Scott Sport Trainer “Grizzly Cub”

Pilots Operating Handbook

N143W

August 2011

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SECTION **PAGE**

Section I - SPECIFICATIONS

Performance

Takeoff Run (ft)	200’
Takeoff Run over 50 ft barrier	500’ *
Best Rate of Climb Speed (mph)	75
Rate of Climb (ft per min)	960
Best Angle of Climb Speed (mph)	35
Best Angle of Climb (Ratio)	1 to 5
Service Ceiling	19,000’
Absolute Ceiling	21,300’
Top Speed (mph)	130mph
Cruising Speed (75% power mph)	105 mph
Cruising Range (75% power)	420
Fuel Consumption (gph) (75% power)	9
Stalling Speed (mph)	28 mph IAS
Landing Roll (ft)	350’

*Flaps Extended

Weights

Gross Weight	2000’
Empty Weight	1136#
USELFUL LOAD	864#

Powerplant

Engine	Lycoming O-320
Rated HP	160
Rated RPM	2700
Bore	5-1/8”
Stroke	3-7/8”
Displacement	319.8 cu. In.
Fuel Consumption (75%power)	9 gph
Oil Sump Capacity	8 Qt

Fuels

Minimum Octane	91
Specified Octane	100LL
Alternate Fuels	90 AKI Mogas (Alcohol Free)
Fuel	32 Gal

Dimensions

Wing Span (ft)_____ 36.3
Wing Area (sq ft)_____ 191.6
Wing Loading (lbs per sq ft)_____10.43
Length (ft)_____ 22.5
Height (ft)_____ 6.7
Power Loading (lbs per hp)_____ 12.5
Propeller Diameter (max. in.)_____84" (Current prop 74")

Landing Gear

Tire Pressure (psi) 18
Tire Size (four ply rating)
26/10.50x6_____8 psi
8:50 x 6_____14 psi
8.00 x 6_____16 psi
7:00 x 6_____18 psi

Section II – DESIGN INFORMATION

ENGINE AND PROPELLER

The Grizzly Cub is powered by a Lycoming 0-320 engine, with a rated horsepower of 160 at 2700 RPM. The standard installation of this engine includes an electrical system.

On the 160 hp engine, the standard propeller is the Sensenich metal design 74-DM-56. In general, propeller designs selected for the Grizzly Cub emphasize takeoff, climb and economical cruising performance rather than high speed cruising. If propellers with higher pitches are used, the cruising speed can be increased somewhat,
A stainless steel header and muffler exhaust system is employed to scavenge exhaust gases effectively. This permits the use of an efficient muffler without any loss in engine power output due to exhaust back-pressure. The muffler is shrouded to provide sources of heat for the cabin heating systems.

STRUCTURES

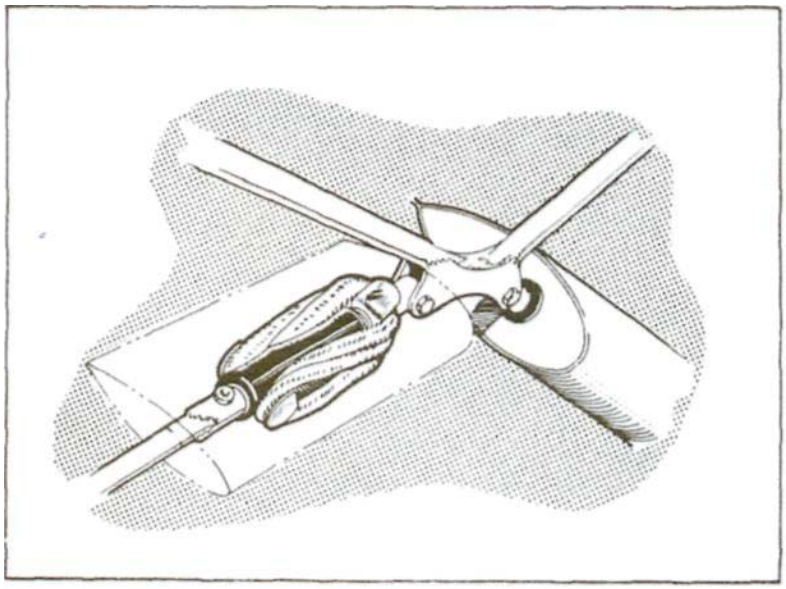
The fuselage frame of the Grizzly Cub is constructed of steel tubes welded together to form a rigid structure. All members are of chromemolybdenum steel (4130).

Repairs to the fuselage can be made in the manner approved by the FAA Advisory Circular 43.13-1, and repair facilities for this type of construction are available universally.

The wing framework consists of glued wood ribs mounted on Spruce spars with tubular drag and compression struts and high strength stainless steel drag wires. Aluminum sheet is used to form the leading edge and the aileron false spar. The full size spar extends the full length of the wing with a fiberglass droop wing tip added to extend the wing.
The wings are attached to the fuselage at the wing hinge fittings on upper fuselage members, and by means of the lift struts which bolt to the lower fuselage members and to the wing spar fittings. To prevent bending the struts, any lifting of the airplane should be done at the extreme end of the strut and not in the center.

LANDING GEAR

The Grizzly Cub landing gear is the well proven maintenance-free shock cord type, which employs two 1080HD shock rings on each shock strut. The only maintenance required on this gear is occasional greasing of the hinge bolts and shock strut members, and inspection of the steel hinge bolt bushings, which can be replaced if worn. Die Spring shock units are available as replacements from Wag Aero.
The 6-inch steerable Grizzly Cub. An 8-inch steerable tail wheel is offered as optional equipment. The main wheels carry 26/10.50 x 6, 8.60 x 6, 8.00 x 6 or 8:00 x 7 four ply or better tires. Tire inflation must be maintained reasonably consistent to prevent tire slippage on the wheel and to produce even wear.



