antennas corroded, dirty, broken, oil coated or delaminated?
_ Is it intermittent?
_ Is heat, cold, altitude or time a factor?

COM. RADIO/ AUDIO PANEL/ INTERCOM

_ Are the audio switches set correctly?
_ Is the auto mode being used?
_ Is the volume set correctly?
_ Is ICS in pilot isolation mode?
_ Is a mic key stuck?
_ Do you hear both the phone and speaker?
_ Does it both receive and transmit?
_ Do you hear sidetone?
_ Do you transmit carrier without voice?
_ Does it make noise with squelch disabled?
_ Try a different headset or microphone.
_ Try an emergency or isolation mode.
_ Are the plugs or jacks corroded?
_ Do all positions have the same problem?
_ Does the second com act the same way?

VOR/ILS

_ Do you receive the ident tone?
_ Do the needles or flags move at all?
_ Can you select a reciprocal OBS course?
_ Does the TO/FROM flag work?
_ How many degrees off is the VOR?
_ Does the VOR test (self or VOT)?
_ Does the VOR have 20 degrees deflection?
_ Does the Localizer work but not the VOR?
_ Are you close or far from the station?
_ Could tail antenna shadowing be a factor?
_ Is the indicator switched to the correct NAV?
_ Does the second NAV act the same way?
_ Is there a NOTAM of any outages?

TRANSPONDER

_ Does both Mode-A and Mode-C work?
_ Is Mode-A inop or just wrong codes?
_ Is Mode-C inop or just wrong altitude?
_ Does the reply lamp illuminate?
_ Is the dimmer turned down?
_ Is it in the correct mode?
_ Does it recycle (power off then on)?
_ Does it test?
_ Does DME interfere?

GPS

_ Verify the correct waypoint.
_ Check present position or nearest airport.
_ Are at least three satellites being tracked?
_ Is the satellite geometry poor?
_ Are the satellite signal levels adequate?
_ Has a current almanac been downloaded?
_ Is the hold mode selected?
_ Is the NAV selected to an ILS frequency?
_ Is there a NOTAM for outages?
_ Are there any warning messages?

AUTOPILOT

_ Does the autopilot engage?
_ Can you overpower the autopilot?
_ Do the controls lock when engaged?
_ Could the control cables be too loose?
_ Is the aircraft out of trim?
_ Is the gyro vacuum within limits?
_ Does the autopilot hold wings level?
_ Does the autopilot hold heading?
_ Do the wings rock?
_ Is the autopilot following a precessing gyro?
_ Does the autopilot respond to NAV?
_ Does the autopilot respond to an ILS?
_ Does the manual electric trim work?

MARKER BEACON

_ Does the lamp illuminate?
_ Do lamps test or are they dimmed?
_ Is high or low sensitivity selected?
_ Is the audio turned down or not selected?
_ Are the lights seen, but tones not heard?

DME

_ Does the DME receive an ident tone?
_ Is remote channeling selected?
_ Is the display dimmed?
_ Does the GS and TTS function?
_ Does the DME work on diffirent channels?
_ Does the DME test?
_ Does the transponder interfere?

ADF

_ Is the unit in ADF mode?
_ Does the ADF point to the station?
_ Does the needle move in test?
_ Does the unit receive in ANT mode?
_ Does the unit receive in ADF mode?
_ Do all three frequency bands (200-399, 400-799 & 800-1699) work?
_ Do you hear alternator or magneto noise?
_ Is the reception better with the engine off?
_ Are other radios interfering with the ADF?
_ Is the aircraft structure shadowing the antenna?
_ Is there a NOTAM of any outages?

GENERAL AVIONICS LONGEVITY TIPS:

- Cover instrument panel when aircraft is parked.
- Exercise autopilot clutches and motors once a month.
- Know where your autopilot and trim circuit breakers are by feel.
- ALWAYS turn avionics master on after alternators are on-line and off before shutdown.

NOTES:

APPLICABILITY

This manual is applicable to Piper Model PA-28-180 aircraft having serial numbers 28-7405001 through 28-7505259. 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 1-3, 2-1 through 2-18, 3-1 through 3-18, 4-1 through 4-6, 5-1 through 5-27, 7-1 through 7-10, 8-1 through 8-2, 9-1 through 9-10, 10-1 through 10-15.

PILOT'S OPERATING MANUAL LOG OF REVISIONS

Current Revisions to the PA-28-180 Cherokee Archer Pilot's Operating Manual, 761 556, issued July 9, 1973.

Revision	Revised Pages	Description	Date
Rev. 1 - 761 556 (PR731106)	2-8	Revised Overvoltage Relay reset time.	Nov. 6, 1973
	4-6	Revised Alternator Failure Item 3.	
	W/B	Added Rev. 1 to Report: VB-547	
	7-7	Added Airspeed Data; Relocated E.L.T.	
	7-8	Added E.L.T.; Relocated Air Conditioning and Air Conditioner Operational Check Procedure.	
	7-9	Added Air Conditioning; Relocated Air Conditioner Effects on Airplane Performance.	
	7-10	Added Air Conditioner Operational Check Procedure and Air Conditioner Effects on Airplane Performance.	
	7-11	Added page.	
	7-12	Added page.	
	8-1	Revised item 6.	
Rev. 2 - 761 556 (PR740530)	ii	Added PAC Approval Form.	May 30, 1974
	iii	Added Applicability and Item III. Original Pages Issued.	
	A F/M	Added Rev. 1 to Report: VB-558.	
	W/B	Added Rev. 2 to Report: VB-547. (NOTE: AIRCRAFT DELIVERED WITH MANUALS PRIOR TO THIS REVISION DO NOT REQUIRE THIS REVISION.)	
Rev. 3 - 761 556 (PR740617)	2-8	Added Annunciator Panel information and footnote.	June 17, 1974
	2-8a	Added page (added material from page 2-8).	
	2-9	Relocated page (Alternator-Starter Schematic).	
	2-9a	Added page (Alternator-Starter Schematic).	
	2-11	Added Annunciator Panel information and footnote.	
	2-12	Revised Instrument Panel illustration.	
	2-16	Added Seat Removal instructions.	
	A F/M	Added Rev. 2 to Report: VB-558.	
	W/B	Added Rev. 3 to Report: VB-547.	
	7-4	Added Annunciator Panel check to Warm-up and Ground Check; added footnote.	
	8-1	Revised item 6; added footnote.	
	8-2	Relocated material from page 8-1.	

PILOT'S OPERATING MANUAL LOG OF REVISIONS (cont)

Revision	Revised Pages	Description	Date
Rev. 3 (cont)	9-i	Revised Performance Charts Index.	
	9-2	Revised Takeoff Chart.	
	9-3	Revised Climb Chart.	
	9-4	Revised Range Chart.	
	9-5	Revised Engine Chart.	
	9-6	Revised Airspeed Chart	
	9-7	Revised Stall Speed vs Weight Chart.	
	9-8	Revised Stall Speed vs Angle of Bank Chart.	
	9-9	Revised Glide Chart.	
	9-10	Revised Landing Chart.	
	10-11	Revised Battery Service.	
Rev. 4 - 761 556 (PR750120)	1-2	Added 0-360-A4M engine designation and footnote.	Jan. 20, 1975
	2-1	Added 0-360-A4M engine designation and footnote.	
	AF/M	Added Rev. 3 to Report: VB-558.	
	W/B	Added Rev. 4 to Report: VB-547.	
	7-4	Added new item 9.; revised existing item nos. under TAKEOFF.	
	7-8	Revised ELT info.	
	8-2	Added item 11.	
	10-8	Added 0-360-A4M engine designation under Oil Requirements.	
Rev. 5 - 761 556 (PR751121)	*iii*	Added concluding ser. no. to Applicability.	Nov. 21, 1975
	1-1	Revised Cruise Speed and Range figures; revised Empty Weight and Useful Load; deleted footnote.	
	1-2	Deleted footnote.	
	2-1	Revised Airframe info; deleted footnote.	
	AF/M	Added Rev. 4 to Report: VB-558.	
	W/B	Added Rev. 5 to Report: VB-547.	
	8-1	Revised item 8 (Fuel Warning Tip).	
	9-4	Revised Cruise Performance - Range chart.	
	9-6	Revised Cruise Performance - True Airspeed chart.	
Rev. 6 - 761 556 (PR790326)	2-8	Added Warning.	March 26, 1979
	2-8a	Added info.	
	2-14	Added Caution.	
	W/B	Added Rev. 6 to Report: VB-547.	
	7-2	Revised items.	
	7-8,7-9	Revised ELT info.	

PILOT'S OPERATING MANUAL LOG OF REVISIONS (cont)

Revision	Revised Pages	Description	Date
Rev. 7 - 761 556 (PR840316)	1-2	Revised fuel and oil.	March 16, 1984
	2-16	Revised para.	
	A F/M	Added Rev. 5 to Report VB-558.	
	W/B	Added Rev. 7 to Report VB-547.	
	7-1	Added to preflight.	
	7-4	Added to text info.	
	9-i	Added Warning.	
	10-1	Added to text info.	
	10-9	Added text info.	
	10-11	Revised para.	
	10-12, 10-13	Revised preventive maintenance info.	
Rev. 8 - 761 556 (PR900320)	10-7	Relocated info. from p. 10-8.	March 20, 1990
	10-8	Moved info. to p. 10-7. Revised para.	
	10-11, 10-12	Revised para.	
	10-13	Revised para.	

TABLE OF CONTENTS

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GENERAL SPECIFICATIONS

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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.

Takeoff Ground Run, 25° flaps, sea level (ft)	720
Takeoff Distance Over 50-ft Obstacle, 25° flaps, sea level (ft)	1625
Best Rate of Climb Speed (mph)	85
Rate of Climb (ft per min)	725
Best Angle of Climb Speed, sea level (mph)	76
Max Speed, sea level (mph)	148*
Max Speed Optimum Altitude 9300 ft., 75% power (TAS) (mph)	141*
Service Ceiling (ft)	14,150
Absolute Ceiling (ft)	16,500
Cruise Speed at best power mixture (mph)	
65% power, 12,800 ft	132*
60% power, 14,000 ft	125*
Range at best power mixture (mi)**	
75% power, 9300 ft	645
65% power, 12,800 ft	705
Cruise speed at best economy mixture (mph)	
75% power, 9300 ft	131*
65% power, 12,600 ft	123*
Range at best economy mixture (mi)**	
75% power, 9300 ft	715
65% power, 12,600 ft	774
Stalling Speed, flaps down (CAS) (mph)	61
Stalling Speed, flaps up (CAS) (mph)	68
Landing Roll, sea level, flaps down (ft)	635
Landing Distance Over 50-ft Obstacle, sea level (ft)	1185

* All speeds stated are with optional wheel fairings installed. Subtract 3 mph if wheel fairings are not installed.

