AN 01-60GFA-1

HANDBOOK
FLIGHT OPERATING INSTRUCTIONS
USAF MODEL
B-45A-1,-5,& B-45C AIRPLANES



This replaces AN 01-60GFA-1 dated 5 May 1949

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20 DECEMBER 1949

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INTRODUCTION

This Handbook contains flight operating instructions for two series of the B-45 Airplane, the B-45A and B-45C. The first 22 airplanes of the A series (AF47-1 through AF47-22) are designated as the A-1 block. All subsequent airplanes of this series (AF47-23 through AF47-96) are designated as the A-5 block. Certain instructions will differ among series, blocks, and airplanes within a block. A coding system has been set up to easily identify instructions applicable to these particular groups of airplanes.

Paragraphs not identified by any coding apply to all series. When necessary, each paragraph is identified by one of the following: "A," "A-1," "A-5," and "C." When one of the codings is followed by a number in parenthesis, reference to the footnote indicated by the number will identify those airplanes to which the instructions apply. For example:

2-8. PILOT'S CHECK.

A

a. On entering airplane, check fluid level in nose gear emergency hydraulic reservoir, and make sure hand-pump is stowed.

On entering airplane, make sure landing gear hand-pump is stowed. **C**

b. Hatches closed and locked; crew members at proper stations.

c. Seat and rudder pedals adjusted.

d. Check alignment of luminous seat position lockpin indicators. **A-5(1),C**

(1) AF47-37 thru AF47-96

The example shows that:

The first statement of step a. applies to the B-45A series. The second statement of step a. applies to the B-45C series. Steps b. and c. apply to both series of the B-45 Airplane. Step d. applies to both series, but only those particular airplanes of the A-5 block as indicated by the footnote.

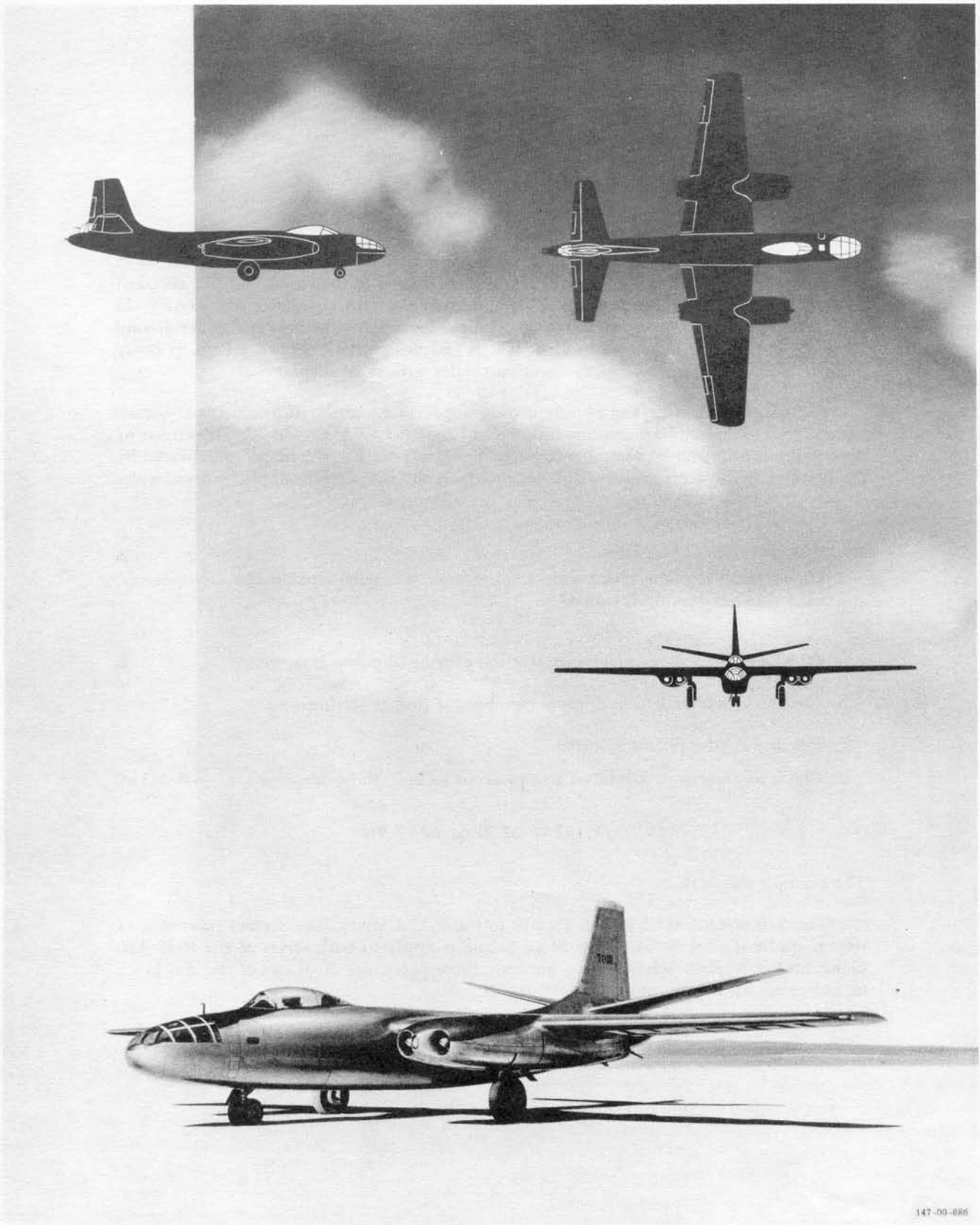


Figure 1-1. The Airplane

Section I

DESCRIPTION

1-1. AIRPLANE.

1-2. The North American B-45A and C Airplanes are land-based, four-engine, jet-propelled bombers. Designed to operate at high speeds and high altitudes, the airplane's chief tactical function is the bombing of land or naval materiel objectives. For long-range operation, fuel capacity may be increased through use of alternate fuel and bomb loading provisions. A basic flight crew of four consists of the following: pilot, copilot-radio operator, bombardier-navigator, and tail gunner.

1-3. AIRPLANE DIMENSIONS.

1-4. Over-all dimensions of the airplane are as follows:

Wing span	89.0 feet	
With wing tip fuel tanks	96.0 feet	C
Fuselage length	75.3 feet	
Height (to top of fin)	25.2 feet	

1-5. AIRPLANE GROSS WEIGHT.

1-6. Design gross weight of the airplane is 82,600 pounds.

1-7. ARMAMENT AND SPECIAL FEATURES.

1-8. Possible bomb loadings vary from twenty-seven 100-pound bombs to a single 22,000-pound bomb. Provision is made for installation of a radar-controlled tail turret mounting two .50-caliber machine guns.

1-9. INTERIOR ARRANGEMENT. The fuselage is divided into four compartments: a forward pressurized cabin for pilot, copilot, and bombardier-navigator; a bomb bay; an unpressurized compartment aft of the bomb bay; and a tail gunner's pressurized cabin. (See figure 1-3.) Movement of personnel between forward and aft compartments is possible only when bomb bay is empty, bomb bay doors are closed, and cabins are unpressurized. The pilot and copilot are seated in tandem, the copilot acting primarily as radio operator; however, to enable the copilot to serve as a relief or emergency pilot with this seating arrangement, basic power plant and flight controls, elevator trim tab control, emergency brakes, and essential instruments are provided at his station. The copilot cannot, however, control the fuel and hydraulic systems, nor can he operate landing gear, wing flaps, or aileron and rudder trim tabs.

1-10. MAIN DIFFERENCES TABLE.

1-11. Externally there are no differences among the B-45A-1, B-45A-5, and B-45C Airplanes, except when wing tip tanks are installed on the B-45C. The main differences are outlined in figure 1-2.

ITEM	B-45A-1	B-45A-5	B-45C
ENGINE	J35-A-9 OR -11	J47-GE-7, -9, -13 OR -15	
WING TIP TANKS	NO	NO	TWO 1250 - GALLON TANKS
WATER INJECTION SYSTEM	NO	NO	YES

147-93-712

Figure 1-2. Main Differences Table

1-12. POWER PLANTS.

A-1

1-13. The airplane is powered by four J35 series axial-flow, turbo-jet engines, two engines (one J35-A-9 and one J35-A-11) being mounted in parallel in each of the nacelles.

A-5,C

The airplane is powered by four J47 series axial-flow, turbo-jet engines, two engines (one J47-GE-7 or -13 and one J47-GE-9 or -15) being mounted in parallel in each of the two nacelles.

A-1

1-14. OIL SYSTEM. Each engine has an independent pressure-type oil system incorporating a 14.6-gallon oil tank (12.7 gallons usable oil). Gages, indicating oil pressure on each engine, are mounted in the pilot's instrument panel. (See 54, figure 1-8.) No oil system controls are provided. The system is serviced with oil conforming to Specification No. AN-O-9, Grade 1010 or AF3606. For temperatures at or below −30°F, use AF Specification No. 3519, Grade 1005.

A-5

Each engine has an independent pressure-type oil system with scavenge pump return to an 8.04-gallon oil tank (6.7 gallons usable oil), serviced with oil conforming to Specification No. AN-O-9, Grade 1010 or AF3606.

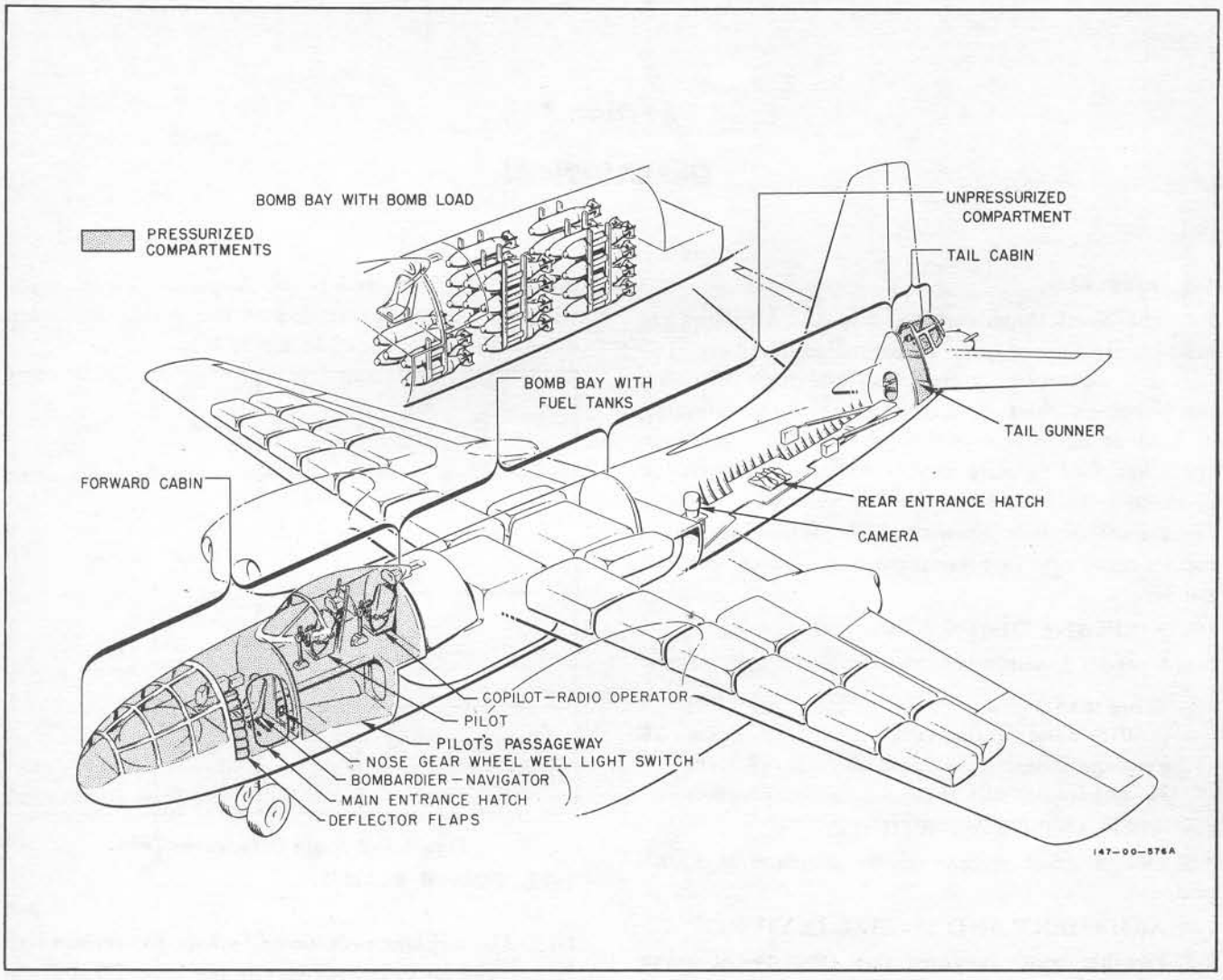


Figure 1-3. General Arrangement

No control of the system is provided. For temperatures at or below −30°F, use AF Specification No. 3519, Grade 1005.

C

Each engine has an independent pressure-type oil system with scavenge pump return to an 11.6-gallon oil tank (9.35 gallons usable oil). No control of the system is provided. The system is serviced with oil conforming to Specification No. AN-O-9, Grade 1010 or AF3606. For temperatures at or below −30°F, use AF Specification No. 3519, Grade 1005.

1-15. POWER CONTROLS.

1-16. There are four power control levers located on the control pedestal at the pilot's right (23, figure 1-10); a similar set of four is provided on the copilot's pedestal (3, figure 1-13). The two sets of controls are interconnected and move simultaneously. Advancement of the power controls from the "OFF" position into operating range illuminates the engine lights on the upper end of the fuel system control panel.

1-17. POWER CONTROL LOCKS. Before the power controls can be advanced from "OFF," a controls lock (paragraph 1-88) must be at "OFF." In addition, a stop in the pilot's power control quadrant prevents inadvertent movement of the levers (either pilot's or copilot's) from the operating range into the "OFF" position. The pilot's levers telescope, and the stop is passed by lifting them full up before pulling them back. No means of passing the stop is provided for the copilot.

1-18. POWER CONTROL SYSTEMS.

A-1

1-19. MAIN POWER CONTROL SYSTEM—J35 ENGINES. Initial movement of each of the four power control levers from the "OFF" position into operating range opens the stopcock portion of a fuel control valve for the corresponding engine. Subsequent movement of the power control varies engine rpm by changing the amount of fuel delivered to the engine through the fuel control valve. To maintain a constant rpm (with a fixed power control setting) irrespective of altitude changes,

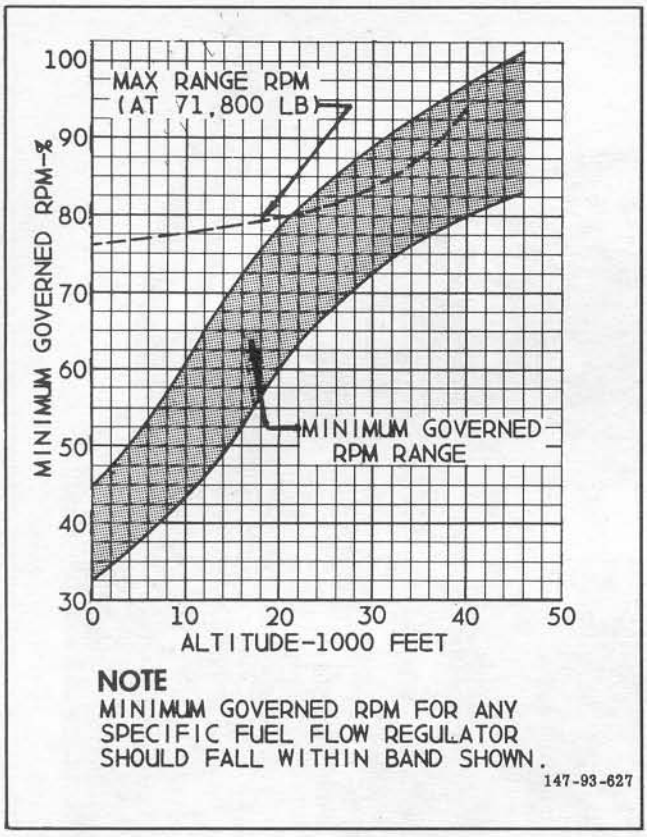


Figure 1-4. Minimum Engine RPM Versus Altitude—J-47 Series Engines—F-4 and F-5 Fuel Flow Regulators

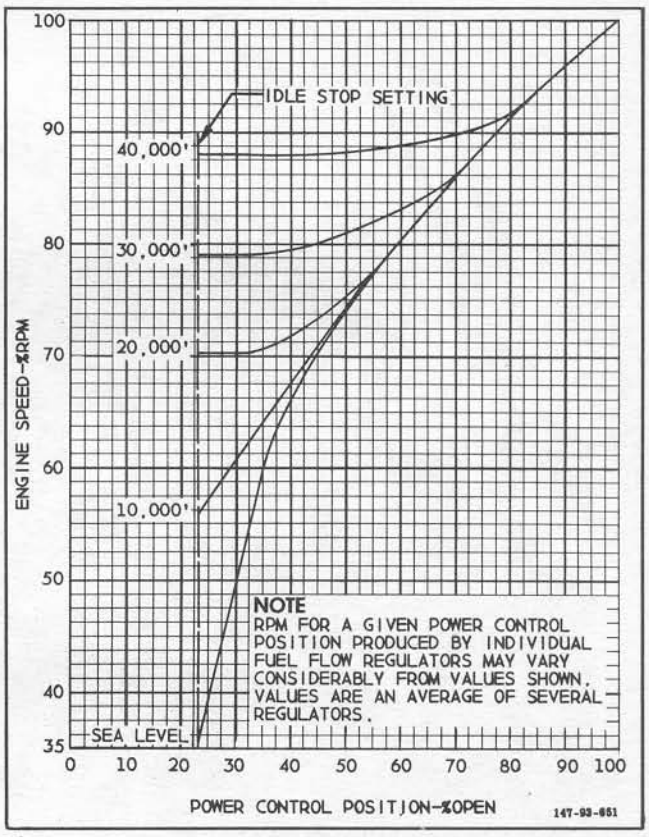


Figure 1-6. Power Control Travel Versus Engine RPM—J-47 Series Engines—F-4 and F-5 Fuel Flow Regulators

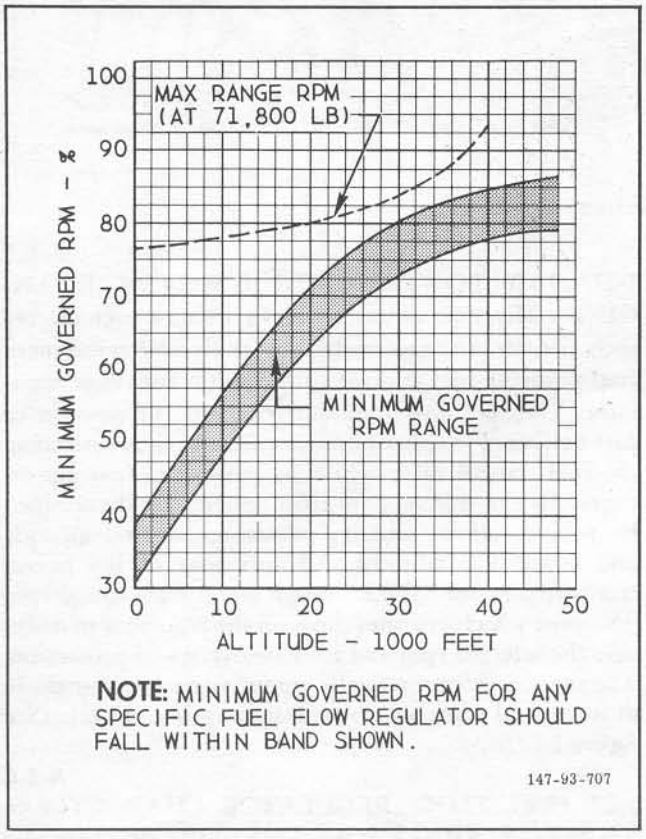


Figure 1-5. Minimum Engine RPM Versus Altitude—J-47 Series Engines—G-5 Fuel Flow Regulator

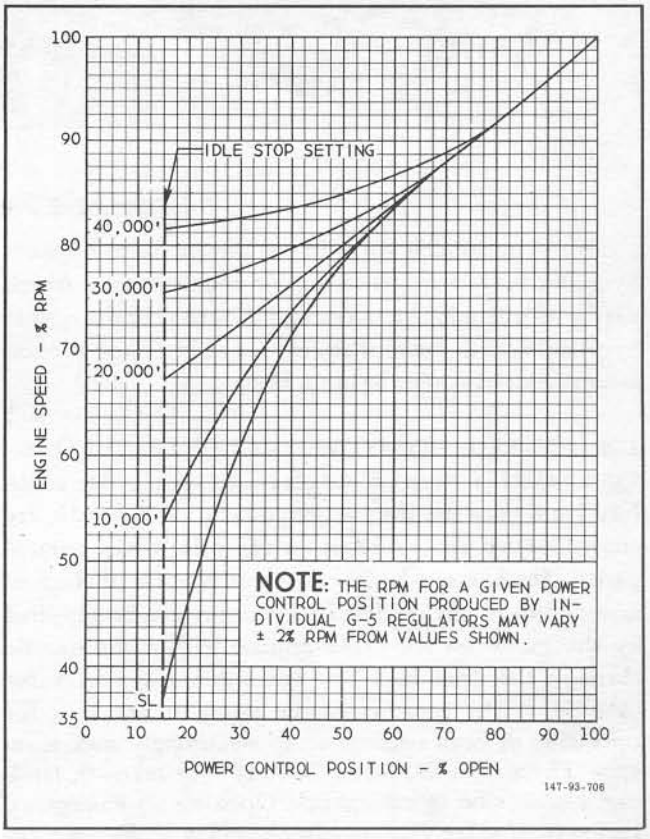


Figure 1-7. Power Control Travel Versus Engine RPM —J-47 Series Engines—G-5 Fuel Flow Regulator

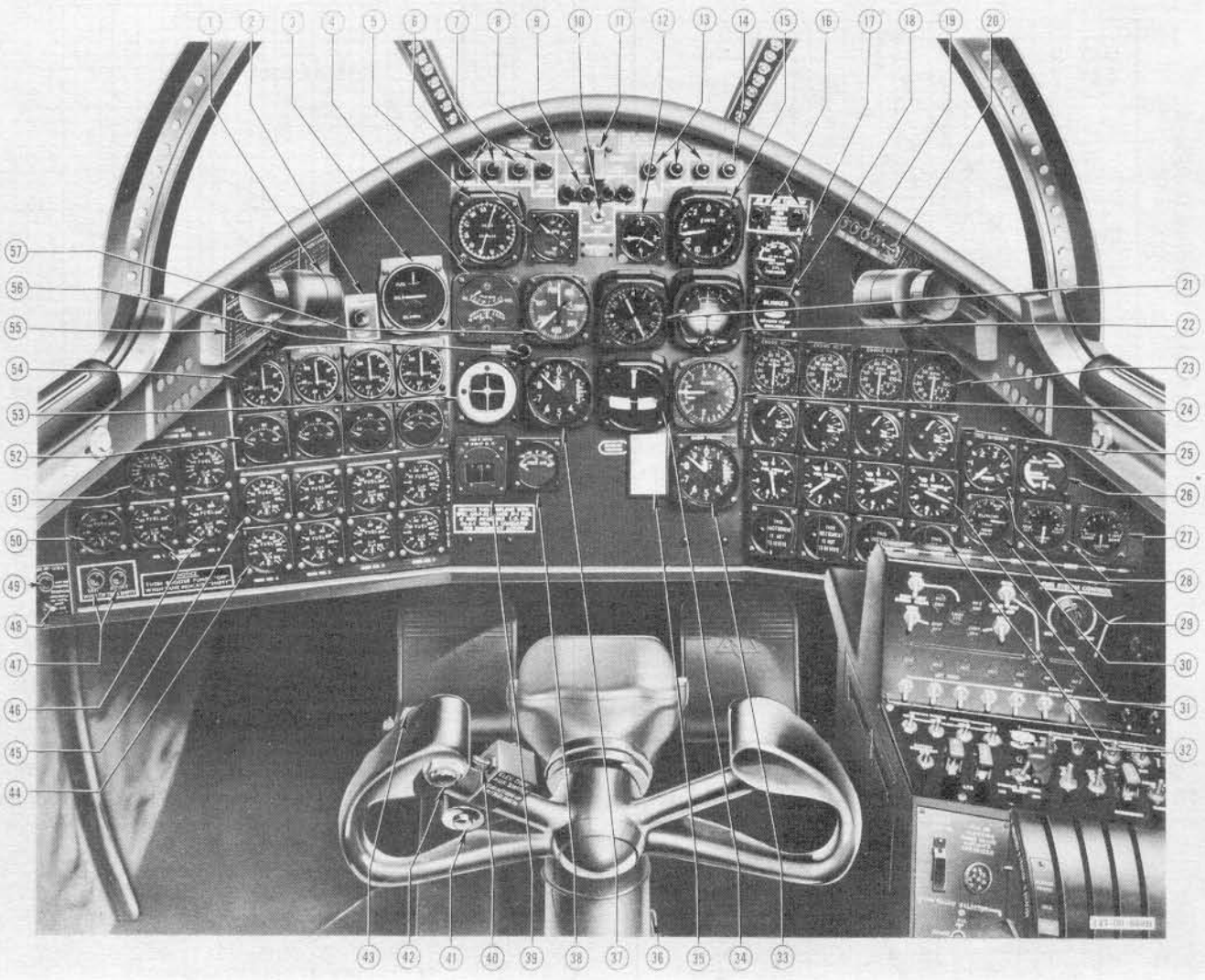


Figure 1-8. Pilot's Station—Forward

a barometric control valve in the power control system by-passes fuel in excess of engine requirements, which vary with altitude. An overspeed governor in the system by-passes fuel to prevent engine speed in excess of maximum allowable. (See figure 1-16.)

A-1

1-20. EMERGENCY POWER CONTROL SYSTEM—J35 ENGINES. Shut-off valves in the emergency cross-feed lines between the two engines in each nacelle are controlled by two switches on the pilot's fuel control panel. (See figure 2-2.) In case some portion of the fuel system fails in one engine, fuel pressure can be supplied by the pump on the other engine within the nacelle through the cross-feed line (emergency system valve "OPEN"). The capacity of the pump is sufficient for operation of both engines at approximately maximum rpm. The valves should be "OPEN" for take-off, landing, and in case of emergency. Opening an emergency fuel system valve also supplies ignition to the two engines in the related nacelle, provided power controls are in operating range.

A-5,C

1-21. MAIN POWER CONTROL SYSTEM—J47 ENGINES. The main power control system on each engine incorporates an engine-driven, positive-displacement fuel pump, a fuel control valve, and a fuel flow regulator. The fuel flow regulator controls the amount of fuel delivered to the combustion chambers by operating the fuel control valve which by-passes any fuel not required by the engine. Fuel requirements are determined by power control setting, engine speed, and altitude and airspeed conditions. Advancement of the power control from the "IDLE" range sets a wide-range rpm governor which operates through the regulator to maintain the selected rpm and provide overspeed protection. The regulator automatically compensates for changes in altitude and airspeed to maintain rpm constant. (See figure 1-17.)

A-5,C

1-22. FUEL FLOW REGULATOR CHARACTERISTICS—J47 ENGINES. It is a characteristic of jet engines that the possibility of flame-out increases with altitude. To minimize the possibility of deceleration flame-out,

1. Fluorescent Light
2. Auto-pilot Power-off Indicator
3. Auto-pilot Trim Indicator
4. Radar Steering Meter*
5. Radio Compass
6. Flap Position Indicator
7. Landing Gear Indicators
8. Landing Gear Door Indicators
9. Engine Fire Detector Lights**
10. Fire Detector System Test Switch**
11. Fire Extinguisher Switch**
12. Clock
13. Bomb Door Indicators**
14. Bomb Release Indicator**
15. Accelerometer
16. ATO Indicators
17. Oxygen Pressure Gage
18. Oxygen Flow Indicator
19. Water Injection System Indicators§
20. Water Injection System Switch§
21. Remote-indicating Compass
22. Attitude Gyro
23. Tachometers
24. Rate-of-Climb Indicator
25. Exhaust Temperature Indicators
26. Hydraulic Fluid Level Indicator
27. Aileron Trim Indicator
28. Rudder Trim Indicator
29. Hydraulic Pressure Gage
30. Elevator Trim Indicator
31. Fuel Pressure Gages
32. Instruments Inoperative
33. Cabin Pressure Altimeter
34. Turn-and-Bank Indicator
35. Stand-by Compass Correction Card
36. Control Column Release Lever
37. Altimeter
38. Free Air Temperature Gage
39. Stand-by Compass
40. Elevator Trim Auxiliary Switch
41. Auto-pilot Release
42. Radio Microphone and Interphone Button
43. Nose Gear Steering Trigger Switch
44. Fuel Gages—Right Wing Tanks
45. Fuel Gages—Left Wing Tanks
46. Fuel Gages—Small Bomb Bay Tanks
47. Wing Tip Tanks "EMPTY" Indicators§
48. Fuel Filter De-icer Switch
49. Fuel Filter Ice Warning Indicator
50. Fuel Gage—Fuselage Tank
51. Fuel Gages—Large Bomb Bay Tanks
52. Oil Temperature Indicators§
53. Glide Path and Runway Localizer Indicator
54. Oil Pressure Gages
55. Pilot's Check List†
56. Marker Beacon Indicator
57. Airspeed Indicator

*B-45A Airplanes AF47-37, AF47-39 and subsequent
**B-45A Airplanes
§B-45C Airplanes
†Located on top of instrument panel shroud on B-45A-1 Airplanes, and B-45A-5 Airplanes AF47-23 thru AF47-46

KEY TO FIGURE 1-8

the fuel flow regulator is designed to hold a fixed minimum fuel pressure, which is sufficient to maintain combustion at all altitudes. While the minimum fuel pressure remains constant, the resultant minimum rpm increases with altitude. The relationship of minimum governed rpm to altitude varies with type of fuel flow regulator, as shown in figures 1-4 and 1-5. Some engines are equipped with Type F-4 or F-5 fuel flow regulators, while others are equipped with Type G-5 regulators. (Appropriate maintenance form should indicate type of fuel flow regulator installed.) The minimum governed rpm range of the G-5 regulator falls below the rpm for maximum airplane range at all altitudes, but the minimum governed rpm range of the F-4 or F-5 regulator is above that required for maximum range at approximately 20,000 feet and above. Although the governor section of each regulator was designed to produce a given engine speed for a given power control setting, the fact that the minimum rpm available from the regulator increases with altitude causes the lower portions of the power control travel to be relatively ineffective at altitude. The result is that most of the engine control at altitude is obtained at or near the forward end of the power control quadrant, leaving a fairly large insensitive range or "flat spot" between the minimum governed rpm and the idle stop. The extent of these insensitive ranges increases with altitude. The relationship of engine rpm to power control travel at various altitudes for the two different regulators is shown in figures 1-6 and 1-7. Because of the generally higher minimum governed rpm of the F-4 or F-5 regulator, this insensitive range is greater on the F-4 or F-5 regulator than on the G-5 regulator. Only extremely slow and cautious power control advancement for engine acceleration can be made at altitude with an F-4 or F-5 regulator because flame-out or engine stall will occur. Normally 6 to 8 seconds is required for power control advancement from idle to full open. The acceleration characteristics of a G-5 regulator are much improved, with no possibility of flame-out regardless of rapid power control advancement for all altitudes up to 35,000 feet. Above that altitude, flame-out may be encountered, if the power control is snapped from idle to full open.

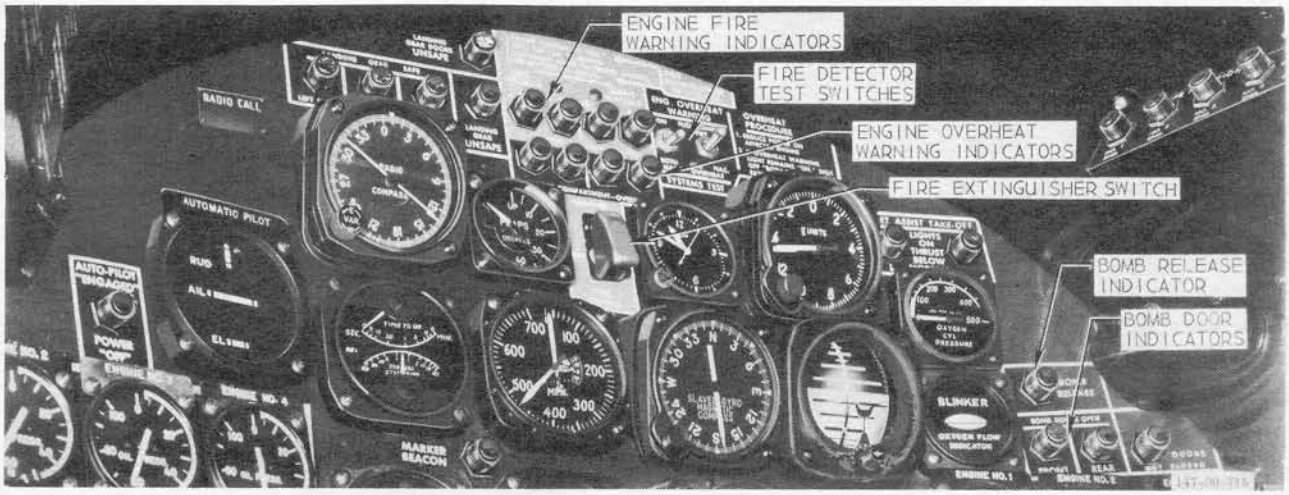


Figure 1-9. Upper Section Pilot's Instrument Panel—B-45C Airplanes

1-23. EXHAUST TEMPERATURE VARIATION. It is an inherent characteristic of turbo-jet engines with fixed area exhaust nozzles, that the exhaust temperature will vary with changes in temperature and density of engine inlet air. The principal factors affecting air delivered to the engine inlet are: outside air temperature, altitude, and airspeed. Generally, an increase in outside air temperature or altitude tends to cause exhaust temperature to rise, whereas an increase in airspeed causes exhaust temperature to drop. Since all three factors can change simultaneously, the effect on exhaust temperature may be inconsistent. As a rule, however, exhaust temperature may be expected to drop as airspeed increases immediately after take-off, and to remain well below the temperature obtained at 100% rpm on the ground, until medium to high altitudes are reached. At about 25,000 feet, exhaust temperature will start rising at a gradually increasing rate up to 35,000 feet, where it might exceed the limit when operating at 100% rpm. Since the engine must not be operated at excessive exhaust temperatures, the power control should be retarded as necessary to keep the temperature within limits. No action is required by the pilot if exhaust temperature is below the limit, although it should be remembered that thrust decreases with temperature when operating at a constant engine rpm.

1. Fuel System Control Panel
2. Landing Light Switch
3. Fuselage Lights Switch
4. Fuselage Lights Keying Switch
5. Navigation Light Switches
6. Formation Lights Switch
7. Taxi Light Switch
8. Bomb Door Switch
9. Engine Air Intake Anti-icing Switch
10. Windshield Anti-icing Switch
11. Canopy Anti-icing Switch
12. Tail Cabin Pressure Switch
13. Main Cabin Pressure Switch
14. Pilot's Air and Windshield Defroster Control
15. Pitot Heater Switch
16. Wing Anti-icing Switch
17. Tail Anti-icing Switch
18. Emergency Alarm Switch
19. Emergency and Parking Brake Levers
20. Emergency Brake Boost Switch*
21. Horn Cutoff Switch—Cabin Pressure
22. Horn Cutoff Switch—Landing Gear
23. Power Controls
24. Wing Flap Control
25. Tail Anti-icing Rheostat
26. Wing Anti-icing Rheostat
27. Surface Control Boost Test Lights
28. Trim Tab Control Stick
29. Cabin Temperature Rheostat
30. Spare Lamps—Fuel System Control Panel
31. Bomb and Fuel Tank Salvo Selector Switch**
32. Power Control Friction Lock
33. Salvo Circuit Indicator Light
34. Bomb and Fuel Tank Salvo Control Switch
35. Surface Control Boost Switch
36. ATO Units Release Switch
37. Data Case
38. ATO Units Ignite Switch
39. Battery Switch
40. Starter Switches
41. Aileron Boost Cutout Switch

NOTE: Pilot's switch panel shown is in B-45A Airplanes.

*B-45A-5 Airplanes AF47-77 thru AF47-96
**B-45A Airplanes

KEY TO FIGURE 1-10

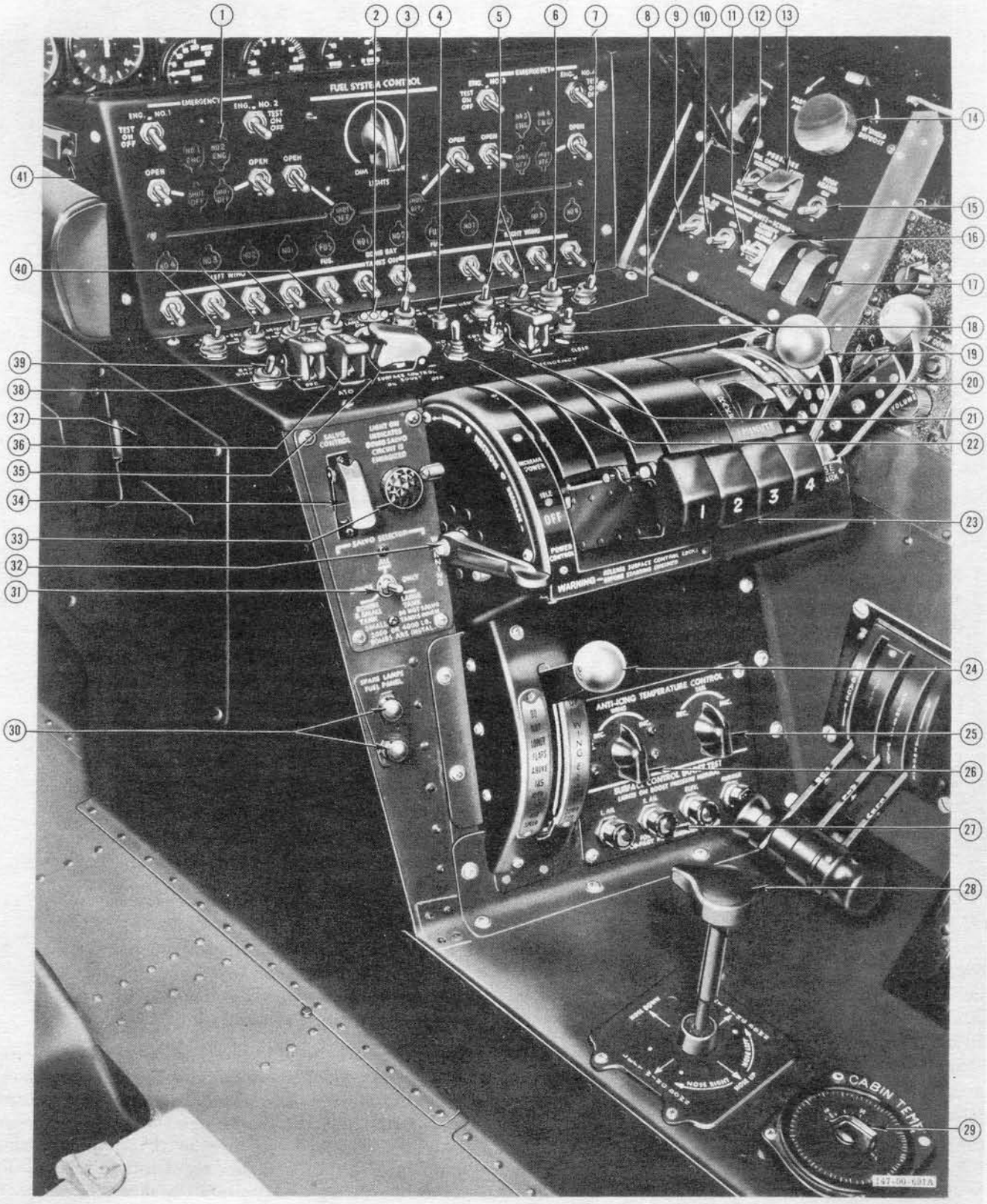
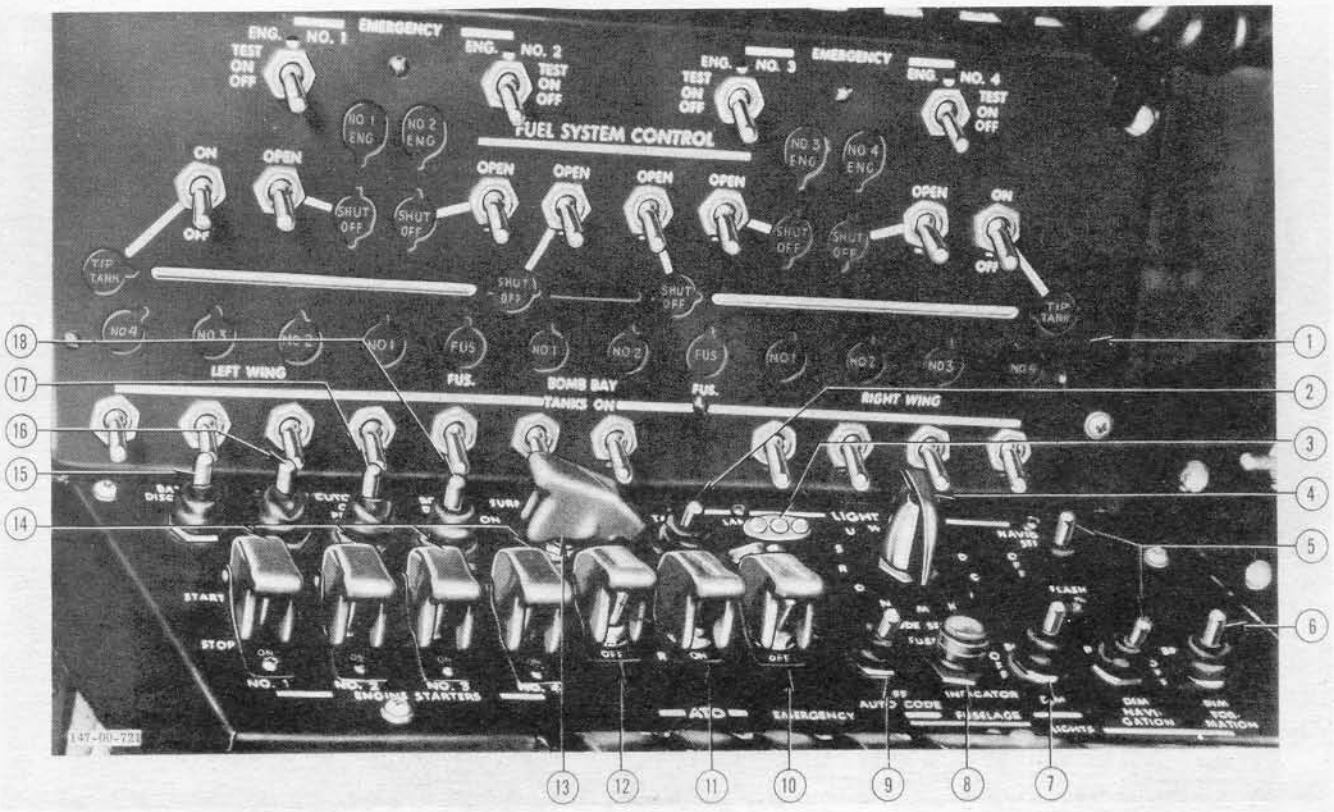


Figure 1-10. Pilot's Control Pedestal



1. Fuel System Control Panel
2. Taxi Light Switch
3. Landing Light Switch
4. Code Selector
5. Navigation Light Switches
6. Formation Lights Switch
7. Fuselage Lights Switch
8. Fuselage Lights Indicator
9. Auto Code Switch
10. Emergency Alarm Switch
11. ATO Release Switch
12. ATO Ignite Switch
13. Surface Control Boost Switch
14. Engine Starters
15. Battery Switch
16. Horn Cutoff Switch—Landing Gear
17. Horn Cutoff Switch—Cabin Pressure
18. Bomb Door Switch

Figure 1-11. Pilot's Switch Panel—B-45C Airplanes

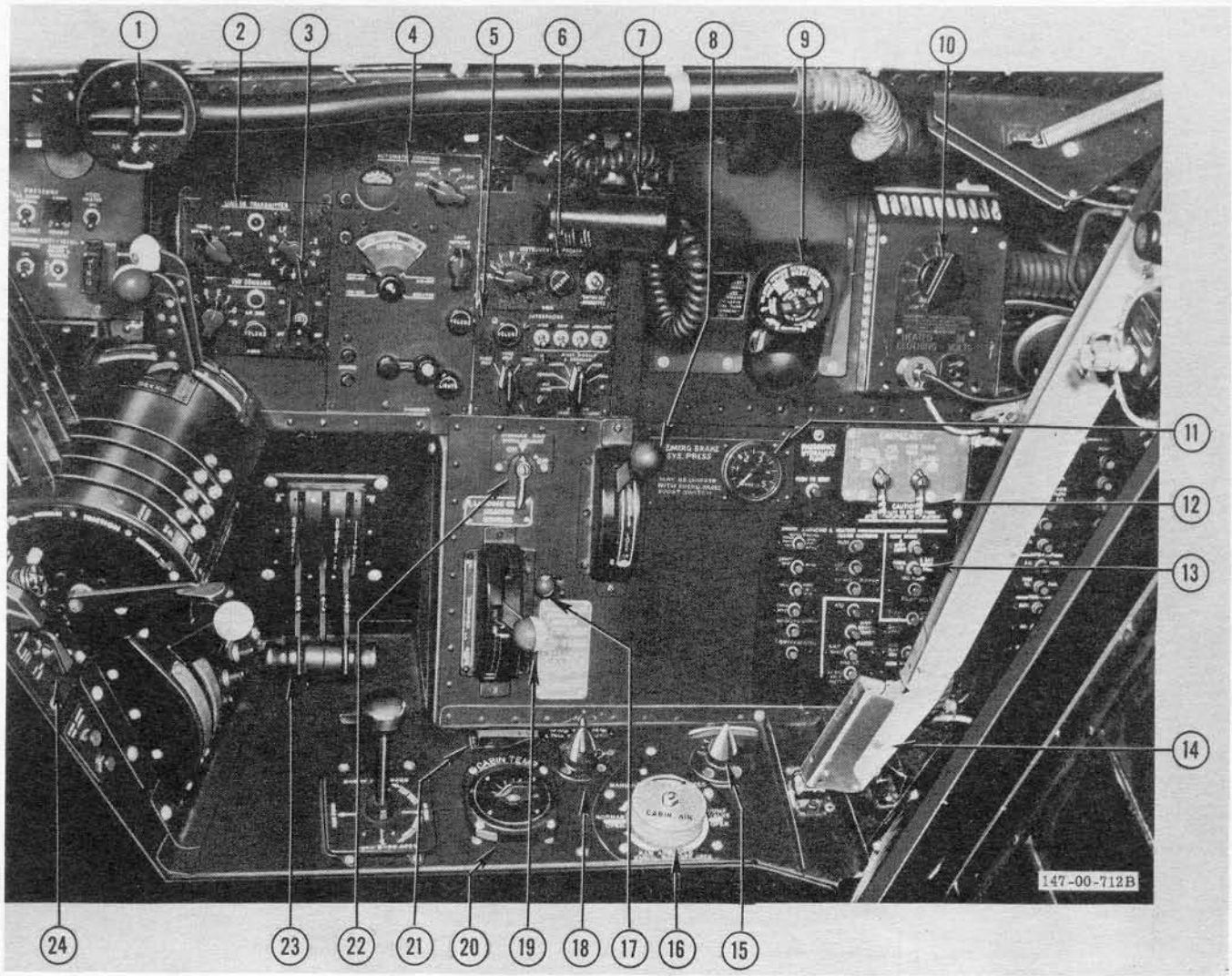
A-5,C

1-24. EMERGENCY POWER CONTROL SYSTEM—J47 ENGINES. The main power control system of each engine is supplemented by an engine-driven, positive-displacement emergency fuel pump and an emergency fuel regulator. (See figure 1-17.) The emergency regulator, controlled by linkage to the power control, is also altitude compensated and will maintain a selected rpm during altitude changes; however, there is no engine speed regulation when operating on the emergency system. The emergency regulator senses main pump discharge pressure and is scheduled to a slightly lower pressure than the main pump. When both systems are operating, as during take-off and landing, the emergency regulator by-passes the entire output of the emergency pump. Should the main pump output drop below the pressure setting of the emergency regulator, by-pass flow is reduced, thereby making the output of the emergency pump available for operating the engine.

Note

When the emergency system comes into operation, engine speed may decrease slightly, because the emergency regulator is set to give 100% rpm on a 100°F day, and therefore will provide somewhat less than 100% rpm at lower outside air temperature. (See figure 2-6.)

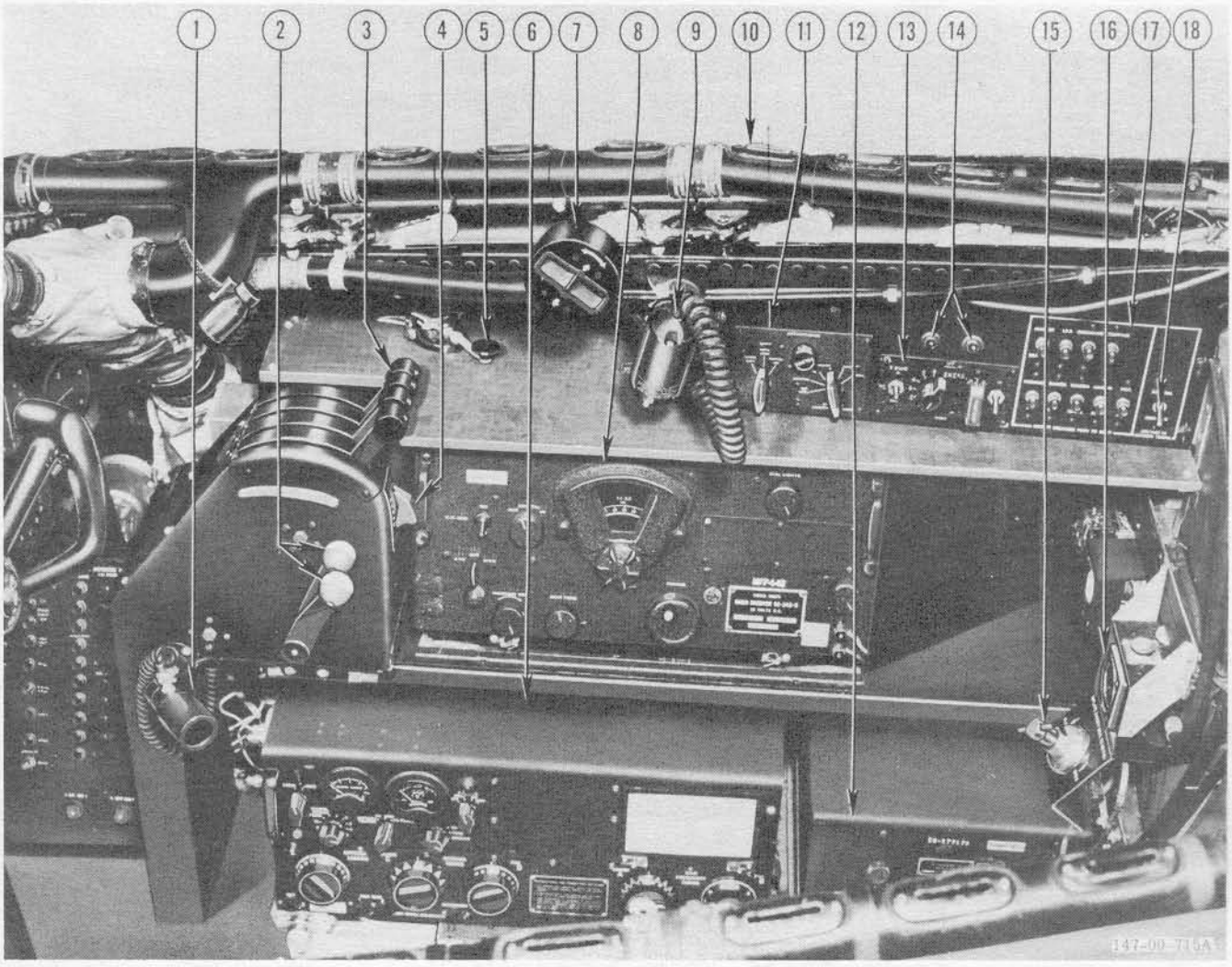
When operating on the emergency system, the amount of fuel supplied to the engine is determined by the power control setting. Advancement of the power control restricts the by-pass flow through the emergency regulator and increases fuel flow to the engine. During normal flight, the emergency regulator is mechanically set to the full by-pass position (by means of an emergency fuel system switch) to prevent its overriding the main pump, thereby allowing wide-range rpm governing by the main regulator. A means of checking the emergency fuel system is provided by the "TEST" position of the emergency fuel switch. (See figure 2-3.)



1. Heat and Vent Outlet
2. Liaison Transmitter Control Panel†
3. Command Radio Control Panel
4. Radio Compass Control Panel
5. Interphone and Mixer Switch Panel
6. Instrument Approach Control Panel
7. Fluorescent Light
8. Controls Lock
9. Oxygen Regulator
10. Heated Clothing Control Panel
11. Emergency Brake Hydraulic System Pressure Gage*
12. Emergency Hydraulic Selector Valves
13. Circuit Breaker Panels
14. Canopy Emergency Release
15. Life Raft Release
16. Cabin Air Valve
17. Landing Gear Lock Emergency Release
18. Wing Tip Tank Mechanical Release**
19. Landing Gear Selector Control
20. Cabin Temperature Rheostat
21. Cabin Temperature Manual Override Switch§
22. Hydraulic Main System Pressure Control Valve
23. Auto-pilot Engaging Handles
24. Bomb and Tank Salvo Selector Switch**

†B-45A-1 Airplanes, B-45A-5 Airplanes AF47-23 thru AF47-61, and B-45C Airplanes AF48-1 thru AF48-6
*B-45A-5 Airplanes AF47-77 thru AF47-96
**B-45C Airplanes
§B-45A-5 Airplanes AF47-47 thru AF47-96, and B-45C Airplanes

Figure 1-12. Pilot's Station—Right Side



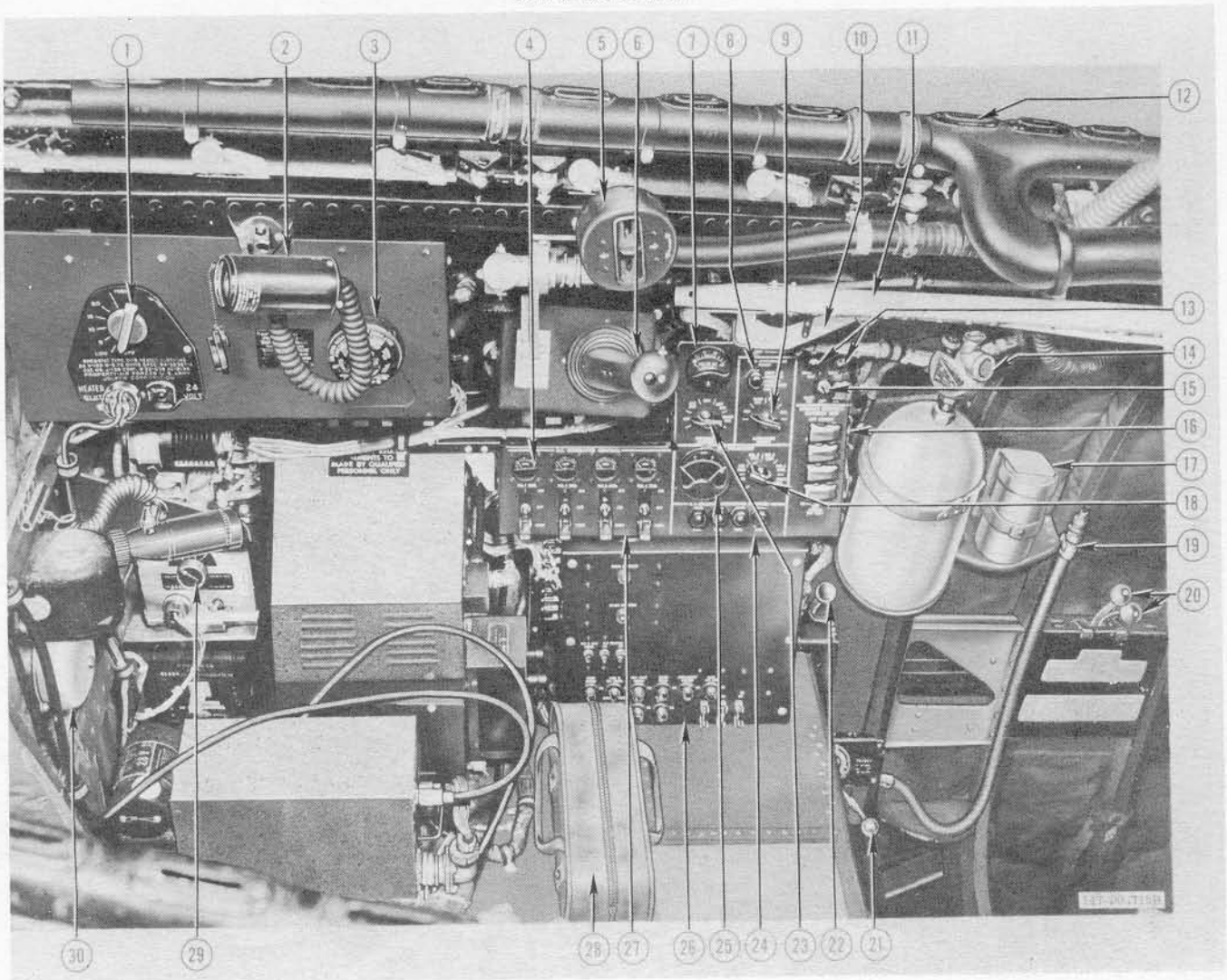
1. Fluorescent Light
2. Emergency Brake Levers
3. Power Controls
4. Emergency Brake Boost Switch*
5. Radio Key
6. Liaison Transmitter†
7. Heat and Vent Outlet
8. Liaison Receiver†
9. Cockpit Light
10. Canopy Defroster Outlets
11. Interphone Panel
12. Radio Compass Receiver
13. IFF Control Panel†
14. IFF Indicator Lights†
15. Canopy Seal Pressure Regulator
16. Canopy Seal Pressure Gage
17. Radio Circuit Breakers
18. Liaison Transmitter Monitor Switch†

*B-45A-5 Airplanes AF47-77 thru AF47-96
†B-45A-1 Airplanes, B-45A-5 Airplanes AF47-23 thru AF47-61, and B-45C Airplanes AF48-1 thru AF48-6

Figure 1-13. Copilot's Station—Right Side

A-5,C

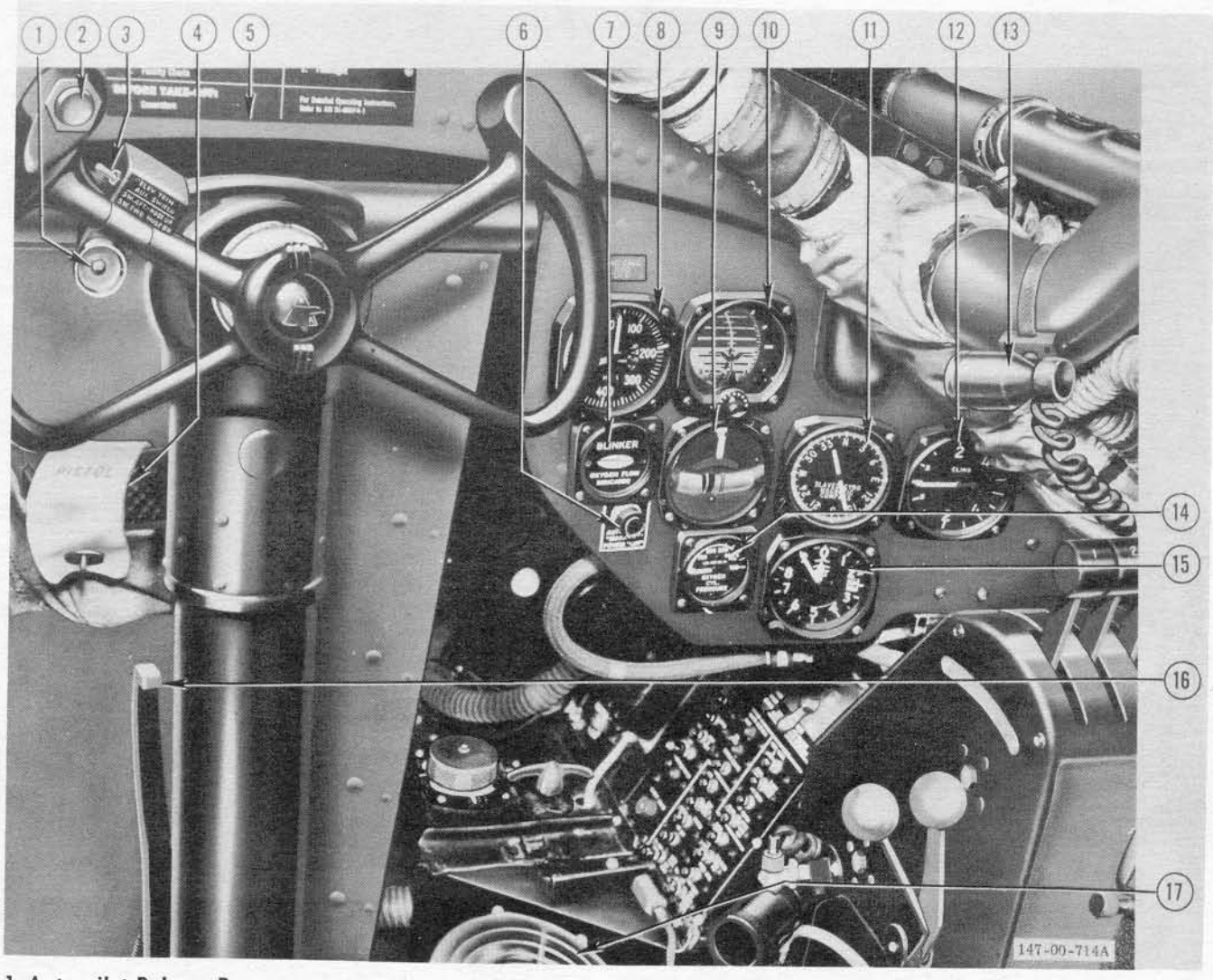
1-25. EMERGENCY FUEL SYSTEM CONTROLS—ALL J47 ENGINES. Four emergency fuel system switches are located on the fuel system control panel. (See figure 2-3.) Each switch controls the emergency fuel regulator for the related engine and also provides a means of checking the emergency fuel system. When the switch is "ON," the emergency regulator operates normally, by-passing fuel from the emergency pump, and will automatically take control in the event the main control system fails. With the switch at "OFF," the emergency regulator is set to full by-pass position, preventing it from overriding the main system under normal operation. The spring-loaded "TEST" position of the switch vents the main fuel regulator sensing line to atmosphere rather than compressor discharge pressure, and causes main pump discharge pressure to drop off, thus allowing the emergency pump to take control with only a slight drop in engine speed.



1. Heated Clothing Control Panel
2. Cockpit Light
3. Oxygen Regulator
4. Ammeters
5. Heat and Vent Outlet
6. Automatic Pilot Controller
7. A-C Voltmeter
8. Alternator Warning Light†
9. Alternator Switch†
10. Pyrotechnic Pistol Mount**
11. Canopy Emergency Release
12. Canopy Defroster Outlets
13. Inverter Warning Lights†
14. Portable Oxygen Bottle
15. Inverter Switch†
16. Surface Control Boost Test Switches*
17. Disposal Container
18. D-C Voltmeter Selector
19. Main Hydraulic System Filler Hose
20. Landing Gear and Door Manual Emergency Controls§
21. Main Hydraulic Reservoir Filling Hand-pump
22. Bomb Door Manual Control
23. A-C Voltmeter Selector
24. Generator Overvoltage Lights
25. D-C Voltmeter
26. Circuit Breaker and Fuse Panel
27. Generator Switches
28. Signal Cartridge Case**
29. Interphone Amplifier Auxiliary Gain Control
30. Alarm Bell

†B-45A-1 Airplanes, and B-45A-5 Airplanes AF47-23 thru AF47-76
*B-45A-5 Airplanes AF47-77 thru AF47-96 and B-45C Airplanes have three switches instead of four
§B-45A-5 Airplanes AF47-37 and subsequent
**B-45A-1 Airplanes, B-45A-5 Airplanes AF47-23 thru AF47-61, and B-45C Airplanes AF48-1 thru AF48-6

Figure 1-14. Copilot's Station—Left Side



1. Auto-pilot Release Button
2. Radio and Interphone Microphone Button
3. Elevator Trim Auxiliary Switch
4. Pyrotechnic Pistol*
5. Copilot's Check List
6. Auto-pilot Engaged—Power Off Indicator
7. Oxygen Flow Indicator
8. Airspeed Indicator
9. Turn-and-Bank Indicator
10. Attitude Gyro
11. Remote-indicating Compass
12. Rate-of-Climb Indicator
13. Fluorescent Light
14. Oxygen Pressure Indicator
15. Altimeter
16. Rudder Bars
17. Heat and Vent Floor Outlet

*B-45A-1 Airplanes, B-45A-5 Airplanes AF47-23 thru AF47-61, and B-45C Airplanes AF48-1 thru AF48-6

Figure 1-15. Copilot's Station—Forward

1-26. ENGINE STARTERS.

A

1-27. The engine starters are controlled by four spring-loaded switches (40, figure 1-10) located on the pilot's electrical switch panel. The starter for each engine is a combination starter-generator unit, acting as a starter for cranking the engine up to 23-26% rpm, and after engine speed reaches 35% rpm, operating as a generator. The starter is energized as long as the switch is held "ON."

C

The engine starters are controlled by four spring-loaded toggle switches located on the pilot's electrical switch panel. (See 14, figure 1-11.) The starter for each engine is a combination starter-generator unit, acting as a starter for cranking the engine up to 23% rpm. After engine speed reaches 35% rpm, the unit operates as a generator. Momentary positioning of a starter switch at "START" energizes the starter until engine speed reaches 23% rpm, at which time the starter circuit is automatically disconnected. If ignition fails to occur

during the starting procedure, the starter switch must be held at "STOP" to de-energize the starter. Each switch is guarded in the off or mid-position.

1-28. IGNITION.

A-1

1-29. One single-phase, 400-cycle inverter, with a spare for emergency use (paragraph 1-67) provides current to ignition transformers on the engines. A microswitch incorporated in the linkage from each power control lever controls the ignition system on the related engine. When the lever is advanced from "OFF" to the operating range, the microswitch closes, energizing an ignition relay which completes the circuit to the spark plugs when the related starter switch is closed. After the ignition system is energized, during the starting procedure, by advancing the power control and closing the starter switch, a locking relay in the starter system locks the ignition on as long as the starter switch is held "ON." Therefore, in addition to retarding the power control to "OFF," the starter switch must be released to turn off the ignition should it be necessary while starting. The spark plugs are energized under two conditions only: once the power controls have been advanced to the operating range and the starter switch is held "ON"; or when the power controls are in the operating range and the emergency fuel system valve in the related nacelle is "OPEN." Constant ignition is not necessary, because once the mixture in the combustion chamber is ignited, it burns continuously.

A-5,C

The ignition transformers on the engines receive 28-volt direct current from an external power source or airplane's batteries in an emergency. A microswitch incorporated in the linkage from each power control lever controls the ignition system on the related engine. Advancing the control lever into the operating range closes the microswitch and energizes the ignition relay which completes the circuit to the spark plugs, when the related starter switch is closed. After the ignition system is energized, a locking relay in the starter system locks the ignition on as long as the starter switch is closed. Therefore, should it be necessary to turn off ignition while starting, the power control will have to be retarded, and the starter switch released on B-45A-5 Airplanes, and positioned at "STOP" on B-45C's. The spark plugs will be energized once the power controls have been moved into operating range and the related starter switch is on. Constant ignition is not necessary, because once the mixture in the combustion chambers is ignited, it burns continuously.

1-30. WATER INJECTION SYSTEM.

C

1-31. To increase thrust available for take-off, a water injection system is installed. A 214-gallon droppable tank is suspended beneath each nacelle by means of suspension hooks, provided for assist take-off units. Each tank supplies both engines in the related nacelle with a water-alcohol mixture which is pumped into the engine combustion chambers by four pumps. Each pump is driven by compressed air from the related engine compressor. A nozzle area trimmer, attached to each tail pipe, automatically reduces the nozzle area, when the system is operating, to obtain maximum thrust increase and keep exhaust temperatures within limits. All four systems are controlled by a single water injection switch. Although the two engines in each nacelle receive water from a single tank and the four systems are controlled by one switch, the systems are independent, and failure of one has no effect on the others. Should one system become inoperative, the other system in the same nacelle will have all the water available. This enables the engine receiving water assist to continue its higher thrust output for a longer period of time, in part compensating for the loss of thrust increase from the engine not receiving water.

C

1-32. WATER INJECTION SYSTEM CONTROL. A single water injection switch and four push-to-test indicator lights (one for each engine) are located at the extreme right of the pilot's instrument panel. (See 19 and 20, figure 1-8.) The water injection switch has two spring-loaded positions, "PRIME" and "OVERRIDE OFF," and a center or "OFF" position. A microswitch incorporated in each power control lever prevents operation of the system unless power controls are full open. When the water injection switch is held at "PRIME" and all four power controls are full open, the four lights will illuminate, indicating that water is being delivered to the four engines at the proper pressure. The switch can then be released, and the lights will remain on as long as full pressure is maintained or until the water supply is exhausted (approximately 2 minutes). The system may be shut off before the supply is exhausted by either of the following methods: retarding the power controls until all four lights go out; or holding the switch at "OVERRIDE OFF" until the lights go out and then releasing the switch. The "OVERRIDE OFF" position is intended primarily for ground testing. Retarding power controls (approximately ¼ inch) is the recommended procedure for stopping the system in the event of malfunction on the take-off run. The power controls can then be advanced to full open and the system will remain off.

WARNING

Inadvertent placement of the water injection switch at "PRIME" when the tanks are either empty or not installed will seriously damage the pumps.

A-5(1)

Note

Partial provisions for installation of the water injection system have been made on these airplanes.

