CROSSWIND TAKEOFF.

During takeoff, aileron displacement is required to keep the wings level. The amount of aileron displacement depends upon the crosswind component (see Takeoff and Landing Crosswind Chart). In severe crosswinds, the takeoff run should be started with full aileron deflection to depress the upwind wing. As the aircraft accelerates, deflection is reduced as necessary to maintain directional control. After takeoff, the aircraft should be crabbed into the wind to maintain a straight path on climbout.

NOTE

Thirty knots is the maximum recommended crosswind component regardless of weight configuration, or liftoff speed. When nosewheel liftoff speed is increased due to crosswind or gust correction, takeoff ground run must be corrected on the Distance and Time Versus Speed chart.

AFTER TAKEOFF CLIMB.

1. ADI - OFF.
2. Landing lights - OFF and retracted.
3. Gear lever - NEUTRAL.

NOTE

Do not place gear lever to neutral until clear of ground turbulance.

4. Hydraulic bypass lever - UP.
5. Pressurization and doors - Checked.

   Flight mechanic checks the cabin rate of climb and cabin altitude for proper indication and checks that door warning lights are off.

6. Fuel flows - Checked.
7. SEAT BELT/NO SMOKING lights - "As required." P
8. Cooling turbine switch - "NORMAL" CP
9. Antiskid brake - "OFF." P
10. APU/GTPU - "As required." FM
11. After Takeoff Climb check - "Completed." FM

ENROUTE CLIMB.

Recommended enroute climb is 190 KIAS. Lower speeds at equal cowl flap gap would provide a slightly higher rate of climb, but the additional cowl flap opening required to maintain the desired cylinder head temperature of 190°C offset this, and the mileage made good during climb would be reduced for the same climb time. A climbing airspeed of 140 KIAS will provide the approximate maximum angle of climb in order to comply with air traffic control (ATC) clearances, crossing altitudes, etc. CHT should be carefully observed when this procedure is used.

a. Enroute climb power is 1500 bhp at 2400 rpm for gross weights above 95,000 pounds, and 1400 bhp at 2300 rpm for gross weights below 95,000 pounds.

b. Throttles should be adjusted to provide equal manifold pressure on all four engines, as selected from the appropriate climb chart for existing carburetor air temperature and pressure altitude (Appendix). BMEP differences among engines with equal manifold pressure, rpm, carburetor air temperature, and fuel flow are due entirely to unequal accessory loads, engine conditions, and/or instrument accuracy. Maximum indication of any existing discrepancies will be provided through control of manifold pressure to chart values.

c. Minimum chart climb rpm is the most desirable, due to propeller efficiency, cowl flap drag, fuel flow, and cabin noise level considerations. Therefore, full throttle in high blower ratio should be reached before rpm is advanced.

d. Doors and emergency hatches.

   (1) When the After Takeoff Climb check is completed and pressurization is begun, a crewmember will check pressurization and alignment of bayonets on all doors.

WARNING

Doors and emergency hatches must not be tampered with during pressurized flight. If a pressure leak develops or a door warning light comes on, passengers should be removed from the danger area (6 feet) and the area roped off and guarded by a flight crewmember.

   (2) If door handle or bayonets are not in place or the door Warning light illuminates, descend to 12,000 feet or below, if terrain clearance permits, and depressurize. Continue nonpressurized flight to station of next intended landing.

e. Flight mechanic will complete engine analyzer check for all engines.

f. Engine blower shift.

The shift from low blower to high blower should be made when the low blower climb BHP critical altitude is reached. The flight mechanic will announce "ready for blower shift." The pilot will acknowledge and decrease the pitch attitude and maintain climb airspeed while power reduction and blower shift is effected. The flight mechanic will make the blower shift and when climb power is established, will call "High Blower Climb Power Set." The pilot will acknowledge and adjust climb angle as necessary.

CRUISE.

Level off upon reaching cruising altitude and maintain climb power setting until desired cruising airspeed is attained.

1. Cruise power - Set.
2. Radio altimeters - "As required." P-CP
3. Cabin pressurization - Checked and set.

   Set start marker for next intended landing.
4. Tank selectors - As required.
5. Booster pumps - As required.
6. ADI quantity - Checked.
7. Cruise check - "Completed." FM

DESCENT.

For a normal cruising descent, the use of AUTO LEAN DETENT is desired. When power lower than normal cruise is required, it is suggested that the necessary power reduction be made with manifold pressure and rpm. Blowers may be shifted to low ratio when at or below low blower critical altitude. Positive indication of a shift renders a check shift unnecessary during the next ground runup. Compare fuel flows at equal manifold pressure to check for stuck automatic mixture control (AMC) units.

NOTE

A minimum of 1-inch manifold pressure should be maintained for each 100 rpm.

PHASE I.

1. Safety belt/shoulder harness - "Fastened." P-CP-FM
2. Start marker - As required.
3. Mixtures - AUTO LEAN DETENT.
4. Blowers - "LOW." P-FM
5. Windshield heat - Climatic.

   Windshield fogging may occur if selector is placed in the OFF ABOVE 10 position.
6. Antiskid brakes - "ON." P
7. Fuel tank selectors - MAIN.
8. Hydraulic bypass lever - DOWN.
9. Gear lever - "UP." FM
10. Radio altimeters - "Set." P-CP
11. Crew and passenger briefing - "Completed." P
12. Phase I check - "Completed." FM

PHASE II.

1. Altimeters - "Set." P-CP-N
2. Mixture - AUTO RICH.
3. RPM - "Rpm -___." P; "Rpm___." FM
4. Booster pumps - LOW.
5. Cabin pressure - Less than 1.8 psi.
6. Wing flaps - "Flaps___" P; "___Set." CP
7. APU/GTPU - "As required." FM
8. SEAT BELT and NO SMOKING lights - ON.
9. Cabin - "Secure." FM/FT
10. Descent check - "Completed." FM

TRAFFIC PATTERN CHECK.

