Example

Handbook Information for:
PIPER
CHEROKEE 140

If Found Please Call:

Student Name: ________________________________
Phone: ________________________________

NOTE: The information contained herein is intended to be used solely as a training tool and is not to be used for any other purpose. Consult the actual Pilot’s Operating Handbook for accurate up-to-date data when planning any flight.
NOTICE

THIS HANDBOOK IS NOT DESIGNED, NOR CAN ANY HANDBOOK SERVE, AS A SUBSTITUTE FOR ADEQUATE AND COMPETENT FLIGHT INSTRUCTION, OR KNOWLEDGE OF THE CURRENT AIRWORTHINESS DIRECTIVES, THE APPLICABLE FEDERAL AIR REGULATIONS, AND ADVISORY CIRCULARS. IT IS NOT INTENDED TO BE A GUIDE OF BASIC FLIGHT INSTRUCTION, NOR A TRAINING MANUAL.

THE HANDBOOK IS DESIGNED:
1. TO HELP YOU OPERATE YOUR CHEROKEE WITH SAFETY AND CONFIDENCE.
2. TO MORE FULLY ACQUAINT YOU WITH THE BASIC PERFORMANCE AND HANDLING CHARACTERISTICS OF THE AIRPLANE.
3. TO MORE FULLY EXPLAIN YOUR CHEROKEE'S OPERATION THAN IS PERMISSIBLE TO SET FORTH IN THE AIRPLANE FLIGHT MANUAL.

IF THERE IS ANY INCONSISTENCY BETWEEN THIS HANDBOOK AND THE AIRPLANE FLIGHT MANUAL APPROVED BY THE F.A.A., THE FLIGHT MANUAL SHALL GOVERN.

Revised text and illustrations shall be indicated by a black vertical line in the margin opposite the change.

Additional copies of this manual, Part No. 753 584, may be obtained from your Piper Dealer.

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## INDEX

### SECTION I
- Specification Features: ........................................ 1
- Performance .................................................. 1
- Weights ......................................................... 2
- Power Plant .................................................... 2
- Fuel and Oil .................................................. 3
- Baggage .......................................................... 3
- Dimensions ..................................................... 3
- Landing Gear ................................................... 3

### SECTION II
- Design Information: ............................................. 5
  - Engine and Propeller ........................................ 5
  - Structures ................................................... 6
  - Landing Gear ................................................ 6
  - Control System ............................................. 7
  - Fuel System .................................................. 8
  - Electrical System .......................................... 9
  - Heating and Ventilating System ......................... 10
  - Cabin Features ............................................. 12

### SECTION III
- Operating Instructions: ....................................... 13
  - Preflight ..................................................... 13
  - Starting ...................................................... 14
  - Warm-up ...................................................... 15
  - Ground Check ............................................... 16
  - Take-off ...................................................... 16
  - Climb .......................................................... 17
  - Stalls .......................................................... 18
  - Cruising ...................................................... 18
  - Approach and Landing ..................................... 19
  - Ground Handling and Mooring ............................. 19
  - Weight and Balance ....................................... 19

### SECTION IV
- Performance Charts: ......................................... 20
  - Take-off Distance vs Density Altitude ................... 20
  - Rate of Climb vs Density Altitude ........................ 21
  - True Airspeed vs Density Altitude (1950 lbs. gross weight) 22
  - True Airspeed vs Density Altitude (2150 lbs. gross weight) 23
  - Range vs Density Altitude (1950 lbs. gross wt) ........... 23a
  - Range vs Density Altitude (2150 lbs. gross wt) ........... 23b
  - Power vs Altitude (1950 lbs. gross weight) .............. 24
  - Power vs Altitude (2150 lbs. gross weight) .............. 25
  - Landing Distance vs Density Altitude .................... 25a
  - Glide Distance vs Altitude ................................ 25b
  - Altitude Conversion Chart ................................ 26

### SECTION V
- General Maintenance: ........................................ 27
  - Tire Inflation ............................................... 27
  - Battery Service ............................................. 27
  - Brake Service ............................................... 27
  - Landing Gear Service ...................................... 28
  - Fuel and Oil Requirements ................................ 30
  - Care of Air Filter .......................................... 31
  - Care of Windshield and Windows ......................... 31
  - Serial Number Plate ...................................... 32
  - Leveling and Rigging ..................................... 32
### V - SPEEDS (MPH)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Speed (MPH)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{so}$</td>
<td>54</td>
<td>Stall Speed in Landing Configuration</td>
</tr>
<tr>
<td>$V_{s}$</td>
<td>83</td>
<td>Stall Speed in Clean Configuration</td>
</tr>
<tr>
<td>$V_{r}$</td>
<td>65</td>
<td>Takeoff Rotation Speed</td>
</tr>
<tr>
<td>$V_{x}$</td>
<td>74</td>
<td>Best Angle of Climb</td>
</tr>
<tr>
<td>$V_{y}$</td>
<td>85</td>
<td>Best Rate of Climb</td>
</tr>
<tr>
<td>$V_{fe}$</td>
<td>115</td>
<td>Max Flap Extended</td>
</tr>
<tr>
<td>$V_{a}$</td>
<td>129</td>
<td>Maneuvering Speed (Max Gross Wt.)</td>
</tr>
<tr>
<td>$V_{no}$</td>
<td>140</td>
<td>Maximum Structural Cruising Speed</td>
</tr>
<tr>
<td>$V_{ne}$</td>
<td>171</td>
<td>Never Exceed Speed</td>
</tr>
<tr>
<td>$V_{g}$</td>
<td>85</td>
<td>Best Glide Speed</td>
</tr>
</tbody>
</table>

