PILOT'S OPERATING HANDBOOK

CHEROKEE CRUISER

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SECTION 1

DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS SYSTEMS

7.1 THE AIRPLANE

The Cherokee 140 is a single-engine, low wing monoplane of all metal construction.

It has a two-place configuration with a third and fourth family seat offered as optional equipment.

7.3 AIRFRAME

The basic airframe is of aluminum alloy construction. The extremities - wing tips, cowling, tail surfaces - are of fiberglass or ABS thermoplastic.

The fuselage is a semi-monocoque structure. The cabin is entered through a door on the right side of the fuselage.

The wings are attached to each side of the fuselage by insertion of the butt ends of the respective main spars into a spar box carry-through which is an integral part of the fuselage structure, providing, in effect, a continuous main spar with splices at each side of the fuselage. There are also fore and aft attachments at the rear spar and at an auxiliary front spar. Each wing contains a twenty-five gallon fuel tank which is filled through the fuel filler port on the upper surface of the wing.

The wing airfoil section is a laminar flow type, $NACA65_2$ 415.

7.5 ENGINE AND PROPELLER

The Lycoming O-320-E3D four-cylinder engine installed in the Cherokee PA-28-140 is rated at 150 horsepower at 2700 rpm. This engine has a compression ratio of 7 to 1 and requires 80/87 minimum octane fuel. The engine is equipped with direct drive or optional geared drive starter, a 60 ampere alternator, dual magnetos, vacuum pump drive, diaphragm type fuel pump and a float carburetor. Starter and magnetos are incorporated in a single, key-operated ignition switch.

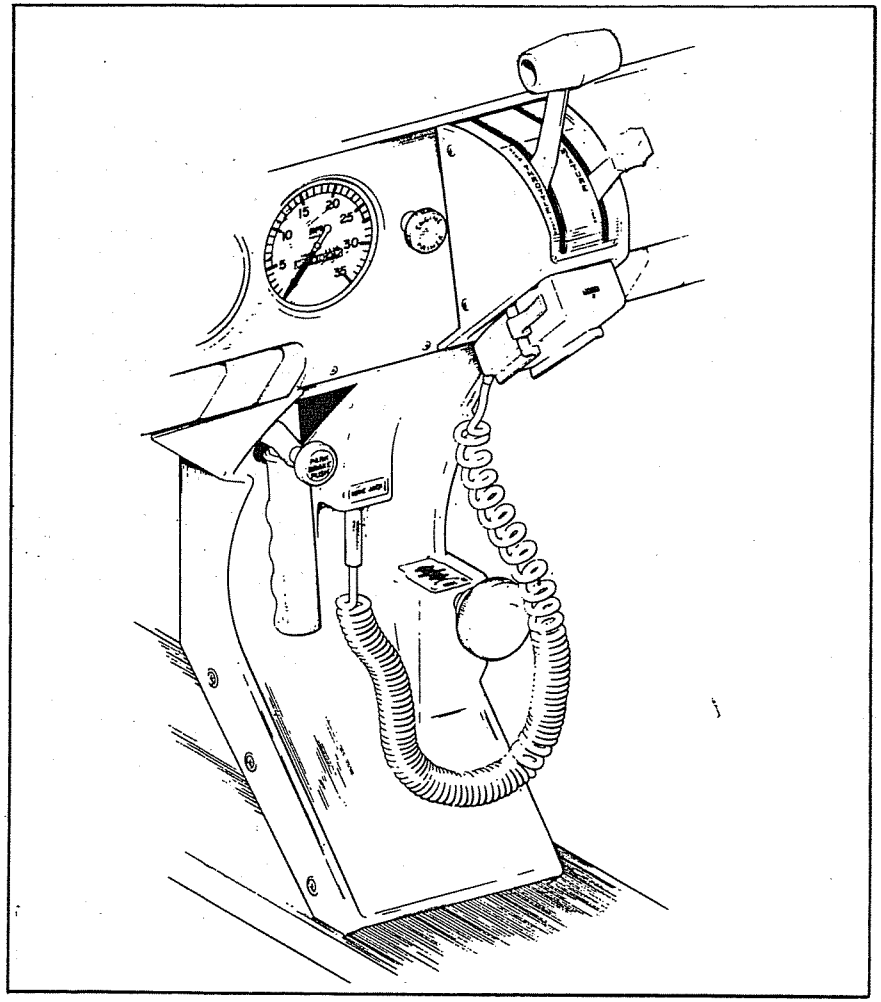
Operation of the engine can be monitored through a group of engine instruments, including a tachometer, oil pressure and temperature gauges, and a fuel pressure gauge.

Exhaust gases are carried through a system constructed of stainless steel which incorporates heater shrouds to provide cabin heat, defrosting, and carburetor deicing.

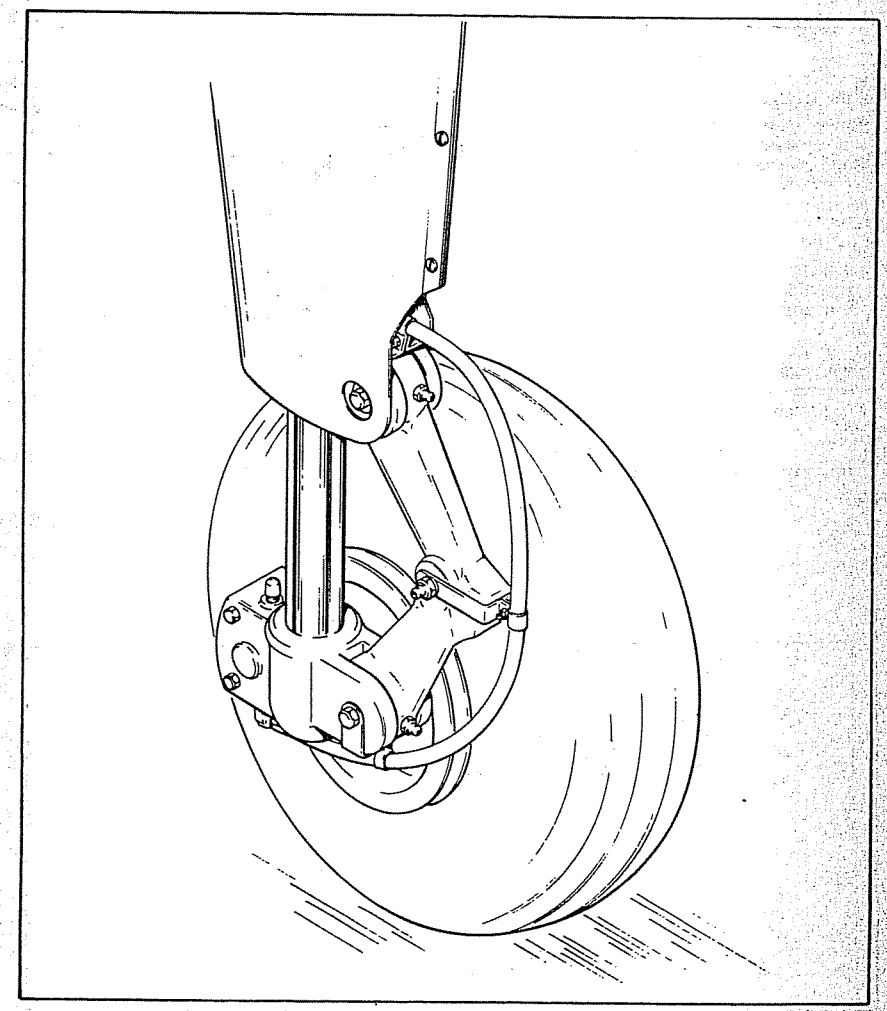
The propeller is a Sensenich M74DM6 fixed-pitch aluminum alloy unit. Its diameter is 74 inches with a standard pitch of 58 inches. All performance figures are based on the standard 58 inch pitch propeller.

ENGINE CONTROLS

The throttle quadrant is in the lower center of the instrument panel and contains the throttle and mixture control. A friction lock on the right side of the quadrant prevents creeping of the controls. To the right of the quadrant is the carburetor heat control that provides maximum carburetor heat when fully ON. Air passes through a dry type filter when the carburetor heat is OFF. Since air for carburetor heat is unfiltered, carburetor heat should be "OFF" during ground operation when dust or other contaminants could enter the system. The primary (through the filter) engine air source should always be used for takeoffs.



CONTROL QUADRANT AND CONSOLE
Figure 1-1



MAIN WHEEL ASSEMBLY
Figure 1-3

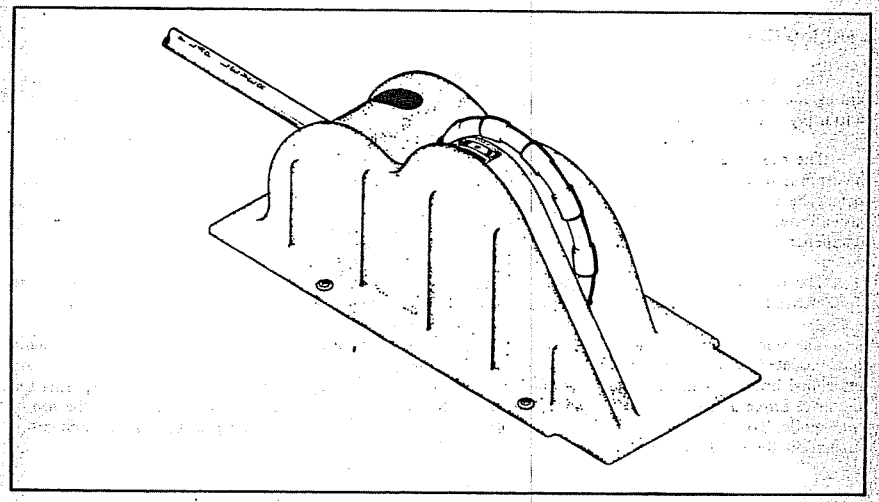
LANDING GEAR

The three landing gears use Cleveland 6.00 x 6 wheels, the main wheels being provided with brake drums and Cleveland single disc hydraulic brake assemblies. The nose wheel and the main gear all use 6.00 x 6 four ply tires with tubes.

The nose gear is steerable through a 60° arc by use of the rudder pedals and brake. A spring device is incorporated in the rudder pedal torque tube assembly to aid in rudder centering and to provide rudder trim. The nose gear steering mechanism also incorporates a bungee device to provide lighter, smoother ground steering and to dampen bumps and shocks during taxiing. The nose gear also includes a shimmy dampener.

The oleo struts are of the air-oil type with a normal extension of 3.25 inches for the nose gear and 4.50 inches for the main gear under normal static load (basic empty weight of airplane plus full fuel).

The standard brake system includes toe brakes on the left and right set of rudder pedals and a hand brake located below and near the center of the instrument panel. 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 to disengage the catch mechanism; then allow the handle to swing forward.



CONSOLE

Figure 1-5

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 all-movable slab type with an anti-servo tab 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 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.

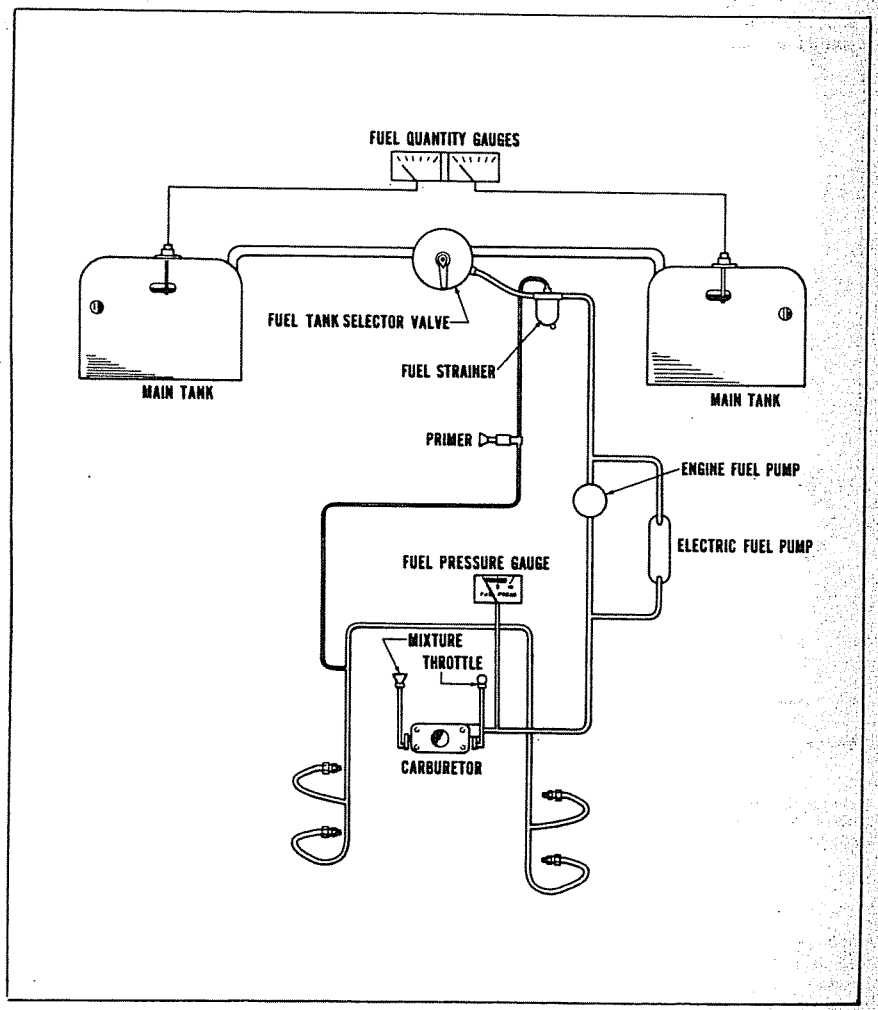
Ailerons are provided with differential deflection.

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.

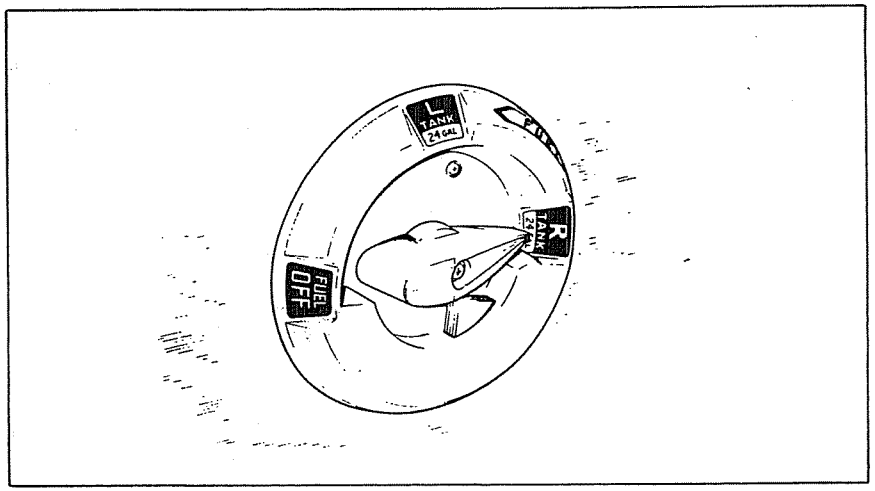
When extending or retracting flaps, there is a pitch change in the aircraft. This pitch change can be corrected either by stabilator trim or increased control wheel force. When the flaps are in the retracted position the right flap, provided with a over-center lock mechanism, acts as a step.

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 SCHEMATIC
Figure 1-7



FUEL SELECTOR
Figure 1-9

FUEL SYSTEM

Fuel is stored in two twenty-five gallon tanks, one of which is secured to the leading edge structure of each wing by screws and nut plates.

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

To obtain the standard fuel quantity of 36 gallons, fill the tanks to the bottom of the filler neck indicator. To obtain the standard plus the reserve quantity, a total of 50 U.S. gallons, fill the tanks to the top of the filler neck.

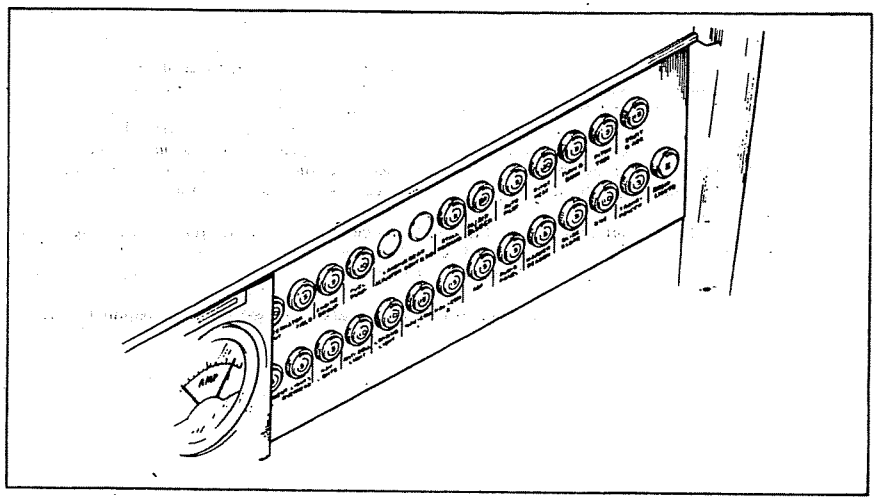
An auxiliary electric fuel pump is provided for use in case of failure of the engine driven pump. The electric pump should be on for all takeoffs and landings and when switching tanks.

The fuel drains should be opened daily prior to first flight to check for water or sediment. Each tank has an individual drain at the bottom, inboard rear corner.

A fuel strainer, located on the lower left front of the fire wall, has a drain which is accessible from outside the nose section. The strainer should also be drained before the first flight of the day. Refer to paragraph 7 21 for the complete fuel draining procedure.

Fuel quantity and pressure are indicated on gauges located in the engine gauge cluster on the left side of the instrument panel. Each of the fuel quantity gauges indicates the amount of fuel on its respective side.

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



CIRCUIT BREAKER PANEL
Figure 1 - 11

ELECTRICAL SYSTEM

The electrical system includes a 14-volt 60 ampere alternator, battery, voltage regulator, overvoltage relay, and master switch relay. The 12-volt battery and master switch relay are located beneath the baggage compartment floor. Access for service or inspection is obtained by raising the hinged floor panel. The regulator and overvoltage relay are located on the fuselage behind the instrument panel.

Electrical switches are located on the right center instrument panel, and the resettable circuit breakers are located on the lower right instrument panel. A rheostat switch on the right side of the switch panel controls the navigation lights and the intensity of the instrument panel light.

Standard electrical accessories include starter, electric fuel pump, stall warning indicator, ammeter, and annunciator panel.

Optional electrical accessories include navigation lights, anti-collision strobe lights, landing light, and instrument panel lighting.

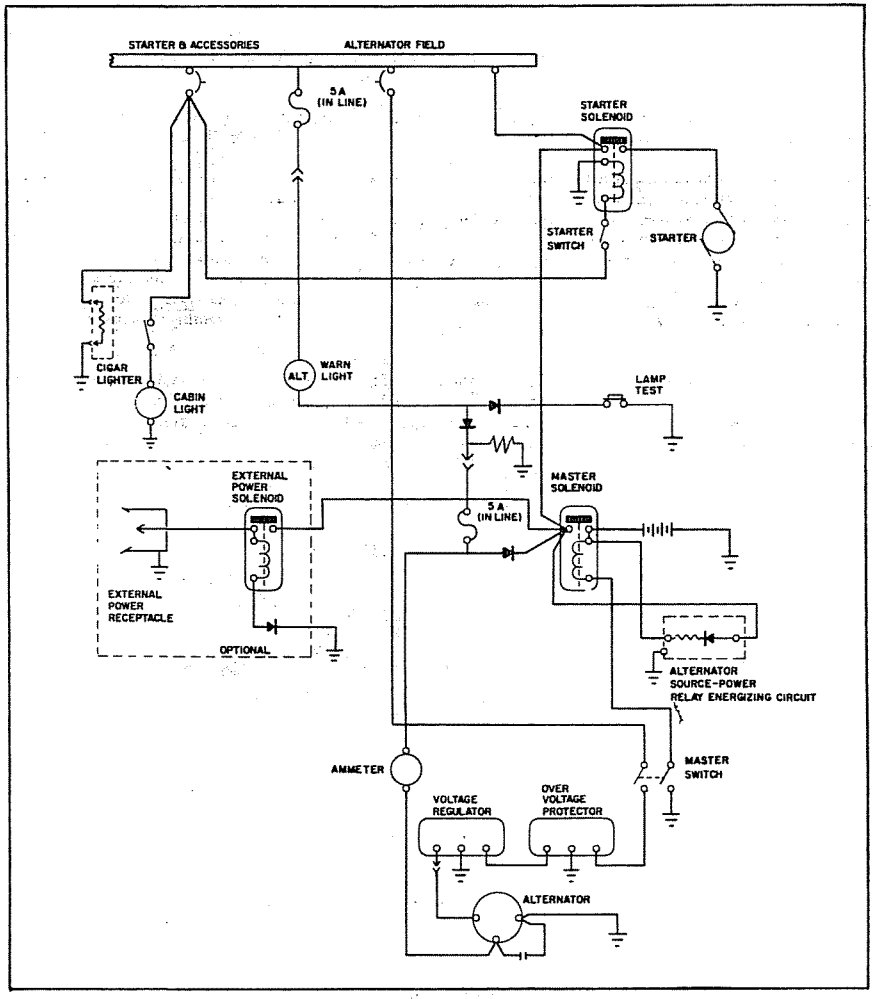
The annunciator panel includes alternator and low oil pressure indicator lights. When the optional gyro system is installed, the annunciator panel also includes a low vacuum indicator light. The annunciator panel lights are provided only as a warning to the pilot that a system may not be operating properly,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

Circuit provisions are made to handle the addition of communications and navigational equipment.

In the Cherokee electrical system, the ammeter displays in amperes the load placed on the alternator. With all electrical equipment except the master switch in the OFF position, the ammeter will indicate the amount of charging current demanded by the battery. As each item of electrical equipment is turned on, the current will increase to a total appearing on the ammeter. This total includes the battery. The maximum continuous load for night flight with radios on is about 30 amperes. This 30 ampere value plus approximately 2 amperes for a fully charged battery will appear continuously under these conditions. Do not take off with a fully discharged battery as 3 volts are needed to excite the alternator.

The master switch is a split switch with the left half operating the master relay and the right half energizing the alternator. The switch is interlocked so that the alternator cannot be operated without the battery. For normal operation, be sure both halves are turned on.