At the pilot's discretion, provided AFTER TAKEOFF CLIMB checklist not accomplished, only the TRAFFIC PATTERN CHECK and the BEFORE LANDING CHECK need be completed when remaining in the traffic pattern after a takeoff, a touch-and-go landing, go-around, or missed approach.

1. ADI- OFF.
2. RPM - "Rpm___." P; "Rpm___Set." FM
3. Wing flaps - "Flaps___." P; "___Set." CP
4. Crew briefing - "Completed." P
5. APU/GTPU - "As required." FM
6. Traffic Pattern check - "Completed." FM

BEFORE LANDING.

A setting of 2100 rpm is recommended for the normal four-engine approach configuration before gear down. If approach condition makes it advisable to use carburetor heat, the heat should be retained at 20°C and carefully monitored to avoid excessive CAT in the event of a go-around. If carburetor heat is not needed during an approach, it should be removed slowly at least two minutes prior to landing to allow the mixture control to adjust properly to ambient temperature, and therefore not cause unduly lean mixture in the event of a go-around.

ADI should be switched on in time, for 5 to 10 seconds, to bleed the system, as it is desired to use full wet takeoff power in the event of a go-around.

Prior to landing, it is recommended that the pilot thoroughly brief the crew by stating performance data and use of ADI, and by giving other necessary instructions. See figure 2-5 for landing pattern.

NOTE

To initiate the Before Landing Check, the pilot states "Rpm 2400, gear down, flaps 30 degrees, Before Landing Check."

1. Rpm - "2400." FM
2. Landing gear - "Down, indicators checked." P-CP
3. Wing flaps - "30 degrees, set." CP
4. Landing lights - "As required." P/FM
5. Cowl flaps - As required.
6. ADI - "As required." P/FM
7. Before Landing check - "Completed." FM

LANDING.

NORMAL LANDING.

PILOT	*COPILOT*	*FLIGHT MECHANIC*
a. Reduces airspeed to 170 KIAS (figure 2-5). Calls for rpm 2100, flaps 20 degrees, and completes descent check. On entering traffic pattern, reduces airspeed to 140 KIAS.	a. On command, extends wing flaps to 20 degrees and states, "Flaps set 20 degrees."	a. On command, sets rpm at 2100. Reads checklist and assists in completing items. After completion, states, "Descent check completed."
b. Proceeds downwind at pattern altitude and 140 KIAS. Turning base, calls rpm 2400, gear down (visual and oral), flaps 30 degrees, and Before Landing check.	b. On command, places gear lever in DOWN position, makes a downward motion with a closed fist, thumb extended, and states, "Gear going down, flaps set 30 degrees." Checks gear indicators, warning light, and hydraulic pressure for proper indications.	b. Sets rpm at 2400. On command "Gear down," checks gear indicators, warning light, hydraulic pressure and quantity for proper indications.
c. When gear is down, checks landing gear position indicator for gear down indication and red warning light out. Calls "Gear down indicators checked."	c. States: "Gear down indicators checked."	c. Challenges pilot and copilot on position of landing gear, continues with checklist positioning cowl flaps and ADI switches and completes Before Landing check. States, "Before Landing check completed."
d. Rolls out on final at 600 feet minimum altitude above field elevation, airspeed 125 KIAS and 2 miles from approach end of runway.		

PILOT	COPILOT	FLIGHT MECHANIC
e. Calls "Flaps full down" above 200 feet.	e. Sets wing flaps as ordered and states, "Flaps set."	e. Monitors engine instruments. Follows up on throttles.
f. States, "Pilot's throttles, recheck gear."	f. Check gear indicators, red light out, and hydraulic pressure.	f. Follows up on copilot's throttles, adjusts manifold pressure as requested by pilot. Rechecks gear indicators and warning light. States, "Pilot's throttles, gear rechecked."
g. Gradually decreases airspeed to cross threshold at 130 percent of stall speed and a minimum height of 50 feet. Maintains minimum of 15 inches Hg until touchdown with main gear.	g. Call out airspeeds below 125 KIAS at 5-knot increments.	g. Monitors engine instruments. Follows up on throttles.
h. Calls "Copilot's yoke" prior to transferring hand to nosewheel steering.	h. Accepts yoke. Steadies control column.	
i. Calls "Reverse," if required.	i. Calls "60 knots" if reverse is used.	i. Actuates reverse bar on pilot's command. Advises pilot of any malfunctions, opens cowl flaps and turns pitot heat OFF when throttles are returned to forward thrust or at 50 KIAS if reverse thrust is not utilized.

Deceleration.

When reversing, pause momentarily at the reverse idle detent before applying appreciable reverse thrust. This will reduce the yawing tendency that would accompany differing rates of blade actuation or engine power response. Propellers should be returned to forward thrust in case of malfunction. If yaw is encountered during the landing roll, the following sequence should be used to maintain directional control: rudder, nosewheel, brakes, and asymmetrical power.

To obtain maximum deceleration, retract the wing flaps immediately and apply reverse thrust (this increases weight on the wheels); then, apply brakes by first partly depressing the brake pedals and gradually increasing braking pressures up to the maximum possible without sliding tires. There is little or no indication to the pilot of tire slide; therefore, if condition of the runway warrants, or if tire slide is suspected, momentarily release the brakes, reapply, release, reapply, etc. The copilot must maintain a wings level attitude by using the aileron control, and also should apply "down elevator" to provide maximum effectiveness from nosewheel steering.

Propellers should normally be returned to forward thrust before the aircraft has decelerated to 50 KIAS. Below 40 KIAS, rudder and elevator control buffeting is encountered and exhaust fumes enter the cabin airscoop in objectionable quantity. Throttles should be returned smoothly to forward thrust position and then retarded as required for taxiing. At low airspeeds, reverse propeller wash tends to starve the carburetor scoops, thus enriching the fuel/air mixture at low rpm at the point that afterfiring or stoppage may occur at the IDLE position of the throttles. Engine stoppage may be corrected by manual leaning.

Gust Correction.