### SECTION I

**SPECIFICATION FEATURES**

- Performance ........................................... 1
- Weights ............................................... 2
- Power Plant. ......................................... 2
- Fuel and Oil .......................................... 3
- Baggage ............................................... 3
- Dimensions .......................................... 3
- Landing Gear ......................................... 3
SECTION I

SPECIFICATION FEATURES

PERFORMANCE

The gross weight of 1950 pounds in the following performance charts applies to Serial Nos. 28-20000 to 28-20939, unless the airplane has been modified to 2150 pounds gross weight. All airplanes from Serial Nos. 28-20940 and up have been licensed from the factory at 2150 pounds gross weight.

Performance figures are for standard airplanes flown at gross weight under standard conditions at sea level, or stated altitude. Any deviation from Standard equipment may result in changes in performance.

<table>
<thead>
<tr>
<th>GROSS WEIGHTS</th>
<th>1950</th>
<th>2150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take-off Run (ft.) (flaps up)</td>
<td>725</td>
<td>800</td>
</tr>
<tr>
<td>Take-off Distance Over 50 ft. Obstacle (ft.) (flaps up)</td>
<td>1500</td>
<td>1700</td>
</tr>
<tr>
<td>Best Rate of Climb Speed (mph) (V_{y})</td>
<td>85</td>
<td>85</td>
</tr>
<tr>
<td>Rate of Climb (ft. per min.)</td>
<td>820</td>
<td>660</td>
</tr>
<tr>
<td>Service Ceiling (ft.)</td>
<td>15,000</td>
<td>14,300</td>
</tr>
<tr>
<td>Absolute Ceiling</td>
<td>17,000</td>
<td>16,800</td>
</tr>
<tr>
<td>Top Speed (mph)</td>
<td>141 (144*)</td>
<td>139 (142*)</td>
</tr>
<tr>
<td>Cruising Speed (75% power, sea level) (mph)</td>
<td>120 (123*)</td>
<td>121 (124*)</td>
</tr>
<tr>
<td>Optimum Cruising Speed (75% power, 7000 ft., mph)</td>
<td>130 (133*)</td>
<td>130 (133*)</td>
</tr>
<tr>
<td>Instructional Power Cruise Speed (50% power, sea level)</td>
<td>100 (102*)</td>
<td>100 (102*)</td>
</tr>
<tr>
<td>Fuel Consumption (gal. per hr. 75%)</td>
<td>7.9</td>
<td>8.4</td>
</tr>
<tr>
<td>Fuel Consumption (gal. per hr. 50%)</td>
<td>5.3</td>
<td>5.6</td>
</tr>
<tr>
<td>Cruising Range (75% power, sea level, mi.)</td>
<td>515, 4 hrs. (720, 6 hrs.**)</td>
<td>490, 4 hrs. (680, 6 hrs.**)</td>
</tr>
<tr>
<td>Cruising Range (75% power, 7000 ft., mi.)</td>
<td>560 (780**)</td>
<td>535 (725**)</td>
</tr>
<tr>
<td>Optimum Cruising Range (55% power, 10,000 ft.)</td>
<td>600 (840**)</td>
<td>570 (790**)</td>
</tr>
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*When Fenders Installed
**With 50 gal. Reserve Fuel
SPECIFICATION FEATURES: (cont)

PERFORMANCE

GROSS WEIGHTS  

<table>
<thead>
<tr>
<th></th>
<th>1950</th>
<th>2150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructional Power Cruising Range</td>
<td>640, 6.5 hrs. (895, 9 hrs.**)</td>
<td>650, 6.5 hrs. (910, 9 hrs.**)</td>
</tr>
<tr>
<td>Stalling Speed (flaps down, mph) (( \sqrt{S_0} ))</td>
<td>52</td>
<td>54</td>
</tr>
<tr>
<td>Landing Roll (flaps down, ft.)</td>
<td>485</td>
<td>535</td>
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WEIGHTS

<table>
<thead>
<tr>
<th></th>
<th>1950</th>
<th>2150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Weight (lbs.)</td>
<td>1950</td>
<td>2150</td>
</tr>
<tr>
<td>Empty Weight (Standard) (lbs.)</td>
<td>1180</td>
<td>1201</td>
</tr>
<tr>
<td>USEFUL LOAD (Standard) (lbs.)</td>
<td>770</td>
<td>949</td>
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<tr>
<td>Empty Weight (AutoFlight) (lbs.)</td>
<td>1220</td>
<td>1241</td>
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<tr>
<td>USEFUL LOAD (AutoFlight) (lbs.)</td>
<td>730</td>
<td>909</td>
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POWER PLANT

<table>
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<tr>
<th></th>
<th>O-320-E2A</th>
<th>O-320-E2A</th>
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<tbody>
<tr>
<td>Engine - Lycoming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated Horsepower and Speed (rpm)</td>
<td>155</td>
<td>155</td>
</tr>
<tr>
<td>Bore (inches)</td>
<td>5.125</td>
<td>5.125</td>
</tr>
<tr>
<td>Stroke (inches)</td>
<td>3.875</td>
<td>3.875</td>
</tr>
<tr>
<td>Displacement (cubic inches)</td>
<td>319.8</td>
<td>319.8</td>
</tr>
<tr>
<td>Compression Ratio</td>
<td>7:1</td>
<td>7:1</td>
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<tr>
<td>Dry Weight (pounds)</td>
<td>272</td>
<td>272</td>
</tr>
<tr>
<td>Oil Sump Capacity (qts.)</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Propeller (Sensenich)</td>
<td>M74DM-6-0-60</td>
<td>M74DM-6-0-60</td>
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</table>

