

CHECK LIST

MODEL AA-5 & TRAVELER

BEFORE STARTING

1. PREFLIGHT—Fuel, Oil, Prop, Tires, Aircraft General Condition
2. Seats and Belts—ADJUSTED
3. Brakes—ON
4. Controls—FREE
5. FUEL—Fullest Tank

STARTING ENGINE

1. Primer—AS REQUIRED
2. Mixture—RICH
3. Throttle—OPEN 1/8 INCH
4. Carb. Heat—OFF
5. Master/Alt. Switch—ON
6. Aux. Pump—ON (0.5 to 8 psi)
Aux. Pump—OFF
7. CLEAR PROP
8. Ignition Switch—ON BOTH
9. Starter—PRESS
10. Oil Pressure—CHECK

ENGINE RUNUP

1. Brakes—ON
2. Throttle—SET (1800 RPM)
3. Engine Inst.—CHECK
4. Magneto—CHECK (175 RPM ea.)
(Max. Difference 50 RPM)
5. Carb. Heat—CHECK

BEFORE TAKE-OFF

1. Flaps—CHECK OPERATION
2. Flaps—UP
2. Trim—SET
3. Primer—LOCKED
4. Mixture—RICH
5. Carb Heat—OFF
6. Controls—CHECK
7. Engine Inst.—CHECK
8. Flight Inst.—SET & CHECK
9. Canopy—CHECK

TAKE-OFF

1. Aux. Pump—ON
2. FULL THROTTLE
3. Raise Nose—55 to 60 MPH

CLIMB

1. FULL THROTTLE
2. Normal—100 MPH

CRUISE

1. Power—2200 to 2700 RPM
2. Aux. Pump—OFF
3. Lean—AS REQUIRED
4. Fuel Quantity—CHECK

BEFORE LANDING

1. FUEL—Fullest Tank
2. Aux. Pump—ON
3. Mixture—RICH
4. Carb. Heat—AS REQUIRED
5. Flaps—AS REQUIRED
(Max. 120 MPH)
6. Approach—75 MPH

AFTER LANDING

1. Flaps—UP
2. Carb. Heat—OFF
3. Aux. Pump—OFF

SHUT DOWN

1. Elec. Equip.—OFF
2. Mixture—IDLE CUT—OFF
3. Magnetos—OFF
4. Master Switch—OFF

OY - GAB

GRUMMAN AMERICAN

Model AA-5

and Traveler

**GRUMMAN AMERICAN AVIATION
CORPORATION**

319 BISHOP ROAD, CLEVELAND, OHIO 44143
(216) 449-2200 TELEX NO. 980-245

OWNER'S MANUAL

Owner _____

Registration No. _____

PERFORMANCE/SPECIFICATIONS: MODEL AA-5

GROSS WEIGHT 2200 lbs.

SPEED: * Top Speed at Sea Level 150 m.p.h.
Cruise, 75% Power at 9000 ft. 140 m.p.h.
Cruise, 65% Power at 9000 ft. 129 m.p.h.

RANGE: Cruise, 75% Power at 9000 ft. 600 mi.
37 Gallons, No Reserve 4.3 hrs.
Cruise, 65% Power at 9000 ft. 645 mi.
37 Gallons, No Reserve 5.0 hrs.
Optimum Range at 10,000 ft. 650 mi.
37 Gallons, No Reserve 5.0 hrs.

RATE OF CLIMB AT SEA LEVEL 660 f.p.m.

SERVICE CEILING 12,650 ft.

TAKE OFF: Ground Roll 880 ft.
Total Distance Over 50 ft. Obstacle 1600 ft.

LANDING: Ground Roll 380 ft.
Total Distance Over 50 ft. Obstacle 1100 ft.

WING LOADING 15.7 lb./sq. ft.

POWER LOADING 14.7 lb./bhp.

BAGGAGE 120 lbs.

FUEL CAPACITY: TOTAL 38 gal.

OIL CAPACITY: TOTAL 8 qts.

PROPELLER: McCauley Fixed Pitch (Diameter) ... 73 in.

ENGINE: LYCOMING
Model O-320-E2G. 150 hp. at 2700 r.p.m.

* Equipped with wheel fairings.

Welcome Aboard!

Congratulations! Your AA-5 has been designed to provide a responsive, high performance four-place aircraft. It offers low hourly cost in flight and minimum maintenance. The materials, techniques and design innovations which made the AA-5 possible also made it much stronger and more handsome than any other four-place aircraft in its class.

Metal-to-metal bonding eliminates the many sources of drag and stress concentrations built into other four-place aircraft, and leaves the aerodynamic surfaces smooth as glass. Aluminum honeycomb completely surrounds the cabin, providing a lightweight, exceptionally strong passenger compartment for maximum safety.

The AA-5's combination of strength, performance, agility and economy plus the rear seat convertibility, make it an excellent passenger or utility aircraft for local or cross-country flights.

Get to know your authorized Grumman American Aviation Corporation Dealer. He can provide the fast, expert service that will keep your AA-5 in excellent condition for many, many years. His factory-trained service people are professionals.

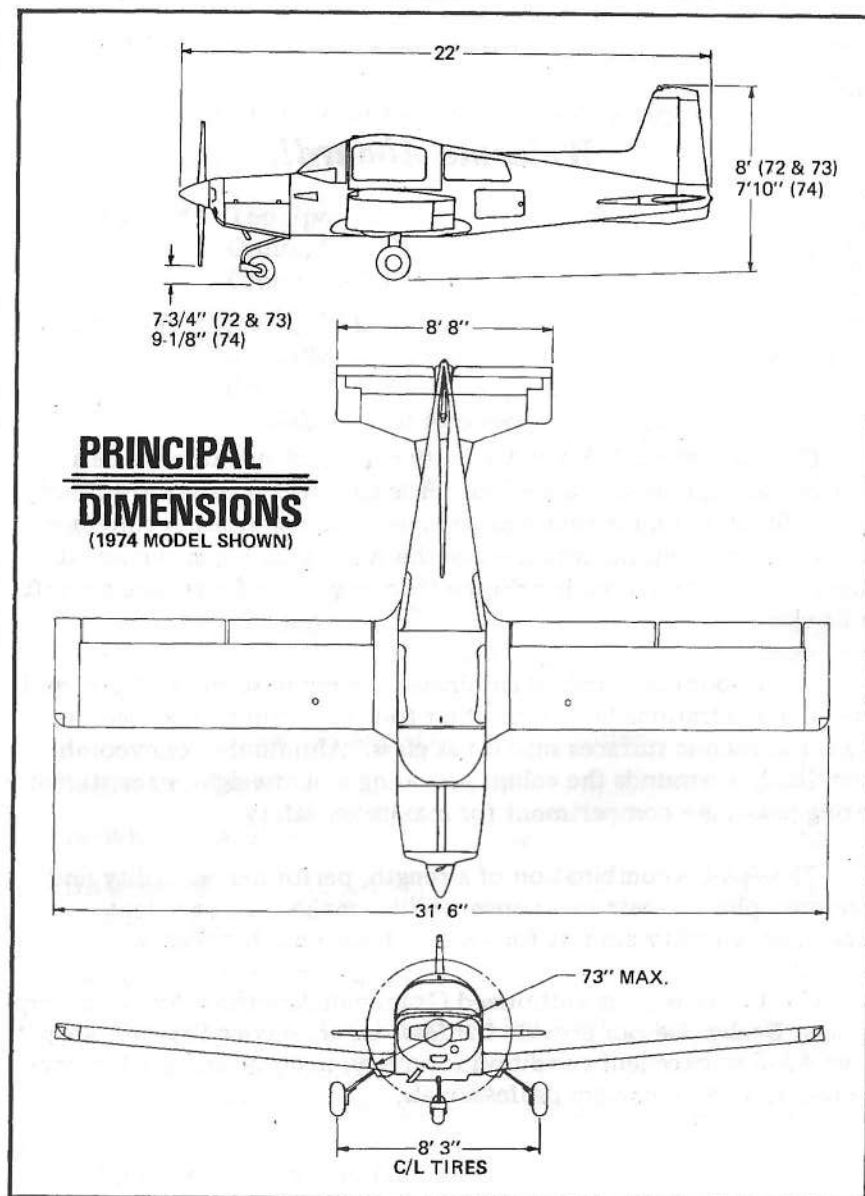


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SECTION I

DESCRIPTION OF SYSTEMS & STRUCTURES

The Model AA-5 is a four-place, all metal, low-wing monoplane. It is powered by a 150 horsepower Lycoming four-cylinder, horizontally opposed engine with a fixed-pitch metal propeller.

Airframe components such as wings, fuselage and tail assemblies employ high-strength adhesive bonding of aluminum sheet metal to ribs and bulkheads. The cabin area is constructed primarily of bonded aluminum honeycomb panel.

CABIN DESCRIPTION

1. CABIN DOME LIGHT

A cabin dome light is provided for illuminating the seating area and baggage compartment. It is controlled by a 3-position rocker switch which is located on the fuselage side panel to the left of the pilot's control wheel. This location provides easy operation by the pilot when in flight, and also convenient access from the outside when entering the aircraft at night. The switch forward position illuminates the front cabin area, the center position is off, and the aft position illuminates both the front and rear cabin areas. It is energized directly from the battery regardless of the master switch position.

2. SEAT AND BELTS

Contoured front seats are individually adjustable fore and aft using the adjustment levers located on the outboard side of each seat. The front seat backs fold forward for easy access to the rear seat.

NOTE

Shoulder belts are provided for your safety. Be sure to use them.

The shoulder belt fastens to the end of the outboard lap belt, allowing both belts to be fastened or removed in one operation. Lap and shoulder belts may be neatly stowed by hanging them on the side panel supports provided.

Lap belts should be adjusted to lie low on the hips, without any slack. Shoulder belts should lie over the outer shoulder and across the chest, with just enough slack to reach all controls comfortably.

3. CARGO CONFIGURATION

The rear seat and seat back may be folded forward to provide a

large cargo area. Both front seats should be in the full forward position to swing the rear seat bottom up and fold it forward.

NOTE

When the rear seat bottom is folded forward, the rear seat back must be folded down.

The rear seat shoulder harnesses may be removed and used to secure items in the cargo area when the rear seats are folded down in the cargo configuration. These harnesses may be hooked to any of the exposed lap belt attachment points as shown in the cargo belt diagram in Section 4.

A baggage door is provided on the left side of the fuselage for access to the baggage compartment (74 models). The baggage door latch is key operated from the outside and can be opened from the inside by a simple slide handle.

Consult Section 4, Weight and Balance, for loading instructions to load the airplane with cargo.

4. INSTRUMENT PANEL

The instrument panel employs a unique "eyebrow" design which shields the windshield from panel reflections during night flights. The eyebrow also houses the instrument panel lights which are controlled by a switch rheostat (ON—OFF and INTENSITY) located just above the throttle. Other panel switches are also the rocker type.

5. CONSOLE

The center console serves as a front seat divider, provides storage for the microphone, houses the microphone jack, the flap switch, flap position indicator, trim wheel, trim position indicator, ash tray, cigarette lighter, fuel selector valve, and fuel gauges.

FLIGHT CONTROLS

The control surfaces are operated by a combination of torque tubes and conventional cable systems. The elevator trim tabs are located on the elevator trailing edges and are anti-servo tabs. These trim tabs are actuated manually by the trim wheel located on the center console. Ground adjustable tabs on the rudder and ailerons provide a simple method of adjusting directional and lateral trim.

