THE

cherokee ARROW

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-28R-200

AIRCRAFT SERIAL NO. 28R-7535277 REGISTRATION NO. N11RB PR750128

PILOT'S OPERATING MANUAL., PART NIJMBER 761 578 REVISION 1-28-75

PIPER AIRCRAFT CORPORATION
APPROVAL. SIGNATURE AND STAMP T.W. Reed, Jr.

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 tr sition from single to multi-engine flying.

It 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.

an

A complete or partial replacement of this manual, Part No. 761 578, may be obtained only from Piper Customer Services.

Published by
PUBLICATIONS DEPARTMENT
Piper Aircraft Corporation
761 578
Issued: July 1973

APPLICABILITY

This manual is applicable to Piper Model PA-28R-200 aircraft having serial numbers commencing with 28R-7435001 through 28R-7635545. Contact Piper Customer Services for specific information on the application of this manual.

WARNING

INSPECTION, MAINTENANCE AND PARTS REQUIREMENTS FOR ALL NON-PIPER APPROVED STC INSTALLATIONS ARE NOT INCLUDED IN THIS HANDBOOK. WHEN A NON-PIPER APPROVED STC INSTALLATION IS INCORPORATED ON THE AIRPLANE, THOSE PORTIONS OF THE AIRPLANE AFFECTED BY THE INSTALLATION MUST BE INSPECTED IN ACCORDANCE WITH THE INSPECTION PROGRAM PUBLISHED BY THE OWNER OF THE STC. SINCE NON-PIPER APPROVED STC INSTALLATIONS MAY CHANGE SYSTEMS INTERFACE, OPERATING CHARACTERISTICS AND COMPONENT LOADS OR STRESSES ON ADJACENT STRUCTURES, PIPER PROVIDED INSPECTION CRITERIA MAY NOT BE VALID FOR AIRPLANES WITH NON-PIPER APPROVED STC INSTALLATIONS.

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 2-24, 3-1 through 3-10, 4-1 through 4-8, 5-1 through 5-32, 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-28R-200 Arrow II Pilot's Operating Manual, 761 578, issued July 13, 1973.

Revision	Revised Pages	Description	Date
Rev. 1 - 761 578 (PR731029)	W/B	Added Rev. 1 to Report: VB-549.	Oct. 29,1973
Rev. 2 - 761 578 (PR740325)	ii	Added PAC Approval Form.	March 25,1974
	iii	Added Applicability and Item III. Original Pages Issued.	
	A F/M	Added Rev. 1 to Report VB-560.	
	W/B	Added Rev. 2 to Report VB-549. (NOTE: AIRCRAFT DELIVERED WITH MANUALS PRIOR TO THIS REVISION DO NOT REQUIRE THIS REVISION.)	
Rev. 3 - 761 578 (PR740618)	2-2	Added Mixture Control Lock and Footnote.	June 18.1974
	2-4	Added Mixture Control Lock to Throttle Quadrant Illustration.	
	2-11	Added Annunciator Panel and Footnote; added Landing Gear Light Dimming Warning.	
	2-12	Revised Alternator and Starter Schematic.	
	2-12a	Added Alternator and Starter Schematic for 1975 Models.	
	2-12b	Added Intentionally Left Blank Page.	
	2-14	Added Annunciator Panel and Footnote to Vacuum System Description.	
	2-15	Added Annunciator Panel and Footnote to Instrument Panel Description.	
	2-16	Added Annunciator Panel and Mixture Control Lock to Instrument Panel Illustration.	
	2-20	Added Rear Seat Removal Instructions.	
	A F/M	Added Revision 2 to Report: VB-560.	
	4-8	Revised Alternator Failure Emergency Procedures.	
	W/B	Added Revision 3 to Report: VB-549.	
	7-i	Revised Operating Instructions Index; added Airspeed Data.	
	7-4	Revised Air Conditioner Ground Check; added Annunciator Panel Check and Footnote; relocated info.	
	7-5	Added info from Page 7-4; relocated Cruising info.	

PILOT'S OPERATING MANUAL. LOG OF REVISIONS (cont)

Revision	Revised Pages	Description	Date
Rev 3 (cont)	7-6	Added Cruising info; added Mixture Control Lock and Footnote; relocated Approach and Landing infb.	
	7-7	Added Approach and Landing info; added Mixture Control Lock and Footnote; relocated Moorings and Weight and Balance infb.	
	7-8	Added Airspeed Data; added Moorings, and Weight and Balance info; relocated ELT info.	
	7-9	Added infb from Page 7-8; relocated Air Conditioning info.	
	7-10	Added Air Conditioning info; relocated info.	
	7-11	Added page; added relocated info.	
	8-1	Added Annunciator Panel to item II; moved Item 13 to Page 8-2.	
	8-2	Added Item 13 from Page 8-1.	
	9-i	Revised Performance Charts Index.	
	9-2	Revised Takeoff Chart.	
	9-3	Revised Climb Chart	
	9-4	Revised Airspeed Chart.	
	9-5	Revised Range Chart.	
	9-8	Revised Glide Chart.	
	9-9	Revised Landing Chart.	
Rev 4 - 761 578 (PR750128)	2-6	Added gear warning info.	.Jan 28. 1975
	2-21	Revised Stall Warning info.	

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PILOT'S OPERATING MANUAL LOG OF REVISIONS (cont)

Revision	Revised Pages	Description	Date
Rev. 9 (cont)	10-9	Added info. from page 10-8.	
	10-11	Revised Service Bulletin info.	
Rev. 10 - 761 578 (PR840229)	iii	Added including serial number.	Feb. 29,1984
	1-2	Revised fuel and oil info.	
	2-21	Revised para.	
	AFM	Added Rev. 6 to Report: VB-560.	
	W/B	Added Rev. 9 to Report: VB-549.	
	9-i	Added Warning.	
	10-7	Added info., and fuel grade chart, moved info. to page 10-8.	
	10-8 -	Relocated info. from pg. 10-7, moved info. to page 10-9.	
	10-9	Relocated info. from page 10-8.	
	10-11	Revised para.	
	10-12	Revised preventive maintenance para., relocated info. from page 10-13.	
	10-13	Moved info. to page 10-12.	
Rev. 11 - 761 578 (PR870131)	2-3	Revised Landing Gear. Relocated Warning	Jan. 31,1987
	2-4	Revised Throttle Quadrant and Console figures.	
	2-5	Revised Schematic.	
	2-6	Revised para. Added info.	
	2-16	Revised Instrument Panel fig.	
	AFM	Added Rev. 7 to Report: VB-560.	
	4-2	Revised Engine Power Loss During Take off para.	
	4-3	Revised Engine Power Loss During Takeoff.	
	4-4	Revised Power Off Landing. Gear Down Landing, and Gear Up Landing paras. Moved info. from page 4-5.	
	4-5	Revised Emergency Gear Extension para. Moved info. to page 4-4.	
	4-6	Revised Note.	
	7-5	Revised footnote.	
	8-1	Revised item 12.	
	9-8	Revised Note.	
	10-14	Added Note.	
	10-15	Added note reference.	

PILOT'S OPERATING MANUAL LOG OF REVISIONS (cont)

Revision	Revised Pages	Description	Date
Rev. 12 - 761 578 (PR900730)	1-2	Revised Oil info. Moved Dimensions and Landing Gear to page 1-4.	July 30, 1990
	1-4	Added page. Relocated Dimensions and Landing Gear from page 1-2.	
	10-i	Revised Table of Contents.	
	10-7	Revised Oil Requirements. Moved info.. to page 10-8.	
	10-8	Relocated info..from page 10-7. Moved Tire Inflation and Battery Sevice info. to page 10-9.	
	10-9	Relocated Tire inflation and Battery Sevice info. from page 10-8.	
	10-11	Revised Facts You Should Know.	
	10-12	Revised Preventive Maintenance.	
	10-13	Revised Required Service and Inspection Periods.	
Rev. 13 - 761-578 (PR050207)	iii	Added Warning.	Feb. 7, 2005
	AFM	Added Rev. 8 to Report: VB-560.	
	4-5	Revised Emergency Landing Gear Extension.	
	10-i	Revised Table of Contents.	
	10-1	Added Warnings and moved info. to page 10-2.	
	10-2	Moved info. from page 10-1.	
	10-13	Revised Required Service And Inspection Periods.	
Rev..14 - 761-578 (PR051010)	AFM	Added Rev. 9 to Report: VB-560	Oct. 10, 2005

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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 the 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 Run (ft)	1025
Takeoff Run (Short field effort, 25° flaps) (ft)	770
Takeoff Distance Over 50-ft Obstacle (ft)	1800
Takeoff Distance Over 50-ft Obstacle (Short field effort. 25° flaps) (ft)	1600
Best Rate of Climb (mph)	95 (100*)
Rate of Climb (gear retracted) (ft per min)	9M)
Best Angle of Climb (mph)	85 (96*)
Service Ceiling (ft)	15,000
Absolute Ceiling (ft)	17,000
Max Speed (mph)	175
Optimum Cruising Speed (75% power, optimum altitude, 6600 ft) (mph)	165
Cruise Speed at best power mixture (rnph)	
65% power. 9,750 ft	159
55% power, 13,000 ft	150
Range at best power mixture (mi)**	
75% power, 6600 ft	665
65% power, 9750 ft	715
55% power, 13,000 ft	765
Cmise Speed at best economy mixture (rnph)	
75% power. 6600 ft	156
65% power, 9700 ft	148
55% power, 13,100 ft	141
Range at best economy mixture (mi)**	
75% power, 6600 A	740
65% power. 9700 ft	785
55% power, 13,100 ft	850
Stalling Speed (flaps and gear down) (CAS) (mph)	64
Stalling Speed (flaps and gear up) (CAS) (mph)	71
Landing Roll (flaps down) (ft)	780
Landing Roll Over 50-ft Obstacle (ft)	1380

*Gear retracted
**No reserve

WEIGHTS

Gmss Weight (lbs)	2650
Standard Empty Weight (lbs)	1531
Maximum Useful Load (obs)	1198

POWER PLANT

	S/N 28R-7435001 thru 28R-7635516	S/N 7635517 & Up
Engine (Lycoming)	IO-360-C1C	IO-360-C1C6
Propeller	Hartzell HC-C2YK-1( )/7666A-2 or HC-C2YK-1( )F/F7666A-2	McCauley B2D34C213/90DHA-16
d H( )	200	200
Rated Speed (rpm)	2700	2700
Bore (in)	5.125	5.125
Stroke (in.)	4.375	4.375
Displacement (cu. in)	361.0	361.0
Compression Ratio	8.7:1	8.7:1
Dry Weight (lbs)	326	333

FUEL (AVGAS ONLY)

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

OIL

Oil Capacity (qts)	8
Oil Specification	Refer to latest issue of Lycoming Instruction No. 1014.

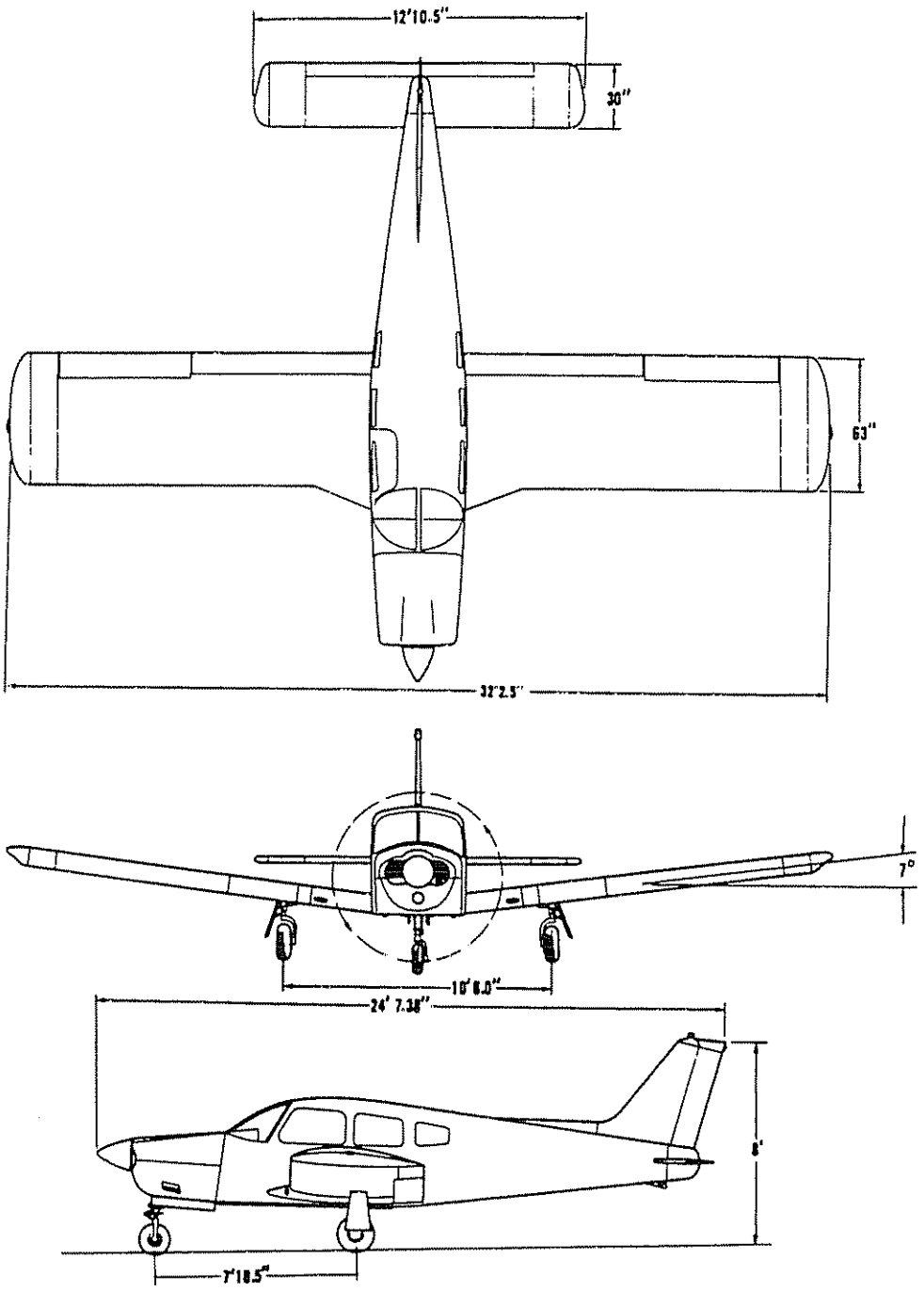
Oil Viscosity per Average Ambient Temp. for Starting

	MIL-L-6082B Mineral SAE Grade	MIL-L-22851 Ashless Dispersant SAE Grades
All Temperatures	--	15W-50 or 20W-50
Above 80°F	60	60
Above 60°F	50	40 or 50
30°F to 90°F	40	40
0°F m 70°F	30	30.40 or 20W-40
0'F m 90°F	20W-50	20W-50 or 15W-50
Below 10°F	20	30 or 20W-30

When operating temperatures overlap indicated ranges, use the lighter grade oil.

BAGGAGE

Maximum Baggage (lbs)	200
Baggage Space (cu ft)	22
Baggage Door Size (in)	20 x 22


12'10.5"
30"
63"
32'2.5"
7°
10' 8.0"
24' 7.38"
8'
7'18.5"

DIMENSIONS

Wing Span (ft)	32.2
Wmg Area (sq ft)	170
Wmg Loading (lbs per sq ft)	15.6
Length (ft)	24.6
Height (ft)	8.0
Power Loading (lbs per hp)	13.25

LANDING GEAR

Wheel Base (ft)		7.8
Wheel Tread (ft)		10.5
Tire Pressure (psi)	Nose	30
	Main	27
Tire Size	Nose (four-ply rating)	5.00 x 5
	Main (four-ply rating)	6.00 x 6

DESCRIPTION

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DESCRIPTION

AIRPLANE. AND SYSTEMS

THE AIRPLANE

The Cherokee Arrow II is a single-engine, retractable landing gear, all metal aircraft Increased fuselage length has enhanced tlie comfort in the rear seats A large cabin door allows composed entry and exit of tlie spacious interior Four individual seats allow individual comfort for extended cross-country flights Sound proofing has been built into the aircraft to reduce fatigue and permit restful conversation. Simplicity of operation was designed into the aircraft to allow the aircraft to operate in VFR or IFR conditions with unhurried en route planning

AIRFRAME.

Aluminum alloy construction has been used throughout for the primary structure except for the steel tube engine mount, steel landing gear struts and isolated areas. Fiberglass and thermoplastic are used extensively for wing tip, engine cowling and non-structure components. Tlie airframe lias been designed to a positive limit load factor of 3.8.

Tlie fuselage is a conventional semi-monocoque structure. External stringers on the bottom of tlie fuselage extend the length of the cabin area, and are used to maximize cabin room. On tlie right side of tlie aircraft are a large cabin door and a large baggage compartment door. Maintenance has been reduced to a minimum with advanced fuselage design.

Tlie wing is of conventional design incorporating a laminar flow NACA 65,-415 airfoil section. This allows for locating the main spar 40% aft of the leading edge, an arrangement which benefits the structure in two ways.

1 It provides unobstructed cabin space for tlie rear passengers.
2 It allows for a lighter wing structure to improve the useful load of the aircraft.

The wing also incorporates a rear spar and front stub spar. The main spar carries the bending loads and the rear and stub spars carry torsional loads. The main spars are bolted into a spat carry through at both sides of tlie fuselage. The rear and stub spars are bolted to attachments at each side of tlie fuselage.

The ailerons are of modern metal construction incorporating a balance weight on the outboard end of each aileron, and are controlled by a right or left rotation of tlie control wheel.

Tlie flaps are also of metal construction When the flaps arc in the retrautcd position, tlie right flap acts as a step. The flap control is located between the front seats.

The empennage consists of a vertical stabilizer. a rudder and a horizontal stabilator. Directional and pitch trim are provided with tlie rudder and stabilator trim tabs respectively. Tlie trim tab on tlie stabilator also acts as an anti-servo control The empennage construction is of a modern lightweight design.

ENGINE AND PROPELLER

The Cherokee Arrow II incorporates a Lycoming IO-360-C1C tour-cylinder, direct drive. horizontally opposed fuel injected engine rated at 200 horsepower at 2700 RPM It is furnished with a starter. 60 ampere 14-volt alternator, shielded ignition. vacuum pump drive. fuel pump, propeller governor arid a dry automotive type induction air filter A recommended overhaul period of 1400 hours is based on Lycoming service experience Operation hcyond the recommended time is the decision of the operator. Since Lycoming from timc to time revises the recommended overhaul period, the owner should check the latest Lycoming Service Instruction at his Piper dealer for the latest recommended overhaul period and for any additional information.

The aircraft is equipped with a Hartzell constant speed, controllable pitch propeller. The propeller control is located on the power quadrant between the throttle and mixture controls A mixture control lock* is provided to prevent activation of the mixture control instead of the pitch control,

The exhaust system is a crossover type, which reduces hack pressure and improves performance It is constructed entirely of stainless steel and is equipped with dual mufflers Cabin heat and windshield defrosting arc provided by a heater shroud around the muffler

An oil cooler is located on the forward lower right side of the firewall, with the air inlet for the cooler located on the right side of tlie bottom cowling A winterization plate is provided to restrict air during winter operation (See Winterization in Handling and Servicing)

Tlie induction system incorporates a Bendix RSA-5AD1 type fuel injector. The injector is based on the principle of differential pressure, which balances air pressure against fuel pressure. Tlie regulated fuel pressure establislied by the servo valve when applied across a fuel control (jetting system) makes tlie fuel flow proportional to airflow. Fuel pressure regulation by tlie servo valve causes a minimal drop in fuel pressure throughout the metering system. Metering pressure is maintained above most vapor forming conditions while fuel inlet pressure is low enough to allow use of a diaphragm pump. The servo system feature also checks vapor lock and associated starting problems

The servo regulation meters fuel flow proportionally with airflow and maintains the mixture as manually set for all engine speeds The fuel flow divider receives metered fuel and distributes fuel to each cylinder fuel nozzle

The fuel flow portion of the manifold fuel flow gauge is connected to tlie flow divider and monitors fuel pressure This instrument converts fuel pressure to an indication of fuel flow in gallons per hour and percentage of rated liorsepower

The alternate air source of the induction system contains a door that functions automatically or manually If the primary source is obstructed, tlie door will open automatically It may be opened manually by moving the selector on the right side of the quadrant Tlie primary source sliould always be used for take-off.

Tlie pilot should rend and follow the procedures reconimended in the Lycoming Operator's Manual lor this engine, in order to obtain maximum engine efficiency and time between engine overhauls

*Serial nos '7535001 and up

LANDING GEAR

The Cherokee Arrow II is equipped with a retractable tricycle landing gear, which is hydraulically actuated by an electrically powered reversible pump. The pump is controlled by a selector switch on the instrument panel to tlie left of the control quadrant. The landing gear is retracted or extended in about seven seconds

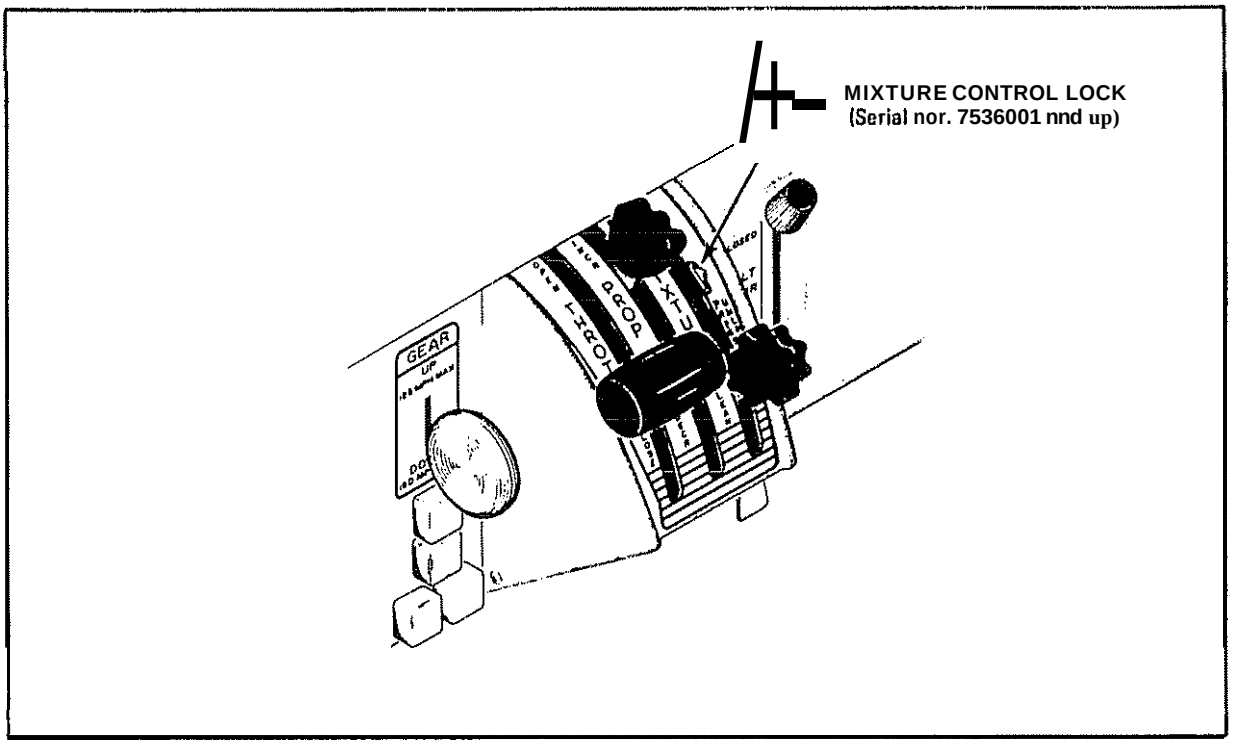
Also incorporated in the system is a pressure sensing device which lowers the gear regardless of gear selector position, depending upon airspeed and engine power (propeller slipstream). Gear extension is designed to occur, even if the selector is in tlie up position, at airspeeds below approximately 105 MPH witli power off The extension speeds will vary from approximately 85 MPH to approximately 105 MPH depending on power settings and altitude The device also prevents the gear from retracting at airspeeds below approximately 85 MPH with full power, though the selector switch may be in the up position. Tliis speed increases with rcduccd power and/or increased altitude. Manual override of the dcvicc is provided by an emergency gear lever located between the front seats to the left of the flap handle. The sensing device operation is controlled by differential air pressure across a flexible diaphragm whicli is mechanically linked to a hydraulic valve aid an electrical switch which actuates tlie pump motor A high pressure aid static air source for actuating the diaphragm is provided in a mast mounted on the left side of the fuselage above the wing. Any obstruction of the holes in this mast will cause the gear to extend. An optional heated mast is available to alleviate obstruction in icing conditions. The optional heated mast is'turned on whenever tlie "PITOT HEAT" is turned on.

WARNING

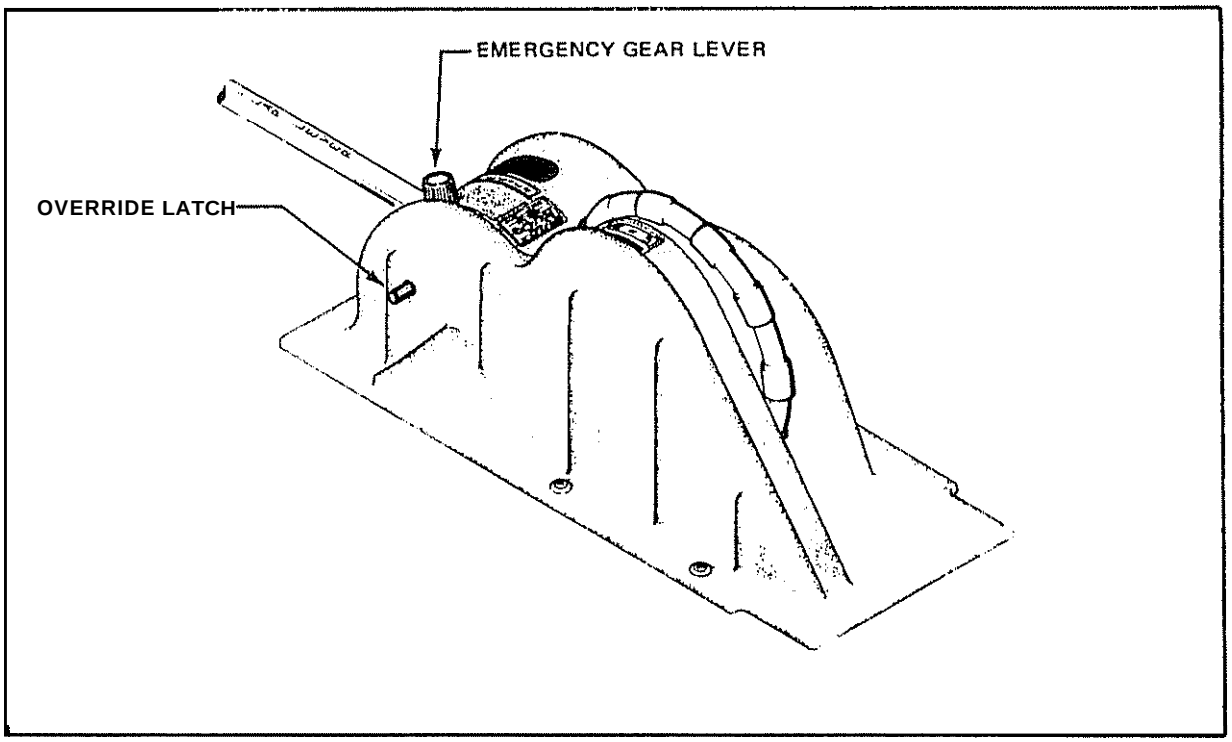
Avoid ejecting objects out of the pilot storm window whicli could possibly enter or obstruct the lioles in the mast.

The emergency gear lever, used lor emergency extension of tlie gear, manually releases hydraulic pressure to permit the gear to free-fall with spring assistance on the nose gear. The lever must he held in the downward position for emergency extension. This same lever, wlien held in the raised position, can be used to override the system, aid gear position is then controlled by tlie selector switch regardless of airspeed/power combinations. The emergency gear lever is provided with a latching device which may be used to lock the override lever in the up position. The latcli is located on the left side panel of the console below tlie level of the manual override lever. To lock the override lever in the up position. raise the override lever to tlie full up position and push in the latcli A yellow warning light located below the gear selector switch flashes to warn the pilot that the automatic gear lowering system is disabled The latch is spring loaded to the off position to aid disengagement. To disengage the latch raise the override lever and release. The lever will return to its normal position and the yellow flashing light will extinguish The lever must also be latched in the raised (up) position when gear-up stalls are practiced.

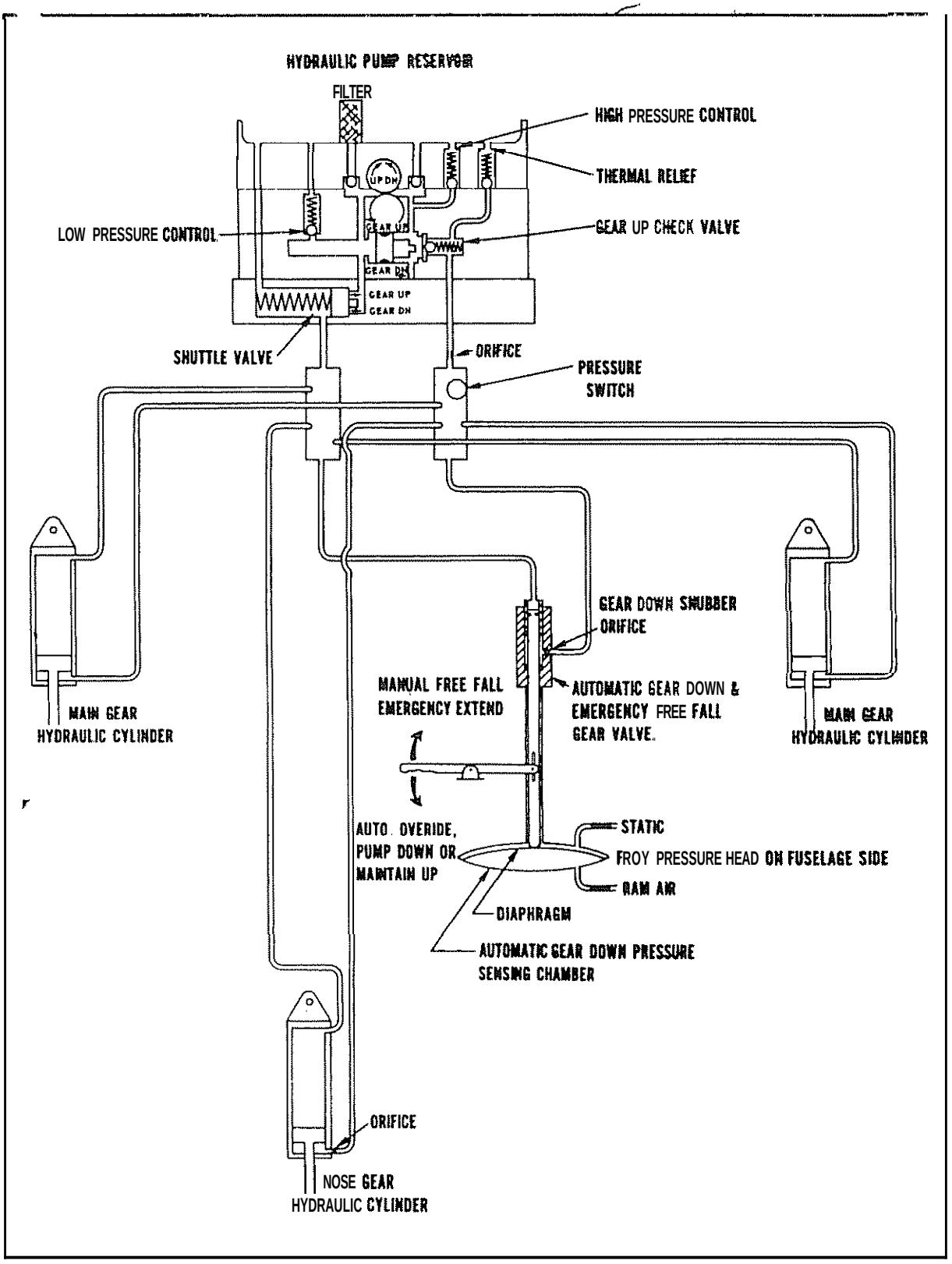
Gear down and locked positions arc indicated by three green lights located below the selector, and a yellow light for in-transit positions is located at the top of the panel. An all lights out condition indicates the gear is up. The landing gear should not be retracted above a speed of 125 MPH and should not be extended above a speed of 150 MPH.