**With 50 gal. Reserve Fuel**
SPECIFICATION FEATURES: (cont)

<table>
<thead>
<tr>
<th>GROSS WEIGHTS</th>
<th>1950</th>
<th>2150</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FUEL AND OIL</strong></td>
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<td></td>
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<tr>
<td>Fuel Capacity (gal.) Standard</td>
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<td>36</td>
</tr>
<tr>
<td>Fuel Capacity (gal.) Reserve</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Oil Capacity (qts.)</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Fuel Aviation Grade (Octane)</td>
<td>80/87</td>
<td>80/87</td>
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<tr>
<td>BAGGAGE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Baggage (lbs.)</td>
<td>100</td>
<td>200***</td>
</tr>
<tr>
<td>Baggage Space (cubic ft.)</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td><strong>DIMENSIONS</strong></td>
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<tr>
<td>Wing Span (ft.)</td>
<td>30</td>
<td>30</td>
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<tr>
<td>Wing Area (sq. ft.)</td>
<td>160</td>
<td>160</td>
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<tr>
<td>Wing Loading (lbs. per sq. ft.)</td>
<td>12.2</td>
<td>13.4</td>
</tr>
<tr>
<td>Length (ft.)</td>
<td>23.3</td>
<td>23.3</td>
</tr>
<tr>
<td>Height (ft.)</td>
<td>7.3</td>
<td>7.3</td>
</tr>
<tr>
<td>Power Loading (lbs. per HP)</td>
<td>13.9</td>
<td>14.3</td>
</tr>
<tr>
<td><strong>LANDING GEAR</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheel Base (ft.)</td>
<td>6.2</td>
<td>6.2</td>
</tr>
<tr>
<td>Wheel Tread (ft.)</td>
<td>10.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Tire Pressure (lbs.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nose</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Main</td>
<td>24</td>
<td>24</td>
</tr>
</tbody>
</table>

***Except when family seat and safety belts are installed, 340 lbs. is permitted.
SECTION II

DESIGN INFORMATION

Engine and Propeller ........................................... 5
Structures ..................................................... 6
Landing Gear ................................................... 6
Control System .................................................. 7
Fuel System ..................................................... 8
Electrical System ............................................... 9
Heating and Ventilating System ......................... 10
Cabin Features ................................................ 12
SECTION II
DESIGN INFORMATION

ENGINE AND PROPELLER

The Lycoming O-320-E2A engine installed in the Cherokee PA-28-140 is rated at 140 horsepower at 2450 rpm or 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 a geared starter, a 35 ampere alternator, dual magnetos, vacuum pump drive, a diaphragm-type fuel pump and a float carburetor.

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

The propeller used on the PA-28-140 is a Sensenich M74DM fixed-pitch aluminum alloy unit. Its diameter is 74 inches with a standard pitch of 60* inches. All performance figures are based on the standard 60* inch pitch propeller.

Cowling on the Cherokee is designed to cool the engine in all normal flight conditions, including protracted climb, without the use of cowl flaps or cooling flanges.

The throttle is of the push-pull type and is located in the lower center of the instrument panel. A knurled friction lock is provided to prevent creeping of the throttle from any desired position. The mixture control, located in the lower right hand side of the instrument panel, is a push-pull control like the throttle. The full rich position is obtained when the control is full forward, while the full aft position provides an idle cut-off.

*58 inch pitch propellers when gross weight is 2150.
**When gross weight is 2150.
for stopping the engine. Intermediate positions are used for leaning the mixture at altitudes above sea-level. The carburetor heat control, located to the left of the throttle, provides maximum carburetor heat when pulled to its full aft position. With carburetor heat off, all engine air passes through a high-efficiency dry-type filter. Therefore, prolonged ground operation with carburetor heat "ON" should be avoided, particularly on unimproved fields as the air is not filtered.

STRUCTURES

All structures are of aluminum alloy construction and are designed to ultimate load factors well in excess of normal requirements. All exterior surfaces are primed with sticking primer and painted with acrylic enamel.

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

The wing airfoil section is a laminar flow type, NACA 652-415 with the maximum thickness about 40% of the leading edge. This permits the main spar carry through structure to be located under the rear seat providing unobstructed cabin floor space ahead of the rear seat.

LANDING GEAR

The three landing gears use a Cleveland 600 x 6 wheel, the main wheels being provided with brake drums and Cleveland single disc hydraulic brake assemblies. The nose wheel and the main gear both use 600 x 6 four ply tires. All the tires have tubes.

The nose gear is steerable through a 30 degree arc each side of neutral by use of the rudder pedals. 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 hydraulic shimmy damper.

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

The brakes are actuated by a hand lever and master cylinder, which is located below and behind the left center of the instrument sub-panel. The brake fluid reservoir is installed on the top left front face of the firewall. The parking brake is incorporated in the master cylinder and is actuated by pulling back on the brake lever, depressing the knob attached to the left side of the handle and then releasing the brake lever. To release the parking brake, pull back on the brake lever to disengage the catch mechanism and allow the handle to swing forward.