Landing Gear Shock Struts.

CONTROL SYSTEMS

The units which make up the empennage are the fin, rudder, stabilizers and elevators. They are all constructed of tubular steel with steel channel ribs. The control surface hinges have bronze bushing inserts which should be oiled occasionally with light oil. Stainless steel tie rods brace the stabilizer to the fin and fuselage. The tail brace wires should not be used for lifting or handling the airplane; a handle on the right rear side of the fuselage is provided for this purpose.

Dual flight controls and dual throttles are provided in the Grizzly Cub. The flap control is located for operation from either seat. Solo operation is normally from the front seat, but the aircraft can be flown solo from either seat.

The flap lever can be set in any one of three positions, for full up flap, half flap, or full down flap. Full flap is recommended for minimum speed landings. Half or full flap can be applied to reduce takeoff run, the more flap used the shorter the run. A minimum takeoff distance is obtained by beginning the takeoff with flaps up, then applying full flaps when takeoff speed (30-35 MPH) has been reached. The best angle of climb is attained with full flap. The best rate of climb is without flaps extended.

The stabilizer adjustment crank was eliminated in favor of an overhead adjustable trim tab.

FUEL SYSTEM

Up to 36 gallons of fuel may be carried in the two 18 gallon fuel tanks, one in each wing.

A small (approximately 2 gallon) header tank, which serves to maintain constant fuel flow to the engine, is included in the installation of the fuel tank. The header tank is concealed behind the headlining aft of the rear seat,

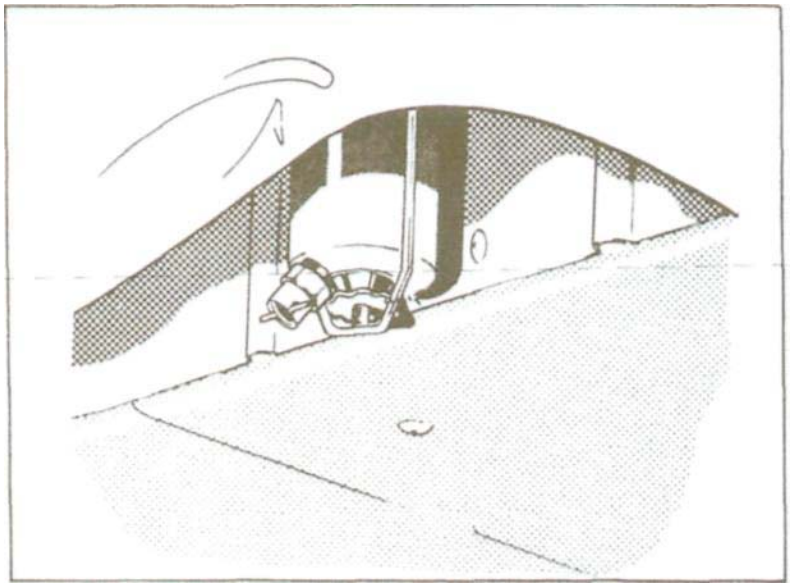
Fuel indicator sight gauges are installed in the upper cabin side panels and arc easily discernible from either seat.

The fuel shut-off valve is in the left cabin panel near the front seat.

The fuel strainer, on the lower left side of the fire wall in the engine compartment is installed to trap water or sediment that may collect in the fuel system. It should be drained before each flight. Fuel screens are provided at each tank outlet, in the strainer, and at the carburetor.

The engine primer pump on the center of the instrument panel takes fuel from the top of the fuel strainer and pumps it directly to all four cylinders on the engine. The primer should be locked in at all times, except when in use, to prevent malfunctioning of the engine.

An idle cut-off is incorporated in the carburetor so that full extension of the mixture control stops the flow of fuel at the carburetor. The cut-off should always be used to stop the engine.
Fuel feeds from both fuel tanks simultaneously, so there is no switching of tanks.



Fuel Strainer and Drain.

ELECTRICAL SYSTEM

An electrical system, consisting of starter, alternator with integral voltage regulator, battery, ammeter, starter solenoid, circuit breakers, switches and related wiring is optional equipment.

A 1 2 volt. Dry cell type battery is mounted in the fuselage under of the baggage compartment. A master switch and circuit breakers arc located on a instrument pane. The circuit breakers automatically break the electrical circuits if an overload is applied. To reset the circuit breakers simply push in the buttons. A continuous popping of the circuit breakers indicates a short and should be investigated.

The master switch is connected to a master contactor, located near the battery.

The voltage regulator is incorporated integral to the alternator to maintain the required voltage of the battery. Position and instrument panel lights (optional equipment) are operated with the same switch on the electrical panel located above the right door. A rheostat is provided for adjusting the intensity of the instrument lighting.

An integral overvoltage relay protects the electrical system from an overvoltage condition.

FINISH

The finish is PolyUrethane Lockhaven Yellow paint over top of fire resistant butyrate plastic material on the fabric surfaces.
All of the covering material, inside and outside, on the Grizzly Cub is treated with butyrate plastic over 5 primer coats of nitrate dope. All of the exterior metal surfaces are finished with polyurethane. The finish must not be covered over or repaired with any incompatible material. The use of different materials from those originally applied will damage the finish.

CABIN FEATURES

The standard instrument group in the Grizzly Cub includes the following: sensitive altimeter, airspeed, compass, oil temperature and pressure gauge, and recording tachometer. Special panels which provide complete instrumentation are available as optional equipment.

Shoulder harnesses are provided for both seats of the Grizzly Cub.

