

OPERATING PROCEDURES

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PILOT CHECK PROCEDURE

THE FOLLOWING CHECKS ARE TO BE MADE BY THE CAPTAIN AND THE FIRST OFFICER.

Before Entering the Aircraft

1. The pilot in command will check the general appearance of the aircraft, including controls, tires, brakes and lines for leaks, landing gear oleo leg extension wheel bays, cowling for proper fastening, and radio antennas. Will proceed as follows from left wing tip, walk undercarriage, check tire for cracks and proper inflation. Check brakes for hydraulic leaks. Looking up in wheel bay check pins installed correctly, also undercarriage locking device. Have a good look in the wheel bay for anything abnormal.

Then check for loose cowlings, engine oil leaks, bent cowl flaps and hydraulic leaks, this can be detected by presence of hydraulic oil on the ground underneath engine.

When crossing on the right side of the aircraft, check for broken or loose antenna and for open inspection traps.

Carry on the same inspection on right side. Then proceed to empannage, check elevators and rudder hinges, check tail wheel inflation.

Check trim tab positions - if not neutral check the corresponding trim indications in the cockpit.

This check will be made prior to departure from station of origin or at a station where the aircraft has been held for several hours.

On Entering the Aircraft

1. Check control locks and pins on board.
2. Check log books, snag book, flight report are on board.
3. Check emergency rations and equipment on board (if required for the trip)
4. Check pay load so C. of G. is within limit also properly tie down.
5. Check emergency exits are secured.
6. Radio circuit breakers - "ON"

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7. Electrical circuit breakers - "ON"
From Top Left to Top Right -
8. All radios are - "OFF"
9. Battery Cart Warning Light - "ON"
10. Radio Master Switch - "OFF"
11. Wing flood light - "OFF"
12. Compass light as necessary.
13. Panel lights as necessary
14. Master Battery Switch - "ON"
15. No smoking and Fasten seat belt switches - "ON"
16. Landing light switches - "OFF"
17. Pitot heater switches - "OFF"
18. Passing light - "OFF"
19. Navigation lights - "OFF"
20. Dome lights as necessary.
21. Side lights as necessary
22. Cockpit lights as necessary
23. Master Ignition switch "ON"
24. Left and right ignition switches - "OFF"
25. Energizer and mesh switches - neutral
26. Oil dilution and primer switches - neutral
27. Booster pump switches - "OFF"
28. Anti-icer pump switches "OFF"; after checking operation in icing season

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29. Check magnetic compass for serviceability.
Instrument Panel - from left to right
30. Heater - "OFF"
31. Clock wind up and set
32. Flight Group - Left side - "check"
33. Left and right vacuum lights - "ON"
34. Static selector on - "Pitot"
35. Check manifold pressure for atmospheric pressure
36. Check outside air temperature
37. Check tachometer for reading
38. Check carburettor air temperature
39. Check cylinder head temperature
40. Check oil temperature
41. Check fuel and oil pressure warning lights - "ON"
42. Check Fire detector warning lights
43. Check fuel and oil pressure gauges for readings
44. Lever to bleed instrument lines in - "OFF"
45. Clock wind up and set
46. Flight Group - right side - "check"
47. Check fuel tanks content
48. Check de-icing pressure gauge for reading
49. Check both suction gauges for reading
50. Check heater fire warning light
51. Check undercarriage warning light
52. Landing Gear and Hydraulic System Pressure - "Check" (Landing Gear Pins may be removed at pressure above 500 PSI minimum)

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53. Cowl flaps - "OPEN" ; then "OFF"
54. De-icer boost - "OFF"
55. Hydraulic Fluid Quantity - "Check"
56. Hydraulic Hand Pump Shut-Off Valve - "CLOSED"
57. Flap selector - "UP" then - "NEUTRAL"
58. Landing Gear Selector - "NEUTRAL"
59. Landing Gear Safety Latch Lever - "DOWN" and "LOCKED"
60. Fire Extinguisher Control Access Door - "OPEN"
61. Cockpit Hot and Cold air selector - "AS REQUIRED"
62. Rudder trim tab control - "check freedom of travel" and set "ZERO"
63. Parking brake - "ON"
64. Aileron trim tab control - "Check freedom of travel" and set "ZERO"
65. Left fuel tank selector - "Left Rear"
66. Engine Oil and hydraulic Shut-Off valves - "Open" (lockwired fully fwd)
67. Carburettor heat control - "full cold"
68. Right fuel tank control - "right rear"
69. Tail wheel - "Unlocked"
70. Elevator trim tab control - "check freedom of travel" and set "as required"
71. Propeller controls - "2700 RPM" position
72. Throttles - "cracked"
73. Mixture controls - "idle cut-off"
74. Have maintenance remove control locks; rudder and aileron locks may be left in place in high winds until engines are started.
NOTE: "1 to" 74 should be done before initial start only.