CONTROL SYSTEM

Dual controls are provided as standard equipment with a cable system used between the controls and the surfaces. The horizontal tail is of all movable slab type, with an anti-servo tab which also acts as a longitudinal trim tab, actuated by a control on the cabin ceiling. The stabilator provides extra stability and controllability with less size, drag, and weight than conventional tail surfaces. The ailerons are provided with a differential action which tends to eliminate adverse yaw in turning maneuvers and also reduces the amount of coordination.
required in normal turns.

The flaps are manually operated, balanced for light operating forces and spring loaded to turn to the up position. A

past-center lock incorporated in the actuating linkage holds the flap when it is in the up position so that it may be used as a

step on the right side. The flap will not support a step load ex-
cept when in the full up position, so it must be completely re-
tracted when used as a step. The flaps have three extended po-
sitions, 10, 25 and 40 degrees.

FUEL SYSTEM

Fuel is stored in two twenty-five gallon tanks which are

secured to the leading edge structure of each wing by screws

and nut plates. This allows easy removal for service or in-

spection.

The standard quantity of fuel is 36 gallons for the Cherokee

140. To obtain the standard quantity of fuel, fill the tanks to the bottom of the filler neck indicator.

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 take-offs and landings.

The fuel strainer, which is equipped with a quick drain, is

located on the front lower left corner of the firewall.

This strainer should be drained regularly to check for water

or sediment accumulation. To drain the lines from the tanks,
sories.

Circuit provisions are made to handle optional communications and navigational equipment.

In conventional generator systems, the ammeter indicates battery discharge. In the Piper Full Time Power electrical system, the ammeter displays the load in amperes placed on the system at any given time. 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. This amount will vary and depends on the percentage of full charge on the battery at the time. When the battery becomes charged, the current displaced on the ammeter will reduce to a minimum value of about two amperes. As each unit of electrical equipment is switched on the amount of current it draws will be shown on the ammeter. The maximum continuous load for night flight with all equipment on is approximately thirty amperes. This thirty amperes plus approximately two amperes for the fully charged battery will appear continuously under these flight conditions.

Because of the mechanical simplicity of the alternator, maintenance should prove to be a minor factor as compared to previous systems. Should service be required, contact your local Piper dealer.

HEATING AND VENTILATING SYSTEM

Heat for the cabin interior and the defroster system is provided by a heater muff attached to the exhaust system. Controls for these systems are located on the lower right hand side of the instrument panel. A third control in this area regulates a large fresh air vent located on the left hand side of the cabin near the pilot's feet. In addition, two side vents are provided, one at each seat location. They may be independently regulated as desired by the seat occupant.
CABIN FEATURES

The instrument panel of the Cherokee is designed to accommodate the customary advanced flight instruments and all the normally required power plant instruments. The Artificial Horizon, Directional Gyro and the Turn and Bank instruments are vacuum operated through use of a vacuum pump installed on the engine. A natural separation of the flight group and the power group is provided by placing the communications and radio navigational equipment in the center of the panel.

The front seats are adjustable fore and aft for pilot comfort and ease of entry and exit. A family seat installation is available which provides two additional seats. Each family seat is capable of carrying a full size adult which gives the Cherokee 140, 4-place capability.
SECTION III
OPERATING INSTRUCTIONS

Preflight ........................................... 13
Starting .............................................. 14
Warm-up ........................................... 15
Ground Check ...................................... 16
Take-off ............................................ 16
Climb ................................................ 17
Stalls ............................................... 18
Cruising .......................................... 18
Maneuvers ........................................ 19
Approach and Landing ......................... 19
Mooring .......................................... 19a
Weight and Balance ............................ 19a
SECTION III

OPERATING INSTRUCTIONS

PREFLIGHT

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

1. a. Master switch "ON."
   b. Check fuel quantity indicators (two tanks).
   c. Master switch and ignition "OFF."

2. a. Check for external damage, operational interference
of control surfaces or hinges.
   b. Insure that wings and control surfaces are free of
      snow, ice or frost.
3. a. Visually check fuel supply, secure caps.
    b. Drain fuel tank sumps.
    c. Check that fuel system vents are open.
4. a. Check landing gear shock struts for proper inflation.
    b. Check tires for cuts, wear and proper inflation.
    c. Drain fuel system sump (left side of aircraft)
5. a. Inspect windshield for cleanliness.
    b. Check the propeller and spinner for defects or nicks.
    c. Check for obvious fuel or oil leaks.
    d. Check oil level, 8 quarts maximum. (Insure dipstick
       is properly seated.)
    e. Inspect cowling and inspection covers for security.
    f. Check nose wheel tire for inflation, wear.
    g. Check nose wheel shock strut for proper inflation.
6. a. Stow tow bar and control locks, if used.
    b. Check baggage for proper storage and security.
    c. Close and secure the baggage compartment door.
7. a. Upon entering aircraft ascertain that all primary flight
    controls operate properly.
    b. Close and secure the cabin door.
    c. Check that required papers are in order and in the
       aircraft.
    d. Fasten seat belts and shoulder harness.

STARTING ENGINE

After completion of the preflight inspection:
1. Lock the wheel brakes.
2. Set the carburetor heat control in the full "COLD"
   position.
3. Select the desired tank with the fuel valve.
4. Move the mixture to the full "RICH" position.
5. Open the throttle 1/8 to 1/4 inch.
6. Turn the electric fuel pump "ON."

