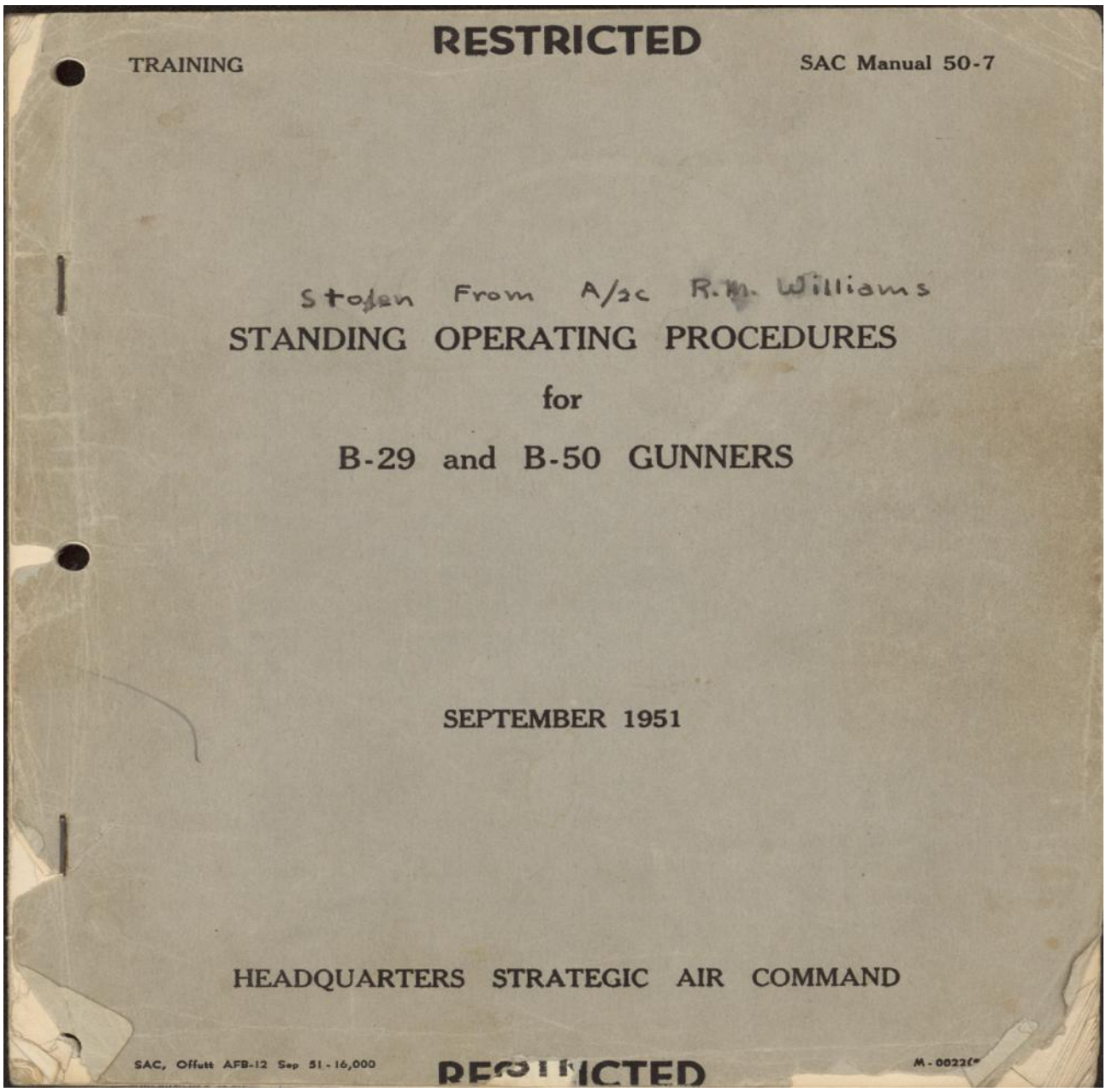

Cover of Standing Operating Procedure for B-29 and B-50 Gunners – September, 1951 – Headquarters Strategic Air Command

STANDING OPERATING PROCEDURES

for

B-29 and B-50 GUNNERS

SEPTEMBER 1951

HEADQUARTERS STRATEGIC AIR COMMAND

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SAC MANUAL)
NO 50-7)

HEADQUARTERS STRATEGIC AIR COMMAND
Offutt Air Force Base, Omaha, Nebraska
September 1951

FOREWORD

1. SAC Manual 50-7, Standing Operating Procedures for the B-29 and B-50 Gunners, is published as a directive for the purpose of standardizing B-29 and B-50 gunnery procedures and to provide a handy guide for combat crew personnel. The material contained herein has been assembled on the basis of the training requirements deemed necessary for all Medium Bombardment units of this command.

2. The procedures contained in this manual are the result of years of experience and analytical study directed toward the goal of obtaining maximum effectiveness from the equipment. They will assist the gunner to attain a thorough knowledge of the capabilities and limitations of his equipment as well as proficiency in the execution of his duties during operational and emergency conditions.

3. Comments or suggestions for future revision of this manual are encouraged and should be directed to the Commanding General, Strategic Air Command, ATTENTION: Director of Operations.

4. This manual will be issued on a hand receipt to each crew member concerned. When the individual leaves the organization, the manual will be returned to the issuing agency.

5. The reserve stock of this manual is being held to a minimum. Additional copies, if required, may be requisitioned from this headquarters, ATTENTION: Publication and Printing Control Division, Air Adjutant General. Each request will be accompanied by full justification.

BY COMMAND OF LIEUTENANT GENERAL LeMAY:

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300 - cys ea Readiness Strength Conventional Medium Bombardment and Reconnaissance Wg
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This manual supersedes SAC Manual 50-126-7, August 1948, as amended by Changes 1 and 2.

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CONDENSED CHECK LIST

INTRODUCTION

One condensed check list is given for the use of all gunners. Chapter 2 of this manual contains instructions for accomplishing all steps of the condensed check list.

The Top gunner will be responsible for assigning preflight and operational check duties. He will also be responsible to see that all gunners complete their assigned inspections.

Following is a recommended breakdown of the sight and turret assignment to gunners for their inspection duties.

Bombardier: Nose sight.

Top and Tail gunner: Tail sight, ring sight, tail turret, upper aft turret, and upper forward turret.

Left and Right gunner: Left and right blister sight, lower aft turret, and lower forward turret.

The team of gunners completing their duties first will help the other gunners complete their inspection.

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C. HEADSET AND THROAT MIKE.

D. OXYGEN EQUIPMENT.

E. DINGHY.

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G. ANTI-EXPOSURE SUIT.