(1) AF47-77 and subsequent

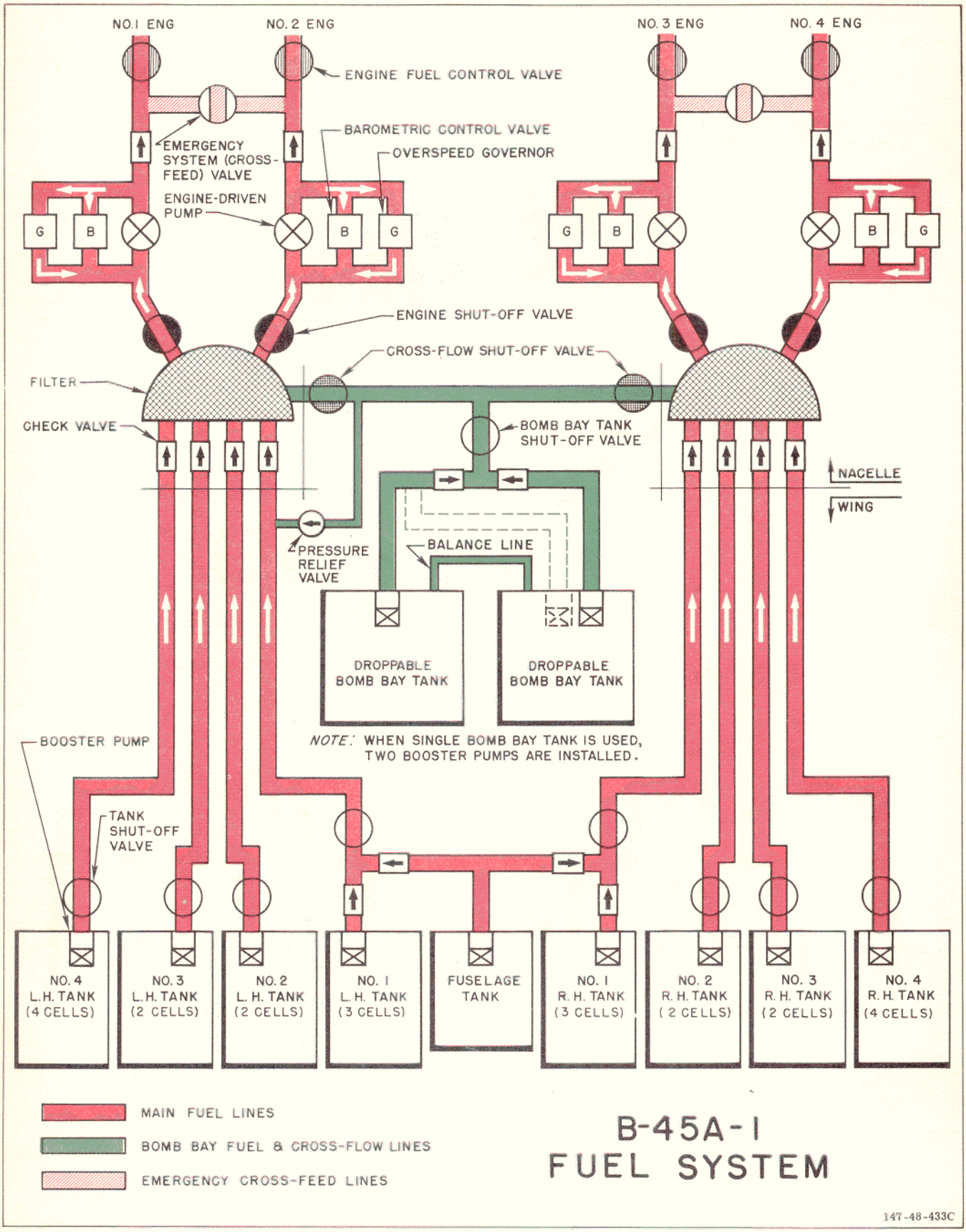


Figure 1-16. Fuel System—B-45A-1 Airplanes

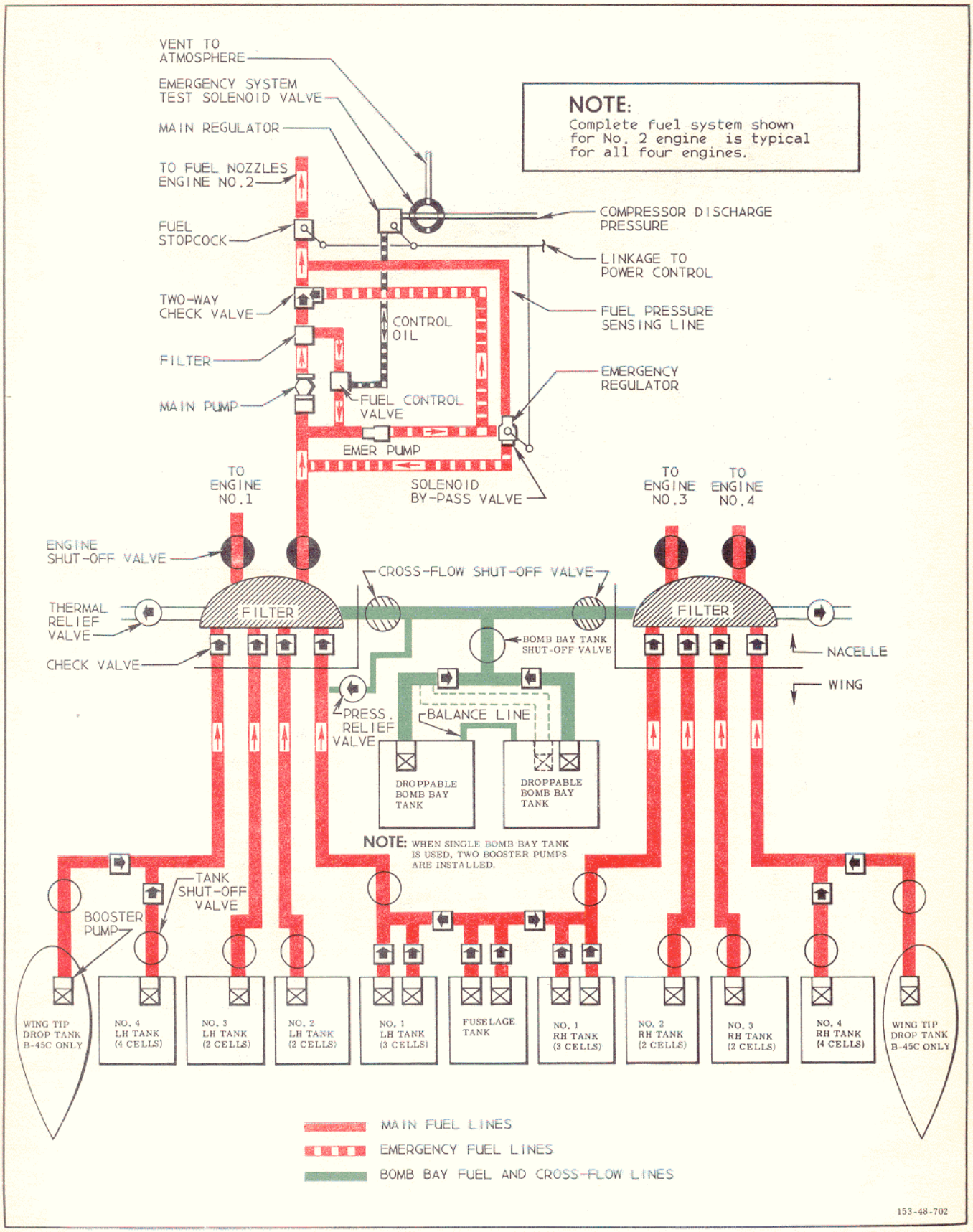


Figure 1-17. Fuel System—B-45A-5 and B-45C Airplanes

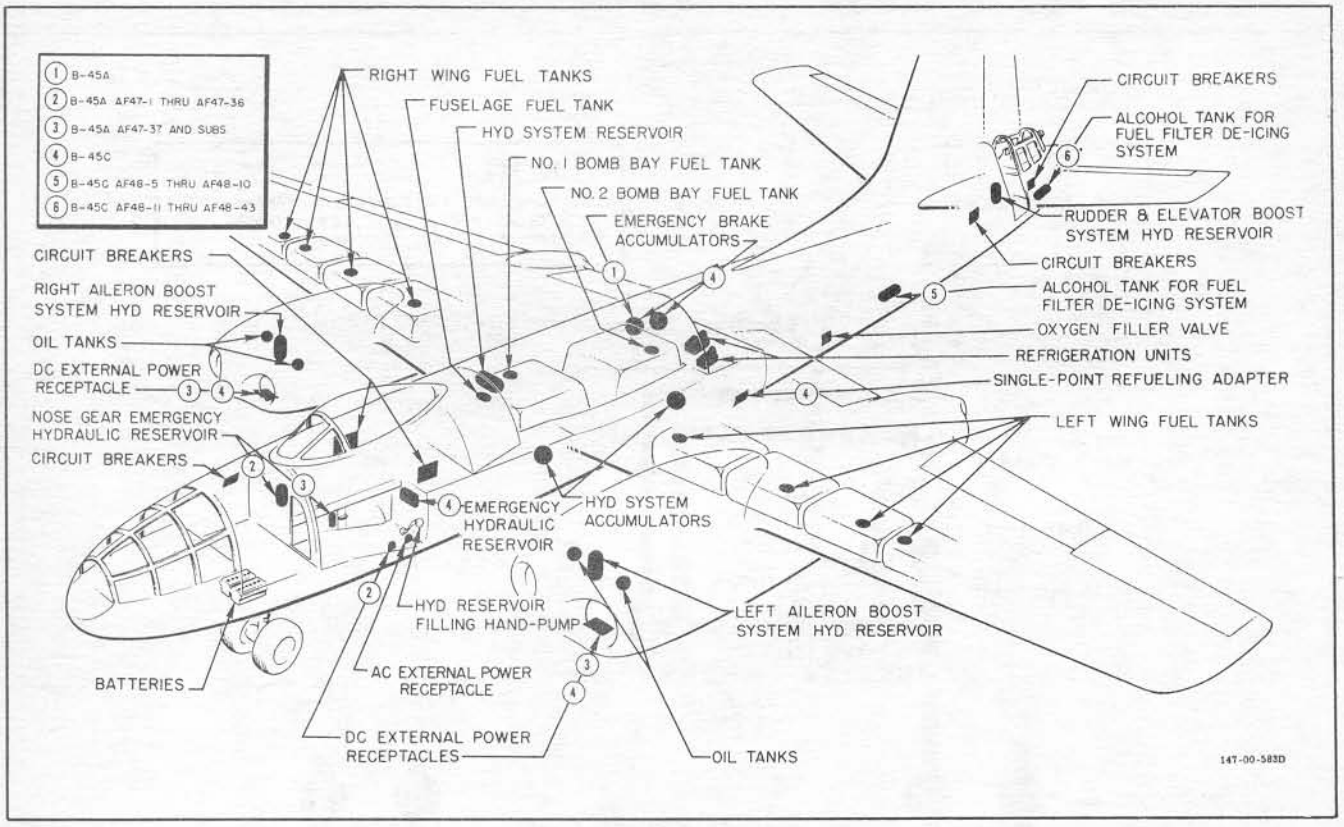


Figure 1-18. Servicing

1-33. FUEL SYSTEM.

1-34. Fuel is supplied to the engines from eight wing tanks (22 cells interconnected to form eight tank units), one fuselage tank, and one 1200-gallon droppable bomb bay tank in the rear bomb bay. (See figures 1-16 and 1-17.) The fuel load can be varied by installing an additional 1200-gallon droppable tank in the forward bomb bay, or by replacing one or both 1200-gallon tanks with one or two 310-gallon droppable tanks (one in the upper aft and one in upper forward bomb bay). The eight wing tanks are divided into two groups of four, the "LEFT WING TANKS" and the "RIGHT WING TANKS." Normally each group forms a separate fuel system for the engines in the nacelle on the related side of the airplane, the two systems being connected by a cross-flow line from a fuel filter in each nacelle. (Each filter serves as a manifold for the lines from the four related wing tanks, the cross-flow line, and the two engines in that nacelle.) Fuel from the fuselage tank is fed into the outlet lines from the two "NO. 1" (inboard) wing tanks. Bomb bay fuel is routed through the cross-flow line directly to the fuel filter in each nacelle. All shut-off and cross-flow valves in the system are d-c electric-motor actuated. Operation of the system is essentially automatic, requiring only that the booster pump in each tank be shut off when the fuel in that tank is consumed.

C

Two droppable 1250-gallon wing tip tanks can be installed to give additional fuel capacity. Fuel from each tip tank is routed to the filter in the related nacelle through "NO. 4" wing tank outlet lines, and supplies the two engines in that nacelle. However, in the event one tip tank becomes inoperative, the other tip tank can supply all four engines through the cross-flow line.

C(1)

A de-icing system is provided for the fuel filter in each nacelle. Water particles in the fuel may freeze (below 32°F) on the filter elements and restrict fuel flow. Alcohol (Specification No. AN-A-18), supplied by a 10-gallon tank located in the aft fuselage (figure 1-18), is pumped into each filter to dissolve these ice crystals and restore normal fuel flow.

1-35. FUEL GRADE AND SPECIFICATION. Recommended fuel is Specification No. AN-F-32, Grade JP-1. Alternate fuel is Specification No. AN-F-48, Grade 100/130.

(1) AF48-5 and subsequent

B-45A &C
FUEL QUANTITY DATA (GALLONS)

TANKS	NO.	USABLE FUEL (each)	UNUSABLE FUEL LEVEL FLIGHT (each)	**EXPANSION SPACE (each)	TOTAL VOLUME (each)
No. 1 Wing	2	509	4	39	552
No. 2 Wing	2	344	5	18	367
No. 3 Wing	2	282	2	14	298
No. 4 Wing	2	376	3	17	396
Fuselage	1	344	4	10	358
Large Bomb Bay	2	1190	Fore 4	Fore 32	Fore 1226
(droppable)		1190	Aft 6	Aft 28	Aft 1224
Small Bomb Bay	2	305	Fore 1	Fore 26	Fore 332
(droppable)		305	Aft 10	Aft 20	Aft 335
*Tip Tank	2	1250	--	--	---

USABLE FUEL TOTALS

Wing and Fuselage	3366
Wing, Fuselage, and 1 Large Bomb Bay	4556
Wing, Fuselage, and 2 Large Bomb Bay	5746
Wing, Fuselage, and 2 Small Bomb Bay	3976
Wing, Fuselage, 2 Large Bomb Bay and Tip Tanks	8246

NOTE

- Tank outlets designed for level flight. The above figures will vary with changes in attitude.
- Quantities shown are calibration test data and may conflict with calculated data given in other publications.

* B-45C only. Missing information not available.
** EXPANSION SPACE is above the filler neck; therefore, normally it is impossible to use EXPANSION SPACE in filling tanks.

147-93-585C

Figure 1-19. Fuel Quantity Data Chart

1-36. FUEL TANK CAPACITIES. See figure 1-19 for fuel tank capacities. Fuel quantity gages for all internal tanks are located at the left side of the pilot's instrument panel. (See 44, 45, 46, 50 and 51, figure 1-8.)

C

No fuel quantity gages are provided for the wing tip tanks; however, two "EMPTY" warning lights on the instrument panel (47, figure 1-8) illuminate when the tanks are empty.

A

1-37. SEQUENCE OF TANK USAGE. Normally, all booster pump switches are on, and sequence of tank usage is entirely automatic. If desired, tank selection may be accomplished by selection of booster pumps. (Refer to paragraph 1-40.) Fuel from the bomb bay tank or tanks (if installed) will be consumed first, then fuel from the wing tanks. The three outboard tanks of each wing will be practically empty before the "NO. 1" wing tank reaches its one-quarter level. Fuselage tank fuel and the remainder of the fuel in the "NO. 1" wing tanks will then be consumed.

C

Tip tank fuel will be consumed first, followed by bomb bay tank fuel, then wing and fuselage tank fuel. When all booster pump switches are on, sequence of tank usage will be entirely automatic. However, bomb bay booster pumps will remain inoperative, until tip tanks are practically empty or tip tank booster pumps are turned off. (Refer to paragraph 1-40.) The three outboard tanks of each wing will be practically empty before the "NO. 1" wing tank reaches its one-quarter level. Fuselage tank fuel and the remainder of the fuel in the "NO. 1" wing tanks will then be consumed.

A,C

Note

Normally, rate of wing tank fuel consumption may be noted to vary among tanks because of differences in the output of individual booster pumps. However, under normal conditions, fuselage tank fuel and the remainder of fuel in the "NO. 1" wing tanks will always be consumed last.

1-38. FUEL SYSTEM CONTROL PANEL. A fuel system control panel, located forward of the control pedestal at the pilot's right (1, figure 1-10), provides a lighted schematic diagram of the complete fuel system. Switches controlling all pumps, shut-off valves, cross-flow, and emergency system valves are mounted on the panel.

A

A light adjacent to each switch illuminates when the switch is turned on, but does not necessarily indicate that the related pump is operating or valve is open.

C

Illumination of a light adjacent to each switch gives definite indication that the valve is open, but not necessarily that the related pump is operating.

Advancement of power controls from the "OFF" position illuminates lights at the upper end of the panel marked "NO. 1," "NO. 2," "NO. 3," and "NO. 4 ENG.," respectively.

A

A rheostat in the center of the panel controls intensity of the panel lights.

C

A rheostat, located on the pilot's control pedestal to the right of the flap handle, controls the intensity of panel lights.

1-39. BOOSTER PUMPS.

A-1

1-40. All booster pumps (one in each wing tank, one in the fuselage tank, and two in the bomb bay tanks) are controlled individually by switches (figure 2-2) at the bottom of the fuel system control panel. When one bomb bay tank is installed, two pumps are required in one tank; when two tanks are installed, one pump is used in each tank. Installation of two pumps is necessary to provide sufficient pump capacity to ensure that bomb bay fuel is consumed first. Tank shut-off valves operate simultaneously with the booster pumps, opening when the pumps are started. A single shut-off valve for both bomb bay tanks is controlled by either of the two bomb bay tank pump switches. Normally, all booster pump switches are "ON"; however, because the bomb bay tank pumps have a higher output pressure than the wing tank pumps, the bomb bay fuel will be consumed first. The pump in the fuselage tank is inoperative until approximately three-fourths of the fuel in one or both "NO. 1" wing tanks is consumed; then the fuselage tank pump is started automatically (provided pump switch is "ON"). When the fuel level in the fuselage tank drops to 40 gallons, the pumps in the "NO. 1" wing tanks are automatically switched to high-speed duty, which increases their output to ensure adequate fuel pressure for two-engine operation from a single tank. In the event of electrical failure, fuel will be drained from all except bomb bay tanks by gravity or suction feed. Fuel can be drawn by suction from bomb bay tanks but only if recommended procedure given in paragraph 3-42 is followed.

A-5,C

Two booster pumps are installed in the fuselage tank, two in the bomb bay tank (or one in each, if two bomb bay tanks are installed), two in each "NO. 1" wing tank, and one in each of the other wing tanks. All booster pumps are controlled by switches at the bottom of the fuel system control panel. (See figure 2-3.) A single switch controls the pumps or pump in each tank. Tank shut-off valves operate simultaneously with the booster pumps, opening when the booster pumps are started. A single shut-off valve for both bomb bay tanks is controlled by either of the bomb bay tank pump switches. When all fuel switches are "ON," all pumps will be operating except one of the pumps in each "NO. 1" wing tank and the two fuselage pumps. Because the bomb bay pumps have a higher output pressure than the wing tank pumps, the bomb bay fuel will be consumed first. When the "NO. 2" and "NO. 4" wing tanks are empty, the second pump in "NO. 1" wing tank will start operating. (At that time, "NO. 3" wing tank will also be empty, as it has the smallest capacity.) Both fuselage tank pumps will be started when three-fourths of the fuel is used in either "NO. 1" wing tanks. In the event of electrical failure, fuel will be drained from all except bomb bay tanks by gravity or suction feed. Fuel can be drawn by suction from bomb bay tanks but only if recommended procedure given in paragraph 3-42 is followed.

C

Booster pumps in the wing tip tanks (one in each tank) are controlled by two switches on the fuel control panel. (See figure 2-3.) Tank shut-off valves operate simultaneously with the booster pumps, opening when the pumps are started. Tip tank and bomb bay tank pumps have the same output pressure, but a switch in each tip tank renders bomb bay booster pumps inoperative until both tip tanks are practically empty. Since tip tank pumps have a higher output pressure than wing tank pumps, tip tank fuel will be consumed first. Bomb bay fuel will be consumed next, with normal sequencing following. In the event of electrical failure, fuel can be drawn by suction from tip tanks but only if recommended procedure given in paragraph 3-40 is followed.

1-41. ENGINE FUEL SHUT-OFF VALVES.

1-42. Fuel flow to each engine is controlled at the fuel filter in each nacelle by an electrically operated fuel shut-off valve. Four switches controlling the shut-off valves are mounted on the fuel system control panel. (See figures 2-2 and 2-3.)

1-43. ENGINE FUEL CONTROL VALVE.

1-44. The stopcock portion of a fuel flow control valve on each engine is controlled by the related engine power control lever. Initial movement of the lever from the "OFF" position opens the stopcock.

1-45. CROSS-FLOW SHUT-OFF VALVES.

1-46. Two cross-flow valves (figures 1-16 and 1-17), actuated by switches on the fuel system control panel, control flow of fuel between the filters in each nacelle.

Operation of these valves, in conjuction with engine fuel shut-off valves and tank booster pumps, makes it possible for one or both engines in either nacelle to consume all the fuel in the airplane, or for any combination of tanks to feed all four engines. The cross-flow valves also control flow of fuel from the bomb bay tanks.

C(1)

1-47. FUEL FILTER DE-ICING SYSTEM CONTROL.

1-48. A single spring-loaded switch, located on the extreme left of the pilot's instrument panel (48, figure 1-8), controls the de-icing system for both fuel filters. A warning light adjacent to the switch (49, figure 1-8) will illuminate whenever ice has formed in either filter, restricting normal fuel flow. When the fuel filter de-icing switch is held "ON," alcohol is injected into each filter. When normal fuel flow has been resumed, the light will go out, and the switch can then be released.

1-49. BOMB BAY FUEL TANK SALVO.

1-50. Controls for jettisoning the droppable bomb bay fuel tanks (and bombs) are located on a salvo control panel (31, 33, and 34, figure 1-10) on the pilot's control pedestal. (Refer to paragraph 4-24.)

CAUTION

If bomb bay doors are opened in flight when 1200-gallon bomb bay tank is empty or nearly empty, the tank may be seriously damaged by buffeting; therefore, unless the tank is to be jettisoned, the doors should not be opened. A full tank is not affected by door opening.

Note

The 310-gallon bomb bay tank cannot be jettisoned when the aft shackles (Type D-7) for 2000 or 4000-pound bombs are installed.

C

1-51. WING TIP TANK RELEASE.

1-52. The wing tip tanks can be released by either the salvo controls on the pilot's control pedestal, or a mechanical release handle to the right of the pilot's seat. (See 18, figure 1-12.)

C

1-53. SINGLE-POINT REFUELING.

1-54. Provisions have been made for single-point refueling, which considerably reduces the time required to refuel. A fuel nozzle adapter is located on the left side of the fuselage, aft and below the trailing edge of the wing. (See figure 1-18.)

1-55. ELECTRICAL SYSTEM.

1-56. Electrical power in this airplane is provided by a direct-current system and several separate alternating-current systems. The 28-volt direct-current system obtains power from four engine-driven generators. The generators are combination starter-generator units, acting as starters for cranking the engines up to approximately 23-26% rpm, and after engine speed reaches 35% rpm, operating as generators. Two 12-volt storage batteries connected in series serve as a stand-by power source and may be used for emergency starting of engines only when external power is unavailable. Alternating current (115 volts) is provided by two engine-driven alternators (alternating-current generators) mounted one on No.1 and one on No. 3 engine, and by two 115-volt, single-phase, 400-cycle inverters.

1-57. ELECTRICALLY OPERATED EQUIPMENT. The following equipment operates on direct current from the electrical system: lights; starters; fuel boost pumps and fuel shut-off valves; armament and communication equipment; bombing system; camera; automatic pilot; nose wheel steering; trim tabs; elevator-rudder boost; ATO units; heated clothing; warning and testing systems; anti-icing, cabin heating, and pressurization system; emergency hydraulic pump; fire detectors and extinguishers; deflector flaps; and electrical instruments and transmitters.

A5(2),C

The landing gear and fairing doors are also controlled and sequenced by direct current.

A-5,C

Ignition transformers also receive current from the d-c system.

1-58. Inverters supply alternating current for operation of automatic pilot gyros, radar equipment, and the driftmeter.

A-1

Inverters also supply alternating current for ignition.

1-59. Alternators supply alternating current for operation of radar equipment and heaters for windshield anti-icing, canopy defrosting, and surface control boost systems.

1-60. DIRECT-CURRENT SYSTEM.

1-61. BATTERIES. The battery-disconnect relay is controlled by a battery switch located on the pilot's electrical switch panel which is mounted on top of the control pedestal. (See 39, figure 1-10; 15, figure 1-11.)

1-62. GENERATORS. Individual switches, one for each of the four generators (27, figure 1-14), are located on a d-c generator control panel to the left of the co-pilot's seat. Each switch has three positions, "ON," "OFF," and "RESET." The "RESET" position is provided for turning the generator on after it has been disconnected by an overvoltage relay. An ammeter for each generator is provided above the related generator switch. (See 4, figure 1-14.)

1-63. GENERATOR OVERVOLTAGE LIGHTS. Should generator voltage output become excessive, an overvoltage relay automatically cuts the affected generator out of the electrical circuit. This condition is indicated by illumination of red lights, one for each

(1) AF48-5 and subsequent

(2) AF47-37 and subsequent

generator, located forward of the generator switches. (See 24, figure 1-14.) When an overvoltage light illuminates, the corresponding generator switch should be turned off to maintain normal system voltage from remaining generators. An attempt may be made to turn the generator on again by holding the related generator switch momentarily at the "RESET" position. If the light again illuminates, the generator is still inoperative.

1-64. VOLTMETER SELECTOR. A d-c voltmeter and voltmeter selector on the d-c generator control panel permits reading voltage output of the individual engine generators and the "MAIN BUS." (See 18 and 25, figure 1-14.)

1-65. ALTERNATING-CURRENT SYSTEM.

A-1,A-5(1)

1-66. ALTERNATORS. An alternator switch (9, figure 1-14) on the a-c system control panel (located to the left of the copilot's position) provides for connecting "BOTH ALT." or the "RIGHT ALT." into the system, or for turning the alternators "OFF." With the switch at "RIGHT ALT.," current is supplied to all equipment except the canopy defrosting heater. The alternator switch is placed at "EXT" for ground operation of the equipment with an external a-c power source connected. A warning light above the alternator switch (8, figure 1-14) illuminates whenever the left alternator is inoperative.

A-5(2),C

Two alternator master switches ("ALT 1" and "ALT 2"), an alternator selector switch, and a selector control switch are located on the a-c system control panel. (See figure 2-5.) Each alternator is turned "ON" or "OFF" by means of its respective master switch. The alternator selector provides a means of selecting a-c power supply and distribution. Normally, it is positioned at "BOTH ALT NORM," with alternator No. 1 supplying current to bus No. 1, and alternator No. 2 supplying current to bus No. 2. In event of malfunction or failure of one alternator, the good alternator can be used to supply either bus, by selecting one of the four positions: "ALT 1 BUS 1," "ALT 2 BUS 2," "ALT 1 BUS 2," or "ALT 2 BUS 1." The canopy defrosting heater is powered by bus No. 1, while bus No. 2 powers radar equipment and heaters for windshield anti-icing and surface control boost system. The alternator selector also permits external power to be supplied to either bus for ground operation of equipment by selecting either "EXT PWR BUS 1" or "EXT PWR BUS 2." The alternator selector is turned on by means of the selector control switch, located to the right of the selector. (See figure 2-5.) Two warning lights above the selector illuminate to indicate which bus is inoperative.

(1) AF47-23 thru AF47-76

(2) AF47-77 thru AF47-96

CAUTION

If alternators are turned off, at least 2 minutes should elapse before the alternators are turned back on, in order to prevent blowing a fuse in the alternator regulator.

1-67. INVERTERS. The two single-phase, 400-cycle inverters are controlled by a three-position switch on the a-c system control panel at the copilot's left. (See 15, figure 1-14.) The switch is usually positioned at "MAIN ON" for normal operation, but may be placed at "SPARE ON" to use the spare inverter. When the switch is centered (guard up), both inverters are off. Should the main inverter fail, the spare inverter is automatically turned on. Above the switch are two warning lights; one illuminates when the main inverter is out, the other when both inverters are out. (See 13, figure 1-14.)

1-68. VOLTMETER SELECTOR. An a-c voltmeter and voltmeter selector are located on the a-c system control panel at the copilot's left. (See 7 and 23, figure 1-14.)

A-1,A-5(1)

The voltmeter selector permits reading voltage for the "INV." (registers whichever inverter is operating), "LEFT ALT.," and "RIGHT ALT." An "ALT BUS." position is provided for measuring external a-c voltage.

A-5(2),C

The voltmeter selector permits reading the voltage for the "INV." (registers inverter that is operating), "BUS NO. 1," and "BUS NO. 2." (See figure 2-5.)

A-1,A-5(3)

1-69. EXTERNAL POWER RECEPTABLES. Three external power receptacles are located on the left side of the fuselage, aft of the main entrance door. (See figure 1-18.) The two forward receptacles are used for connecting direct-current external power to the airplane's electrical system; the aft receptacle is used for connecting alternating current.

A-5(4),C

There are five external power receptacles. Two direct-current receptacles are located under each nacelle, and one receptacle for alternating current is located on the left side of the fuselage aft of the main entrance door. (See figure 1-18.)

1-70. CIRCUIT BREAKERS AND FUSES. All d-c electrical circuits are protected by push-to-reset circuit breakers or by circuit-breaker switches; all a-c circuits are protected by fuses. In the pilot's compartment the circuit breakers are located on a panel to the right rear of the pilot's seat; a panel to the left of copilot's seat contains both circuit breakers and fuses. (See 13, figure 1-12; 26, figure 1-14.) The tail gunner's panel is located

(3) AF47-23 thru AF47-36

(4) AF47-37 and subsequent

on the right side of the tail cabin, and contains push-to-reset circuit-breaker switches for heated clothing and the cabin light. (See 17, figure 4-6.) The bombardier-navigator's panel is at the top of his bomb control panel and includes circuit-breaker switches for heated clothing, bomb release equipment, bomb door controls, and indicator lights. (See 9, figure 4-1.)

1-71. HYDRAULIC SYSTEM.

1-72. The hydraulic systems in the airplane include a main system, emergency system, landing gear emergency system, and surface control boost systems.

1-73. LANDING GEAR EMERGENCY SYSTEM. The landing gear emergency system is an independent system, using a hand-pump and hydraulic fluid from an emergency reservoir to lower the gear in event the main hydraulic system fails. (Refer to paragraph 1-129.)

1-74. SURFACE CONTROL BOOST. Surface control boost is supplied by three separate hydraulic systems which are independent of the main hydraulic system. Refer to paragraph 1-93.

1-75. HYDRAULIC FLUID SPECIFICATION. Hydraulic fluid, Specification No. AN-O-366, is used.

1-76. MAIN HYDRAULIC SYSTEM.

1-77. The main system supplies power for operation of the landing gear (and fairing doors), nose wheel steering, wing flaps, bomb doors, wheel brakes, and tail skid. (See figures 1-20 and 1-21.) Hydraulic pressure is provided by engine-driven pumps on the No. 2 and No. 4 engines. The main hydraulic fluid reservoir is located in the forward end of the bomb bay, with a fluid level gage provided at the reservoir. A hand-pump and filler hose are provided on the left side of the pilot's passageway (19 and 21, figure 1-14) for refilling the main hydraulic reservoir. Two system accumulators are located on the left side of the bomb bay.

1-78. MAIN HYDRAULIC SYSTEM PRESSURE CONTROL VALVE. When hydraulic pressure is not required, main system pressure may be relieved by means of a valve to the right of the pilot's seat. (See 22, figure 1-12.) When the pressure control valve is turned to "OFF," fluid is by-passed back to the reservoir from the engine pumps, thus relieving system pressure. Before operating any hydraulic unit, the valve must be turned "ON" to provide pressure in the system.

Note

Whenever the bomb doors are operated (except by the manual control), a solenoid shut-off valve in the pressure line to the control valve is automatically closed to provide system pressure. Refer to NOTE in paragraph 4-10.

1-79. HYDRAULIC SYSTEM INDICATORS. A hydraulic reservoir fluid level gage and a system pressure gage are provided on the pilot's instrument panel. (See 26 and 29, figure 1-8.) A pressure gage at each accumulator in the bomb bay permits reading accumulator air pressure when system pressure is exhausted.

1-80. EMERGENCY HYDRAULIC SYSTEM.

1-81. An electrically driven pump is provided as an emergency pressure source and for emergency operation of the wing flaps and bomb doors. (See figures 1-20 and 1-21.) Hydraulic power from the emergency system is also utilized prior to bail-out to open deflector flaps (forward of main entrance hatch and gunner's escape hatch), position the navigator's seat, and jettison main entrance hatch. (Refer to paragraphs 1-151 and 1-153.)

A

Fluid is supplied to the emergency pump from the main reservoir, the outlet being located at a point below the standpipe level which supplies the main system.

C

Fluid is supplied to the emergency pump from the emergency reservoir located in the pilot's passageway above the bomb bay door entrance. (See figure 1-18.) This emergency reservoir is connected to and filled from the main system reservoir.

1-82. EMERGENCY HYDRAULIC SELECTORS. Two emergency hydraulic selectors to the right of the pilot's seat (12, figure 1-12) control the emergency system. The emergency pump is automatically started when either selector is turned to an operating position. Pressure is supplied to the main system by placing the forward selector at "SYSTEM PRESS" and operating the hydraulic units with their normal controls. This position is provided primarily for ground check of hydraulic system operation and should not be used for emergency purposes in flight, as it could cause all hydraulic fluid to be pumped overboard through a damaged line or unit. When the forward emergency hydraulic selector is positioned at "WING FLAPS DOWN" (normal flap handle down), pressure is supplied through separate emergency lines to lower the flaps. The aft emergency hydraulic selector may be positioned at "BOMB DOORS OPEN" or "BOMB DOORS CLOSED," and fluid is routed directly to the door actuating cylinders through emergency lines. The selectors must be left at the desired position until the operation is completed. Then they should be turned off as soon as possible to prevent overheating the emergency pump.

1-83. FLIGHT CONTROLS.

1-84. The primary flight controls are conventionally operated from either the pilot's or copilot's position; however, hydraulic boost systems supply boost assistance to the ailerons, elevators, and rudder, reducing the amount of force required for their movement.

1-85. CONTROL WHEELS AND RUDDER PEDALS.

1-86. The pilot's control wheel contains a radio push-to-talk button, an auto-pilot release, a trigger switch that controls the hydraulic nose wheel steering unit, and an elevator trim auxiliary switch. (See 40, 41, 42, and 43, figure 1-8.) The pilot's control column may be disengaged and stowed full forward by means of a release lever on the right side of the column. (See

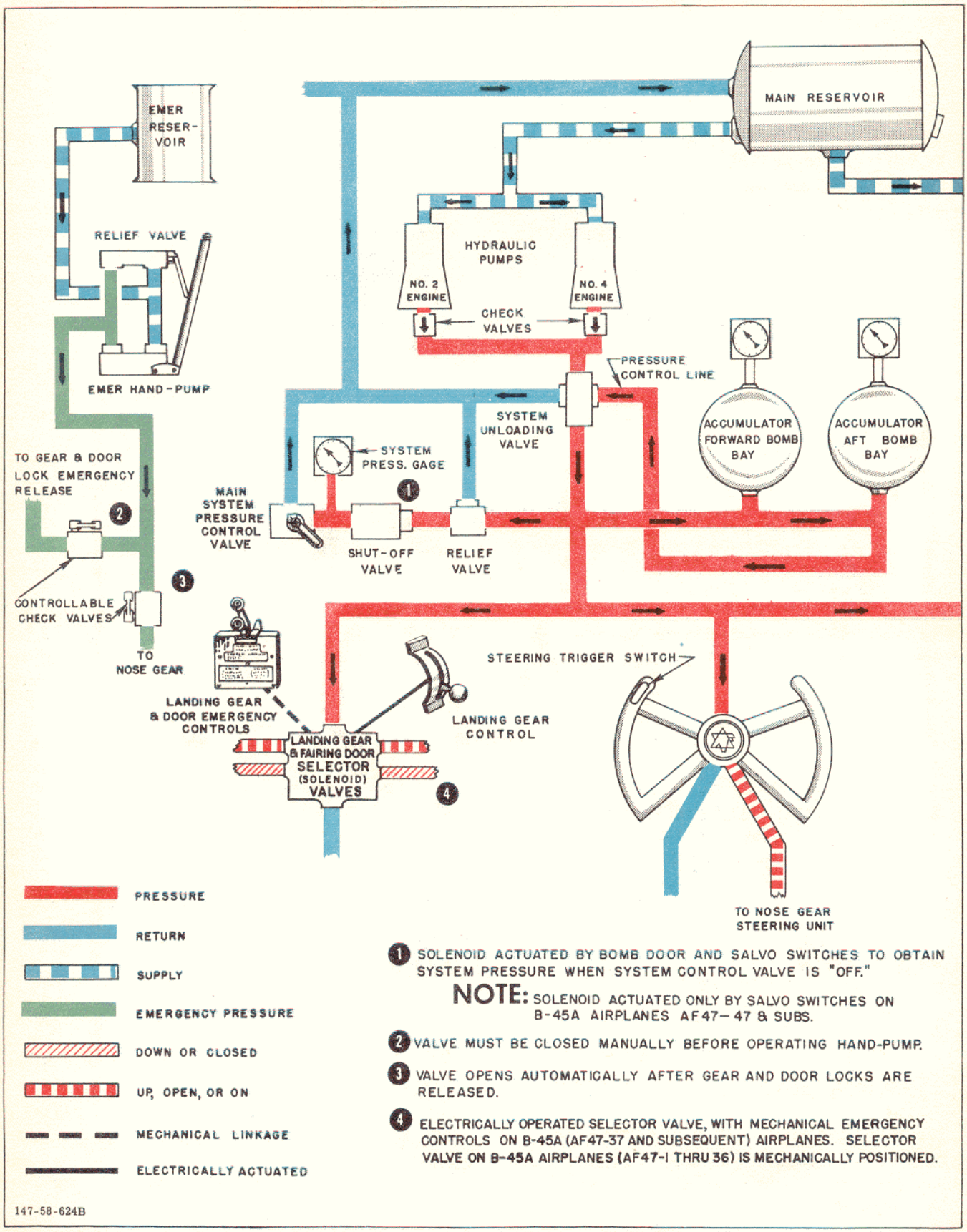


Figure 1-20 (Sheet 1 of 2 Sheets). Hydraulic System—B-45A Airplanes

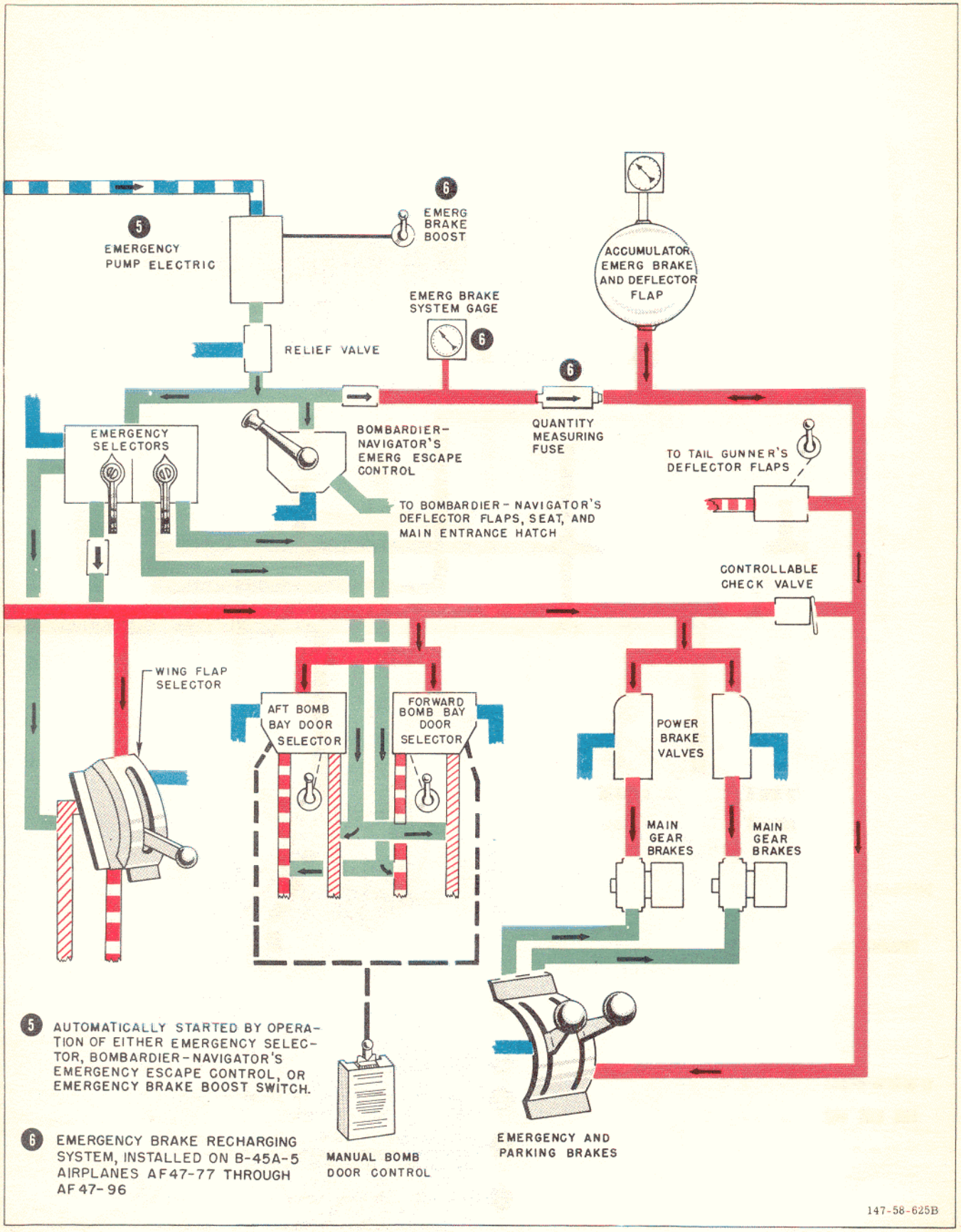


Figure 1-20 (Sheet 2 of 2 Sheets). Hydraulic System—B-45A Airplanes

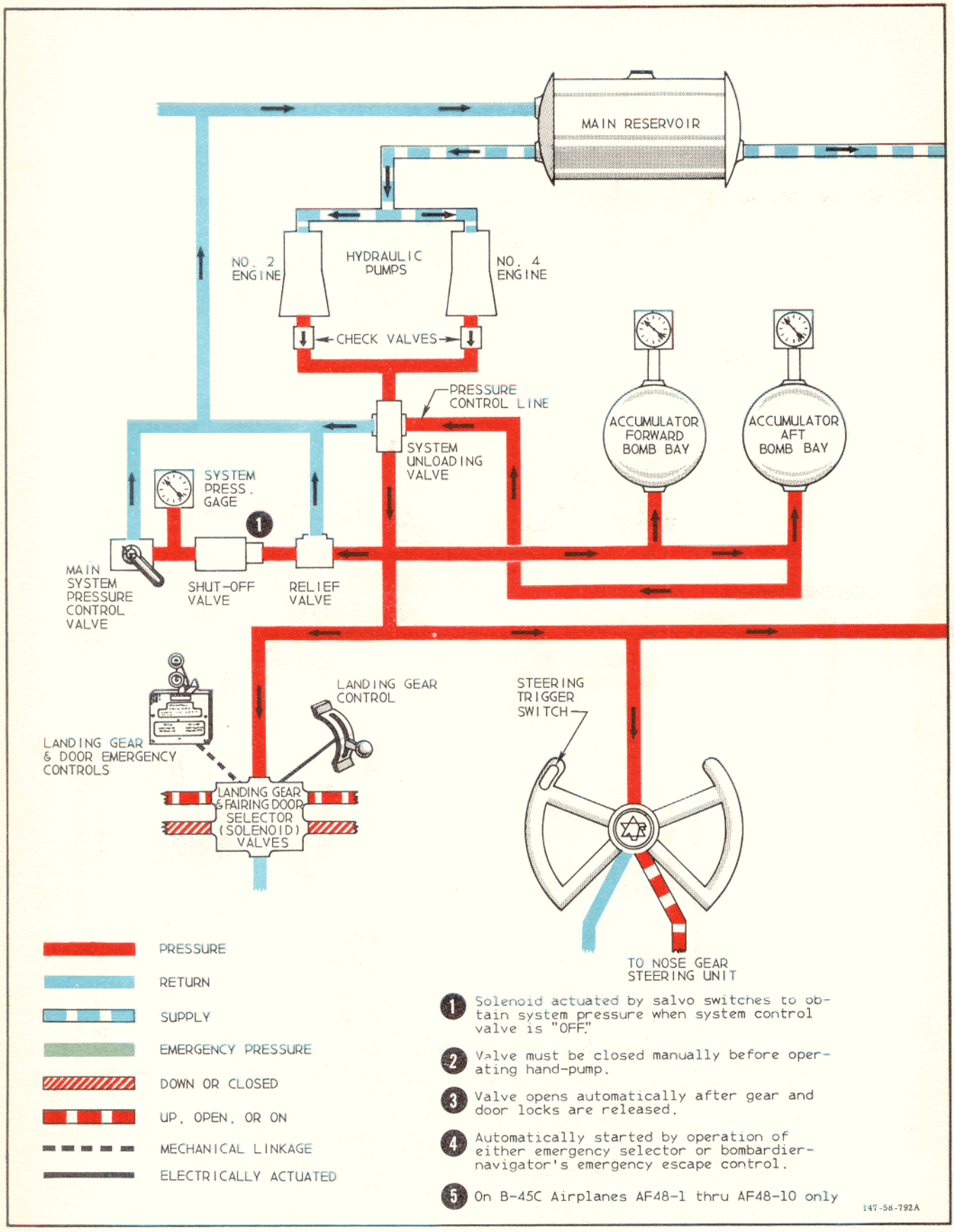


Figure 1-21 (Sheet 1 of 2 Sheets). Hydraulic System—B-45C Airplanes

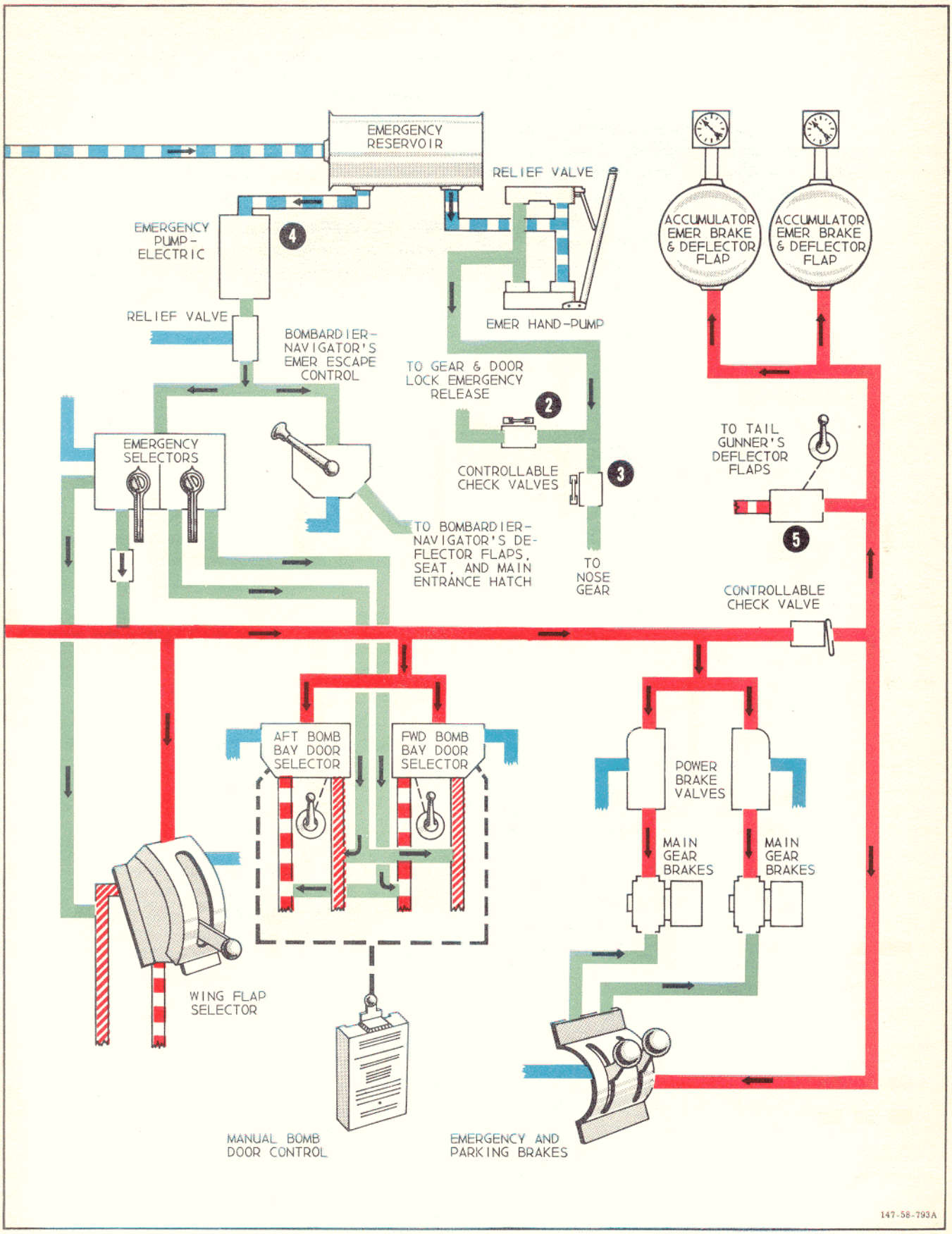


Figure 1-21 (Sheet 2 of 2 Sheets). Hydraulic System—B-45C Airplanes

36, figure 1-8.) The pilot's rudder pedals are adjustable fore and aft. The copilot's control wheel contains a radio push-to-talk button, an auto-pilot release, and an elevator trim auxiliary control switch. (See 1, 2, and 3, figure 1-15.)

The control column in the copilot's compartment may be disengaged by means of a control column release lever on the right side of the column. When the lever is pressed toward the column, the column can be moved full forward where it hooks onto the rudder bar assembly. The rudder bars (16, figure 1-15) are hinged in the center and can be folded up behind the control column when not in use. The control column must be stowed first, as the rudder bars are held in the stowed position by a lock on the column. Both controls are unstowed by pressing the release lever and pulling the column back until it engages; the rudder bars are spring-loaded to return to the normal operating position when the control column lock is released.

1-87. CONTROLS LOCK (POWER CONTROLS AND CONTROL SURFACES).

1-88. The control surfaces and the power controls are locked by means of a controls lock lever (8, figure 1-12) aft of the landing gear control. Before the lock lever can be moved to "ON," the power controls must be "OFF." With the lock lever "ON," the control surface locks are spring-loaded to lock when the flight controls are neutralized.

1-89. TRIM TABS.

1-90. Elevator, aileron and rudder trim tabs are electrically operated by means of a single trim tab control stick located at the right of the pilot's seat. (See 28, figure 1-10.) The trim tab control stick is moved fore and aft to operate elevator trim tab, and side to side for aileron trim; it is rotated left or right for rudder trim. Individual indicators on the pilot's instrument panel show trim tab position. (See 27, 28, and 30, figure 1-8.)

1-91. ELEVATOR TRIM AUXILIARY SWITCH. An elevator trim auxiliary switch is located on both the pilot's and copilot's control wheels. (See 40, figure 1-8; and 3, figure 1-15.) The nose of the airplane will move up with aft movement of the switch, and down with forward movement of the switch.

1-92. SURFACE CONTROL BOOST SYSTEMS.

1-93. Three individual boost systems (one elevator-rudder system, and two separate aileron systems) supply boost assistance to all surface controls, reducing the amount of force required for their movement. Each system has its own hydraulic reservoir.

1-94. ELEVATOR-RUDDER BOOST SYSTEM. Elevator and rudder boost pressure is supplied by two d-c electric-motor-driven hydraulic pumps which obtain fluid from a single reservoir. Pressure from both pumps is routed to the elevator boost control valve, while only one pump provides rudder boost.

1-95. SURFACE CONTROL BOOST SWITCH. Elevator-rudder boost is controlled by a surface control boost switch on the pilot's electrical switch panel forward of the power controls. (See 35, figure 1-10.) The switch is guarded in the "ON" position.

Note

"SURF. BOOST CONT." circuit breaker must be in to turn boost "OFF."

A-1

1-96. ELEVATOR BUNGEE. An elevator bungee is installed to provide adequate low-speed stability and control during landing approach. This bungee, acting through the elevator boost system, supplies a down-elevator force. In flight, this force is balanced-out by trim tab for "hands-off" flight.

A-5,C

Note

A springy tab, attached to the elevators, and down-canted tail pipes provide low-speed stability in the B-45A-5 and B-45C Airplanes.

A-1

1-97. AILERON BOOST SYSTEM. The left and right ailerons obtain boost pressure from engine-driven hydraulic pumps on the No. 1 and No. 3 engines, respectively.

A-5,C

The left and right ailerons obtain boost pressure from engine-driven hydraulic pumps on the No. 2 and No. 4 engines, respectively.

Aileron boost becomes effective as soon as both engines on which pumps are located are started, and is turned off when engines are stopped. Should either boost system fail, fluid is automatically by-passed from the other aileron booster units, making both aileron boost systems completely inoperative. Aileron boost will be affected whenever the speed of the engine on which the pump is located is reduced, because reduction in engine speed causes a corresponding reduction in pump output. If either engine on which the pumps are located is shut down, the windmilling rpm will be high enough at normal cruise speeds to maintain aileron boost. However, at approach speeds (approximately 140 mph) with engine windmilling, hydraulic flow becomes too low and the by-pass valves open, making the system inoperative. Therefore, there will be sudden increases in aileron forces during the approach, whenever the windmilling speed falls below 15% rpm.

1-98. AILERON BOOST CUTOUT SWITCH. The aileron boost system can be manually controlled by means of an aileron boost cutout switch mounted on the inboard side of the pilot's control pedestal. (See 41, figure 1-10.) The switch has two maintained positions, "ON" and "OFF," being guarded in the "OFF" position for normal operation. When the switch is placed at "ON," aileron boost will become inoperative, allowing manual control of the ailerons.

1-99. SURFACE CONTROL BOOST TEST SYSTEM. A preflight check of surface control boost can be accomplished by means of four test switches on the copilot's electrical panel (16, figure 1-14), and indicator lights on the pilot's control pedestal outboard of the flap control handle. (See 27, figure 1-10.)

A-1,A-5(1)

Four switches ("RUDDER," "ELEVATOR," "LEFT AILERON," and "RIGHT AILERON") provide a means of checking control boost at the individual control surfaces.

A-5(2),C

Three switches ("RUDDER," "ELEVATOR," and one switch marked for both "LH AIL" and "RH AIL" provide a means of checking control boost at the control surfaces.

When the test switches are held on, solenoid valves at the boost cylinders are closed so that by moving the flight controls, the pilot builds up pressure in the system. When maximum boost pressure is reached, the indicator lights will illuminate. After testing the boost system, the flight controls should be operated normally to make sure the valves returned to the normal operating position.

1-100. WING FLAPS.

1-101. NORMAL WING FLAP CONTROL.

1-102. Hydraulically operated wing flaps on each wing panel extend from aileron to nacelle, and from nacelle to fuselage. The wing flap control handle is located on the pilot's control pedestal aft of the power controls. (See 24, figure 1-10.) A flap position indicator (6, figure 1-8), located on the pilot's instrument panel, is marked from "UP" to 40 degrees full down. As there is no marking on the flap control quadrant, intermediate flap positions must be selected by correlating movement of the flap handle with the flap position indicator. The flaps remain locked in any selected position until the handle is moved again. Hydraulic pressure is supplied by the main hydraulic system.

Note

Normally, when flaps are lowered to the full "DOWN" position at maximum flap lowering speed, they will stop 4 to 5 degrees short of the 40-degree position. However, as speed is decreased during approach and flare-out, flaps will gradually assume the 40-degree position at approximately 110 mph. If flaps are positioned to full "DOWN" prior to take-off, however, they will remain at that position at all speeds up to 185 mph, until retracted.

1-103. EMERGENCY WING FLAP CONTROL.

1-104. In the event of hydraulic system failure, the flaps can be lowered by means of the forward emergency hydraulic selector valve (12, figure 1-12) at the right of the pilot's seat. By positioning the selector at "WING FLAPS DOWN" (normal flap control down), pressure from the emergency hydraulic pump is supplied through separate emergency lines to lower the flaps. There is no emergency means for raising the flaps.

1-105. AUTOMATIC PILOT.

1-106. An electrically operated automatic pilot (Type E-4) is installed in the airplane. Electric power is supplied by both a-c (inverter) and d-c systems. All controls, with the exception of the engaging control and electrical release, are contained in a stowable pedestal to the left of the pilot's seat. A stowable control pedestal is also provided at the left of the copilot's seat, but includes only the flight controller. (See figure 2-1.) Flight instruments are located on the pilot's instrument panel, with a remote-indicating compass also provided on the copilot's and bombardier-navigator's instrument panels. The automatic pilot may be used in conjunction with the automatic approach equipment (paragraph 1-115) to guide the airplane during instrument approach on radio beams received from instrument landing system transmitters.

A-5(3),C

The auto-pilot may also be connected to the radar navigational computer through a steering adapter in the bombardier's compartment so that the heading of the airplane can be automatically controlled during a bombing run. (Refer to paragraph 1-117.)

1-107. AUTOMATIC PILOT CONTROLS.

1-108. PILOT SWITCH. A switch, marked "PILOT," on the pilot's pedestal (figure 2-1) controls the electrical circuits to the automatic pilot. Because of safety interlocks, the pilot switch can be turned "ON" only when the airplane's electrical power (ac and dc) has been on for at least 2 minutes, the automatic approach control selector is positioned at "AUTOPILOT," and the engaging control is disengaged. The pilot switch will automatically return to "OFF" if the airplane's power supply fails, the auto-pilot release button is pressed, or the operational sequence is not followed. A red light on the pilot's and copilot's instrument panels will illuminate should power fail while the auto-pilot is engaged. (See 2, figure 1-8; 6, figure 1-15.)

1-109. ENGAGING HANDLES. The auto-pilot servos are mechanically engaged and disengaged by means of three handles at the right of the pilot's seat. (See 23, figure 1-12.) The handles are normally interconnected to move simultaneously but may be separated by pulling out the knob on each outer handle, allowing the servos to be engaged or disengaged individually. When the handles are moved to "ENGAGE" and the pilot switch is "ON," the automatic pilot will take over and maintain flight attitude of the airplane at time of engagement.

(1) AF47-23 thru AF47-46

(2) AF47-47 and subsequent

(3) AF47-37 and subsequent

CAUTION

Auto-pilot should not be engaged while in a turn.

1-110. TRIM CONTROLS. An aileron trim control (figure 2-1) on the pilot's pedestal may be used to level the wings within a limit of 8 degrees either way. Maximum pitch trim of 18 degrees up or down is available by use of the pitch control wheel on the outboard side of the pedestal. (See figure 2-1.) The aileron and pitch trim controls are provided on the pilot's pedestal only, but are also operative when control of the auto-pilot has been transferred to the copilot, or bombardier (when bombardier's controller is installed). An indicator at the top left of the pilot's instrument panel gives a constant indication of trim condition for rudder, aileron, and elevator (when pilot switch is "ON" and servos are engaged). (See 3, figure 1-8.) Alignment of all three meters indicates that the airplane is trimmed correctly. Constant displacement of one or more of the meters indicates that repeated correction is being made by the servos, and this condition should be corrected by retrimming manually with the airplane trim tab control stick.

1-111. FLIGHT CONTROLLER. While under automatic pilot control, the airplane may be made to climb, dive, and execute coordinated turns by means of a stick-type flight controller (figure 2-1), provided on both the pilot's and copilot's pedestals. When the controller is moved left or right, it automatically produces a coordinated turn in the selected direction. When released, the controller will go to the central position and the airplane will return to level flight (or the flight attitude prior to operation of the controller). Control of the automatic pilot is transferred from one unit to another by depressing the button on top of the flight controller. Illumination of a light on the pedestal aft of the controller indicates that that unit has control. A trigger-type microphone switch is provided on each controller.

1-112. ALTITUDE CONTROL. An on-off altitude control switch is located on the inboard side of the pilot's pedestal. (See figure 2-1.) With the altitude control "ON," the airplane is automatically maintained at a specific barometric pressure altitude. Should the control be turned on during a climb or descent, the airplane will level off and hold altitude. When the control is subsequently turned "OFF," the airplane will return to the attitude at which it was turned on. The altitude control switch cannot be turned on unless the pilot power switch is on, the elevator servo is engaged, and the automatic approach control selector is at "AUTOPILOT" or "LOCALIZER." The altitude control will automatically return to the "OFF" position when the elevator servo is disengaged, the pilot switch is turned off, or the automatic approach control selector is moved to "APPROACH." As long as the altitude control is on, operation of the flight controller for elevator control or movement of the pitch trim wheel is ineffective.

1-113. AUTO-PILOT RELEASE. The pilot's and copilot's control wheels contain a push button (41, figure 1-8; 1, figure 1-15) for electrically releasing the automatic pilot system.

1-114. AUTOMATIC APPROACH CONTROL.

1-115. The automatic approach equipment operates through the automatic pilot to guide the airplane during instrument approach on radio beams established by localizer and glide path transmitters.

A-1,A-5(1)

The automatic approach equipment is controlled by an automatic approach control selector located to the left of the pilot's seat. (See figure 2-1.)

A-5(2),C

The automatic approach equipment is controlled by an automatic approach control selector attached to the controller pedestal. (See figure 2-1.)

With the automatic approach control selector on "AUTOPILOT," the approach control is inoperative; the two operating positions are designated "LOCALIZER" and "APPROACH." A green "approach ready" light, forward of the automatic approach control selector, illuminates to indicate that the equipment is ready for operation (when automatic pilot is on and instrument landing radio receivers are on and receiving power). When the airplane intercepts the localizer beam (indicated by the vertical needle on cross-pointer indicator leaving its stop), the automatic approach control selector should be turned to "LOCALIZER."

Note

All automatic pilot servos should be engaged before the selector is turned to "LOCALIZER" or "APPROACH."

When approaching the center of the localizer beam, the airplane will automatically turn toward the transmitter at the end of the runway and establish a heading such that the ground track is coincident with the beam center. As the airplane approaches the center of the glide path beam (horizontal needle on cross-pointer indicator nearing centered position), the automatic approach control selector should be turned to the "APPROACH" position. The automatic pilot then noses the airplane down until the flight path coincides with the center of the glide path beam. The automatic approach system must be turned off at a predetermined altitude above the runway and the landing completed manually. Depressing the auto-pilot release button on the control wheel turns off both the auto-pilot and the automatic approach control. (Refer to paragraph 2-81 for operating instructions.)

(1) AF47-23 thru AF47-36

(2) AF47-37 and subsequent

Note

Failure of the instrument landing system glide path transmitter or receiver causes a full scale "fly-up" signal (glide path needle on cross-pointer meter goes to top of indicator), and the airplane will assume a 2½ degree climb.

1-116. AUTO-PILOT STEERING ADAPTER.

A-5(1),C

1-117. A steering adapter connects the automatic pilot to the radar navigational computer and also allows the bombardier to manually control the heading of the airplane through the automatic pilot, by means of an automatic pilot transfer switch and a bombardier's controller.

1-118. AUTOMATIC PILOT TRANSFER SWITCH.

A-5(1),C

1-119. A two-position switch, located on the automatic pilot control pedestal (figure 2-1) allows the pilot to transfer turn control of the airplane to the bombardier. The switch is marked for "PILOT" and "BOMBARDIER." An interlock system prevents the pilot from transferring control to the bombardier unless automatic pilot is engaged and operating, pilot's flight controller is in neutral, rudder and aileron controls are engaged, and bombardier's turn control knob is in neutral.

CAUTION

If the transfer switch will not move to "BOMBARDIER," it should not be forced, as there is probably an open circuit in the interlock system.

The pilot can gain control at any time, either by positioning the automatic pilot transfer switch at "PILOT," or by moving the flight controller from neutral.

1-120. BOMBARDIER'S CONTROLLER.

A-5(1),C

1-121. The bombardier's controller, located beneath the radar scope, has a two-position transfer switch and a turn control knob. (See 21 and 22, figure 4-1.) With the bombardier's transfer switch at "MANUAL" and the pilot's transfer switch at "BOMBARDIER," the bombardier can control the heading of the airplane by turning the turn control knob clockwise for a right turn and counterclockwise for a left turn. Full rotation of the knob (approximately 140 degrees) will result in approximately 40 degrees of bank. With the switch at "AUTOMATIC," the automatic pilot controls the heading of the airplane according to electrical impulses transmitted to it by the radar navigational computer. The interlock system prevents the bombardier from moving the transfer switch to "AUTOMATIC" unless the turn control knob is in neutral.

(1) AF47-37 and subsequent

CAUTION

If the transfer switch will not move to "AUTOMATIC," it should not be forced, as there is probably an open circuit in the interlock system.

Turning the turn control knob from neutral or moving the transfer switch to "MANUAL" allows the bombardier to regain control. Illumination of a "ready" light, located on the bombardier-navigator's instrument panel (3, figure 4-3) indicates that control has been transferred to the bombardier.

1-122. LANDING GEAR.

A-1,A-5(2)

1-123. The landing gear and wheel fairing doors are operated hydraulically.

A-5(1),C

The landing gear and wheel fairing doors are hydraulically operated, but are electrically (d-c) controlled and sequenced.

The main gear retracts inboard into the wings, and the dual nose gear retracts aft into the fuselage. As the main gear retracts, the brakes are automatically applied momentarily to stop wheel rotation. The nose gear contains a hydraulic steering unit (paragraph 1-132) which acts as a shimmy damper whenever the steering mechanism is disengaged. The tail skid is also hydraulically actuated, extending and retracting automatically with the landing gear. The main wheel fairing doors remain open during the landing approach to provide additional drag for deceleration. Ground safety locks and a lock on the landing gear control are provided to prevent retraction of the gear when the airplane is on the ground.

1-124. LANDING GEAR SELECTOR CONTROL.

1-125. The landing gear is normally operated by a handle (19, figure 1-12) to the right of the pilot's seat. After each completed operation of the gear, the handle must be returned to "NEUTRAL" to relieve pressure in the system. A solenoid-actuated lock prevents moving the handle to "UP" when the airplane is on the ground. In the event of malfunction, the lock may be released by means of a landing gear lock emergency release lever (17, figure 1-12) aft of the control handle.

1-126. LANDING GEAR POSITION INDICATORS.

1-127. The landing gear and door position indicator lights (7 and 8, figure 1-8) are located at the top left of the pilot's instrument panel. Three green lights (one for each gear), one red light (connected to all three gears), and one amber light (connected to all gear doors) give a constant visual indication of gear and door position. Each green light illuminates when its respective gear is down and locked. The red light illuminates when the gear is in any position other than down and locked

(2) AF47-23 thru AF47-36

or up and locked, or if the gear is up and locked and the power controls are retarded below cruising rpm. The amber light illuminates when the landing gear doors are open.

Note

Main landing gear doors remain open during landing approach to provide additional drag for deceleration. When the main gear touches down, the doors will close provided landing gear handle is left in the "DOWN" position. If it is desired to keep the doors open for additional deceleration during the landing roll, the landing gear handle must be returned to "NEUTRAL" before the main gear touches the ground. After the landing roll, the gear handle must be positioned to "DOWN" in order to close the doors.

A warning horn in the pilot's compartment sounds when the gear is in any position other than down and locked, and the power controls are retarded below minimum cruising power. A horn cutoff switch is provided on the pilot's switch panel (22, figure 1-10) to silence the horn; the horn circuit is reset when the power controls are advanced.

1-128. LANDING GEAR EMERGENCY CONTROLS.

1-129. LANDING GEAR EMERGENCY RELEASE. The landing gear may be released in event of hydraulic system failure by means of an emergency hydraulic hand-pump located on the bulkhead behind the bombardier-navigator's seat. (See 17, figure 4-4.) A two-position manual check valve below the pump (18, figure 4-4) must be closed (vertical position) before using the hand-pump in order to maintain pressure to the lock release until the gear is down and locked. Initial operation of the hand-pump unlocks all gear and door uplocks, and opens hydraulic dump valves to relieve fluid-lock at all gear and door actuating cylinders, allowing the main gear to fall free. When the nose gear doors are unlocked, continued operation of the hand-pump supplies pressure to the down side of the nose gear actuating cylinder. To operate the landing gear normally, the pump handle must be stowed in a vertical position in order to hold open a check valve which allows fluid in the emergency system to flow back to the reservoir and the manual check valve must be placed in "FREE FLOW" (horizontal) position.

A-5(1),C

1-130. LANDING GEAR AND DOOR EMERGENCY MANUAL CONTROLS. Two manual controls, located in the pilot's walkway to the right (facing aft) of the bomb bay entrance (20, figure 1-14) are provided to operate and sequence the landing gear and doors in the event of electrical failure. Moving the door manual control to "OPEN" or "CLOSED" and the gear manual control to "GEAR UP" or "GEAR DOWN," mechanically positions hydraulic selector valves for landing gear and door operation. For normal operation of landing gear, both controls must be in "NEUTRAL."

CAUTION

If emergency manual controls are used for ground checks when electrical system is operative, landing gear selector control must be in "NEUTRAL" or emergency landing gear linkage may be damaged.

1-131. NOSE WHEEL STEERING.

1-132. The hydraulically operated nose wheel steering unit obtains pressure from the main hydraulic system through a shut-off valve actuated by a trigger switch on the back of the pilot's control wheel. (See 43, figure 1-8.) When the trigger is depressed, the nose wheel can be turned 45 degrees either side of center by rotation of the control wheel. Before the steering mechanism can be engaged, the control wheel must be aligned with the position of the nose wheel. The steering unit can be engaged only when the nose wheel is on the ground with the shock strut compressed.

1-133. NOSE GEAR STEERING RELEASE PIN. A nose gear steering release pin is located on the forward face of the nose gear shock strut between the wheels. When the pin is disengaged for towing the airplane, it disconnects the steering unit and shimmy damper. Consequently, the pin should be checked prior to flight to make sure it is engaged with the safety cap on.

1-134. WHEEL BRAKES.

1-135. Power brakes on the main wheels are normally operated by means of toe pedals at the pilot's station only. During main gear retraction, the brakes are automatically applied to stop wheel rotation.

1-136. EMERGENCY AND PARKING BRAKE CONTROLS.