Electrically operated flaps provide a full range of settings by means of a spring-loaded, three position switch. The flap actuator switch is held down until the flap position indicator shows the desired flap angle; when released, it returns to neutral, and flap travel stops.

(Caution: abruptly releasing the switch may cause it to snap through the neutral detent, into the retract position.) To retract flaps, push the switch forward and release it; the flaps retract fully with no further attention, and the flap drive motor shuts off automatically.

ENGINE CONTROLS

The push-pull throttle control, located in the lower center instrument panel, is equipped with a friction lock to prevent creeping (but which can be overridden manually). The mixture control and carburetor heat control, to the right and left of the throttle, respectively, are also of the push-pull design.

FUEL SYSTEM

The AA-5's fuel system (Figure 1) consists of two tanks located just outboard of the wing root fairing, two sump tanks (one in each wing root fairing), independent fuel gauges and a fuel selector valve. The fuel tanks are vented and equipped with two main fuel lines in each tank, located to assure fuel supply in all normal flight attitudes. The flush mounted fuel tank vents are located in the bottom of the outboard wing panels, just forward and inboard from the wing tie downs. A mechanical fuel pump mounted on the engine transfers fuel from the tanks to carburetor.

An auxiliary electric fuel pump supplements the engine-driven pump. Fuel pressure is indicated on a gauge in the engine instrument cluster, located to the right of the radio section of the instrument panel. The electric pump should be turned on if the engine-driven pump fails as noted by a loss of fuel pressure. The electric fuel pump can also be used to provide fuel pressure redundancy during low altitude operation, such as during take-off and landing.

There are four fuel drains on the airplane. One is located in each fuel tank, and one in each sump tank. They can be reached under the front side of the wing at the wing root on each side of the airplane. A drain cup is provided (in the glove box) for draining fuel which should be inspected for water or sediment contamination.

HEATING AND VENTILATION

Cabin heat and defrost air are supplied by a heat exchanger on the engine exhaust system. The supply of warm air for the heater and defroster is controlled by the cabin heater control on the center of the instrument panel.

Fresh air ventilation is provided by adjustable vents located just below the instrument panel, with the air supply being ducted in from inlets in the fuselage. Maximum ventilation can be obtained by sliding

FUEL SYSTEM Schematic – Model AA-5

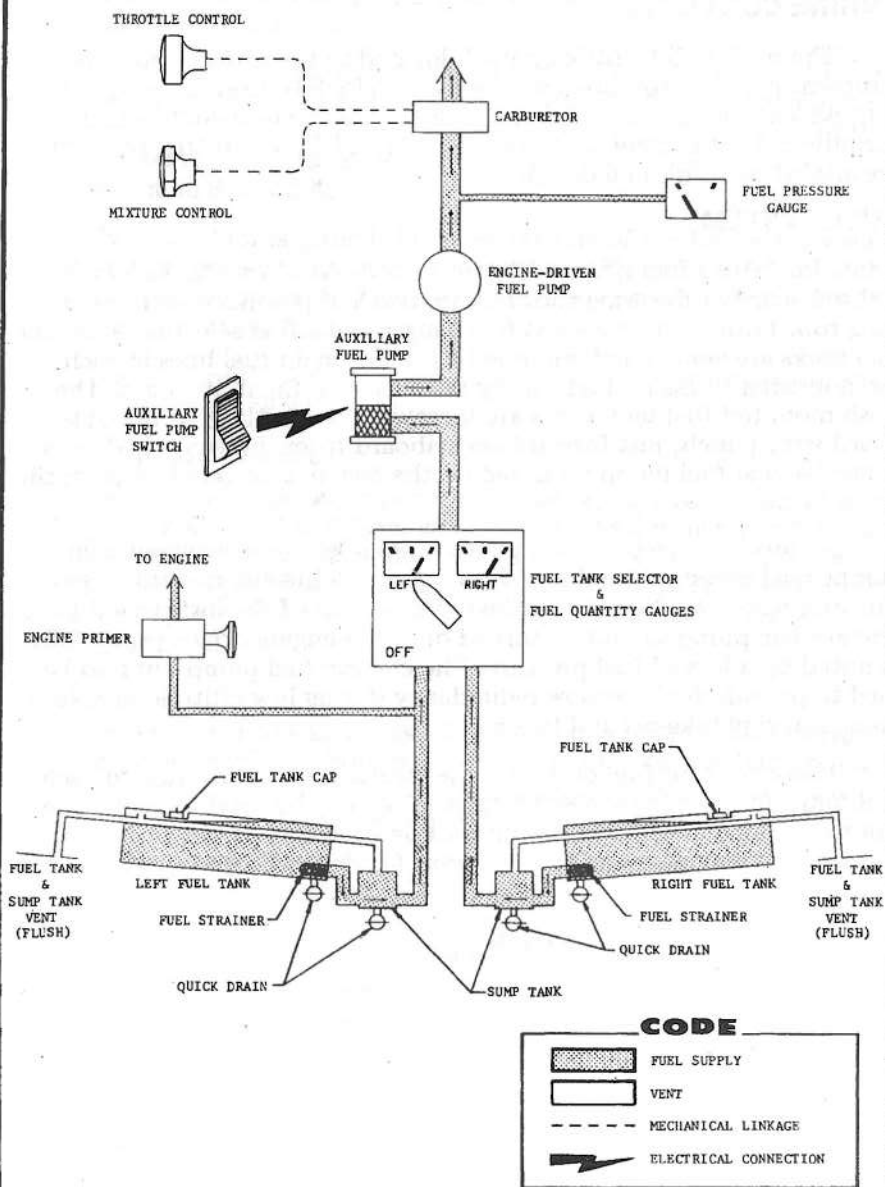


Figure 1

the canopy open to the placard marker on the canopy track at speeds up to 130 MPH.

Fresh air ventilation for the rear cabin area (optional), is provided by adjustable vents located just forward of the rear arm rests. They are operated by a twisting motion and air may be directed by positioning the vent in the desired direction.

To obtain warm defrost air, pull out the cabin heat control (on the right side of the instrument panel) and slide open the defroster vents near the lower edge of the windshield. The fresh air vent also provides good defrost action when partially opened with the louvers directed toward the side canopy.

When cool and high humidity conditions exist, do not use partial defrost as the windshield may fog rapidly on take-off. Always check defroster position before flight.

NOTE

The heater system and fresh air system can be turned on simultaneously during cold weather operations to provide a comfortable cabin atmosphere.

ELECTRICAL SYSTEM

The electrical system (Figure 2) uses a 14-volt, 60-amp alternator with internal power diodes which delivers DC power direct to the main bus through a 60-amp circuit breaker. An external voltage regulator controls the alternator output voltage and automatically adjusts the battery charging rate to maintain proper charge. The electrical system ammeter is located in the engine instrument cluster and indicates current charge (+) and discharge (–) of the battery.

The master switch is a split rocker type which serves two functions. One side (master) energizes the battery circuit for engine starting and operating electrical systems with the engine OFF. The other side (alt) energizes the alternator field circuit which produces the electrical field in the alternator. With the electrical field energized, the alternator supplies all of the required current for the system loads through the bus bar.

In the event of alternator failure, as indicated by a battery discharge indication on the ammeter, the alternator side of the master switch can be turned OFF and the aircraft systems then operated on the existing battery voltage. To conserve the battery voltage, only the necessary electrical systems should be ON when operating from the battery.

The alternator circuits are protected by a 60-amp alternator circuit breaker and a 5-amp alternator field circuit breaker. Should either

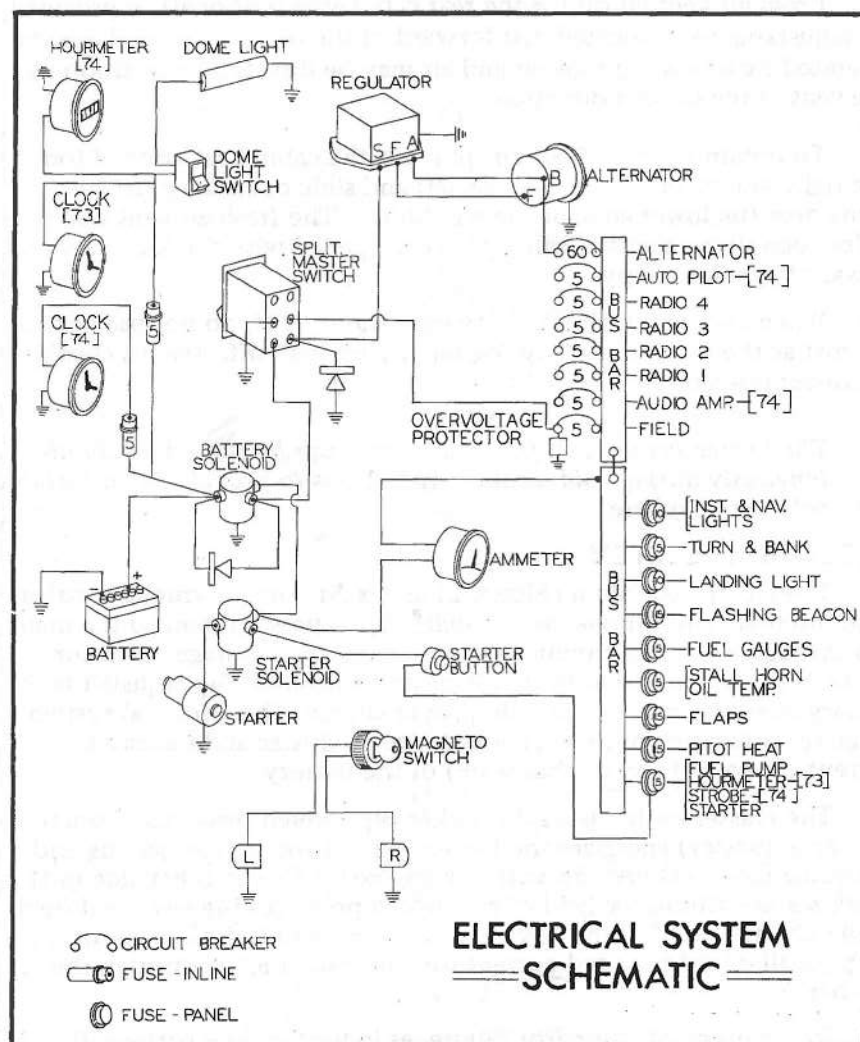


Figure 2

of these breakers open due to excessive current in the system, they should be reset after waiting at least 15 seconds. If either breaker continues to open, the alternator side of the master switch should be turned OFF and the aircraft systems then operated on existing battery voltage.

Fuses and circuit breakers for the electrical systems are located on the lower right side of the instrument panel, and spare fuses are mounted in the right side of the glove compartment. Electrical switches for exterior lighting and accessories are located at the right of the pilot's wheel.

The engine's dual-magneto ignition system is completely independent of the aircraft electrical system, and will continue to operate in the event of an electrical system failure.

LANDING GEAR

The FACE SAVER[®] main landing gear struts are of tough, laminated fiberglass to achieve outstanding shock absorption and good ground stability. The nose gear is free-castering to 90° on either side of the center line, which gives good maneuverability on the ground.

