



normal procedures

section
II

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PREPARATION FOR FLIGHT.

FLIGHT RESTRICTIONS.

For flight restrictions on the aircraft, refer to Section V of this manual.

FLIGHT PLANNING.

Preflight planning data needed for completing the proposed mission should be determined by using the performance data contained in Appendix I.

WEIGHT AND BALANCE.

Check the aircraft weight and balance (refer to the manual of Weight and Balance, T.O. 1C-54A-6). Refer to Section V for the weight limitations of the aircraft, and check the takeoff and anticipated landing gross weights. Make certain that the weight and balance clearance (Form 365F) is satisfactory. Make certain that the weight grades of fuel, oil, and any special equipment carried are suited to the mission to be performed.

ENTRANCE.

The crew will normally enter through the main cabin door on the left side of the aircraft. However, the aircraft may also be entered through the crew entrance door on the right side of the fuselage near the navigator's station.

PREFLIGHT.

Check the AFTO Form 781 for status of the aircraft. It will be the responsibility of the pilot to insure that preflight or thruflight inspection as required by the manual of Inspection Requirements, T.O. 1C-54A-6, has been performed. It will also be the responsibility of the pilot to insure that each crew member has accomplished his individual inspection requirement as outlined in this section and Section VIII.

Note

The air crew visual inspection procedures outlined in this section are based on the assumption that maintenance personnel have completed all the requirements of the manual of Inspection Requirements, T.O. 1C-54A-6, for preflight or thruflight; therefore, duplicate inspections and operational checks of systems by air crew members have been eliminated, except for certain items required in the interest of flying safety.

Note

The expanded checklists are principally for the training of air crew members and the standardization of procedures. Their use is not intended to replace or supplement the responsibilities of maintenance personnel.

Note

The crew engineer will read all operating checklists except the Before Starting, Before Takeoff, and Before Leaving Aircraft checks. These three checklists will be read by the copilot. The pilot will ask for the appropriate checklists, and all items will be read and properly answered. (For R5D, the copilot will read all checklists.)

In the following procedures P, CP, and CE denote pilot, copilot, or crew engineer as responsible for performing the action and making the response. Where a crew engineer is not aboard, the person who is to make the response is denoted in parentheses immediately after the letters CE.

STANDARD TERMINOLOGY.

To assure complete understanding by all crew members, the following terminology and procedures will be used.

STANDARD POWER TERMINOLOGY.

1. Max Power.
2. METO Power.
3. Climb Power.
4. Cruise Power.
5. On other than standard power settings, the pilot will call for a desired power setting by using a definite rpm and manifold pressure figure:

Rpm Twenty-One Hundred

Manifold Two Eight

FLAP SETTINGS.

Flap settings will be requested in the following manner:

Flaps Twenty

CLIMATIC.

The term climatic as used in this manual indicates equipment operation or setting which may be necessary for other than daylight VFR conditions. This includes IFR, night, cold weather, tropic, and desert conditions. The equipment operation or setting will vary, depending under which type of conditions operations are being conducted.

THRU-FLIGHT INSPECTION.

When an aircraft is flown by the same flight crew on the same day in regularly scheduled airline-type operation, or when assigned missions that requires intermediate stops, it is not necessary to perform all checks under Before Interior Inspection, Interior Inspection, and Exterior Inspection. Only those items preceeded by an asterisk must be performed during thru-flight operation. The remaining items may be checked at the discretion of the flight crew. All items under Before Starting Engines and subsequent checks must be accomplished for all flights.

BEFORE INTERIOR INSPECTION.

1. Tail stand — In place.
2. Wheel chocks — In place.
3. Landing gear downlock pins — In place.
4. Forward lower cargo compartment — On aircraft with the APP installed in the forward lower cargo compartment, check cover plate (fire screen) to insure that cargo is not stowed against the APP creating a potential fire hazard.

INTERIOR INSPECTION.

1. AFTO Form 781 and 781A — Checked. Check Part 2 for inspections, engine time, servicing, release, write-ups, maintenance, etc. Check Part 3 for maintenance record, T.O. compliance, etc.
2. Aircraft Publications — Aboard. Insure that all pertinent publications are aboard and stowed.
3. Circuit Breakers and Fuses — As required. Insure that all fuses are good and spares are available. Check that all appropriate circuit breakers are set.
4. Cabin Heater Rheostat — OFF. Must be OFF before electrical power is applied to the aircraft.
5. Radio and radar equipment — OFF. Check all switches.
6. Ignition Switches — OFF. Check both master and engine switches — OFF.
7. Battery Switch — OFF.
8. Alarm Bell — Checked and OFF. With electrical power off, check the alarm bell for operation. (Power is supplied directly from battery.)
- *9. External Power or APP — ON. Use external power or APP when available. (See electrical system description, Section I.)
10. Lights — As Required. Check all lights for operation.
11. Landing Gear Lever — DN and Locked. Check lever for down and locked position, indicator lights for proper indication.

12. Prop Anti-Ice Pump Rheostats — Checked and OFF. Check pump for operation by observing flow of fluid from propeller slinger rings. Turn pump OFF.
13. Windshield De-Icing Switch and Control Knob — Check and OFF. Check flow of fluid from windshield alcohol lines, then turn OFF.
14. Inverters — Checked and ON. Check spare (No. 2) inverter, then turn on main (No. 1) inverter. Check autosyn instruments for operation.
15. Instrument Lights — Checked. Turn on lights and check for proper illumination.
16. Cockpit Heater and Blower — Checked and OFF. Turn blower on, turn on No. 2 (No. 3 on some aircraft) booster pump, open ventilators, then turn on cockpit heater switch. Check for rise in heater temperature, turn off booster pump. Turn off heater switch and allow temperature to cool to below 50°C before turning off blower.
- *17. Fuel, Oil, Hydraulic Fluid and Alcohol Quantity — Checked. Check fuel, oil, and alcohol gages for required quantity. Check hydraulic fluid quantity gage, also reservoir sight gage, for required quantity.
18. Inverter Switch — OFF. Turn OFF after autosyn instruments have been checked.
19. Trim Tabs — Checked and Neutral. Check trim tabs for ease of operation, then set at zero trim.
- *20. Airbrake Pressure — Checked. Within Limits. Limits should be approximately 950 psi to 1050 psi.
21. Windshield Wipers — Checked and OFF. Check windshield wipers for proper speed, then turn OFF.
22. Auxiliary Hydraulic Hand Pump — Checked. Operate hand pump and check for buildup in hydraulic pressure.
23. Aldis Lamp — Checked. See that lamp cord is properly plugged in and that lamp is operating.
24. Oxygen Equipment and Pressure — Checked. Check oxygen equipment for proper operation and oxygen system for desired service, normally 400 psi.
25. Navigator's Table — Secured. Must be secured during takeoff and landing.
26. Driftmeter — Positioned and Caged. Check for cleanliness of lens cover. This instrument should be properly positioned and caged.
27. Smoke Mask and Asbestos Gloves — Aboard. Check for availability and stowage.
28. Hand Axes — Stowed. Check for availability and stowage.
29. Auxiliary Oil Tank — Checked. Check this system by selecting an engine system, turn on circuit breaker, and operate pump. Turn off circuit breaker and place selector in OFF position. The tank should be serviced to approximately 40 gallons.
30. Reserve Hydraulic Fluid and Funnel — Stowed. Check for 5 gallons of reserve hydraulic fluid, and stowage of funnel and wrench.
- *31. Fuselage Fuel Tank — Checked (if installed). Check for servicing and selectors OFF.
- *32. Emergency Exit Doors, Top of Wing, Gas and Oil Caps and Anti-Icing Filler Cap — Checked and secure. Check fuel tank quantity. Secure fuel, oil, and anti-icing fluid tank caps. Secure all emergency exit doors.
33. Emergency Cabin Lights (Battle Lanterns) — Checked and OFF. Check operation and stowage. Turn off.
34. Fire Extinguishers — Checked. Check for proper stowage.
35. First Aid Kits — Checked. Check for proper stowage.
36. Tail Cone Access Door — Checked and Secured. Check in tail cone for stowaways, etc. Secure door.
- *37. Cargo Doors — Checked and Pins Installed. Check for damage and proper safetying of hinge pins.

EXTERIOR INSPECTION.

Refer to Figure 2-1 for suggested route and items to be checked.

BEFORE STARTING ENGINES.

1. Preflight inspections — Completed.
2. AFTO Form 781 and Form 365F — Aboard.
3. Takeoff, climb, and landing data — Computed.
4. Oxygen masks — In place.
5. Seats and rudder pedals — Adjusted.
6. Hydraulic pressure — Within limits.
7. Parking brakes — Set.
8. Ignition switches — OFF.
9. Battery switch — As required.
10. Generator switches — ON.
11. Booster pump switches — OFF.
12. Inverter switch — As required.
13. NO SMOKING and FASTEN SEAT BELT sign switches — ON.
14. Fuel tank selector handle — Main Tanks — ON.
15. Carburetor air levers — COLD.
16. Crossfeed selector levers — OFF.
17. Propeller levers — Forward.
18. Throttles — Set.
19. Autopilot — DISENGAGED.
20. Mixture levers — IDLE CUT OFF.
21. Landing gear lever — DN and locked.
22. Wing flap lever — OFF.
23. Blower levers — LOW and locked.
24. Cowl flap levers — OPEN.

25. Auxiliary fuel tank selectors (if installed) — OFF.
26. Bypass handle — DOWN.
27. Hand pump selector handle — Forward.
28. Emergency landing gear handle — OPEN (Aft).
29. Static source selector switches — STATIC (left-right).
30. Flight instruments — Uncaged.
31. Fire extinguisher selector handles — In.
32. Fire detector system — Checked.
33. Manifold pressure — Noted.
34. Radios — As required. One radio should be turned ON and tuned to tower frequency.
35. Gear pins, tail stand, pitot covers, and entrance ladder — Aboard.

ENGINE STARTING PROCEDURE.

