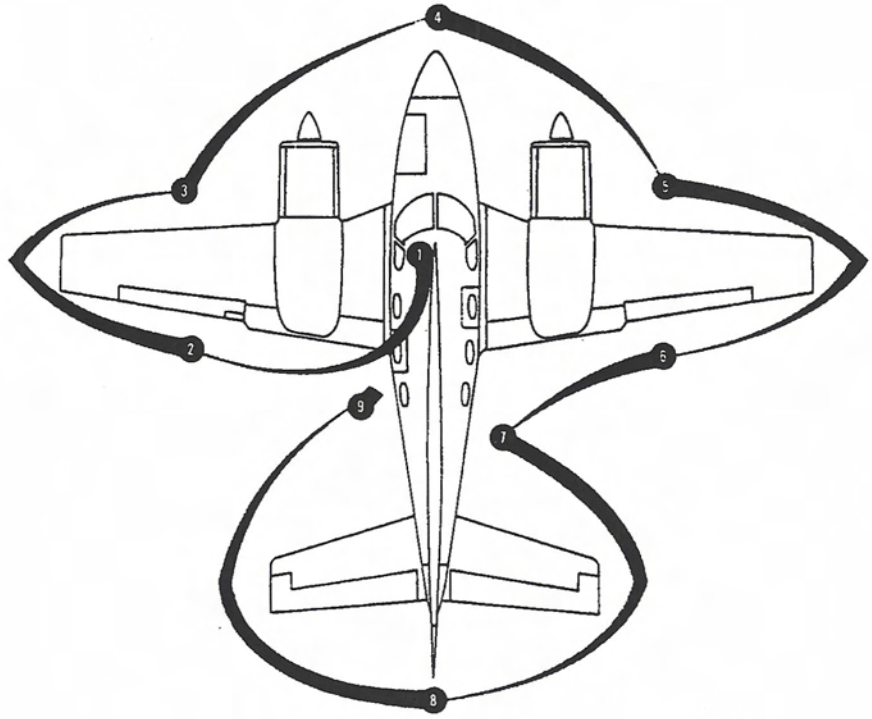
SECTION II

NORMAL PROCEDURES

All speeds quoted in this section are Indicated Airspeeds (IAS)



PREFLIGHT INSPECTION

1. Cockpit Check

1. Control Locks - REMOVE and STOW
2. Parking Brake - SET
3. All Switches - OFF
4. Landing Gear Handle - DOWN
5. Battery Switch - ON
6. Fuel Quantity Indicators - CHECK QUANTITY (See LIMITATIONS for take-off fuel)
7. Cowl Flap Switches - OPEN
8. Battery Switch - OFF
9. Oxygen Pressure - CHECK
10. Trim Tabs (3) - SET TO ZERO

2 Left Wing, Trailing Edge

1. Wing Root Fuel Sump - DRAIN
2. Flaps - CHECK
3. Aileron - CHECK FREEDOM OF MOVEMENT, TAB NEUTRAL WHEN AILERON NEUTRAL

3. Left Wing, Leading Edge

1. Position Light - CHECK
2. Fuel - CHECK QUANTITY; Cap - SECURE
3. Stall Warning Vane - CHECK FREEDOM OF MOVEMENT
4. Deice Boots - CHECK
5. Tie Down, Chocks - REMOVE
6. Engine Oil - CHECK QUANTITY; Cap - SECURE
7. Propeller and Propeller Deice Boots - CHECK
8. Engine Air Intakes - CHECK FOR OBSTRUCTIONS
9. Engine Cowling and Cowl Flap - CHECK
10. Fuel Sumps (2) - DRAIN
11. Wheel Well Doors, Tire, Brake and Shock Strut - CHECK
12. Landing Gear Down-Lock Mechanism and Up-Lock Rollers - CHECK FOR CONDITION
13. Pressurization Intercooler Inlet - CLEAR

4. Nose Section

1. Baggage Door - CHECK
2. Wheel Well Door, Tire and Shock Strut - CHECK
3. Heater Fuel Strainer - DRAIN
4. Pitot(s) - REMOVE COVER, EXAMINE FOR OBSTRUCTIONS
5. Nose Cone - CHECK
6. Ram Air Inlet - CLEAR