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CHAPTER 2

AMPLIFIED GUNNERS' CHECK LIST

SECTION I

GUNNERY PREFLIGHT INSPECTION

A. VISUAL CHECKS.

1. ALL SWITCHES "OFF." Check all control box switches and safety switches to insure that they are in the "OFF" position. (Turret safety switches for the LFT's and some old UFT's are located inside the turret well and the turret well cover must be removed to turn the switches "OFF."

2. REMOVE DOMES, GUN ENCLOSURES, TAIL ARMOR PLATE, COWLING AND TURRET WELL COVERS.

a. Two Gun Turrets. Open the elevation access door and unlatch the elevation latching solenoid or TDM Brake. Move the guns approximately 45° from horizontal. Release the safety catch on the dome locking handle and move the handle to the unlock position then remove the dome. Remove the canvas gun covers. The top of the gun enclosure is hinged and may be raised by turning the locking lever located inside of the gun enclosure. The gun enclosure may be removed by pulling out the four locking pins and on the lower turrets loosening two dzus fasteners.

NOTE: The "J" type turrets have two additional J-shaped locking pins which must be released before the dome can be removed.

b. Four Gun Turrets.

(1) B and C Systems. Open both access doors and unlatch the elevation latching solenoid. Move the guns approximately 45° from horizontal and unhook the four J-shaped hooks inside the dome. Release the safety catch on the dome locking handle. move the handle to the unlock position and remove the dome. Unfasten the dzus fasteners on the gun enclosure and remove the enclosure.

(2) New Type Tear Drop Dome. Open both access doors and unlatch the elevation TDM brake. (There are two levers that must be positioned to release the brake.) Move the guns approximately 45° from horizontal and unhook the two J-shaped hooks inside the dome. Loosen the dzus fastener on the dome locking handle located below the elevation access door. Move the locking handle to the unlocked position and remove the dome. The top of the gun enclosure is hinged and may be raised by unhooking the J-shaped hook located inside the gun enclosure. The gun enclosure may be removed, by removing the canvas gun covers, loosening the dzus fastener securing the enclosure and sliding the enclosure off over the muzzle of the guns.

(3) "J" Type Turrets. Open both access doors and unlatch the elevation TDM brake. (Two levers must be positioned to release the brake.) Move the guns approximately 45° from horizontal and unhook the two J-shaped hooks inside the dome. Open the dome locking handle access plate located under the elevation access door. Loosen the dzus fastener on the dome locking handle, move the handle to the unlocked position and remove the dome. The top of the gun enclosure is hinged and may be raised by unhooking the J-shaped hook located

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inside the gun enclosure. The gun enclosure may be removed by removing the canvas gun covers, loosening the dzus fasteners securing the enclosure and sliding the gun enclosure off over the muzzle of the guns.

c. Tail Armor Plate and Cowling. Remove the three wing nuts, metal washers and rubber washers from the armor plate. Remove the plate (inside tail gunner's compartment); this opens the safety switches and prevents electrical operation of the turret. The canvas cover has a zipper and can be opened to allow access to the guns or the canvas cover can be removed by loosening the clamps on the guns and the dzus fasteners on the dome. The cowling is fastened to the aircraft and can be removed by loosening the dzus fasteners. The dome assembly is fastened to the support ring with dzus fasteners and can also be removed if necessary.

NOTE: If a center tail gun is installed it will be necessary to remove the center tail ammunition can to allow free access to the guns.

3. GUNS.

a. M-2.

(1) Check chutes, feedways and chambers for ammunition.

(2) Field strip the guns, check for burrs, worn or broken parts and remove excess oil.

(3) Reassemble the guns.

(a) Fill the oil buffer tube and adjust the oil buffer by turning the oil buffer tube counter-clockwise until clicking stops, then turn the tube clockwise three notches.

(b) Check the bolt switch for proper feed direction.

(c) Check the sear slide; the square end should be facing the side of the gun on which the gun charger is mounted.

(d) Check bolt assembly for proper operation by cocking and releasing firing pin.

(e) Be sure the cocking lever is forward before installing the bolt in the receiver.

(f) Check the bolt stud to see that it fits properly and can be engaged by the gun charger.

(g) Check the adjustment of the buffer adjusting screw. It should be set hand tight with a combination wrench. With the correct number of buffer discs installed (21-23), the adjusting screw should protrude from the end of the buffer tube, but not more than one thread should be showing. Check the belt feed slide assembly and belt feed lever plunger and spring for proper direction of feed.

(h) Check the belt holding pawl, link strippers, cartridge stops and/or right hand rear cartridge stop assembly for proper direction of feed.

b. M-3.

(1) Check chutes, feedways and chambers for ammunition.

(2) Field strip the guns, check for burrs, worn or broken parts and remove excess oil.

(3) Reassemble the guns.

(a) Check the barrel buffer assembly to see that the drain hole in the tube is on the bottom.

(b) Check the bolt switch for proper direction of feed.

(c) Check the sear slide; the square end should be facing the side of the gun on which the gun charger is mounted.

(d) Check cocking lever pin. It must be inserted from the same side as the sear slide, to retain the sear slide stop pin.

(e) Check bolt assembly for proper operation by cocking and releasing the firing pin.

(f) Be sure the cocking lever is forward before installing the bolt in the receiver.

(g) Check the bolt stud to see that it fits properly and can be engaged by the gun charger.

(h) Check that the ejector is set for the desired direction of feed.

(i) Check the belt holding pawl and link chute adapter assembly for proper direction of feed.

(j) Check buffer adjustment. To reset adjustment, grasp the portion of the buffer plate that projects through the front of the backplate with the fingers and slightly rotate the buffer plate back and forth. At the same time tighten the adjusting screw, using a combination wrench, until the buffer plate is snug and can no longer be moved with the fingers. Tighten the adjusting screw to the next plunger click, then an additional one and one-half turns (three more clicks).

c. Headspace Adjustment (M-2 and M-3). After assembling the gun, proceed as follows for upper and tail turret guns:

(1) Assembled Method.

(a) Pull the bolt back about one inch.

(b) Screw the barrel into the barrel extension by applying a screw-driver to the notches on the rear end of the barrel, until the recoiling parts will not go into battery position when the bolt is released.

(c) Screw the barrel out of the barrel extension one notch at a time, until the recoiling parts will just be into battery position when the bolt is released.

(d) When this point is found, retract the bolt and unscrew the barrel two more notches.

(2) Disassembled Method. The lower turret guns do not have enough room to easily use the above procedure and should be set in the following manner before installation of the gun in the receiver:

(a) Assemble the barrel, barrel extension and bolt.

(b) Hold the breech lock firmly in the breech lock recess of the bolt.

(c) Tighten the barrel into the barrel extension as far as possible, then loosen the barrel three notches. This should allow the breech lock to release from the bolt by its own weight.