Prior to starting engines, a ready signal should be received from the ramp coordinator. After this signal is received, start engines as follows:

1. Engines — Clear — P, CP. Both pilot and copilot will determine that the area surrounding the engines is clear of personnel and objects and that a fire guard is posted before starting engines.
2. Master Ignition Switch — ON — CE (P). The crew engineer will turn on the master ignition switch at the pilot's command. On the R5D, the pilot will turn on the master ignition switch.
3. Start Engines — P, CP, CE.
 - a. The engines are started in the order of No. 3, No. 4, No. 2 and No. 1. An inboard engine is always started first in order that hydraulic system pressure may be gained.
 - b. At the command from the pilot to start engines, the copilot will engage No. 3 starter and, as the propeller rotates through 9 blades, watch for hydraulic lock, which is indicated by propeller stoppage. If no hydraulic lock is evident, the copilot will call for "switch on, boost pump low."

EXTERIOR

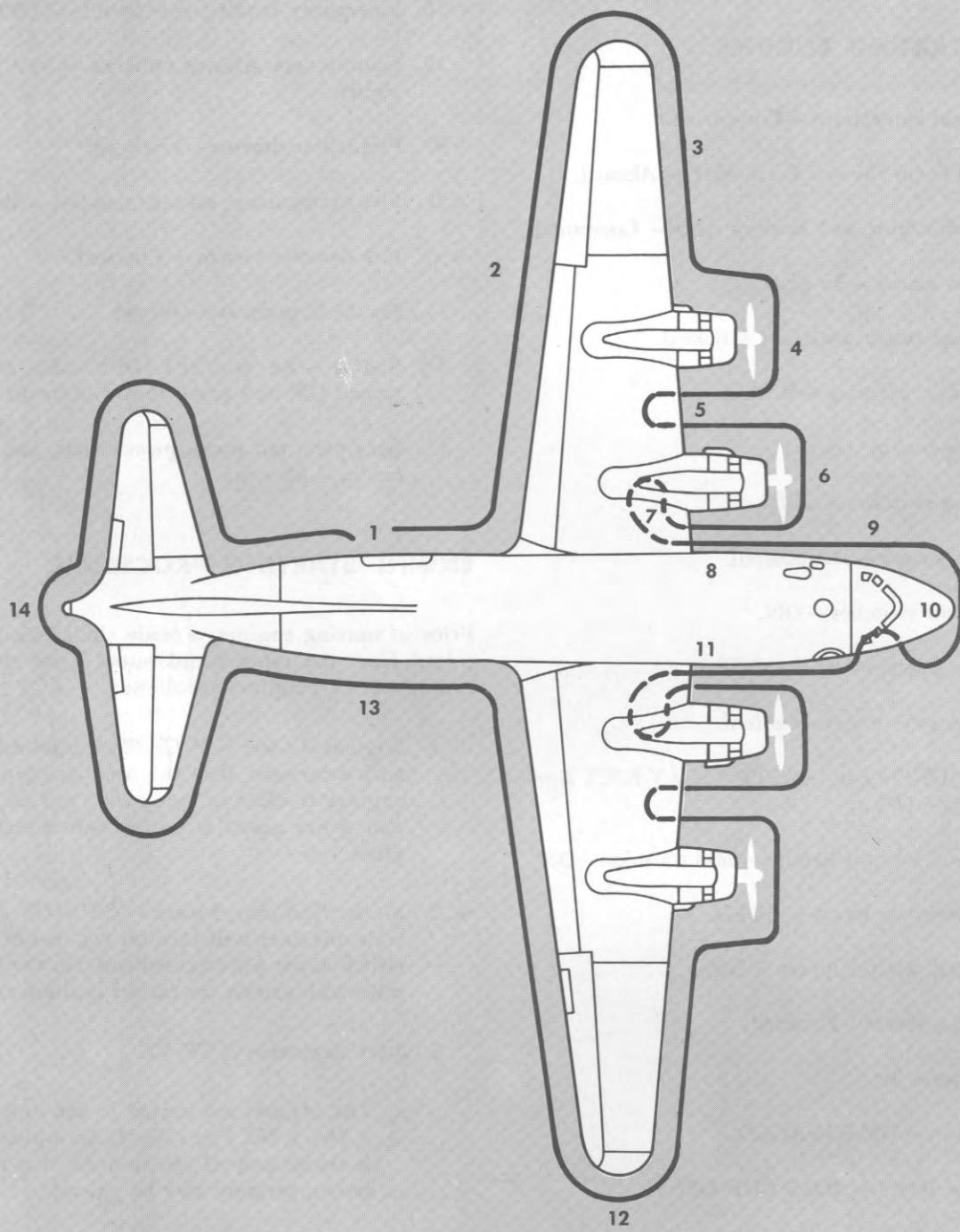


Figure 2-1 (Sheet 1 of 4)

INSPECTION

Note:

During the exterior inspection, the aircraft should be checked for evidence of damage, leaks, secureness of inspection plates and attachments, installation, position, and presence of foreign matter.

1. Between main cabin door and left wing root — Checked. Check the flare chute covers for damage and secureness.
2. Trailing edge left wing — Checked.
 - a. Flaps — Check flap surfaces for general condition and signs of warping (warping is indicated by an irregular trailing edge). Check flap doors for loose or missing rivets and cracks. Check flap hinges for bends. With the flaps up, the door covering the flap hinge should have 1-inch clearance.
 - b. Aileron — Check aileron surfaces for general condition. Note if drain grommets are open. Check that three static dischargers are in place and in good condition. Check bonding on aileron.
 - c. Inspection plates — Check secureness.
3. Left wing tip to No. 1 nacelle — Checked.
 - a. Navigation lights — Check all navigation lights for operation (steady and flashing).
 - b. Inspection doors and plates — Check secureness.
 - c. De-icer boots — Check boots for cracks, tears, and secureness. Check for evidence of dents in leading edge of wing that would be concealed by de-icer boot. If there are no boots, check that holes are plugged.
 - *d. Underside of wing — Check for fuel leaks, especially rear side of main wing spar and around tank inspection plate.

Note:

During ground operations, when there is evidence of leakage either by odor or sight of raw fuel, the aircraft will remain on the ground until an investigation determines the source and extent of the leak.

- e. Fuel tank vents and drains — Check for freedom from obstruction. When checking any vent or drain line, check that it is not bent into the airstream, as this would reverse the function of the line.
4. No. 1 nacelle — Checked.
 - a. Fuel strainer drain — Open the inspection door placarded FUEL STRAINER DRAIN and check for safetying (if required) and leakage. Secure inspection door.
 - b. Fuel tank drain valve — Open the inspection door placarded FUEL TANK DRAIN and check for leakage and safetying. Secure inspection door. The outboard tank drain valve cannot be reached when standing on the ramp.
 - c. Fuel sump drain — Open the inspection door placarded FUEL SUMP DRAIN and check for safetying (if required) and leakage. Secure inspection door.
 - *d. Propeller blades and dome — Check blades for looseness, pitting, nicks, and cracks. Check dome for

excessive oil leaks and check that the dome retainer nut is safetied. Check propeller anti-icer boots for condition and secureness.

- e. Front of engine — Check for loose or frayed ignition cables and leads, foreign matter lodged in the front section of the engine, and excessive oil leaks on reduction gear housing.
- f. Carburetor air and oil radiator air scoop — Check general condition of the scoop and check for foreign matter obstructing the scoop. Check condition of oil radiator shutters.
- g. Cowling — Check for fit and secureness. One-half inch clearance is allowable where cowling joins.
- h. Exhaust stack — Check for cracks and secureness.
- i. Cowl flap, rear of engine, exhaust stack retainer rings — Check the cowl flaps for excessive wear, binding, and loose or bent connecting links. Check the rear of the engine for loose articles or rags. Check as many exhaust stack retainer rings as possible for secureness.
- *j. Engine — Check nacelle and ground under the engine for evidence of excessive oil leaks.
- *k. Oil cap door — Visually check that oil cap door is closed.

5. Wing section between No. 1 and No. 2 nacelles — Checked.
 - a. Under side of wing — Check for fuel leaks, especially rear side of main spar and around tank inspection plates.
 - b. Landing light — Check that landing light is fully refracted, clean and undamaged.
6. No. 2 nacelle — Checked.
 - a. Repeat the inspection given in item No. 4.
7. Inside wheel well No. 2 nacelle — Checked.
 - a. Firewall shutoff valve — Check for secureness and position. Check that all three shutoff valves are connected by a link rod and that valves are in a 45° up position.
 - b. Propeller feathering motor — Check for peeled paint or cracked housing which may indicate a burned-out motor.
 - *c. Fuel, oil, and hydraulic lines — Check for leaks, damaged or changed lines, and loose hose clamps.
 - d. Fuel tank drain — Check for leakage and safetying.
 - e. Oil tank and drain — Check for damage, secureness, and leakage. Check that oil tank drain valve is safetied in the OFF position.
 - f. Electrical junction box plate and main line resistor — Check for position and secureness. Check main line resistor for evidence of burning which may indicate an overload or short circuit.