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



ALTERNATOR AND STARTER SCHEMATIC

Figure 1-13

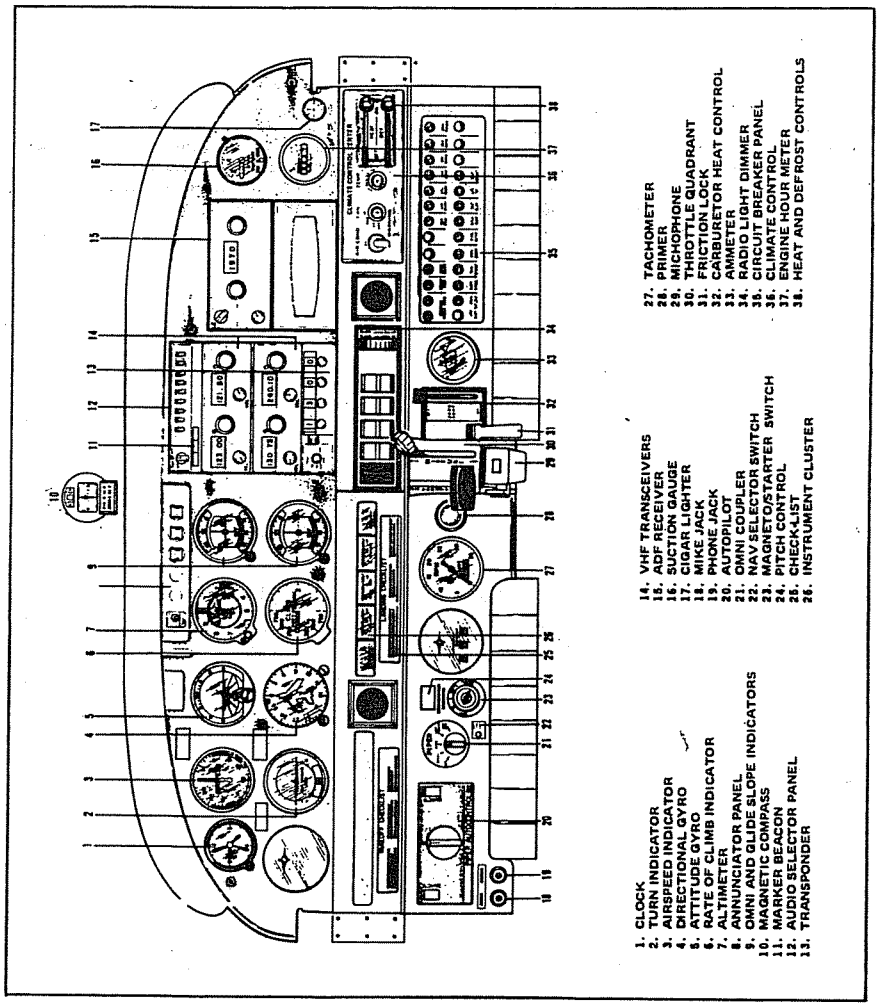
VACUUM SYSTEM

The vacuum system operates 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. 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 the 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. Operation at very high altitudes (above 12,000 feet) or low engine speeds on approach or during training maneuvers can result in lower than normal vacuum gauge readings.

A vacuum regulator in the system protects the gyros. The valve is set so the normal vacuum reads 5.0 ± .1 inches of mercury at 2000 RPM, 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.

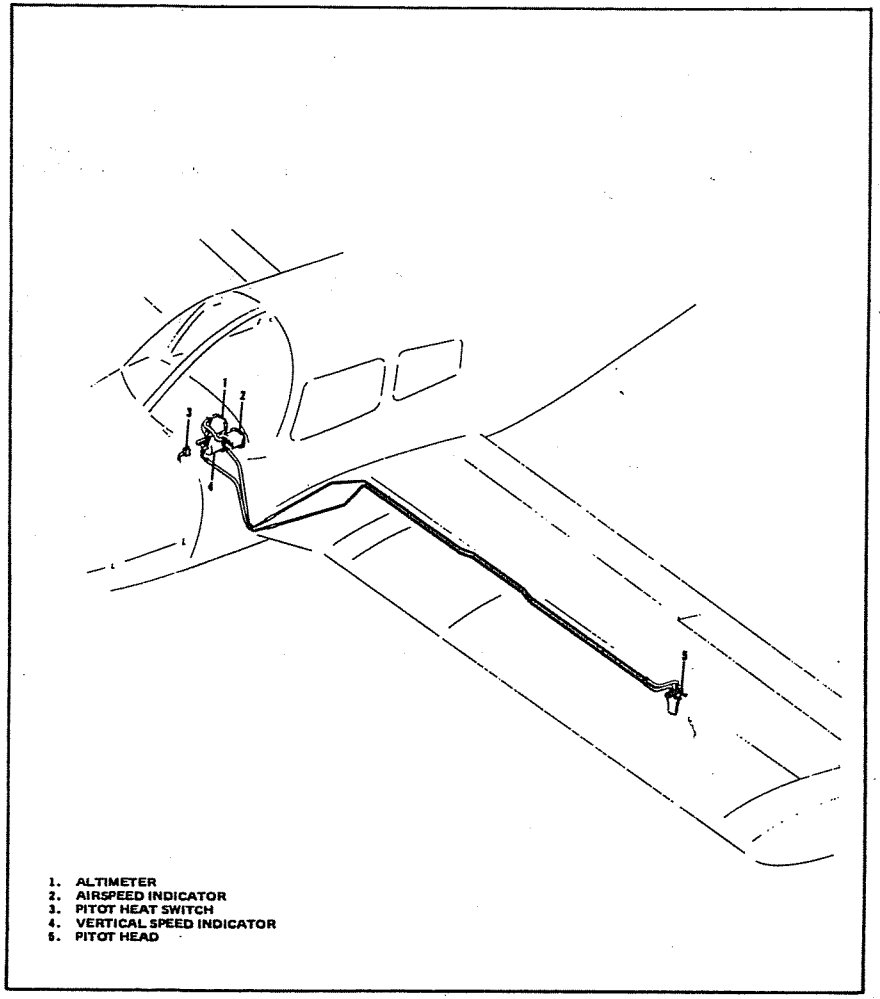


INSTRUMENT PANEL

Figure 1-15

INSTRUMENT PANEL

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



PITOT-STATIC SYSTEM

Figure 1-17

PITOT-STATIC SYSTEM

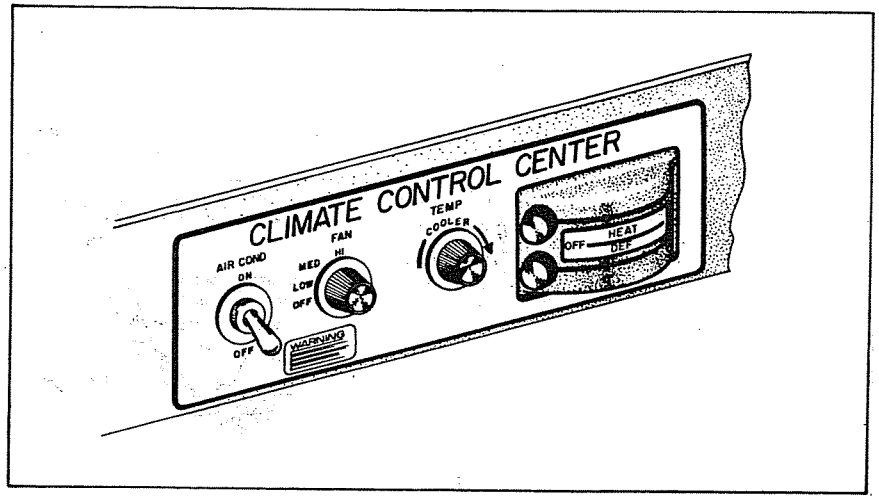
The system supplies both pitot and static pressure for the airspeed indicator, altimeter and vertical speed indicator (when installed).

Pitot and static pressure are picked up by the pitot head on the bottom of the left wing.

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

NOTE

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



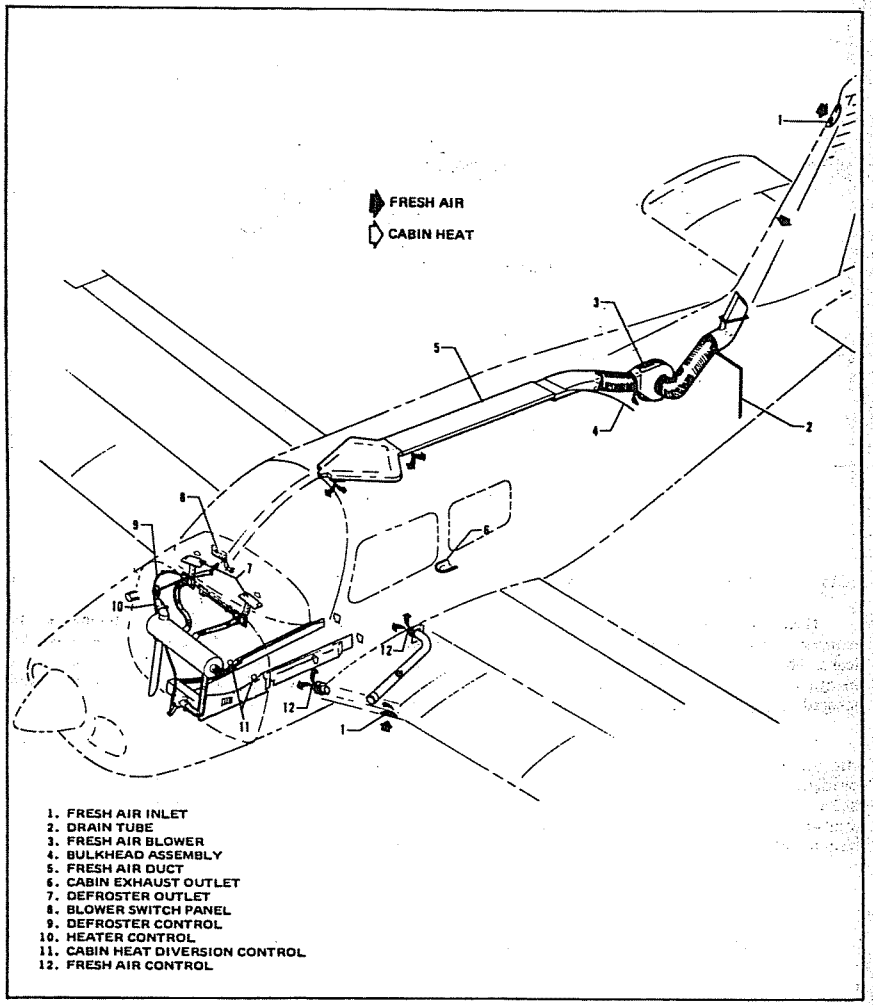
CLIMATE CONTROL CENTER

Figure 1-19

HEATING AND VENTILATING SYSTEM

Heat for the cabin interior and the defroster system is provided by a heater muff attached to the exhaust system. If unusual odors are noticed, the heater should be shut off and the system inspected for leaks. The amount of heat desired can be regulated with the controls located on the far right side of the instrument panel. The airflow may be regulated between the front and rear seats by the use of the levers located on top of the heat ducts next to the control console.

Fresh air inlets are located in the leading edge of the wing at the intersection of the tapered and straight sections. An adjustable outlet is located on the side of the cabin near the floor at each seat location; overhead air outlets are offered as optional equipment. Cabin air is exhausted through an outlet located below the rear seat floor panel. A cabin air blower, which helps to distribute fresh air through the cabin, is available as optional equipment when air conditioning is not installed. This blower is operated by a "FAN" switch with 4 positions - "OFF," "LOW," "MED," or "HIGH."



HEATING, VENTILATING AND DEFROSTER SYSTEM

Figure 1-21

CABIN FEATURES

For ease of entry and exit and pilot-passenger comfort, the front seats recline and are adjustable fore and aft. A family seat installation which provides two additional seats is available. Each family seat is capable of carrying a full size adult, which gives the Cherokee 140 4-place capability. Optional headrests and vertically adjustable front seats are also available.

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

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

BAGGAGE AREA

A 22 cubic foot luggage compartment is located behind the seats in the two-place model and is accessible from the cabin. Maximum baggage capacity is 200 pounds.

NOTE

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

STALL WARNING

An approaching stall is indicated by a stall warning indicator which is activated between 5 and 10 knots above stall speed. Mild airframe buffeting and gentle pitching may also precede the stall. Stall speeds are shown on graphs in the Performance Charts Section. The stall warning indicator is a continuous sounding horn located behind the instrument panel. The stall warning indicator is activated by a lift detector installed on the leading edge of the left wing. During preflight, the stall warning system should be checked by turning the master switch "ON," lifting the detector and checking to determine if the indicator is actuated.

FINISH

All exterior surfaces are primed with etching primer and finished with acrylic lacquer. To keep a new look, economy size "Touch-Up" spray paint cans are available from Piper Dealers.

AIR CONDITIONING*

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

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

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

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

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

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

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

NOTE

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

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

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

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

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

*Optional equipment

PIPER EXTERNAL POWER*

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

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. This plate is attached with three slotted-head nylon screws for ease of removal; these screws may be readily removed with a variety of common items such as a dime, a key, a knife blade, etc. If there are no tools available in an emergency the screw heads may be broken off by any means. The ELT is an emergency locator transmitter which meets the requirements of FAR 91.52. It is automatically 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 battery has a useful life of 10 years. However, to comply with FAA regulations it must be replaced after 5 years of shelf life or service life. 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 replacement date is marked on the transmitter label.

On the unit itself is a three position selector switch placarded "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. The pilot's remote switch 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 actuate 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.

*Optional equipment

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.

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.

SECTION 2

NORMAL PROCEDURES

GENERAL

This section clearly describes the recommended procedures for the conduct of normal operations for the Cherokee Cruiser. All of the required (FAA regulations) procedures and those necessary for the safe operation of the airplane as determined by the operating and design features of the airplane are presented.

Normal procedures associated with those optional systems and equipment which require handbook supplements are provided by Section 9 (Supplements).

These procedures are provided to present a source of reference and review and to supply information on procedures which are not the same for all aircraft. Pilots should familiarize themselves with the procedures given in this section in order to become proficient in the normal operations of the airplane.

The first portion of this section consists of a short form check list which supplies an action sequence for normal operations with little emphasis on the operation of the systems.

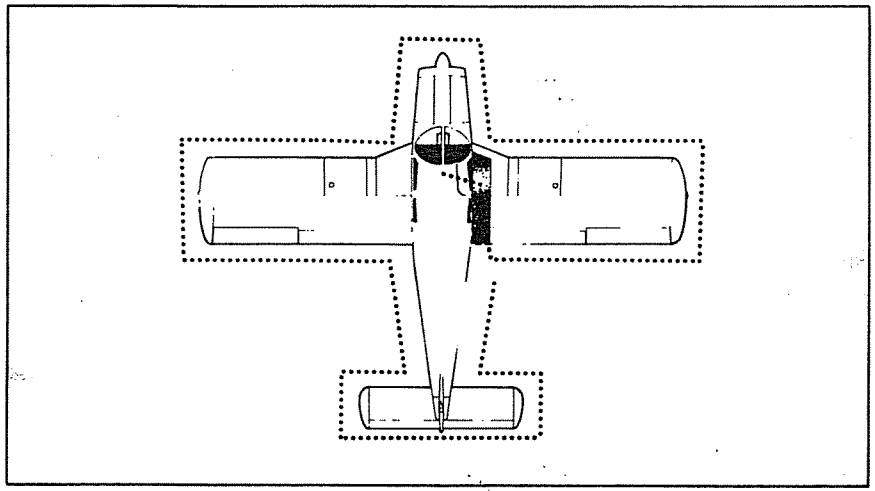
The remainder of the section is devoted to amplified normal procedures which provide detailed information and explanations of the procedures and how to perform them. This portion of the section is not intended for use as an in-flight reference due to the lengthly explanations. The short form check list should be used for this purpose.

AIRSPEEDS FOR SAFE OPERATIONS

The following airspeeds are those which are significant to the safe operation of the airplane. These figures are for standard airplanes flown at gross weight under standard conditions at sea level.

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.

(a)	Best Rate of Climb Speed	75 KIAS
(b)	Best Angle of Climb Speed	66 KIAS
(c)	Turbulent Air Operating Speed (See Airspeed Limitations)	114 KIAS
(d)	Maximum Flap Speed	101 KIAS
(e)	Landing Final Approach Speed (Flaps 40°)	59 KIAS
(f)	Maximum Demonstrated Crosswind Velocity	17 KTS



WALK-AROUND

Figure 2-1

NORMAL PROCEDURES CHECK LIST

PREFLIGHT CHECK

Control wheel . . . . . release belts
Master switch . . . . . ON
Fuel quantity gauges . . . . . check
Master switch . . . . . OFF
Ignition . . . . . OFF
Exterior . . . . . check for damage
Control surfaces . . . . . check for interference - free of ice, snow, frost
Hinges . . . . . check for interference
Wings . . . . . free of ice, snow, frost
Stall warning . . . . . check
Navagation lights . . . . . check
Fuel tanks . . . . . check supply visually - secure caps
Fuel tank sumps . . . . . drain
Fuel vents . . . . . open
Majn gear struts . . . . . proper inflation (3.25 in.)
Tires . . . . . check
Brake blocks . . . . . check
Pitot head . . . . . remove cover - holes clear
Windshield . . . . . clean
Propeller and spinner . . . . . check
Fuel and oil . . . . . check for leaks
Oil . . . . . check level
Dipstick . . . . . properly seated
Cowling . . . . . secure
Inspection covers . . . . . secure
Nose wheel tire . . . . . check
Nose gear strut . . . . . proper inflation (50 in.)
Air inlets . . . . . ar
Alternator belt . . . . .
Tow bar and control locks . . . .
Baggage . . . . . .

Baggage door . . . . .
Fuel strainer . . . .
Primary flight co
Cabin door
Required p
Seat be

BEFORE STARTING ENGINE

Brakes . . . . . set
Carburetor heat . . . . . full COLD
Fuel selector . . . . . desired tank

STARTING ENGINE WHEN COLD

Throttle . . . . . 1/4" open
Master switch . . . . . .ON
Electric fuel pump . . . . . .ON
Mixture . . . . . full RICH
Starter . . . . . .engage
Throttle . . . . . adjust
Oil pressure . . . . . check

If engine does not start within 10 sec. prime and repeat starting procedure.

STARTING ENGINE WHEN HOT

Throttle . . . . . 1/2" open
Master switch . . . . . .ON
Electric fuel pump . . . . . .ON
Mixture . . . . . idle cut-off
Starter . . . . . .engage
Mixture . . . . . advance
Throttle . . . . . adjust
Oil pressure . . . . . check

STARTING ENGINE WHEN FLOODED

Throttle . . . . . open full
Master switch . . . . . .ON
Electric fuel pump . . . . . .OFF
Mixture . . . . . idle cut-off
Starter . . . . . .engage
Mixture . . . . . advance
Throttle . . . . . retard
Oil pressure . . . . . check

STARTING WITH EXTERNAL POWER SOURCE

Master switch . . . . . .OFF
Terminals . . . . . connect
Plug . . . . . insert in fuselage
Proceed with normal start
Plug . . . . . disconnect from fuselage
Master switch . . . . . .ON - check ammeter
Oil pressure . . . . . check

WARM-UP

Throttle . . . . . 800 to 1200 RPM

TAXIING

Chocks . . . . . .removed
Taxi area . . . . . .clear
Throttle . . . . . apply slowly
Brakes . . . . . check
Steering . . . . . check

GROUND CHECK

Throttle . . . . . 2000 RPM
Magnetos . . . . . .max. drop 175 RPM
-max. diff. 50 RPM
Vacuum . . . . . 5.0" Hg. ± .1
Oil temp . . . . . check
Oil pressure . . . . . check
Air conditioner . . . . . check
Annunciator panel . . . . . .press-to-test
Carburetor heat . . . . . check
Engine is warm for takeoff when throttle can be opened without engine faltering.
Electric fuel pump . . . . . .OFF
Fuel pressure . . . . . check
Throttle . . . . . retard

BEFORE TAKEOFF

Master switch . . . . . .ON
Flight instruments . . . . . check
Fuel selector . . . . . .proper tank
Electric fuel pump . . . . . .ON
Engine gauges . . . . . check
Carburetor heat . . . . . .OFF
Seat backs . . . . . .erect
Mixture . . . . . set
Belts/harness . . . . . .fastened
Empty seats . . . . . seat belts snugly fastened
Flaps . . . . . set
Trim tab . . . . . set
Controls . . . . . free
Doors . . . . . latched
Air conditioner . . . . . .OFF

TAKEOFF

NORMAL

Flaps . . . . . set
Tab . . . . . set
Accelerate to 45 to 55 KIAS
Control wheel . . . . . back pressure to rotate to climb attitude

SHORT FIELD, OBSTACLE CLEARANCE

Flaps . . . . . 25° (second notch)
Accelerate to 48-55 KIAS
Control wheel . . . . . back pressure to rotate

After breaking ground, accelerate to best angle of climb speed (66 KIAS).

After clearing obstacle, slowly retract flaps and continue climb at best rate of climb speed (75 KIAS).

SHORT FIELD, NO OBSTACLE

Flaps . . . . . 25° (second notch)
Accelerate to 48-55 KIAS.
Control wheel . . . . . back pressure to rotate

After breaking ground, accelerate to best rate of climb speed (75 KIAS).

Flaps . . . . . retract slowly while climbing out

SOFT FIELD, OBSTACLE CLEARANCE

Flaps . . . . . 25° (second notch)
Control wheel . . . . . .pull nose gear off ground as soon as possible

Lift off at lowest possible airspeed.

Accelerate just above ground to best angle of climb speed (66 KIAS) until obstacle is cleared.

Continue climb while accelerating to best rate of climb speed (75 KIAS).

Flaps . . . . . .retract slowly while climbing out

SOFT FIELD, NO OBSTACLE

Flaps . . . . . 25° (second notch)
Control wheel . . . . . .pull nose wheel off ground as soon as possible

Lift off at lowest possible airspeed.

Accelerate just above ground to best rate of climb speed (75 KIAS)

Flaps . . . . . .retract slowly while climbing out

CLIMB

Best rate (flaps up) . . . . . 75 KIAS
Best angle (flaps up) . . . . . 66 KIAS

At lighter than gross weight, the above speeds are reduced.

En route . . . . . 87 KIAS
Electric fuel pump . . . . . OFF at desired altitude

CRUISING

Reference performance charts and Avco-Lycoming Operator's Manual.
Normal max power 75%
Power . . . . . set per power table
Mixture . . . . . adjust

APPROACH AND LANDING

Fuel selector . . . . . .proper tank
Seat backs . . . . . .erect
Seat belts/harness . . . . . fasten
Electric fuel pump . . . . . .ON
Mixture . . . . . rich
Flaps . . . . . .set - 101 KIAS max.
Air conditioner . . . . . .OFF
Trim to 70 KIAS (flaps up)

Approach speed is reduced approximately 3 knots for each notch of flaps extended.
Final approach speed (flaps 40°) . . . . . 59 KIAS

STOPPING ENGINE

Flaps . . . . . .retract
Electric fuel pump . . . . . .OFF
Air conditioner . . . . . .OFF
Radios . . . . . .OFF
Throttle . . . . . .full aft
Mixture . . . . . idle cut-off
Magnetos . . . . . .OFF
Master switch . . . . . .OFF

PARKING

Parking brake . . . . . .set
Control wheel . . . . . .secured with belts
Flaps . . . . . .full up
Wheel chocks . . . . . .in place
Tie downs . . . . . .secure

AMPLIFIED NORMAL PROCEDURES (GENERAL)

The following paragraphs are provided to supply detailed information and explanations of the normal procedures necessary for the safe operation of the airplane.

PREFLIGHT CHECK

The airplane should be given a thorough preflight and walk-around check. The preflight should include a check of the airplane's operational status, computation of weight and C.G. limits, takeoff distance and in-flight performance. A weather briefing should be obtained for the intended flight path, and any other factors relating to a safe flight should be checked before takeoff.

Upon entering the cockpit, release the seat belts securing the control wheel. Turn "ON" the master switch and check the fuel quantity gauges for sufficient fuel. After the fuel quantity check is made turn the master switch "OFF" and check that the ignition switch is "OFF."

To begin the exterior walk-around, check for external damage and operational interference of the control surfaces or hinges. Insure that the wings and control surfaces are free of snow, ice, frost or any other foreign materials.

An operational check of the stall warning system and navigation lights should now be made. Turn the master switch "ON," then lift the detector while checking to determine if the horn is actuated and check that the navigation lights are illuminated. The master switch should be returned to the "OFF" position after the checks are complete.

A visual check of the fuel tank quantity should be performed. Remove the filler cap from each tank and visually check the supply and color. Be sure to secure the caps properly after the check is complete.