(3) Headspace Check with a Gage. After setting the headspace by either of the above methods it should be checked with a headspace gage as outlined below:

(a) Charge the gun to retract the firing pin.

(b) Retract the bolt approximately 1/16 inch to engage the locking surfaces of the breech lock and the bolt.

(c) Attempt to insert the .202 inch "GO" gage between the face of the bolt and the breech end of the barrel.

(d) If the "GO" gage goes in, continue with step (f).

(e) If the "GO" gage does not go in, the headspace is too tight: Correct the adjustment by unscrewing the barrel one notch at a time, checking with the "GO" gage until it enters.

(f) Attempt to insert the .206 inch "NO GO" gage between the face of the bolt and the breech end of the barrel.

(g) If the "NO GO" gage does not go the headspace is correct.

(h) If the "NO GO" gage goes in, the headspace is too loose: Correct the adjustment by screwing the barrel into the barrel extension one notch at a time, checking with the "NO GO" gage until the "NO GO" gage will not enter. Recheck with the "GO" gage.

d. Check the security of the front mount adapter and mounting of the gun.

e. Check safety wiring and cotter pins for security and condition.

f. Check ammunition guides for security and condition.

4. GUN CHARGERS.

a. Check the mounting of the charger and proper safety wiring of the mounting bolt.

b. Check to see that you have the proper type of gun charger (M-2 or M-3).

c. Check the air hoses and electrical connections for security and condition.

d. Check the gun charger for proper timing. The sear should not release with the .116 inch "NO FIRE" gage between the barrel extension and the trunnion block, but should release with the .020 inch "FIRE" gage between the barrel extension and the trunnion block.

e. If it is necessary to adjust the timing it will be adjusted in the following manner:

(1) Turn the sear pin adjuster on the charger fully clockwise.

(2) Charge the gun either by hand or by inserting a screw-driver in the "C" socket and pressing the handle toward the muzzle of the gun. (If charger is used, accumulator air pressure must be built up.)

(3) Place the .020 inch "FIRE" gage between the barrel extension and the trunnion block.

(4) Attempt to release the firing pin by placing a screw-driver in the "F" socket and pressing the handle toward the rear of the gun. The firing pin should not release.

(5) Turn the sear pin adjuster one notch counter-clockwise and try to release the firing pin. Continue turning the adjuster one notch at a time, until you reach the first position where the firing pin will release. Remove the "FIRE" gage and charge the gun.

(6) Turn the sear pin adjuster two additional notches counter-clockwise.

(7) Insert the .116 inch "NO FIRE" gage and attempt to release the firing pin; it should not release.

(8) Safety and sear pin adjuster.

NOTE: If a timing gage is not available, use the same procedure to find the first position where the firing pin will release with the gun in battery position, then turn the sear pin adjuster four additional notches counter-clockwise and safety.

5. TURRET CHECKS.

a. All electrical cables, air hoses, selsyns and selsyn caps for security and condition.

b. The link ejection chutes, ammunition chutes, ammunition guides and ammunition cans for security and condition.

c. All exposed bolts, nuts and screws for tightness and safety wiring, if applicable.

d. On the upper aft turret, check the ammunition can hoists for condition and hoist chains for proper stowing.

e. Disengage latching solenoids or TDM brakes and manually move the turret in azimuth and elevation to check for freedom of movement.

f. General condition of saddle, saddle support, drive motors, etc.

g. Ammunition booster sprockets for proper operation.

6. AIR COMPRESSOR CHECKS.

a. Fan guard to see that it is not bent.

b. Fan for freedom of movement.

c. Compressor oil sump, to see that it is filled to within approximately one-half inch of the top with proper oil.

d. Electrical and air connections for security and condition.

e. Compressor mount for security and condition.

f. Drain all air and moisture from the compressor accumulator by loosening the drain plug on the bottom of the accumulator. Tighten the drain plug after draining the accumulator.

7. FIRE INTERRUPTER CHECKS. Check the fire interrupter for alignment of the cross hairs on the drum with the indicator marks on the switch carriage (within 1/32 inch), or by using fire interrupter continuity checking box. The tail does not have a fire interrupter.

a. Reference Marks Method. UFT's and LFT's must be stowed at 0^{o} azimuth and 0^{o} elevation when checking alignment. UAT's and LAT's must be stowed at 180^{o} azimuth and 0^{o} elevation when checking alignment. If the cross hairs are not aligned with the reference marks, disconnect the flexible cables and make the necessary adjustment. (There are in some cases two sets of scrib marks on the drum. Be sure you are using the correct set as indicated by the decal on the drum.) The turret should be moved so that the switch actuator rides over the raised portion of the drum; check to see that the switches operate.

NOTE: On the "C" system UFT's, check the relationship of the scribe mark on the fire interrupter drum with the pointer located on the fixed part of the housing.

b. Fire Interrupter Continuity Checking Box Method.

(1) There must be no power to the RCT system while making this check.

(2) Disconnect the electric cannon plugs from the gun chargers and insert the leads from the box into the cannot plugs.

(3) Clamp the ground wire on some part of the turret that will serve as a ground.

(4) Disengage the azimuth and elevation latching solenoids and/or TDM brakes.

(5) Turn the switch on the box to the "ON" position; if the guns are not pointed at an interrupted area, the lights should come on.

(6) Manually move the guns toward an interrupted area; with a boresight tool in the gun muzzle or looking through the barrel, check to see that the lights go out before the guns are pointed at an interrupted area.