Figure 2-1 (Sheet 2 of 4)

EXTERIOR

- *g. Gear uplatch — The correct position of the gear uplatch is approximately 45° down. Check for evidence of strain or damage from jamming.
- h. Main gear — Check strut for proper inflation (the piston should be exposed approximately 3-1/4 inches). Check hydraulic lines and fittings for leakage and general condition. Check that gear actuating cylinder is safetied, that gear lugs are tight and safetied, check gear microswitches for cleanliness and operation. Check bungee spring cables for tautness and evidence of fraying. Check bulkhead plates for strain or fuel leaks resulting from hard landings.
- i. Brake assembly — Check lines and fittings for evidence of leakage, looseness, and wear.
- j. Brake deboosters and bleeds — Check that bleeds are safetied. Check all lines and fittings on both deboosters for condition. No leaks are permitted between the deboosters and bleeds.
- k. Shuttle valves — Check for cracks. Check attachment of airbrake lines for secureness.
- l. Tires and wheels — Check tires for proper inflation and position of slip mark.
- m. Wheel well — Check for general condition (miscellaneous wires, fittings, and actuating struts).
- 8. Wing section No. 2 nacelle to fuselage — Checked.
 - *a. Wing — Check wing in general for fuel leaks.
 - b. Cross feed drain — Open the inspection door placarded CROSS FEED DRAIN and check the drain for leakage and safetying (if required). Close inspection door.
 - c. Wing de-icer boot — Check for general condition. If no boots are installed, check plugs.
 - d. Fuel tank drain valve — Open the inspection door placarded FUEL TANK DRAIN and check valve for leakage and safetying. Close inspection door.
- 9. Fuselage, wing to nose wheel well — Checked.
 - a. Anti-icing pumps — Check pumps for leakage by opening the inspection door on the fuselage. Close the inspection door.
 - b. Trailing and fixed antennas — If a trailing antenna is installed, check the guide and weight for secureness. On fixed antennas, check that masts are secure and that insulators and wire are clean and taut.
 - c. ADF loop housing — Check for secureness and evidence of damage.
 - d. Manual loop — Check loop housing for warping, damage, and alignment.
 - e. CO₂ discharge disk — Check that the left side disk is in place (if installed). If disk has blown, the cylinder has been discharged.
- f. Static intake holes — Check for any obstruction of holes.
- 10. Nose wheel well — Checked.
 - a. Hydraulic lines, cables, friction brake, wiring, doors, and actuating struts — Check for general condition.
 - b. CO₂ cylinders — Check the red ball on the knife lever at the top of each bottle for indication that bottle has not been discharged.
 - *c. Gear uplatch — Check for proper position, evidence of damage, and general condition.
 - d. Nose gear strut, tire wheel plate, and static ground wire — Check for cracks in torque link collar and nose wheel collar. Check the nose wheel strut for wear and proper inflation (extended approximately 3-7/8 inches, maximum of 7-7/8 inches). Check nose wheel for general condition, tire for inflation, and position of slippage mark and dust covers. Check static ground wire for installation.
 - e. Ground safety lock, torque link and pin, Ahrens cable — Check that the ground safety lock pin is in place with red streamer attached. Check that the torque link pins are properly seated and safetied (if required). Check that Ahrens cable is secured and in good condition.
 - f. Nose heater and ventilating scoop — Check the nose heater assembly for general condition, secureness, and evidence of overheating. Check for obstruction of ventilating scoop.
 - g. Autopilot oil filter — Check for leaks.
 - h. Pitot static vent drain — Check for water.
 - i. Pitot tube — Remove covers and check tubes for damage and obstructions.
- 11. Nose to right wing — Checked.
 - a. CO₂ discharge disk — Repeat item No. 9, e.
 - b. Battery compartment access door — Check for security and flush with fuselage.
 - c. Driftmeter lens and reference line — Check lens and lens housing for damage. Make certain that lens is clean. Check fore and aft reference pins and check that reference line is clean.
 - d. Forward lower cargo compartment — Push the compartment door and check that door is properly closed and locked.
 - *e. Hydraulic compartment — Check hydraulic compartment for leaks, quantity, and system pressure.

Figure 2-1 (Sheet 3 of 4)

INSPECTION

12. Right wing — Checked.
 - *a. Wing section — Repeat item No. 8.
 - *b. No. 3 nacelle — Repeat item No. 4.
 - *c. No. 3 wheel well — Repeat item No. 7.
 - *d. Wing section between No. 3 and No. 4 nacelles — Repeat item No. 5.
 - *e. No. 4 nacelle — Repeat item No. 4.
 - *f. No. 4 nacelle to right wing tip — Repeat item No. 3.
 - g. Trailing edge — Repeat item No. 2.
 - h. Trim tab — Check for centering and condition.
13. Wing to tail, right side — Checked.
 - a. Antennas — Check all antennas on the fuselage for tautness and secureness. Check the condition of leads and insulation.
 - b. Aft lower cargo compartment door — Push on the door to check that the door is properly closed and locked.
14. Tail section — Checked.
 - a. De-icer boots — Check the general condition of boots on horizontal and vertical stabilizer. If not installed, check plugs in holes. Check for evidence of dents in leading edge that would be concealed by boots.
 - b. Elevators, rudder, and bonding — Check general condition and elevator bonding.
 - c. Trim tabs — Check for condition and centering.
 - d. Static dischargers — Check general condition and secureness.
 - e. Tail light — Check for condition and operation.
 - f. Anti-collision light — Check for condition and operation.
 - g. Tail skid and support — Check general condition, secureness, and proper position.
 - h. Cabin and cargo door — Check fit of door and hinges.

Figure 2-1 (Sheet 4 of 4)

- c. The crew engineer (pilot R5D) will turn magneto switch on BOTH and turn booster pump on LOW.
- d. The crew engineer (pilot R5D) will handle throttle and retard it in case of backfire.
- e. The copilot will apply prime as necessary until the engine is firing smoothly on constant prime and call for "mixture auto rich."
- f. The crew engineer (pilot (R5D) will move mixture control to AUTO RICH position in a slow, continuous motion.

- g. After engine is running at approximately 1000 rpm, check oil pressure, booster pump OFF, check fuel pressure and hydraulic pressure, and lower flaps.
- h. Repeat procedure for starting engine No. 4.
- i. The pilot will start engines No. 2 and No. 1 using the same procedures as outlined above for the copilot in starting engines No. 3 and No. 4.

BEFORE TAXI.

1. External Power Supply — Removed and Clear. P — Signal the ground crew to remove the external power supply and be sure that it is moved clear of the path of the aircraft prior to taxiing.
2. Battery Switch — ON — CE (P). See electrical system description, Section I, for instructions when external power supply is used.
3. Hydraulic Pressure — Checked within limits — CE, CP. Check normal system operating limits to be 2600 to 3050 psi.
4. Door Warning Light — OFF — P. The aircraft should not be moved until the door warning light is OFF. This light is controlled by circuits leading from main and lower cargo doors and crew compartment door. If light fails to go off, investigate.
5. APP — As Required — CE. If the APP is not used while taxiing, set it on idling speed for cooling prior to turning it off.
6. Vacuum Pressure — Checked — CP. Copilot should check vacuum pressure on both pumps. Leave selector on pump desired.
7. Flight Instruments — Set and uncage all gyro instruments, set and wind clock (P, CP).
8. Safety Belts — Fastened — P, CP, CE. Crew members and passengers will have safety belts fastened prior to takeoff.
9. Ignition Grounding Checked — CE (CP). Reduce power to near idling rpm, turn master ignition switch off, then on. All engines should stop momentarily. If the engines or an engine does not stop, abort the flight and investigate.
10. Chocks — Removed.
11. Ground Clearance — Clear Left and Right — P, CP. Use Aldis lamp for scanning area during ground operation at night.

TAXIING.

Normal taxiing is accomplished with all operating engines set at 800 to 1000 rpm, depending upon generator requirements. Turn by use of nosewheel steering. Use full flaps and as little power as necessary when moving away from the ramp to avoid dusting personnel and equipment. Avoid high taxiing speeds and excessive movement of the nosewheel. Begin a turn with a slight change in direction of the nosewheel and gradually increase it until the desired rate of turn is established. Use the same technique to straighten out the turn. The rolling inertia of the aircraft resists turning, which may cause sidewise skipping and skidding of the nosewheel, especially when the surface is slick. In this case, and only in this case, may outboard engines be used in turning. Avoid sharp turns at high speeds. Always stop with the nosewheel straight; otherwise, severe side loads and strain will be placed on the nosewheel tire and strut during engine runup. In stopping, depress the brake pedal, and, as the aircraft slows, gradually release brake pressure so that when the aircraft stops very little pressure is being applied to the pedals. Make certain the aircraft has stopped prior to setting the parking brake. Use caution at all times while taxiing, to avoid accidents.

CAUTION

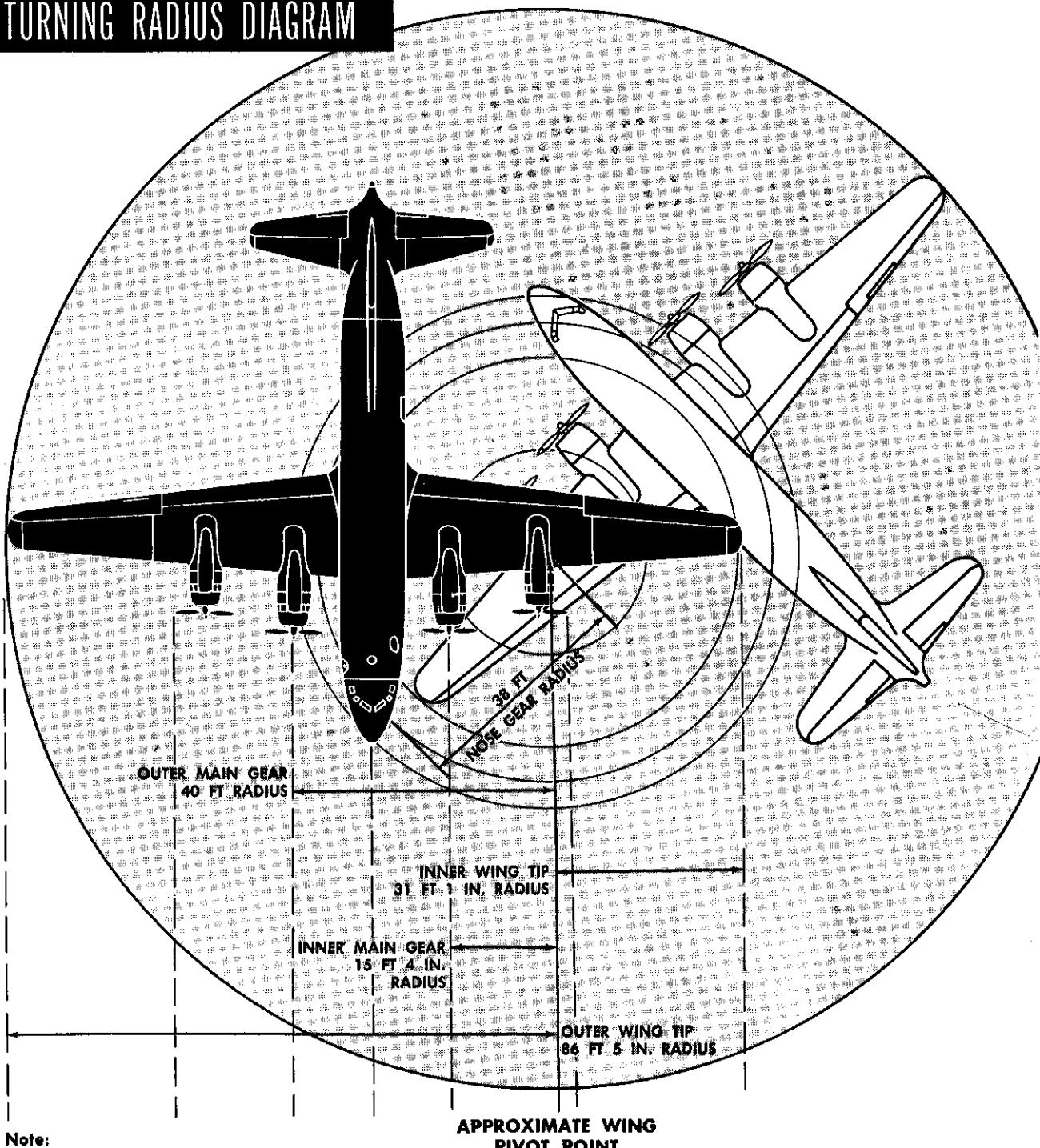
Avoid sudden acceleration or deceleration of the engines to prevent severe stresses from being imposed on engines and mounts.