Throttle Quadrant



Console



Landing Gear Hydraulic Schematic

Two micro-switches in the throttle quadrant activate a warning horn and a red "Warning Gear Up" light under the following conditions:

1 Gear tip and power reduced below approximately 14 inches of manifold pressure.
2 Gear extended by back-up gear extender system but gear selector switch "UP," except at full throttle.
3 Gear selector switch "UP" while on the ground.

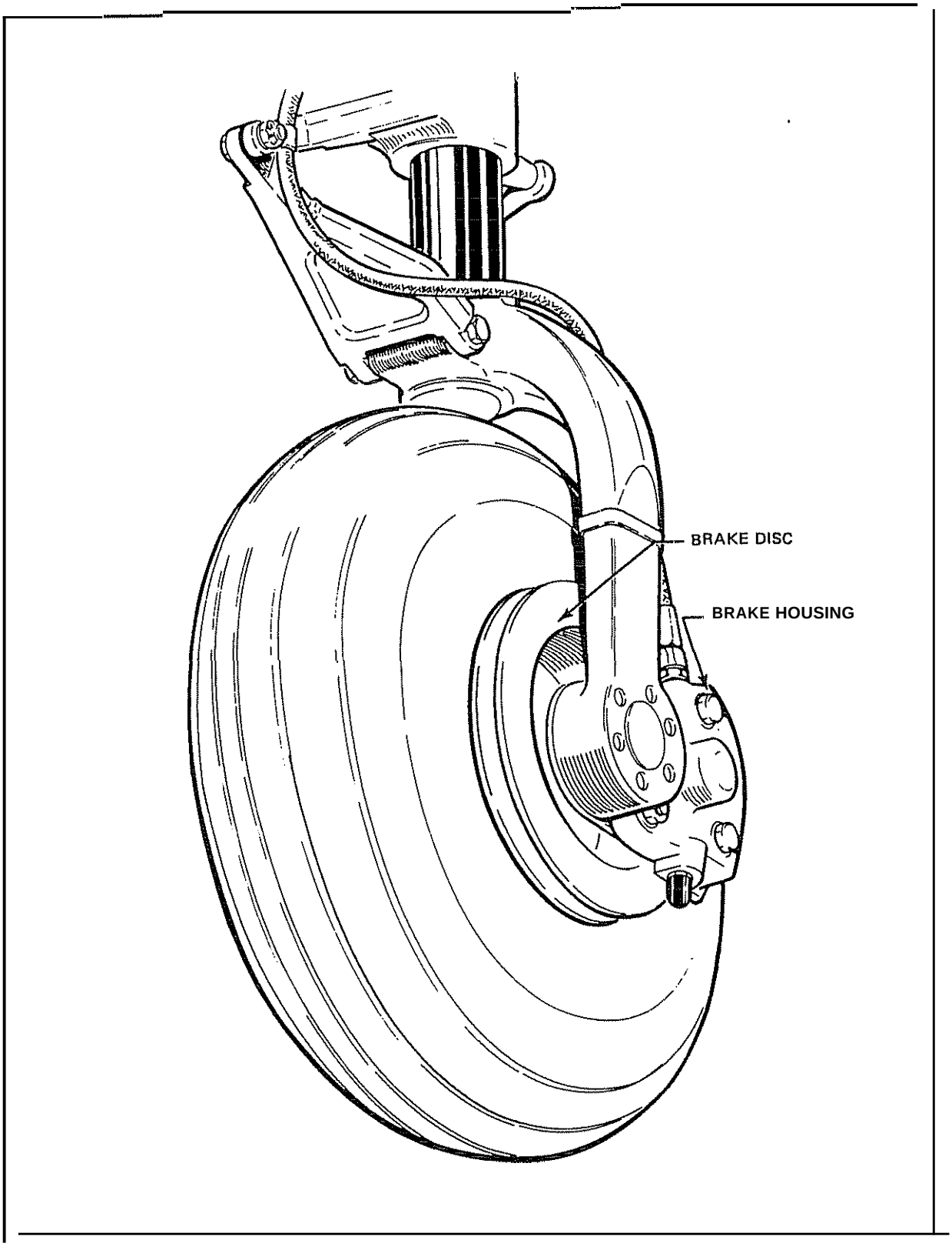
The gear warning horn emits a steady sound on earlier models and a 90 cps beeping sound on later models which are equipped with a stall warning horn.

The nose gear is steerable through a 30 degree arc each side of center through the use of the rudder pedals and brakes. As the nose wheel retracts, the steering linkage disengages to reduce rudder pedal loads in flight. The nose wheel is equipped with a hydraulic shimmy dampener to reduce nose wheel shimmy. A bungee assembly is also included to reduce ground steering effort and to dampen shocks and bumps during taxiing.

The oleo struts are of the air-oil type, with normal extension being 2.75 inches for the nose gear and 2 0 inches for the main gear under normal static load (empty weight of airplane plus full fuel and oil).

The standard brake system includes toe brakes on the left set of rudder pedals and a hand brake located below and near the center of the instrument panel. Toe brakes on the right rudder pedals are optional The toe brakes and the hand brake have individual brake cylinders, but all cylinders use a common reservoir. The parking brake is incorporated in the lever brake and is operated by pulling back on the lever and depressing the knob attached to the top of the handle. To release the parking brake, pull back on the brake lever: then allow the handle to swing forward.

A single disc. single puck brake is mounted on the main gears. A brake disc is mounted on the inboard side of the wheels and the brake housing which incorporates the pucks is mounted to the inboard side of the wheel axle.



Main Wheel **Assembly**

FLIGHT CONTROLS

Dual flight controls are provided as standard equipment. A cable system provides actuation of the control surfaces when the flight controls are moved in their respective directions.

The horizontal surface (stabilator) is of the flying tail design with a trim tab/servo mounted on the trailing edge. This tab serves the dual function of providing trim control and pitch control forces. The trim function is controlled by a trim control wheel located on the control console between the two front seats. Rotating the wheel forward gives nose down trim and rotation aft gives nose up trim. The stabilator provides extra stability and controllability with less area, drag and weight than conventional tail surfaces.

The rudder is conventional in design and incorporates a rudder trim. The trim mechanism is a spring-loaded recentering device. The trim control is located on the right side of the pedestal below the throttle quadrant. Turning the trim control clockwise gives nose right trim and counterclockwise rotation gives nose left trim.

Ailerons are provided with differential deflection. This feature reduces adverse yaw in turning maneuvers, and thus reducing the amount of coordination required.

Manually controlled flaps are provided.. They are extended by a control cable and are spring-loaded to the retracted (up) position. The control is located between the two front seats on the control console. To extend the flaps pull the handle up to the desired flap setting of 10, 25 or 40 degrees. To retract, depress the button on the end of the handle and lower the control. A balanced control system is used for light operating forces.

When extending or retracting flaps, there is a pitch change in the aircraft. This pitch change can be corrected either by stabilator trim or increased control wheel force. When the flaps are in the retracted position the right flap, provided with a over-center lock mechanism, acts as a step.

NOTE

The right flap will support a load only in the fully retracted (up) position. When loading and unloading passengers make sure the flaps are in the retracted (up) position.

FUEL SYSTEM

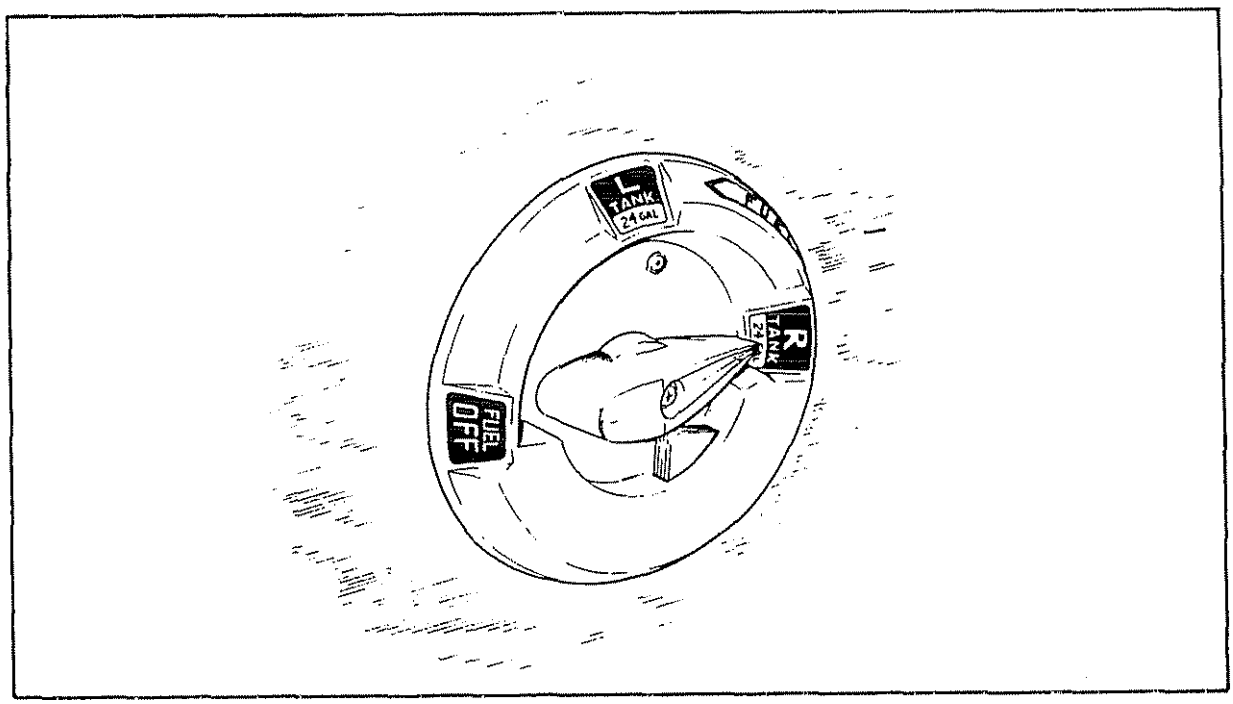
The fuel system was designed with simplicity in mind. It incorporates two fuel tanks, one in each wing containing twenty-five *(25)* U.S. gallons, giving a total of 48 usable gallons. The tanks are attached to the leading edge of the wing with screws and are an integral part of the wing structure. This allows for easy removal for service. **An** auxiliary electric fuel pump is provided in case of a failure of the engine driven pump. **A** rocker type switch for controlling the electric pump is located on the switch panel above the throttle quadrant. The electric pump should be on for take-off, switching tanks and during landing.

The fuel tank selector, which allows the pilot to control the flow of fuel to the engine, is located on the left side wall below the instrument panel. It has three positions: OFF, LEFT TANK and RIGHT TANK, The arrow on the handle of the selector points to the tank which is supplying fuel to the engine. The valve also incorporates a safety latch which prevents inadvertently selecting the "OFF" position.

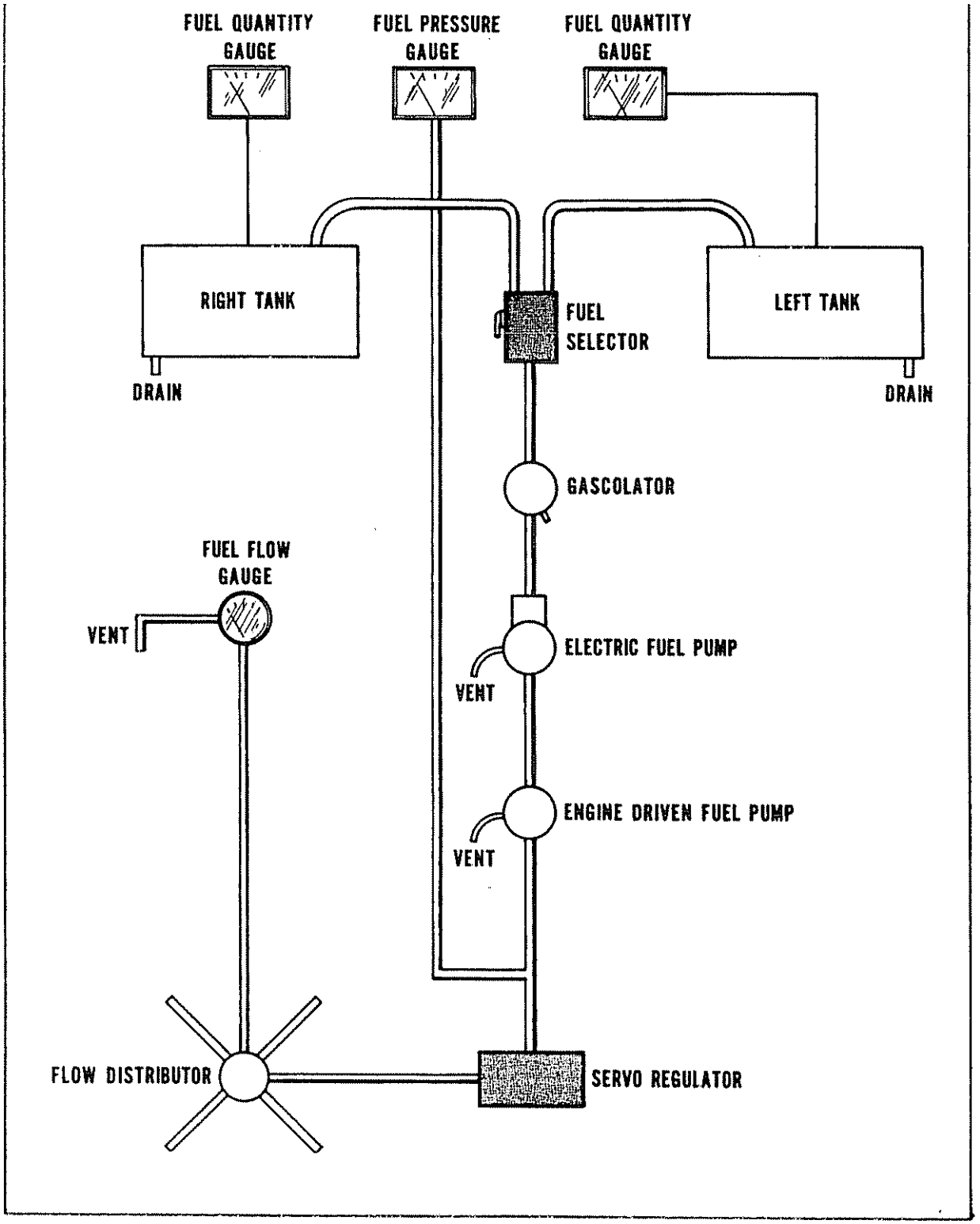
Each tank has an individual quick drain located at the bottom inboard rear comer. The fuel strainer also incorporates a quick drain which is located in the left front corner of the firewall. The quick drain protrudes from the cowling to allow easy draining of the fuel strainer. All three drains should be drained before every flight and checked for contamination.

The fuel tanks are vented individually by a vent tube which protrudes below the bottom of the wing at the rear outboard corner of'each fuel rank. The vent should be checked periodically to ascertain that the vent is not obstructed and allows free passage of air.

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



Fuel Selector



Fuel Schematic

ELECTRICAL SYSTEM

The electrical system is very simple and functional All switches are grouped in a switch panel above the power quadrant On the lower right side of the instrument panel is the circuit breaker panel. with each breaker clearly marked to show what circuit it protects. Also, circuit provisions are made to handle a complete complement of communication and navigational equipment

Standard electrical accessories include alternator, starter, electric fuel pump, stall warning indicator, 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, anti-collision, landing, instrument and cabin dome lights. Navigation and radio lights are controlled by a rheostat switch on the left side of the switch panel. The instrument panel lights are controlled by a rheostat switch on the right side of the panel"

WARNING

When optional panel tights are installed, rheostat switch must be off to obtain gear lights full intensity during daytime flying. When aircraft is operated at night and panel tight rheostat switch is turned on, gear lights will automatically dim.

The anti-collision and landing lights are controlled by rocker switches on the switch panel Circuits will handle a full complement of communications and navigational equipment.

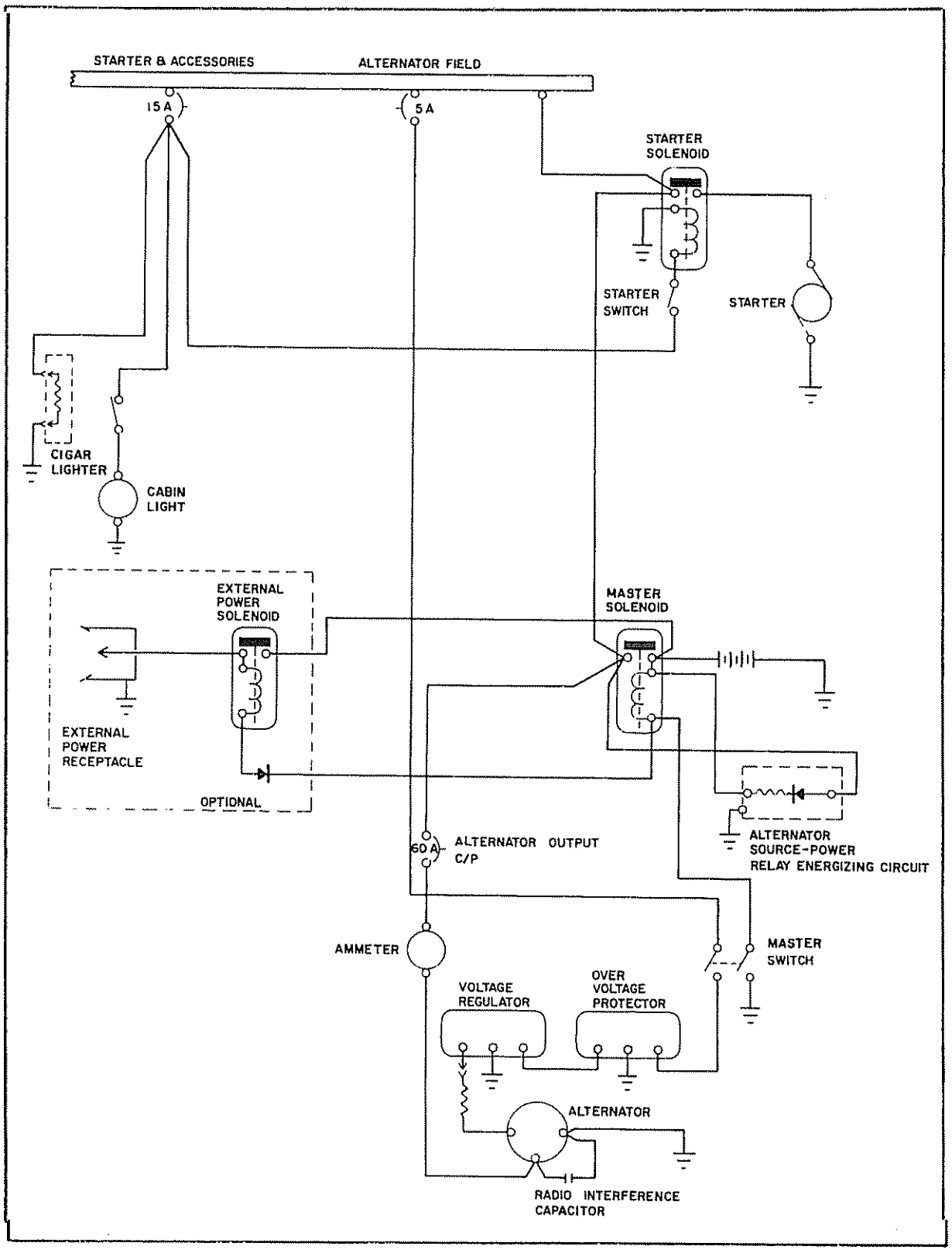
NOTE,

Anti-collision lights should not be operating when flying through overcast and clouds since reflected light can produce spacial disorientation. Do not operate strobe lights while taxiing in the vicinity of other aircraft.

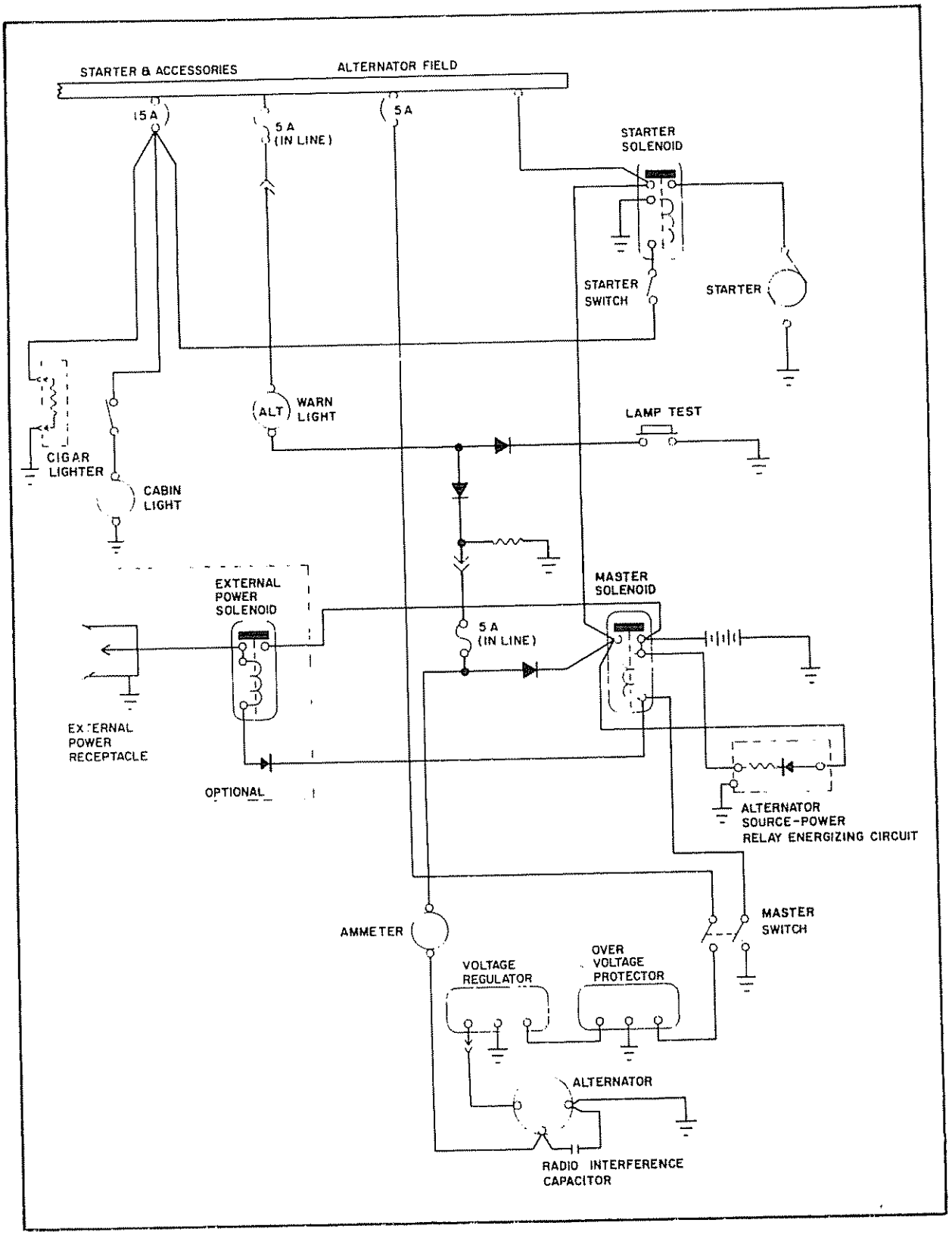
The master switch, also located in the switch panel, is a split rocker switch. One side of the switch is the battery side ("BAT") and the other is the alternator side ("ALT") Henceforth, "master switch," used in this manual, shall mean both "BAT" and "ALT" switches. The "ALT" switch is provided for an emergency and its function is covered under "Alternator Failure" in the Emergency section of the handbook.

The primary electrical power source is a 14-volt, 60-amp alternator, which is protected by a voltage regulator and an overvoltage relay. The alternator provides full electrical power output even at low engine RPM This provides improved radio and electrical equipment operation and increases battery life by reducing battery load

*Serial nos. 7535001 and up



Alternator and Starter Schematic (Ser Nos. 7435001 through 7435.331)



Alternator and Starter Schematic (Ser. Nos. 7535001 and up)

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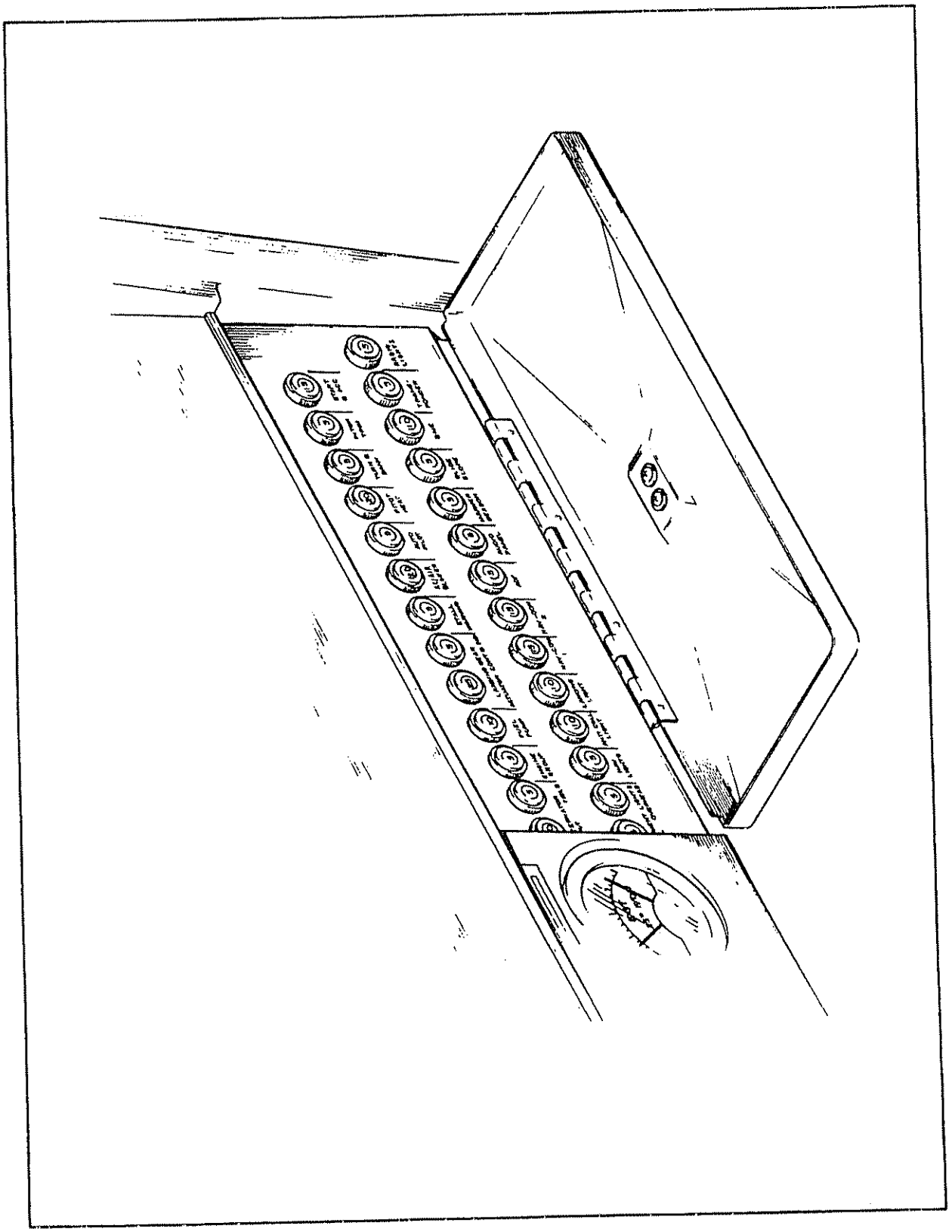

Circuit Breaker Panel

Secondary power is provided by a 12-volt, 25-ampere hour battery

The ammeter as installed does not show battery discharge; rather it shows the electrical load placed on the system. With all the electrical equipment off, and the master switch on, the ammeter will indicate the charging rate of the battery. As each electrical unit is switched on, the ammeter will indicate the total ampere draw of all the units including the battery For example, the maximum continuous load for night flying with radios on is about 30 amperes. The 30 ampere value plus 2 amperes for charging the battery will then show on the ammeter, indicating the alternator is functioning properly.

Solenoids, provided in the battery and starter circuits, are used to control high current drain functions remotely from the cabin.

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 RPM. Higher settings will damage the gyros and with a low setting the gyros will be unreliable..The regulator is located behind the instrument panel.,

*Serial nos. 75.35001 and up

AIRPLANE FLIGHT MANUAL

FOR

CHEROKEE ARROW

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-28R-200

AIRCRAFT SERIAL NO 28R-7535277 REGISTRATION NO. _____

AIRPLANE FLIGHT MANUAL, REPORT NUMBER VB-560 REVISION 2

PIPER AIRCRAFT CORPORATION
APPROVAL. SIGNATURE AND STAMP M. Keller

NOTE

THIS MANUAL MUST BE KEPT IN THE AIRPLANE AT ALL TIMES

FAA APPROVED BY: H. W. Barnhouse

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 AND FAR PART 21, SUBPART J

REPORT: VB-560
MQDEL: PA-28R-200

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AIRPLANE FLIGHT MANUAL LOG OF REVISIONS

Revision	Revised Pages	Description and Revision	FAA Appraved Date
1	Title	Added PAC Approval Form. (NOTE: AIRCRAFT DELIVERED WITH MANUALS PRIOR TO THIS REVISION DO NOT REQUIRE THIS REVISION.)	D H. Trompler March 25, i974
2	3-i	Added Item E., AutoControl IIIB to Supplements.	
	3-7	Added Gear Light Warning to Item 4. (b); Relocated Items 4. (c) and 4. (d).	
	3-8	Added Info from Page 3-7.	
	3-15	Added Item E., Installation of Piper AutoControl IIIB.	
	3-21, 3-22, 3-23. 3-24	Added pages (AutoControl IIIB Supplement info added).	D. H. Trompler June 18, 1974
	3-i	Revised Section IV Title (Supplements to Optional Equipment); deleted item B. (AutoControl III); revised existing item letters; added AutoControl III to new item D.	
	3-15	Revised Section IV Title (Supplements to Optional Equipment); revised Note; deleted item B. (AutoControl III); revised existing item letters; added AutoControl III to new item D.	
	3-17	Revised item A. (Electric Pitch Trim Installation) info.	
	3-18	Delete item B. (AutoControl III).	
	3-19	Revised item letter (C. to B.); revised item 2 b (1); added new item (2); revised existing item nos.	
	3-20	Revised item letter (D. to C.).	
	3-21	Revised item letter (E. to D.); added AutoControl III to Title.	Ward Evans
	3-24	Deleted IIIB designation from item nos. c. (I) and c. (2).	Ward Evans June 27, 1975

AIRPLANE FLIGHT MANUAL LOG OF REVISIONS (cont.)

Revision	Revised Pages	Description and Revision	FAA Approved Date
4	3-24	Revised Item c (1)	Ward Evans Ward Evans Dec. 8, 1975
5	3-1 3-11	Added Lycoming OI-360-C1C6 Engine and McCauley Propeller; added Tachometer Green Arc for McCauley prop. Added info to item B.1. (Emergency Landing Gear Extension).	Ward Evans Ward Evans Feb. 28, 1977
6	3-1	Revised item B.	Ward Evans Ward Evans Feb. 29, 1984
7	3-4 3-7, 3-8 3-11	Added placard note. Revised landing gear system operation. Revised emergency landing gear extension procedures.	D.H Trompler D.H Trompler May 14, 1987
8	3-11	Revised item B.1.(h).	Linda J. Dicken Linda J. Dicken Feb. 7,2005
9	3-1	Revised items C and D.	Linda J. Dicken Linda J. Dicken Oct 10,2005

SECTION 1

LIMITATIONS

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

A. ENGINE
Lycoming IO-360-C1C (Serial Nos. 28R-7435001 through 28R-7635516)
Lycoming IO-360-C1C6 (Serial Nos 28R-7635517 and up)

ENGINE LIMITS
For all operations 2700 RPM 200 HP

B. FUEL (AVGAS ONLY)
1001130 Octane Aviation Gasoline (Minimum)

C. PROPELLER - SIN 28R-74,35001 thru 28R-7635516	S/N 28R-7635517 and up
Hartzell HC-C2HK-1( )/7666A-2 or	McCauley B2D34C213/90DHA-16
Hartzell HC-C2YK-1( )F/F7666A-2	
Pitch Settings at 30 in. Station:	Pitch Settings at 30 i n Station:
High 29.0 ± 2.0	High 27.5 ± 0.5
Low 14 ± 0.2	Low 12.5 ± 0.2
Diameter: Maximum 74 inches	Diameter: Maximum 74 inches
Minimum 72.5 inches	Minimum 73 inches
(Avoid continuous operation	(Avoid continuous operation
2000-2350 RPM)	between 1500 and 1950 RPM
	below 15 inches manifold pressure.)