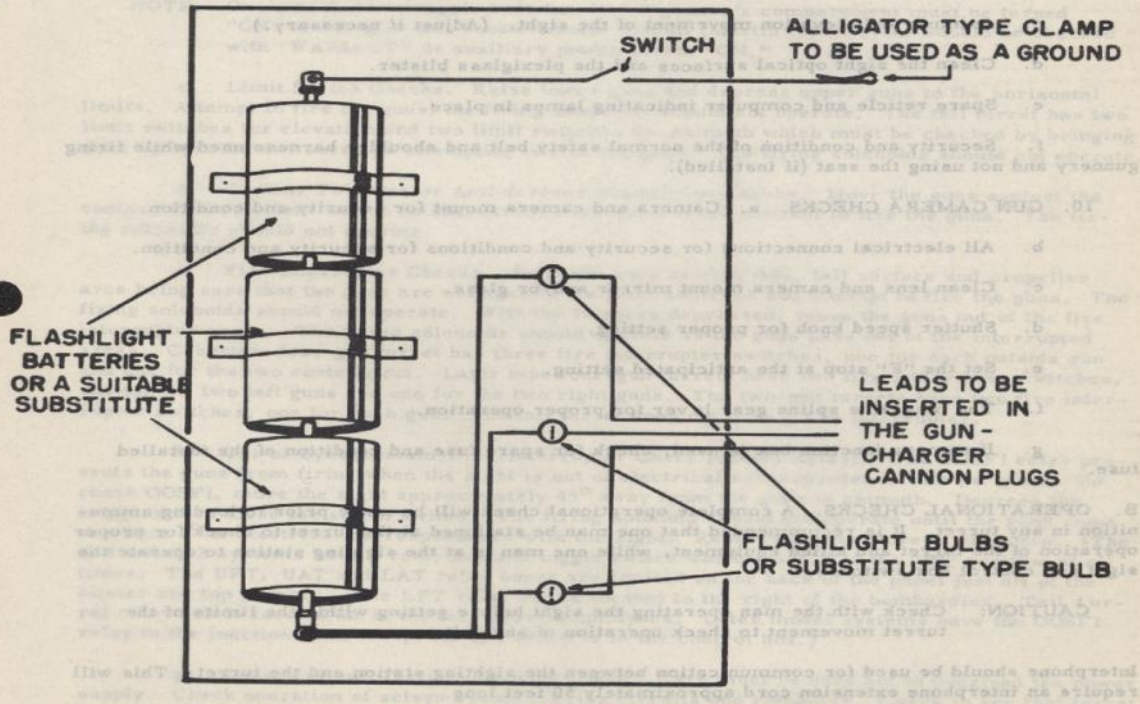
(7) The lights should stay out while guns are in the interrupted area and come on after the guns leave the interrupted area.

(8) The lights should come on or go out individually as each gun moves into, or out of, an interrupted area.

(9) Make this check in azimuth and elevation on all interrupted areas such as tail, wing tips and propeller arcs.

FIRE INTERRUPTER CONTINUITY CHECKING BOX

This is a diagram of a continuity checking box, which can be locally manufactured from available parts and should be used to check for proper operation of the fire interrupter switches.



To use this fire interrupter continuity checking box: On two gun turrets only two leads are used; on "C" system four gun turrets, one lead is used on the left gun, one on either of the center guns and one on the right gun; other four gun turrets need only two leads, one on either the left inboard or outboard gun and one on either the right inboard or outboard gun.

Page 16 – Fire Interrupter Continuity Checking Box

8. CONTOUR FOLLOWER. Check to see that the contour follower gives you maximum elevation movement of the guns while pointed toward the center line of the ship, thus keeping the guns from pointing at or hitting the astro dome, ring sight blister or fuselage. Firing circuits to to all guns of the turret should be interrupted when the guns are against the contour follower.

NOTE: This may be checked with fire interrupter continuity checking box.

9. SIGHT AND SIGHTING STATION CHECKS. a. Sight, selsyns and selsyn caps for security and condition. (If the sight is not secure, harmonization will be affected.)

b. All electrical connections on sight, control boxes, junction boxes, servo amplifiers and rotating machines for security and condition.

c. Azimuth and elevation movement of the sight. (Adjust if necessary.)

d. Clean the sight optical surfaces and the plexiglass blister.

e. Spare reticle and computer indicating lamps in place.

f. Security and condition of the normal safety belt and shoulder harness used while firing gunnery and not using the seat (if installed).

10. GUN CAMERA CHECKS. a. Camera and camera mount for security and condition.

b. All electrical connections for security and conditions for security and condition.

c. Clean lens and camera mount mirror and/or glass.

d. Shutter speed knob for proper setting.

e. Set the "F" stop at the anticipated setting.

f. The magazine spline gear le ver for proper operation.

g. If camera junction box is used, check for spare fuse and condition of the installed fuse.

B. OPERATIONAL CHECKS. A complete operational check will be made prior to loading ammunition in any turret. It is recommended that one man be stationed at the turret to check for proper operation of the turret and allied equipment, while one man is at the sighting station to operate the sight and control box switches.

CAUTION: Check with the man operating the sight before getting within the limits of the turret movement to check operation of any unit.

Interphone should be used for communication between the sighting station and the turret. This will require an interphone extension cord approximately 50 feet long.

11. EXTERNAL POWER OR APU "ON." An external power unit must be connected to the aircraft; or the auxiliary power unit (Putt-Putt) must be on the line before an operational check is made. When the APU is used, do not operate more than one turret at a time. If external power unit is used, be careful not to overload it.

WARNING: Battery must be disconnected while using external power unit.

12. TURRETS CLEARED, ENGAGE SOLENOIDS OR TDM BRAKES. Check latching solenoids or TDM brakes, to insure that they are engaged. Check to see that the turret to be used is clear of all loose equipment and that the man on interphone extension is at the turret, but other personnel are not in the vicinity of the turret.

13. SAFETY SWITCHES "ON." Check to see that the safety switches are "ON" for the turret to be operated. The tail gunner's armor plate must be on the close safety swtiches.

14. RESET ALL CIRCUIT BREAKERS. Press hard on all circuit breaker buttons on the control boxes and junction boxes to insure that they are in the reset position. An additional circuit breaker or toggle switch may be attached to the control box to protect the air compressor: Its action is similar to the other type of circuit breakers.

CAUTION: Do not attempt to reset the circuit breakers while there is power on the system.

15. AUXILIARY POWER SWITCH "ON" OR UNI-SWITCH TO "WARM UP." The following circuits are energized when auxiliary power (warm up) is turned "ON": Air compressor, computer heaters, gun heaters, ammunition counters and heated suit panel for top gunner (Hughes booster motor if used).

a. Air Compressor. The air compressor should start to operate and continue to run for approximately three to five minutes at sea level before cutting off. (The running time will increase with altitude and type of compressor.) In the event the compressor builds up pressure, cuts off, then starts to run again; all connections, lines and the compressor accumulator should be checked for leaks. (The man at the turret should check for running time and leaks, while the man at the sight continues with his checks.)

b. Gun Heaters (if installed). The gun heaters should operate; and after clearing with the man operating the sight, the man at the turret can check the heaters for proper operation.

c. Ammunition Counters (if installed). The ammunition counter circuit should be energized and can be checked by clearing with the man at the sight, then operating the ammunition counter actuator mounted on the edgewater adapter of the gun. The ammunition counter at the sighting station should operate every time the actuator is operated.

d. Hughes Ammunition Booster Motor (if used). Check the Hughes booster motors by moving the switch actuator to approximately the same level that a round of ammunition would raise it: The booster motor should operate. Full movement of the switch actuator should cause the booster motor to stop running.

e. Tail Booster Motor (Martin Type). Check the tail booster motor by raising the actuator lever: The sprocket should run.

NOTE: On some B-29's, toggle switches in the tail gunner's compartment must be turned on to energize the tail booster motor circuit.