BRAKES

The brakes are toe-operated, single-disc hydraulic systems with integral parking brakes. The brakes provide all steering control while taxiing at speeds up to 15 to 20 MPH, where the rudder becomes effective and the brakes and the rudder can be used together. The parking brake is set by pressing the toe brakes; then pulling the parking brake knob; then releasing brake pedal pressure. To release, push the parking brake knob in, then press the toe-brakes firmly. Parking brakes are operated from the left side only.

EMERGENCY LOCATOR TRANSMITTER (Factory Installed Model)

The emergency locator transmitter (ELT) is a self contained battery powered radio transmitter which emits a signal (121.5/243.0 MHZ) to assist in locating a downed aircraft. The ELT consists of a transmitter located in the aft fuselage section under the vertical stabilizer and a transmitting antenna mounted on the leading edge of the vertical stabilizer or on top of the dorsal fin on the later models. The ELT has self-contained batteries and is completely independent of the aircraft electrical system. The ELT is activated automatically by a deceleration of 5 G's along the flight axis of the aircraft or manually by removing the left side empennage inspection cover and moving the transmitter control switch to the "on" position.

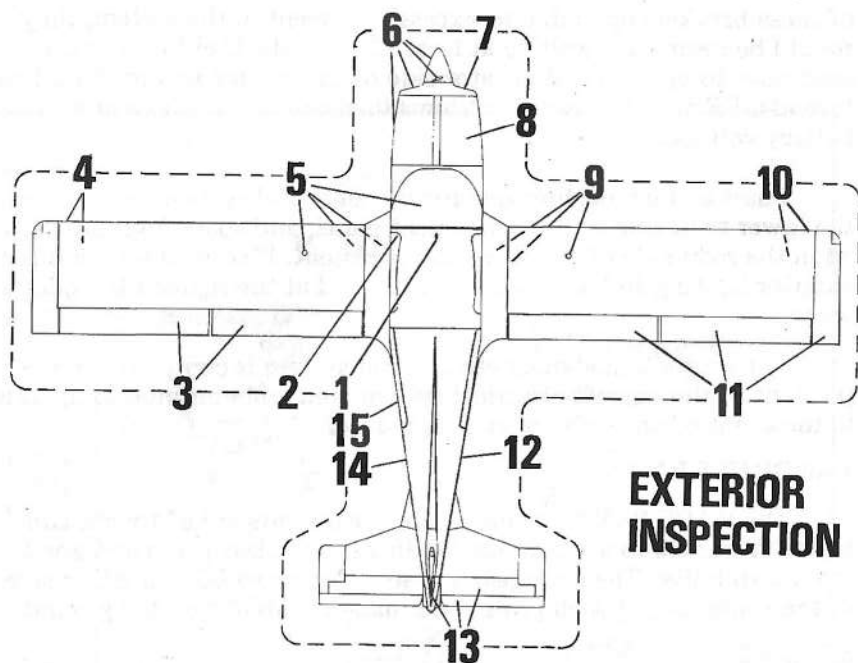


Figure 3

PREFLIGHT

The airplane should be given a thorough visual inspection prior to each flight. This procedure is recommended as shown on Figure 3.

1. Unlock and open canopy. (Latch handle turns counterclockwise to open)
2. CHECK: Ignition switch OFF, Master switch OFF, mixture control in FULL AFT, IDLE CUT-OFF position. Remove control lock.
3. Check for flap security.
Check ailerons for freedom of movement.
4. Check wing surface and tip for damage.
Remove left wing tie down.
Inspect pitot opening for foreign particles.
Inspect fuel tank vent for foreign material.
5. Visually check fuel level and check cap for tight seal.
Drain sample from the left fuel tank and left sump tank.
Inspect landing gear and tires for general condition (wear, cuts, abrasions, leaking brakes, tire inflation.)
Check windshield and canopy for general condition.
Check fresh air vents for blockage.

SECTION II

CHECK LIST AND OPERATING INSTRUCTIONS

PREFLIGHT (Continued)

6. Check propeller and spinner for cracks, nicks and security.
Check cowling for damage and security of latches.
Check landing light for damage.
Check carburetor air passage for obstructions.
7. Engine baffles and cooling openings free of foreign materials/obstructions.
Remove tow bar from nose gear.
8. Check oil level. It is recommended you DO NOT OPERATE ENGINE WITH LESS THAN 4 QUARTS. FILL TO 8 QUARTS MAXIMUM FOR EXTENDED FLIGHT.
Check nose gear and tire for wear, cuts, abrasions and proper inflation.
9. Inspect landing gear and tire for general condition (wear, cuts, abrasions, leaking brakes, proper inflation.)
Drain sample from the right fuel tank and right sump tank.
Visually check fuel level and check cap for tight seal.
10. Inspect fuel tank vent for foreign material.
Check stall horn vane for freedom of movement.
11. Check wing surface and tip for damage.
Remove right tie down.
Check ailerons for freedom of movement.
Check for flap security.
12. Check static source for foreign particles.
13. Check elevators and rudder for freedom of movement.
Check trim tabs for security.
Check tail cone for security.
Remove tail tie down.
14. Check static source for foreign particles.
15. Check baggage door for security (74).

NOTE

For night operations: always check instrument, position and landing lights for proper operation prior to starting engine. Always carry a flashlight during night operations.

BEFORE STARTING ENGINE

1. Seat: Adjusted and locked.
2. Seat belts and shoulder harnesses: Buckled and adjusted.
3. Brakes: Set.
4. Check all controls for operation.
5. Fuel selector: To fullest tank.
6. Radios and lights: OFF.

STARTING ENGINE

1. Prime engine if necessary.
2. Mixture control: Full rich.
3. Throttle: Open 1/8 inch.
4. Carburetor heat: OFF.
5. Master/Alternator switch: ON.
6. Auxiliary fuel pump: ON. Check for operation (Pressure 0.5 to 8 psi.) then turn fuel pump OFF.
7. Clear propeller.
8. Ignition switch: ON BOTH.
9. Press starter button.
10. Check oil pressure. If no pressure indicated in 30 seconds, shut engine down and determine trouble.
11. Warm up engine at 800 to 1200 RPM.

ENGINE RUN-UP

1. Throttle setting: 1800 RPM.
2. Engine instruments: Operating properly in green arc ranges.
3. Check magnetos: RIGHT-BOTH-LEFT-BOTH. 175 RPM maximum drop on either magneto, no more than 50 RPM difference between magnetos.
4. Carburetor heat: ON check for RPM drop, then OFF.
5. Suction gauge (if installed): 4.6 to 5.4 inches Hg.
6. Radio (if installed): Operation checked.
7. Engine is ready for take-off when it will take throttle without hesitating or faltering.

BEFORE TAKE-OFF

1. Console check:
 - a. Microphone (if installed): Secure.

- b. Trim Wheel: At take-off setting
- c. Flaps: Check for correct operation.
- d. Flaps: UP
- e. Fuel: On fullest tank.

2. Panel and control Check:
 - a. Primer knob: In and locked.
 - b. Mixture: Full rich.
 - c. Carburetor heat: OFF.
 - d. Auxiliary fuel pump: ON.
 - e. Controls: Free-no binding-movement in proper direction.
 - f. Flight instruments: Set.
 - g. Radios: ON.
 - h. Engine instruments: Normal.

TAKE-OFF (Normal)

1. Auxiliary fuel pump: ON.
2. Throttle: Full open.
3. Raise nose wheel between 55 and 60 MPH.
4. Normal climb speed: 100 MPH.

TAKE-OFF (Obstacle Clearance)

1. Auxiliary fuel pump: ON.
2. Throttle: Full open.
3. Controls: Apply light elevator back pressure at 55 MPH, lift nose wheel at 60 MPH.
4. Climb speed: 73 MPH.

CLIMB

1. Normal 100 MPH-full throttle.
2. Best rate 91 MPH at sea level-full throttle.
3. Best angle 78 MPH at sea level-full throttle.

CRUISE

1. Auxiliary fuel pump: OFF.
2. Power Setting: 2200 to 2700 RPM.
3. Mixture: Full rich when operating at more than 75% power. If in doubt as to percentage of power being used, use full-rich mixture for all operations below 5,000 ft.

BEFORE LANDING

1. Fuel selector: To fullest tank.
2. Mixture: Full rich.
3. Auxiliary fuel pump: ON.
4. Carburetor heat: Check, leave ON if icing conditions are known to exist.

5. Wing flaps: As desired below 120 MPH.
6. Airspeed: 75 to 80 MPH.

LANDING (Normal)

1. Touchdown on main gear.
2. Lower nose wheel slowly as speed decreases.
3. Directional Control: Use rudder while it is effective (Down to approximately 20 MPH).
4. Brakes: As required for stopping and directional control.

LANDING (Obstacle Clearance)

1. Flaps: Fully extended below 120 MPH.
2. Airspeed: 70 MPH.
3. Land on main wheels first.
4. Apply full up elevator.
5. Flaps: UP.
6. Brakes: As required for stopping and directional control.

BALKED LANDING

1. Apply full throttle.
2. Carburetor heat OFF.
3. Establish climb attitude.
4. Flaps: Retract, after accelerating to safe airspeed.

AFTER LANDING

1. Flaps: UP.
2. Carburetor heat: OFF.
3. Auxiliary fuel pump: OFF.

SHUT-DOWN

1. All electrical equipment: OFF.
2. Mixture: To idle cut-off.
3. Magneto switch: OFF.
4. Master switch: OFF.
5. Install control lock.
6. Brakes: Set and/or wheels chocked.

SECTION III

OPERATING PROCEDURES

STARTING THE ENGINE

Before priming, set the parking brake by depressing the tops of both rudder pedals, and pulling out on the parking brake control knob. It is good practice to have all radios and lights off, both to limit battery drain during the start and to protect avionics from voltage surges.

NOTE

Normally, one to three strokes of the priming pump is sufficient for quick starting. In temperatures below 40° F, however, four to six strokes may be necessary. During extremely cold days, starting will be aided by pulling the propeller through four or five revolutions by hand. Switches must be OFF when pulling the propeller. Preheating the engine or oil before starting in sub-zero temperatures will speed the start and conserve the battery charge.

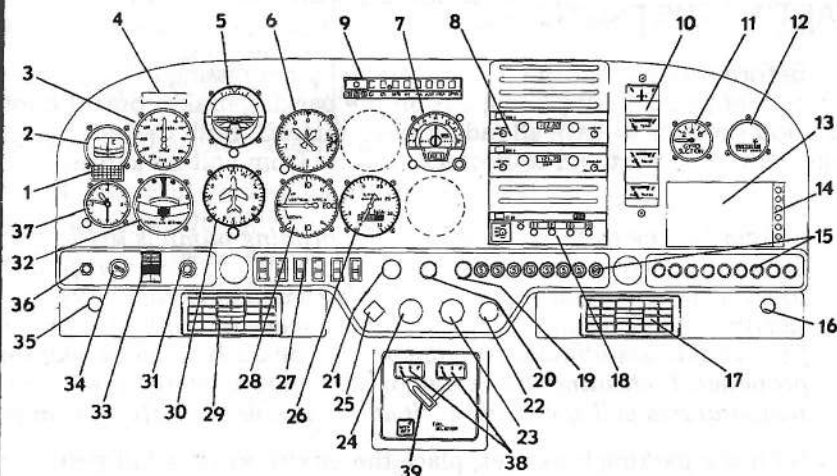
With the parking brake set, place the mixture in the full rich position; turn master switch and alternator switch ON; clear propeller area; set ignition switch to both; and engage the starter. If the engine fails to start on the first attempt, a second attempt should be made without priming. If the day is hot and the second attempt fails, it is possible the engine is over-primed. Pull the mixture control to full lean, throttle 1/4 open, and turn the engine with the starter. When the engine starts, push the mixture control to full rich. If the day is cold, it is more likely the engine is under-primed. In this event, a few extra strokes of the primer should provide a prompt start.