ENGINE START

1. Door warning light - "check" - "OFF". In response to hand signal from ground personnel, recheck and acknowledge parking brake - "ON".
2. Right fuel booster pump - "ON"; and check fuel pressure.
3. Energize starter for 10 - 15 secondes (never more than 30 secondes)
4. Mesh "right engine", allowing engine to turn over at least two revolutions.
5. While engine is turning, right ignition switch - "Both"
6. Press Priming switch - "As required" to obtain a smooth start

CAUTION: Care should be exercised no to overprime the engine. In case engine becomes overprimed, turn ignition "Off", open the throttle, and pull the propeller through with the starter so that the excess fuel may be drained through the Exhaust Port. Serious damage may result if an attempt is made to start an engine which is overprimed.

NOTE: Inexchanging "Brakes on" signal, Captain automatically confirms - "Hydraulic Pressure up" landing gear neutral and latched. Ground crew will then remove undercarriage external locking pins.

7. As soon as engine fires - Mixture control - "Automatic Rich"

CAUTION: Oil pressure should rise to 40 psi within 30 seconds after starting. Do not run engines over 700 RPM until oil pressure is up to 40 psi. If pressure does not indicate within 30 secondes, Stop Engine and investigate. Otherwise, adjust throttles to 700 RPM to 800 RPM and hold this speed until oil temperature is high enough to release oil relief compensator and oil pressure has dropped below 125 psi. After oil pressure has stabilized, the warm-up can be started at 1000 RPM.

8. Right fuel booster pump - "OFF"
9. Repeat starting procedure for left engine.

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10. After both engines are started.
 - (1) Ground Personnel will remove ground power
 - (2) Check battery cart warning light goes - "OUT"
 - (3) Generators - "BOTH - ON" simultaneously
 - (4) Captain's Artificial Horizon - "CHECK - UNCAGED"
 - (5) Left Directional Gyro - "SET" and "UNCAGE"
 - (6) Landing Gear Pressure - "500 PSI MINIMUM"; Hydraulic System Pressure "600 - 875 PSI"
 - (7) Heater - "RESTART" - AS REQUIRED"
11. Flight Controls - "CHECK FOR FULL TRAVEL AND FREEDOM OF MOVEMENT" ensuring all Control Locks removed.
12. Ground Personnel will display Landing Gear Pins.
13. Door Warning Light - "CHECK - OFF"
14. The signal man will give clearance to depart from ramp.
15. DO NOT START TAXYING BEFORE C.H.T. HAS REACHED 100 C AND OIL TEMPERATURE 40 C

TAXI

1. Brake - "Check" as soon as airplane starts moving
2. Flight instruments (D.G., A/H, T & B.I. etc.) - "Check" while turning during taxiing.

GROUND CHECK

1. Position airplane for run-up check in a location as free as possible from cinders, loose gravel, water, ice, etc.

NOTE: The ground check could be done at the ramp if enough time is available while waiting for the cylinder head temperature and oil temperature to come up to minimum temperature for taxiing.