16. A. C. POWER SWITCH "ON" OR UNI-SWITCH TO "STAND BY." The following circuits are energized when A.C. power is turned "ON": Dynamotor, selsyn system, sight lamps, servo amplifier and computer D.C. The uni-switch to "STAND BY" also starts the sight gyroscopes. The old type control box has a separate computer in-out switch.

a. Check for starting of the dynamotor.

b. Check the sight in the following manner:

(1) Reticle lamp rheostat for proper operation. Rotate rheostat from off to high, noting varying brilliance of the reticle image.

(2) The double filament reticle switch for proper operation. There should be a reticle visible at both positions. (If both filaments do not operate, change the lamps.)

(3) The target dimension dial and knob for proper operation. When the knob is moved, the target dimension dial should turn.

(4) The range wheel on pedestal type sight or left hand grip on ring sight and reticle for proper operation. The reticle should contract and expand when the range mechanism is turned.

(5) The computer stand by switch and indicating lamp for proper operation.

(a) Control boxes with uni-switch. Uni-switch to "STAND BY," the computer indicating lamp should be on. Computer stand by switch to "IN" position and close the action switch; the lamp should go out.

(b) Control box with individual switches. Computer in-out switch to "IN," the computer indicating lamp should be on. Stand by switch to "IN" position and close the action switch; the lamp should go out.

(6) Check to see that the sight gyroscopes are running.

(7) Optical parallax and double image should be checked. To check optical parallax, place reticle image on a distant object and move your head from side to side and up and down. The reticle image should not move off of the object. There should be only one clear reticle image visible in the optic head.

(8) Check the ring and post sight to see that it is aligned with the center dot of reticle image. This is to be used in the case of reticle lamp circuit failure to give a reference point to tell about where the guns are pointed.

c. Gun Camera.

(1) Turn the camera junction box switch "ON."

(2) Open the camera access door.

(3) Extend the spline gear.

(4) Close the action switch and trigger.

(5) Check spline gear and shutter operation.

(6) Check overrun and overrun indicator for proper operation when the trigger is released.

(7) With camera bore sight kit, check the camera for proper alignment with the optical axis of the sight, and readjust refraction lens if necessary.

17. TURRET POWER SWITCH "ON" OR UNI-SWITCH TO "OPERATION." Before turning on the turret power, check with the man at the turret to see if the turret is clear. The following units will be energized: Amplidynes, turret drive motor and latching solenoids or TDM brakes. (Uni-switch to "OPERATION" sends A.C. to the Computer.)

a. Latching Solenoids or TDM Brakes. When the turret power switch is turned on, the latching solenoids or TDM brakes should pick up, allowing the turret to be moved electrically.

b. 1 and 31 Speed Selsyn Checks. The selsyn system should be energized; and when the action switch is closed, the circuit between the servo amplifier and amplidyne control field is closed; the turret should follow the sight. To check the one speed system, release the action switch and position the sight approximately 45° away from the turret in azimuth. Close the action switch; the turret should move into alignment with the sight. Repeat in the opposite azimuth direction. To check the 31-speed system, track slowly in azimuth with the action switch closed. The turret should follow the sight smoothly. Repeat in the opposite azimuth direction. Use the same procedure to check elevation.

c. Harmonization Check (Infinity Method). Aim the sight at some fixed object at least one mile distant, block the action switch closed and lock the sight in position. (Azimuth and elevation sight locking tools should be utilized. When tools are not available, use the sight friction adjusting screws.) With a boresight tool in the guns concerned, check to see that the guns are pointed at the object at which the sight is aimed. (If no boresight tool is available, remove the gun's backplate and bolt group and sight through the gun barrel.)

d. Limit Switch Checks. With the action switch closed, move the guns to the horizontal limits. The guns should actuate the elevation limit switch (which cuts off 75% of the power to the elevation TDM and interrupts firing circuit) and stop firmly on the mechanical limit stops. Move the sight to its zenith limits (straight up) if controlling upper turrets and to its nadir limits (straight down) if controlling lower turrets. The guns should stop, because the sight movement is mechanically restricted. The tail turret has four limit switches to be checked, two for azimuth and two for elevation movement.

e. Backout Circuit Check. Move the sight to bring the guns against a limit stop, then away from the stop. If the backout circuit is working, the guns will move off of the limit stops. (Tail turret has double backout circuit in azimuth and elevation.)

f. Stowing Circuit Check. When the action switch is released, the lower guns should raise to elevation limits, the upper guns should lower to elevation limits and stay there until the action switch is closed. (Tail turret does not have a stowing circuit.)

g. Holding Circuit Check. When the action switch is released, the guns should not move in azimuth. On the tail turret, the holding circuit keeps the turret from moving either in azimuth or elevation when the action switch is released.

h. Contour Follower or Anti-ference Mechanism Check. With the action switch closed, move the sight in azimuth around the horizontal limits of the guns. Upper turret guns should lower enough to prevent the guns from pointing at or striking the astro dome, ring sight station, curved portion of the fuselage and, in some cases, the radar dome.

i. Computing System Checks. Adjust altitude and airspeed handset unit to maximum airspeed and minimum altitude; this is to amplify the gun movements during computer checks. To check the computing system, turn the computer switch on the control box to "IN" ("OPERATION" position on the uni-switch) and the computer stand by switch to "IN." In making these checks, you will have to be extremely observant as the movement of the gun muzzles may be slight.

CAUTION: Do not run any computer more than 15 minutes at a time on the ground if the temperature in the aircraft is high enough to be uncomfortable.

(1) Lead Check. Turn the range wheel to maximum range (smallest reticle circle). Lock the sight in elevation and with the action switch closed, track smoothly in azimuth. Stop the sight quickly and the guns should stop and move back into alignment with the sight. Repeat this in the opposite azimuth direction. Unlock the sight in elevation and lock it in azimuth and repeat the lead check for elevation.

(2) Windage Check. With the range set to maximum (smallest reticle circle), stow the sight abroadside and horizontal. With the action switch closed, move the computer stand by switch to "STAND BY." The gun muzzles should swing slightly to the rear of the aircraft. Move the computer stand by switch to "IN." The windage correction will come back in and move the gun muzzles slightly forward.

(3) Gravity Check. Stow the sight aft where windage effect is minimum and slightly above horizontal for upper turrets and below horizontal for lower turrets. With the range still set at maximum (smallest reticle circle) and the action switch closed, turn the computer stand by switch to "STAND BY." The gun muzzles should move down slightly. Turn the computer stand by switch to "IN," and the gun muzzles should move up slightly.

(4) Computer Elevation Limit Switch Check. Track upper guns toward zenith (straight up) and lower guns toward nadir (straight down). When the guns reach approximately 85° plus or minus, the computer indicating lamp should come on, indicating the computer is out of the circuit.

(5) Tail Computer Checks. If the tail computer cannot be placed in or out of the circuit by the computer stand by switch, check for windage and gravity drop in the following manner: (Lead can be checked in the same way as other turrets.)