** No reserve.

WEIGHTS

Gross Weight (lbs)	2450
Standard Empty Weight (lbs)	1404
Maximum Useful Load (lbs)	1046

POWER PLANT

Engine (Lycoming)		O-360-A4A or O-360-A4M
Rated Horsepower		180
Rated Speed (rpm)		2700
Bore (inches)		5.125
Stroke (inches)		4.375
Displacement (cubic inches)		361.0
Compression Ratio		8.5:1
Dry Weight (pounds)		285
Propeller		76EM8S5-0-60

FUEL

AVGAS ONLY

Fuel Capacity (U.S. gal) Usable	48
Fuel, Aviation Grade (min octane)	100/130

OIL

Oil Capacity (qts)	8

BAGGAGE

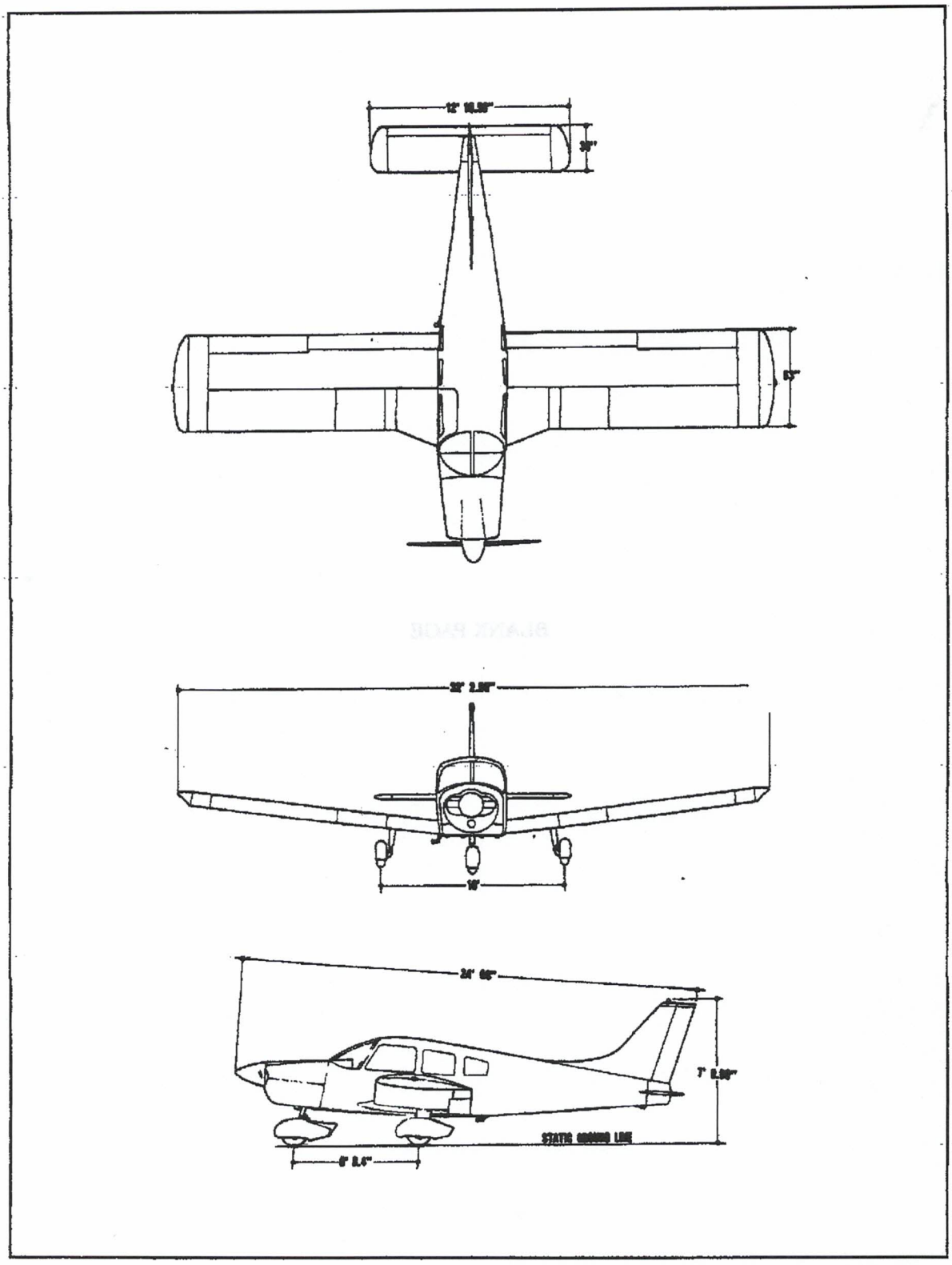
Maximum Baggage (lbs)	200
Baggage Space (cubic ft)	24
Baggage Door Size (in.)	20 x 22

DIMENSIONS

Wing Span (ft)	32
Wing Area (sq ft)	170
Wing Loading (lbs per sq ft)	14.4
Length (ft)	24.0
Height (ft)	7.8
Power Loading (lbs per hp)	13.6

LANDING GEAR

Wheel Base (ft)		6.7
Wheel Tread (ft)		10
Tire Pressure (psi)	Nose	24
	Main	24
Tire Size	Nose (4 ply rating)	6.00 x 6
	Main (4 ply rating)	6.00 x 6



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AIRPLANE AND SYSTEMS

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DESCRIPTION

AIRPLANE AND SYSTEMS

THE AIRPLANE

The PA-28-180 Cherokee is a single-engine, low-wing monoplane of all metal construction. Its full 4-place seating, two hundred pound baggage capacity, 645 mile range and economical operation, coupled with the lively performance of a 180 horsepower engine, make this Cherokee a versatile airplane in the business and personal aviation fields.

AIRFRAME

The **basic airframe**, except for a tubular steel engine mount, steel landing gear struts and other miscellaneous steel parts, is of aluminum alloy construction. The extremities - the wing tips, the cowling, the tail surfaces - are of tough fiberglass.

The **wings** are attached to each side of the fuselage by insertion of the butt ends of the respective main spars into a spar box carry-through which is an integral part of the fuselage structure, providing, in effect, a continuous main spar with splices at each side of the fuselage. There are also fore and aft attachments at the rear spar and at an auxiliary front spar.

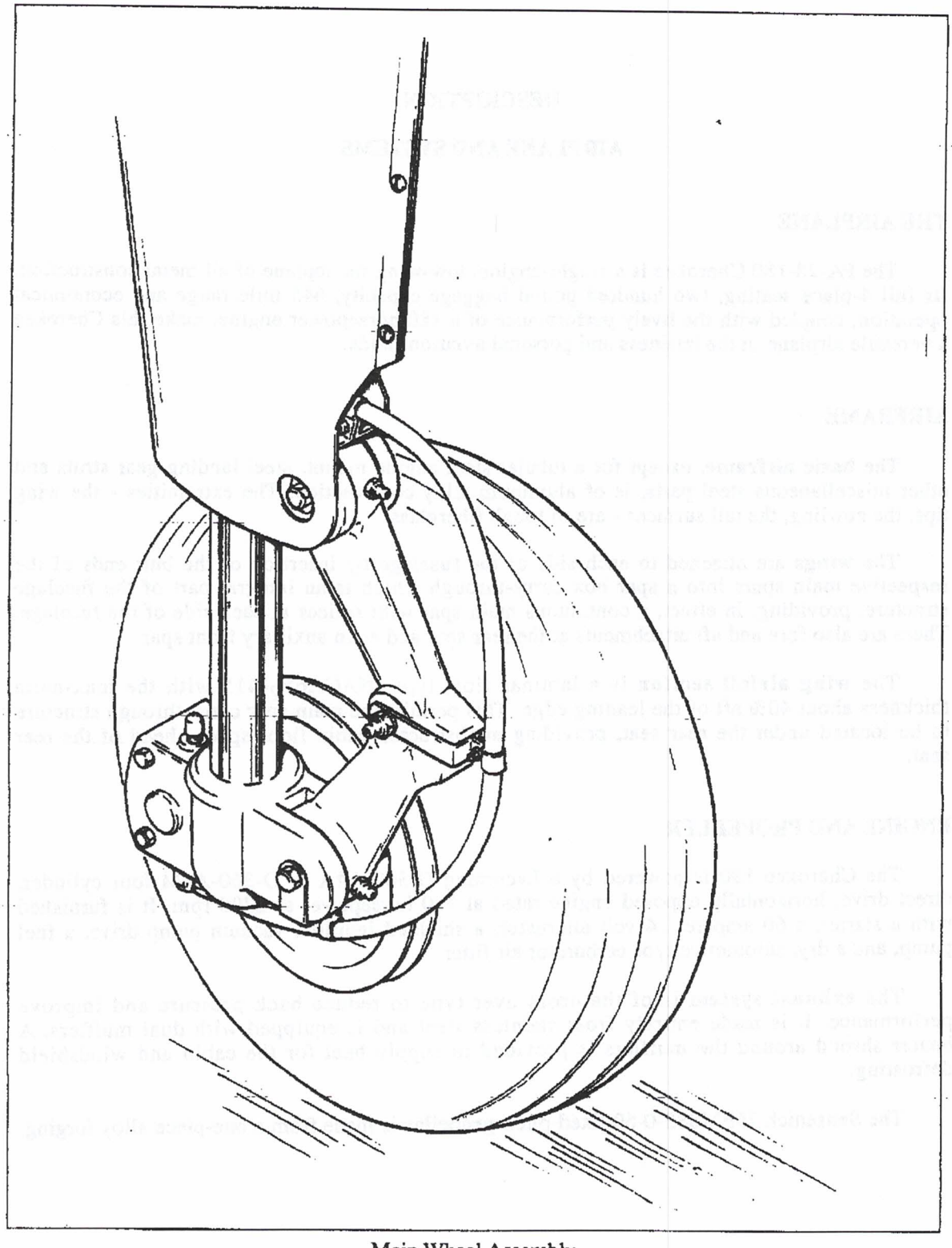
The **wing airfoil section** is a laminar flow type, NACA65_2-415 with the maximum thickness about 40% aft of the leading edge. This permits the main spar carry-through structure to be located under the rear seat, providing unobstructed cabin floor space ahead of the rear seat.

ENGINE AND PROPELLER

The Cherokee 180 is powered by a Lycoming O-360-A4A or O-360-A4M four cylinder, direct drive, horizontally opposed engine rated at 180 horsepower at 2700 rpm. It is furnished with a starter, a 60 ampere, 14 volt alternator, a shielded ignition, vacuum pump drive. a fuel pump, and a dry, automotive type carburetor air filter.

The **exhaust system** is of the cross-over type to reduce back pressure and improve performance. It is made entirely from stainless steel and is equipped with dual mufflers. A heater shroud around the mufflers is provided to supply heat for the cabin and windshield defrosting.

The Sensenich 76EM8S5-0-60 fixed-pitch **propeller** is made from a one-piece alloy forging.