2. Parking Brake - "Set"
3. Idle engines - 1200 RPM

FROM TOP LEFT TO TOP RIGHT

4. All radios - "Check" ; then "On as necessary"

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5. Battery Cart warning light - "Off"
6. Radio master switch - "ON"
7. Wing flood light - "OFF" ; at night to be checked then "OFF"
8. Compass light as necessary
9. Panel light as necessary
10. Master battery switch - "ON"
11. No smoking and fasten seat belt switches - "ON"
12. Landing light switches - "OFF" ; at night to be checked then "OFF"
13. Pitot heater switches as necessary; (should be checked though)
14. Passing light - "OFF" ; should be checked for serviceability
15. Navigation lights as necessary
16. Dome lights as necessary
17. Side lights as necessary
18. Cockpit lights as necessary
19. Master ignition switch - "ON"
20. Left and right ignition switches - "On both"
21. Energizer and mesh switches - neutral
22. Oil dilution and primer switches - neutral
23. Booster pump switches - "Off"
24. Anti-icer pump switches "Off"
Generators - "On" - Check generator loads normal, depending upon electrical services being operated
25. Check magnetic compass for serviceability

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Instrument Panel - From Left to Right

26. Heater - "OFF"
27. Clock checked
28. Flight Group - Left Side - "Checked"
29. Left and right vacuum lights - "OFF"
30. Static selector on - "Pitot" ; after being checked on alternate
31. Manifold pressure checked
32. Outside air temperature - "Checked"
33. Tachometer - "Checked"
34. Carburetor air temperature levers working
35. Cylinder head temperature - "Normal"
36. Oil temperature "Normal"
37. Fuel and oil pressure warning lights are - "OFF"
38. Fire detector warning lights - "Checked"
39. Fuel and oil pressures - "normal"
40. Bleed all instrument lines in all positions
41. Clock - "Checked"
42. Flight Group - right side - "Checked"
43. Fuel tanks content - "checked"
44. Check de-icer boost - pressure normal and check visually inboard and outboard shoes
45. D.G. and Horizon suction - 3.75 to 4.25" Hg; Turn and bank suction - 1.75 to 2.25" Hg
46. Heater fire warning lights - "Off"
47. Undercarriage warning lights Checked

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48. Landing gear hydraulic pressure - "500 PSI" minimum
49. Hydraulic system pressure - "600-875" PSI
50. Cowl flaps - "Open then Off"
51. De-icer boost - "Off"
52. Hydraulic fluid quantity - "Checked"
53. Hydraulic Hand Pump Shut-Off valve - "Closed"
54. Flap selector - "Up then Neutral"
55. Landing gear selector - "Down then Neutral"
56. Landing gear safety latch lever - "Down and Locked"
57. Fire Extinguisher Control Access Door - "Open"
58. Cockpit hot and cold air selector - "As required"
59. Rudder trim tab control - "Zero"
60. Parking brake - "On"
61. Aileron trim tab control - "Zero"
62. Left fuel tank selector - "Left Front"
63. Engine Oil and hydraulic shut-off valves - "Open"
64. Carburetor heat control levers - "Checked"
65. Right fuel tank selector - "Right Front"
66. Tail wheel - "Unlocked" ; after checking operation
67. Elevator trim tab control - "Set as required"
68. Propeller controls - "Check movement"

Run-up

1. Check that engines temperatures and pressures are within limits for run-up

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2. Mixture controls - "Automatic Rich"
3. Run-up both engines simultaneously to 1600 RPM
4. Move Propeller Pitch Controls slowly from "Increase RPM" to "Decrease RPM" momentarily to force warm oil into propeller dome; reset controls - "2700 RPM position."
5. Check carburetor heat
6. Check suction
7. Check ignition for a dead magneto
8. Check feathering and at the same time the generators (200 RPM drop when feathering is enough)
9. Check ignition at atmospheric pressure for magneto drop

NOTE: Normal drop on ignition check is 50-75 RPM. If drop on engine speed exceeds 100 RPM on single ignition the following procedure should be adopted. Run engines at 2200 RPM in "Auto Lean". Apply full carburetor heat and maintain until Cylinder Head Temperature of up to 230 C is reached. Return carburetor heat - "FULL COLD" and mixture control "AUTO RICH". Repeat magneto check.

10. Check power of the engines - with 45" - 2700 RPM
11. Check idling - 600 to 700 RPM
12. Out side check.

PRE-TAKE-OFF CHECKS

1. Hydraulic pressure - 600 to 875 PSI
2. Harness - fasten and Hatch - closed
3. Light - "Off" - door closed
4. Trims - aileron set at zero
rudder set at zero
elevator as necessary
5. Tension - tighten
6. Mixture - auto rich
7. Carburetor heat - cold

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8. Pitch - full fine
9. Fuel - check selection
 - " content
 - " pressure
 - " booster "ON" or "Cross-Fedd" "ON"
10. Flaps as required
11. Gills - Trail
12. Gyros - uncaged and set
13. Switches - ignition switches on "Both"
14. No smoking and belt signs "ON"
15. Temperatures and pressures of engines "NORMAL"
16. Tail wheel - "Locked" when lined up with runway.