1. Brakes — Checked — P. To check brake operation, depress brake pedals lightly. If brakes are operating properly, pressure will be felt through the pedals, and the aircraft will react.
2. Flight Instruments — Checked — P, CP. Observe operation of turn-and-slip and gyro instruments while making turns. Pilot's and copilot's instruments should indicate the same degree of operation.
3. Wing Flaps — UP — CP.
4. Fuel System — Checked — CE (CP). Check fuel system for proper operation of auxiliary and crossfeed systems.
5. Carburetor Heat — Checked — CE (CP). Apply carburetor heat to each engine. Check for indication, and return to COLD.
6. Carburetor Alcohol — Checked — CE (CP). Momentarily apply carburetor alcohol to each engine. Check CAT for indication of operation and return to OFF. CAT should show decrease.

ENGINE RUNUP PROCEDURE.

1. Nosewheel — Centered — P.
2. Parking Brake — Set — P. Set parking brake. During runup, when power is applied, monitor aircraft for movement due to brake slippage or slick ground surface.
3. Wing De-Icers — Checked — CE (CP). Crew engineer (copilot R5D) will turn wing de-icer switch ON. Pilot and copilot observe action of wing boot on their respective sides. Turn de-icer switch OFF after completion of check.
4. Cowl Flaps — Checked and open — P, CP.
5. APP — As Required — CE. APP may be left on the line or in standby idle position, if additional electric power is required.
6. Temperatures and Pressures — Within Limits — CE (P, CP). Crew engineer (pilot and copilot R5D) checks all temperatures and pressures within normal operating limits. Report any discrepancies noted.
7. Alarm Bell — Checked — P. Alarm system should be checked with engines operating. (This check not required on aircraft equipped with a public address system or aircraft used in aeromedical evacuation operations.)
8. Engine Runup — Completed — P, CP, CE. Pilot, copilot, and crew engineer cite any mechanical malfunction or discrepancy noted during engine runup. (This check may be made with engine analyzer, if installed.) The following procedures are to be followed for engine check:
 - a. Advance all throttles to 1700 rpm and shift all blower levers to HIGH position, (P No. 1 and No. 2, CP No. 3 and No. 4).
 - b. Retard propeller levers to low rpm — P.
 - c. Return propeller levers to high rpm — P.
 - d. Repeat step b.
 - e. Repeat step c.
 - f. Check generators for output.
 - g. Push feathering buttons, one at a time, and check tachometer for 200-rpm drop. Pull button out, note return of rpm to 1700 — P.

TURNING RADIUS DIAGRAM



Note:

For ground maneuvering with nose wheel set at full left or full right, the aircraft pivots about a point outboard of the main gear and requires a circle 172 ft 10 in. diameter to turn.

VERTICAL CLEARANCES

VERTICAL STABILIZER TIP	27 FT 6 5/16 IN.
FUSELAGE	17 FT 6 IN.
PROPELLER INBOARD	13 IN.
PROPELLER OUTBOARD	30 IN.

Figure 2-2

h. Retard throttles to 1000 rpm, and state "ready for magneto check" — CP.

Note

During above checks, pilot and copilot monitor checks, receive airway clearance, tune radios, and perform other duties as directed by the pilot.

i. Pilot sets No. 1 throttle to barometric pressure and states, "Low blower, one." Crew engineer states "Low blower," and shifts blower lever to LOW, then checks engine instruments. Pilot readjusts No. 1 throttle to barometric pressure. Tachometer should read 2200 ± 50 rpm. During check, pilot observes No. 1 engine visually for roughness, fuel and oil leaks, smoke, sparks, etc. Crew engineer makes magneto check by moving No. 1 magneto switch from BOTH to RIGHT, back to BOTH, from BOTH to LEFT, then back to BOTH. Normal drop is 75 rpm; however, drop should not exceed 100 rpm or a difference of 40 rpm between magnetos. Retard throttle No. 1 to 1000 rpm and report amount of magneto drop and any discrepancies noted.

j. Repeat step i for engines No. 2, 3, and 4. Pilot observes No. 1 and 2, and copilot observes No. 3 and 4. Crew engineer reports runup check complete. Pilot calls for Before Takeoff Check.

BEFORE TAKEOFF.

1. Trim Tabs — Set — P. Normally, all trim tab indicators should be set at zero; however, experience with individual aircraft may reveal a requirement to set trim indicators slightly off zero to effect a neutral trim condition. This is due to varying cargo and fuel loads.

2. Flight Instruments — Set — P, CP. Check and/or align flight instruments and N-1 compass. The N-1 compass is set at the navigator's station and cross checked with pilot's magnetic compass.

3. Altimeters — State Setting — P, CP, N. Check altimeters set to local barometric pressure, and note any difference in the altimeter readings and amount of variation from field elevation.

CAUTION

All altimeters should be checked closely to assure that the 10,000-foot pointer is reading correctly. Due to previous settings, the setting knob could have been rotated until the numbers reappeared in the altimeter setting window from the opposite side, thus indicating a 10,000-foot error.

4. Fuel Tank Selector Levers — Main Tanks ON — CE (P). For all engine starts, takeoff, and landing operation, use a straight line system of each main tank to its respective engine, ie, main tank No. 1 to engine No. 1, main tank No. 2 to engine No. 2, etc.

5. Carburetor Air Levers — COLD — CE (P). Normally, carburetor air will be in COLD position to prevent loss of power during takeoff. Refer to Section IX for cold weather operation.

6. Crossfeed Selector Handles — OFF — CE (P). Separate crossfeed selector handles are installed on D model aircraft only.

7. Propeller Levers — Forward and Locked — CE (P). Adjust the friction lock tension so that propeller control levers are snug enough to prevent creeping.

8. Mixture Levers — AUTO RICH — CE (P). Check position of the levers in the AUTO RICH detent.

9. Flap Lever — Flaps 15°, then OFF — CE (CP). Lower wing flaps to 15° for a normal takeoff.

10. Blower Levers — LOW and Locked — CE (CP).

11. Cowl Flaps — TRAIL — CE (CP R5D). Move cowl flap levers from OPEN to momentary CLOSE to TRAIL position.

12. Emergency Landing Gear Handle — CLOSED (Forward) — CE (CP). In event that the emergency gear handle is left in the OPEN (back) position, hydraulic pressure will not be supplied to the uplines and gear will not retract when gear handle is placed in UP position. See Section III for emergency operation of gear.

13. Wing De-Icers — OFF — CE (CP). Operation of the wing de-icer creates a turbulent effect in the airstream passing over the wing; thereby tending to increase stall speeds.

14. Booster Pumps — HIGH — CE (CP). Place fuel booster pump switches in HIGH position to assure adequate fuel supply during maximum power settings and in the event of engine-driven pump failure during critical phase of takeoff.

15. Radios and IFF — As Required — P, CP. IFF ON if required. All radios should be tuned to desired frequencies for use during initial portion of climb.

16. Gust Lock — OFF — P, CE. Crew engineer pulls lock pin and assures lock handle is full down (unlocked).

CAUTION

Lock pin ribbon, if installed, is spring-loaded and may cause injury to personnel if not handled with caution.

- 17. Autopilot — Off.— P. See that autopilot servo valve controls are in the up position.
- 18. Flight Controls — Checked — P. Check flight controls for free and correct movement.
- 19. Cockpit Windows — Closed and Locked — P, CP, CE.
- 20. Radio Altimeter — As Required — CP. Set radio altimeter on low range.
- 21. Pitot Heat — Climatic — P.
- 22. Windshield Wipers — Climatic — P, CP.
- 23. Windshield Defrosters — Climatic — P, CP.
- 24. Prop Anti-Icers — Climatic — CP.
- 25. Lights — Climatic — P. Under certain fog, rain, and haze conditions, landing lights may be more of a hindrance than help.
- 26. Anticollision Light — Climatic — CP.

Note

Ground operation of the anticollision light should be kept to a minimum. Excessive heat created on the ground shortens bulb life and increases maintenance problems, and during ground emergencies the operating light could confuse rescue operations since emergency ground vehicles use a similar light.

- 27. Crew Briefing — Completed — P. Pilot should brief crew as necessary regarding any aspects of the takeoff which might be unusual or not routine. Consider the crew's experience and avoid needless repetition.

Note

An effort should be made to secure the lowest practicable cylinder head temperatures immediately prior to takeoff, thereby reducing the peak cylinder head temperatures encountered during initial climb. The reasons for this are as follows: (1) Cylinder head temperature will rise 40 to 60 degrees during

takeoff; (2) the power available at 2700 rpm decreases with increasing cylinder head temperature at approximately 25 bhp per 20°C ; (3) common types of spark plug deposits become more conductive with increasing temperature and their grounding tendencies can be reduced or eliminated through the control of peak cylinder head temperature.

CREW BRIEFING — TYPICAL.