5. Right Wing, Leading Edge

1. Pressurization Intercooler Inlet - CLEAR
2. Wheel Well Doors, Tire, Brake and Shock Strut - CHECK
3. Landing Gear Down-Lock Mechanism and Up-Lock Roller - CHECK FOR CONDITION
4. Fuel Sumps (2) - DRAIN
5. Engine Cowling and Cowl Flap - CHECK
6. Engine Air Intakes - CHECK FOR OBSTRUCTIONS
7. Propeller and Propeller Deice Boots - CHECK
8. Engine Oil - CHECK QUANTITY; Cap - SECURE
9. Tie Down, Chocks - REMOVE
10. Deice Boots - CHECK
11. Fuel - CHECK QUANTITY; Cap - SECURE
12. Position Light - CHECK

6. Right Wing, Trailing Edge

1. Aileron - CHECK FOR FREEDOM OF MOVEMENT
2. Flaps - CHECK
3. Wing Root Sump - DRAIN

7. Fuselage, Right Side

1. Static Port - CLEAR OF OBSTRUCTIONS
2. Antennas - CHECKED
3. Emergency Locator Transmitter - ARMED

8. Empennage

1. Position Light - CHECK
2. Rudder Mounted Rotating Beacon - CHECK
3. Control Surfaces - CHECK
4. Tab - ELEVATOR TAB NEUTRAL WITH ELEVATOR NEUTRAL
5. Deice Boots - CHECK
6. Tie Down - REMOVE

9. Fuselage, Left Side

1. Static Port - CLEAR OF OBSTRUCTIONS

NOTE

If night flight is anticipated, exterior lights should be checked for operation.

BEFORE STARTING

1. Cabin Door, Escape Hatch and Baggage - SECURED
2. Seat and Rudder Pedals - ADJUSTED
3. Seat Belts - FASTENED
4. Flight Controls - FREEDOM OF MOVEMENT and PROPER RESPONSE
5. Cowl Flaps - CHECK OPEN
6. Circuit Breakers - IN
7. Fuel Selectors - ON

STARTING

1. Propeller Controls - FORWARD (Low Pitch)
2. Mixture Controls - IDLE CUT-OFF
3. Battery Switch - ON

NOTE

If external power is used start right engine first.

4. Boost Pumps - ON
5. Start Engines

a. Cold Starts:

(1) Throttle 1000 rpm position (approximately 1/2 inch open).
(2) Mixture control FULL FORWARD for 2 to 3 seconds to prime then to IDLE CUT-OFF.
(3) Magneto/Start Switch - START
(4) When the engine starts, return the Magneto/Start switch to BOTH. Slowly advance the mixture control to FULL RICH.

b. Flooded Engine:

(1) Mixture Control - IDLE CUT-OFF
(2) Throttle - 1/2 OPEN
(3) Magneto/Start Switch - START
(4) When engine starts, return the Magneto/Start switch to BOTH. Retard the throttle and slowly advance the mixture control to FULL RICH position.

c. Hot Starts:

(1) Throttle 1300 to 1500 rpm position (approximately 1 inch open).
(2) Mixture Controls - IDLE CUT-OFF
(3) Magneto/Start Switch - START

NOTE

A small prime may be necessary if the engine does not start after a few revolutions.

(4) When the engine starts, return the Magneto/Start switch to BOTH. Slowly advance the mixture control to FULL RICH.

6. Throttle 1000 to 1500 rpm
7. Oil Pressure - ABOVE RED RADIAL WITHIN 30 SECONDS
8. Generator Switch - ON.
9. External Power (if used) - DISCONNECT
10. Use the same procedure to start other engine.
11. Fuel Boost Pumps - OFF

NOTE

Continuous use of the fuel boost pumps is recommended for ground operation in ambient temperatures of 90°F (32°C) or above.

AFTER STARTING AND TAXI

1. Brakes - CHECK
2. Voltage and Loadmeters - CHECK
3. Avionics - ON
4. Lights - AS REQUIRED
5. Cabin Temperature and Mode - AS REQUIRED
6. Annunciator Warning Lights - PRESS-TO-TEST
7. Instruments - CHECK

CAUTION

Never taxi with a flat shock strut.

BEFORE TAKE-OFF

1. Parking Brake - SET
2. Engine Warm-up - 1000 TO 1500 RPM
3. Fuel Boost Pumps - ON

NOTE

With engine speed below 2000 rpm, a diaphragm failure in the engine driven pump will cause engine roughness and a drop in rpm when the fuel pump is turned on.

4. Fuel Selectors - CROSSFEED. (For 10-15 seconds)
5. Fuel Selectors - RETURN BOTH TO ON
6. Instruments - CHECK, NORMAL INDICATION AND SET
7. Flaps - CHECK OPERATION AND SET
8. Electric Trim - CHECK OPERATION
9. Trim - SET TO TAKE-OFF RANGE
10. Propeller Synchronizer - OFF
11. Landing Gear Safety System (If Installed) - CHECK
12. Autopilot - CHECK
13. Throttles - 2000 RPM
14. Magnetos - CHECK (175 rpm maximum drop. within 50 rpm of each other.)