(a) Windage Check. Lock the sight in elevation and move it almost to the azimuth limit stops. With action switch closed, move the range to maximum (smallest reticle circle) as fast as possible without moving the sight; the gun muzzles should move toward the front of the aircraft. Move the range to minimum (largest reticle circle) and the gun muzzles should move toward the rear of the aircraft.

(b) Gravity Check. Lock the sight at 0° elevation and 180° azimuth. Close the action switch and move the range to maximum (smallest reticle circle); the gun muzzles should rise. Move the range to minimum (largest reticle circle); the gun muzzles should lower.

(6) Turn all computer switches "OFF."

18. GUN SAFE FIRE SWITCH "ON" OR UNI-SWITCH TO "COMBAT." a. Firing and Charging circuit, point the guns at an uninterrupted area (off of the limit stops and not at the tail surface, wing tips or propeller arcs). Close the action switch and press the triggers; the guns should charge and continue to charge until the timing mechanism opens the charging circuit. The reset button on the rear of the charger indicates the charging circuit is cut out (approximately four seconds or charging approximately seven times). The firing solenoid should operate and release the firing pin. To check for firing pin release, clear with the man operating the sight, turn turret safety

switches "OFF," then inspect the front of the bolt to see if the firing pin protrudes through the firing pin port. Turn turret safety switches "ON."

b. Booster Motor Checks. To check the G.E. booster motor for proper operation, close the action switch and press the triggers. The ammunition feed sprockets should turn as long as the triggers are depressed.

NOTE: The Hughes booster motors should be checked when the uni-switch is on the "WARM UP" position.

Check tail booster motor (Martin type) by raising the actuator lever; the sprocket should run.

NOTE: On some B-29's, toggle switches in tail gunner's compartment must be turned "ON" to energize tail booster motor circuit (Martin type). This should be checked with "WARM UP" or auxiliary power switch "ON."

c. Limit Switch Checks. Raise lower guns and depress upper guns to the horizontal limits. Attempt to fire the guns; the firing solenoids should not operate. The tail turret has two limit switches for elevation and two limit switches for azimuth which must be checked by bringing guns against the switches and attempting to fire the guns. The firing solenoids should not operate.

d. Contour Follower or Anti-ference Mechanism Checks. Move the guns against the contour follower limit switch or anti-ference mechanism and attempt to fire the guns. The firing solenoids should not operate.

e. Fire Interrupter Checks. Point the guns at wing tips, tail surface and propeller arcs being sure that the guns are not against the limit switches and attempt to fire the guns. The firing solenoids should not operate. With the triggers depressed, move the guns out of the fire interrupter areas. The firing solenoids should operate as the guns pass out of the interrupted areas. C-system four-gun turret has three fire interrupter switches, one for each outside gun and one for the two center guns. Later type four-gun turrets have two fire interrupter switches, one for the two left guns and one for the two right guns. The two-gun turrets have two fire interrupter switches, one for each gun. The tail turret does not have a fire interrupter.

f. Out-of-Synchronism-Fire-Interrupter Check (OOSFI Relay). The OOSFI relay prevents the guns from firing when the sight is out of electrical correspondence with the guns. To check OOSFI, move the sight approximately 45° away from the guns in azimuth. Depress the triggers then close the action switch. The firing solenoid should not operate until the guns come to within 3° of electrical correspondence with the sight. Repeat the procedure in elevation. (The C-1 and C-2 systems have a relay box and toggle switch which must be to the "IN" position at all times. The UFT, UAT and LAT relay boxes are located on the back of the panel just aft of the blister and top gunners. The LFT relay box is located to the right of the bombardier. Tail turret relay box is located aft of the tail turret amplidynes. Later model systems have the OOSFI relay in the junction box, except for tail which is in the control box.)

g. Secondary and Tertiary Control Check. Care must be used not to overload the power supply. Check operation of selsyn system, firing circuits and computer. Check to see that turret secondary control indicating light is operating properly. Lights should be on when primary control of turrets is being used. On systems using individual switch control boxes, turret secondary control indicating lights are located in the blister position. On systems using uni-switch control boxes, turret secondary control indicating lights are located on the control boxes.

h. Turret Stowing Indicator Lights (A/C Instrument Panel). Check operation of turret stowing indicator lights.

i. Turn All Switches "OFF." Check to insure that all control box switches and turret safety switches are "OFF" and external power unit disconnected.

j. Domes. If no ammunition is to be loaded, drain compressor accumulator and replace all turret domes, gun enclosures and canvas gun covers. Reset gun charger, stow the turrets and engage latching solenoids and/or TDM brakes. Replace turret well covers and access doors.

C. COMBAT ARMING.

19. INSPECTION OF AMMUNITION. This inspection is to be accomplished before loading ammunition in the turret ammunition cans. Ammunition will be inspected for corroded, cracked or broken links, uneven linking, short rounds, bulges, burrs, corroded or defective primers, extractor rim too thick or too thin and for dirt or oil on ammunition or links. Ammunition should be checked for proper linking with a link loading machine or hand link-delinker. Be sure there is a round in the double link that is to be placed in the feedway of the guns.

20. LOADING OF AMMUNITION. a. Two-gun Turrets. Ammunition should be taken to the turrets in boxes to avoid stretching of links. On the lower turrets it is not necessary to remove the ammunition cans from the frames; but on the upper aft turret, the cans must be lowered with the chain hoists. Place the single link end of the belt into the can first, with rounds pointing INBOARD. Fill cans in zig-zag layers, leaving a space at the top equal to the thickness of one row of ammunition, so that the belt will not bind in feeding. Then feed the double link end of the belt through the ammunition chute and over the booster assembly. (On upper aft turret, attach a three-foot piece of safety wire or a short belt of ammunition to the ammunition in the cans for ease in loading the guns. After raising the ammunition cans into position, be sure they are properly locked and the hoisting chains are properly stowed.)

b. Four-gun Turrets. Ammunition should be taken to the turrets in boxes to avoid stretching of the links. Unlatch the azimuth and elevation latching solenoids or TDM brake. Raise guns 15° and engage elevation latching solenoid or TDM brake. Rotate the turret and check the four elastic stop nuts that hold each of the ammunition cans on the frame to be sure they are properly tightened. Rotate the turret until the desired ammunition can is aligned with the well access door. Ammunition may be loaded from either inside or topside of the aircraft. The rounds must point "OUTBOARD." The forward cans must be loaded first and the ammunition then placed over the outboard gun ammunition booster motor sprockets to keep it from dropping into the can. Close the ammunition can access door, rotate the turret until the rear ammunition can is aligned with the turret well access door and load ammunition in the same manner. This can supplies the inboard gun. Load the remaining cans in the same manner, forward can first then rear can.

c. Tail Turret. Ammunition should be taken to the tail turret ammunition cans in boxes to avoid stretching of the links. Remove the armor plate, ammunition can covers and turret cowling. The ammunition cans for the tail mount cannot be removed and must be loaded inside the aircraft. They are located just forward of the tail gunner's compartment in unpressurized section.