1-137. Two emergency brake levers on the pilot's and copilot's control pedestals (19, figure 1-10; 2, figure 1-13) actuate emergency brake valves and provide differential braking control. The emergency brake levers are pulled aft toward the "ON" position to apply brakes. The pilot's levers may be raised and locked in the extreme aft position to hold the brakes "ON" for parking.

A

A brake emergency accumulator and pressure gage are located on the bomb bay aft bulkhead.

C

Two brake emergency accumulators and pressure gages are located on the bomb bay aft bulkhead.

A controllable check valve at each accumulator maintains pressure in the emergency brake system, should the main hydraulic system fail. The check valve may

(1) AF47-37 and subsequent

be opened by means of a lever at the valve to check accumulator air pressure (when system pressure is exhausted).

1-138. EMERGENCY BRAKE ACCUMULATOR RECHARGING SYSTEM.

A-5(1)

1-139. The emergency brake accumulator is normally charged by hydraulic pressure from the main hydraulic system. (See figure 1-20.) However, in event sufficient pressure is not available for effective brake application, the emergency brake accumulator may be recharged by hydraulic pressure from the emergency system. Two emergency brake boost switches are provided for operation of the emergency brake accumulator recharging system. One switch is mounted on the pilot's control pedestal (20, figure 1-10), and the other, on the copilot's control pedestal. (See 4, figure 1-13.) When either switch is turned "ON," the emergency hydraulic pump will be started and hydraulic fluid will be directed to the emergency brake accumulator. To prevent overheating, the emergency hydraulic pump should not be continuously operated for more than one minute. Each switch is guarded in the "OFF" position. An emergency brake system pressure gage installed to the right of the pilot (11, figure 1-12) provides visual means of determining whether or not the emergency brake system is pressurized.

1-140. ASSIST TAKE-OFF UNITS.

1-141. Provision is made for installation of two droppable rocket-motor assist units, one on the underside of each nacelle. Each unit supplies an additional thrust of 4000 pounds for approximately one minute. The units are fired and jettisoned by operation of two ATO switches on the pilot's electrical switch panel. (See 36 and 38, figure 1-10.) When the "IGNITE" switch is moved to "ON," both units are fired simultaneously and continue to burn until fuel is exhausted. Moving the switch to "OFF" shuts off both units. Thrust indicating lights on the pilot's instrument panel (16, figure 1-8) warn the pilot if the units fail to deliver required thrust. The light, one for each unit, normally goes on when the "IGNITE" switch is closed, but remains on only if the related unit does not attain 75 percent of normal thrust. The lights will again illuminate when the units expire. A spring-loaded "RELEASE" switch is held by a guard at the center or off position. Moving the switch momentarily to the "L" or "R" position releases the corresponding unit.

1-142. EMERGENCY ESCAPE EQUIPMENT AND CONTROLS.

1-143. Special equipment and controls are provided to facilitate emergency escape from the airplane. The canopy is jettisonable, and ejection seats are provided for both pilot and copilot. Hydraulically operated deflector flaps are located forward of the main entrance

(1) AF47-77 thru AF47-96

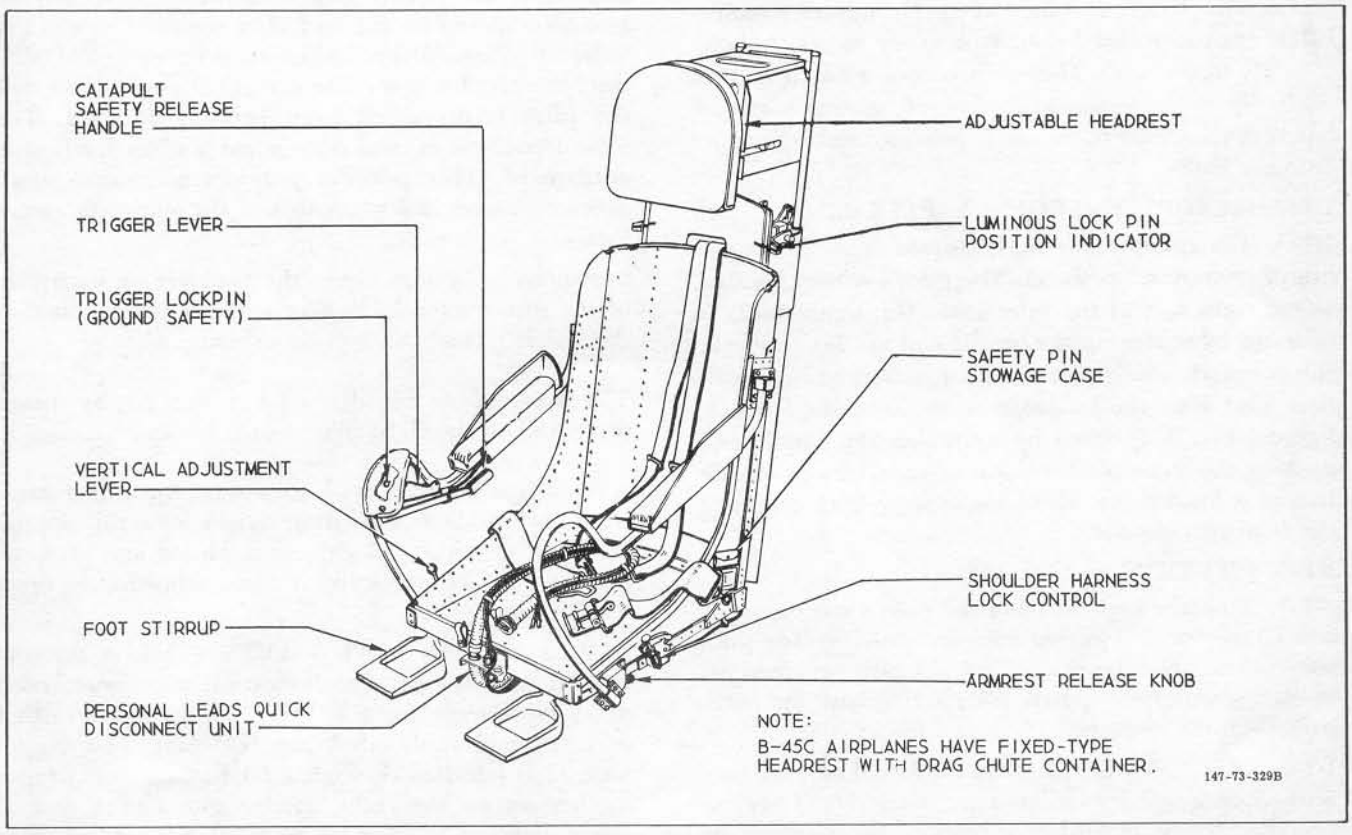


Figure 1-22. Ejection Seat

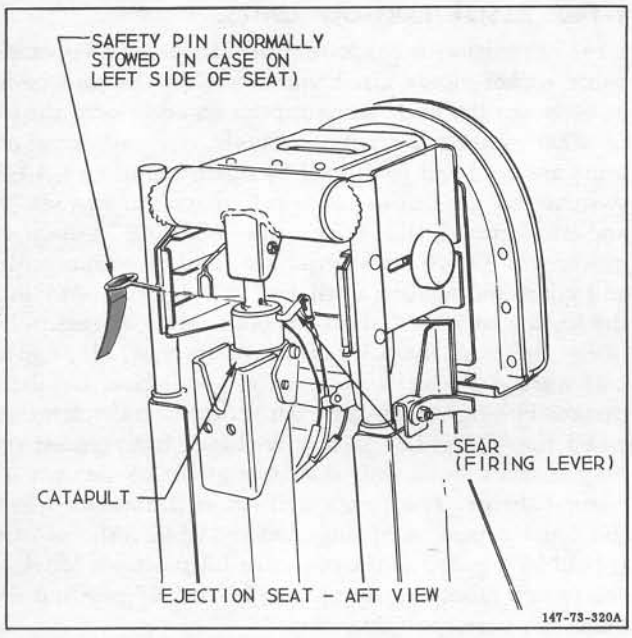


Figure 1-23. Ejection Seat—Aft View

hatch (bombardier-navigator's emergency exit) and forward of an escape hatch in the tail gunner's cabin. (See figure 3-2.) When open, the flaps extend out from the fueslage, interrupting the airflow. The flaps at the main entrance hatch are controlled by operation of an emergency escape control, provided for the bombardier-navigator, which also positions his seat for bail-out and jettisons the hatch. The flaps at the tail gunner's escape hatch are controlled by an emergency escape switch. (See 16, figure 4-6.) The main entrance hatch is also manually jettisonable, as is the tail gunner's escape hatch. A parachute static line is provided near the main entrance hatch.

1-144. CANOPY EMERGENCY RELEASE.

1-145. The canopy may be jettisoned from either the pilot's or copilot's position. The pilot's release, located to the right rear of the pilot's seat (14, figure 1-12) is operated by squeezing the handle and pulling the lever full forward. The copilot's release, mounted in a position level with the longeron at the copilot's left (11, figure 1-14), is operated by squeezing the handle and pushing the lever full down. An external canopy release handle is located just aft of the canopy to the right of the airplane centerline.

1-146. EJECTION SEATS.

1-147. To make bail-out from the pilot's compartment safe at any speed, ejection seats are provided for pilot and copilot. (See figure 1-22.) A catapult mounted aft of each seat supplies power for ejecting seat and occupant from the airplane.

1-148. EJECTION SEAT CONTROLS. The two armrests on each seat are individually adjustable. They can be raised freely, but must be released for lowering by armrest release knobs (figure 1-22) at the forward corners of each seat. The left armrest may be used in either of two raised positions; however, the right armrest should be raised only for seat ejection. All controls for ejection are incorporated in the right armrest. (See figure 1-22.) When the right armrest is raised, foot stirrups simultaneously slide out from beneath the seat. Downward movement of a catapult safety release handle beneath the right armrest pulls a safety pin from the catapult, readying it for firing.

Note

The catapult safety release handle cannot be moved until after the canopy release lever at either pilot's or copilot's station is operated.

Squeezing the trigger lever located below the forward end of the right armrest fires the catapult.

A two-position (locked-unlocked) shoulder harness inertia reel lock control is located on the left side of the pilot's and copilot's seats. A latch is provided for positively retaining the control handle at either position of the quadrant. By pressing down on the top of the control handle, the latch is released and the control handle may then be moved freely from one position to another. When the control is in the unlocked position, the reel harness cable will extend to allow the seat occupant to lean forward in the cockpit; however, the reel harness cable will automatically lock when an impact force of 2 or 3 G is encountered. When the reel is locked in this manner, it will remain locked until the control handle is moved to the locked and then returned to the unlocked position. When the control is in the locked position, the reel harness cable is manually locked so that the pilot is prevented from bending forward. The locked position is used only when a crash landing is anticipated. This position provides an added safety precaution over and above that of the automatic safety lock.

Luminous indicators above the backrest on each side of the seat (figure 1-22) give a visual indication that the seat is locked in vertical position.

A

The headrest can be adjusted fore and aft, by means of a knob on the right side of each headrest.

C

A fixed-type headrest, with provisions for a drag parachute, is installed. This drag parachute stabilizes the seat after ejection, and reduces tumbling and speed of descent. It is automatically released immediately upon seat ejection.

1-149. EJECTION SEAT SAFETY PINS. A stowage case on the left side of each ejection seat (figure 1-22) provides stowage for a trigger lockpin (with leather tab) and a catapult safety pin (red tab). The trigger lockpin is installed through a hole in the seat trigger mechanism on the right armrest guard as a ground safety device, and must be removed and stowed prior to flight. The catapult safety pin is installed in the

catapult above the sear (firing level) when the airplane is on the ground. It must be removed and stowed before flight.

1-150. BOMBARDIER-NAVIGATOR'S EMERGENCY ESCAPE CONTROL.

1-151. An emergency escape control is located on the right side of the bombardier-navigator's seat. (See 15, figure 4-4.) Pulling the control full up and safetying it in that position opens deflector flaps located forward of the main entrance hatch, rotates bombardier-navigator's seat left to face the hatch, and releases the hatch. Hydraulic power for these operations is supplied by the emergency hydraulic pump, which is started when the emergency escape control is pulled.

1-152. TAIL GUNNER'S EMERGENCY ESCAPE SWITCH.

1-153. A guarded emergency escape switch, on an electrical panel at the tail gunner's right, controls deflector flaps located forward of the tail gunner's escape hatch. When the switch is moved to "ON," hydraulic pressure from the emergency brake system opens the flaps.

CAUTION

Operation of the tail gunner's deflector flaps at high speeds causes an excessive nose-down trim change in the airplane; therefore, deflector flaps should be used only in an emergency.

1-154. MAIN ENTRANCE HATCH EMERGENCY RELEASE.

1-155. An emergency release handle is locate just forward of the main entrance hatch. (See 30, figure 4-3.) When the handle is pulled down, the pins holding the hatch are released, and the hatch can be pushed out. The hatch is also released by operation of the bombardier-navigator's emergency escape control. (Refer to paragraph 1-151.)

1-156. TAIL GUNNER'S ESCAPE HATCH.

1-157. The tail gunner's escape hatch is located on the left side of the tail cabin with a release handle provided on the door. (See 6, figure 4-5.) When the handle is pulled, the door is released and can be pushed out.

1-158. PARACHUTE STATIC LINE.

1-159. An emergency parachute static line, located just forward of the main entrance hatch at the left side of the bombardier-navigator's compartment, provides a means of parachuting injured crew members. (See 1, figure 4-3.)

(1) AF47-23 thru AF47-56

(2) AF47-57 and subsequent

1-160. DITCHING EQUIPMENT.

1-161. BOMBARDIER-NAVIGATOR'S DITCHING RESTRAINT STRAP.

A-1,A-5(1)

1-162. A ditching restraint strap is stowed beneath a door in the floor at the aft end of the pilot's passageway. (See figure 3-5.) The strap, secured to the airplane structure, is hooked to the bombardier-navigator's parachute harness in preparation for ditching.

A-5(2),C

A combination head and back support ditching harness is stowed on the left side of the pilot's passageway. (See figure 3-1.) When installed, it is attached to hooks on each side of the passageway, supporting the bombardier-navigator in a sitting position facing aft. (See figure 3-5.) A lap safety belt, stowed on the right side of the pilot's passageway (figure 3-1), is also used for ditching.

1-163. TAIL GUNNER'S DITCHING BELT.

A-1,A-5(3),C(4)

1-164. A ditching belt is stowed to the right of the headrest. (See 1, figure 4-5.) When installed, the belt extends across the cabin access door, supporting the tail gunner's back during ditching. (See figure 3-5.)

A-1,A-5(3),C(4)

1-165. BOMB DOOR DITCHING BRACES.

1-166. Prior to ditching the airplane, six braces are to be installed at specified intervals in the bomb bay to give support to the doors. (See figure 3-5.) The braces are normally stowed in a box at the aft end of the bomb bay; however, during ferrying operations or when carrying 22,000-pound bomb or rear bomb bay fuel tank, the braces are stowed in the unpressurized compartment aft of the bomb bay. (See figure 3-5.) The ends of the three front braces and the matching areas on the doors are painted white. The ends of the aft three braces are colored blue, yellow, and orange, respectively, and must be placed on the pads of corresponding color on the bomb bay doors. (Refer to paragraph 3-86) for installation instructions.)

Note

When braces are used to practice ditching procedure, they must be reinstalled in stowage box according to instruction placard on box.

A-1,A-5(3),C(4)

1-167. DITCHING PANEL.

1-168. A panel is provided for covering the hatch between the pilot's and bombardier-navigator's compartments before ditching the airplane. Installation of the panel closes off the pilot's compartment in the event the glass enclosure in the nose should break on ditching. The panel is stowed on the left side of the passageway in the pilot's compartment. (See 10, figure 4-4.)

(3) AF47-23 thru AF47-61

(4) AF48-1 thru AF48-6

Note

The ditching panel is carried in the airplane on over-water flights only.

A-1,A-5(1),C(2)

1-169. LIFE RAFT.

1-170. A life raft, with an emergency radio transmitter attached, is installed on the left side of the unpressurized compartment aft of the bomb bay. (See figure 3-1.) Internal release handles are located to the right of the pilot's seat (15, figure 1-12) and in the rear compartment, aft of the raft stowage space. An external release handle is provided forward of the raft stowage space on the left side of the fuselage. When released, the raft automatically inflates as it leaves the airplane, and pulls the dinghy radio with it. After release, the raft remains attached to the airplane by a mooring line with a breaking strength of approximately 75 pounds.

1-171. MISCELLANEOUS EMERGENCY EQUIPMENT.

A

1-172. ENGINE FIRE DETECTOR LIGHTS.

1-173. Warning of engine fire is given by four red detector lights, one for each engine, located at the top of the pilot's instrument panel. (See 9, figure 1-8.) Operation of the system and lights can be checked by means of a fire detector system test switch below the lights. (See 10, figure 1-8.) The switch has two positions, "ON" and "OFF," and must be held at the "ON" position for testing. The lights are push-to-test type, permitting check of bulb illumination independent of system operation.

C

1-174. ENGINE OVERHEAT AND FIRE DETECTOR LIGHTS. Warning of engine overheat and fire is given by eight lights (two for each engine) located at the top of the pilot's instrument panel. (See figure 1-9.) The four upper lights are red, and the four lower ones are amber. When engine overheat is detected in the forward compartment of each engine, the corresponding red light will illuminate. When overheat is detected in the fuel compartment of a nacelle, the red lights for both engines in that nacelle will illmuinate. Overheat in the aft section of each engine will illuminate the amber light for the corresponding engine. Overheat in the mid nacelle will illuminate both amber lights for the engines in that nacelle. Fire detector system test switches are located to the right of the lights. Placing the switch marked "BOTH NAC" at "ON" illuminates all lights. Placing the other switch at "FUEL COMP'T FIRE" illuminates the four red lights, while placing it at "MID NAC OVERHEAT" illuminates the four amber lights. The lights are push-to-test type, permitting check of bulb illumination independent of system operation.

1-175. ENGINE FIRE EXTINGUISHER.

1-176. A single-shot, pressure-type CO_2 fire extinguishing system is provided for combating engine nacelle fires. Discharge of CO_2 is controlled by a spring-loaded switch at the top of the pilot's instrument panel. (See 11, figures 1-8 and 1-9.) Pressing the switch toward either "RIGHT NACELLE" or "LEFT NACELLE" directs all of the CO_2 supply to the desired nacelle, flooding the entire area around both engines.

1-177. EMERGENCY ALARM.

1-178. A guarded emergency alarm switch is located on the pilot's electrical switch panel. (See 18, figure 1-10.) When the switch is turned on, alarm bells ring simultaneously in the pilot's, tail gunner's, and bombardier-navigator's compartments. (See 30, figure 1-14; 13, figure 4-5; and 4, figure 4-4.)

1-179. MISCELLANEOUS EQUIPMENT AND CONTROLS.

1-180. TAIL GUNNER'S SEAT.

1-181. The tail gunner's seat is adjustable vertically and horizontally. A conventional vertical adjustment lever is located on the right side of the seat. (See 11, figure 4-5.) A control at center front of the seat releases it for approximately 3 inches horizontal adjustment. (See 10, figure 4-5.) No shoulder harness is provided for the tail gunner.

1-182. BOMBARDIER-NAVIGATOR'S SEAT.

1-183. The bombardier-navigator's seat is provided with three adjustments: vertical, lateral, and swivel. (See 12, 13, and 14, figure 4-4.) A conventional shoulder harness inertia reel lock (paragraph 1-148) is located on the left side of the seat. (See 11, figure 4-4.) The emergency escape control (paragraph 1-151) is on the right side of the seat.

1-184. MAIN ENTRANCE HATCH.

1-185. The main entrance hatch, providing access to the forward pressurized cabins, is on the left side of the fuselage in line with the nose wheel. (See figure 1-3.) An external release handle is located aft of the hatch. From within the airplane, the hatch is controlled by a lever located on the right side (facing aft) of the entrance to the pilot's passageway. (See 29, figure 4-3.) Spring-loaded to a vertical position, the lever is pulled down and aft (approximately 45 degrees) to open the hatch, or down and forward to close the hatch. A detachable ladder is provided with the airplane for access to the hatch from the ground and is stowed beneath the navigator's chart table when not in use.

1-186. REAR ENTRANCE HATCH.

1-187. An external handle for opening the entrance hatch under the rear section of the fuselage (figure 1-3) is located at the aft end of the door, and is spring-loaded to lie flush with the fuselage skin. The door is opened from within the airplane by pulling up on a similar handle on the inside of the door. The hatch snaps locked when closed.

(1) AF47-23 thru AF47-61

(2) AF48-1 thru AF48-6

1-188. LIGHT CLOSE-OUT CURTAINS.

1-189. Curtains are provided in the bombardier-navigator's compartment to close out the light for radar operations. Two separate curtains for closing off the light from the nose section are stowed one on either side of the radome shelf. (See 5, figure 4-3.) When drawn into position across the radome, the curtains are fastened together by means of a zipper. Lights from the astrodome can be closed off by means of a roller blind stowed at the left side of the astrodome window. (See 34, figure 4-3.) A curtain is also provided to cover the entrance hatch into the pilot's compartment. The curtain, stowed in the bombardier-navigator's compartment, is provided with snaps for fastening it around the hatch.

1-190. INSTRUMENTS.

A

1-191. All gyroscopic instruments are electrically operated by alternating current from the inverters.

C

All gyroscopic instruments are electrically operated by alternating current from the inverters, except the turn-and-bank indicator, which is operated by direct current.

Fuel and oil pressure gages operate on a-c power from the inverters. The tachometers and exhaust temperature indicators are self-generated electrical instruments, and do not receive current from the airplane electrical system. The free air temperature gage, flap position indicator, fuel quantity indicators, and hydraulic fluid level indicators are all operated on d-c electrical power. A Type F-4 airspeed indicator is provided on the pilot's and copilot's instrument panels, with a true airspeed indicator provided on the bombardier-navigator's panel. An automatically operated vibrator, powered by direct current, is installed behind the instrument panel to prevent the instruments from sticking during flight.

1-192. BOMB DOOR GROUND SAFETY LOCKS.

1-193. Eight safety locks, one for each bomb bay door actuating cylinder, are provided with the airplane. Whenever the bomb bay doors are to be left open on the ground, the locks must be installed.

1-194. SEXTANT STOWAGE BOX.

1-195. A stowage box is mounted on the left side of the bombardier-navigator's compartment (27, figure 4-3) for stowing the sextant when it is carried in flight.

1-196. OPERATIONAL EQUIPMENT.

1-197. Section IV of this handbook contains information on the following operational equipment: bombing, gunnery, oxygen, communications, radar pressurization, heating, ventilating, pressurization, anti-icing, heated clothing, and lighting.

Section II

NORMAL OPERATING INSTRUCTIONS

2-1. BEFORE ENTERING PILOT'S COMPARTMENT.

2-2. RESTRICTIONS.

a. See figure A-5 for power plant, airspeed, Mach No., and acceleration limits other than those listed.

b. Flights with a 22,000-pound bomb installed are prohibited until flight test data are available.

c. All acrobatics are prohibited.

d. Abrupt maneuvers are prohibited when full or partially full wing tip tanks, water injection tanks, or ATO units are installed.

e. With full ATO units or full water injection tanks installed, do not exceed the following airspeed limitations:

GROSS WEIGHT LB	IAS MPH	
82,600	270	
96,000	300	
110,000	320	C

f. Do not land with any fuel in tip tanks. If fuel cannot be consumed either normally or by suction feed (paragraph 3-40), jettison tanks before landing.

g. Maximum take-off gross weight is 95,558 pounds. A

Maximum take-off gross weight is 112,965 pounds. C

h. Maximum landing gross weight is 90,500 pounds. A

C

Maximum landing gross weight is 112,965 pounds. (This weight must not include tip tank fuel, since landings are prohibited with fuel in tip tanks.)

Note

Landings at gross weights in excess of design landing weight (66,000 pounds) should be made only in case of emergency, since these weights are overload for landing and exceed the normal design limits of the airplane. Extreme care must be used when such a landing is necessary.

2-3. TAKE-OFF GROSS WEIGHT AND BALANCE.

Note

Refer to Handbook of Weight and Balance Data, AN 01-1B-40, for detailed loading information.

a. Make sure the total weight of fuel, oil, armament, and special equipment carried is suited to the mission to be performed.

b. Check take-off and anticipated landing gross weight and balance.

Note

A

Maximum take-off gross weight is 95,558 pounds.

C

Maximum take-off gross weight is 112,965 pounds.

c. Make sure weight and balance clearance (Form F) is satisfactory.

2-4. EXTERIOR CHECK.

a. Make sure the airplane has been serviced with proper quantities of fuel, oil, hydraulic fluid, and oxygen. Check Form 1A.

C

b. Make sure water injection tanks are full.

c. Make sure that nacelle doors are closed and properly safetied, and that all nacelle access doors are in place.

d. Make sure that all dust covers are removed.

e. Make sure that loose equipment has not been left in air inlet ducts.

f. Make sure pitot tube cover has been removed.

g. Make sure that radar compartment installation is secure.

A-1,A-5(1),C(2)

h. Check life raft door for security of installation.

A

i. Check air pressure on all three accumulators.

C

Check air pressure on all four accumulators.

Note

Be sure main system and emergency brake hydraulic pressure is exhausted before checking air pressure in accumulators.

j. Make sure bomb door ground locks have been removed.

k. Check landing gear oleo strut extension; check condition and security of landing gear doors.

l. Remove landing gear ground locks. Make sure nose gear steering release pin is engaged (safety cap on).

m. Examine tires for general condition and inflation.

n. Chock wheels.

o. Inspect over-all exterior for obvious damage.

2-5. ENTRANCE TO AIRPLANE.

2-6. For access to pilot's, copilot's, and bombardier-navigator's stations, enter through main entrance hatch on left side of airplane (figure 1-3), using ladder provided with airplane. Access to rear fuselage and tail gunner's compartment is gained through rear hatch under fuselage (figure 1-3) at tail section. Hatches in each bomb bay bulkhead (figure 1-3) permit travel between forward and rear areas within airplane when bomb bay is empty and bomb doors are closed.

2-7. MINIMUM CREW REQUIREMENTS.

2-8. The minimum crew requirements for this airplane are pilot and copilot. Additional crew members as required to accomplish special missions will be added at the discretion of the Commanding Officer.

2-9. ON ENTERING AIRPLANE.

2-10. PILOT'S CHECK.

A

a. On entering airplane, check fluid level in nose gear emergency hydraulic reservoir, and make sure hand-pump is stowed.

C

On entering airplane, make sure landing gear hand-pump is stowed.

b. Hatches closed and locked; crew members at proper stations.

c. Check ejection seat as follows: make sure that cotter key or pin has been removed from hole above catapult sear (figure 1-23), that trigger lockpin (with leather tab) on right armrest guard has been removed, and that each safety and emergency pin is stowed in case on left side of seat in accordance with instruction placard.

d. Seat and rudder pedals adjusted.

e. Check alignment of luminous seat position lockpin indicators.

A-1,A-5(3)

f. Check generator switches "ON"; set alternator switch "BOTH ALT."; inverter switch "MAIN ON" (check copilot).

CAUTION

If a-c external power source is used for ground operation of equipment, alternator selector switch must be positioned at "EXT." If alternator selector switch is positioned at either "BOTH ALT" or "RIGHT ALT," abnormally high current may be fed into alternators, resulting in permanent damage.

A-5(4),C

Check generator switches "ON"; set alternator switches "ON"; alternator selector control "ON"; alternator selector "BOTH ALT NORM."; inverter switch "MAIN ON" (check copilot).

g. Battery switch off.

Note

Under emergency conditions when airplane's batteries are used for starting, turn battery switch "ON."

(1) AF47-23 thru AF47-61
(2) AF48-1 thru AF48-6

(3) AF47-23 thru AF47-76
(4) AF47-77 and subsequent

h. Surface control boost switch "OFF."

i. Emergency fuel system switches off.

j. Cabin pressure switches "NORMAL."

k. Anti-icing switches off.

WARNING

Operation of the surface anti-icing system causes a substantial reduction in available thrust; therefore, anti-icing should not be used for take-off unless available distance is at least 20 to 25 percent greater than is normally required. (Refer to WARNING in paragraph 4-95.)

l. Power controls "OFF."

m. Emergency brake levers locked "ON."

n. Bomb and fuel tank salvo selector switch "ALL." If aft shackles (Type D-7) for 2000 or 4000-pound bombs and small tanks are installed, set salvo selector switch at "BOMBS ONLY."

WARNING

If bombs are installed, make sure the bombardier-navigator's master switch is off, so that bombs will drop unarmed if emergency salvo is necessary.

o. Automatic pilot engaging handles at "DISENGAGE"; pilot switch "OFF."

p. D-c external power source connected.

Note

Whenever possible, use a 28-volt external power source, capable of supplying 1500 amperes for starting.

A

q. Fire detector system test switch "ON." Check lights.

C

Overheat and fire detector system test switches on. Check lights.

r. Fuel quantity—check all gages.

s. Clock and altimeters set.

t. Check hydraulic fluid level; hydraulic main system pressure control valve "ON."

Note

Hydraulic fluid level indication should be at "F" (full). After engines are started, level will drop because the main system accumulators are charged from main system reservoir.

u. Landing gear selector control momentarily at "DOWN"—then return to "NEUTRAL." Check gear position lights.

Note

In case emergency pump handle has been operated, shuttle valve will be repositioned to main system return by placing gear handle at "DOWN."

WARNING

Check personnel clear before placing gear selector control at "DOWN." If doors are open, they will close when selector control is placed at "DOWN."

v. Controls lock "OFF." Be sure control column is properly engaged. Check controls for freedom of movement and proper travel, observing control surfaces for correct response.

w. Check operation of trim tabs, observing tabs and indicators for correct response.

x. Cabin air valve "NORMAL OPER." **A**

Cabin air valve "PRESSURE ON." **C**

y. Emergency hydraulic selector valves "OFF."

z. Circuit breakers in.

aa. Make sure canopy emergency release handle is in locked position and canopy is secure.

ab. Bomb door manual control "NEUTRAL."

A-5(1),C

ac. Landing gear emergency manual control handles "NEUTRAL."

ad. Oxygen pressure 400 psi. Test operation of oxygen equipment.

ae. Test operation of communication equipment.

af. Test operation of automatic pilot. (Refer to paragraph 2-12.) Make sure auto-pilot is disengaged after check.

ag. Before any night or instrument take-off, check all lights, instruments, and automatic approach equipment. (Refer to paragraph 2-13.)

2-11. COPILOT—RADIO OPERATOR'S CHECK.

a. Check ejection seat. (Refer to paragraph 2-10, c.)

b. Control column unlocked.

c. Seat adjusted. Check alignment of luminous lockpin position indicators.

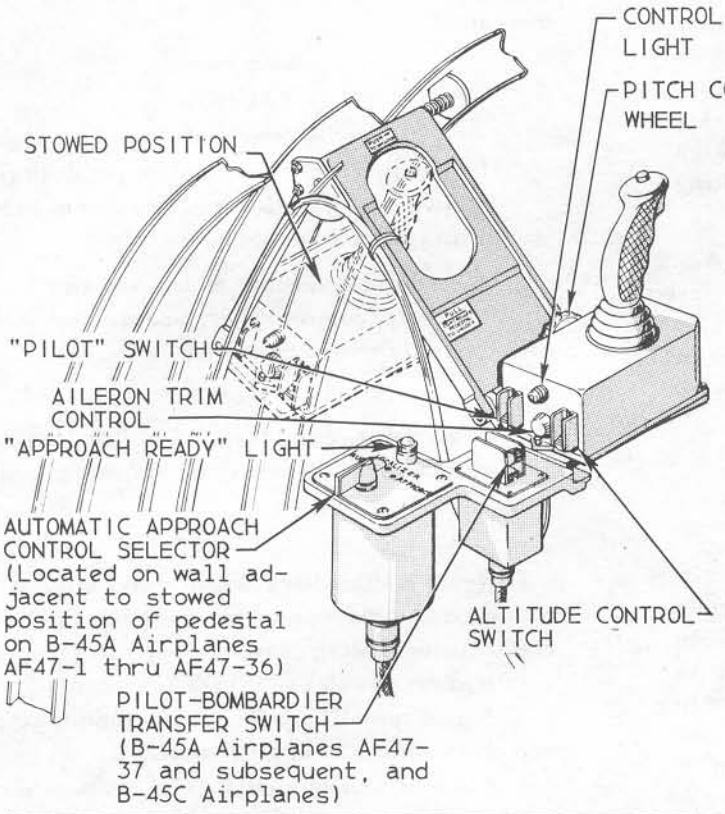
d. Altimeter set.

A-1,A-5(2)

e. Check generator switches "ON"; set inverter switch "MAIN ON"; alternator switch "BOTH ALT."—at request of pilot.

(1) AF47-37 and subsequent

(2) AF47-23 thru AF47-76



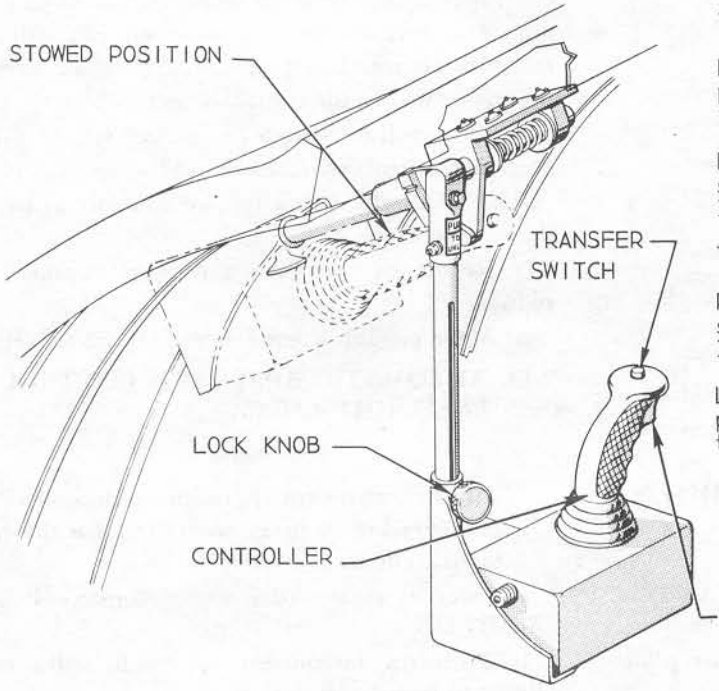
TO STOW PILOT'S PEDESTAL:

Pull pedestal aft and rotate up against pedestal support. Push support forward and swing unit outboard until it locks in stowed position.

TO UNSTOW PILOT'S PEDESTAL:

Push pedestal support forward and swing unit inboard until it locks in position.

Pull pedestal aft and down to locked position.



TO STOW COPILOT'S PEDESTAL:

Loosen lock knob and push pedestal up to top of guide slot; then tighten lock knob.

Pull pedestal support aft and swing unit outboard until it locks in stowed position.

TO UNSTOW COPILOT'S PEDESTAL:

Pull pedestal support aft and swing unit inboard until it locks in position.

Loosen lock knob and lower pedestal to bottom of guide slot; then tighten lock knob.

147-96-12A

Figure 2-1. Auto-pilot Controller Pedestals

A-1,A-5(1)

CAUTION

If a-c external power source is used for ground operation of equipment, alternator selector switch must be positioned at "EXT." If selector switch is positioned at either "BOTH ALT" or "RIGHT ALT," abnormally high currents may be fed into alternators, resulting in permanent damage.

A-5(2),C

Check generator switches "ON"; set inverter switch "MAIN ON"; alternator switches "ON"; alternator selector control "ON"; alternator selector "BOTH ALT NORM."—at request of pilot.

f. Circuit breakers pushed in.

CAUTION

Do not push in "LH-RH ALT EXCITER" circuit breakers until No. 1 and No. 3 engines have been started and rpm is at least 50%, to prevent blowing the 2-ampere fuse in the alternator exciter voltage regulator. Be sure to pull these two circuit breakers out before No. 1 and No. 3 engines drop below 40% rpm. If these circuit breakers are pulled out with the alternators operating, do not push them back in until at least 2 minutes have elapsed.

g. Oxygen pressure 400 psi. Check operation of oxygen equipment.

h. Test operation of communication equipment.

i. Check canopy seal pressure gage for required pressure.

Note

If accumulator is not charged, pressure gage will not indicate required pressure until engine speed reaches 100% rpm.

j. Test operation of automatic pilot controller.

2-12. AUTOMATIC PILOT PREFLIGHT CHECK.

a. External power (dc) source connected; inverter switch "MAIN ON."

b. Check auto-pilot engaging handles "DISENGAGE."

c. Unstow auto-pilot pedestals.

d. Automatic approach control selector "AUTOPILOT."

e. After power has been on 2 to 3 minutes, turn pilot switch "ON."

f. Check auto-pilot trim indicators centered. (Indicators need not be exactly centered or stationary.)

g. Move engaging handles to "ENGAGE."

h. Rotate pitch trim wheel and aileron trim knob, and check control column and wheel for corresponding movement.

CAUTION

Hold control wheel and rudder pedals during checks i. and j. following, to cushion movement against limit stops.

i. Move flight controller to left and right, fore and aft, and check control wheel and rudder pedals for corresponding movement.

Note

When flight controller is neutralized, control wheel will return to neutral, but rudder pedals will not.

A-5(3),C

j. Signal bombardier-navigator and transfer control to him. As he moves turn control knob right and left, check corresponding movement of rudder pedals. Return transfer switch to "PILOT."

k. Signal copilot to press transfer button for control, and check controller at his station.

l. Altitude control switch "ON." There should be minimum movement of control column. Rotation of pitch trim wheel or fore-and-aft movement of flight controller should produce no movement of control column. However, side-to-side movement of the flight controller or aileron trim knob should produce corresponding movement of the control wheel.

m. Push release switch on control wheel. Pilot and altitude control switches should snap automatically "OFF." Manually check surface controls to be certain they are free.

n. Re-engage auto-pilot and check copilot's release switch.

o. Move engaging handles to "DISENGAGE."

2-13. AUTOMATIC APPROACH CONTROL PREFLIGHT CHECK.

Note

Airport instrument approach transmitter must be operating in order to accomplish the following check.

a. External power (dc) source connected; inverter "MAIN ON."

b. Turn on instrument approach radio receiver. (Refer to paragraph 4-48.)

c. Engage and check automatic pilot. (Refer to paragraph 2-12.)

(1) AF47-23 thru AF47-76 **(2) AF47-77 and subsequent** **(3) AF47-37 and subsequent**

d. Check green "approach ready" light on.

CAUTION

Hold control wheel and rudder pedals during following checks e. and f. to cushion movement against stops. Accomplish checks as rapidly as possible to avoid building up excessive control signals.

e. Turn automatic approach control selector switch to "LOCALIZER." Check indication of localizer needle on cross-pointer indicator. Control wheel and rudder should move for turn in direction of needle deflection.

f. Turn selector switch to "APPROACH." Altitude control should automatically snap "OFF" (if "ON"), and control column should move back for an upward deflection of glide path needle.

g. Return selector switch to "AUTOPILOT."

h. Disengage automatic pilot.

2-14. FUEL SYSTEM MANAGEMENT.

2-15. See figures 2-2 and 2-3 for fuel system management.

2-16. STARTING ENGINES.

2-17. If possible, reverse order of starting engines with each succeeding start. This will equalize engine operating time and will also provide a means of checking the hydraulic pumps individually. After completing cockpit checks outlined in paragraphs 2-10 and 2-11, start each engine as follows:

WARNING

Before starting engines, make sure danger areas fore and aft of engine nacelles (figure 2-4) are clear of personnel, aircraft, and vehicles. Suction at the nacelle intake ducts is of sufficient magnitude to kill or seriously injure personnel if drawn into or pulled suddenly against the ducts. Danger aft of the nacelles is created by the high exhaust temperature and blast from the tail pipes.

CAUTION

- Whenever possible, start and run up engines on a concrete surface to minimize the possibility of dirt and foreign objects being drawn into the engine compressors.
- If possible, start engines with airplane headed into the wind, as an engine fire during starting procedure would be aggravated by a tail wind.

Note **A-5(1),C**

To avoid excessive voltage drop, be sure to start engines in the nacelle to which external power source is connected.

a. Recheck power controls "OFF."

b. All fuel booster pump switches "ON" (bomb bay pumps off when tanks are not installed); cross-flow shut-off valve switches "OPEN" (if bomb bay tanks are installed); desired engine fuel shut-off valve switch "OPEN."

C

Wing tip tank booster pump switches "ON."

A-1

c. Hold starter switch at "ON." At 9% rpm watch fuel pressure gage and open power control halfway.

A-5

Hold starter switch at "ON." At 6% rpm watch fuel pressure gage and open power control halfway.

C

Momentarily place starter switch at "START." At 6% rpm watch fuel pressure gage and open power control halfway.

d. As fuel pressure rises, retard power control to hold pressure at approximately 30-40 psi until ignition occurs as indicated by increase in exhaust temperature.

WARNING

A

If ignition does not occur within 5 to 10 seconds, close power control, release starter switch, and wait 3 minutes before another attempt to start.

C

If ignition does not occur within 5 to 10 seconds, close power control and place starter switch momentarily at "STOP." Wait 3 minutes before another attempt to start.

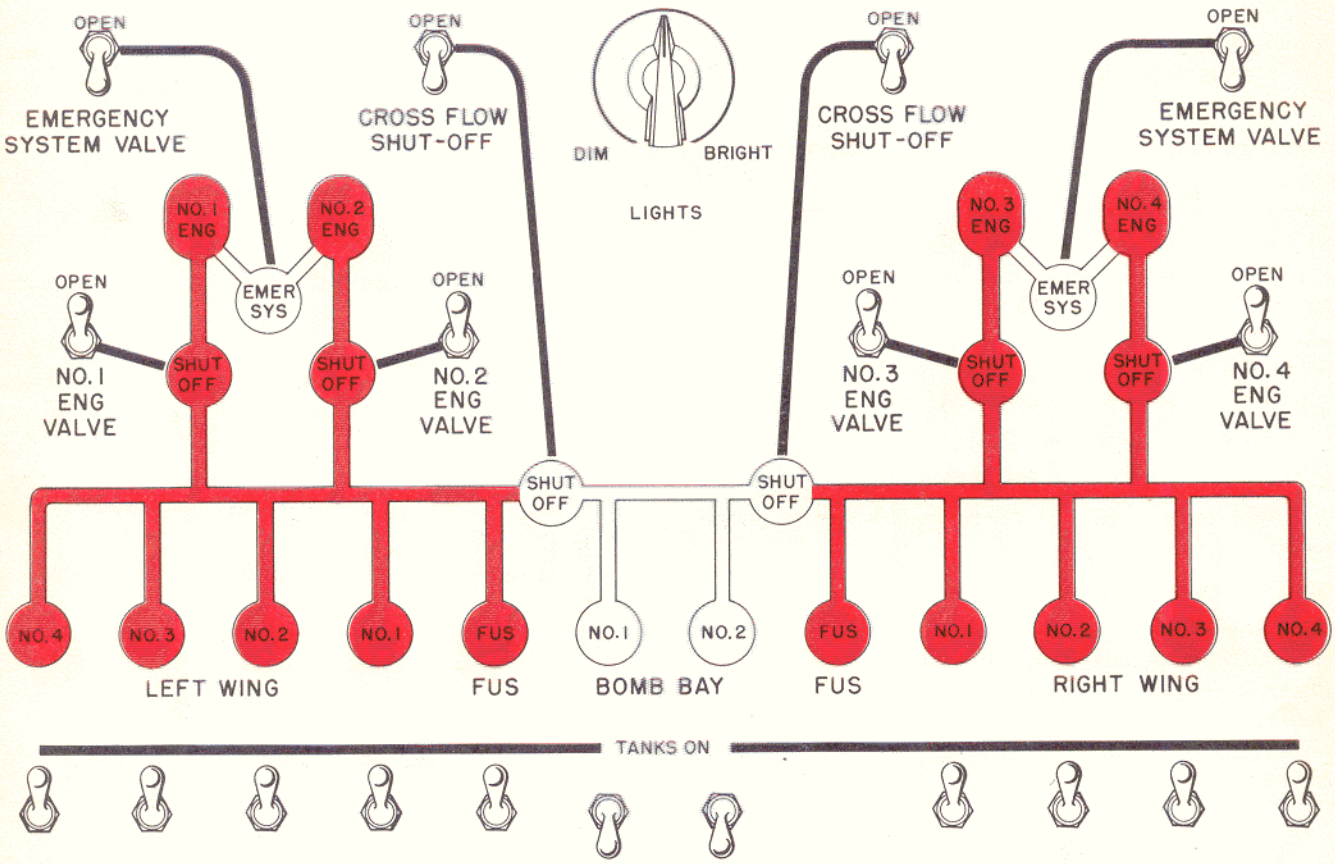
CAUTION

The starter is limited to three starts of one minute duration each; if more than three starts are required, allow starter to cool 30 minutes before using again.

e. After ignition, retard power control to hold approximately 650°C exhaust temperature; then advance power control to 40% rpm, maintaining exhaust temperature below maximum limits. Hold power control lever fully extended, since it will usually be necessary to pass the "IDLE" stop to keep exhaust temperatures within desired ranges.

(1) AF47-37 and subsequent

B-45A-1
FUEL SYSTEM CONTROL



COURSE OF FUEL FLOW SHOWN—DURING FLIGHT WITHOUT BOMB BAY TANKS

STARTING ENGINES:

All booster pumps "ON." (Bomb bay pumps off when tanks not installed.)
Cross-flow shut-off valves "OPEN" (if bomb bay tanks installed).
Engine fuel shut-off valve **"OPEN"** prior to starting each engine.
Power control advanced as each engine is started.

TAKE-OFF:

Cross-flow shut-off valves "OPEN"
Emergency system valves "OPEN."
When safe altitude is reached after take-off, close emergency system valves.

DURING FLIGHT:

Bomb bay tanks will drain first. When gages indicate bomb bay tanks empty, turn off bomb bay pumps and close cross-flow shut-off valves.
As each tank is drained, turn related booster pump off. The fuselage and two No. 1 wing tanks will drain last.

LANDING:

Emergency system valves "OPEN".
Cross-flow shut-off valves "OPEN."

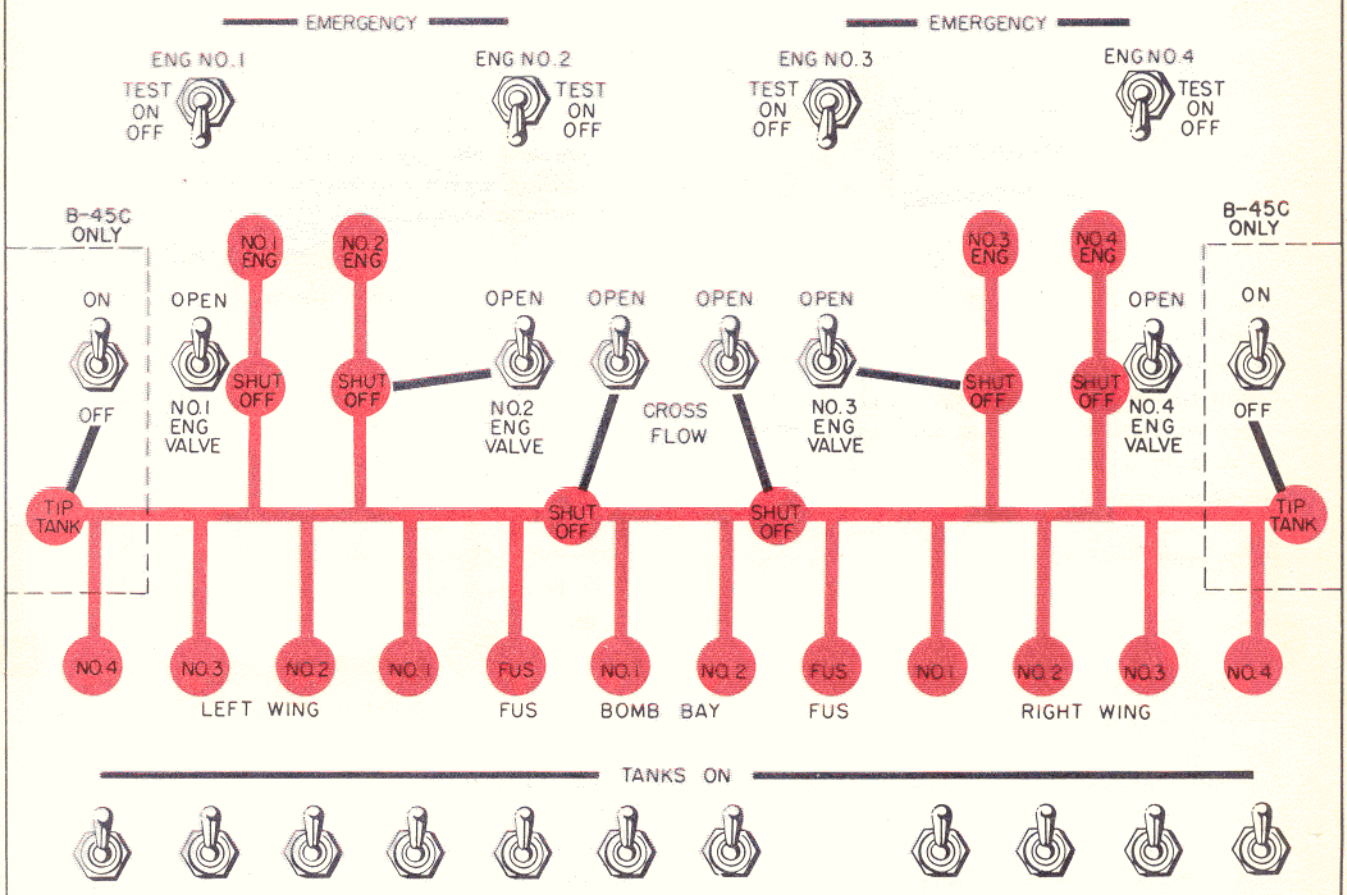
STOPPING ENGINES:

Emergency system valves "CLOSED".
Power controls retarded to stop each engine.
After engines have stopped rotating:
a. All booster pumps **"OFF"**
b. All engine fuel shut-off valves **"CLOSED"**
Cross-flow valves **"OPEN"**

147-48-434A

Figure 2-2. Courses of Fuel Flow—B-45A-1 Airplanes

B-45A-5 AND B-45C FUEL SYSTEM CONTROL



COURSES OF FUEL FLOW SHOWN—DURING FLIGHT WITH BOMB BAY TANKS

STARTING ENGINES:

All booster pumps "ON". (Bomb bay pumps off when tanks not installed.)
Wing tip tank switches "ON". (Switches "OFF", when tanks not installed.)
Cross-flow shut-off valves "OPEN" (if bomb bay tanks installed.)
Engine fuel shut-off valve "OPEN" prior to starting each engine.
Power control advanced as each engine is started.

TAKE-OFF:

Cross-flow shut-off valves "OPEN".
Emergency fuel system switches "ON".
When safe altitude is reached after take-off, turn emergency fuel system switches "OFF".

DURING FLIGHT:

Wing tip tanks will drain first. When wing tip tank "EMPTY" warning light illuminates, turn wing tip tank switches "OFF".
Bomb bay tanks will drain next (if installed). When gages indicate bomb bay tanks empty, turn off bomb bay pumps and cross-flow shut-off valves. (Bomb bay tanks drain first, when wing tip tanks not installed.)
As each tank is drained, turn related booster pump off. The fuselage and two No. 1 wing tanks will drain last.

LANDING:

Emergency fuel system switches "ON".
Cross-flow shut-off valves "OPEN".

STOPPING ENGINES:

Emergency fuel system switches "OFF".
Power controls retarded to stop each engine.
After engines have stopped rotating:
a. All booster pumps "OFF".
b. All engine fuel shut-off valves "CLOSED".
Cross-flow shut-off valves "OPEN".

147-48-531A

Figure 2-3. Courses of Fuel Flow—B-45A-5 and B-45C Airplanes

A-1

f. When rpm reaches 26%, release starter switch.

A-5

When rpm reaches 23%, release starter switch.

C

Starter switch automatically disconnects at 23% rpm.

A-1

WARNING

After any five hot starts exceeding 820°C for one minute, after any five hot starts and/or accelerations exceeding 870°C for 20 seconds, or after one hot start at 1000°C momentarily, the engine must be carefully inspected before flight. Inspect turbine wheel, turbine nozzle, inner combustion chambers, and exhaust cone for possible damage. (The five hot starts constitute an inspection requirement regardless of the time elapsed between the starts.) The temperature and duration of all overtemperature operation (820°C) shall be entered in Form 1A. If overspeeding of 102% to 104% rpm is encountered during any hot start and/or acceleration, the engine will be removed from the airplane; an overspeeding at any time in excess of 104% rpm will require that the engine be removed. When a hot start occurs, move power control to "OFF" position and turn engine over, with the starter, from 20 to 30 seconds to assist in blowing out residual fires or fuel vapors.

A-5,C

WARNING

Any one start or acceleration during which exhaust temperature exceeds 983°C momentarily, or any five starts or accelerations during which exhaust temperatures exceed 870°C momentarily, shall constitute over temperature operation and require that the engine be carefully inspected before flight. (The five hot starts constitute an inspection requirement regardless of the time elapsed between starts.) The temperature and duration of all overtemperature operation (870°) shall be entered in Form 1A. When a hot start occurs, move power control to "OFF" position and turn engine over, with the starter, from 20 to 30 seconds to assist in blowing out residual fires or fuel vapors.

g. Check oil pressure. If there is no indication of oil pressure within 30 seconds (at idle rpm), shut down engine and investigate.

h. At 40% rpm, check engine instruments for desired readings. (See figure A-5.)

Note

An idle stop is provided to preclude inadvertent stopping of the engine by retarding the power control. The idle stop is set at approximately 38% rpm on the ground. However, idling speeds will vary with altitude and outside air temperature.

A-5(1),C

i. After starting two engines in one nacelle, have external power source connected to the other nacelle.

j. When the engines are started and operating above 40% rpm, so that the generators are powering the electrical system, have external power disconnected.

k. Battery switch "ON."

l. Have copilot turn all generators off momentarily, and check that electrical system is powered by batteries; then have all generators turned "ON."

m. Fire detector system test switch "ON."—Check lights.

Note

Refer to paragraph 3-3 for instructions in case of fire during starting procedure.

2-18. WARM-UP.

2-19. No warm-up period is necessary. As soon as engines stabilize with normal instrument readings, power controls may be opened to full power; however, the following procedure is suggested for use when a complete power ground check is desired.

Note

During any idling period, engine rpm should be held near the practical minimum; however, rpm must never be reduced below 26%, since engine will not accelerate. Minimum operating temperatures will be obtained in range between 40 and 50% rpm. Engine generators will not charge below approximately 40% rpm. Alternators will not produce rated output below approximately 50% rpm.

a. Gradually advance power control to full open position and note that engine instrument readings are within desired ranges. Make sure maximum rpm is not exceeded.

Note

The engine is rated at 100% rpm; however, a tolerance of plus or minus ½% is allowed to accommodate slight variations in setting of the engine governors in production.

(1) AF47-77 and subsequent

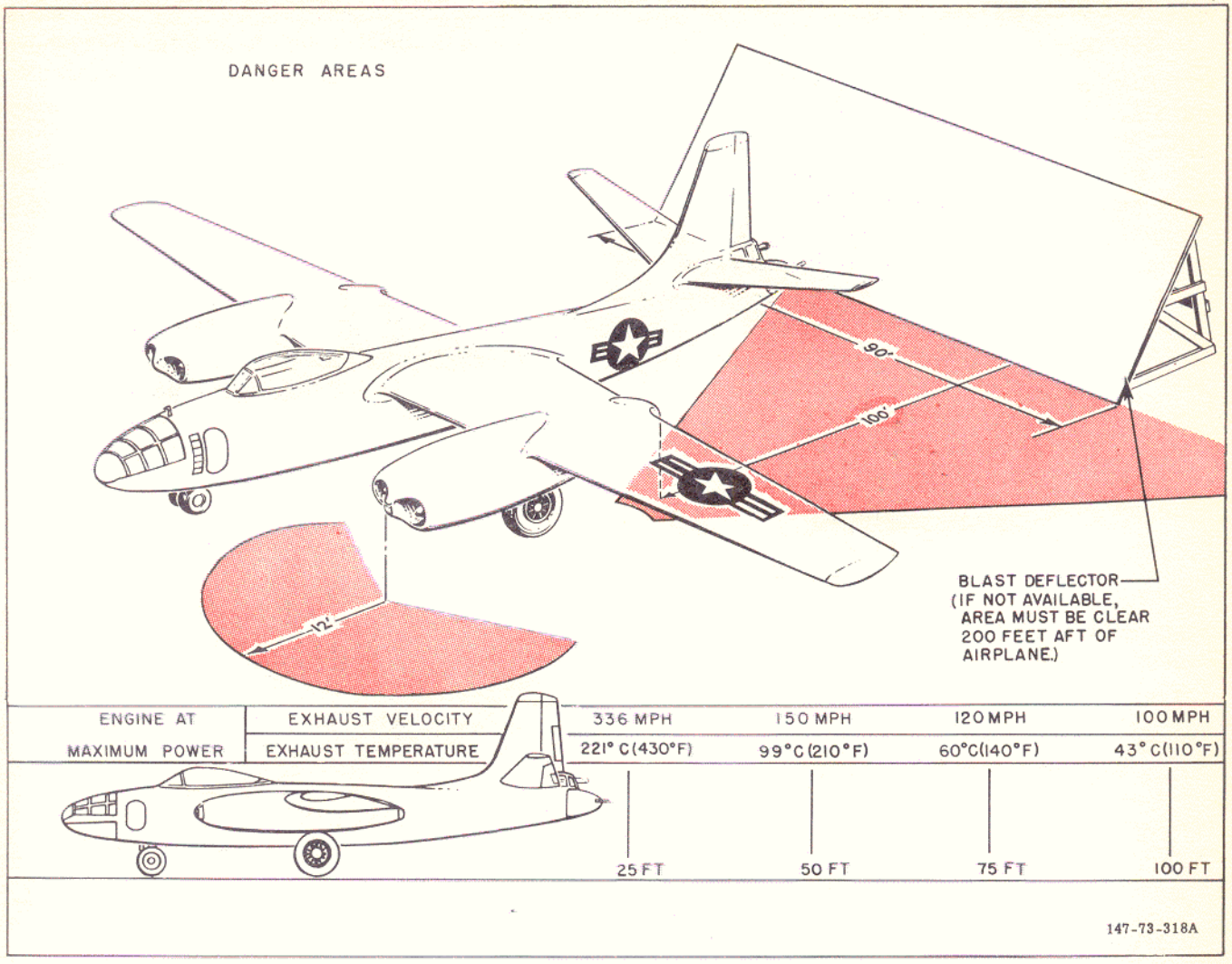


Figure 2-4. Danger Areas

WARNING

If engine should overspeed by more than 4% rpm at any time (either with or without excessive exhaust temperature), the airplane is unsafe for flight.

b. Check exhaust temperature within limits.

Note

When power control is advanced toward full open position, exhaust temperature may tend to exceed the limit. Therefore, advance power control only until temperature limit is reached, and then wait until temperature drops sufficiently to allow advancing to full open position. (Three to five minutes may be required for engines to stabilize.)

c. Note that vibration is not excessive.

2-20. CHECKING OPERATION OF FUEL TANK SHUT-OFF VALVES.

2-21. If desired, check operation of fuel tank shut-off valves as follows:

a. Retard all power controls to idling rpm; then advance power control of one engine in right nacelle to 70% rpm.

b. Open cross-flow valves, and turn off all except one tank booster pump. Allow approximately 30 seconds to ensure that selected tank is supplying all engines.

c. Select other tanks individually, allowing 30 seconds between selections.

Note

- Fuselage tanks cannot be checked, as the fuselage tank booster pump is inoperative until approximately three-fourths of the fuel in either No. 1 wing tank has been consumed.
- This check may be accomplished while taxiing. Higher rpm on one engine is specified only to obtain a more rapid indication.

2-22. GROUND TESTS.

2-23. PILOT.

2-24. After engines are started, check the following:

a. Surface controls—surface control boost switch "ON." With assistance of copilot, test surface control boost system. (Refer to paragraph 1-99.) After test, check normal operation of controls.

b. Hydraulic system—test by operating wing flaps through complete cycle. Pressure in normal range.

c. Bomb doors—operate through four complete cycles, twice by emergency system and twice by main system. Cycle doors by emergency system first. (This check will bleed any air that might be in the lines, and help to ensure proper operation.)

WARNING

Check personnel clear before operating bomb doors.

d. Electrical system—have copilot make electrical checks.

2-25. COPILOT.

2-26. At request of pilot, check electrical system as follows:

a. Inverters—test operation at "SPARE ON"; then position at "MAIN ON." The warning light will illuminate if selected inverter is inoperative.

A-1,A-5(1)

b. Alternators—test "RIGHT ALT."; then select "BOTH ALT."

A-5(2),C

Alternators—test each alternator on each bus; then select "BOTH ALT NORM." One bus indicator light will illuminate at every position of selector except "BOTH ALT NORM."

c. Voltage—check a-c voltmeter for reading of 115 volts at each position of a-c voltmeter selector (engine rpm above 50%); check d-c voltmeter for reading of 28 (±.5) volts at each position of d-c voltmeter selector (engine rpm above 40%).

d. Generators—check ammeter readings. All readings should be uniform if regulators are functioning properly.

2-27. TAXIING INSTRUCTIONS.

2-28. Observe the following general instructions for taxiing:

a. Release emergency brakes. Check toe brakes.

A-1

b. Use approximately 50% to 70% rpm on each engine. If desired, the airplane may be taxied on two engines.

(1) AF47-23 thru AF47-76

A-5,C

Use approximately 40% to 50% rpm on each engine. If desired, the airplane may be taxied on two engines.

c. Maintain directional control by use of control wheel—steering trigger depressed. Do not use brakes for steering.

Note

- Nose wheel and control wheel must be aligned before steering mechanism will engage.
- If airplane has been inoperative several days, use of nose wheel steering will prevent nose wheel shimmy on take-off by eliminating air in the system.

d. Check emergency brakes individually, while taxiing.

e. Avoid excessive jockeying of power controls during taxi operation.

f. Minimize taxi time. Airplane range is considerably decreased by high fuel consumption during taxiing.

Note

Estimated fuel consumption with four engines operating at taxi rpm: 10-15 gallons per minute.

2-29. BEFORE TAKE-OFF.

2-30. After taxiing to take-off position, complete cockpit checks as follows:

a. Safety belt and shoulder harness tightened and inertia reel lock control unlocked.

b. Trim tabs (unassisted take-off): aileron and rudder 0°; elevator trim setting 0° (aft CG position—32%) to 10° "NOSE UP" (forward CG position—23.5%).

c. Wing flaps "20°" (unassisted take-off).

Note

Increasing flap setting for take-off will shorten the necessary ground run, but because of slower acceleration in the air, the distance required to clear an obstacle will be increased. Although the shortest combined ground run and air distance can be obtained with a flap setting of 30°, a setting of 20° is recommended because the distance required is only slightly greater and the take-off is safer in case of engine failure.

d. Check crew prepared for take-off.

e. Roll into position for take-off, heading airplane straight down runway with nose wheel centered.

A-1

2-31. Hold brakes on and check emergency fuel systems as follows:

(2) AF47-77 thru AF47-96



Figure 2-5. Electrical Control Panel on B-45A-5 (AF47-77 Through AF47-96) and B-45C Airplanes

a. Advance power controls for No. 1 and No. 3 engines to 100% rpm.

WARNING

If engine should overspeed by more than 4% rpm at any time (either with or without excessive exhaust temperature), the airplane is unsafe for flight.

b. Set power controls for No. 2 and No. 4 engines at 50% rpm.

Note

Engines are specified by number for clarity only. The check can be accomplished with either of the two engines within one nacelle at 100% rpm and the other engine at 50% rpm.

c. Emergency fuel system valve switches "OPEN."

d. Check engines No. 2 and No. 4 for a loss of approximately 6% rpm or less.

Note

This check provides a means of determining that the emergency fuel system (cross-feed) valve in each nacelle has opened. A difference in fuel pressure upstream of the fuel control valves on the two engines in each nacelle causes this drop in rpm. The *high rpm* engine is operating *within* the effective range of the overspeed governor (approximately 98-100% rpm) while the *low rpm* engine is operating *below* effective range of the overspeed governor, and is regulated only by the barometric control valve. The low rpm engine (No. 2 or No. 4 in this case) has the higher fuel pressure; consequently, when the emergency system valve is opened, fuel flows through the cross-feed line to the higher rpm engine. This flow of fuel

causes a loss of fuel pressure available to the low rpm engine and is reflected as a drop in rpm. If a drop of rpm on the low rpm engine is not noted, slowly advance throttle on low rpm engine until a *slight* overspeed is noted on high rpm engine. This deliberate overspeeding is allowed only for testing.

e. Retard power controls of No. 1 and No. 3 engines (high rpm engines) to 50% rpm—allow engines to stabilize.

f. Close both emergency fuel system valve switches.

g. Advance power controls to 100% rpm; then reopen emergency fuel system valve switches for take-off.

CAUTION

The emergency fuel system valve in each nacelle must be closed before: (1) movement of the power control of an engine operating at low rpm if the other engine within the nacelle is at 100% rpm; (2) movement of either power control if both engines in the nacelle are at 100% rpm. If the emergency fuel system valve is open when the power control is moved under the conditions described, the other engine will overspeed.

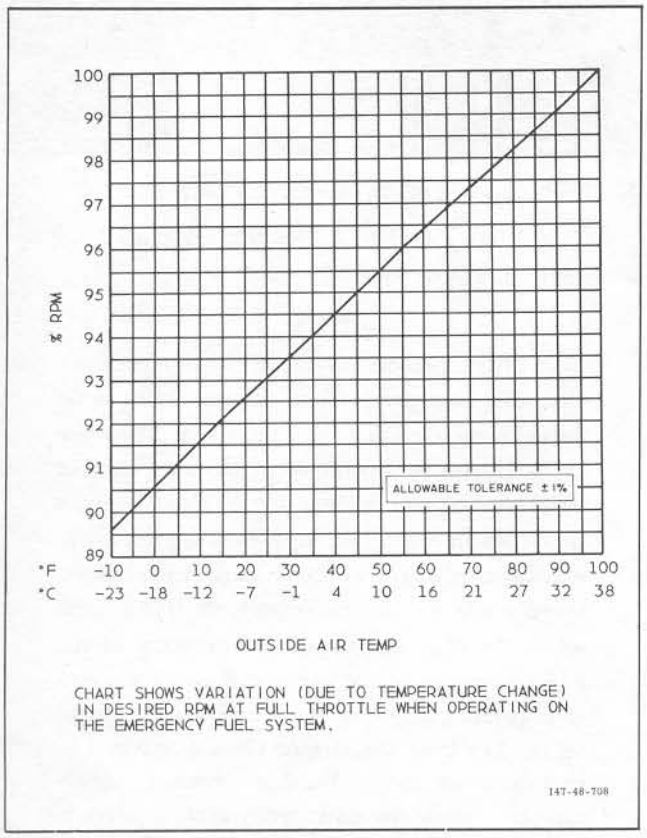


Figure 2-6. B-45A-5 and B-45C Emergency Fuel System Test—Maximum RPM Available

A-5,C

Hold brakes and test emergency fuel system on each engine as follows:

a. Open power control slowly to 100% rpm.

WARNING

If engine should overspeed by more than 4% rpm at any time (either with or without excessive exhaust temperature), the airplane is unsafe for flight.

b. Hold emergency fuel switch at "TEST" and check rpm. (See figure 2-6 for maximum rpm available when testing emergency fuel system.) Normally, a drop should be noted.

c. Move switch to "ON" for take-off.

2-32. With power controls at take-off rpm, check all engine instruments for desired readings. (See figure A-5 for take-off limits.)

2-33. TAKE-OFF.

2-34. NORMAL TAKE-OFF.

a. With power controls at take-off rpm, release brakes and start take-off run.

b. Use nose wheel steering for directional control until rudder becomes effective at approximately 50 mph (45 knots).

c. Between 90 to 110 mph (80 to 95 knots), ease control column back to lift nose wheel and allow airplane to fly itself off. Nose wheel lift-off speed will depend on airplane gross weight and CG at take-off.

d. Recommended speeds for normal take-off are approximately as follows:

GROSS WEIGHT	APPROXIMATE UNASSISTED TAKE-OFF SPEED (IAS)
90,000 lb	150 mph (130 knots)
80,000 lb	145 mph (125 knots)
70,000 lb	135 mph (110 knots)

e. Refer to Unassisted Take-off Charts (figures A-6 and A-7) for take-off distances.

Note

Refer to paragraphs 3-13, 3-15, and 3-17 for procedure in case of engine failure during take-off.

2-35. AFTER NORMAL TAKE-OFF.

a. When definitely airborne, landing gear selector control "UP." When gear and door position indicator lights are out, return control to "NEUTRAL." Approximately 11 seconds is required for gear retraction.

STALLING SPEEDS (IAS) — IDLING POWER												
GROSS WEIGHT	GEAR AND FLAPS UP						GEAR AND FLAPS DOWN					
	LEVEL FLIGHT		15° BANK		30° BANK		LEVEL FLIGHT		15° BANK		30° BANK	
	MPH	KNOTS	MPH	KNOTS	MPH	KNOTS	MPH	KNOTS	MPH	KNOTS	MPH	KNOTS
60,000	115	100	120	105	125	110	105	90	110	95	115	100
80,000	135	115	140	120	145	125	125	110	130	113	135	115
100,000	150	130	155	135	165	145	140	120	145	125	150	130

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Figure 2-7. Stalling Speeds—Idling Power

CAUTION

Do not exceed 185 mph (161 knots) IAS with gear down or gear doors open.

b. Level off over obstacles.

c. Wing flaps "UP." (See figure 2-7 for applicable stalling speeds.)

d. Maintain level flight and accelerate to best climbing speed before starting climb. (See Climb Charts for climbing speeds at various gross weights and altitudes.)

e. Emergency fuel system switches off after safe altitude is reached.

2-36. ASSISTED TAKE-OFF.

Note

When an assisted take-off is made, it is extremely important that the take-off be completed before the assist units expire. Time required for a complete take-off includes the time to clear an obstacle while raising the gear, attain an airspeed above flaps-up stalling speed, and raise the flaps.

a. Trim tabs: rudder and aileron 0°; elevator trim setting 0° (aft CG position—32%) to 10° "NOSE UP" (forward CG position—23.5%).

b. Wing flaps "20°."

Note

Shorter take-off distances can be secured by using 40° flaps with assist; however, 20° are recommended even though distances are slightly greater, because the time required for complete take-off is less. Furthermore, using 20° flaps affords the best chance for continued flight in case of engine failure or expiration of assist before take-off is complete.

c. In position for take-off, make sure airplane is headed straight down runway with nose wheel centered.

d. With power controls at take-off rpm, release brakes and move ATO ignite switch to "ON." Thrust indicating lights should go on within approximately 1½ seconds. If one or both lights do not go out within 2 seconds, shut off the assist units and throttle back on engines. A heavy yaw will result if one unit is operating; however, the airplane can be held straight by using nose wheel steering.