NOTE

Avoid operation on one magneto for more than 5 to 10 seconds.

15. Pressurization - SET.
16. Throttles - 1500 RPM
17. Propellers - FEATHER CHECK (No more than 500 rpm drop) Repeat 2 to 3 times in cold weather
18. Gyro Pressure and Load Meters - CHECK
19. Throttles - IDLE
20. Parking Brake - RELEASE

TAKE-OFF

POWER SETTINGS:

Take-off and Maximum Continuous . . . . . 41.5 in. Hg - 2900 RPM

1. Power - SET take-off power before brake release.
2. Airspeed - ACCELERATE to and maintain take-off speed
3. Landing Gear - RETRACT when aircraft is positively airborne.
4. Airspeed - ESTABLISH DESIRED CLIMB SPEED when clear of obstacles.

CRUISE CLIMB

1. Power - SET CRUISE CLIMB POWER (35.5 in. Hg - 2750 rpm)
2. Fuel Flow - 194 LBS/HR/ENGINE
3. Propeller Synchronizer - ON
4. Airspeed - ESTABLISH CRUISE-CLIMB SPEED
5. Cowl Flaps - AS REQUIRED (MAINTAIN 225°C CYLINDER HEAD TEMPERATURE OR LESS)

NOTE

Use of fuel boost pump may be discontinued at any time except that excessive fluctuations of fuel flow readings indicate a need for continued use.

MAXIMUM PERFORMANCE CLIMB

1. Power - SET MAXIMUM CONTINUOUS POWER
2. Fuel Boost Pumps - ON
3. Mixtures - FULL RICH
4. Cowl Flaps - OPEN
5. Propeller Synchronizer - ON
6. Airspeed - ESTABLISH 138 MPH/120 KTS

CRUISE

1. Power - SET AS DESIRED (Use Horsepower Calculator or Cruise Power Settings tables)
2. Fuel Flow - LEAN AS REQUIRED (Lean to recommended fuel flow if Turbine Inlet Temperature (TIT) is below 900°C).
3. Fuel Boost Pumps - OFF. (Unless needed to prevent fuel flow fluctuations.)
4. Cowl Flaps - AS REQUIRED (maintain 225°C cylinder head temperature or less)
5. Battery Condition - CHECK (Refer to page 2-8)

OPERATIONAL SPEEDS

Minimum Single-Engine Control	98 mph/85 kts
Single-Engine Best Angle-of-Climb	115 mph/100 kts
Single-Engine Best Rate-of-Climb	127 mph/110 kts
Two-Engine Best Angle-of-Climb	114 mph/99 kts
Two-Engine Best Rate-of-Climb	138 mph/120 kts
Cruise Climb:	
SL - 20,000 feet	162 mph/140 kts
20 - 25,000 feet	150 mph/130 kts
25 - 30,000 feet	138 mph/120 kts

DESCENT

1. Altimeter - SET
2. Cowl Flaps - CLOSED
3. Windshield Anti-ice and Defroster - AS REQUIRED (On before descent into warm, moist air)
4. Pressurization - SET
5. Power - AS REQUIRED

BEFORE LANDING

1. Pressurization - ZERO DIFFERENTIAL PRESSURE
2. Seat Belts - FASTENED
3. Fuel Boost Pumps - ON
4. Propeller Synchronizer - OFF
5. Mixtures - FULL RICH
6. Propellers - SET AT 2750 RPM
7. Flaps - APPROACH (15°) (Maximum Extension Speed 200 mph/174 kts)
8. Landing Gear - DOWN (Maximum Extension Speed 200 mph/174 kts).
9. Flaps - FULL DOWN (30°) (Maximum Extension Speed 155 mph/134 kts)
10. Airspeed - ESTABLISH LANDING APPROACH SPEED

BALKED LANDING

1. Power - 2900 RPM and 41.5 in. Hg
2. Airspeed - BALKED LANDING CLIMB SPEED
3. Flaps - UP
4. Gear - UP
5. Cowl Flaps - AS REQUIRED

AFTER LANDING

1. Landing and Taxi Lights - AS REQUIRED
2. Flaps - UP
3. Trim Tabs - SET TO ZERO
4. Cowl Flaps - OPEN

NOTE

Boost pumps may be turned off if ambient temperature is below 90°F (32°C.)