The pilot should increase charted liftoff, approach, and threshold airspeeds by the full amount of reported gusts not to exceed 10 knots. Example: If the reported gust is 6 knots over the steady wind, the pilot would increase liftoff, approach, and theshold speeds by that amount. If the reported gust is 14 knots, the pilot would increase liftoff, approach, and threshold speeds only 10 knots.

Correction of charted airspeeds for gusts is necessary to provide a safety margin relating to aircraft control if the gusts suddenly dissipate.

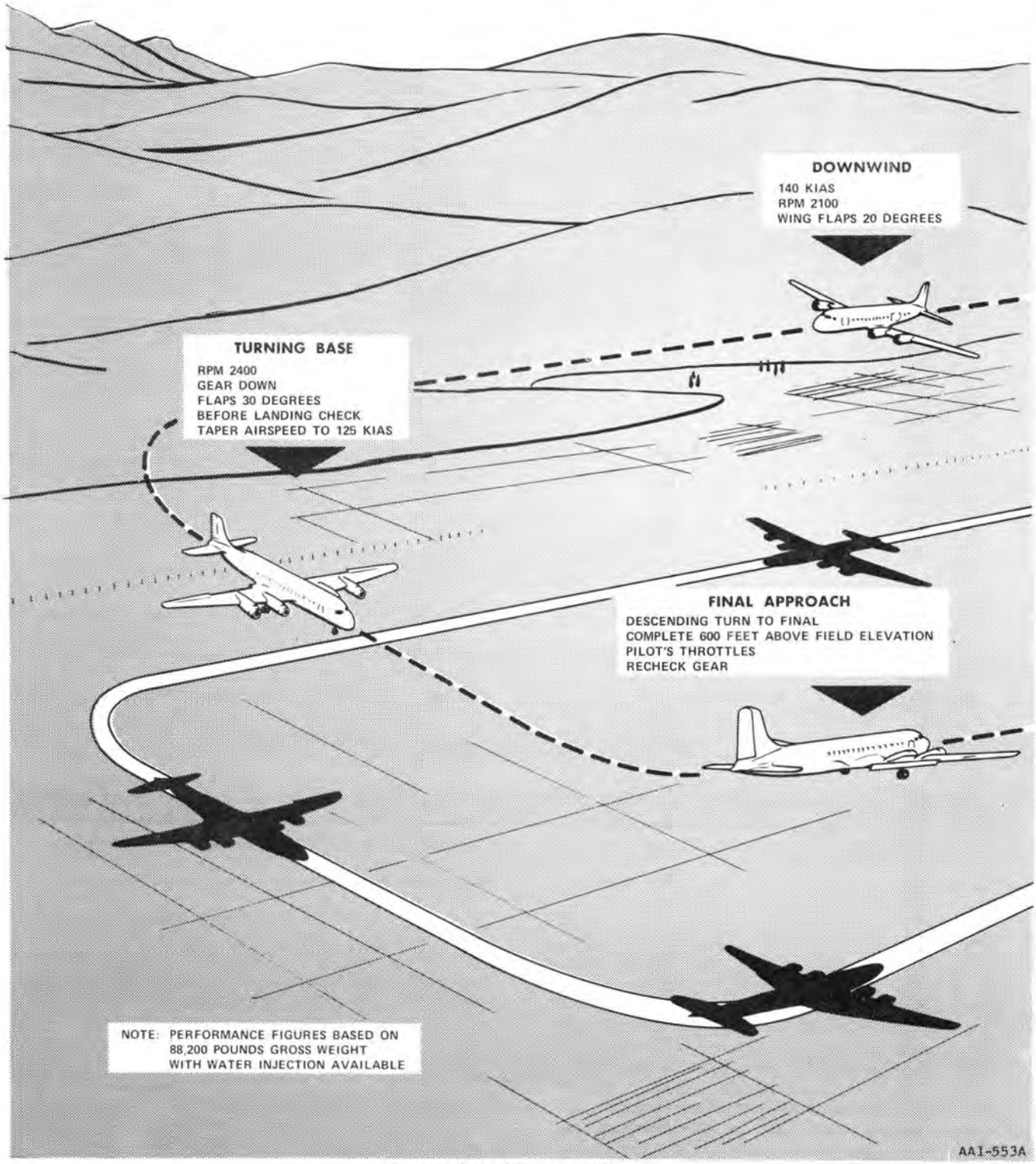

Figure 2-5 (Sheet 1 of 2)