Note

Under certain conditions of take-off (clearing obstacles, etc), it will be advantageous to complete part of the ground run before igniting the assist units, thereby using the additional thrust through the latter part of the take-off. Inasmuch as the flaps must be retracted before assist units expire, correct analysis of the take-off to be made will determine at what part of the take-off run the assist units should be ignited. Delaying to start the assist units, however, has the disadvantage of increasing the ground run. In any case, ignite assist units before speed is so high that the airplane cannot be stopped if the units fail to fire.

e. Recommended speeds for assisted take-off are approximately as follows:

GROSS WEIGHT	APPROXIMATE ASSISTED TAKE-OFF SPEED (IAS)
115,000 lb	175 mph (150 knots)
110,000 lb	170 mph (145 knots)
100,000 lb	160 mph (140 knots)
90,000 lb and below	Same as unassisted

f. See Assisted Take-off Charts (figures A-8 and A-9) for assisted take-off distances.

2-37. AFTER ASSISTED TAKE-OFF.

a. When definitely airborne, landing gear selector control "UP." After gear is up, move landing gear selector control to "NEUTRAL."

b. Level off over obstacles for most rapid acceleration.

c. Raise wing flaps as quickly as possible as airspeed increases. Flaps should not be *full* "UP" until flaps-up stalling speed (figure 2-7) has been exceeded by a safe margin.

d. ATO ignite switch "OFF" when assist units expire (indicator lights on).

e. At an altitude of 500 feet, release assist units.

2-38. TAKE-OFF USING WATER INJECTION. C

a. Trim tab: rudder and aileron 0°; elevator trim setting 0° (aft CG position–32%) to 10° "NOSE UP" (forward CG position–23.5%).

b. Wing flaps "20°."

c. With the airplane at the end of the runway and power controls at take-off rpm, hold water injection switch at "PRIME" until all four lights illuminate. Then release switch.

CAUTION

Do not hold water injection switch at "PRIME" longer than 5 seconds. Failure of at least one light for a nacelle to illuminate indicates that water is not being delivered to that nacelle. Continuing to prime will destroy water injection pumps.

Note

If only one light for a nacelle illuminates, the related engine will provide a normal increase of thrust through a longer period of time, by using all of the water supply available for that nacelle. Yaw will not be excessive, and take-off can be continued, depending on take-off conditions.

d. Release brakes and start take-off run.

Note

If water supply to both engines in one nacelle fails after take-off is begun, considerable yaw will result. (However, the airplane can be held straight by use of nose wheel steering until rudder becomes effective, and the take-off can be continued with water injection to only two engines.) To shut off entire system, retard power controls, approximately ¼ inch, until lights go out. Then readvance power controls and continue take-off if conditions permit. See figures A-7 and A-10 for comparison of take-off distances with and without water injection.

e. See Water Injection Take-off Chart (figure A-10) for estimated take-off distances.

f. Recommended speeds for water injection take-off are approximately the same as for assisted take-off.

2-39. AFTER TAKE-OFF USING WATER INJECTION.

a. When definitely airborne, landing gear selector control "UP." After gear is up, move landing gear selector control to "NEUTRAL."

b. Level off over obstacles for most rapid acceleration.

c. Raise wing flaps.

d. When lights go out, water supply will be exhausted and system will automatically shut off.

Note

The system normally operates for 2 minutes, which allows ample time to retract the gear and raise flaps after becoming airborne, and before the water supply is exhausted.

2-40. CLIMB.

2-41. Climb at 100% rpm. Refer to Climb Charts (figures A-11, and A-13) for recommended airspeeds to be used during climb and for estimated rates of climb and fuel consumption.

A-1

If time to climb to a desired altitude exceeds 15 minutes (maximum for continuous engine operation at 100% rpm on engines without dovetail turbine buckets), use one of the following procedures:

a. For maximum rate of climb, use 96% rpm until rate of climb drops below 1000 feet per minute, then climb at 100% rpm.

b. If range must also be considered, use 15-minute climb periods at 100% rpm with alternate 5-minute level flight periods at 96% rpm.

2-42. DURING FLIGHT.

2-43. ENGINE OPERATION.

a. Retard power controls to desired settings. (See Appendix for cruise data.)

CAUTION

When engines are equipped with F-4 fuel flow regulators, minimum governed rpm at certain altitudes will be above that required for maximum cruise. (See figure 1-4.)

b. Periodically check for desired instrument readings. (See figure A-5.)

Note

During high-power operation at altitude (above approximately 25,000 feet), it may be necessary to retard power controls to keep exhaust temperature within limits. (Refer to paragraph 1-23.)

c. Periodically check for proper fuel system operation (tanks feeding evenly and in correct sequence). As each fuel tank is drained, turn related booster pump switch off.

Note

A moderate amount of fuel pressure fluctuation can be expected on some engines. Fluctuations of approximately 10 psi are normal and not an indication of malfunction. Such fluctuation is usually more pronounced at higher fuel pressures.

WARNING

Because of proximity of No. 1 and No. 2 wing fuel tank filler caps to the engine nacelles, leakage from the caps may create a serious hazard, because leaking fuel may flow into the nacelles. If such leakage is observed in flight, reduce airspeed and land as soon as possible. If an immediate landing is impractical, flight at reduced airspeeds will tend to decrease leakage.

d. Best engine acceleration is obtained by opening power controls slowly at first, then more rapidly as rpm increases.

WARNING

- Do not snap power controls open. At low altitudes, too rapid advancement of power controls will cause excessive exhaust gas temperatures; at high altitudes, surge or stall of compressors or flame-out may result.

A-5,C

- If engines are equipped with F-4 fuel flow regulators, accelerate *very* slowly (10 to 20 seconds from "IDLE" to full power) at high altitudes, as acceleration flame-out may occur even with normal power control advancement.

2-44. COMPRESSOR SURGE AND STALL. Compressor surge (or pulsation) may result from too rapid acceleration of the engines, especially at altitudes above 20,000 feet. If the acceleration is made at very high exhaust temperature, surge will be much more severe. If the rate of acceleration was a marginal case, surge may be absent and compressor stall will occur. Surge or stall may be recognized in flight by one or more of the following characteristics:

a. Loss of thrust, detected possibly by change in flight attitude (yaw).

b. Pulsating, roaring noise, accompanied by heavy engine vibration.

c. Rapid rise of exhaust temperature.

d. Loss of acceleration, and even possible deceleration, due to loss of thrust.

e. Long flame from tail pipe.

f. Possible flame-out at high altitude. (Refer to paragraphs 2-45 and 2-46.)

Note

Whenever such conditions are encountered, immediately retard related power control, reducing rpm on affected engine until exhaust temperature decreases; then accelerate more slowly to desired rpm.

2-45. ACCELERATION FLAME-OUT. Acceleration flame-out may result from compressor surge, and is most likely to be encountered at 35,000 feet or above. (Refer to paragraph 2-44.) If surge is not the cause, acceleration flame-out is most likely to occur between 75% rpm and 90% rpm, and can be avoided by accelerating at a lower rate. It is indicated by loss of thrust, drop in exhaust temperature, and deceleration. If the exhaust temperature does not drop too low (below 260°C), it may mean that some of the combustion chambers are still ignited. An attempt may be made to relight the other chambers by retarding the power control and then advancing it slowly.

A-1

2-46. DECELERATION FLAME-OUT. Too rapid retarding of the power control when operating between 75% and 90% rpm above 20,000 feet, may result in deceleration flame-out. Recovery may be made by advancing the power control and then retarding it slowly to the desired rpm, provided exhaust temperature has not dropped below 260°C. Otherwise, the engine will have to be restarted according to the emergency air restarting procedure.

2-47. HYDRAULIC SYSTEM CONTROL.

2-48. During flight, when hydraulic pressure is not required, relieve system pressure by turning hydraulic main system pressure control valve to "OFF." Reposition valve at "ON" before attempting to operate any hydraulically actuated unit.

2-49. AUTOMATIC PILOT OPERATION.

2-50. ENGAGING AUTOMATIC PILOT. To engage automatic pilot, proceed as follows:

CAUTION

Do not engage auto-pilot while in a turn.

a. Check automatic approach controller selector at "AUTOPILOT."

b. Check engaging handles at "DISENGAGE."

c. Turn pilot switch "ON."

d. Check control indicator light on. If necessary, press transfer button to obtain control.

e. Trim airplane in desired attitude.

f. Center aileron trim knob.

g. Check for zero deflection of auto-pilot trim indicators.

CAUTION

Do not engage handles if indicators show maximum deflections.

h. Move engaging handles to "ENGAGE."

Note

If turn-and-bank indicator shows slip or skid, check to see if wings are level. If wings are not level, correct by adjusting auto-pilot aileron trim knob.

i. Turn altitude control "ON" if desired.

2-51. MANEUVERING WITH AUTOMATIC PILOT. Maneuvering with auto-pilot can be accomplished as follows:

a. To make coordinated turns, move flight controller left or right until desired angle of bank is obtained. Airplane will return to level flight when flight controller is centered.

b. To trim into a constant rate of climb or glide, adjust pitch trim wheel fore or aft. (Altitude control must be "OFF.")

c. To climb or glide for a short period of time, move flight controller fore or aft to desired rate of climb or glide.

2-52. DISENGAGING AUTOMATIC PILOT. To disengage auto-pilot, proceed as follows:

a. Press release switch on control wheel, or

b. Move engaging handles to "DISENGAGE" and turn pilot switch "OFF."

2-53. FLIGHT CHARACTERISTICS.

2-54. Flight characteristics of the B-45 are completely normal for a large bomber, except for the differences common to jet aircraft. These differences are caused principally by lack of propeller slipstream over the wing and by lack of propeller drag. Lack of propeller slipstream causes the difference between power-on and power-off stalling speeds of a jet airplane to be considerably less than that of propeller-driven aircraft. The lack of propeller drag results in slower deceleration of the jet airplane in the power-off condition. (These differences are applicable whether gear and flaps are up or down.)

2-55. MANEUVERABILITY.

2-56. Although the B-45 is a relatively large airplane, hydraulic boost on all surface controls provides exceptional maneuverability with moderate pilot effort, even at the high airspeeds possible in level flight or in diving. Both the ease of control and the high operating speeds make it necessary that you remember always that the airplane is designed as a bombardment aircraft with a maximum allowable load factor which varies with loading conditions, gross weight, and airspeed. (See figure A-5.) It is easily possible, when maneuvering at low altitudes, even at high cruise speeds, to exceed these limits by attempting a turn of short radius or making a sharp pull-up; consequently, learn to fly the airplane by "feel" and by reference to the accelerometer, rather than by ground reference. At low airspeeds with an aft CG condition, the elevator force required to reach the limit load factor becomes relatively light, and caution is necessary. In turbulent air, or when high compressibility buffet is encountered, you must depend mainly on your own judgment, since shock loads from gusts and buffet cause the accelerometer to overswing and indicate readings much higher than actual. Even moderate turbulence produces an extremely rough ride at maximum level flight speed, but the airplane handles very well with no tendency to oscillate directionally. Air that seems only moderately rough at 300 mph produces violent shocks at airspeeds above 460 mph. Therefore, it is recommended that airspeed be maintained within the green ranges shown in figure 2-8 whenever turbulence is encountered.

2-57. SURFACE CONTROL BOOST CHARACTERISTICS. The hydraulic boost systems supply boost assistance to all surface controls, reducing the amount of force required for their movement. During normal flight with boost on, load feel of all controls increases in proportion to the amount of deflection (as it does with unboosted controls). A condition known as boost "chatter," a vibration of moderate frequency and small amplitude, may be encountered during normal use of any control surface, although it most commonly occurs when large aileron deflections are used. Appearance of such chatter should not cause any great concern, as it is merely uncomfortable and does not damage the airplane or cause any appreciable loss of boost. Moving the controls back and forth several times may cure chatter in flight, and the possibility of its occurrence may be lessened by working the controls full throw several times before taxiing out for take-off.

2-58. In the event of failure of hydraulic boost to any surface, control forces become very high, but the airplane is still flyable. (Refer to paragraphs 3-56 through 3-66.) While such malfunction should be infrequent, it is recommended that the airplane always be kept in trim so that it will not be necessary to overcome excessive forces in the event of sudden loss of boost. This will also make the airplane more comfortable to fly and

will train you for emergency use of the tabs. To become familiar with the effect of boost failure on control forces, you may turn off either boost system by means of the related switch. To turn off rudder and elevator boost, place surface control boost switch at "OFF"; to turn off aileron boost system, place aileron boost cutout switch at "ON." However, before boost is turned off, the airplane must be well trimmed for zero control force.

Note **A-1**

If the airplane is trimmed boost-on, and boost is turned off, the loss of elevator boost will cause the airplane to nose up sharply because of being normally trimmed against the force exerted by the elevator bungee. Conversely, if the airplane is trimmed without boost, and boost is turned on, the airplane will nose down.

2-59. STALLS.

2-60. The stall in this airplane is mild, with gentle pitch and no rolling tendency. With flaps and gear up, stall warning is provided by a pronounced tail buffet starting about 6 to 8 mph (5 to 7 knots) above stall. In the landing condition, flaps and gear down, no buffet is apparent. Some rearward stick travel and nose-down pitching occurs prior to actual stall in this condition. Stalls, power-on, are characterized by a steeper stalling angle, but the difference between power-on and idling power stalling speeds (figure 2-7) is small. Recovery from stall is entirely normal—release back pressure on control column and advance power controls.

2-61. SPINS.

2-62. Intentional spins are prohibited. In case a spin is entered accidentally, normal recovery procedure is recommended.

2-63. DIVING.

2-64. The B-45 is a very clean airplane and operates close to maximum permissible speed in level flight, so care must be used in power-on dives to avoid exceeding permissible limits. For most operating altitudes, the limit is determined by Mach number rather than airspeed, but will be continuously indicated for the particular altitude at which the airplane is flying by the red hand on the airspeed indicator. Below the limit, the airplane has no vibration or buffet, but as the limit Mach number is approached, light variations in elevator force may be encountered, usually resulting in a slight diving tendency. This tendency is easily controlled, but it is wise to keep the airplane in trim so unusually high elevator forces will not be necessary. Remember that any change in trim made during the dive will also require trim in the opposite direction during recovery to avoid high elevator forces.

2-65. The limit Mach number chosen coincides with the beginning of a light compressibility buffet, which will be observed as a gentle shuddering of the airplane. This provides good warning of the safe limit for general operation. No serious instability will be encountered at speeds below the limit, but if the limit is exceeded inadvertently, rapid changes in elevator force, accompanied by heavy buffet, may take place. The airplane will be controllable; however, it may be advisable to use trim to avoid high elevator forces. The trim is effective at any speed, and the elevator trim auxiliary control switch on the wheel is easily accessible in such an emergency.

2-66. TURBULENT AIR AND THUNDERSTORM FLYING.

CAUTION

Thunderstorm flying demands considerable instrument experience and should be intentionally undertaken only by pilots able to qualify for the AF Form 8A (Green) instrument card. However, many routine flight operations require a certain amount of thunderstorm flying, since it is often impossible to detect individual storms and find the in-between clear areas. A pilot, using modern equipment and possessing a combination of proper experience, common sense and instrument flying proficiency, can safely fly thunderstorms.

2-67. Power setting and pitch attitude are the keys to proper flight technique in turbulent air. The power setting and pitch attitude required for desired penetration airspeed should be established before entering the storm. This power setting and pitch attitude, if maintained throughout the storm, must result in a constant airspeed, regardless of any false readings of the airspeed indicator. Specific instructions for thunderstorm flying are given in the following paragraphs 2-68 through 2-71.

2-68. BEFORE TAKE-OFF.

a. Check Turbulent Air Penetration Speed Chart for best penetration speed.

b. Make a thorough analysis of the general weather situation to determine thunderstorm areas and prepare a flight plan which will require least exposure of the airplane to regions of possible thunderstorms.

c. Be sure to check proper operation of all flight instruments, navigation equipment, pitot heaters, instrument panel lights, and anti-icing equipment before undertaking any instrument flight and also before attempting flight into thunderstorm areas.

2-69. APPROACHING THE STORM.

2-70. It is imperative that you prepare the airplane prior to entering a zone of turbulent air. If the storm cannot be seen, its proximity can be detected by radio crash static. Prepare the airplane as follows:

a. Be sure the altitude control is turned off if the auto-pilot is being used.

b. Adjust power controls as necessary to obtain safe penetration speed. (See figure 2-8.)

c. Pitot heater switch "ON."

d. Check gyro instruments for proper settings.

e. Safety belt fastened.

f. Turn off any radio equipment rendered useless by static.

g. At night, turn cockpit lights full bright or use dark glasses to minimize blinding effect of lightning.

CAUTION

Do not lower gear and flaps, as they merely decrease the aerodynamic efficiency of the airplane.

2-71. IN THE STORM.

a. Maintain power setting and pitch attitude (established before entering the storm) throughout the storm. Hold these constant and your airspeed will be constant, regardless of the airspeed indicator.

b. Devote all attention to flying the airplane.

c. Expect turbulence, precipitation, and lightning. Don't allow these conditions to cause undue concern.

d. Maintain attitude. Concentrate principally on holding a level attitude by reference to the artificial horizon.

e. Maintain original heading. Do not make any turns unless absolutely necessary.

f. Don't chase the airspeed indicator, since doing so will result in extreme airplane attitudes. If a sudden gust should be encountered while airplane is in a nose-high attitude, a stall might easily result. A heavy rain, by partial blocking of the pitot tube pressure head, may decrease the indicated airspeed reading considerably.

g. Use as little elevator control as possible to maintain your attitude in order to minimize the stresses imposed on the airplane.

h. The altimeter may be unreliable in thunderstorms because of differential barometric pressure within the storm. A gain or loss of several thousand feet may be expected. Make allowance for this error in determining minimum safe altitude.

Note

Altitudes between 10,000 and 20,000 feet are usually the most turbulent areas in a thunderstorm. The least turbulent areas will be above 30,000 feet. Therefore, altitudes in excess of 30,000 feet are recommended for thunderstorm penetration.

2-72. DESCENT.

2-73. When the quickest possible descent from high altitude is desired, effective use may be made of the red limit hand on the airspeed indicator and the warning provided by compressibility buffet. Retard power controls to the idle stop, and gradually increase the dive angle and airspeed until the two airspeed hands coincide or a light buffet is felt. Maintaining this condition throughout the descent will result in a very rapid loss of altitude and a relatively steep dive angle, without exceeding the limitations on the aircraft.

2-74. APPROACH.

Note

A

Maximum landing gross weight is 90,500 pounds. (This weight does not include tip tank fuel, since landings are prohibited with fuel in tip tanks.)

C

Maximum landing gross weight is 112,965 pounds.

Obviously, landings at gross weights in excess of design landing weight (66,000 pounds) should be made only in case of emergency, since these weights are overload for landing and exceed the normal design limits of the airplane. Extreme care must be used when such a landing is necessary.

2-75. The glide angle, even with all four engines at idling power, is extremely flat. The airplane must be leveled off or climbed slightly to reduce speed enough to lower gear and flaps. During approach to field for landing, make the following checks:

a. Crew prepared for landing.

b. Safety belt and shoulder harness tightened and inertia reel lock control unlocked.

c. Automatic pilot engaging handles at "DISENGAGE"; pilot switch "OFF."

d. Hydraulic main system pressure control valve "ON." Check pressure.

e. Anti-icing switches normally off.

WARNING

Exercise extreme caution when using surface anti-icing for landing, because operation of the system causes a reduction in thrust available should go-around be necessary. (Refer to WARNING in paragraph 4-95.)

f. Fuel cross-flow shut-off valve switches "OPEN."

g. Emergency fuel system switches on.

h. Landing gear selector control "DOWN" below 185 mph (161 knots) IAS. Check gear position indicator lights; then return control to "NEUTRAL." Approximately 15 seconds is required for gear extension.

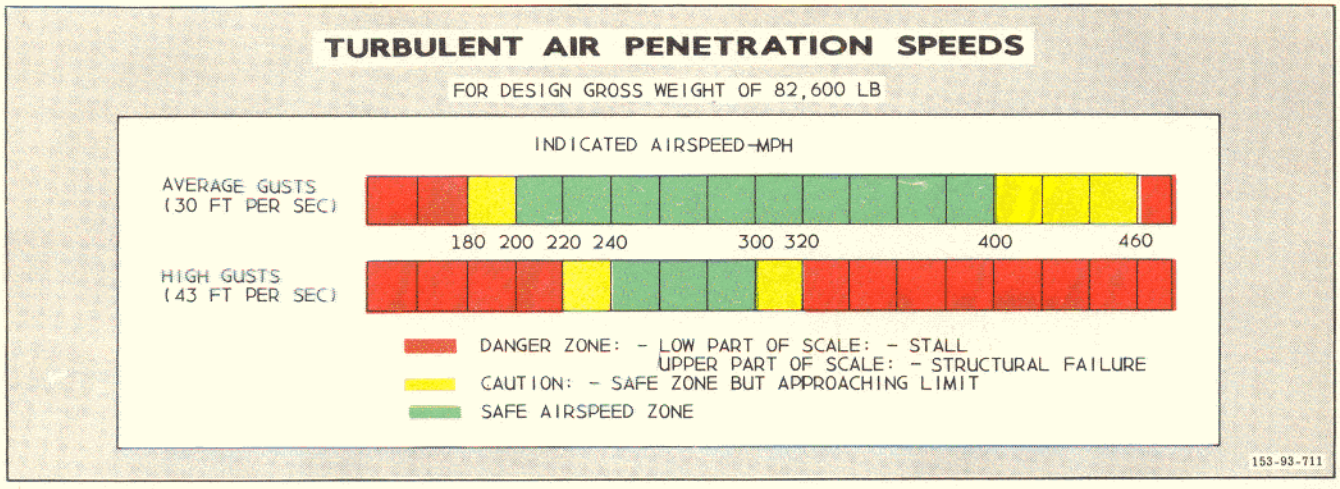


Figure 2-8. Turbulent Air Penetration Speeds

Note

Gear door position indicator light will be illuminated because main gear doors are open, and will remain open until gear selector is again placed at "DOWN," and airplane is on the ground. Open gear doors provide additional deceleration in both the approach and landing roll.

A-1

i. Plan approach to require a minimum of 72% rpm in pattern.

A-5,C

Plan approach to require a minimum of 57% rpm in pattern.

Note

- To ensure adequate acceleration in an emergency, it is desirable to use more flap and higher power on approach than are normally used with propeller-driven aircraft.

A-5,C

- Too rapid acceleration from engine speeds below 64% rpm may cause compressor stall.

j. Wing flaps 20° to 30° down on down-wind leg. (Maximum flap lowering indicated airspeed—185 mph (161 knots).)

k. Check engine instruments for desired ranges. (See figure A-5.)

2-76. LANDING.

2-77. NORMAL LANDING.

Note

See figure 2-8A for landing pattern and figures A-17 and A-18 for landing distances.

a. Wing flaps full "DOWN" on final approach. Maintain a slightly flat approach, holding approximately the following applicable indicated airspeed:

GROSS WEIGHT	MPH—IAS	KNOTS—IAS
70,000 lb	150	130
60,000 lb	140	120
50,000 lb	130	115

Note

Full flaps and a slightly flat approach will permit maintaining engine speed high enough for rapid acceleration in case of go-around.

aA. Gradually reduce power, but maintain the following applicable airspeed until over the fence (assumed to be a 50-foot obstacle):

GROSS WEIGHT	MPH—IAS	KNOTS—IAS
70,000 lb	140	120
60,000 lb	130	115
50,000 lb	120	105

b. When landing is assured, retard power controls to idle stop.

c. During flare, the airplane has a definite tendency to float without much loss of speed or altitude. This floating tendency makes it possible to flare smoothly from speeds close to stall. To reduce the ground distance of the flare, the airplane may be flown on to the ground with touch-down before stall.

d. Touch main wheels first, tail slightly down; then lower nose wheel gently. Apply brakes lightly at first to prevent locking wheels.

e. Nose wheel steering may be engaged as soon as desired, but the airplane can be guided more easily at high speed with brakes. (Nose wheel and control wheel must be aligned before steering mechanism will engage.)

CAUTION

Do not shut down two engines after landing to minimize landing roll, because fuel may flow into dead hot engines and create a fire.

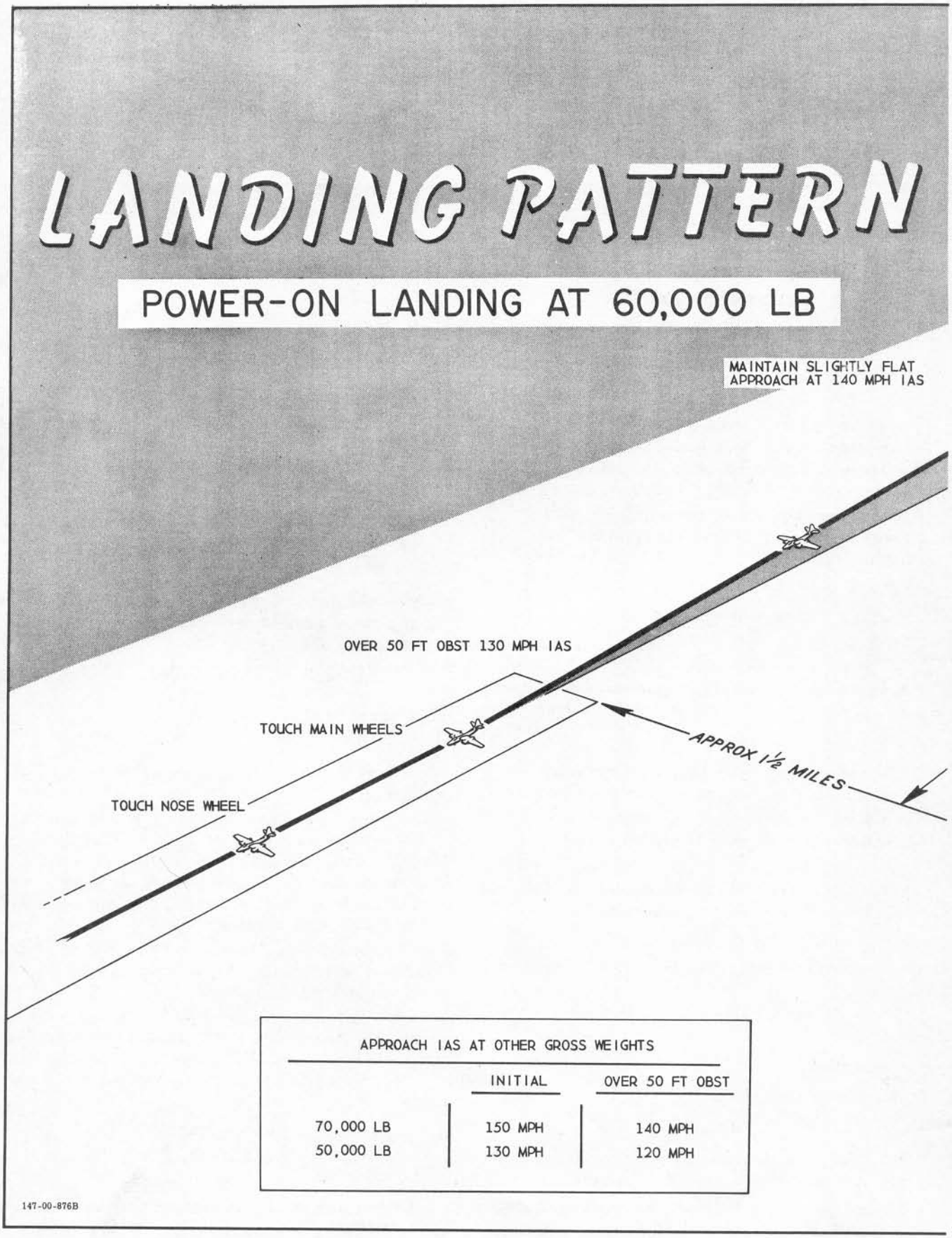


Figure 2-8A (Sheet 1 of 2 Sheets). Landing Pattern

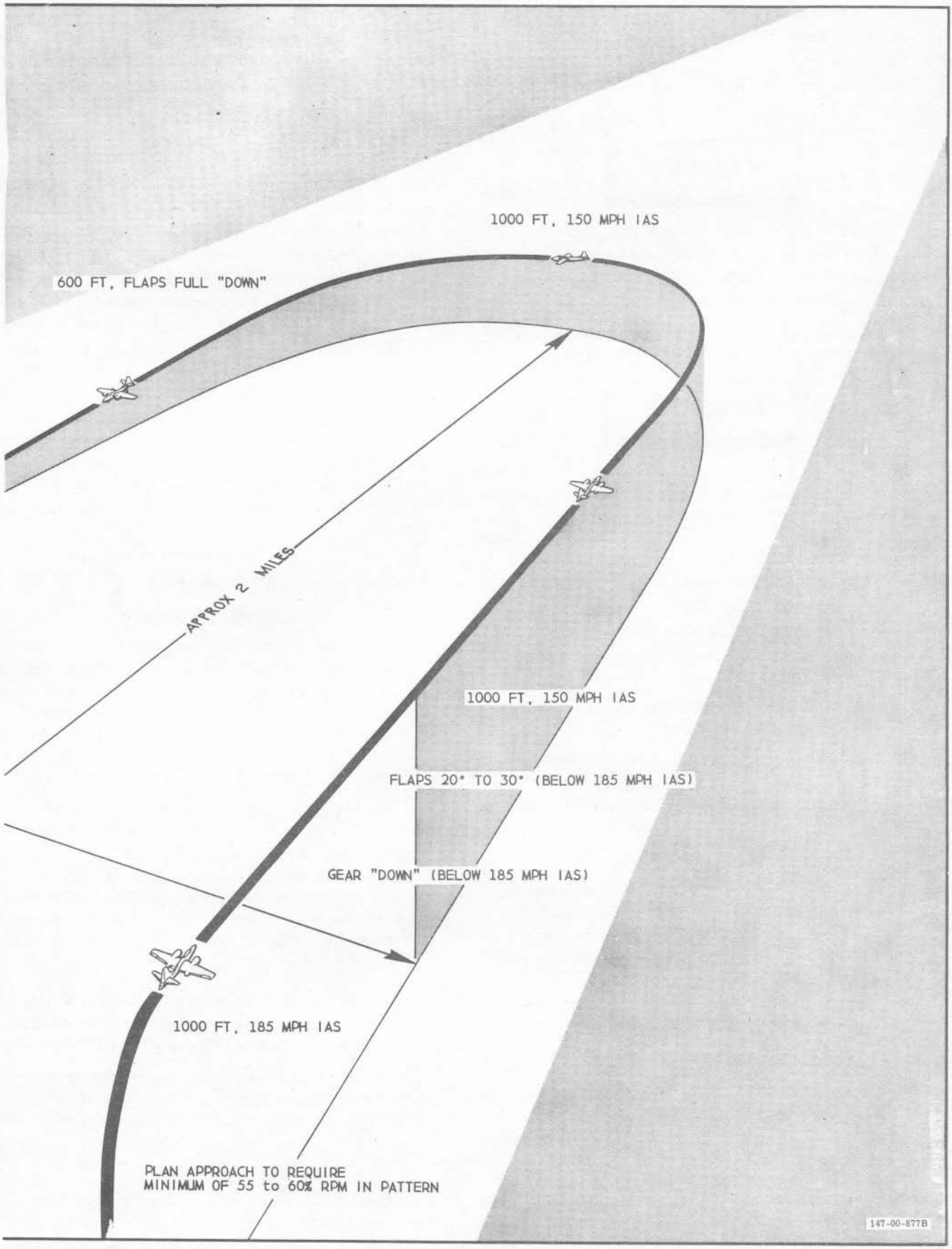


Figure 2-8A (Sheet 2 of 2 Sheets). Landing Pattern

2-78. AFTER LANDING.

a. Wing flaps "UP" before taxiing.

A-1

b. Emergency fuel system valve switches off.

2-79. GO-AROUND.

WARNING

Make decision to go around as early as possible. The acceleration characteristics of a jet airplane are definitely inferior to those of a propeller-driven airplane.

a. Advance power controls to take-off power as slowly as circumstances (engine rpm and IAS) permit.

WARNING

A-1

Too rapid acceleration below 75% rpm may result in compressor stall or surge.

A-5,C

Too rapid acceleration below 64% rpm may result in compressor stall.

b. Retract gear immediately. (Return control to "NEUTRAL" when all indicator lights are out.)

c. Gradually raise flaps as airspeed increases. (See figure 2-7 for applicable stalling speeds.)

2-80. AUTOMATIC APPROACH ON AUTOMATIC PILOT.

2-81. To make instrument approach on automatic pilot, proceed as follows:

a. Turn on instrument approach radio receivers according to instructions in paragraph 4-48.

Note

Power switch on instrument approach radio panel must be "ON" approximately 20 minutes before approaching landing area.

b. Check automatic approach control selector switch at "AUTOPILOT."

c. Engage automatic pilot.

d. Check green "approach ready" light on.

WARNING

Do not attempt automatic approach if green light is out.

e. At an altitude of approximately 2000 feet (above runway elevation), approach localizer beam at an angle within 90 degrees of the beam heading at a point 12 to 15 miles from runway (transmitter).

f. Reduce speed, lower gear and lower flaps 15 to 20 degrees. Check auto-pilot trim indicators and, if necessary, adjust trim manually with trim tab control stick.

g. When localizer needle on cross-pointer indicator leaves its stop, turn automatic approach control selector switch to "LOCALIZER."

h. Auto-pilot altitude control "ON" if desired.

i. After airplane has turned on center of course (localizer needle centered), set flaps and power for landing. Power settings should be same as for normal approach pattern. Airspeed should be 150 mph (IAS). Adjust elevator trim manually if necessary.

j. Before glide path beam is intersected, turn altitude control "OFF" and rotate auto-pilot pitch trim wheel for 2.5 degrees nose down (estimate by reference to artificial horizon); then return altitude control to "ON," which will return airplane to a level attitude at a slightly lower altitude.

k. Just before glide path needle reaches center position, turn automatic approach control selector switch to "APPROACH." (Altitude control automatically snaps "OFF," and airplane returns to a 2.5-degree nose-down attitude.)

WARNING

Local disturbances (such as taxiing aircraft and moving vehicles near ground transmitters) may deflect or distort beams sent out by transmitters. Such distortion will affect control action during automatic approach. Be prepared for such a possibility, particularly on final approach and near ground.

l. Adjust power settings to maintain constant airspeed of 150 mph (IAS) while descending on glide path.

m. During descent, adjust elevator trim manually with trim tab control stick to maintain alignment of auto-pilot elevator trim indicator. This adjustment is necessary to ensure proper pitch trim of the airplane when the auto-pilot is turned off just before landing.

Note

If large deviations are shown on cross-pointer indicator, use pitch action of flight controller to approximately center the glide path needle.

n. At desired altitude above runway, press auto-pilot release switch (disengaging auto-pilot and turning off automatic approach equipment), and complete landing manually.

Note

Failure of instrument approach equipment causes safety circuit to operate, putting out "fly-up" signal. Auto-pilot will automatically change airplane attitude to a 2½ degree climb.

2-82. STOPPING ENGINES.

2-83. Stop engines as follows:

WARNING

To minimize danger of explosion or fire due to accumulation of fuel vapor, always park airplane headed into wind when possible, and wait at least 15 minutes after any engine operation (flight or ground) before moving airplane into hangar.

a. Emergency brake levers locked "ON."

CAUTION

Never set brakes if they are overheated.

b. Idle engines at approximately 40 to 45% rpm to stabilize engine speed.

c. Pull power controls sharply to "OFF."

d. After engines have stopped rotating, turn all booster pump switches off.

e. Then close engine fuel shut-off valves.

f. Leave cross-flow shut-off valves "OPEN," to relieve pressure between the filters in the cross-flow line.

g. Turn off all other switches (except generator).

A-5,C

2-84. TURBINE NOISE DURING SHUT-DOWN.

2-85. The light scraping or squealing noise which may be heard during engine shut-down results from interference between the turbine buckets and turbine shroud. Contact of the two parts is due to the tendency of the shroud to shift and distort under varying temperature conditions, such as are induced by engine shut-down. Light scraping, while undesirable, does not damage either part; however, in order to minimize it, idle engines for approximately 5 minutes before shut-down after any high-power operation (either flight or ground). If, despite this precaution, heavy scraping does occur on shut-down, do not attempt to restart an engine until turbine temperature has dropped sufficiently to provide adequate clearance between the buckets and shroud, since a starting attempt might result in destruction of the starter. If a start must be made when interference is suspected, station an observer near the tailpipe nozzle to check that engine begins to turn as soon as starter is engaged.

WARNING

Station observer at sufficient distance from tail pipe to avoid injury in case of explosive ignition of accumulated fuel vapor.

A

If rotor does not begin turning at starter engagement, release starter switch immediately.

C

If rotor does not begin turning at starter engagement, place starter switch at "STOP" immediately.

2-86. BEFORE LEAVING AIRPLANE.

2-87. Before leaving airplane, make the following checks:

a. Controls lock "ON."

b. Chock wheels; then release brakes.

c. Hydraulic main system pressure control valve "OFF."

d. Complete Forms 1 and 1A.

e. Make sure landing gear ground locks are installed.

f. Make sure bomb door ground locks are installed if bomb bay doors are open.

g. Insert the safety pin in each ejection seat catapult, above the sear.

h. Insert trigger lockpin in the right armrest guard of each ejection seat.

Section III

EMERGENCY OPERATING INSTRUCTIONS

3-1. FIRE.

3-2. ENGINE FIRE DURING STARTING PROCEDURE.

C

3-3. If an overheat detector light (amber) illuminates:

a. Retard power control on affected engine.

b. If overheat detector light does not go out, use fire extinguishing procedure, given in paragraph 3-4.

3-4. If a fire detector light comes on, or there is other indication of external fire:

a. Power controls "OFF" for both engines in affected nacelle.

b. Starter switch "OFF." A

Starter switch positioned at "STOP." C

c. Engine fuel shut-off valve switches closed.

d. Wing tank fuel boost pump switches on related side of airplane off. Cross-flow shut-off valve switches closed.

C

Wing tip tank switch on related side of airplane "OFF."

e. If fire does not go out, press fire extinguisher switch toward affected nacelle.

f. If fire still is not extinguished, shut down other engines.

g. Notify crew to abandon airplane.

CAUTION

This procedure should not be construed to require immediate shut-down in case of a "hot start." When a hot start occurs, the engine should instead be brought up to a high idle speed (50% to 60% rpm) as rapidly as possible and allowed to stabilize before shut-down.

3-5. ENGINE FIRE DURING FLIGHT.

C

3-6. If an overheat detector light (amber) illuminates:

a. Retard power control on affected engine.

b. If overheat detector light does not go out, use fire extinguishing procedure, given in paragraph 3-7.

3-7. If a fire detector light illuminates, or there is other indication of fire during flight:

Note A

False warnings may be given when rapid changes of temperature occur within a nacelle. For example, the aft compartment, between the tail pipes of a nacelle, cools in a prolonged glide or dive. Subsequently, if power controls are suddenly opened, rapid increases in temperature may cause detector lights to illuminate. Therefore, consideration should be given to conditions of flight immediately preceding warning.

a. Power control for affected engine "OFF."

b. Related engine fuel shut-off valve switch closed.

c. If light does not go out, shut down other engine in nacelle.

d. Shut off fuel supply (wing tanks on related side of airplane and cross-flow shut-off valves).

C

Wing tip tank switch on related side of airplane "OFF."

e. Press fire extinguisher switch toward affected nacelle.

f. Do not restart engine on which fire was originally indicated.

3-8. FUSELAGE FIRE.

3-9. In case of fuselage fire, proceed as follows:

a. If fire reported is located in the forward pressurized compartment, order crew to use oxygen and turn cabin air valve (16, figure 1-12) to "DUMP VALVE OPEN."

b. Use hand fire extinguishers. (See figure 3-1.)

c. If source of fire is electrical, turn off switches controlling faulty circuits. When it is impossible to isolate an electrical fire, turn battery switch off and instruct copilot to turn generator and alternator switches off.

CAUTION

Land as soon as possible. Much of the airplane's equipment will be inoperative when the electrical power source is shut off.

d. If fire is caused by leaking fuel lines, turn off applicable booster pump switches.

3-10. WING FIRE.

3-11. In case of wing fire, proceed as follows:

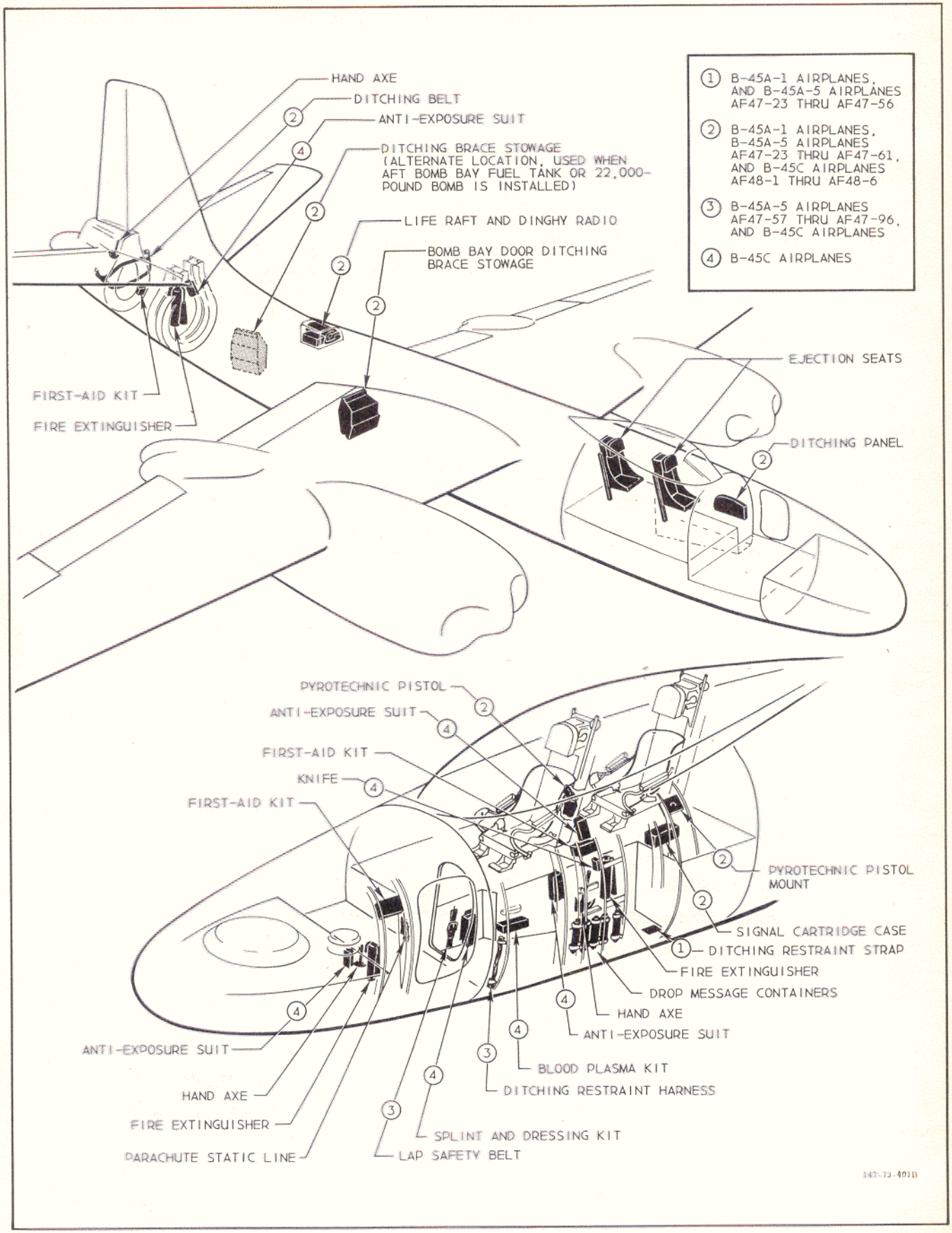


Figure 3-1. Emergency Equipment

a. Turn off all switches controlling electrical installations in affected wing.

Note

If wing tank fuel booster pumps are turned off, open fuel cross-flow shut-off valves.

b. When possible, attempt to extinguish fire by sideslipping airplane away from flame.

3-12. ENGINE FAILURE.

3-13. ENGINE FAILURE DURING TAKE-OFF RUN.

a. Retard power controls to "OFF" immediately, and apply brakes.

b. Nose wheel steering may be used to turn off the runway, if speed is not excessive.

3-14. ENGINE FAILURE DURING TAKE-OFF—CONTINUED FLIGHT.

3-15. If an engine fails immediately after take-off, quickly determine whether attained airspeed and altitude will permit continued flight, or if a forced landing must be made. It is estimated that continued flight is possible after a single-engine failure during an unassisted take-off with 20-degree flaps, if the maximum gross weight of the airplane does not exceed the following:

	NACA STANDARD DAY		ARMY HOT DAY	
AIRPLANE MODEL	A-5 & C	A-1	A-5 & C	A-1
ALTITUDE				
Sea Level	105,000 lb	80,000 lb	95,000 lb	70,000 lb
3000 feet	100,000 lb	75,000 lb	90,000 lb.	65,000 lb
6000 feet	90,000 lb	70,000 lb	80,000 lb	60,000 lb

WARNING

While it is estimated that flight may be continued at and below specified weights, a successful take-off may not be possible if there is an obstacle to clear.

If continued flight is possible, proceed as follows:

a. Power control on dead engine "OFF."

b. Landing gear selector control "UP." After gear is up, move landing gear selector control to "NEUTRAL."

Note

If either No. 2 or No. 4 engine has failed, time required for gear retraction will be increased slightly, because only one hydraulic pump will be operating.

c. Bomb and fuel tank salvo control switch "ON." Close bomb doors as soon as possible.

WARNING

Before any take-off, bomb and fuel tank salvo selector switch should be positioned at "ALL." When aft shackles (Type D-7) for 2000 or 4000-pound bombs are installed, set salvo selector switch at "BOMBS ONLY." If bombs are installed, make sure bombardier-navigator's master switch is off, so that bombs will drop unarmed if emergency salvo is necessary.

d. Raise wing flaps as soon as practicable. (See figure 2-7 for applicable stalling speeds.)

e. Gain as much speed as possible before starting climb.

f. Complete engine shut-down. (Engine fuel shut-off valve switch closed, generator switch "OFF"—signal copilot.)

g. If either No. 1 or No. 3 engine has failed, make sure operating alternator is selected.

3-16. ENGINE FAILURE DURING TAKE-OFF—FORCED LANDING.

3-17. If it is impossible to maintain flight after engine failure during take-off, accomplish as much of the following as time permits:

a. Power controls "OFF."

b. Landing gear selector control "UP." After gear is up, move landing gear selector control to "NEUTRAL."

Note

If either No. 2 or No. 4 engine has failed, the landing gear retraction will be slower than normal, because only one hydraulic pump will be operating.

c. If flaps have been raised, move control to desired setting. If necessary, position forward emergency hydraulic selector at "WING FLAPS DOWN."

d. If sufficient altitude is available, jettison bomb bay fuel tanks and bombs. Close bomb doors if possible. (Refer to WARNING following paragraph 3-15c.)

e. Jettison canopy.

WARNING

Pilot and copilot must lower heads and bodies as far as possible when jettisoning canopy. Crew member jettisoning canopy must signal other compartment occupant before pulling release.

f. Lock shoulder harness.

CAUTION

The pilot is prevented from bending forward when the control is in the locked position; therefore, all switches not readily accessible should be "cut" before moving the control to the locked position.

g. Land straight ahead, changing direction only enough to miss obstacles.

Note **A-1**

Aileron boost available after No. 1 and No. 3 engines are shut down will depend on windmilling speed of engines.

A-5,C

Aileron boost available after No. 2 and No. 4 engines are shut down will depend on windmilling speed of engines.

Elevator and rudder boost will be effective as long as electric power is available.

h. Instruct bombardier-navigator to jettison main entrance hatch just before landing, as impact may jam hatch and prevent jettisoning later.

3-18. ENGINE FAILURE DURING FLIGHT.

3-19. ENGINE SHUTDOWN. To shut down dead engine, proceed as follows:

a. Power control "OFF."

b. Engine fuel shut-off valve switch closed.

c. Generator switch "OFF." (Signal copilot.)

d. Make necessary power adjustments on operating engines.

e. Adjust airplane trim.

f. Jettison bomb bay fuel tanks and bombs as required.

WARNING

Make sure that bombardier-navigator's master switch is off, before jettisoning bombs.

g. Cross-flow shut-off valve switches "OPEN," to make all the fuel supply available to operating engines.

3-20. FLIGHT WITH INOPERATIVE ENGINES. The following operational notes apply to flight under various conditions of engine failure:

a. Alternating current supplied by the alternators will not be available if the No. 1 and No. 3 engines are shut down. If either the No. 1 or No. 3 engine has failed:

A-1,A-5(1)

Make sure operating alternator is selected.

Select the desired bus. **A-5(2),C**

b. Main hydraulic system will be inoperative if No. 2 and No. 4 engines are shut down.

c. If either of the following engines is shut down, the effective aileron boost will depend on the windmilling speed of that engine; however, if this speed falls below 15% rpm, aileron boost will be inoperative:

Engine No. 1 or No. 3 **A-1**

Engine No. 2 or No. 4 **A-5,C**

d. Stalling speeds with various combinations of engine failure are approximately the same as normal stalling speeds. (See figure 2-7.)

e. It is safe to turn into a dead engine if adequate airspeed is maintained or if power on operating engines is not too high. The available power on each side of airplane should be balanced.

f. For maximum range at high altitudes (with one or two engines inoperative), set power controls at maximum continuous rpm and maintain 200 mph IAS with B-45A Airplanes, 250 mph IAS with B-45C Airplanes. Allow airplane to descend until level flight can be maintained at this airspeed. Hold this altitude using maximum continuous rpm until gross weight decreases to where normal operation can be used. Refer to applicable Flight Operation Instruction Chart in the Appendix for normal operation at this altitude.

A-1

g. Service ceilings with inoperative engines are as follows:

100% RPM ON OPERATING ENGINES
NACA STANDARD DAY

GROSS WEIGHT	ONE ENGINE INOPERATIVE	TWO ENGINES INOPERATIVE (IN ONE NACELLE)
80,000 lb	26,000 ft	8000 ft
70,000 lb	30,000 ft	14,000 ft
60,000 lb	34,000 ft	20,000 ft

A-5,C

h. Estimated service ceilings with inoperative engines are as follows:

100% RPM ON OPERATING ENGINES
NACA STANDARD DAY

GROSS WEIGHT	ONE ENGINE INOPERATIVE	TWO ENGINES INOPERATIVE (IN ONE NACELLE)
90,000 lb	29,000 ft	14,000 ft
80,000 lb	32,000 ft	19,000 ft
70,000 lb	36,000 ft	24,000 ft
60,000 lb	39,000 ft	28,000 ft

(1) AF47-23 thru AF47-76

(2) AF47-77 thru AF47-96

Note

On an Army Hot Day, service ceilings at the specified gross weights will be approximately 3000 feet lower.

3-21. RESTARTING ENGINE IN FLIGHT. To restart an engine in flight:

Note

Best flight starts are obtained below 20,000 feet, at low windmilling engine rpm and low airspeed. Air starts can be made at altitudes as high as 25,000 feet, but considerably higher fuel pressure will be required to obtain ignition.

a. Power control "OFF."

b. If engine failure was caused by fuel system failure, turn on emergency fuel system.

c. Obtain windmilling speed below 25% rpm on dead engine by reducing airspeed below 230 mph (200 knots).

CAUTION

Restarting in flight with engine speeds above 25% rpm should not ordinarily be attempted, since such starts are more difficult and may result in excessive exhaust temperatures.

d. Hold related starter switch "ON." **A**

Note **A-1**

It will not be necessary to hold starter switch on if the emergency fuel system valve switch is "OPEN."

C

Momentarily position related starter switch at "START."

e. Move power control to "IDLE" position and wait until engine starts and accelerates to idling rpm. (Combustion can be recognized by rising exhaust temperature.)

Note

Flight starts at higher airspeeds and altitudes may require fuel pressure as high as 70 to 80 psi; therefore, above 20,000 feet, it will be necessary to position power control somewhat beyond "IDLE" to obtain a start.

A

f. Release starter switch after ignition occurs.

g. After stable combustion is obtained, advance power control slowly to desired rpm, adjusting power control as necessary, to avoid high exhaust temperatures.

CAUTION

On some altitude restarts, the engine may be on the verge of compressor stall with power control at "IDLE," and any attempt to advance the power control will cause a complete stall. Should a compressor stall occur, retard power control below initial position and readvance it slowly, keeping exhaust temperature well within limits.

h. If initial restart is unsuccessful, retard power control to "OFF" and allow engine to drain a minute or more before another attempt to start.

A-1

Hold airplane level or nose-high if possible to drain combustion chambers.

A-5,C

Hold airplane level to drain combustion chambers.

3-22. EMERGENCY SHORT-FIELD LANDING. For maximum deceleration in case of an emergency short-field landing, cut inboard engines off completely when landing is assured, and use only idling power on outboard engines.

3-23. EMERGENCY EXIT.

3-24. PILOT AND COPILOT.

3-25. SEAT EJECTION. In all cases of emergency exit in flight, it is recommended that escape be accomplished by means of seat ejection. This is the safest method of escape in either high-speed or low-speed flight, since it precludes the possibility of injury to the user through collision with the airplane. Contrary to some circulated reports, seat ejection does not impose dangerous accelerations on the user. When emergency exit is necessary, proceed as follows:

a. Give crew bail-out warning by interphone and three short rings of alarm bell (pilot).

b. Cabin air valve "DUMP VALVE OPEN" (pilot). *This step may be omitted if immediate exit is necessary.*

c. Give command to abandon airplane by interphone and one long ring of alarm bell (pilot).

d. Proceed with seat ejection as instructed in figure 3-3.

3-26. ALTERNATE BAIL-OUT. In instances where considerable time is available and the airplane is controllable, escape may be made through main entrance hatch or bomb bay doors. This method should be considered only as an alternate for seat ejection because of the time involved and the possible difficulty of getting to the escape hatches. Proceed as follows:

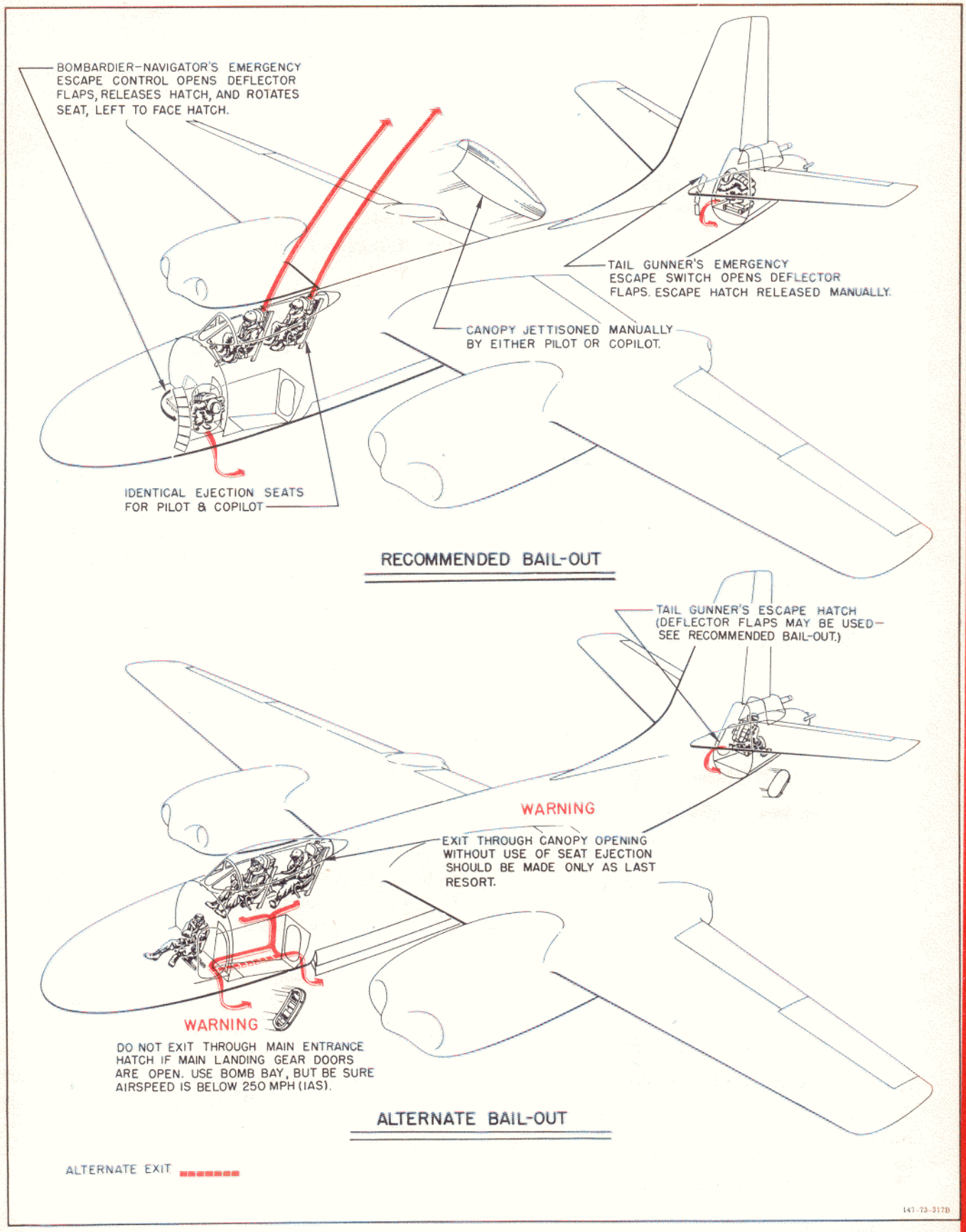


Figure 3-2. Emergency Exits

WARNING

Main entrance hatch should always be used, except when main landing gear doors are open. In event landing gear doors are open, emergency exit can then be made through bomb bay, but airspeed must be reduced below 250 mph IAS. (It is unlikely that speeds will be that high, inasmuch as maximum allowable speed for lowering the gear is 185 mph IAS.)

a. Give crew bail-out warning by interphone and three short rings of alarm bell (pilot).

b. Reduce speed as much as possible and engage automatic pilot (pilot).

Note

Airplane should be trimmed to fly at a shallow angle of descent toward an uninhabited area.

c. Cabin air valve "DUMP VALVE OPEN" (pilot). (See 16, figure 1-12.)

d. Give command to abandon airplane by interphone and one long ring of alarm bell (pilot).

e. Disconnect personal equipment.

Note

Before jumping at altitude, pull ball handle on bail-out bottle.

f. Exit through main entrance hatch or bomb bay as conditions permit.

WARNING

Inasmuch as there is danger of striking the dorsal fin in bail-out through the canopy opening, this means of exit should be used only as a last resort.

3-27. BOMBARDIER-NAVIGATOR.

3-28. Bombardier-navigator normally exits through main entrance hatch at left of seat. (See figure 3-2.)

WARNING

If main landing gear doors are open, bombardier-navigator must exit through bomb bay, but airspeed must be below 250 mph IAS. (Refer to WARNING preceding step a., paragraph 3-26.)

a. Lower seat to floor.

b. Disconnect personal equipment.

Note

Before jumping at altitude, pull ball handle on bail-out bottle.

c. Pull and safety emergency escape control, if airspeed is excessive and airplane out of control. (If bail-out is made at low speed, jettison main entrance hatch manually.)

d. Release safety belt and dive out.

3-29. TAIL GUNNER.

3-30. Tail gunner exits through escape hatch to left of seat. (See figure 3-2.)

a. Pull cabin air emergency dump valve up.

b. Lower seat to floor.

c. Disconnect personal equipment.

Note

Before jumping at altitude, pull ball handle on bail-out bottle.

d. If airspeed is 300 mph IAS or above, or airplane is out of control, move emergency escape switch to "ON."

CAUTION

Operation of the tail gunner's emergency escape flaps at high speed causes an excessive nose-down trim change in the airplane.

e. Pull escape hatch release handle.

f. Release safety belt and dive out.

3-31. EMERGENCY EXIT ON GROUND.

3-32. If main entrance hatch is jammed, jettison canopy for exit of pilot, copilot, and bombardier-navigator. Tail gunner exits through escape hatch to his left.

3-33. EMERGENCY ENTRANCE.

3-34. In an emergency, enter airplane as follows:

a. For access to pilot's compartment, pull emergency canopy release located on top of fuselage just aft of canopy.

b. For access to bombardier-navigator's compartment, open main entrance hatch with normal external control.

c. For access to tail cabin, pull external emergency release on tail gunner's escape hatch.

d. If necessary, effect entrance by breaking through areas designated for "EMERGENCY RESCUE" by yellow markings on fuselage exterior.

3-35. FUEL SYSTEM EMERGENCY OPERATION.

3-36. CROSS-FLOW OPERATION.

3-37. ENGINE FAILURE. In case of engine failure, all fuel in the airplane can be supplied to the operating engines as follows (figures 2-2 and 2-3):

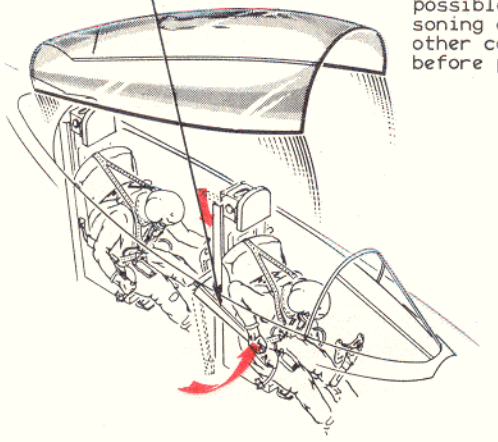
1 At altitude, pull ball handle on bail-out bottle.

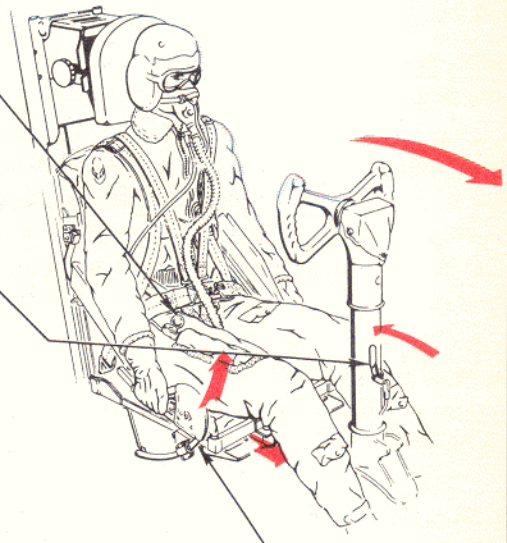
2 Release control column and push full forward.

3 Jettison canopy. (If time permits, lower seat first.)

WARNING

Lower head and body as far as possible. Crew member jettisoning canopy must signal other compartment occupant before pulling release.





4 Pull both armrests up to locked position.

5 Lock shoulder harness.

6 Push catapult safety release handle down.

7 Place feet in stirrups. Brace arms on armrests.



8 Sit erect with head hard back against headrest and chin tucked in.

9 Squeeze trigger.



10 After seat has been ejected, release safety harness and kick away from seat as soon as possible.

11 Delay opening parachute as long as altitude will permit to allow seat to clear parachute canopy and reduce parachute opening shock.

147-73-316D

Figure 3-3. Ejection Seat Operation

a. Engine fuel shut-off valve switch for dead engine or engines closed.

b. Cross-flow shut-off valve switches "OPEN."

3-38. DAMAGED TANKS. If tanks are damaged or a severe leak is suspected, proceed as follows:

a. If practicable, use fuel from damaged tanks first by opening cross-flow shut-off valve switches and turning as many booster pump switches for good tanks off as engine power demands will permit. (Fuselage tank can be drained only if three-fourths of the fuel in at least one "NO. 1" wing tank has been consumed.)

b. When damaged tanks are nearly empty, turn booster pumps in good tanks "ON" and shut off booster pumps in damaged tanks. Leave cross-flow shut-off valve switches "OPEN."

C

3-39. TIP TANK BOOSTER PUMP FAILURE.

3-40. In the event a tip tank booster pump fails, fuel may possibly be drawn from the affected tank by suction feed.

Note

Suction feed with JP-1 fuel should be successful under all normal flight conditions. When AN-F-48 or JP-3 fuel is used, suction feed possibilities decrease with increased fuel temperatures and high altitudes.

Booster pump failure will be indicated if wing tank fuel on one side of the airplane is being consumed before tip tank fuel. (In normal sequence, tip tank fuel is consumed first.) If suction feed is attempted, use the following recommended procedure:

a. Turn on emergency fuel system switches for both engines on the affected side of the airplane.

b. Close cross-flow shut-off valves.

c. Turn off three wing tank booster pump switches on the affected side of the airplane.

d. Turn the fourth wing tank booster pump switch off and on momentarily three or four times in order to prime the fuel line from the tip tank.

e. Then leave the fourth booster pump off while closely observing rpm of both engines on that side.

CAUTION

If suction feed is insufficient for engine demands, considerable drop in rpm will result and flame-out may occur. Therefore, extreme caution should be observed while attempting suction feed.

f. If suction feed is satisfactory, little or no drop in rpm will result and wing tank booster pump switches should be left off until tip tank fuel is consumed. When "EMPTY" indicator for the affected tip tank illuminates, immediately turn wing tank pumps on and open cross-flow shut-off valves to avoid possible flame-out.

WARNING

Do not land with any fuel in tip tanks. If suction feed is unsuccessful, jettison tanks before landing.

g. If suction feed is insufficient for engine demands and an excessive drop in rpm occurs, retard power controls on affected engines to idle position, then turn wing tank pumps back on and open cross-flow valves. Retarding power controls first will prevent sudden engine acceleration when wing tank pumps are turned on. If flame-out occurs, restart engines in accordance with in-flight restart procedure.

3-41. BOMB BAY BOOSTER PUMP FAILURE.

3-42. If fuel is not being consumed from bomb bay tank (or tanks, if two are installed) in normal sequence, it can be assumed that both booster pumps have failed. When suction feed is attempted, the following recommended procedure should be followed:

a. Close only one cross-flow shut-off valve.

b. Turn on emergency fuel system for both engines on the open cross-flow side of the airplane. (For example, turn on emergency fuel system for No. 1 and No. 2 engines if left cross-flow shut-off valve is open.)

c. Turn off three wing tank booster pump switches on the affected side of the airplane.

d. Turn the fourth wing tank booster pump switch off and on momentarily three or four times in order to prime the fuel line from the bomb bay tank.

e. Then leave the fourth booster pump off while closely observing rpm of both engines on that side.

f. If suction feed is satisfactory, little or no drop in rpm will result and wing tank booster pumps should be left off until bomb bay tank fuel is consumed.

g. When bomb bay tank fuel gages indicate that tank is nearly empty, turn wing tank booster pump switches on and open the other cross-flow shut-off valve.

3-43. If suction feed is insufficient for engine power demands, proceed according to instructions given in paragraph 3-40, g. Suction feed conditions and flame-out possibilities are similar to those described in NOTE in paragraph 3-40.

3-44. USE OF EMERGENCY FUEL SYSTEM.

3-45. Sudden drop in fuel pressure and loss of engine rpm usually indicate failure of some part of the fuel system of the affected engine. Should this occur, proceed as follows:

a. If loss of power is detected before flame-out occurs, retard related power control to idle stop.

b. Turn on related emergency fuel system.

c. Gradually advance power control to desired rpm.

Note

If complete flame-out occurred before loss of power was noticed, retard dead engine power control to "OFF," then:
Turn on the emergency fuel system and attempt to restart the engine as instructed in paragraph 3-21.

A-1

It will not be necessary to close the starter switch, because the ignition circuit is completed when the emergency fuel system valve switch is at "OPEN."

3-46. ELECTRICAL SYSTEM EMERGENCY OPERATION.

3-47. GENERATOR OVERVOLTAGE.

3-48. In the event of excessively high voltage, shown by illumination of an overvoltage indicator light, proceed as follows:

a. Hold related generator switch at "RESET."

b. If overvoltage indicator light goes out and remains out when switch is released, the overvoltage was temporary.

c. If the light comes on again after switch is released, move switch to "OFF."

d. If more than one generator is disconnected, operate only essential electrical equipment.

3-49. ALTERNATOR FAILURE.

A-1,A-5(1)

3-50. If the alternator warning light illuminates, move alternator switch to other setting.

A-5(2),C

If either bus light illuminates, when alternator selector is positioned at "BOTH ALT NORM," position alternator selector switch so that the good alternator will power the desired bus.

3-51. FILLING MAIN HYDRAULIC RESERVOIR IN FLIGHT.

3-52. If hydraulic fluid level indicator indicates "REFILL," proceed as follows:

a. Remove cap from hand-pump hose and place hose in container of hydraulic fluid.

b. Operate hand-pump until fluid level indicator indicates "FLIGHT LEVEL."

c. Replace cap and stow filler hose in stowage clips.

Note

Aileron, rudder, and elevator boost system reservoirs are not serviced by this pump.

3-53. WING FLAP EMERGENCY OPERATION.

3-54. If wing flaps fail to lower normally, first make sure hydraulic main system pressure control valve was "ON" when operation failed, then proceed as follows:

a. Move normal wing flap control to full "DOWN."

b. Position forward emergency hydraulic selector at "WING FLAPS DOWN."

Note

Leave emergency hydraulic selector at "WING FLAPS DOWN" position until landing is completed; otherwise, the wing flaps may creep up.

3-55. SURFACE CONTROL BOOSTER SYSTEM FAILURE.

3-56. There is no emergency system provided for the surface control booster systems. In the event hydraulic boost to any control surface fails, control forces become very high, but the airplane is still flyable. At high speeds you can change airplane attitude only very slowly with maximum effort, but by using the trim tabs constantly, it is possible to maneuver fairly quickly.

3-57. AILERON BOOST FAILURE.

3-58. Aileron boost failure will have no appreciable effect if the airplane is in trim at the time of failure; however, aileron control forces will be greatly increased. If either of the two engines which drive the aileron boost hydraulic pumps is shut down, aileron boost will become inoperative when the windmilling speed of that engine falls below 15% rpm. Since windmilling speed decreases with true airspeed, aileron boost will be lost only when airspeed is reduced for approach and landing. Under this condition, aileron control response is very slow and care should be used if landing in gusty air. If desired, the aileron boost system can be turned off by placing the aileron boost cutout switch at "ON."

3-59. RUDDER BOOST FAILURE.

3-60. If the airplane is in trim at the time of failure, loss of rudder boost will have no appreciable effect. Although rudder forces will be considerably increased without boost, ample rudder control is available for normal flight.