D. INSTRUMENT MARKINGS (Power Plant)

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)	14 PSI to 45 PSI
Red Line (Minimum)	14 PSI
Red Line (Maximum)	45 PSI

TACHOMETER	
Serial Nos. 28R-7435001 thru 28R-7635516	
Green Arc (Normal Operating Range)	500 to 2000 and 2350 to 2700 RPM
Red Arc	2000 to 2.350 RPM
Red Line (Maximum Continuous Power)	2700 RPM
Serial Nos. 28R-7635517 and up	
Green Arc (Normal Operating Range)	500 to 2700 RPM
Red Line (Maximum Continuous Power)	2700 RPM

E. AIRSPEED LIMITATIONS AND INSTRUMENT MARIUNGS (Calibrated Airspeed)

NEVER EXCEED SPEED	214 MPH
MAXIMUM STRUCTURAL. CRUISE SPEED	170 MPH
MANEUVERING SPEED	1.31 MPH
FLAPS EXTENDED SPEED	125 MPH
MAXIMUM GEAR EXTENSION SPEED	150 MPH
MAXIMUM GEAR RETRACTION SPEED	125 MPH

AIRSPEED INSTRUMENT MARKINGS

Red Radial Line (Never Exceed)	214 MPH (186 KT)
Yellow Arc (Caution Range)	170 MPH to 214 MPH
(Smooth Air Only)	(148 KT to 186 KT)
Green Arc (Normal Operating Range)	71 MPH to 170 MPH (62 KT to 148 KT)
White Arc (Flap Down Range)	64 MPH to 125 MPH (56 KT to 109 KT)

F. FLIGHT LOAD FACTORS

Positive Load Factor (Maximum)	3.8 G
Negative Load Factor (Maximum)	No inverted maneuvers approved

G. MAXIMUM WEIGHT 2650 LBS

H. BAGGAGE. CAPACITY 200 LBS

I. C. G. RANGE

Weight Pounds	Forward Limit Inches Aft of datum	Rearward Limit Inches Aft of Datum
2650	87.3	93.0
2300	82.0	93.0
1800	80.0	93.0

NOTES

1. Straight line variation between points given.
2. The datum used is 78.4 inches ahead of' the wing leading edge at the intersection of the straight and tapered section.
3. 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.

J. MANEUVERS

All acrobatic maneuvers including spins prohibited.

K. PLACARDS

In full view of the pilot:

"THIS AIRCRAFT APPROVED FOR NIGHT IFR NON–ICING FLIGHT WHEN EQUIPPED IN ACCORDANCE WITH FAR 91 OR FAR 135."

"THIS AIRCRAFT MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUALS."

In full view of the pilot, the following takeoff and landing check lists will be installed:

TAKEOFF CHECK LIST

Fuel on Proper Tank	Mixture - Set	Flaps - Set
Electric Fuel Pump - On	Propeller - Set	Trim Tab - Set
Engine Gauges - Checked	Fasten Belts/Harness	Controls - Free
Alternate Air - Closed		Door - Latched
Seat Backs Erect		Air Conditioner - Off

LANDING CHECK LIST

Fuel on Proper Tank	Electric Fuel Pump - On	Gear Down (150 MPH Max)
Seat Back Erect	Mixture - Rich	Flaps - Set (125 MPH)
Fasten Belts/Harness	Propeller - Set	Air Conditioner - Off

The "AIR CONDITIONER OFF" item in the above takeoff and landing check lists is mandatory for air conditioned aircraft only.

In full view of the pilot:

"NO ACROBATIC MANEIJVERS INCLUDING SPINS APPROVED."

On the instrument panel in full view of the pilot:

"MANEUVERING SPEED – 131 MPH."

On the instrument panel in full view of the pilot:

"DEMONSTRATED CROSSWIND COMPONENT – 20 MPH."

Adjacent to upper door latch:

"ENGAGE. LATCH BEFORE FLIGHT."

On the inside of the baggage compartment door:

"BAGGAGE MAXIMUM 200 LBS. SEE WEIGHT & BALANCE DATA FOR BAGGAGE LOADINGS BETWEEN 150 LBS AND 200 LBS."

Near emergency gear lever:

"EMERGENCY DOWN"

"OVERRIDE ENGAGED AUTO-EXT-OFF
LOCK PIN ON SIDE
TO ENGAGE OVERRIDE:
PULL LEVER FULL UP, PUSH LOCK PIN
TO RELEASE OVERRIDE:
PULL LEVER FULL UP & RELEASE,"

Near landing gear selector switch:

"GEAR UP	125 MPH MAX"
"DOWN	150 MPH MAX"

In full view of the pilot when AutoFlite is installed:

"FOR HEADING CHANGES: PRESS DISENGAGE SWITCH ON CONTROL WHEEL. CHANGE HEADING, RELEASE DISENGAGE SWITCH."

On the instrument panel in full view of the pilot when the oil cooler winterization kit is installed:

"OIL. COOLER WINTERIZATION PLATE TO BE REMOVED WHEN AMBIENT TEMPERATIJRE EXCEEDS 50° F."

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"

In full view of the pilot in the area of the air conditioner controls when the air conditioner is installed:

"WARNING - AIR CONDITIONER MUST BE OFF TO INSIJRE NORMAL TAKEOFF CLIMB PERFORMANCE."

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SECTION II

PROCEDURES

A. SYSTEM OPERATIONS

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

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

3. This airplane is equipped with an airspeed - power sensing system (back-up gear extender) which extends the landing gear under low airspeed - power conditions* even though the pilot may not have selected gear down. This system will also prevent retraction of the landing gear by normal means when the airspeed -power values are below a predetermined minimum. (See Item 5, Procedures Section.) To override this system or to hold the emergency gear lever in the override up position without maintaining manual pressure on the emergency gear lever, pull the lever full up and push the latch pin in. To release the override, pull lever up to disengage latch pin, then release lever.

   For normal operation, the pilot should extend and retract the gear with the gear selector switch located on the instrument panel, just as he would if the back-up gear extender system were not installed.

*Approximately 105 mph IAS at any altitude, power off.

4 Landing gear position indication and warning lights:

(a) The red gear warning light on the instrument panel and the horn operate simultaneously when:

(1) In flight, when the throttle is reduced to where the manifold pressure is approximately 14 inches of mercury or below, and tlie gear selector switch is not in the down position.

(2) In flight, when the back-up gear extender system has lowered tlie landing gear and the gear selector switch is not in the down position and the throttle is not full open.

(3) On the ground, when the master switch is on and the gear selector switch is in the up position.

(b) The three green lights on the instrument panel operate individually as each associated gear is locked in the extended position

WARNING

Panel light dimmer switch must be off to obtain gear lights iul! intensity during daytime flying When aircraft is operated at night and panel tight dimmer switch is turned on, gear lights will automatically dim.

(c) The yellow "In Transit" light on the instrument panel operates whenever any of the three gears is not in either the fully retracted position or the fully extended and locked position

(d) The yellow "Auto Ext. Off" light immediately below the gear selector switch flashes whenever the emergency gear lever is in the full up position.,

5. Takeoff considerations:

After takeoff, if the gear selector switch is placed in the gear up position before reaching the airspeed at which the back up gear extender system no longer commands gear down,* the gear will not retract. For' obstacle clearance on takeoff and for takeoffs from high altitude airports, the landing gear can be retracted at the pilot's discretion by placing the gear selector switch in the up position and then latching the emergency gear lever in the override up position. If desired, the override up position can be selected and latched before takeoff, and the gear will then retract as soon as the gear selector switch is placed in the up position. In this case care should be taken not to retract the gear prematurely, or the aircraft could settle back onto the runway., If the override lock is used for takeoff, it should be disengaged as soon as sufficient airspeed and terrain clearance are obtained, to return the gear system to normal operation.

*Approximately 85 mph IAS at sea level to approximately 100 mph IAS at 10,000 ft, with a straight line variation between.

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United States of America

Department of Transportation — Federal Aviation Administration

Supplemental Type Certificate

Number **SA5842NM**

This certificate, issued to Horizon Instruments, Inc.
556 S. State College Blvd.
Fullerton, CA, 92631

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part **3** *of the Civil* **Air** *Regulations.* Including amendment 3-7, and FAR 23 Amendment 23-41.

Original Product — Type Certificate Number 2A13

Make Piper Aircraft Corp.

Model PA28-140, -150, -151, -160, -161, -180, -181, -235, -236, -201T, R-180, R-200, R-201, R-201T, RT-201, RT-201T, S-160

Description of Type Design Change. Installation of an Engine Electronic Digital Tachometer, Horizon Model P-1000, P/N P100070- (Applicability table on continuation sheet) in Piper Aircraft Corp. PA28-140, -150, -151, -160, -161, -180, -181, -235, -236, -201T, R-180, R-200, R-201, R-201T, RT-201, RT-201T, and S-160 Series aircraft, in accordance with Horizon Instruments, Inc. Master Drawing List No. P100070, Rev. N/C, Dated June 22, 1992, and/or later FAA approved revision.

Limitations and Conditions Horizon Airplane Flight Manual Supplement No. 1, dated September 14, 1992, or The approval of this change in type design applies basically to the above listed airplane models only. This approval should not be extended to other specific airplanes of these models on which other previously approved modifications are incorporated unless it is determined by the installer that the interrelationship between this change and any of those previously approved modifications will introduce no adverse effect upon the airworthiness of the above listed airplanes.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application 07/30/92 *Date reissued*

Date of issuance 09/30/92 *Date amended* January 6, 1993

By direction of the Administrator

(Signature)

Acting Manager, Propulsion Branch
Los Angeles Aircraft Certification Office
(Title)

Any alteration of this certificate is punishable by a fine not exceeding [redacted] *or imprisonment not exceeding 3 years, or both*

This certificate may be [redacted] *in accordance with FAR 21.17*

FAA Form 8110-2 (10-68)

United States of America

Department of Transportation—Federal Aviation Administration

Supplemental Type Certificate

(Continuation Sheet)

Number SA5842NM

Applicability Table

~~Aircraft~~ Model	Serial Number Range	Horizon Tachometer Part Number
PA28-140	28-20002 - UP	P100070-408
PA28-150	28-03, 28-1 - UP	P100070-408
PA28-151	28-7415001 - UP	P100070-408
PA28-160	28-03, 28-1 - UP	P100070-408
PA28S-160	28-03, 28-1 - UP	P100070-408
PA28-161	28-7716001 - UP	P100070-408
PA28-180	28-671 - 28-1760	P100070-408, or P100070-402
	28-1571, 28-1573, 28-1761 - UP	P100070-408
PA28R-180	28R-30002 - UP	P100070-401
PA28-181	28-7690001 - UP	P100070-408 P100070-403
PA28-235	28-10003 - 28-11393 28-7110001 - UP	P100070-603
PA28-236	28-7911001 - UP	P100070-602
PA28R-200	28R30482, 28R-35001 - UP	P100070-407 P100070-406 P100070-408
PA28R-180	28R-30005 - UP	
PA28-201T	28-7921001 - UP	P100070-609
PA28R-201	28R-7737002 - UP	P100070-408
PA28R-201T	28R-7703001 - UP	P100070-609 P100070-608
PA28RT-201	28R-7918001 - 28R-7918267	P100070-408 P100070-403
PA28RT-201T	28R-7931001 - UP	P100070-609 P100070-603

- end -

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, a imprisonment not exceeding 3 years, or both

FAA FORM 8110-2-1 (10-69) *This certificate may be transferred in accordance with FAR 21 47*

C FAA AC 82-03478

Horizon Instruments, Inc.
600 S. Jefferson St, Unit C, Placentia, CA 92870
Ph. (714) 524-1919 Fx. (714) 524-5937

CONDITIONAL

Airplane Flight Manual Supplement
for a
Piper PA28R-200

This document, by no means, gives the authority to amend or add to any existing Pilot Owners Handbook. This document serves as an example of a Model P-1000 Electronic Digital Engine Tachometer Flight Manual Supplement, which must be approved by the FAA.

This document must be carried in the airplane at all times. It describes the operating procedures for the Horizon Model P-1000 Electronic Digital Engine Tachometer, PART NUMBER P100-200-422-00, SERIAL NUMBER 2008206, when it has been installed in accordance with Horizon Instruments, Inc. P/N P103050 Horizon Instruments, Inc. Model P-1000 Installation & Instruction Manual and FAA Form 337 dated _____

September 16, 2002

Horizon Instruments, Inc.
600 S. Jefferson St, Unit C, Placentia, CA 92870
Ph. (714) 5241919 Fx. (714) 5245937

LOG OF REVISED PAGES

Revision Number	Pages Attached	Description	FAA Approved	Date
--------	1-7	Original Issue		

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Section I. General: No Change

Section II. Limitations:

This table lists each engine operating range by the lowest RPM within the operating range. Ranges are listed in order from the highest (engine Red-line) on the left side of the table to the lowest on the right side. Note that an RPM range with no colored marking is denoted as a black, or "BLK", range.

TACHOMETER PART NUMBER P100-200-422-00
SERIAL NUMBER 2008206

RPM ARC PLACARDING

TOP ARC		ARC 2		ARC 3		ARC 4		LOWEST ARC		CY 1
RPM	COLOR	RPM	COLOR	RPM	COLOR	RPM	COLOR	RPM	COLOR	
2700	RED	2699 2350	GRN	2349 2000	RED	1999 500	GRN	----	----	4

PLACARDS

The face of the P-1000 tachometer is placarded with the Engine RPM Operating Range information that normally appears on the face of the mechanical tachometer. This includes the RED (restricted), YELLOW (cautionary or transient) and GREEN (normal) operation RPM ranges.

A placard is provided to label the newly installed circuit breaker for operation with the P-1000 tachometer. This placard is placed on the circuit breaker panel. Refer to Figure 1.

Figure 1, Circuit Breaker Placard

Section III. Emergency Procedures: No Change

Section IV. Normal Procedures:

The operation of the P-1000 Electronic Digital Engine Tachometer is straightforward. After power is supplied to the Tachometer, the engine is started, and the self-tests are performed, the default display of engine RPM appears on the display. The default display is insured via the use of internal timers that will restore the display to the current RPM even in the event that one of the panel buttons becomes stuck or defective.

Internally, (2) independent tachometers watch the pulses received from each magneto. Each tachometer is accurate to less than I RPM and can

be individually enabled/disabled via buttons on the face of the Tachometer, refer to items K and I on page 5 of 7.

Engine operating ranges are indicated on the large green, yellow, and red LEDs (Light Emitting Diode). See page 7, items D, E, and F. Three small LED magneto system *alert* indicator lights are located within the **"Status"** area on the upper left corner of the Tachometer face, see items A, B, and C on page 7, figure *2.* The left and right red LED *alert* indicator lights, when illuminated, indicate, because of a loss of the ignition signal to the Tachometer, a possible malfunction of the respective left or right magneto ignition system.

While performing a magneto check during engine run-up, the red *alert* indicator lights will illuminate, thus identifying the grounding of the respective right or left magneto systems.

IGNITION SWITCH POSITION	TACHOMETER MAGNETO ALERT INDICATOR LIGHTS	
	LEFT STATUS LED	RIGHT STATUS LED
OFF	ON	ON
RIGHT	ON	OFF
LEFT	OFF	ON
BOTH	OFF	OFF

Between the left and right red magneto ignition system *alert* indicators is a yellow "RPN **Synchronization"** indicator. 'This small yellow indicator is illuminated when there is a difference of more than 80 RPM between the right and left tachometers. This indicator also may flicker during extreme RPM excursions of the engine.

There are three panel buttons, see items J, K, and I on page 7, figure *2.* Each button has two modes of operation:

- Press-and-hold,
- Press-and-release.

Press-and-hold button operations instruct the Tachometer to perform a *specific operation* when a button is pressed and held for more than 2/3 of a second. Press-and-hold button operations are placarded on the face of the Tachometer above each button.

Similarly, press-and-release button operation instructs the Tachometer to perform a specific operation when a button is pressed and released in less than 2/3 of a second. Press-and-release button operations are placarded on the face of the Tachometer below each button.

PRESS AND HOLD OPERATIONS

The left button, K, upon depression, will cause the Tachometer to display the non-fractional portion (0000.) of the current accumulated engine hours. When the button is released, the fractional part of the engine hours (.00) is displayed for a short period of time. The clock is started whenever the engine RPM exceeds 800 RPM and is recorded in real hours.

The right button, L, upon depression, will cause the Tachometer to display the current contents of the RPN **trap.** This trap records the highest engine RPM achieved before the button was pressed. The middle button, J, upon depression, clears the RPM trap. During depression of the switch, the RPM trap is zeroed. When the button is released, the trap will record the current engine RPM.

PRESS AND RELEASE OPERATIONS

During normal operation, the Tachometer presents the average of the left and right internal tachometers on the display. However, a mechanism exists to **mask** either tachometer from the display, leaving the remaining tachometer **to** display its RPM.

The regular flashing of the right or left signal loss status indicator LEDs indicates a masked tachometer. This feature is handy when attempting to determine magneto/ignition problems.

Quickly pressing and releasing the left button, K, causes the Tachometer to mask or un-mask the left internal tachometer.

Quickly pressing and releasing the right. button, L, causes the Tachometer to mask or un-mask the right internal tachometer.

An internal interlock prevents masking both internal tachometers at the same time, therefore preventing total loss of RPM indication.

If the tachometer is masked, pressing the button will un-mask it and allow its RPM to show on the display, and conversely, if the tachometer is un-masked, pressing the button will mask it from the display.

Quickly pressing and releasing the center button, 3, causes the Tachometer to alternately dim or brighten the LED indicators.

The LED indicators, see items A thru F, are bright enough to overcome daylight washout conditions. However, during night operations the large

green, yellow, and small red and yellow LEDS are **dim-able.** The large red LED still operates at full intensity to maximize the possibility of gaining pilot attention during excursion into restricted rpm ranges.

Section V. Performance: No Change

Section VI. Weight & Balance and Equipment List: Negligible Change

Section VII. System Description

The Horizon Instruments' Model P-1000 Electronic Digital Engine Tachometer is an electronic replacement for the existing mechanical cable-driven tachometer.

The Tachometer differs from the existing mechanical tachometer in the following areas:

The Tachometer is fully electronic and uses timing information from the primary leads ("P-Leads") of both the left-hand and right-hand magneto ignition systems, operating the P-1000's internal left and right tachometers, to determine engine rpm instead of a rotating cable driving a magnetic slip-clutch analog type display.

The Tachometer uses super bright LED indicators to indicate normal range engine operation (Green LED), cautionary range operation (Yellow LED), and do-not-exceed or restricted range RPM (Red LED) as substitutes for the ranges normally painted on the tachometer dial.

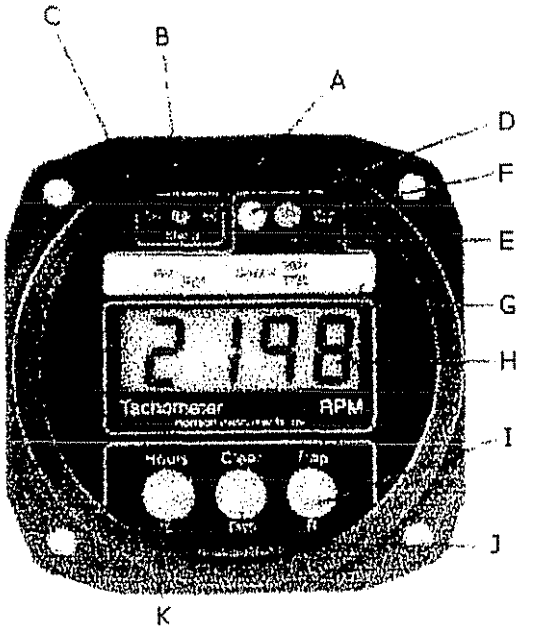
The primary display consists of four 1/2" high characters on a backlit Liquid Crystal Display (LCD), easily and clearly visible in daylight and night flying.

Diagnostic features available include: *alert* indication of **loss** of magneto signal, indication that both magnetos are reporting different rpm, and the ability to mask RPM from either magneto.

Magneto test, via the ignition switch, is indicated by the illumination of the grounded magneto system's *alert* light and the display of the amount of RPM that the engine has slowed. This is indicated as a negative number on the display (number is preceded by a leading hyphen or minus sign).

LED indicators are dim-able (except the restricted or red-light indicator) to reduce pilot annoyance during night flying.

A specific engine hour is preset at the factory to accommodate Tachometer changes on non-zero-time engines. Only Horizon Instruments, Inc may change engine time.



A) Right Magneto Signal Loss Indicator

B) RPM Sync Loss Indicator

C) Left Magneto Signal Loss Indicator

D) Normal Operating Green RPM Mark

E) Cautionary Yellow RPM Arc Indicator

F) Restricted Red RPM Arc Indicator

G) Placard Area

H) 4 Digit LCD Display

I) Right switch for Overspeed Trap display and right tachometer enable/disable.

J) Middle switch for Overspeed Trap Clear and LED dimming.

K) Left switch for engine hours display and left tachometer enable/disable.

Figure 2, P-1000 Features

Section MII. Additional Information

For additional information about the operation and installation, refer to Horizon Instruments, Inc. Document Number P103050 Horizon Instruments, Inc. Model P-1000 Installation & Instruction Manual.

The exterior of the P-1000 is nameplated with all pertinent operational and configuration information referred to in Figure 3.

Horizon Instruments, Inc
600 S. Jefferson St., Unit C
Placentia, CA 92870, USA
Model P-1000 Digital Tachometer
H/W P/N: P100-200-422-00
S/W P/N: P132001, Vers, 1.06
6-30 VDC, 150ma max, ½ lb
Serial Number: 2008206
Red Arc: 2700 - UP
Green Arc: 2699 - 2350
Red Arc: 2349 - 2000
Green Arc: 1999 - 500
04 Cylinder
Patent Number: 4,811,255

Figure 3 Example of Product Identification Nameplate

US Propeller Service of Connecticut
P.O. Box 415 Goodspeed Airport
East Haddam, Connecticut 06423-0415

FAA APPROVED
Aircraft Flight Manual Supplement For:
Piper PA-28R-200, PA-28R-201, PA-28RT-201
Make & Model of Aircraft
Registration. No.: _____
Serial No.: _____

This supplement must be attached to FAA Approved Aircraft Flight Manual for the Piper PA-28R-200, PA-28R-201 & PA-28RT-201, when a McCauley Propeller Model C3D36C415/82NGA-8 and McCauley Spinner Assembly information contained herein supplements or supersedes the basic manual only on those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Aircraft Flight Manual.

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

Engines:
Lycoming IO-360-C1C
Lycoming IO-360-C1C6

Propeller and propeller limits:
McCauley constant speed:
Hub model: C3D36C415
Blade model: 82NGA-8
Angles: At 30" station
Low: 10.9 deg.
High: 33.8 deg.
Diameter: Not over 74", not under 72.5".

Propeller Spinner:
McCauley model: D5992

Powerplant Instrument Markings:
Tachometer:

green ARC	–	Normal	–	500 RPM	–	1900 RPM
yellow ARC	–	Caution	–	1900 RPM	–	2350 RPM
green ARC	–	Normal	–	2350 RPM	–	2700 RPM
red Radial	–	Maximum	–	2700 RPM		

Date: April 18, 1989
Revised: October 23, 1990
Revised: June 9, 1992

US PROPELLER SERVICE of CONNECTICUT
PO BOX 415 GOOUSPEED AIRPORT
EAST HAUDAM, CT 06423-0415

I. Limitations: (continued):
Placard:
On the instrument panel, between tachometer and manifold pressure guages station:

"Avoid continuous operation below 15 inches HG between 1900 RPM and 2350 RPM."

II. Procedures:
No changes.

11I. Performance:
No chanaes.

FAA APPROVED _____

Manager
Boston Aircraft Certification Office
FAA
New England Region
Burlington, MA

DATE: April 18,1989
REVISED: October 23,1990
June 9,1992

REVISION NO.	PAGES REVISED	REMARKS	DATE	FAA APPROVED
1	1,2	ACD PA-28R-201	10-23-90	Manager, BOSTON ACO
2	1, 2	Add: PA-28RT-201	6-9-92	Manager, Boston ACO

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT
OR
SUPPLEMENTAL FLIGHT MANUAL
FOR

AIRCRAFT MODEL: PA28R-200

SERIAL NUMBER: 28R-7535277

REGISTRATION NUMBER: N8HN

This supplement must be attached to the FAA approved Airplane Flight Manual, when the Precise Flight Standby Vacuum has been installed in accordance with STC(s).

SA2160NM, SA2161NM, SA2162NM, SA2164NM, SA2167NM, SA2168NM, SA2683NM - Aircraft

&

SE1779NM - Lycoming Engine

or

SE1780NM - Continental Engine

The information contained in this document supplements or supersedes the basic manual only in those areas listed. For Limitations, Procedures. and Performance information not contained in this supplement, consult the basic Airplane Flight Manual.

FAA APPROVED: _____

Manager,
Special Certification Branch
Seattle Aircraft Certification Office

DATE OF APPROVAL: Feb. 4, 2000

SYSTEM DESCRIPTION

A Precise Flight Standby Vacuum System may be installed to provide a temporary vncuum system in the event of a primary vacuum failure. The Standby Vacuum System operates on the differential between the intake manifold and ambient air pressure and is directed through a shuttle valve system to drive your flight instruments.

CAUTION: The use of the Standby Vacuum System requires a degree of Pilot skill end proficiency that is best maintained through practice. It is recommended, upon recurrent IFR training, in VFR conditions, in the presence of a CFI, that the aircraft be flown at the RPM and or Manifold Pressure settings found on the required placard and entered in this AFMS. This procedure will familiarize the pilot with limitations of using engine manifold vacuum for instrument power and maintaining level flight

I. OPERATING LIMITATIONS

A. INSTRUCTIONS

1. The Standby Vacuum System is for emergency or standby use only and not for dispatch purposes.
2. Vacuum powered and/or Vacuum gyro directed autopilot operation may be unreliable when the Standby Vacuum System is the sole source of vacuum. Vacuum powered or vacuum gym directed autopilot should be OFF when operating with a failed primary vacuum system
3. The Supplemental Vacuum System is not designed to operate pneumatic de-ice systems. DO NOT operate a pneumatic de-ice system when operating with a failed primary vacuum system.
4. Above 10,000 ft. pressure altitude. engine power settings may have to be significantly reduced to provide adequate vacuum power for proper gyro instrument operation.
5. The following placards are required to be in full view of pilot:

I. OPERATING LIMITATIONS (CONT.)

B. PLACARDS

Placard to be located on the push/pull control cable

Placard to be located around the LED for the pump inop warning light.

Placard to be placed in front and in full view of the pilot.

STANDBY VACUUM SYSTEM EQUIPPED: FOR OPERATING INSTRUCTIONS AND LIMITATIONS SEE SUPPLEMENT IN OWNERS MANUAL OR PILOTS OPERATING HANDBOOK

I. OPERATING LIMITATIONS (CONT.)

B. PLACARDS

One of the following placards must be placed in full view of the pilot near the instrument vacuum indicator after appropriate entries have been made.

Approximate Standby Vacuum Available - Altitude - Power Chart for aircraft with Constant Speed Propeller - Maximum Continuous RPM.

PRESS ALT. (FT.)	RPM	MAN. PRESSURE	SVS VACUUM IN. HG MIN.
2000	Max. Cont.		
4000	Max. Cont.		
6000	Max. Cont		
8000	Max. Cont.		
10,000	Max. Cont.		

Approximate Standby Vacuum Available - Altitude - Power Chart for aircraft with a Fixed Pitch Propeller

PRESS ALT. (FT.)	RPM	SVS VACUUM IN. HG MIN.
2000		
4000		
6000		
8000		
10,000		

II. OPERATING PROCEDURES

A. NORMAL PROCEDURES

1. GROUND CHECK

a Cycle the Standby Vacuum Control Knob OUT - ON - ,and return Control Knob IN - OFF - position.

2. BEFORE TAKEOFF

a Idle Engine at low speed, momentarily pull the standby vacuum knob OUT - ON -and check vacuum gauge. Normally, the vacuum reading will be slightly higher. After checking system push Standby Vacuum System knob IN - OFF -. Check that vacuum gauge has returned to the previous reading.

3. ENROUTE

a. Regularly check vacuum gauge and monitor warning light for proper vacuum system operation.

B. EMERGENCY PROCEDURES

1. PRIMARY VACUUM FAILURE WARNING LIGHT ILLUMINATES

a. Pull the Standby Vacuum System knob OUT -ON- and adjust throttle setting as required to maintain adequate vacuum for the primary instruments - Suction Gauge Reading in the Green Arc - If necessary descend to a lower altitude to obtain a larger differential between manifold and ambient pressure. Vacuum power must be closely monitored by checking the vacuum gauge Frequently.

b. The SVS is not designed fur continued IFR flight. Immediate steps should be taken to return to VFR conditions or to land. If this is not possible, IFR flight should be continued only as long as necessary to return to VFR conditions or land the airplane.

WARNING: FAILURE OF THE VACUUM SYSTEM STILL CONSTITUTES AN EMERGENCY SITUATION REGARDLESS OF THE INSTALLATION OF THE SVS. IT MAY NOT BE POSSIBLE TO MAINTAIN A SAFE ALTITUDE AND MAKE USE OF THE SVS. IN SUCH A SITUATION THE AIRPLANE MUST BE FLOWN USING NON-VACUUM POWERED INSTRUMENTS.

B. EMERGENCY PROCEDURES (CONT.)

c. If descent is impractical:

Periodically and temporarily reduce power as required to provide adequate vacuum to the aircraft primary instruments.

- Reapply power as required, while comparing vacuum driven gyms against the Turn and Bank Indicator, Turn Coordinator, VSI and/or other flight instruments.

When an obvious discrepancy is noted between the vacuum driven instruments and other flight instrumentation. Periodically and temporarily reduce power as required to provide adequate vacuuln to the aircraft primary instruments.

III. PERFORMANCE

NO CHANGE

- - END - -

B. EMERGENCY PROCEDURES

1. Emergency landing gear extension instructions:
Accomplish the following check prior to initiation of the emergency extension procedures:
(a) Master Switch - Check On
(b) Circuit Breakers - Check
(c) Panel Lights - Off (in daytime)
(d) Gear Indicator Bulbs - Check

If landing gear does not check down and locked:
(e) Reduce airspeed below 100 mph.
(f) Move landing gear selector switch to gear down position.
(g) If gear has failed to lock down, on aircraft equipped with the backup gear extender, raise emergency gear lever to "Override Engaged" position.
(h) If gear has still failed to lock down, move and ***hold*** emergency gear lever down to "Emergency Down" position.
(i) If gear has still failed to lock down, yaw the airplane abruptly from side to side with the rudder.

If the nose gear will not lock down using the above procedure, slow the aircraft to the lowest safe speed attainable using the lowest power setting required for safe operation and accomplish the following:
(j) On aircraft equipped with backup gear extender, raise emergency gear lever to "Override Engaged" position.
(k) Move landing gear selector switch to gear down position.

If landing gear does not check down, recycle gear through up position, and repeat (k).

When the Emergency Landing Gear Extension Procedure is performed for training purposes, the following changes must be made to the procedure in order to prevent the hydraulic pump from activating during the procedure. On aircraft equipped with the backup gear extender, the landing gear selector must be left in the UP position until all gear position indicators are green. On aircraft which do NOT have the backup gear extender a pull type LANDING GEAR PUMP circuit breaker is installed and must be pulled prior to executing the emergency extension procedure. The circuit breaker must be reset after the completion of the procedure to allow normal gear system operation.

2. Gear up emergency landing:
In the event a gear up landing is required, proceed as follows:
(a) On aircraft equipped with the backup gear extender, lock emergency gear lever in "Override Engaged" position before airspeed drops to 115 mph to prevent landing gear from inadvertently free falling.
(b) Flaps as desired.
(c) Close throttle and shut off the master and ignition switches.
(d) Turn the fuel selector valve to OFF.
(e) Contact surface at minimum possible airspeed.

NOTE

With the master switch off, the landing gear cannot be retracted.

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SECTION III

PERFORMANCE

A. STALLS

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 2650 pounds.