Check the oil pressure as the engine starts. If no oil pressure is indicated within 30 seconds (60 seconds on a very cold day), stop the engine and determine the source of trouble. Oil pressure should indicate approximately 25 psi with the engine at idle.

WARM-UP AND GROUND CHECK

Engine warm-up should be at 800 to 1200 RPM. The magneto check is run at 1800 RPM using the BOTH-RIGHT-BOTH-LEFT-BOTH sequence. Maximum RPM drop per magneto should not exceed 175 RPM, or 50 RPM differential between magnetos. The carburetor heat should be checked for operation at this time, then returned to the full OFF position. The engine is ready for take-off when it will take full throttle without hesitation or faltering.

INSTRUMENT PANEL



- | | |
|-----------------------------------|-------------------------------------|
| 1. Compass Correction Card | 21. Instrument Light Rheostat |
| 2. Compass | 22. Engine Primer |
| 3. Airspeed Indicator | 23. Mixture Control |
| 4. Aircraft Registration Number | 24. Throttle Control |
| 5. Horizon Gyro (opt.) | 25. Carb Heat Control |
| 6. Altimeter | 26. Tachometer |
| 7. Omni Head (opt.) | 27. Individual Circuit Controls |
| 8. Radios (opt.) | 28. Vertical Speed Indicator (opt.) |
| 9. Radio Selector Switches (opt.) | 29. Vent Louver (LH) |
| 10. Instrument Cluster | 30. Directional Gyro (opt.) |
| 11. Suction Gauge (opt.) | 31. Starter Button |
| 12. Hourmeter (opt.) | 32. Turn & Bank Indicator (opt.) |
| 13. Map Compartment | 33. Master Switch |
| 14. Spare Fuses | 34. Ignition Switch |
| 15. Fuses & Circuit Breakers | 35. Vent Control (LH) |
| 16. Vent Control (RH) | 36. Head Phone Jack |
| 17. Vent Louver (RH) | 37. Clock (opt.) |
| 18. Transponder (opt.) | 38. Fuel Quantity Gauges |
| 19. Parking Brake Control | 39. Fuel Selector |
| 20. Cabin Heat Control | |

Figure 4

TAKE-OFF

Before beginning the take-off roll, align the airplane with runway. Aligning the nose wheel with the take-off direction will allow minimum brake usage during the initial ground roll. When full power is applied for take-off, directional control is maintained with light toe pressure on the brakes. At speeds above 15-20 MPH, the rudder becomes fully effective and brake steering is NOT necessary. Continued use of brake steering will only prolong the take-off roll.

Accelerate to 55 MPH before applying a light back pressure on the control wheel to lift off. Raising the nose wheel too soon or to an excessive angle may increase take-off ground distance. When airborne, accelerate to the desired climb speed.

SOFT FIELD TAKE-OFF

After alignment in the take-off direction and with the elevator held in the full up position, apply take-off power smoothly. As the airplane accelerates and the elevator becomes effective, the nose load will lighten reducing nose wheel drag. As the nose raises, the elevator should be eased forward so the nose wheel is held just clear of the ground. After lift-off, accelerate to the best angle of climb speed (78 MPH at sea level) or best rate of climb (91 MPH at sea level) depending on obstacles.

NOTE

Avoid prolonged engine run-up in loose gravel, since the propeller will tend to pick up stones and debris causing blade damage.

SHORT FIELD TAKE-OFF

After alignment in the take-off direction, advance the throttle without hesitation, and begin the take-off roll with the elevator neutral. Use light smooth brake pressures to maintain low speed directional control. At 60 MPH apply elevator back pressure for rotation, then climb at 73 MPH while in ground effect below 50 ft. If terrain or further obstacles are to be cleared after take-off and above the 50 foot obstacle, accelerate to the best angle of climb speed (78 MPH at sea level). When obstacles are cleared, accelerate to the desired climb speed.

NOTE

Speeds given are for gross weight, sea level conditions.

CLIMB

A normal climb speed of 100 MPH is recommended once over ground obstacles. This speed offers good visibility, excellent over-the-ground speed and rate of climb. The best rate of climb speed varies from 91 MPH at sea level to 85 MPH at 10,000 ft. The best angle of climb speed varies from 78 MPH at sea level to 81 MPH at 10,000 ft. Refer to Section V performance charts for additional information.

NOTE

The mixture should be full rich during take-off and climb at altitudes below 5000 ft. MSL. However, during take-off or climb from high-altitude airports, the engine should be leaned to achieve best power (maximum RPM).

CRUISE

The maximum recommended cruise power setting is 75% of the rated horsepower. True airspeeds, which are determined by the particular altitude and power setting chosen, can be obtained from the tables in Section V.

Fuel consumption can be reduced significantly, especially at high altitudes, by leaning the mixture in cruising flight. For optimum fuel consumption in cruise at 75% power or less, lean the mixture as follows:

1. Slowly move the mixture control from full rich position toward lean position.
2. Continue leaning until engine roughness is noted.
3. Enrich mixture slightly until engine runs smoothly.

The Cruise Performance fuel consumption given in Section V is based upon this leaning technique.

NOTE

If engine runs rough during cruise with carburetor heat on, it may be due to an over-rich condition. To correct for engine roughness in such a situation, lean to smooth engine operation.

STALLS

The AA-5's stall characteristics are conventional in all configurations. Elevator buffeting occurs approximately 3 MPH above the stall and becomes more pronounced as the stall occurs. An audible stall warning horn begins to blow steadily 5 to 10 MPH above the actual stall speed.

NOTE

Rudder is the primary control for yaw and roll through the stall. In addition, the aileron is effective for roll control. Both controls should be used as necessary to control roll and yaw through the stall.

For specific stall speeds at maximum weight with flaps up and down, refer to the Stall Speed Table in Section V.

NORMAL APPROACH AND LANDING

Trim the airplane to an approach speed between 75 and 80 MPH, depending on weight and wind conditions. Normal approach speed is 75 MPH. Maximum flap extension speed is 120 MPH. Any flap setting may be used for landings.

As a general rule, it is good practice to contact the ground at a minimum safe speed consistent with existing conditions. After touchdown, hold the nose wheel off as long as possible on roll-out. Lower the nose gently and apply brakes as needed. Retract the flaps after touchdown to minimize the possibility of skidding when braking. In gusty or crosswind conditions, many pilots prefer to increase their airspeed slightly above the normal approach speed; this decision, however, can only be made by the pilot in light of his own experience and training.

NOTE

A pilot-induced porpoise maneuver may be encountered during landing by contacting the nose wheel first with excessive touchdown speed. The porpoise could be accentuated by a wavy or rolling runway surface. Should a porpoise occur, use the following technique to recover:

1. Apply full power.
2. Maintain steady elevator-back pressure for a normal climb.
3. Normal climb - 100 MPH.
4. Carburetor heat - OFF.
5. Retract flaps.
6. Execute normal go-round.

A power-off tail-low touchdown attitude is the best assurance of a porpoise-free landing, and excessive touchdown speed is not required with direct crosswinds up to 13 MPH.

SHORT FIELD LANDING

When making a landing where obstacle clearance or ground roll is a factor, the AA-5 should be trimmed to an approach speed of 70 MPH with flaps fully extended. Touchdown should be made on the main gear at the slowest safe airspeed. Best braking can be obtained by applying light pressure immediately after touchdown and continuously increasing brake pressure just enough so the wheels do not skid.

SOFT FIELD LANDING

For soft fields, the AA-5 should be trimmed to an approach speed of 70 MPH with flaps fully extended. Use power as necessary to control glide path consistent with existing conditions. Touchdown in a rough or soft field should be in a nose-high pitch attitude at the slowest safe airspeed. The nose wheel should be held off the surface as long as possible, and braking should be the minimum required for directional control and safety. (Maximum braking on soft surfaces may lead to excessive gear loads.)

BALKED LANDINGS (Go-arounds)

Should a landing be balked, apply full power immediately;

carburetor heat OFF; establish a positive rate of climb; retract the flaps and trim for normal climb.

SLIPS TO LANDINGS

Slips are very effective in the AA-5. Rapid descents with high sink rates can be obtained through a properly executed slip. It is recommended, however, that slips be practiced at altitude until the pilot is familiar with the AA-5. The recommended slip speeds are 75 to 85 MPH, depending on load, pilot proficiency, and local conditions. Pilots should make themselves familiar with the airplane at a variety of slip speeds.

GROUND HANDLING AND TIE-DOWN

The AA-5 is easily handled on the ground by hand with the aid of a tow bar attached to the nose wheel fork. Tie-down rings are provided under each wing tip and under the tail. Proper tie-down is the best insurance against damage to the airplane by gusty or strong winds. Installation of the control wheel lock helps avoid damage to the movable surfaces under such conditions.

Care should be taken when using the parking brakes for an extended period of time during which an air temperature rise could cause the hydraulic fluid to expand, which in turn could damage the brake system and/or cause difficulty in releasing the parking brake. For prolonged parking, tie-downs and wheel chocks are recommended.

ADDITIONAL ENGINE OPERATING INFORMATION

Refer to the "Operating Instructions" section of the "Lycoming Engine Operator's Manual" for additional information on fuel mixture leaning procedures, the use of carburetor heat and general good engine operating procedures to assure maximum engine performance.

SECTION IV

OPERATING LIMITATIONS

The AA-5 is approved for day VFR operation with standard equipment installed. With appropriate optional equipment installed, the AA-5 is certified for day and night VFR and IFR. Operation must be in accordance with all FAA approved markings, placards and check lists in the airplane.

NORMAL CATEGORY OPERATION

The normal category is limited to airplanes intended for non-acrobatic operation within the flight load factor limitations listed below. The AA-5 is approved for the following normal category maneuvers:

1. Any maneuver incident to normal flying.
 2. Stalls (except whip stalls).
 3. Lazy eights, chandelles, and steep turns in which the angle of bank is not more than 60°.
- | | |
|----------------------------------|------------|
| Maximum Design Weight | 2200 lbs. |
| Design Maneuvering Speed | 122 MPH |
| Flight Load Factors - Flaps Up | +3.8 -1.52 |
| Flight Load Factors - Flaps Down | +3.5 |

UTILITY CATEGORY OPERATION

The utility category is limited to airplanes intended for limited acrobatic operation within the flight load factor limitations listed below. The rear seat must not be occupied during utility category operations. The AA-5 is approved for the following utility category maneuvers:

1. All maneuvers listed under normal category operation.
 2. Lazy eights, chandelles, and steep turns, in which angle of bank is more than 60°.
- | | |
|----------------------------------|------------|
| Maximum Design Weight | 1850 lbs. |
| Design Maneuvering Speed | 122 MPH |
| Flight Load Factors - Flaps Up | +4.4 -1.76 |
| Flight Load Factors - Flaps Down | +3.5 |

ACROBATIC LIMITATIONS

Maneuver	Entry Speed — CAS
Chandelles	122 MPH
Lazy Eights	122 MPH
Steep Turns	122 MPH
Stalls (except whip stalls)	Slow deceleration
SPINS PROHIBITED	

All approved maneuvers listed can be performed to normally acceptable standards. As noted, *spins are prohibited*. In case of an inadvertent spin, recovery is effected by applying full rudder opposite to the spin rotation and neutralizing the aileron, then applying full down elevator. The controls should be applied briskly. As the rotation stops, neutralize the anti-spin rudder and elevator, then apply smooth elevator back pressure to bring the nose up to level flight.