Main Wheel Assembly

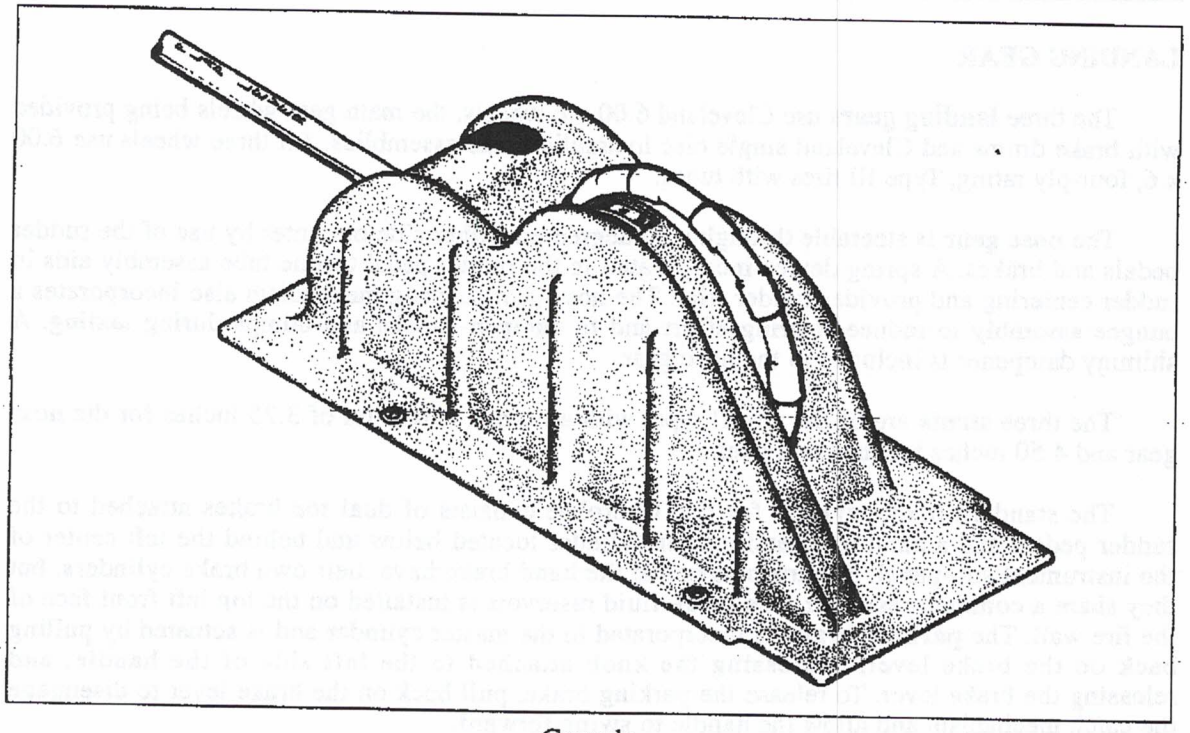
LANDING GEAR

The three **landing gears** use Cleveland 6.00 x 6 wheels, the main gear wheels being provided with brake drums and Cleveland single disc hydraulic brake assemblies. All three wheels use 6.00 x 6, four-ply rating, Type III tires with tubes.

The **nose gear** is steerable through a 30 degree arc either side of center by use of the rudder pedals and brakes. A spring device incorporated in the rudder pedal torque tube assembly aids in rudder centering and provides rudder trim. The nose gear steering mechanism also incorporates a bungee assembly to reduce steering effort and to dampen shocks and bumps during taxiing. A shimmy dampener is included in the nose gear.

The three **struts** are of the air-oil type, with a normal extension of 3.25 inches for the nose gear and 4.50 inches for the main gear.

The standard **brake system** for this Cherokee consists of dual toe brakes attached to the rudder pedals and a hand lever and master cylinder located below and behind the left center of the instrument sub-panel. The toe brakes and the hand brake have their own brake cylinders, but they share a common reservoir. The brake fluid reservoir is installed on the top left front face of the fire wall. The **parking brake** is incorporated in the master cylinder and is actuated by pulling back on the brake lever, depressing the knob attached to the left side of the handle, and releasing the brake lever. To release the parking brake, pull back on the brake lever to disengage the catch mechanism and allow the handle to swing forward.



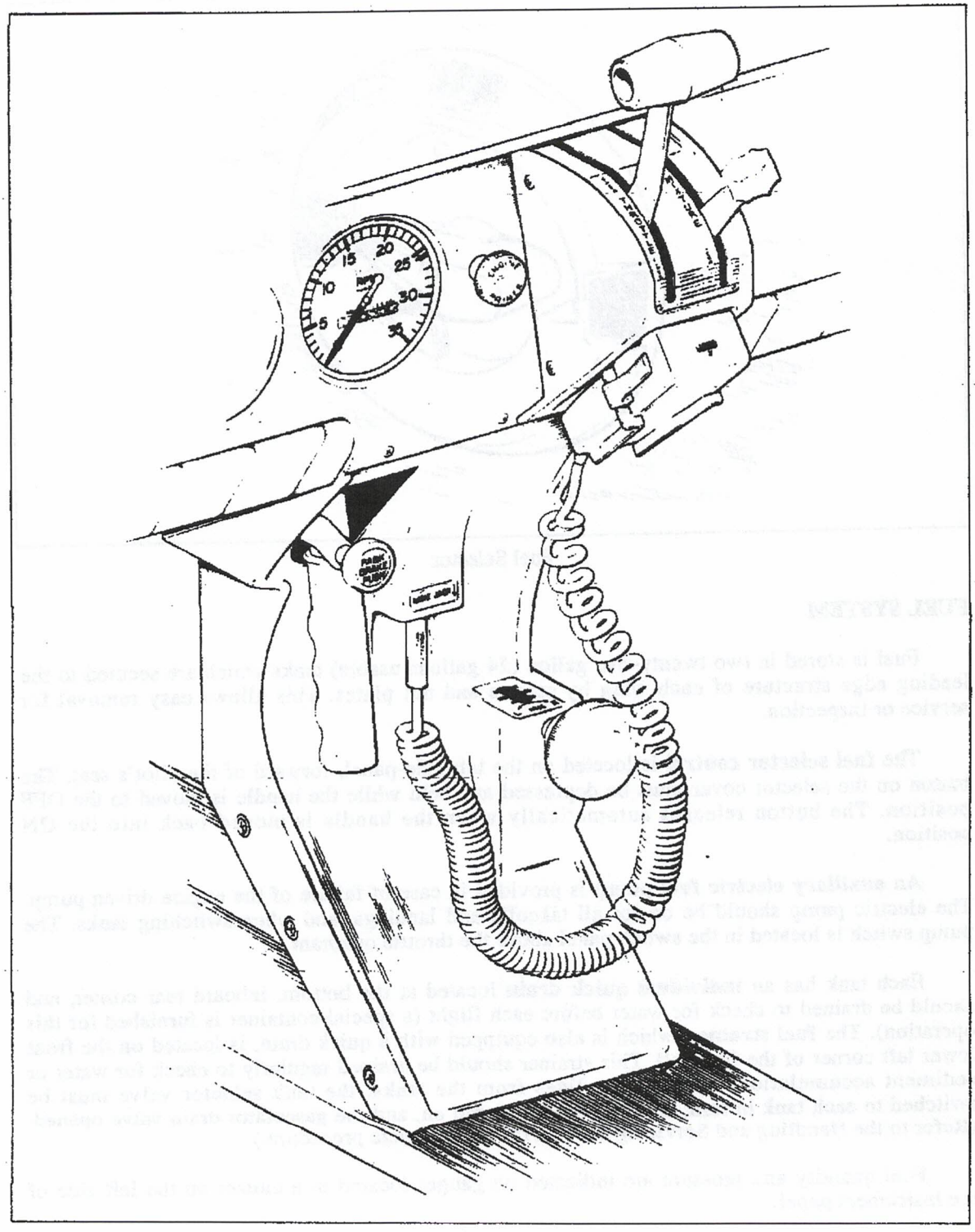
Console

FLIGHT CONTROLS

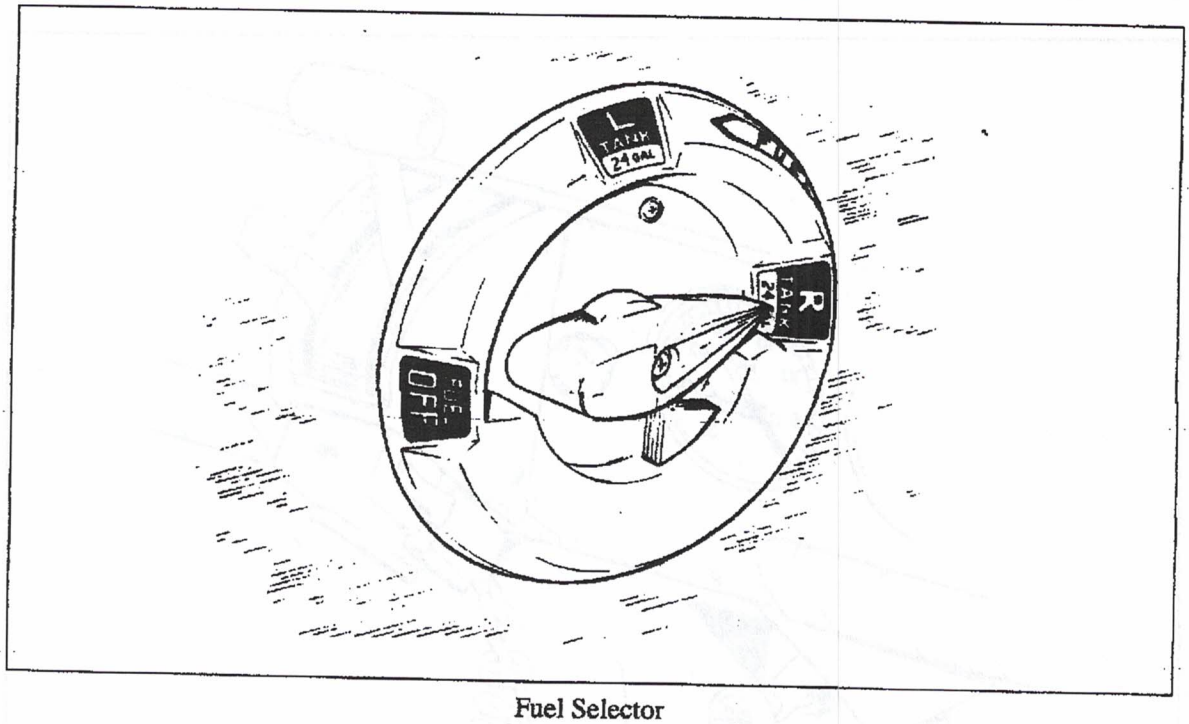
Dual controls are provided as standard equipment, with a cable system used between the controls and the surfaces. The horizontal tail (**stabilator**) is of the all-movable slab type with a **trim tab** mounted on the trailing edge of the stabilator to reduce the control system forces. This tab is actuated by a control wheel on the floor between the front seats.

The **stabilator** provides extra stability and controllability with less size, drag and weight than conventional tail surfaces. The **ailerons** are provided with a differential action which tends to reduce adverse yaw in turning maneuvers, and which also reduces the amount of coordination required in normal turns. A rudder trim adjustment is mounted on the right side of the pedestal below the throttle quadrant and permits directional trim as needed in flight.

The **flaps** are manually operated, balanced for light operating forces and spring-loaded to return to the up position. A past-center lock incorporated in the actuating linkage holds the flap when it is in the up position so that it may be used as a step on the right side. The flap will not support a step load except when in the full up position, so it must be completely retracted when used as a step. The flaps have three extended positions, 10, 25 and 40 degrees.