- 1. The copilot will hold forward pressure on the control column.
- 2. The pilot will advance the throttles to maximum power. The copilot will follow throttles to maximum power.
- 3. After maximum power is set, the engineer will make a power check and will call out "power check O.K." or cite exception.
- 4. The copilot will call out V_1 and V_2 speeds.
- 5. If a malfunction occurs before V_1 the flight will abort, if after V_1 the flight will proceed and treat it as an inflight emergency.
- 6. The copilot will acknowledge and retract the gear on the pilot's visual and oral signal.
- 7. The copilot will handle the throttles and the engineer will handle the props and flaps.
- 8. The first power reduction after gear UP will be to METO power. The engineer will retract flaps at the pilot's command.
- 9. The second power reduction will be to climb power.
- 10. In the event of an overspeeding prop, standard emergency procedure will be used.
- 11. In case of engine failure on takeoff, the affected prop will not be feathered unless there is complete power failure or fire. The engineer will feather at the pilot's command and the copilot will monitor the engineer's actions.
- 12. If any other emergency arises, either the copilot or crew engineer will notify the pilot.
- 13. Any questions by the crew will be answered by the pilot.

TAKEOFF.

The following technique will be observed by all pilots, conditions permitting. The aircraft will be maneuvered to a position that permits using the entire length of the runway. Release the brakes and proceed with the takeoff.

CAUTION

Running takeoffs are not recommended because of possible pilot disorientation. Also asymmetrical loading due to sloshing of fuel may result.

1. The pilot will advance the throttles to maximum power. The copilot will follow up on the throttles and adjust the manifold pressure to maximum power limits. The pilot will maintain directional control. During the acceleration to V_1 speed, nosewheel steering should be used until reaching approximately 43 knots (50 mph) IAS. Above this speed, the rudder should be used to maintain directional control. This will reduce the abrupt yawing which results from attempting to steer the airplane with the nosewheel at high speed. A slight forward pressure should be held on the control column to keep the nosewheel in firm contact with the runway.
2. The copilot will steady the control column during the initial portion of the takeoff run until the pilot assumes control of the control column by a predetermined signal.
3. The copilot will indicate when the critical engine failure speed has been reached, as found in the Appendix. Critical engine failure speed is the speed at which, in the event of an engine failure, the takeoff can be continued, or the aircraft can be stopped in the runway distance remaining. As the takeoff speed is approached, the pilot will apply back pressure on the control column to insure that takeoff is made at recommended airspeed as shown on the performance charts in the Appendix.

Minimum Run (Short Field) Takeoff.

Compute takeoff performance and takeoff path from performance data. Complete Before Takeoff Check and align aircraft so as to use all available runway. Hold brakes and apply maximum power. Release brakes and steer with nosewheel until rudder control is gained.

Establish normal takeoff attitude and become airborne at precomputed lift-off speed. (Lift-off should be made at 115 percent V_{stall} . If aircraft gross weight is below 59,400 pounds, lift off at 92 knots (1.1 \times minimum control speed). (See characteristic takeoff chart in the Appendix.) When definitely airborne, raise landing gear and establish climb at 115 percent of stalling speed for the given gross weight (92 knots for weights below 59,400 pounds) with wing flaps set at 15 degrees. Use maximum power until obstacle is cleared, then proceed as during normal climb.

Crosswind Takeoff.

In a severe crosswind, roll the aileron control wheel toward the wind and keep the aircraft in a three-point attitude until reaching takeoff speed. This will help maintain directional control. When airborne, the pilot will correct the drift effect by crabbing, in order to maintain a prolonged track over the runway. (See takeoff crosswind chart, Part 3, Appendix.)

Night Takeoff.

Instrument takeoff technique (procedures) are recommended to avoid flying back into the ground when visual reference is lost immediately after takeoff.

AFTER TAKEOFF - CLIMB.

The following procedures will be observed immediately after takeoff.

1. Landing Gear Lever - UP - CP (P). When the aircraft is definitely airborne, and a positive rate of climb is established, the pilot will indicate "gear up" by visual and oral signal. The copilot will repeat the command "gear up", then move the landing gear lever to the UP position. The crew engineer will guard the wing flap lever to prevent inadvertent retraction of the wing flaps.

CAUTION

Do not apply brakes after takeoff as structural damage may result.

2. Wing Flap Lever - UP - CE (P-CP). Continue climb at maximum power and as the minimum wing flap retraction airspeed (120 percent power-off stalling airspeed) is reached, and the crew engineer calls "gear up, red light out", the pilot will call for wing flap retraction as

follows: "flaps - 10, flaps - 5, and flaps up." The crew engineer will retract the wing flaps as directed by the pilot. Refer to CHARACTERISTIC TAKEOFF SPEEDS, Part 3 of the Appendix.

Note

After landing gear retraction, allow the aircraft to accelerate. This may be accomplished by holding the aircraft in the takeoff attitude, thus allowing drag reduction from landing gear retraction and/or power change to affect the acceleration. It is not necessary, or advisable, to decrease the angle of attack to increase airspeed. As soon as the landing gear has retracted and the minimum wing flap retraction airspeed has been reached, start wing flap retraction. If the wing flaps are retracted during a period of acceleration, no change in aircraft attitude will be required to maintain a relatively constant flight path slope; however, if wing flap retraction is delayed until a constant airspeed or slower rate of acceleration is attained, it will be necessary to increase the angle of attack as the wing flaps retract. If the angle of attack is not increased, settling will occur. When the angle of attack is increased under these conditions, the result is not a reduction in airspeed; rather, the airspeed will continue to increase due to the resultant drag reduction as the wing flaps retract.

3. METO Power - SET - CE (P). After the wing flaps have been retracted, the pilot will state, "METO power." The crew engineer will adjust the throttles and propeller levers to METO power and call out, "METO power set." The copilot will monitor power indications.
4. Landing Light Switches - RETRACT AND OFF - CE.
5. Landing Gear Lever - NEUTRAL - CE. Monitor the red landing gear warning light for possible landing gear uplatch failure. If the landing gear uplatch has failed, the red landing gear indicator light will come on 3 to 5 minutes after the hydraulic system is bypassed.
6. Wing Flap Lever - OFF, OR AS REQUIRED - CE. Hydraulic pressure bleed-off may allow the wing flaps to droop after a period of time. The wing flap lever should be momentarily placed to the UP position to correct the droop. In severe cases, the wing flap lever may be placed to the UP position during the entire flight. This condition should be noted in Form 781 for maintenance correction.

7. Hydraulic System Bypass Handle — UP — CE. Monitor the red landing gear indicator light.
8. Climb Power — AS REQUIRED — P, CE. After METO power has been set, continue acceleration until the recommended enroute climb airspeed (128 KIAS) is reached. At this time, but not before, reduce METO power to climb power. This technique should be followed for both four- and three-engine initial climb as it results in the minimum time requirement for high power settings and furnishes adequate cooling in the shortest possible time.

Note

If conditions require a higher rate of climb, METO power may be used until cruising altitude is reached.

9. Generator Output — CHECK — CE. Check generator output within limits.
10. Main Fuel Tank Booster Pump Switches — LOW — CE. Refer to FUEL SYSTEM MANAGEMENT, Section VII.
11. Engine Instruments — CHECK — CE. Check all engine instrument readings within limits.
12. Radio Low Altimeter — AS REQUIRED — P. It is not necessary to turn the radio low altimeter off; however, the radar high altimeter will be inoperative if the radio low altimeter is on.
13. Engines And Top Of Wings — SCAN — CE. Scan engines and wings for evidence of loose cowling, oil or fuel leaks, and syphoning. Report condition to pilot.
14. APP — OFF — CE. Turn off APP if it has been operating during takeoff. Refer to AUXILIARY POWER PLANT, Section IV.
15. FASTEN SEAT BELT/NO SMOKING Sign — AS REQUIRED — P. Turn sign off after cabin has been checked for fuel fumes.
16. After Takeoff-Climb Check — COMPLETED. Operation at maximum angle of climb results in a maximum altitude gain for the least horizontal distance traveled. The airspeed for maximum angle of climb will therefore result in maximum flight path slope for obstacle clearance. Operation at maximum rate of climb results in the maximum altitude gain for the least time consumed, and is therefore applicable for initial climb when obstacle clearance is not a requirement. The airspeed for maximum rate of climb is always higher than the airspeed

for maximum angle of climb. Operation at maximum rate of climb therefore becomes an intermediate condition between operation at maximum angle of climb for obstacle clearance and operation at enroute climb. Takeoff speed, although not exactly at the maximum angle of climb airspeed for all initial climb configurations, has been established as applicable for best angle of climb for obstacle clearance during three-engine takeoff climbs. Takeoff speed is not a minimum speed limit on the ability of the aircraft to clear obstacles. Takeoff speed is selected to provide adequate margins above minimum control and stalling airspeeds. The approach airspeeds similarly provide adequate margins above both minimum control and stall airspeeds and are also close to the airspeed for maximum angle of climb. To obtain the best rate of climb and consequently the greatest efficiency, the correct airspeed and climb power must be maintained within close limits. For best airspeed control, trim longitudinally, directionally, and laterally and maintain pitch attitude as constant as possible. Before shifting to high blower, increase airspeed approximately 5 KIAS. As power is reduced and the blowers are shifted, gradually decrease airspeed to the enroute climb airspeed. With the proper crew coordination, little loss in rate of climb will occur.

CRUISE.

Level off upon reaching cruising altitude and maintain power setting until desired cruising airspeed is attained. At this time, notify the crew engineer and copilot to establish cruise power to obtain the cruise condition desired.

1. Hydraulic Pressure — Checked.
2. Cowl Flap Levers — CLOSED, then OFF — CE. When leveling off, it is not necessary to wait until cruising airspeed is attained before closing the cowl flaps.
3. Mixture Levers — AUTO LEAN — CE (P). Move mixture levers to the AUTO LEAN detent and note fuel flow indication.
4. Booster Pumps — As required.
5. FASTEN SEAT BELT/NO SMOKING SIGN — As Required — P. Turn sign OFF when flight conditions permit.

6. Fuel Tank Selector Levers — As Required — CE (CP). Set fuel tank selectors as required by mission and directed by pilot. See Section VII.

CAUTION

Shift blowers in accordance with procedures outlined in Section VII.

Note

Bmep may easily be computed by using any standard time-distance circular navigational computer by aligning rpm on the outer scale with bhp on the inner scale and reading bmep on the inner scale opposite the constant (396) on the outer scale. (Constant for the R-2000 engine is 396.) Also bmep may be computed by the formula

$$\text{bmep} = \frac{\text{bhp} \times 396}{\text{rpm}}$$

FLIGHT CHARACTERISTICS.