AIRSPEED LIMITATIONS

Maximum Glide or Dive, Smooth Air (Red Line)	190 MPH CAS
Caution Range (Yellow Arc)	150-190 MPH CAS
Normal Range (Green Arc)	63-150 MPH CAS
Flap Operating Range (White Arc)	61-120 MPH CAS
Maneuvering Speed	122 MPH CAS
Maximum Canopy Partially Open	130 MPH CAS

ENGINE INSTRUMENT MARKINGS

Oil Temperature Gauge—Normal Operating Range	Green Arc
Maximum Allowable	245° (Red Line)
Oil Pressure Gauge—Minimum Idling	25 PSI
Normal Operating Range	60-90 PSI
Maximum Allowable	100 PSI
Fuel Pressure Gauge—Normal Operating Range	0.5-8 PSI
Tachometer—Normal Operating Range	2200-2700 RPM

CARGO LOADING

With rear seats folded down, in the cargo configuration, no passengers are allowed in the cargo area.

Place plywood or other suitable material under all high density cargoes to distribute the loads and prevent damage to the floors or supporting structures.

WEIGHT AND BALANCE

The following information will enable you to fly your AA-5 within the prescribed weight and center of gravity limitations. To calculate the weight and balance for your AA-5, use the Sample Problem, Loading Graph and Center of Gravity Envelope charts as follows:

Write down the "Licensed Empty Weight" and "Moment" on the Sample Loading Problem chart under the column marked "your airplane" from the Weight and Balance Data sheet (and/or changes listed on FAA Form 337) included with your aircraft papers. Also add all additional weights and their corresponding moments (obtained from the "loading graph") of items to be carried on the flight. Plot the total weight and moment on the "Center of Gravity Envelope" chart and if the intersection point is within the envelop, the loading is acceptable.

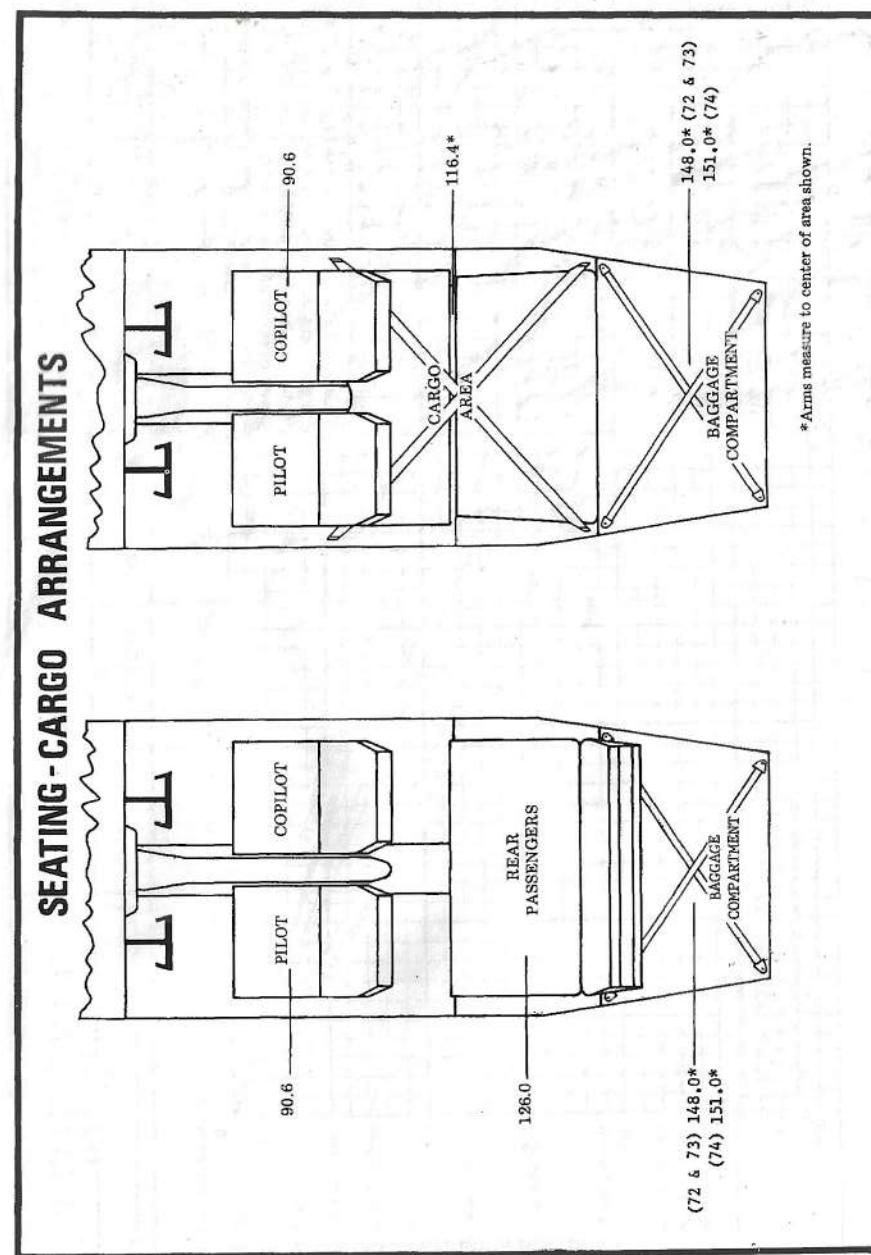


Figure 5

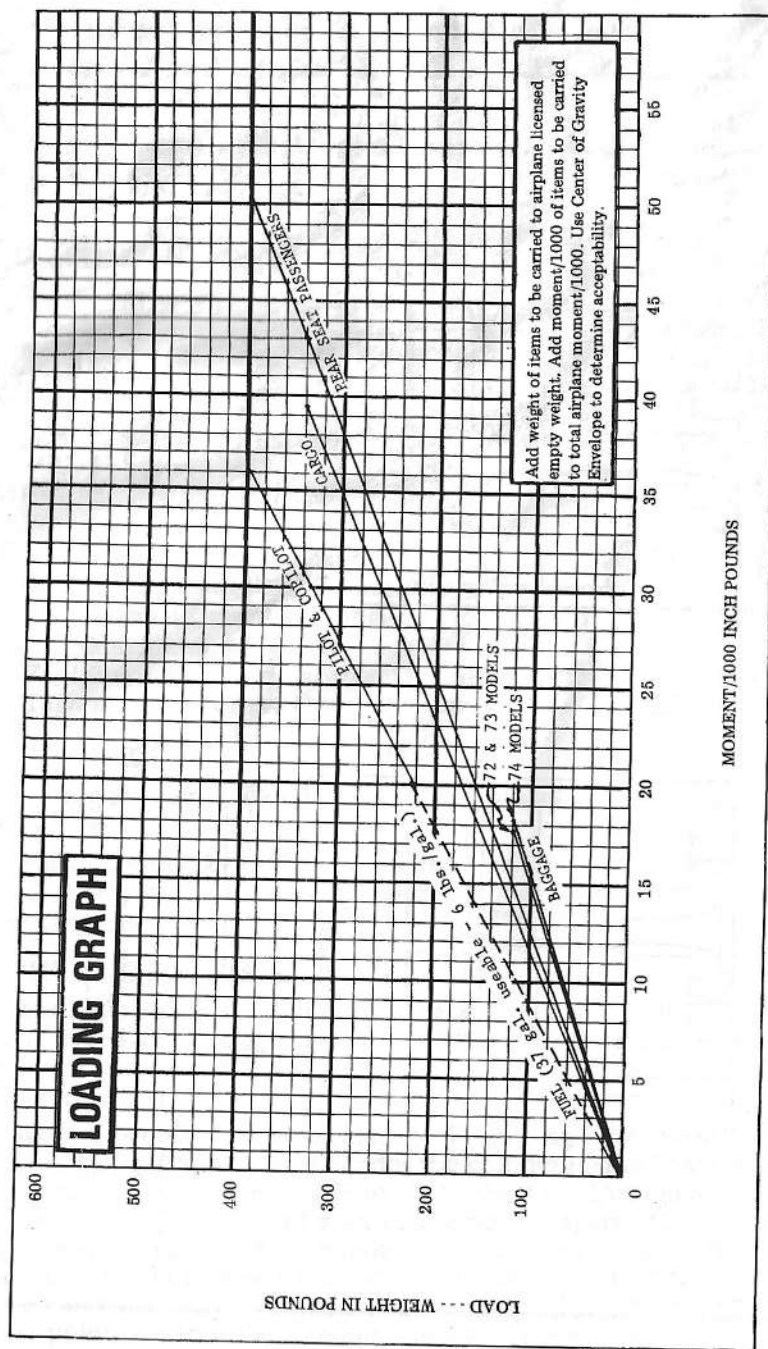


Figure 6

SAMPLE LOADING PROBLEM	SAMPLE AIRPLANE			YOUR AIRPLANE		
	Weight (lbs.)	Arm (in.)	Moment (lb.-in./1000)	Weight (lbs.)	Arm (in.)	Moment (lb.-in./1000)
1. Licensed Empty Weight	1271	80.3	102.04			
2. Oil (8qts.) 1 qt. = 1.8 lbs.	15	32.0	.48		32.0	
3. Fuel (in excess of unusable)	222	90.9	20.18		90.9	
4. Pilot and Co-Pilot	340	90.6	30.80		90.6	
5. Rear Seat Passengers	340	126.0	42.84		126.0	
* 6. Baggage (in baggage compartment) Max. allowable 120 lbs.	12	148.0** 151.0***	1.78** 1.81***		148.0** 151.0***	
7. Cargo Area Max. allowable 340 lbs.		116.4			116.4	
8. Total Aircraft Weight (loaded)	2200	90.1	198.12** 198.15***			

NOTE: Change in moment from upright to fold-down position of rear seat is negligible.

*Maximum allowable is 120 pounds if C.G. is within Center of Gravity Envelope. Refer to Cargo Loading and Weight and Balance Sections for cargo loading instructions.