Throttle Quadrant and Console



Fuel Selector

FUEL SYSTEM

Fuel is stored in two twenty-five gallon (24 gallons usable) tanks which are secured to the leading edge structure of each wing by screws and nut plates. This allows easy removal for service or inspection.

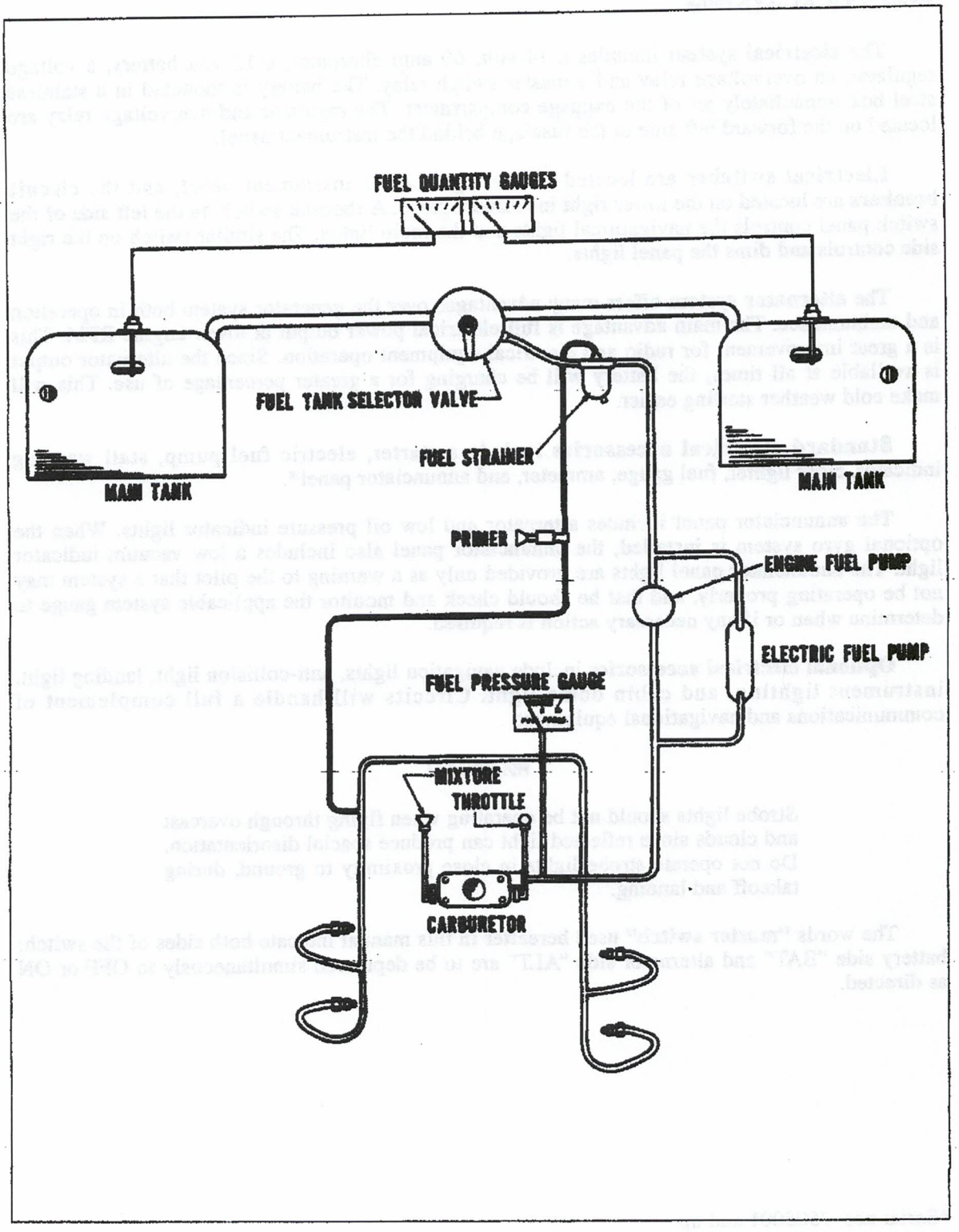
The **fuel selector control** is located on the left side-panel, forward of the pilot's seat. The button on the selector cover must be depressed and held while the handle is moved to the OFF position. The button releases automatically when the handle is moved back into the ON position.

An **auxiliary electric fuel pump** is provided in case of failure of the engine driven pump. The electric pump should be on for all takeoffs and landings, and when switching tanks. The pump switch is located in the switch panel above the throttle quadrant.

Each tank has an **individual quick drain** located at the bottom, inboard rear corner, and should be drained to check for water before each flight (a special container is furnished for this operation). The **fuel strainer,** which is also equipped with a quick drain, is located on the front lower left corner of the fire wall. This strainer should be drained regularly to check for water or sediment accumulation. To drain the lines from the tanks, the tank selector valve must be switched to each tank in turn, with the electric pump on, and the gascolator drain valve opened. (Refer to the Handling and Servicing Section for the complete procedure.)

Fuel quantity and pressure are indicated on gauges located in a cluster on the left side of the instrument panel.

An optional **engine priming system** is available to facilitate starting. The primer pump is located to the immediate left of the throttle quadrant.



Fuel System Schematic

ELECTRICAL SYSTEM

The **electrical system** includes a 14-volt, 60 amp alternator, a 12-volt battery, a voltage regulator, an overvoltage relay and a master switch relay. The battery is mounted in a stainless steel box immediately aft of the baggage compartment. The regulator and overvoltage relay are located on the forward left side of the fuselage behind the instrument panel.

Electrical switches are located on the right center instrument panel, and the **circuit breakers** are located on the lower right instrument panel. A rheostat switch on the left side of the switch panel controls the navigational lights and the radio lights. The similar switch on the right side controls and dims the panel lights.

The **alternator system** offers many advantages over the generator system both in operation and maintenance. The main advantage is full electrical power output at lower engine RPM. This is a great improvement for radio and electrical equipment operation. Since the alternator output is available at all times, the battery will be charging for a greater percentage of use. This will make cold weather starting easier.

Standard electrical accessories include a starter, electric fuel pump, stall warning indicator, cigar lighter, fuel gauge, ammeter, and annunciator panel*.

The annunciator panel includes alternator and low oil pressure indicator lights. When the optional gyro system is installed, the annunciator panel also includes a low vacuum indicator light. The annunciator panel lights are provided only as a warning to the pilot that a system may not be operating properly, and that he should check and monitor the applicable system gauge to determine when or if any necessary action is required.

Optional electrical accessories include navigation lights, anti-collision light, landing light, instrument lighting, and cabin dome light. Circuits will handle a full complement of communications and navigational equipment.

WARNING

Strobe lights should not be operating when flying through overcast and clouds since reflected light can produce spacial disorientation. Do not operate strobe lights in close proximity to ground, during takeoff and landing.

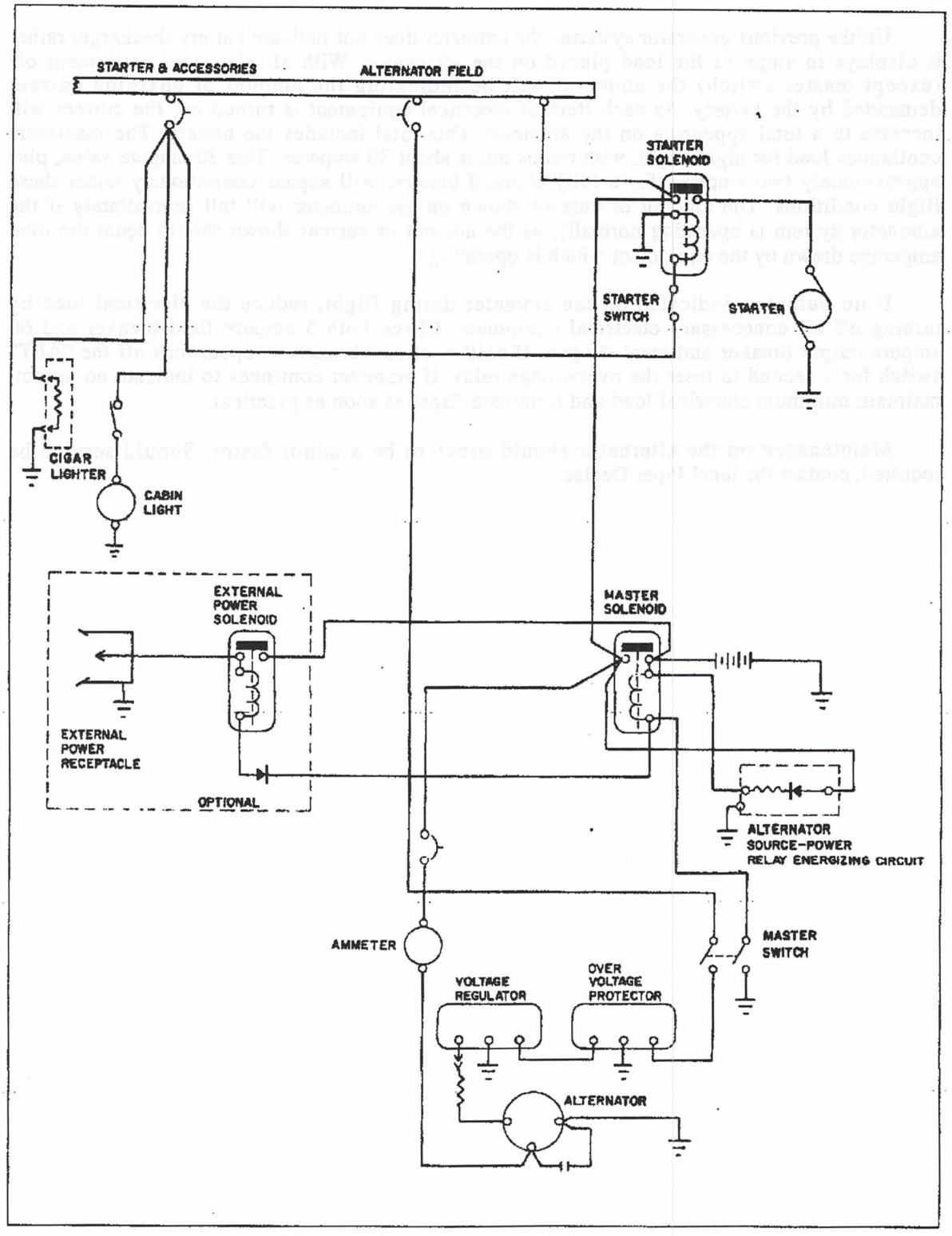
The words **"master switch"** used hereafter in this manual indicate both sides of the switch: battery side "BAT" and alternator side "ALT" are to be depressed simultaneously to OFF or ON as directed.