Refer to Section VI for detailed information on the aircraft flight characteristics.

SYSTEM OPERATION.

Refer to Section VII for applicable detailed information on the operation of the aircraft systems.

DESCENT.

Passenger comfort, weather conditions, and turbulence should be taken into consideration during descent. The rate of descent is determined by altitude, distance from the field, terrain, and the weight of the aircraft. Power reductions will be made in order to maintain efficient and economical engine operation. A constant rate of descent should be maintained. Brief the crew concerning the type of landing anticipated, touchdown speed, and go-around procedure.

NORMAL DESCENT.

Whenever operating conditions permit, the clean configuration should be used for cruising descent, as this provides the greatest ability for the aircraft to withstand gust loads. For cruising descent in the clean con-

figuration, observe the maximum level flight speed of 217 knots (250 mph) IAS. Gear and flaps down descent should be made in the vicinity of intended landing. Maximum speed with gear and flaps extended is 127 knots (146 mph) IAS. If descents are conducted at the long range airspeeds, the power reductions should be made on a coordinated basis by reducing the rpm and manifold pressure to obtain sufficient bmep to maintain desired cylinder head temperatures. Low cylinder head temperature at long range airspeeds is usually caused by low bmep resulting from establishing the descent manifold pressure with cruising rpm's. Do not enrich the mixture during long range descents in an attempt to increase cylinder head temperature. If auto rich mixture is used, there will be an increase in trip fuel consumption and a tendency to aggravate plug fouling, particularly if cylinder head temperatures are not kept at cruise levels during the descent. Whenever a power lower than normal cruise is required, it is recommended that the necessary power reduction be made with rpm rather than with the throttle for the following reasons:

1. It is a simpler procedure, since only one set of controls need be moved in normal situations where cruise has been conducted at or near full throttle.
2. With the lower cylinder head temperature resulting from reduced power and appreciable moisture content in the air, engine operation will be more stable at the lower rpm. Although reduction in rpm further reduces cylinder head temperatures, it provides a greater time period for each combustion cycle; this is the most important effect in maintaining stable operation under these conditions. Cold cylinder head temperature instability is largely the result of reduced manifold pressure and intake temperature, which in turn provides a slower burning mixture.

Rpm may be reduced as required with the throttles full open as they nearly always are during cruise; however, care should be exercised to avoid operation in the 1600 to 1700 rpm range, because of propeller restrictions. The bmep will also drop with rpm when operating at full throttle. As altitude decreases, bmep must be limited to 150 in low blower and 138 in high blower.

CAUTION

When maneuvering with low power or during descents with low power, it is important to cushion the high inertia loads on the master bearings which occur with high rpm and low manifold pressure. As a rule of thumb, each 100 rpm requires at least 1 inch Hg manifold pressure. Use high rpm and low manifold pressure ranges only when necessary.

DESCENT CHECK.

1. Autopilot — DISENGAGED — P. Pull autopilot servo levers up to disengage autopilot.
2. Altimeters — State Setting — P, CP, N. Set altimeters to barometric pressure as given by controlling facility.
3. Radio Altimeter — As required — CP. Set radio altimeter on range desired.
4. Mixture Levers — AUTO RICH — CE (P). Move mixture controls to AUTO RICH position and check locks in detent.
5. Fuel Tank Selector Handles — Main Tanks ON; Fuselage and Auxiliary Tanks OFF — CE (P). Exact positioning of handles depends upon model of aircraft.
6. Carburetor Air — Cold — CE (CP).
7. Crossfeed Selector Handles — OFF — CE (P). Separate handles provided in D model only.
8. Bypass Valve Handle — DOWN — CE (CP). Easy operation of the landing gear handle is provided if the gear handle is placed in the UP position at this time in order to raise gear off uplocks.
9. Hydraulic Pressure — Checked — CP. Note hydraulic pressure within limits and steady.
10. Airbrake Pressure — Checked — CP. Check normal limits.
11. FASTEN SEAT BELT/NO SMOKING Sign — ON — P.
12. Blower Levers — LOW and locked — CE (CP). Shift blowers during descent and return to LOW and locked.
13. Navigator's Table — Secured.
14. Driftmeter — Caged and OFF.
15. APP — As required.
16. Cabin Emergency Lights (if installed) — ON.
17. Hydraulic Fluid Level — Checked.
18. Crew Briefing — Completed.

LANDING PATTERN.

See figure 2-3 for landing pattern, power settings, and various aircraft configurations.

BEFORE LANDING

1. Wing De-Icer Switch — OFF — CE (CP). May be delayed if ice is present; however, do not land with de-icer boots operating.
2. Cabin Heater Switches — OFF — CE (CP). Minimum speed for cabin heat operation is 105 knots IAS.
3. Safety Belts — Fastened — P, CP, CE.
4. Nose Heater and Blower — Climatic — P. Check blower ON if heater is to be operated on the ground.
5. Booster Pumps — HIGH — CP. Booster pumps should be on HIGH for landing.
6. Cowl Flaps — As Required — CE (CP).
7. Propeller Levers — rpm As Required — CE (CP). See Section III for emergency condition.
8. Landing Gear Lever — DOWN — CP. Move gear handle to DOWN position. Maximum air-speed 127 knots (146 mph) IAS.
9. Hydraulic Pressure — Checked — CP. Check within limits.
10. Landing Gear Indicator Lights — Three green on.
11. Wing Flaps — As Required — CE (CP). Under normal conditions, a wing flap setting of 10 degrees is desired throughout the downwind leg and base leg. This setting brings the nose of the aircraft down to normal cruise attitude and also reduces the stall speed. Normally, 40 degrees flap will be used on all landings. In the event of crosswind or water on the runway, it may be desirable to use less than 40 degrees flap. See figure 2-3 for normal landing and Section III for emergency conditions.
12. Landing Lights — Climatic — P. Use landing lights during night landings or as desired.

LANDING.

As the landing gear is extended in the traffic pattern, power settings above the normal cruise range should be made to compensate for the additional drag of the landing gear and wing flaps in the event a go-around

LEADING PATTERN — FLOWERS

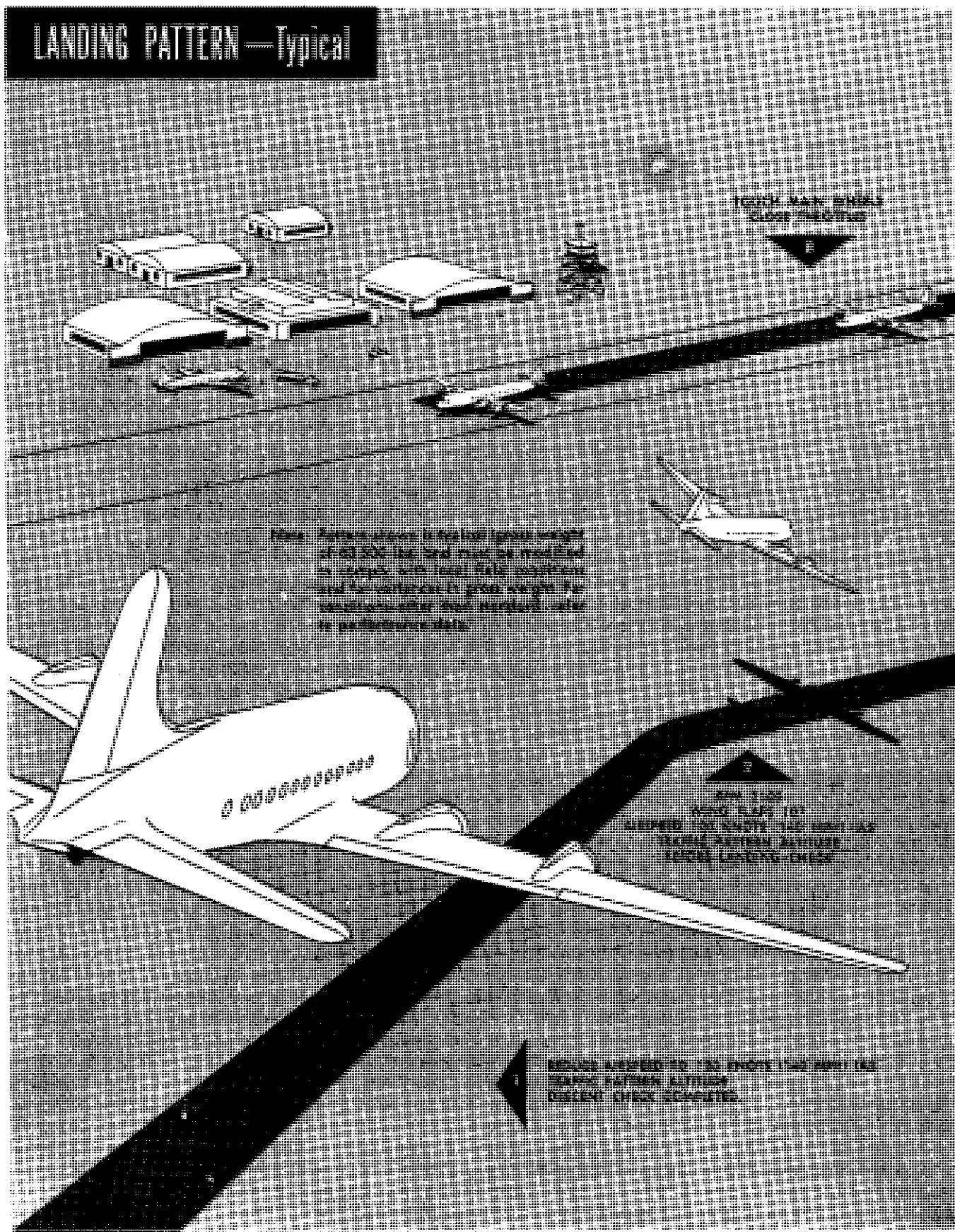


Figure 2-3 (Sheet 1 of 2)