The flow of hot air for heating the cabin is obtained through the use of the cabin heat control in the right side panel control box. Cooling air is admitted through the window on the left side of the cabin. For special purpose flights, such as photography, the right door and window may be opened in flight. Care should be taken not to impose high air loads on the window in the open position, and a check should be made to insure that both occupants have their seat belts and shoulder harnesses fastened before the door or window is opened.

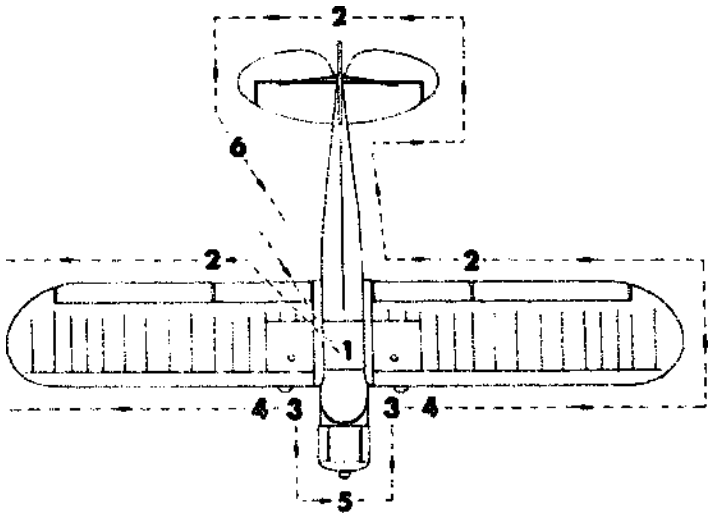
SECTION III OPERATING INSTRUCTIONS

PREFLIGHT

The following safety procedure instructions must become an integral part of the aircraft owner's operational routine and preflight inspection.

Before each flight visually inspect the airplane and determine that:

1. a. Ignition and battery switches "OFF."
   b. Mixture to idle cut-off
2. a. There is no external damage or operational interference to the control surfaces, wings, or fuselage.
   b. There is no snow, ice, or frost on the wings or control surfaces.
3. a. The fuel supply is checked.
   b. The caps are secured.



4. a. The tires are satisfactorily inflated.
   b. Tires are not excessively worn or cut.
5. a. The cowling and inspection covers are secured.
   b. The windshield is clean and free of defects.
   c. The propeller is free of detrimental nicks and there are no cracks in the propeller spinner.
   d. There are no obvious fuel or oil leaks.
   e. The engine oil is at the proper level.
   f. The fuel strainer is drained.
6. a. Upon entering the airplane, all controls operate normally.
   b. All the required papers are in order and are in the airplane.
   c. The cabin door is closed and secured.
   d. Seat belts and shoulder harnesses are fastened.

STARTING

When the engine is cold, prime three to five strokes after turning fuel valve to the on position. Push mixture control to full rich, carburetor heat off, and open throttle about one-eighth of an inch or until the intake of air at the carburetor can be heard when the engine is pulled through by hand. Engine should be pulled through at least four times.

Next turn the ignition switch to "Both" and with brakes set, have engine pulled through by hand or engage starter if installed. If the engine does not start in the first few revolutions, open the throttle while the engine is turning over with ignition on. When engine starts, reduce throttle.

Manual starts must be accomplished with great care. To avoid accidents, both the person at the controls and the person at the propeller must be acquainted with manual starting techniques.

If the above procedure does not start the engine, reprime and repeat process. Continue to load cylinders by priming or unload by turning over the engine with the throttle open.

If engine still does not start, check for malfunctioning of ignition or carburetor system.

When the engine is warm, do not prime, but turn ignition switch to "OFF" before pulling propeller through. Engine should start after it has been rotated through four compression strokes. If turned over more than four times the engine will frequently "load up" after which it should be started with the throttle well advanced.

WARM-UP AND GROUND CHECK

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 1000 RPM, for not more than two minutes in warm weather, four minutes in cold weather. The magnetos should be checked at 1800 RPM; the drop should not exceed 100 RPM. The engine is warm enough for takeoff when the throttle can be opened without engine faltering.

Carburetor heat should be checked during the warm-up to make sure the heat control operation is satisfactory and to clear out the engine if any ice has formed. It should also be checked in flight occasionally when outside air temperatures are between 20 and 70 to see if icing is occurring in the carburetor. In most cases when the engine loses speed without apparent cause, the use of carburetor heat will correct the condition.

TAKEOFF, CLIMB AND STALLS

The trim adjustment should be set approximately in the neutral position for takeoff. Fuel selector should be on, carburetor heat off, mixture full rich, except a minimum amount of leaning is permitted for smooth engine operation when taking off at high elevation. The flaps can be lowered if desired, but should be retracted as soon as

climbing airspeed has been reached to achieve maximum rate of climb. The best rate of climb airspeed at gross load is 55 MPH. At lighter weights, the best climbing airspeed will be reduced proportionally.
The gross weight power off stalling speed with full flaps in the Grizzly Cub 150 is 28 MPH IAS; with flaps up the stalling speed increases about 3 MPH.