PATTERN - Typical

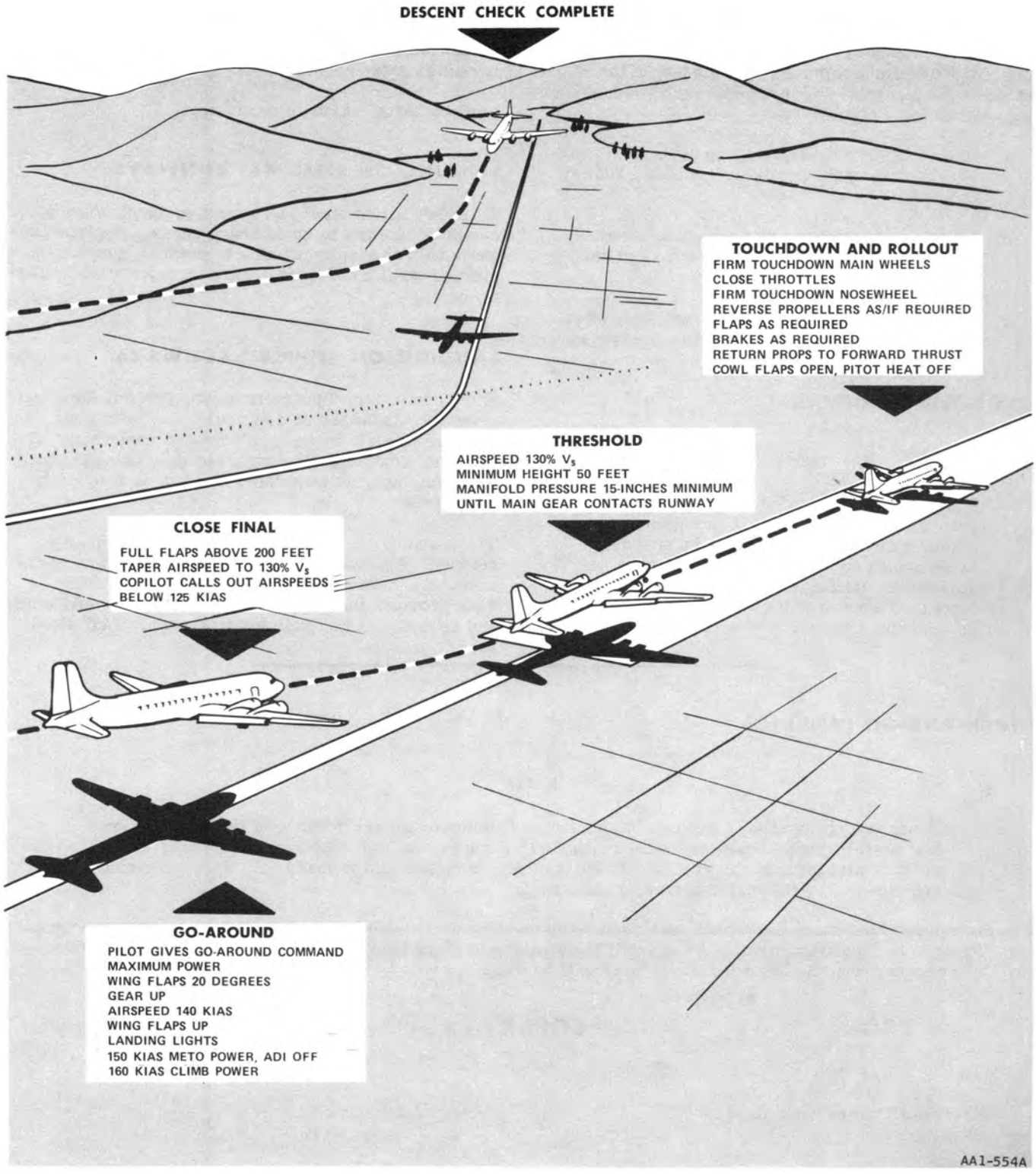

Figure 2-5 (Sheet 2 of 2)

Strength and duration of gusts are unpredictable. The pilot must be prepared to accept longer ground roll during takeoff and a longer landing distance if gusts are not encountered. Effect on landing distance using increased threshold airspeeds cannot be determined. If landing distance is marginal, the pilot should select a longer runway or proceed to a more suitable airfield.

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:

a. Make landing with flaps full, touching the main wheels as near the approach end of the runway as possible.

b. Allow nosewheel to touch as soon as possible, and apply full reverse thrust and maximum braking without skidding the tires.

c. Wing flaps should be raised immediately after touchdown to assure more positive braking action at higher speeds.

CROSSWIND LANDING.

NOTE

Maximum recommended crosswind component is 30 knots except in emergency. If minimum nosewheel touchdown speed is increased due to crosswind and gust correction, landing ground roll will be increased correspondingly. See Takeoff and Landing Crosswind Chart.

Establish a slightly longer final approach than normal; either crab into the wind or align the axis of the aircraft with the runway and lower the upwind wing. Use opposite rudder as required to maintain a straight course. Align the aircraft with the runway before touchdown and contact the runway with the upwind gear. Lower the nosewheel and apply forward pressure on the control column to assure positive steering control. Continue to roll the aileron control toward the wind as speed decreases. It is recommended that only the inboard propellers be reversed in extreme crosswind conditions.

Apply braking action as necessary.

LANDING ON STEEL MAT RUNWAYS.

When landing on steel mat runways, touch down in the center of the mat to avoid sharp edges. Apply brakes cautiously and intermittently to prevent humping the pierced steel planks and avoid excessive wear on the tires.

LANDING ON SLIPPERY RUNWAYS.

When landing on slippery runways, use full flaps and make the touchdown at minimum speed with power on. Reverse propellers and apply brakes cautiously. Directional control can be maintained by using the outboard engines, as nosewheel steering is frequently inadequate.

The antiskid system is very effective on slippery runways; it assists the pilot during the landing operation by automatically preventing wheel skidding. This provides the greatest possible braking efficiency and reduces landing roll and tire wear. Taxi slowly.

TOUCH-AND-GO-LANDINGS.

NOTE

Touch-and-go landings introduce a significant element of danger because of the many actions that must be swiftly executed while rolling on the runway at high speed or while flying in immediate proximity to the ground. Touch-and-go landings should be made only when authorized and directed by the major command concerned.

The procedures for pattern, approach and landing are identical to those of a typical normal approach and landing. Prior to the approach, the pilot will brief the copilot and flight mechanic regarding their duties after landing. After touchdown, the following procedures will be used.

PILOT	*COPILOT*	*FLIGHT MECHANIC*
a. Closes throttles and maintains directional control with rudders.		

PILOT	COPILOT	FLIGHT MECHANIC
b. Calls, "Props full increase, flaps 20 degrees, and trim set."	b. Moves wing flaps control to 20 degrees and adjusts elevator trim tab. States, "Flaps 20 degrees and trim set."	b. Places props full-increase and with indicator lights ON states, "Four lights."
c. Advances throttles and calls for maximum power.		c. Follows up on throttles and adjusts to maximum power.
d. Flies aircraft off runway at liftoff speed.	d. Calls out liftoff speed.	d. Monitors engine instruments.

Proceed as in normal takeoff. (Refer to Takeoff procedure in this Section.)

FOUR-ENGINE - GO-AROUND.

If the pilot considers a go-around necessary, he will perform the following check.