TAKE-OFF

1. Take-off using 2700 RPM and 48" MP maximum (normal 44" MP)
2. During the complete take-off, the First Officer will devote his attention to maintain required power setting, synchronize engines and observe all engines instrument readings.
3. Normal lift-off speed is 90 MPH I.A.S.

NOTE: Certain runway condition, such snow sand on loose gravel, take-off in a tail down attitude would be advisable in that case lift-off speed could be 10 MPH lower.

4. When airborne the Captain will order the First Officer to raise the landing Gear by raising his thumb and calling "Gear Up" (The landing gear requires approximately 12 seconds to fully retract).
5. When Landing Gear is fully retracted and Landing Gear Warning Light is "RED" the First Officer will indicate this to the Captain by saying "Gear Up".

CLIMB

1. After take-off, reduce power settings - "32.5 in. M.P., and 2325 RPM" at a climb speed of not less than 110 MPH I.A.S. (95K) if conditions of terrain permit rate of Climb 400" a minute.

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2. At a convenient time, normally at, but not below 1000', check the following:

- (1) "No smoking and Fasten seat Belt" switches - "OFF"
- (2) Fuel booster pumps - "OFF"
- (3) Landing Gear Selector Lever - "NEUTRAL"

CRUISE

1. On reaching cruising altitude, adjust the Manifold Pressure and RPM according to Cruise Control Chart, in the cockpit.
2. When Cylinder Head Temperature are lower than 200C.
 - (1) Cowl Flaps - "close", then "off"
 - (2) Mixture controls - "auto-lean"
3. Visually check the nacelles for oil leaks, vibrations, etc.
4. Check instrument indications during flight to ensure correct of all equipment within proper limits.
5. At outside air temperatures below - 13 F (250), the propeller should be exercised at frequent intervals in cruising flight, and always before landing, by slowly advancing the RPM to 2325 and then back to cruising RPM.

DESCEND

1. Retard throttles during descent so that power settings for 550 BHP/engine are not exceeded.

APPROACH

1. Gas - selection, content, pressure, boosters on
2. Brake - parking off and tail wheel - locked
3. Landing Gear lower at 140 MPH I.A.S. or less, and when landing gear is fully extended check hydraulic system and landing gear system pressure for 600-875 PSI return landing gear selector to "neutral"; check warning lights for "Green" and "Wheels Down" visually. Lock landing gear safety latch lever to floor. Upon completion of operation both pilots verbally check - "Pressure Up" "Two Green Lights" - I have a Wheel and Locked".

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4. Mixture controls - "Automatic "rich"
5. Carburetor Heat Controls - "Full Cold" unless carburetor icing evident or suspected.
6. No smoking and Fasten seat Belt switches - "On"
7. De-icer selector valve - "Off" before landing
8. Wing flaps - "As required"

AFTER LANDING

1. Pitot heaters - "Off"
2. Fuel Booster Pumps - "Off"
3. Landing Gear Pressure - "Check" - 500 PSI/Minimum and hydraulic system Pressure 600-875 PSI"
4. Cowl Flaps - "Open", then "Off"
5. Wing Flaps - "Up", then selector to "Neutral"
6. Tail wheel - "Unlocked"
7. Heater - "Off"

At RAMP

1. Parking Brake - "On"
2. Set engines to 1000 RPM
3. When Cylinder Head Temperature is less than 175 C, the mixture to idle cut-off.
4. Master Ignition and Right and Left Ignition switches - "Off" after propellers stop turning.
5. Signal ground service personnel - "Switches Off"
6. "Seat Belt" switch - "Off"
7. Artificial Horizon and Directional Gyro - "Caged"