CRUISING

The cruising speed of the Grizzly Cub at 75% of rated engine power, at gross load under standard sea level conditions, is approximately 105 M PH. Cruising airspeed and engine RPM will depend on the propeller installed on the airplane.
Normally the Grizzly Cub should cruise at 2400 to 2450 RPM, but the 75% of power RPM (low altitudes) can be determined as follows:
1. Fly the aircraft as near sea level as practicable at full throttle until maximum speed is reached. Note RPM at top speed, level flight.
2. Reduce the maximum RPM by 10% and cruise at 90% of full RPM. The correct cruising RPM will result in a cruising airspeed of 105 MPH with a fuel consumption of approximately 9 gallons per hour. If the airplane is slowed down to about 85 MPH, approximately 5 gallons per hour will be used. See fuel consumption chart.
The metal propeller with which the Grizzly Cub 160 is equipped as standard equipment is, unless specified otherwise, a 56 inch pitch propeller that favors takeoff and climb rather than cruising speed. For training and other purposes which do not require use of full power settings to obtain satisfactory performance, this propeller may be operated, during takeoff, climb, and cruise, at 2200 RPM or less. This will still provide more performance than was formerly available in 65 HP trainers, and will reduce fuel consumption and engine wear very appreciably.
The fuel consumption chart should be consulted to determine most economical cruising RPM for specific requirements.

To lean the mixture, pull the mixture control until the engine becomes rough, indicating that the lean mixture limit has been reached in the leaner cylinders. Then enrich the mixture by pushing the control toward the instrument panel until engine operation becomes smooth. The mixture should be leaned 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. Always enrich the mixture before increasing power settings. 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.

Unless icing conditions in the carburetor are severe, do not cruise with the carburetor heat on. Apply full carburetor heat only for a few seconds at intervals determined by icing severity.

APPROACH AND LANDING

During the approach, trim the plane with the stabilizer adjustment until no force is required on the stick to maintain a gliding speed of 70 MPH. Lower the flaps at an airspeed not to exceed 85 MPH. The mixture should be full rich, fuel valve on correct tank. The carburetor heat need not be used unless icing conditions prevail, but the engine should be cleared frequently by opening the throttle.
During the landing roll the steerable tail wheel should be used for directional control, and brakes should be used as little as possible to avoid excessive brake and tire wear.

Before shutting down the engine, set throttle to idle and turn the magneto switches off momentarily to check magneto grounding.

To stop the engine, after landing and when clear of the runway, pull the mixture control full out to idle cui-off. When using alternate fuels, the engine should be run up to 1200 RPM for one minute prior to shutdown to clean out any unburned fuel. After the engine stops, turn the ignition and master switch (if any) off, and retract the flaps.

WEIGHT AND BALANCE

For weight and balance data, see the weight and balance sheet that gives the exact weight of the airplane and permissible center of gravity conditions. When a heavy load, either passengers or cargo, is to be carried, the pilot is responsible for computing gross weight and center of gravity location.

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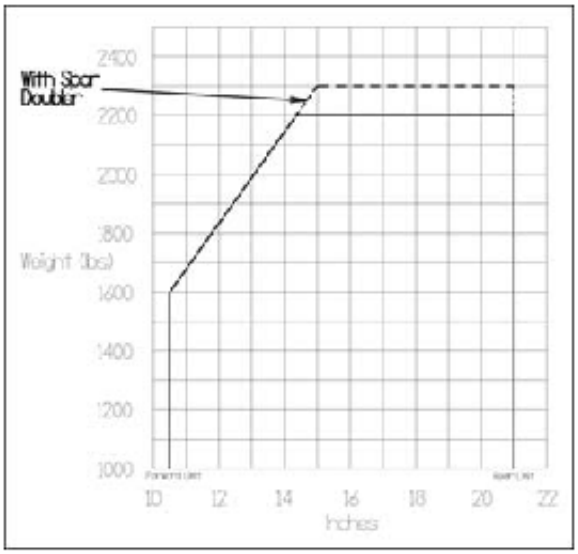
The Datum line is the leading edge of the wing. The aircraft is to be leveled in the flight attitude (level between bottom of front and rear spars) and each wheel weighed using aircraft scales. Install 2 gallons of fuel into each tank then drain tanks by disconnecting the fuel line at the engine. This will add the unusable fuel to the aircraft weight. (ensure that oil levels are at maximum recommended)

Empty Weight of Aircraft

Enter weights in green sections ONLY!			
Item	Weight (lbs)	Arm (inches)	Moment
Right Main	542	2	1084
Left Main	544	2	1088
Tail Wheel	59	201.75	11903.25
Cargo Pod	25	45.95	1148.75
Empty Weight is	1170		
Center of Gravity is	13.01		

Load Calculations

100LL weights 6 lbs/Gallon			
Item	Weight (lbs)	Arm (inches)	Moment
Aircraft Empty Weight	1145	12.03	13774.50
Fuel (gallons)	32	21	4032.00
Front Passenger	180	11	1980.00
Rear Passenger	180	37	6660.00
Baggage 1	20	57	1140.00
Baggage 2 (25# empty)	50	40	2000.00



Aircraft Gross Weight **2000**

Total Aircraft Weight can not exceed Gross Weight

Spar Doubler NOT installed on this Aircraft

Total Aircraft Weight	1607
Final CG Position	18.41

EMERGENCY LOCATOR TRANSMITTER

The Emergency Locator Transmitter (ELT), when installed, is located in the fuselage just aft of the battery and is accessible through a removable plate on the upper right side of the fuselage. The ELT meets the requirements of FAR 91.52. The transmitter operates on a self-contained battery.

A battery replacement date is marked on the transmitter label. To comply with FAA regulations, the battery must be replaced on or before this date. The battery must also be replaced if the transmitter has been used in an emergency or if the accumulated test time exceeds one hour, or if the unit has been inadvertently activated for an undetermined time period.

When installed in the airplane, the ELT transmits through the antenna mounted on the fuselage. The unit is also equipped with an integral portable antenna to allow the locator to be removed from the airplane in an emergency and used as a portable signal transmitter.

The locator should be checked during the preflight ground check to make sure that it 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. Rearm the unit and then recheck.