The fuel system sumps and strainer should be drained daily prior to the first flight and after refueling to avoid the accumulation of contaminants such as water or sediment. Each fuel tank is equipped with an individual quick drain located at the lower inboard rear corner of the tank. The fuel strainer is equipped with a quick drain located on the front lower corner of the firewall. Each of the fuel tank sumps should be drained first. Then the fuel strainer should be drained twice, once with the fuel selector valve on each tank. Each time fuel is drained, sufficient fuel should be allowed to flow to ensure removal of contaminants. This fuel should be collected in a suitable container, examined for contaminants, and then discarded.

CAUTION

When draining any amount of fuel, care should be taken to ensure that no fire hazard exists before starting the engine.

Each quick drain should be checked after closing it to make sure it has closed completely and is not leaking.

Check all of the fuel tank vents to make sure they are open.

Next, a complete check of the landing gear. Check the main gear shock struts for proper inflation. There should be 4.50 inches of strut exposure under a normal static load. The nose gear should be checked for 3.25 inches of strut exposure. Check all tires for cuts and wear and insure proper inflation. Make a visual check of the brake blocks for wear or damage.

Remove the cover from the pitot head on the underside of the left wing. Check the pitot head to make sure the holes are open and clear of obstructions.

Don't forget to clean and check the windshield.

The propeller and spinner should be checked for defects or nicks.

Lift the cowling and check for any obvious fuel or oil leaks. Check the oil level. Make sure that the dipstick has properly seated after checking. Secure the cowling and check the inspection covers.

Check the air inlets for foreign matter and the alternator belt for proper tension.

Stow the tow bar and check the baggage for proper storage and security.

Upon entering the aircraft, ascertain that all primary flight controls operate properly. Close and secure cabin door and check that all the required papers are in order and in the airplane.

Fasten the seat belts and shoulder harness and check the function of the inertia reel by pulling sharply on the strap. Fasten seat belts on empty seats.

BEFORE STARTING ENGINE

Before starting the engine the brakes should be set "ON" and the carburetor heat lever moved to the full COLD position. The fuel selector should then be moved to the desired tank. Before starting the engine, be sure that all radio switches, light switches, and the pitot heat switch are in the "OFF" position to avoid an overload condition when the starter is engaged.

STARTING ENGINE

(a) Starting Engine When Cold

Open the throttle lever approximately 1/4 inch. Turn "ON" the master switch and the electric fuel pump.

Move the mixture control to full "RICH" and engage the starter by rotating the magneto switch clockwise and pressing in. When the engine fires, release the magneto switch, and move the throttle to the desired setting.

If the engine does not fire within five to ten seconds, disengage the starter, prime the engine and repeat the starting procedure.

(b) Starting Engine When Hot

Open the throttle approximately 1/2 inch. Turn "ON" the master switch and the electric fuel pump. Move the mixture control lever to idle cut-off and engage the starter by rotating the magneto switch clockwise and pressing in. When the engine fires, release the magneto switch, advance the mixture and move the throttle to the desired setting.

(c) Starting Engine When Flooded

The throttle lever should be full "OPEN." Turn "ON" the master switch and turn "OFF" the electric fuel pump. Move the mixture control lever to idle cut-off and engage the starter by rotating the magneto switch clockwise and pressing in. When the engine fires, release the magneto switch, advance the mixture and retard the throttle.

(d) Starting Engine With External Power Source

An optional feature called the Piper External Power (PEP) allows the operator to use an external battery to crank the engine without having to gain access to the airplane's battery.

Connect the RED lead of the PEP kit jumper cable to the POSITIVE (+) terminal of an external 12-volt battery and the BLACK lead to the NEGATIVE (-) terminal. Insert the plug of the jumper cable to the socket located on the fuselage.

After the engine has started, disconnect the jumper cable from the airplane. With the master switch in the "ON" position check the alternator ammeter for an indication of output. DO NOT ATTEMPT FLIGHT IF THERE IS NO INDICATION OF ALTERNATOR OUTPUT.

When the engine is firing evenly, advance the throttle to 800 RPM. If oil pressure is not indicated within thirty 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 Lycoming Operating Handbook, Engine Troubles and Their Remedies.

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

WARM-UP

Warm-up the engine at 800 to 1200 RPM for not more than two minutes in warm weather and four minutes in cold. Avoid prolonged idling at low RPM, as this practice may result in fouled spark plugs.

Takeoff may be made as soon as the ground check is completed, provided that the throttle may be opened fully without backfiring or skipping, and without a reduction in engine oil pressure.

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.

TAXIING

Before attempting to taxi the airplane, ground personnel should be instructed and approved by a qualified person authorized by the owner. Ascertain that the propeller back blast and taxi areas are clear.

Power should be applied slowly to start the taxi roll. Taxi a few feet forward and apply the brakes to determine their effectiveness. While taxiing, make slight turns to ascertain the effectiveness of the steering.

Observe wing clearances when taxiing near buildings or other stationary objects. If possible, station an observer outside the airplane.

Avoid holes and ruts when taxiing over uneven ground.

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.

GROUND CHECK

The magnetos should be checked at 2000 RPM. Switch from "BOTH" to "RIGHT," then back to "BOTH" before switching to "LEFT." Drop off on either magneto should not exceed 175 RPM and the difference between the magnetos should not exceed 50 RPM. Operation on one magneto should not exceed 10 seconds.

Check the vacuum gauge; the indicator should read 5.0" ± .1" Hg at 2000 RPM.

Check the annunciator panel lights with the press-to-test button. Also check the air conditioner.

Carburetor heat should also be checked prior to takeoff to be sure the control is operating properly and to clear any ice which may have formed during taxiing. Avoid prolonged ground operation with carburetor heat "ON" as the air is unfiltered.

The electric fuel pump should be turned "OFF" after starting or during warm-up to make sure that the engine driven pump is operating. Prior to takeoff the electric pump should be turned ON again to prevent loss of power during takeoff should the engine driven pump fail. Check both oil temperature and oil pressure. The temperature may be low for some time if the engine is being run for the first time of the day. The engine is warm enough for takeoff when the throttle can be opened without the engine faltering.

BEFORE TAKEOFF

All aspects of each particular takeoff should be considered prior to executing the takeoff procedure.

Turn "ON" the master switch and check and set all of the flight instruments as required. Check the fuel selector to make sure it is on the proper tank (fullest). Turn "ON" the electric fuel pump and check the engine gauges. The carburetor heat should be in the "OFF" position.

All seat backs should be erect and the seat belts and shoulder harness fastened. Fasten the seat belts snugly around the empty seats.

The mixture should be set.

NOTE

The mixture should be set FULL RICH except a minimum amount of leaning is permitted for smooth engine operation when taking off at high elevation.

Exercise and set the flaps and trim tab. Insure proper flight control movement and response.

The door should be properly secured and latched.

On air conditioned models, the air conditioner must be "OFF" to insure normal takeoff performance.

TAKEOFF

In the conventional takeoff procedure set the trim control aft of neutral. Allow the airplane to accelerate to 45-55 KIAS, then ease back on the wheel enough to let the airplane fly itself from the ground. Premature or excessive raising of the nose will result in a delayed takeoff. After takeoff let the aircraft accelerate to the desired climb speed by lowering the nose slightly. Trying to pull the airplane off the ground at too low an airspeed decreases the controllability of the airplane in the event of an engine failure.

Short Field, Obstacle Clearance:
Lower the flaps to 25° (second notch), accelerate to 48-55 KIAS and ease back on the control wheel to rotate. After breaking ground, accelerate to the best angle of climb speed, 66 KIAS. Slowly retract the flaps when the obstacle has been cleared, and continue climb at 75 KIAS.

Short Field, No Obstacles:
Lower the flaps to 25° (second notch), accelerate to 48-55 KIAS. Ease back on the control wheel to rotate and accelerate to best rate of climb speed, 75 KIAS. 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, 66 KIAS to climb past obstacle clearance height; continue climb while accelerating to best rate of climb speed, 75 KIAS, and slowly retract the flaps.

Soft Field, No Obstacle:
Lower the flaps to 25° (second notch), accelerate aircraft and pull nose gear from the ground as soon as possible, lift off at lowest possible airspeed. Accelerate just above the ground to best rate of climb speed, 75 KIAS. Climb out while slowly retracting the flaps.

CLIMB

The best rate of climb at gross weight will be obtained at 75 KIAS. The best angle of climb may be obtained at 66 KIAS. At lighter than gross weight these speeds are reduced somewhat. For climbing en route, a speed of 87 KIAS is recommended. This will produce better forward speed and increased visibility over the nose during the climb. Shallow turns of a few degrees will also improve forward visibility during climbs.

When reaching the desired altitude, the electric fuel pump may be turned off. The air conditioner may be turned on after all obstacles have been cleared.

CRUISING

The cruising speed of the Cherokee Cruiser is determined by many factors, including power setting, altitude, temperature, loading and equipment installed in the airplane.

The normal maximum cruising power is 75% of the rated horsepower of the engine. Airspeeds which may be obtained at various altitudes and power settings can be determined from the performance graphs provided by Section 3.

Use of the mixture control in cruising flight reduces fuel consumption significantly, especially at higher altitudes, and reduces lead deposits when the alternate fuels are used. During letdown and low power flight operations, it may be necessary to lean because of excessively rich mixture. The mixture should be leaned during cruising operation above 5000 feet altitude and 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. Always enrich the mixture before increasing power settings.

To lean the mixture, disengage the 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 towards the instrument panel until engine operation becomes smooth. When leaning, carefully observe the temperature instruments.

Always remember that the electric fuel pump should be turned "ON" before switching tanks, and should be left on for a short period thereafter. 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 takeoff, then the other tank be used for two hours; then return to the first tank, which will have approximately one and one half hours of fuel remaining if the tanks were full at takeoff. The second tank will contain approximately one half hour of fuel. Do not run tanks completely dry in flight. The electric fuel pump should be normally "OFF" so that any malfunction of the engine driven fuel pump is immediately apparent. If signs of fuel starvation should occur at any time during flight, fuel exhaustion should be suspected, at which time the fuel selector should be immediately positioned to the other tank and the electric fuel pump switched to the "ON" position.

APPROACH AND LANDING

Check to insure the fuel selector is on the proper (fullest) tank and that the seat backs are erect. The seat belts and shoulder harness should be fastened and the inertia reel checked.

Turn "ON" the electric fuel pump and turn "OFF" the air conditioner. The mixture should be set in the full "RICH" position.

The airplane should be trimmed to an initial approach speed of about 70 KIAS with a final approach speed of 59 KIAS with flaps extended. The flaps can be lowered at speeds up to 101 KIAS, if desired.

The mixture control should be kept in full "RICH" position to insure maximum acceleration if it should be necessary to open the throttle again. Carburetor heat should not be applied unless there is an indication of carburetor icing, since the use of carburetor heat causes a reduction in power which may be critical in case of a go-around. Full throttle operation with carburetor heat on can cause detonation.

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 flap and enough power to maintain the desired airspeed and approach flight path. Mixture should be full "RICH," fuel on the fullest tank, and electric fuel pump "ON." Reduce the speed during the flareout and contact the ground close to the stalling speed (41-50 KIAS). After ground contact hold the nose wheel off as long as possible. As the airplane slows down, gently lower the nose and apply the brakes. Braking is most effective when flaps are raised and back pressure is applied to the control wheel, putting most of the aircraft weight on the main wheels. In high wind conditions, particularly in strong crosswinds, it may be desirable to approach the ground at higher than normal speeds with partial or no flaps.

STOPPING ENGINE

At the pilot's discretion, the flaps should be raised and the electric fuel pump turned "OFF." The air conditioner and radios should be turned "OFF," and the engine stopped by disengaging the mixture control lock and pulling the mixture control back to idle cut-off. The throttle should be left full aft to avoid engine vibration while stopping. Then the magneto and master switches must be turned "OFF."

NOTE

When alternate fuels are used, the engine should be run up to 1200 RPM for one minute prior to shutdown to clean out any unburned fuel.

PARKING

If necessary, the airplane should be moved on the ground with the aid of the nose wheel tow bar provided with each airplane and secured behind the rear seats. The aileron and stabilator controls should be secured by looping the safety belt through the control wheel and pulling it snug. The flaps are locked when in the "UP" position and should be left retracted.

Tie downs can be secured to rings provided under each wing and to the tail skid. The rudder is held in position by its connections to the nose wheel steering and normally does not have to be secured.

STALLS

The stall characteristics of the Cherokee Cruiser are conventional. An approaching stall is indicated by a stall warning horn which is activated between five and ten knots above stall speed. Mild airframe buffeting and gentle pitching may also precede the stall.

The gross weight stalling speed of the Cherokee Cruiser with power off and full flaps is 41 KIAS at 2150 pounds. With the flaps up this speed is increased 9 KTS. Loss of altitude during stalls can be as great as 200 feet, depending on configuration and power.

NOTE

The stall warning system is inoperative with the master switch "OFF."

During preflight, the stall warning system should be checked by turning the master switch "ON," lifting the detector and checking to determine if the horn is actuated. The master switch should be returned to the "OFF" position after the check is complete.

MANEUVERS

The airplane is approved for certain aerobatic maneuvers, provided it is loaded within the approved weight and center of gravity limits (see Section 5 - Limitations). The approved maneuvers are spins, steep turns, lazy eights, and chandelles. Spins are prohibited when air conditioning or ventilation blower is installed.

Intentional spins are prohibited in the normal category airplane. Lazy eights and chandelles may be performed in the normal category provided a 60 degree angle of bank and/or a 30 degree angle of pitch is not exceeded. For approved maneuvers and entry speed, refer to Section 5 - Limitations.

TURBULENT AIR OPERATION

In keeping with good operating practice used in all aircraft, it is recommended that when turbulent air is encountered or expected, the airspeed be reduced to maneuvering speed to reduce the structural loads caused by gusts and to allow for inadvertent speed build-ups which may occur as a result of the turbulence or of distractions caused by the conditions. **(See Airspeed Limitations)**

WEIGHT AND BALANCE

It is the responsibility of the owner and pilot to determine that the airplane remains within the allowable weight vs. center of gravity envelope while in flight.

For weight and balance data, refer to Section 4 - Weight and Balance and Section 5 - Limitations.

SECTION 3

PERFORMANCE

GENERAL

All of the required (FAA regulations) and complementary performance information applicable to the Cherokee Cruiser is provided by this section.

Performance information associated with those optional systems and equipment which require handbook supplements is provided by Section 9 (Supplements).

INTRODUCTION TO PERFORMANCE AND FLIGHT PLANNING

The performance information presented in this section is based on measured Flight Test Data corrected to I.C.A.O. standard day conditions and analytically expanded for the various parameters of weight, altitude, temperature, etc.

The performance charts are unfactored and do not make any allowance for varying degrees of pilot proficiency or mechanical deterioration of the aircraft. This performance, however, can be duplicated by following the stated procedures in a properly maintained airplane.

Effects of conditions not considered on the charts must be evaluated by the pilot, such as the effect of soft or grass runway surface on takeoff and landing performance, or the effect of winds aloft on cruise and range performance. Endurance can be grossly affected by improper leaning procedures, and inflight fuel flow and quantity checks are recommended.

REMEMBER! To get chart performance, follow the chart procedures.

The information provided by (Flight Planning Example) outlines a detailed flight plan using the performance charts in this section. Each chart includes its own example to show how it is used.

FLIGHT PLANNING EXAMPLE

(a) Aircraft Loading

The first step in planning our flight is to calculate the airplane weight and center of gravity by utilizing the information provided by Section 4 (Weight and Balance) of this handbook.

The basic empty weight for the airplane as delivered from the factory has been entered in Figure 6-5. If any alterations to the airplane have been made effecting weight and balance, reference to the aircraft logbook and Weight and Balance Record (Figure 4-7) should be made to determine the current basic empty weight of the airplane.

Make use of the Weight and Balance Loading Form (Figure 4-13) and the C.G. Range and Weight graph (Figure 4-17) to determine the total weight of the airplane and the center of gravity position.

After proper utilization of the information provided we have found the following weights for consideration in our flight planning example.

The landing weight cannot be determined until the weight of the fuel to be used has been established [refer to item (g)(1)].

(1)	Basic Empty Weight	1360 lbs.
(2)	Occupants (2 x 170 lbs)	340 lbs.
(3)	Baggage and Cargo	80 lbs.
(4)	Fuel (6 lb/gal x 50)	300 lbs.
(5)	Takeoff Weight	2080 lbs.
(6)	Landing Weight (a)(5) minus (g)(1), (2080 lbs. minus 228.54 lbs.)	1851.5 lbs.

Our takeoff weight is below the maximum of 2150 lbs. and our weight and balance calculations have determined our C.G. position within the approved limits.

(b) Takeoff and Landing

Now that we have determined our aircraft loading, we must consider all aspects of our takeoff and landing.

All of the existing conditions at the departure and destination airport must be acquired, evaluated and maintained throughout the flight.

Apply the departure airport conditions and takeoff weight to the appropriate Takeoff Performance graph (Figure 3-5 or 3-7) to determine the length of runway necessary for the takeoff and/or the barrier distance.

The landing distance calculations are performed in the same manner using the existing conditions at the destination airport and, when established, the landing weight.

The conditions and calculations for our example flight are listed below. The takeoff and landing distances required for our example flight have fallen well below the available runway lengths.

		Departure Airport	Destination Airport
(1)	Pressure Altitude	1100 ft.	800 ft.
(2)	Temperature	50°F	56°F
(3)	Wind Component	+5 KTS	-5 KTS
(4)	Runway Length Available	3800 ft.	4200 ft.
(5)	Runway Required	850 ft.*	720**

NOTE

The remainder of the performance charts used in this flight plan example assume a no wind condition. The effect of winds aloft must be considered by the pilot when computing climb, cruise and descent performance.

(c) Climb

The next step in our flight plan is to determine the necessary climb segment components.

The desired cruise pressure altitude and corresponding cruise outside air temperature values are the first variables to be considered in determining the climb components from the Time, Distance, and Fuel to Climb graph (Figure 5-13). After the time, distance and fuel for the cruise pressure altitude and outside air temperature values have been established, apply the existing conditions at the departure field to graph (Figure 5-13). Now, subtract the values obtained from the graph for the field of departure conditions from those for the cruise pressure altitude.

The remaining values are the true fuel, distance and time components for the climb segment of the flight plan corrected for field pressure altitude and temperature.

The following values were determined from the above instructions in our flight planning example.

(1)	Cruise Pressure Altitude	6000 ft.
(2)	Cruise OAT	45°F
(3)	Time to Climb (14.5 min. minus 1.5 min.)	13 min.***
(4)	Distance to Climb (20.5 miles minus 2 miles)	18.5 naut. miles***
(5)	Fuel to Climb (4.5 gal. minus .5 gal.)	4 gal.***

*Reference Figure 3-7
**Reference Figure 3-25
***Reference Figure 3-13

(d) Descent

The descent data will be determined prior to the cruise data to provide the descent distance for establishing the total cruise distance.

Utilizing the cruise pressure altitude and OAT we determine the basic time, distance and fuel for descent (Figure 3-21). These figures must be adjusted for the field pressure altitude and temperature at the destination airport. To find the necessary adjustment values, use the existing pressure altitude and temperature conditions at the destination airport as variables to find the time, distance and fuel values from the graph (Figure 3-21). Now, subtract the values obtained from the field conditions from the values obtained from the cruise conditions to find the true time, distance and fuel values needed for the flight plan.

The values obtained by proper utilization of the graphs for the descent segment of our example are shown below.

(1)	Time to Descend (7.5 min. minus 1 min.)	6.5 min.*
(2)	Distance to Descend (18 miles minus 2 miles)	16 naut. miles*
(3)	Fuel to Descend (2 gal. minus .5 gal.)	1.5 gal.*

(e) Cruise

Using the total distance to be traveled during the flight, subtract the previously calculated distance to climb and distance to descend to establish the total cruise distance. Refer to the appropriate Avco Lycoming Operator's Manual when selecting the cruise power setting. The established pressure altitude and temperature values and the selected cruise power should now be utilized to determine the true airspeed from the Cruise Performance graph (Figure 3-15).

Calculate the cruise fuel flow for the cruise power setting from the information provided by the Avco Lycoming Operator's Manual.

The cruise time is found by dividing the cruise distance by the cruise speed and the cruise fuel is found by multiplying the cruise fuel flow by the cruise time.

The cruise calculations established for the cruise segment of our flight planning example are as follows:

(1)	Total Distance	458 naut. miles
(2)	Cruise Distance (e)(1) minus (c)(4) minus (d)(2), (458 miles minus 18.5 miles minus 16 miles)	423.5 naut. miles
(3)	Cruise Power, Best Economy Mixture	75% rated power
(4)	Cruise Speed	109.5 KTS TAS***
(5)	Cruise Fuel	8.4 GPH**
(6)	Cruise Time (e)(2) divided by (e)(4), (423.5 miles divided by 109.5 KTS)	3.88 hrs.
(7)	Cruise Fuel (e)(5) multiplied by (e)(6), (8.4 GPH multiplied by 3.88 hrs.)	32.59 gal.

***Reference Figure 3-21**
****Reference Figure 3-9**
*****Reference Figure 3-15**

(f) Total Flight Time

The total flight time is determined by adding the time to climb, the time to descend and the cruise time. Remember! The time values taken from the climb and descent graphs are in minutes and must be converted to hours before adding them to the cruise time.

The following flight time is required for our flight planning example.

(1)	Total Flight Time (c)(3) plus (d)(1) plus (e)(6), (.22 hrs. plus .10 hrs. plus 3.88 hrs.)	4.20 hrs.

(g) Total Fuel Required

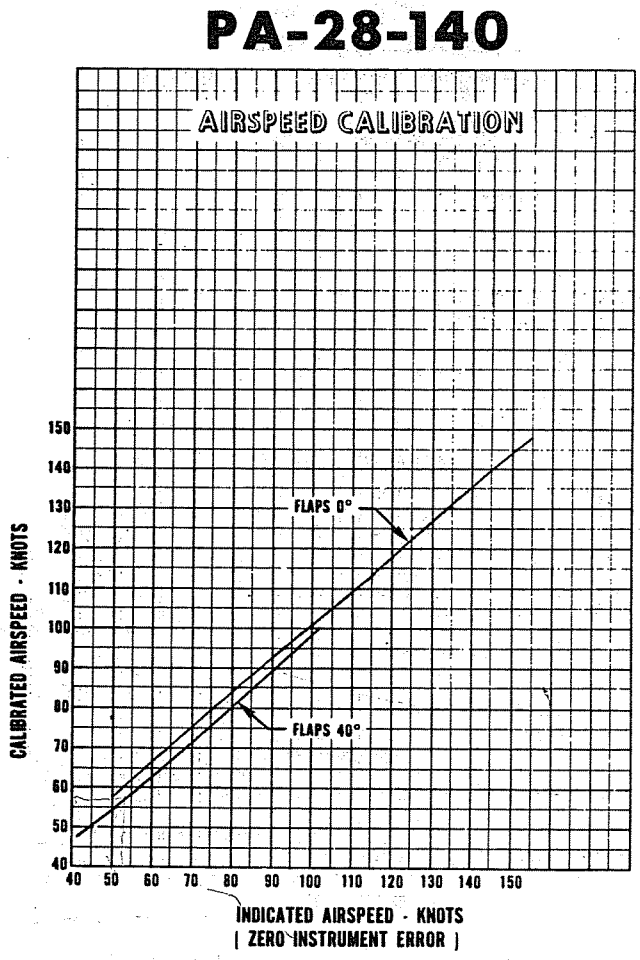
Determine the total fuel required by adding the fuel to climb, the fuel to descend and the cruise fuel. When the total fuel (in gallons) is determined, multiply this value by 6 lb/gal to determine the total fuel weight used for the flight.

The total fuel calculations for our example flight plan are shown below.