Loss of altitude during stalls varied from 100 to 300 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 (gear down)	71	73	81	88	100
Flaps down (gear down)	64	66	73	80	90

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SECTION IV

SUPPLEMENTS

NOTE

A FLIGHT MANUAL SUPPLEMENT IS REQIJIRED TO BE IN THE AIRPLANE FLIGHT MANUAL ONLY IF THE EQUIPMENT WHICH IS THE SUBJECT OF THE SUPPLEMENT IS INSTALLED

A. Electric Pitch Trim Installation

B. AutoControl III Installation

C. AutoFlite II Installation

D. Air Conditioner Installation

E. Installation of Piper AutoControl IIIB

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A. ELECTRIC PITCH TRIM INSTALLATION

1. LIMITATIONS

There are no Limitations for this installation.

2. PROCEDURES

a. Preflight

(1) Circuit breaker - Set
(2) Operate rocker switch - Trim fore and aft
(3) Manually override electric trim
(4) Check manual trim operation
(5) If trim fails preflight, disengage electric trim by operating push button trim switch on instrument panel until repaired. If trim does not disengage have unit repaired before further flight.

b Inflight

(1) Activate rocker fore-aft trim

3. EMERGENCY OPERATION

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

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

c In cruise configuration, a malfunction can result in a 10° pitch change and 200 ft altitude variation.

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

B. AUTOCONTROL III INSTALLATION

1. LIMITATIONS

a. Autopilot use is prohibited above 200 MPH-CAS

b. Autopilot "OFF" for takeoff and landing

2. PROCEDURES

a Normal Operation

Refer to the current AutoControl III Owner's Handbook.

b. Emergency Operation

(1) In an emergency, the AutoControl III can be disconnected by

(a) Pushing the roll "ON-OFF" switch to "OFF."

(b) Turning aircraft Master Switch "OFF."

(2) The AutoControl III can be overpowered at either control wheel.,

(3) An autopilot runaway, with a 3 second delay in the initiation of recovery, while operating in a climb, cruise or descending flight could result in a 50° bank and a 190 foot altitude loss.

(4) An autopilot runaway, with a 1 second delay in the initiation of recovery, during an approach operation, coupled or uncoupled, could result in a 15" bank and a 40 foot altitude loss.

3. PERFORMANCE

The airplane performance remains unchanged

C AUTOFLITE II INSTALLATION

1. LIMITATIONS

a. Autopilot use is prohibited above 200 MPH-CAS

b. Autopilot "OFF" for takeoff and landing

2. PROCEDURES

a. Normal Operation

Refer to the current AutoFlite II Owner's Handbook

b. Emergency Operation

(1) In an emergency, the AutoFlite I1 can be disconnected by

(a) Pressing disconnect switch on pilot's control wheel.

(b) Rocker switch on instrument panel - OFF

(2) Unit may be overpowered manually at either control wheel.

(3) An autopilot runaway, with a **3** second delay in the initiation of recovery, while operating in a climb, cruise or descending flight could result in a 50° bank and a 190 foot altitude loss.

(4) An autopilot runaway, with a I second delay in the initiation of recovery, during an approach operation, coupled or uncoupled, could result in a 15° bank and a 40 foot altitude loss.

3. PERFORMANCE

The airplane performance remains unchanged.

D. AIR CONDITIONER INSTALLATION

1 LIMITATIONS

Air Conditioner "OFF" for takeoff and landing.

2 PROCEDURES

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

a. Check aircraft master switch on

b. 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.

c. 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.

d. 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 inflight failure is suspected.,

3. PERFORMANCE

a. 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.

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

E. INSTALLATION OF PIPER AUTOCONTROL IIIB

1. LIMITATIONS
   a Autopilot OFF during takeoff and landing
   b. Autopilot use prohibited above 200 MPH CAS

2. PROCEDIJRES
   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
      (I) 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)

c. EMERGENCY OPERATION

(1) In an emergency the AutoControl can be disconnected by:
   (a) Placing the A/P ON/OFF switch to the "OFF" position.
   (b) Pulling the Autopilot circuit breaker (aircraft S/N 28-7635001 and up).

(2) The AutoControl can be overpowered at either control wheel.

(3) An Autopilot runaway, with a **3** second delay in the initiation of recovery, while operating in a climb, cruise or descending flight could result in a 45° bank and 150 foot altitude loss.

(4) An Autopilot runaway, with a 1 second delay in the initiation of recovery, during an approach operation, coupled or uncoupled, could result in a 15° bank and 50 foot altitude loss.

3. PERFORMANCE

No change.

EMERGENCY PROCEDURE

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EMERGENCY PROCEDURES

INTRODUCTION

This section contains procedures that are recommended if an emergency condition should occur during ground operation, take-off, or in-flight. These procedures are suggested as the best course of action for coping with the particular condition described, but are not a substitute for sound judgment and common sense. Since emergencies rarely happen in modern aircraft, their occurrence is usually unexpected, and the best corrective action may not always be obvious. Pilots should familiarize themselves with the procedures given in this section and be prepared to take appropriate action should an emergency arise.

Most basic emergency procedures, such as power off landings, are a part of normal pilot training Although these emergencies are discussed here, this information is not intended to replace such training, but only to provide a source of reference and review, and to provide information on procedures which are not the same for all aircraft. It is suggested that the pilot review standard emergency procedures periodically to remain proficient in them

In the procedures that follow, critical actions with respect to time are indicated by use of bold print; these actions should be perfbrmed immediately if the emergency condition is not to be aggravated. The remaining procedures are non-critical in the sense that time is usually available for consulting the check list.

ENGINE FIRE, DURING START

Refer to FIRE emergency procedures

ENGINE POWER LOSS DURING TAKE-OFF

The proper action to be taken if loss of power occurs during take-off will depend on circumstances.

1. If sufficient runway remains for a normal landing, leave the gear down and land straight ahead.
2. If the area ahead is rough, or if it is necessary to clear obstructions, put gear selector switch in the "UP" position, and latch the gear lever in the override position.
3. If you have gained sufficient altitude to attempt a restart, proceed as follows:
   a. MAINTAIN SAFE AIRSPEED
   b. FUEL SELECTOR - SWITCH TO ANOTHER TANK CONTAINING FUEL
   c. ELECTRIC FUEL PUMP - CHECK ON
   d. MIXTURE - CHECK RICH
   e. ALTERNATE AIR - ON
   f. EMERGENCY GEAR LEVER - AS REQUIRED

NOTE

The landing gear will extend automatically when engine power fails at speeds below approximately 105 MPH IAS. Glide distance with the gear extended is roughly halved; if conditions dictate, the gear can be retained in the retracted position by latching the lever in the override up position

NOTE

If engine failure was caused by fuel exhaustion, power will not be regained after tanks are switched until empty fuel lines are filled, which may require up to ten seconds.

If power is not regained, proceed with the POWER OFF LANDING procedure.

ENGINE POWER LOSS IN FLIGHT

Complete engine power loss is usually caused by fuel flow interruption, and power will be restored shortly after fuel flow is restored. If power loss occurs at low altitude, the first step is to prepare for an emergency landing (See POWER OFF LANDING). Maintain an airspeed of at least 110 MPH IAS, gear and flaps up and if altitude permits proceed as follows:

1. Fuel Selector - Switch to another tank containing fuel.
2. Electric Fuel Pump - On
3. Mixture - Rich
4. Alternate Air - On
5. Engine Gauges - Check for indication of the cause of power loss.
6. If no fuel pressure is indicated, check tank selector position to be sure it is on a tank containing fuel.

When power is restored:

7. Alternate Air - Off
8. Electric Fuel Pump - Off

If the above steps do not restore power, prepare for an emergency landing. If time permits:

1. Ignition Switch - "L" then "R" then back to "BOTH."
2. Throttle and Mixture - Different settings. (This may restore power if problem is too rich or too lean a mixture, or partial fuel system restriction.
3. Try another fuel tank. (Water in the fuel could take some time to be used up, and allowing the engine to windmill may restore power. If power loss is due to water, fuel pressure indications will be normal).

NOTE

If engine failure was caused by fuel exhaustion, power will not be restored after tanks are switched until empty fuel lines are filled, which may require up to ten seconds.

If power is not restored, proceed with POWER OFF LANDING procedures

POWER OFF LANDING

If loss of power occurs at altitude, trim the aircraft for best gliding angle (105 MPH IAS) (Air Cond. off) and look for a suitable field. (See Note) If measures taken to restore power are not effective, and if time permits, check your charts for airports in the immediate vicinity: it may be possible to land at one if you have sufficient altitude. At best gliding angle, with the engine windmilling, and the propeller control in full "decrease RPM," the aircraft will travel approximately 1 6 miles for each thousand feet of altitude. If possible, notify the FAA by radio of your difficulty and intentions. If another pilot or passenger is aboard, let him help.

When you have located a suitable field, establish a spiral pattern around this field. Try to be at 1000 feet above the field at the downwind position, to make a normal landing approach. When the field can easily be reached, slow to 90 MPH IAS for the shortest landing. Excess altitude may be lost by widening your pattern, using flaps or slipping, or a combination of these.

Wliethcr to attempt a landing with gear up or down depends on msny factors. If the field chosen is obviously smooth and firm, and long enough to bring the plane to a stop, the gear should be down If there are stumps or rocks or other large obstacles in the field, the gear in the down position will better protect the occupants of the aircraft. If, however, the field is suspected to be excessively soft or short, or when landing in water of any depth, a wheels-up landing will normally be safer and do less damage to the airplane.

Don't forget that at airspeeds below approximately 105 MPH IAS the gear will free fall, and will lake six to eight seconds to be down and locked. If a gear up landing is desired, it will be necessary to latch the override lever in the up position before airspeed drops to 115 mph to prevent landing gear from inadvertently free falling.

Touchdown should normally be made at the lowest possible airspeed

GEAR DOWN LANDING

For a gear down landing, proceed as follows when committed to landing:

1 Close throttle and shut off the master and ignition switches
2 Flaps as desired
3 Turn the fuel selector valve to off
4 Mixture - Idle cut-off
5 Tighten seat belt (and shoulder harness, if available)
6 Touchdown at lowest possible airspeed

NOTE

Automatic gear mechanism will extend tlie gear below approximately 105 MPH IAS with power off Be prepared to latch the emergency override lever UP before airspeed drops to 115 mph to prevent landing gear from inadvertently free falling, unless gear extension is desired.

NOTE

With the master switch off, the landing gear cannot be retracted

PROPELLER OVERSPEED

Propeller overspeed is caused by a malfunction in the propeller governor, or low oil pressure, which allows the propeller blades to rotate to full low pitch. If this should occur, proceed as follows:

1. THROTTLE - RETARD.
2. OIL PRESSURE - CHECK.
3. PROPELLER CONTROL - FULL DECREASE RPM, THEN SET IF ANY CONTROL AVAILABLE.
4. REDUCE AIRSPEED.
5. THROTTLE - AS REQUIRED TO REMAIN BELOW 2700 RPM

EMERGENCY LANDING GEAR EXTENSION

Accomplish the following checks prior to initiation of the emergency extension procedure:

1. Master Switch - Check On.
2. Circuit Breakers - Check.,
3. Panel Lights - Off (in daytime).
4. Gear Indicator Bulbs - Check.

If landing gear does not check down and locked:

5. Reduce airspeed below 100 mph.
6. Move landing gear selector switch to gear down position.
7. If gear has failed to lock down, on aircraft equipped with the backup gear extender, raise emergency gear lever to "Override Engaged" position.
8. If gear has still failed to lock down, move and ***hold*** emergency gear lever down to Emergency Down position.
9. If gear has still failed to lock down, yaw the airplane abruptly from side to side with the rudder.

NOTE

If all electrical power has been lost, the landing gear must be extended using the above emergency procedures. The landing gear position indicator lights will not be operative.

NOTE

Refer to page 3-11 for differences when emergency extension procedure is performed for training purposes.

SPINS

Intentional spins are prohibited in this aircraft. If a spin is inadvertently entered, immediately use the following recovery procedures:

1. THROTTLE - IDLE.
2. RUDDER - FULL OPPOSITE TO DIRECTION OF ROTATION.
3. CONTROL WHEEL - FULL FORWARD.
4. RUDDER - NEUTRAL (WHEN ROTATION STOPS).
5. CONTROL WHEEL - AS REQUIRED TO SMOOTHLY REGAIN LEVEL FLIGHT ATTITUDE.

NOTE

On aircraft equipped with the backup gear extender, the landing gear will extend in this flight condition, but will retract during recovery, and has no adverse affect on the spin characteristics.

OPEN DOOR

The cabin door on the Cherokee Arrow II is latched at four points so the chances of its opening in flight are remote. However, should you forget to completely close or latch the door, it may open partially. This will usually happen soon after take-off. An open door will not affect the normal flight characteristics, and a normal landing can be made with it open. If the door opens it will trail in a slightly open position, and the airspeed will be reduced slightly.,

To close the door in flight, proceed as follows:

1. Slow aircraft to 100 mph IAS.
2. Cabin Vents - Close.
3. Storm Window - Open.
4. If upper latch is open - latch. If lower latch is open - open top latch, push door further open, and then close rapidly. Latch top latch.

A slip in the direction of the open door will assist in latching procedure

FIRE

The presence of fire is noted through smoke, smell, and heat in the cabin It is essential that the source of the fire be promptly identified through instrument readings, character of the smoke. or other indications, since the action to be taken differs somewhat in eaclt case.

1 Source of Fire - Check
   a. Electrical Fire (Smoke in Cabin):
      (1) Master Switch - Off
      (2) Vents - Open
      (3) Cabin Heat - Off
      (4) Land as soon as practicable.

   b. Engine Fire:
      (1) In case of engine fire in flight
         (a) Fuel Selector - OFF
         (b) Throttle -CLOSE
         (c) Mixture - IDLE CUT OFF
         (d) Heater - Off (In all cases of fire)
         (e) Defroster - OFF (In all cases of fire)
         (f) If terrain permits - Land Immediately

The possibility of an engine fire in flight is extremely remote. The procedure given above is general and pilot judgement should be the deciding factor fbr action in such an emergency.

      (2) In case of engine fire on the ground
         (a) If engine has not started
            1. Mixture - IDLE CUT OFF
            2. Throttle -OPEN
            3. Turn engine with starter (This is an attempt to pull the fire into the engine.)
         (b) If engine has already started and is running, continue operating to try pulling the fire into the engine.
         (c) In either case stated in (a) and (b), if the fire continues longer than a few seconds, the fire should be extinguished by the best available external means.
         (d) If external fire extinguishing is to be applied
            1. Fuel Selector Valves - OFF
            2. Mixture - IDLE. CUT OFF

LOSS OF OIL PRESSURE

Loss of oil pressure may be either partial or complete. A partial loss of' oil pressure usually indicates a malfunction in the oil pressure regulating system, and a landing should be made as soon as possible to investigate the cause and prevent engine damage..

A complete loss of oil pressure indication may signify oil exhaustion or may be the result of a faulty gauge In either case, proceed toward the nearest airport, and be prepared for a fbrced landing. if the problem is not a pressure gauge malfunction, the engine may stop sud'enly. Maintain altitude until such time as a dead stick landing can be accomplished. Don't

change power settings unnecessarily, as this may hasten complete power loss

Depending on the circumstances, it may be advisable to make an off airport landing while power is still available, particularly if other indications of actual oil pressure loss, such as sudden increase in temperatures, or oil smoke, are apparent, and an airport is not close.

If engine stoppage occurs, proceed to POWER OFF LANDING.

LOSS OF FUEL PRESSURE

1. Electric Boost Pump - On.
2. Mixture Control Forward.,
3. Fuel Selector - Check on full tank

If problem is not an empty fuel tank, land as soon as practicable and have the fuel system checked.

HIGH OIL TEMPERATURE

An abnormally high oil temperature indication may be caused by a low oil level, an obstruction in the oil cooler, damaged or improper baffle seals, a defective gauge, or other causes. Land as soon as practicable at an appropriate airport, and have the cause investigated.

A steady, rapid rise in oil temperature is a sign of trouble. Land at the nearest airport and let a mechanic investigate the problem. Watch the oil pressure gauge for an accompanying loss of pressure.

ALTERNATOR FAILURE

Loss of alternator output is detected through a zero reading on the ammeter. Before executing the following procedure, insure that the reading is zero and not merely low by actuating an electrically powered device, such as the landing light. If no increase in the ammeter reading is noted, alternator failure can be assumed.

1. Reduce electrical load.
2. Alternator Circuit Breakers - Check.
3. "Alt" Switch - Off (for 1 second), then On.

If the ammeter continues to indicate no output, or alternator will not stay reset, turn off "Alt" switch, maintain minimum electrical load, and land as soon as practical. All electrical power is being supplied by the battery.

NOTE

If the battery is fully discharged, the gear will have to be lowered using the "EMERGENCY LANDING GEAR EXTENSION" procedure, and the position lights will of course not be operating.

WEIGHT AND BALANCE

FOR

CHEROKEE ARROW

WARNING

EXTREME CARE MUST BE EXERCISED TO LIMIT THE USE OF THIS REPORT TO APPLICABLE AIRCRAFT THIS REPORT 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-28R-200

AIRCRAFT SERIAL NO 28R-7535277 REGISTRATION NO _____

WEIGHT AND BALANCE, REPORT NUMBER VB-549 REVISION 3

PIPER AIRCRAFT CORPORATION
APPROVAL SIGNATURE AND STAMP _____

ISSUED: MAY 14, 1973
REVISED: MARCH 25, 1974

REPORT: VB-549
MODEL: PA-28R-200

WEIGHT AND BALANCE

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WEIGHT AND BALANCE LOG OF REVISIONS

Revision	Revised Pages	Description and Revision	Approved Date
1	5-8	Revised Fuel Capacity on Sample Problem.	Oct. 29, 1973
	5-14	Revised Battery and Voltage Regulator Weights and Moments.	
	5-18	Revised Toe Brake Weight and Moment.	
	5-21	Revised Battery Weights and Moment.	
	5-26	Revised Selector Panel and Marker Beacon Weights, Arms and Moments.	
	5-28	Revised -10 and -12 Microphones Weights, Arms and Moments.	
	5-31	Revised Right and Left Vert. Adj. Front Seats' Weights, Arms and Moments.	
	5-32	Revised Ground Vent. Blower; Added Corrosive Resistant Kit.	
2	Title	Added PAC Approval Form. (NOTE: AIRCRAFT DELIVERED WITH MANUALS PRIOR TO THIS REVISION DO NOT REQUIRE THIS REVISION.)	March 25, 1974
3	5-12	Added Oil Filters and footnote.	June 18, 1974
	5-14	Added Annunciator Light and footnote.	
	5-18	Revised Inertia Safety Belts Weights, Arm, Moment and Part No.	
	5-20	Added Oil Filter, Lycoming' LW-13743; added Vacuum Pump Model 211cc; added Low Vacuum Annunciator Light; added Vacuum Regulator # 133A4; added Vacuum Regulator # 2H3-19; added footnotes.	
	5-23	Added AutoControl IIIB; added footnotes; added ser. nos, to AutoControl III Console.	
	5-25	Added footnotes; relocated Item.	
	5-26	Added item relocated from Page 5-25; revised item entries; added footnote; re-located items; added Dual KNI-520.	
	5-27	Added items relocated from Page 5-26; added footnote; relocated items.	
	5-28	Added items relocated from Page 5-27; added footnote.	
	5-28a	Added page.,	
	5-28b	Added page.	

WEIGHT AND BALANCE LOG OF REVISIONS (cont)

Revision	Revised Pages	Description and Revision	Approved Date
3 (cont)	5-28c	Added page	
	5-28d	Added page.	
	5-29	Added Encoding Altimeter.	
	5-31	Revised Inertia Safety Belts' Weights, Arm, Moment and Part No.; revised Assist Strap and Coat Hook (62353-5); relocated info to page 5-32.	
	5-32	Added info from page 5-31	
	5-12	Deleted Alternator	June 27, 1975
	5-14	Revised Battery description	C.E. Rabl.
	5-18	Added 79337-3 Right Front Seat.	
	5-21	Revised Rotating Beacon description	
	5-29	Deleted Vacuum Regulator.	
	5-30	Added Engine Hour Meter, Radar Altimeter and NSD Gyro; added footnote	
	5-31	Added 79337-18 Front Headrest; added 79337-18 Rear Headrest; added 79591-0 Left Front Seat; relocated Right Front Seat to page 5-32.	
	5-32	Added Right Front Seat from page 5-31; added 79591-1 Right Front Seat; added 76304-11 and -12 Overhead Vent Systems; added Stainless Steel Control Cables; added footnote.	
	5-22	Revised Electric Trim System to Piper Pitch Trim 67469-2; added Piper Pitch Trim 67469-3; added footnote.	Dec. 8, 1975
	5-27	Added King KN61 DME and King KN65A DME.	Jaye Vaughey
	5-28	Added Dwg. No. to PAL. Transmitter; added PAL Transmitter 79265-6.	
	5-29	Deleted Dwg. No, from Clock.,	
	5-30	Added Narco OC-110 Converter and Mount.	
6	5-28	Added PAL. Transmitter 79761-4	July 22, 1976 Jaye Vaughey

WEIGHT AND BALANCE LOG OF REVISIONS (cont)

Revision	Revised Pages	Description and Revision	Approved Date
	5-11	Added McCauley Propeller and Spinner; added footnotes.	Jaye Thyaley
	5-12	Added Lycoming IO-360-C1C6 Engine and footnotes.	
	5-15	Added Tachometer and footnotes.	
	5-29	Revised Attitude and Directional Gyro dash nos.	Feb. 28, 1977
8	5-1	Revised Weight and Balance info.	
	5-3	Added Caution; relocated para 2.6 to pg. 5-4.	Hal Fletcher
	5-4	Added para. 2.h. from pg. 5-3.	April 13, 1979
9	5-1	Revised Weighr and Balance info	Ward Evans
	5-3	Revised weighing procedures para	
	5-7	Revised info	Feb 29. 1984

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WEIGHT AND BALANCE

In order to achieve the performance and flying characteristics which are designed into the aircraft. the Arrow must be flown with the weight and center of gravity (C.G.) position within the approved envelope. The aircraft offers flexibility of loading. However, youcannot fill theaircraft, with four adults. full fuel tanks and maximum baggage. With the flexibility comes responsibility, The pilot must insure that the airplane is loaded within the loading envelope before he makes a takeoff.

Misloading carries consequences for any aircraft An overloaded airplane will not take off, climb or cruise as well as when it is properly loaded The heavier the airplane is loaded the less climb performance it will have.

Center of gravity is a determining factor in flight characteristics. If the C.G. is too far forward in any airplane, it may he difficult to rotate lor takeoff or landing. If the C.G. is too far aft, the airplane may rotate prematurely on takeoff or try to pitch up during climb. Longitudinal stability will be reduced This can lead to inadvertent stallsand even spins; and spin recovery becomesmore difficult as the center of gravity moves aft of the approved limit,

A properly loaded aircraft. however, will perform as intended. Before the aircraft is licensed, the Arrow is weighed and a licensed empty weight and C G. locationcomputed. Usingthe licensed empty weight and C *G* location, the pilot caneasily determine the weight and C.G position for the loaded airplane by computing the total weight and moment and thendetermining whether they are within the approved envelope

The licensed empty weight and C.G location for a particular airplane are recorded in the weight and balance section of the Airplane Flight Manual. The current values should always be used Whenever new equipment is added or any modification work is done, the mechanic responsible for the work is required to compute a new basic empty weight and C.G. positionand to write these in the aircraft log book The owner should make sure that it is done,

A weight and balance calculation is necessary in determining how much fuel or baggage can be boarded so as to keep within allowable limits. Check calculations prior to adding fuel to insure against improper loading.

The following pages are forms used in weighing an airplane in production and in computing empty weight. C G. position, and useful load. Note that the useful load includes fuel, oil, baggage, cargo and passengers Following this is the method for computing takeoff weight and C G.

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WEIGHT AND BALANCE DATA

WEIGHING PROCEDURE

At the time of licensing, Piper Aircraft Corporation provides each airplane with the licensed empty weight and center of gravity location. This data is on Page 5-7.

The removal or addition of an excessive amount of equipment or excessive airplane modifications can affect the licensed empty weight and empty weight center of gravity. The following is a weighing procedure to determine this licensed empty weight and center of gravity location:

1. PREPARATION

a. Be certain that all items checked in the airplane equipment list are installed in the proper location in the airplane..

b. Remove excessive dirt, grease, moisture, foreign items such as rags and tools from the airplane before weighing.

c. Defuel airplane. Then open all fuel drains until all remaining fuel is drained. Operate engine on each tank until all undrainable fuel is used and engine stops.

CAUTION

Whenever the fuel system is completely drained and fuel is replenished it will be necessary to run the engine for a minimum of 3 minutes at 1000 RPM on each tank to insure no air exists in the fuel supply lines.

d. Drain ail oil from the engine, by means of the oil drain, with the airplane in ground attitude. This will leave the undrainable oil still in the system. Engine oil temperature should be in the normal operating range before draining.

e. Place pilot and copilot seats in fourth (4th) notch, aft of forward position Put flaps in the fully retracted position and all control surfaces in the neutral position. Tow bar should be in the proper location and all entrance and baggage doors closed.

f. Weigh the airplane inside a closed building to prevent errors in scale readings due to wind.

2. LEVELING

a. With airplane on scales, block main gear oleo pistons in the fully extended position.

b. Level airplane (see diagram) deflating nose wheel tire, to center bubble on level.

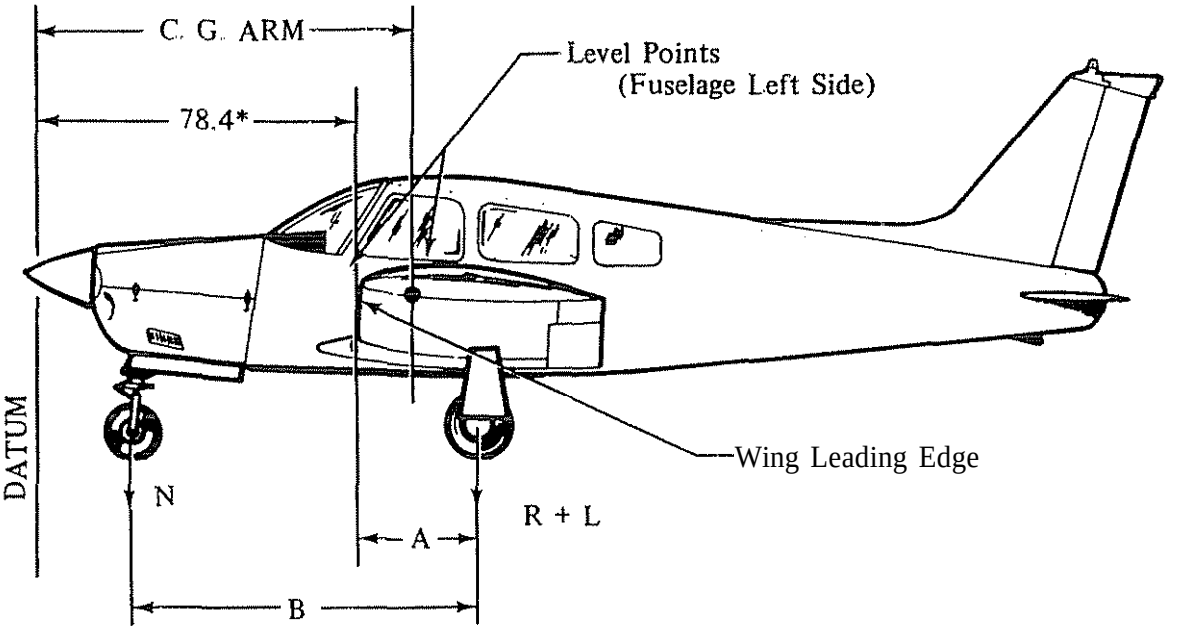
3. WEIGHING - AIRPLANE EMPTY WEIGHT

a. With the airplane level and brakes released, record the weight shown on each scale. Deduct the tare, if any, from each reading.

Scale Position and Symbol	Scale Reading	Tare	Weight
Nose Wheel (N)			
Right Main Wheel (R)			
Left Main Wheel (L)			
Airplane Empty Weight, as Weighed (T)			

4. EMPTY WEIGHT CENTER OF GRAVITY

a. The following geometry applies to the PA-28R-200 airplane when airplane is level (See Item 2).



A =

B =

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

b. Obtain measurement **"A"** by measuring from a plumb bob dropped from the wing leading edge, at the intersection of the straight and tapered section, horizontally and parallel to the airplane centerline, to the main wheel centerline.

c. Obtain measurement "B" by measuring the distance from the main wheel centerline, horizontally and parallel to the airplane centerline, to each side of the nose wheel axle. Then average the measurements.

d. The empty weight center of gravity (as weighed including optional equipment and undrainable oil) can be determined by the following formula:

$$C.G.\ Arm = 78.4 + A - \frac{B(N)}{T}$$

C. G. Arm = 78.4 + ( ) - $\frac{(\quad)(\quad)}{(\quad)}$ = inches

5. LICENSED EMPTY WEIGHT AND EMPTY WEIGHT CENTER OF GRAVITY

	Weight	Arm	Moment
Empty Weight (as weighed)			
Unusable Fuel (13 1/3 Pints)	+10.0	103.0	+1030
Licensed Empty Weight			

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WEIGHT AND BALANCE DATA

MODEL PA-28R-200 CHEROKEE

Aiilane Serial Number 28R7535277

Registration Number N8FN

Date _____

AIRPLANE EMPTY WEIGHT

Item	Weight (Lbs)	C. G. Arm (Inches Aft of Datum)	Moment (In-Lbs)
*Empty Weight Actual Computed			
Unusable Fuel (13-1/3 pints)	10.0	103.0	1030
Standard Empty Weight			
Optional Equipment			
Licensed Empty Weight			

*Empty weight is defined as dry empty weight (including paint and hydraulic fluid) plus 1.8 lbs undrainable engine oil.

AIRPLANE USEFUL LOAD - NORMAL CATEGORY OPERATION

(Gross Weight) - (Licensed Empty Weight) = Useful Load

(2650 lbs) - (lbs) = lbs

THIS LICENSED EMPTY WEIGHT. C.G. AND USEFUL LOAD ARE FOR THE AIRPLANE AS LICENSED AT THE FACTORY. REFER TO APPROPRIATE AIRCRAFT RECORD WHEN ALTERATIONS HAVE BEEN MADE.

C. G. RANGE AND WEIGHT INSTRUCTIONS

1. Add the weight of all items to be loaded to the licensed empty weight.
2. Use the loading graph to determine the moment of all items to be carried in the airplane.
3. Add the moment of all items to be loaded to the licensed empty weight moment.
4. Divide the total moment by the total weight to determine the C.G. location.
5. By using the figures of Item 1 and Item 4, locate a point on the C.G. range and weight graph. If the point falls withii the C.G. envelope, the loading meets the weight and balance requirements.