A-1

With one outboard engine out and rudder boost inoperative, it is still relatively easy to hold the airplane straight at airspeeds as low as 145 mph IAS, with gear and flaps down and 100% rpm on good engines, if rudder trim is used. With two engines out on one side and no rudder boost, the airplane can be held straight at speeds as low as 145 mph IAS with good engines at 96% rpm, although heavy rudder forces will be re-

(1) AF47-23 thru AF47-76

(2) AF47-77 and subsequent

quired. However, if good engines are at 100% rpm, it will be necessary to bank into the operating engines to avoid excessive rudder forces.

A-5,C

With one outboard engine out and rudder boost inoperative, it will be possible to hold the airplane straight at an airspeed of 220 mph IAS, gear and flaps up and 100% rpm on good engines, if full rudder trim is used and heavy rudder force is applied. With two engines out on one side, it will be necessary to increase the airspeed to 290 mph IAS to hold the airplane straight under the same described conditions. To control the airplane at lower speeds when good engines are at 100% rpm, it will be necessary to bank into the operating engines. However, as thrust is decreased on good engines, the forces required to hold the airplane straight will also be reduced.

3-61. ELEVATOR BOOST FAILURE.

3-62. If the elevator boost system should fail or be turned off in flight, normal increase in stick forces results. However, on B-45A-1 Airplanes, the longitudinal trim is noticeably affected, because of the elevator bungee which acts through the elevator boost system.

A-1

3-63. ELEVATOR BOOST FAILURE IN LEVEL FLIGHT. In level flight, the down elevator force created by the bungee is balanced out when the airplane is trimmed for "hands off" or level flight. If the elevator boost system should fail or be turned off, this down elevator force is decreased and the elevator moves up, resulting in a nose-high attitude with positive accelerations. Acceleration will increase .3 to .8 G, depending on CG position. (See figure 3-4, noting resultant acceleration when boost fails with initial acceleration of 1.0 G.) To maintain the original attitude and airspeed, the airplane will have to be retrimmed or heavy push forces applied. If no action is taken, the airplane will eventually stabilize at an airspeed lower than the original one. The loss of airspeed in this case will depend on CG position, trim speed, and altitude. It is usually less than 50 mph, but with trim speeds below 200 mph, action is necessary to prevent the airplane slowing down enough to reach stalling speed. If the airplane has been trimmed for "hands off" flight after elevator boost failure, and the system is restored—small negative acceleration will result. This nose-down tendency will have to be trimmed out.

A-5,C

If the elevator boost system should fail or be turned off, there will be no appreciable effect if the airplane is trimmed at the time of failure. However, if the airplane is not trimmed, normal increase in elevator forces will result.

3-64. ELEVATOR BOOST FAILURE IN DIVES. If elevator boost should fail or be turned off when large push forces are being applied (as during dives with increasing airspeed), large positive accelerations will result. Conversely, large negative accelerations will be experienced at the time of boost failure if large pull forces are being applied. The elevator-boost ratio determines the amount of force needed to maintain the original attitude of flight. For example, if you are pushing 40 pounds at the time of boost failure, you will have to push approximately 250 pounds after boost failure to keep the airplane from nosing up. However, if you continue to push only 40 pounds, the limit load factor will not be exceeded even at the critical aft CG position. To avoid the possibility of heavy stick forces, the airplane should be flown near trim during dives. Trimming is facilitated by the elevator trim switch on the control wheel.

3-65. ELEVATOR BOOST FAILURE DURING TURNS OR PULL-UPS.

A-1

WARNING

Do not trim into high load factor turns or pull-ups.

Loss of elevator boost during a turn or pull-up will cause the acceleration being applied at the time of failure to decrease or increase slightly. The amount of change depends on the acceleration existing at the time failure occurs. If the airplane *is not* trimmed into the turn or pull-up, the resultant acceleration will be well within the allowable G limits. However, if the airplane *is* trimmed into a turn or pull-up at the time of boost failure, the resultant acceleration may exceed the limit load factor; therefore, do not trim into high-load-factor turns or pull-ups. Figure 3-4 illustrates both the safe (untrimmed) and unsafe (trimmed) conditions.

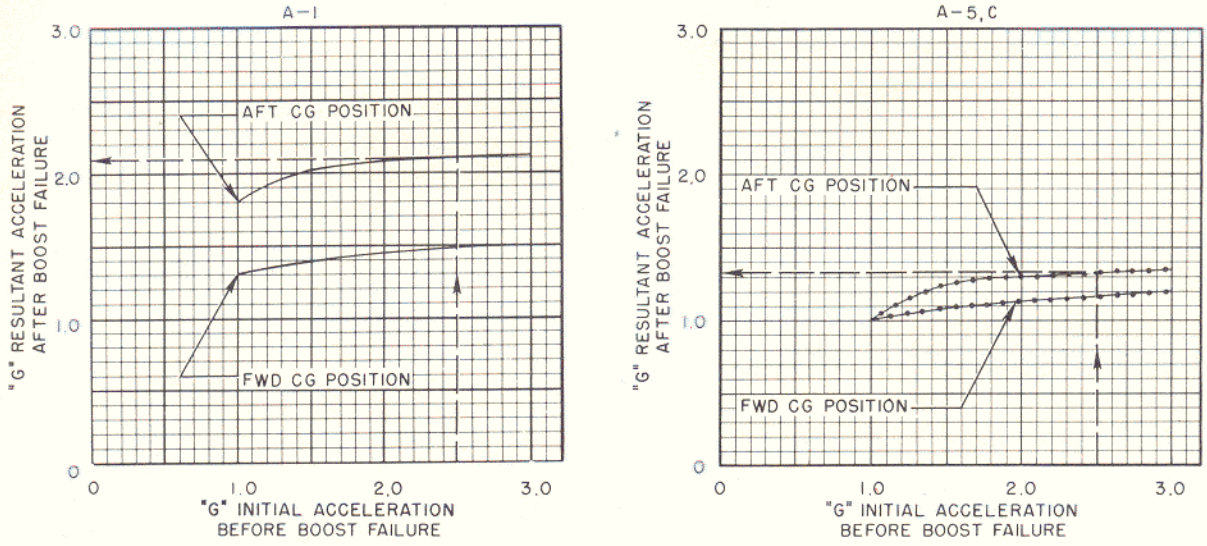
A-5,C

If the elevator boost system should fail or be turned off during a turn or pull-up, and the airplane *is not* trimmed into the turn or pull-up, the applied acceleration will decrease. If the airplane *is* trimmed into a turn or pull-up at the time elevator boost failure occurs, the acceleration remains unchanged. Because the limit load factor may be exceeded when subsequent wheel forces are applied (because of the lack of feel of applied acceleration in trim condition), do not trim into high-load-factor turns or pull-ups.

3-66. LANDING WITH ELEVATOR BOOST INOPERATIVE. Normal landings can be made with elevator boost inoperative, although control forces during flare will be considerably higher, especially at forward CG positions. Under such circumstances, control forces can be reduced by moving CG aft as far as possible. (Jettisoning all disposable load items and, when practicable, continuing flight until most of the fuel has been consumed, will move CG aft.) During approach and landing, the control forces can be held to a minimum by constantly adjusting trim while reducing airspeed to approximately 10 mph above touch-down speed.

EFFECT OF ELEVATOR BOOST FAILURE ON ELEVATOR CHARACTERISTICS IN TURNS AND PULL-UPS

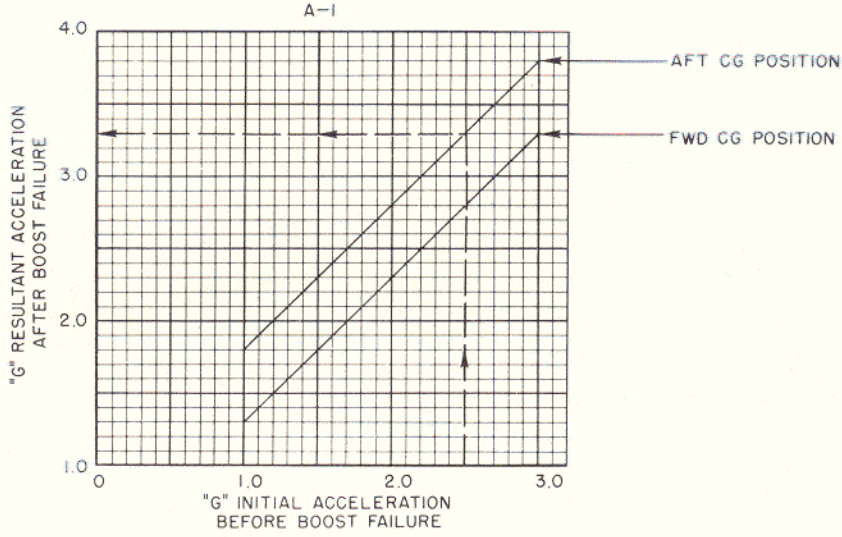
CONDITIONS:
1. AIRPLANE TRIMMED AT 1.0 G BUT NOT TRIMMED INTO TURN OR PULL-UP.
2. PILOT MAINTAINS ONLY INITIAL WHEEL FORCE AFTER BOOST FAILURE.



NOTE:
IF AIRPLANE IS NOT TRIMMED INTO TURN OR PULL-UP WHEN BOOST FAILURE OCCURS, ACCELERATION DECREASES OR INCREASES SLIGHTLY (DEPENDING ON INITIAL ACCELERATION), BUT RESULTANT ACCELERATION IS WITHIN ALLOWABLE LIMITS.

B-45A-1 — BUNGEE INSTALLED
B-45A-5, B-45C — NO BUNGEE

CONDITIONS:
1. AIRPLANE TRIMMED INTO A TURN OR PULL-UP.
2. PILOT EXERTS NO WHEEL FORCE AFTER BOOST FAILURE.



WARNING:
IF AIRPLANE (B-45A-1 ONLY) IS TRIMMED INTO A TURN OR PULL-UP WHEN BOOST FAILURE OCCURS, ACCELERATION INCREASES AND LIMIT LOAD FACTOR MAY BE EXCEEDED.

B-45A-1 — BUNGEE INSTALLED
B-45A-5, B-45C — CURVE NOT SHOWN SINCE ACCELERATION REMAINS UNCHANGED.

147-93-628B

Figure 3-4. Effect of Elevator Boost Failure on Elevator Characteristics in Turns and Pull-ups

The possibility of simultaneous boost and trim tab control failure is extremely remote; however, should such a failure occur, a landing can be made if CG position is aft and combined pilot and copilot effort is used.

3-67. AUTOMATIC PILOT EMERGENCY RELEASE.

3-68. The automatic pilot is disengaged automatically in case of electrical failure.

3-69. LANDING GEAR EMERGENCY OPERATION.

3-70. LANDING GEAR LOCK EMERGENCY RELEASE.

3-71. If the landing gear selector control cannot be moved to "UP" after take-off, proceed as follows:

a. Move landing gear lock emergency release to extreme aft position.

b. Move landing gear selector control as far up as it will go.

c. Move emergency release to extreme forward position (normal position).

d. Move landing gear selector control to "UP."

3-72. LANDING GEAR EMERGENCY LOWERING.

A-5(1),C

3-73. ELECTRICAL FAILURE. If gear fails to lower normally because of electrical failure, proceed as follows:

a. Make sure hydraulic main system pressure control valve is "ON."

b. Landing gear selector control at "DOWN" or "NEUTRAL."

c. Move landing gear door emergency manual control to "OPEN." Wait for doors to open.

Note

Leave door handle in "OPEN" position—doors are to remain open for landing.

d. Move landing gear emergency manual control "DOWN."

Note

To resume normal operation, return both door and gear handles to "NEUTRAL."

e. Check gear position indicator lights for safe gear condition.

f. Visually check gear position—nose gear through window in pilot's passageway, main gear from pilot's compartment.

3-74. HYDRAULIC FAILURE. If gear fails to lower normally, first make sure hydraulic main system pressure control valve was "ON" when operation failed, then proceed as follows:

a. Landing gear selector control at "DOWN" or "NEUTRAL."

b. Make sure the emergency hydraulic manual check valve handle (18, figure 4-4) is in vertical position.

Note

The manual check valve must be closed (handle vertical) before the pump is used in order to maintain pressure to lock release until gear is down and locked.

c. Release landing gear emergency hydraulic hand-pump (on bulkhead aft of bombardier-navigator's seat) from stowed position.

d. Operate hand-pump until cylinder pulley stops moving and gear is down.

e. Check gear position indicator lights for safe gear condition.

CAUTION

If lights do not indicate gear down and locked, reset emergency system to relieve possible emergency cable restriction to main gear down latches, and recheck to be sure gear selector control is at "DOWN."

f. Visually check gear position—nose gear through window in pilot's passageway, main gear from pilot's compartment.

3-75. RESETTING LANDING GEAR EMERGENCY LOWERING SYSTEM. After the emergency hydraulic system has been used to lower the gear, it must be reset before subsequent normal operation of the gear. To reset the system, proceed as follows:

a. Stow pump handle.

b. Place manual check valve handle in "FREE FLOW" (horizontal) position.

c. When cylinder has fully retracted, return manual check valve handle to vertical position.

CAUTION

If emergency system is not reset and landing gear selector control is at "DOWN," normal hydraulic system pressure will not be available for subsequent operation of flaps and brakes. (Emergency dump valve opens when emergency system is being used, routing normal hydraulic pressure to system return.)

3-76. WHEEL BRAKE EMERGENCY OPERATION.

3-77. In case wheel brakes fail to respond to pressure on toe pedals, use emergency brake levers. If the main hydraulic system is known to be inoperative, before

(1) AF47-37 and subsequent

landing instruct a crew member to check the emergency brake accumulator pressure. (Two emergency brake accumulators are provided on B-45C Airplanes.)

A-5(1)

If main hydraulic system is known to be inoperative before landing, check emergency hydraulic pressure gage; if reading is below normal operating range, place emergency brake boost switch at "ON" to recharge system.

Note

Do not test emergency brakes in flight, as only three brake applications are available from the emergency system.

3-78. LANDING WITH GEAR RETRACTED.

3-79. If it is necessary to make a wheels-up landing, proceed as follows:

a. Give crew forced-landing warning by interphone and six short rings of alarm bell.

b. Jettison bombs and bomb bay fuel tanks.

WARNING

Before bomb salvo, make sure that bombardier-navigator's master switch is off.

c. Unbuckle parachute; tighten safety belt.

d. Jettison canopy.

WARNING

Crew member jettisoning canopy must warn other compartment occupant before pulling release. Pilot and copilot must lower heads as far as possible.

e. Lock shoulder harness.

CAUTION

The pilot is prevented from bending forward when the control is in the locked position; therefore, all switches not readily accessible should be "cut" before moving the control to the locked position.

f. Make sure bombardier-navigator and tail gunner are in position for crash landing. (Positions for crash landing are the same as for ditching as shown in figure 3-5.)

g. Lower full flaps when landing is assured.

h. Instruct bombardier-navigator to jettison main entrance hatch just before landing, as impact may jam hatch and prevent jettisoning later.

i. Turn generators and alternators off (copilot).

j. Retard power controls to "OFF" just prior to landing.

k. Warn crew with one long ring of alarm bell to brace themselves for impending impact (pilot).

l. After landing, battery switch off.

m. Get out of airplane immediately, and stay out.

3-80. DITCHING. A-1,A-5(2),C(3)

WARNING

Do not ditch airplanes in which ditching provisions are not installed; use recommended bail-out procedure.

3-81. PREPARING FOR DITCHING.

3-82. PILOT AND COPILOT. Prepare for ditching as follows (figure 3-5):

a. Give command, "Prepare for ditching," and six short rings of alarm bell (pilot).

b. Copilot immediately starts emergency radio procedure.

c. Jettison bomb bay fuel tanks and bombs.

d. Instruct bombardier-navigator and/or tail gunner to install bomb bay door ditching braces. (Refer to paragraph 3-86.)

e. Unbuckle parachute. Tighten and lock safety belt.

f. Jettison canopy just before landing.

WARNING

Crew member jettisoning canopy must signal other compartment occupant before pulling release. Pilot and copilot lower heads as far as possible.

g. Lock shoulder harness.

CAUTION

The pilot is prevented from bending forward when the control is in the locked position; therefore, all switches not readily accessible should be "cut" before moving the control to the locked position.

h. Five seconds before impact, warn crew with one long ring of alarm bell to brace themselves (pilot).

(1) AF47-77 and subsequent (2) AF47-23 thru AF47-61 (3) AF48-1 thru AF48-6

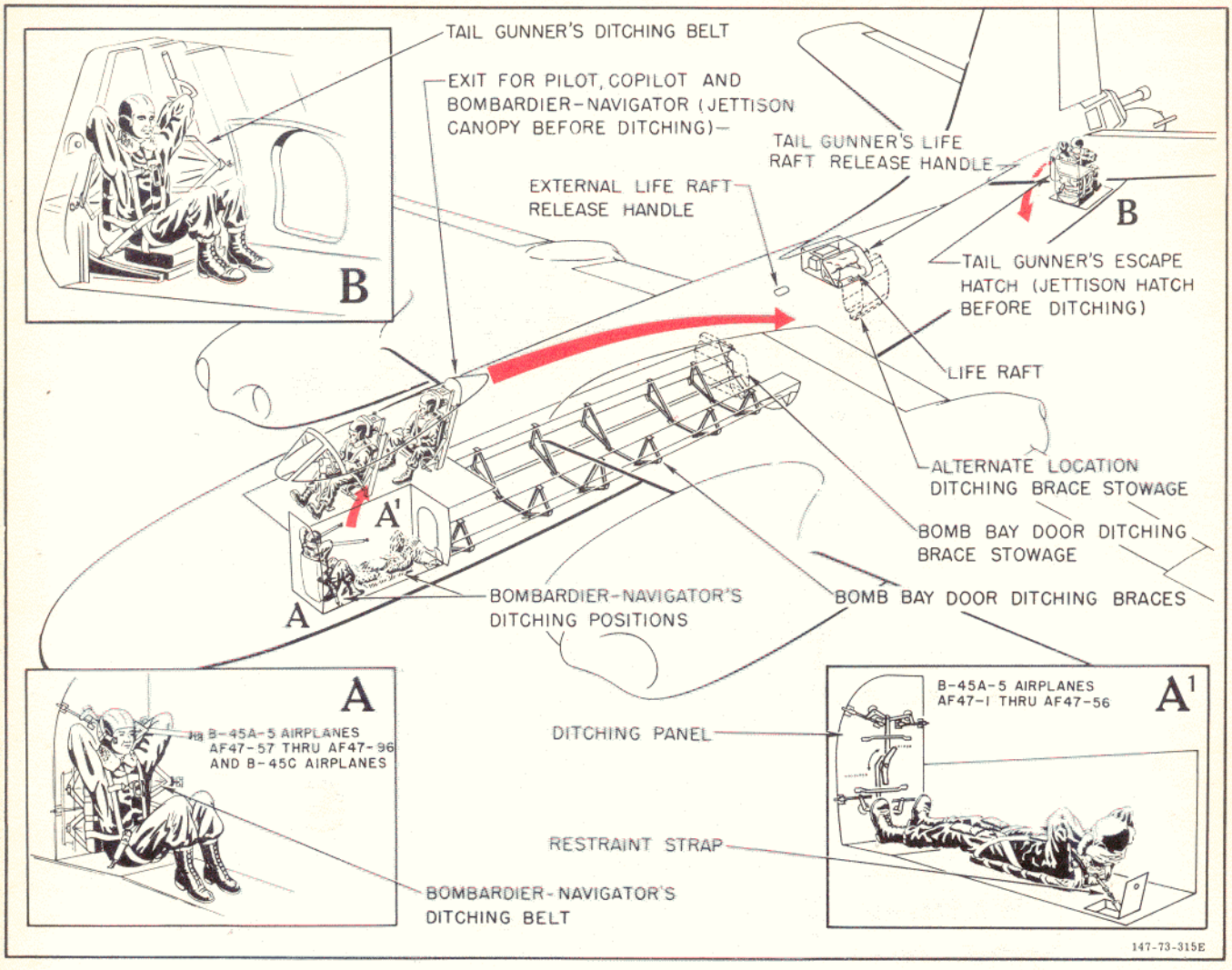


Figure 3-5. Ditching Positions and Exits—B-45A-1, B-45A-5 AF47-23 Through AF47-61, and B-45C AF48-1 Through AF48-6 Airplanes

3-83. BOMBARDIER-NAVIGATOR. Acknowledge command for ditching and proceed as follows (figure 3-5):

a. Leave front cabin and install ditching panel (10, figure 4-4) in hatch.

b. Install bomb bay door ditching braces.

c. Make sure hatch to bomb bay is closed and locked after return to pilot's compartment.

d. Assume ditching position on walkway floor. (See figure 3-5.)

A-1,A-5(1)

e. Attach ditching restraint strap to parachute harness.

A-5(2),C(3)

Attach ditching harness and lap belt.

f. Notify pilot, "Ready for ditching."

3-84. TAIL GUNNER. Acknowledge command for ditching and proceed as follows (figure 3-5):

a. Install bomb bay door ditching braces.

b. After leaving bomb bay, make sure rear bomb bay hatch is closed and locked.

c. Close tail cabin entrance hatch and install ditching belt. (See 1, figure 4-5.)

d. Lower seat to floor.

e. Safety belt tightened and locked.

f. Pull escape hatch emergency release and push out door.

g. Assume ditching position. (See figure 3-5.)

h. Notify pilot, "Ready for ditching."

3-85. INSTALLING BOMB BAY DOOR DITCHING BRACES.

3-86. Remove each set of ditching braces from stowage

(1) AF47-23 thru AF47-56 **(2) AF47-57 thru AF47-61** **(3) AF48-1 thru AF48-6**

rack (figure 3-5) individually, and install at positions marked on bomb bay doors as follows:

a. Insert end of center strut (attached to right brace) into socket in left brace with pins in mating slots, and place in position. Make sure colors of braces correspond with colors of pads on doors.

b. Lock braces by swinging lever down against center strut until latch snaps over lever.

3-87. HANDLING THE AIRPLANE.

a. Check landing gear "UP" and wing flaps 20° to 30° "DOWN."

b. Shut down engines.

c. Make a normal approach and flare out to normal landing attitude. Unless wind is high or sea is rough, select approach heading parallel to any uniform swell pattern and try to touch down along the crest of a swell or just after the crest passes. If sea surface is irregular or if wind speeds are 30 mph or above, ditch into the wind and try to touch down on the falling side of a wave.

3-88. ABANDONING THE AIRPLANE.

3-89. Hold ditching positions until the airplane comes to a stop; then proceed as follows:

a. Pilot pulls life raft release at right of seat. (Alternate internal life raft release for the tail gunner is located on left side of airplane, aft of life raft stowage space.)

b. Crew abandons airplane. (See figure 3-5.)

Note

If internal release mechanisms fail, release life raft by pulling external release handle on left side of fuselage, forward of life raft door, near trailing edge of wing.

3-90. BOMB AND BOMB BAY FUEL TANK SALVO.

WARNING

Before emergency salvo of bombs, make sure bombardier-navigator's master switch is off. This precaution ensures that bombs will drop unarmed when released. (Refer to paragraphs 4-13 and 4-24.)

3-91. PILOT.

a. Make sure bombardier-navigator's master switch is off if bombs are to be salvoed.

b. Salvo selector switch at desired position.

c. Salvo control switch "ON." Check salvo circuit indicator light on.

d. After salvo, hold bomb door switch at "CLOSE." Check bomb door warning light on instrument panel off after closing.

3-92. BOMB BAY DOOR EMERGENCY OPERATION.

3-93. In case bomb bay doors fail to operate normally, proceed as follows:

a. If failure is hydraulic, turn aft emergency hydraulic selector to desired position.

CAUTION

When emergency hydraulic system is used to close bomb doors, main system bomb door control valve (solenoid operated) is energized to the open position and held there for emergency system return. After bomb doors are closed by emergency system, "BOMB DOOR" circuit breaker must be pulled and reset to break the holding circuit and allow main system control valve to return to neutral. If valve is not returned to neutral, bomb doors will open as soon as main system pressure is obtained.

b. If failure is electrical, make sure hydraulic main system pressure control valve is "ON" and move bomb door manual control to desired position.

c. If steps a. and b. are ineffective, it may be that failure of doors to operate is due to malfunction of the electrical solenoids at the doors selector valves plus failure of the normal hydraulic system. In this event, move bomb door manual control to desired position (manually sets selector valves), then turn emergency hydraulic selector to desired position (supplies hydraulic pressure from emergency hydraulic pump).

Note

Emergency hydraulic selector must be left at "OPEN" until operation is completed to make sure that doors will remain open.

Section IV
OPERATIONAL EQUIPMENT

4-1. BOMBING EQUIPMENT.

4-2. The bomb bay is capable of carrying bomb loads from twenty-seven 100-pound bombs up to a single 22,000-pound bomb. Two sets of hydraulically operated doors cover the bomb bay and partially retract into the fuselage when open. Electrical controls for operating doors and releasing bombs are located in the bombardier-navigator's compartment. Bomb door and bomb and tank salvo controls are provided in the pilot's compartment. A camera may be installed in the rear unpressurized section of the fuselage and controlled either remotely by the bombardier-navigator or by an operator at the camera station.

A-1,A-5(1),C

Provisions are made for installation of AN/APQ-24 radar bombing and navigational equipment.

A-5(2)

AN/APQ-24 radar bombing and navigational equipment is installed.

4-3. BOMBARDIER-NAVIGATOR'S BOMB CONTROLS.

4-4. Electrical controls for bombing are located on a panel at the right side of the bombardier-navigator's compartment. (See 9, figure 4-1.) Bombs may be released automatically through operation of the radar bombing system or by means of an electrical release button (12, figure 4-1) stowed below the bomb control panel.

4-5. MASTER SWITCH. Power is supplied to all bomb controls (except bomb salvo and the intervalometer) through a master switch in the center of the bomb control panel. (See figure 4-2.)

4-6. BOMB RELEASE INTERVAL CONTROL. An intervalometer control is provided on the bomb control panel to preset the interval (in feet) between bomb impacts on the ground in a train release, and a counter to select number of bombs to be dropped. (See figure 4-2.) A switch is also provided for selecting train or selective (single) release of bombs. A light on the panel illuminates whenever selective release is selected or when the counter is set above zero when train release is selected.

4-7. CONTROL SELECTOR. The control selector switch (figure 4-2) has two positions: "AUTO," and "NORMAL." On "AUTO," bombs are released through operation of the bomb timer, either by manual release or automatically through the radar equipment. At the correct release point, the radar actuates a bomb timer (indicated by illumination of a timer light adjacent to the master switch) which opens the bomb bay doors, releases the bombs, and then recloses the doors. At the "NORMAL" position of the control selector, bombs are released through the intervalometer, either automatically by actuation from the radar equipment or manually by depressing the bomb release button. On "NORMAL" operation, bomb doors must be opened and closed by means of the door switch.

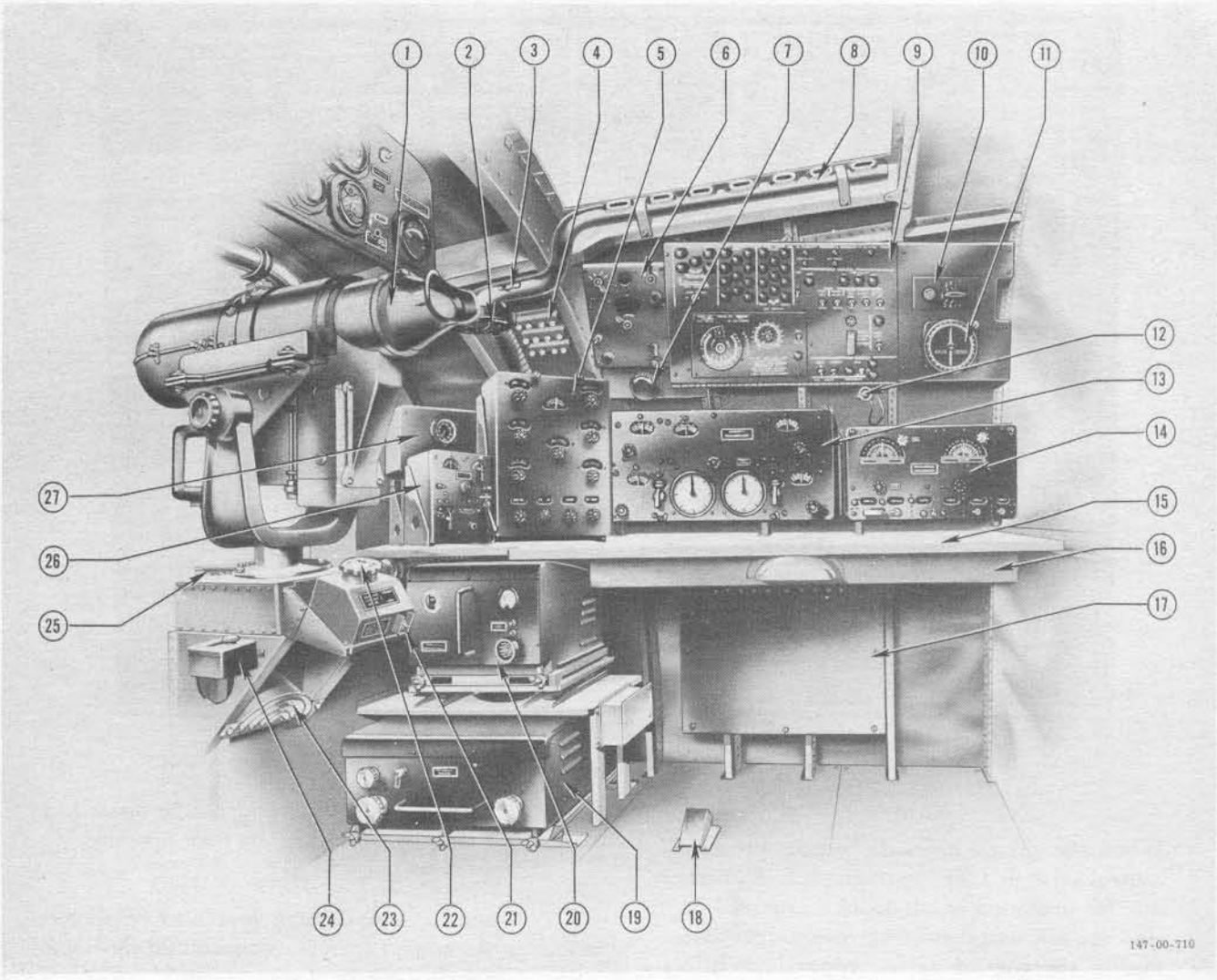
4-8. RELEASE SELECTOR. The bomb release selector switch (figure 4-2) provides for "NORMAL RELEASE" or "AIMED SALVO," either through the radar equipment or by means of the bomb release button. At "NORMAL RELEASE," bombs are dropped through operation of the intervalometer; when switch is positioned at "AIMED SALVO," all bombs are dropped simultaneously. At "AIMED SALVO," bombs are armed and bomb doors are opened automatically (either on manual or automatic release), and both the control selector and bomb group and door selectors are by-passed. Since the bomb timer does not operate for salvo release, there is no delay between door opening and bomb release; this will result in bombs falling short of their target unless the release point is changed accordingly.

4-9. BOMB GROUP AND DOOR SELECTORS. Separate switches provide selection of the "FRONT" or "REAR" bomb group and doors. (See figure 4-2.) The front group consists of two bays, a forward and center, while the rear group consists of only one aft bay. When the "FRONT" bomb group is selected, only front bomb doors will open and bombs will be dropped from the front and center bomb bays. When just the "REAR" bomb group is selected, the front doors will open with the rear doors in order for the rear bombs to fall clear. The bomb group and door selector must be on before the doors can be opened or the bombs released (except in "AIMED SALVO" release).

4-10. BOMB DOOR CONTROL. The bomb doors may be opened by means of a spring-loaded switch (figure 4-2) aft of the bomb group and door selectors. To open the doors, the bomb group and door selectors must first be turned on before holding the door switch momentarily at "OPEN." Holding the switch at "CLOSED" will shut all bomb doors.

(1) AF47-23 thru AF47-36, and AF47-38

(2) AF47-37, AF47-39 and subsequent



1. ID-218/APS-23 Indicator*
2. Heat and Vent Outlet
3. Astrodome Defrost Shut-off Valve
4. Spare Lamps
5. C-413/APS-23 Control Unit*
6. AN/ARN-6 Radio Compass Control Panel
7. Defrost and Ventilating Air Control
8. Astrodome Defroster Outlets
9. Bomb Control Panel
10. Interphone Panel
11. Radio Compass Indicator
12. Bomb Release Button
13. CP-21/APA-44 Ballistics Computer*
14. CP-22/APA-44 Mileage Computer*
15. Chart Table
16. Chart Table Drawer
17. J-166/APA-44 Junction Box*
18. Microphone Switch
19. AM-166/APA-44 Amplifier Unit*
20. PP-185/APA-44 Power Supply Unit*
21. Auto-pilot Control Transfer Switch†
22. Auto-pilot Turn Control Knob†
23. Heat and Vent Floor Outlet
24. C-416/APS-23 Control Unit*
25. J-218/APS-23 Main Junction Box*
26. C-293/APA-44 Tracking Control*
27. ID-168/APA-44 Airspeed Indicator*

*B-45A-5 Airplanes AF47-37 and AF47-39 thru AF47-96
†B-45A-5 Airplanes AF47-37 thru AF47-96, and B-45C Airplanes

Figure 4-1. Bombardier-Navigator's Compartment—Right Side

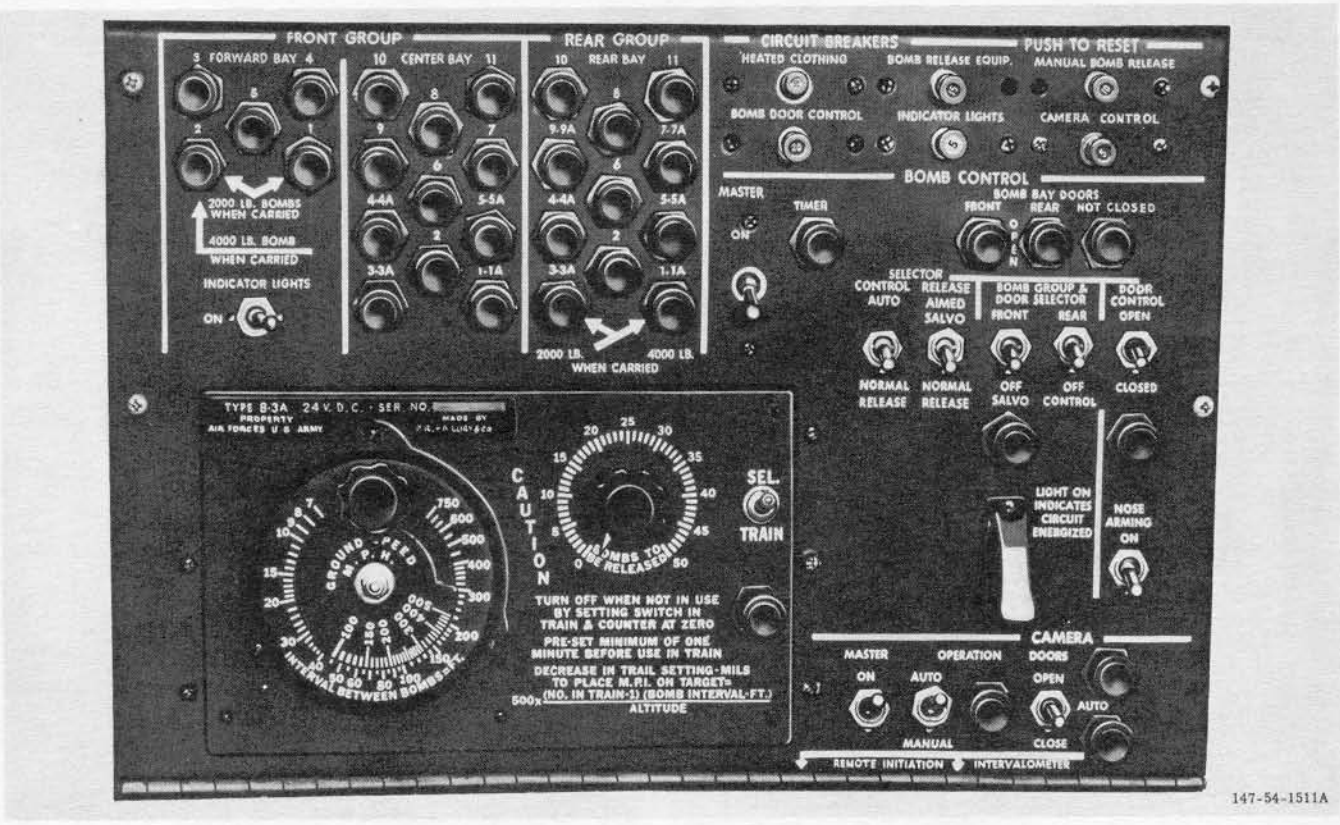


Figure 4-2. Bombardier's Bomb Control Panel

Note

When the pilot's hydraulic system pressure control valve is "OFF" (paragraph 1-78), pressure for operating bomb doors is provided by closing a solenoid shut-off valve in the pressure line to the control valve. Approximately 6 seconds is required to build up sufficient pressure to operate the doors.

A-1,A-5(1)

This shut-off valve is actuated by operation of bomb door and salvo switches (bombardier-navigator's or pilot's) and the bomb timer when on automatic release.

A-5(2),C

This shut-off valve is actuated by the salvo switches only.

(An emergency manual bomb door control (22, figure 1-14) is installed in the pilot's compartment above the bomb bay entrance hatch.)

CAUTION

If bomb bay doors are opened in flight when 1200-gallon bomb bay tank is empty or nearly empty, the tank may be seriously damaged by buffeting; therefore, unless the tank is to be jettisoned, the door should not be opened. A full tank is not affected by door opening.

Note

When loose equipment is stowed on shelves in the bomb bay, it is recommended the bomb bay doors be kept closed.

4-11. BOMB DOOR INDICATORS. Three lights above the door switches show position of bomb bay doors. (See figure 4-2.) A red light for each set of doors will illuminate when the related doors are open. A single amber light illuminates when bomb doors are not fully closed.

4-12. BOMB ARMING. A nose arming switch and indicator light are located below the door control switch. (See figure 4-2.) When the nose arming switch is turned "ON," all bombs are nose armed for instantaneous detonation. Illumination of the light above the switch indicates that the nose arming circuit is energized. When the switch is off, bombs are automatically tail armed for delayed detonation. When bombs are dropped with the release selector at "AIMED SALVO," bombs are automatically nose armed without positioning the nose arming switch.

4-13. EMERGENCY SALVO SWITCH. A single salvo switch (figure 4-2) on the bomb control panel is used for emergency bomb salvo. When the switch is held

(1) AF47-23 thru AF47-46

(2) AF47-47 and subsequent

on momentarily, a locking relay holds current on to close the hydraulic shut-off valve, open bomb doors, and release the bombs unarmed.

WARNING

During operation of the emergency salvo switch, the master switch should be off. If it is not off and the release selector is at the "AIMED SALVO" position, the bombs will be nose armed when released.

Following bomb salvo, the doors must be closed by operation of the bomb door switch. A red light above the emergency salvo switch illuminates when the salvo circuits are energized for emergency salvo release, or when the pilot operates his salvo control switch for bomb salvo. The light serves as a warning against operating the salvo switch when the circuit is already energized, as it would then de-energize the circuit. Power is supplied directly to the salvo switch from the battery, permitting operation regardless of master switch position.

4-14. BOMB INDICATOR LIGHTS. Bomb station loading is indicated by illumination of a group of lights at the top left of the bomb control panel. (See figure 4-2.) The lights are divided into front and rear groups; the front group includes lights for the forward and center bay, the rear group for the rear bay only. An indicator light switch below them must be turned "ON" before the lights will illuminate. As the bombs are released, the related station lights will go out.

Note

No indicator lights are provided for station loading of bombs larger than 4000 pounds.

4-15. BOMBARDIER'S CAMERA CONTROLS.

4-16. MASTER SWITCH. Electrical power (dc) is supplied to the camera circuits through a master switch (figure 4-2) on a camera control panel at the bottom of the bomb control panel.

4-17. OPERATION SWITCH. The operation switch (figure 4-2) adjacent to the master switch is spring-loaded to the "AUTO" position for automatic operation of the camera during the bombing run. The switch may be held at "MANUAL" for momentary operation of the camera, although the camera doors must be opened first by means of the door switch. A light adjacent to the operation switch illuminates when the camera is running.

4-18. DOOR SWITCH. The camera doors are operated through a switch on the camera control panel. (See figure 4-2.) The switch is spring-loaded to the "AUTO" position so that the doors will automatically open whenever the forward bomb doors open and the camera master switch is on. However, after bomb release, the camera doors must be shut by holding the switch at "CLOSE." The doors may be opened for manual operation of the camera by holding the switch momentarily at the "OPEN" position. Separate lights indicate when the doors are open or closed.

4-19. CAMERA INTERVALOMETER CONTROL. A Type B-7 camera intervalometer control is mounted on the bombardier-navigator's aft bulkhead outboard of the oxygen panel. (See 2, figure 4-4.) The intervalometer controls automatic operation of the camera and the interval between successive camera exposures. It may be set for four different types of operation: day reconnaissance, day orientation, night orientation, and night reconnaissance and bomb spotting. The camera intervalometer control box may also be mounted at the camera station, and the camera may be operated at that location as long as the bombardier's camera master switch is "ON."

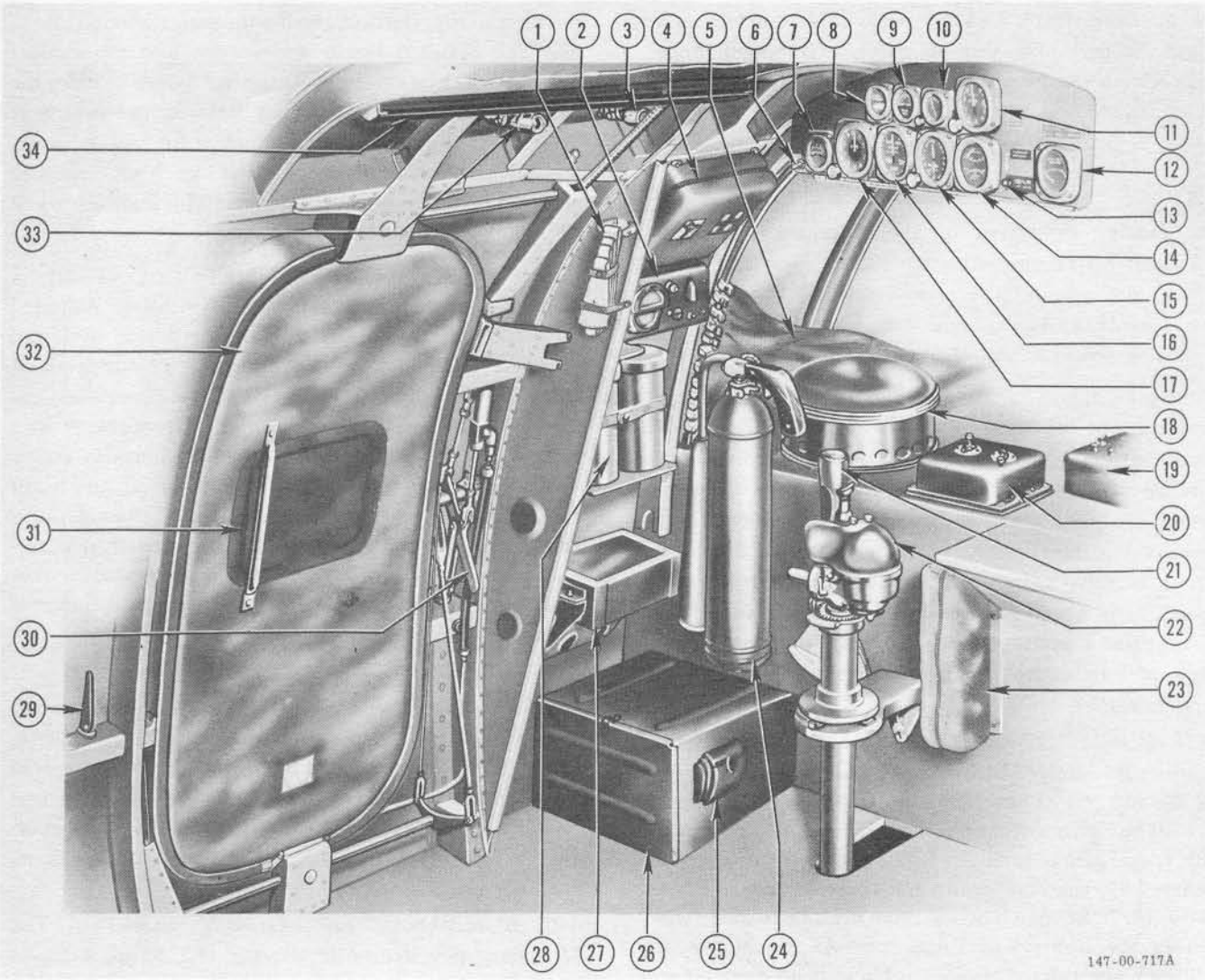
4-20. PILOT'S BOMB AND DOOR CONTROLS.

4-21. BOMB DOOR SWITCH. A spring-loaded bomb door switch on the pilot's electrical switch panel (8, figure 1-10) operates both bomb bay doors when held momentarily at "OPEN" or "CLOSE." (Refer to first NOTE in paragraph 4-10.) When the switch is operated, a locking relay holds current on until the doors are fully opened or closed.

4-22. BOMB DOOR EMERGENCY SELECTOR. The aft emergency hydraulic selector (12, figure 1-12) at the right of the pilot's seat may be used to obtain emergency pressure for operating the bomb doors. When the selector is placed at "BOMB DOORS OPEN" or "BOMB DOORS CLOSED," pressure from the emergency hydraulic pump is supplied to the door actuating cylinders through emergency lines.

4-23. BOMB AND DOOR INDICATORS. Three lights at the top right of the pilot's instrument panel indicate bomb door position. (See 13, figure 1-8.) One amber light illuminates when all doors are not fully closed. Two red lights, one each for the front and rear doors, illuminate when the related door is open. An amber bomb release light (outboard of the door indicator) flickers as each bomb release is initiated by the intervalometer. Consequently, on "AIMED SALVO" release, the light will not illuminate.

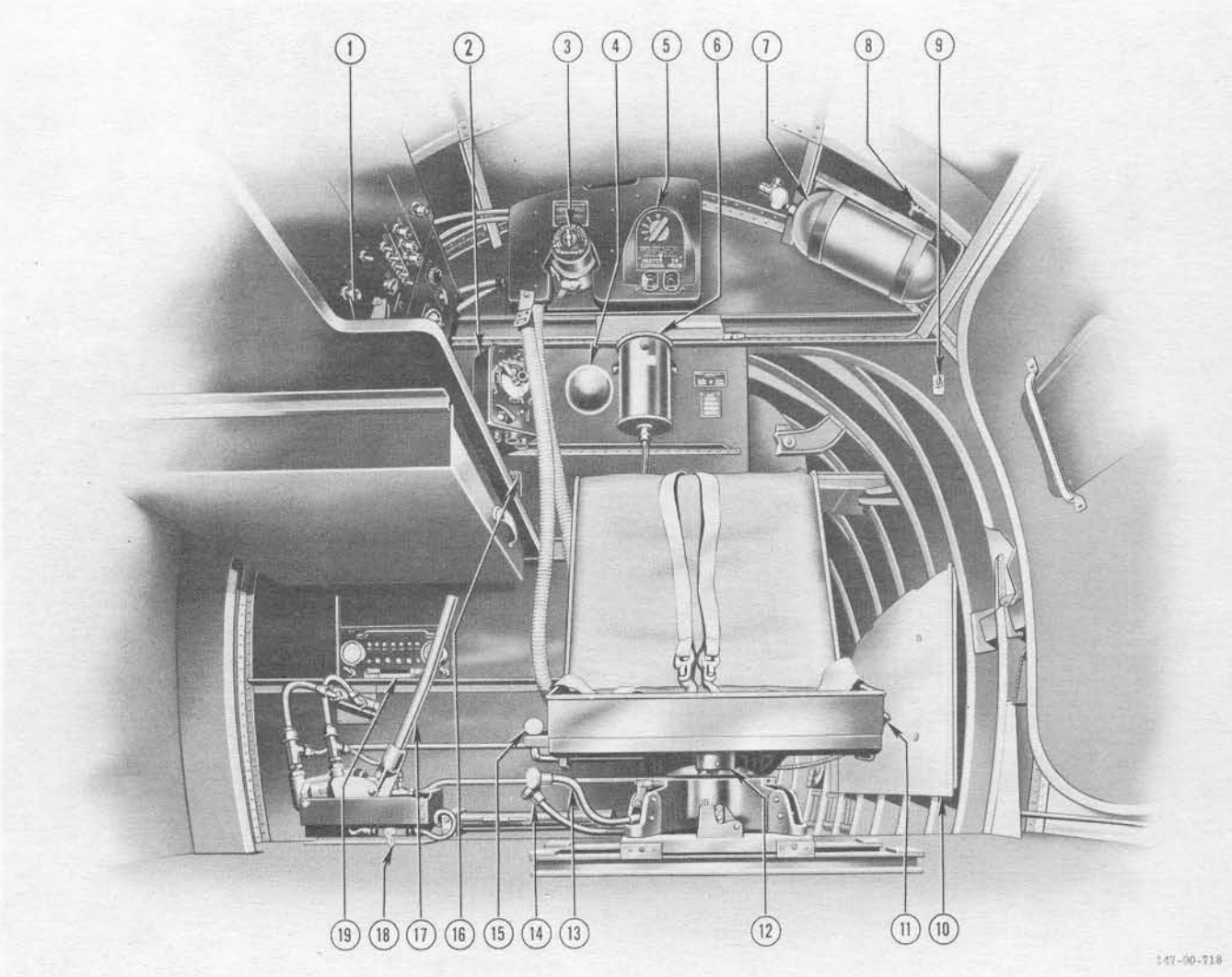
4-24. EMERGENCY SALVO CONTROLS. The pilot's bomb and tank salvo controls are located on the control pedestal inboard of the power controls. (See 31 and 34, figure 1-10.) A salvo selector switch and a salvo control switch provide for jettisoning all combinations of bombs and bomb bay fuel tanks. The salvo selector



1. Parachute Static Line
2. Radar Pressurization Control Panel
3. Fluorescent Light
4. First-aid Kit
5. Radome Close-out Curtains
6. Driftmeter Power Switch**
7. Free Air Temperature Gage
8. Oxygen Flow Indicator
9. Oxygen Pressure Indicator
10. Clock
11. Cabin Pressure Altimeter
12. ID-166/APA-44 Monitor Voltmeter*
13. Bombardier Auto-pilot Controller Indicator*
14. Radar Steering Meter*
15. Remote-indicating Compass
16. True Airspeed Indicator
17. Altimeter
18. RT-124/APS-23 Receiver-Transmitter
19. Circuit Breaker Box (Radar)
20. Radar Camera Control Box
21. Hand Axe
22. Driftmeter
23. Anti-exposure Suit†
24. Fire Extinguisher
25. Ash Tray
26. Map and Data Case
27. Sextant Stowage Box
28. Disposal Containers
29. Main Entrance Hatch Control
30. Main Entrance Hatch Emergency Release
31. Window§
32. Main Entrance Hatch
33. Compartment Light
34. Astrodome Close-out Curtain

*B-45A-5 Airplanes AF47-37 and AF47-39 thru AF47-96
**B-45A Airplanes
†B-45C Airplanes
§B-45A-5 Airplanes AF47-77 thru AF47-96, and B-45C Airplanes

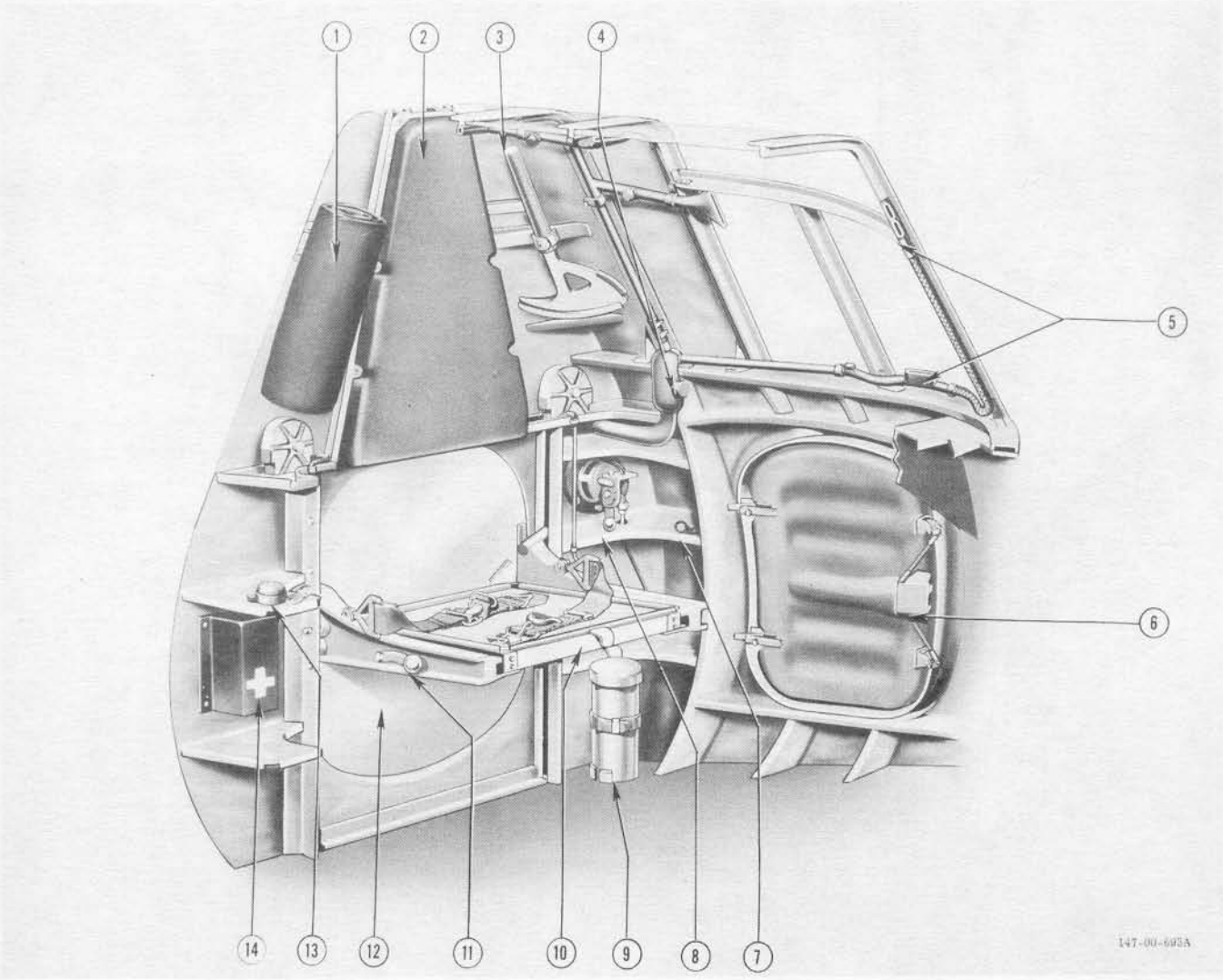
Figure 4-3. Bombardier-Navigator's Compartment—Left Side



1. Chart Table
2. Camera Intervalometer Control
3. Oxygen Regulator
4. Alarm Bell
5. Heated Clothing Control Panel
6. Nose Gear Emergency Hydraulic Reservoir*
7. Portable Oxygen Bottle
8. Refiller Valve—Portable Oxygen Bottle
9. Passageway Light Switch
10. Ditching Panel (Carried on overwater flights only)§
11. Shoulder Harness Lock Control
12. Seat Swivel Control
13. Seat Vertical Control
14. Seat Lateral Control
15. Emergency Escape Control
16. Landing Gear Emergency Operation Instruction Placard
17. Hand-pump—Landing Gear Emergency Release
18. Manual Check Valve—Emergency Landing Gear Lowering System
19. SN-47/APS-23 Synchronizer†

*On B-45A-5 Airplanes AF47-37 and subsequent, located on right side of pilot's walkway
†B-45A-5 Airplanes AF47-37, and AF47-39 thru AF47-96
§B-45A-1 Airplanes, B-45A-5 Airplanes AF47-23 thru AF47-61, and B-45C Airplanes AF48-1 thru AF48-6

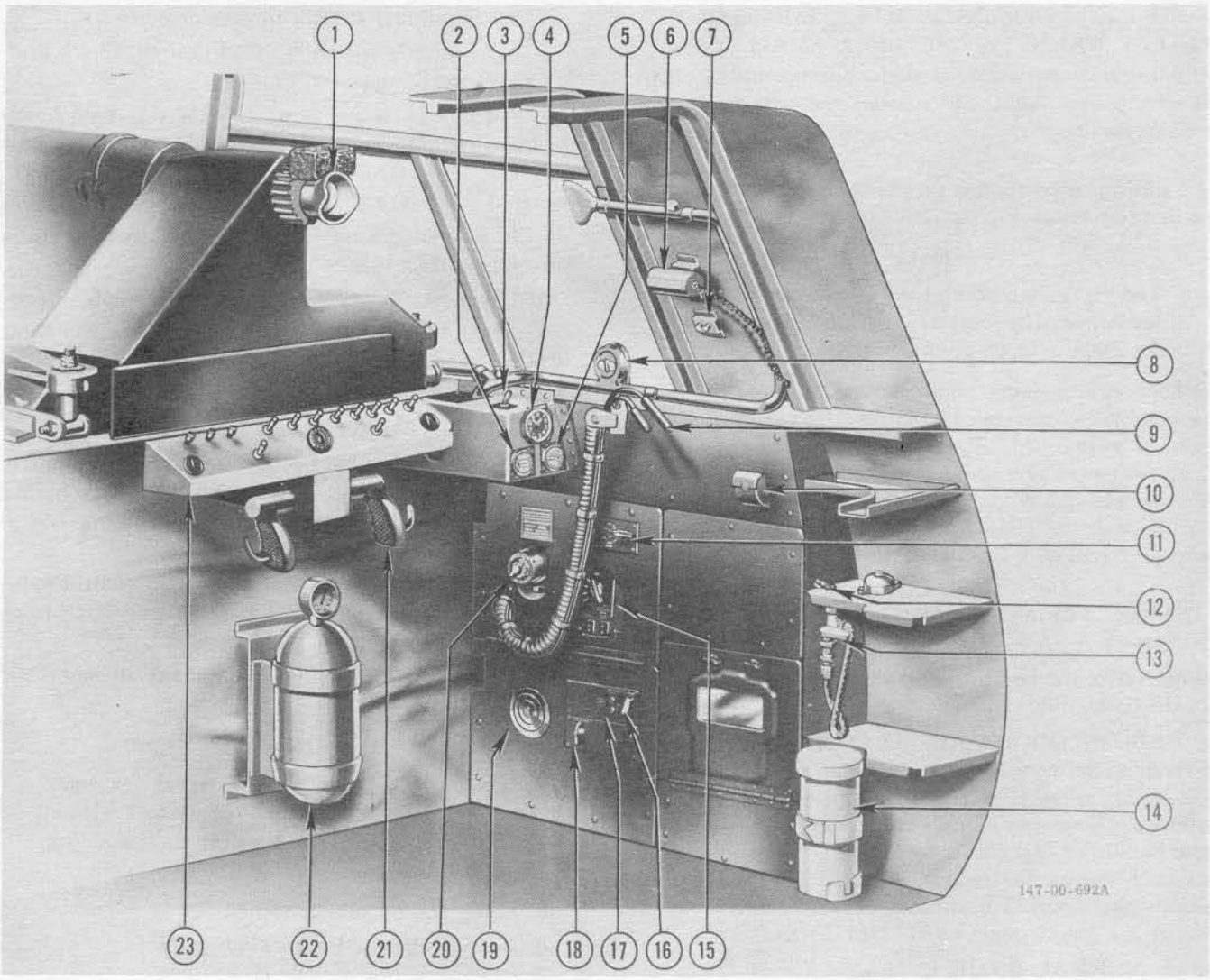
Figure 4-4. Bombardier-Navigator's Compartment—Rear View



1. Ditching Belt*
2. Head and Back Rest
3. Hand Axe
4. Air Shut-off Valve
5. Defroster Outlets
6. Escape Hatch Release Handle
7. Ditching Belt Attaching Hook
8. Cabin Air Emergency Dump Valve
9. Disposal Container
10. Seat Horizontal Adjusting Handle
11. Seat Vertical Adjusting Handle
12. Cabin Access Door
13. Alarm Bell
14. First-aid Kit

*B-45A-1 Airplanes, B-45A-5 Airplanes AF47-23 thru AF47-61, and B-45C Airplanes AF48-1 thru AF48-6

Figure 4-5. Tail Cabin—Left Side



1. Gun Sight
2. Oxygen Flow Indicator
3. Cabin Pressure Switch
4. Cabin Pressure Altimeter
5. Oxygen Pressure Indicator
6. Cabin Light
7. Spare Lamps
8. Heat and Vent Outlet
9. Radio Jacks
10. Ash Tray
11. Interphone Panel
12. Ditching Belt Attaching Hook
13. Refiller Valve—Portable Oxygen Bottle
14. Disposal Container
15. Heated Clothing Panel
16. Emergency Escape Switch
17. Circuit Breakers
18. Cabin Temperature Rheostat
19. Heat and Vent Outlet
20. Oxygen Regulator
21. Turret Controller
22. Portable Oxygen Bottle
23. Turret Control Panel

Figure 4-6. Tail Cabin—Right Side

switch may be positioned at "ALL," "BOMBS ONLY," "LARGE TANK," or "BOMBS & SMALL TANK." Holding the salvo control switch on momentarily opens the bomb bay doors and releases the selected bombs and/or fuel tanks.

C

An additional position is provided on the salvo selector switch for jettisoning tip tanks.

Note

The 310-gallon bomb bay fuel tank cannot be jettisoned when the aft shackles (Type D-7) for 2000 or 4000-pound bombs are installed.

Whenever emergency bomb salvo is initiated (by pilot or bombardier-navigator), a light adjacent to the salvo control switch will illuminate. (See 33, figure 1-10.) This is to warn against operating the salvo switch when the circuit is already energized, thus disrupting the salvo operation. The light will not illuminate when just the large fuel tank is jettisoned.

C

The light will not illuminate when the tip tanks are jettisoned.

After salvo, the bomb bay doors must be closed by use of the bomb door switch.

4-25. BOMB DOOR MANUAL CONTROL. A manual override control for operating bomb doors in case of electrical failure is located in the pilot's compartment above the bomb bay hatch. (See 22, figure 1-14.) Moving the handle to "OPEN" or "CLOSED" manually positions the hydraulic selector valves for forward and aft bomb bay doors. For normal electric control of the doors, the handle must be in "NEUTRAL."

4-26. NORMAL BOMB RELEASE.

4-27. For normal bomb release, either automatically through operation of the radar bombing equipment or manually by means of the bomb release switch, proceed as follows:

a. Check that pilot's hydraulic system control valve is "ON."

Note

If hydraulic system control valve is "OFF," door operation will be delayed approximately 6 seconds and may cause the bombs to miss the target, especially on automatic release. (Refer to first NOTE in paragraph 4-10.)

b. Preset radar bombing equipment if automatic release is desired.

c. Bomb control master switch "ON."

d. Bomb indicator light switch "ON."

e. Camera master switch "ON."

f. Control selector "NORMAL" or "AUTOMATIC."

g. Release selector "NORMAL."

h. Bomb group and door selectors "FRONT" or "REAR" or both.

i. Set bomb and camera intervalometers.

j. Nose arming switch "ON" if desired. Check arming indicator light.

k. If control selector is at "NORMAL," hold bomb door switch momentarily at "OPEN" and check door indicator lights. (Doors open automatically on "AUTO" control.)

l. If manual release is desired, press bomb release button at correct release point.

m. Check bomb indicator lights for bomb release.

n. After manual bomb release, hold door switch at "CLOSE" and check door indicator lights. (Doors automatically close on "AUTO" control.)

4-28. AIMED SALVO BOMB RELEASE.

4-29. All bombs may be dropped simultaneously (armed), either manually using the bomb release button or automatically through the radar bombing equipment, as follows:

a. Check that pilot's hydraulic system control valve is "ON." (Refer to NOTE following step a. in paragraph 4-27.)

b. Preset radar bombing equipment if automatic salvo is desired.

Note

Remember that the time interval for automatic salvo is shorter than for normal release, since there is no delay between door opening and bomb release.

c. Bomb control master switch "ON."

d. Bomb indicator light switch "ON."

e. Camera master switch "ON."

f. Set camera intervalometer.

g. Release selector at "AIMED SALVO."

h. If manual release is desired, press bomb release button at correct release point. On either manual or automatic salvo release, bombs are armed (nose arming light on) and bomb doors opened (door open lights on) automatically prior to bomb release.

i. Check bomb indicator lights for release.

j. When bombs are released, hold bomb door switch momentarily at "CLOSE" and check door indicator lights.

4-30. DRIFTMETER.

4-31. A B-3 type driftmeter, mounted in the bombardier-navigator's compartment (22, figure 4-3) is electrically powered by the inverter. All controls are an integral part of the driftmeter.

A

To operate the driftmeter, the master power switch on the bombardier-navigator's instrument panel (6, figure 4-3), as well as the power switch on the driftmeter, must be "ON."

4-32. GUNNERY EQUIPMENT.

4-33. Provisions are made for installation of a controllable tail turret containing two .50-caliber machine guns. Six hundred rounds of ammunition can be carried for each gun. The gunnery equipment is remotely controlled from a pressurized cabin forward of the turret. The guns are automatically charged by means of a pneumatic gun charging system. The gun sight installed with the turret consists of a hemisphere optical sighting system (with built-in gun camera) and a radar sighting system. Either means of sighting may be used individually, or the radar sight may be used for ranging with the optical sight.

4-34. OXYGEN.

4-35. Oxygen is supplied from eight Type F-1 low-pressure oxygen cylinders, two cylinders per crew member. Two cylinders are located on the left side of the bombardier-navigator's compartment below the floor, two on the right side beneath the pilot's compartment, and four in the unpressurized section aft of the bomb bay. Should oxygen supply cylinders for any crew station be depleted or destroyed, that crew member will automatically draw oxygen from the cylinders supplying one of the other crew stations. Normal full pressure for the system is 400 psi. All cylinders may be refilled through a single filler valve on the left side of the fuselage forward of the rear entrance hatch. A diluter demand pressure breathing regulator, installed at each crew station, is used with reference to the cabin pressure altimeter. An oxygen regulator, pressure gage, and flow indicator are installed at each crew station.

4-36. PORTABLE OXYGEN UNITS.

4-37. Walk-around oxygen bottles are provided in each compartment: on left side of passageway in pilot's compartment (14, figure 1-14) at the left of the bombardier-navigator's seat above the main entrance hatch (7, figure 4-4) and directly forward of gunner's seat. (See 22, figure 4-6.) The portable units may be refilled from the main system at filler valves at the following locations: forward of the portable cylinder in the pilot's compartment left of seat in the bombardier-navigator's compartment (8, figure 4-4); on the right side of gunner's cabin (13, figure 4-6); and at the camera station in the rear fuselage section.

4-38. OXYGEN SYSTEM EMERGENCY OPERATION.

4-39. Satisfactory operation of the oxygen system should be crew checked by means of interphone every 3 minutes after an oxygen altitude has been reached. If any crew member feels symptoms of anoxia, or if his oxygen regulator becomes inoperative, he should immediately notify the pilot and attach his walk-around bottle. If the walk-around bottle does not immediately supply him with oxygen, then he should pull handle on his bail-out bottle. As soon as the pilot (or copilot) receives the call, he should immediately descend to 10,000 feet at maximum rate of descent. The crew member not piloting the airplane should then go to the aid of crew member experiencing oxygen failure, being certain to attach his own walk-around bottle. If smoke or fuel fumes should enter the cabin, then, regardless of altitude, proceed as follows:

a. Cabin air emergency valve "RAM AIR OPEN."

b. Oxygen regulator air valve "100% OXYGEN."

c. Set oxygen regulator dial control as required by airplane altitude.

4-40. OXYGEN MASK REMOVAL AT ALTITUDE. Should brief removal of mask be necessary at high altitude, use the following procedure:

a. Take three or four deep breaths of undiluted oxygen (air valve at "100% OXYGEN").

b. Hold breath and remove mask from face.

c. As soon as practicable, replace mask to face and take three or four deep breaths of undiluted oxygen.

d. Reset air valve to "NORMAL OXYGEN."

MAN-HOUR OXYGEN CONSUMPTION TABLE

(APPROXIMATE DURATION—REGULATOR AIR VALVE AT NORMAL OXYGEN)

GAGE PRESSURE	ALTITUDE 10,000'	15,000'	20,000'	25,000'	30,000'	35,000'	40,000'
400	7:15	5:25	4:30	4:00	4:15	5:40	7:40
350	6:10	4:40	3:50	3:25	3:35	4:55	6:30
300	5:10	3:55	3:10	2:50	3:00	4:05	5:25
250	4:10	3:05	2:35	2:15	2:25	3:15	4:25
200	3:05	2:20	1:55	1:45	2:15	2:25	3:15
150	2:00	1:35	1:15	1:10	1:15	1:35	2:10
100	1:05	0:45	0:40	0:35	0:35	0:50	1:05
50	DESCEND	BELOW 10,000 FEET					

NOTE: THIS TABLE IS BASED ON THE CAPACITY OF TWO F-1 OXYGEN CYLINDERS PER CREW MEMBER

147-93-405

Figure 4-7. Oxygen Consumption Table

4-41. COMMUNICATIONS AND ASSOCIATED ELECTRONIC EQUIPMENT.

4-42. TABLE OF COMMUNICATIONS AND ASSOCIATED ELECTRONIC EQUIPMENT.

TYPE	DESIGNATION	USE	OPERATOR	ILLUSTRATION
Command	AN/ARC-3	Two-way voice communication	Pilot	3, figure 1-12.
*Liaison	AN/ARC-8	Long-range, two-way code, and voice communication	Copilot (pilot provided with remote control of transmitter)	6 and 8, figure 1-13; 2, figure 1-12.
Radio Compass	AN/ARN-6	Reception of voice and code communications; position finding; homing	Pilot or bombardier-navigator	4, figure 1-12; 12, figure 1-13; 6 and 11, figure 4-1.
Instrument Approach	RC-103 and AN/ARN-5A	Localizer and glide path indicator for instrument approach	Pilot	6, figure 1-12; 53, figure 1-8.
*IFF	SCR-695-B	Automatic identification	Copilot—radio operator	13, figure 1-13.
Interphone	AN/AIC-2A	Intercrew communication	All crew members	5, figure 1-12; 11, figure 1-13; 10, figure 4-1; 11, figure 4-6.
Marker Beacon	RC-193-(A)	Reception of location marker signals from instrument approach stations	Pilot	56, figure 1-8.
*Dinghy Transmitter (provisions only)	AN/CRT-3	Transmit distress signals when forced down	All crew members	Figure 3-1.
Radar	AN/APQ-24	Navigation, bombing	Bombardier-navigator	Figure 4-1.