(1)	Total Fuel Required (c)(5) plus (d)(3) plus (e)(7), (4 gal. plus 1.5 gal. plus 32.59 gal.)	38.09 gal.
	(38.09 gal. multiplied by 6 lb/gal.)	228.54 lbs.

PERFORMANCE GRAPHS

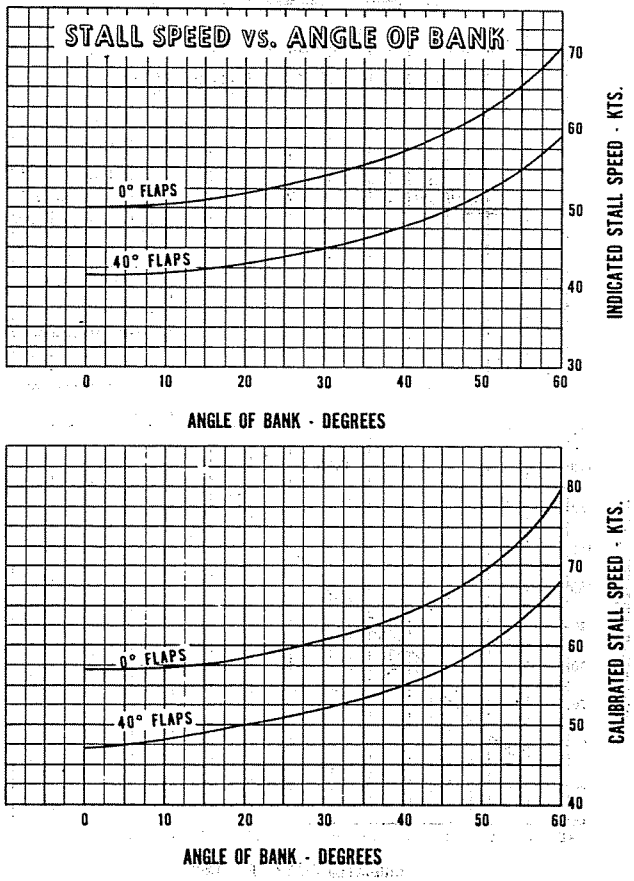
LIST OF FIGURES



AIRSPEED CALIBRATION

Figure 3-1

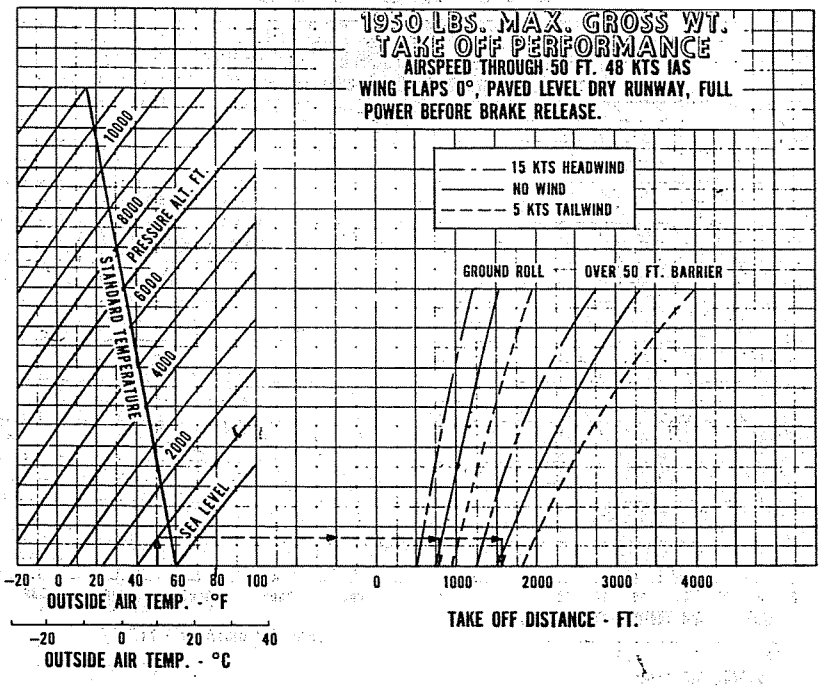
PA-28-140



STALL SPEED VS. ANGLE OF BANK

Figure 3-3

PA-28-140

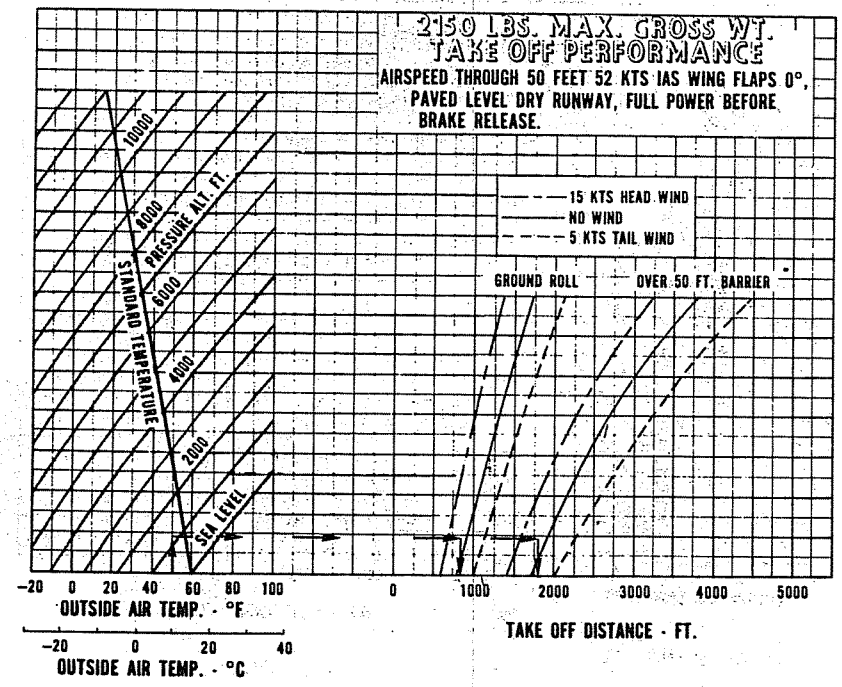


Example:
Departure airport pressure altitude: 1100 ft.
Temperature: 50° F
Wind: 5 KTS headwind
Ground roll: 800 ft.
Distance over 50 ft. barrier: 1600 ft.

TAKEOFF PERFORMANCE (1950 POUNDS)

Figure 3-5

PA-28-140

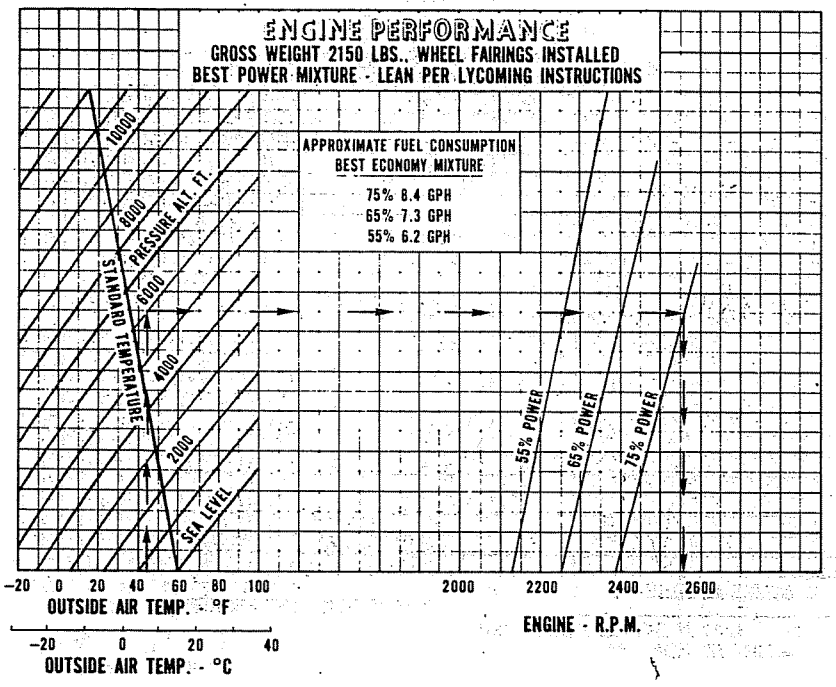


Example:
Departure airport pressure altitude: 1100 ft.
Temperature: 50°F
Wind: 5 knots headwind
Ground roll: 850 ft.
Distance over 50 ft. barrier: 1800 ft.

TAKEOFF PERFORMANCE (2150 POUNDS)

Figure 3-7

PA-28-140

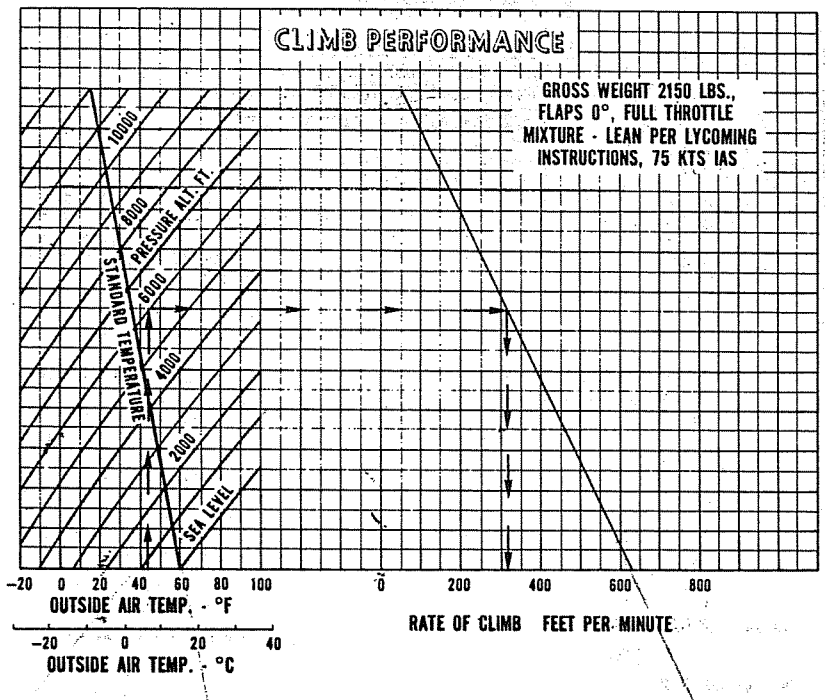


Example:
Cruise pressure altitude: 6000 ft.
Cruise OAT: 45°F
Cruise power: 75%
Engine RPM: 2560

ENGINE PERFORMANCE

Figure 3-9

PA-28-140

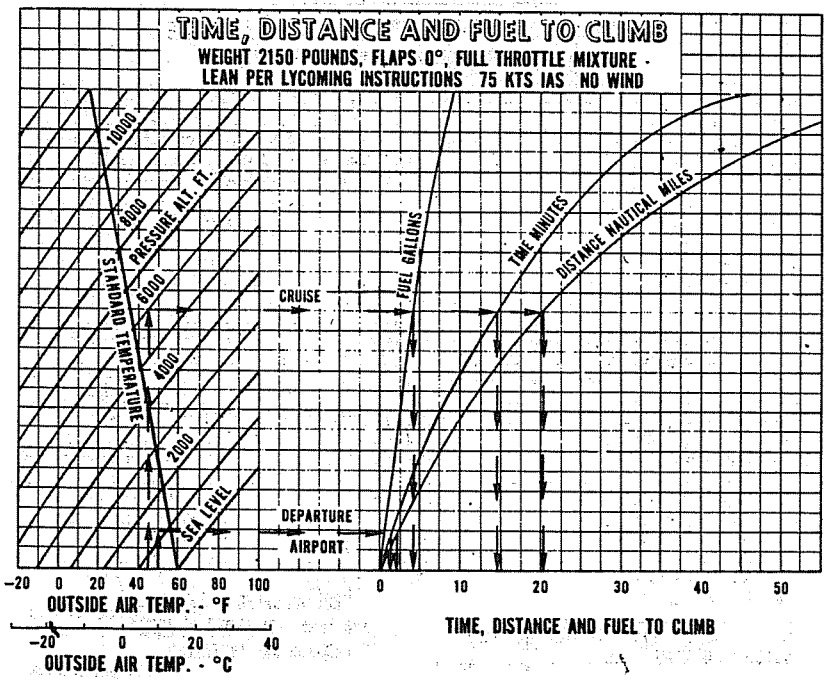


Example:
Climb pressure altitude: 6000 ft.
Climb OAT: 45°F
Rate of climb: 320 ft./min.

CLIMB PERFORMANCE

Figure 3-11

PA-28-140

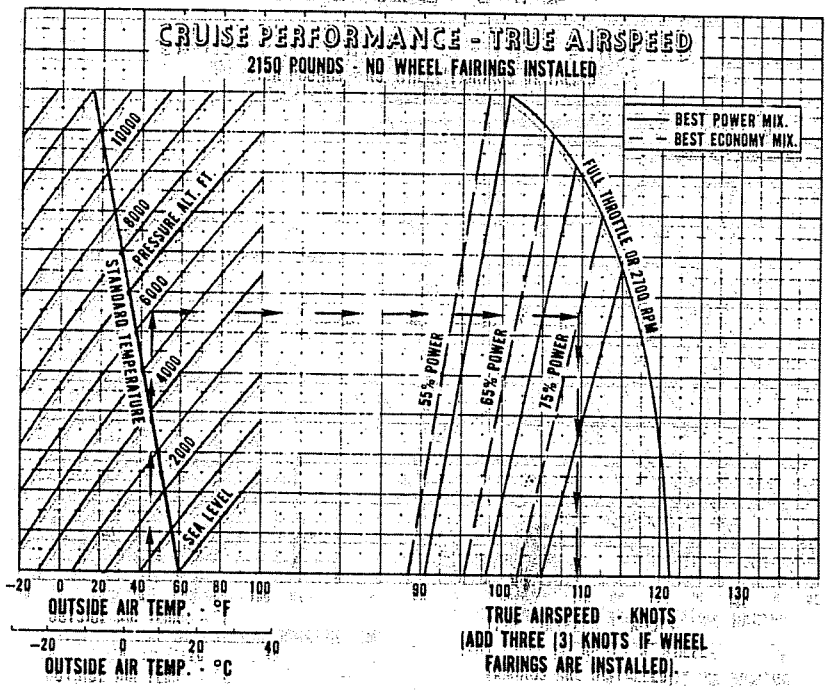


Example:
Departure airport pressure altitude: 1100 ft.
Departure airport temperature: 50°F
Cruise pressure altitude: 6000 ft.
Cruise OAT: 45°F
Time to climb (14.5 min. minus 1.5 min.): 13 min.
Distance to climb (20.5 miles minus 2 miles): 18.5 nautical miles
Fuel to climb (4.5 gal. minus .5 gal.): 4 gal.

TIME, DISTANCE AND FUEL TO CLIMB

Figure 3-13

PA-28-140

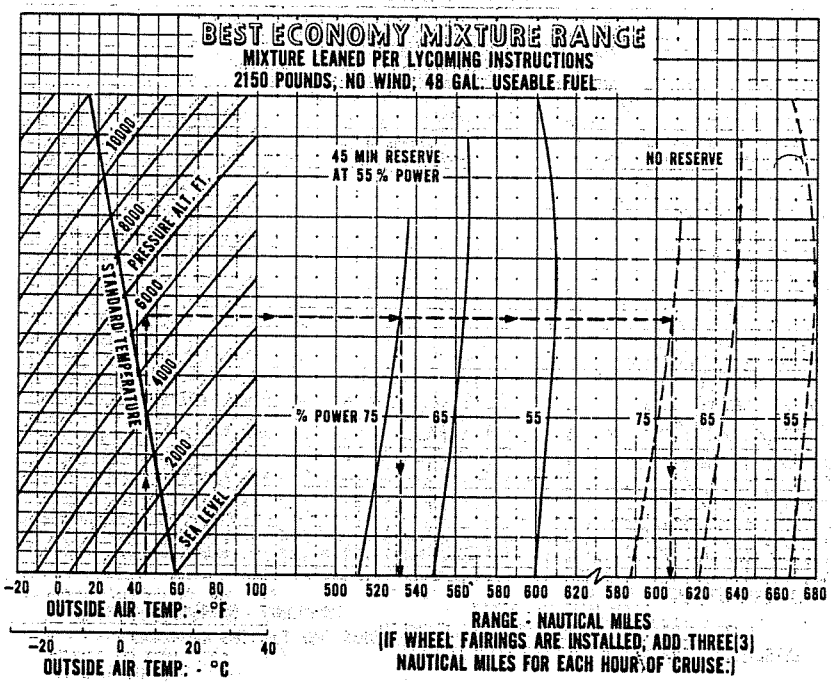


Example:
Cruise pressure altitude: 6000 ft.
Cruise OAT: 45°F
Cruise power: 75%, Best Economy Mixture
Cruise speed: 109.5 KTS TAS

CRUISE PERFORMANCE - TRUE AIRSPEED

Figure 3-15

PA-28-140

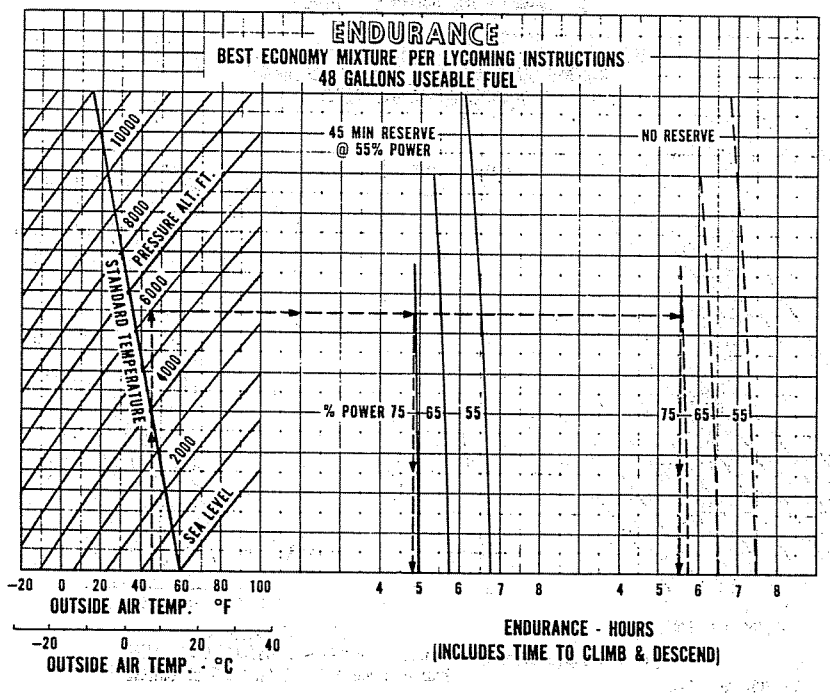


Example:
Cruise pressure altitude: 6000 ft.
Cruise OAT: 45°F
Cruise power: 75%, Best Economy Mixture
Range with 45 min. reserve at 55% power: 532 nautical miles
Range with no reserve: 608 nautical miles

BEST ECONOMY MIXTURE RANGE

Figure 3-17

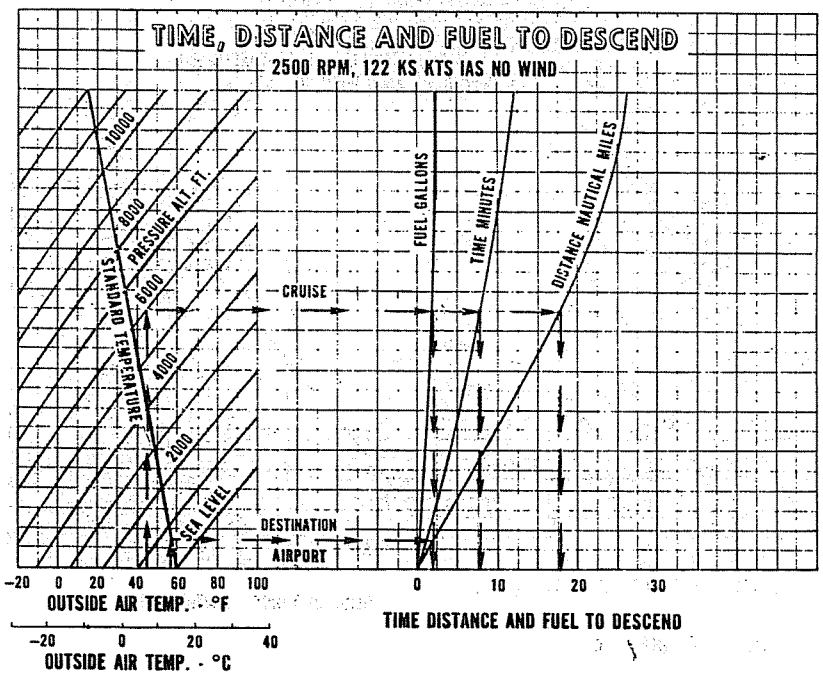
PA-28-140



Example:
Cruise pressure altitude: 6000 ft.
Cruise OAT: 45°F
Cruise power: 75%, Best Economy Mixture
Endurance with 45 min. reserve at 55% power: 4.8 hrs.
Endurance with no reserve: 5.6 hrs.

ENDURANCE
Figure 3-19

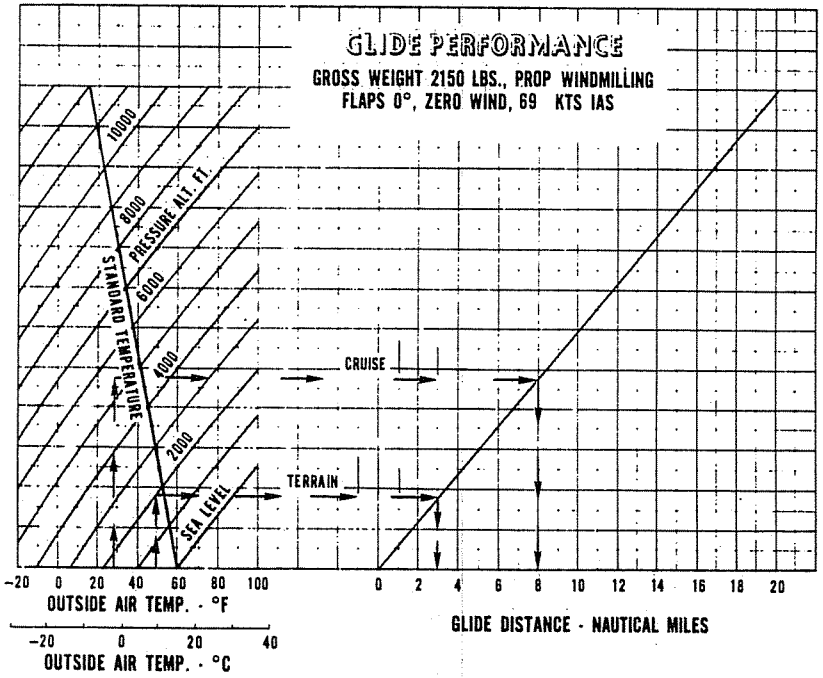
PA-28-140



Example:
Cruise pressure altitude: 6000 ft.
Cruise OAT: 45°F
Destination airport pressure altitude: 800 ft.
Time to descend (7.5 min. minus 1 min.): 6.5 min.
Distance to descend (18 miles minus 2 miles): 16 nautical miles
Fuel to descend (2 gal. minus 5 gal.): 1.5 gal.