SAMPLE LOADING PROBLEM (Normal Category)

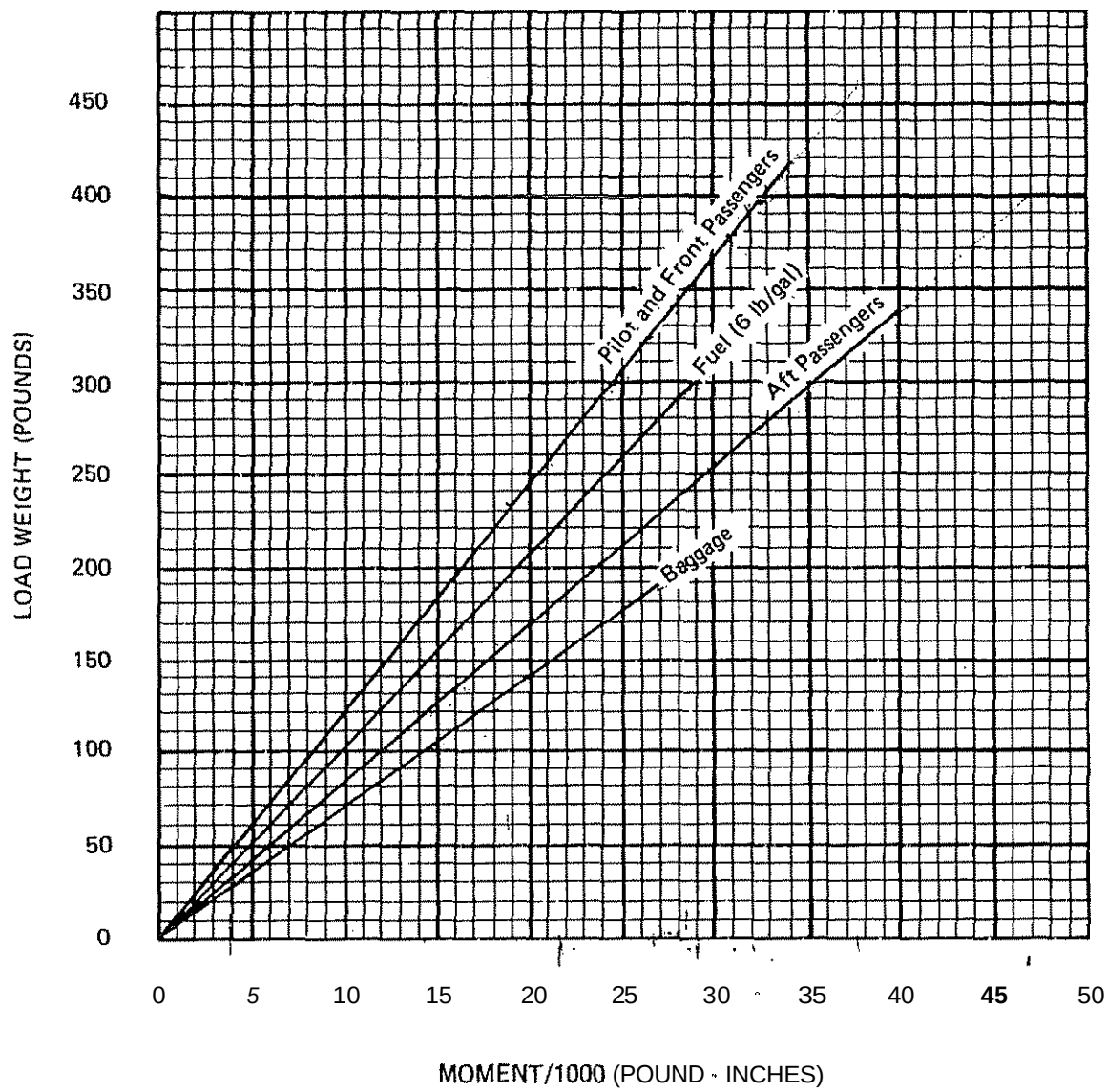
	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Licensed Empty Weight			
Oil (8 quarts)	15	24.5	368
Pilot and Front Passenger	340	80.5	27370
Passengers, Aft (Rear Seat)	340	118.1	40154
Fuel (48 Gal. Maximum)		95.0	
*Baggage		142.8	
Moment due to Retracting of Landing Gear			819
Total Loaded Airplane			

The center of gravity (C.G.) of this sample loading problem is at inches aft of the datum line. Locate this point ( ) on the C.G. range and weight graph. Since this point falls within the weight-C.G. envelope, this loading meets the weight and balance requirements.

IT IS THE RESPONSIBILITY OF THE PILOT AND AIRCRAFT OWNER TO INSURE THAT THE AIRPLANE IS LOADED PROPERLY.

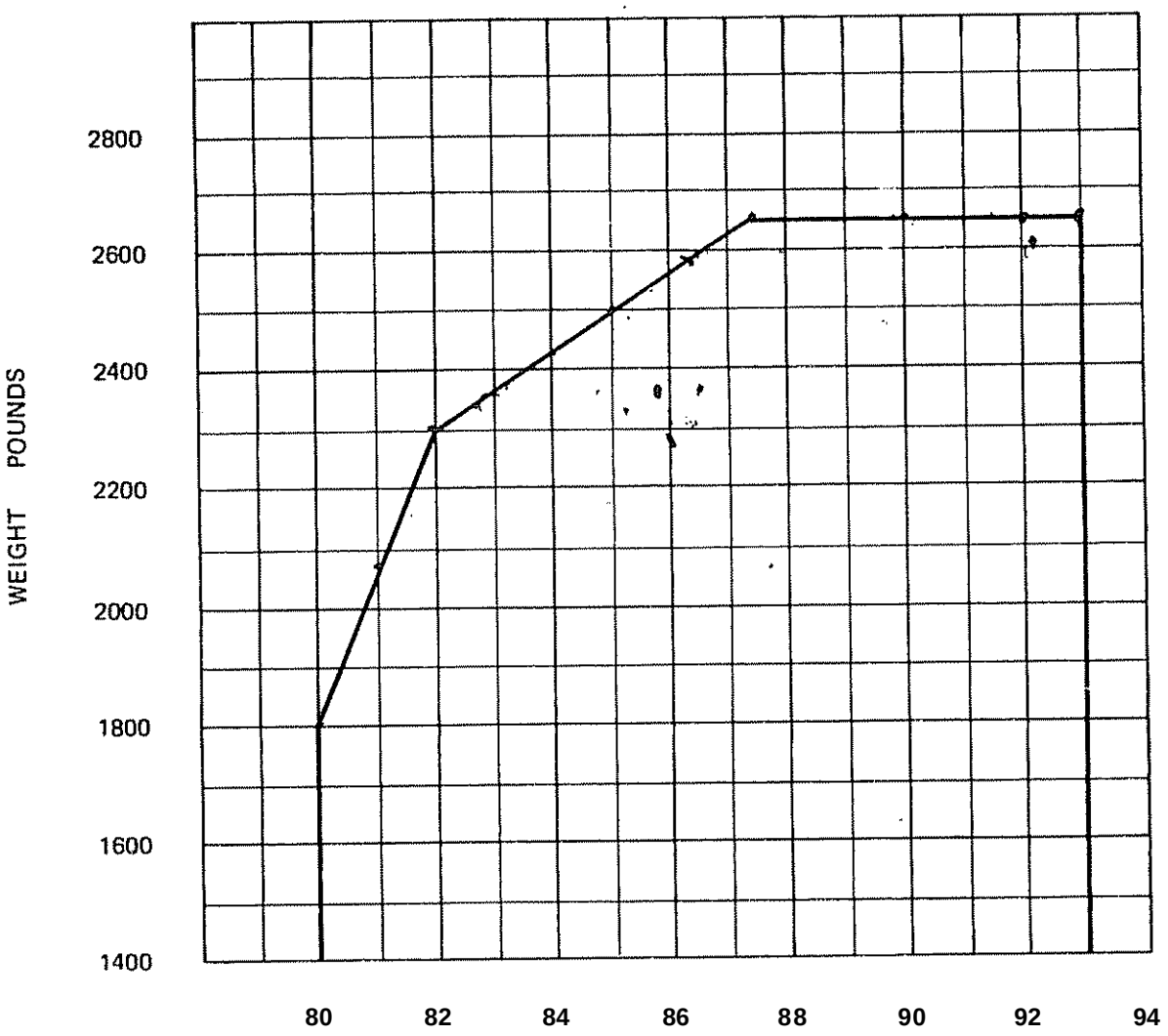
*Check Aft C.G. between 150 lbs and 200 lbs.

LOADING GRAPH



IT IS THE RESPONSIBILITY OF THE OWNER AND PILOT TO ASCERTAIN THAT THE AIRPLANE ALWAYS REMAINS WITHIN THE ALLOWABLE WEIGHT VS CENTER OF GRAVITY ENVELOPE WHILE IN FLIGHT

C. G. RANGE AND WEIGHT



MOMENT DUE TO RETRACTING LANDING GEAR = +819 IN. LBS

EQUIPMENT LIST

The following is a list of' equipment which may be installed in the PA-28R-200. Items marked with an "X" are items installed when the airplane was delivered by the manufacturer.

Item	Item	Weight Lbs.	Ann Aft Datum	Moment	Cert. Basis
	A. Propellers and Propeller Accessories				
X	~~Propeller - Hartzell Model~~ REMOVED 7/20/03				
_____	~~HC-C2YK-1( )/7666A-2~~ or				
_____	~~HC-C2YK-1( )F/F7666A-2~~	55.0	-1.9	-105	TC P920
X	~~Spinner and Attachment Plate~~				
_____	~~Installation PAC Dwg. 99374~~	5.0	-2.2	-11	TC 2A13
_____	Hydraulic Governor Hartzell Model F-2-7 ( )	5.5	34.1	188	TC P920
X	McCauley C3D36C415C	68.0	-1.9		INSTALLED IAW STC SA645NE
X	SPINNER D5992	5.0	-2.2		

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	B. Engine and Engine Accessories - Fuel and Oil Systems				
X	Engine - Lycoming Model IO-360-C1C	326	18.7	6096	TC 1E10
	Fuel Pump - Electric Auxiliary Weldon *8120-AB	2.8	42.9	120	TC 2A13
	Induction Air Filter Fram Model CA-144PL	.5	37.2	19	TC 2A13
	Fuel Pump - Engine Driven Lycoming 75247	1.6	32.0	51	TC 1E10
X	Alternator 12V 60 Amp Chrysler 2642997	12.5	9.6	120	TC 2A13
	Starter - 12V Prestolite Model MZ-4206 Lycoming 76211	18.0	10.5	189	TC 1E10
	Oil Cooler, PAC 67848	2.6	39.7	103	TC 2A13
	Oil Filter with Adapter AC OF5578770 (3 3 lbs each) (Lycoming * 75528)*	3 3	33.1	109	TC 2A13
	Oil Filter, Lycoming * LW-13743 (Champion *CH-48110)*	2.8	33.1	93	TC 2A13

*Serial nos 7535001 and up

Item	ltem	Weight Lbs.	Arm Aft Datum	Moment	Cert Basis
	C. Landing Gear and Brakes				
_____	**TWO** Main Wheel - Brake Assemblies 40-86 Wheel Assembly (Cleveland) 30-55 Brake Assembly (Cleveland) **TWO** Main 4 Ply Rating Tires 6.00-6 with Regular Tubes	34.4	109.8	3777	TC 2A13
_____	One Nose Wheel Assembly 40-77 Wheel Assembly (Cleveland) (less brake drum) One 4 Ply Rating Tire 5.00-5 Regular Tube	8.1	15.5	126	TC 2A13

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	D. Electrical Equipment				
_____	One Battery 12V, 23 Amp Hour Rebat S-25	21.9	168.0	3679	TC 2A13
X	Battery Contactor, Piper 63880-0	1.2	168.0	202	TC 2A13
_____	Stall Warning Detector, Safe Flight Inst. Corp. No. C52207-4	.2	80.2	16	TC 2A13
_____	Switch - Landing Gear Selector Cutler Hammer 8906-K 1736	.2	62.8	13	TC 2A13
	Voltage Regulator Wico Electric No. X-16300B	.9	59.4	53	TC 2A13
X	Overvoltage Relay Wico Electric No. X-16799B	.5	55.4	28	TC 2A13
_____	Starter Relay Piper Dwg. 99130-2	1.0	47.0	47	TC 2A13
_____	Landing Gear Motor Contactor Cole-Hersee *24059 (2) 8 lbs. each	1.6	162.0	259	TC 2A13
_____	Annunciator Lights *	.9	55.5	50	TC 2A13

*Serial nos. 75.35001 and up

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	E. Instruments				
X					
_____	Compass - Piper 67462	.9	59.9	54	TSO C7c
_____	Airspeed Indicator - Piper 67434-2 or -3	.6	61.8	37	TSO C2b
_____	Tachometer - Piper 62177-6	.7	61.2	43	TC 2A13
_____	Engine Cluster - Piper 95241-2	.8	62.4	50	TC 2A13
_____	Engine Cluster - Piper 95241-3	.8	62.4	50	TC 2A13
_____	Altimeter - Piper PS50008-2, -3, -4 or -5	1.0	60.9	61	TSO C10b
_____	Manifold Pressure and Fuel Flow - Piper PS50031-6	1.7	60.8	103	TSO C45
_____	Airspeed Indicator - Piper PS 50049-5	.6	61.8	37	TSO C2b

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Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cett. Basis
	F. Hydraulic Equipment				
X	Cylinder Hydraulic Nose Gear Piper 67504	.9	45.0	41	TC 2A13
	Cylinder Hydraulic (2) Main Gear Piper 67505 (0.9 lbs. each)	1.8	108.4	195	TC 2A13
	Pump Assembly - Piper 67500-2	9.0	159.0	1431	TC 2A13
	Switch, Pressure Consolidated Controls *211C243-3	.2	116.7	23	TC 2A13
	Valve - Free Fall Piper 67522-2	.3	114.0	34	TC 2A13

Item	Item	Weight Lbs..	Arm Aft Datum	Moment	Cert. Basis
	G. Miscellaneous				
A	Forward Seat Belts (2) PS50039-4-2 (.75 lbs. each)	1.5	81.9	123	TSO C22
	Rear Seat Belts (2) PS50039-4-3 (.70 lbs. each)	1.4	123.0	172	TSO C22
	Inertia Safety Belts, Front Seats (2) PS50039-4-17 (0.75 lbs. each)	1.5	119.6	179	TC 2A13
	Toe Brakes (Dual) Piper Dwg. 67018-3	11.0	49.6	546	TC 2A13
X	Right Front Seat Piper Dwg. 76171-1	13.7	88.0	1206	TC 2A13
	Individual Rear Seats (2) Piper Dwg. 997300 and -1 (13.5 lbs. each)	27.0	124.1	3351	TC 2A13
	Flight Manual and Logs	2.6	95.1	247	TC 2A13
	Tow Bar, Piper Dwg. 67336-0	2.3	155.2	357	TC 2A13

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Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	H. Engine and Engine Accessories - Fuel and Oil System (Optional Equipment)				
_____	Vacuum Pump Airborne Manufacturing Co Model 200 CC	5.0	29.6	148	TC 2A13
_____	Oil Filter with Adapter AC 0F5578770 (3.3 lbs. each) (Lycoming *75528)**	3.3	33.1	109	TC 2A13
_____	Oil Filter, Lycoming * LW-1374.3(Champion * CH-48110)**	2.8	33.1	93	TC 2A13
* _____	Vacuum Pump, Airborne Mfg. Co., Model 211cc PAC 79399-0	3.2	29.6	94	TC 2A13
_____	Low Vacuum Annunciator Light *	Neglect			TC 2A13
_____	Vacuum Regulator. Airborne ** Mfg. Co., *133A4	.6	52.0	31	TC 2A13
_____	Vacuum Regulator, Airborne * Mfg. Co., *2H3-19	.5	52.0	26	TC 2A13

*Serial nos 7535001 and up
**Serial nos. 7435001 through 7435331

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	I. Electrical Equipment (Optional Equipment)				
	Landing Light G.E. Model4509	.5	13.1	7	TC 2A13
	Navigation Light (Rear) Grimes A2064	.2	281.0	56	TSO C30b
	Navigation Light Wing) (2) Grimes A1285-G-12 A1285-R-12 (0.2 lbs. each)	.4	106.6	43	TSO C30b
_____	Auxiliary Power Receptacle Piper 65647	2.7	178.5	482	TC 2A13
_____	External Power Cable Piper 62355-2	4.6	142.8	657	TC 2A13
	Cabin Speaker Quincy Spkr. Co. 8B-15052 or Oaktron Ind. GEV 1937	.8	99.0	79	TC 2A13
_____	Cabin Light	.3	99.0	30	TC 2A13
	Rotating Beacon	1.5	263.4	395	TC 2A13
_____	Battery 12V, 35 A.H. Reading R-35 (Weight 27.2 lbs.)	* 5.3	168.0	890	TC 2A13

*Weight and moment difference between standard and optional equipment.

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	I. Electrical Equipment (Optional Equipment) (cont)				
_____	Heated Pitot Head - Piper 67477-0	.4	100.0	40	TC 2A13
	Anti-Collision Lights Whelen Engineering Co. Piper Dwg. 99030-2 or -5				
_____	Power Supply, Model HS, No. A412A-14 (with fin light only)	2.3	198.0	455	TC 2A1.3
_____	Power Supply, Model HD, T3 No. A413 (with fin and wing lights)	3.0	198.0	594	TC 2.413
_____	Light, Fin Tip, A408	.4	263.4	105	TC 2.413
_____	Cable, Fin Light, A417-1/300	.4	230.7	92	TC 2A13
_____	Lights, Wing Tip (2) (0.15 lbs. each) No. A429	.3	106.6	32	TC 2A13
_____	Cable, Wing Lights A417-1/298 & A417-1/252	2.0	115.6	231	TC 2A13
_____	Piper Pitch Trim Piper Dwg. 67496-2	4.3	155.3	668	TC 2A13
_____	Piper Pitch Trim* Piper Dwg. 67496-3	4.3	155.3	668	TC 2A13

*Serial nos. 28-7535077 and up

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert Basis
	J. Autopilots (Optional Equipment)				
	AutoControl 111 *				
_____	Roll Servo #1C363-1-183R	2.5	122.2	306	STC SA1406SW
_____	Console #1C338 (thru S/N 9999)	1.2	60.1	72	STC SA1406SW
_____	Cables	.7	95.5	67	STC SA1406SW
_____	Attitude Gyro #52D66	2.3	59.4	137	STC SA1406SW
_____	Directional Gyro #52D54	3.2	59.0	189	STC SA1406SW
_____	Omni Coupler #1C388	.9	59.3	53	STC SA1406SW
	AutoFlite II				
_____	Roll Servo #1C363-1-183R	2.5	122.2	306	STC SA1157SW
_____	Cable	.7	93.4	65	STC SA1157SW
_____	Panel Unit #52D75-3 or -4	2.4	59.4	143	STC SA1157SW
	AutoControl III B **				
X	Roll Servo *1C363-1-183R	2.5	122.2	306	STC SA1406SW
_____	Console. *lC.338 (S/N 10000 & up)	1.0	60 1	60	STC SA1406SW
_____	Cables	.5	95.5	48	STC SA1406SW
_____	Attitude Gyro, *52D66	2.7	59.4	160	STC SA1406SW
_____	Directional Gyro, *52D54	2.9	59.0	171	STC SA1406SW
_____	Omni Coupler, *1C388	1.0	59 3	59	STC SA1406SW

*Serial nos 7435001 through 7435331
**Serial nos 7535001 and up

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Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
K.	Radio Equipment (Optional Equipment)				
_____	Narco Mark 16 Transceiver, Single *	7.5	56.9	427	TC 2A13
	Narco Mark 16 Transceiver, Dual*	15.0	56.9	854	TC 2A13
_____	Narco VOA-50M Omni Converter*	2.1	59.9	126	TC 2A13
_____	Narco VOA-40M Omni Converter *	1.9	59.9	114	TC 2A13
	Narco VOA-40 Omni Converter *	1.9	59.9	114	TC 2A13
_____	Nav. Receiving Antenna	.5	265.0	133	TC 2A13
_____	Cable, Nav. Antenna	.9	157.0	141	TC 2A13
_____	#1 VHF Comm. Antenna	.3	157.8	47	TC 2A13
_____	Cable, #1 VHF Comm. Antenna	.4	103.4	41	TC 2A13
_____	#2 VHF Comm. Antenna	3	192.8	58	TC 2A13
_____	Cable, #2 VHF Comm. Antenna	.5	147.5	60	TC 2A13
_____	Anti Static Kit #1 VHF Comm. Antenna	1.0	160.8	161	TC 2A13
_____	Cable, #1 VHF Comm. Antenna	.4	103.4	41	TC 2A13
_____	#2 VHF Comm. Antenna	1.0	195.8	196	TC 2A13
_____	Cable, #2 VHF Comm. Antenna	.5	120.9	60	TC 2A13
_____	Low Frequency Antenna	.5	147.5	74	TC 2A13
_____	Static Wicks	–	–	–	TC 2A13

*Serial nos 7435001 through 7435331

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	K. Radio Equipment (Optional Equipment) (cont)				
	Bendix ADF-T-I2C or D *				
_____	Receiver Model 201F	3.9	59.4	232	TC 2A13
	Receiver Model 201 C or D	3.5	59.4	208	TC 2A13
	Audio Amplifier 102A	.8	52.4	42	TC 2A13
_____	Servo Indicator 551A	1.7	60.9	104	TC 2A13
_____	Loop Antenna 2321E	1.3	160.8	209	TC 2A13
_____	Cable, Interconnecting	2.3	108.0	248	TC 2A13
_____	Sense Antenna and Cable	.4	150.0	60	TC 2A13
_____	Narco Comm 10( )	3.9	57.4	224	TC 2A13
_____	Narco Comm 11( )	3.6	57.4	207	TC 2A13
_____	Dual Comm 11( )	7.1	57.4	408	TC 2A13
_____	Narco Nav 10	1.9	58.6	111	TC 2A13
_____	Narco Nav 11	2.8	58.6	164	TC 2A13
_____	Narco Nav 12	3.4	58.6	199	TC 2A13
.	Dual Nav 11	5.6	58.6	328	TC 2A13
X	KX-155-31	5.65	57.5	324.9	
X	King KY-196( ) or KY-175 (S)	7.5	56.6	425	TC 2A13
X	Dual KX-170 (xx) or KX-175 (S)	15.0	56.6	849	TC 2A13
X	King KI-201 (C)	2.5	59.9	150	TC 2A13
X	King KI-208 (XX)	3.3	59.9	198	TC 2A13
_____	Dual KI-201( )	5.0	59.9	300	TC 2A13
	Dual KNI-520	5.6	59.9	335	TC 2A13
	Narco ADF-31 *				
	Panel Unit	5.0	58.5	293	TC 2A13
_____	Sensor Unit	2.5	162.7	407	TC 2A13
_____	Sensor Cable	2.3	105.6	243	TC 2A13
_____	Sensor Antenna and Cable	.4	150.0	60	TC 2A13

*Serial nos. 7435001 through 7435331

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	K. Radio Equipment (Optional Equipment) (cont)				
	King KR-85				
_____	Receiver	4.3	59.4	255	TC 2A13
_____	Servo Indicator	1.2	61.3	74	TC 2A13
	Loop Antenna	1.3	161.5	210	TC 2A13
_____	Loop Cable	1.8	105.5	190	TC 2A13
_____	Audio Amplifier	.8	51.0	41	TC 2A13
_____	Sense Antenna and Cable	.4	147.5	59	TC 2A13
	Narco CP-25B/125 Selector *				
_____	Panel	1.2	55.0	66	TC 2A13
_____	Narco MBT-12-R Marker Beacon	3.1	69.1	214	TC 2A13
_____	Narco Comm 110*	3.0	57.4	172	TC 2A13
_____	Narco Comm 111	3.0	57.4	172	TC 2A13
_____	Narco Nav 110*	1.7	58.6	100	TC 2A13
	Narco Nav 111	2.5	58.6	147	TC 2A13
_____	Narco Nav 112	3.3	58.6	193	TC 2A13
	PM-I Marker Beacon*				
_____	Receiver	1.1	121.3	133	TC 2A13
_____	Remote Unit	.3	128.4	39	TC 2A13
_____	Cable	.3	85.0	26	TC 2A13
	UGR-2A Glide Slope				
_____	Receiver	2.4	173.8	417	TC 2A13
_____	Cable	1.8	128.0	230	TC 2A13
_____	Antenna	.4	92.4	37	TC 2A13
_____	Cable, Antenna	.5	145.0	73	TC 2A13
	King KN60C DME				
_____	Receiver	6.8	56.7	386	TC 2A13
_____	Antenna	.2	112.1	22	TC 2A13
_____	Cable, Antenna	.3	83.1	25	TC 2A13
X	~~King KN61 DME~~ Removed 11-5-84	~~12.5~~	~~179.0~~	~~2237~~	TC 2A13
_____	King KN65A DME	13.0	174.9	2274	TSO C66a
X	King KN-64	2.6	58.8	152.9	

"Serial nos. 7435001 through 74.35331

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	K. Radio Equipment (Optional Equipment) (cont)				
	IFD Starlight Transponder *				
_____	Panel Unit	2.3	59.4	137	TC 2A13
_____	Antenna	.1	47.2	5	TC 2A13
_____	Cable	.3	46.5	14	TC 2A13
	IFD Skyline 300 Transponder*				
_____	Panel Unit	1.7	60.4	103	TC 2A13
_____	Remote Unit	1.8	53.1	96	TC 2A13
_____	Antenna	.1	47.5	5	TC 2A13
_____	Cable	.1	52.1	5	TC 2A13
	Piper Automatic Locator				
_____	Transmitter, Piper Dwg. 79265-0	1.7	236.2	402	TC 2A13
_____	Transmitter, Piper Dwg. 79265-6	1.3	236.2	307	TC 2A13
_____	Transmitter, Piper Dwg. 79761-4	1.7	236.2	402	TC 2A13
	Antenna & Coax	.2	224.4	45	TC 2A13
_____	Shelf & Access Hole	.33	235.4	78	TC 2A13
	King KT76/78 Transponder				
_____	Panel Unit	3.1	58.1	180	TC 2A13
_____	Antenna &Cable	—	—	—	TC 2A13
_____	Narco AT-50A Transponder (Includes Antenna & Cable)	3.0	57.3	172	TC 2A13
_____	King KMA-20 ( ) Audio Panel	2.8	60.2	169	TC 2A13
_____	Antenna	.5	116.3	58	TC 2A13
_____	Cable	.4	87.5	35	TC 2A13
	Audio Selector Panel - Piper * 99395-0, -2, or -3	.7	61.3	43	TC 2A13
_____	Microphone (Carbon) Piper Dwg. 68856-10	.3	64.9	19	TC 2A13
_____	Microphone (Dynamic) Piper Dwg. 68856-12	.3	64.9	19	TC 2A13
_____	Headset	.5	60.0	30	TC 2A13

"Serial nos. 7435001 through 7435331

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	K. Radio Equipment (Optional Equipment) (cont)				
____	King KE21.3 VOR/LOC/GS Indicator *	2.5	60.4	151	TC 2A13
	King KR-86 ADF *				
~~X~~	~~Receiver~~	3.9	59.4	232	TC 2A13
~~X~~	~~Loop Antenna~~ Removed	1.5	161.5	242	TC 2A13
~~X~~	~~Loop Cable~~	1.3	105.5	137	TC 2A13
____	Audio Amplifier	0.8	51.0	41	TC 2A13
~~X~~	~~Sense Antenna & Cable~~	0.4	147.5	59	TC 2A13
	King KR-86 ADF (2nd) *				
____	Receiver	3.9	59.4	2.32	TC 2A13
____	Loop Antenna	1.5	150.7	226	TC 2A13
____	Loop Cable	1..3	105.0	137	TC 2A1.3
____	Sense Antenna & Cable	3.0	147.5	443	TC 2A13
____	King KN-73 Glide Slope Receiver *	3.2	184.3	590	TC 2A13
____	King KN-77 VOR/LOC Converter *	3.6	183.6	661	TC 2A13
____	King Dual KN-77 VOR/LOC Converter *	7.8	183.6	1432	TC 2A13
	King KN-65 DME *				
____	Receiver	7.6	201.6	1532	TC 2A13
____	Antenna	0.2	112.1	22	TC 2A13
	Cable, Antenna	0.3	157.1	47	TC 2A13
____	Indicator	1.0	60.0	60	TC 2A13
	King KN-74 R-Nav *				
____	Computer	3.7	57.6	213	TC 2A13
____	Cable Assy.	1.0	53.0	53	TC 2A13
____	~~King KN-74 VOR/LOC Indicator~~ *	3.3	59.9	198	TC 2A13
~~X~~	~~King KR-21 marker receiver~~	~~.5~~	~~60.~~	~~30.~~	~~FAA 337~~
~~X~~	~~Cenetre Lambda 75 antenna~~ Removed	~~.5~~	~~140.~~	~~70.~~	~~FAA-337~~

*Serial nos. 7535001 and up

Item	Item	Weight Lbs	Arm Aft Datum	Moment	Cert Basis
	K. Radio Equipment (Optional Equipment) (cont)				
_____	Narco Comm 11B VHF Transceiver *	3.9	57.4	224	TC 2A13
	Narco Dual Comm 11B VHF Transceiver *	7.8	57.4	448	TC 2A13
_____	Narco Dual Comm 111 VHF Transceiver *	6.0	57.4	344	TC 2A13
_____	Narco Comm 111B VHF Transceiver *	3.9	57.4	224	TC 2A13
	Narco Dual Comm 111B VHF Transceiver *	7.8	57.4	448	TC 2A13
_____	Narco Nav 14 VHF Receiver *	2.5	57.4	144	TC 2A13
_____	Narco Nav 114 VHF Receiver *	2.5	57.4	144	TC 2A13
	Narco UGR-3 Glide Slope *				
_____	Receiver	2.4	173.8	417	TC 2A13
_____	Cable	1.8	128.0	230	TC 2A13
_____	Antenna	0.4	92.4	37	TC 2A13
_____	Cable, Antenna	0.5	145.0	73	TC 2A13
_____	Narco CP-125 Audio Selector Panel"	2.2	55.0	121	TC 2A13
	Narco ADF-140*				
_____	Receiver	2.5	58.3	146	TC 2A13
_____	Servo Indicator	1.3	61.0	79	TC 2A13
_____	Loop Antenna	1.6	162.0	259	TC 2A13
_____	Cable, Loop	0.6	105.5	63	TC 2A13
_____	Sense Antenna and Cable	0.4	147.5	59	TC 2A13

*Serial nos. 7535001 and up

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	K. Radio Equipment (Optional Equipment) (cont)				
	Narco Dual ADF-140*				
_____	Receivers	5.0	58.3	292	TC 2A13
_____	Dual Needle Indicator	3.5	61.0	214	TC 2A13
_____	Loop Antenna '1	1.6	162.0	259	TC 2A13
_____	Cable, Loop *1	0.6	105.5	63	TC 2A13
_____	Sense Antenna and Cable *1	0.4	143.8	58	TC 2A13
_____	Loop Antenna *2	1.6	150.0	240	TC 2A13
_____	Cable, Loop *2	0.6	93.5	56	TC 2A13
_____	Sense Antenna and Cable *2	3.0	143.8	431	TC 2A13
_____	Remote for Dual Ind.	2.0	185.5	371	TC 2A13
	Narco DME-190*				
_____	Receiver	5.2	61.8	321	TC 2A13
	Antenna	0.3	113.9	34	TC 2A13
	Cable, Antenna	0.4	85.6	34	TC 2A13
	Microphone (Dynamic)*				
_____	Piper Dwg. 68856-11	0.6	69.9	42	TC 2A13

'Serial nos. 75.35001 and up

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Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	L. Instruments (Optional Equipment)				
X	Suction Gauge - Piper 99480-0 or -2	.5	62.2	31	TC 2A13
X	Vacuum Filter, Piper 66673	.3	52.0	16	TC 2A13
	Indicator - Rate of Climb - Piper 99010-2, -4, or -5	1.0	60.9	61	TSO C8b
X	Indicator - Rate of Climb - Piper 99010-3	.5	62.2	31	TSO C8b
	Attitude Gyro - Piper 99002-2, -3, -4, or -5	2.2	59.4	131	TSO C4c
	Directional Gyro -Piper 99003-2, -3, -4, or -5	2.6	59.7	155	TSO C5c
X	Air Temperature Gauge Piper Dwg. 79316	.2	72.6	15	TC 2A13
X	Clock	.4	62.4	25	TC 2A13
	Turn and Slip Indicator - Piper PS.50030-2 or -3	2.6	59.7	155	TSO C3B Type II
X	Exhaust Gas Temperature Gauge Piper 99026	.7	55.4	39	TC 2A13
	Tru-Speed Indicator Piper 67433-2 or -3 or PS50049-4	(same as Standard Equipment)			
X	Encoding Altimeter PS50008 -6 or -7	* .9	60.3	54	TSO C10b, C88

* Weight and Moment difference between standard and optional equipment.