In cold weather (below 40 degrees F.) prime the engine
with one to three full strokes of the priming pump. If extremely
cold, starting will be aided by pulling the propeller through by
hand (switch "OFF") four to five revolutions. If the tempera-
ture is above 40 degrees the engine may be primed by three
or four short quick strokes of the throttle.

After priming, turn the electric master switch on, engage
the starter and allow the engine to turn approximately one full
revolution, then turn the ignition switch to the "Left" magneto
position.

When the engine is firing evenly, turn the magneto switch
to the "Both" position and advance the throttle to 800 RPM.
Check the oil pressure gauge for a pressure indication. If
oil pressure is not indicated within thirty seconds, stop the
engine and determine the trouble.

If the engine fails to start at the first attempt, another
attempt should be made without priming. If this fails, it is
possible that the engine is overprimed. Turn the magneto
switch off, open the throttle slowly, and rotate the engine
approximately ten revolutions with the starter. Reprime the
engine with one half the amount used in the initial attempt,
turn the magneto switch to "Left," and repeat the starting
procedure. If the engine again fails to start, refer to the
"Lycoming Operating Handbook, Section VII, Engine Troubles."

WARM-UP

As soon as the engine starts, the oil pressure should be
checked. If no pressure is 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.
Warm-up the engine at 800 to 1200 RPM.

Take-off may be made as soon as ground check is com-
pleted, providing that the throttle may be opened fully without
back firing or skipping, and without reduction in engine oil
pressure.
GROUNDS CHECK

Check the magnetos at 2000 RPM by switching from Both to Right then back to Both before switching to Left. Differential drop should not exceed 50 RPM while the total drop on either magneto should not exceed 175 RPM. Check vacuum gauge, indicator should read 5" Hg ± 1" Hg at 2000 RPM.

Check both the oil temperature and pressure. The temperature may be low for some time if the engine is being run for the first time of the day, but as long as the pressure is within limits the engine is ready for take-off.

Carburetor heat should also be checked prior to take-off to be sure that 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.

TAKE-OFF

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

1. Controls free
2. Flaps "UP"
3. Tab set
4. Mixture "RICH"
5. Carburetor heat "OFF"
6. Fuel on proper tank
7. Electric fuel pump "ON"
8. Engine gauges normal
9. Door latched
10. Altimeter set
11. Fasten belts/harness

The take-off technique is conventional for the Cherokee. The tab should be set slightly aft of neutral, with the exact setting determined by the loading of the aircraft. Allow the airplane to accelerate to 50 to 60 miles per hour, then ease back on the wheel until the airplane is flying itself off the ground. Premature raising of the nose, or raising it to an excessive angle, will result in a delayed take-off. After take-off, let the aircraft accelerate to the desired climb speed by lowering the nose slightly.

THE PIPER CHEROKEE

Short Field, Obstacle Clearance:

- Lower the flaps to 25° (second notch), accelerate to 55-60 miles per hour and ease back on the control wheel to rotate. After breaking ground, accelerate to the best angle of climb speed, 74 miles per hour. Slowly retract the flaps when the obstacle has been cleared and continue climb at 85 miles per hour.

Short Field, No Obstacles:

- Lower the flaps to 25° (second notch) accelerate to 55-60 miles per hour. Ease back on the control wheel to rotate and accelerate to best rate of climb speed, 85 miles per hour. Slowly retract the flaps while climbing out.

Soft Field, Obstacle Clearance:

- Lower the flaps to 25° (second notch), accelerate aircraft, 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, 85 miles per hour. Climb out while slowly retracting the flaps.

Soft Field, No Obstacles:

- Lower the 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, 74 miles per hour to climb past obstacle clearance height, continue climb while accelerating to best rate of climb speed, 85 miles per hour and slowly retract the flaps.

CLIMB

The best rate of climb at gross weight will be obtained at 85 miles per hour. The best angle of climb may be obtained at 74 miles per hour. At lighter than gross weight these speeds are reduced somewhat. For climbing enroute a speed of 100 miles per hour is recommended. This will produce better forward speed and increased visibility over the nose during the climb.
STALLS

Stall characteristics of the Cherokee are conventional. Visual stall warning is provided by a red light located on the left side of the instrument panel, which is turned on automatically between 5 and 10 miles per hour above stall speed. Gross weight stalling speed with power off and full flaps is 52 miles per hour at 1950 pounds and 54 miles per hour at 2150 pounds. With flaps up this speed is increased 9 miles per hour.

Intentional spins are prohibited in the normal category airplane. For approved maneuvers and entry speeds refer to the Flight Manual.

CRUISING

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

The normal cruising power is 75% of the rated horsepower of the engine. True airspeeds, which may be obtained at various altitudes and power settings, can be determined from the charts in "Section IV" of this handbook.

Use of the mixture control in cruising flight reduces fuel consumption significantly, especially at high altitudes. The mixture should always be leaned during cruising operations at 75% power or less, but during the climb only at altitudes above 5000 feet.

The continuous use of carburetor heat during cruising flight decreases engine efficiency. Unless icing conditions in the carburetor are severe, do not cruise with the heat on. Apply full carburetor heat slowly and only for a few seconds at intervals determined by icing severity.

In order to keep the airplane in best lateral trim during cruising flight, the fuel should be used alternately from each main tank. It is recommended that one main tank be used for one hour after take-off; the other main tank used until nearly exhausted, then return to the first main tank.