**Use for 72 & 73 Models

***Use for 74 Models

Figure 7

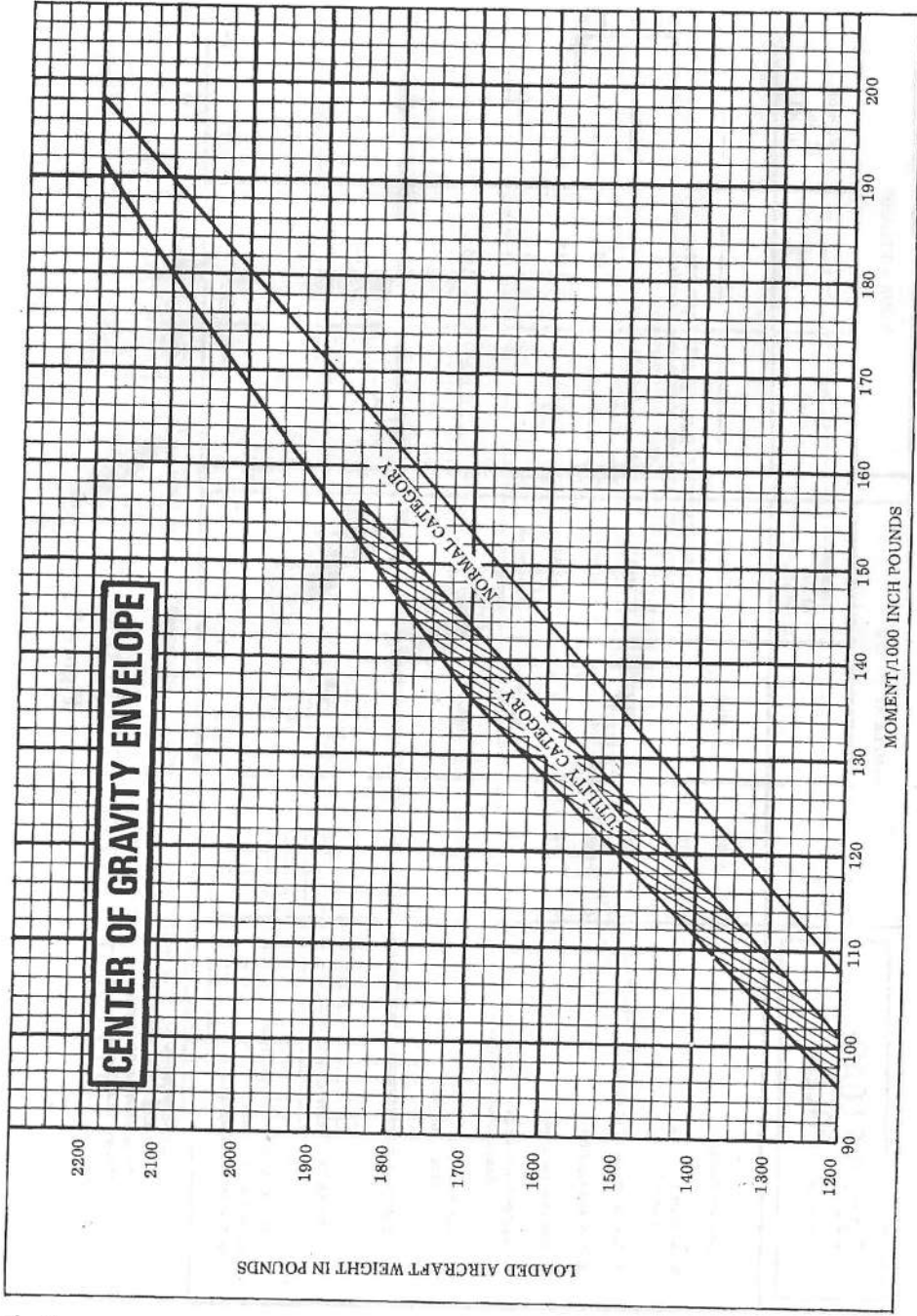


Figure 8

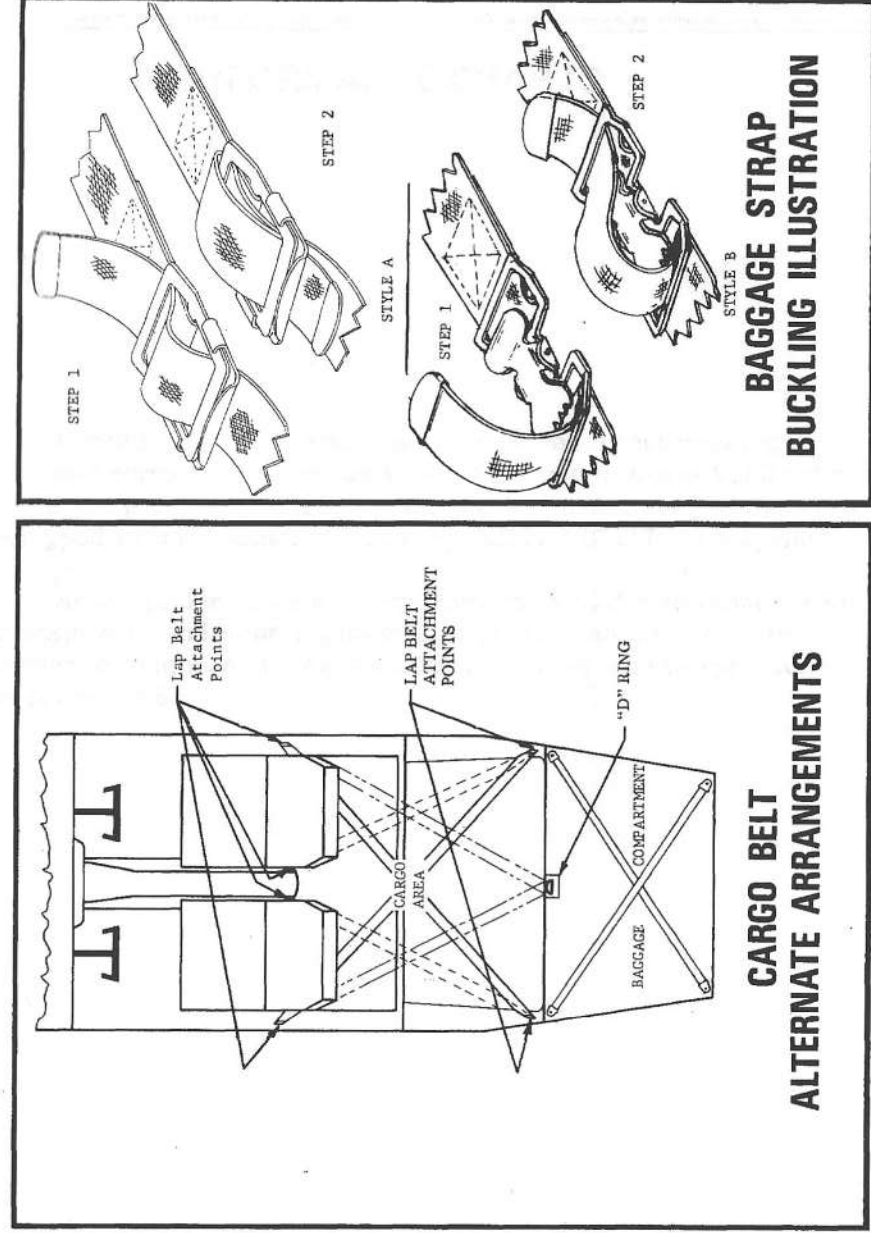


Figure 9

SECTION V

PERFORMANCE CHARTS

Performance information has been derived from actual flight tests and corrected to standard atmospheric conditions at 2200 pounds maximum gross weight. All performance is representative of the AA-5 equipped with the standard McCauley 1C172/SBTM7359 propeller.

Actual performance will vary from standard due to variations in atmospheric conditions, engine and propeller condition, mixture leaning technique, and other variables associated with the particular performance item.

TAKE-OFF DATA

HARD SURFACE RUNWAY - FLAPS UP

Gross Weight Pounds	IAS At 50' MPH	Head Wind Knots	At Sea Level & 59° F.		At 2000 Ft. & 52° F.		At 4000 Ft. & 45° F.		At 6000 Ft. & 38° F.	
			Ground Run	Total To Clear 50' Obs.	Ground Run	Total To Clear 50' Obs.	Ground Run	Total To Clear 50' Obs.	Ground Run	Total To Clear 50' Obs.
2200	73	0	880	1600	1015	1915	1195	2375	1405	3075
		10	615	1215	715	1475	850	1845	1010	2430
		20	395	875	465	1075	565	1375	680	1845
2000	70	0	680	1265	785	1515	925	1880	1085	2445
		10	475	960	555	1165	660	1460	780	1930
		20	305	690	360	850	435	1088	525	1465
1800	67	0	510	975	590	1170	695	1455	815	1895
		10	355	740	415	900	495	1130	585	1500
		20	230	535	270	655	330	840	395	1140

NOTES: 1. Increase ground run 7% for each 20° F. above standard temperatures.
 2. The increase in total take-off distance varies from 8% at sea level to 14% at 6000 feet for each 20° F. above standard temperature.

Figure 10

MAXIMUM RATE-OF-CLIMB DATA

2200 POUNDS GROSS WEIGHT - FLAPS RETRACTED

ALTITUDE FEET	TEMPERATURE °F.	IAS MPH	RATE OF CLIMB FT./MIN.	FUEL USED FROM SEA LEVEL GALLONS
S. L.	59°	91	660	1.0
2500	50°	89	550	1.8
4500	43°	88	460	2.7
6500	36°	87	370	3.7
8500	28°	86	280	4.9
10500	21°	85	200	6.5

NOTES: 1. Full throttle climb, mixture leaned above 5,000 feet to smooth engine operation.
 2. Fuel used includes taxi and warm up allowance.
 3. Power loss attributable to the presence of humidity can be as high as 7%, this represents approximately 100 FPM loss in climb rate at sea level.

Figure 11

CRUISE & RANGE PERFORMANCE				GROSS WEIGHT-2200 LBS. STANDARD CONDITIONS ZERO WIND LEAN MIXTURE		
MODEL AA-5						
ALTITUDE	RPM	PERCENT POWER	TRUE AIR SPEED—MPH	GALLONS / HOUR	ENDURANCE HOURS	RANGE MILES
2500	2600	81	136	9.3	3.9	524
	2500	73	129	8.3	4.3	555
	2400	65	122	7.5	4.8	586
	2300	58	115	6.6	5.4	617
	2200	52	108	6.0	6.0	645
4500	2600	77	135	8.8	4.0	539
	2500	69	129	7.9	4.5	572
	2400	62	121	7.1	5.0	601
	2300	56	113	6.4	5.5	628
	2200	51	106	5.7	6.1	646
6500	2700	81	140	9.3	3.8	530
	2600	73	134	8.3	4.2	559
	2500	66	126	7.5	4.7	587
	2400	60	119	6.8	5.2	611
	2300	54	112	6.1	5.7	632
8500	2700	77	139	8.8	4.0	547
	2600	70	132	7.9	4.4	575
	2500	63	125	7.2	4.9	598
	2400	57	118	6.5	5.3	620
	2300	52	109	5.9	5.8	635
10500	2700	73	138	8.3	4.2	569
	2600	66	130	7.6	4.6	590
	2500	60	122	6.9	5.0	610
	2400	55	115	6.3	5.4	625
	2300	50	106	5.7	5.9	631

NOTES:

1. Range and endurance data include allowance for take-off and climb.
2. Fuel consumption is for level flight with mixture leaned. See Section III for proper leaning technique. Continuous operations at powers above 75% should be with full rich mixture.
3. Speed performance is without wheel fairings. Add 2 MPH for wheel fairings.
4. For temperatures other than standard, add or subtract 1% power for each 10° F. below or above standard temperature respectively.