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
L.	**Instruments (Optional Equipment) (cont)**				
_____	**Engine Hour Meter* Piper Dwg..79548-0**	.3	61.2	18	TC 2A13
_____	**MK10 Radar Altimeter* Piper Dwg. 37693-2**	5.4	156.3	844	TC 2A13
_____	**NSD-360 Gyro***	4.1	59.0	241	TSO C52a TSO C5c
_____	**Narco OC-110* Converter and Mount**	2.1	185.5	390	TSO C36c C40a

***Serial nos. 28R-7635001 and up.**

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
M.	Miscellaneous (Optional Equipment)				
X	Assist Step Piper 653844	1.8	156.0	281	TC 2A13
	Assist Strap and Coat Hook Piper 62353-5	.2	109.5	22	TC 2A13
	Assist Strap Piper Dwg. 79455	.2	109.5	22	TC 2A13
	Inertia Safety Belts, Rear Seats (2) PS50039-4-14	1.6	140.3	224	TC 2A13
	Lighter 200462 (12V Universal)	.2	62.9	13	TC 2A13
	Fire Extinguisher, Scott Aviation 42211-00 Piper Dwg. 76167-2	4.6	71.0	327	TC 2A13
	Headrests, Front (2) 99255-3 (1.0 lbs. each)	2.0	94.5	189	TC 2A13
	Headrests, Rear (2) 99255-3 (1.0 lbs. each)	2.0	132.1	264	TC 2A13
	Alternate Static Source	.4	61.0	24	TC 2A13
	Calibrated Alternate Static Source Placard Required: Yes _____ No X				
	Zinc Chromate Finish	5.0	158.0	790	TC 2A13
	Air Conditioner Instl.	68.9	105.0	7235	TC 2A13
	Vert. Adj. Front Seat (Left) Piper Dwg..763404	* 6.6	80.7	533	TC 2A13
	Vert. Adj. Front Seat (Right) Piper Dwg. 76340-1	* 6.8	80.0	544	TC 2A13

* Weight and Moment difference between standard and optional equipment

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert Basis
M.	Miscellaneous (Optional Equipment) (cont)				
_____	Super Cabin Sound Proofing Piper Dwg. 790304	18.1	86.8	1571	TC 2A13
_____	Cabin Overhead Vent System Piper Dwg. 76304-3	6.4	159.6	1022	TC 2A13
X _____	Cabin Overhead Vent System With Ground Ventilating Blower Piper Dwg..763044	14.0	170.7	2390	TC 2A1.3
_____	Corrosive Resistant Kit	3.0	106.0	318	TC 2A13
	TOTAL OPTIONAL EQUIPMENT	~~105.3~~	~~108.1~~	~~11385~~	

EXTERIOR FINISH

Base Color Juneau White

Trim Color Bahama Blue

Accent Color Dakota Black

Registration No. Color Red & Blue

Type Finish Lacquer

OPERATING INSTRUCTIONS

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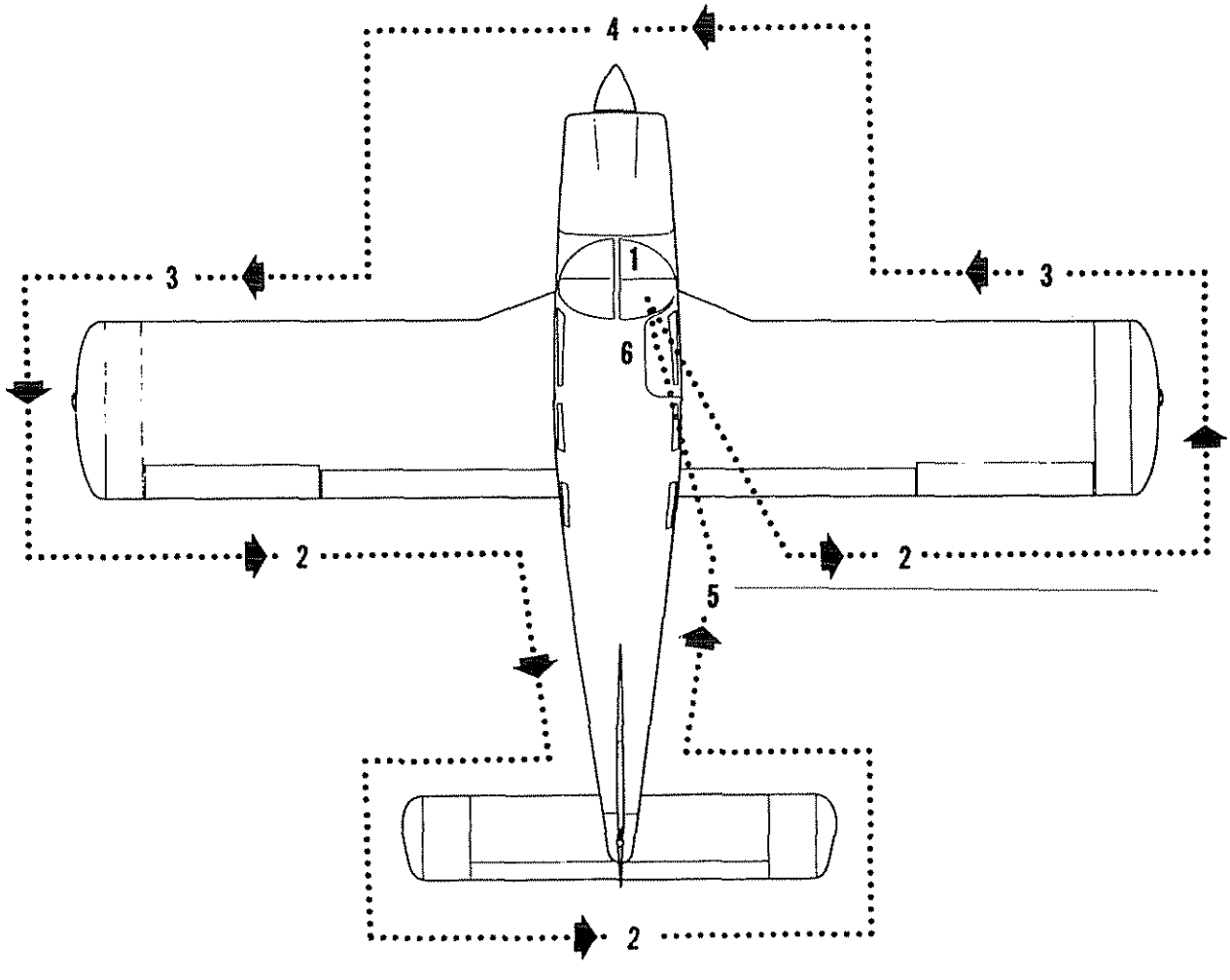
OPERATING INSTRUCTIONS

PREFLIGHT

The airplane should be given a thorough visual inspection prior to each flight. Particular attention should be given to the following items:

1. Master switch and ignition OFF; landing gear switch DOWN; remove seat belt securing control wheel.
2. a. Check for external damage and operational interference of control surfaces or hinges
   b. Insure that wings and control surfaces are free of snow, ice or frost.
3. a. Visually check fuel supply; secure caps.
   b. Drain all fuel system sumps and lines.
   c. Check that fuel system vents are open.
   d. Check landing gear shock struts for proper inflation (approximately 2 inches showing).
   e. Check hydraulic lines and landing gear cylinders for leaks.



f. Check tires for cuts, wear and proper inflation.
g. Check brake blocks and discs for wear and damage.

4. a. Check windshield for cleanliness.
b. Check propeller and spinner for defects or nicks.
c. Check for obvious fuel or oil leaks.
d. Check oil level. (Insure dipstick is properly seated.)
e. Check cowling and inspection covers for security.
f. Check cowl scoop for obstructions.
g. Check nose wheel tire for inflation or wear.
h. Check nose gear shock strut for proper inflation (approximately 2-3/4 inches showing).,
i. Check hydraulic lines and landing gear cylinder for excessive leaks.
j. Check for fbreign matter in air inlet.

5. a. Stow tow bar and control locks if used.,
b. Check baggage for proper storage and'security.
c. Close and secure the baggage compartment door.

6. a. Upon entering airplane check that all primary flight controls operate properly, and that aircraft is properly loaded.,
b. Close and secure cabin door.
c. Check that required papers are in order and in the airplane.

STARTING ENGINE

After completetion of the preflight inspection:

1. Set parking brakes ON.
2. Set the propeller control in full INCREASE RPM (control forward).
3 Select the desired tank with fuel selector valve.

STARTING ENGINE WHEN COLD

1. Open the throttle approximately 1/2 inch.
2. Turn the master switch ON.
3. Turn the electric fuel pump ON.
4. Move the mixture control to FULL RICH until an indication on the fuel flow meter is noted. (Engine is primed.)
5. Move the mixture control to IDLE CUT-OFF.
6. Engage the starter by rotating magneto switch clockwise and pressing in.
7. When the engine fires. advance mixture control to FULL. RICH and move throttle to the desired setting,
8. If the engine does not fire within five to ten seconds, disengage starter and reprime.

STARTING ENGINE WHEN HOT

1. Open the throttle approximately 1/2 inch.
2. Turn the master switch ON.
3. Turn the electric fuel pump ON.
4. Put mixture control in IDLE CUT-OFF.
5. Engage the starter by rotating magneto switch clockwise and pressing in. When the engine fires. advance the mixture control and move the throttle to desired setting.

STARTING ENGINE WHEN FLOODED

1. Open the throttle full.
2. Turn the master switch ON.
3. Turn the electric fuel pump OFF.
4. Put mixture control in IDLE CUT-OFF.
5. Engage the starter by rotating the magneto switch clockwise and pressing in. When the engine fires, advance the mixture control and retard the throttle.

When the engine is firing evenly, advance the throttle to 800 RPM. If oil pressure is not indicated within 30 seconds, stop the engine and determine the trouble. In cold weather it will take a few seconds longer to get an oil pressure indication. If the engine has failed to start, refer to the "Engine Troubles and Their Remedies" section of the Lycoming Operating Handbook.

Starter manufacturers recommend that cranking periods be limited to 30 seconds with a two minute rest between cranking periods. Longer cranking periods will shorten the life of the starter.

STARTING WITH EXTERNAL POWER*

An optional feature known as Piper External Power (PEP) allows the operator to use an external battery to crank the engine without having to gain access to the aircraft battery.

The procedure is as follows:

1. Turn aircraft MASTER SWITCH to OFF.
2. Connect RED lead of PEP kit jumper cable to POSITIVE (+) terminal of external 12 volt battery and BLACK lead to NEGATIVE (-) terminal.
3. Insert plug of jumper cable into socket located on aircraft fuselage.
4. Turn aircraft MASTER SWITCH to ON and proceed with NORMAL engine starting technique.
5. After engine has been started, turn MASTER SWITCH to OFF and remove jumper cable plug from aircraft.
6. Turn aircraft MASTER SWITCH to ON and check alternator ammeter for indication of output. DO NOT ATTEMPT FLIGHT IF THERE IS NO INDICATION OF ALTERNATOR OUTPUT.

WARM-UP AND GROUND CHECK

Warm-up the engine at 1400 to 1500 RPM for not more than two minutes in warm weather, four minutes in cold weather. Avoid prolonged idling at low RPM as this practice may result in fouled spark plugs, If necessary to hold before take-off, it is recommended that engine be operated at 1400.1500 RPM.

The magnetos should be checked at 2000 RPM with the propeller set at increase RPM. Drop off on either magneto should not exceed 175 RPM and the differential should be not more than 50 RPM. Prolonged operation on one magneto should be avoided.

*Optional Equipment

Check vacuum gauge. Indicator should read 5" Hg ± .I" Hg at 2000 **RPM.** Check both the oil temperature and pressure. The temperature may be low for some time if the engine is being run for the first time of the day, but as long as the pressure is within limits the engine is ready for takeoff. For air conditioner ground check, refer to page 7-10.

Check the annunciator panel lights with the press-to-.test button*

The propeller control should be moved through its complete range to check for proper operation and then placed to full increase RPM for takwff. To obtain maximum RPM, push the pedestal-mounted control fully toward the instrument panel. In cold weather the propeller control should be cycled at least three times to ensure that warm engine oil has circulated through the system.

The electric fuel pump should be turned off momentarily during ground check to make sure that the engine driven pump is operating. The electric fuel pump should be on during takwff to prevent loss of power should the engine driven pump fail. The engine is warm enough for take-off when the throttle can be opened without the engine faltering.

TAKEOFF

Just before take-off the following items should be checked:

1. Fuel - on proper tank
2. Electric fuel pump -ON
3. Engine gauges - checked
4. Flight instruments -checked and set as required
5. Master Switch - ON
6. Alternate air - closed
7. Prop -set
8. Mixture - set
9. Seat backs - erect
10. Fasten belts/harness
11. Empty seats - seat belts snugly fastened
12. Flaps - exercised and set
13. Trim tab-set
14. Controls - free
15. Door - latched
16. Air condition - OFF

The takeoff technique is conventional for the Cherokee Arrow II. The tab should be set slightly aft of neutral, with the exact setting determined by the loading of the aircraft. Allow the airplane to accelerate to 60 to 70 MPH. Then ease back on the wheel enough to let the airplane fly from the ground.

"Serial nos. 7535001 and up

Short Field, Obstacle Clearance:

Lower flaps to 25° (second notch), accelerate aircraft to 60-65 MPH and ease back on the wheel to rotate. After breaking ground, accelerate to best angle of climb speed, 85 MPH, select gear "up"* and continue climb while accelerating to best rate of climb speed, 100 MPH, and slowly retract the flaps while climbing out.

Soft Field, Obstacle Clearance:

Lower flaps to 25° (second notch), accelerate aircraft, pull nose gear off as soon as possible and lift ***off*** at lowest possible airspeed. Accelerate just above the ground to best angle of climb speed, 85 MPH, select gear "up"* and climb past obstacle clearance height. Continue climb while accelerating to best rate of climb speed, 100 MPH, and slowly retract the flaps,.

Soft Field, No Obstacle:

Proceed as above after gear retraction, continue climb at best rate of climb speed, 100 MPH, and slowly retract the flaps.

*If desired, the override up position can be selected and latched before take-off, and the gear will then retract as soon as the gear selector switch is placed in the up position. In this case care should be taken not to retract the gear prematurely, or the aircraft could settle back onto the runway. If the override lock is used for take-off, it should be disengaged as soon as sufficient terrain clearance is obtained, to return the gear system to normal operation.

CLIMB

The best rate of climb at gross weight will be obtained at 95 MPH with gear down and 100 MPH with gear up. The best angle of climb may be obtained at 85 MPH with gear down and 96 MPH with gear up. For climbing en route a speed of 110 MPH is recommended. This will produce better forward speed and increase visibility over the nose during the climb, with little sacrifice in rate of climb. Air conditioner may be turned on after all obstacles have been cleared.

STALLS

Angle of Bank	Flaps 40°	Flaps Retracted
0°	64 MPH	71 MPH
20°	66 MPH	73 MPH
40°	73 MPH	81 MPH
60°	90 MPH	100 MPH

Power Off - Gear Up or Down - Gross Weight 2650 Lbs

CRUISING

The cruising speed of the Cherokee Arrow II is determined by many factors, including power setting, altitude, temperature, loading, and equipment installed on the airplane. The normal cruising power is 75% of the rated horsepower of the engine True airspeeds which may be obtained at various altitudes and power settings can be determined from the charts in "Section XIII" of this manual.

When selecting RPM below 2400, limiting manifold pressure for continuous operation, as specified by the Lycoming Operator's Manual, should be observed.

To INCREASE power, first increase RPM (propeller control); then increase manifold pressure (throttle control).

To DECREASE power, fist decrease manifold pressure (throttle); then decrease RPM (propeller control).

Use of the mixture control in cruising flight reduces fuel consumption significantly, especially at higher altitudes. The mixture should be leaned during cruising operation above 5000 feet altitude and at the pilot's discretion at lower altitudes when 75% power or less is being used. If any doubt exists as to the amount of power being used, the mixture should be in the FULL. RICH position for all operations under 5000 feet

To lean the mixture, disengage lock* and pull the mixture control until the engine becomes rough, indicating that the lean mixture limit has been reached in the leaner cylinders. Then enrich the mixture by pushing the control toward the instrument panel until engine operation becomes smooth. The fuel flow meter will give a close approximation of the fuel being consumed

If the airplane is equipped with the optional exhaust gas temperature (EGT) gauge, a more accurate means of leaning is available to the pilot. For this procedure, refer to the Avco Lycoming Operator's Manual.

In order to keep the airplane in best lateral trim during cruising flight, the fuel should be used alternately from each tank.. It is recommended that one tank be used for one hour after take-off, then the other tank be used for two hours, then return to the first tank for one hour. Each tank will then contain approximately 1/2 hour of fuel if tanks were full (24 gallons usable each tank) at take-off. Do not run tanks completely dry in flight.

NOTE

There are no mechanical uplocks in the landing gear system In the event of a hydraulic system malfunction, the landing gear will free fall to the gear down and locked position. The pilot should be aware that the airplane true airspeed with gear down is approximately 75% of the gear retracted airspeed for any given power setting. Allowances for the reduction in airspeed and range should be made when planning extended flight between remote airfields or flight over water

*Serial nos 75.35001 and up

APPROACH AND LANDING

Before landing check list:

1. Seat backs - erect
2. Fasten belts/harness
3. Fuel - on proper tank
4. Fuel pump - ON
5. Mixture - set
6. Propeller - set
7. Gear - **DOWN** (150 MPH MAX)
8. Flaps - set (125 MPH)
9. Air conditioner - OFF

The airplane should be trimmed to an approach speed of about 90 MPH with the flaps and gear extended. The flaps can be lowered at speeds up to 125 MPH and the gear can be extended at speeds up to 150 MPH if desired. The propeller should be set at approximately 2600 RPM to facilitate ample power for emergency go-around and to prevent over-speeding of the engine if the throttle is advanced sharply. The mixture control should be kept in the full rich position to insure maximum acceleration if it should be necessary to open the throttle again.

The amount of flap used during landings and the speed of the aircraft at contact with the runway should be varied according to the landing surface and conditions of wind and airplane loading. It is generally good practice to contact the ground at the minimum possible safe speed consistent with existing conditions.

Normally, the best technique for short and slow landings is to use full flaps and enough power to maintain the desired approach flight path. The mixture should be full rich, fuel selector on the fullest tank, and the electric fuel pump on. The airspeed should be reduced during flare out and contact with the ground should be made close to stalling speed. After ground contact, the nose wheel should be held off. As the airplane slows down, the nose should be eased down and the brakes applied. There will be less chance of skidding the tires if the flaps are retracted before applying the brakes. Braking is most effective when back pressure is applied to the control wheel, putting most of the airplane weight on the main wheels without lifting the nose wheel. In high wind conditions, although it may be desirable to approach at higher than normal speeds, it is still desirable to make contact with the runway when the airplane is approximately at its minimum speed.

STOPPING ENGINE

At the pilot's discretion, the flaps should be raised and the electric fuel pump turned off After parking, the air conditioner and radios should be turned off, the propeller set to increase RPM and the engine then stopped by disengaging mixture control lock* and pulling the mixture control to idle cut-off. The throttle should be left full aft to avoid engine vibration while stopping Then the ignition and master switches should be turned off and the parking brake set

*Serial nos. 7535001 and up

AIRSPEED DATA

All airspeeds quoted in this manual are calibrated unless otherwise noted. Calibrated airspeed is indicated airspeed corrected for instrument and position errors. The following table gives the correlation between indicated airspeed and calibrated airspeed if zero instrument error is assumed This calibration is valid only when flown at maximum gross weight in level flight.

AIRSPEED CORRECTION TABLE

Flaps 0"													
IAS - MPH	60	70	80	90	100	110	120	130	140	150	160	170	180
CAS-MPH	70	77	85	94	103	111	120	129	138	147	157	166	175

Flaps 40"							
IAS-MPH	60	70	80	90	100	110	120
CAS-MPH	67	74	82	91	100	109	118

MOORINGS

The Cherokee Arrow II should be moved on the ground with the aid of the nose wheel tow bar provided with each plane and secured in the baggage compartment. Tie down ropes may be secured to rings provided under each wing and to the tail skid The aileron and stabilator control should be secured by looping the seat belt through the control wheel and pulling it snug. The rudder is held in position by its connections to the nose wheel steering and normally does not have to be secured. The flaps are locked when in the full up position and should be left retracted.

WEIGHT AND BALANCE

It is the responsibility of the pilot to determine that the airplane remains within the allowable weight vs. center of gravity envelope while in flight. For weight and balance data see the Airplane Flight Manual and Weight and Balance form supplied with each airplane.

EMERGENCY LOCATOR TRANSMITTER*

The Emergency Locator Transmitter (ELT), when installed, is located in the aft portion of the fuselage just below the stabilator leading edge and is accessible through a plate on the right side of the fuselage. It is an emergency locator transmitter which meets the requirements of FAR 91.52. It is automatically activated by a longitudinal force of 5 to 7 g's and transmits a distress signal on both 121.5 MHz and 243.0 MHz for a period of from 48 hours in low temperature areas up to 100 hours in high temperature areas. The unit operates on a self-contained battery.

*Optional equipment

activated by a longitudinal force of 5 g's and transmits a distress signal on both 121.5 MHz and 243.0 MHz for a period of from 48 hours in low temperature areas up to 100 hours in high temperature areas. The unit operates on a self-contained battery. The replacement date as required by FAA regulations is marked on the transmitter label. The battery should also be replaced if the transmitter has been used in an emergency situation or if accumulated test time exceeds one hour. The unit is equipped with a portable antenna to allow the locator to be removed from the airplane in case of an emergency and used as a portable signal transmitter.

On the unit itself is a three position selector switch labeled "OFF," "ARM" and "ON." The "ARM" position is provided to set the unit to the automatic position so that it will transmit only after impact and will continue to transmit until the battery is drained to depletion or until the switch is manually moved to the "OFF" position. The "ARM" position is selected when the transmitter is installed at the factory and the switch should remain in that position whenever the unit is installed in the airplane. The "ON" position is provided so the unit can be used as a portable transmitter or in the event the automatic feature was not triggered by impact or to periodically test the function of the transmitter.

Select the "OFF" position when changing the battery, when rearming the unit if it has been activated for any reason, or to discontinue transmission.

NOTE

If the switch has been placed in the "ON" position for any reason, the "OFF" position has to be selected before selecting "ARM." If "ARM" is selected directly from the "ON" position, the unit will continue to transmit in the "ARM" position.

A pilot's remote switch, located on the left side panel, is provided to allow the transmitter to be controlled from inside the cabin.

1. On some models the pilot's remote switch has three positions and is placarded "ON," "AUTO/ARM," and "OFF/RESET." The switch is normally left in the "AUTO/ARM" position. To turn the transmitter off, move the switch momentarily to the "OFF/RESET" position. The aircraft master switch must be "ON" to turn the transmitter "OFF." To activate the transmitter for tests or other reasons, move the switch upward to the "ON" position and leave it in that position as long as transmission is desired.
2. On other models the pilot's remote switch has two positions and is placarded "ON/RESET" and "ARM (NORMAL POSITION)." The switch is normally left in the down or "ARM" position. To turn the transmitter off, move the switch to the "ON/RESET" position for one second then return it to the "ARM" position To activate the transmitter for tests or other reasons, move the switch upward to the "ON/RESET" position and leave it in that position as long as transmission is desired.

The locator should be checked during the ground check to make certain the unit has not been accidentally activated. Check by tuning a radio receiver to 121.5 MHz. If there is an oscillating sound, the locator may have been activated and should be turned off immediately. Reset to the "ARM" position and check again to insure against outside interference.,

NOTE

If for any reason a test transmission is necessary, the operator must first obtain permission from a local FAA/FCC representative (or other applicable Authority). Test transmission should be kept to a minimal duration.

AIR CONDITIONMG *

To operate the air conditioning system either on the ground or in flight:

1. Start the engine (ground operation).
2. Turn the air conditioning "Master" switch to "ON."
3. Turn "TEMP" control to desired temperature. Clockwise rotation increases cooling.
4. Select desired "FAN" position, "LOW," "MED" or "HIGH."

AIR CONDITIONER OPERATIONAL CHECK PROCEDURE

Prior to take-off the air conditioner should be checked for proper operation as follows:

1 Check aircraft Master Switch ON.

2. Select desired "FAN" position, "LOW," "MED" or "HIGH."
3. Turn the air conditioner control switch to "ON" - the "Air Cond. Door Open" warning light will turn on, thereby indicating proper air conditioner condenser door actuation

4 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.

5 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 inflight failure is suspected.

AIR CONDITIONER EFFECTS ON AIRPLANE PERFORMANCE

Operation of the air conditioner will cause slight decreases in the cruise speed and range of the Cherokee Arrow II. Power from the engine is required to run the compressor, and the condenser door, when extended, causes a slight increase in drag. When the air conditioner is turned off there is normally no measurable difference in climb, cruise or range performance of the airplane.

NOTE

To insure maximum climb performance the air conditioner must be turned off manually before take-off to disengage the compressor and retract the condenser door. Also the air conditioner must be turned off manually before the landing approach in preparation for a possible go-around.

*Optional equipment

Although the cruise speed and range are only slightly affected by the air conditioner operation, these changes should be considered in preflight planning. To be conservative, the following figures assume that the compressor is operating continuously while the airplane is airborne. This will be the case only in extremely hot weather.

1. Decrease true airspeed - approximately 5 mph at normal cruise power setting.
2. Decrease range - may be as much as 30 statute miles for 48 gallon capacity.

When the full throttle is not used or in the event of malfunction which caused the compressor to operate and the condenser door to be extended, a decrease in rate of climb of as much as 100 feet per minute can be expected. Should a malfunction occur which prevents the condenser door retraction when the compressor is turned off, a decrease in rate of climb of as much as 50 feet per minute can be expected.

OPERATING TIPS

Operating Tips 8-1

OPERATING TIPS

The following Operating Tips are of particular value in the operation of the Cherokee Arrow II.

1. Learn to trim for take-off so that only a very light back pressure on the wheel is required to lift the airplane off the ground.
2. On take-off, do not retract the gear prematurely. The airplane may settle and make contact with the ground because of lack of flying speed, atmospheric conditions, or rolling terrain.
3. The best speed for takeoff is about 65 MPH under normal conditions. Trying to pull the airplane off the ground at too low an airspeed decreases the controllability of the airplane in event of engine failure.
4. In high density areas where high traffic pattern speeds are necessary or when it is advantageous to extend the gear, it is permissible to extend the landing gear at speeds up to 150 MPH.
5. Flaps may be lowered at airspeeds up to 125 MPH. To reduce flap operating loads, it is desirable to have the airplane at a slower speed before extending the flaps.
6. Before attempting to reset any circuit breaker, allow a two to five minute cooling off period.
7. Always determine position of landing gear by checking the gear position lights.
8. Remember that when the panel lights are on, the gear position lights are very dim.
9. Before starting the engine, check that all radio switches, light switches, and the pitot heat switch are in the off position so as not to create an overloaded condition when the starter is engaged.
10. A high fuel pressure indication on the fuel flow indicator is a possible sign of restricted air bleed nozzles.
11. The overvoltage relay is provided to protect the electronics equipment from a momentary overvoltage condition (approximately 16.5 volts and up), or a catastrophic regulator failure. In the event of a momentary condition, the relay will open and the ammeter will indicate zero output from the alternator. The relay may be reset by switching the "ALT" switch to "OFF" for approximately 30 seconds and then returning the "ALT" switch to "ON." If after recycling the "ALT" switch the condition persists, the flight should be terminated as soon as practical. Reduce the battery load to a minimum. The ALT light on the annunciator panel* will illuminate if the alternator fails. Recycle the ALT switch and check the ALT FIELD circuit breaker.. If the failure persists after this action, reduce electrical loads and land as soon as practical.
12. It should always be kept in mind that the back-up gear extender system is intended to lower the gear during the approach should the pilot forget. However, the pilot should always lower the gear during normal operations by using the gear selector switch on the instrument panel.

*Serial nos. 7535001 and up

13. The vacuum gauge is provided to monitor the pressure available to assure the correct operating speed of the vacuum-driven gyroscopic flight instruments. It also monitors the condition of the commom air filter by measuring the flow of air through the filter.

If the vacuum gauge does not register 5" Hg ± .10" Hg at 2000 RPM, the following items should be checked before flight:

a. Common air filter, could be dirty or restricted.
h. Vacuum lines, could be collapsed or hrokcn.
c. Vacuum pump, worn.
d. Vacuum regulator, not adjusted correctly. The pressure, even though set correctly, can read lower under two conditions:
   (1) Very high altitude, above 12,000 feet.
   (2) Low engine RPM usually on approach or during training maneuvers, This is normal and should not be considered a malfunction.

14. The shape of the wing fuel tanks is such that in certain maneuvers the fuel may move away from the tank outlct. If the outlet is uncovercd, the fucl will be interrupted and a temporary loss of power may result. Pilots can prevent inadvcrtcnt uncovering of the outlet by avoiding maneuvers which could rcsult in uncovering the outlet.,

Extreme running turning takeoffs should bc avoided as fuel flow interruption may occur.

Prolonged slips or skids which rcsult in excess of 2000 feet of altitude loss, or other radical or extreme maneuvers which could cause uncovering of the fuel outlct must be avoided as fuel flow interruption may occur when tank being used is not full.

15. The rudder pedals arc suspended from a torque tube which extends across the fuselage. The pilot should become familiar with the proper positioning of his feet on the rudder pedals so as to avoid interference with the torque tube when moving the rudder pedals or operating the toe brakes.
16. Anti-collision lights should not be operating when flying through overcast and clouds, since reflected light can produce spacial disorientation. Do not operate strobe lights when taxiing in the vicinity of other aircraft..
17. In an effort to avoid accidents, pilots should obtain and study the safety related information made available in FAA publications such as regulations, advisory circulars, Aviations News, AIM and safety aids..