NOTE:
If for any reason a test transmission is necessary, the test transmission should be conducted only in the first five minutes of any hour and limited to three audio sweeps. If tests must be made at any other time, the tests should be coordinated with the nearest FAA tower or flight service station.

A pilot's remote switch on the left overhead panel allows the ELT transmitter to be controlled from the cockpit. This switch is placarded "ON," "ARM" and "OFF RESET" If the switch has been placed in the "ON** position for any reason, the "OFF RESET" position must be selected for one second before the switch is placed in the "ARM" position.

SECTION IV EMERGENCY PROCEDURES

INTRODUCTION

This section contains procedures that are recommended if an emergency condition should occur during ground operation, takeoff, or in flight. These procedures are suggested as the best course of action for coping with the particular condition described, but are not a substitute for sound judgement 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 herein, 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 pilots review standard emergency procedures periodically to remain proficient in them.

ENGINE POWER LOSS DURING TAKEOFF

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

1. If sufficient runway remains for a normal landing, land straight ahead.
2. If insufficient runway remains, maintain a safe airspeed and make only a shallow turn if necessary to avoid obstructions. Use of flaps depends on circumstances. Normally, flaps should be fully extended for touchdown.
3. If you have gained sufficient altitude to attempt a restart, proceed as follows:
    a. MAINTAIN SAFE AIRSPEED
    b. FUEL SELECTOR - CHECK FUEL ON
    c. MIXTURE - CHECK RICH
    d. CARBURETOR HEAT – ON

NOTE:

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

ENGINE POWER LOSS IN FLIGHT

Complete engine power loss is usually caused by fuel flow interruption, and power will be restored shordy after fuel flow is restored. If power loss occurs at low altitude, the first step is to prepare for an emergency landing (See POWER OFF LANDING). Maintain an airspeed of at least 70 MPH IAS, and if altitude permits, proceed as follows:

1. Fuel Selector - Switch ON.
2. Mixture - Rich
3. Carburetor Heat - On
4. Engine Gauges - Check for an indication of the cause of power loss.
5. Primer - Check locked

PARTIAL POWER LOSS

If the engine is producing partial power and time permits:

1. Ignition Switch - "L" then R" then back to "BOTH."
2. Throttle and Mixture - Different settings. (This may restore power if problem is too rich or too lean a mixture, or a partial fuel system restriction.)

NOTE

If engine failure was caused by fuel exhaustion, power will not be regained . If power is not restored, proceed with POWER OFF-' LANDING procedures.

POWER OFF LANDING

If loss of power occurs at altitude, trim the aircraft for best gliding angle (60 MPH IAS), 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 them 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 approach. Excess altitude may be lost by widening your pattern, using flaps or slipping, or a combination of these.

Touchdown should normally be made at the lowest possible airspeed, with full flaps.

When committed to landing:

1. Ignition - Off
2. Master Switch - Off
3. Fuel Selector - Off
4. Mixture - Idle Cut-Off
5. Seat Belt, Shoulder Harness - Snug

FIRE

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

Source of fire - Check

1. Electrical Fire (smoke in cabin):
    a. Master Switch - Off
    b. Land as soon as possible.
2. Engine Fire In Flight:
    a. Fuel Selector - Off
    b. Mixture - Idle Cut-Off
    c. Heater - Off (In all cases of fire)
    d. Prepare for forced landing.

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

3. Engine Fire During Start:
    a. If engine has not started
        (1) Mixture - Idle Cut-Off
        (2) Throttle - Open
        (3) Turn engine with starter (This is an attempt to pull the fire into the engine.)
    b. If engine has already started and is running, continue operating to try pulling the fire into the engine.
    c. In either case stated in a. and b.. if the fire continues longer than a few seconds, the fire should be extinguished by the best available external means.
    d. If external fire extinguishing is to be applied:
        (1) Fuel Selector - Off
        (2) Mixture- Idle Cut-Off

Engine fires during start are usually the result of over priming. The procedure above is designed to draw the excess fuel back into the induction system.

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 die 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 to POWER OFF LANDING.

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

1. Reduce Electrical Load.
2. Alternator Circuit Breaker - Check
3. Master Switch - Off (for 1 second), Then On

If the ammeter continues to indicate no output, or alternator circuit breaker will not stay reset, maintain minimum electrical load and land as soon as practical. All electrical load is being supplied by the battery.

ENGINE ROUGHNESS

Engine roughness may be due to carburetor icing, ignition trouble, incorrect mixture, or an unlocked primer and may be accompanied by serious power loss. This power loss may be evidenced by a loss of RPM and by a slight loss of airspeed or altitude. If too much carburetor ice is allowed to accumulate, restoration of full power may not be possible; therefore, prompt action is required.

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 carburetor heat to COLD. If the engine is still rough, try steps below.

1. Mixture - Adjust for maximum smoothness. Engine will run rough if the mixture is too rich or too lean.
2. Engine Gauges - Check for abnormal readings. If any gauge readings are abnormal, proceed accordingly.
3. Magneto Switch - "L", then "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.
4. Primer Pump-Check locked.

If roughness persists, prepare for a precautionary landing at pilots discretion.

NOTE:

Partial carburetor heat may be worse than no heat at ail since it may partially melt the 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.