PILOT	COPILOT	FLIGHT MECHANIC
a. Indicates decision to go-around and advances throttles, calls, "MAX POWER, Flaps 20 degrees," after descent is stopped, calls, "GEAR UP."	a. Moves wing flap lever to 20-degree position and states, "Flaps coming up to 20 degrees." Moves gear handle to UP position and calls out, "Gear coming up."	a. Repeats "MAX POWER," advances propellers and throttles as required, watches for overspeed, and monitors engine instruments.
b. When 140 KIAS is attained calls for "FLAPS UP."	b. Retracts flaps and states, "Flaps coming up."	b. Adjusts cowl flaps as required. Monitors engine instruments.

NOTE

Climb at liftoff speed with maximum power and wing flaps 20 degrees if obstacle clearance is required. Compute minimum climbing airspeed for landing gross weight from takeoff speed chart.

AFTER LANDING.

After landing check to be made when clear of the active runway or upon completion of a 180-degree turn to taxi back.

1. Cowl flaps - OPEN.
2. Landing lights - As required.
3. Pitot and scoop heaters - OFF.
4. Controls - "Locked." FM, CP

   Flight mechanic pulls the control-surface lock lever to the ENGAGED (up) position and locks the controls.
5. Gear safety solenoid - Visually checked.
6. Propellers - Master lever forward.
7. Anti-icers - OFF.
8. Cabin heater - Set.
9. Booster pumps - OFF.

10. ADI - OFF.
11. Wing flaps - "UP." CP
12. Cabin pressure - Window open.
13. Anticollision/navigation lights - Set.
14. Turbine switch - OFF.
15. Antiskid brake - "OFF." P
16. AIMS/IFF/RADAR - "As required." P, CP, N

    If it is desired to retain the mode 4 codes between flights, it is necessary to lock the codes into the transponder computer before turning the MASTER control to OFF. Turning the MASTER control to OFF, or removing power from the aircraft without first locking the codes into the transponder computer, will zeroize the mode 4 codes. To lock the code, momentarily place the CODE control in the HOLD position after landing, and then proceed with the normal stopping procedure. When power is next applied, the transponder computer will again operate normally. If it is again desired to lock the code in the transponder computer, it is necessary to repeat the HOLD procedure. The transponder computer will zeroize any time that power is applied and the CODE control is turned to ZERO, even if the HOLD function has been activated. Once the code is zeroized, the code is not available until reset.

17. After Landing check - "Completed." FM

ENGINE SHUTDOWN.

1. Engine analyzer - OFF.
2. Parking brakes - "Set." P
3. Mixtures - IDLE CUTOFF.

   Set throttles to 800 rpm. Shut down with mixture controls when CHT has dropped below 200° C.

4. Ignition switches - OFF.
5. Battery selector switch - As required.
6. Chocks - "In place." P-CP
7. Brakes - "OFF." P

CAUTION

Do not leave parking brakes set if brakes are overheated.

8. SEAT BELT light - OFF.
9. Engine Shutdown check - "Completed." FM

BEFORE LEAVING AIRCRAFT.

1. Oil coolers - OFF.
2. Cowl flaps - OFF.

   Do not close cowl flaps for 15 minutes after shutdown, in order to allow residual engine heat to escape.

NOTE

Critical engine temperatures rise immediately after shutdown and may not begin to drop again until 15 to 30 minutes have elapsed. However, the cylinder head temperature indication begins to drop immediately.

3. Radios and radio altimeters - "OFF." P-CP-N
4. Inverters and instrument switches - OFF.
5. Fuel selectors - MAIN.
6. Carburetor air doors - Set.
7. Gear safety pins - Installed.
8. Circuit breakers - Set.
9. APU/GTPU - As required.
10. Battery master switch - As required.
11. Lights - As required.
12. AIMS/IFF classified codes - "As required." P/CP
13. Before Leaving Aircraft check - "Completed." FM.

CAUTION

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

AIRCRAFT BACKING USING REVERSE THRUST.

The use of reverse thrust for backing the aircraft shall be restricted to those infrequent occasions required by operational necessity and when ground handling equipment is not available.

WARNING

Ensure that the maneuvering area is free of debris that could damage propellers or injure ground personnel. Brief taxi signalman to ensure understanding of path and distance to be traversed and of the aircraft's maneuvering and stopping capabilities.

a. The taxi signalman should position himself forward of the aircraft in view of the pilot.

b. Taxi slowly and anticipate stopping so that forward thrust can be used for braking action.

c. If it is desired to have forward thrust immediately available for deceleration with outboard engines, taxi with reverse thrust applied only to inboard engines on LIGHTLY loaded aircraft.

WARNING

Use of brakes while in reverse thrust is NOT recommended. The possibility of setting the aircraft on its tail exists if an excessive braking force is applied.

CAUTION

Do not hold propellers in reverse pitch longer than one minute.

d. Use forward thrust as the primary means of stoppage.

SECTION III
emergency procedures

TABLE OF CONTENTS

EMERGENCY PROCEDURES

This section contains text and procedures to be followed in an emergency. It is presented in approximately chronological order, with emergency procedures grouped as they might be expected to occur during the course of operations. Ground emergencies are discussed first, as they might occur during engine start or taxi. Next are takeoff emergencies, inflight emergencies, and on through the course of a flight, followed by systems emergency operation. The text is divided into primary paragraphs in accordance with the type of emergency and, where applicable, is followed by an amplified procedure for that particular emergency. The procedures describe in detail the actions to be taken.

In the procedures of this section, certain actions are given in bold face type. These actions are critical actions and constitute the minimal steps to be taken by a crewmember to insure survival. Bold face items shall be performed in proper sequence without reference to the checklist. Following completion of these bold face items, the applicable checklist will be completed in its entirety by the flight mechanic. All steps in each checklist must be accomplished in order to insure complete control of each emergency.

Any emergency requires the full coordinated effort of each crew member. The pilot will command the action, the designated crew member will complete the action, and the copilot will monitor and assist the flight mechanic. Although many emergencies require immediate corrective action, difficulties frequently are compounded by the tempo of the pilot's command and a too hurried execution by the crew. In order to avoid incorrect action, the pilot must thoroughly evaluate the difficulty before issuing instructions and exercise positive control by allowing time for acknowledgement and execution of his orders.