*Serial nos. 7505001 and up

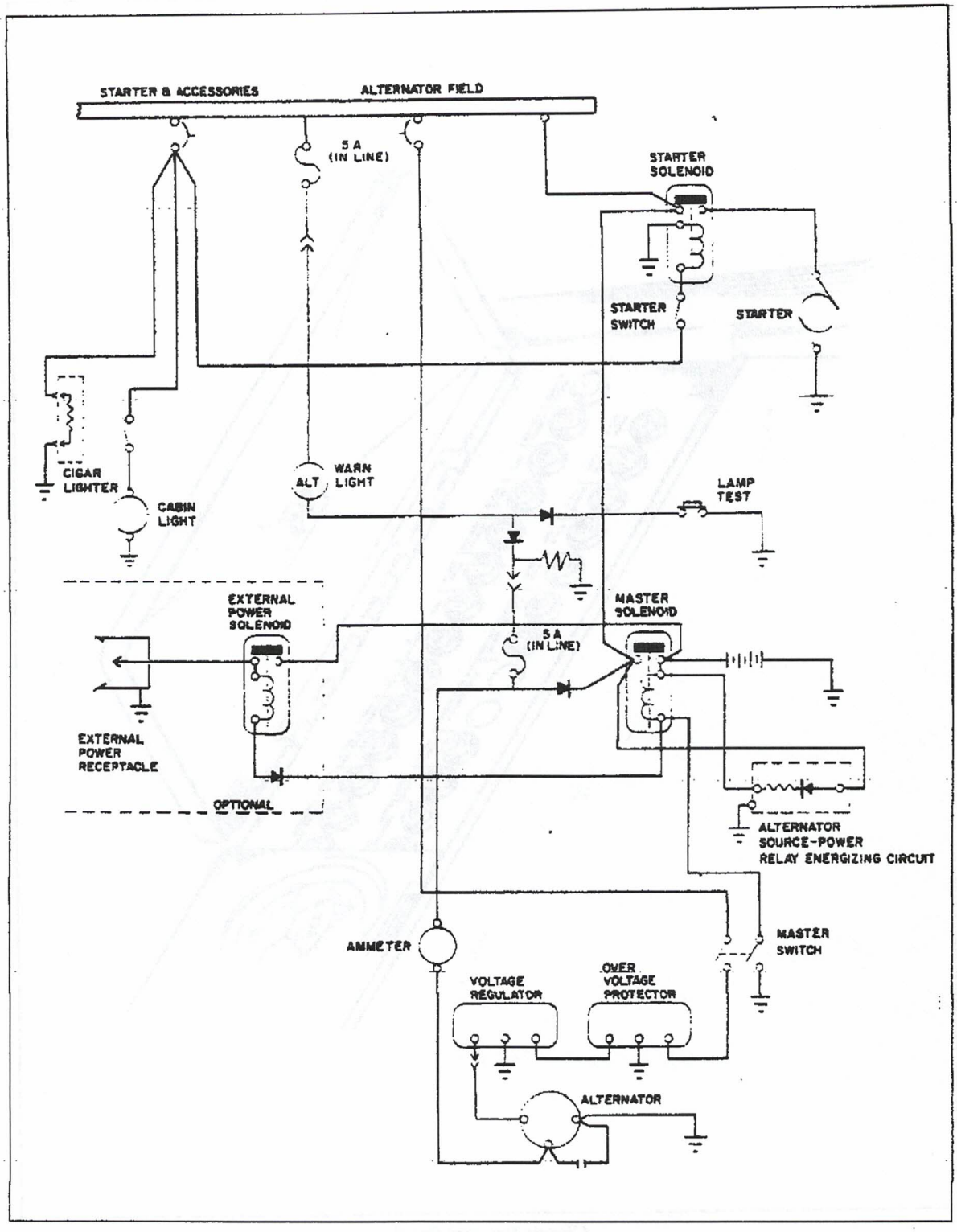
Unlike previous generator systems, the ammeter does not indicate battery discharge; rather it displays in amperes the load placed on the alternator. With all electrical equipment off (except master switch) the ammeter will be indicating the amount of charging current demanded by the battery. As each item of electrical equipment is turned on, the current will increase to a total appearing on the ammeter. This total includes the battery. The maximum continuous load for night flight, with radios on, is about 30 amperes. This 30 ampere value, plus approximately two amperes for a fully charged battery, will appear continuously under these flight conditions. The amount of current shown on the ammeter will tell immediately if the alternator system is operating normally, as the amount of current shown should equal the total amperage drawn by the equipment which is operating.

If no output is indicated on the ammeter during flight, reduce the electrical load by turning off all unnecessary electrical equipment. Check both 5 ampere field breaker and 60 ampere output breaker and reset if open. If neither circuit breaker is open, turn off the "ALT" switch for 1 second to reset the overvoltage relay. If ammeter continues to indicate no output, maintain minimum electrical load and terminate flight as soon as practical.

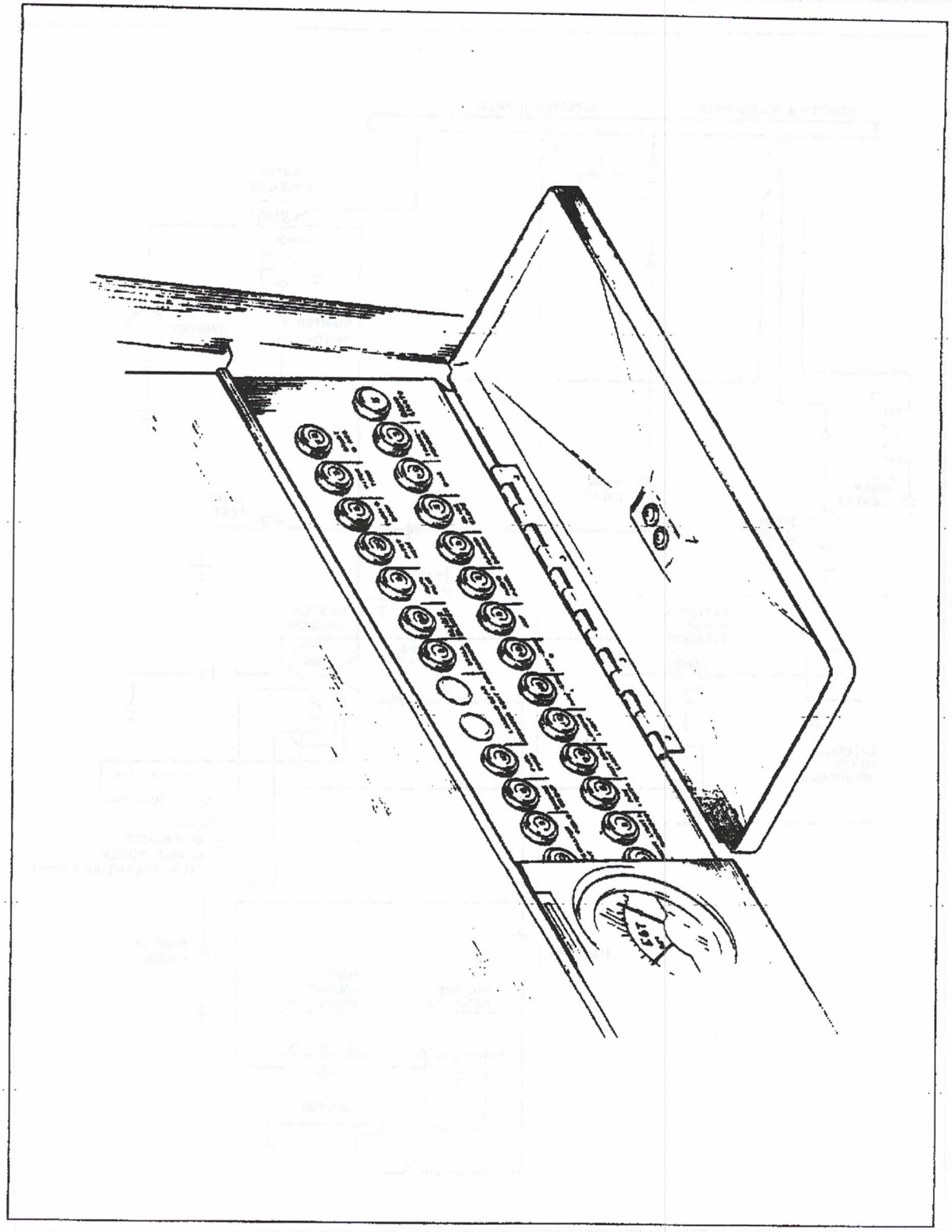
Maintenance on the alternator should prove to be a minor factor. Should service be required, contact the local Piper Dealer.



Alternator and Starter Schematic (Ser. nos. 7405001 through 7405290)



Alternator and Starter Schematic (Ser. nos. 7505001 and up)



Circuit Breaker Panel

VACUUM SYSTEM

The vacuum system is designed to operate the air driven gyro instruments. This includes the directional and attitude gyros when installed. The system consists of an engine driven vacuum pump, a vacuum regulator, a filter and the necessary plumbing.

The **vacuum pump** is a dry type pump which eliminates the need for an air/oil separator and its plumbing. A shear drive protects the pump from damage. If the drive shears, the gyros will become inoperative.

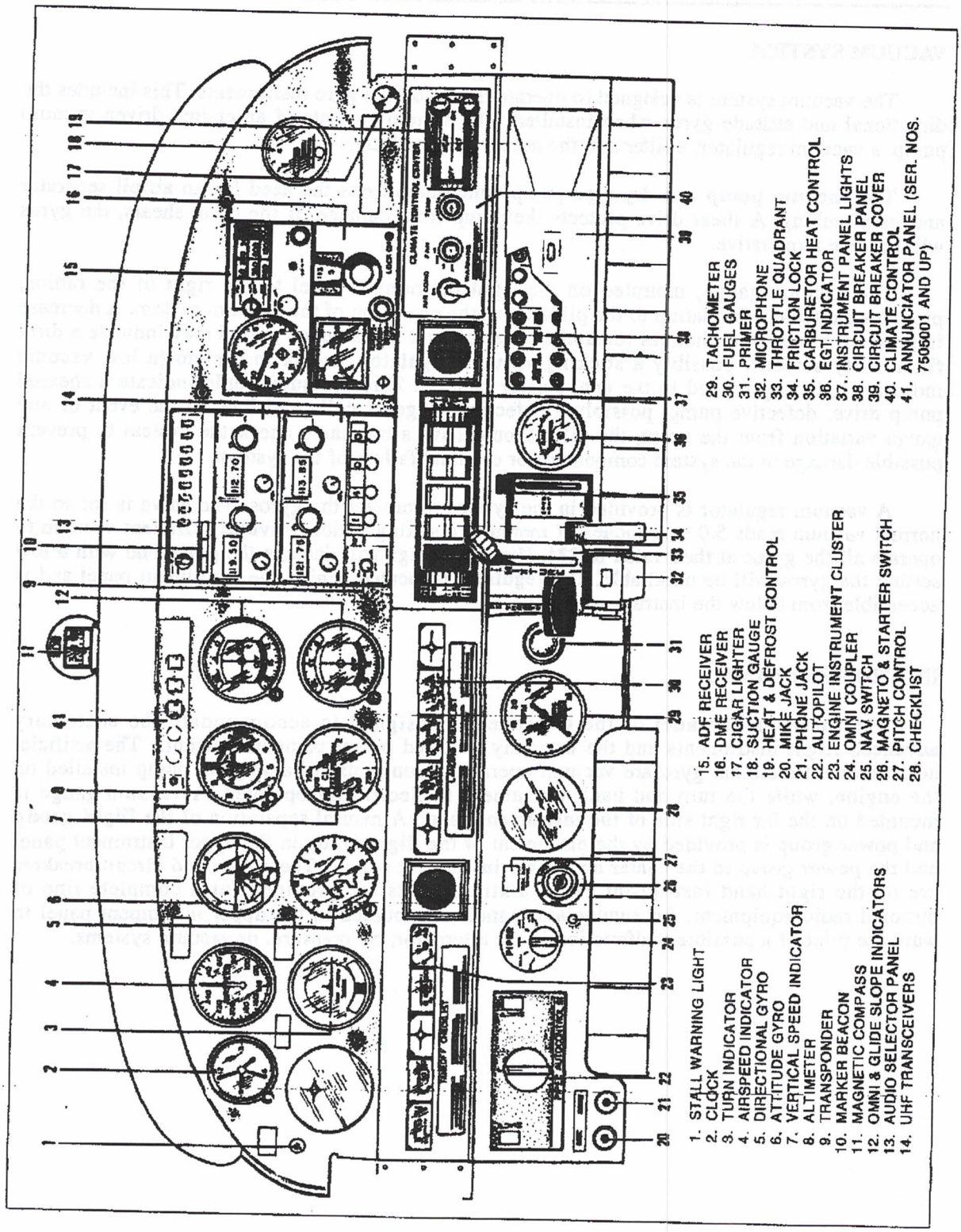
The vacuum gauge, mounted on the right instrument panel to the right of the radios, provides valuable information to the pilot about the operation of the vacuum system. A decrease in pressure in a system that has remained constant over an extended period may indicate a dirty filter, dirty screens, possibly a sticking vacuum regulator or leak in system (a low vacuum indicator light is provided in the annunciator panel*). Zero pressure would indicate a sheared pump drive, defective pump, possibly a defective gauge or collapsed line. In the event of any gauge variation from the norm, the pilot should have a mechanic check the system to prevent possible damage to the system components or eventual failure of the system.