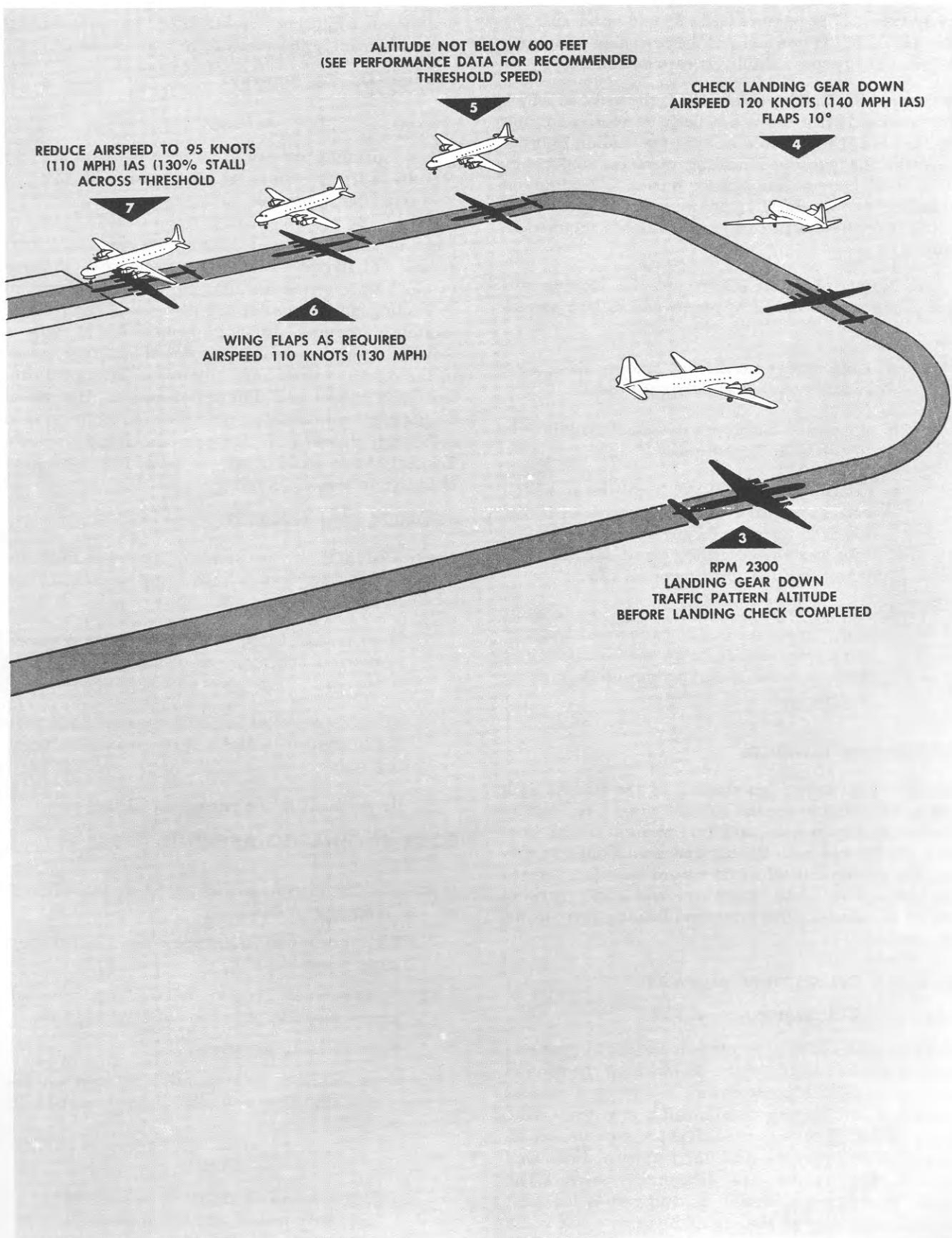


Figure 2-3 (Sheet 2 of 2)

is necessary. The mixture levers should be advanced to the AUTO RICH position and the cowl flaps positioned to maintain proper cylinder head temperature.

The speed for landing (120% V_n) is the speed at which all landing performance has been demonstrated, and is the speed which should be used for landing in order to make the published landing distances applicable. This is of extreme importance during a landing on three or two engines, as an increase in speed over 120% V_n will result in increased distance required to stop.

1. Normal Landing — Refer to the landing distance chart in the Appendix and make a normal landing.
 - a. Keep power on during landing flare, then reduce power gradually until contact.
 - b. As soon as touchdown is made, retard throttle to full CLOSE position.
 - c. Contact the ground with the main wheels and maintain a nose-high attitude during the landing roll. Before elevator control is lost, ease the nosewheel down and use nosewheel steering for directional control.
 - d. Apply normal, even braking for deceleration. Do not use brakes more than necessary. On a long runway, allow the aircraft to roll until it loses speed before using braking action.

CROSSWIND LANDING.

On final approach, align the axis of the aircraft with the runway and lower the upwind wing. Use opposite rudder, as required, to maintain a straight course. Contact the runway with the upwind gear. Continue rolling the aileron control wheel toward the wind as speed decreases. Lower the nosewheel and apply braking action as necessary (see crosswind landing chart in the Appendix).

LANDING ON SLIPPERY RUNWAY.

Landing On A Wet Runway.

Landing on a wet runway presents no special problems if the runway is well drained. However, if the runway has low spots or is covered with water, use a reduced wing flap position to prevent possible damage to wing flap surfaces. If runway conditions are such that directional control may be difficult, maintain directional control with rudder and differential power. The initial phase of the landing ground roll is the most critical, since lift on the wings prevents efficient use of the brakes. During the initial phase of ground roll, use brakes cautiously. Overuse of brakes could result in a locked wheel and a severe yaw of the aircraft.

and/or a tire blowout. Brakes should be applied intermittently with equal pressure to both brakes.

Landing On Icy Runway.

Note

If operation on icy runway is anticipated, the aircraft should be equipped with ice grip tires if possible.

Landing on ice-covered runway is considered hazardous and should be attempted only when dictated by the nature of the mission. Primary considerations in landing on icy runway are directional control and increased stopping distance. Land with as slow a forward speed as possible and lower the nose wheel to the runway immediately. Maintain directional control with rudder and differential power. Use wheel brakes cautiously and only after the aircraft has slowed sufficiently to lessen the danger of locking the wheels. Locked wheels could result in dangerous yawing of the aircraft and/or skidding.

MINIMUM RUN LANDING.

The procedure for a minimum run landing is the same as for a normal power-on approach and landing, except for the following differences:

1. Make normal landing, touching the main wheels as near the approach end of the runway as possible.
2. Retract wing flaps immediately after main gear has touched in order to obtain maximum braking action.
3. Be prepared to use emergency airbrakes.

FOUR-ENGINE GO-AROUND.

If the pilot considers it necessary to make a go-around, he will proceed as follows:

1. Pilot gives oral command "Go-Around" and states power desired.
2. Crew engineer (copilot R5D) immediately advances propeller levers to the rpm required.
3. Pilot advances throttles.
4. Crew engineer follows pilot through on copilot's throttles, and sets desired manifold pressure.

Note

If go-around is initiated below 400 feet above terrain, maximum power is mandatory. At 400 feet and above, power used will be at the pilot's discretion.

AFTER LANDING.

1. Propeller Levers — Forward — CE (CP).
2. Cowl Flap Levers — OPEN — CE (CP).
3. Emergency Landing Gear Extension Handle — OPEN (Aft) — CE (CP).
4. Wing Flap Levers — UP — CE (CP).
5. Pitot Heat Switch — OFF — CE, P.
6. Booster Pumps — OFF — CE (CP).
7. Anti-Icers — OFF — CE (CP).
8. Gust Lock — ON — CE (P).
9. Unnecessary Radios and Radar — OFF — P, CP.
10. Rotating Anticollision Light — OFF — CE (P).
11. APP — As Required — CE (CP).
12. Trim Tabs — Zero — P.

BEFORE LEAVING AIRCRAFT.

Prior to engine shutdown, the engines should be operated at approximately 1200 rpm with the cowl flaps full open to reduce the cylinder head temperature to a desired 180°C or below. Shutting down a hot engine results in an excessive amount of heat being stored in the mass of the engine with no means of conducting it away except by convection currents. It is not recommended that the throttles be opened as the engines stop. Before stopping the engines, retard throttles to idle.

1. Nosewheel — Centered — P.
2. Parking Brakes — Set — P.

CAUTION

Do not set brakes if they are overheated. Pressure on the brakes with excessive temperatures resulting from hard braking will damage the brakes or cause them to seize.

3. Landing Lights — Retracted and OFF — CE (P). Landing lights should be turned OFF when approaching the parking spot, to avoid blinding ground personnel.
4. Radios — OFF — P, CP.
5. Mixture Control Levers — IDLE CUT OFF — CE (CP). Cut engines at pilot's command.
6. Ignition Switches — OFF — CE (CP). Turn ignition switches and master ignition switch off after propellers stop rotating.
7. Throttles — CLOSED — P.
8. Inverter and AC Switches — OFF — CE (P).
9. Fuel Tank Selector Handles — OFF — CE (P).
10. Wheel Chocks — In Place.
11. Parking Brake — OFF — P.
12. Unnecessary Lights — OFF — P, CP.
13. Battery Switch — OFF — CE (P).
14. APP — OFF — CE (CP).
15. Gear Pins and Tail Stand — In Place.
16. Form 781 — COMPLETED — CE (P).

CAUTION

In addition to established requirements for reporting any system defects, unusual and excessive operations, the flight crew will also make entries in Form 781 to indicate when any limits in the Flight Manual have been exceeded.

CONDENSED CHECKLIST.

Refer to pages 2-23 through 2-33 for the Condensed Checklist.

PILOT'S C-54D CONDENSED CHECKLIST**BEFORE INTERIOR INSPECTION.**

1. Tail stand — In place.
2. Wheel chocks — In place.
3. Gear pins — Installed.
4. Forward baggage compartment — Checked.

INTERIOR INSPECTION.

1. AFTO Form 781 — Checked.
2. Aircraft publications — Aboard.
3. Circuit breakers and fuses — As required.
4. Cabin heater rheostat — OFF.
5. Radio and Radar equipment — OFF.
6. Ignition switches — OFF.
7. Battery switch — OFF.
8. Alarm bell — Checked and OFF.
- *9. External power or APP — ON.
10. Lights — Checked.
11. Landing gear lever — DN and locked.
12. Prop anti-icer pump rheostats — Checked and OFF.
13. Windshield de-icing switch and control knob — Checked and OFF.
14. Inverters — Checked and ON.
15. Instrument lights — Checked.
16. Cockpit heater and blower — Checked and Climatic.
- *17. Fuel, oil, hydraulic fluid, and alcohol quantity — Checked.