GROUND OPERATION

ENGINE FIRE ON GROUND.

If an induction fire occurs during engine start, discontinue priming, advance the throttle to full OPEN and keep the engine turning, with the starter, while the following steps are being performed.

1. **MIXTURE - "OFF". FM**
2. **FIRE SELECTOR HANDLE - "ARMED". FM**

NOTE

If the fire continues complete the following procedures.

3. **CO_2 - "DISCHARGE". FM**
4. Fuel tank selectors - OFF FM

5. Cockpit side windows - "OPEN". P-CP
6. Fire fighting equipment - "Called". CP
7. All engines shut down. FM
8. Ignition - OFF. FM
9. Passengers - Evacuated. FT/FM
10. Engine Fire on Ground checklist - "Completed". FM

FUEL PRESSURE DROP—ENGINE OPERATING NORMALLY.

If the fuel pressure drops below the operating limits during ground operation, but the engine continues to operate normally, proceed as follows:

1. Mixture - OFF. FM
2. Fire selector handle - Armed. FM
3. Aircraft - "Stopped". P
4. Remaining engines - Shutdown. FM

If engine fire develops:

5. Engine Fire on Ground Checklist - Accomplish. FM

BRAKE FIRE.

When frequent landings are made or when excessive braking is required in an emergency stop, it is possible to overheat the brake system and cause a fire.

To avoid the possibility of retracting a gear with hot brakes into the wheel well and having it burst into flames, it is desirable to have a visual brake check made while taxiing or prior to takeoff. If brakes have been used excessively during taxiing, or during repeated landings, it may be advisable to leave the gear down for cooling while flying the traffic pattern.

In case of brake fire, proceed as follows:

a. Upon detecting a brake fire, notify tower to dispatch crash equipment, stop and hold aircraft by means of opposite brake and nosewheel steering.

b. Shut down all engines except inboard engine on side of affected brake, and advance throttle to blow combustible fluids away from burning brake.

c. Send a crewmember aft to see if fire is out and to alert crew for possible evacuation.

d. If unable to extinguish fire, order evacuation of personnel as quickly as possible.

e. Shut down the remaining engine and evacuate the crew when the crash equipment arrives.

WARNING

If the left gear is burning, it may not be feasible to evacuate the passengers from the main exit. In this event, they should be evacuated through the forward crew entrance door. One crewmember should be stationed on the ground to keep people away from the turning propeller and also keep them a safe distance from the fire because of the danger of an explosion.

When attempting to extinguish a brake fire with portable fire extinguishers, approach the gear assembly from the front or rear, never from the side. If intense heat or fire causes the tire to explode, fragments of the tire and gear assembly will generally explode outward from both sides rather than frontwards or backwards.

D-2 APU FIRE.

1. Ignition - "OFF". FM
2. CO_2 - "Discharged". FM
3. Throttle - CLOSE. FM
4. APU Fire Checklist - "Completed". FM

GTPU FIRE.

In case of a GTPU fire on the ground, perform the following procedures:

1. Fire selector - "ARMED". FM
2. CO_2 - "Discharged". FM

   Wait 10 seconds before discharging agent to allow door to close.
3. Fire fighting equipment - "Call". CP
4. Compartment - Inspect. FM
5. GTPU Fire checklist - "Completed". FM

TAKEOFF.

ENGINE FAILURE DURING TAKEOFF.

During takeoff if an engine fails prior to reaching refusal speed, abort the takeoff. If an engine fails at or above refusal speed, proceed as follows:

a. Takeoff and climb at liftoff speed.

b. Raise landing gear after being safely airborne.

c. Feather propeller of failed engine.

WARNING

Positive determination of which engine has failed must be made prior to feathering the propeller.

d. After obstacles are cleared, retract wing flaps at appropriate airspeed and accelerate to enroute climb airspeed.

e. Complete remaining steps under Engine Failure or Fire.

OVERSPEEDING PROPELLER.

OVERSPEEDING PROPELLER (AFTER TAKEOFF OR CLIMB).

If an engine seriously overspeeds after takeoff or during climb, indicating that the governor is not functioning to reduce rpm, and the engine is not required for safe flight, proceed as follows:

1. **THROTTLE - "AS REQUIRED". P-FM**
2. **AIRSPEED - "140 KIAS". P**
3. **ENGINE FEATHERING PROCEDURES - "AS REQUIRED". P-FM**
4. Overspeeding propeller checklist - "Completed". FM

NOTE

If the engine is required for safe climb performance, some power may be obtained from the engine by reducing the throttle as required, toggling the propeller selector switch toward decrease to obtain 2800 rpm or below, and intermittent use of the feathering button to hold engine rpm within limits.

OVERSPEED PROPELLER (MODEL 43E60-535 PITCH-LOCK PROPELLERS, ON SOME AIRCRAFT).

If the propeller overspeeds, the following procedure is recommended. This procedure may be terminated at any point propeller control is regained.

NOTE

If overspeed occurs prior to refusal speed, abort the takeoff.

If overspeed exceeds 3300 rpm (pitch lock inoperative) and airspeed is greater than refusal speed, the following is recommended:

1. **THROTTLE - 2700 RPM.**

   If unable to control engine rpm, follow overspeeding propeller procedures.

If overspeed is below 3300 rpm (pitch lock engaged), the following is recommended:

a. Actuate feathering button intermittently to reduce engine speed to 2700 rpm.

b. Throttle back as required to control engine speed to 2700 rpm.

c. If unable to control engine rpm, follow overspeeding propeller procedures.

NOTE

Maximum potential of the pitch lock is obtained by causing the propeller to lock in as high a blade angle as possible. If power is immediately reduced, the time required to reach the pitch lock engaging rpm is increased, thus permitting the blade to move to a lower angle than if maximum power is retained.