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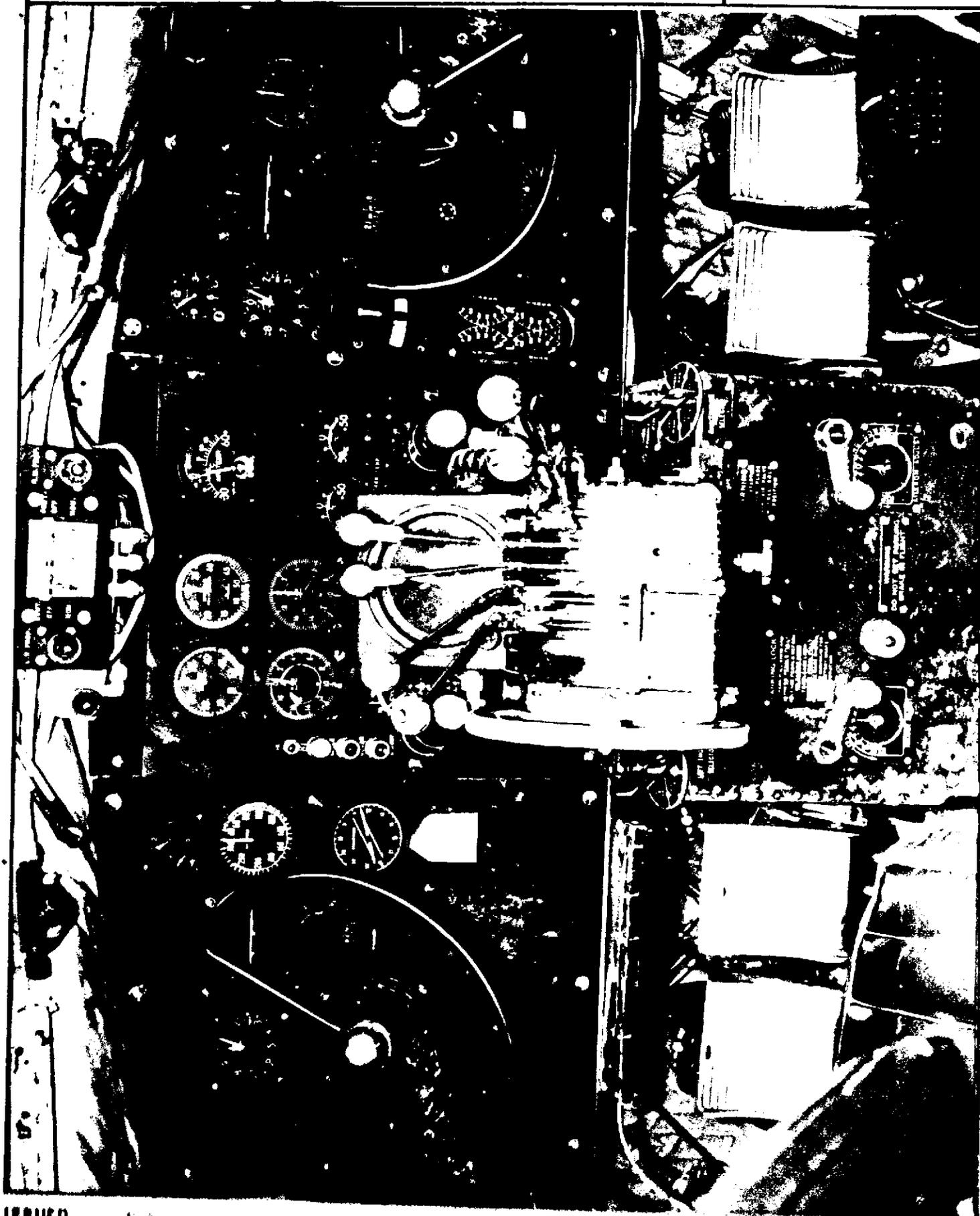
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8. Above 32 F Outside Air Temperature - Cowl Flaps - "Open", then "Off"
Below 32 F Outside Air Temperature - Cowl Flaps - "Close", then "Off"
 9. Flap selector "Up"
 10. Landing Gear Selector - "Down"
 11. Fuel Tank Selectors - "Off"
 12. At intermediate stops, a ground power supply should be plugged in to operate the essential services. If an auxiliary power unit is installed runs it at intervals. Where a ground power supply is not available, or APU not installed the master switch should be set "Off" or all non-essential circuits left inoperative by individual switch control or by setting "Off" the circuit breaks of those circuits not controlled by switches.
 13. Master Radio Switch - "Off"
 14. Controls "Locked - As required"

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FUEL SYSTEM FAILURE

1. An Electric Fuel Booster Pump is installed in the fuel system of each engine which will provide the normal operating pressure of 14 - 16 pounds per square inch in the event of failure of the engine Fuel Pump. The control switches for the Electric Fuel Booster Pumps are located on the Right Hand Electrical Control Panel above the windshield.