A vacuum regulator is provided in the system to protect the gyros. The valve is set so the normal vacuum reads 5.0 ± .1 inches of mercury, a setting which provides sufficient vacuum to operate all the gyros at their rated R.P.M. Higher settings will damage the gyros and with a low setting the gyros will be unreliable. The regulator is located behind the instrument panel and is accessible from below the instrument panel.

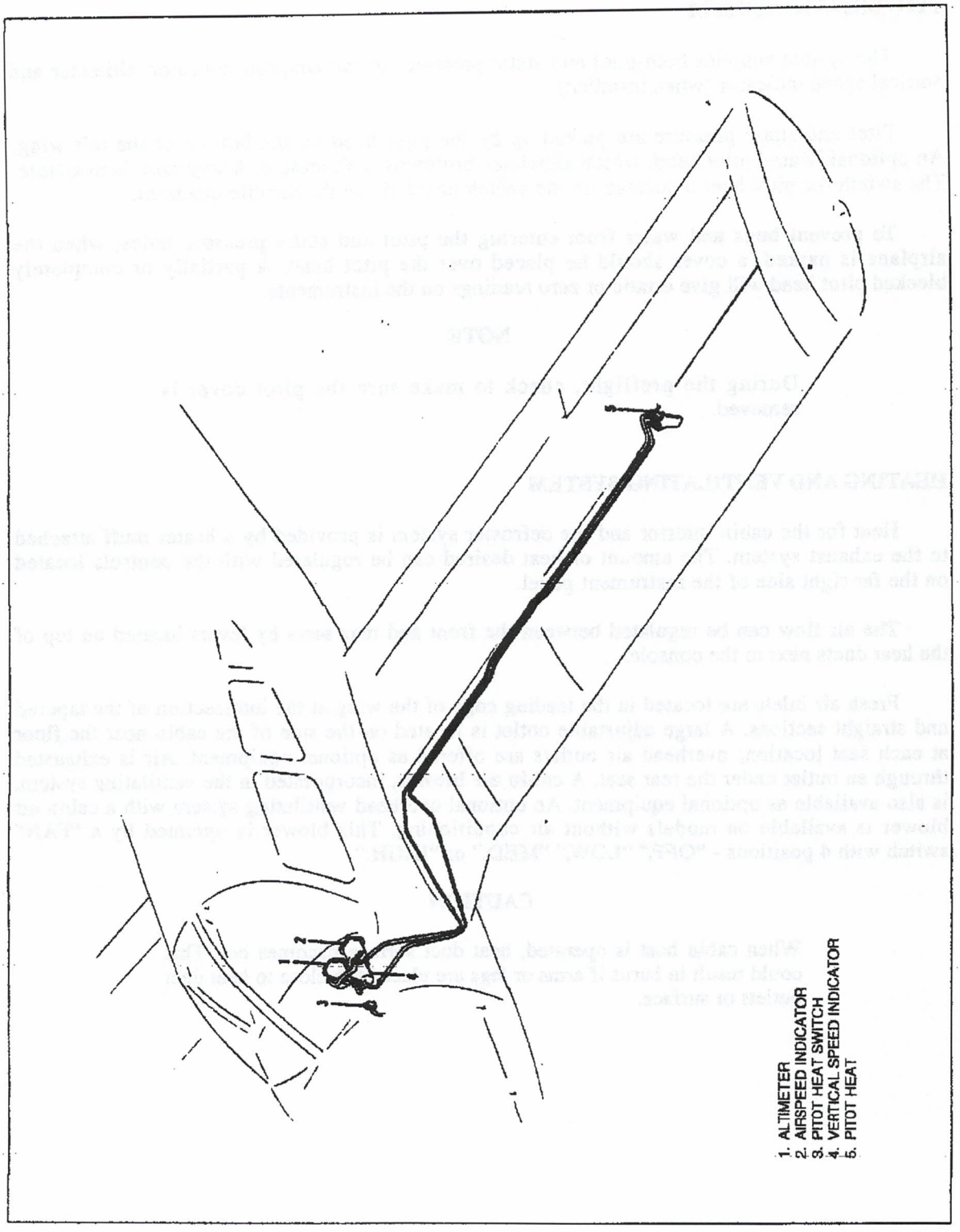
INSTRUMENT PANEL

The **instrument panel** of the Cherokee is designed to accommodate the customary advanced flight instruments and the normally required power plant instruments. The artificial horizon and directional gyro are vacuum operated through use of a vacuum pump installed on the engine, while the turn and bank instrument is electrically operated. A vacuum gauge is mounted on the far right side of the instrument panel. A natural separation of the **flight group** and power group is provided by the placement of the flight group in the upper instrument panel and the power group in the center and lower instrument panels. The radios and circuit breakers are on the right hand instrument panel. Extra circuits are provided for a complete line of optional radio equipment. An annunciator panel* is mounted in the upper instrument panel to warn the pilot of a possible malfunction in the alternator, oil pressure. or vacuum systems.

*Serial nos. 7505001 and up



Instrument Panel



Pitot - Static System

PITOT-STATIC SYSTEM

The system supplies both pitot and static pressure for the airspeed indicator, altimeter and vertical speed indicator (when installed).

Pitot and static pressure are picked up by the pitot head on the bottom of the left wing. An optional heated pitot head, which alleviates problems with icing or heavy rain, is available. The switch for pitot heat is located on the switch panel above the throttle quadrant.

To prevent bugs and water from entering the pitot and static pressure holes, when the airplane is parked, a cover should be placed over the pitot head. A partially or completely blocked pitot head will give erratic or zero readings on the instruments.

NOTE

During the preflight, check to make sure the pitot cover is removed.

HEATING AND VENTILATING SYSTEM

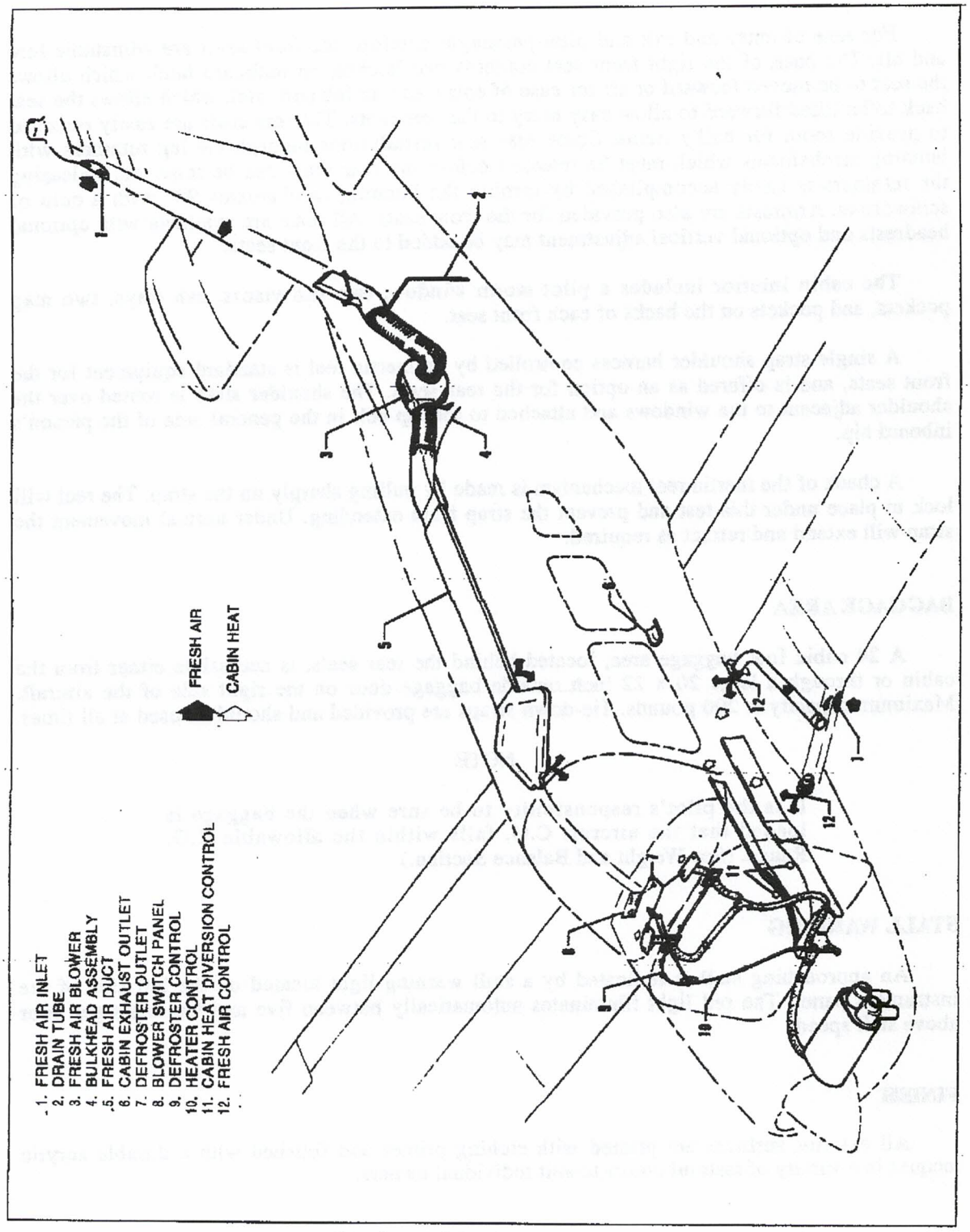
Heat for the cabin interior and the defroster system is provided by a heater muff attached to the exhaust system. The amount of heat desired can be regulated with the controls located on the far right side of the instrument panel.