PERFORMANCE CHARTS

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Glide Performance 9-8
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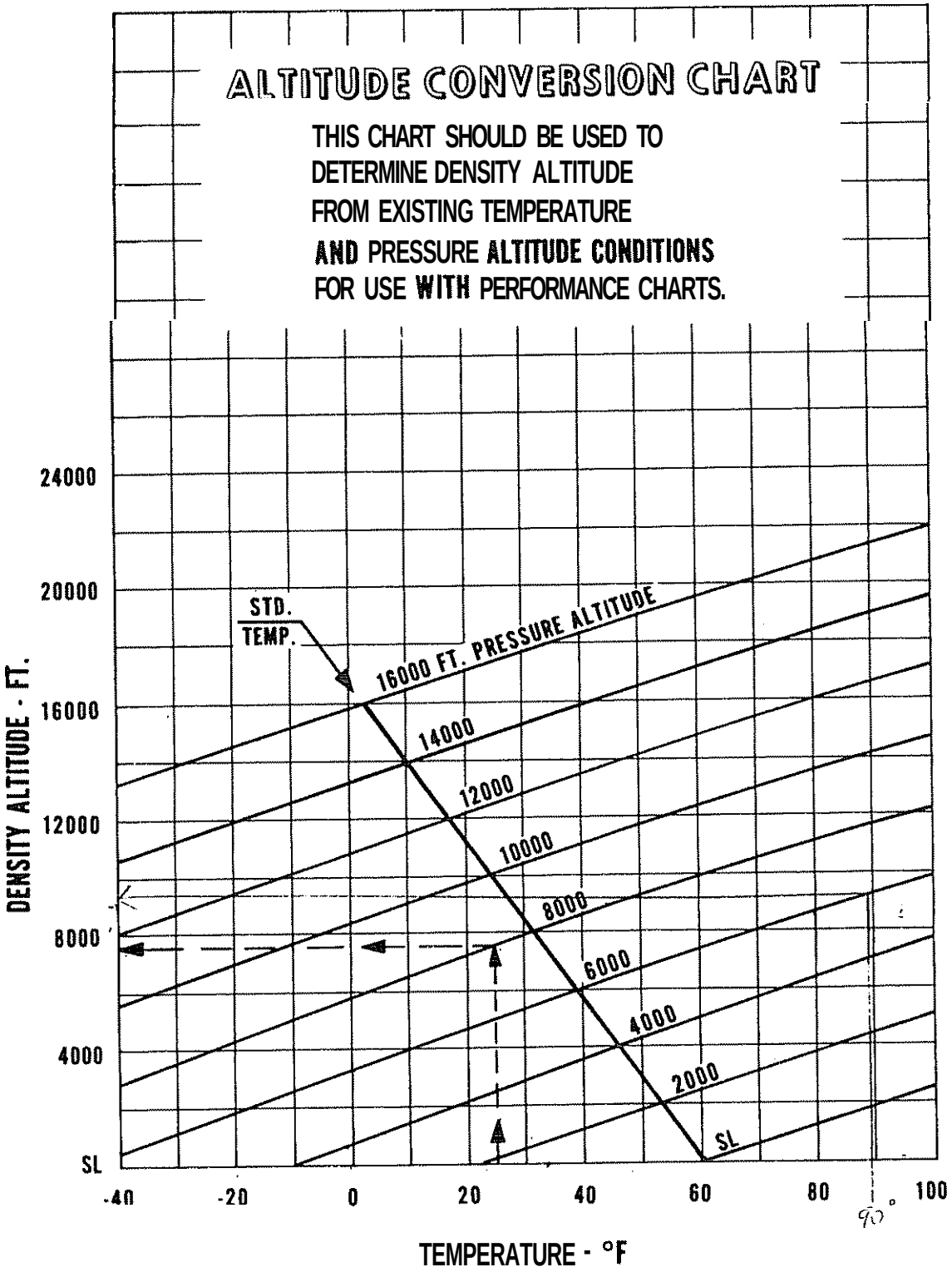
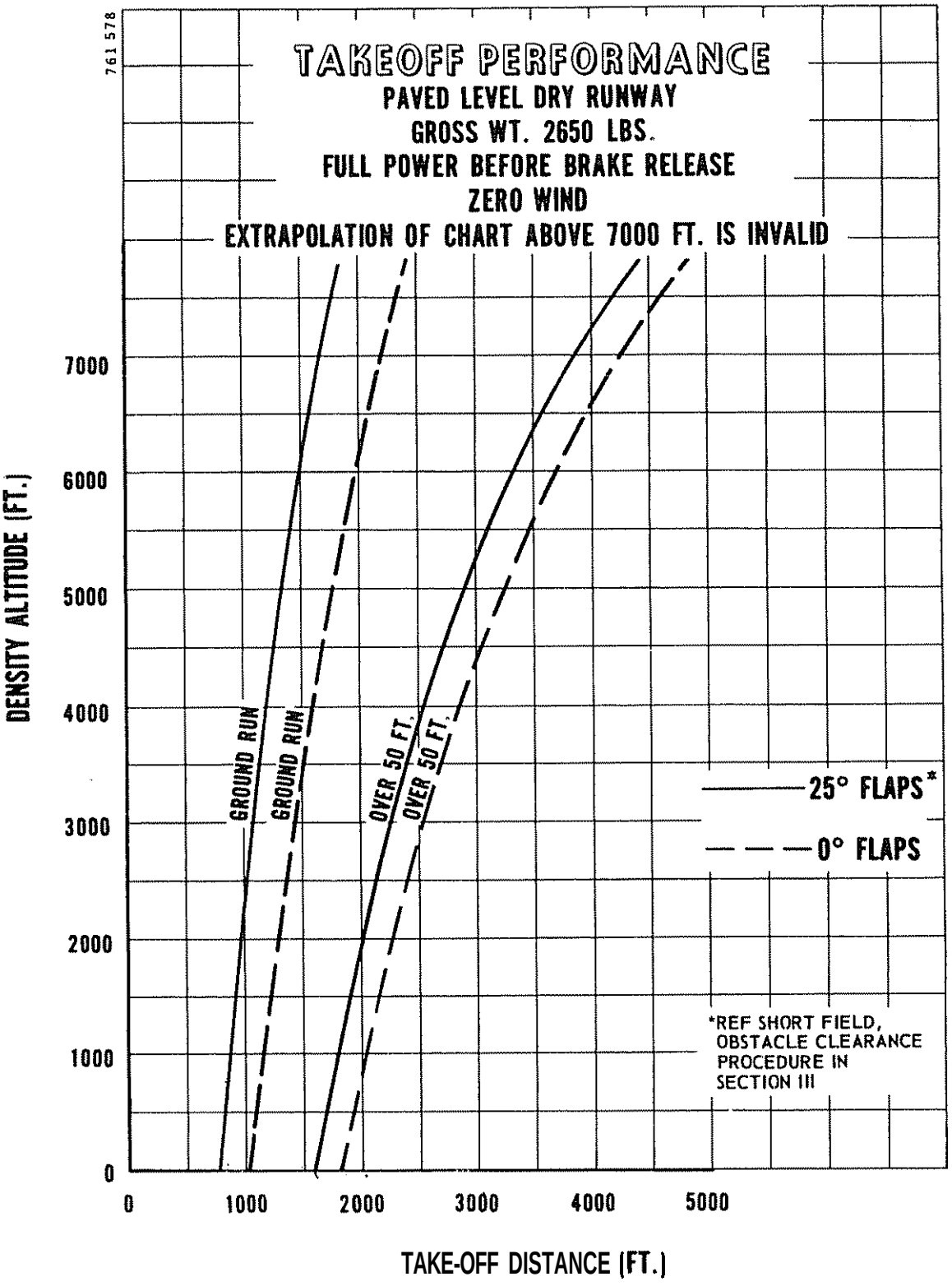
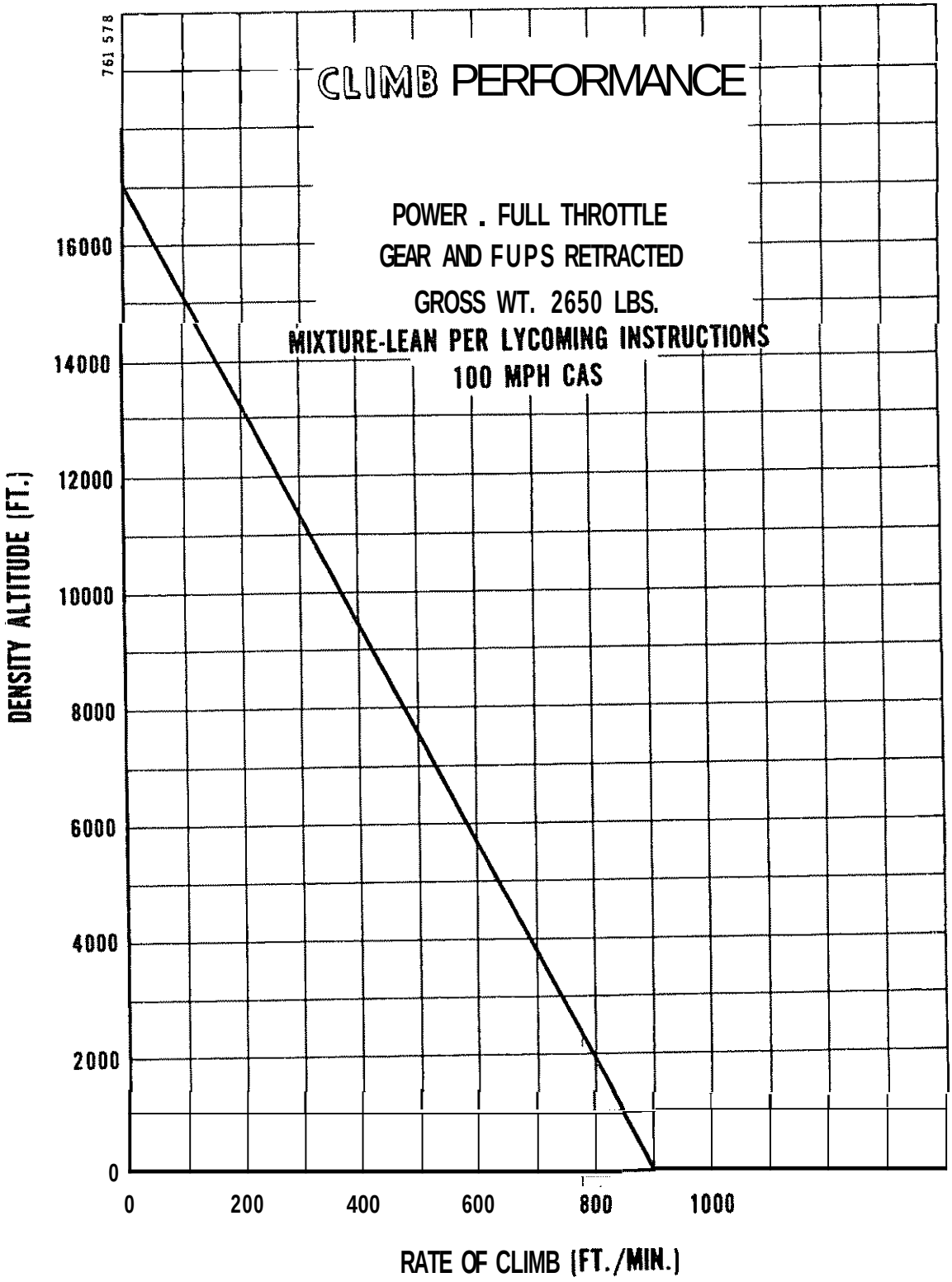
WARNING

Performance information derived by extrapolation beyond the limits shown on the charts should not be used for flight planning purposes.

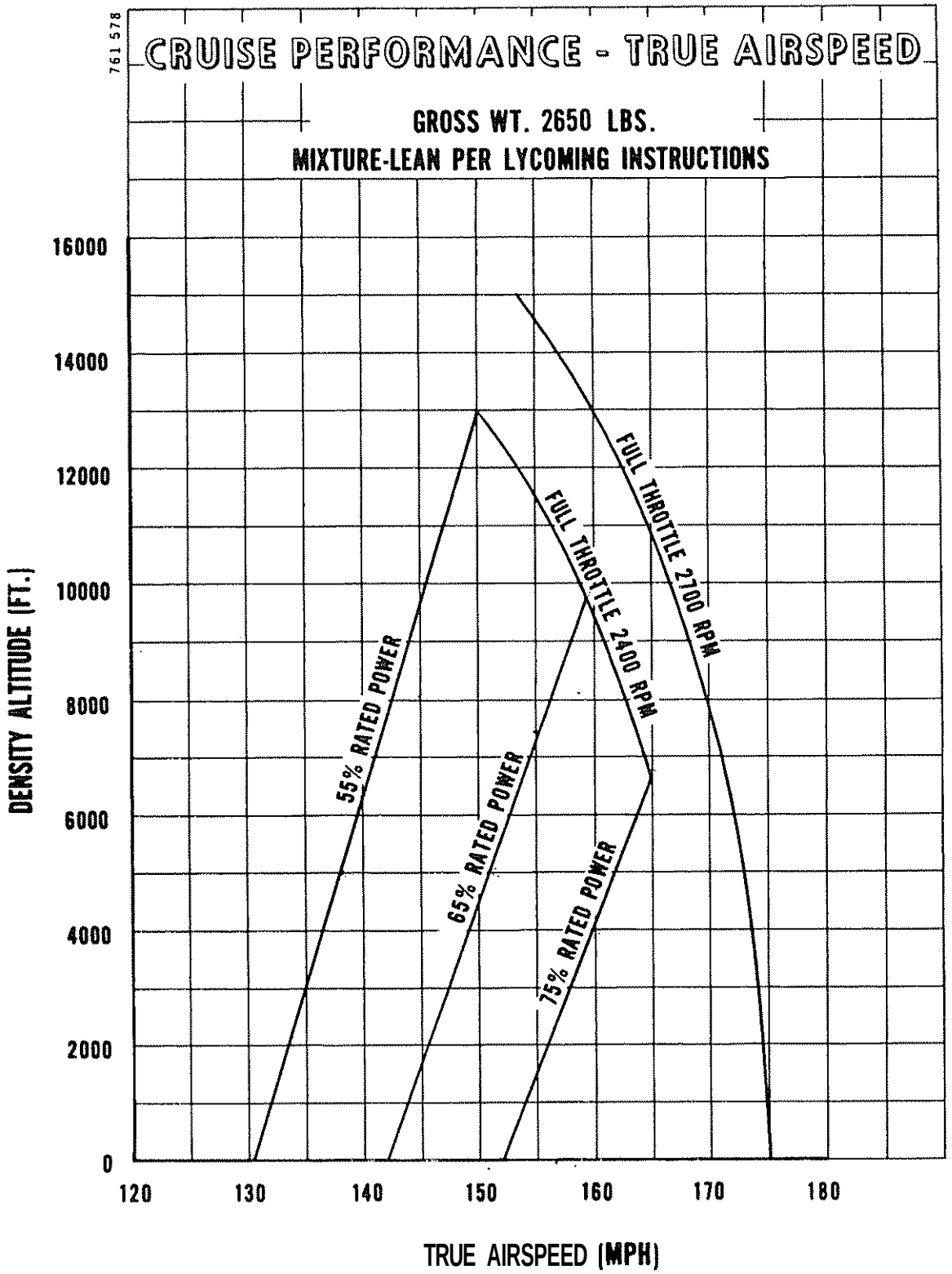

ALTITUDE CONVERSION CHART
THIS CHART SHOULD BE USED TO
DETERMINE DENSITY ALTITUDE
FROM EXISTING TEMPERATURE
AND PRESSURE ALTITUDE CONDITIONS
FOR USE WITH PERFORMANCE CHARTS.
STD. TEMP.
16000 FT. PRESSURE ALTITUDE
14000
12000
10000
8000
6000
4000
2000
SL
DENSITY ALTITUDE - FT.
24000
20000
16000
12000
8000
4000
SL
-40
-20
0
20
40
60
80
100
90°
TEMPERATURE - °F



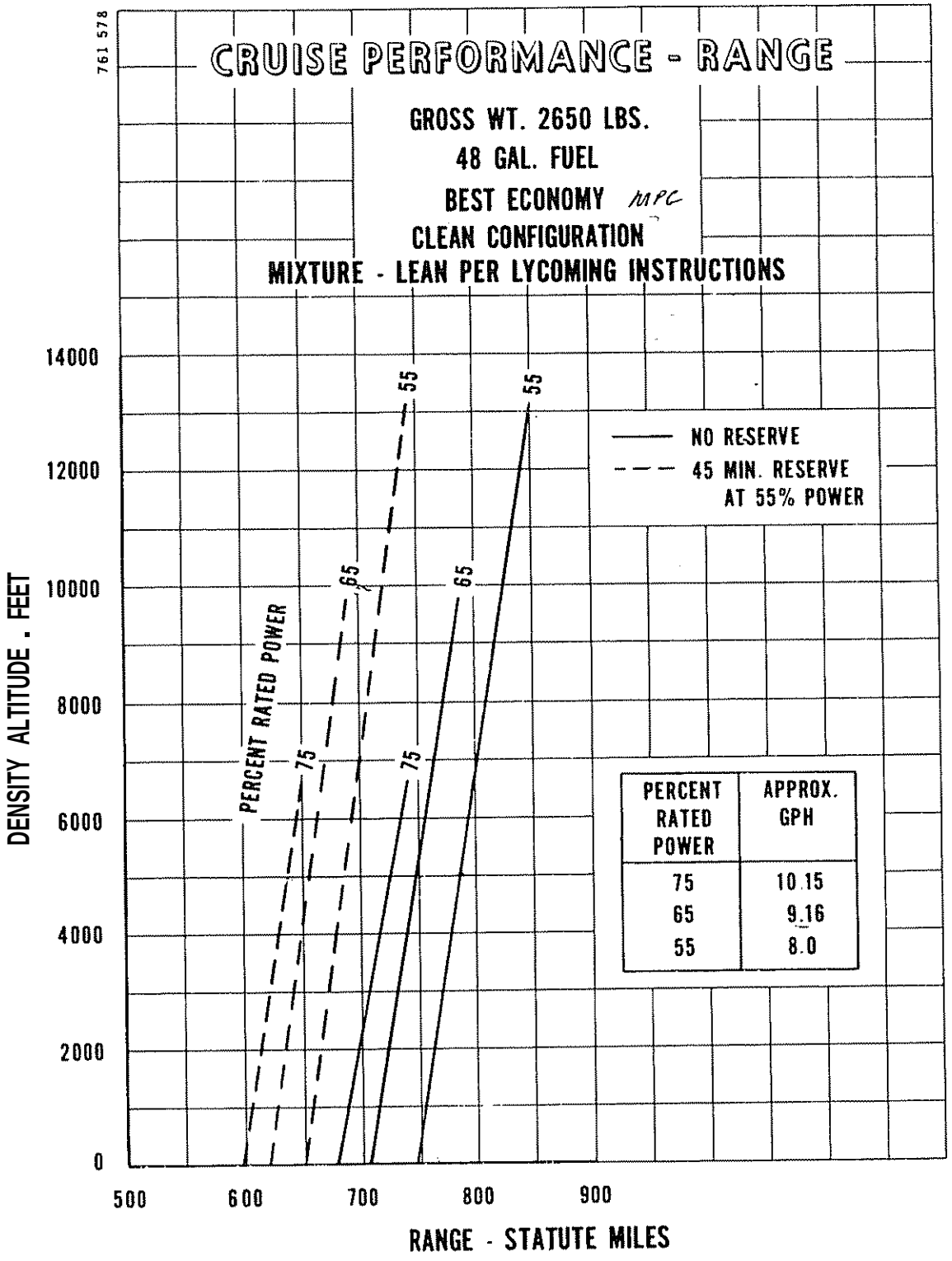
NOTE: SEE SECTION 7 FOR EFFECTS OF AIR CONDITIONING INSTALLATION ON PERFORMANCE.



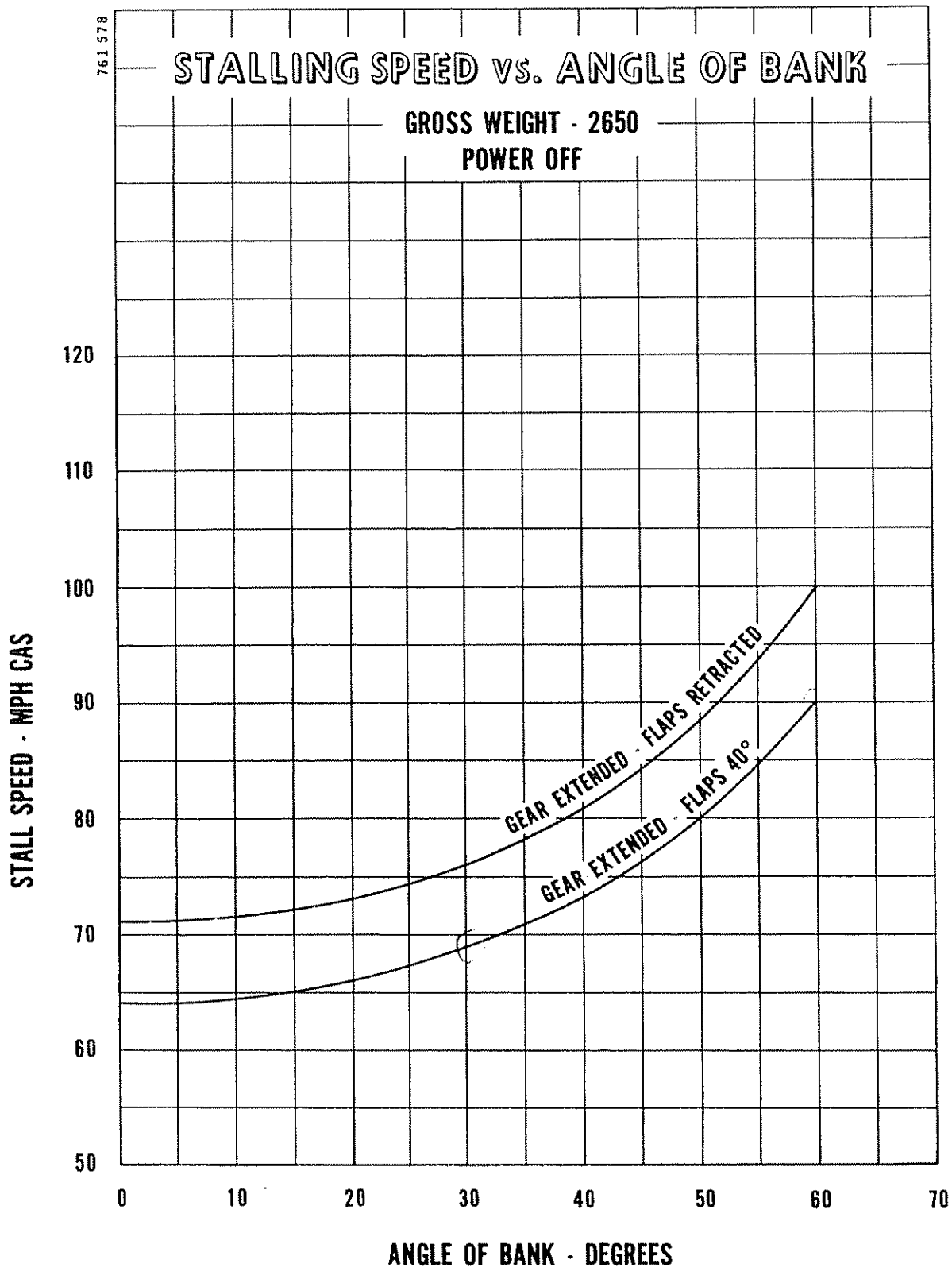
NOTE: SEE SECTION 7 FOR EFFECTS OF AIR CONDITIONING INSTALLATION ON PERFORMANCE.

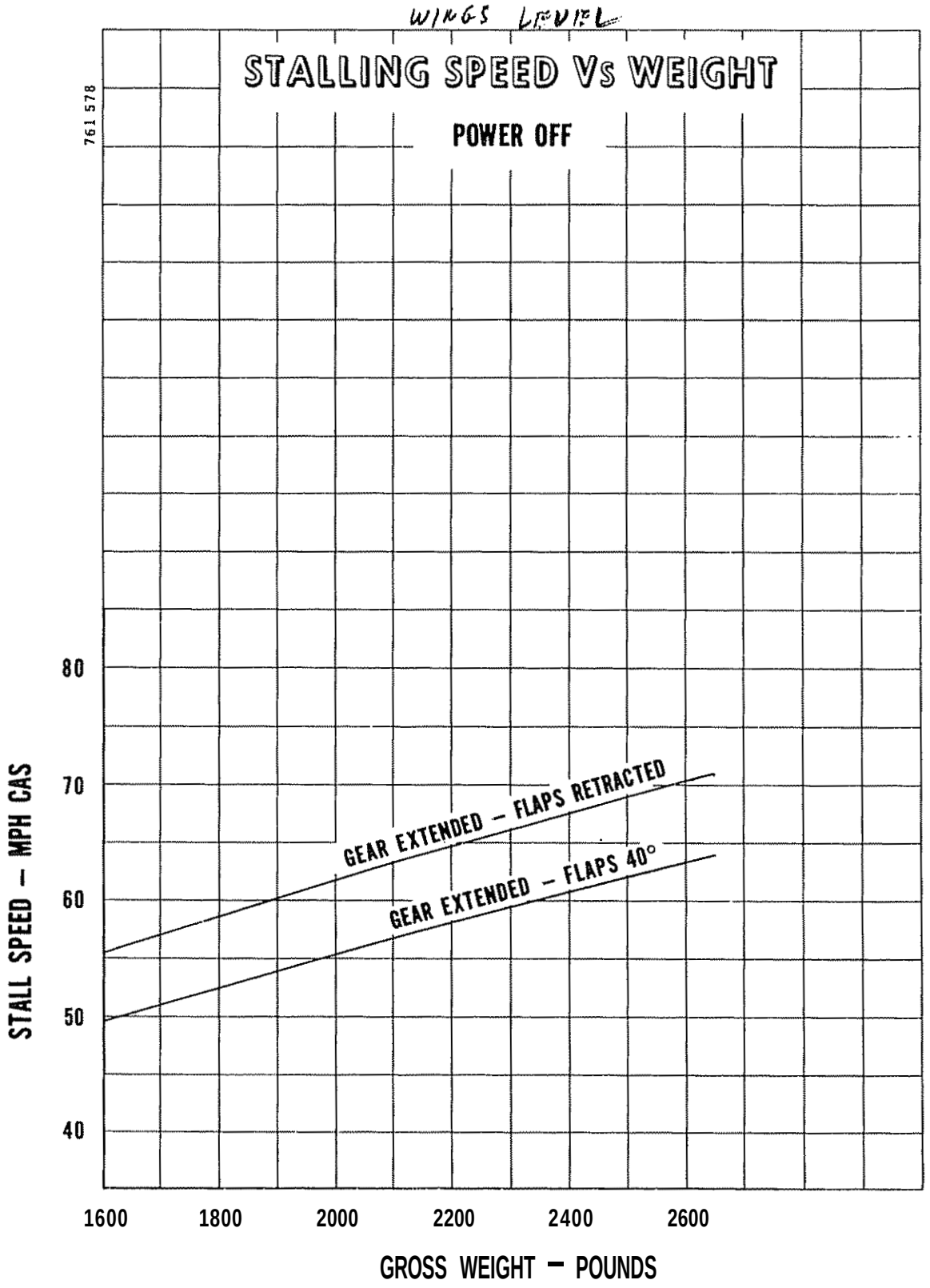


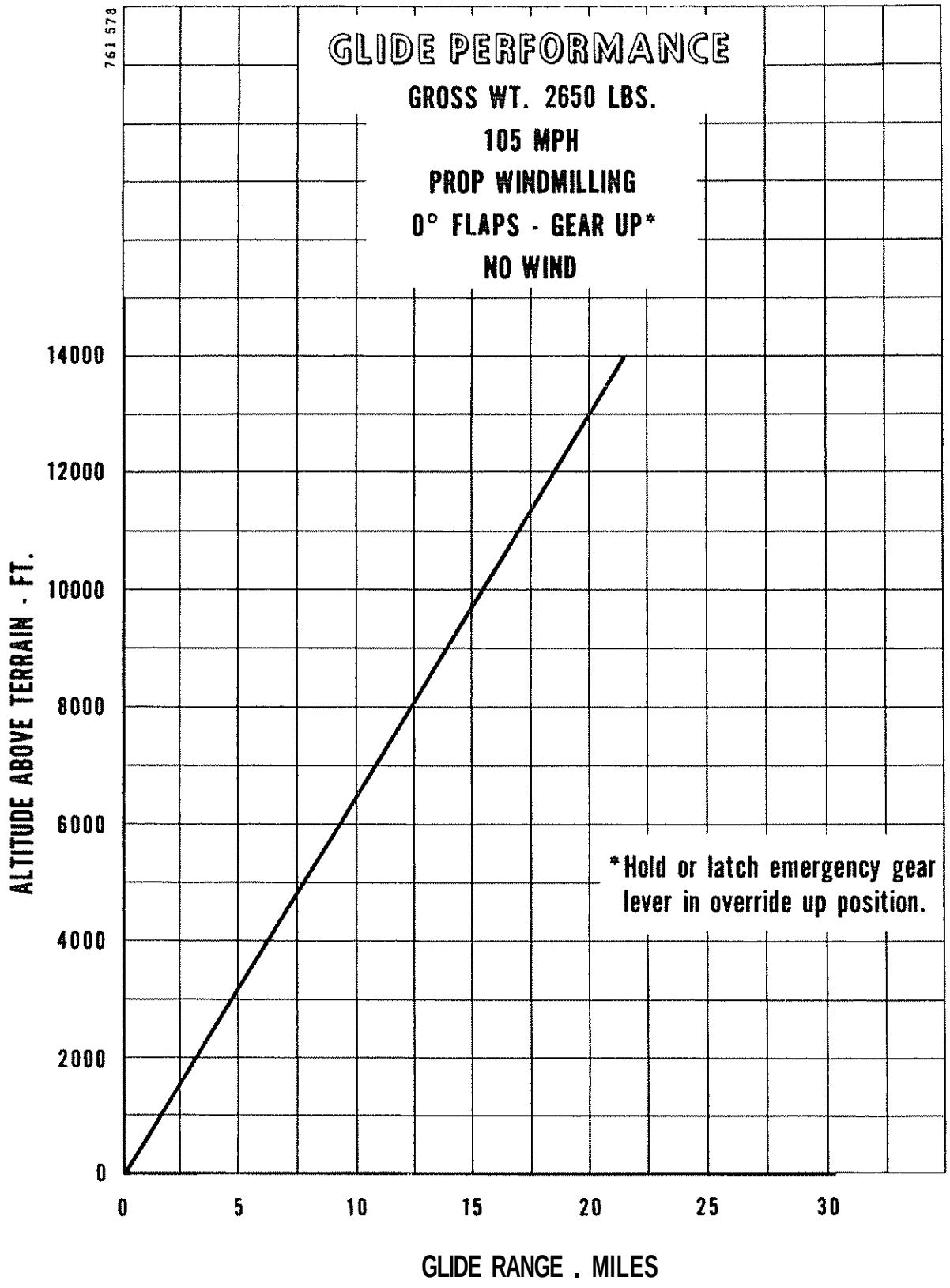
NOTE: SEE SECTION 7 FOR EFFECTS OF AIR CONDITIONING INSTALLATION ON PERFORMANCE.

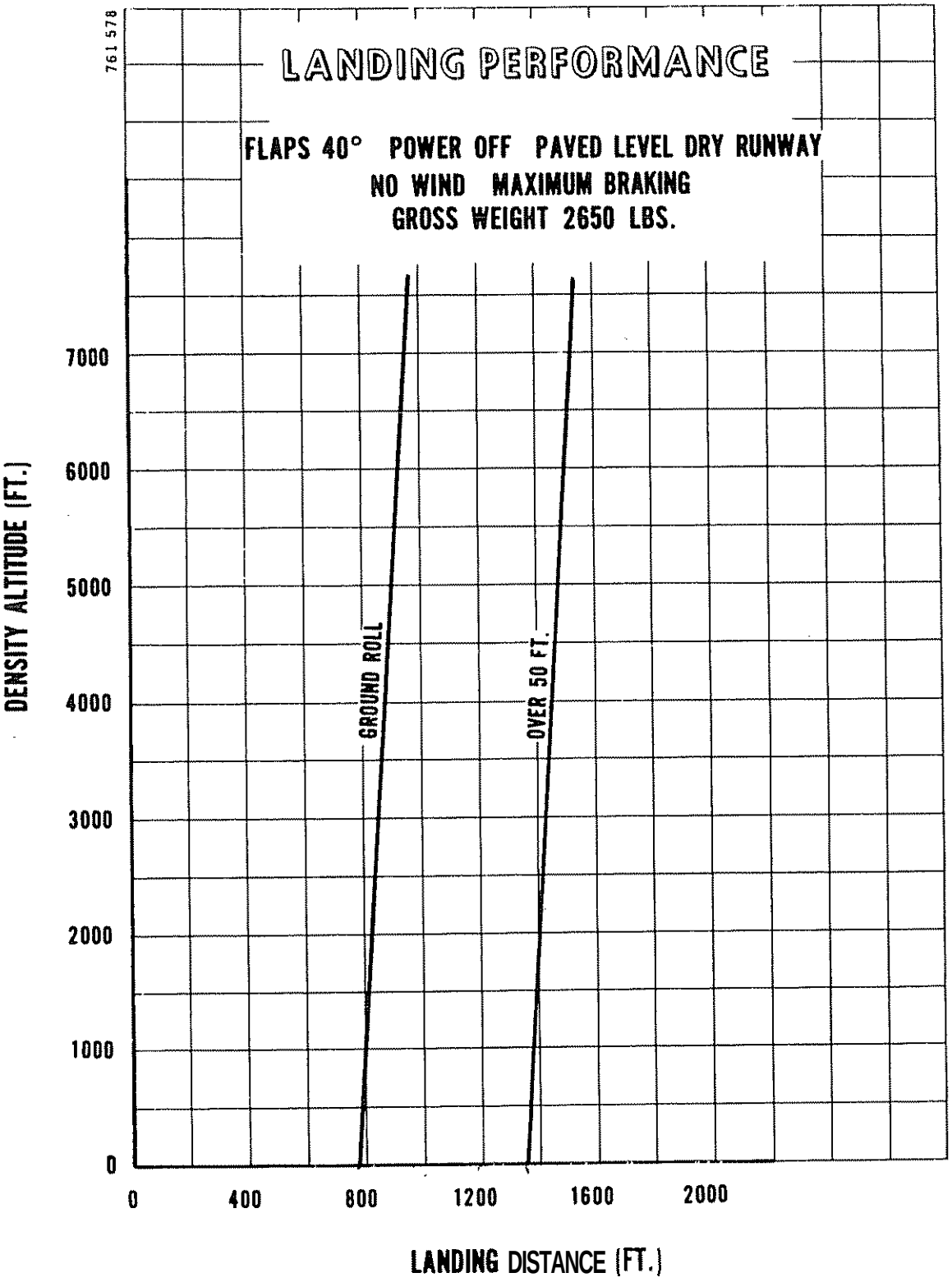


NOTE: SEE SECTION 7 FOR EFFECTS OF AIR CONDITIONING INSTALLATION ON PERFORMANCE.


761 578
STALLING SPEED vs. ANGLE OF BANK
GROSS WEIGHT - 2650
POWER OFF
STALL SPEED - MPH CAS
120
110
100
90
80
70
60
50
0
10
20
30
40
50
60
70
ANGLE OF BANK - DEGREES
GEAR EXTENDED - FLAPS RETRACTED
GEAR EXTENDED - FLAPS 40°


WINGS LEVEL
STALLING SPEED Vs WEIGHT
POWER OFF
761 578
80
70
60
50
40
STALL SPEED – MPH CAS
GEAR EXTENDED – FLAPS RETRACTED
GEAR EXTENDED – FLAPS 40°
1600
1800
2000
2200
2400
2600
GROSS WEIGHT – POUNDS


761 578
GLIDE PERFORMANCE
GROSS WT. 2650 LBS.
105 MPH
PROP WINDMILLING
0° FLAPS - GEAR UP*
NO WIND
ALTITUDE ABOVE TERRAIN - FT.
14000
12000
10000
8000
6000
4000
2000
0
0
5
10
15
20
25
30
GLIDE RANGE . MILES
*Hold or latch emergency gear lever in override up position.



NOTE: SEE SECTION 7 FOR EFFECTS OF AIR CONDITIONING INSTALLATION ON PERFORMANCE.