NOTE: The center tail ammunition can must be removed for loading and installed only after the outboard guns have been armed.

First feed approximately 100 rounds of ammunition into each ammunition chute from the cans toward the guns, double-link end first, rounds pointing INBOARD or OUTBOARD as indicated by the decal on the cans. Then from outside the aircraft, pull the belts up to the guns. Load each can with rounds, pointing inboard or outboard as indicated by the decal on the cans, placing the single link end of the belt in the can first. Fill the cans in zig-zag layers, leaving a space at the top of the can equal to one layer of ammunition to prevent binding. As a final step, connect the belts in the ammunition chutes with the belts in the cans.

21. ARMING THE GUNS. With the gun covers down and latched, push the first round of ammunition over the belt holding pawl. Charge the gun once to position the round against the cartridge stops. Either one of two methods can be utilized to charge the guns. A hand charging tool should be used to retract the bolt; or if no hand charging tool is available, a screwdriver can be inserted into the "C" socket of the charger and the handle of the screw-driver pushed gently toward the muzzle of the gun to actuate the charging solenoid. Lift the cover to check that rounds are properly aligned in the feedway against the cartridge stops and the extractor is properly engaged. Close the cover securely.

22. RESET THE GUN CHARGERS AND DRAIN AIR COMPRESSOR ACCUMULATOR. After loading of guns is complete, drain the air compressor accumulators and reset the chargers by pressing the reset button on top rear of the charger.

23. REPLACE DOMES, GUN ENCLOSURES AND TAIL COWLING. Remove sealing tape from lower aft turret, lower forward turret and tail turret ejection chutes. Replace the gun enclosures and turret domes. Check visually through the inspection ports and access doors that dome locking wire is properly engaged over the holding lugs and the dome locking handle is properly engaged and locked. (UFT's and "J" type turrets have J-shaped hooks that should be checked to see that they are properly hooked.)

NOTE: LFT's and some UFT's have safety switches inside the turret pressure dome, and they should be turned on before replacing the turret well covers.

24. STOWING OF GUNS AFTER LOADING. When guns are loaded for a mission, they should be stowed in the following manner to indicate that they are "HOT": UFT 0° azimuth and plus 45° elevation--UAT 180° azimuth and plus 45° elevation--tail turret 180° azimuth and plus 30° elevation--LAT 180° azimuth and minus 90° elevation--LFT 180° azimuth and minus 90° elevation--LFT 180° azimuth and minus 90° elevation.

NOTE: Just prior to boarding the aircraft for take-off the two lower turrets will be moved manually into their normal stowed position. Engage latching solenoids or TDM brakes. Check to see that all dome access doors are closed and secure.

25. TURRET SAFETY SWITCHES. The turret safety switches should be turned on at the following time: Tail turret safety switch is turned on by replacing the armor plate. LFT safety switches will be turned on before replacing turret well cover. LAT safety switches will be turned on before pressurization. UFT and UAT safety switches can be turned on any time before operating the system.

26. REPLACE WELL COVERS, TAIL ARMOR PLATE AND ACCESS DOORS. Replace the turret well covers, tail armor plate and turret well access doors, being sure that they seal properly. Canvas gun covers should not be replaced.

SECTION II

PREFLIGHT PERSONAL AND EMERGENCY EQUIPMENT

A. CLOTHING. Check to see that you have proper clothing for the mission to be performed. If heated suit is to be worn, check to see that it is operating properly.

B. PARACHUTE. Check parachute for cleanliness and exposed canopy, and make sure it is not wet. Check your leg straps for proper fit; check snaps, seal, and pins. Check parachute log record: The ten-day inspection and repack date must be current. The parachute or harness will be worn during the entire flight. Safety belts and parachutes will be worn by the blister gunners

during pressurized flight. If wearing only a harness, always keep your pack within reach but secured, so that it will not be lost if a blister should blow out.

C. HEADSET AND THROAT MIKE. Check headset and throat mike for condition.

D. OXYGEN EQUIPMENT. Check the fit of your mask by holding a hand over the quick disconnect fitting and inhaling gently. No air should leak in around the edges of the mask. Be sure the gasket is on the male quick disconnect fitting. The fitting should fit snugly into oxygen hose, requiring about a ten-pound pull to separate. Check oxygen mask to insure it has been modified for bail-out bottle attachment. Check bail-out bottle for a minimum of 1500 pounds PSI and safety pin installed. Be sure the knurled collar on the regulator is tight, and check to see that the diaphragm is intact. Breathe from the regulator normally with the auto-mix OFF, to check operation of the flow indicator. Turn the auto-mix to the ON position. Diluter demand system check; Breathe normally with diluter switch and selector on normal; check operation of flow indicator. Turn selector to any of the pressure dial positions; breathe normally and check oxygen flow. Return selector to normal.

NOTE: Pressure dial is set with reference to cabin altitude.

Check your oxygen pressure; it should indicate 425 and 450 pounds PSI. Check your walk around bottles for the same pressure.

E. DINGHY (IF USED). Check pack for any visible damage or contamination (oil, mildew, etc). Examine corners of the pack cover for wear. Check inspection date.

NOTE: During flight, be sure than when the dinghy raft is attached to the parachute, the lanyard is passed under the parachute leg straps and hooked to the life vest.

F. LIFE VEST (IF USED). Check life vest for leaks, by inflating it with your breath (check both sides). Deflate the vest and close the valves. Check CO_2 cartridges to be sure that they are not punctured. Check that sea marker dye, shark repellent, operational flashlight and whistle are in the life vest pockets and/or secured to the vest. Life vest will be worn under parachute harness on all over-water flights.

NOTE: In the event any of the above equipment is found to be defective, it will be replaced with serviceable equipment immediately.

G. ANTI-EXPOSURE SUIT (IF USED). Check the cover for condition and proper seal.

H. C-1 VEST (IF USED). Check if seals are intact on all pockets and compartments.

I. FLAK SUIT (IF REQUIRED). Location and condition.

SECTION III

ENGINEERING PRE-FLIGHT INSPECTION

A. B-29 GUNNERS ENGINEERING PRE-FLIGHT CHECKS.

27. TOP GUNNER. The top gunner will be responsible for the upper surface of the aircraft and both bomb bays.

a. Upper Surfaces of Aircraft.

(1) Metal skin for corrosion, dents, surface cracks, and loose rivets.

(2) De-icer equipment for condition.

(3) Formation and navigational lights for condition and operation.