The air flow can be regulated between the front and rear seats by levers located on top of the heat ducts next to the console.

Fresh air inlets are located in the leading edge of the wing at the intersection of the tapered and straight sections. A large adjustable outlet is located on the side of the cabin near the floor at each seat location; overhead air outlets are offered as optional equipment. Air is exhausted through an outlet under the rear seat. A **cabin air blower,** incorporated in the ventilating system, is also available as optional equipment. An optional overhead ventilating system with a cabin air blower is available on models without air conditioning. This blower is operated by a "FAN" switch with 4 positions - "OFF," "LOW," "MED," or "HIGH."

CAUTION

When cabin heat is operated, heat duct surface becomes hot. This could result in burns if arms or legs are placed too close to heat duct outlets or surface.



Heating and Ventilating System

CABIN FEATURES

For ease of entry and exit and pilot-passenger comfort, the front seats are adjustable fore and aft. The back of the right front seat contains two latches, an outboard latch which allows the seat to be moved forward or aft for ease of entry, and an inboard latch which allows the seat back to be tilted forward to allow easy entry to the rear seats. The rear seats are easily removed to provide room for bulky items. Some rear seat installations incorporate leg retainers with latching mechanisms which must be released before the rear seats can be removed. Releasing the retainers is easily accomplished by turning the latching mechanisms 90° with a coin or screwdriver. Armrests are also provided for the front seats. All seats are available with optional headrests and optional vertical adjustment may be added to the front seats.

The cabin interior includes a pilot storm window, two sun visors, ash trays, two map pockets, and pockets on the backs of each front seat.

A single strap shoulder harness controlled by an inertia reel is standard equipment for the front seats, and is offered as an option for the rear seats. The shoulder strap is routed over the shoulder adjacent to the windows and attached to the lap belt in the general area of the person's inboard hip.

A check of the inertia reel mechanism is made by pulling sharply on the strap. The reel will lock in place under this test and prevent the strap from extending. Under normal movement the strap will extend and retract as required.

BAGGAGE AREA

A 24 cubic foot baggage area, located behind the rear seats, is accessible either from the cabin or through a large 20 x 22 inch outside baggage door on the right side of the aircraft. Maximum capacity is 200 pounds. Tie-down straps are provided and should be used at all times.

NOTE

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

STALL WARNING

An approaching stall is indicated by a stall warning light located on the left side of the instrument panel. The red light illuminates automatically between five and ten miles per hour above stall speed.

FINISH

All exterior surfaces are primed with etching primer and finished with a durable acrylic lacquer in a variety of tasteful colors to suit individual owners.

AIR CONDITIONING*

The air conditioning system is a recirculating air system. The major items include; evaporator, condenser, compressor, blower, switches and temperature controls.

The evaporator is located behind the left rear side of the baggage compartment. This cools the air that is used for air conditioning.

The condenser is mounted on a retractable scoop located on the bottom of the fuselage and to the rear of the baggage compartment area. The scoop extends when the air conditioner is "ON" and retracts to a flush position when the system is "OFF."

The compressor is mounted on the forward right underside of the engine. It has an electric clutch which automatically engages or disengages the compressor to the belt drive system of the compressor.

An electrical blower is mounted on the aft side of the rear cabin panel. Air from the baggage area is drawn through the evaporator by the blower and distributed through an overhead duct to individual outlets located adjacent to each occupant.

The switches and temperature control are located on the lower right side of the instrument panel in the climate control center panel. The temperature control regulates the desired temperature of the cabin. Turn the control clockwise for increased cooling, counterclockwise for decreased cooling.

Located inboard of the temperature control is the fan speed switch and the air conditioning "ON-OFF" switch. The fan can be operated independently of the air conditioning. However, it must be on for air conditioner operation. Turning either switch off will disengage the compressor clutch and retract the condenser door. Cooling air should be felt within one minute after the air conditioner is turned on.

NOTE

If the system is not operating in 5 minutes, turn the system "OFF" until the fault is corrected.

The "FAN" switch allows operation of the fan with the air conditioner turned "OFF" to aid cabin air circulation if desired. A "LOW," "MED" or "HIGH" flow of air can be selected to the air conditioner outlets located in the overhead duct. The outlets can be adjusted or turned off by each occupant to regulate individual cooling effect.

The "DOOR OPEN" indicator light is located to the left of the radio stack in front of the pilot. The light illuminates whenever the condenser door is open and remains on until the door is closed.

A circuit breaker located on the circuit breaker panel protects the air conditioning electrical system.

*Optional equipment

Whenever the throttle is in the full throttle position, it actuates a micro switch which disengages the compressor and retracts the scoop. This is done to obtain maximum power and maximum rate of climb. The fan continues to operate and the air will remain cool for approximately one minute. When the throttle is retarded approximately 1/4 inch, the clutch will engage and the scoop will extend, again supplying cool, dry air.

PIPER EXTERNAL POWER*

An optional starting installation known as Piper External Power (PEP) is accessible through a receptacle located on the right side of the fuselage aft of the wing. An external battery can be connected to the socket, thus allowing the operator to crank the engine without having to gain access to the airplane's battery.

*Optional equipment

AIRPLANE FLIGHT MANUAL

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DUPLICATE

AIRPLANE FLIGHT MANUAL

FOR

CHEROKEE ARCHER

APPLICABLE TO SERIAL NUMBERS 28-7405001 THROUGH 28-7505259

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-28-180

AIRCRAFT SERIAL NO. 28-7405237 REGISTRATION NO. _____

AIRPLANE FLIGHT MANUAL, REPORT NUMBER VB-558 REVISION 5

PIPER AIRCRAFT CORPORATION
APPROVAL SIGNATURE AND STAMP

NOTE

THIS MANUAL MUST BE KEPT IN THE AIRPLANE AT ALL TIMES

FAA APPROVED BY:

H.W. BARNHOUSE
PIPER AIRCRAFT CORPORATION
D.O.A. No. SO—1
VERO BEACH, FLORIDA

DATE OF APPROVAL: MAY 14, 1973

APPROVAL BASIS: CAR 3

REPORT: VB-558
MODEL: PA-28-180

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TABLE OF CONTENTS

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AIRPLANE FLIGHT MANUAL LOG OF REVISIONS

Revision	Revised Pages	Description and Revisions	FAA Approved Date
1	Title	Added PAC Approval Form. (NOTE: AIRCRAFT DELIVERED WITH MANUALS PRIOR TO THIS REVISION DO NOT REQUIRE THIS REVISION.)	D. H. Trompler May 30, 1974
2	3-i	Added item F. Installation of Piper Auto-Control IIIB to Supplements.	D. H. Trompler June 17, 1974
	3-11	Added item F. Installation of Piper Auto-Control IIIB.	
	3-19, 3-20, 3-21, 3-22	Added Pages (AutoControl IIIB Supplement).	
3	3-i	Changed Section IV title from Supplements to Optional Equipment; deleted (With Pitch Trim Switch) from item A.; deleted items B. and C.; revised existing item letters; added AutoControl III to new item D.	Ward Evans Jan. 20, 1975
	3-1	Added O-360-A4M engine designation and ser. nos.	
	3-11	Changed Section IV title from Supplements to Optional Equipment; revised NOTE; deleted items B. and C.; revised existing item letters; added AutoControl III to new item D.	
	3-13	Deleted (With Pitch Trim Switch) from title.	
	3-14	Deleted item B. AutoFlite Installation.	
	3-15	Deleted item C. AutoControl III Installation.	
	3-16	Changed item letter (D. to B.); revised item 2.b. (3).	
	3-17	Changed item letter (E. to C.).	
	3-19	Changed item letter (F. to D.); added Auto Control III to title.	
	3-22	Deleted IIIB designation from items 2. c. (1) and (2).	
4	Title	Added Applicable Serial Nos.	Ward Evans Nov. 21, 1975
	3-1	Removed Serial Nos. from item A.	

AIRPLANE FLIGHT MANUAL LOG OF REVISIONS

Revision	Pages	Description	FAA Approved Date
5	3-1	Revised item B.	Ward Evans Ward Evans March 16, 1984

SECTION I

LIMITATIONS

The following limitations must be observed in the operation of this airplane:

A. ENGINE
Lycoming O-360-A4A or O-360-A4M with carburetor setting IO-3878

ENGINE LIMITS
For all operations 2700 RPM, 180 HP

B. FUEL (AVGAS ONLY)
100/130 minimum octane aviation fuel

C. PROPELLER
Sensenich M76EMMS or 76EM8S5. Maximum diameter 76 inches, minimum diameter 76 inches. Static RPM at maximum permissible throttle setting. Not over 2425, not under 2325. No additional tolerance permitted.

D. POWER INSTRUMENTS

OIL TEMPERATURE	
Green Arc (Normal Operating Range)	75°F to 245°F
Red Line (Maximum)	245°F
OIL PRESSURE	
Green Arc (Normal Operating Range)	60 PSI to 90 PSI
Yellow Arc (Caution Range)	25 PSI to 60 PSI
Red Line (Minimum)	25 PSI
Red Line (Maximum)	90 PSI
FUEL PRESSURE	
Green Arc (Normal Operating Range)	.5 PSI to 8 PSI
Red Line (Minimum)	.5 PSI
Red Line (Maximum)	8 PSI
TACHOMETER	
Green Arc (Normal Operating Range)	500 to 2700 RPM
Red Line (Maximum Continuous Power)	2700 RPM

E. AIRSPEED LIMITATIONS AND AIRSPEED INSTRUMENT MARKINGS

NEVER EXCEED	171 MPH
MAXIMUM STRUCTURAL CRUISE	140 MPH
MANEUVERING	127 MPH
FLAPS EXTENDED	115 MPH
MAXIMUM POSITIVE LOAD FACTOR	(Normal Category) 3.8
MAXIMUM POSITIVE LOAD FACTOR	(Utility Category) 4.4
MAXIMUM NEGATIVE LOAD FACTOR	No inverted maneuvers approved

AIRSPEED INSTRUMENT MARKINGS

Red Radial Line (Never Exceed)	171 MPH (148 KTS)
Yellow Arc (Caution Range) (Smooth Air Only)	140 MPH to 171 MPH (121 KTS to 148 KTS)
Green Arc (Normal Operating Range)	68 MPH to 140 MPH (59 KTS to 121 KTS)
White Arc (Flaps Down Range)	61 MPH to 115 MPH (53 KTS to 100 KTS)

F. MAXIMUM WEIGHT

Normal Category	2450 LBS
Utility Category	1950 LBS

G. BAGGAGE CAPACITY 200 LBS

H. C. G. RANGE

The datum used is 78.4 inches ahead of wing leading edge at the intersection of the straight and tapered section.