Engine Fuel Pump Drive or Valve Failure

2. Warning:

The "red" Fuel pressure Light on the Instrument Panel will light up

3. Action:

- (1) Electric Fuel Booster Pump - "ON" (pressure will return to normal if no line failure has occurred.)

Fuel Pressure Relief Valve Failure

4. Warning:

The "red" Fuel Pressure Light on the Instrument Panel will light up.

5. Action:

- (1) Electric Fuel Booster Pump - "ON" (pressure will return to normal if no line failure has occurred.)

Broken Fuel Line

6. Warnings:

The "red" Fuel Pressure Light on the Instrument Panel will light up.

7. Action:

- (1) Electric Fuel Booster Pump - "ON". If pressure fails to return to normal it indicates a broken fuel line - if this occurs proceed as follows:
 - (a) Fuel Tank Selector Valve - "OFF" isolating fuel supply to the failing engine.
 - (b) Propeller - "FEATHER"

HYDRAULIC SYSTEM FAILURE

General

1. The hydraulic system operates the landing gear, wing flaps, wheel brakes, cowl flaps and windshield wipers. Pressure is provided by the engine driven hydraulic pump on each engine which feeds the fluid through a common line to a pressure regulator which maintains the normal system operating pressure at 600-875 p.s.i. If one engine-driven pump is inoperative the operative pump on the other engine will maintain the desired system pressure. A hand pump is installed at the base of the hydraulic control panel to provide pressure to operate any of the services in the event both engine driven pumps fail or are inoperative or there is insufficient pressure. The 8.3 quart capacity hydraulic reservoir has an outlet on the side which is located so that 6 quarts of fluid are available to the engine-driven pumps and the remainder, 2.3 quarts, available only to the hand pump through an outlet in the bottom of the reservoir.
2. The principal indication of trouble in the hydraulic system is given by the System Pressure Gauge and/or the Sight Gauge in the reservoir.
3. Procedure in Event of Loss of Hydraulic System Pressure and/or Fluid
 - (1) Leave all Hydraulic Selectors - "NEUTRAL" or "OFF" during en-route flight. (Testing the functioning of hydraulic services en-route may mean loss of all fluid and/or possibility of not being able to retract landing gear or flaps after lowering; which would be particularly undesirable in event of engine failure.)
 - (2) Approach
 - (a) Landing Gear Selector - "DOWN" (Gear will extend under its own weight - pulling nose up sharply will lock gear in place)
 - (b) Landing Gear Selector - "NEUTRAL" to conserve all the fluid possible for flap and brake operation.
 - (c) Safety Latch Lever - "DOWN" and "LOCKED"
 - (d) Check - "TWO GREEN" - "I HAVE A WHEEL" & "LOCKED" (the airplane may be landed safely with no pressure showing on the Landing Gear Pressure Gauge.)

HYDRAULIC SYSTEM FAILURE (continued)

- (e) Wing Flap Selector - "DOWN"; hand pump flaps down to desired position and return Selector - "NEUTRAL". If flaps do not lower immediately by pumping, a load in the wing flap down-lines is indicated and the Wing flap selector should immediately be returned to "NEUTRAL" to conserve fluid and a 'flaps-up' carried out.

(3) Landing

- (a) The landing should be planned and executed for minimum use of brakes; the aircraft should be landed with the tail well down to shorten the landing roll.
- (b) The First Officer is to keep continuous pressure on the hand pump; the handle will move each time the brakes are applied.

Landing Gear Safety Latch Failure

- (1) The airplane may be landed regardless of whether the Safety Latches are engaged; provided the Landing Gear is fully down, with hydraulic pressure in the landing gear struts and the Landing Gear Selector - "NEUTRAL". The horn will continue to sound as the unlocked safety latches actuate the horn switch.