CAUTION

Do not pull feathering button out beyond neutral position to unfeathering position. If feathering action is ineffective, retard respective throttle as necessary to reduce rpm.

NOSEWHEEL SHIMMY.

Nosewheel shimmy is an indication of an unbalanced condition of the nosewheel or failure of the steering system. If this occurs during takeoff, decreasing the load on the nosewheel will decrease the shimmy tendency; therefore, pull the nosewheel off the ground as soon as possible.

LANDING GEAR TIRE FAILURE.

If a tire is blown during takeoff and the remaining runway is sufficient to stop the aircraft, close the throttles and maintain directional control by using brakes and nosewheel steering. Use reverse thrust as necessary. The use of aileron on the flat-tire side will ease the weight on the blown tires. When the aircraft has slowed, reverse thrust may be used on the outboard engine opposite the side of the blown tires to aid in maintaining directional control. Do not apply brakes to the wheels with the blown tires during the rollout nor attempt to taxi after the aircraft has stopped. If the remaining runway is not sufficient to accomplish a safe stop, continue the takeoff, but do not retract the landing gear, since the blown tire may jam the gear in the wheel well.

REJECT.

During takeoff roll, any crewmember noting an abort condition will call, "Reject." The pilot will make the decision to abort the takeoff or treat the condition as an inflight emergency. If the decision is made to abort, the pilot will announce, "Abort," retard all throttles, apply brakes, and reverse as necessary. If reject is called above decision speed, the pilot will state, "Continue takeoff."

NOTE

With dry runway, reversing three engines is permissible. On slippery runways, reverse symmetrically.

INFLIGHT

ENGINE FAILURE OR FIRE.

It is of primary importance, upon encountering an engine failure, to maintain airspeed and directional control at all times while executing the proper emergency procedures. Only at maximum power and slow speeds does the aircraft require a great amount of control force to compensate for turning action caused by engine failure. Very little trim is required at cruise power. As airspeed is decreased, more rudder deflection is necessary to counteract unbalanced thrust. The minimum speed at which the aircraft can be controlled in flight is that speed required to provide sufficient control to enable the aircraft to be flown on a straight flight path when the critical engine (No. 1) has failed. This speed is based on takeoff configuration with gear up, propeller on failed engine windmilling, MAX Power available on the remaining engines, and not more than 5 degrees of bank away from the failed engine. Minimum control airspeed with the critical engine (No. 1) propeller windmilling and the other three engines at maximum power is 85 KIAS. However, at gross weights in excess of 70,000 pounds, the stalling speed becomes the minimum control speed. In determining which engine is defective, check for below normal BMEP or any abnormal indication of the engine instruments.

NOTE

It is mandatory that the first action taken in the event of engine fire in flight is to actuate the feathering button. While the feathering action is progressing, other critical items in the engine fire procedure will be completed so that the extinguishing agent can be discharged with the least possible time delay.

1. **PROPELLER - "FEATHER". FM**

WARNING

Positive determination of which engine has failed must be made prior to feathering the propeller.

2. **FUEL SELECTORS - "MAIN, CROSSFEEDS - OFF, AFFECTED ENGINE - OFF". FM**
3. **FIRE SELECTOR HANDLE - "AS REQUIRED". FM**
4. **CO_2 - "AS REQUIRED". FM**

The following items will be accomplished immediately after engine is shut down and/or fire is extinguished:

5. Oxygen - "As required". P-CP-FM
6. Heaters -"As required". FM

CAUTION

If a fire occurs in zones two (2) and three (3) of any engine, turn off all heaters.

7. Mixture -"OFF." FM

8. Booster pump - OFF. FM

9. Ignition - OFF. FM

10. Propeller master selector - As required. FM

11. Generator - OFF. FM

12. Fuel and oil pressure isolation switches - OFF. FM

13. CO_2 selector - As required. FM

NOTE

After the propeller has feathered, the position of the feathering button should be checked to ensure that it has returned to the neutral position. If a propeller is feathered due to loss of oil quantity, the feathering button should be manually pulled out as soon as the propeller is feathered to conserve oil. The feathering timer is set at approximately 15 seconds and the pump will continue to operate during this period. If the propeller continues to windmill and will not feather, the firewall selector should be pushed into the spring-stop to provide oil to the engine (figure 3-1). If after feathering, the propeller windmills backwards, monentarily pull the feathering button to stop rotation. The button should be carefully pulled so as not to cause the propeller to unfeather.

WARNING

If an engine oil leak is confirmed by visual means and an unsuccessful attempt at feathering the engine is accompanied by a rapid drop in oil quantity gage indication and a low amperage reading in the feathering pump circuit, any further attempts to feather should be discontinued. This condition could indicate a failure of the propeller feathering line forward of the propeller feathering pump.

Conserve the remaining oil for engine lubrication.

14. Propeller - Toggle to LOW. FM

15. Oil cooler - Closed and OFF. FM

16. Cowl flaps - Closed and OFF. FM (After engine has cooled.)

17. Throttle - As required. FM

18. Engine Failure or Fire Inflight Checklist - "Completed". FM

HEATER AND GTPU OPERATION AFTER ENGINE FIRE.

a. If the fire occurred in engine No. 1 or 4, the cabin heater may be operated normally. Do not operate airfoil heaters or GTPU unless absolutely necessary. If it can be determined that the fire was limited to zone 1, the airfoil heaters and GTPU may be operated normally.

b. If fire occurred in engine No 2, do not use cabin heater or crossfeed system unless it can be determined that fire was limited to zone 1. Then the cabin heater and crossfeed system can be operated normally.

c. If fire occurred in engine No. 3, turn off airfoil heater fuel pump circuit breaker and use crossfeed fuel for operation of airfoil heaters. If it can be determined that the fire was limited to zone 1, the airfoil heaters or GTPU may be operated normally.

NOTE

Fuel lines pass through zone 3 of engine No. 2 and 3 ; therefore, monitor heater fuel pressure. If low pressure is noted, turn off airfoil heaters immediately.