WARNING

Radar ground checks must not be made within 50 feet of operations involving fuel. Tests indicate that electrical energy from radar equipment may cause ignition of fuel vapors.

*B-45A-1 Airplanes, B-45A-5 Airplanes AF47-23 thru AF47-61, and B-45C Airplanes AF48-1 thru AF48-6

4-43. OPERATION OF COMMUNICATION EQUIPMENT.

4-44. COMMAND RADIO—AN/ARC-3.

a. Turn "ON" power switch on command radio control panel.

b. Turn radio equipment selector (on interphone panel) to "COMMAND."

c. Rotate command radio selector to desired frequency channel and allow approximately 30 seconds for set to warm up. When audio tone heard in the earphones stops, the set is tuned and ready for operation.

d. Adjust volume control for desired output.

e. To transmit, press push-to-talk button on control wheel (or on auto-pilot controller).

f. To turn radio off, turn power switch on command radio control panel "OFF."

A-1,A-5(1),C(2)

4-45. LIAISON RECEIVER.

a. Turn power switch on receiver to "ON."

b. Turn receiver switch to "MVC."

c. Rotate radio equipment selector on interphone panel to "LIAISON."

d. Set band switch on desired frequency band.

e. Select desired frequency with "TUNING" control.

f. Adjust volume as desired.

g. To turn off the receiver, move power switch to "OFF."

A-1,A-5(1),C(2)

4-46. LIAISON TRANSMITTER.

a. Position transfer switch on transmitter unit to "LOCAL" or "REMOTE" control as desired.

b. Check that ART-13 transmitter switch on copilot's panel is at "NORMAL."

c. Turn radio equipment selector on interphone panel to "LIAISON."

d. Turn emission switch to "VOICE."

e. Rotate channel selector to desired frequency channel.

f. To transmit, press push-to-talk button on control wheel (or on auto-pilot controller).

g. To turn transmitter off, move emission switch to "OFF."

4-47. RADIO COMPASS—AN/ARN-6.

a. Depress center "CONTROL" knob to obtain control of the radio.

b. Turn radio equipment selector on interphone panel to "COMP."

c. Turn compass control switch to desired type of operation: "ANT," "COMP," or "LOOP."

d. Select one of the four frequency bands, and tune station desired with the tuning crank.

e. Adjust audio control for desired output.

f. The radio is turned off by rotating control switch to "OFF."

4-48. INSTRUMENT LANDING—RC-103, AN/ARN-5A.

Note

The instrument landing radios may be used in conjunction with automatic approach equipment and the automatic pilot. Refer to paragraphs 1-115 and 2-81.

a. Approximately 20 minutes before approaching landing area, turn "ON" power switch on instrument approach control panel.

b. Rotate selector to desired frequency channel.

c. Turn radio equipment selector on interphone panel to "COMMAND," and turn on "LOCALIZER" mixer switch.

d. Adjust volume as desired.

e. Observe cross-pointer indicator on instrument panel for course indications.

f. When landing is completed, turn instrument approach power switch to "OFF."

4-49. IDENTIFICATION RADIO—SCR-695-B.

WARNING

Before take-off, insert destructor plug in face of IFF equipment to left of copilot's seat. *Remove plug immediately after landing.*

a. Rotate code selector to position "1." (Leave in position "1" at all times when operating the equipment, unless directed by commanding officer to use one of the other positions.)

b. Move G-band switch to "ON" or hold it momentarily at "TIME" as desired.

c. To turn off the radio, move the code selector and G-band switch to "OFF."

4-50. SIMULTANEOUS RECEPTION OF RECEIVERS.

4-51. The pilot's interphone panel contains four switches that allow simultaneous reception of several receivers. With the radio equipment selector on "COMMAND," the pilot can also receive on localizer, marker beacon, radio compass, and interphone by turning on the corresponding switches on his panel.

4-52. RADAR PRESSURIZATION.

4-53. A pressurizing system is provided to maintain a constant pressure in the radio frequency unit and wave guide portion of the radar equipment installed in the bombardier-navigator's compartment. Pressure is supplied by a d-c electrically operated pump which automatically maintains pressure within a specified operating range.

4-54. RADAR PRESSURIZATION CONTROL.

4-55. A panel, forward of the main entrance hatch on the left side of the bombardier-navigator's compartment (2, figure 4-3) contains all controls and indicators for the radar pressurization system. A push-to-reset type circuit breaker is provided on the panel.

4-56. CONTROL SWITCH. A guarded switch on the radar pressurization panel controls the pressure system. In the "NORMAL ON" position (guard down), the pressurizing pump will operate through a pressure switch to maintain the desired pressure. A spring-loaded "MOMENTARY ON" position provides a means of

overriding the pressure switch for preflight or leakage tests of the system. The central "EMERGENCY OFF" position is used to turn off the pump in the event the pressure switch becomes inoperative. The switch should be left at "EMERGENCY OFF" except during operation of the radar equipment to avoid unnecessary operation of the system.

4-57. PRESSURE PUMP INDICATOR. A light, aft of the control switch, illuminates when the pressure pump is operating. Normally the pump will operate once during a 15-minute period and should not run for more than 20 seconds to build up the required pressure.

4-58. PRESSURE GAGE. A pressure gage is provided on the control panel with the desired pressure range marked in green. The pressure switch automatically maintains pressure within 2½ in. Hg of the calibration pressure. A "LEAKAGE TEST ONLY" mark on the gage is used to test for pressure leakage in the system.

4-59. RADAR PRESSURIZING BLEEDER VALVE. Pressure in the system is relieved by depressing a bleeder valve knob forward of the pressure gage.

4-60. CHECKING RADAR PRESSURIZATION SYSTEM. Test operation of the radar pressurization system as follows:

a. Before take-off, align calibration pressure arrow with gage pointer, and then check system for leakage. Hold control switch at "MOMENTARY ON" until pressure reaches "LEAKAGE TEST ONLY" mark. Make sure that pressure is retained for 5 minutes with less than ½ in. Hg pressure loss.

b. Check automatic operation in flight. With control switch at "NORMAL ON," depress bleeder valve knob until the pump starts (indicator lamp illuminated). Release bleeder knob and allow pressure to build up until pump is automatically turned off. Make sure that pressure remains in the green range.

4-61. CABIN PRESSURIZATION, HEATING, AND VENTILATING.

4-62. Air is taken from the engine compressors and delivered under pressure to the main cabin (which includes stations for pilot, copilot, and bombardier-navigator) and tail cabin at a preselected temperature for either heating or cooling. (See figure 4-8.) Cross-flow between engines provides continuous operation of the system should one or more engines fail. The system is normally controlled by the pilot, although temperature and emergency controls are also provided in the tail cabin, and manual controls at each station allow crew members to direct airflow to desired outlets. A cabin pressure altimeter is provided on the pilot's bombardier-navigator's, and tail gunner's instrument panels. (See 33, figure 1-8; 11, figure 4-3; and 4, figure 4-6.) The canopy is sealed in a rubber seating, which is inflated by compressed air from the engine compressors to provide a tighter seal and allow full effectiveness of the pressurization system.

4-63. PILOT'S PRESSURIZATION, HEAT, AND VENT CONTROLS.

4-64. CABIN PRESSURE SWITCHES. A cabin pressure switch (13, figure 1-10), on the panel outboard of pilot's control pedestal, controls a pressure regulator in the main cabin and one in the tail cabin. With the switch at "NORMAL," the pressure regulator in each cabin maintains cabin pressure at atmospheric pressure up to 5000 feet, and a pressure equivalent to that at 5000 feet up to 24,000 feet. Above 24,000 feet, a 6.55 psi pressure differential will be maintained between cabin and outside air pressure. The "COMBAT" position of the cabin pressure switch sets both regulators to a 2.75 psi differential pressure with increase in altitude (above approximately 12,000 feet), thereby minimizing the effects of sudden decompression resulting from a break in cabin sealing. A tail cabin pressure switch is located adjacent to the main cabin pressure switch in the pilot's cockpit. (See 12, figure 1-10.) Usually positioned at "NORMAL," the tail cabin pressure switch may be turned "OFF" in an emergency to isolate the tail cabin from the rest of the system.

4-65. PRESSURE WARNING SIGNAL. When cabin pressure is equivalent to an altitude of 10,000 feet, a horn in the pilot's compartment will sound as a warning to the crew members to put on oxygen masks. The horn will continue to blow until turned off by means of a cabin pressure horn cutoff switch (21, figure 1-10) on the pilot's switch panel. Since there is no warning signal in the tail cabin, *the pilot must warn the tail gunner to go on oxygen when the horn blows.*

4-66. CABIN TEMPERATURE RHEOSTAT. Automatic temperature control is provided in the forward pressurized compartment by means of a thermostat which controls an air mixing valve, thereby proportioning cooled and heated air to give the desired cabin temperature. A cabin temperature rheostat to the right of the pilot's seat (29, figure 1-10) provides remote control of the forward thermostat to vary cabin temperature from 40°F to 80°F. Operation of the rheostat is ineffective unless:

A

The cabin air valve control (16, figure 1-12) is at "NORMAL OPER."

C

The cabin air control valve is at "PRESSURE ON."

An additional mixing valve in the tail cabin supply duct permits control of the temperature in the tail cabin.

4-67. CABIN AIR VALVE CONTROL. An air valve control is located at the right of the pilot's seat. (See 16, figure 1-12.)

A

At the "NORMAL OPER" position, the pressurization system is on, and the cabins will be pressurized according to the position of the cabin pressure switch.

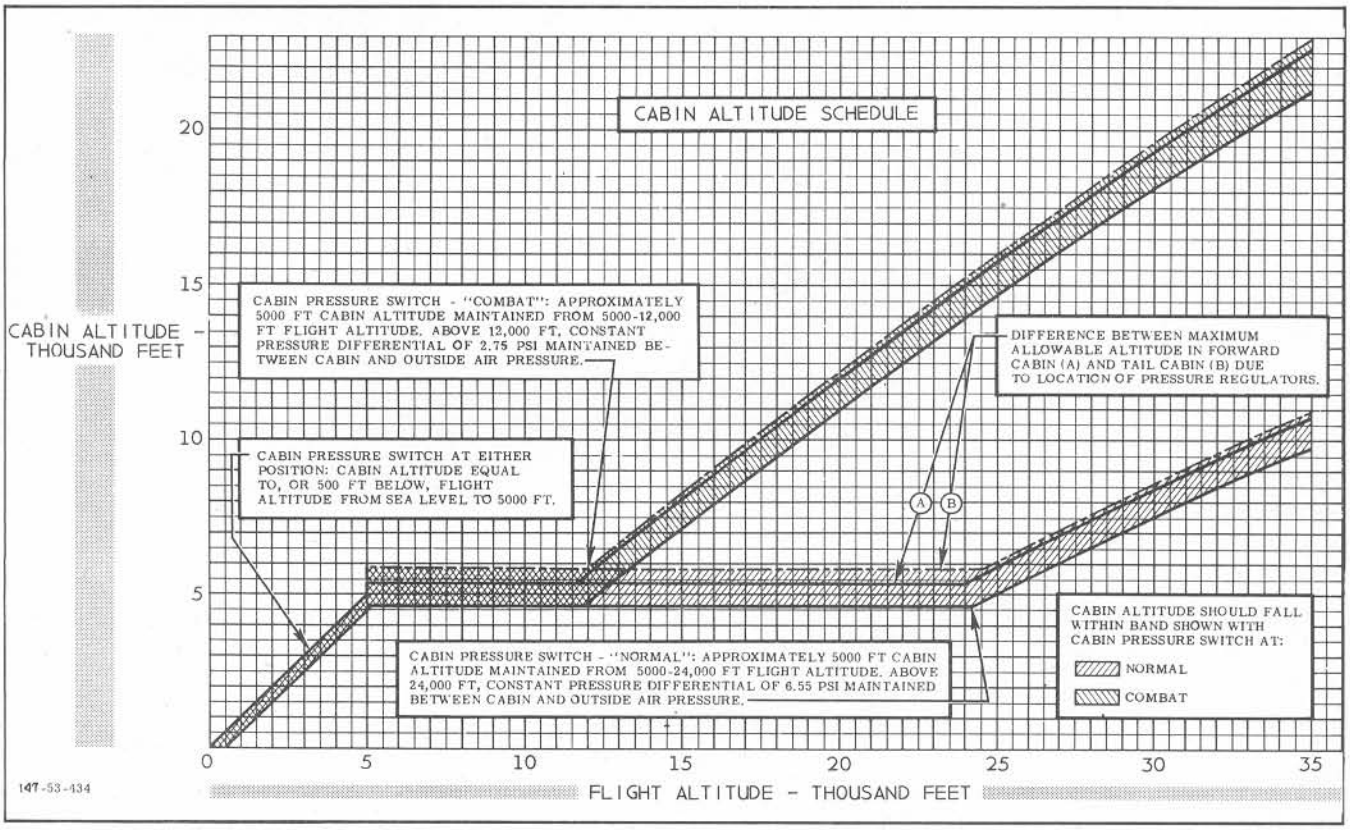


Figure 4-7A. Cabin Altitude vs Flight Altitude

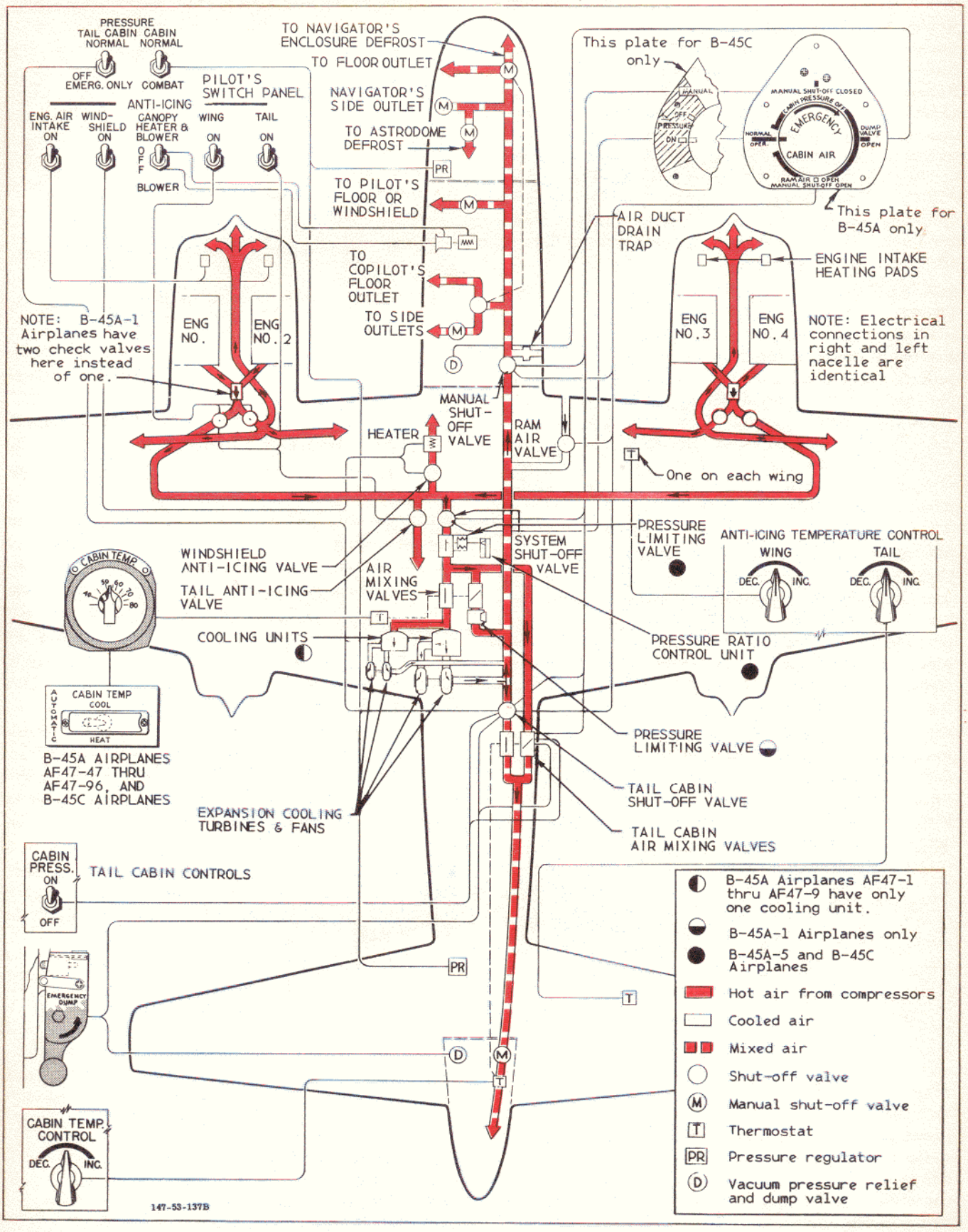


Figure 4-8. Pressurization, Heating, and Ventilating System

C

At the "PRESSURE ON" position, the pressurization system is on, and the cabins will be pressurized according to the position of the cabin pressure switch. Rotating the control to "MANUAL SHUT-OFF CLOSED" closes a valve in the air supply duct to the main cabin, and turns off the system air supply. When the control is turned to "DUMP VALVE OPEN," pressure within the forward cabin is released. The "RAM AIR OPEN" position reopens the shut-off valves at each cabin and admits ram air into the supply ducts. A separate dump valve is provided in the tail cabin to release pressure in that cabin only.

4-68. VENTILATING AND DEFROSTING CONTROLS. A ventilating and defrosting control (14, figure 1-10) above the cabin pressure switches allows air to be directed to the windshield for defrosting, or to a floor outlet forward of the seat for heating or cooling. Manually controlled directional outlets are located on each side of the pilot's and copilot's seats. (See 1, figure 1-12, and 7, figure 1-13.) However, airflow to the copilot's outlets is automatically shut off when the bombardier-navigator's air control (7, figure 4-1) is turned to the defrosting position.

A-5(1),C

4-69. MANUAL OVERRIDE TEMPERATURE CONTROL SWITCH. A manual override toggle switch (21, figure 1-12) allows the pilot to gain control of cabin temperature in event the automatic temperature control fails. The switch directly controls the mixing valve and is normally positioned at "AUTOMATIC." It can be momentarily positioned at either "COOL" or "HEAT," changing cabin temperature accordingly.

4-70. CANOPY SEAL PRESSURE CONTROL. Compressed air is delivered to the canopy seal from the engine compressors. An accumulator in the system acts as a pressure reservoir, maintaining a constant pressure in the seal when compressor output is insufficient to meet seal requirements. A pressure regulator and pressure gage are located to the right of the copilot's seat. (See 15 and 16, figure 1-13.) The automatic regulator is preset to maintain 25 psi at the canopy seal, and does not need adjustment under normal conditions; however, if desired, the following procedure may be used to check the canopy seal system:

a. Close the regulator valve and check the pressure gage. Pressure should not drop more than one psi over a period of one minute.

b. Carefully reopen the regulator valve until the pressure gage indicates slightly higher than 25 psi, but does not exceed 30 psi.

An external line is provided for testing the canopy seal or for charging the accumulator before flight. The canopy seal is independent of the pressurization system, and is deflated only by operation of the emergency canopy release handle.

4-71. OPERATION OF PRESSURIZING, HEATING, AND VENTILATING SYSTEM—PILOT.

a. Cabin air valve "NORMAL OPER." A

Cabin air valve "PRESSURE ON." C

b. Cabin pressure switches "NORMAL."

Note

Normally the cabin pressure switch should be positioned at "COMBAT" when above 12,000 feet in combat areas.

c. Cabin temperature rheostat set at desired temperature.

d. Manual controls adjusted to direct airflow to desired outlets.

A-5(1),C

e. Manual override temperature control switch at "AUTOMATIC."

4-72. TAIL GUNNER'S PRESSURIZATION, HEAT, AND VENT CONTROLS.

4-73. CABIN PRESSURE SWITCH. A tail cabin pressure switch is provided in the tail cabin just above the instrument panel. The switch controls a shut-off valve and the air-mixing valves (figure 4-8) in the air supply duct to the tail cabin. The same shut-off valve is controlled by the pilot's tail cabin pressure switch, which, when turned "OFF," overrides the tail gunner's switch to close the valves.

4-74. TAIL CABIN TEMPERATURE CONTROL. A cabin temperature rheostat on the electrical panel at the right side of the tail gunner's cabin controls air mixing valves in the air supply duct to the tail cabin. The rheostat permits the tail gunner to increase or decrease temperature of air entering the tail cabin only.

4-75. DEFROSTING CONTROLS. Ventilating air is diverted to the windows for defrosting by rotating the air shut-off valves at each defrost outlet.

4-76. MANUAL AIR SHUT-OFF VALVE. A manual air shut-off valve, located in the inlet air duct (4, figure 4-5) allows the tail gunner to shut off the air supply to the tail cabin.

4-77. AIR EMERGENCY DUMP VALVE. An air emergency dump valve in the tail cabin is located just forward of the escape hatch. (See 8, figure 4-5.) With the control in the normal down position, the valve will operate as a pressure and vacuum relief should the pressure regulator fail. When the control is pulled up, it opens a dump valve to relieve pressure in the tail cabin only. Opening the dump valve also shuts off the air supply to isolate the tail cabin from the rest of the system. However, if the dump valve is opened when the pilot's cabin air control is turned to "RAM AIR OPEN," the tail cabin shut-off valve is opened to admit cold ram air into the cabin.

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4-78. OPERATION OF PRESSURIZING, HEATING, AND VENTILATING CONTROLS—TAIL GUNNER.

a. Dump valve closed.

b. Tail cabin pressure switch "ON."

c. Temperature rheostat set.

d. Air control valves adjusted for desired airflow.

e. Manual air shut-off valve open.

4-79. BOMBARDIER-NAVIGATOR'S HEAT AND VENT CONTROLS.

4-80. Although the temperature of the air admitted to the bombardier-navigator's compartment is controlled by the pilot's temperature rheostat, the bombardier-navigator has controls for directing airflow to desired outlets. One manually controlled directional outlet is provided on the right side of the compartment. (See 2, figure 4-1.) A ventilating and defrosting control below the outlet (7, figure 4-1) is used to direct air to either a floor outlet or enclosure defrosting outlets. When the control is turned to "VENT AIR," the air is directed to a floor outlet (23, figure 4-1) forward of the bombardier-navigator's seat. Rotating the control to "ENCLOSURE DEFROST" directs all air to manifolds at the enclosure glass. (In this position, ventilating air to the copilot's outlets is shut off.) The bombardier-navigator's directional outlet should also be closed when defrosting, in order to divert all air to the astrodome.

4-81. CABIN PRESSURIZATION EMERGENCY OPERATION.

WARNING

Always have oxygen available for immediate use when flying above 10,000 feet (airplane altitude) with pressurized cabins.

4-82. DEPRESSURIZATION – FORWARD CABIN. Should sudden depressurization of the forward cabin be necessary, proceed as follows:

a. Put on oxygen mask and turn oxygen regulator dial control to position required by altitude of airplane. Warn crew to do likewise.

b. Turn cabin air valve to "DUMP VALVE OPEN."

c. If smoke or fumes enter the cabin as a result of a fire in the bomb bay or aft fuselage areas, rotate cabin air valve to "MANUAL SHUT-OFF CLOSED."

d. If smoke or fumes enter the cabin as a result of engine fire or malfunction, rotate cabin air valve to "RAM AIR OPEN."

4-83. DEPRESSURIZATION—TAIL CABIN. Should sudden depressurization of the tail cabin be necessary, proceed as follows:

a. Open the tail cabin air emergency dump valve.

b. If the tail cabin is damaged, turn tail cabin pressure switch in either forward or tail cabin to "OFF," to isolate the tail cabin from the rest of the system.

c. If smoke or fumes enter the tail cabin with cabin pressure switch "OFF," close manual shut-off valve.

4-84. ANTI-ICING AND DEFROSTING.

4-85. Hot air for anti-icing and defrosting is extracted from the final stage of the engine compressors and routed through ducts to the surfaces. Cross-flow lines between engines ensure continued operation of the system should one or more engines fail. All anti-icing controls are located at the pilot's station on an anti-icing switch panel outboard of power controls; controls for defrosting glass enclosures are provided in the pilot's (paragraph 4-68), bombardier-navigator's (paragraph 4-80), and tail gunner's (paragraph 4-75) compartments.

4-86. SURFACE ANTI-ICING.

4-87. The anti-icing switch panel outboard of the pilot's control pedestal contains separate switches for wing (including nacelles) and tail anti-icing. (See 16 and 17, figure 1-10.) When the wing and tail anti-icing switches are turned "ON," hot air is routed to the leading edges of the wing, nacelles, and tail. Thermostats in the wings and tail prevent overheating by modulating airflow to the surfaces. The setting of these thermostats may be increased or decreased by means of two anti-icing rheostats, one each for wing and tail, located on the pilot's pedestal outboard of the wing flap handle. (See 25 and 26, figure 1-10.) Operation of the wing and tail anti-icing system may cause a reduction in air available to maintain sufficient cabin pressurization (on the "NORMAL" setting of the pressure regulators only), especially at low engine speeds. When surface anti-icing is used up to an altitude of 24,000 feet, cabin altitude should not exceed 5000 feet. It is unlikely that icing will be encountered above 24,000 feet, but if the surface anti-icing system is on above that altitude, cabin pressurization will be affected. Should cabin altitude exceed the limit of 12,500 feet (the cabin pressure altitude equivalent to an airplane altitude of 40,000 feet), the anti-icing system should be checked to make sure it is turned off.

4-88. WINDSHIELD ANTI-ICING.

4-89. The air for windshield anti-icing is passed through an electric heater before being delivered to outlets on the outside of the windshield panel. Windshield anti-icing is controlled by a switch on the anti-icing switch panel. (See 10, figure 1-10.)

CAUTION

Do not turn on windshield anti-icing on the ground unless temperature is below 32°F and actual icing conditions prevail.

Note **A-1,A-5(1)**

One of the alternators must be operating to supply current for operation of the windshield anti-icing heater.

A-5(2),C

The windshield anti-icing heater is powered by bus No. 2; therefore, one of the alternators must be operating on bus No. 2.

4-90. CANOPY DEFROSTING.

4-91. The inside surface of the pilot's canopy is defrosted by means of a blower and heater which are controlled by a canopy defroster switch on the anti-icing switch panel. (See 11, figure 1-10.) When the canopy defroster switch is positioned on "BLOWER," air at cabin temperature is drawn into the blower and routed to a manifold which distributes it over the entire canopy surface. When the switch is turned to "HEATER & BLOWER," the air is reheated by the electric heater before being supplied to the canopy. For operation of the canopy defrosting heater:

A-1,A-5(1)

Alternator switch (9, figure 1-14) must be at "BOTH ALT."

A-5(2),C

Bus No. 1 must be powered by either alternator or the selector must be positioned at "BOTH ALT NORM." for operation of the canopy defrosting heater. (See figure 2-5.)

4-92. ENGINE AIR INTAKE ANTI-ICING.

4-93. The accessory dome fairing on each engine contains an electric heating unit for anti-icing. The heating units are turned on by an engine air intake anti-icing switch (9, figure 1-10) on the anti-icing switch panel.

4-94. ANTI-ICING OPERATIONAL NOTES.

4-95. Observe the following precautions when operating the anti-icing equipment:

WARNING

Extreme caution should be exercised when using surface anti-icing during take-off or landing, inasmuch as the system functions by extracting air from the engine compressors, thereby causing a reduction in available thrust. This will also result in a reduction in usable rpm for take-off (or go-around), since at full power with the anti-icing system operating, exhaust temperature limits would be exceeded. Therefore, do not use surface anti-icing for take-off unless available take-off distance is at least 20 to 25 percent greater than is normally required.

a. Always adjust wing and tail anti-icing temperature rheostats as near the full decrease position as will prevent ice accumulation on the surfaces.

b. When operating wing and tail anti-icing, check cabin altitude frequently to make sure sufficient cabin pressure is maintained. Turn off the anti-icing system as soon as icing conditions no longer exist.

c. Do not turn on windshield anti-icing during flight when outside air temperature is above 40°F, or the heat will harm the windshield glass.

d. For most efficient windshield and canopy defrosting during descent from high altitude, turn defrosting system on at start of descent rather than waiting until frost begins to form.

4-96. LIGHTING EQUIPMENT.

4-97. EXTERIOR LIGHTING.

4-98. NAVIGATION LIGHTS. The navigation lights on wing tips and tail are controlled by two navigation light switches at the top of the pilot's main switch panel. (See 5, figures 1-10 and 1-11.) One switch turns the lights on when positioned at "STEADY" or "FLASH." The other switch controls brilliancy of the navigation lights and can be placed at "BRIGHT" or "DIM."

Note **C**

Inasmuch as the wing tip navigational lights are covered completely when wing tip tanks are installed, each tip tank is equipped with a navigational light.

4-99. FUSELAGE LIGHTS. Each of two fuselage lights, one mounted on the top and one on the bottom of the fuselage, contains a large and a small lamp. When the fuselage lights switch (3, figure 1-10, and 7, figure 1-11) on the pilot's main switch panel is turned to "BRIGHT" or "DIM," the small lamps are illuminated.

A

Operation of the code key adjacent to the fuselage switch (4, figure 1-10) flashes the large lamp in the two fuselage lights.

C

4-100. AUTOMATIC CODE SWITCHES. An automatic code switch and a code selector on the pilot's main switch panel allow both the navigation and fuselage lights to be flashed in code. When the auto code switch (9, figure 1-11) is "ON," power is supplied to the code selector (4, figure 1-11) rotary switch and any one of 12 letters can be flashed. A fuselage indicator light (8, figure 1-11) flashes simultaneously with the fuselage lights. The navigation lights can be dimmed when operating on code, but the fuselage lights cannot.

4-101. FORMATION LIGHTS. Formation lights on top of wings and fuselage are controlled by a formation lights switch on the pilot's main switch panel. (See 6, figures 1-10 and 1-11.) The lights may be adjusted for

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desired brilliancy by placing the switch at "BRIGHT" or "DIM."

4-102. LANDING LIGHT. A landing light is installed in the leading edge of the left engine nacelle. A luminous landing light switch (2, figure 1-10, and 3, figure 1-11) is located on the pilot's switch panel.

A

4-103. TAXI LIGHT. A taxi light, installed on the left landing gear strut, is controlled by a taxi light switch on the pilot's main switch panel. (See 7, figure 1-10.)

C

A taxi light, installed on the nose gear strut, is controlled by a taxi light switch on the pilot's switch panel. (See 2, figure 1-11.)

4-104. INTERIOR LIGHTING.

4-105. Instrument panel lighting at the pilot's, copilot's, and bombardier-navigator's stations is provided by fluorescent lamps. Cabin lights are located at each crew station.

4-106. PASSAGEWAY LIGHT. A passageway light in the pilot's compartment is controlled by a toggle switch (9, figure 4-4) to the right of the entrance from the bombardier-navigator's compartment. The switch is wired directly to the battery, allowing the light to be turned on immediately upon entering the airplane.

4-107. DOME LIGHTS. Dome lights in the unpressurized section aft of the bomb bay are controlled by a toggle switch located at each of the three entrance hatches in the compartment. Bomb bay dome lights are controlled by a switch adjacent to the entrance hatch at each end of the bomb bay.

4-108. NOSE GEAR WHEEL WELL LIGHT. A light is installed in the nose gear wheel well to aid in checking the position of the nose gear in flight through a small window located at floor level on the right side of the pilot's passageway. The light is turned on by means of a spring-loaded switch aft of the window. (See figure 1-3.)

4-109. HEATED CLOTHING.

4-110. Each crew member is provided with an outlet and controlling rheostat for heated clothing. (See 10, figure 1-12; 1, figure 1-14; 5, figure 4-4; and 15, figure 4-6.)

4-111. PITOT HEATER.

4-112. The pitot heater is controlled by a switch on the pilot's switch panel. (See 15, figure 1-10.)

Section V

EXTREME WEATHER OPERATION

5-1. COLD WEATHER OPERATION.

5-2. BEFORE ENTERING PILOT'S COMPARTMENT.

a. Heating of jet engines is not required. However, at temperatures below −15°F, it is necessary to pre-heat the cabin.

b. Inspect fuel tank vents and pitot tube, and remove any ice present.

c. Clean shock struts of dirt and ice, and check for proper inflation.

d. Use external power for operating and ground-checking all electrical and radio equipment.

e. Remove covers from wing, empennage, and canopy, and remove plugs from air intake ducts and tail pipes.

f. Remove snow and ice from surfaces, control hinges, and fuel tank caps and vents.

g. Check surface controls.

h. Be sure an external power source of 28.5 volts, 15 kw, is available for starting. If Dual C-13A cart or equivalent is not available, use of preheat on engine accessories is desirable to reduce starter loads. (Remove accessory covers for preheating the accessory section.)

5-3. STARTING ENGINES.

CAUTION

Make sure wheels are chocked. Do not set emergency (parking) brakes for engine run-up. Main wheel brakes should be applied several times with increasing pressures before subjecting brake seals to higher emergency brake pressures.

a. If possible, use gasoline (fuel Specification No. AN-F-48, Grade 100/130) for starting at temperatures below 0°F. Emergency starting on JP-1 fuel between temperatures of 0°F and −30°F usually results in excessive exhaust temperatures and will shorten the life of the engines.

b. When attempting cold starts on JP-1 fuel, start engines in the normal manner. However, at low temperatures, better results will be secured by first obtaining maximum cranking speed, followed by a rapid and maximum opening of the power control until ignition occurs, then an *immediate* retarding of the power control to the near closed position.

c. If there is no oil pressure after 30 seconds running, or if pressure drops after a few minutes of ground operation, shut down and check for blown oil lines.

A-5,C

d. Minimum oil temperature for starting is −45°C.

5-4. TAXIING.

5-5. Reduce speed and increase normal taxi interval on ice or snow-covered areas. Pilots of jet aircraft must be especially cautious in maneuvering near other aircraft, as the heat and blast from the tail pipes blow snow and slush which immediately freezes into ice upon contact.

5-6. BEFORE TAKE-OFF.

a. Check trim tabs and surface controls for proper operation.

b. Pack or remove loose snow from runway before take-off.

c. Never turn on electrical equipment except that absolutely needed, until generators show output.

d. Turn on surface anti-icing if necessary.

WARNING

Operation of the surface anti-icing system causes a reduction in available thrust; therefore, anti-icing should not be used for take-off unless available distance is at least 20 to 25 percent greater than is normally required. (Refer to paragraph 4-87.)

5-7. AFTER TAKE-OFF.

a. After take-off from a snow- or slush-covered field, operate landing gear and flaps through several complete cycles to preclude their freezing in the up position.

b. Check instruments. Many flight instruments, and other instruments such as automatic pilots, sextants, watches, compasses, and driftmeters, may be unreliable at extremely low temperatures.

5-8. APPROACH.

a. Pump brake pedals several times during the approach.

b. Disconnect electric suits and other electrical units not absolutely needed.

5-9. AFTER LANDING.

a. Taxi with sufficient rpm to cut in generator if

have been started and are at idle speed, turn switches "ON" for other fuel tanks and turn bomb bay tank switches off. The remaining fuel will be used only for engine shutdown or in an emergency.

b. When starting at very low temperatures, best results can be obtained by first obtaining high cranking rpm, followed by rapid advancement of power control to full open until ignition occurs, and then immediately retarding power control to a near-closed position to maintain desired exhaust temperature.

c. If minimum starting rpm cannot be obtained with available auxiliary power units, battery power may be used in an emergency. Attempting to start with less than minimum rpm may cause a hot start resulting in possible damage to the engine.

d. If there is no oil pressure after 30 seconds running, or if pressure drops after a few minutes ground operation, shut down engines and investigate.

CAUTION

During cold-weather operation, avoid engine speeds above 70% rpm until oil temperature is at least −18°C (0°F).

e. After engines are started, turn on cabin heat and windshield defrosting system as required. Do not turn on windshield anti-icing unless temperature is below 0°C (32°F).

f. Operate surface control boost systems, wing flaps, and bomb doors through several cycles during preflight engine run-up.

5-4. TAXIING.

5-5. When taxiing in cold weather, observe the following precautions:

a. Avoid taxiing in deep snow, as taxiing and steering are extremely difficult and brakes are likely to freeze.

b. Check operation of brakes and nose wheel steering during taxiing.

c. On ice- or snow-covered areas, reduce speed and increase normal taxi interval. Observe special caution in maneuvering near parked aircraft and in maintaining taxi interval at subfreezing temperatures, as the heat and blast of the jet blows snow and slush, which immediately freezes into ice upon contact with other aircraft.

d. Use only essential electrical equipment, and taxi with sufficient rpm to cut in generators, if conditions permit, as low temperatures decrease battery output.

e. Reduce taxiing time and engine run-up time to a minimum under conditions where ice fog results from engine operation. A few minutes of engine operation under these conditions will produce tremendous quantities of ice fog and could close the field.

5-6. BEFORE TAKE-OFF.

a. Check trim tabs and surface controls for proper operation.

b. Do not attempt to take off with a completely frosted windshield, or with snow, ice or frost on wings. Turn on surface anti-icing if necessary.

WARNING

Operation of the surface anti-icing system causes a reduction in available thrust; therefore, anti-icing should not be used for take-off unless available distance is at least 20 to 25 percent greater than is normally required. (Refer to paragraph 4-95.)

c. With power controls at take-off rpm, brakes will not hold airplane on snow-covered or icy runways.

5-6A. TAKE-OFF.

a. Advance power controls and release brakes as airplane starts to slide. Move power controls to take-off rpm and make instrument check during the first part of take-off roll.

b. Operate the fuel filter de-icing system as required. Ice particles may occur on fuel filter elements and restrict fuel flow during operation at fuel temperatures below 0°C (32°F).

c. No decrease in maximum available rpm is anticipated at low temperatures. However, excessive tail-pipe temperatures may result at high engine speeds and zero or low ram air pressure. Therefore, take-off rpm may be limited by exhaust temperature. Any reduction of take-off engine rpm made to reduce exhaust temperature to permissible limit will be more than compensated for by the thrust augmentation obtained from increased air densities at these temperaures; that is, 100% rated thrust is reached at 94% rpm at −18°C (0°F) and at 88% rpm at −54°C (−65°F).

5-7. AFTER TAKE-OFF.

a. Check instruments. Many flight instruments may be unreliable at extremely low temperatures. Also, as a result of low outside temperatures, jet engine thrust will be considerably increased and airplane operating limitations will be reached at somewhat lower power settings.

b. After take-off from a wet, slush-covered or snow-covered field, operate landing gear and flaps through several complete cycles to preclude their freezing in the up position.

5-7A. DURING FLIGHT.

a. Use cabin heat and defrosting as required.

b. Turn off windshield anti-icing if the outside air temperature goes above 4°C (40°F), as the heat will harm the windshield glass.

c. Turn off the anti-icing system if icing conditions no longer exist.

d. Operate fuel filter de-icing system as required.

5-8. APPROACH.

a. During approach, pump brake pedal several times

conditions permit, as low temperatures decrease battery output.

b. When low temperatures are anticipated (—20°F and below), purge all JP-1 fuel from the fuel system, by introducing gasoline from a special tank into the engines for at least 2 minutes prior to shutting down so that gasoline will be available for starting. Shut down engines with the gasoline system in operation.

5-10. BEFORE LEAVING AIRPLANE.

a. Clean dirt and ice from shock struts.

b. Chock wheels and release brakes.

c. Install wing, empennage, and canopy covers, and install plugs in air intake ducts and tail pipes.

d. Check specific gravity of battery at least weekly. If less than 1.250, remove battery and service.

e. Moor airplane securely.

f. If layover of several days is expected, the battery should be removed.

5-11. HOT WEATHER OPERATION.

5-12. DUST EXCLUDERS.

5-13. Dust excluders or air duct shields are provided to prevent sand and dust from blowing into both the intake and exhaust ducts. All openings should be covered when the airplane is on the ground.

5-14. EMERGENCY FUEL SYSTEM.

A-5,C

5-15. The emergency fuel regulators on J47 engines are set to give 100% rpm on a 100°F day, and do not compensate for temperature changes. If the emergency fuel system is tested at maximum rpm when temperature is above 100°F, the engine will overspeed. The following procedure is recommended for testing the emergency fuel system at excessively high outside air temperatures:

a. With power control less than half open, hold emergency fuel switch at "TEST."

b. Advance power control until 100% rpm is obtained. If 100% rpm is obtained at less than the full open position, it indicates that the emergency system will override the main system during take-off at approximately this power control position. Therefore, at outside air temperatures above 100°F, take-off will necessarily be made on the emergency fuel system, and power control will not be full open.

Note

- If airplane is based at a field where normal temperature range is above 100°F, the emergency regulator should be reset to give 100% rpm at the maximum outside air temperature.
- At high outside air temperatures, it may be necessary to have exhaust nozzle tabs reset to avoid excessive exhaust temperatures at maximum rpm.

5-16. TAKE-OFF.

5-17. The increase in required take-off distances commonly associated with hot weather operation of any airplane is even greater when the airplane is jet-propelled. It should be noted, however, that the additional thrust provided by ATO units is not affected by temperature variation, and when assist is used, the increase in required distances with temperature increase is considerably less. (See Take-Off Charts for take-off distances at high temperatures, with and without assist.)

Appendix I
OPERATING CHARTS

A-1. AIRSPEED CORRECTION TABLES.

A-2. An Airspeed Installation Correction Table (figure A-1) and a Compressibility Correction Table (figure A-2) are provided for computing calibrated airspeed (CAS) and true indicated airspeed (TIAS) from indicated airspeed (IAS). A Free Air Temperature Correction Table (figure A-3) is also furnished, because true free air temperature must be known to obtain true airspeed (TAS). Indicated airspeed is the airspeed indicator reading corrected for instrument error. Calibrated airspeed is indicated airspeed corrected for installation error. True indicated airspeed is calibrated airspeed corrected for compressibility error. True airspeed is true indicated airspeed corrected for atmospheric density.

A-3. EXAMPLE—USE OF CORRECTION TABLES.

A-4. Airplane is flying at 10,000 feet pressure altitude, indicated free air temperature is 5°C, and airspeed indicator reading is 400 mph. What is the true airspeed?

Airspeed indicator reading	400 mph
Correction for instrument error	−2
Indicated airspeed	398 mph
Correction for installation error	−2
	396 mph

The value of 396 mph is calibrated airspeed (CAS).

Free air temperature indicator reading	5°C
Correction for temperature error	−16
	−11°C

The value of −11°C is the true free air temperature. Use calibrated airspeed and true free air temperature with a Type D-4 or a Type G-1 airspeed computer to determine true airspeed (TAS) of 450 mph. When using the dead reckoning computer, Type AN5835-1, the calibrated airspeed (396 mph) must be corrected for compressibility. The Compressibility Correction Table shows that 6 mph must be subtracted from the calibrated airspeed (396 mph) to obtain true indicated airspeed (390 mph). Use the dead reckoning computer and the values of 390 mph and −11°C to determine a true airspeed of 450 mph.

A-5. FLIGHT PLANNING.

A-6. A series of charts on the following pages present the performance of the B-45A-1 Airplane, with J35 series engines as obtained from flight test data and estimated performance of the B-45A-5 and B-45C Airplanes with J47 series engines. All charts, except the take-off charts, are based on operation in NACA standard atmosphere; however, the Flight Operation Instruction Charts are applicable in non-standard atmosphere if the recommended CAS values are maintained.

A-7. TAKE-OFF CHARTS.

A-8. Ground run distances and total distances to clear a 50-foot obstacle are tabulated for both normal and assisted take-offs at different temperatures. Only a hard-surface runway is considered. The charted distances are 125 percent of the distances obtainable in high performance take-offs.

AIRSPEED INSTALLATION CORRECTION TABLE

APPLY CORRECTION TO CORRECTED INSTRUMENT READING TO OBTAIN CALIBRATED AIRSPEED

GEAR AND FLAPS UP				GEAR AND FLAPS DOWN			
IAS		CORRECTION		IAS		CORRECTION	
MPH	KNOTS	MPH	KNOTS	MPH	KNOTS	MPH	KNOTS
150	130	+3	+3	100	85	−1	−1
200	175	+1	+1	120	105	−2	−2
250	215	0	0	140	120	−2	−2
300	260	−1	−1	160	140	−3	−3
350	305	−2	−2	180	155	−3	−3
400	350	−2	−2				
450	390	−2	−2				
500	435	−1	−1				

147-93-410C

Figure A-1. Airspeed Installation Correction Table

COMPRESSIBILITY CORRECTION TABLE

SUBTRACT CORRECTION FROM CALIBRATED AIRSPEED TO OBTAIN TRUE INDICATED AIRSPEED

PRESSURE ALTITUDE	CALIBRATED AIRSPEED																	
	MPH 150	KTS 130	MPH 200	KTS 175	MPH 250	KTS 215	MPH 300	KTS 260	MPH 350	KTS 305	MPH 400	KTS 350	MPH 450	KTS 390	MPH 500	KTS 435	MPH 550	KTS 480
5,000	0	0	0	0	1	1	1	1	2	2	3	2	4	3	5	4	6	5
10,000	0	0	1	1	2	1	3	2	4	4	6	5	8	7	10	9	13	12
15,000	1	0	1	1	3	2	4	4	7	6	9	8	13	11	17	15		
20,000	1	1	2	2	4	3	6	6	10	8	14	12	19	16	25	22		
25,000	1	1	3	2	5	4	9	8	13	12	19	17	26	22				
30,000	2	2	4	3	7	6	12	10	18	16	25	22						
35,000	2	2	5	5	10	8	16	14	24	21								
40,000	3	3	7	6	13	11	20	18										

147-93-409B

Figure A-2. Compressibility Correction Table

A-9. CLIMB CHARTS.

A-10. The best climb speed for maximum range, rate of climb, time to climb, distance covered, and fuel consumed can be determined from the Climb Charts. A fuel allowance for warm-up and take-off is listed at sea level. Fuel requirements at other altitudes include this allowance plus the fuel needed to climb from sea level. Fuel required for an in-flight climb from one altitude to another is the difference of the tabulated fuel required to climb to each altitude from sea level.

A-11. DESCENT CHARTS.

A-12. The Descent Charts are based on a compromise involving rate of descent, airspeed, fuel pressure, and fuel consumption. To minimize fuel consumption, idling power is used. The speeds approximate .5 Mach number, being higher at high altitude and lower at low altitude.

A-13. LANDING CHARTS.

A-14. Total landing distances over a 50-foot obstacle and ground run distances are presented together with minimum speeds for the final approach. The tabulated distances are 125 percent of the distances obtainable in high performance landings.

FREE AIR TEMPERATURE CORRECTION TABLE

Subtract correction from indicated free air temperature (°C) to obtain true free air temperature (°C).

PRESS. ALT	CALIBRATED AIRSPEED - MPH								
	150	200	250	300	350	400	450	500	550
SL	2	3	5	7	9	12	15	19	23
5000	2	4	5	8	11	14	17	22	26
10,000	2	4	6	9	12	16	20	25	
15,000	3	5	7	11	14	18	23		
20,000	3	6	9	12	16	21			
25,000	4	7	10	14	19	25			
30,000	4	8	12	17	22				
35,000	5	9	14	20					
40,000	7	11	17						

147-93-716

Figure A-3. Temperature Correction Table

A-15. FLIGHT OPERATION INSTRUCTION CHARTS.

A-16. The Flight Operation Instruction Charts, provided to facilitate flight planning, show the range of the airplane at maximum range airspeeds and the procedure required to obtain this range. Each chart contains columns representing initial altitude conditions. On the line opposite available fuel in the upper half of the chart, ranges are shown for each initial altitude. In general, two range values are quoted for each altitude and fuel quantity. One is for continued flight at the initial altitude, and one for the maximum range obtainable by climbing to a higher altitude. The charted ranges *do not* include the fuel consumed and distance covered during warm-up, take-off, and initial climb at the start of a flight. However, fuel used and distance

COMBAT ALLOWANCE CHART

NACA STANDARD DAY — 100% RPM

PRESSURE ALTITUDE	TOTAL FUEL REQUIRED POUNDS PER MINUTE	
	B-45A-1 LIMIT: ENGINES WITH DOVETAIL TURBINE BUCKETS - 30 MIN; OTHERS - 15 MIN.	B-45A-5 & B-45C LIMIT - 30 MIN
SEA LEVEL	350	600
5000	300	520
10,000	270	450
15,000	240	380
20,000	200	320
25,000	170	280
30,000	140	240
35,000	120	200
40,000	100	150

BASED ON: Black figures - flight test data as of 11/11/49.
Red figures - B-45A-1 and F-86A flight test data as of 11/11/49.

Divide pm by 6.8 to obtain gpm AN-F-32, JP-1 fuel.
Divide pm by 6.5 to obtain gpm AN-F-58, JP-3 fuel.
Divide pm by 6.0 to obtain gpm AN-F-48 fuel.

147-93-579B

Figure A-4. Combat Allowance Chart

covered during letdown or during in-flight climb to an optimum altitude are taken into account.

A-17. Ranges shown on a given chart are based on resetting power to obtain CAS shown on succeeding charts when gross weight decreases to the lower weight brackets. Ranges obtained by climbing to an optimum altitude are further based on increasing optimum altitude as well as resetting power when gross weight reaches the lower weight brackets on succeeding charts.

A-18. The lower half of each chart presents operating procedure to obtain the ranges quoted in the upper half. When altitude is changed, operating instructions in the column according to the new altitude must be referred to if the ranges listed are to be obtained.

A-19. Under different wind conditions, ranges (in ground miles) are varied by the effect of wind on ground speed. Letdown distances are affected for the same reason. Recommended CAS may also change in order to maintain the most favorable ground miles per gallon. To facilitate range computations under wind conditions, the operating procedure in the lower half of each chart contains instructions for various winds at each altitude listed.

A-20. Ground miles in a wind are obtained by multiplying chart air miles by the range factor found opposite the effective wind at the altitude where the airplane will be cruised. Thus, range factors may be used to determine the best altitude for cruising when there is a known wind difference at different altitudes.

A-21. Although a wind may be from any direction with respect to the airplane course, it may be expressed as an effective wind. An effective wind has the same effect on the airplane's ground speed as if it were a straight head wind or tail wind. In other words, the wind component in the direction of the airplane heading should be used as the effective wind. For example, a 100 mph wind at 30 degrees to the course is an effective head wind of approximately 85 mph. If the airplane true airspeed is 385 mph, the true ground speed along the course is approximately 300 mph.

A-22. The approximate rpm values quoted on any one chart are based on the gross weight equal to the high limit of the chart weight band. If the recommended CAS values are maintained, the rpm values will decrease slightly as the gross weight decreases. No allowances are made for navigational errors, combat, formation flight, landing, or other contingencies. Such allowances must be made as required.

A-23. PREFLIGHT RANGE PLANNING. Select the Flight Operation Instruction Chart for the gross weight at take-off. In case of an assisted take-off, do not include the weight of the ATO units.

A-24. Determine the amount of fuel available for flight planning. Available fuel is equal to the total amount in the airplane before starting the engines, minus the amount needed for warm-up, taxi, take-off, initial climb, and necessary reserves.

A-25. Select a figure in the fuel column equal to, or less than, the amount available for flight planning. To determine maximum range at a given altitude, move horizontally right or left to the desired altitude column. Multiply the range value thus obtained by the correct range, and add the distance covered in initial climb to obtain total range with a given wind at altitude.

A-26. To fly a given distance, determine range factors for the effective winds and altitudes to be considered. From the desired distance, subtract the miles covered in climb. Divide the resultant figure by the range factor to obtain air miles to be covered in cruise and descent. Enter the chart as described in paragraph A-25. Move horizontally right or left to a range figure which exceeds the calculated air distance to be covered in cruise and descent. Fly according to the instructions for the altitude so obtained. Change charts when gross weight reaches the next lower weight band charted, and change CAS as required.

CAUTION

Do not plan climbs which exceed present time limit at military power.

A-1

A-27. If time to climb to a desired altitude exceeds 15 minutes (maximum continuous engine operation at 100% rpm on engines without dovetail turbine buckets) use 96% rpm during part of the climb or else climb in stages with level flight in between. If it is desired to cruise at high altitudes, after take-offs with heavy gross weights, use one of the following procedures:

a. Climb at 96% rpm immediately after take-off (a good rate of climb can be obtained by using 96% rpm when operating at low altitudes and heavy gross weights). When rate of climb drops below 1000 feet per minute, climb at 100% rpm for 15 minutes.

b. Use alternate 5-minute level flight periods at 96% rpm between 15-minute climb periods at 100% rpm.

A-28. If altitude, wind, or weight decrease does not remain reasonably constant, break the flight up into several sections and plan each section separately.

A-29. IN-FLIGHT RANGE PLANNING. To use the charts in flight, determine airplane gross weight, available fuel, altitude, and effective wind. When determining gross weight, use correct conversion factor to determine weight of fuel. Available fuel is equal to fuel on board, minus reserves.

A-30. Enter the appropriate Flight Operation Instruction Chart at a fuel quantity equal to, or less than, the available fuel. Move horizontally right or left to the proper altitude column.

A-31. From the ranges and wind factors listed, determine the altitude at which the flight will be continued. For continued cruising at the present altitude, refer to the cruising instructions directly below. When changing charts, refer to cruising instructions on the new chart at the altitude of flight.

A-32. To obtain the range shown at optimum altitude when flying at a given altitude, climb immediately according to the recommended climb procedure. For cruising instructions at the new altitude, refer to the lower half of the chart in the column under the new altitude. If decreasing gross weight necessitates changing to another chart, it may be necessary to climb to a new optimum altitude to obtain the maximum range listed on the first chart.

A-33. SAMPLE PROBLEMS.

A-34. PROBLEM 1.

A-35. To illustrate the use of the charts for planning a flight, suppose a B-45A-1 must be ferried 1200 miles. For unexpected difficulties, a general reserve of 4600 pounds of fuel is considered necessary.

A-36. From the 86,000 pounds to 70,000 pounds Flight Operation Instruction Chart (figure A-19), it is apparent that both bomb bay tanks must be carried in addition to permanent fuel capacity. The initial known conditions are as follows:

Required range	1200 miles
Winds	80 mph effective head wind at 25,000 feet
Aircraft basic weight	45,000 lb (includes trapped fuel and oil, and miscellaneous equipment)
Crew (4)	1000 lb
Oil (51 gal)	380 lb
Rear bomb bay tank (1200 gal)	370 lb
Front bomb bay tank (1200 gal)	330 lb
Total weight (less fuel)	47,080 lb
Maximum fuel (JP-1) capacity (5800 gal x 6.8)	39,400 lb
Total gross weight	86,480 lb

A-37. Reference to the Climb Chart (figure A-11) shows that 20,000 feet is the maximum altitude which can be reached with the required take-off weight and still remain within the time limit for operation at 100% rpm. Finish the climb from 20,000 feet to 25,000 feet at 96% rpm. Thus, from take-off to 20,000 feet at 100% rpm (by interpolation) will require 5300 pounds of fuel to cover 79 miles. The climb from 20,000 feet to 25,000 feet at 96% rpm will require (conservatively using the take-off gross weight) 1500 pounds of fuel to cover 54 miles. Thus, the total climb will use 6800 pounds of fuel and cover 133 miles. The available fuel at 25,000 feet will be 28,000 pounds (39,400 – 4600 – 6800).

A-38. Reference to the 86,000 pounds to 70,000 pounds Flight Operation Instruction Chart shows that 1580 air miles can be flown with 28,000 pounds of available fuel. The total range (no wind) is then 1713 air miles (133 + 1580).

A-39. Reference to the lower half of the chart shows that the range factor for an 80 mph effective head wind is .8. Thus, to take into account the 80 mph head wind, multiply the range obtained after the climb (1580) by the range factor (.8) and add the mileage covered in the climb (133) to obtain the actual range of 1397 ground miles. The required range is obtained by using the following CAS: 320 mph above 60,000 pounds gross weight and 310 mph below 60,000 pounds gross weight. The letdown should be started at least 65 miles from the destination.

Note

The effective wind must be determined to find the true range in ground miles, because the ranges quoted on the charts are air miles. The effective wind also must be considered when determining operating procedure, because a head wind increases, the power setting and CAS for maximum range must also be increased.

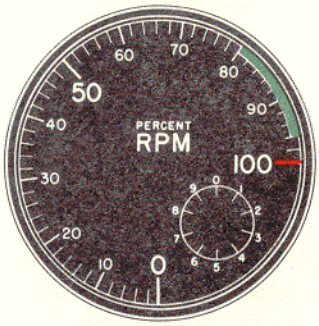
A-40. PROBLEM 2.

A-41. During flight, suppose a pilot is at 5000 feet altitude with 12,000 pounds of fuel on board and 400 miles to be covered. A reserve of 3000 pounds of fuel is desired for approach, go-around, and landing. Therefore, available fuel is 9000 pounds (12,000 – 3000).

A-42. If fuel only (no bombs) is being carried, the gross weight is less than 60,000 pounds. Reference to the appropriate Flight Operation Instruction Chart (figure A-21) shows that only 340 air miles (by interpolation between 8000 and 12,000 pounds of fuel) may be obtained by continued cruising at 5000 feet. By an immediate climb to 40,000 feet, 580 air miles may be covered. However, since a range of only 400 miles is desired, an intermediate altitude may be tried.

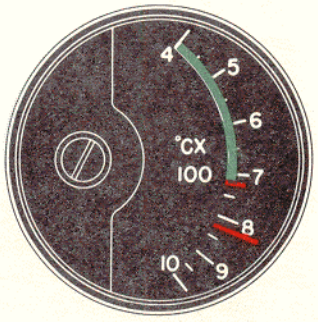
A-43. For example, reference to the Climb Chart (figure A-11) shows that a climb to 15,000 feet will use 1000 pounds of fuel and 25 miles will be covered. Available fuel will then be 8000 pounds. Checking back on the Flight Operation Instruction Chart (figure A-19) shows that the range for this amount of fuel at 15,000 feet will be 400 air miles. Adding this range to the 25 miles covered in the climb, gives a total of 425 miles. Therefore, the pilot should climb to 15,000 feet and use the operating procedure shown on the chart for that altitude.

ENGINES
J35 SERIES



TACHOMETER

	80% rpm	Minimum Cruise
	80%-96% rpm	Continuous
	96% rpm	Max Continuous (Operation Above This Point Limited)
	100% rpm	Max and Take-off Power (30 Min Max on Those Engines With Dovetail Turbine Buckets, Others 15 Min Max.)



EXHAUST TEMPERATURE

	260°C*	Minimum
	260°C*-720°C	Continuous
	720°C	Maximum
	820°C**	Max During Starting and Acceleration Only

*Instrument calibration inadequate for marking in accordance with allowable engine operating limit.

**See WARNING in paragraph 2-15 f.

TAKE-OFF CONDITIONS	
RPM	100%
OIL PRESSURE	15 psi Min
EXHAUST TEMP	680°C Min



FUEL PRESSURE

	40 psi	Minimum
	40-450 psi	Continuous
	600 psi	Maximum



OIL PRESSURE

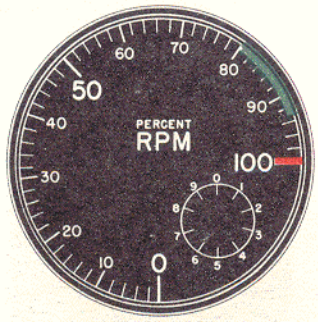
	10 psi	Minimum
	10-50 psi	Continuous
	60 psi	Maximum

BASED ON
AN-F-32, JP-1 FUEL or AN-F-48, 100/130 FUEL

147-51-270D

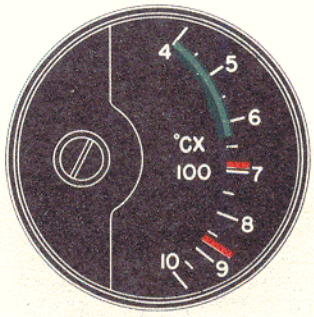
Figure A-5 (Sheet 1 of 3 Sheets). Instrument Dial Markings

ENGINES
J47 SERIES



TACHOMETER

	80% rpm	Minimum Cruise
	80% - 93% rpm	Continuous
	93% rpm	Max Continuous (Operation Above This Point Limited)
	100% rpm	Take-off Power (5 Min Max) Military (30 Min Max)



EXHAUST TEMPERATURE

	315°C*	Minimum
	315°C* - 625°C	Continuous
	690°C	Maximum (Take-off 5 Min Military 30 Min)
	870°C**	Max (During Starting and Acceleration Only)

*Instrument calibration inadequate for marking in accordance with allowable engine operating limit.

**See WARNING in paragraph 2-15 f.



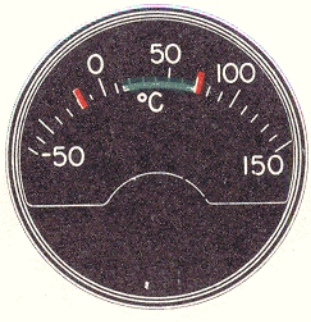
FUEL PRESSURE

	40 psi	Minimum
	40 - 400 psi	Continuous
	600 psi	Maximum



OIL PRESSURE

	2 psi	Minimum
	2 - 30 psi	Continuous
	60 psi	Maximum



OIL TEMPERATURE

	-18°C	Minimum
	15°C - 70°C	Continuous
	70°C	Maximum

TAKE-OFF CONDITIONS	
RPM	100%
EXHAUST TEMP	660°C Min
OIL PRESSURE	12 psi Min
OIL TEMP	-18°C Min

BASED ON

AN-F-32, JP-1 FUEL
or
AN-F-48, 100/130 FUEL

147-51-310D

Figure A-5 (Sheet 2 of 3 Sheets). Instrument Dial Markings



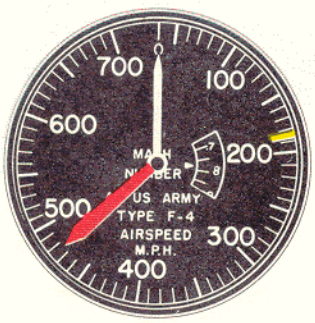
CANOPY SEAL
PRESSURE GAGE

20-30 psi Normal



HYDRAULIC PRESSURE GAGE

2700-3000 psi Normal
3600 psi Maximum
1600 psi Pressure for One Brake Application Remaining



AIRSPEED INDICATOR



ACCELEROMETER

185 mph (IAS) Max airspeed with flaps or gear down or gear doors open.

At present the instrument setting is such that the red pointer will move to indicate the limiting structural airspeed of 475 mph IAS or the airspeed representing the limiting Mach No. of .77, whichever is less.

NOTE

B-45A Airplanes are restricted to 465 mph IAS (or airspeed representing Mach No. of .77, whichever is less) under the following conditions:
(1) when gross weight exceeds 82,600 lb;
(2) when water injection tanks (empty), ATO units (empty), 310 or 1200-gallon forward bomb bay tank (empty), or bombs weighing more than 500 lb each are installed, even if gross weight is less than 82,600 lb.

2.8 G Max at 82,600 lb for B-45A Airplanes

NOTE

Max allowable positive acceleration for B-45C Airplanes is 3.0 G at 82,600 lb.

2.0 G Max for Gross Weights above 82,600 lb
-1.0 G Max for Gross Weights above 82,600 lb

NOTE

The limit load factors of 2.0 G and -1.0 G also apply when water injection tanks, ATO units, tip tanks, forward bomb bay tank (310 or 1200 gal), or bombs weighing more than 500 lb each are installed, even if gross weight is less than 82,600 lb.

147-51-317C

Figure A-5 (Sheet 3 of 3 Sheets). Instrument Dial Markings

AIRPLANE MODEL: B-45A-1

TAKE-OFF DISTANCES

ENGINE MODEL: J35 SERIES

FEET

UNASSISTED

HARD SURFACE RUNWAY - NO WIND

CONFIGURATION AND GROSS WEIGHT	PRESS. ALT. FT.	40°F		60°F		80°F		100°F		120°F	
		GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'
90,000 LB	5000	10,700	14,900	12,300	18,800	---	---	---	---	---	---
	4000	9700	13,200	11,400	16,600	13,100	24,400	---	---	---	---
	3000	8900	12,100	10,500	14,700	12,100	19,200	---	---	---	---
	2000	8100	11,000	9600	13,200	11,000	16,300	12,900	30,500	---	---
	1000	7400	10,000	8600	11,900	10,000	14,400	11,700	20,200	---	---
	S.L.	6900	9300	7900	10,900	9300	13,100	10,900	17,000	12,500	26,600
80,000 LB	5000	8000	10,900	9500	13,100	11,000	16,200	---	---	---	---
	4000	7300	10,000	8500	11,800	10,100	14,300	11,800	20,000	---	---
	3000	6700	9200	7800	10,700	9100	12,900	10,800	16,600	---	---
	2000	6200	8400	7200	9800	8200	11,400	9900	14,400	11,600	23,000
	1000	5700	7800	6600	9000	7600	10,500	9000	12,800	10,600	17,500
	S.L.	5200	7200	6000	8300	7000	9700	8300	11,700	9700	14,900
70,000 LB	5000	5900	8100	6800	9300	7800	10,900	9200	13,300	11,000	19,000
	4000	5400	7500	6200	8600	7200	9900	8500	12,100	10,000	15,700
	3000	5000	6900	5700	7900	6600	9100	7800	10,800	9100	13,600
	2000	4600	6400	5200	7300	6000	8400	7000	9800	8400	12,100
	1000	4200	5900	4800	6700	5500	7700	6400	9000	7700	10,900
	S.L.	3800	5500	4400	6200	5100	7100	5900	8300	7100	10,000
	5000										
	4000										
	3000										
	2000										
	1000										
	S.L.										

NOTES:

1. Use 20° flaps and 100% rpm.
2. Optimum take-off is 80% of chart values.

DATA AS OF: 10/10/48

BASED ON: FLIGHT TESTS

147-93-553B

MCRE Form No. 2398 (5 MAY 48)

Figure A-6. B-45A-1 Take-off Chart—Unassisted

AIRPLANE MODEL
B-45A-5
B-45C

TAKE-OFF DISTANCES

ENGINE MODEL
J47 SERIES

FEET

UNASSISTED

HARD SURFACE RUNWAY - NO WIND

CONFIGURATION AND GROSS WEIGHT	PRESS. ALT. FT.	40°F		60°F		80°F		100°F		120°F	
		GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'
105,000	5000										
	4000	10,400	13,600								
	3000	9400	12,400	10,600	14,000						
	2000	8700	11,500	9700	12,800	10,900	14,400				
	1000	8000	10,600	8900	11,700	10,000	13,100				
	S.L.	7300	9800	8200	10,900	9200	12,100	10,200	13,400		
95,000	5000	8800	11,700	10,000	13,100						
	4000	8100	10,800	9100	12,000	10,200	13,500				
	3000	7500	10,000	8400	11,100	9400	12,400	10,500	13,800		
	2000	6900	9300	7700	10,200	8600	11,300	9500	12,600	10,700	14,100
	1000	6300	8600	7000	9400	7800	10,400	8700	11,500	9800	12,900
	S.L.	5800	8000	6500	8800	7200	9700	8000	10,700	9000	11,900
85,000	5000	6900	9200	7600	10,200	8600	11,300	9500	12,600	10,700	14,100
	4000	6300	8600	7000	9400	7800	10,400	8700	11,500	9700	12,900
	3000	5800	7900	6500	8700	7200	9600	8000	10,600	8900	11,800
	2000	5300	7400	5900	8100	6600	8900	7300	9800	8200	10,900
	1000	4900	6800	5500	7500	6100	8300	6700	9000	7500	10,000
	S.L.	4500	6400	5000	7000	5600	7700	6200	8400	6900	9300
75,000	5000	5100	7000	5700	7700	6400	8500	7100	9300	7900	10,300
	4000	4700	6500	5300	7200	5900	7900	6500	8600	7200	9500
	3000	4400	6100	4900	6700	5400	7300	6000	8000	6600	8800
	2000	4000	5700	4500	6200	5000	6800	5500	7400	6100	8100
	1000	3700	5300	4100	5800	4600	6300	5100	6900	5600	7600
	S.L.	3400	5000	3800	5400	4200	5900	4700	6400	5200	7000

NOTES: (1) Use 20° flaps and 100% rpm.
(2) Optimum take-off is 80% of chart values.

DATA AS OF: 2-9-49

BASED ON: WIND TUNNEL & ESTIMATED DATA RED FIGURES HAVE NOT BEEN FLIGHT CHECKED

147-93-630A

MCRE Form No. 2398 (5 MAY 48)

Figure A-7. B-45A-5 and B-45C Take-off Chart—Unassisted

AIRPLANE MODEL: B-45A-1

TAKE-OFF DISTANCES

FEET

ENGINE MODEL: J35 SERIES

TWO 4000-POUND ASSIST UNITS

HARD SURFACE RUNWAY - NO WIND

CONFIGURATION AND GROSS WEIGHT	PRESS. ALT. FT.	40°F		60°F		80°F		100°F		120°F	
		GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'
90,000 LB	5000	5800	8100	6400	8700	7100	9600	7800	10,500	8600	11,400
	4000	5400	7500	6000	8300	6600	9000	7400	9900	8100	10,800
	3000	5100	7100	5700	7900	6200	8500	6800	9300	7600	10,300
	2000	4800	6700	5300	7400	5800	8000	6400	8800	7200	9700
	1000	4500	6400	5000	7000	5500	7600	6000	8300	6700	9100
	S.L.	4200	6000	4600	6600	5100	7200	5700	7800	6300	8600
80,000 LB	5000	4500	6400	4900	6900	5400	7600	6000	8300	6500	9000
	4000	4200	6100	4600	6600	5100	7200	5600	7800	6200	8500
	3000	3900	5700	4300	6200	4800	6800	5300	7400	5900	8100
	2000	3700	5400	4100	5900	4500	6400	5000	7000	5500	7600
	1000	3400	5100	3800	5600	4200	6100	4700	6600	5100	7200
	S.L.	3200	4800	3600	5300	3900	5700	4400	6200	4800	6800
70,000 LB	5000	3300	5000	3700	5400	4000	5900	4400	6300	4900	6900
	4000	3100	4700	3400	5100	3800	5500	4200	6000	4600	6500
	3000	2900	4500	3200	4800	3500	5200	4000	5700	4300	6200
	2000	2700	4200	3000	4600	3300	5000	3700	5400	4000	5900
	1000	2600	4000	2800	4400	3100	4700	3400	5100	3800	5600
	S.L.	2400	3800	2700	4200	3000	4500	3300	4900	3600	5300
	5000										
	4000										
	3000										
	2000										
	1000										
	S.L.										

NOTES:

(1) Use 20° flaps, 100% rpm, and 8000 pounds assist from start of take-off run.
(2) Optimum take-off is 80% of chart values.