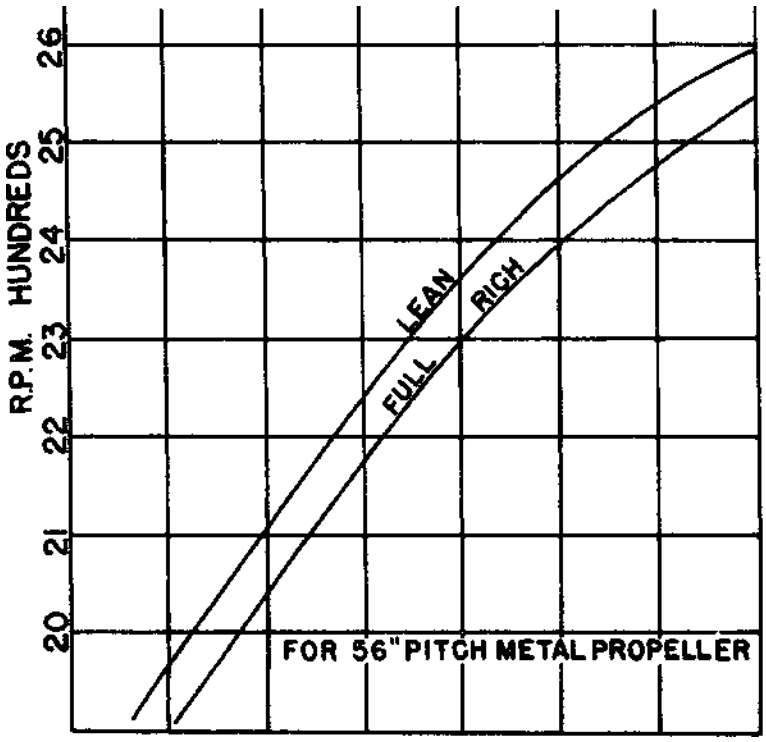
SPINS

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

SECTION V
PERFORMANCE CHART

Fuel Consumption

PIPER PA-18 160 LYCOMING 0-320 FUEL CONSUMPTION, GALS. PER. HOUR VS R.RM. AT FULL RICH
- AND -
BEST LEAN MIXTURE SETTINGS



SECTION VI

SECTION VI GENERAL MAINTENANCE

ENGINE ACCESS

The steel tubular engine mount on the Grizzly Cub is mounted to the fuselage at the firewall on hinges, so that the rear of the engine can readily be made accessible for service. To hinge the motor mount, first remove the top, side and bottom engine cowl panels which are quickly detachable by means of cowl fasteners. Next detach the rear end of the cowl support channels from their fire wall brackets, extract the right hand hinge bolts, and swing the right side of the engine forward.

TIRE INFLATION

For maximum tire service, keep the tires inflated to the proper pressure, which is I5 pounds on the Grizzly Cub. Reverse the tires on the wheels, if necessary, to produce even wear.

BATTERY SERVICE

An Odyssey PC680 12 V Dry Cell battery is installed Aft of the rear seat. Be sure all connections are clean and tight. If battery is not up to proper charge, recharge, starting with a charging rate of four amps and finishing with two amps. If a quick charge is desired for the battery, be sure master switch is off while charging.

CARE OF WINDSHIELD AND WINDOWS

The windshield and windows are made of plexiglas and a certain amount of care is required to keep them clean and clear. The following procedure is suggested.-

1. Wash with clean water and dislodge excess dirt, mud, etc. with your hand.
2. Wash with mild soap and warm water. Use a soft cloth or sponge. (Do not rub.)
3. Remove oil, grease or sealing compounds with a cloth soaked in kerosene.

NOTE

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

4. After cleaning, apply a thin coat of hard polishing wax. Rub lightly with soft dry cloth.
5. A severe scratch or mar can be removed by using jewelers rouge to rub out scratch; then smooth on both sides and apply wax.

OIL REQUIREMENTS

The oil capacity of the 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. LI85 and Lycoming Service Instruction No. 1014 for additional information and recommended service procedures. The following grades are recommended for the specified temperatures:
Temperatures above 60° F_____SAE 50
Temperatures between 30°F to 90°F_____SAE 40
Temperatures between 0° F to 70° F_____SAE 30
Temperatures below 10° F_____SAE 20
All Temperatures_____!5W-50 or 20W-50 Multivis Oils.
Either mineral oil or anti-dispersant oil may be used, but the two types of oil may never be mixed.

FUEL REQUIREMENTS

The minimum aviation grade fuel for the PA-18-150 is 80/87. The use of lower grades can cause serious engine damage in a short period of times. Whenever 80/87 is not available, the lowest lead 100 grade should be used. (See Fuel Grade Comparison Chart, next page.) Refer to the latest issue of Lycoming Service Instruction No. 1070 for additional information. Alternatively, Alcohol Free MOGAS of 90 AKI or higher may be used in place of AVGAS.

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.
Reference the latest issue of Lycoming Service Letter No, L185 for care, operation and maintenance of the airplane when using the higher leaded fuel.

The fuel gauge glass should be cleaned occasionally so that the fuel level indicator will always be readily seen. To clean or replace the fuel gauges, first remove lower wing butt fairings. Pinch the rubber line to the lower gauge fitting so that fuel cannot drain from the tank. Then remove the fuel gauges by pulling the fittings from the connecting rubber tubes.

CARBURETOR AIR FILTER

1. Visual Inspection

A visual inspection of the Bracket BA-4108 element should be made at intervals not exceeding eight (8) hours of operation or at any time after the filter has been subjected to severe dust conditions. This inspection should be made to determine if there has been a rupture of the foam element, damage to the outer screen or end seals, or blockage of the air flow due to leaves, paper, etc.

2. Cleaning

Remove cartridge and rinse with Stoddard solvent or Avgas. Spray lightly with K&N Air Filter Oil. If any deterioration in the element is noted, replace with a new Bracket BA-4108 element.

3. Replacement

If the present element is found to be in good condition and is not obstructed after being properly cleaned (see paragraphs 1 and 2), the following check should be made:

a. Operate engine to static RPM at full throttle and note RPM.

b. Remove filter cartridge and repeat operation in paragraph 3a.