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CHANGED 15 MARCH 1961**

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PILOT'S C-54D CONDENSED CHECKLIST (Continued)

- 18. Inverter switch — OFF.
- 19. Trim tabs — Checked and neutral.
- *20. Airbrake pressure — Checked within limits.
- 21. Windshield wipers — Checked and OFF.
- 22. Hydraulic hand pump — Checked.
- 23. Aldis lamp — Checked.
- 24. Oxygen equipment and pressure — Checked.
- 25. Navigator's table — Secured.
- 26. Driftmeter — Caged and OFF.
- 27. Smoke mask and asbestos gloves — Aboard.
- 28. Hand axes — Stowed.
- 29. Auxiliary oil tank — Checked.
- 30. Reserve hydraulic fluid and funnel — Stowed.
- *31. Fuselage fuel tank — Checked (if installed).
- *32. Emergency exit doors, top of wing, gas and oil caps, and anti-icing filler cap — Checked and secure.
- 33. Emergency cabin lights (battle lanterns) — Checked and OFF.
- 34. Fire extinguishers — Checked.
- 35. First aid kits — Checked.
- 36. Tail cone access door — Checked.
- *37. Cargo doors — Checked and pins installed.

EXTERIOR INSPECTION.

1. Between main cabin door and left wing root - Checked.
2. Trailing edge, left wing - Checked.

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PILOT'S C-54D CONDENSED CHECKLIST (Continued)

- *3. Left wing tip to No. 1 nacelle — Checked.
- *4. No. 1 nacelle — Checked.
- *5. Wing section between No. 1 and No. 2 nacelles — Checked.
- *6. No. 2 nacelle — Checked.
- *7. Inside wheel well No. 2 nacelle — Checked.
- *8. Wing section No. 2 nacelle to fuselage — Checked.
- 9. Fuselage, wing to nosewheel well — Checked.
- *10. Nosewheel well — Checked.
- *11. Nose to right wing — Checked.
- *12. Right wing — Checked.
- 13. Wing to tail, right side — Checked.
- 14. Tail section — Checked.

BEFORE STARTING ENGINES.

- 1. Preflight inspection — Completed.
- 2. Forms 781 and 365F — Aboard.
- 3. Takeoff, climb, and landing data — Computed.
- 4. Oxygen masks — In place.
- 5. Seats and rudder pedals — Adjusted.
- 6. Hydraulic pressure — Within limits.
- 7. Parking brakes — Set.
- 8. Ignition switches — OFF.
- 9. Battery switch — As required.
- 10. Generators — ON.

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PILOT'S C-54D CONDENSED CHECKLIST (Continued)

11. Booster pumps - OFF.
12. Inverter switch - ON.
13. FASTEN SEAT BELT/NO SMOKING sign - ON.
14. Fuel tank selectors - MAIN TANKS ON.
15. Carburetor air - COLD.
16. Crossfeed selectors - OFF.
17. Propeller levers - Forward.
18. Throttles - Set.
19. Autopilot - DISENGAGED.
20. Mixtures - IDLE CUT OFF.
21. Landing gear lever - DN and locked.
22. Wing flap lever - OFF.
23. Blowers - LOW and locked.
24. Cowl flaps - OPEN.
25. Auxiliary fuel tank selectors (if installed) - OFF.
26. Bypass handle - DOWN.
27. Hand pump selector - Forward.
28. Emergency gear extension handle - OPEN (Aft).
29. Static selector switches - STATIC (left-right).
30. Flight instruments - Uncaged.
31. Fire extinguisher selector handles - IN.
32. Fire detector system - Checked.
33. Manifold pressure - Noted.
34. Radios - As required.
35. Gear pins, tail stand, pitot covers, and entrance ladder - Aboard.

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PILOT'S C-54D CONDENSED CHECKLIST (Continued)**STARTING ENGINES.**

1. Engines — Clear.
2. Master ignition switch — ON.
3. Start engines — Starting No. 3.
4. Wing Flaps — DOWN.

BEFORE TAXIING.

1. External power — Removed and clear.
2. Battery switch — ON.
3. Hydraulic pressure — Checked.
4. Door warning light — OFF.
5. APP — As required.
6. Vacuum pressure — Checked.
7. Flight instruments — Set and uncaged.
8. Safety belts — Fastened.
9. Ignition grounding — Checked.
10. Chocks — Removed.
11. Ground clearance — Clear left and right.

TAXIING.

1. Brakes — Checked.
2. Flight instruments — Checked.
3. Wing flaps — UP.
4. Fuel system — Checked.
5. Carburetor heat — Checked.
6. Carburetor alcohol — Checked.

PILOT'S C-54D CONDENSED CHECKLIST (Continued)**ENGINE RUNUP.**

1. Nosewheel -- Centered.
2. Parking brake -- Set.
3. Wing de-icers -- Checked.
4. Cowl flaps -- Checked and Open.
5. APP -- As required.
6. Temperatures and pressures -- Within limits.
7. Alarm bell -- Checked.
8. Engine runup -- Completed.

BEFORE TAKEOFF.

1. Trim tabs -- Set.
2. Flight instruments -- Set.
3. Altimeters -- State Setting.
4. Fuel tank selectors -- MAIN TANKS ON.
5. Carburetor air -- COLD.
6. Crossfeed selectors -- OFF.
7. Propeller levers -- Forward and locked.
8. Mixtures -- AUTO RICH.
9. Wing flaps -- Wing flaps 15°.
10. Blowers -- LOW and locked.
11. Cowl flaps -- TRAIL.
12. Emergency gear extension handle -- CLOSED (forward).
13. Wing de-icers -- OFF.
14. Booster pumps -- HIGH.

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PILOT'S C-54D CONDENSED CHECKLIST (Continued)

15. Radios and IFF — As required.
16. Gust lock — OFF.
17. Autopilot — OFF.
18. Flight controls — Checked.
19. Cockpit windows — Closed and locked.
20. Radio altimeter — As required.
21. Pitot heat — Climatic.
22. Windshield wipers — Climatic.
23. Windshield defrosters — Climatic.
24. Prop anti-icers — Climatic.
25. Lights — Climatic.
26. Anticollision light — Climatic.
27. Crew briefing — Completed.

TAKEOFF.

1. Takeoff as briefed by pilot.

AFTER TAKEOFF — CLIMB.

1. Landing Gear Lever — UP.
2. Wing Flap Lever — UP.
3. METO Power — SET.
4. Landing Light Switches — RETRACT AND OFF.
5. Landing Gear Lever — NEUTRAL.
6. Wing Flap Lever — OFF, OR AS REQUIRED.
7. Hydraulic System Bypass Handle — UP.
8. Climb Power — AS REQUIRED.
9. Generator Output — CHECK.

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PILOT'S C-54D CONDENSED CHECKLIST (Continued)

10. Main Fuel Tank Booster Pump Switches — LOW.
11. Engine Instruments — CHECK.
12. Radio Low Altimeter — AS REQUIRED.
13. Engines And Top Of Wings — SCAN.
14. APP — OFF.
15. FASTEN SEAT BELT/NO SMOKING Sign — AS REQUIRED.
16. After Takeoff-Climb Check — COMPLETED.

CRUISE.

1. Hydraulic Pressure — Checked.
2. Cowl flaps — CLOSED, then OFF.
3. Mixtures — AUTO-LEAN.
4. Booster pumps — As required.
5. FASTEN SEAT BELT/NO SMOKING sign. As required.
6. Fuel tank selectors — As required.

DESCENT.

1. Autopilot — DISENGAGED.
2. Altimeters — State Setting.
3. Radio altimeter — As required.
4. Mixtures — AUTO-RICH.
5. Fuel tank selectors — MAIN TANKS ON; fuselage and auxiliary tanks — OFF.
6. Carburetor air — COLD.
7. Crossfeed selectors — OFF.
8. Bypass handle — DOWN.

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PILOT'S C-54D CONDENSED CHECKLIST (Continued)

9. Hydraulic pressure — Checked.
10. Airbrake pressure — Checked.
11. FASTEN SEAT BELT/NO SMOKING sign — ON.
12. Blowers — LOW and locked.
13. Navigator's table — Secured.
14. Driftmeter — Caged and OFF.
15. APP — As required.
16. Cabin emergency lights (if installed) — ON.
17. Hydraulic fluid level — Checked.
18. Crew briefing — Completed.

BEFORE LANDING.

1. Wing de-icers — OFF.
2. Cabin heaters — OFF.
3. Safety belts — Fastened.
4. Nose heater and blower — Climatic.
5. Booster pumps — HIGH.
6. Cowl flaps — As required.
7. Propellers — rpm as required.
8. Landing gear — DOWN.
9. Hydraulic pressure — Checked.
10. Landing gear indicator lights — Three green on.
11. Wing flaps — As required.
12. Landing lights — Climatic.

PILOT'S C-54D CONDENSED CHECKLIST (Continued)**AFTER LANDING.**

1. Propeller levers — Forward.
2. Cowl flaps — OPEN.
3. Emergency gear extension handle — OPEN (aft).
4. Wing flaps — UP.
5. Pitot heat — OFF.
6. Booster pumps — OFF.
7. Anti-icers — OFF.
8. Gust lock — ON.
9. Unnecessary radios and radar — OFF.
10. Anticollision light — OFF.
11. APP — As required.
12. Trim tabs — Zero.

BEFORE LEAVING AIRCRAFT.

1. Nosewheel — Centered.
2. Parking brakes — Set.
3. Landing lights — Retracted and OFF.
4. Radios — OFF.
5. Mixtures — IDLE CUT-OFF.
6. Ignition switches — OFF.
7. Throttles — CLOSED.
8. Inverters — OFF.
9. Fuel tank selectors — OFF.
10. Wheel chocks — In place.

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PILOT'S C-54D CONDENSED CHECKLIST (Continued)

11. Parking brake - OFF.
12. Instrument, cabin, and cockpit lights - OFF.
13. Battery switch - OFF.
14. APP - OFF.
15. Gear pins and tail stand - In place.