TIME, DISTANCE AND FUEL TO DESCEND
Figure 3-21

PA-28-140

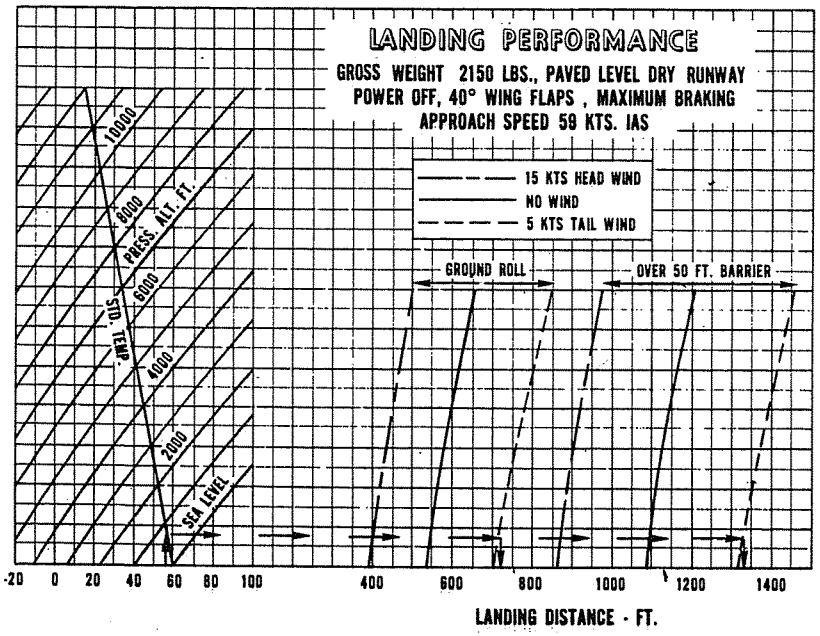


Example:
Cruise pressure altitude: 5500 ft.
Cruise OAT: 28° F
Terrain pressure altitude: 2000 ft.
Temperature at terrain: 49° F
Glide distance (8 nautical miles minus 3 nautical miles): 5 nautical miles

GLIDE PERFORMANCE

Figure 3-23

PA-28-140



Example:
Destination airport pressure altitude: 800 ft.
Destination airport temperature: 56° F
Destination airport wind: 5 KTS tailwind
Ground roll: 720 ft.
Distance over 50 ft. barrier: 1330 ft.

LANDING PERFORMANCE

Figure 3-25

SECTION 4

WEIGHT AND BALANCE

6.1 GENERAL

In order to achieve the performance, safety and good flying characteristics which are designed into the airplane, it must be flown with the weight and center of gravity (C.G.) position within the approved operating range (envelope). Although the airplane offers a tremendous flexibility of loading, it cannot be flown with the maximum number of adult passengers, full fuel tanks and maximum baggage. With the flexibility comes responsibility. The pilot must ensure 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 a properly loaded one. 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 be difficult to rotate for takeoff or landing. If the C.G. is too far aft, the airplane may rotate prematurely on takeoff or tend to pitch up during climb. Longitudinal stability will be reduced. This can lead to inadvertent stalls and even spins; and spin recovery becomes more difficult as the center of gravity moves aft of the approved limit.

A properly loaded airplane, however, will perform as intended. This airplane is designed to provide excellent performance and safety within the flight envelope. Before the airplane is delivered, it is weighed, and a basic empty weight and C.G. location is computed (basic empty weight consists of the standard empty weight of the airplane plus the optional equipment). Using the basic empty weight and C.G. location, the pilot can easily determine the weight and C.G. position for the loaded airplane by computing the total weight and moment and then determining whether they are within the approved envelope.

The basic empty weight and C.G. location are recorded in the Aircraft Log Book, or the Weight and Balance Data Form (Figure 6-5) and the Weight and Balance Record (Figure 6-7). 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. position and to write these in the Aircraft Log Book and the Weight and Balance Record. The owner should make sure that it is done.

A weight and balance calculation can be helpful 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 overloading.

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

AIRPLANE WEIGHING PROCEDURE

At the time of delivery, Piper Aircraft Corporation provides each airplane with the basic empty weight and center of gravity location. This data is supplied by Figure 4-5

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

(a) Preparation

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

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

(3) 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. Then add the unusable fuel (3 pints total, 1.5 pints each wing).

(4) Fill with oil to full capacity.

(5) 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 door closed.

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

(b) Leveling

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

(2) Level airplane (refer to Figure 4-3 deflating nose wheel tire, to center bubble on level.

(c) Weighing - Airplane Basic Empty Weight

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

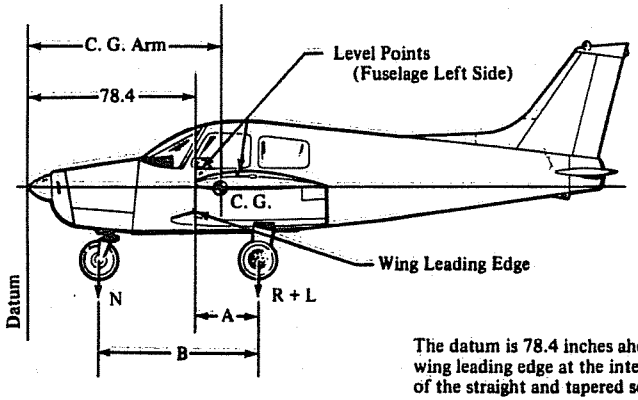
Scale Position and Symbol		Scale Reading	Tare	Net Weight
Nose Wheel	(N)			
Right Main Wheel	(R)			
Left Main Wheel	(L)			
Basic Empty Weight, as Weighed (T)		–	–	

WEIGHING FORM

Figure 4-1

(d) Basic Empty Weight Center of Gravity

(1) The following geometry applies to the PA-28-140 airplane when it is level. Refer to Leveling (b).



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

A =

B =

LEVELING DIAGRAM

Figure 4-3

(2) 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.

(3) 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.

(4) The basic empty weight center of gravity (as weighed including optional equipment, full oil and unusable fuel) can be determined by the following formula:

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

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

WEIGHT AND BALANCE DATA AND RECORD

The Basic Empty Weight, Center of Gravity Location and Useful Load listed in Figure 4-5 are for the airplane as delivered from the factory. These figures apply only to the specific airplane serial number and registration number shown.

The basic empty weight of the airplane as delivered from the factory has been entered in the Weight and Balance Record (Figure 4-7. This form is provided to present the current status of the airplane basic empty weight and a complete history of previous modifications. Any change to the permanently installed equipment or modification which affects weight or moment must be entered in the Weight and Balance Record.

MODEL PA-28-140 CHEROKEE CRUISER

Airplane Serial Number _____

Registration Number _____

Date _____

AIRPLANE BASIC EMPTY WEIGHT

Item		Weight (Lbs)	x	C.G. Arm (Inches Aft of Datum)	=	Moment (In-Lbs)
Standard Empty Weight*	Actual Computed					
Optional Equipment						
Basic Empty Weight						

*The standard empty weight includes full oil capacity and 3.0 pints of unusable fuel.

AIRPLANE USEFUL LOAD

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

Normal Category (2150 lbs) - (lbs) = lbs.

Utility Category (1950 lbs) - (lbs) = lbs.

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

WEIGHT AND BALANCE DATA FORM

Figure 4-5

PA-28-140	Serial Number	Registration Number	Page Number

Date	Item No. In	Item No. Out	Description of Article or Modification	Weight Change Added (+) Wt. (Lb.)	Weight Change Added (+) Arm (in.)	Weight Change Added (+) Moment /100	Weight Change Removed (-) Wt. (Lb.)	Weight Change Removed (-) Arm (in.)	Weight Change Removed (-) Moment /100	Running Basic Empty Weight Wt. (Lb.)	Running Basic Empty Weight Moment /100
			As Delivered								

WEIGHT AND BALANCE RECORD

Figure 4-7

PA-28-140	Serial Number	Registration Number	Page Number

Date	Item No. In	Item No. Out	Description of Article or Modification	Weight Change Added (+) Wt. (Lb.)	Added (+) Arm (In.)	Added (+) Moment /100	Removed (-) Wt. (Lb.)	Removed (-) Arm (In.)	Removed (-) Moment /100	Running Basic Empty Weight Wt. (Lb.)	Running Basic Empty Weight Moment /100
			As Delivered								

WEIGHT AND BALANCE RECORD (cont)

Figure 4-7 (cont)

WEIGHT AND BALANCE DETERMINATION FOR FLIGHT

(a) Add the weight of all items to be loaded to the basic empty weight.

(b) Use the Loading Graph (Figure 4-15 to determine the moment of all items to be carried in the airplane.

(c) Add the moment of all items to be loaded to the basic empty weight moment.

(d) Divide the total moment by the total weight to determine the C.G. location.

(e) By using the figures of item (a) and item (d) (above), locate a point on the C.G. range and weight graph (Figure 4-17 If the point falls within the C.G. envelope, the loading meets the weight and balance requirements.

	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight			
Pilot and Front Passenger	340.0	85.5	29070
Passengers, Aft*		117.0	
Fuel (50 Gallon Maximum)		95.0	
Baggage* Area 1		117.0	
Baggage* Area 2		133.3	
Total Loaded Airplane			

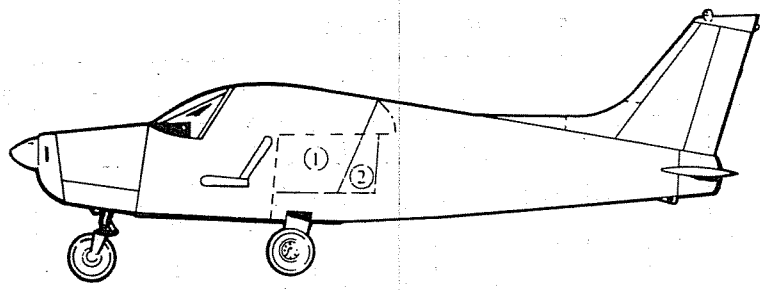
The center of gravity (C.G.) of this sample loading problem is at inches aft of the datum line. Locate this point ( ) on the C.G. range and weight graph. Since this point falls within the weight - C.G. envelope, this loading meets the weight and balance requirements.

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

*Utility Category Operation - No baggage or aft passengers allowed.
Normal Category Operation - See Figure 4-11.

SAMPLE LOADING PROBLEM

Figure 4-9



A. Maximum Allowable Baggage Capacity Area (1) = 200 lbs.

B. Maximum Allowable Baggage Capacity Area (2) = 100 lbs.

Aircraft are eligible for 100-lb maximum baggage in this area when modified in accordance with Piper drawing 66671.

MAXIMUM ALLOWABLE BAGGAGE

Figure 4-11

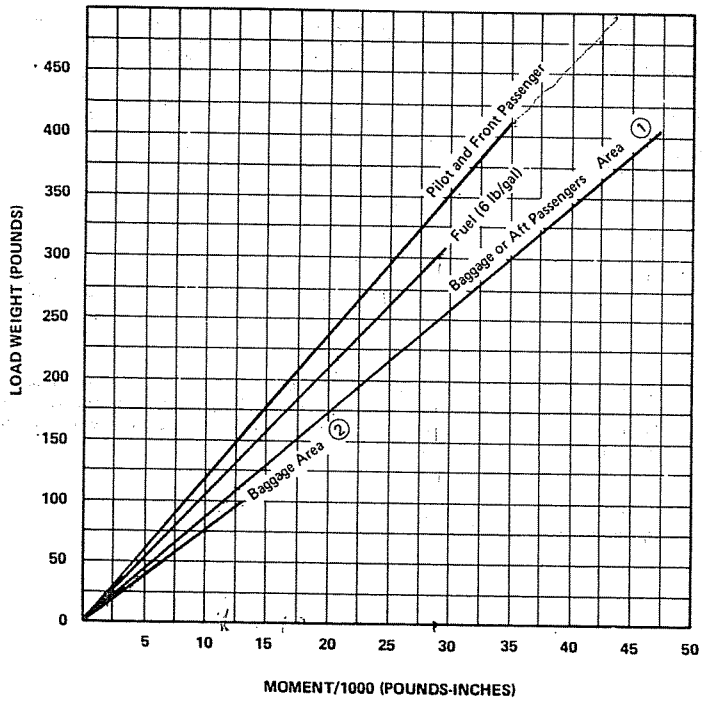
	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight			
Pilot and Front Passenger		85.5	
Passengers, Aft*		117.0	
Fuel (50 Gallon Maximum)		95.0	
Baggage* Area 1		117.0	
Baggage* Area 2		133.3	
Total Loaded Airplane			

Totals must be within approved weight and C.G. limits. It is the responsibility of the airplane owner and the pilot to insure that the airplane is loaded properly. The Basic Empty Weight C.G. is noted on the Weight and Balance Data Form (Figure 4-5. If the airplane has been altered, refer to the Weight and Balance Record for this information.

*Utility Category Operation - No baggage or aft passengers allowed.
Normal Category Operation - See Figure 4-11

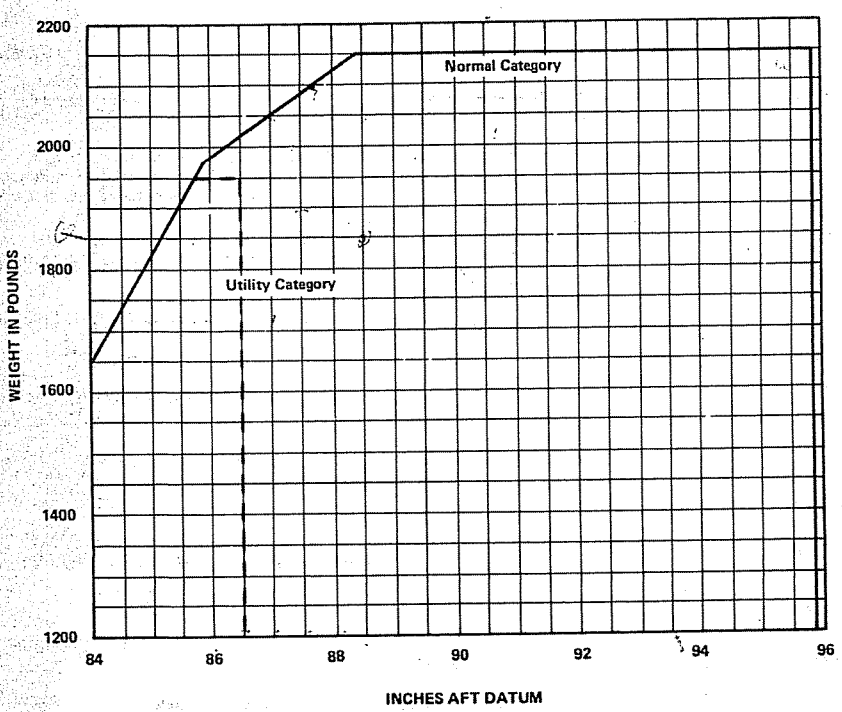
WEIGHT AND BALANCE LOADING FORM

Figure 4-13



LOADING GRAPH

Figure 4-15



C. G. RANGE AND WEIGHT

Figure 4-17

SECTION 5

LIMITATIONS

GENERAL

This section provides the "FAA Approved" operating limitations, instrument markings, color coding and basic placards necessary for the safe operation of the airplane and its systems.

This airplane must be operated as a normal or utility category airplane in compliance with the operating limitations stated in the form of placards and markings and those given in this section and this complete handbook.

Limitations associated with those optional systems and equipment which require handbook supplements can be found in Section 9 (Supplements).

AIRSPEED LIMITATIONS

SPEED	KIAS	KCAS
Never Exceed Speed (V_{NE}) - Do not exceed this speed in any operation.	155	148
Maximum Structural Cruising Speed (V_{NO})- Do not exceed this speed except in smooth air and then only with caution.	124	122
Design Maneuvering Speed (V_A)- Do not make full or abrupt control movements above this speed.		
2150 LBS.	114	112
1650 LBS.	93	95

CAUTION

Maneuvering speed decreases at lighter weight as the effects of aerodynamic forces become more pronounced. Linear interpolation may be used for intermediate gross weights. Manuevering speed should not be exceeded while operating in rough air.

Maximum Flaps Extended Speed (V_{FE}) - Do not exceed this speed with the flaps extended.	101	100

AIRSPEED INDICATOR MARKINGS

MARKING	KIAS
Red Radial Line (Never Exceed)	155
Yellow Arc (Caution Range - Smooth Air Only)	124 to 155
Green Arc (Normal Operating Range)	50 to 124
White Arc (Flap Down)	41 to 101

POWER PLANT LIMITATIONS

(a) Number of Engines	1
(b) Engine Manufacturer	Lycoming
(c) Engine Model No.	O-320-E3D
(d) Engine Operating Limits	
(1) Maximum Horsepower	150
(2) Maximum Rotation Speed (RPM)	2700
(3) Maximum Oil Temperature	245°F
(e) Oil Pressure	
Minimum (red line)	25 PSI
Maximum (red line)	90 PSI
(f) Fuel Pressure	
Minimum (red line)	.5 PSI
Maximum (red line)	8 PSI
(g) Fuel Grade (minimum octane)	80/87 - Red
(h) Number of Propellers	1
(i) Propeller Manufacturer	Sensenich
(j) Propeller Model	M74DM6-0-58
(k) Propeller Diameter	
Minimum	72.5 IN.
Maximum	74 IN.
(l) Propeller Tolerance (static RPM at maximum permissible throttle setting)	Not above 2425 RPM Not below 2275 RPM

No additional tolerance permitted.

POWER PLANT INSTRUMENT MARKINGS

(a) Tachometer	
Green Arc (Normal Operating Range)	500 to 2700 RPM
Red Line (Maximum Continuous Power)	2700 RPM
(b) Oil Temperature	
Green Arc (Normal Operating Range)	75° to 245°F
Red Line (Maximum)	245°F
(c) Oil Pressure	
Green Arc (Normal Operating Range)	60 PSI to 90 PSI
Yellow Arc (Caution Range) (Idle)	25 PSI to 60 PSI
Red Line (Minimum)	25 PSI
Red Line (Maximum)	90 PSI
(d) Fuel Pressure	
Green Arc (Normal Operating Range)	.5 PSI to 8 PSI
Red Line (Minimum)	.5 PSI
Red Line (Maximum)	8 PSI

CENTER OF GRAVITY LIMITS

(a) Normal Category

Weight Pounds	Forward Limit Inches Aft of Datum	Rearward Limit Inches Aft of Datum
2150	88.4	95.9
1975	85.9	95.9
1650	84.0	95.9

(b) Utility Category

Weight Pounds	Forward Limit Inches Aft of Datum	Rearward Limit Inches Aft of Datum
1950	85.8	86.5
1650	84.0	86.5

NOTES

Straight line variation between points given.

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

It is the responsibility of the airplane owner and the pilot to insure that the airplane is properly loaded. See Section 4 (Weight and Balance) for proper loading instructions.

WEIGHT LIMITS

	NORMAL	UTILITY
(a) Maximum Weight	2150 LBS	1950 LBS
(b) Maximum Baggage at Fuselage Station +117	200 LBS	0 LBS
Maximum Baggage at Fuselage Station +133.3 when modified in accordance with Piper Drawing 66671	100 LBS	0 LBS

NOTE

Refer to Section 5 (Performance) for maximum weight as limited by performance.

MANEUVER LIMITS

(a) Normal Category - All acrobatic maneuvers including spins prohibited.
(b) Utility Category - Approved maneuvers for Utility Category only.

	Entry Speed
(1) Models Without Air Conditioning or Ventilation Blower	
Spins (Flaps Up)	Stall
Steep Turns	114 KIAS
Lazy Eights	114 KIAS
Chandelles	114 KIAS
(2) Models With Air Conditioning or Ventilation Blower	Entry Speed
Steep Turns	114 KIAS
Lazy Eights	114 KIAS
Chandelles	114 KIAS

FLIGHT LOAD FACTORS

	NORMAL	UTILITY
(a) Maximum Positive Load Factors	3.8 G	4.4 G
(b) Maximum Negative Load Factors	No inverted maneuvers approved	

TYPES OF OPERATION

The airplane is approved for the following operations when equipped in accordance with FAR 91 or FAR 135.

(a) Day V.F.R.
(b) Night V.F.R.
(c) Day I.F.R.
(d) Night I.F.R.
(e) Non Icing

FUEL LIMITATIONS

(a) Total Capacity	50 U.S. GAL
(b) Unusable Fuel	.375 U.S. GAL
The unusable fuel for this airplane has been determined as .1875 gallon in each wing in critical flight attitudes.	
(c) Usable Fuel	49.625 U.S. GAL
The usable fuel in this airplane has been determined as 24.8125 gallons in each wing.	

AIR CONDITIONED AIRPLANES

Air conditioner must be off for takeoff and landing.

PLACARDS

In full view of the pilot:

(a) Models Without Air Conditioning or Ventilation Blower

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

ALL MARKINGS AND PLACARDS ON THIS AIRPLANE APPLY TO ITS OPERATION AS A UTILITY CATEGORY AIRPLANE. FOR NORMAL AND UTILITY CATEGORY OPERATION, REFER TO THE PILOT'S OPERATING HANDBOOK.

FOR SPIN RECOVERY, USE FULL RUDDER AGAINST SPIN, FOLLOWED IMMEDIATELY BY FORWARD WHEEL.

NO ACROBATIC MANEUVERS (INCLUDING SPINS) ARE APPROVED FOR NORMAL CATEGORY OPERATIONS."

(b) Models With Air Conditioning or Ventilation Blower

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

ALL MARKINGS AND PLACARDS ON THIS AIRPLANE APPLY TO ITS OPERATION AS A UTILITY CATEGORY AIRPLANE. FOR NORMAL AND UTILITY CATEGORY OPERATION, REFER TO THE PILOT'S OPERATING HANDBOOK.

NO ACROBATIC MANEUVERS ARE APPROVED FOR NORMAL CATEGORY OPERATIONS. SPINS ARE PROHIBITED FOR BOTH NORMAL AND UTILITY CATEGORY."

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	Fasten belts/harness
Electric fuel pump on	Seat backs erect	Trim tab - set
Engine gauges checked		Controls - free
Flaps - set		Door - latched
Carb heat off		Air Conditioner - off

LANDING CHECK LIST

Fuel on proper tank		Flaps - set (101 KIAS max.)
Mixture rich	Seat backs erect	Fasten belts/harness
Electric fuel pump on		Air Conditioner - off

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

In full view of the pilot, in the area of the air conditioner control panel when air conditioner is installed:

"WARNING – AIR CONDITIONER MUST BE OFF TO INSURE NORMAL TAKEOFF CLIMB PERFORMANCE."

Adjacent to upper door latch:

"ENGAGE LATCH BEFORE FLIGHT."

On aft side of baggage compartment:

"UTILITY CATEGORY OPERATION - NO BAGGAGE OR AFT PASSENGERS ALLOWED. NORMAL CATEGORY OPERATION - SEE PILOT'S OPERATING HANDBOOK WEIGHT AND BALANCE SECTION FOR BAGGAGE AND AFT PASSENGER LIMITATIONS."

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 TEMPERATURE EXCEEDS 50° F."

In full view of the pilot:

UTILITY CATEGORY OPERATION ONLY

(1) NO AFT PASSENGERS ALLOWED.

(2) ACROBATIC MANEUVERS ARE LIMITED TO THE FOLLOWING:

(a) Models Without Air Conditioning or Ventilation Blower

	Entry Speed
SPINS (FLAPS UP)	STALL
STEEP TURNS	114 KIAS
LAZY EIGHTS	114 KIAS
CHANDELLES	114 KIAS

(b) Models With Air Conditioning or Ventilation Blower

	Entry Speed
SPINS PROHIBITED	
STEEP TURNS	114 KIAS
LAZY EIGHTS	114 KIAS
CHANDELLES	114 KIAS

In full view of the pilot:

"MANEUVERING SPEED - 114 KIAS AT 2150 LBS. (SEE P.O.H.)"

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

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

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

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

SECTION 6

EMERGENCY PROCEDURES

GENERAL

The recommended procedures for coping with various types of emergencies and critical situations are provided by this section. All of required (FAA regulations) emergency procedures and those necessary for the safe operation of the airplane as determined by the operating and design features of the airplane are presented.