Power Setting Table - Lycoming Model IO-360-C Series. 200 HP Engine

Press. Alt Feet	Std. Alt Temp °F	110 HP - 55% Rated RPM AND MAN. PRESS. 2100	110 HP - 55% Rated RPM AND MAN. PRESS. 2400	130 HP - 65% Rated RPM AND MAN. PRESS. 2100	130 HP - 65% Rated RPM AND MAN. PRESS. 2400	150 HP - 75% Rated RPM AND MAN. PRESS. 2400	Press. Alt Feet
SL	59	22.9	20.4	25.9	22.9	25.5	SL
1,000	55	22.7	20.2	25.6	22.7	25.2	1,000
2,000	52	22.4	20.0	25.4	22.5	25.0	2.000
3.000	48	22.2	19.8	25.1	22.2	24.7	3.000
4,000	45	21.9	19.5	24.8	22.0	24.4	4.000
5.000	41	21.7	19.3	FT	21.7	FT	5.000
6,000	38	21.4	19.1	--	21.5	--	6,000
7.000	34	21.2	18.9	--	21.3	--	7.000
8.000	31	21.0	18.7	--	21.0		8,000
9.000	27	FT	18.5	--	FT		9.000
10,000	23	--	18.3				10,000
11.000	19	--	18.1				11,000
12,000	16	--	17.8				12.000
13,000	12	--	17.6				13.000
14,000	9	--	FT				14.000

To maintain constant power, correct mantfold pressure approximately 0.16" Hg for each 10" F variation in inlet air temperature from standard altitude temperature. Add manifold pressure for air temperatures above standard, subtract for temperatures below standard.

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HANDLING AND SERVICING

This section contains information on preventive maintenance. Refer to the appropriate Service Manual for further maintenance procedures. Any complex repair or modification should be accomplished by a Piper Certified Service Center.

WARNING

Inspection, maintenance and parts requirements for all non-PIPER approved STC installations are not included in this handbook. When a non-PIPER approved STC installation is incorporated on the airplane, those portions of the airplane affected by the installation must be inspected in accordance with the inspection program published by the owner of the STC. Since non-PIPER approved STC installations may change systems interface, operating characteristics and component loads or stresses on adjacent structures. PIPER provided inspection criteria may not be valid for airplanes with non-PIPER approved STC installations.

WARNING

Modifications must be approved in writing by PIPER prior to installation. Any and all other installations, whatsoever, of any kind will void this warranty in it's entirety.

WARNING

Use only genuine PIPER parts or PIPER approved parts obtained from PIPER approved sources, in connection with the maintenance and repair of PIPER airplanes.

Genuine PIPER parts are produced and inspected under rigorous procedures to insure airworthiness and suitability for use in PIPER airplane applications. Parts purchased from sources other than PIPER, even though identical in appearance, may not have had the required tests and inspections performed, may be different in fabrication techniques and materials, and may he dangerous when installed in an airplane.

Additionally, reworked or salvaged parts or those parts obtained from non-PIPER approved sources, may have service histories which are unknown or cannot he authenticated, may have been subjected to unacceptable stresses or temperatures or may have other hidden damage not discernible through routine visual or nondestructive testing. This may render the part, component or structural assembly, even though originally manufactured by PIPER, unsuitable and unsafe for airplane use..

PIPER expressly disclaims any responsibility for malfunctions, failures, damage or injury caused by use of non-PIPER approved parts.

GROUND HANDLING

TOWING

The airplane may he moved by using the nose wheel steering bar provided, or power equipment that will not damage or cause excess strain to the nose gear assembly.. The steering bar is stowed in the baggage compamnent.

CAUTION

When towing with power equipment, do not turn nose gear more than 30 degrees in either direction as this will result in damage to the nose gear and steering mechanism.

TAXIING

Before attempting to taxi the airplane, ground personnel should be checked out by a qualified pilot or other responsible person. Engine starting and shut-down procedures should be covered as well as taxi techniques. When it is ascertained that the propeller back blast and taxi areas are clear, power should be applied to start the taxi roll and the following checks should be performed.

a. Taxi forward a few feet and apply brakes to determine their effectiveness.
b. Taxi with propeller set in low pitch, high RPM setting.
c. While taxiing, make slight turns to ascertain the effectiveness of steering.
d. Observe wing clearances when taxiing near buildings or other stationary objects. If possible, station a guide outside the airplane to observe.
e. When taxiing on uneven ground, look for holes and ruts.
f. Do not operate the engine at high RPM when running up or taxiing over ground containing loose stones, gravel or any loose material that may cause damage to the propeller blades.

PARKING

When parking the airplane, insure that it is sufficiently protected against adverse weather conditions and presents no danger to other aircraft. When parking the airplane for any length of time or overnight, it is recommended that it be moored securely.

a. To park the airplane, head it into the wind, if possible.
b. Set the parking brake. (Use wheel chocks if available.)

NOTE

Care should be taken to avoid setting brakes that are overheated or during cold weather when accumulated moisture may freeze a brake.

MOORING

The airplane should be moored to insure its immovability, protection and security under varying weather conditions. The following procedure should be used for proper mooring of the airplane.

a. Head the airplane into the wind, if possible.
b Lock the aileron and stabilator controls by looping the seat belt through the control wheel and pulling it snug.
c Block the wheels
d. Secure tie down ropes to the wing tie down rings and tail skid at approximately 45-degree angles to the ground.

CAUTION

Use bowline knots or locked slip knot Do not use a plain slip knot

NOTE

Additional preparations for high winds include using tie down ropes from the landing gear forks, and securing the rudder.

CLEANING

CLEANING ENGINE COMPARTMENT

Before cleaning the engine compatment, place a strip of tape on the magneto vents to prevent solvent from entering these units.

a. Place a large pan under the engine to catch waste.
b. With the engine cowling removed, spray or brush the engine with solvent or a mixture of solvent and degreaser, as desired. Where heavy grease and dirt deposits have collected, it may be necessary to brush areas that were sprayed, in order to clean them.

CAUTION

Do not spray solvent into the alternator, vacuum pump, starter or air intakes.

c. Allow the solvent to remain on the engine from five to ten minutes. Then rinse the engine clean with additional solvent and allow to dry.

CAUTION

Do not operate engine until excess solvent has evaporated or otherwise been removed.

d. Remove the protective covers from the magnetos.
e. Lubricate controls, bearing surfaces, etc., in accordance with the Lubrication Chart.

CLEANING LANDING GEAR

Before cleaning the landing gear, place a plastic cover or similar material over the wheel and brake assembly.

a. Place a pan under the gear to catch waste.
b. Spray or brush the gear area with solvent or a mixture of solvent and degreaser, as desired. Where heavy grease and dirt deposits have collected, it may be necessary to brush areas that were sprayed, in order to clean them.
c. Allow the solvent to remain on the gear from five to ten minutes. Then rinse the gear with additional solvent and allow to dry.
d. Remove the cover from the wheel and remove the catch pan.
e. Lubricate the gear in accordance with the Lubrication Chart.
f. Caution: Do not brush the micro switches.

CLEANING EXTERIOR SIJRFACES

The airplane should be washed with a mild soap and water. Harsh abrasive or alkaline soaps or detergents used on painted or plastic surfaces could make scratches or cause corrosion of metal surfaces. Cover areas where cleaning solution could cause damage. To wash the airplane, the following procedure may be used:

a Flush away loose dirt with water.
b. Apply cleaning solution with a rag, sponge or soft bristle brush.
c. To remove stubborn oil and grease, use a cloth dampened with naphtha.
d. Where exhaust stains exist, allow solution to remain on the surface longer.
e. Any good automotive wax may be used to preserve the painted surfaces. Soft cleaning cloths or a chamois should be used to prevent scratches when cleaning or polishing. A heavier coating of wax on the leading surfaces will reduce the abrasion problems in these areas.

CLEANING WINDSHIELD AND WINDOWS

a. Remove dirt, mud, and other marks from exterior surface with clean water.
b. Wash with mild soap and warm water or an aircraft plastic cleaner. Use a soft cloth or sponge using a straight rubbing motion. Do not rub surface harshly.
c. Remove oil and grease with a cloth moistened with kerosene.

NOTE,

Do not use gasoline, alcohol, benzene, carbon tetrachloride, thinner, acetone, or window cleaning sprays.

d. After cleaning plastic surfaces, apply a thin coat of hard polishing wax. Rub lightly with a soft cloth. Do not use a circular motion.
e. A severe scratch or mar in plastic can be removed by using jeweler's rouge to rub out the scratch. Smooth both sides and apply wax.

CLEANING HEADLINER, SIDE PANELS AND SEATS

a. Clean headliner, side panels and seats with a stiff bristle brush, and vacuum where necessary.
b. Soiled upholstery, except leather, may be cleaned by using an approved foam upholstery cleaner. Carefully follow the manufacturer's instructions. Avoid soaking or harsh rubbing.

CAUTION

Solvent cleaners require adequate ventilation.

CLEANING CARPETS

Use a small whisk broom or vacuum cleaner to remove dirt. For soiled spots, use a non-inflammable dry cleaning fluid.

POWER PLANT INDUCTION AIR FILTER

The induction air filters must be cleaned at least once every 50 hours. Depending on the type of condition existing, it may be necessary to clean the filters more often.

REMOVAL OF INDUCTION AIR FILTER

a. Remove top cowl.
b. Remove the thumb screws holding the filter cover
c. Remove filter.

CLEANING INDUCTION AIR FILTER

a. Tap filter gently to remove dirt particles. Do not use compressed air or cleaning solvents.
b. Inspect filter. If paper element is torn or ruptured or gasket is damaged, the filter should be replaced. The usable life of the filter should be restricted to one year or 500 hours, whichever comes fist.

INSTALLATION OF INDUCTION AIR FILTER

a. After cleaning or replacing filter, install filter in reverse order of removal.

BRAKE SERVICE

The brake system is filled with MIL-H-5606 (petroleum base), red hydraulic brake fluid. This should be checked periodically or at every 100-hour inspection and replenished when necessary. The brake reservoir is located in the upper left comer of the front side of the firewall. Keep the fluid level at the level marked on the reservoir.

No adjustment of brake clearance is necessary Refer to the Service Manual for the procedure for replacing brake linings.

LANDING GEAR SERVICE

The main landing gear uses Cleveland Aircraft Products wheels and Cleveland single disc hydraulic brake assemblies. The main wheel tires are 6.00 x 6, four-ply rating, type III with tubes. The nose wheel uses a Cleveland Aircraft Products 5.00 wheel with a 5.00 x 5, four-ply rating, type III tire with tube

Wheels are removed by taking off the hub cap, cotter pin, axle nut, and the two bolts holding the brake segment in place. Mark tire and wheel for reinstallation; then dismount by deflating the tire, removing the three through-bolts from the wheel and separating the wheel halves.

Landing gear oleos on the Cherokee Arrow should be serviced according to the instructions on the units The main oleos should be extended under normal static load until 2.0 ± 25 inches of oleo piston tube is exposed, and the nose gear should show 2.75 ± 25 inches. To add air to the oleo struts, attach a strut pump to the valve assembly near the top of the oleo strut housing and pump the oleo to the desired position. To add oil, jack the aircraft, release the air pressure in the strut, remove the valve core and add oil through this opening with the strut extended After the strut is full, compress it slowly and fully to allow excess air and oil to escape. With the strut still compressed reinsert the valve stem and pump up the strut as above.

In jacking the aircraft for landing gear or other service, two hydraulic jacks and a tail stand should be used At least 250 pounds of ballast should be placed on the base of the tail stand before the airplane is jacked up The hydraulic jacks should be placed under the jack points on the bottom of the wing and the airplane jacked up until the tail skid is at the right height to attach the tail stand. After the tail stand is attached and the ballast added, jacking may be continued until the airplane is at the height desired There is also a jack point behind the nose gear actuating cylinder

The steering arms from the rudder pedals to the nose wheel are adjusted at the rudder pedals or at the nose wheel by turning the threaded rod end bearings in or out. Adjustment is normally accomplished at the forward end of the rods and should be done in such a way that the nose wheel is in line with the fore and aft axis of the plane when the rudder pedals and rudder are centered Alignment of the nose wheel can be checked by pushing the airplane back and forth with the rudder centered to determine that the plane follows a perfectly straight line The turning arc of the nose wheel is 30 degrees in either direction and is factory adjusted at stops on the bottom of the forging. The turning radius of the nose wheel is 13 feet

The steering arm stops should be carefully adjusted so that the nose wheel reaches its full travel just after the rudder hits its stops. This guarantees that the rudder will be allowed to move through its full travel.

PROPELLER SERVICE

The spinner and backing plate should be cleaned and inspected frequently for cracks. The propeller should be inspected before each flight for nicks, scratches, and corrosion. If found, they should be taken care of as soon as possible by a rated mechanic, because nicks and scratches cause areas of increased stress which can cause serious damage or loss of a propeller tip. The back face of the blades should be painted when necessary with flat black paint to retard glare to the pilot's eyes. To prevent corrosion the surface should be cleaned and waxed periodically.

OIL REQUIREMENTS

The oil capacity of the Lycoming engine is 8 quarts with a minimum safe quantity of 2 quarts. It is recommended that engine oil be drained and renewed every 50 hours. The oil filter element should be changed every 50 hours of operation. The interval between oil and oil filter changes should not exceed a total of four months. Under unfavorable dusty conditions, the oil and oil filter should be changed more frequently. Should fuel other than the specified octane rating for the power plant be used, refer to the latest issue of Lycoming Service Letter No. L185 for additional information and recommended service procedures.

The following seasonal aviation oil grades and seasonal ambient temperature ranges are recommended.

Average Ambient Temperature	MIL-L-6082B Mineral SAE Grade	MIL-L-22851 Ashless Dispersant SAE Grades
All Temperatures	-	15W-50 or 20W-50
Above 80°F	60	60
Above 60°F	50	40 or 50
30°F to 90°F	40	40
0°F to 70°F	30	30, 40 or 20W-40
0°F to 90°F	2OW-50	20W-50 or 15W-50
Below 10°F	20	30 or 20W-30

When operating temperatures overlap indicated ranges, use the lighter grade oil"

NOTE

Refer to the latest issue of Textron Lycorning Service Instruction 1014 (Lubricating Oil Recommendations) for further information

FUEL SYSTEM

The fuel screens in the strainer and the injector will require cleaning every 50 hour inspection. The screen in the injector is located in the housing where the fuel inlet line connects to the injector. The fuel strainer. located ahead of the firewall, is accessible for cleaning by removal of the lower cowl. When the strainers are reassembled after cleaning, a small amount of grease applied to the gasket will facilitate assembly.

FUEL REQUIREMENTS (AVGAS ONLY)

A minimum octane of 100/130 Aviation Grade fuel must be used in the Arrow II. Since the use of lower grades can cause serious engine damage in a short period of time. the engine warranty is invalidated by the use of lower octanes.

The operation of the aircraft is approved with an anti-icing additive in the fuel. When an anti-icing additive is used, it must meet the specification MIL-I-27686, must be uniformly blended with the fuel while refueling, must not exceed .15% by volume of the refueled quantity, and to ensure its effectiveness, should be blended at not less than .10% by volume. One and one half liquid ozs. per ten gallons of fuel would fall within this range. A blender supplied by the additive manufacturer should be used. Except for the information contained in this section, the manufacturer's mixing or blending instructions should be carefully followed.

CAUTIONS

Some fuels have anti-icing additives preblended in the fuel at the refinery, so no further blending should be performed.

Fuel additive cannot be used as a substitute for preflight draining of the fuel system.

FILLING FUEL TANKS

Observe all required precautions for handling gasoline. Fill the fuel tanks to the bottom of the filler neck. Each wing tank holds a maximum of 25 gallons, giving a total of 50 gallons of fuel.

DRAINING FUEL VALVES AND LINES

The fuel strainer, located on the lower left side of the firewall, is provided with a quick drain which should be drained before the first flight of the day or after refueling, to check for fuel contamination. If contamination is found, fuel should be drained until the contamination stops. If contamination persists after draining fuel for a minute, contact a mechanic to check the fuel system.

Each fuel tank is provided with a fuel quick drain to check for contamination. Each tank should be checked for contamination in accordance with the above procedure.

DRAINING FUEL SYSTEM

The bulk of the fuel may be drained from the fuel cells by the use of a siphon hose placed in the cell or tank through the filler neck. The remainder of the fuel may be drained by opening all the drain valves.

CAUTION

Whenever the fuel system is completely drained and fuel is replenished it will be necessary to run the engine for a minimum of 3 minutes at 1000 RPM on each tank to ensure no air exists in the fuel supply lines.

TIRE INFLATION

For maximum service from the tires, keep them inflated to the proper pressure of 30 psi for nose tire and 27 psi for main tires. Interchange the tires periodically for even wear. All wheels and tires are balanced before original installation, and the relationship of tire, tube and wheel should be maintained upon reinstallation. In the installation of new components. it may be necessary to rebalance the wheels with the tires mounted. Unbalanced wheels can cause extreme vibration in the landing gear.

BATTERY SERVICE

Access to the 12-volt 25 ampere-hour banery is gained through the baggage compartment. It is located just aft of the baggage compartment. The battery container has a plastic drain tube which is normally closed off. This tube should be drained periodically to remove banery acid which may have collected in the tube.

The banery fluid level must not be brought above the baffle plates. It should be checked every 30 days to determine that the fluid level is proper and the connections are tight and free of corrosion.

If the banery is not properly charged, recharge it starting with a rate of four amperes and finishing with a rate of two amperes. The battery should be removed from the airplane for charging, and quick drains are not recommended.

The external power receptacle, if installed, is located on the right side of the fuselage aft of the baggage compartment.

Refer to the Arrow II Service Manual for battery servicing procedure.

WINTERIZATION

For winter operation, a winterization kit is installed on the inlet opening of the oil cooler plenum chamber. This kit should be installed whenever the ambient temperature is 50°F or less. When the kit is not being used, it can be stowed on a bracket provided for this purpose on the outboard side of the oil cooler plenum chamber,

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FACTS YOU SHOULD KNOW

The Federal Aviation Administration (FAA) occasionally publishes Airworthiness Directives (AD's) that apply to specific groups of aircraft. They are mandatory changes and are to be complied with within a time limit set by the FAA. When an AD is issued, it is sent by the FAA to the latest registered owner of the affected aircraft and also to subscribers of the service. The owners should periodically check with their Piper Service Center or Piper's Customer Services Department to see whether they have the latest AD against their airplane. The owner is solely responsible for keeping up with ADs.

Piper Aircraft Corporation takes a continuing interest in having owners get the most efficient use from their airplane and keeping it in the best mechanical condition. Consequently, Piper Aircraft, from time to time, issues service releases including Service Bulletins, Service Letters. Service Spares Letters, and others relating to the airplane.

Piper Service Bulletins are of special importance and Piper considers compliance mandatory. These are sent directly to the latest FAA-registered owners in the United States (U.S.) and Piper Service Centers worldwide. Depending on the nature of the release, material and labor allowances may apply. This information is provided to all authorized Piper Service Centers.

Service Letters deal with product improvements and servicing techniques pertaining to the airplane. They are sent to Piper Service Centers and, if necessary, to the latest FAA-registered owners in the U.S. Owners should give careful attention to Service Letter information.

Service Spares Letters offer improved parts, kits, and optional equipment which were not available originally. and which may be of interest to the owner.

Piper Aircraft Corporation offers a subscription service for Service Bulletins, Service Letters, and Service Spares Letters. This service is available to interested persons such as owners, pilots, and mechanics at a nominal fee, and may be obtained through an authorized Piper Service Center or Piper's Customer Services Department.

Service manuals, parts catalogs, and revisions to both, are available from Piper Service Centers or Piper's Customer Services Department Any correspondence regarding the airplane should include the airplane model and serial number to ensure proper response.

Pilot's Operating Manual supplements are distributed by the manufacturer as necessary. These revisions and additions should be studied and put into the operating manual to keep it up to date. This manual contains important information about the operation of the aircraft and should be kept with the aircraft at all times, even after resale. Every owner, to avail himself of Piper Aircraft's support systems, should stay in close contact with an authorized Piper Service Center or Piper's Customer Services Department so that he can receive the latest information.

If the owner desires to have his aircraft modified. he must obtain FAA approval for the alteration. Major alterations accomplished in accordance with Advisory Circular 43.13-2, when performed by an A & P mechanic, may be approved by the local FAA office. Major alterations to the basic airframe or systems not covered by AC **43.13-2** require a Supplemental Type Certificate.

The owner or pilot is required to ascertain that the following Aircraft Papers are in order and in the aircraft.

a. To be displayed in the aircraft at all times:
   1. Aircraft Airworthiness Certificate Form FAA-1362B.
   2. Aircraft Registration Certificate Form FAA-500A.
   3. Aircraft Radio Station License Form FCC-404A, if transmitters are installed.

b. To be carried on the aircraft at all times:
   1. Aircraft Flight Manual.
   2. Weight and Balance data plus a copy of the latest Repair and Alteration Form FAA-337, if applicable.
   3. Aircraft equipment list.

Although the aircraft and engine logbooks are not required to be in the aircraft, they should be made available upon request. Log books should be complete and up to date. Good records will reduce maintenance cost by giving the mechanic information about what has or has not been accomplished.

PREVENTIVE MAINTENANCE

The holder of a pilot certificate issued under Federal Aviation Regulations (FAR) Part 61 may perform certain preventive maintenance as defined in the FARs. This maintenance may be performed only on an aircraft which the pilot owns and operates, and which is not used in air carrier or air taxi/commercial operations service

All other aircraft maintenance must be accomplished by a person or facility appropriately certificated by the Federal Aviation Administration (FAA) to perform that work.

Anytime maintenance is accomplished, an entry must be made in the appropriate aircraft maintenance records. The envy shall include:

(a) The date the work was accomplished.
(b) Description of the work.
(c) Number of hours on the aircraft.
(d) The certificate number of pilot performing the work
(e) Signature of the individual doing the work.

REQUIRED SERVICE AND INSPECTION PERIODS

WARNING

All inspection intervals, replacement time limits, overhaul time limits, the method of inspection, life limits, cycle limits, etc., recommended by Piper are solely based on the use of new, remanufactured or overhauled Piper approved parts. If parts are designed, manufactured, remanufactured, overhauled and/or approved by entities other than Piper, then the data in Piper's maintenance/service manuals and parts catalogs are no longer applicable and the purchaser is warned not to rely on such data for non-Piper parts. All inspection intervals, replacement time limits, overhaul time limits, the method of inspection, life limits, cycle limits, etc., for such non-Piper parts must be obtained from the manufacturer and/or seller of such non-Piper parts.

The Owner Service Agreement which the owner receives upon delivery of the aircraft should be kept in the aircraft at all times. This identifies him to authorized Piper dealers and entitles the owner to receive service in accordance with the regular service agreement terms. This agreement also entitles the transient owner full warranty by any Piper dealer in the world.

Piper has developed inspection items and required inspection intervals for the PA-28R-200 (see the latest revision of the PA-28R-200 Service and Inspection Manuals). The PA-28R-200 Inspection Manual contains appropriate forms, and all inspection procedures should be complied with by a properly trained, knowledgeable, and qualified mechanic at a Piper Authorized Service Center or a reputable repair shop. Piper cannot accept responsibility for the continued airworthiness of any aircraft not maintained to these standards, and/or not brought into compliance with applicable Service Bulletins issued by Piper, instructions issued by the engine, propeller, or accessory manufacturers, or Airworthiness Directives issued by the FAA.

A Progressive Inspection, approved by the Federal Aviation Administration (FAA), is also available to the owner This involves routine and detailed inspections to allow maximum utilization of the airplane. Maintenance inspection costs are reduced, and the maximum standard of continued airworthiness is maintained. Complete details are available from Piper.

In addition, but in conjunction with the above, the FAA requires periodic inspections on all aircraft to keep the Airworthiness Certificate in effect The owner is responsible for assuring compliance with these inspection requirements and for maintaining proper documentation in logbooks and/or maintenance records.

A spectrographic analysis of the engine oil is available from several sources. This inspection, if performed properly, provides a good check of the internal condition of the engine. To be accurate, induction air filters must be cleaned or changed regularly, and oil samples must be taken and sent in at regular intervals.

TYPE OF WBRICAM

IDENTIFICATION LETTER	LUBRICANT	SPECIFICATION	PREFERRED PRODUCT AND VENDOR
A	LUBRICATING OIL. GENERAL PURPOSE, LOW TEMP	MIL-L-7870	
B	LUBRICATING OIL. AIRCRAFT RECIPROCATING ENGINE (PISTON) GRADE AS SPECIFIED SAE 50 ABOVE 60°F AIR TEMP. SAE 40 30°F TO 90°F AIR TEMP. SAE 30 0° to 70°F AIR TEMP. SAE 20 BELOW 10°F AIR TEMP.	MIL-L-6082	
C	HYDRAULIC FLUID PETROLEUM BASE	MIL-H-5606	
D	GREASE. AIRCRAFT AND INSTRUMENT. GEAR AND ACTUATOR SCREW	MIL-G-23827	
E	GREASE, AIRCRAFT, HIGH TEMP.		TEXACO MARFAK ALL PURPOSE GREASE. MOBIL GREASE 77 (OR MOBILUX EP2).
F	COMPOUND, SILICONE, SOFT FILM	MIL-C-21567	SHELL ALVANIA EP GREASE 2
G	PARKER "O" RING LUBRICANT		
H	AERO LUBRIPLATE		FISKE BROS. REFINING CO.
I	FLUOROCARBON RELEASE AGENT DRY LUBRICANT	MS-122	
J	GREASE - LUBRICANT GEN PURPOSE AIRCRAFT	MIL-G-7711	

SPECIAL INSTRUCTIONS

I. AIR FILTER - m CLEAN FILTER, TAP GENTLY m REMOVE DIRT PARTICLES. DO NOT BLOW OUT WITH COMPRESSED AIR OR USE OIL. REPLACE FILTER IF PUNCTURED OR DAMAGED.
2 BEARINGS AND BUSHINGS - CLEAN EXTERIOR WITH A DRY M P E SOLVENT BEFORE LUBRICATING.
3. WHEEL BEARINGS - DISASSEMBLE AND CLEAN WITH A DRY TYPE SOLVENT. ASCERTAIN THAT GREASE IS PACKED BETWEEN THE BEARING ROLLER AND CONE. DO NOT PACK GREASE IN WHEEL HOUSING.
4. OLEO STRUTS, HYDRAULIC PUMP RESERVOIR AND BRAKE RESERVOIR - FILL PER INSTRUCTIONS ON UNIT OR CONTAINER, OR REFER TO SERVICE MANUAL, SECTION II
5. PROPELLER - REMOVE ONE OF THE TWO GREASE FITTINGS FOR EACH BLADE. APPLY GREASE THROUGH FITTING UNTIL FRESH GREASE APPEARS AT HOLE OF REMOVED FITTING.
6. LUBRICATION POINTS - WIPE ALL LUBRICATION POINTS CLEAN OF OLD GREASE, OIL, DIRT, ETC. BEFORE LUBRICATING.
7. INTERVALS BETWEEN OIL CHANGES CAN BE INCREASED AS MUCH AS 100% ON ENGINES EQUIPPED WITH FULL FLOW (CARTRIDGE TYPE) OIL FILTERS. PROVIDED THE ELEMENT IS REPLACED EACH 50 HOURS OF OPERATION.

SPECIAL INSTRUCTIONS (cont)

a RECOMMENDED FOR USE WHEN OPERATING AT TEMPERATURES BELOW 20°F.
9. WRING. CONTROL SHAFT BUSHING - DISASSEMBLE "O" RING RETAINER PLATES FROM INSTRUMENT PANEL. LUBRICATE "O" RING AND REASSEMBLE.
10. GREASE HOLES REQUIRE A NEEDLE TYPE ADAPTER ON THE GREASE GUN NOZZLE.
11. AILERON HINGES WITH TEFLON SLEEVES SHOULD NOT BE LUBRICATED. AILERON HINGES WITHOUT TEFLON SLEEVES SHOULD FIRST BE CLEANED WITH A DRY TYPE SOLVENT THEN LUBRICATED WITH MIL-L-7870 LUBRICATING OIL.

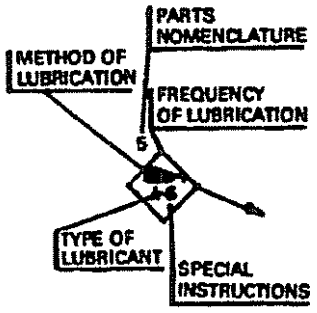
NOTES

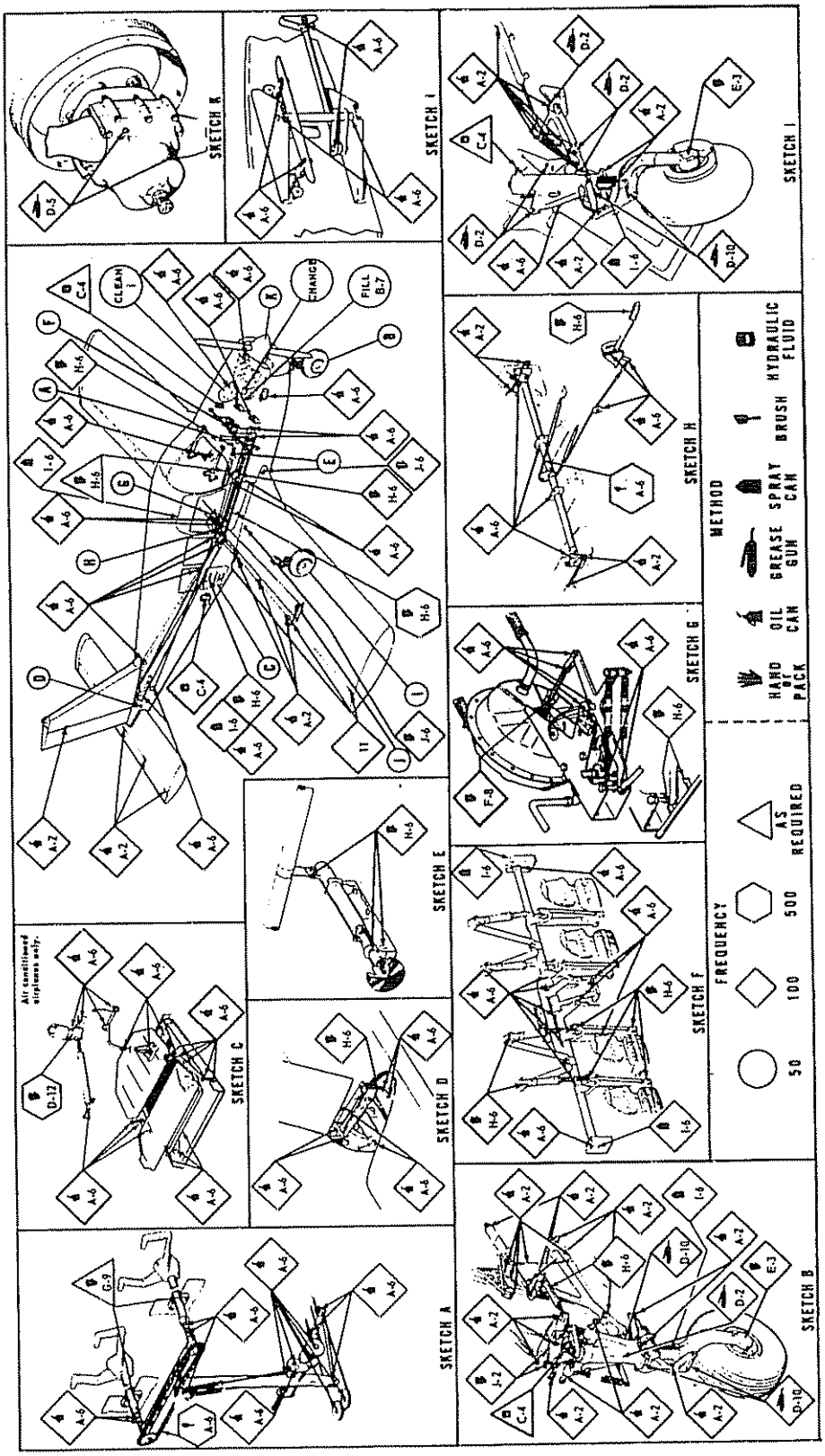
1. PILOT AND PASSENGER SEATS - LUBRICATE TRACK ROLLERS AND STOP PINS AS REQUIRED. (TYPE OF LUBRICANT: "A")
2. WHEEL BEARINGS REQUIRE CLEANING AND REPACKING AFTER EXPOSURE TO AN ABNORMAL QUANTITY OF WATER.
3 FUEL SELECTOR VALVE - LUBRICATE SELECTOR VALVE AS REQUIRED. REFER TO PIPER SERVICE LETTER NO. 351
4. SEE LYCOMING SERVICE INSTRUCTIONS NO. 1014 FOR USE OF DETERGENT OIL.
5. ON AIRCRAFT EQUIPPED WITH BACKUP GEAR EXTENDER.

CAMONS

1. DO NOT USE HYDRAULIC FLUID WITH A CASTOR OIL OR ESTER BASE.
2. NO NOT OVER-LUBRICATE COCKPIT CONTROLS.
3. DO NOT APPLY LUBRICANT TO RUBBER PARTS.

EXAMPLE





Lubrication Chart