FAILURE OF TWO ENGINES.

The minimum control speed, with two engines out on one side, propellers windmilling, and maximum power applied to the remaining engines, is 101 KIAS or stall speed, which ever is higher. If two engines fail after takeoff, with a gross weight of 107,000 pounds in the clean configuration, under Standard Day, sea level conditions, it is possible to establish a rate of climb of at least 100 feet per minute at takeoff speed. If a speed of 140 KIAS can be attained, it is possible to establish a rate of climb of 225 feet per minute. See Two-Engine Emergency Climb Chart in T.O. 1C-118A-1-1 for specific data. When two engines are out and the feathering procedure has been accomplished, maintain METO power and cowl flaps as required to maintain cylinder head temperatures under 232°C.

NOTE

Monitor the electrical load on the remaining generators.

Lighten aircraft, jettison fuel if necessary (carefully compute fuel requirements to intended point of landing prior to jettisoning), and be careful not to jettison

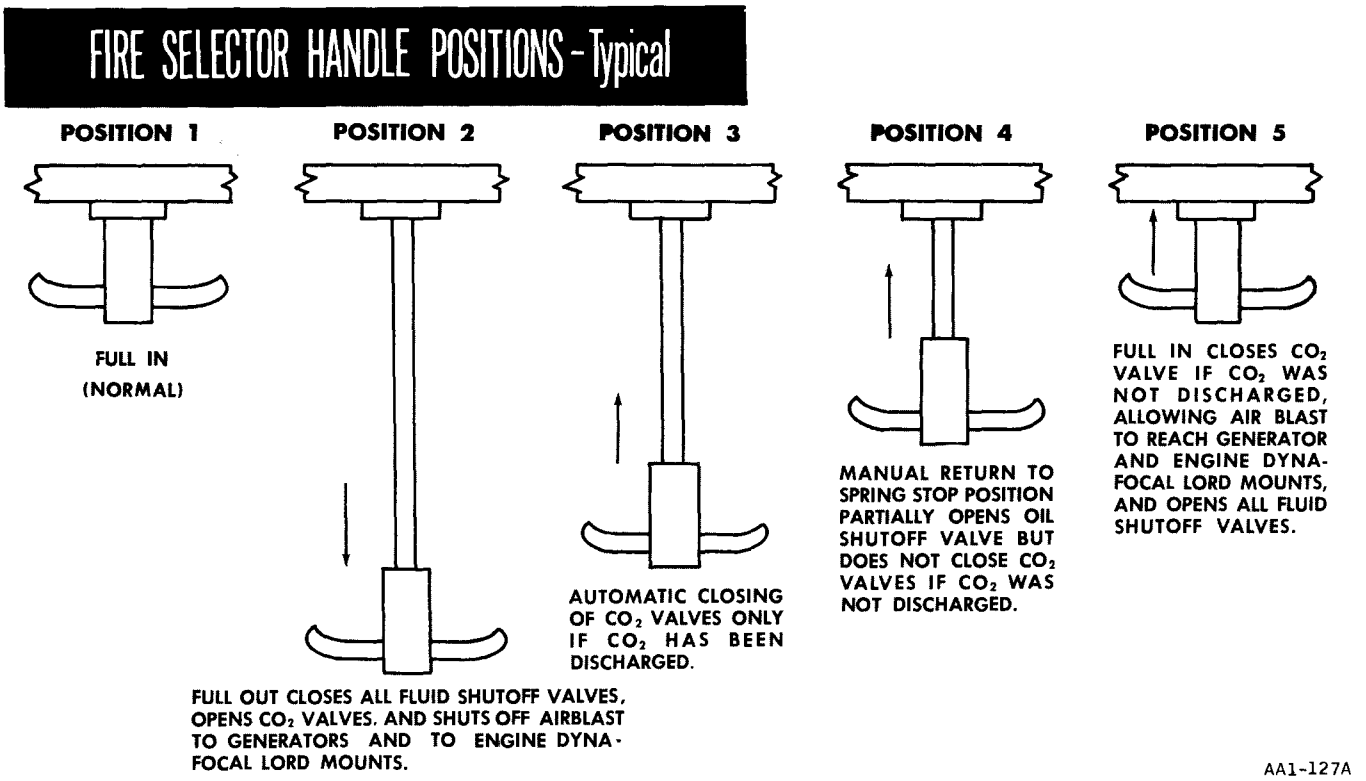

Figure 3-1

any emergency equipment or clothing needed in case of emergency landing or ditching. (Prepare for emergency landing or ditching.) Proceed to the nearest suitable airfield, if possible, using only that power necessary to maintain safe flying speed.

NOTE

It has been determined that even small amounts of wing flaps do not add to the performance of the aircraft on two engines.

As altitude is decreased, power required to maintain desired cruise airspeed decreases. Therefore, if one or more engines fail during cruising flight, altitude should be reduced gradually by the amount necessary to bring power requirements within cruise power limits. If the terrain permits, a gradual letdown should be made at long-range airspeed, with maximum cruise power used on the remaining engines. With this technique, the aircraft will level off at the maximum ceiling for this power. If above the three- or two-engine service ceiling and if maximum operating altitude is required, it will be obtained by using the speed for enroute climb (160 KIAS) and METO power, with a gradual letdown being made. Using this speed and power, the aircraft will level off at its ceiling.

To obtain best efficiency in either of these operating conditions, eliminate all unnecessary drag from such items as out-of-trim, cowl flaps, oil coolers, doors, etc.

FAILURE OF THREE ENGINES.

It is not possible to maintain level flight at any gross weight with three engines inoperative.

UNFEATHERING.

To unfeather the propeller after an engine shutdown in flight, proceed as follows:

1. Airspeed - "140 KIAS" P
2. Oil cooler door - AUTOMATIC. FM
3. Cowl flap switch - Positioning. FM
4. Fuel and oil pressure warning lights isolation switch - ON. FM
5. Booster pump - LOW. FM
6. Generator - ON. FM