Emergency procedures associated with those optional systems and equipment which require handbook supplements are provided by Section 9 (Supplements).

The first portion of this section consists of an abbreviated emergency check list which supplies an action sequence for critical situations with little emphasis on the operation of systems.

The remainder of the section is devoted to amplified emergency procedures containing additional information to provide the pilot with a more complete understanding of the procedures.

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 normal part of 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.

EMERGENCY PROCEDURES CHECK LIST

ENGINE FIRE DURING START

Starter . . . . . crank engine
Mixture . . . . . idle cut-off
Throttle . . . . . open
Electric fuel pump . . . . . OFF
Fuel selector . . . . . OFF
Abandon if fire continues

ENGINE POWER LOSS DURING TAKEOFF

If sufficient runway remains for a normal landing, land straight ahead.

If insufficient runway remains:
Maintain safe airspeed
Make only shallow turn to avoid obstructions
Flaps as situation requires

If sufficient altitude has been gained to attempt a restart:
Maintain safe airspeed
Fuel selector . . . . . switch to tank containing fuel
Electric fuel pump . . . . . check ON
Mixture . . . . . check RICH
Carburetor heat . . . . . ON
If power is not regained, proceed with power off landing.

ENGINE POWER LOSS IN FLIGHT

Fuel selector . . . . . switch to tank containing fuel
Electric fuel pump . . . . . ON
Mixture . . . . . RICH
Carburetor heat . . . . . ON
Engine gauges . . . . . check for indication of cause of power loss
Primer . . . . . check locked
If no fuel pressure is indicated, check tank selector position to be sure it is on a tank containing fuel,

When power is restored:
Carburetor heat . . . . . OFF
Electric fuel pump . . . . . OFF

If power is not restored prepare for power off landing.
Trim for 69 KIAS

POWER OFF LANDING

Trim for best gliding angle - 69 KIAS (Air Cond. OFF).
Locate suitable field.
Establish spiral pattern.
1000 ft. above field at downwind position for normal landing approach.

Touchdowns should normally be made at lowest possible airspeed with full flaps.

When committed to landing:
Ignition . . . . . OFF
Master switch . . . . . OFF
Fuel selector . . . . . OFF
Mixture . . . . . idle cut-off
Seat belt and harness . . . . . tight

FIRE IN FLIGHT

Source of fire . . . . . check

Electrical fire (smoke in cabin):
Master switch . . . . . OFF
Vents . . . . . open
Cabin heat . . . . . OFF
Land as soon as practicable.

Engine fire:
Fuel selector . . . . . OFF
Throttle . . . . . CLOSED
Mixture . . . . . idle cut-off
Electric fuel pump . . . . . OFF
Heater . . . . . OFF (in all cases of fire)
Defroster . . . . . OFF (in all cases of fire)
Proceed with POWER OFF LANDING Procedure.

LOSS OF OIL PRESSURE

Land as soon as possible and investigate cause.
Prepare for power off landing.

LOSS OF FUEL PRESSURE

Electric fuel pump . . . . . .ON
Fuel selector . . . . . check on full tank

HIGH OIL TEMPERATURE

Land at nearest airport and investigate the problem.
Prepare for power off landing.

ALTERNATOR FAILURE

Verify failure
Reduce electrical load as much as possible.
Alternator circuit breakers . . . . . check
Alt switch . . . . . .OFF (for 1 second), then on
If no output:
Alt switch . . . . . .OFF

Reduce electrical load and land as soon as practical.

SPIN RECOVERY

Throttle . . . . . idle
Ailerons . . . . . neutral
Rudder . . . . . full opposite to direction of rotation
Control wheel . . . . . .full forward
Rudder . . . . . neutral (when rotation stops)
Control wheel . . . . . .as required to smoothly regain level flight altitude

OPEN DOOR

If both upper and lower latches are open, the door will trail slightly open and airspeeds will be reduced slightly.

To close the door in flight:
Slow airplane to 87 KIAS
Cabin vents . . . . . .close
Storm window . . . . . .open

If upper latch is open . . . . . .latch
If lower latch is open . . . . . .open top latch, push door further open and close rapidly. Latch top latch.

A slip in direction of open door will assist latching.

ENGINE ROUGHNESS

Carburetor heat . . . . . .ON

If roughness continues after one min:
Carburetor heat . . . . . .OFF
Mixture . . . . . .adjust for max. smoothness
Electric fuel pump . . . . . .ON
Fuel selector . . . . . switch tanks
Engine gauges . . . . . check
Magneto switch . . . . . "L" then "R" then "BOTH"

If operation is satisfactory on either one, continue on that magneto at reduced power and full "RICH" mixture to first airport.

Prepare for power off landing.

AMPLIFIED EMERGENCY PROCEDURES (GENERAL)

The following paragraphs are presented to supply additional information for the purpose of providing the pilot with a more complete understanding of the recommended course of action and probable cause of an emergency situation.

ENGINE FIRE DURING START

Engine fires during start are usually the result of overpriming. The first attempt to extinguish the fire is to try to start the engine and draw the excess fuel back into the induction system.

If a fire is present before the engine has started, move the mixture control to idle cut-off, open the throttle and crank the engine. This is an attempt to draw the fire back into the engine.

If the engine has started, continue operating to try to pull the fire into the engine.

In either case (above), if fire continues more than a few seconds, the fire should be extinguished by the best available external means.

The fuel selector valves should be "OFF" and the mixture at idle cut-off if an external fire extinguishing method is to be used.

ENGINE POWER LOSS DURING TAKEOFF

The proper action to be taken if loss of power occurs during takeoff will depend on the circumstances of the particular situation.

If sufficient runway remains to complete a normal landing, land straight ahead.

If insufficient runway remains, maintain a safe airspeed and make only a shallow turn if necessary to avoid obstructions. Use of flaps depends on the circumstances. Normally, flaps should be fully extended for touchdown.

If sufficient altitude has been gained to attempt a restart, maintain a safe airspeed and switch the fuel selector to another tank containing fuel. Check the electric fuel pump to insure that it is "ON" and that the mixture is "RICH." The carburetor heat should be "ON."

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

If power is not regained, proceed with the Power Off Landing procedure (refer to the emergency check list and power off landing).

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 a low altitude, the first step is to prepare for an emergency landing. An airspeed of at least 69 KIAS should be maintained.

If altitude permits, switch the fuel selector to another tank containing fuel and turn the electric fuel pump "ON." Move the mixture control to "RICH" and the carburetor heat to "ON." Check the engine gauges for an indication of the cause of the power loss. Check to insure the primer is locked. If no fuel pressure is indicated, check the tank selector position to be sure it is on a tank containing fuel.

When power is restored move the carburetor heat to the "OFF" position and turn "OFF" the electric fuel pump.

If the preceding steps do not restore power, prepare for an emergency landing.

If time permits, turn the ignition switch to "L" then to "R" then back to "BOTH." Move the throttle and mixture control levers to different settings. This may restore power if the problem is too rich or too lean a mixture or if there is a partial fuel system restriction. Try other fuel tanks. 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.

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

If power is not regained, proceed with the Power Off Landing procedure (refer to the emergency check list and power off landing).

POWER OFF LANDING

If loss of power occurs at altitude, trim the aircraft for best gliding angle 69 KIAS (Air Cond. off) and look for a suitable field. 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. 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. Excess altitude may be lost by widening your pattern, using flaps or slipping, or a combination of these.

When committed to a landing, close the throttle control and shut "OFF" the master and ignition switches. Flaps may be used as desired. Turn the fuel selector valve to "OFF" and move the mixture to idle cut-off. The seat belts and shoulder harness (if installed) should be tightened. Touchdown should be normally made at the lowest possible airspeed.

FIRE IN FLIGHT

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 each case.

Check for the source of the fire first.

If an electrical fire is indicated (smoke in the cabin), the master switch should be turned "OFF." The cabin vents should be opened and the cabin heat turned "OFF." A landing should be made as soon as possible.

If an engine fire is present, switch the fuel selector to "OFF" and close the throttle. The mixture should be at idle cut-off. Check that the electric fuel pump is "OFF." In all cases, the heater and defroster should be "OFF." If radio communication is not required select master switch "OFF." Proceed with power off landing procedure.

NOTE

The possibility of an engine fire in flight is extremely remote. The procedure given is general and pilot judgment should be the determining factor for action in such an emergency.

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 forced landing. If the problem is not a pressure gauge malfunction, the engine may stop suddenly. 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 increases in temperatures, or oil smoke, are apparent, and an airport is not close.

If engine stoppage occurs, proceed with Power Off Landing.

LOSS OF FUEL PRESSURE

If loss of fuel pressure occurs, turn "ON" the electric fuel pump and check that the fuel selector is on a full tank.

If the problem is not an empty tank, land as soon as practical and have the engine-driven fuel pump and 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 practical 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 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.

The electrical load should be reduced as much as possible. Check the alternator circuit breakers for a popped circuit.

The next step is to attempt to reset the overvoltage relay. This is accomplished by moving the "ALT" switch to "OFF" for one second and then to "ON." If the trouble was caused by a momentary overvoltage condition (16.5 volts and up) this procedure should return the ammeter to a normal reading.

If the ammeter continues to indicate "O" output, or if the alternator will not remain reset, turn off the "ALT" switch, maintain minimum electrical load and land as soon as practical. All electrical load is being supplied by the battery.

SPIN RECOVERY

Intentional spins are prohibited in the normal category airplane and in the utility category airplane when air conditioning is installed. For approved maneuvers in a utility category airplane, see Section 2 - Limitations. If a spin is inadvertently entered, immediately move the throttle to idle and the ailerons to neutral.

Full rudder should then be applied opposite to the direction of rotation followed by control wheel full forward. When the rotation stops, neutralize the rudder and ease back on the control wheel as required to smoothly regain a level flight attitude.

OPEN DOOR

The cabin door on the Cherokee is double latched, so the chances of its springing open in flight at both the top and bottom are remote. However, should you forget the upper latch, or not fully engage the lower latch, the door may spring partially open. This will usually happen at takeoff or soon afterward. A partially open door will not affect normal flight characteristics, and a normal landing can be made with the door open.

If both upper and lower latches are open, the door will trail slightly open, and airspeed will be reduced slightly.

To close the door in flight, slow the airplane to 87 KIAS, close the cabin vents and open the storm window. If the top latch is open, latch it. If the lower latch is open, open the top latch, push the door further open and close rapidly. Then secure the top latch.

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

ENGINE ROUGHNESS

Engine roughness is usually due to carburetor icing which is indicated by a drop in RPM, and may be accompanied by a slight loss of airspeed or altitude. If too much ice is allowed to accumulate, restoration of full power may not be possible; therefore, prompt action is required.

Turn carburetor heat on (See Note). RPM will decrease slightly and roughness will increase. Wait for a decrease in engine roughness or an increase in RPM, indicating ice removal. If no change in approximately one minute, return the carburetor heat to "OFF."

If the engine is still rough, adjust the mixture for maximum smoothness. The engine will run rough if too rich or too lean. The electric fuel pump should be switched to "ON" and the fuel selector switched to the other tank to see if fuel contamination is the problem. Check the engine gauges for abnormal readings. If any gauge readings are abnormal, proceed accordingly. Move the magneto switch to "L" then to "R," then back to "BOTH." If operation is satisfactory on either magneto, proceed on that magneto at reduced power, with mixture full "RICH," to a landing at the first available airport.

If roughness persists, prepare for a precautionary landing at pilot's discretion.

NOTE

Partial carburetor heat may be worse than no heat at all, since it may partially melt ice, which will refreeze in the intake system. When using carburetor heat, therefore, always use full heat, and when ice is removed return the control to the full cold position.

SECTION 7

AIRPLANE HANDLING, SERVICING AND MAINTENANCE

GENERAL

This section provides general guidelines relating to the handling, servicing and maintenance of the Cherokee Cruiser.

Every owner should stay in close contact with his Piper dealer or distributor and Authorized Piper Service Center to obtain the latest information pertaining to his aircraft and to avail himself of the Piper Aircraft Service Back-up.

Piper Aircraft Corporation takes a continuing interest in having the owner get the most efficient use from his aircraft and keeping it in the best mechanical condition. Consequently, Piper Aircraft from time to time issues Service Bulletins, Service Letters and Service Spares Letters relating to the aircraft.

Service Bulletins are of special importance and should be complied with promptly. These are sent to the latest registered owners, distributors and dealers. Depending on the nature of the bulletin, material and labor allowances may apply, and will be addressed in the body of the Bulletin.

Service Letters deal with product improvements and service hints pertaining to the aircraft. They are sent to dealers, distributors and occasionally (at the factory's discretion) to latest registered owners, so they can properly service the aircraft and keep it up to date with the latest changes. Owners should give careful attention to the 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.

If an owner is not having his aircraft serviced by an Authorized Piper Service Center, he should periodically check with a Piper dealer or distributor to find out the latest information to keep his aircraft up to date.

Piper Aircraft Corporation has a Subscription Service for the Service Bulletins, Service Letters and Service Spares Letters. This service is offered to interested persons such as owners, pilots and mechanics at a nominal fee, and may be obtained through Piper dealers and distributors.

A service manual, parts catalog, and revisions to both, are available from your Piper dealer or distributor. Any correspondence regarding the airplane should include the airplane model and serial number to insure proper response.

AIRPLANE INSPECTION PERIODS

The Federal Aviation Administration (FAA) occasionally publishes Airworthiness Directives (ADs) 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 to the latest registered owner of the affected aircraft and also to subscribers of the service. The owner should periodically check with his Piper dealer or A & P mechanic to see whether he has the latest issued AD against his aircraft.

Piper Aircraft Corporation provides for the initial and first 50-hour inspection, at no charge to the owner. 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.

One hundred hour inspections are required by law if the aircraft is used commercially. Otherwise this inspection is left to the discretion of the owner. This inspection is a complete check of the aircraft and its systems, and should be accomplished by a Piper Authorized Service Center or by a qualified aircraft and power plant mechanic who owns or works for a reputable repair shop. The inspection is listed, in detail, in the inspection report of the appropriate Service Manual.

An annual inspection is required once a year to keep the Airworthiness Certificate in effect. It is the same as a 100-hour inspection except that it must be signed by an Inspection Authorized (IA) mechanic or a General Aviation District Office (GADO) representative. This inspection is required whether the aircraft is operated commercially or for pleasure.

A Progressive Maintenance program is approved by the FAA and is available to the owner. It involves routine and detailed inspections at 50-hour intervals. The purpose of the program is to allow maximum utilization of the aircraft, to reduce maintenance inspection cost and to maintain a maximum standard of continuous airworthiness. Complete details are available from Piper dealers.

A spectographic analysis of the oil is available from several sources. This system, if used intelligently, provides a good check of the internal condition of the engine. For this system to be accurate, oil samples must be sent in at regular intervals, and induction air filters must be cleaned or changed regularly.

PREVENTIVE MAINTENANCE

The holder of a Pilot Certificate issued under FAR Part 61 may perform certain preventive maintenance described in FAR Part 43. This maintenance may be performed only on an aircraft which the pilot owns or operates and which is not used in air carrier service. The following is a list of the maintenance which the pilot may perform:

(a) Repair or change tires and tubes.
(b) Service landing gear wheel bearings, such as cleaning, greasing or replacing.
(c) Service landing gear shock struts by adding air, oil or both.
(d) Replace defective safety wire and cotter keys.
(e) Lubrication not requiring disassembly other than removal of non-structural items such as cover plates, cowling or fairings.
(f) Replenish hydraulic fluid in the hydraulic reservoirs.
(g) Refinish the exterior or interior of the aircraft (excluding balanced control surfaces) when removal or disassembly of any primary structure or operating system is not required.
(h) Replace side windows and safety belts.
(i) Replace seats or seat parts with replacement parts approved for the aircraft.
(j) Replace bulbs, reflectors and lenses of position and landing lights.
(k) Replace cowling not requiring removal of the propeller.
(l) Replace, clean or set spark plug clearance.
(m) Replace any hose connection, except hydraulic connections, with replacement hoses.
(n) Replace prefabricated fuel lines.
(o) Replace the battery and check fluid level and specific gravity.

Although the above work is allowed by law, each individual should make a self analysis as to whether he has the ability to perform the work.

If the above work is accomplished, an entry must be made in the appropriate logbook. The entry should contain:

(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.

AIRPLANE ALTERATIONS

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-8100-2.
- (2) Aircraft Registration Certificate Form FAA-8050-3.
- (3) Aircraft Radio Station License if transmitters are installed.

(b) To be carried in the aircraft at all times:
- (1) Pilot's Operating Handbook.
- (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. Logbooks 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.

8.9 GROUND HANDLING

(a) Towing

The airplane may be moved on the ground by the use of the nose wheel steering bar that is stowed in the baggage compartment; or by power equipment that will not damage or excessively strain the nose gear steering assembly. Towing lugs are incorporated as part of the nose gear fork.

CAUTION

When towing with power equipment, do not turn the nose gear beyond its 30 degree steering radius in either direction, as this will result in damage to the nose gear and steering mechanism.

CAUTION

Do not tow the airplane when the controls are secured.

In the event towing lines are necessary, ropes should be attached to both main gear struts as high up on the tubes as possible. Lines should be long enough to clear the nose and/or tail by not less than fifteen feet, and a qualified person should ride in the pilot's seat to maintain control by use of the brakes.

(b) Taxiing

Before attempting to taxi the airplane, ground personnel should be instructed and approved by a qualified person authorized by the owner. Engine starting and shut-down procedures as well as taxi techniques should be covered. 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:
- (1) Taxi a few feet forward and apply the brakes to determine their effectiveness.
- (2) While taxiing, make slight turns to ascertain the effectiveness of the steering.
- (3) Observe wing clearance when taxiing near buildings or other stationary objects. If possible, station an observer outside the airplane.
- (4) When taxiing over uneven ground, avoid holes and ruts.
- (5) 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.

(c) Parking

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

(1) To park the airplane, head it into the wind if possible.
(2) Set the parking brake by pulling back on the brake lever and depressing the knob on the handle. To release the parking brake, pull back on the handle until the catch disengages; then allow the handle to swing forward.

CAUTION

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

(3) Aileron and stabilator controls should be secured with the front seat belt and chocks used to properly block the wheels.

(d) Mooring

The airplane should be moored for immovability, security and protection. The following procedures should be used for the proper mooring of the airplane:

(1) Head the airplane into the wind if possible.
(2) Retract the flaps.
(3) Immobilize the ailerons and stabilator by looping the seat belt through the control wheel and pulling it snug.
(4) Block the wheels.
(5) Secure tie-down ropes to the wing tie-down rings and to the tail skid at approximately 45 degree angles to the ground. When using rope of non-synthetic material, leave sufficient slack to avoid damage to the airplane should the ropes contract.

CAUTION

Use bowline knots, square knots or locked slip knots. Do not use plain slip knots.

NOTE

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

(6) Install a pitot head cover if available. Be sure to remove the pitot head cover before flight.
(7) The cabin door should be locked when the airplane is unattended.

ENGINE AIR FILTER

(a) Removing Engine Air Filter

The air filter is located below the spinner assembly. If a landing light is installed, it will be within the center of the filter assembly. To remove the filter:

(1) Open the cowl.
(2) Remove the thumb screw on the back of the filter assembly.
(3) Remove the retainer assembly. If a landing light is installed, disconnect the wires.
(4) Remove the filter.

(b) Cleaning Engine Air Filter

The induction air filter must be cleaned at least once every 50 hours, and more often, even daily, when operating in dusty conditions. Extra filters are inexpensive, and a spare should be kept on hand for use as a rapid replacement. The usable life of the filter is restricted to one year or 500 hours of operation, whichever comes first.

To clean the filter:

(1) Tap the filter gently to remove dirt particles, being careful not to damage the filter. DO NOT wash the filter in any liquid. DO NOT attempt to blow out dirt with compressed air.
(2) If the filter is excessively dirty or shows any damage, replace it immediately.
(3) Wipe the filter housing with a clean cloth soaked in unleaded gasoline. When the housing is clean and dry, install the filter.

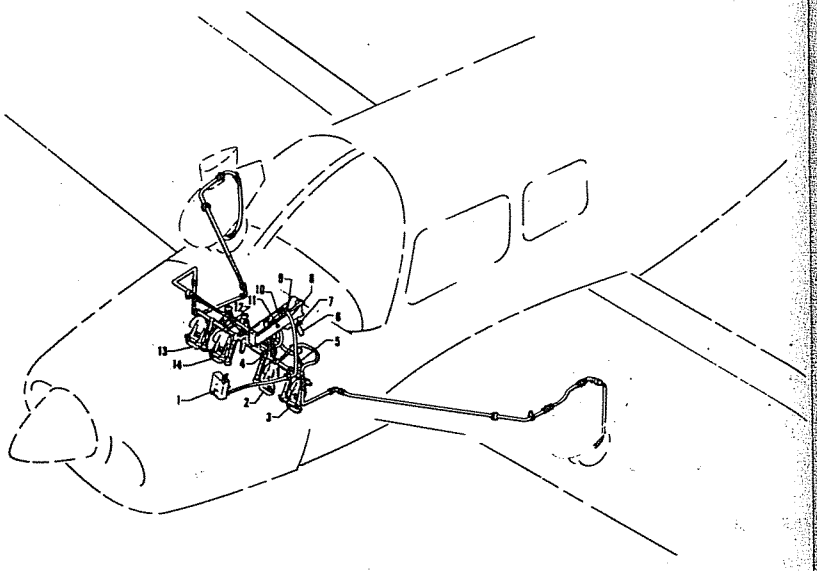
(c) Installation Of Engine Air Filter

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

BRAKE SERVICE

The brake system is filled with MIL-H-5606 (petroleum base) hydraulic brake fluid. This should be checked at every 50 hour inspection and replenished when necessary by filling the brake reservoir on the fire wall to the indicated level. If the entire system has to be refilled, it should be done by filling from the brake end of the system with fluid under pressure. This will eliminate air from the system.

No adjustment of brake clearances is necessary on the Cherokee. If after extended service the brake blocks become worn excessively, they are easily replaced with new segments.



1. BRAKE RESERVOIR
2. RIGHT BRAKE AND RUDDER PEDAL
3. LEFT BRAKE AND RUDDER PEDAL
4. RIGHT BRAKE CYLINDER
5. LEFT BRAKE CYLINDER
6. BRAKE HANDLE
7. HANDLE RELEASE BUTTON
8. LINE, INLET
9. CLEVIS PIN
10. MASTER CYLINDER ASSEMBLY
11. BOLT ASSEMBLY
12. TORQUE TUBE
13. COPILOT'S RIGHT BRAKE AND RUDDER PEDAL
14. COPILOT'S LEFT BRAKE AND RUDDER PEDAL

BRAKE SYSTEM
Figure 7-1

LANDING GEAR SERVICE

The three landing gear use Cleveland Aircraft Products 6.00 x 6 wheels with 6.00 x 6, four-ply rating tires and tubes. The nose wheel uses a Cleveland Aircraft Products 5.00 x 5 wheel with a 5.00 x 5 six-ply rating, type III tire and tube.

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

Landing gear oleo struts should be checked for proper strut exposures and fluid leaks. The required extensions for the strut when under normal static load (basic empty weight of airplane plus full fuel and oil) are 3-1/4 inches for the nose gear and 4-1/2 inches for the main gear. Should the strut exposure be below that required, it should be determined whether air or oil is required by first raising the airplane on jacks. Depress the valve core to allow air to escape from the strut housing chamber. Remove the filler plug and slowly raise the strut to full compression. If the strut has sufficient fluid, it will be visible up to the bottom of the filler plug hole and will then require only proper inflation with air.