SHUT DOWN

1. Parking Brake - SET
2. Battery - CHECK CONDITION and CHARGE (Refer to Battery Condition Check)
3. Electrical and Avionics Equipment - OFF
4. Cabin Temp Mode - OFF
5. Propellers - LOW PITCH (High rpm)
6. Throttles - 1000 RPM
7. Fuel Boost Pumps - OFF
8. Mixtures - IDLE CUT-OFF
9. Magneto/Start Switches - OFF, after engines stop
10. Battery and Generator Switches - OFF
11. Controls - LOCKED
12. If airplane is to be parked for an extended period of time, install wheel chocks and release the parking brake as greatly varying ambient temperatures may build excessive pressures on the hydraulic system.

ADDITIONAL FUNCTIONAL CHECKS

NICKEL-CADMIUM BATTERY CONDITION CHECK

It is recommended that one of the following battery condition checks be accomplished for each flight and an engine shut down check be accomplished each week.

DURING CRUISE FLIGHT

1. Battery Switch - OFF (Momentarily)
2. Loadmeter - NOTE CHANGE (Both loadmeters on, either loadmeter may be used)

NOTE

The change in loadmeter indication is the battery charge current and should be less than .025 (no perceivable needle movement). If the result of the test is not satisfactory, turn the Battery Switch - OFF and proceed to destination. (The battery switch should be turned on for landing in order to avoid electrical spikes caused by power fluctuations.) A Shutdown Battery Condition Check should be made after landing. If the battery indicates unsatisfactory, it should be removed and checked by a qualified Nickel-Cadmium Battery shop.

DURING ENGINE SHUTDOWN

1. One Generator - OFF
2. Engine Speed (Engine with Generator On) - 1000 RPM (Voltmeter indicating approximately 28 volts)
3. After loadmeter needle stabilizes, momentarily turn the battery switch off and note change in meter indication

NOTE

The change in loadmeter indication is the battery charge current and should be .025 (no preceivable needle movement). If the result of the first test is not satisfactory, allow the battery to charge repeating the test each 90 seconds. If the results are not satisfactory within 3 minutes, the battery should be removed and checked by a qualified Nickel-Cadmium Battery Shop.

ENVIRONMENTAL CONTROLS

PRESSURIZATION SYSTEM

PREFLIGHT (Manual Control System)

1. Pressurization Air Controls - CLOSED (In)
2. Pressurization Dump Switch - PRESSURIZATION MODE
3. Cabin Altitude Controller - SET 1000 FEET BELOW FIELD ELEVATION
4. Throttles - 2500 RPM
5. Test Switch - PRESS-TO-TEST (Note momentary cabin descent) RELEASE SWITCH
6. Cabin Altitude Controller - SET 1000 FEET ABOVE TAKE-OFF FIELD OR DESTINATION FIELD ELEVATION WHICH EVER IS HIGHEST.

PREFLIGHT (Motorized Controller System)

1. Pressurization Air Controls - CLOSED (In)
2. Directional Toggle Switch - OFF
3. Drive Motor Rate Rheostat - FULL INCREASE
4. Cabin Altitude Controller - MANUALLY SET TO FIELD ELEVATION
5. Throttles - 2500 RPM
6. Test/Dump Switch - TEST (Note momentary cabin descent) RETURN TO OFF
7. Directional Toggle Switch - UP (Set to 1000 feet above field elevation) THEN OFF
8. Drive Motor Rate Rheostat - MID RANGE
9. Red Altitude Selector Ring - SET TO 500 FEET ABOVE CRUISE ALTITUDE

IN FLIGHT

When Cabin Rate-of-Climb indicates zero

1. Directional Toggle Switch - UP (To raise cabin to selected altitude)

On descent when differential pressure is below 4.0 psi

1. Directional Toggle Switch - DOWN (To lower cabin to 1000 feet above destination field elevation).

CAUTION

Insure that cabin differential pressure is ZERO to avoid landing with a pressurized cabin.

COLD WEATHER OPERATION

PREFLIGHT INSPECTION

In addition to the normal preflight exterior inspection, remove ice, snow, and frost from the wings, tail, control surfaces and hinges, propellers, windshield, fuel cell filler caps and fuel vents. The wing contour may be changed by these formations sufficiently that its lift qualities are considerably disturbed and sometimes completely destroyed. Complete your normal preflight procedures, including a check of the flight controls for complete freedom of movement.

Conditions for accumulating moisture in the fuel cells are most favorable at low temperatures due to the condensation increase and the moisture that enters as the systems are serviced. Therefore, close attention to draining the fuel system sumps will assume particular importance during cold weather.