MANEUVERS

The airplane is approved for certain aerobatic maneuvers up to a gross weight of 1950 lbs., provided it is loaded within the approved weight and center of gravity limits. (See Airplane Flight Manual) The maneuvers are spins, steep turns, lazy eights and chandeliers.

APPROACH AND LANDING

The airplane should be trimmed to an approach speed of about 85 miles per hour with flaps up. The flaps can be lowered at speeds up to 115 miles per hour, if desired, and if approach speed is reduced 3 miles per hour for each additional notch of flap. 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 heat on is likely to 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 existing conditions, both windwise and loadwise. 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, carburetor heat off, and electric fuel pump on. Reduce the speed during the flareout and contact the ground close to the stalling speed (55 to 65 MPH). After ground contact hold the nose wheel off as long as possible. As the airplane slows down, drop the nose and apply the brakes. There will be less chance of skidding the tires if the flaps are retracted before
SECTION III

THE PIPER CHEROKEE

applying the brakes. Braking is most effective when 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 cross-winds, it may be desirable to approach the ground at higher than normal speeds with partial or no flaps.

MOORING

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

WEIGHT AND BALANCE

It is the responsibility of the 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 see the Airplane Flight Manual and Weight and Balance Form supplied with each airplane.

SECTION IV

PERFORMANCE CHARTS

Take-off Distance vs Density Altitude .................. 20
Rate of Climb vs Density Altitude ..................... 21
True Airspeed vs Density Altitude (1950 lbs gross wt) ...... 22
True Airspeed vs Density Altitude (2150 lbs gross wt) ...... 23
Range vs Density Altitude (1950 lbs gross wt) ............. 23a
Range vs Density Altitude (2150 lbs gross wt) ............. 23b
Power vs Altitude (1950 lbs gross wt) .................. 24
Power vs Altitude (2150 lbs gross wt) .................. 25
Landing Distance vs Density Altitude .................. 25a
Glide Distance vs Altitude .............................. 25b
Altitude Conversion Chart .............................. 26
PA-28-140
PIPER CHEROKEE

GLIDE DISTANCE
VS
ALTITUDE

2180 LBS.
83 M.P.H.
PROP WINDING
0° FLAPS - NO WIND

ALTITUDE ABOVE TERRAIN, FEET

GLIDE RANGE, MILES

Piper Cherokee
PA-28-140

ALTITUDE CONVERSION CHART
THIS CHART SHOULD BE USED TO
DETERMINE DENSITY ALTITUDE
FROM EXISTING TEMPERATURE
AND PRESSURE ALTITUDE CONDITIONS
FOR USE WITH PERFORMANCE CHARTS.

DEN SITY ALTITUDE, FT.

STG.

TEMP.

18,000 FT PRESSURE ALTITUDE

16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0

-60 -40 -20 0 20 40 60 80 100
TEMPERATURE - °F

730115
730115
25b
SECTION V

GENERAL MAINTENANCE

Tire Inflation .......................... 27
Battery Service ......................... 27
Brake Service .......................... 27
Landing Gear Service ................... 28
Fuel and Oil Requirements ............. 30
Care of Air Filter ....................... 31
Care of Windshield and Windows ...... 31
Serial Number Plate ..................... 32
Leveling and Rigging .................... 32

SECTION V

GENERAL MAINTENANCE

TIRE INFLATION

For maximum service from the tires on the Cherokee, keep the tires inflated to the proper pressure of 24 pounds for the main gear and 24 pounds for the nose wheel. Interchange the tires on the main wheels, if necessary, to produce even wear. All wheels and tires are balanced before original installation, and the relationship of the tire, tube and wheel should be maintained, if at all possible. Out of balance wheels can cause extreme vibration on take-off. In the installation of new components, it may be necessary to rebalance the wheel with the tires mounted.

BATTERY SERVICE

The 12 volt battery is located in a stainless steel container under the baggage compartment floor. The container should be drained occasionally by opening the rubber cap on the drain tube. Check the battery for proper fluid level (below the baffle plates). Use a hydrometer to determine the density of the battery fluid.

If the battery is discharged, charge it before take-off as three volts are needed to excite the alternator. Recharge starting at a 4 amp rate and finishing with a 2 amp rate. Quick charges are not recommended.

BRAKE SERVICE

The brake system is filled with MIL-H-5606 (petroleum
SECTION V

THE PIPER CHEROKEE

base) hydraulic brake fluid. This should be checked at every 100 hour inspection and replenished when necessary by filling the brake reservoir on the firewall to the indicated level. If the system as a whole has to be refilled with fluid, this should be done by filling with the fluid under pressure from the brake end of the system. This will eliminate air from the system as it is being filled.

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.

LANDING GEAR SERVICE

Main wheels are easily removed by taking off the hub cap, axle nut, and the two bolts holding the brake segment in place, after which the wheel slips easily from the axle.

Tires are removed from the wheels by first deflating the tire, removing the three through bolts, 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 (empty weight of airplane plus full fuel and oil) is 3.25 inches for the nose gear and 4.50 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 only require proper inflation.

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. With fluid in the strut housing at the correct level, attach a strut pump to the air valve and with the airplane on the ground, inflate the oleo strut to the correct height.

In jacking the Cherokee for landing gear or other service, a jack kit (available through the Piper Aircraft Service Department) should be used. This kit consists of two hydraulic jacks and a tall stand. At least 350 pounds of ballast should be placed on the base of the tall stand before jacking up the airplane. 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 attaching the tall stand, and adding the ballast, the jacking may be continued until the airplane is at the height desired.