Should fluid be below the bottom of the filler plug hole, oil should be added. Replace the plug with valve core removed; attach a clear plastic hose to the valve stem of the filler plug and submerge the other end in a container of hydraulic fluid (MIL-H-5606). Fully compress and extend the strut several times, thus drawing fluid from the container and expelling air from the strut chamber. To allow fluid to enter the bottom chamber of the main gear strut housing, the torque link assembly must be disconnected to let the strut be extended a minimum of 10 inches (the nose gear torque links need not be disconnected). Do not allow the strut to extend more than 12 inches. When air bubbles cease to flow through the hose, compress the strut fully and again check fluid level. Reinstall the valve core and filler plug, and the main gear torque links, if disconnected.

In jacking the aircraft for landing gear or other service, two hydraulic jacks and a tail stand should be used. At least 350 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.

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 limited by stops at the rudder pedals.

PROPELLER SERVICE

The spinner and backing plate should be cleaned and inspected for cracks frequently. Before each flight the propeller should be inspected for nicks, scratches, and corrosion. If found, they should be repaired as soon as possible by a rated mechanic, since a nick or scratch causes an area of increased stress which can lead to serious cracks or the loss of a propeller tip. The back face of the blades should be painted when necessary with flat black paint to retard glare. To prevent corrosion, the surface should be cleaned and waxed periodically.

OIL REQUIREMENTS

The oil capacity of the Lycoming O-320 series engine is 8 quarts, and the minimum safe quantity is 2 quarts. It is recommended that the oil be changed every 50 hours and sooner under unfavorable operating conditions. 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 and the specified octane fuel is used. 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 and Lycoming Service Instruction No. 1014 for additional information and recommended service procedures. The following grades are recommended for the specified temperatures:

Average Ambient Air Temperature For Starting	Single Viscosity Grade	Multi-Viscosity Grades
Above 60°F	SAE 50	SAE 40 or SAE 50
30° to 90°F	SAE 40	SAE 40
0° to 70°F	SAE 30	SAE 40 or 20W-30
Below 10°F	SAE 20	SAE 20W-30

FUEL SYSTEM

(a) Servicing Fuel System

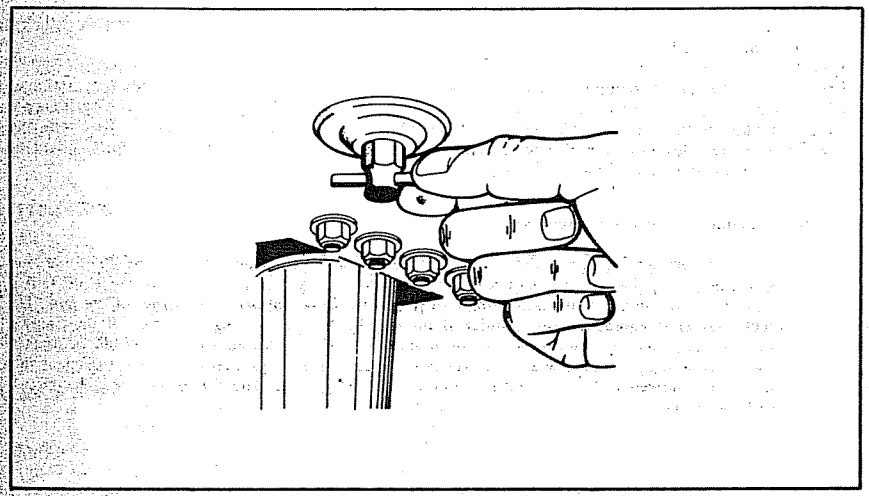
At every 50 hour inspection, the fuel screens in the strainer, in the electric fuel pumps, and at the carburetor inlet must be cleaned.

(b) Fuel Requirements

The minimum aviation grade fuel for the PA-28-140 is 80/87. 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.

Whenever 80/87 is not available, the lowest lead 100 grade should be used. (See Fuel Grade Comparison Chart, Page 7-11) Refer to the latest issue of Lycoming Service Instruction No. 1070 for additional information.

The continuous use, more than 25% of the operating time, of the higher leaded fuels can result in increased engine deposits, both in the combustion chamber and in the engine oil. It may require increased spark plug maintenance and more frequent oil changes. The frequency of spark plug maintenance and oil drain periods will be governed by the amount of lead per gallon and the type of operation. Operation at full rich mixture requires more frequent maintenance periods, therefore it is important to use proper approved mixture leaning procedures.



FUEL DRAIN

Figure 7-3

Reference the latest issue of Avco Lycoming Service Letter No. L185 attached to the Engine Operators Manual for care, operation and maintenance of the airplane when using the higher leaded fuel.

A summary of the current grades as well as the previous fuel designations is shown in the following chart:

FUEL GRADE COMPARISON CHART

Previous Commercial Fuel Grades (ASTM-D910)			Current Commercial Fuel Grades (ASTM-D910-75)			Current Military Fuel Grades (MIL-G-5572E) Amendment No. 3		
Grade	Color	Max. TEL ml/U.S. gal.	Grade	Color	Max. TEL ml/U.S. gal.	Grade	Color	Max. TEL ml/U.S. gal.
80/87	red	0.5	80	red	0.5	80/87	red	0.5
91/98	blue	2.0	*100LL	blue	2.0	none	none	none
100/130	green	3.0	100	green	**3.0	100/130	green	**3.0
115/145	purple	4.6	none	none	none	115/145	purple	4.6

* - Grade 100LL fuel in some over seas countries is currently colored green and designated as "100L."
** - Commercial fuel grade 100 and grade 100/130 (both of which are colored green) having TEL content of up to 4 ml/U.S. gallon are approved for use in all engines certificated for use with grade 100/130 fuel.

(c) Filling Fuel Tanks

Observe all required precautions for handling gasoline. Each fuel tank holds a maximum of 25 U.S. gallons. To obtain the standard fuel quantity of 36 U.S. gallons total or 18 gallons per tank, fill the tanks to the bottom of the filler neck tube or visual indicator. To obtain the standard plus reserve quantity, fill the tanks to the top of the filler neck. Fuel should be distributed equally between each side.

(d) Draining Fuel Strainer, Sumps and Lines

The fuel system sumps and strainer should be drained daily prior to the first flight and after refueling to avoid the accumulation of contaminants such as water or sediment. Each fuel tank is equipped with an individual quick drain located at the lower inboard rear corner of the tank. The fuel strainer is equipped with a quick drain located on the front lower corner of the firewall. Each of the fuel tank sumps should be drained first. Then the fuel strainer should be drained twice, once with the fuel selector valve on each tank. Each time fuel is drained, sufficient fuel should be allowed to flow to ensure removal of contaminants. This fuel should be collected in a suitable container, examined for contaminants, and then discarded.

CAUTION

When draining any amount of fuel, care should be taken to ensure that no fire hazard exists before starting the engine.

Each quick drain should be checked after closing it to make sure it has closed completely and is not leaking.

(e) Draining Fuel System

The bulk of the fuel may be drained by opening the individual drain on each tank. The remaining fuel may be drained through the fuel strainer. Any individual tank may be drained by closing the selector valve and then draining the desired tank.

TIRE INFLATION

For maximum service from the tires, keep them inflated to the proper pressure - 24 psi for all three tires. All wheels and tires are balanced before original installation, and the relationship of tire, tube, and wheel should be maintained upon reinstallation. Unbalanced wheels can cause extreme vibration in the landing gear; therefore, in the installation of new components, it may be necessary to rebalance the wheels with the tires mounted. When checking tire pressure, examine the tires for wear, cuts, bruises, and slippage.

BATTERY SERVICE

The 12-volt battery is located under the floor of the baggage compartment. The battery box has a plastic drain tube which is normally closed off with a cap and which should be opened occasionally to drain off any accumulation of liquid. The battery should be checked for proper fluid level. DO NOT fill the battery above the baffle plates. DO NOT fill the battery with acid - use water only. A hydrometer check will determine the percent of charge in the battery.

If the battery is not up to charge, recharge starting at a 4 amp rate and finishing with a 2 amp rate. Quick charges are not recommended.

CLEANING

(a) Cleaning Engine Compartment

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

(1) Place a large pan under the engine to catch waste.
(2) With the engine cowling removed, spray or brush the engine with solvent or a mixture of solvent and degreaser. In order to remove especially heavy dirt and grease deposits, it may be necessary to brush areas that were sprayed.

CAUTION

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

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

CAUTION

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

(4) Remove the protective tape from the magnetos.
(5) Lubricate the controls, bearing surfaces, etc., in accordance with the Lubrication Chart in the PA-28 Cherokee Service Manual.

(b) Cleaning Landing Gear

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

(1) Place a pan under the gear to catch waste.
(2) 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.
(3) Allow the solvent to remain on the gear from five to ten minutes. Then rinse the gear with additional solvent and allow to dry.
(4) Remove the cover from the wheel and remove the catch pan.
(5) Lubricate the gear in accordance with the Lubrication Chart in the PA-28 Cherokee Service Manual.

(c) Cleaning Exterior Surfaces

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

(1) Flush away loose dirt with water.
(2) Apply cleaning solution with a soft cloth, a sponge or a soft bristle brush.
(3) To remove exhaust stains, allow the solution to remain on the surface longer.
(4) To remove stubborn oil and grease, use a cloth dampened with naphtha.
(5) Rinse all surfaces thoroughly.
(6) Any good automotive wax may be used to preserve 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.

(d) Cleaning Windshield and Windows

(1) Remove dirt, mud and other loose particles from exterior surfaces with clean water.
(2) Wash with mild soap and warm water or with aircraft plastic cleaner. Use a soft cloth or sponge in a straight back and forth motion. Do not rub harshly.
(3) Remove oil and grease with a cloth moistened with kerosene.

CAUTION

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

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

(e) Cleaning Headliner, Side Panels and Seats

(1) Clean headliner, side panels, and seats with a stiff bristle brush, and vacuum where necessary.
(2) Soiled upholstery, except leather, may be cleaned with a good upholstery cleaner suitable for the material. Carefully follow the manufacturer's instructions. Avoid soaking or harsh rubbing.

CAUTION

Solvent cleaners require adequate ventilation.

(f) Cleaning Carpets

To clean carpets, first remove loose dirt with a whisk broom or vacuum. For soiled spots and stubborn stains use a noninflammable dry cleaning fluid. Floor carpets may be removed and cleaned like any household carpet.

AIRPLANE FLIGHT MANUAL

MODEL PA-28-140

FAA IDENTIFICATION NO. CF-XTW

SERIAL NO. 28-25407

THIS DOCUMENT MUST BE KEPT IN AIRPLANE AT ALL TIMES.

FAA APPROVED: H. E. Waterman

H. E. Waterman
Supervisor, EMDO 42
FAA Southern Region
Atlanta, Georgia

DATE: February 14, 1964

Maximum Weight 2150 lbs. (See Limitations Section for Static RPM Limits).

Baggage Capacity

100 lbs. (+117) S/N 28-20001 through 28-20939 (Maximum baggage may be increased to 200 lbs by the installation of Piper Kit 756 962 and Sensenich propeller M74DM58 or 74DM6-0-58. Maximum baggage may be increased to 300 lbs by the installation of Piper Kit 756 962, Sensenich propeller M74DM58 or 74DM6-0-58 and when modified in accordance with Piper drawing 66671. See Page 2A of the weight and balance section for proper loading of baggage).

200 lbs. (+117) S/N 28-20940 and up. (See Page 2A of the weight and balance section for proper loading of baggage).

300 lbs. (+117) (&) (+133) S/N 28-20940 and up. (Aircraft are eligible for 300-lb maximum baggage when modified in accordance with Piper drawing 66671. See Page 2A of the weight and balance section for proper loading of baggage).

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

1. Normal Category

Weight (Pounds)	Forward Limit (In. Aft of Datum)	Rearward Limit (In. Aft of Datum)
2150	88.4	95.9
1975	85.9	95.9
1650	84.0	95.9

2. Utility Category

Weight (Pounds)	Forward Limit (In. Aft of Datum)	Rearward Limit (In. Aft of Datum)
1950	85.8	86.5
1650	84.0	86.5

Straight line variation between given points.

NOTE: It is the responsibility of the airplane owner and/or the pilot to insure that the airplane is properly loaded. See weight and balance section for loading information.

Maneuvers

1. Normal Category - All acrobatic maneuvers including spins prohibited.
2. Utility Category - Approved maneuvers for Utility Category only.

	Entry Speed
Spins (Flaps Up)	Stall
Steep Turns	129 mph
Lazy Eights	129
Chandelles	129

Placards

1. In full view of the pilot:

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

ALL MARKINGS AND PLACARDS ON THIS AIRPLANE APPLY TO ITS OPERATION AS A UTILITY CATEGORY AIRPLANE. FOR NORMAL AND UTILITY CATEGORY OPERATIONS, REFER TO THE AIRPLANE FLIGHT MANUAL."

FOR SPIN RECOVERY, USE FULL RUDDER AGAINST SPIN, FOLLOWED IMMEDIATELY BY FORWARD WHEEL.

NO ACROBATIC MANEUVERS (INCLUDING SPINS) ARE APPROVED FOR NORMAL CATEGORY OPERATIONS."

2. Adjacent to upper door latch: "ENGAGE LATCH BEFORE FLIGHT."

3. On aft side of baggage compartment: "UTILITY CATEGORY OPERATION - NO BAGGAGE OR AFT PASSENGERS ALLOWED. NORMAL CATEGORY OPERATION - SEE AIRPLANE FLIGHT MANUAL WEIGHT AND BALANCE SECTION FOR BAGGAGE AND AFT PASSENGER LIMITATIONS."

4. 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 TEMPERATURE EXCEEDS 50° F."

5. On the instrument panel in full view of the pilot when the autoflite is installed: "FOR HEADING CHANGES: PRESS DISENGAGE SWITCH ON CONTROL WHEEL. CHANGE HEADING. RELEASE DISENGAGE SWITCH."

6. In full view of the pilot: Utility Category Only

Acrobatic maneuvers are limited to the following:

	Entry Speed
Spins (Flaps Up)	Stall
Steep Turns	129 mph
Lazy Eights	129
Chandelles	129

Airspeed Instrument Markings

RED radial line	Never Exceed	171 mph (148 knots)
YELLOW arc	Caution Range (Smooth Air Only)	140 to 171 mph (121 to 148 knots)
GREEN arc	Normal Operating Range	64 to 140 mph (56 to 121 knots)
WHITE arc	Flaps Down Range	55 to 115 mph (48 to 100 knots)

FAA APPROVED 2/14/64

REVISED 6/24/68 Rev. No. 14

2. Procedures Section

1. The stall warning system is inoperative with the master switch off.
2. The electric fuel pump must be on for both takeoff and landing.
3. Except as noted above, all operating procedures for this airplane are normal.
4. (Electric Pitch Trim Installation Only)
   The following emergency information applies in case of electric pitch trim malfunction:
   a. In case of malfunction, disengage electric pitch trim by pulling out circuit breaker on instrument panel.
   b. In emergency, electric pitch trim may be overpowered using manual pitch trim.
   c. In cruise configuration, malfunction results in 10° pitch change and 30 Ft. altitude variation.
5. (Autoflite Installation Only)
   The following emergency information applies in case of autoflite malfunction:
   a. In case of malfunction PRESS disconnect switch on pilot's control wheel.
   b. Rocker switch on instrument panel - OFF.
   c. Unit may be overpowered manually.
   d. In cruise configuration malfunction, 3 seconds delay results in 60° bank, and 100' altitude loss.
   e. In approach configuration malfunction, 1 second delay results in 10° bank and 0' altitude loss.

3. Performance Section

All performance is given for a weight of 2150 pounds.

Loss of altitude during stalls can be as great as 200 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	64	66	73	80	91
Flaps Down	55	--	--	--	--

WEIGHT AND BALANCE DATA

MODEL PA-28-140 CHEROKEE

Airplane Serial Number 28-25407

Registration Number CF-XTW

Date JAN 13 1969

AIRPLANE EMPTY WEIGHT

Item	Weight (lbs)	X	C.G. Arm (Inches Aft of Datum)	=	Moment (In-lbs)
Standard Empty Weight * ~~XXXXXX~~ Computed	1224.0		84.4		103294
Optional Equipment	72.5		97.1		7040
Unusable Fuel (3 Pints)	2.2		103.0		227
Licensed Empty Weight = Total of Above Items	1298.7		85.1		110561
AMENDMENT #4	1310.5		85.4		111922.5

* Standard Empty Weight includes paint, hydraulic fluid and undrainable engine oil.

AIRPLANE USEFUL LOAD

	(Gross Weight)	-	(Licensed Empty Weight)	=	Useful Load
Normal Category:	(2150 lbs.)	-	(1298.7 lbs)	=	851.3 lbs.
Utility Category:	(1950 lbs.)	-	(1298.7 lbs)	=	651.3 lbs.

THIS LICENSED EMPTY WEIGHT, C.G. AND USEFUL LOAD ARE FOR THE AIRPLANE AS DELIVERED FROM THE FACTORY. REFER TO FORM FAA-337 WHEN ALTERATIONS HAVE BEEN MADE.

Inspection Representative

THE WEIGHT AND BALANCE DATA SHOWN IN THIS REPORT ARE COMPUTED ON THE BASIS OF FEDERAL AVIATION ADMINISTRATION APPROVED PROCEDURES FOR ESTABLISHING FLEET WEIGHT AVERAGES.

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 within the C.G. envelope, the loading meets the weight and balance requirements.

NOTE: With optional jump seats installed, aft passenger weight is restricted only by airplane weight and balance limitations (See Page 4 of this section). For baggage allowance, see Page 2A of this section.

SAMPLE LOADING PROBLEM (Normal Category)

	Weight (lbs)	Arm Aft Datum (Inches)	Moment (In-lbs)
Licensed Empty Weight	1298.7	85.1	110561
Oil (8 quarts)	15	32.5	488
Pilot and Front Passenger	340	85.5	29070
Passengers, Aft *	340	117.0	39780
Fuel (50 Gal. Maximum)	156.3	95.0	14849
Baggage * Area (1)		117.0	
Baggage * Area (2)		133.3	
Total Loaded Airplane	2150.0	90.6	194748

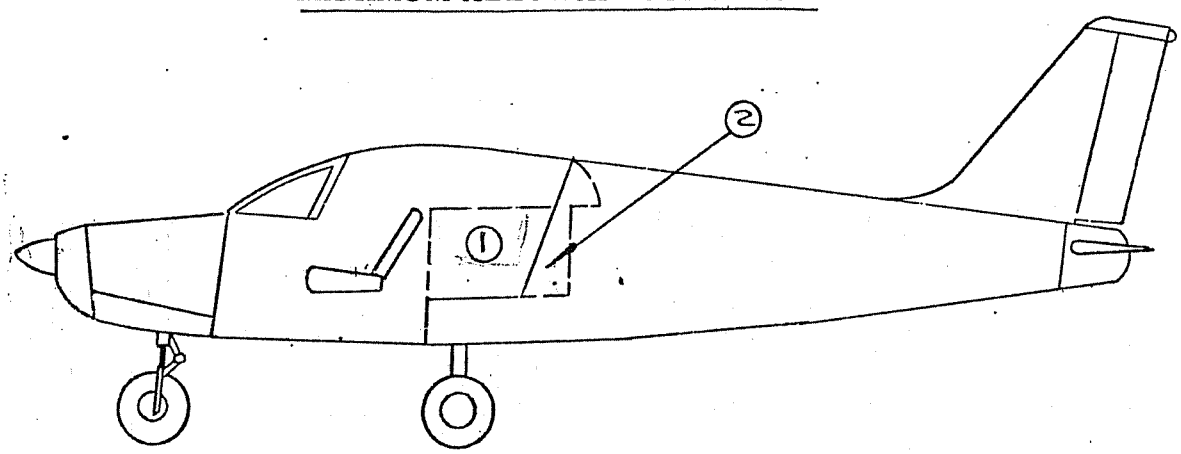
The center of gravity (C.G.) of this sample loading problem is at 90.6 inches aft of the datum line. Locate this point (90.6) on the C.G. range and weight graph. Since this point falls within the weight - C.G. envelope, this loading meets the weight and balance requirements.

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

* Utility Category Operation - No baggage or aft passengers allowed.

Normal Category Operation - See Page 2A of this section

MAXIMUM ALLOWABLE BAGGAGE



A. Maximum Allowable Baggage Capacity Area (1) = 200 lbs.

1. S/N 28-20940 and up.

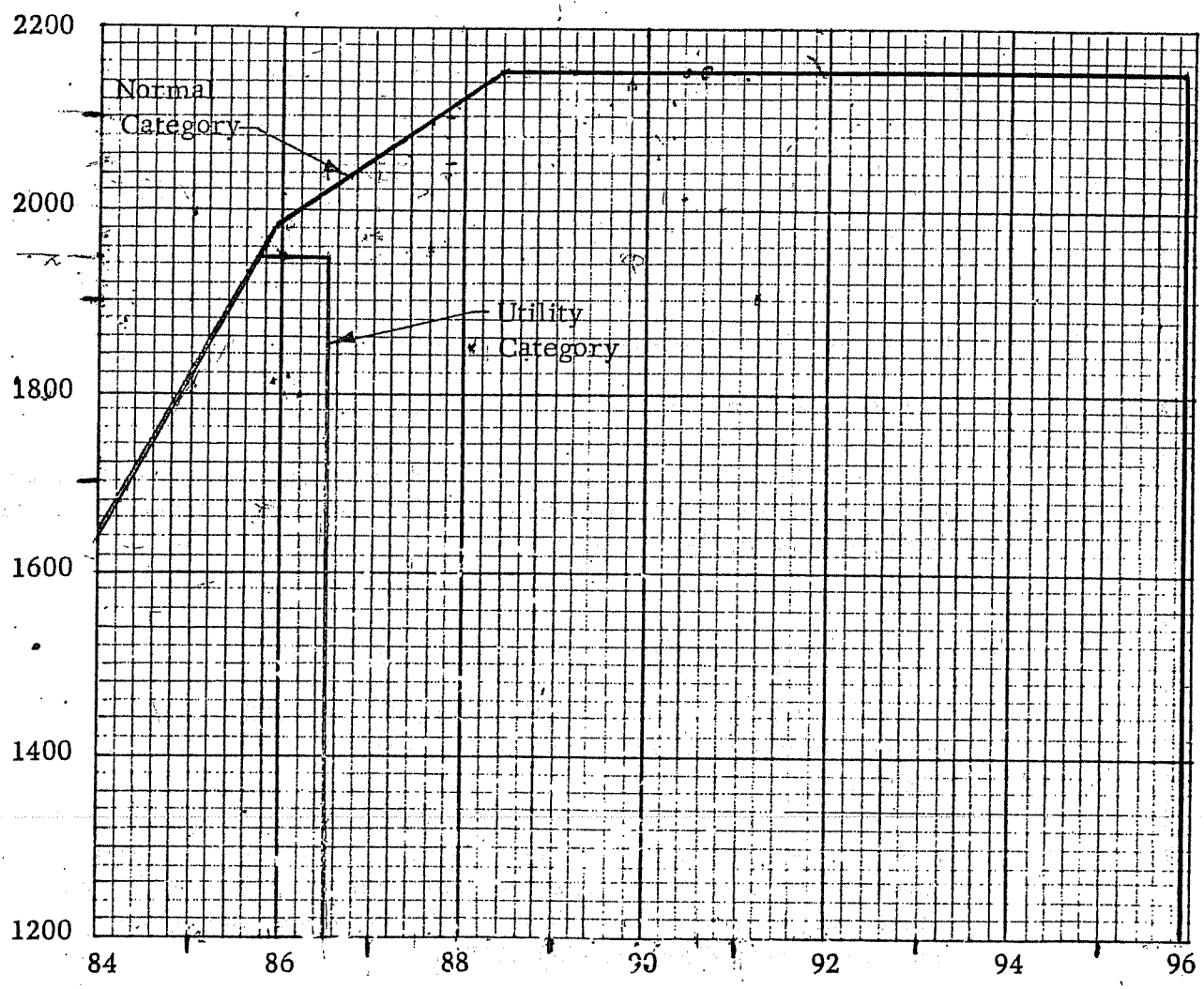
2. S/N 28-20001 through 28-20939 (maximum baggage may be increased to 200 lbs by the installation of Piper Kit 756 962 and Sensenich propeller M74DM58 or 74DM6-0-58).