1. Normal Category

Weight (Pounds)	Forward Limit (In. Aft of Datum)	Rearward Limit (In. Aft of Datum)
2450	87.4	93.0
2050	82.0	93.0

2. Utility Category

Weight (Pounds)	Forward Limit (In. Aft of Datum)	Rearward Limit (In. Aft of Datum)
1950	82.0	86.5

Straight line variation between points given.

NOTE

It is the responsibility of the airplane owner and the pilot to insure that the airplane is properly loaded. See Weight and Balance Section for proper loading instructions.

On the instrument panel in full view of the pilot when the AutoFlite II is installed:

"TURN AUTOFLITE ON. ADJUST TRIM KNOB FOR MINIMUM HEADING CHANGE. FOR HEADING CHANGE, PRESS DISENGAGE SWITCH ON CONTROL WHEEL, CHANGE HEADING, RELEASE SWITCH. ROTATE TURN KNOB FOR TURN COMMANDS. PUSH TURN KNOB IN TO ENGAGE TRACKER. PUSH TRIM KNOB IN FOR HI SENSITIVITY. LIMITATIONS: AUTOFLITE OFF FOR TAKEOFF AND LANDING."

On the instrument panel in full view of the pilot when the supplementary white strobe lights are installed:

"WARNING - TURN OFF STROBE LIGHTS WHEN TAXIING IN VICINITY OF OTHER AIRCRAFT, OR DURING FLIGHT THROUGH CLOUD, FOG OR HAZE."

K. AIR CONDITIONED AIRPLANES
Air Conditioner must be off for takeoff and landing.

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SECTION II

PROCEDURES

1 The stall warning system is inoperative with the master switch off.

2. Electric fuel pump must be on for both landing and takeoff.

3. The PA-28-180 airplane is approved under FAA Regulation CAR 3 which prohibits intentional spins for both normal and utility category operation. The following information is noteworthy:

   a. The stall characteristics of the PA-28-180 are normal with the nose pitching down moderately following the stall, occasionally with a moderate roll which can be corrected by normal use of ailerons and rudder against the roll.

   b. Prolonged use of full rudder during stall practice may result in a rapid roll followed by a spin and should be avoided. Recovery from an incipient spin may be effected in less than one additional turn by use of opposite rudder followed by full forward control wheel.

   c. In the event that a fully developed spin is inadvertently experienced, recovery is best made by using full opposite rudder followed by full forward wheel and full opposite aileron. The control positions against the spin should be maintained during the entire recover, which may require several turns and a substantial loss of altitude if the airplane is loaded heavily with a rearward center of gravity.

4. Except as noted above, all operating procedures for this airplane are normal.

5. Air Conditioned Models only: Warning - The air conditioner must be off to insure normal takeoff performance.

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SECTION III

PERFORMANCE

The following performance figures were obtained during FAA type tests and may be realized under conditions indicated with the airplane and engine in good condition and with average piloting technique. All performance is given for 2450 pounds.

Loss of altitude during stalls varied from 100 to 250 feet, depending on configuration and power.

Stalling speeds, in mph, power off, versus angle of bank (Calibrated Airspeed):

Angle of Bank	0°	20°	40°	50°	60°
Flaps Up	68	70	78	85	96
Flaps Down	61	-	-	-	

Air Conditioned Models only:

When the full throttle position is not used or in the event of a malfunction which causes the compressor to operate and the condenser door to remain extended, a decrease in rate of climb of as much as 100 fpm can be expected at all altitudes.

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SECTION IV

OPTIONAL EQUIPMENT

NOTE

THE INFORMATION CONTAINED IN THIS SECTION APPLIES WHEN THE RELATED EQUIPMENT IS INSTALLED IN THE AIRCRAFT.

A. Electric Pitch Trim Installation

B. AutoFlite II Installation

C. Air Conditioner Installation

D. Installation of Piper AutoControl III and/or AutoControl IIIB

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A. ELECTRIC PITCH TRIM INSTALLATION

The following emergency information applies in case of electric pitch trim malfunction:

1. In case of malfunction, disengage electric pitch trim by pushing pitch trim switch on instrument panel to OFF position.

2. In an emergency, electric pitch trim may be overpowered using manual pitch trim.

3. In cruise configuration, malfunction results in 10° pitch change and 200 ft altitude variation.

4. In approach configuration, a malfunction can result in a 5° pitch change and 50 ft altitude loss.

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B. AUTOFLITE II INSTALLATION

1. LIMITATIONS

AutoFlite off for takeoff and landing.
AutoFlite use prohibited above 160 mph CAS.

2. PROCEDURES

a. Normal Operation

Refer to Manufacturer's Operation Manual.

b. Emergency Operation

(1) In case of malfunction, PRESS disconnect switch on pilot's control wheel.
(2) Rocker switch on instrument panel - OFF.
(3) Unit may be overpowered manually.
(4) In climb, cruise or descending flight an autopilot runway, with a 3 second delay could result in 60° bank, and 190 ft altitude loss.
(5) In approach configuration an autopilot runaway, with a 1 second delay results in 15° bank and 40 ft altitude loss.

C. AIR CONDITIONER INSTALLATION

Prior to takeoff, the air conditioner should be checked for proper operation as follows:

1. Check aircraft master switch on.

2. Turn the air conditioner control switch to "ON" and the fan switch to one of the operating positions - the "AIR COND DOOR OPEN" warning light will turn on, thereby indicating proper air conditioner condenser door actuation.

3. Turn the air conditioner control switch to OFF - the "AIR COND DOOR OPEN" warning light will go out, thereby indicating the air conditioner condenser door is in the up position.

4. If the "AIR COND DOOR OPEN" light does not respond as specified above, an air conditioner system or indicator bulb malfunction is indicated and further investigation should be conducted prior to flight.

The above operational check may be performed during flight if an in flight failure is suspected.

WARNING

The air conditioner must be off to insure normal takeoff performance.

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D. INSTALLATION OF PIPER AUTOCONTROL III AND/OR AUTOCONTROL IIIB

1. LIMITATIONS
   a. Autopilot OFF during takeoff and landing.
   b. Autopilot use prohibited above 160 MPH CAS.

2. PROCEDURES
   a. PREFLIGHT
      (1) Roll Section
         (a) Place Radio Coupler in "Heading" mode and place A/P ON/OFF switch in the "ON" position to engage roll section. Rotate roll command knob Left and Right and observe control wheel describes a corresponding Left and Right turn, then center knob.
         (b) Set proper D.G. Heading on D.G. and turn Heading Indice to aircraft heading. Engage "Heading" mode switch and rotate Heading Indice right and left. Aircraft control wheel should turn same direction as Indice. While D.G. indice is set for a left turn, grasp control wheel and override the servo to the right. Repeat in opposite direction for right turn.
         (c) If VOR signal available check Omni mode on Radio Coupler by swinging Omni needle left and right slowly. Observe that control wheel rotates in direction of needle movement.
         (d) Disengage by placing the A/P ON/OFF switch to the "OFF" position.

   b. IN-FLIGHT
      (1) Trim airplane (ball centered).
      (2) Check air pressure or vacuum to ascertain that the Directional Gyro and Attitude Gyro are receiving sufficient air.
      (3) Roll Section
         (a) To engage, center Roll Command Knob, place the A/P ON/OFF switch to the "ON" position. To turn rotate roll command knob in desired direction. (Maximum angle of bank should not exceed 30°.)
         (b) For heading mode, set Directional Gyro with Magnetic Compass. Push directional gyro HDG knob in, rotate to aircraft heading. Place the console HDG ON/OFF switch to the "ON" position. To select a new aircraft heading, push D.G. heading knob IN and rotate, in desired direction of turn, to the desired heading.

NOTE

In HDG mode the maximum bank angles are limited to approximately 20° and single command, heading changes should be limited to 150°. (HDG Indice not more than 150° from actual aircraft heading.)

(4) VOR

(a) To Intercept:

1. Using OMNI Bearing Selector, dial desired course, inbound or outbound.
2. Set identical heading on Course Selector D.G.
3. After aircraft has stabilized, position coupler mode selector knob to OMNI mode. As aircraft nears selected radial, interception and crosswind correction will be automatically accomplished without further switching.

NOTE

If aircraft position is less than 45° from selected radial, aircraft will intercept before station. If position is more than 45°, interception will occur after station passage. As the aircraft nears the OMNI station, (1/2 mile) the zone of confusion will direct an "S" turn in alternate directions as the OMNI indicator needle swings. This alternate banking limited to the standard D.G. bank angle, is an indication of station passage.

(b) To select new course:

1. To select a new course or radial, rotate the HDG indice to the desired HDG (match course).
2. Rotate OBS to the new course. Aircraft will automatically turn to the intercept heading for the new course.

(c) To change stations:

1. If same course is desired, merely tune receiver to new station frequency.
2. If different course is desired, position coupler mode selector to HDG mode. Dial course selector D.G. to new course. Dial OBS to new course and position coupler mode selector to OMNI mode.

(5) VOR Approach

Track inbound to station as described in VOR navigation section. After station passage:

(a) Dial outbound course on Course Selector D.G., then dial same course on OBS.

(b) After established on outbound radial, position coupler mode selector to HDG mode and select outbound procedure turn heading. After 40 seconds to 1 minute select a turn in the desired direction with the Course Selector D.G. to the inbound procedure turn heading.

(c) Set OBS to inbound course.

(d) When aircraft heading is 45° to the inbound course, dial Course Selector D.G. to inbound course and position coupler mode selector to OMNI mode.

NOTE

For precise tracking over OMNI station, without "S" turn, position coupler mode selector to HDG mode just prior to station passage. If holding pattern is desired, position coupler mode selector to HDG mode at station passage inbound and select outbound heading in direction of turn. After elapsed time, dial inbound course on Course Selector D.G. When aircraft heading is 45 ° to radial, position coupler mode selector to OMNI mode.

(6) LOC Approach Only
   (a) To intercept dial ILS outbound course on Course Selector D.G. When stabilized, position coupler mode selector to LOC REV mode.
   (b) After interception and when beyond outer marker, position coupler mode selector to HDG mode and dial outbound procedure turn heading. After one minute, dial inbound procedure turn heading in direction of turn.
   (c) When aircraft heading is 45° to ILS inbound course dial inbound course on Course Selector D.G. and position coupler mode selector to LOC NORM mode.
   (d) At the missed approach point (M.A.P.), or when missed approach is elected, position coupler mode selector to HDG mode and execute missed approach procedure.

(7) LOC Approach - Back Course (Reverse)
   (a) To intercept dial ILS Back Course outbound heading on Course Selector D.G. When stabilized, position coupler mode selector to LOC NORM mode.
   (b) After interception and when beyond fix, position coupler mode selector to HDG and dial outbound procedure turn heading. After one minute, dial inbound procedure turn heading in direction of turn.
   (c) When heading 45° to inbound course, dial inbound course on Course Selector D.G. and position coupler mode selector to LOC REV mode.
   (d) Approximately 1/2 mile from runway, position coupler mode selector to HDG mode to prevent "S" turn over ILS station near runway threshold.
   (e) Missed approach - same as Front Course. (See (6) d)