If an increase of 50 RPM or greater is noted, a new cartridge should be installed.

BRAKE SERVICE

The brake system is filled with M1L-H-5606 hydraulic brake fluid. This should be checked at every 100 hour inspection, and replenished if necessary. This aircraft is equipped with model 40-59 6:00 x 6 Cleveland wheels and brakes using RA066-11200 Rapco linings and Matco MCMC-4A Master Cylinders. (Wheels and brakes from Beech Skipper)

Use only MIL-H-5606 petroleum base brake fluid when refilling the system. When it is necessary to refill brake system, or when the brakes seem spongy, probably due to air in the lines, the following procedures are to be followed:

1. To fill the brake system, Pump fluid into the system via bleed valve on the slave cylinder at the wheel. Some air may get trapped in the line at the master cylinder.
2. Air in the brake lines cause faulty operation which can be corrected by bleeding the brake system as follows:

a. Loosen the brake line at the output of the master cylinder.
b. Press lightly on the brake pedal by hand until some fluid escapes from the loosened fitting.
c. Without releasing the brake pedal, reattach and snug the brake line fitting back to the master cylinder.

CLEVELAND:
No adjustment of the brake lining clearance is necessary as they are self-adjusting. Inspection of the lining is necessary, and it may be inspected visually while installed on the airplane. The linings are of the riveted type and should be replaced if the thickness of any one segment becomes worn below 0.099 of an inch or unevenly worn.

Check the brake disc for grooves, scratches, pits or coning. Coning beyond .015 in either direction would be cause for replace-ment. A single groove or isolated grooves up to 0.031 of an inch deep would not necessitate replacement, but a grooving of the entire surface would reduce lining life and should be replaced. If a powdery rust appears on the disc, one or two taxi-braking applications should clear the rust up. Heavier rust may require removal of the disc to wire brush it. Then finish sand with 220 grit sandpaper.

Lining may be removed from the backing plates by drilling or punching out the old rivets and installing a new set using the proper rivets and a rivet set that will properly stake the lining and form a correct flare of the rivet. Use RAPCO RA066-11200 linings to reline brakes.

Bearings are races are Timken part numbers LM29710 race and LM29749 Bearing, commonly available at most auto parts dealers.

To service the tires and/ or bearings, place the airplane on jacks or a properly sized block. To remove the main wheel, remove the two cap bolts that join the brake cylinder housing and the lining back plate assemblies. Remove

the back plate from between brake disc and wheel. Remove the cover and the cotter pin that safeties the wheel nut, remove the wheel nut and slide the wheel from the axle. The wheel halves may be separated by first deflating the tire. With the tire sufficiently deflated, remove the wheel through bolts. Pull the wheel halves from the tire by removing the inner half from the tire first, and then the other half.

LANDING GEAR SERVICE

The landing gear shock cords, which are enclosed in shock cord covers, should be inspected regularly for signs of wear. Shock struts and landing gear hinge bolts should be kept properly lubricated with light grease or oil.

LEVELING AND RIGGING

The airplane should be leveled as follows:
Use a carpenters level or a smart level on the open right door sill to level longitudinally, and level horizontally with a level on the cross tube holding the front of the baggage bag aft of the rear seat.. The airplane will be leveled longitudinally and laterally as indicated by the levels.

Lateral leveling: Place jacks or blocks under the inside portion of the axles, adjusting them until the plumb bob is roughly in line laterally with the mark on the door frame.

Longitudinal leveling: Support the tail on an adjustable jack or stand so that the airplane is approximately in level flight attitude. Adjust the jack until the plumb bob is in line longitudinally with the reference mark.
Next readjust the lateral leveling jacks until the plumb bob hangs directly over the designated mark. The airplane is then leveled on both axes.

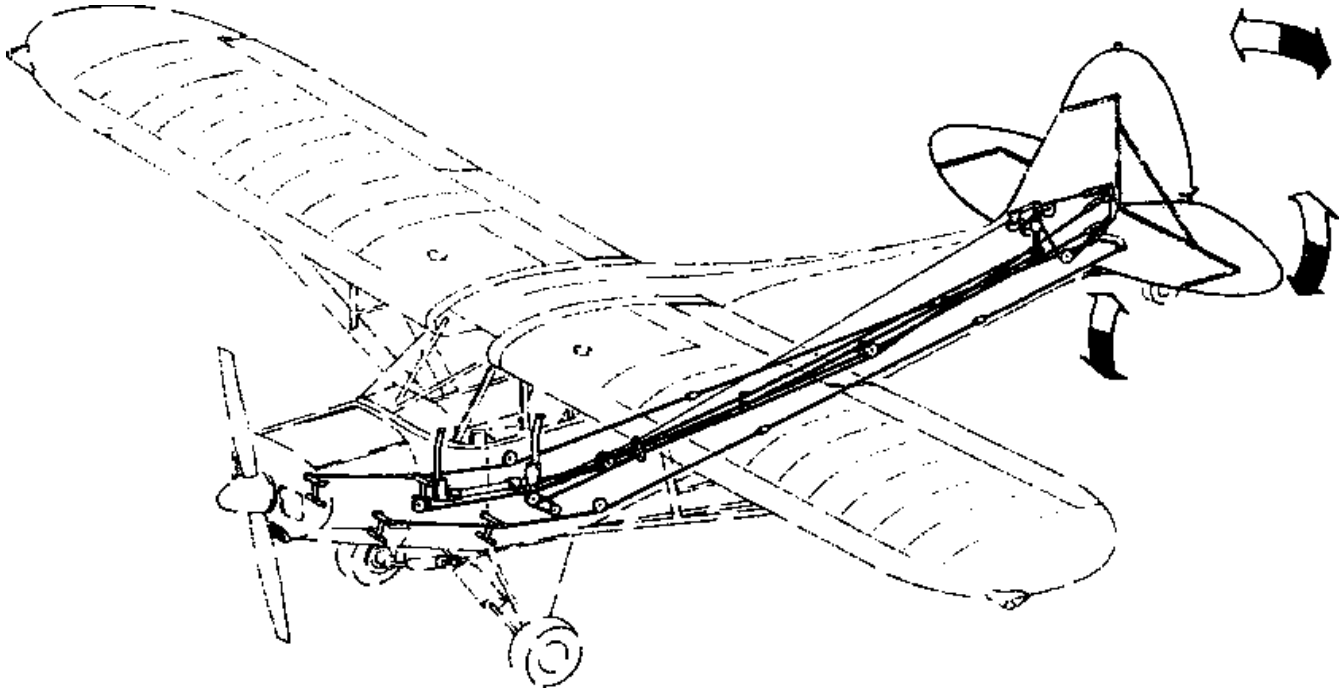
Rigging of the aircraft is done as follows:

1. **Dihedral angle**: Place a block 3/8" high on one end of a 30" level. Hold the level between the jury strut and the main strut attachments under the front spar with spacer block outboard. When the bubble is centered, the front spars have an angle of 45 minutes off level.
Normally the correct dihedral will be obtained when about seven threads on the lift strut adjustment forks are exposed. (A maximum extension of 15 threads is permissible.) If proper rigging does not result from this procedure, check the fuselage for lateral leveling by holding a level between the front landing gear bolt heads, using this means to level the fuselage laterally, rather than the plumb bob. Then rccheck for equal and proper dihedral of the wings.
2. **Wash out**: Place a 3/8" spacer block on top of a 30 inch level at one end. Working on the outboard aileron rib, hold the level fore and aft with the spacer block at the rear and the front end of the level under the front spar. The correct wash out will exist when the bubble is centered. Adjust the rear struts in or out to obtain this condition.
3. **Tail assembly**: With the airplane in level position, the stabilizers should be leveled at their rear spars by adjusting the rear set of tail brace wires while leaving the front set loose. The elevator hinge line should be straight and level from tip to tip. The fin should be vertical at the rudder post. After the rear set of wires are rigged, tighten up on the front set. being careful not to twist the fin or stabilizer. Hold a straight edge of 37.5 inches in length on the tail wire. Hook a spring scale onto the center of the tail wire. A pull of 10 pounds + one pound on the scale

perpendicular to the straight edge will cause a deflection of 7/16 ± 1/16 inches on a tail wire under proper tension. Adjust all wires to this tension.

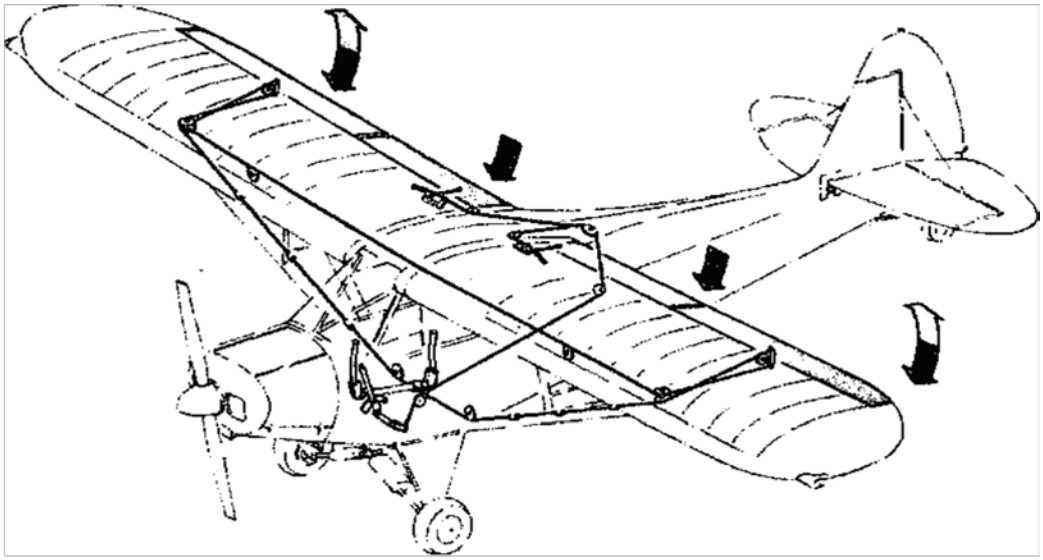
CONTROL SURFACE RIGGING

1. Elevator cable tension should be checked and set to a tension of 62 t 2 pounds. (See Tail Surface Control System, page 22.)
2. Aileron cable tension should be checked and set to a tension of 40 ± 2 pounds. (See Aileron Flap Control System, page 23.)
3. Flap cable tension should be taunt and the left flap is set at 50° ± 2°, then bring the right flap to the same setting.
4. Rudder cable tension should be taunt and adjustment is made by setting the rudder at neutral, clamping the rudder pedals at neutral and connecting the cable with the rudder horn by aligning the cable end with the proper hole on the rudder horn.



TAIL SURFACES CONTROL SYSTEM SCOTT Grizzly CUB

TRAVEL OF:
Rudder: 25°±2°Rt & 25° ±2° Lt
Stabilizer: FIXED
Elevator: 25° ±2°up & 15° ±2° Down



AILERON AND FLAP CONTROL SYSTEM SCOTT Grizzly Cub

TRAVEL OF

Aileron: 18° ± 2° Up & 18° ± 2° Down

Flap: 0° Up & 50° ± 2° Down

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SECTION V

SECTION VI