Figure 12

LANDING DATA				
LANDING DISTANCE ON HARD SURFACE RUNWAY ZERO WIND—FLAPS DOWN—2200 LBS. GROSS WEIGHT 70 MPH IAS AT 50 FEET				
ALTITUDE TEMPERATURE	SEA LEVEL 59° F.	2000 FT. 52° F.	4000 FT. 45° F.	6000 FT. 37° F.
GROUND RUN TOTAL DISTANCE	380 1100	405 1150	430 1205	455 1265
NOTE: 1. Reduce total landing distance 10% for each 5 knots of head wind.				

STALL SPEEDS — MPH CAS				
CONDITION	BANK ANGLE			
	0°	20°	40°	60°
FLAPS UP	62	64	71	88
FLAPS DOWN	58	60	66	82
2200 LBS. GROSS WEIGHT - POWER OFF - AFT CG LOADING				

AIRSPEED CORRECTION TABLE												
IAS	60	70	80	90	100	110	120	130	140	160	180	190
CAS	61	71	81	91	101	111	121	131	141	161	181	191
2200 LBS. GROSS WEIGHT—FLAPS UP—DOWN												

Figure 13

SECTION VI

EMERGENCY PROCEDURES

BRAKE FAILURE

Although brake failure is infrequent in any aircraft, landing without brakes is no problem in the AA-5. If a brake failure is detected, proceed to the nearest airport with adequate runway length to accommodate an emergency brake-failure landing. It is recommended, with a single brake failure, that neither brake be utilized during landing and roll-out.

Plan the touchdown near the approach end of the runway. The aircraft nose should be aligned with the runway centerline. Use minimum safe airspeeds for existing conditions. Maintain directional control straight down the runway with use of rudder only. Allow the airplane to roll to a stop without the use of brakes. The engine may have to be stopped (with mixture control) to stop the ground roll. Request assistance from the appropriate ground control authority, and it is recommended that towing to a parking area be accomplished with hand tow or "tug".

LOW OIL PRESSURE/ENGINE OVERHEAT

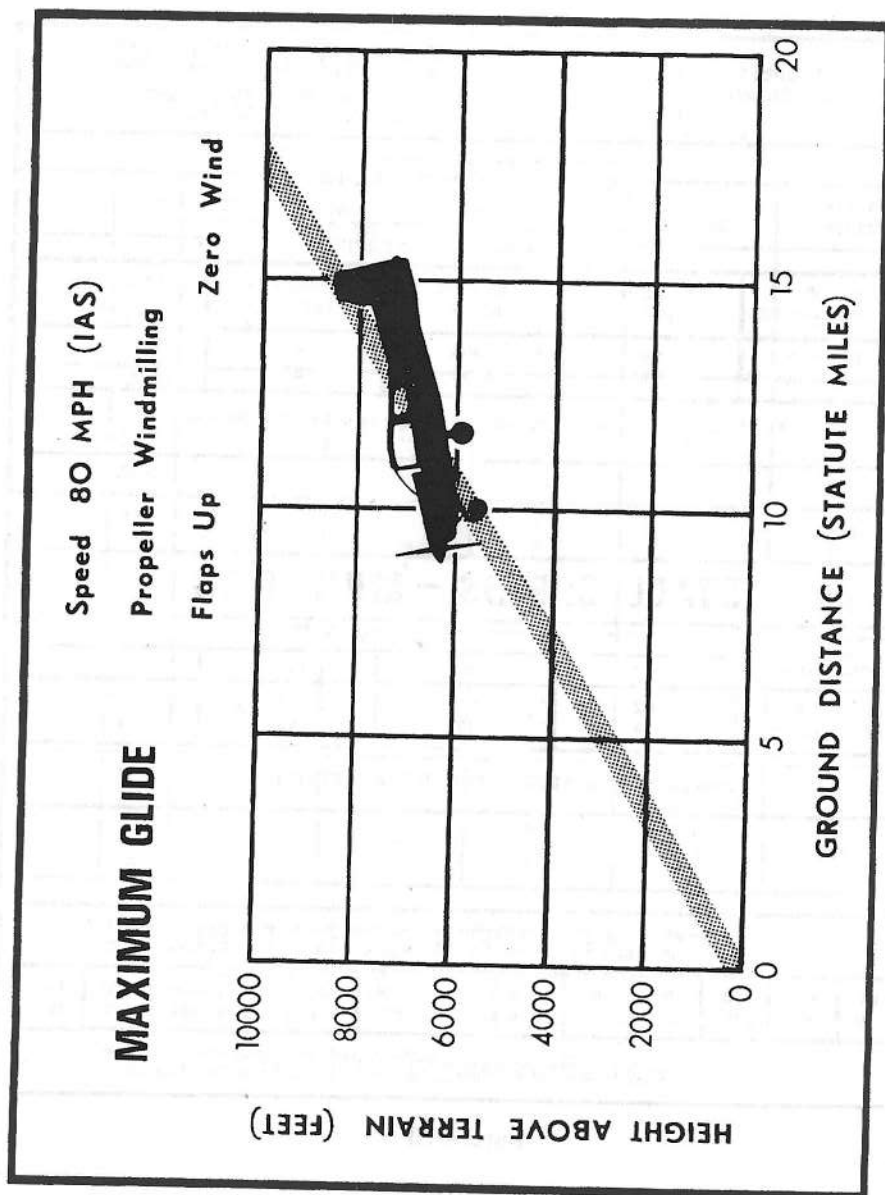
A low oil pressure reading may be caused by malfunction of the indicating system, oil pump failure, or loss of oil. Monitor the oil temperature gauge for a marked increase in temperature. If no temperature change is detected, the failure is most likely in the oil pressure indicating system. Proceed to the nearest airport, land, check the oil level and determine the difficulty.

In flight, if the oil pressure indication is low and is confirmed by high oil temperatures, reduce power and proceed to the nearest airport or suitable landing area. If possible, notify the nearest ATC radio facility of your difficulty and land.

REMEMBER: A thorough and complete preflight will usually prevent low-oil pressure emergencies.

ELECTRICAL SYSTEM MALFUNCTION

The ammeter system on the AA-5 indicates current flow to or from the battery. During normal operation, with a fully charged battery, the ammeter will indicate near zero or slightly toward the charge side. This indication will be true even though all electrical systems are energized, unless the capacity of the alternator (60 amps) has been



exceeded. Failure of the alternator is easily detected since the ammeter will show discharge to the extent of the loads being applied.

Should a component of the electrical system fail (landing light, radio, turn and bank indicator, etc.), visually check the related circuit protector and replace or reset it as required.

If the alternator circuit breaker opens (pops out), wait 15 seconds then reset by pushing the circuit breaker back into position.

If either fuses or circuit breakers continue to indicate a malfunction, turn off the electrical component causing the problem or turn off the alternator switch respectively, and land at an airport for electrical system inspection.

EXCESSIVE BATTERY CHARGING RATE (1972 Models)

If a sustained high battery charging rate (more than two needle widths), caused by a faulty voltage regulator, is noted on a long flight, a higher than normal voltage in the electrical system is possible and can adversely affect the electronic components and cause the battery to overheat and evaporate the electrolyte at an excessive rate. In this event, turn off the alternator switch and use only the minimum electrical components to conserve the battery. Reactivate the alternator switch only as required for emergency power to complete the flight.

NOTE

Malfunctions caused by electrical shorts will cause the related fuse or circuit breaker to open.

OVERVOLTAGE PROTECTION (1973 & 1974)

Overvoltage protection is provided by a diode attached to the field circuit breaker forward of the instrument panel. A sustained overvoltage condition will result in failure of the diode and subsequent opening of the alternator field circuit breaker. The breaker will not reset until the fault is corrected and the diode replaced.

INSUFFICIENT OUTPUT

If the ammeter shows discharge, an alternator failure has occurred, or the electrical system load exceeds the output of the alternator. The alternator switch must be on. To determine if alternator capacity has been exceeded, turn off the accessories one at a time and note if ammeter moves toward the charge side. No change in the ammeter indicates the alternator is not charging.

ENGINE FAILURE

Engine failures are very rare in modern aircraft. Should an engine failure occur, the basic procedures listed below may be a useful guide:

1. Establish best glide speed of 80 MPH for best range.

2. Check wind direction for landing.
3. Pick a suitable landing area and plan an approach.
4. Check fuel and switch the tank selector to the opposite tank if it contains fuel. Check fuel pressure and turn on electric fuel pump if necessary.
Mixture - Rich
Carburetor heat - ON
Magneto - check right and left. If engine runs on either one, leave switch on that magneto.
5. If the engine does not start promptly, attention should be shifted to the forced landing procedure.
6. Notify ATC of your location and problem.
7. Fuel selector OFF; mixture to idle cut-off; turn ignition OFF; flaps as needed; and the master switch OFF.
8. Complete the landing and secure the aircraft. Notify ATC by telephone of your situation and location.

WINDSHIELD OBSCURATION

A windshield obscuration caused by ice or moisture condensation may be encountered. Turn cabin heat and defroster full ON to clear the windshield of moisture. If obscuration persists, open the canopy, and proceed to the nearest airport. A safe landing may be accomplished by using a forward slip to a landing while looking through the opening in the canopy.

GROUND FIRES

Ground fires may be caused by over-priming the engine. Proper starting procedure, outlined on page 3-1, will help prevent fires when starting engine.

Should a ground fire occur, the following procedures are suggested:

1. Keep the engine running to ingest the flames into carburetor. Increasing engine RPM may help.
2. Dispatch ground personnel for fire equipment.
3. When assistance arrives, turn fuel selector valve OFF. Let engine stop due to fuel starvation.
4. If no assistance is available or the fire is beyond control, turn the fuel selector valve OFF, mixture OFF. ABANDON AIRCRAFT.

IN-FLIGHT ENGINE FIRES

In-flight engine fires in today's modern aircraft are extremely rare and it should be noted that the presence of smoke does not always mean that a flaming fire exists. As an example, it may be engine oil on the exhaust system. If, in the pilot's judgement, an engine fire exists the following procedures are suggested:

1. Fuel selector: OFF
2. Mixture: Idle cut-off
3. Cabin heat control: OFF
4. Establish a maximum safe rate of descent. Increasing speed may blow the fire out.
5. Side slip maneuvers may be used, as necessary, to direct flames away from cabin area.
6. Select a suitable field for a forced landing.
7. Notify ATC if possible.
8. Turn master switch OFF and complete the forced landing. Do not attempt to restart the engine.

IN-FLIGHT ELECTRICAL FIRES

Indication of in-flight electrical fires may be wisps of smoke or the smell of hot or burning insulation. Should an electrical fire develop, the following procedures are suggested:

1. Master switch: OFF.
2. All electrical switches: OFF.
3. Ignition switch: ON.
4. Cabin air vents: OFF (If ventilation is necessary, the cabin air vent may be opened for brief periods. Under these conditions the canopy may be cracked or opened as required.)
5. Proceed to nearest suitable airport for landing.

If electrical power is necessary for safety of flight under the above conditions, the following procedures are recommended:

1. Disengage and isolate each power circuit.
2. Master switch: ON.
3. Engage each electrical circuit separately. Allow sufficient time to analyze for faulty operation.
4. Analyze each circuit separately until the malfunctioning system is detected. DO NOT disengage circuits that are determined to be functioning properly.
5. Disengage faulty circuit and report any problems to ATC.
6. If necessary, proceed to nearest suitable airport and land.