**FUEL AND OIL REQUIREMENTS**

Aviation grade 80/100 Octane (minimum) fuel must be used in the Cherokee. The use of lower grades can cause serious engine damage in a very short period of time, and is considered of such importance that the engine warranty is invalidated by such use.

The oil capacity of the Lycoming O-320 series engines is 8 quarts and the minimum safe quantity is 2 quarts. It is recommended that the oil be changed every 50 hours or sooner under unfavorable conditions. The following grades are recommended for the specified temperatures:

**CARE OF AIR FILTER**

The carburetor air filter must be cleaned at least once every fifty hours. Under extremely adverse conditions of operation it may be necessary to clean the filter daily. Extra filters are inexpensive and a spare should be kept on hand and used as a rapid replacement.

The filter manufacturer recommends that the filter be tapped gently to remove dirt particles. Do not blow out with compressed air.

**CARE OF WINDSHIELD AND WINDOWS**

A certain amount of care is needed to keep the plexiglass windows clean and unmarred. The following procedure is recommended:

1. Flush with clean water and dislodge excess dirt, mud, etc., with your hand.
2. Wash with mild soap and water. Use a soft cloth or sponge, do not rub.
3. Remove oil, grease or sealing compounds with a soft cloth and kerosene.
4. After cleaning, apply a thin coat of hard polishing wax. Rub lightly with a soft cloth.
5. A severe scratch or mar may be removed by using jeweler's rouge to rub out the scratch, smoothing, and then applying wax.
SERIAL NUMBER PLATE

The serial number plate is located near the stabilator on the left side of the airplane. Refer to this number for service or warranty matters.

LEVELING AND RIGGING

Leveling the Cherokee for purposes of weighing or rigging is accomplished as follows:

1. Partially withdraw two machine screws located immediately below the left front side window. These screws are leveling points and the airplane is longitudinally level when a level placed on the heads of these screws indicates level.

2. To put the airplane in a longitudinally level position on scales, first block the main gear oleos in the fully extended position, then deflate the nose wheel tire until the proper attitude is obtained. For rigging only, the airplane may be placed on jacks for leveling.

3. To level the airplane laterally, place a level across the baggage compartment floor along the rear bulkhead.

Rigging: Although the fixed flight surfaces on the Cherokee cannot be adjusted for rigging purposes, it may be necessary upon occasion to check the position of these surfaces. The movable surfaces all have adjustable stops, as well as adjustable turnbuckles on the cables or push-pull tubes, so that their range of travel can be altered. The positions and angular travels of the various surfaces are as follows:

1. Wings: 7° dihedral, 2° washout.
2. Stabilator Travel: 18° up, 2° down, tolerance ± 1°.
3. Fin should be vertical and in line with center of fuselage.
4. Aileron Travel: 30° up, 15° down, tolerance ± 2°.
5. Flap Travel: 10°, 25°, 40°, tolerance ± 2°.
6. Rudder Travel: 27° right and left, tolerance ± 2°.
7. Stabilator Tab Travel: 3° up, 12° down, tolerance ± 1°.

Cable tensions for the various controls are as follows:
Rudder: 40 ± 5 lbs.  Stabilator: 40 ± 5 lbs.
Ailerons: 40 ± 5 lbs.  Stabilator Trim: 5 ± 1 lb.
CHEROKEE ELECTRICAL SYSTEM SCHEMATIC
ALTERNATOR
1. On the instrument panel, in full view of the pilot, place:

- 129
- 129
- 129
- Steil
- Bury Speed

2. Approved maneuvers for Utility Category

- All aerobatic maneuvers including spins

3. Straddle the variation between given points.

<table>
<thead>
<tr>
<th>Weight Limit (Weight Limit)</th>
<th>Forward Limit (forward limit)</th>
<th>Rearward Limit (Rearward Limit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>98.5 S</td>
<td>98.5 S</td>
<td>98.5 S</td>
</tr>
<tr>
<td>98</td>
<td>98.1</td>
<td>98.5 S</td>
</tr>
<tr>
<td>98.5 S (at of atm)</td>
<td>98.5 S (at of atm)</td>
<td>98.5 S (at of atm)</td>
</tr>
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<td>98.5 S (at of atm)</td>
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<tr>
<td>98.5 S (at of atm)</td>
<td>98.5 S (at of atm)</td>
<td>98.5 S (at of atm)</td>
</tr>
</tbody>
</table>

4. The intersection of the straddle and limited section. The datum used is 78.4 inches in front of the wing leading edge at 200 lbs.

5. Maximum Weight 2250 lbs. (See limitations section for static Rm Limits.)

6. C.G. Range 20° 91.965

7. Development Center: 780 Biscayne - FLA.

8. Paper Aircraft Corp.
UTILITY CATEGORY OPERATION - C. BAGGAGE OR AFT PASSENGERS ALLOWED.

WEIGHT AND BALANCE REQUIREMENTS.

Since this point falls within the C.G. envelope, the loading meets all requirements.

Locate this point on the C.G. Range and Weight Graph.

Inches (ARM at Datum) = \( \frac{2190}{1951.4} \)

Inches

1951.4

2190

TOTAL LOADED

Airplane

Baggage

0.0

Fuel

30.3 G.

Pilot & Passenger

34.4

Passengers (AFT)

21.7

Oil (2 G.

15

Licensed Empty Weight

1273

lbs.

1085.4

(10.25 x 85.2)

Sample Loading Problem (Normal Category)

Baggage capacity is limited to 200 pounds by the overweight requirements.