ENGINES

Use engine oil in accordance with the Consumable Materials. At temperatures of 10°F and below preheat engines prior to start. Give particular attention to the oil cooler and engine sump to ensure proper preheat. A start with congealed oil in the system may produce an indication of normal pressure immediately after the start, but then the oil pressure may decrease when residual oil in the engine is pumped back with the congealed oil in the sump. If an engine heater capable of heating both the engine sump and cooler is not available, the oil should be drained while the engines are hot and stored in a warm area until the next flight.

The airplane is equipped with an external power receptacle, and, during very cold weather, it is advisable to use external power for starting when available.

Normal engine starting procedures will be used. If there is no oil pressure within the first 30 seconds of running, or if oil pressure drops after a few minutes of ground operation, shut down and check for broken oil lines, oil cooler leaks or the possibility of congealed oil.

During warm-up, watch engine temperatures closely, since it is quite possible to exceed the cylinder head temperature limit in trying to bring up the oil temperature. Exercise the propellers several times to remove cold oil from the pitch change mechanisms. The propellers should also be cycled occasionally in flight. During letdown and landing, give special attention to engine temperatures, since the engines cool quickly.

STARTING ENGINES USING EXTERNAL POWER

1. Battery switch - ON
2. Generator, Electrical and Avionics Equipment Switches - OFF
3. Connect external power unit.
4. Set the output of the power unit at 27.0 to 28.5 volts.
5. Auxiliary power unit - ON
6. Start right engine first (use normal start procedures)
7. After engine has been started, turn auxiliary power unit OFF
8. Generator Switches - ON
9. Disconnect external power before starting left engine.

TAXIING

Avoid taxiing through water, slush, or muddy surfaces if possible. In cold weather, water, slush, or mud, when splashed onto landing gear mechanisms or control surface hinges, may freeze, preventing free movement and resulting in structural damage.

OXYGEN SYSTEM

OPERATION

1. Place the system in operation by rotating the valve to the fully ON position. (The shutoff valve on the oxygen cylinder must also be open.)

CAUTION

The shutoff valves of all high pressure oxygen systems should be opened slowly to prevent possiblity of damage to the system.

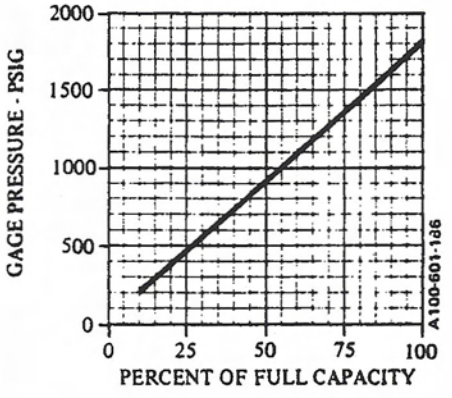
2. Select mask and hose. All are identical and provide the same flow to both pilot and passengers. Check for proper fit of mask and adjust if necessary. Proper fit is important at higher altitudes.
3. Plug in the oxygen mask and check for oxygen flow by noting whether the bag expands or by checking the flow indicator in the hose.
4. Discontinue use by unplugging outlets. The control valve should also be off to ensure complete oxygen flow stoppage. Closing the control valve on the bottle is not recommended except during servicing or prolonged periods of inactivity.

DURATION

Prior to the flight, check for an adequate oxygen supply for the number of people and the trip duration. Determine the supply pressure and convert it to percent of capacity on the Oxygen Available Graph. Find the duration on the Oxygen Duration Table and multiply by the percent of capacity.

OXYGEN AVAILABLE WITH PARTIALLY FULL BOTTLE

1. Determine percent of full bottle from airplane gage pressure.
2. Multiply oxygen duration in minutes by percent of full bottle.



OXYGEN DURATION

Oxygen duration is computed for Scott oxygen masks which regulate the flow rate to 2.5 Standard Liters Per Minute (SLPM). These masks, identified by an aluminum anodized color coded plug-in, are approved for altitudes up to 27,000 feet.

Cylinder Volume Cubic Feet	Number of People Using					
	1	2	3	4	5	6
	Duration in Minutes					
11	112	55	37	28	22	18
22	222	112	74	54	44	37
49	501	250	167	125	100	83
64	668	334	222	167	133	111

OXYGEN DURATION

Oxygen duration is computed for Scott oxygen masks which regulate the flow rate to 3.0 Standard Liters Per Minute (SLPM). These masks, identified by a green color coded plug-in, are approved for altitudes up to 30,000 feet.

Cylinder Volume Cubic Feet	Number of People Using					
	1	2	3	4	5	6
	Duration In Minutes					
11	93	46	31	23	18	15
22	187	93	62	46	37	31
49	415	208	138	103	83	69
64	543	271	181	135	108	90