Procedure:

- (a) Landing Gear Selector - "DOWN"; check Landing Gear Hydraulic Pressure "600-875 P.S.I."; return Selector - "NEUTRAL"
- (b) Move the Landing Gear Safety Latch Lever gently back out of the "spring position" - this may release the Safety Latches if they are jammed or not fully locked. Use only moderate force when moving the Safety Latch Lever so as not to strain the cables and render the mechanism completely inoperative.
- (c) Before landing, check Landing Gear Hydraulic Pressure - "600-875 p.s.i." (Use the Hand Pump if necessary to keep the Landing Gear Pressure UP)
- (d) If possible, complete landing without use of brakes. If brakes are necessary, apply very gently to prevent the Landing Gear from tending to collapse.
- (e) Have Landing Gear Safety Pins installed as soon as the airplane comes to rest.

HYDRAULIC SYSTEM FAILURE

(continued)

5. Landing Without Fluid Pressure or Latches

(1) If hydraulic pressure has been lost and the latches cannot be engaged, as described in the preceding paragraph, proceed as follows:

- (a) Landing Gear Selector - "DOWN"
- (b) Operate Hand Pump continuously immediately before landing.
- (c) Landing Gear Hydraulic Selector - "NEUTRAL" just before touchdown.
- (d) Do not use brakes except in emergency.
- (e) Have Landing Gear Safety Pins installed as soon as airplane comes to rest.

ICING

1. The information contained in this section describes the operation of the various anti-atmospheric systems of the DC-3-S1C3G airplane.

Carburetor Icing

1. Each engine is equipped with a pre-heater which provides a carburetor air intake temperature increase of 56°C minimum above an outside air temperature of -1°C . The heat is supplied by the hot exhaust gases in the collector ring. The controls are located on the right hand side of the Engine Control Pedestal with a friction locking control adjacent. The controls may be adjusted and locked in any position from "FULL COLD" to "FULL HOT". The "FULL COLD" position is fully forward. (Full carburetor heat will reduce the engine power by as much as 30 to 40 BHP per engine).

Propeller Icing

1. The propeller anti-icing system is installed in the airplane to prevent the formation of ice rather than to remove it when formed. The system should therefore be used whenever icing conditions are expected or suspected.
2. Goodrich propeller de-icer shoes are cemented along the leading edge of each propeller blade. These are grooved on the outer surface to give the best possible distribution of anti-icing fluid over the blade. Fluid is supplied from the anti-icer tank through a slinger ring around the propeller shaft and a feed ring cemented around each blade shank.
3. The pump control switch is located on the electrical panel in front of the First Officer's head. The flow of fluid to the propellers from the main pump is controlled by means of Adel toggle valves located under the magnetic compass. The quantity of fluid flow is controlled by restrictors in the lines to the slinger ring discharge nozzles. The restrictors give a rate of flow of approximately 5 IMP. quarts per hour to each engine.

Operation of the Propeller Anti-Icing System

1. Switch anti-icer pump - "ON" (switch located on right hand electrical panel)
2. Turn propeller anti-icing needle valve on (located under the magnetic compass).

Windshield Anti-icing, De-frosting and Wiper System

1. The windshield anti-icing system consists of two discharge nozzles aimed at the two main windshield panels. The nozzles are supplied with fluid from the main anti-icing fluid system.
2. For defrosting purposes provision is made to blow hot air on to the inside surface of the windshield by means of two outlets attached to two branch ducts from the flight compartment heating duct. Two valves for controlling the hot air flow are located on the outlets themselves. Hot air is only available to these outlets if the airplane heating system is operating.
3. Hydraulically operated windshield wipers are installed for the purpose of clearing the windshield when the airplane is operating in rain or snow. If the airplane is operating in moisture conditions producing icing, the wipers may be used in conjunction with the anti-icing and defrosting system. The wipers must not be operated on dry glass.

Operation of Windshield Anti-Icing System

1. Switch anti-icer pump "ON".
2. Place windshield toggle control valve "ON" by lifting it.
3. For momentary operation hold switch down.

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4. Windshield Defrosting System

- (1) Windshield Defrosters - "ON" (located at centre of windshield immediately above Main Instrument Panel).
- (2) Other aircrafts windshield defrosters are located below electrical panels and valves to operate them are behind pilots' head.