By airplane weight and balance limitations (See page 10 of this section).

Note: With optional jump seats installed, the passenger weight is restricted only to 1273 lbs.

C.G. Range and Weight Instructions

Have been made.

Delivered from the Factory. Refer to Form FAA-337 when alterations are made.

Development Center, Yermo, CA.

Piper Aircraft Corp.
ALC CALCULATIONS DERIVED FROM LOG BOOK ENTER "NORMAL CATEGORY"

NEW USEFUL LOAD 885.20
NEW CG 85.75
NEW MOMENT 10856.6
NEW EMPTY WTL 1264.8

MOM 288.24
CG 70.38
WTL 410

AX350 BLIND ENCODER
NEW ITEM ADDED

USEFUL LOAD 889.3
EMPTY WT CG 85.8
EMPTY MOMENT 108168.06
EMPTY WEIGHT 1260.7

PREVIOUS WEIGHT AND BALANCE

WITH DATA IN AIRCRAFT
VERIFY ANY CHANGES

8322R

WEIGHT AND BALANCE

PA28-140
S/N 28-22193
N8322R
1-17-2000

8322R
<table>
<thead>
<tr>
<th>ITEM</th>
<th>PARTS</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>170</td>
<td>66</td>
<td>2.5</td>
</tr>
<tr>
<td>461.8</td>
<td>98</td>
<td>3.3</td>
</tr>
<tr>
<td>KING KI201 INDICATOR</td>
<td>7.3</td>
<td></td>
</tr>
<tr>
<td>KING KX170 TRANSCIEVER</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The following items were added:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PARTS</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>252</td>
<td>66</td>
<td>4.1</td>
</tr>
<tr>
<td>390</td>
<td>66</td>
<td>5.3</td>
</tr>
<tr>
<td>ALFA 200 TRANSCIEVER</td>
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<td></td>
</tr>
<tr>
<td>9.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Any changes or additions to this list should be highlighted.

Verify with A.C. Dols.

Bobby E. Little

Piper PA28-140 N41487

Route 2, Box 24, Advance, NC 27006

Twin Lakes Aviation, Inc.

Ser 141 Number 28-222503

CHARLOTTE
8018 DOW RD

NC 28213
ANY CHANGES TO AIRCRAFT DOCS. VERIFY WITH
7291F

Date: 30-APR-97
Certificate Number: APF 243278635
Prepared By: [Signature]

New Usual Load: 1,831.40
Gross Weight: 2,100.00
New Empty Weight: 846.8
New Empty Weight C.G.: 11.16622
New Total Moment: 14.31860

Jump Seat Belts and Cables
Jump Seats
Cessna R-182 ADF Indicator
Cessna R-446 ADF
King KI-241 Indicator
King KMA-200 ADF Panel
King KY-1000 Nav/Com
Equipment Installed:

Note: Equipment Removed:
Previous Empty Weight: 1,363.00

Weight
Am
1,265.20

Moment
108.591.00

Larry Mills
6744 Campbell Road
York, SC 29745

Owner
Name: [Name]
Address: [Address]

Make & Model: [Make & Model]
Registration No.: N7291F

Make & Model: [Make & Model]
Serial Number: 28-25205
Owner
Name: [Name]
Address: [Address]

Weight & Balance: [Weight & Balance]
According to the requirements of the drawings 66761 and the modified specifications of the M74DM38 or 74DM36-0-38, when modified in accordance with the installations of the M75962, the maximum baggage area is limited to 100-12.5 lb.

B. Maximum Allowable Baggage Capacity Area:

- For M74DM38 or 74DM36-0-38, the maximum allowable baggage area is 100 lb.
- For S/N 28-20001 through 28-20099, the maximum baggage capacity area is increased to 200 lb.
- For S/N 28-20001 and beyond, the maximum baggage capacity area is increased to 200 lb.

A. Maximum Allowable Baggage Capacity Area

Maximum Allowable Baggage

200 lb.

7291F

Piper Aircraft Corp.
Airplane is Loaded Properly.

It is the responsibility of the pilot and aircraft owner to ensure that the airplane is loaded properly. The requirements for this involve ensuring that the total weight of the airplane is within the specified limits. If the airplane is overloaded, it may not be able to fly safely.

### Sample Loading Problem (Normal Category)

<table>
<thead>
<tr>
<th>Loaded Airplane</th>
<th>Area (sq ft)</th>
<th>Passenger's Allowance</th>
</tr>
</thead>
<tbody>
<tr>
<td>133.3</td>
<td>117.0</td>
<td>99.0</td>
</tr>
<tr>
<td>0</td>
<td>117.0</td>
<td>69.5</td>
</tr>
<tr>
<td>15</td>
<td>32.5</td>
<td></td>
</tr>
</tbody>
</table>

### Loading Requirements

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 items 1 and item 4, locate a point on the C.G. range and weight envelope.**

### Example

<table>
<thead>
<tr>
<th>Item</th>
<th>Weight (lbs)</th>
<th>Moment (lbs-ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>B</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>C</td>
<td>150</td>
<td>150</td>
</tr>
</tbody>
</table>

### Graph

- **C.G. Range and Weight Instructions**
- **Piper Aircraft Corp.**
- **Model PA-22-140**
- **Developed by CFI, Vero Beach, FLA**
- **Weight and Balance Data**

**NOTE:** With optional jump seats installed, the passenger weight is restricted.