DATA AS OF: 10/10/48

BASED ON: FLIGHT TESTS

147-93-562B

MCRE Form No. 2398 (5 MAY 48)

Figure A-8. B-45A-1 Take-off Chart—Assisted

AIRPLANE MODEL

B-45A-5
B-45C

TAKE-OFF DISTANCES

ENGINE MODEL

J47 SERIES

FEET

TWO 4000-POUND ASSIST UNITS

HARD SURFACE RUNWAY - NO WIND

CONFIGURATION AND GROSS WEIGHT	PRESS. ALT. FT.	40°F		60°F		80°F		100°F		120°F	
		GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'
115,000	5000										
	4000										
	3000	7400	9900								
	2000	6900	9300	7500	10,000						
	1000	6400	8700	7000	9400	7600	10,200				
	S.L.	6000	8200	6500	8900	7100	9600	7700	10,300		
105,000	5000	6800	9300	7500	10,100						
	4000	6400	8800	7000	9500	7600	10,200				
	3000	6000	8300	6500	8900	7100	9600	7700	10,300		
	2000	5600	7800	6100	8400	6600	9000	7200	9700	7700	10,400
	1000	5200	7300	5700	7900	6200	8500	6700	9100	7200	9800
	S.L.	4900	6900	5300	7400	5800	8000	6200	8600	6800	9200
95,000	5000	5500	7700	6000	8300	6500	8900	7000	9500	7600	10,200
	4000	5100	7300	5600	7800	6000	8400	6500	8900	7100	9600
	3000	4800	6900	5200	7400	5600	7900	6100	8400	6600	9000
	2000	4500	6500	4900	7000	5300	7500	5700	8000	6200	8500
	1000	4200	6100	4600	6600	5000	7100	5300	7500	5800	8000
	S.L.	3900	5800	4300	6200	4700	6700	5000	7100	5400	7600
85,000	5000	4300	6200	4700	6700	5100	7200	5500	7700	5900	8200
	4000	4000	5900	4400	6300	4700	6800	5100	7200	5500	7700
	3000	3800	5600	4100	6000	4400	6400	4800	6800	5200	7300
	2000	3500	5300	3800	5700	4100	6100	4500	6500	4900	6900
	1000	3300	5000	3600	5400	3900	5700	4200	6100	4600	6500
	S.L.	3100	4700	3400	5100	3700	5400	4000	5800	4300	6200

NOTES:

(1) Use 20° flaps, 100% rpm, and 8000 pounds assist from start of take-off run.
(2) Optimum take-off is 80% of chart values.
(3) No data is presented where take-off may be marginal due to expiration of assist.

DATA AS OF: 2/18/49

BASED ON: WIND TUNNEL & ESTIMATED DATA RED FIGURES HAVE NOT BEEN FLIGHT CHECKED

147-93-629B

MCRE Form No. 2398 (5 MAY 48)

WF-0-4 JUN 48 700

Figure A-9. B-45-5 and B-45C Take-off Chart—Assisted

AIRPLANE MODEL

B-45C

TAKE-OFF DISTANCES

FEET

WATER INJECTION

ENGINE MODEL

J47 SERIES

HARD SURFACE RUNWAY - NO WIND

CONFIGURATION AND GROSS WEIGHT	PRESS. ALT. FT.	40°F		60°F		80°F		100°F		120°F	
		GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'
115,000	5000										
	4000	10,500	13,600								
	3000	9600	12,600	10,800	14,000						
	2000	8800	11,600	9900	12,900						
	1000	8100	10,700	9000	11,900	10,100	13,100				
	S.L.	7500	10,000	8300	11,000	-9200	12,100	10,400	13,500		
105,000	5000	9200	12,100	10,300	13,400						
	4000	8500	11,200	9400	12,400						
	3000	7800	10,300	8700	11,400	9700	12,600				
	2000	7200	9600	8000	10,600	8800	11,700	9800	12,800		
	1000	6600	8900	7300	9800	8100	10,800	9000	11,800	10,100	13,200
	S.L.	6000	8300	6800	9100	7500	10,000	8300	11,000	9300	12,100
95,000	5000	7300	9800	8200	10,800	9100	11,900	10,100	13,200		
	4000	6700	9100	7500	10,000	8300	11,000	9300	12,100	10,300	13,500
	3000	6200	8400	6900	9300	7700	10,200	8500	11,200	9500	12,400
	2000	5700	7800	6400	8600	7100	9500	7800	10,400	8700	11,400
	1000	5300	7300	5900	8000	6500	8800	7200	9600	8000	10,600
	S.L.	4900	6800	5400	7400	6000	8100	6600	8900	7400	9800
85,000	5000	5700	7800	6300	8600	7000	9400	7800	10,400	8700	11,400
	4000	5300	7300	5800	8000	6500	8700	7200	9600	8000	10,500
	3000	4900	6800	5400	7400	6000	8100	6600	8900	7300	9800
	2000	4500	6300	5000	6900	5500	7500	6000	8200	6700	9100
	1000	4100	5900	4600	6400	5100	7000	5600	7600	6200	8400
	S.L.	3800	5500	4200	6000	4700	6600	5200	7100	5700	7800

NOTES:

(1) Use 20° flaps, 100% rpm, and water injection.

(2) Optimum take-off is 80% of chart values.

DATA AS OF: 2/11/49

BASED ON: WIND TUNNEL & ESTIMATED DATA RED FIGURES HAVE NOT BEEN FLIGHT CHECKED

147-93-631B

MCRE Form No. 2398 (5 MAY 48)

WF-O-4 JUN 48 700

Figure A-10. B-45C Take-off Chart—Water Injection

AIRPLANE MODEL B-45A-1

CLIMB CHART

STANDARD DAY

FOUR ENGINES

ENGINE MODEL J35 SERIES

96 % RPM					PRESSURE ALTITUDE FEET	100 % RPM				
	APPROXIMATE			CAS MPH		CAS MPH	APPROXIMATE			
RATE OF CLIMB	FROM SEA LEVEL						FROM SEA LEVEL			RATE OF CLIMB
	DISTANCE	TIME	FUEL				FUEL	TIME	DISTANCE	
AIRPLANE CONFIGURATION & GROSS WEIGHT 90,000 POUNDS										
1600	0	0	1800(1)	295	SEA LEVEL	350	1800(1)	0	0	1950
1350	15	3	2700	285	5000	330	2700	2.5	10	1750
1150	40	7	3700	275	10,000	310	3600	6	35	1500
850	65	12	4700	260	15,000	290	4500	10	55	1200
600	105	20	6000	245	20,000	270	5500	14	85	900
300	165	30	7800	230	25,000	250	6800	21	125	550
					30,000	225	8900	35	205	200
AIRPLANE CONFIGURATION & GROSS WEIGHT 80,000 POUNDS										
1900	0	0	1800(1)	295	SEA LEVEL	350	1800(1)	0	0	2300
1650	10	3	2600	285	5000	330	2600	2	10	2050
1350	30	6	3300	275	10,000	310	3300	5	30	1800
1100	50	10	4200	260	15,000	290	4100	8	45	1500
800	80	16	5200	245	20,000	270	4900	12	70	1150
500	125	23	6300	230	25,000	250	5900	17	100	800
200	195	36	8100	210	30,000	225	7200	25	150	400
AIRPLANE CONFIGURATION & GROSS WEIGHT 70,000 POUNDS										
2250	0	0	1800(1)	295	SEA LEVEL	350	1800(1)	0	0	2700
2000	10	2.5	2400	285	5000	330	2400	2	10	2450
1700	25	5	3100	275	10,000	310	3000	4.5	25	2150
1400	40	8	3700	260	15,000	290	3700	7	40	1800
1100	65	12	4500	245	20,000	270	4400	10	55	1450
800	90	18	5400	230	25,000	250	5100	13.5	80	1100
500	145	26	6500	210	30,000	225	5900	19	115	700
200	230	42	8100	185	35,000	205	7200	29	170	300
AIRPLANE CONFIGURATION & GROSS WEIGHT 60,000 POUNDS										
2750	0	0	1800(3)	295	SEA LEVEL	350	1800(1)	0	0	3250
2450	10	2	2400	285	5000	330	2400	1.5	10	2950
2100	25	4	2900	275	10,000	310	2900	3.5	25	2600
1750	35	7	3400	260	15,000	290	3400	5.5	35	2250
1400	50	10	4000	245	20,000	270	3900	8	45	1850
1100	75	14	4700	230	25,000	250	4400	11	65	1400
800	105	19	5400	210	30,000	225	5100	15	90	1000
500	150	27	6300	185	35,000	205	5800	21	125	600
					40,000	190	7000	33	200	150

MULTIPLY STATUTE UNITS BY .87 FOR CONVERSION TO NAUTICAL UNITS

NOTES:

(1) Fuel column includes allowance of 1800 pounds of fuel for warm-up and take-off.
(2) Continuous operation at 100% limited to 30 minutes on engines with dovetail turbine buckets, others limited to 15 minutes.
(3) Divide pounds by 6.8 to obtain gallons of AN-F-32, JP-1 fuel. Divide pounds by 6.5 to obtain gallons of AN-F-58, JP-3 fuel. Divide pounds by 6.0 to obtain gallons of AN-F-48 fuel.

LEGEND

FUEL - Pounds
DISTANCE - Statute Miles
TIME - Minutes
RATE OF CLIMB - Feet Per Minute
CAS - Calibrated Air Speed
MPH - Statute Miles Per Hour

DATA AS OF: 11/11/49

BASED ON: FLIGHT TESTS

BASED ON ANY FUEL LISTED IN NOTE 3

147-93-730

MCRE Form No. 239F (5 May 48)

Figure A-11. B-45A-1 Climb Chart—Four Engines

AIRPLANE MODEL

B-45A-1

CLIMB CHART

STANDARD DAY

TWO & THREE ENGINE OPERATION

ENGINE MODEL

J35 SERIES

100 % RPM					PRESSURE ALTITUDE FEET	100 % RPM				
APPROXIMATE				CAS MPH		CAS MPH	APPROXIMATE			
RATE OF CLIMB	FROM SEA LEVEL						FROM SEA LEVEL			RATE OF CLIMB
	DISTANCE	TIME	FUEL				FUEL	TIME	DISTANCE	
AIRPLANE CONFIGURATION & GROSS WEIGHT										
86,000 POUNDS					THREE ENGINES				80,000 POUNDS	
1000	0	0	0	290	SEA LEVEL	290	0	0	0	1200
900	20	4.5	1200	280	5000	280	1100	4	20	1100
700	50	10	2400	265	10,000	265	2100	9	45	900
500	85	18	3800	250	15,000	250	3300	16	75	700
250	145	28	5600	235	20,000	235	4800	24	125	450
					25,000	220	7200	42	220	150
AIRPLANE CONFIGURATION & GROSS WEIGHT										
70,000 POUNDS					THREE ENGINES				60,000 POUNDS	
1500	0	0	0	290	SEA LEVEL	290	0	0	0	1850
1350	15	3.5	900	280	5000	280	700	3	15	1700
1150	35	7.5	1700	265	10,000	265	1300	6	30	1500
950	60	12	2600	250	15,000	250	2000	9.5	45	1250
650	90	18	3600	235	20,000	235	2800	14	70	950
350	145	28	4900	220	25,000	220	3600	20	105	650
					30,000	205	4800	30	160	350
AIRPLANE CONFIGURATION & GROSS WEIGHT										
70,000 POUNDS					TWO ENGINES				60,000 POUNDS	
500	0	0	0	230	SEA LEVEL	230	0	0	0	700
450	40	10	1700	230	5000	230	1200	7.5	25	600
250	90	23	3600	225	10,000	225	2500	17	65	500
					15,000	220	4200	29	120	250
AIRPLANE CONFIGURATION & GROSS WEIGHT										
					SEA LEVEL					

MULTIPLY STATUTE UNITS BY .87 FOR CONVERSION TO NAUTICAL UNITS

NOTES:

(1) Continuous operation at 100% limited to 30 minutes on engines with dovetail turbine buckets, others limited to 15 minutes.
(2) Divide pounds by 6.8 to obtain gallons of AN-F-32, JP-1 fuel. Divide pounds by 6.5 to obtain gallons of AN-F-58, JP-3 fuel. Divide pounds by 6.0 to obtain gallons of AN-F-48 fuel.

LEGEND

FUEL - Pounds
DISTANCE - Statute Miles
TIME - Minutes
RATE OF CLIMB - Feet Per Minute
CAS - Calibrated Air Speed
MPH - Statute Miles Per Hour

DATA AS OF: 11/11/49

BASED ON: FLIGHT TESTS

BASED ON ANY FUEL LISTED IN NOTE (2).

RED FIGURES HAVE NOT BEEN FLIGHT CHECKED

147-93-727

MCRE Form No. 239F (5 May 48)

Figure A-12. B-45A-1 Climb Chart—Two and Three Engines

AIRPLANE MODEL

B-45A-5
B-45C

CLIMB CHART

STANDARD DAY

FOUR ENGINES

ENGINE MODEL

J47 SERIES

100 % RPM					PRESSURE ALTITUDE FEET	100 % RPM				
APPROXIMATE				CAS MPH		CAS MPH	APPROXIMATE			
RATE OF CLIMB	FROM SEA LEVEL						FROM SEA LEVEL			RATE OF CLIMB
	DISTANCE	TIME	FUEL				FUEL	TIME	DISTANCE	
AIRPLANE CONFIGURATION & GROSS WEIGHT										
112,000 POUNDS				TWO 1250 GALLON TIP TANKS (4)				95,000 POUNDS		
1800	0	0	2600 (1)	460	SEA LEVEL	460	2600 (1)	0	0	2300
1600	20	3	4100	430	5000	430	3800	2.5	15	2050
1300	45	6.5	5800	400	10,000	400	5100	5	35	1700
950	80	11	7600	370	15,000	370	6400	8	60	1350
600	130	17	9800	340	20,000	340	7800	12.5	95	1000
200	230	30	13,500	310	25,000	315	9700	19	140	600
					30,000	290	13,000	32	240	200
AIRPLANE CONFIGURATION & GROSS WEIGHT										
80,000 POUNDS				TWO 1250 GALLON TIP TANKS (4)				65,000 POUNDS		
2850	0	0	2600 (1)	460	SEA LEVEL	460	2600 (1)	0	0	3650
2550	15	2	3600	430	5000	430	3300	1.5	10	3300
2200	30	4	4600	400	10,000	400	4100	3	20	2900
1850	45	6.5	5600	370	15,000	375	4900	5	35	2450
1400	70	9.0	6600	345	20,000	345	5700	7	55	1950
1000	105	13.5	7800	315	25,000	315	6500	10	75	1500
600	150	20	9400	285	30,000	290	7500	14	105	1050
150	260	35	12,500	260	35,000	260	8700	20	150	600
					40,000	230	11,400	36	260	100
AIRPLANE CONFIGURATION & GROSS WEIGHT										
91,000 POUNDS				NO EXTERNAL LOAD				75,000 POUNDS		
2700	0	0	2600 (1)	455	SEA LEVEL	460	2600 (1)	0	0	3450
2400	15	2	3600	430	5000	435	3400	1.5	10	3050
2000	30	4.5	4700	405	10,000	410	4200	3.5	25	2650
1600	55	7	5800	375	15,000	380	5100	5.5	40	2200
1200	80	10.5	7100	350	20,000	350	5900	8	60	1750
750	120	16	8500	320	25,000	320	6900	11.5	85	1300
300	190	25	10,800	290	30,000	290	8100	16	120	800
					35,000	260	10,000	25	190	300
AIRPLANE CONFIGURATION & GROSS WEIGHT										
65,000 POUNDS				NO EXTERNAL LOAD						
3950	0	0	2600 (1)	460	SEA LEVEL					
3500	10	1.5	3300	440	5000					
3100	20	3	4000	410	10,000					
2650	35	4.5	4700	380	15,000					
2150	50	6.5	5500	350	20,000					
1700	70	9.5	6200	320	25,000					
1200	95	13	7100	290	30,000					
700	135	18	8200	260	35,000					
150	230	31	10,300	230	40,000					

MULTIPLY STATUTE UNITS BY .87 FOR CONVERSION TO NAUTICAL UNITS

NOTES:

(1) Fuel column includes allowance of 2600 pounds of fuel for warm-up and take-off.
(2) Continuous operation at 100% rpm is limited to 30 minutes.
(3) Divide pounds by 6.8 to obtain gallons of AN-F-32, JP-1 fuel.
Divide pounds by 6.5 to obtain gallons of AN-F-58, JP-3 fuel.
Divide pounds by 6.0 to obtain gallons of AN-F-48 fuel.
(4) B-45C Airplanes only.

LEGEND

FUEL - Pounds
DISTANCE - Statute Miles
TIME - Minutes
RATE OF CLIMB - Feet Per Minute
CAS - Calibrated Air Speed
MPH - Statute Miles Per Hour

DATA AS OF: 11/1/49

BASED ON: Flight Test B45A & Estimated Data

BASED ON ANY FUEL LISTED IN NOTE (3).

RED FIGURES HAVE NOT BEEN FLIGHT CHECKED

153-93-728

MCRE Form No. 239F (5 May 48)

Figure A-13. B-45A-5 and B-45C Climb Chart—Four Engines

AIRPLANE MODEL

B-45A-5 & B-45C

CLIMB CHART

STANDARD DAY

THREE ENGINES

ENGINE MODEL

J47 SERIES

100 % RPM					PRESSURE ALTITUDE FEET	100 % RPM				
APPROXIMATE				CAS MPH		CAS MPH	APPROXIMATE			
RATE OF CLIMB	FROM SEA LEVEL						FROM SEA LEVEL			RATE OF CLIMB
	DISTANCE	TIME	FUEL				FUEL	TIME	DISTANCE	
AIRPLANE CONFIGURATION & GROSS WEIGHT										
112,000 POUNDS					TWO 1250 GALLON TIP TANKS (3)		95,000 POUNDS			
550	0	0	0	330	SEA LEVEL	335	0	0	0	850
350	60	11.5	4500	325	5000	325	2700	7	35	650
100	190	33	12,000	310	10,000	310	6000	16.5	95	400
					15,000	290	12,000	35	210	150
AIRPLANE CONFIGURATION & GROSS WEIGHT										
80,000 POUNDS					TWO 1250 GALLON TIP TANKS (3)		65,000 POUNDS			
1150	0	0	0	340	SEA LEVEL	345	0	0	0	1550
950	25	4.5	1900	325	5000	330	1400	3.5	20	1350
700	60	10.5	4000	305	10,000	305	2800	7.5	40	1100
450	110	19.5	6600	285	15,000	285	4300	12.5	70	800
100	225	39	11,400	265	20,000	265	6300	20	115	500
					25,000	245	10,100	37	220	150
AIRPLANE CONFIGURATION & GROSS WEIGHT										
91,000 POUNDS					NO EXTERNAL LOAD		75,000 POUNDS			
1000	0	0	0	350	SEA LEVEL	350	0	0	0	1400
800	30	5.5	2200	335	5000	335	1500	4	20	1200
550	75	13	4800	315	10,000	315	3200	8.5	50	950
250	150	25	8400	295	15,000	290	5100	15	90	650
					20,000	270	7800	26	150	300
AIRPLANE CONFIGURATION & GROSS WEIGHT										
65,000 POUNDS					NO EXTERNAL LOAD					
1700	0	0	0	355	SEA LEVEL					
1500	15	3	1300	335	5000					
1200	40	7	2600	315	10,000					
900	70	11.5	4000	290	15,000					
550	110	18	5700	270	20,000					
200	190	31	8600	250	25,000					

MULTIPLY STATUTE UNITS BY .87 FOR CONVERSION TO NAUTICAL UNITS

NOTES:
(1) Continuous operation at 100% is limited to 30 minutes.
(2) Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
(3) B-45C Airplanes only.

LEGEND

FUEL - Pounds
DISTANCE - Statute Miles
TIME - Minutes
RATE OF CLIMB - Feet Per Minute
CAS - Calibrated Airspeed
MPH - Statute Miles Per Hour

DATA AS OF: 11/11/49

BASED ON: ESTIMATED DATA

BASED ON ANY FUEL LISTED IN NOTE (2).

RED FIGURES HAVE NOT BEEN FLIGHT CHECKED

147-93-784

MCRE Form No. 239F (5 May 48)

WF-0-4 JUN 48 700

Figure A-14. B-45A-5 and B-45C Climb Chart—Three Engines

AIRPLANE MODEL B-45A-1

DESCENT CHART

STANDARD DAY

ENGINE MODEL J35 SERIES

NOTES: (1) Maintain idling power (approximately 70% at 35,000 feet to 55% at sea level) and CAS shown on chart.
(2) Descend at 185 MPH CAS for maximum range with no power.

Airplane configuration & Gross wt 70,000 Pounds or Less					PRESS. ALT. FT.	Airplane configuration & Gross wt.				
	APPROXIMATE			CAS MPH			APPROXIMATE			
RATE OF DESCENT	TO SEA LEVEL					CAS MPH	TO SEA LEVEL			RATE OF DESCENT
	DISTANCE	TIME	FUEL				FUEL	TIME	DISTANCE	
2000	130	20	1200	240	40,000					
2000	115	17.5	1100	250	35,000					
2000	100	15	1000	270	30,000					
2000	80	12.5	900	280	25,000					
2000	65	10	800	290	20,000					
2000	45	7.5	600	300	15,000					
2000	30	5	400	300	10,000					
2000	15	2.5	200	300	5000					
0	0	0	0	300	SEA LEVEL					

MULTIPLY STATUTE UNITS BY .87 FOR CONVERSION TO NAUTICAL UNITS
DATA AS OF: 11/11/49
BASED ON: Flight Test
BASED ON AN-F-32, JP-1; AN-F-58, JP-3; or AN-F-48 FUEL

LEGEND: FUEL - Pounds
DISTANCE - Statute Miles
TIME - Minutes
Rate of Descent - Ft. Per Min.
CAS - Calibrated Airspeed
MPH - Statute Miles per Hour

MCRE Form No. 239E (5 May 48)

147-93-732A

Figure A-15. B-45A-1 Descent Chart

AIRPLANE MODEL

B-45A-5
B-45C

DESCENT CHART

STANDARD DAY

ENGINE MODEL

J47 SERIES

NOTES: (1) Maintain idling power and CAS shown on chart.
(2) Descend at 185 MPH CAS for maximum range with no power.

AIRPLANE CONFIGURATION & GROSS WEIGHT CLEAN OR TWO 1250-GAL TIP TANKS 60,000 LB					PRESS. ALT. FT.	AIRPLANE CONFIGURATION & GROSS WEIGHT				
RATE OF DESCENT	APPROXIMATE TO SEA LEVEL DISTANCE	TIME	FUEL	CAS MPH		CAS MPH	APPROXIMATE TO SEA LEVEL FUEL	TIME	DISTANCE	RATE OF DESCENT
2000	120	20	1300	220	40,000					
2000	100	17.5	1250	230	35,000					
2000	85	15	1150	240	30,000					
2000	70	12.5	1050	250	25,000					
2000	55	10	900	260	20,000					
2000	40	7.5	700	270	15,000					
2000	25	5	500	280	10,000					
2000	10	2.5	300	290	5000					
2000	--	---	--	300	SEA LEVEL					

MULTIPLY STATUTE UNITS BY .87 FOR CONVERSION TO NAUTICAL UNITS
DATA AS OF: 11/11/49
BASED ON: WIND TUNNEL & ESTIMATED DATA
BASED ON: AN-F-32, JP-1; AN-F-58, JP-3; OR AN-F-48 FUEL
RED FIGURES HAVE NOT BEEN FLIGHT CHECKED

MCRE Form No. 239E (5 May 48)

LEGEND
FUEL - Pounds
DISTANCE - Statute Miles
TIME - Minutes
RATE OF DESCENT - Ft. Per Min.
CAS - Calibrated Airspeed
MPH - Statute Miles Per Hour

147-93-637A

Figure A-16. B-45A-5 and B-45C Descent Chart

AIRPLANE MODEL: B-45A-1

LANDING DISTANCE

FEET

ENGINE MODEL: J35 SERIES

GROSS WEIGHT LB.	BEST IAS APPROACH		HARD SURFACE - NO WIND							
	POWER OFF	POWER ON	AT SEA LEVEL		AT 2000'		AT 4000'		AT 6000'	
	MPH	MPH	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'
70,000	---	140	4300	5400	4500	5600	4800	5900	5100	6300
60,000	---	130	3700	4700	3900	4900	4100	5200	4400	5500
50,000	---	120	3100	4000	3300	4200	3500	4400	3700	4700

NOTES:

OPTIMUM LANDING IS 80% OF CHART VALUES

LEGEND

IAS - Indicated Airspeed

MPH - Miles Per Hour

DATA AS OF: 10/10/48

BASED ON: FLIGHT TESTS

147-93-560B

MCRE Form No. 239A (5 May 48)

Figure A-17. B-45A-1 Landing Chart

AIRPLANE MODEL

B-45A-5
B-45C

LANDING DISTANCE

FEET

ENGINE MODEL

J47 SERIES

GROSS WEIGHT LB.	BEST IAS APPROACH		HARD SURFACE - NO WIND							
	POWER OFF	POWER ON	AT SEA LEVEL		AT 2000'		AT 4000'		AT 6000'	
	MPH	MPH	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'
70,000	----	140	4300	5400	4500	5600	4800	5900	5100	6300
60,000	----	130	3700	4700	3900	4900	4100	5200	4400	5500
50,000	----	120	3100	4000	3300	4200	3500	4400	3700	4700

NOTES: Optimum Landing is 80% of Chart Values

LEGEND

MPH - Miles Per Hour
IAS - Indicated Airspeed

147-93-638A

DATA AS OF: 10/10/48

BASED ON: B-45A-1 FLIGHT TESTS

RED FIGURES HAVE NOT BEEN FLIGHT CHECKED

MCRE Form No. 239A (5 May 48)

WF-(A)-O-4 JUN 48 700

Figure A-18. B-45A-5 and B-45C Landing Chart

MCRE Form No. 239C Sheet 1 of 2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S) B-45A-1

ENGINE(S) J35 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 86,000 TO 70,000 POUNDS

EXTERNAL LOAD ITEMS NONE

NUMBER OF ENGINES OPERATING: FOUR

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. C	OIL PRESS PSI	FUEL PRESS PSI	
MILITARY	15	100	720	60	600	
MAX CONT	--	96	720	60	600	

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING.

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/11/49 BASED ON FLIGHT TESTS

LOW ALTITUDE

147-93-750

IF YOU ARE AT S. L. RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 5000' RANGE IN AIRMILES			IF YOU ARE AT 10000' RANGE IN AIRMILES			IF YOU ARE AT 15000' RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 20000' RANGE IN AIRMILES		
BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 5000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 10000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 15000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 20000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
(1210)	30	(2530)	39,000	(1390)	30	(2560)	(1570)	30	(2600)	----	---	----	39,000	----	---	----
1120	30	2280	36,000	1280	30	2310	1450	30	2340	(1650)	30	(2370)	36,000	(1850)	30	(2400)
980	30	1940	32,000	1130	30	1990	1280	30	2010	1460	30	2040	32,000	1630	30	2060
850	30	1610	28,000	980	30	1640	1110	30	1680	1260	30	1710	28,000	1410	30	1730
730	30	1330	24,000	830	30	1360	940	30	1390	1070	30	1420	24,000	1200	30	1450
600	30	1050	20,000	690	30	1080	780	30	1120	890	30	1150	20,000	990	30	1170

CRUISING AT S. L.						EFFEC-TIVE WIND	CRUISING AT 5000'						CRUISING AT 10000'						CRUISING AT 15000'						EFFEC-TIVE WIND	CRUISING AT 20000'					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.
						120 HW																			120 HW	350	96	10,200	350	.75	45
						80 HW							390	94	12,200	370	.80	25	365	94	10,900	375	.80	35	80 HW	340	95	9700	375	.80	50
425	92	14,600	385	.9	0	40 HW	395	92	12,800	385	.9	15	380	93	11,700	395	.90	25	355	93	10,400	400	.90	40	40 HW	340	95	9700	415	.90	60
400	90	13,500	400	1.0	0	0	385	91	12,200	410	1.0	15	365	92	11,100	425	1.0	30	345	92	9900	425	1.0	45	0	330	94	9300	445	1.0	65
390	89	13,000	430	1.1	0	40 TW	375	90	11,800	440	1.1	15	355	91	10,700	450	1.1	35	345	92	9900	465	1.1	50	40 TW	320	93	8900	470	1.1	70
						80 TW							340	90	10,300	475	1.2	35	330	91	9400	490	1.2	55	80 TW	320	93	8900	510	1.2	80
						120 TW																			120 TW	310	92	8500	535	1.3	85

Figure A-19 (Sheet 1 of 2 Sheets). B-45A-1 Flight Operation Instruction Chart, Four-engine Operation—86,000 Pounds to 70,000 Pounds

HIGH ALTITUDE

AIRPLANE MOD. B-45A-1 ENG. J35 SERIES CHART WT. LIMITS 86,000 TO 70,000 LB. EXT. LOAD NONE NO. OF ENGINES OPERATING: 4

IF YOU ARE AT 25000'			FUEL POUNDS	IF YOU ARE AT 30000'			IF YOU ARE AT 35000'			IF YOU ARE AT 40000'			FUEL POUNDS	IF YOU ARE AT 45000'		
RANGE IN AIRMILES				RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES				RANGE IN AIRMILES		
BY CRUISING AT 25000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		Y CRUISING AT 30000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 35000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 40000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 45000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
----	---	----	39,000	----	---	---							39,000			
(2080)	30	(2430)	36,000	----	---	---							36,000			
1840	30	2090	32,000	(2030)	30	(2120)							32,000			
1580	30	1760	28,000	1750	30	1800							28,000			
1350	30	1480	24,000	1490	30	1510							24,000			
1110	30	1200	20,000	1240	--	----							20,000			

CRUISING AT 25000'						EFFEC-TIVE WIND	CRUISING AT 30000'						CRUISING AT 35000'						CRUISING AT 40000'						EFFEC-TIVE WIND	CRUISING AT 45000'					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.
320	96	8800	340	.75	55	120 HW	270	96	7300	305	.70	70													120 HW						
320	96	8800	380	.80	65	80 HW	270	96	7300	345	.80	80													80 HW						
310	95	8400	410	.90	70	40 HW	270	96	7300	385	.90	90													40 HW						
310	95	8400	450	1.0	80	0	270	96	7300	425	1.0	100													0						
300	94	8000	475	1.1	90	40 TW	270	96	7300	465	1.1	110													40 TW						
300	94	8000	515	1.2	95	80 TW	270	96	7300	505	1.2	120													80 TW						
300	94	8000	555	1.3	105	120 TW	270	96	7300	545	1.3	130													120 TW						

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel. Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel. Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.
6. Multiply 5800 gallons (full bomb bay tanks), or 3400 gallons (no bomb bay fuel), by factor in note 4 to obtain maximum available fuel in pounds.

DATA AS OF: 11/11/49 BASED ON: FLIGHT TESTS

EXAMPLE

If you are at 10,000 feet with 36,000 pounds of available fuel, you can fly 1450 statute airmiles by holding 365 mph CAS. However, you can fly 2340 statute airmiles by immediately climbing to 30,000 feet using 100% RPM. At 30,000 feet cruise at 270 mph CAS and start let down 100 statute miles from home. With an 80 mph headwind the range at 30,000 feet would be .8 x 2340 or 1870 statute miles. Cruise at 270 mph CAS with this wind and start let down 80 statute miles from destination.

BASED ON ANY FUEL LISTED IN NOTE 4

LEGEND

EFFECTIVE WIND - HW, Headwind, TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Air-Miles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles
( ) - Range in Parenthesis for Interpolation Purposes Only.

147-93-753

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-19 (Sheet 2 of 2 Sheets). B-45A-1 Flight Operation Instruction Chart, Four-engine Operation—86,000 Pounds to 70,000 Pounds

MCRE Form No. 239C Sheet 1 of 2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S) B-45A-1

ENGINE(S) J35 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 70,000 TO 60,000 POUNDS

EXTERNAL LOAD ITEMS NONE

NUMBER OF ENGINES OPERATING: FOUR

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. C	OIL PRESS PSI	FUEL PRESS PSI	
MILITARY	15	100	720	60	600	
MAX CONT	--	96	720	60	600	

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING.

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/11/49 BASED ON FLIGHT TESTS

LOW ALTITUDE

147-93-752

IF YOU ARE AT S. L.			FUEL	IF YOU ARE AT 5000'			IF YOU ARE AT 10000'			IF YOU ARE AT 15000'			FUEL	IF YOU ARE AT 20000'		
RANGE IN AIRMILES				RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES				RANGE IN AIRMILES		
BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	POUNDS	BY CRUISING AT 5000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 10000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 15000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	POUNDS	BY CRUISING AT 20000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
900	35	2020	28,000	1040	35	2060	1180	35	2080	1350	35	2110	28,000	1530	35	2140
770	35	1680	24,000	890	35	1720	1010	35	1740	1150	35	1760	24,000	1310	35	1810
640	35	1350	20,000	740	35	1380	840	35	1410	960	35	1440	20,000	1090	35	1470
510	35	1010	16,000	590	35	1040	670	35	1070	770	35	1100	16,000	870	35	1130
380	35	680	12,000	440	35	710	500	35	740	570	35	770	12,000	650	35	800
250	30	400	8000	290	30	430	340	35	460	380	35	480	8000	440	35	520
120	15	150	4000	150	20	180	170	25	200	200	30	220	4000	230	30	250

CRUISING AT S. L.						EFFEC-TIVE WIND	CRUISING AT 5000'						CRUISING AT 10000'						CRUISING AT 15000'						EFFEC-TIVE WIND	CRUISING AT 20000'					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.
						120 HW																			120 HW	350	94	9500	345	.70	45
						80 HW							380	92	11,300	355	.80	25	355	92	10,000	360	.80	35	80 HW	340	93	9100	375	.80	50
390	88	12,500	350	.90	0	40 HW	385	90	11,700	375	.90	15	355	90	10,300	370	.90	25	345	91	9500	390	.90	40	40 HW	330	92	8700	400	.90	60
380	87	12,000	380	1.0	0	0	365	88	10,800	390	1.0	15	345	89	9800	400	1.0	30	335	90	9000	415	1.0	45	0	315	91	8200	425	1.0	65
360	85	11,200	400	1.15	0	40 TW	355	87	10,400	420	1.1	15	335	88	9400	425	1.1	35	320	89	8600	440	1.1	50	40 TW	305	90	7800	450	1.1	70
						80 TW							320	87	9000	450	1.25	35	310	88	8200	465	1.25	55	80 TW	305	90	7800	490	1.2	80
						120 TW																			120 TW	295	89	7500	515	1.35	85

Figure A-20 (Sheet 1 of 2 Sheets). B-45A-1 Flight Operation Instruction Chart, Four-engine Operation—70,000 Pounds to 60,000 Pounds

HIGH ALTITUDE

AIRPLANE MOD. B-45A-1 ENG. J35 SERIES CHART WT. LIMITS 70,000 TO 60,000 LB. EXT. LOAD NONE NO. OF ENGINES OPERATING: 4

IF YOU ARE AT 25000'			FUEL POUNDS	IF YOU ARE AT 30000'			IF YOU ARE AT 35000'			IF YOU ARE AT 40000'			FUEL POUNDS	IF YOU ARE AT 45000'		
RANGE IN AIRMILES				RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES				RANGE IN AIRMILES		
BY CRUISING AT 25000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 30000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 35000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 40000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 45000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
1730	35	2170	28,000	1920	35	2200	2080	35	2230				28,000			
1480	35	1830	24,000	1640	35	1860	1780	35	1890				24,000			
1230	35	1490	20,000	1360	35	1520	1480	35	1550				20,000			
980	35	1160	16,000	1090	35	1180	1180	35	1210				16,000			
730	35	830	12,000	810	35	850	880	--	---				12,000			
500	35	540	8000	550	35	570	600	--	--				8000			
260	30	270	4000	290	--	---	320	--	---				4000			

CRUISING AT 25000'						EFFEC-TIVE WIND	CRUISING AT 30000'						CRUISING AT 35000'						CRUISING AT 40000'						EFFEC-TIVE WIND	CRUISING AT 45000'					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE							APPROXIMATE				
C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.
330	95	8600	355	.70	55	120 HW	295	96	7500	345	.70	70	250	96	6200	310	.70	80							120 HW						
320	94	8200	385	.80	65	80 HW	295	96	7500	385	.80	80	250	96	6200	350	.80	90							80 HW						
310	93	7800	410	.90	70	40 HW	290	95	7200	415	.90	90	250	96	6200	390	.90	105							40 HW						
300	92	7500	435	1.0	80	0	280	94	6900	440	1.0	100	250	96	6200	430	1.0	115							0						
290	91	7100	460	1.1	90	40 TW	270	93	6600	470	1.1	110	250	96	6200	470	1.1	125							40 TW						
290	91	7100	500	1.2	95	80 TW	270	93	6600	510	1.2	120	250	96	6200	510	1.2	140							80 TW						
275	90	6800	525	1.3	105	120 TW	260	92	6300	535	1.3	130	250	96	6200	550	1.3	150							120 TW						

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.

EXAMPLE

If you are at 10,000 feet with 28,000 pounds of available fuel, you can fly 1180 statute airmiles by holding 345 mph CAS. However, you can fly 2080 statute airmiles by immediately climbing to 35,000 feet using 100% RPM. At 35,000 feet cruise at 250 mph CAS and start let down 115 statute miles from home. With an 80 mph headwind the range at 35,000 feet would be .8 x 2080 or 1660 statute miles. Cruise at 250 mph CAS with this wind and start let down 90 statute miles from destination.

LEGEND

EFFECTIVE WIND - HW, Headwind, TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Air-Miles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles

BASED ON ANY FUEL LISTED IN NOTE 4

DATA AS OF: 11/11/49 BASED ON: FLIGHT TESTS

147-93-755

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-20 (Sheet 2 of 2 Sheets). B-45A-1 Flight Operation Instruction Chart, Four-engine Operation—70,000 Pounds to 60,000 Pounds

MCRE Form No. 239C Sheet 1 of 2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S) B-45A-1

ENGINE(S) J35 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 60,000 OR LESS POUNDS

EXTERNAL LOAD ITEMS NONE

NUMBER OF ENGINES OPERATING: FOUR

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. °C	OIL PRESS PSI	FUEL PRESS PSI	
MILITARY	15	100	720	60	600	
MAX CONT	--	96	720	60	600	

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING.

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/11/49 BASED ON FLIGHT TESTS

LOW ALTITUDE

147-93-745

IF YOU ARE AT S. L.			FUEL	IF YOU ARE AT 5000′			IF YOU ARE AT 10000′			IF YOU ARE AT 15000′			FUEL	IF YOU ARE AT 20000′		
RANGE IN AIRMILES				RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES				RANGE IN AIRMILES		
BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	POUNDS	BY CRUISING AT 5000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 10000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 15000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	POUNDS	BY CRUISING AT 20000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
520	40	1140	16,000	610	40	1180	690	40	1210	790	40	1240	16,000	900	40	1270
390	40	800	12,000	460	40	840	520	40	870	600	40	910	12,000	680	40	930
260	40	470	8000	300	40	500	350	40	530	400	40	570	8000	460	40	590
130	25	180	4000	150	30	200	180	30	220	210	30	250	4000	240	30	270

CRUISING AT S. L.						EFFEC-TIVE WIND	CRUISING AT 5000′						CRUISING AT 10000′						CRUISING AT 15000′						EFFEC-TIVE WIND	CRUISING AT 20000′					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.
						120 HW																			120 HW	340	92	8700	330	.70	45
						80 HW							365	90	10,300	340	.80	25	345	90	9100	345	.80	35	80 HW	330	91	8300	360	.80	50
385	87	12,000	345	.90	0	40 HW	375	88	10,900	360	.90	15	355	89	9900	370	.90	25	335	89	8600	375	.90	40	40 HW	315	90	7900	385	.90	60
365	85	11,200	365	1.0	0	0	355	86	10,100	380	1.0	15	345	88	9500	400	1.0	30	320	88	8200	400	1.0	45	0	305	89	7500	410	1.0	65
345	83	10,500	385	1.15	0	40 TW	345	85	9700	405	1.1	15	335	87	9100	430	1.1	35	310	87	7900	425	1.1	50	40 TW	295	88	7100	435	1.1	70
						80 TW							325	86	8800	460	1.25	35	310	87	7900	465	1.2	55	80 TW	295	88	7100	475	1.2	80
						120 TW																			120 TW	285	87	6800	500	1.35	85

Figure A-21 (Sheet 1 of 2 Sheets). B-45A-1 Flight Operation Instruction Chart, Four-engine Operation—60,000 Pounds or Less

HIGH ALTITUDE

AIRPLANE MOD. B-45A-1 ENG. J35 SERIES CHART WT. LIMITS 60,000 OR LESS LB. EXT. LOAD NONE NO. OF ENGINES OPERATING: 4

IF YOU ARE AT 25000′			FUEL POUNDS	IF YOU ARE AT 30000′			IF YOU ARE AT 35000′			IF YOU ARE AT 40000′			FUEL POUNDS	IF YOU ARE AT 45000′		
RANGE IN AIRMILES				RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES				RANGE IN AIRMILES		
BY CRUISING AT 25000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 30000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 35000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 40000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 45000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
1020	40	1300	16,000	1140	40	1330	1230	40	1360	1380	---	---	16,000			
770	40	960	12,000	860	40	990	930	40	1020	1040	---	---	12,000			
520	40	620	8000	580	40	650	630	40	680	710	---	---	8000			
270	35	290	4000	310	--	---	330	40	340	370	---	---	4000			

CRUISING AT 25000′						EFFECTIVE WIND	CRUISING AT 30000′						CRUISING AT 35000′						CRUISING AT 40000′						EFFECTIVE WIND	CRUISING AT 45000′					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.
320	93	7900	340	.70	55	120 HW	295	94	7100	345	.70	70	270	96	6400	345	.70	80	235	96	5300	330	.75	90	120 HW						
310	92	7600	370	.80	65	80 HW	285	93	6800	370	.80	80	265	95	6100	370	.80	90	235	96	5300	370	.85	105	80 HW						
300	91	7200	400	.90	70	40 HW	280	92	6500	400	.90	90	255	94	5900	400	.90	105	235	96	5300	410	.90	115	40 HW						
290	90	6800	425	1.0	80	0	270	91	6200	425	1.0	100	255	94	5900	440	1.0	115	235	96	5300	450	1.0	130	0						
280	89	6500	450	1.1	90	40 TW	270	91	6200	465	1.1	110	250	93	5700	470	1.1	125	235	96	5300	490	1.1	145	40 TW						
270	88	6200	470	1.25	95	80 TW	260	90	5900	490	1.2	120	250	93	5700	510	1.2	140	235	96	5300	530	1.2	155	80 TW						
270	88	6200	510	1.35	105	120 TW	260	90	5900	530	1.3	130	240	92	5400	535	1.3	150	235	96	5300	570	1.25	170	120 TW						

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.

EXAMPLE

If you are at 10,000 feet with 16,000 pounds of available fuel, you can fly 690 statute airmiles by holding 345 mph CAS. However, you can fly 1210 statute airmiles by immediately climbing to 40,000 feet using 100% RPM. At 40,000 feet cruise at 235 mph CAS and start let down 130 statute miles from home. With an 80 mph headwind the range at 40,000 feet would be .85 x 1210 or 1030 statute miles. Cruise at 235 mph CAS with this wind and start let down 105 statute miles from destination.

BASED ON ANY FUEL LISTED IN NOTE 4

LEGEND

EFFECTIVE WIND - HW, Headwind - TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Air-Miles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles

DATA AS OF: 11/11/49 BASED ON: FLIGHT TESTS

147-93-749

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-21 (Sheet 2 of 2 Sheets). B-45A-1 Flight Operation Instruction Chart, Four-engine Operation—60,000 Pounds or Less

MCRE Form No. 239C Sheet 1of2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S)

B-45A-1

ENGINE(S) J35 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 86,000 TO 70,000 POUNDS

EXTERNAL LOAD ITEMS

NONE

NUMBER OF ENGINES OPERATING: THREE

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. °C	OIL PRESS PSI	FUEL PRESS PSI
MILITARY	15	100	720	60	600
MAX CONT	--	96	720	60	600

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING.

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/11/49 BASED ON FLIGHT TESTS

LOW ALTITUDE

IF YOU ARE AT S. L. RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 5000′ RANGE IN AIRMILES			IF YOU ARE AT 10000′ RANGE IN AIRMILES			IF YOU ARE AT 15000′ RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 20000′ RANGE IN AIRMILES		
BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 5000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 10000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 15000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 20000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
(1240)	20	(2190)	39,000	(1430)	20	(2230)	(1620)	20	(2260)	---	---	---	39,000	---	---	---
1140	20	1970	36,000	1320	20	2010	1490	20	2040	(1700)	20	(2070)	36,000	(1900)	20	(2090)
1010	20	1690	32,000	1170	20	1720	1310	20	1750	1500	20	1780	32,000	1680	20	1800
880	20	1400	28,000	1010	20	1440	1140	20	1460	1300	20	1490	28,000	1450	20	1520
750	20	1150	24,000	860	20	1190	970	20	1220	1110	20	1250	24,000	1230	20	1270
620	20	910	20,000	710	20	940	810	20	970	920	20	1000	20,000	1020	20	1030

CRUISING AT S. L.						EFFEC-TIVE WIND	CRUISING AT 5000′						CRUISING AT 10000′						CRUISING AT 15000′						EFFEC-TIVE WIND	CRUISING AT 20000′					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.
						120 HW																			120 HW	255	96	7100	225	.65	45
						80 HW							330	96	9700	300	.80	25	300	96	8400	295	.80	35	80 HW	255	96	7100	265	.75	50
385	96	12,600	345	.90	0	40 HW	360	96	11,000	345	.90	15	330	96	9700	340	.90	25	300	96	8400	335	.90	40	40 HW	255	96	7100	305	.90	60
385	96	12,600	385	1.0	0	0	360	96	11,000	385	1.0	15	330	96	9700	380	1.0	30	300	96	8400	375	1.0	45	0	255	96	7100	345	1.0	65
385	96	12,600	425	1.1	0	40 TW	360	96	11,000	425	1.1	15	330	96	9700	420	1.1	35	300	96	8400	415	1.1	50	40 TW	255	96	7100	385	1.1	70
						80 TW							330	96	9700	460	1.2	35	300	96	8400	455	1.2	55	80 TW	255	96	7100	425	1.25	80
						120 TW																			120 TW	255	96	7100	465	1.35	85

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel. Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel. Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.
6. Multiply 5800 gallons (full bomb bay tanks), or 3400 gallons (with no bomb bay fuel), by factor in note 4 to obtain maximum available fuel in pounds.

DATA AS OF: 11/11/49 BASED ON: FLIGHT TEST

EXAMPLE

If you are at 10,000 feet with 36,000 pounds of available fuel, you can fly 1490 statute airmiles by holding 330 mph CAS. However, you can fly 2040 statute airmiles by immediately climbing to 20,000 feet using 100% RPM. At 20,000 feet cruise at 255 mph CAS and start let down 65 statute miles from home. With an 80 mph headwind the range at 20,000 feet would be .75 x 2040 or 1530 statute miles. Cruise at 255 mph CAS with this wind and start let down 50 statute miles from destination.

BASED ON ANY FUEL LISTED IN NOTE 4

LEGEND

EFFECTIVE WIND - HW, Headwind - TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Airmiles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption in Pounds Per Hour
( ) - Range in Parenthesis for Interpolation Purposes Only
RANGE - Statute Miles

147-93-756

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-22. B-45A-1 Flight Operation Instruction Chart, Three-engine Operation—86,000 Pounds to 70,000 Pounds

MCRE Form No. 239C Sheet 1 of 2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S)

B-45A-1

ENGINE(S) J35 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 70,000 TO 60,000 POUNDS

EXTERNAL LOAD ITEMS

NONE

NUMBER OF ENGINES OPERATING: THREE

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. C	OIL PRESS PSI	FUEL PRESS PSI	
MILITARY	15	100	720	60	600	
MAX CONT	--	96	720	60	600	

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING.

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/11/49 BASED ON FLIGHT TESTS

LOW ALTITUDE

147-93-751

IF YOU ARE AT S. L. RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 5000′ RANGE IN AIRMILES			IF YOU ARE AT 10000′ RANGE IN AIRMILES			IF YOU ARE AT 15000′ RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 20000′ RANGE IN AIRMILES		
BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 5000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 10000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 15000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 20000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
920	25	1770	28,000	1060	25	1800	1200	25	1830	1380	25	1860	28,000	1580	25	1890
780	25	1480	24,000	910	25	1510	1030	25	1540	1180	25	1570	24,000	1350	25	1600
650	25	1190	20,000	760	25	1220	850	25	1250	990	25	1280	20,000	1120	25	1310
520	25	900	16,000	600	25	930	680	25	960	790	25	990	16,000	900	25	1020
390	25	870	12,000	450	25	650	510	25	680	590	25	710	12,000	670	25	740
260	25	360	8000	300	25	400	340	25	380	390	25	460	8000	450	25	490
130	15	140	4000	150	15	170	170	20	190	200	25	220	4000	240	25	250

CRUISING AT S. L.						EFFEC-TIVE WIND	CRUISING AT 5000′						CRUISING AT 10000′						CRUISING AT 15000′						EFFEC-TIVE WIND	CRUISING AT 20000′					
C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.
						120 HW																			120 HW	290	96	7200	270	.70	45
						80 HW							350	96	9800	325	.80	25	325	96	8500	325	.80	35	80 HW	290	96	7200	310	.80	50
400	96	12,700	360	.90	0	40 HW	375	96	11,100	365	.90	15	350	96	9800	365	.90	25	325	96	8500	365	.90	40	40 HW	290	96	7200	350	.90	60
375	94	11,600	375	1.0	0	0	365	95	10,600	390	1.0	15	350	96	9800	405	1.0	30	325	96	8500	405	1.0	45	0	290	96	7200	390	1.0	65
365	93	11,200	405	1.1	0	40 TW	350	94	10,100	415	1.1	15	335	95	9300	425	1.1	35	325	96	8500	445	1.1	50	40 TW	290	96	7200	430	1.1	70
						80 TW							320	94	8900	450	1.25	35	310	95	8200	470	1.2	55	80 TW	290	96	7200	470	1.2	80
						120 TW																			120 TW	290	96	7200	510	1.3	85

Figure A-23 (Sheet 1 of 2 Sheets). B-45A-1 Flight Operation Instruction Chart, Three-engine Operation—70,000 Pounds to 60,000 Pounds

HIGH ALTITUDE

AIRPLANE MOD. B-45A-1 ENG. J35 SERIES CHART WT. LIMITS 70,000 TO 60,000 LB. EXT. LOAD NONE NO. OF ENGINES OPERATING: 3

IF YOU ARE AT 25000′ RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 30000′ RANGE IN AIRMILES			IF YOU ARE AT 35000′ RANGE IN AIRMILES			IF YOU ARE AT 40000′ RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 45000′ RANGE IN AIRMILES		
BY CRUISING AT 25000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 30000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 35000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 40000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 45000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
1790	25	1910	28,000													
1530	25	1620	24,000													
1280	25	1330	20,000													
1020	25	1040	16,000													
760	--	----	12,000													
510	--	----	8000													
270	--	----	4000													

CRUISING AT 25000′						EFFEC-TIVE WIND	CRUISING AT 30000′						CRUISING AT 35000′						CRUISING AT 40000′						EFFEC-TIVE WIND	CRUISING AT 45000′					
C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.
255	96	6200	255	.70	55	120 HW																			120 HW						
255	96	6200	295	.80	65	80 HW																			80 HW						
255	96	6200	335	.90	70	40 HW																			40 HW						
255	96	6200	375	1.0	80	0																			0						
255	96	6200	415	1.1	90	40 TW																			40 TW						
255	96	6200	455	1.2	95	80 TW																			80 TW						
255	96	6200	495	1.3	105	120 TW																			120 TW						

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.

EXAMPLE

If you are at 10,000 feet with 28,000 pounds of available fuel, you can fly 1200 statute airmiles by holding 350 mph CAS. However, you can fly 1830 statute airmiles by immediately climbing to 25,000 feet using 100% RPM. At 25,000 feet cruise at 255 mph CAS and start let down 80 statute miles from home. With an 80 mph headwind the range at 25,000 feet would be .8 x 1830 or 1460 statute miles. Cruise at 255 mph CAS with this wind and start let down 65 statute miles from destination.

LEGEND

EFFECTIVE WIND - HW, Headwind, TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Air-Miles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles

BASED ON ANY FUEL LISTED IN NOTE 4

DATA AS OF: 11/11/49 BASED ON: FLIGHT TESTS

147-93-754

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-23 (Sheet 2 of 2 Sheets). B-45A-1 Flight Operation Instruction Chart, Three-engine Operation—70,000 Pounds to 60,000 Pounds

MCRE Form No. 239C Sheet 1 of 2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S)

B-45A-1

ENGINE(S) J35 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 60,000 OR LESS POUNDS

EXTERNAL LOAD ITEMS

NONE

NUMBER OF ENGINES OPERATING: THREE

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. C	OIL PRESS PSI	FUEL PRESS PSI	
MILITARY	15	100	720	60	600	
MAX CONT	--	96	720	60	600	

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING.

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/11/49 BASED ON FLIGHT TESTS

LOW ALTITUDE

147-93-748

IF YOU ARE AT S. L. RANGE IN AIRMILES: BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 5000′ RANGE IN AIRMILES: BY CRUISING AT 5000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	IF YOU ARE AT 10000′ RANGE IN AIRMILES: BY CRUISING AT 10000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	IF YOU ARE AT 15000′ RANGE IN AIRMILES: BY CRUISING AT 15000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 20000′ RANGE IN AIRMILES: BY CRUISING AT 20000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
530	30	1010	16,000	620	30	1040	710	30	1070	810	30	1100	16,000	920	30	1130
390	30	720	12,000	470	30	750	530	30	780	610	30	810	12,000	700	30	840
260	30	430	8000	310	30	460	360	30	490	410	30	520	8000	470	30	550
130	15	160	4000	160	20	180	180	25	210	210	25	240	4000	240	30	260

CRUISING AT S. L. C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFECTIVE WIND	CRUISING AT 5000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 10000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 15000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFECTIVE WIND	CRUISING AT 20000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.
						120 HW																			120 HW	305	96	7400	290	.70	45
						80 HW							360	96	9800	335	.80	25	335	96	8600	335	.80	35	80 HW	305	96	7400	330	.80	50
370	93	11,400	330	.90	0	40 HW	370	95	10,700	360	.90	15	350	95	9400	360	.90	25	325	95	8200	365	.90	40	40 HW	305	96	7400	370	.90	60
360	92	11,000	360	1.0	0	0	350	93	9800	375	1.0	15	335	94	9000	390	1.0	30	315	94	7900	390	1.0	45	0	295	95	7100	400	1.0	65
350	91	10,500	390	1.1	0	40 TW	325	91	9000	390	1.15	15	315	92	8300	405	1.15	35	305	93	7600	420	1.1	50	40 TW	285	94	6800	425	1.1	70
						80 TW							305	91	7900	430	1.25	35	295	92	7200	445	1.25	55	80 TW	275	93	6500	450	1.25	80
						120 TW																			120 TW	265	92	6200	475	1.35	85

Figure A-24 (Sheet 1 of 2 Sheets). B-45A-1 Flight Operation Instruction Chart, Three-engine Operation—60,000 Pounds or Less

HIGH ALTITUDE

AIRPLANE MOD. B-45A-1 ENG. J35 SERIES CHART WT. LIMITS 60,000 OR LESS LB. EXT. LOAD NONE NO. OF ENGINES OPERATING: 3

IF YOU ARE AT 25000′			FUEL POUNDS	IF YOU ARE AT 30000′			IF YOU ARE AT 35000′			IF YOU ARE AT 40000′			FUEL POUNDS	IF YOU ARE AT 45000′		
RANGE IN AIRMILES				RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES				RANGE IN AIRMILES		
BY CRUISING AT 25000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 30000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 35000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 40000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 45000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
1050	30	1160	16,000	1190	***	***										
790	30	870	12,000	900	***	***										
540	30	580	8000	610	***	***										
280	30	290	4000	320	---	---										

CRUISING AT 25000′						EFFEC-TIVE WIND	CRUISING AT 30000′						CRUISING AT 35000′						CRUISING AT 40000′						EFFEC-TIVE WIND	CRUISING AT 45000′					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C.A.S.	% RPM	LB HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.
280	96	6300	285	.70	55	120 HW	240	96	5300	260	.70	70													120 HW						
280	96	6300	325	.80	65	80 HW	240	96	5300	300	.80	80													80 HW						
280	96	6300	365	.90	70	40 HW	240	96	5300	340	.90	90													40 HW						
280	96	6300	405	1.0	80	0	240	96	5300	380	1.0	100													0						
265	95	6000	430	1.1	90	40 TW	240	96	5300	420	1.1	110													40 TW						
265	95	6000	470	1.2	95	80 TW	240	96	5300	460	1.2	120													80 TW						
255	94	5800	495	1.35	105	120 TW	240	96	5300	500	1.3	130													120 TW						

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.

EXAMPLE

If you are at 10,000 feet with 16,000 pounds of available fuel, you can fly 710 statute airmiles by holding 335 mph CAS. However, you can fly 1070 statute airmiles by immediately climbing to 30,000 feet using 100% RPM. At 30,000 feet cruise at 240 mph CAS and start let down 100 statute miles from home. With an 80 mph headwind the range at 30,000 feet would be .8 x 1070 or 850 statute miles. Cruise at 240 mph CAS with this wind and start let down 80 statute miles from destination.

LEGEND

EFFECTIVE WIND – HW, Headwind, TW, Tailwind – MPH
RANGE FACTOR – Ratio of Ground Distance to Air-Miles for Corresponding Winds
G.S – Ground Speed in MPH
CAS – Calibrated Airspeed in MPH
LB/HR – Fuel Consumption – Pounds Per Hour
RANGE – Statute Miles

DATA AS OF: 11/11/49 BASED ON: FLIGHT TESTS BASED ON ANY FUEL LISTED IN NOTE 4 147-93-747

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-24 (Sheet 2 of 2 Sheets). B-45A-1 Flight Operation Instruction Chart, Three-engine Operation—60,000 Pounds or Less

MCRE Form No. 239C Sheet 1of2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S) B-45A-1

ENGINE(S) J35 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 70,000 TO 60,000 POUNDS

EXTERNAL LOAD ITEMS NONE

NUMBER OF ENGINES OPERATING: TWO

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. C	OIL PRESS PSI	FUEL PRESS PSI	
MILITARY	15	100	720	60	600	
MAX CONT	--	96	720	60	600	

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING.

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/11/49 BASED ON FLIGHT TEST

LOW ALTITUDE

IF YOU ARE AT S. L. RANGE IN AIRMILES BY CRUISING AT S. L.	IF YOU ARE AT S. L. RANGE IN AIRMILES OPT. ALT. 1000 FT.	IF YOU ARE AT S. L. RANGE IN AIRMILES BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 5000′ RANGE IN AIRMILES BY CRUISING AT 5000′	IF YOU ARE AT 5000′ RANGE IN AIRMILES OPT. ALT. 1000 FT.	IF YOU ARE AT 5000′ RANGE IN AIRMILES BY CRUISING AT OPT. ALT.	IF YOU ARE AT 10000′ RANGE IN AIRMILES BY CRUISING AT 10000′	IF YOU ARE AT 10000′ RANGE IN AIRMILES OPT. ALT. 1000 FT.	IF YOU ARE AT 10000′ RANGE IN AIRMILES BY CRUISING AT OPT. ALT.	IF YOU ARE AT 15000′ RANGE IN AIRMILES BY CRUISING AT 15000′	IF YOU ARE AT 15000′ RANGE IN AIRMILES OPT. ALT. 1000 FT.	IF YOU ARE AT 15000′ RANGE IN AIRMILES BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 20000′ RANGE IN AIRMILES BY CRUISING AT 20000′	IF YOU ARE AT 20000′ RANGE IN AIRMILES OPT. ALT. 1000 FT.	IF YOU ARE AT 20000′ RANGE IN AIRMILES BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
990	5	1220	28,000	1120	5	1240							28,000			
840	5	1020	24,000	950	5	1040							24,000			
700	5	820	20,000	790	5	840							20,000			
550	5	620	16,000	630	5	640							16,000			
410	5	440	12,000	460	-	---							12,000			
270	5	280	8000	300	-	---							8000			
130	-	---	4000	150	-	---							4000			

CRUISING AT S. L. C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFEC. TIVE WIND	CRUISING AT 5000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 10000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 15000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFEC. TIVE WIND	CRUISING AT 20000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.
						120 HW																			120 HW						
						80 HW																			80 HW						
265	96	7900	225	.85	0	40 HW	240	96	6900	220	.85	15													40 HW						
265	96	7900	265	1.0	0	0	240	96	6900	260	1.0	15													0						
265	96	7900	305	1.15	0	40 TW	240	96	6900	300	1.15	15													40 TW						
						80 TW																			80 TW						
						120 TW																			120 TW						

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.

EXAMPLE

If you are at 5000 feet with 28,000 pounds of available fuel, you can fly 1120 statute airmiles by holding 240 mph CAS. However you can fly 1240 statute airmiles by holding 5000 feet until weight decreases to 60,000 pounds and then following the optimum range procedure on that chart.

LEGEND

EFFECTIVE WIND - HW, Headwind, TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Air-Miles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles

DATA AS OF: 11/11/49 BASED ON: FLIGHT TEST BASED ON ANY FUEL LISTED IN NOTE 4

147-93-757

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-25. B-45A-1 Flight Operation Instruction Chart, Two-engine Operation—70,000 Pounds to 60,000 Pounds

MCRE Form No. 239C Sheet 1of2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S) B-45A-1

ENGINE(S) J35 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 60,000 OR LESS POUNDS

EXTERNAL LOAD ITEMS NONE

NUMBER OF ENGINES OPERATING: TWO

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. °C	OIL PRESS PSI	FUEL PRESS PSI	
MILITARY	15	100	720	60	600	
MAX CONT	--	96	720	60	600	

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING.

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/11/49 BASED ON FLIGHT TEST

LOW ALTITUDE

147-93-746

IF YOU ARE AT S. L. RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 5000′ RANGE IN AIRMILES			IF YOU ARE AT 10000′ RANGE IN AIRMILES			IF YOU ARE AT 15000′ RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 20000′ RANGE IN AIRMILES		
BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 5000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 10000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 15000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 20000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
570	15	730	16,000	660	15	760	730	15	790	810	---	---	16,000			
430	15	530	12,000	500	15	560	550	15	590	610	---	---	12,000			
290	15	330	8000	330	15	370	370	15	390	410	---	---	8000			
140	---	---	4000	170	---	---	190	---	---	210	---	---	4000			

CRUISING AT S. L.						EFFEC-TIVE WIND	CRUISING AT 5000′						CRUISING AT 10000′						CRUISING AT 15000′						EFFEC-TIVE WIND	CRUISING AT 20000′					
C.A.S.	APPROXIMATE % RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	APPROXIMATE % RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	APPROXIMATE % RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	APPROXIMATE % RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	APPROXIMATE % RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.
						120 HW																			120 HW						
						80 HW							235	96	6100	195	.70	25	205	96	5200	175	.7	35	80 HW						
285	.96	8000	245	.85	0	40 HW	265	96	7000	245	.85	15	235	96	6100	235	.85	25	205	96	5200	215	.85	40	40 HW						
285	96	8000	285	1.0	0	0	265	96	7000	285	1.0	15	235	96	6100	275	1.0	30	205	96	5200	255	1.0	45	0						
285	96	8000	325	1.15	0	40 TW	265	96	7000	325	1.15	15	235	96	6100	315	1.15	35	205	96	5200	295	1.15	50	40 TW						
						80 TW							235	96	6100	355	1.30	35	205	96	5200	335	1.3	55	80 TW						
						120 TW																			120 TW						

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.

DATA AS OF: 11/11/49 BASED ON: FLIGHT TEST

EXAMPLE

If you are at 5000 feet with 16,000 pounds of available fuel, you can fly 660 statute airmiles by holding 265 mph CAS. However, you can fly 760 statute airmiles by immediately climbing to 15,000 feet using 100% RPM. At 15,000 feet cruise at 205 mph CAS and start let down 45 statute miles from home. With an 80 mph headwind the range at 15,000 feet would be .7 x 760 or 530 statute miles. Cruise at 205 mph CAS with this wind and start let down 35 statute miles from destination.

BASED ON ANY FUEL LISTED IN NOTE 4

LEGEND

EFFECTIVE WIND - HW, Headwind - TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Air-Miles for Corresponding Winds
G.S. - Ground Speed in MPH.
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-26. B-45A-1 Flight Operation Instruction Chart, Two-engine Operation—60,000 Pounds or Less

MCRE Form No. 239C Sheet 1of2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S)

B-45A-5 & B-45C

ENGINE(S) J47 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 91,000 TO 75,000 POUNDS

EXTERNAL LOAD ITEMS

NONE

NUMBER OF ENGINES OPERATING: FOUR

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. °C	OIL PRESS PSI	OIL TEMP °C	FUEL PRESS PSI
MILITARY	30	100	690	60	70	600
MAX CONT	--	93	625	60	70	600

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING.

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/1/49 BASED ON ESTIMATED DATA

LOW ALTITUDE

/47-93-778

IF YOU ARE AT S. L. RANGE IN AIRMILES: BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 5000′ RANGE IN AIRMILES: BY CRUISING AT 5000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	IF YOU ARE AT 10000′ RANGE IN AIRMILES: BY CRUISING AT 10000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	IF YOU ARE AT 15000′ RANGE IN AIRMILES: BY CRUISING AT 15000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 20000′ RANGE IN AIRMILES: BY CRUISING AT 20000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
(1170)	30	(1960)	39,000	(1280)	30	(1990)	(1480)	30	(2030)	(1650)	30	(2060)	39,000	(1820)	30	(2090)
1090	30	1770	36,000	1170	30	1800	(1360)	30	(1830)	(1510)	30	(1860)	36,000	(1670)	30	(1900)
950	30	1500	32,000	1020	30	1540	1200	30	1570	1330	30	1600	32,000	1460	30	1640
830	30	1250	28,000	880	30	1280	1030	30	1310	1150	30	1340	28,000	1260	30	1380
700	30	1020	24,000	780	30	1050	880	30	1090	970	30	1120	24,000	1060	30	1150
580	25	810	20,000	640	25	840	720	25	870	800	25	900	20,000	870	25	940

CRUISING AT S. L. C. A. S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G. S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFEC. TIVE WIND	CRUISING AT 5000′ C. A. S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G. S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 10000′ C. A. S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G. S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 15000′ C. A. S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G. S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFEC. TIVE WIND	CRUISING AT 20000′ C. A. S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G. S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.
						120 HW																			120 HW	370	89	12,000	375	.75	35
						80 HW							400	87	13,500	380	.80	20	385	88	12,600	395	.80	30	80 HW	355	88	11,300	395	.85	40
390	83	14,000	350	.85	0	40 HW	380	84	13,000	365	.90	10	385	86	12,800	400	.90	20	370	87	11,900	420	.90	35	40 HW	355	88	11,300	435	.90	50
360	81	12,600	360	1.0	0	0	365	83	12,400	390	1.0	10	370	85	12,000	425	1.0	25	370	87	11,900	460	1.0	40	0	355	88	11,300	475	1.0	55
345	80	12,000	385	1.15	0	40 TW	335	81	11,100	400	1.15	10	350	84	11,400	445	1.10	30	355	86	11,300	480	1.10	45	40 TW	340	87	10,500	495	1.10	60
						80 TW							335	83	10,700	465	1.25	30	335	85	10,600	500	1.20	50	80 TW	340	87	10,500	535	1.20	70
						120 TW																			120 TW	340	87	10,500	575	1.30	75

Figure A-27 (Sheet 1 of 2 Sheets). B-45A-5 and B-45C Flight Operation Instruction Chart, Four-engine Operation—91,000 Pounds to 75,000 Pounds

HIGH ALTITUDE

AIRPLANE MOD. B-45A-5 & B-45C ENG. J47 SERIES CHART WT. LIMITS 91,000 TO 75,000 LB. EXT. LOAD NONE NO. OF ENGINES OPERATING: 4

IF YOU ARE AT 25000′			FUEL POUNDS	IF YOU ARE AT 30000′			IF YOU ARE AT 35000′			IF YOU ARE AT 40000′			FUEL POUNDS	IF YOU ARE AT 45000′		
RANGE IN AIRMILES				RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES				RANGE IN AIRMILES		
BY CRUISING AT 25000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 30000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 35000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 40000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 45000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
(2000)	30	(2120)	39,000	(2130)	30	(2160)							39,000			
(1830)	30	(1920)	36,000	(1940)	30	(1960)							36,000			
(1610)	30	(1660)	32,000	(1690)	30	(1700)							32,000			
1380	30	1410	28,000	1450	--	---							28,000			
1170	30	1180	24,000	1220	--	---							24,000			
960	--	---	20,000	1000	--	---							20,000			

CRUISING AT 25000′						EFFEC-TIVE WIND	CRUISING AT 30000′						CRUISING AT 35000′						CRUISING AT 40000′						EFFEC-TIVE WIND	CRUISING AT 45000′					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.
345	90	11,000	375	.75	45	120 HW	320	93	10,900	380	.75	55													120 HW						
345	90	11,000	415	.80	55	80 HW	315	92	10,400	415	.85	65													80 HW						
345	90	11,000	455	.90	60	40 HW	315	92	10,400	455	.90	75													40 HW						
330	89	10,400	475	1.0	70	0	315	92	10,400	495	1.0	85													0						
330	89	10,400	515	1.10	80	40 TW	315	92	10,400	535	1.10	95													40 TW						
330	89	10,400	555	1.15	85	80 TW	305	91	10,000	560	1.20	105													80 TW						
330	89	10,400	595	1.25	95	120 TW	305	91	10,000	600	1.25	115													120 TW						

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.
6. Multiply 5800 (full bomb bay) or 3400 (no bomb bay) gallons by factor in note 4 to obtain maximum available fuel in pounds.

EXAMPLE

If you are at 10,000 feet with 36,000 pounds of available fuel, you can fly 1360 statute airmiles by holding 370 mph CAS. However, you can fly 1830 statute airmiles by immediately climbing to 30,000 feet using 100% RPM. At 30,000 feet cruise at 315 mph CAS and start let down 85 statute miles from home. With an 80 mph headwind the range at 30,000 feet would be .85 x 1830 or 1550 statute miles. Cruise at 315 mph CAS with this wind and start let down 65 statute miles from destination.