B. Maximum Allowable Baggage Capacity Area (2) = 100 lbs.

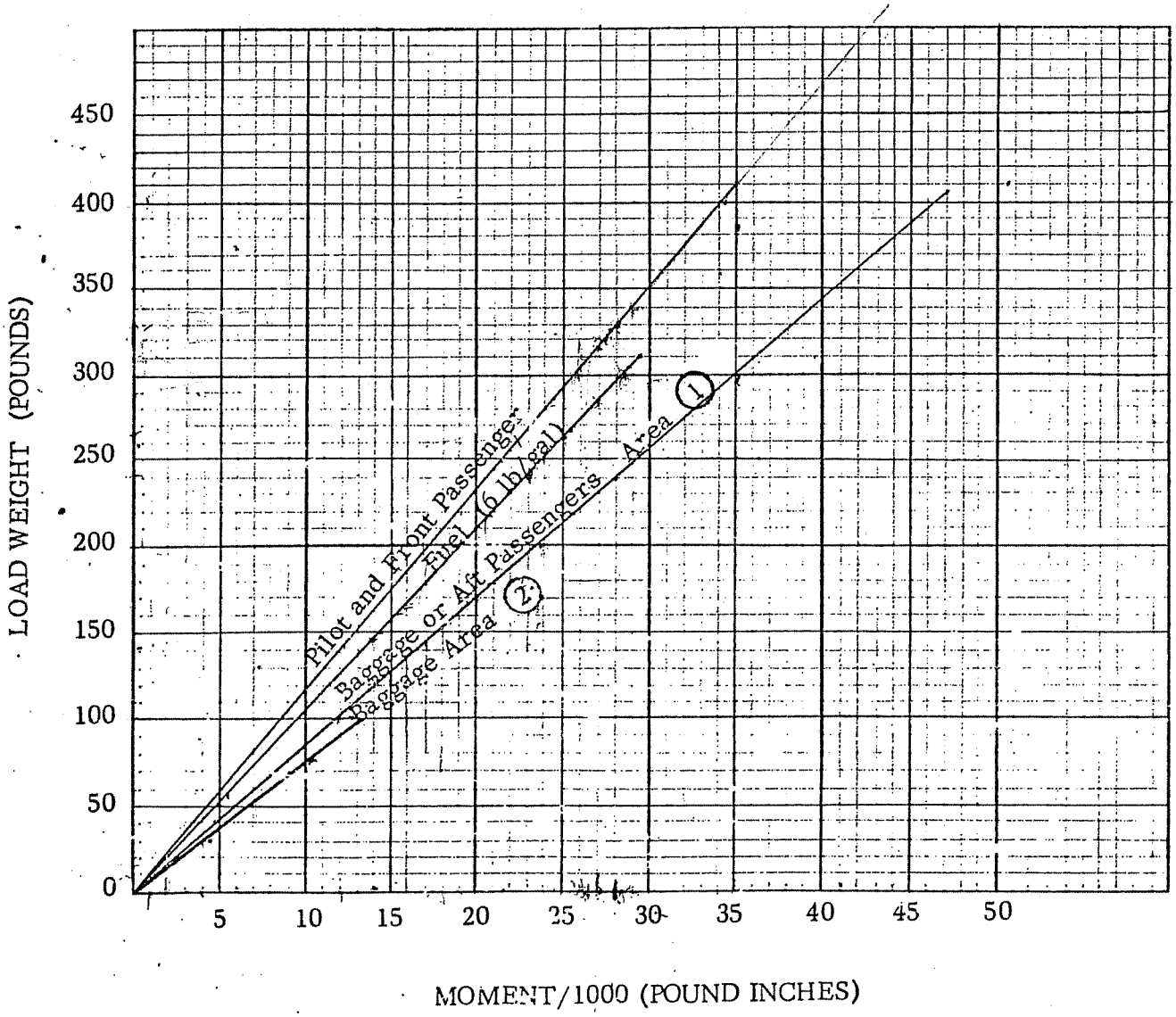
1. S/N 28-20940 and up. (Aircraft are eligible for 100-lb maximum baggage in this area when modified in accordance with Piper drawing 66671).

2. S/N 28-20001 through 28-20939. (Aircraft are eligible for 100-lb. maximum baggage in this area by the installation of Piper Kit 756 962, Sensenich propeller M74DM58 or 74DM6-0-58 and when modified in accordance with Piper drawing 66671).

C.G. RANGE AND WEIGHTS



LOADING GRAPH



WEIGHT AND BALANCE DATA

WEIGHING PROCEDURE

At the time of delivery, Piper Aircraft Corporation provides each airplane with the licensed empty weight and center of gravity location. This data is on Page 1, Section 1 of this Flight Manual.

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.

   d. Drain all 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 co-pilot 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) by deflating nose wheel tire, to center bubble on level.

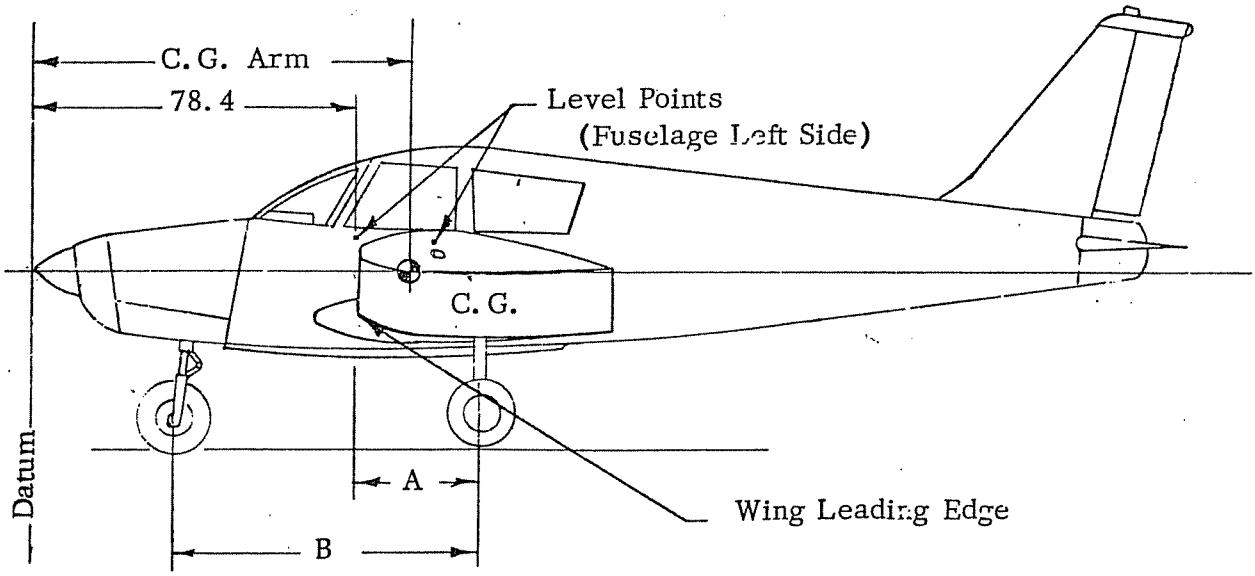
3. WEIGHING - AIRPLANE EMPTY WEIGHT

2. 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	Net 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-28-140 B 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.

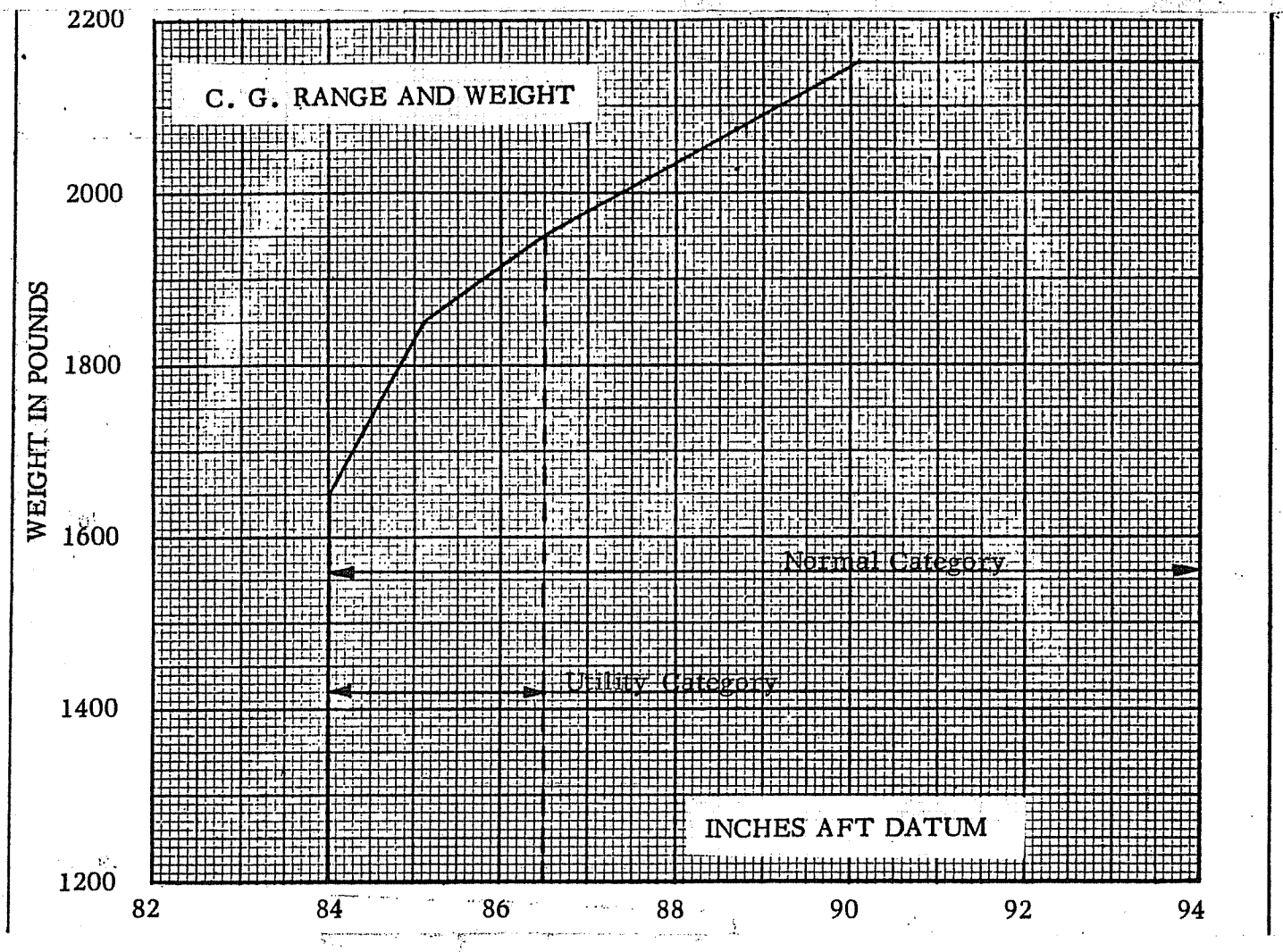
d. The empty weight center of gravity (as weighed including optional equipment and undrainable oil) can be determined by the following formula:

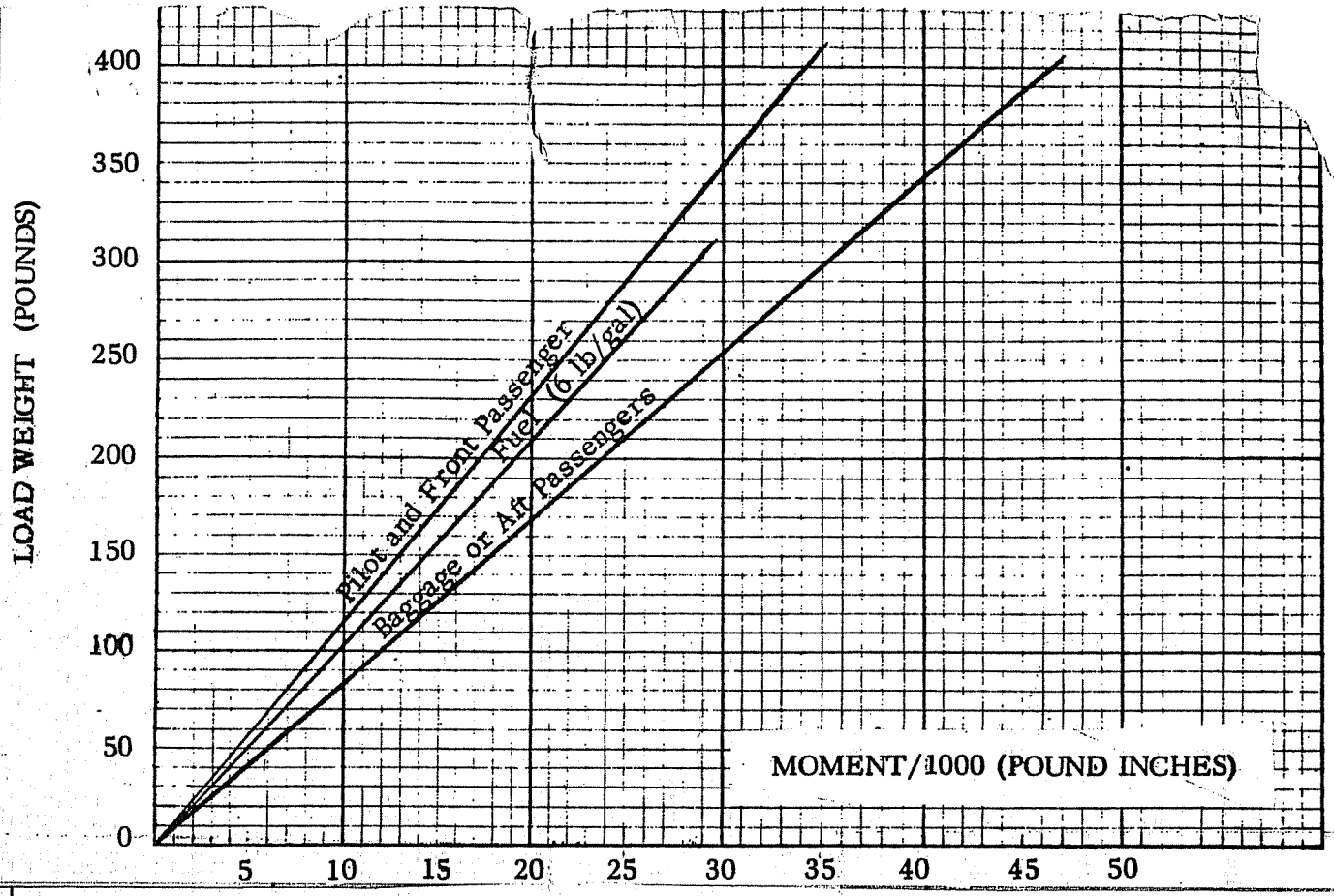
$$C.G.\ Arm = 78.4 + A - \frac{B(N)}{T}$$

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

5. LICENSED EMPTY WEIGHT AND EMPTY WEIGHT CENTER OF GRAVITY

	Weight	Arm	Moment
Empty Weight (as weighed)			
Unusable Fuel (3 pints)	+ 2.2	103.0	+ 227
Licensed Empty Weight			


C. G. RANGE AND WEIGHT
WEIGHT IN POUNDS
2200
2000
1800
1600
1400
1200
Normal Category
Utility Category
INCHES AFT DATUM
82
84
86
88
90
92
94



SAMPLE LOADING PROBLEM (NORMAL CATEGORY)

	WEIGHT (LBS.)	ARM AFT DATUM (INCHES)	MOMENT (POUND-INCHES)
LICENSED EMPTY WEIGHT	~~1286.0~~ 1310.5	~~84.7~~ 85.4	~~108944~~ 111974.65
OIL (2 GAL.)	15	32.5	488
PILOT & PASSENGER	~~340~~ 330	85.5	~~29070~~ 29210
PASSENGERS (AFT) *	~~340~~ 330	117.0	~~39780~~ 38610
FUEL ~~28.2~~ 27.4 gal.	~~169~~ 164.5	95.0	~~16055~~ 15618.0
BAGGAGE *		117.0	
TOTAL LOADED AIRPLANE	2150		~~194337~~ 194905

$$\frac{\text{~~194337~~ 194905}}{2150} = \text{~~90.4~~ 90.65}$$ INCHES (ARM AFT DATUM)

* UTILITY CATEGORY OPERATION - NO BAGGAGE OR AFT PASSENGERS ALLOWED.

Baggage capacity is limited to 200 pounds by tiedown requirements.

DEPARTMENT OF TRANSPORT
CANADIAN AIR TRANSPORTATION ADMINISTRATION
CIVIL AERONAUTICS

CERTIFICATE OF AIRWORTHINESS

CANADA

MINISTÈRE DES TRANSPORTS
ADMINISTRATION CANADIENNE DES TRANSPORTS AÉRIENS
AÉRONAUTIQUE CIVILE

CERTIFICAT DE NAVIGABILITÉ

(1) Nationality and Registration Marks Marques de nationalité et d'immatriculation	(2) Manufacturer and Manufacturer's Designation of Aircraft Constructeur et Désignation de l'aéronef	(3) Aircraft Serial No. Numéro de série de l'aéronef
CF-XTW	PIPER AIRCRAFT CORPORATION Piper PA 28-140	28-25407

(4) Category — Catégorie

Normal/Normale

(5) This Certificate of Airworthiness is issued pursuant to the Convention on International Civil Aviation signed at Chicago the 7th December, 1944 and the Air Regulations in respect to the above mentioned aircraft which is considered to be airworthy when maintained and operated in accordance with the foregoing and either the Aircraft Specification or Type Approval, the Weight and Balance Report and Aircraft Flight Manual.

(6) Unless expired, suspended or cancelled in accordance with the Air Regulations, this certificate shall remain in force so long as the aircraft identified above is maintained and certified airworthy in accordance with the Air Navigation Orders.

(7) This certificate shall expire if the condition and conformity inspection procedure is not completed as provided for in Air Navigation Order, Series II, No. 4.

(5) Le présent certificat de navigabilité est délivré en vertu de la convention relative à l'Aviation Civile Internationale signée à Chicago le 7 Décembre 1944 et du Règlement de l'Air en ce qui concerne l'aéronef mentionné ci-dessus, considéré comme étant en bon état de navigabilité quand il est entretenu et exploité conformément à ce qui précède et soit aux spécifications soit à l'homologation de type de l'aéronef, au rapport de poids et centrage et au manuel de vol de l'aéronef.

(6) Sauf expiration, suspension ou annulation en vertu du Règlement de l'Air, le présent certificat demeurera en vigueur tant que l'aéronef mentionné ci-dessus sera entretenu et certifié comme étant en bon état de navigabilité conformément aux Ordonnances sur la Navigation Aérienne.

(7) Le présent certificat expirera si les procédures relatives à l'inspection de l'aéronef quant à son état et à sa conformité ne sont pas suivies conformément à l'Ordonnance sur la Navigation Aérienne Série II, no. 4.

June/juin 5, 1987

Date of Issue — Date de délivrance

SEAL — SCEAU

FOR MINISTER OF TRANSPORT — POUR LE MINISTRE DES TRANSPORTS

26-0038 (11-82)

SEE REVERSE SIDE — VOIR AU VERSO

WEIGHT & BALANCE REPORT

AMENDMENT # 11 DATED 05 JUN 2006

MANUFACTURER: Piper Aircraft Co.
MODEL: PA 28-140
SERIAL NUMBER: 28-25407
REGISTRATION: C-FXTW

THIS REPORT AMENDS AMENDMENT # 10 DATED 14 Apr 2003.

	WEIGHT	ARM	MOMENT
LICENSED EMPTY WEIGHT:	1333.2	85.42	113881.5
REMOVED:			
Lap belts	2.0	86.9	173.8
INSTALLED:			
Shoulder harness kit	5.0	108.0	540.0
TOTAL:	1336.2	85.50	114247.7

GROSS WEIGHT: 2150.00 lbs.
NEW LICENSED EMPTY WEIGHT: 1336.2 lbs
USEFUL LOAD: 813.8 lbs.
NEW EMPTY WEIGHT C of G: 85.50 Inches Aft Of Datum

I CERTIFY THAT THIS DATA HAS BEEN PREPARED IN ACCORDANCE WITH THE PROVISIONS OF THE AIRWORTHINESS MANUAL, CHAPTER 571 APPENDIX C (2) AND TO THE BEST OF MY KNOWLEDGE REPRESENTS THE TRUE EMPTY WEIGHT AND CENTER OF GRAVITY OF THIS AIRCRAFT.

Paul Weston M115030

AIM Underwriting Limited

Declaration Page
Policy: AIM0951752

Premium	$13,083
Endorsement	$0
Finance	$0
Issuance	$100
Total Due	**$13,183**
Minimum & Retained	

You have made an application to us for coverage on your aircraft and we agree to issue on behalf of Allianz Global Risk US Insurance Company, a Policy of insurance based on the details provided to us. This Declaration Page outlines the coverage that you purchased. The Policy attached to this Declaration Page defines the available coverages along with the terms, conditions and exclusions applicable to this Policy and Declaration Page.

1. **Named Insured**
   Airshare Partners In Flight Ltd.
   864-165th Street
   Surrey, British Columbia V4A 9B9
2. **Policy Period** Commences at the address shown above at 12:01AM on **March 11, 2009** and Expires at 12:01 AM on **March 11, 2010.**
3. **Coverage** The coverage under this Policy applies only to the coverage details listed below or as stated by endorsements attached.

Hull Coverage Purchased

Registration	Make & Model of Aircraft	Landplane[a]	Skiplane[a]	Floatplane[a]	Coverage Purchased	Deductible in Motion	Deductible Not in Motion	Premium
C-GHTD	Cessna, 172M	$50,000	$0	$0	A	$500	$500	$2,875
C-GHCJ	Cessna, 172	$35,000	$0	$0	A	$500	$500	$2,013
CF-XTW	Piper, PA-28-140	$40,000	$0	$0	A	$500	$500	$2,300

a Amount of Insurance when aircraft is operated on.

Liability Coverage Purchased

Registration	Passenger Seat	Coverage F[a] Each Occurrence	Coverage G[b] Each Person	Coverage G[b] Each Occurrence	Coverage F & G Each Occurrence	Premium
C-GHTD	3	$1,000,000	$100,000	$300,000	None	$1,965
C-GHCJ	3	$1,000,000	$100,000	$300,000	None	$1,965
CF-XTW	3	$1,000,000	$100,000	$300,000	None	$1,965

a Combined Bodily Injury and Property Damage. *See Liability Section.*
b Passenger Bodily injury. *See Liability Section.*

4. **Use of Your Aircraft** The aircraft will be used for **Private Business and Pleasure**
5. **Approved Pilots** Coverage under this Policy only applies when the pilot flying the aircraft is
   a. **C-GHCJ - Sharholders only and as per Endorsement No.1**
   b. **C-GHTD - Sharholders only and as per Endorsement No.1**
   c. **CF-XTW - Sharholders only and as per Endorsement No.1**
6. **Owner of the Aircraft** The Named Insured as shown in item 1 of this Declaration Page is the sole owner of the aircraft insured under this Policy and no other person has any financial interest in the aircraft except as stated as follows:
   No exception.

This document dated February 27, 2009 has been signed and approved by:

AIM Underwriting Limited

Countersigned by