5. Windshield Wipers

- (1) Windshield Wiper Valve - "ON" (Located on lower left side of Main Instrument Panel).

Pitot Heat and Pitot Alcohol System

6. Both pitot-static heads on the nose of the aircraft are equipped with electrical heating elements controlled by a single "ON-OFF" toggle switch on the left hand Electrical Panel. (Alcohol flow at the rate of one quart per hour is also available at each pitot-static head if required).

7. Operation

(1) Pitot Heat

- (a) Pitot Heater Switch - "ON" prior to take-off and leave "ON" during flight regardless of atmospheric conditions.
- (b) Pitot Ammeters - "CHECK 3 TO 5 AMPS" (located on right Electrical Panel).

(2) Pitot Alcohol

- (a) Main Anti-Icer Pump - "ON"
- (b) Pitot Anti-icing Selector - "ON" (under First Officer's side window) or, if Auxiliary Anti-icer Pump is used:
 - (1) Auxiliary Anti-icer Pump - "ON"
 - (2) One Propeller Anti-icing Selector - "ON" (under First Officer's side window).
 - (3) Pitot Anti-icing Selector - "ON"

NOTE: When the Auxiliary Anti-icer Pump is "ON", there is a continuous flow of alcohol to the propellers regardless of whether the Propeller Selectors are "ON" or "OFF".

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(cont'd)

- (3) If the pitot heads cannot be kept clear of ice switch the Static Selector Valve "ALTERNATE SOURCE" (located on the left side of the Main Instrument Panel). The following corrections should be applied to the airspeed and altimeter readings when the Static Selector is set to "ALTERNATE SOURCE".
- (4) Corrections to Airspeed Indicator and Altimeter with static selector at "Alternate Source".

KNOTS			MPH		
IAS	Correction to ASI Reading	Correction to Altimeter Reading	IAS	Correction to ASI Reading	Correction to Altimeter Reading
70	-5	-30 Ft.	80	-4	-30 Ft.
80	-5	-45 "	90	-5	-45 "
90	-6	-60 "	100	-6	-55 "
100	-7	-75 "	110	-7	-70 "
110	-8	-95 "	120	-8	-85 "
120	-9	-110 "	130	-9	-100 "
130	-10	-125 "	140	-9	-110 "
140	-11	-140 "	150	-10	-125 "
150	-12	-155 "	160	-11	-140 "
160	-13	-175 "	170	-12	-155 "
170	-14	-190 "	180	-13	-165 "
180	-15	-205 "	190	-13	-180 "
190	-16	-220 "	200	-14	-195 "
			210	-15	-210 "

Surface De-icing

8. The leading edges of the wings and the horizontal and vertical stabilizers are equipped with Goodrich inflatable rubber de-icer shoes. This system is intended to remove ice after it has formed rather than to prevent ice formation. Wing flood light controlled with switch on the left Electrical Panel is located in fuselage to illuminate the left wing during night operations. The De-icer Selector Valve is located directly behind the First Officer's seat. The De-icer Pressure Gauge and Pressure Selector Lever are located on the right hand side of the Instrument Panel. The De-icer System pressure fluctuates during the de-icer cycle but will indicate 8 psi at the peak of each inflation.
9. (Unassigned)
10. (Unassigned)

Operation of Surface De-icing System

11. At night, Wing Floodlight Switch - "ON" (located on left hand Electrical Panel)
12. Assess ice formation type, severity and thickness carefully, generally allowing the ice to build up to some degree on the leading edge before using the de-icers.
13. De-icer Selector Valve - "ON" and "OFF" - "AS REQUIRED" to give most efficient ice removal.

- CAUTION:
- (1) Continuous use of the de-icers may have a detrimental effect on ice removal. It is frequently better to allow the ice to build up to some degree with the de-icers - "OFF" to permit cleaner removal when the de-icers are turned "ON".
 - (2) Do not attempt to take-off or land with the de-icer boots operating as the stalling speed is increased approximately 8 mph (7knots).
 - (3) Approaches and landings with ice on the wings should be made at speeds some what higher than normal to allow for increased stalling speed.
 - (4) When the airplane is flown through an icing condition the controls should be moved at intervals to check any possibility of freezing.