LEGEND

EFFECTIVE WIND - HW, Headwind - TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Airmiles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles
( ) - Range in Parenthesis Available Only After Dropping External Tanks

DATA AS OF: 11/1/49 BASED ON: FLIGHT TEST B-45A & ESTIMATED

BASED ON ANY FUEL LISTED IN NOTE 4
RED FIGURES HAVE NOT BEEN FLIGHT CHECKED:

147-93-783

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-27 (Sheet 2 of 2 Sheets). B-45A-5 and B-45C Flight Operation Instruction Chart, Four-engine Operation—91,000 Pounds to 75,000 Pounds

MCRE Form No. 239C Sheet 1 of 2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S)

B-45A-5 & B-45C

ENGINE(S) J47 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 75,000 TO 65,000 POUNDS

EXTERNAL LOAD ITEMS

NONE

NUMBER OF ENGINES OPERATING: FOUR

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. °C	OIL PRESS PSI	OIL TEMP °C	FUEL PRESS PSI
MILITARY	30	100	690	60	70	600
MAX CONT	--	93	625	60	70	600

INSTRUCTIONS FOR USING CHART. (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING.

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/1/49 BASED ON ESTIMATED DATA

LOW ALTITUDE

47-93-777

IF YOU ARE AT S. L. RANGE IN AIRMILES: BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 5000' RANGE IN AIRMILES: BY CRUISING AT 5000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	IF YOU ARE AT 10000' RANGE IN AIRMILES: BY CRUISING AT 10000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	IF YOU ARE AT 15000' RANGE IN AIRMILES: BY CRUISING AT 15000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 20000' RANGE IN AIRMILES: BY CRUISING AT 20000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
870	35	1530	28,000	990	35	1570	1120	35	1600	1260	35	1640	28,000	1390	35	1660
740	35	1270	24,000	840	35	1300	960	35	1340	1080	35	1370	24,000	1190	35	1400
620	35	1010	20,000	700	35	1040	790	35	1080	890	35	1110	20,000	980	35	1140
490	30	750	16,000	560	35	780	630	35	820	710	35	850	16,000	780	35	880
370	25	510	12,000	410	30	540	470	30	570	530	30	600	12,000	580	30	630
240	20	290	8000	270	25	320	310	25	350	350	25	380	8000	380	25	400
120	--	---	4000	130	10	140	160	--	---	180	--	---	4000	190	--	---

CRUISING AT S. L. C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFECTIVE WIND	CRUISING AT 5000' C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 10000' C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 15000' C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFECTIVE WIND	CRUISING AT 20000' C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.
						120 HW																			120 HW	360	87	10,700	360	.70	35
						80 HW							380	85	12,100	360	.75	20	360	85	10,600	365	.80	30	80 HW	350	86	10,000	385	.80	40
365	80	12,100	325	.85	0	40 HW	365	82	11,800	350	.90	10	355	83	10,800	370	.90	20	345	84	10,100	385	.90	35	40 HW	350	86	10,000	425	.90	50
335	78	11,000	335	1.0	0	0	340	80	10,600	365	1.0	10	325	81	9700	375	1.0	25	330	83	9500	410	1.0	40	0	335	85	9500	445	1.0	55
310	76	10,000	350	1.15	0	40 TW	310	78	9600	375	1.15	10	310	80	9200	400	1.10	30	315	82	8900	430	1.10	45	40 TW	320	84	8900	470	1.10	60
						80 TW							295	79	8700	420	1.25	30	315	82	8900	470	1.20	50	80 TW	300	83	8400	485	1.20	70
						120 TW																			120 TW	300	83	8400	525	1.30	75

Figure A-28 (Sheet 1 of 2 Sheets). B-45A-5 and B-45C Flight Operation Instruction Chart, Four-engine Operation—75,000 Pounds to 65,000 Pounds

HIGH ALTITUDE

AIRPLANE MOD. B-45A-5 & B-45C ENG. J47 SERIES CHART WT. LIMITS 75,000 TO 65,000 LB. EXT. LOAD NONE NO. OF ENGINES OPERATING: 4

IF YOU ARE AT 25000′			FUEL POUNDS	IF YOU ARE AT 30000′			IF YOU ARE AT 35000′			IF YOU ARE AT 40000′			FUEL POUNDS	IF YOU ARE AT 45000′		
RANGE IN AIRMILES				RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES				RANGE IN AIRMILES		
BY CRUISING AT 25000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 30000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 35000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 40000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 45000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
1540	35	1700	28,000	1670	35	1730	1770	--	---				28,000			
1320	35	1430	24,000	1430	35	1470	1510	--	---				24,000			
1100	35	1170	20,000	1180	35	1210	1250	--	---				20,000			
870	35	910	16,000	930	35	940	990	--	---				16,000			
650	30	660	12,000	690	--	---	730	--	---				12,000			
430	--	---	8000	460	--	---	490	--	---				8000			
220	--	---	4000	240	--	---	260	--	---				4000			

CRUISING AT 25000′						EFFECTIVE WIND	CRUISING AT 30000′						CRUISING AT 35000′						CRUISING AT 40000′						EFFECTIVE WIND	CRUISING AT 45000′					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.
340	88	9900	370	.70	45	120 HW	315	89	9100	370	.75	55	290	92	8700	375	.75	65							120 HW						
330	87	9300	395	.80	55	80 HW	305	88	8700	400	.85	65	290	92	8700	415	.80	75							80 HW						
330	87	9300	435	.90	60	40 HW	305	88	8700	440	.90	75	285	91	8400	445	.90	90							40 HW						
315	86	8700	460	1.0	70	0	305	88	8700	480	1.0	85	285	91	8400	485	1.0	100							0						
315	88	8700	500	1.10	80	40 TW	295	87	8100	500	1.10	95	285	91	8400	525	1.10	110							40 TW						
315	86	8700	540	1.20	85	80 TW	295	87	8100	540	1.20	105	275	90	8000	555	1.20	125							80 TW						
300	85	8200	555	1.30	95	120 TW	295	87	8100	580	1.30	115	275	90	8000	595	1.25	135							120 TW						

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.

EXAMPLE

If you are at 10,000 feet with 24,000 pounds of available fuel, you can fly 960 statute airmiles by holding 325 mph CAS. However, you can fly 1340 statute airmiles by immediately climbing to 35,000 feet using 100% RPM. At 35,000 feet cruise at 285 mph CAS and start let down 100 statute miles from home. With an 80 mph headwind the range at 35,000 feet would be .8 x 1340 or 1070 statute miles. Cruise at 290 mph CAS with this wind and start let down 75 statute miles from destination.

LEGEND

EFFECTIVE WIND - HW, Headwind - TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Airmiles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles

DATA AS OF: 11/1/49 BASED ON: ESTIMATED DATA

BASED ON ANY FUEL LISTED IN NOTE 4
RED FIGURES HAVE NOT BEEN FLIGHT CHECKED:

147-93-782

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-28 (Sheet 2 of 2 Sheets). B-45A-5 and B-45C Flight Operation Instruction Chart, Four-engine Operation—75,000 Pounds to 65,000 Pounds

MCRE Form No. 239C Sheet 1 of 2 (Rev. 1 Jan. 4)

AIRPLANE MODEL(S)

B-45A-5 & B-45C

ENGINE(S) J47 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 65,000 OR LESS POUNDS

EXTERNAL LOAD ITEMS

NONE

NUMBER OF ENGINES OPERATING: FOUR

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. °C	OIL PRESS PSI	OIL TEMP °C	FUEL PRESS PSI
MILITARY	30	100	690	60	70	600
MAX CONT	--	93	625	60	70	600

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated

DATA AS OF 11/1/48 BASED ON ESTIMATED DATA

LOW ALTITUDE

147-93-780

IF YOU ARE AT S. L.			FUEL	IF YOU ARE AT 5000′			IF YOU ARE AT 10000′			IF YOU ARE AT 15000′			FUEL	IF YOU ARE AT 20000′		
RANGE IN AIRMILES				RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES				RANGE IN AIRMILES		
BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	POUNDS	BY CRUISING AT 5000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 10000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 15000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	POUNDS	BY CRUISING AT 20000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
500	35	830	16,000	570	35	870	650	35	900	740	35	930	16,000	850	35	970
370	35	570	12,000	430	35	610	490	35	640	550	35	670	12,000	620	35	710
250	25	330	8000	280	25	360	330	30	390	370	30	420	8000	410	30	450
120	10	130	4000	140	15	150	160	15	170	190	---	---	4000	210	---	---

CRUISING AT S. L.						EFFEC-TIVE WIND	CRUISING AT 5000′						CRUISING AT 10000′						CRUISING AT 15000′						EFFEC-TIVE WIND	CRUISING AT 20000′					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C. A. S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C. A. S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C. A. S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C. A. S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C. A. S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.
						120 HW																			120 HW	355	86	10,100	355	.70	35
						80 HW							360	83	10,800	335	.75	20	350	84	10,000	335	.80	30	80 HW	345	85	9400	380	.80	40
355	79	11,600	315	.85	0	40 HW	345	80	10,600	330	.85	10	335	81	9700	345	.90	20	325	82	9000	365	.90	35	40 HW	330	84	8900	405	.90	50
330	77	10,500	330	1.0	0	0	320	.8	9600	345	1.0	10	325	80	9200	370	1.0	25	315	81	8500	390	1.0	40	0	315	83	8400	425	1.0	55
310	75	9600	350	1.15	0	40 TW	295	76	8800	360	1.15	10	295	78	8400	385	1.15	30	300	80	8100	410	1.10	45	40 TW	300	82	7800	445	1.10	60
						80 TW							285	77	8000	410	1.25	30	300	80	8100	450	1.25	50	80 TW	300	82	7800	485	1.20	70
						120 TW																			120 TW	285	81	7400	505	1.35	75

Figure A-29. (Sheet 1 of 2 Sheets). B-45A-5 and B-45C Flight Operation Instruction Chart, Four-engine Operation—65,000 Pounds or Less

HIGH ALTITUDE

AIRPLANE MOD. B-45A-5 & B-45C ENG. J47 SERIES CHART WT. LIMITS 65,000 OR LESS LB. EXT. LOAD NONE NO. OF ENGINES OPERATING: 4

IF YOU ARE AT 25000′ RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 30000′ RANGE IN AIRMILES			IF YOU ARE AT 35000′ RANGE IN AIRMILES			IF YOU ARE AT 40000′ RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 45000′ RANGE IN AIRMILES		
BY CRUISING AT 25000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 30000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 35000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 40000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 45000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
910	35	990	16,000	1000	35	1030	1060	--	---	1110	--	---	16,000			
680	35	740	12,000	750	35	770	800	--	---	840	--	---	12,000			
460	35	470	8000	500	35	510	540	--	---	570	--	---	8000			
230	--	---	4000	260	--	---	280	--	---	300	--	---	4000			

CRUISING AT 25000′						EFFECTIVE WIND	CRUISING AT 30000′						CRUISING AT 35000′						CRUISING AT 40000′						EFFECTIVE WIND	CRUISING AT 45000′					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.
330	86	8800	355	.70	45	120 HW	310	87	8200	365	.70	55	285	89	7700	370	.75	65	255	93	7300	370	.75	80	120 HW						
315	85	8200	380	.80	55	80 HW	300	86	7700	390	.80	65	280	88	7400	400	.85	75	255	93	7300	410	.85	95	80 HW						
315	85	8200	420	.90	60	40 HW	300	86	7700	430	.90	75	280	88	7400	440	.90	90	255	93	7300	450	.90	105	40 HW						
315	85	8200	460	1.0	70	0	300	86	7700	470	1.0	85	280	88	7400	480	1.0	100	255	93	7300	490	1.0	120	0						
300	84	7700	480	1.1	80	40 TW	285	85	7200	490	1.1	95	270	87	7000	505	1.1	110	255	93	7300	530	1.10	135	40 TW						
300	84	7700	520	1.2	85	80 TW	285	85	7200	530	1.2	105	270	87	7000	545	1.2	125	255	93	7300	570	1.15	145	80 TW						
300	84	7700	560	1.3	95	120 TW	285	85	7200	570	1.3	115	270	87	7000	585	1.3	135	255	93	7300	610	1.25	160	120 TW						

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.

EXAMPLE

If you are at 10,000 feet with 16,000 pounds of available fuel, you can fly 650 statute airmiles by holding 325 mph CAS. However, you can fly 900 statute airmiles by immediately climbing to 35,000 feet using 100% RPM. At 35,000 feet cruise at 280 mph CAS and start let down 100 statute miles from home. With an 80 mph headwind the range at 35,000 feet would be .85 x 900 or 760 statute miles. Cruise at 280 mph CAS with this wind and start let down 75 statute miles from destination.

LEGEND

EFFECTIVE WIND - HW, Headwind - TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Airmiles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles

DATA AS OF: 11/1/49 BASED ON: ESTIMATED DATA

BASED ON ANY FUEL LISTED IN NOTE 4
RED FIGURES HAVE NOT BEEN FLIGHT CHECKED:

/17-93-781

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-29 (Sheet 2 of 2 Sheets). B-45A-5 and B-45C Flight Operation Instruction Chart, Four-engine Operation—65,000 Pounds or Less

MCRE Form No. 239C Sheet 1 of 2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S)
B-45A-5 & B-45C
ENGINE(S) J47 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 91,000 TO 75,000 POUNDS

EXTERNAL LOAD ITEMS
NONE
NUMBER OF ENGINES OPERATING: THREE

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. °C	OIL PRESS PSI	OIL TEMP °C	FUEL PRESS PSI
MILITARY	30	100	690	60	70	600
MAX CONT	--	93	625	60	70	600

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated

DATA AS OF 11/11/49 BASED ON ESTIMATED DATA

LOW ALTITUDE

IF YOU ARE AT S. L.			FUEL POUNDS	IF YOU ARE AT 5000'			IF YOU ARE AT 10000'			IF YOU ARE AT 15000'			FUEL POUNDS	IF YOU ARE AT 20000'		
RANGE IN AIRMILES				RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES				RANGE IN AIRMILES		
BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 5000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 10000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 15000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 20000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
(1190)	15	(1390)	39,000	(1290)	15	(1440)	(1390)	15	(1480)	(1510)	15	(1530)	39,000	(1610)	---	---
1090	15	1250	36,000	1180	15	1300	(1270)	15	(1340)	(1380)	15	(1390)	36,000	(1470)	---	---
960	15	1070	32,000	1030	15	1110	1110	15	1160	1210	---	---	32,000	1290	---	---
820	15	890	28,000	880	15	940	950	15	980	1040	---	---	28,000	1100	---	---
690	15	730	24,000	740	15	780	800	15	820	870	---	---	24,000	930	---	---
570	10	580	20,000	610	15	620	660	15	670	720	---	---	20,000	760	---	---

CRUISING AT S. L.						EFFEC. TIVE WIND	CRUISING AT 5000'						CRUISING AT 10000'						CRUISING AT 15000'						EFFEC. TIVE WIND	CRUISING AT 20000'					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.
						120 HW																			120 HW	295	93	11,000	280	.7	35
						80 HW							360	92	13,300	335	.8	20	345	93	12,600	345	.8	30	80 HW	295	93	11,000	320	.8	40
350	87	12,800	310	.85	0	40 HW	365	90	13,500	350	.9	10	345	91	12,600	360	.9	20	345	93	12,600	385	.9	35	40 HW	295	93	11,000	360	.9	50
335	86	12,100	335	1.0	0	0	350	89	12,600	375	1.0	10	345	91	12,600	400	1.0	25	325	92	11,800	405	1.0	40	0	295	93	11,000	400	1.0	55
320	85	11,400	360	1.15	0	40 TW	335	88	11,900	400	1.15	10	330	90	11,900	425	1.1	30	325	92	11,800	445	1.1	45	40 TW	295	93	11,000	440	1.1	60
						80 TW							330	90	11,900	465	1.25	30	325	92	11,800	485	1.2	50	80 TW	295	93	11,000	480	1.2	70
						120 TW																			120 TW	295	93	11,000	520	1.3	75

SPECIAL NOTES

1. Climb at 100% RPM
2. All distances and speeds are statute units
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.
6. Multiply 5800 gallons by factor in note 4 to obtain maximum available fuel in pounds

EXAMPLE

If you are at 5000 feet with 36,000 pounds of available fuel, you can fly 1180 statute airmiles by holding 350 mph CAS. However, you can fly 1300 statute airmiles by immediately climbing to 15,000 feet using 100% RPM. At 15,000 feet cruise at 325 mph CAS and start let down 40 statute miles from home. With an 80 mph headwind the range at 15,000 feet would be .8 x 1300 or 1040 statute miles. Cruise at 345 mph CAS with this wind and start let down 30 statute miles from destination

LEGEND

EFFECTIVE WIND - HW, Headwind - TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Airmiles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles
( ) - Range in Parenthesis Available Only After Dropping External Tanks

DATA AS OF: 11/11/49 BASED ON: ESTIMATED DATA

BASED ON ANY FUEL LISTED IN NOTE 4
RED FIGURES HAVE NOT BEEN FLIGHT CHECKED

147-93-771

MCRE Form No. 239C Sheet 2 of 2 (Rev. 1 Jan. 49)

Figure A-30. B-45A-5 and B-45C Flight Operation Instruction Chart, Three-engine Operation—91,000 Pounds to 75,000 Pounds

MCRE Form No. 239C Sheet 1 of 2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S)

B-45A-5 & B-45C

ENGINE(S) J47 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 75,000 TO 65,000 POUNDS

EXTERNAL LOAD ITEMS

NONE

NUMBER OF ENGINES OPERATING: THREE

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. °C	OIL PRESS PSI	OIL TEMP °C	FUEL PRESS PSI
MILITARY	30	100	690	60	70	600
MAX CONT	--	93	625	60	70	600

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING.

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/11/49 BASED ON ESTIMATED DATA

LOW ALTITUDE

147-93-779

IF YOU ARE AT S. L. RANGE IN AIRMILES: BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 5000′ RANGE IN AIRMILES: BY CRUISING AT 5000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	IF YOU ARE AT 10000′ RANGE IN AIRMILES: BY CRUISING AT 10000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	IF YOU ARE AT 15000′ RANGE IN AIRMILES: BY CRUISING AT 15000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 20000′ RANGE IN AIRMILES: BY CRUISING AT 20000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
920	20	1090	28,000	990	20	1130	1080	20	1170	1170	20	1210	28,000	1260	--	---
780	20	900	24,000	850	20	950	920	20	990	1000	20	1030	24,000	1080	--	---
650	20	720	20,000	700	20	760	760	20	800	830	20	840	20,000	890	--	---
510	15	550	16,000	550	15	580	600	15	620	660	--	---	16,000	700	--	---
380	--	---	12,000	410	--	---	440	15	450	480	--	---	12,000	520	--	---
250	--	---	8000	270	--	---	290	--	---	320	--	---	8000	350	--	---
120	--	---	4000	130	--	---	150	--	---	170	--	---	4000	180	--	---

CRUISING AT S. L. C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFECTIVE WIND	CRUISING AT 5000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 10000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 15000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFECTIVE WIND	CRUISING AT 20000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.
						120 HW																			120 HW	330	93	11,100	325	.7	35
						80 HW							340	89	11,300	310	.75	20	340	91	11,200	340	.8	30	80 HW	330	93	11,100	365	.8	40
330	84	10,900	290	.85	0	40 HW	315	85	10,200	300	.85	10	330	88	10,700	340	.9	20	325	90	10,600	365	.9	35	40 HW	320	92	10,500	385	.9	50
305	82	9800	305	1.0	0	0	305	84	9700	325	1.0	10	315	87	10,100	365	1.0	25	310	89	9900	390	1.0	40	0	305	91	9900	410	1.0	55
290	81	9300	330	1.15	0	40 TW	290	83	9100	350	1.15	10	300	86	9500	385	1.15	30	300	88	9400	410	1.15	45	40 TW	305	91	9900	450	1.1	60
						80 TW							285	85	8900	410	1.25	30	300	88	9400	450	1.25	50	80 TW	290	90	9300	470	1.2	70
						120 TW																			120 TW	290	90	9300	510	1.3	75

Figure A-31 (Sheet 1 of 2 Sheets). B-45A-5 and B-45C Flight Operation Instruction Chart, Three-engine Operation—75,000 Pounds to 65,000 Pounds

HIGH ALTITUDE

AIRPLANE MOD. B-45A-5 & B-45C ENG. J47 SERIES CHART WT. LIMITS 75,000 TO 65,000 LB. EXT. LOAD NONE NO. OF ENGINES OPERATING: 3

IF YOU ARE AT 25000′ RANGE IN AIRMILES: BY CRUISING AT 25000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 30000′ RANGE IN AIRMILES: BY CRUISING AT 30000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	IF YOU ARE AT 35000′ RANGE IN AIRMILES: BY CRUISING AT 35000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	IF YOU ARE AT 40000′ RANGE IN AIRMILES: BY CRUISING AT 40000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 45000′ RANGE IN AIRMILES: BY CRUISING AT 45000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
1340	--	---	28,000													
1140	--	---	24,000													
950	--	---	20,000													
750	--	---	16,000													
560	--	---	12,000													
380	--	---	8000													
200	--	---	4000													

CRUISING AT 25000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFECTIVE WIND	CRUISING AT 30000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 35000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 40000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFECTIVE WIND	CRUISING AT 45000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.
290	93	9500	300	.7	45	120 HW																			120 HW						
290	93	9500	340	.8	55	80 HW																			80 HW						
290	93	9500	380	.9	60	40 HW																			40 HW						
290	93	9500	420	1.0	70	0																			0						
290	93	9500	460	1.1	80	40 TW																			40 TW						
290	93	9500	500	1.2	85	80 TW																			80 TW						
290	93	9500	540	1.3	95	120 TW																			120 TW						

SPECIAL NOTES

1. Climb at 100% RPM
2. All distances and speeds are statute units
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds

EXAMPLE

If you are at 5000 feet with 24,000 pounds of available fuel, you can fly 850 statute airmiles by holding 305 mph CAS. However, you can fly 950 statute airmiles by immediately climbing to 20,000 feet using 100% RPM. At 20,000 feet cruise at 305 mph CAS and start let down 55 statute miles from home. With an 80 mph headwind the range at 20,000 feet would be .8 x 950 or 760 statute miles. Cruise at 330 mph CAS with this wind and start let down 40 statute miles from destination

LEGEND

EFFECTIVE WIND - HW, Headwind - TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Airmiles for Corresponding Winds
G. S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles

DATA AS OF: 11/11/49 BASED ON: ESTIMATED DATA

BASED ON ANY FUEL LISTED IN NOTE 4
RED FIGURES HAVE NOT BEEN FLIGHT CHECKED

/47-93-774

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-31 (Sheet 2 of 2 Sheets). B-45A-5 and B-45C Flight Operation Instruction Chart, Three-engine Operation—75,000 Pounds to 65,000 Pounds

MCRE Form No. 239C Sheet 1of2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S)

B-45A-5 AND B-45C

ENGINE(S) J47 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 65,000 OR LESS POUNDS

EXTERNAL LOAD ITEMS

NONE

NUMBER OF ENGINES OPERATING: THREE

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. °C	OIL PRESS PSI	OIL TEMP °C	FUEL PRESS PSI
MILITARY	30	100	690	60	70	600
MAX CONT	--	93	625	60	70	600

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING.

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/11/49 BASED ON ESTIMATED DATA

LOW ALTITUDE

147-93-768

IF YOU ARE AT S. L. RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 5000′ RANGE IN AIRMILES			IF YOU ARE AT 10000′ RANGE IN AIRMILES			IF YOU ARE AT 15000′ RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 20000′ RANGE IN AIRMILES		
BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 5000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 10000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 15000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 20000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
540	20	600	16,000	580	20	640	640	20	680	700	20	710	16,000	750	--	---
400	15	420	12,000	440	15	460	480	15	490	520	20	530	12,000	570	--	---
270	--	---	8000	290	--	---	320	--	---	360	--	---	8000	380	--	---
130	--	---	4000	140	--	---	160	--	---	180	--	---	4000	200	--	---

CRUISING AT S. L.						EFFEC-TIVE WIND	CRUISING AT 5000′						CRUISING AT 10000′						CRUISING AT 15000′						EFFEC-TIVE WIND	CRUISING AT 20000′					
C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.
						120 HW																			120 HW	320	91	9900	310	.7	35
						80 HW							325	87	10,100	295	.75	20	315	88	9500	310	.75	30	80 HW	310	90	9300	335	.8	40
305	81	9300	265	.85	0	40 HW	305	83	9200	285	.85	10	300	85	9000	310	.85	20	300	87	8900	335	.9	35	40 HW	295	89	8800	360	.9	50
280	79	8400	280	1.0	0	0	280	81	8300	300	1.0	10	290	84	8500	335	1.0	25	285	86	8300	355	1.0	40	0	285	88	8300	385	1.0	55
270	78	8000	310	1.15	0	40 TW	270	80	7800	330	1.15	10	275	83	8000	360	1.15	30	275	85	7800	380	1.15	45	40 TW	285	88	8300	425	1.1	60
						80 TW							275	83	8000	400	1.25	30	275	85	7800	420	1.25	50	80 TW	270	87	7800	445	1.25	70
						120 TW																			120 TW	270	87	7800	485	1.35	75

Figure A-32 (Sheet 1 of 2 Sheets). B-45A-5 and B-45C Flight Operation Instruction Chart, Three-engine Operation—65,000 Pounds or Less

HIGH ALTITUDE

AIRPLANE MOD. B-45A-5 & C ENG. J47 SERIES CHART WT. LIMITS 65,000 OR LESS LB. EXT. LOAD NONE NO. OF ENGINES OPERATING: 3

IF YOU ARE AT 25000′			FUEL POUNDS	IF YOU ARE AT 30000′			IF YOU ARE AT 35000′			IF YOU ARE AT 40000′			FUEL POUNDS	IF YOU ARE AT 45000′		
RANGE IN AIRMILES				RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES				RANGE IN AIRMILES		
BY CRUISING AT 25000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 30000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 35000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 40000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 45000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
800	--	---	16,000	860	--	---										
600	--	---	12,000	650	--	---										
410	--	---	8000	440	--	---										
210	--	---	4000	230	--	---										

CRUISING AT 25000′						EFFECTIVE WIND	CRUISING AT 30000′						CRUISING AT 35000′						CRUISING AT 40000′						EFFECTIVE WIND	CRUISING AT 45000′					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.
305	93	9400	325	.7	45	120 HW	270	93	8100	305	.7	55													120 HW						
305	93	9400	365	.8	55	80 HW	270	93	8100	345	.8	65													80 HW						
295	92	9000	390	.9	60	40 HW	270	93	8100	385	.9	75													40 HW						
285	91	8600	415	1.0	70	0	270	93	8100	425	1.0	85													0						
285	91	8600	455	1.1	80	40 TW	270	93	8100	465	1.1	95													40 TW						
275	90	8100	480	1.2	85	80 TW	270	93	8100	505	1.2	105													80 TW						
275	90	8100	520	1.3	95	120 TW	270	93	8100	545	1.3	115													120 TW						

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.

EXAMPLE

If you are at 5000 feet with 16,000 pounds of available fuel, you can fly 580 statute airmiles by holding 280 mph CAS. However, you can fly 640 statute airmiles by immediately climbing to 20,000 feet using 100% RPM. At 20,000 feet cruise at 285 mph CAS and start let down 55 statute miles from home. With an 80 mph headwind the range at 20,000 feet would be .8 x 640 or 510 statute miles. Cruise at 310 mph CAS with this wind and start let down 40 statute miles from destination.

LEGEND

EFFECTIVE WIND - HW, Headwind - TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Airmiles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles

DATA AS OF: 11/11/49 BASED ON: ESTIMATED DATA

BASED ON ANY FUEL LISTED IN NOTE 4
RED FIGURES HAVE NOT BEEN FLIGHT CHECKED.

147-93-769

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-32 (Sheet 2 of 2 Sheets). B-45A-5 and B-45C Flight Operation Instruction Chart, Three-engine Operation—65,000 Pounds or Less

MCRE Form No. 239C Sheet 1 of 2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S) B-45C

ENGINE(S) J47 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 112,000 TO 95,000 POUNDS

EXTERNAL LOAD ITEMS

TWO 1250 GALLON TIP TANKS

NUMBER OF ENGINES OPERATING: FOUR

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. °C	OIL PRESS PSI	OIL TEMP °C	FUEL PRESS PSI
MILITARY	30	100	690	60	70	600
MAX CONT	--	93	625	60	70	600

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/1/49 BASED ON ESTIMATED DATA

LOW ALTITUDE

147-93-759

(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)

IF YOU ARE AT S. L. RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 5000′ RANGE IN AIRMILES			IF YOU ARE AT 10000′ RANGE IN AIRMILES			IF YOU ARE AT 15000′ RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 20000′ RANGE IN AIRMILES		
BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 5000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 10000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 15000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 20000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(1560)	25	(2400)	56,000	(1730)	25	(2450)	---	---	---	---	---	---	56,000	---	---	---
1430	25	2150	52,000	1590	25	2200	(1760)	25	(2230)	(1930)	25	(2260)	52,000	---	---	---
1310	25	1910	48,000	1450	25	1960	1600	25	1980	1760	25	2010	48,000	(1900)	25	(2050)
1190	25	1710	44,000	1320	25	1760	1450	25	1780	1600	25	1810	44,000	1730	25	1850
1070	25	1510	40,000	1190	25	1560	1310	25	1580	1430	25	1610	40,000	1550	25	1640
960	25	1300	36,000	1060	25	1350	1160	25	1380	1270	25	1410	36,000	1370	25	1440

CRUISING AT S. L. APPROXIMATE						EFFECTIVE WIND	CRUISING AT 5000′ APPROXIMATE						CRUISING AT 10000′ APPROXIMATE						CRUISING AT 15000′ APPROXIMATE						EFFECTIVE WIND	CRUISING AT 20000′ APPROXIMATE					
C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.
						120 HW																			120 HW	380	93	14,900	385	.75	35
						80 HW							415	90	16,100	395	.80	20	395	91	15,200	410	.80	30	80 HW	380	93	14,900	425	.80	40
410	86	16,300	370	.90	0	40 HW	415	88	16,200	400	.90	10	400	89	15,200	420	.90	20	380	90	14,300	430	.90	35	40 HW	370	92	14,100	455	.90	50
390	85	15,400	390	1.0	0	0	395	87	15,300	425	1.0	10	400	89	15,200	460	1.0	25	380	90	14,300	470	1.0	40	0	370	92	14,100	495	1.0	55
375	84	14,600	415	1.1	0	40 TW	380	86	14,500	445	1.1	10	385	88	14,400	480	1.1	30	365	89	13,400	490	1.1	45	40 TW	355	91	13,400	515	1.1	60
						80 TW							365	87	13,500	500	1.2	30	365	89	13,400	530	1.2	50	80 TW	355	91	13,400	555	1.2	70
						120 TW																			120 TW	355	91	13,400	595	1.25	75

Figure A-33 (Sheet 1 of 2 Sheets). B-45C With Tip Tanks—Flight Operation Instruction Chart, Four-engine Operation—112,000 Pounds to 95,000 Pounds

HIGH ALTITUDE

AIRPLANE MOD. B-45C ENG. J47 SERIES CHART WT. LIMITS 112,000 TO 95,000 LB. EXT. LOAD TWO 1250 GALLON TIP TANKS NO. OF ENGINES OPERATING: 4

IF YOU ARE AT 25000′			FUEL POUNDS	IF YOU ARE AT 30000′			IF YOU ARE AT 35000′			IF YOU ARE AT 40000′			FUEL POUNDS	IF YOU ARE AT 45000′		
RANGE IN AIRMILES				RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES				RANGE IN AIRMILES		
BY CRUISING AT 25000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 30000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 35000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 40000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 45000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
---	--	---	56,000													
---	--	---	52,000													
---	--	---	48,000													
(1860)	25	(1880)	44,000													
1670	25	1680	40,000													
1470	25	1480	36,000													

CRUISING AT 25000′						EFFECTIVE WIND	CRUISING AT 30000′						CRUISING AT 35000′						CRUISING AT 40000′						EFFECTIVE WIND	CRUISING AT 45000′					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.
330	93	12,700	355	.75	45	120 HW																			120 HW						
330	93	12,700	395	.85	55	80 HW																			80 HW						
330	93	12,700	435	.90	60	40 HW																			40 HW						
330	93	12,700	475	1.0	70	0																			0						
330	93	12,700	515	1.1	80	40 TW																			40 TW						
330	93	12,700	555	1.15	85	80 TW																			80 TW						
330	93	12,700	595	1.25	95	120 TW																			120 TW						

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.
6. Multiply 8300 (full tip tanks and full bomb bay) or 5900 (full tip tanks and empty bomb bay) gallons by factor in note 4 to obtain maximum available fuel in pounds.

EXAMPLE

If you are at 10,000 feet with 48,000 pounds of available fuel, you can fly 1600 statute airmiles by holding 400 mph CAS. However, you can fly 1980 statute airmiles by immediately climbing to 25,000 feet using 100% RPM. At 25,000 feet cruise at 330 mph CAS and start let down 70 statute miles from home. With an 80 mph headwind the range at 25,000 feet would be .85 x 1980 or 1680 statute miles. Cruise at 330 mph CAS with this wind and start let down 55 statute miles from destination.

LEGEND

EFFECTIVE WIND - HW, Headwind - TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Airmiles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles
( ) - Range in Parenthesis for Interpolation Purposes Only

DATA AS OF 11/1/49 BASED ON: ESTIMATED DATA

BASED ON ANY FUEL LISTED IN NOTE 4
RED FIGURES HAVE NOT BEEN FLIGHT CHECKED.

147-93-761

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-33 (Sheet 2 of 2 Sheets). B-45C With Tip Tanks—Flight Operation Instruction Chart, Four-engine Operation—112,000 Pounds to 95,000 Pounds

MCRE Form No. 239C Sheet 1 of 2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S) B-45C

ENGINE(S) J47 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 95,000 TO 80,000 POUNDS

EXTERNAL LOAD ITEMS

TWO 1250 GALLON TIP TANKS

NUMBER OF ENGINES OPERATING: FOUR

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. °C	OIL PRESS PSI	OIL TEMP °C	FUEL PRESS PSI
MILITARY	30	100	690	60	70	600
MAX CONT	--	93	625	60	70	600

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING.

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/1/49 BASED ON ESTIMATED DATA

LOW ALTITUDE

147-93-758

IF YOU ARE AT S. L. RANGE IN AIRMILES: BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 5000′ RANGE IN AIRMILES: BY CRUISING AT 5000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	IF YOU ARE AT 10000′ RANGE IN AIRMILES: BY CRUISING AT 10000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	IF YOU ARE AT 15000′ RANGE IN AIRMILES: BY CRUISING AT 15000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 20000′ RANGE IN AIRMILES: BY CRUISING AT 20000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
1160	30	1830	40,000	1290	30	1870	1440	30	1910	1600	30	1940	40,000	1750	30	1970
1030	30	1580	36,000	1150	30	1620	1280	30	1660	1420	30	1690	36,000	1550	30	1720
910	30	1340	32,000	1010	30	1370	1130	30	1410	1250	30	1440	32,000	1360	30	1470
790	30	1130	28,000	880	30	1160	980	30	1200	980	30	1230	28,000	1180	30	1260
670	30	920	24,000	740	30	960	830	30	1000	820	30	1030	24,000	1000	30	1060
550	25	730	20,000	610	25	760	680	25	800	660	30	830	20,000	820	30	860

CRUISING AT S. L. C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G. S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFECTIVE WIND	CRUISING AT 5000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G. S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 10000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G. S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 15000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G. S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFECTIVE WIND	CRUISING AT 20000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G. S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.
						120 HW																			120 HW	365	90	12,700	365	.75	35
						80 HW							400	88	14,400	380	.80	20	385	89	13,500	395	.80	30	80 HW	365	90	12,700	405	.80	40
375	83	14,000	335	.90	0	40 HW	380	85	13,700	365	.90	10	385	87	13,600	400	.90	20	370	88	12,700	415	.90	35	40 HW	350	89	11,900	430	.90	50
360	82	13,200	360	1.0	0	0	365	84	12,900	390	1.0	10	370	86	12,800	425	1.0	25	355	87	11,900	440	1.0	40	0	350	89	11,900	470	1.0	55
350	81	12,600	390	1.15	0	40 TW	350	83	12,300	415	1.1	10	350	85	12,100	445	1.10	30	355	87	11,900	480	1.1	45	40 TW	335	88	11,300	490	1.1	60
						80 TW							335	84	11,400	465	1.25	30	335	86	11,300	500	1.2	50	80 TW	335	88	11,300	530	1.2	70
						120 TW																			120 TW	335	88	11,300	570	1.3	75

Figure A-34 (Sheet 1 of 2 Sheets). B-45C With Tip Tanks—Flight Operation Instruction Chart, Four-engine Operation—95,000 Pounds to 80,000 Pounds

HIGH ALTITUDE

AIRPLANE MOD. B-45C ENG. J47 SERIES CHART WT. LIMITS 95,000 TO 80,000 LB. EXT. LOAD TWO 1250 GALLON TIP TANKS NO. OF ENGINES OPERATING: 4

IF YOU ARE AT 25000′			FUEL POUNDS	IF YOU ARE AT 30000′			IF YOU ARE AT 35000′			IF YOU ARE AT 40000′			FUEL POUNDS	IF YOU ARE AT 45000′		
RANGE IN AIRMILES				RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES				RANGE IN AIRMILES		
BY CRUISING AT 25000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 30000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 35000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 40000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 45000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
1900	30	2010	40,000	2030	30	2050										
1680	30	1760	36,000	1790	30	1800										
1470	30	1510	32,000	1550	---	---										
1270	30	1300	28,000	1340	---	---										
1080	30	1100	24,000	1140	---	---										
890	30	900	20,000	940	---	---										

CRUISING AT 25000′						EFFEC-TIVE WIND	CRUISING AT 30000′						CRUISING AT 35000′						CRUISING AT 40000′						EFFEC-TIVE WIND	CRUISING AT 45000′					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.
345	92	12,200	380	.75	45	120 HW	310	93	10,900	360	.75	55													120 HW						
335	91	11,500	405	.85	55	80 HW	310	93	10,900	400	.85	65													80 HW						
335	91	11,500	445	.90	60	40 HW	310	93	10,900	440	.90	75													40 HW						
335	91	11,500	485	1.0	70	0	310	93	10,900	480	1.0	85													0						
335	91	11,500	525	1.10	80	40 TW	310	93	10,900	520	1.10	95													40 TW						
335	91	11,500	565	1.15	85	80 TW	310	93	10,900	560	1.15	105													80 TW						
325	90	10,900	585	1.25	95	120 TW	310	93	10,900	600	1.25	115													120 TW						

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.

EXAMPLE

If you are at 10,000 feet with 36,000 pounds of available fuel, you can fly 1280 statute airmiles by holding 370 mph CAS. However, you can fly 1660 statute airmiles by immediately climbing to 30,000 feet using 100% RPM. At 30,000 feet cruise at 310 mph CAS and start let down 85 statute miles from home. With an 80 mph headwind the range at 30,000 feet would be .85 x 1660 or 1410 statute miles. Cruise at 310 mph CAS with this wind and start let down 65 statute miles from destination

LEGEND

EFFECTIVE WIND - HW, Headwind - TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Airmiles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds per Hour
RANGE - Statute Miles

DATA AS OF: 11/1/49 BASED ON: ESTIMATED DATA

BASED ON ANY FUEL LISTED IN NOTE 4
RED FIGURES HAVE NOT BEEN FLIGHT CHECKED

147-93-760

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-34 Sheet 2 of 2 Sheets). B-45C With Tip Tanks—Flight Operation Instruction Chart, Four-engine Operation—95,000 Pounds to 80,000 Pounds

MCRE Form No. 239C Sheet 1of2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S)

B-45C

ENGINE(S) J47 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 80,000 TO 65,000 POUNDS

EXTERNAL LOAD ITEMS

TWO 1250 GALLON TIP TANKS

NUMBER OF ENGINES OPERATING: FOUR

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. °C	OIL PRESS PSI	OIL TEMP °C	FUEL PRESS PSI
MILITARY	30	100	690	60	70	600
MAX CONT	--	93	625	60	70	600

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING.

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/1/49 BASED ON ESTIMATED DATA

LOW ALTITUDE

147-93-764

IF YOU ARE AT S. L. RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 5000′ RANGE IN AIRMILES			IF YOU ARE AT 10000′ RANGE IN AIRMILES			IF YOU ARE AT 15000′ RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 20000′ RANGE IN AIRMILES		
BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 5000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 10000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 15000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 20000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
960	30	1610	32,000	1080	35	1650	1220	35	1690	1350	35	1720	32,000	1500	35	1750
840	30	1370	28,000	940	35	1400	1060	35	1440	1180	35	1470	28,000	1310	35	1500
710	30	1120	24,000	800	35	1150	900	35	1190	1000	35	1230	24,000	1110	35	1260
590	30	880	20,000	660	30	910	740	30	950	830	30	980	20,000	910	30	1010
470	30	640	16,000	520	30	670	590	30	720	650	30	740	16,000	720	30	770
350	25	450	12,000	390	25	480	440	30	510	490	30	540	12,000	540	30	570
230	20	260	8000	260	20	290	300	25	320	330	25	350	8000	370	--	---
110	--	---	4000	130	--	---	150	--	---	170	--	---	4000	190	--	---

CRUISING AT S. L.						EFFEC-TIVE WIND	CRUISING AT 5000′						CRUISING AT 10000′						CRUISING AT 15000′						EFFEC-TIVE WIND	CRUISING AT 20000′					
C.A.S.	APPROXIMATE % RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	APPROXIMATE % RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	APPROXIMATE % RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	APPROXIMATE % RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	APPROXIMATE % RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.
						120 HW																			120 HW	355	88	11,200	355	.70	35
						80 HW							365	85	12,000	340	.80	20	370	87	11,900	375	.80	30	80 HW	355	88	11,200	395	.80	40
360	81	12,600	320	.85	0	40 HW	365	83	12,400	350	.85	10	350	84	11,300	365	.90	20	355	86	11,200	400	.90	35	40 HW	345	87	10,600	420	.90	50
335	79	11,400	335	1.0	0	0	340	81	11,100	360	1.0	10	340	83	10,700	390	1.0	25	340	85	10,600	425	1.0	40	0	330	86	10,000	440	1.0	55
310	77	10,400	350	1.15	0	40 TW	325	80	10,600	385	1.15	10	325	82	10,100	410	1.10	30	325	84	10,000	445	1.1	45	40 TW	330	86	10,000	480	1.1	60
						80 TW							310	81	9600	435	1.25	30	325	84	10,000	485	1.2	50	80 TW	330	86	10,000	520	1.2	70
						120 TW																			120 TW	310	85	9400	535	1.3	75

Figure A-35 (Sheet 1 of 2 Sheets). B-45C With Tip Tanks—Flight Operation Instruction Chart, Four-engine Operation—80,000 Pounds to 65,000 Pounds

HIGH ALTITUDE

AIRPLANE MOD. B-45C ENG. J47 SERIES CHART WT. LIMITS 80,000 TO 65,000 LB. EXT. LOAD TWO 1250 GALLON TIP TANKS NO. OF ENGINES OPERATING: 4

IF YOU ARE AT 25000′ RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 30000′ RANGE IN AIRMILES			IF YOU ARE AT 35000′ RANGE IN AIRMILES			IF YOU ARE AT 40000′ RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 45000′ RANGE IN AIRMILES		
BY CRUISING AT 25000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 30000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 35000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 40000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 45000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
1650	35	1790	32,000	1780	35	1820	1870	--	---				32,000			
1430	35	1540	28,000	1540	35	1570	1620	--	---				28,000			
1220	35	1290	24,000	1300	35	1320	1370	--	---				24,000			
1000	35	1040	20,000	1070	--	---	1130	--	---				20,000			
780	30	800	16,000	830	--	---	880	--	---				16,000			
590	30	600	12,000	630	--	---	670	--	---				12,000			
400	--	---	8000	420	--	---	450	--	---				8000			
210	--	---	4000	220	--	---	240	--	---				4000			

CRUISING AT 25000′						EFFEC. TIVE WIND	CRUISING AT 30000′						CRUISING AT 35000′						CRUISING AT 40000′						EFFEC. TIVE WIND	CRUISING AT 45000′					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.
335	89	10,400	365	.75	45	120 HW	315	91	10,000	370	.75	55	280	93	9100	360	.75	65							120 HW						
335	89	10,400	405	.80	55	80 HW	315	91	10,000	410	.80	65	280	93	9100	400	.85	75							80 HW						
325	88	9800	430	.90	60	40 HW	305	90	9600	440	.90	75	280	93	9100	440	.90	90							40 HW						
325	88	9800	470	1.0	70	0	305	90	9600	480	1.0	85	280	93	9100	480	1.0	100							0						
325	88	9800	510	1.1	80	40 TW	305	90	9600	520	1.1	95	280	93	9100	520	1.1	110							40 TW						
310	87	9200	525	1.2	85	80 TW	295	89	9100	545	1.2	105	280	93	9100	560	1.15	125							80 TW						
310	87	9200	565	1.3	95	120 TW	295	89	9100	585	1.3	115	280	93	9100	600	1.25	135							120 TW						

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.

EXAMPLE

If you are at 10,000 feet with 24,000 pounds of available fuel, you can fly 900 statute airmiles by holding 340 mph CAS. However, you can fly 1190 statute airmiles by immediately climbing to 35,000 feet using 100% RPM. At 35,000 feet cruise at 280 mph CAS and start let down 100 statute miles from home. With an 80 mph headwind the range at 35,000 feet would be .85 x 1190 or 1010 statute miles. Cruise at 280 mph CAS with this wind and start let down 75 statute miles from destination.

LEGEND

EFFECTIVE WIND - HW, Headwind - TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Airmiles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles

DATA AS OF: 11/1/49 BASED ON: ESTIMATED DATA

BASED ON ANY FUEL LISTED IN NOTE 4
RED FIGURES HAVE NOT BEEN FLIGHT CHECKED

147-93-762

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-35 (Sheet 2 of 2 Sheets). B-45C With Tip Tanks—Flight Operation Instruction Chart, Four-engine Operation—80,000 Pounds to 65,000 Pounds

MCRE Form No. 239C Sheet 1 of 2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S) B-45C

ENGINE(S) J47 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 65,000 OR LESS POUNDS

EXTERNAL LOAD ITEMS

TWO 1250 GALLON TIP TANKS

NUMBER OF ENGINES OPERATING: FOUR

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. °C	OIL PRESS PSI	OIL TEMP °C	FUEL PRESS PSI
MILITARY	30	100	690	60	70	600
MAX CONT	--	93	625	60	70	600

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING.

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/1/49 BASED ON ESTIMATED DATA

LOW ALTITUDE

147-93-765

IF YOU ARE AT S. L.			FUEL POUNDS	IF YOU ARE AT 5000'			IF YOU ARE AT 10000'			IF YOU ARE AT 15000'			FUEL POUNDS	IF YOU ARE AT 20000'		
RANGE IN AIRMILES				RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES				RANGE IN AIRMILES		
BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 5000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 10000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 15000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 20000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
490	35	790	16,000	560	35	820	630	35	860	710	35	890	16,000	800	35	930
370	30	540	12,000	420	30	570	480	35	610	530	35	640	12,000	600	35	680
240	25	310	8000	280	25	340	320	30	370	360	30	400	8000	400	30	430
120	--	---	4000	140	--	---	160	--	---	180	--	---	4000	200	--	---

CRUISING AT S. L.						EFFEC. TIVE WIND	CRUISING AT 5000'						CRUISING AT 10000'						CRUISING AT 15000'						EFFEC. TIVE WIND	CRUISING AT 20000'					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C. A. S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C. A. S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C. A. S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.	C. A. S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.		C. A. S.	% RPM	LB/HR	G. S.	RANGE FACTOR	LET DOWN DIST.
						120 HW																			120 HW	345	86	10,000	340	.70	35
						80 HW							350	83	10,800	325	.75	20	340	84	10,000	345	.80	30	80 HW	335	85	9400	365	.80	40
345	79	11,400	305	.85	0	40 HW	340	80	10,600	320	.85	10	325	81	9700	335	.90	20	330	83	9400	365	.90	35	40 HW	320	84	8900	390	.90	50
325	77	10,500	325	1.0	0	0	315	78	9600	335	1.0	10	315	80	9200	360	1.0	25	315	82	9000	390	1.0	40	0	305	83	8400	410	1.0	55
300	75	9600	340	1.15	0	40 TW	290	76	8700	350	1.15	10	300	79	8700	385	1.15	30	300	81	8500	415	1.10	45	40 TW	305	83	8400	450	1.1	60
						80 TW							285	78	8300	410	1.25	30	285	80	8000	440	1.25	50	80 TW	290	82	7900	470	1.2	70
						120 TW																			120 TW	290	82	7900	510	1.3	75

Figure A-36 (Sheet 1 of 2 Sheets). B-45C With Tip Tanks—Flight Operation Instruction Chart, Four-engine Operation—65,000 Pounds or Less

HIGH ALTITUDE

AIRPLANE MOD. B-45C ENG. J47 SERIES CHART WT. LIMITS 65,000 OR LESS LB. EXT. LOAD TWO 1250 GALLON TIP TANKS NO. OF ENGINES OPERATING: 4

IF YOU ARE AT 25000′			FUEL POUNDS	IF YOU ARE AT 30000′			IF YOU ARE AT 35000′			IF YOU ARE AT 40000′			FUEL POUNDS	IF YOU ARE AT 45000′		
RANGE IN AIRMILES				RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES				RANGE IN AIRMILES		
BY CRUISING AT 25000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 30000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 35000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 40000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 45000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
880	35	960	16,000	970	35	990	1020	--	---	1060	--	---	16,000			
660	35	710	12,000	730	35	740	770	--	---	810	--	---	12,000			
440	30	460	8000	490	--	---	520	--	---	550	--	---	8000			
230	--	---	4000	250	--	---	270	--	---	290	--	---	4000			

CRUISING AT 25000′						EFFEC-TIVE WIND	CRUISING AT 30000′						CRUISING AT 35000′						CRUISING AT 40000′						EFFEC-TIVE WIND	CRUISING AT 45000′					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.
330	87	9400	360	.70	45	120 HW	310	88	8600	365	.70	55	285	90	8000	365	.75	65	240	93	7200	340	.75	80	120 HW						
320	86	8800	385	.80	55	80 HW	300	87	8100	390	.80	65	280	89	7600	395	.85	75	240	93	7200	380	.85	95	80 HW						
305	85	8200	400	.90	60	40 HW	300	87	8100	430	.90	75	280	89	7600	435	.90	90	240	93	7200	420	.90	105	40 HW						
305	85	8200	440	1.0	70	0	290	86	7600	455	1.0	85	280	89	7600	475	1.0	100	240	93	7200	460	1.0	120	0						
290	84	7700	465	1.1	80	40 TW	290	86	7600	495	1.10	95	270	88	7300	505	1.1	110	240	93	7200	500	1.1	135	40 TW						
290	84	7700	505	1.2	85	80 TW	290	86	7600	535	1.20	105	270	88	7300	545	1.2	125	240	93	7200	540	1.2	145	80 TW						
290	84	7700	545	1.3	95	120 TW	275	85	7100	550	1.25	115	270	88	7300	585	1.3	135	240	93	7200	580	1.25	160	120 TW						

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.

EXAMPLE

If you are at 10,000 feet with 16,000 pounds of available fuel, you can fly 630 statute airmiles by holding 315 mph CAS. However, you can fly 860 statute airmiles by immediately climbing to 35,000 feet using 100% RPM. At 35,000 feet cruise at 280 mph CAS and start let down 100 statute miles from home. With an 80 mph headwind the range at 35,000 feet would be .85 x 860 or 730 miles. Cruise at 280 mph CAS with this wind and start let down 75 statute miles from destination.

LEGEND

EFFECTIVE WIND - HW, Headwind - TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Airmiles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles

DATA AS OF: 11/1/49 BASED ON: ESTIMATED DATA

BASED ON ANY FUEL LISTED IN NOTE 4
RED FIGURES HAVE NOT BEEN FLIGHT CHECKED.

147-93-763

M^RE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-36 (Sheet 2 of 2 Sheets). B-45C With Tip Tanks—Flight Operation Instruction Chart, Four-engine Operation—65,000 Pounds or Less

MCRE Form No. 239C Sheet 1 of 2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S) B-45C

ENGINE(S) J47 SERIES

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. °C	OIL PRESS PSI	OIL TEMP °C	FUEL PRESS PSI
MILITARY	30	100	690	60	70	600
MAX CONT	--	93	625	60	70	600

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 112,000 TO 95,000 POUNDS

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING.

EXTERNAL LOAD ITEMS

TWO 1250 GALLON TIP TANKS

NUMBER OF ENGINES OPERATING: THREE

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/11/49 BASED ON ESTIMATED DATA

LOW ALTITUDE

IF YOU ARE AT S. L. RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 5000′ RANGE IN AIRMILES			IF YOU ARE AT 10000′ RANGE IN AIRMILES			IF YOU ARE AT 15000′ RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 20000′ RANGE IN AIRMILES		
BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 5000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 10000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 15000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 20000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
(1510)	5	(1690)	56,000	(1630)	10	(1710)	---	--	---				56,000			
1380	5	1530	52,000	1490	10	1550	(1600)	10	(1620)				52,000			
1250	5	1360	48,000	1350	10	1380	1450	10	1460				48,000			
1130	5	1220	44,000	1220	10	1240	1320	--	---				44,000			
1010	5	1070	40,000	1100	--	---	1180	--	---				40,000			
900	5	930	36,000	970	--	---	1050	--	---				36,000			

CRUISING AT S. L. C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFECTIVE WIND	CRUISING AT 5000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 10000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 15000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFECTIVE WIND	CRUISING AT 20000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.
						120 HW																			120 HW						
						80 HW							325	93	13,900	295	.8	20							80 HW						
385	92	16,800	345	.9	0	40 HW	370	93	15,800	355	.9	10	325	93	13,900	335	.9	20							40 HW						
370	91	15,800	370	1.0	0	0	370	93	15,800	395	1.0	10	325	93	13,900	375	1.0	25							0						
355	90	15,000	395	1.15	0	40 TW	370	93	15,800	435	1.1	10	325	93	13,900	415	1.1	30							40 TW						
						80 TW							325	93	13,900	455	1.2	30							80 TW						
						120 TW																			120 TW						

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel. Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel. Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.
6. Multiply 8300 (full tip tanks and full bomb bay) or 5900 (full tip tanks and empty bomb bay) gallons by factor in note 4 to obtain maximum available fuel in pounds.

EXAMPLE

If you are at 5000 feet with 52,000 pounds of available fuel, you can fly 1490 statute airmiles by holding 370 mph CAS. However, you can fly 1550 statute airmiles by immediately climbing to 10,000 feet using 100% RPM. At 10,000 feet cruise at 325 mph CAS and start let down 25 statute miles from home. With an 80 mph headwind the range at 10,000 feet would be .8 x 1550 or 1240 statute miles. Cruise at 325 mph CAS with this wind and start let down 20 statute miles from destination.

LEGEND

EFFECTIVE WIND - HW, Headwind - TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Airmiles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles
( ) - Range in Parenthesis for Interpolation Purposes Only

DATA AS OF: 11/11/49 BASED ON: ESTIMATED DATA

BASED ON ANY FUEL LISTED IN NOTE 4

RED FIGURES HAVE NOT BEEN FLIGHT CHECKED.

147-93-770

MCRE Form No. 239C Sheet 2 of 2 (Rev. 1 Jan. 49)

Figure A-37. B-45C With Tip Tanks—Flight Operation Instruction Chart, Three-engine Operation—112,000 Pounds to 95,000 Pounds

MCRE Form No. 239C Sheet 1of2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S) B-45C

ENGINE(S) J47 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 95,000 TO 80,000 POUNDS

EXTERNAL LOAD ITEMS

TWO 1250 GALLON TIP TANKS

NUMBER OF ENGINES OPERATING: THREE

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. °C	OIL PRESS PSI	OIL TEMP °C	FUEL PRESS PSI
MILITARY	30	100	690	60	70	600
MAX CONT	--	93	625	60	70	600

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart, i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/11/49 BASED ON ESTIMATED DATA

LOW ALTITUDE

IF YOU ARE AT S. L.			FUEL POUNDS	IF YOU ARE AT 5000'			IF YOU ARE AT 10000'			IF YOU ARE AT 15000'			FUEL POUNDS	IF YOU ARE AT 20000'		
RANGE IN AIRMILES				RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES				RANGE IN AIRMILES		
BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 5000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 10000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 15000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 20000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
1140	10	1280	40,000	1240	15	1320	1330	15	1370	1440	--	----	40,000			
1010	10	1110	36,000	1100	15	1160	1180	15	1200	1270	--	----	36,000			
880	10	950	32,000	960	10	990	1030	15	1040	1110	--	----	32,000			
760	10	800	28,000	820	10	850	890	--	----	960	--	----	28,000			
640	10	670	24,000	700	10	710	750	--	----	820	--	----	24,000			
530	10	540	20,000	570	10	580	620	--	----	670	--	----	20,000			

CRUISING AT S. L.						EFFEC. TIVE WIND	CRUISING AT 5000'						CRUISING AT 10000'						CRUISING AT 15000'						EFFEC. TIVE WIND	CRUISING AT 20000'					
	APPROXIMATE							APPROXIMATE						APPROXIMATE						APPROXIMATE						APPROXIMATE				
C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	% RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.
						120 HW																			120 HW						
						80 HW							355	93	14,000	330	.8	20	320	93	12,300	315	.8	30	80 HW						
360	89	14,200	320	.9	0	40 HW	360	91	14,000	345	.9	10	355	93	14,000	370	.9	20	320	93	12,300	355	.9	35	40 HW						
345	88	13,400	345	1.0	0	0	345	90	13,300	370	1.0	10	340	92	13,200	395	1.0	25	320	93	12,300	395	1.0	40	0						
335	87	12,700	375	1.15	0	40 TW	330	89	12,600	395	1.15	10	340	92	13,200	435	1.1	30	320	93	12,300	435	1.1	45	40 TW						
						80 TW							325	91	12,500	458	1.25	30	320	93	12,300	475	1.2	50	80 TW						
						120 TW																			120 TW						

SPECIAL NOTES

1. Climb at 100% RPM
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.

EXAMPLE

If you are at 5000 feet with 36,000 pounds of available fuel, you can fly 1100 statute airmiles by holding 345 mph CAS. However, you can fly 1160 statute airmiles by immediately climbing to 15,000 feet using 100% RPM. At 15,000 feet cruise at 320 mph CAS and start let down 40 statute miles from home. With an 80 mph headwind the range at 15,000 feet would be .8 x 1160 or 920 statute miles. Cruise at 320 mph CAS with this wind and start let down 30 statute miles from destination.

LEGEND

EFFECTIVE WIND - HW, Headwind - TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Airmiles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles

DATA AS OF 11/11/49 BASED ON: ESTIMATED DATA

BASED ON ANY FUEL LISTED IN NOTE 4
RED FIGURES HAVE NOT BEEN FLIGHT CHECKED.

147-93-772

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-38. B-45C With Tip Tanks—Flight Operation Instruction Chart, Three-engine Operation—95,000 Pounds to 80,000 Pounds

MCRE Form No. 239C Sheet 1 of 2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S) B-45C

ENGINE(S) J47 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 80,000 TO 65,000 POUNDS

EXTERNAL LOAD ITEMS

TWO 1250 GALLON TIP TANKS

NUMBER OF ENGINES OPERATING: THREE

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. C	OIL PRESS PSI	OIL TEMP °C	FUEL PRESS PSI
MILITARY	30	100	690	60	70	600
MAX CONT	--	93	625	60	70	600

INSTRUCTIONS FOR USING CHART. (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/11/49 BASED ON ESTIMATED DATA

LOW ALTITUDE

IF YOU ARE AT S. L. RANGE IN AIRMILES: BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 5000' RANGE IN AIRMILES: BY CRUISING AT 5000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	IF YOU ARE AT 10000' RANGE IN AIRMILES: BY CRUISING AT 10000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	IF YOU ARE AT 15000' RANGE IN AIRMILES: BY CRUISING AT 15000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 20000' RANGE IN AIRMILES: BY CRUISING AT 20000'	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
970	15	1140	32,000	1060	15	1180	1150	15	1210	1250	--	----	32,000	1330	--	----
850	15	960	28,000	920	15	1000	1000	15	1040	1080	--	----	28,000	1150	--	----
720	15	790	24,000	780	15	840	840	15	870	920	--	----	24,000	980	--	----
590	15	630	20,000	640	15	670	690	15	710	750	--	----	20,000	800	--	----
460	10	470	16,000	500	10	510	540	--	----	590	--	----	16,000	620	--	----
340	--	----	12,000	370	--	----	410	--	----	440	--	----	12,000	470	--	----
230	--	----	8000	250	--	----	270	--	----	300	--	----	8000	320	--	----
110	--	----	4000	120	--	----	140	--	----	160	--	----	4000	170	--	----

CRUISING AT S. L. C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFEC. TIVE WIND	CRUISING AT 5000' C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 10000' C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 15000' C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFEC. TIVE WIND	CRUISING AT 20000' C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G.S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.
						120 HW																			120 HW	310	93	11,000	295	.7	35
						80 HW							345	91	12,500	320	.75	20	330	92	11,700	330	.8	30	80 HW	310	93	11,000	335	.8	40
400	86	12,100	360	.85	0	40 HW	335	88	12,000	320	.85	10	335	90	11,800	345	.85	20	330	92	11,700	370	.9	35	40 HW	310	93	11,000	375	.9	50
360	84	10,900	360	1.0	0	0	310	86	10,700	335	1.0	10	325	89	11,200	370	1.0	25	315	91	11,000	395	1.0	40	0	310	93	11,000	415	1.0	55
345	83	10,300	385	1.15	0	40 TW	295	85	10,100	360	1.15	10	310	88	10,600	395	1.15	30	300	90	10,400	415	1.15	45	40 TW	310	93	11,000	455	1.1	60
						80 TW							295	87	10,000	420	1.25	30	300	90	10,400	455	1.25	50	80 TW	295	92	10,300	475	1.2	70
						120 TW																			120 TW	295	92	10,300	515	1.3	75

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.

EXAMPLE

If you are at 5000 feet with 28,000 pounds of available fuel, you can fly 920 statute airmiles by holding 310 mph CAS. However, you can fly 1000 statute airmiles by immediately climbing to 15,000 feet using 100% RPM. At 15,000 feet cruise at 315 mph CAS and start let down 40 statute miles from home. With an 80 mph headwind the range at 15,000 feet would be .8 x 1000 or 800 statute miles. Cruise at 330 mph CAS with this wind and start let down 30 statute miles from destination.

LEGEND

EFFECTIVE WIND - HW, Headwind - TW, Tailwind - MPH
RANGE FACTOR - Ratio of Ground Distance to Airmiles for Corresponding Winds
G.S. - Ground Speed in MPH
CAS - Calibrated Airspeed in MPH
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles

DATA AS OF: 11/11/49 BASED ON: ESTIMATED DATA

BASED ON ANY FUEL LISTED IN NOTE 4
RED FIGURES HAVE NOT BEEN FLIGHT CHECKED

147-93-766

MCRE Form No. 239C Sheet 2 of 2 (Rev. 1 Jan. 49)

Figure A-39. B-45C With Tip Tanks—Flight Operation Instruction Chart, Three-engine Operation—80,000 Pounds to 65,000 Pounds

MCRE Form No. 239C Sheet 1 of 2 (Rev. 1 Jan. 49)

AIRPLANE MODEL(S)

B-45C

ENGINE(S) J47 SERIES

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS 65,000 OR LESS POUNDS

EXTERNAL LOAD ITEMS

TWO 1250 GALLON TIP TANKS

NUMBER OF ENGINES OPERATING: THREE

LIMITS	TIME LIMIT	% RPM	TAIL PIPE TEMP. °C	OIL PRESS PSI	OIL TEMP °C	FUEL PRESS PSI
MILITARY	30	100	690	60	70	600
MAX CONT	--	93	625	60	70	600

INSTRUCTIONS FOR USING CHART: (A) IN FLIGHT — Select figure in fuel column equal to or less than fuel on board. Move horizontally right or left to section according to present altitude and read total range available (no wind) by cruising at that altitude or by climbing to another altitude of maximum range. For a flight at initial altitude, operating instructions are given directly below. For a flight at higher altitude, climb immediately to desired altitude and read cruising instructions in appropriate cruising altitude section. (B) FLIGHT PLANNING — Subtract fuel required for take-off and climb to altitude. Then use chart as for IN FLIGHT above, adding initial climb distance to range values. DATA BELOW CONTAINS NO FUEL RESERVE FOR LANDING

NOTES: Ranges shown at optimum altitudes are maximum. In order to obtain maximum range on flights requiring more than one chart (due to external configuration or gross weight change), it is necessary to observe that optimum cruising altitude on each chart; i.e., when changing charts a climb may be required to obtain a maximum range. All range values include allowances for descent distance and fuel. Climb distance and fuel are included where climbs are indicated.

DATA AS OF 11/11/49 BASED ON ESTIMATED DATA

LOW ALTITUDE

147-93-767

IF YOU ARE AT S. L. RANGE IN AIRMILES: BY CRUISING AT S. L.	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 5000′ RANGE IN AIRMILES: BY CRUISING AT 5000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	IF YOU ARE AT 10000′ RANGE IN AIRMILES: BY CRUISING AT 10000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	IF YOU ARE AT 15000′ RANGE IN AIRMILES: BY CRUISING AT 15000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	FUEL POUNDS	IF YOU ARE AT 20000′ RANGE IN AIRMILES: BY CRUISING AT 20000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
510	15	560	16,000	560	15	600	610	20	640	670	20	680	16,000	720	--	---
380	15	400	12,000	420	15	440	460	15	470	500	--	---	12,000	540	--	---
250	--	---	8000	280	--	---	310	--	---	340	--	---	8000	360	--	---
120	--	---	4000	140	--	---	150	--	---	170	--	---	4000	190	--	---

CRUISING AT S. L. C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G. S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFECTIVE WIND	CRUISING AT 5000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G. S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 10000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G. S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	CRUISING AT 15000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G. S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.	EFFECTIVE WIND	CRUISING AT 20000′ C.A.S.	APPROX. % RPM	APPROX. LB/HR	APPROX. G. S.	APPROX. RANGE FACTOR	APPROX. LET DOWN DIST.
						120 HW																			120 HW	320	92	10,300	305	.7	35
						80 HW							315	87	10,000	285	.75	20	315	89	9800	310	.75	30	80 HW	310	91	9800	335	.8	40
305	82	9900	265	.85	0	40 HW	305	84	9600	285	.85	10	305	86	9500	310	.85	20	300	88	9300	335	.9	35	40 HW	300	90	9300	360	.9	50
285	80	8900	285	1.0	0	0	285	82	8700	305	1.0	10	290	85	8900	335	1.0	25	290	87	8800	360	1.0	40	0	285	89	8800	385	1.0	55
275	79	8500	315	1.15	0	40 TW	270	81	8200	330	1.15	10	280	84	8500	365	1.15	30	275	86	8300	385	1.15	45	40 TW	275	88	8200	405	1.15	60
						80 TW							265	83	8000	385	1.30	30	275	86	8300	425	1.25	50	80 TW	275	88	8200	445	1.25	70
						120 TW																			120 TW	275	88	8200	485	1.35	75

Figure A-40 (Sheet 1 of 2 Sheets). B-45C With Tip Tanks—Flight Operation Instruction Chart, Three-engine Operation—65,000 Pounds or Less

HIGH ALTITUDE

AIRPLANE MOD. B-45C ENG. J47 SERIES CHART WT. LIMITS 65,0000 OR LESS LB. EXT. LOAD TWO 1250 GALLON TIP TANKS NO. OF ENGINES OPERATING: 3

IF YOU ARE AT 25000′ RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 30000′ RANGE IN AIRMILES			IF YOU ARE AT 35000′ RANGE IN AIRMILES			IF YOU ARE AT 40000′ RANGE IN AIRMILES			FUEL POUNDS	IF YOU ARE AT 45000′ RANGE IN AIRMILES		
BY CRUISING AT 25000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 30000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 35000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.	BY CRUISING AT 40000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.		BY CRUISING AT 45000′	OPT. ALT. 1000 FT.	BY CRUISING AT OPT. ALT.
(RANGE FIGURES INCLUDE ALLOWANCES FOR PRESCRIBED CLIMB & DESCENT TO SEA LEVEL)																
770	--	---	16,000	830	--	---										
580	--	---	12,000	630	--	---										
390	--	---	8000	430	--	---										
200	--	---	4000	220	--	---										

CRUISING AT 25000′						EFFEC-TIVE WIND	CRUISING AT 30000′						CRUISING AT 35000′						CRUISING AT 40000′						EFFEC-TIVE WIND	CRUISING AT 45000′					
C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.	C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.		C.A.S.	APPROXIMATE % RPM	LB/HR	G.S.	RANGE FACTOR	LET DOWN DIST.
295	93	9400	310	.7	45	120 HW	255	93	8000	285	.7	55													120 HW						
295	93	9400	350	.8	55	80 HW	255	93	8000	325	.8	65													80 HW						
295	93	9400	390	.9	60	40 HW	255	93	8000	365	.9	75													40 HW						
285	92	8900	415	1.0	70	0	255	93	8000	405	1.0	85													0						
285	92	8900	455	1.1	80	40 TW	255	93	8000	445	1.1	95													40 TW						
275	91	8400	480	1.2	85	80 TW	255	93	8000	485	1.2	105													80 TW						
275	91	8400	520	1.3	95	120 TW	255	93	8000	525	1.3	115													120 TW						

SPECIAL NOTES

1. Climb at 100% RPM.
2. All distances and speeds are statute units.
3. Multiply all statute units by .87 to obtain nautical units.
4. Divide lb/hr by 6.8 to obtain gals/hr of AN-F-32, JP-1 fuel.
   Divide lb/hr by 6.5 to obtain gals/hr of AN-F-58, JP-3 fuel.
   Divide lb/hr by 6.0 to obtain gals/hr of AN-F-48 fuel.
5. Multiply gallons by factor in note 4 to obtain pounds.

EXAMPLE

If you are at 5000 feet with 16,000 pounds of available fuel, you can fly 560 statute airmiles by holding 285 mph CAS. However, you can fly 600 statute airmiles by immediately climbing to 15,000 feet using 100% RPM. At 15,000 feet cruise at 290 mph CAS and start let down 40 statute miles from home. With an 80 mph headwind the range at 15,000 feet would be .75 x 600 or 450 statute miles. Cruise at 315 mph CAS with this wind and start let down 30 statute miles from destination.

LEGEND

EFFECTIVE WIND - HW, Headwind,- TW, Tailwind,- MPH
RANGE FACTOR - Ratio of Ground Distance to Airmiles for Corresponding Winds
G.S. - Ground Speed in Knots
CAS - Calibrated Airspeed in Knots
LB/HR - Fuel Consumption - Pounds Per Hour
RANGE - Statute Miles

DATA AS OF: 11/11/49 BASED ON: ESTIMATED DATA

BASED ON ANY FUEL LISTED IN NOTE 4
RED FIGURES HAVE NOT BEEN FLIGHT CHECKED.

147-93-773

MCRE Form No. 239C Sheet 2of2 (Rev. 1 Jan. 49)

Figure A-40 (Sheet 2 of 2 Sheets). B-45C With Tip Tanks—Flight Operation Instruction Chart, Three-engine Operation—65,000 Pounds or Less