BLOWN TIRES

If a landing is to be made with a blown tire, the following procedures are suggested:

Main Tires

1. Plan your approach with a slightly long final for a slow rate of descent.
2. Approach at the slowest safe speed for the conditions. A power-on approach is recommended.
3. Touch down on the good tire only. Use power to cushion the

landing (this is the time for a "greaser"). Allow the nose wheel to touch down.

4. Hold the blown tire off the ground with aileron as long as possible.
5. After the blown tire has touched down, allow the aircraft to roll to a stop, lightly and intermittently applying the brakes on the "good" tire to maintain directional control.

Nose Tire

1. Plan a slightly long, power-on approach for a slow rate of descent.
2. Touch down in a slightly nose-high attitude at a safe air speed.
3. Gently lower the nose wheel as the air speed decreases to the point at which elevator control is lost, thereby averting the hard impact when the nose "falls through".
4. After the nose wheel touches down, allow the aircraft to roll to a stop without the use of brakes. Use of brakes places additional weight on the defective nose gear tire.

ICING CONDITIONS

Carburetor ice may be encountered at any time. The first indication of carburetor ice in the AA-5 should be a slight drop in engine RPM. Slight engine roughness may or may not accompany this engine RPM drop. If carburetor icing is suspected, the following procedures are suggested:

1. Slowly apply full carburetor heat. Engine roughness may then occur due to an over-rich mixture or water from the melting ice.
2. Continuous engine operation with carburetor heat ON is not recommended due to the decrease in engine efficiency.

Flying in known icing conditions is prohibited by FAA regulations. However, should wing icing occur the following procedures are suggested:

1. Turn pitot heat ON.
2. Turn windshield defroster full ON.
3. If IFR or under control of an in-flight ground facility, notify them of the condition and request assistance. A change of altitude, if possible, or reversing course to fly out of the icing conditions may be desirable.
4. Pilot technique is important in this situation:
 - a. Increase and decrease engine RPM to keep propeller clear of ice.
 - b. Increase airspeed if possible. This technique reduces angle of attack exposing less surface area for ice accumulation.

- c. Do not extend flaps. A clean configuration will expose less surface to ice and will prevent a change in air flow over the tail surfaces.
- 5. Monitor engine RPM for any indication of carburetor ice. (Refer to carburetor ice procedures.)
- 6. Plan a landing at the first suitable airport. The following procedures are suggested:
 - a. If the windshield is obstructed, the canopy may be opened to improve visibility. A forward slip may be helpful.
 - b. Remember that ice accumulation increases wing loading, decreases performance, decreases range and increases stall speeds. When landing, plan a slightly higher than normal air speed during landing approach. Guard against increased stall speed created by the above mentioned conditions. Touch down in a level attitude.

REMEMBER: Flying in icing conditions is NOT APPROVED!

EMERGENCY LOCATOR TRANSMITTER OPERATION (Factory Installed Model)

In the event of an inadvertent landing in a remote area, the emergency locator transmitter will automatically be activated by a deceleration of 5 G's along the flight axis of the aircraft or it can be manually activated by removing the left side empennage inspection cover and moving the transmitter control switch to the "on" position. The lower attach holes in the inspection cover are slotted to allow emergency removal of the cover without the use of tools by pulling it up at this point. The transmitter emits a signal on the standard aircraft emergency frequencies of 121.5/243.0 MHz and the self contained batteries have power to provide operation for a minimum of 48 hours.

SECTION VII

CARE OF THE AIRPLANE

Proper maintenance and general attention to detail will assure a long life and maximum reliability for your aircraft and it has been made surprisingly easy, fast and economical.

EXTERIOR CARE

The painted surfaces of the aircraft have a long-lasting, all-weather finish and should require no buffing or rubbing out in normal conditions. However, it is desirable to wax and polish it to preserve the outstanding exterior finish. It is recommended that wax or polish operations be delayed (*at least 60 days after date of certification*) to allow proper curing of the paint.

The paint can be kept bright simply by washing with water and mild soap. Avoid abrasive or harsh detergents. Rinse with clear water and dry with terry cloth towels or chamois. Oil and grease spots may be removed with kerosene or mineral spirits.

NOTE

No commercial paint removers are to be used on any airframe component unless specific prior approval has been received from the factory (see latest Service Manual).

If you choose to wax your airplane, use a good automotive-type wax applied as directed. The use of wax in areas subject to high abrasion, such as leading edges of wings and tail surfaces, propeller spinner and blades, is recommended.

WINDSHIELD, CANOPY AND WINDOW CARE

It is recommended that you keep the plexiglas in the canopy, windshield and cabin windows clean and unscratched. The following procedures are recommended:

1. If large deposits of mud and/or dirt have accumulated on the plexiglas, flush with clean water. Rubbing with your hand is recommended to dislodge excess dirt and mud without scratching the plexiglas.
2. Wash with soap and water. Use a sponge or heavy wadding

- of a soft cloth. DO NOT rub, as the abrasive action in the dirt and mud residue will cause fine scratches in the surface.
3. Grease and oil spots may be removed with a soft cloth soaked in kerosene.
 4. After cleaning, wax the plexiglas surface with a thin coat of hard polish-wax. Buff with a soft cloth.
 5. If a severe scratch or marring occurs, jeweler's rouge is recommended. Follow directions, rub out scratch, smooth, apply wax and buff.

REMEMBER! NEVER use gasoline, benzine, alcohol, acetone, carbon tetrachloride, fire extinguisher fluid, anti-ice fluid, lacquer thinner or glass cleaner to clean plastic. These materials will damage the plastic and may cause severe crazing.

PROPELLER CARE

Damage from foreign objects, sometimes referred to as "nicks", may appear in the leading edges of the propeller from time to time. *It is vital that these nicks be corrected as quickly as possible. Such minor damage may cause stress concentrations and result in cracks forming in the propeller.* Keep the blades clean and free of dirt or grass build-up. This type of foreign material on the propeller may cause an imbalance and accompanying vibration. We recommend cleaning agents such as carbon tetrachloride or mineral spirits followed by waxing or coating with a light film of oil.

TIRE SERVICE

All tires and wheels are balanced at the factory prior to original installation. A similar relationship of the tire, tube and wheel should be maintained. If vibration is encountered, it may be due to out-of-round or out-of-balance conditions. When wheel, tire or tube is replaced due to wear, it is recommended that they be re-balanced.

BATTERY SERVICE

The battery is accessible by opening the top cowl. The battery is equipped with an overboard manifold vent, thereby eliminating the need for the battery box to be vented. The battery is rated at 12 volt, 25 ampere-hours. It should be inspected periodically for proper fluid level. If the fluid level is found to be low, fill as recommended by the battery manufacturer. DO NOT fill above the visible battery baffle plates.

BRAKE SERVICE

The Aircraft Service Manual outlines procedures to use in the case of soft or ineffective brakes.

FUEL REQUIREMENTS

Aviation grade fuel 80/87 octane minimum or grade 100/130 AVGAS with 2 c. c. tel. max. (Refer to the latest revision of Lycoming Service Instruction No. 1070).

OIL REQUIREMENTS

New engines have been carefully run-in by Avco Lycoming and therefore no further break-in is necessary insofar as operation is concerned; however, new or newly overhauled engines should be operated on STRAIGHT MINERAL OIL for a minimum of 50 hours or until oil consumption has stabilized. After this period a change to an approved additive oil may be made, if so desired.

Aviation Grade *Recommended Grade Oil		
Average Ambient Air	Mineral Grade	Ashless Dispersant
Above 60°F	SAE 50	SAE 40 or SAE 50
30° to 90°F	SAE 40	SAE 40
0° to 70°F	SAE 30	SAE 40 or SAE 30
Below 10°F	SAE 20	SAE 30

* Refer to latest revision of Lycoming Service Instruction No. 1014.

Oil Sump Capacity 8 U. S. Quarts

Minimum Safe Quantity in Sump 2 U. S. Quarts

It is recommended that the lubricating oil be changed every 50 flying hours.

NOTE

After the first twenty-five hours operating, new engines should undergo draining and renewing lubricating oil.

WARRANTY

GRUMMAN AMERICAN AVIATION CORPORATION (herein GRUMMAN AMERICAN) warrants each new aircraft and part thereof manufactured by it, together with all new aircraft equipment and accessories bearing the name "GRUMMAN AMERICAN AVIATION," to be free from defects in material and workmanship under normal use and service, but extends no warranty of any kind, expressed or implied, to any items not manufactured by GRUMMAN AMERICAN, or not so bearing its name, whether incorporated into or installed in the aircraft, except that the workmanship involved in installing such items is warranted to be without defect. The obligation of GRUMMAN AMERICAN under this warranty is limited to replacement or repair, at the option of GRUMMAN AMERICAN, of any such aircraft, or any part or accessory which shall within six (6) months of operation be found defective. Such aircraft, part or accessory is to be returned to a GRUMMAN AMERICAN DEALER upon which examination by GRUMMAN AMERICAN, shall disclose to its reasonable satisfaction to have been thus defective. This warranty shall not in any way apply to or cover any products which are in GRUMMAN AMERICAN's opinion damaged as a result of being in any manner altered or repaired outside of the factory of GRUMMAN AMERICAN or that shall have been subject to misuse or negligence.

GRUMMAN AMERICAN makes no warranty whatsoever with respect to engines, radios, propellers, ignition apparatus, starting devices, generators, batteries, or other trade accessories, inasmuch as such products are generally warranted separately by their respective manufacturers.

THESE WARRANTY PROVISIONS ARE EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, STATUTORY OR IMPLIED IN FACT OR BY LAW, INCLUDING ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND OF ANY OTHER OBLIGATION OR LIABILITY ON THE PART OF GRUMMAN AMERICAN, EXPRESSED OR IMPLIED, OF ANY NATURE WHATSOEVER. GRUMMAN AMERICAN NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON OR BUSINESS ORGANIZATION TO ASSUME FOR IT ANY OTHER WARRANTY OR LIABILITY IN CONNECTION WITH THE SALE, USE OR OPERATION OF ITS PRODUCTS.

Immediately on commencing first use of an aircraft, a warranty validation card must be filled out and mailed to the attention of the Customer Service Manager, Cleveland, Ohio. No warranty claims will be honored if this card is not on file at the factory.

NOTES:

NOTES:

SERVICE REQUIREMENTS

FUEL:

Aviation grade 80/87 minimum grade
Capacity each tank 19 gallons

ENGINE OIL:

Aviation Grade
*Recommended Grade Oil

Average Ambient Air	Mineral Grade	Ashless Dispersant
Above 60°F	SAE 50	SAE 40 or SAE 50
30° to 90°F	SAE 40	SAE 40
0° to 70°F	SAE 30	SAE 40 or SAE 30
Below 10°F	SAE 20	SAE 30

Oil Sump Capacity 8 U.S. quarts

Minimum Safe Quantity in Sump 2 U.S. quarts

HYDRAULIC FLUID:

MIL-H-5606

TIRE INFLATION:

Nose Wheel	21 PSI	5.00 x 5 tire
Main Wheels	24 PSI	6.00 x 6 tires

* Refer to latest revision of Lycoming Service Instruction
No. 1014.

Fully illustrated Parts Catalogs and Service Manuals are obtainable through authorized Dealers of Grumman American Aviation Corporation or from the Customer Service Department, Cleveland, Ohio.