(4) Astro dome and CFC dome for cracks, cleanliness, and security.

(5) Turret domes for security.

(6) Life raft doors for security and door handles for safetying.

(7) Control surfaces for general condition.

(8) Cabin heater intake (leading edge of wing) free from foreign objects.

(9) Gun covers installed (except on gunnery mission).

(10) Upper turrets properly stowed. Latching solenoids or TDM brakes engaged.

(11) Fuel filler caps inspected for condition of seals and security.

b. Forward and Aft Bomb Bays.

(1) Down locks in place and safety valves or switch OFF.

(2) Bomb bay lights for proper operation.

(3) Control cables for condition and routing.

(4) Catwalks for cleanliness and loose equipment.

(5) Bomb bay doors for general condition.

(6) Interphone for proper operation.

(7) Can Salvo switches in OFF position.

(8) Emergency flap motor properly installed.

(9) Hand cranks properly stowed.

(10) Normal pressure accumulator (1200 to 1500 pounds PSI).

(11) Emergency pressure accumulator (750 to 850 pounds PSI).

(12) Check for any disconnected electrical cables or lines.

28. ENGINE PRE-FLIGHT INSPECTION TO INCLUDE PRESSURE CHECK TO BE ACCOMPLISHED BY:

a. Left and Right Gunners.

(1) Front engine section (front bank of cylinders forward).

(a) Injection nozzles for leaks.

(b) Spark plug connections for security.

(c) Condition of ignition harness.

(d) Propeller governor for leaks.

(e) Exhaust short stacks for security.

(f) Front sump plug for safetying.

(g) Propeller dome seal for leaks.

(h) Propeller blades for nicks, etc.

(i) Propeller anti icing system for condition and operation.

(j) Rocker box covers for evidence of oil leaks.

(k) Push rod housings for security and evidence of oil leaks.

(l) Oil crossover lines for leaks.

(2) Rear engine section (rear bank of cylinders to fire-wall).

(a) Fuel injection lines for condition.

(b) Spark plug leads for security.

(c) Ground bonding for security.

(d) Exhaust collector ring and short stacks for condition and security.

(e) Rocker box covers for evidence of oil leaks.

(f) Push rod housings for security and evidence of oil leaks.

(g) Oil crossover lines for leaks.

(h) Thermo-couple lead for condition.

(3) Accessory Section.

(a) Turbo-oil tank (fill to screen).

(b) Propeller feathering tank (fill to neck).

(c) Turbo oil cuno filter (rotate 3 to 5 turns).

(d) Electrical connections for condition and safetying.

(e) Electrical conduits for condition.

(f) All fuel and oil lines and connections for leaks while props are turning.

(g) Rear sump plug for safetying.

(h) All ground bonding for security of attachment.

(i) Freedom of movement of mixture and throttle linkage.

(j) Synchronization bar for proper operation.

(k) Master control and fuel injection pumps for leaks with propeller turning.

(l) Accessory section for general condition and cleanliness.

(4) Engine nacelle (exterior).

(a) Engine cowling for security of mounting and general condition.

(b) Engine primer (overflow).

(c) Cowl flaps, inter cooler and oil cooler flaps for condition, safetying and operation.

(d) Transition stacks for freedom of movement.

(e) Turbo bucket wheel for freedom of rotation.

(f) Waste gate for proper operation.

(g) Shrouds for general condition (if installed).

(h) Air scoop free of foreign objects.

(i) Access doors for proper fit and security.

(j) General condition and cleanliness of engine nacelle.

b. Tail Gunners. Will check aft pressurized and unpressurized areas, tail compartment and lower turrets.

(1) Aft pressurized areas.

(a) Pressure bulkhead doors for fit and seal.

(b) Ditching braces properly stowed.

(c) Emergency cabin pressure release "T" handle properly safetied.

(d) Aft bomb bay salvo switch safetied OFF.

(e) Aft bomb bay compressor circuit breaker ON.

(f) Anti-icer fluid tank filled to 20 gallons.

(g) Cabin pressure regulator knurled knob should be screwed down for all ground operation.

NOTE: Knurled knobs will be in the full up position for all normal pressurized flights.

(h) Interior lights for proper operation and 100% replacement of bulbs.

(i) Fire extinguisher properly stowed and seal intact.

(j) Control cables for condition and routing.

(k) Vacuum relief valve for freedom of movement.

(l) Emergency cabin pressure release valve fully closed.

(m) Chemical toilet for insert and adequate paper.

(n) Check all oxygen gages in rear pressurized compartment for approximately 425 to 450 pounds PSI.

(o) All trouble lights, installation and operation.

(2) Aft Unpressurized area.

(a) Escape hatch and rear entrance door for proper fit.

(b) Fire extinguisher properly stowed and seal intact.

(c) Interior lights for proper operation and 100% replacement of bulbs.

(d) APU fuel and oil quantity.

(e) Control cables for condition and routing.

(f) Interphone for proper operation (if stalled).

(g) Tail gunners pressure bulkhead door for fit and seal.

(h) All loose equipment secured.

(i) Battery overflow lines and jar for condition and security of mounting.

(3) Tail gunners compartment.

(a) Oxygen gage for approximately 425 to 450 pounds PSI.

(b) Trouble light for installation and operation.

(c) Escape hatch for security and seal.

(d) Walk around bottle, for condition and installation, and filled to approximately 425 to 450 pounds PSI.

(e) Plexiglass for cleaniness and cracks.

(f) First aid kit installed and seal intact.

(4) Lower turrets.

(a) Domes for security.

(b) Gun covers installed (except for gunnery mission).

(c) Properly stowed and latching solenoids engaged.

NOTE: If gunnery mission, turrets will be stowed in "hot" position, until just prior to boarding aircraft.

(d) Dome access door secured.

B. B-50 ENGINEERING PRE-FLIGHT.

29. TOP GUNNER. Top side of aircraft.

a. Escape hatches for condition and security.

b. Tail heater air intake for condition and presence of foreign objects.

c. Both upper turrets for proper stowing, both turret domes securely latched (locking wires engaged and handles locked; also J pins engaged when applicable); TDM brakes manually locked or latching solenoids when applicable; all six gun covers on and clamps tight except on gunnery mission; all access doors closed and securely fastened.

d. CFC blister and astro dome for cracks, security and cleanliness (clean if necessary).

e. Life raft doors securely latched (pull on each door) and release handles safety wired; rafts installed (if over water flight), and inspection date on tag in window.

f. All antennae and masts for security and cleanliness.

g. Slipway doors for condition and security (B-50D).

h. Sun shields for TAS indicator air intakes near UFT for condition and security.

i. All light covers for general condition.

j. Proper installation of engine cowling; condition of exhaust stacks; general security and cleanliness of power plants.

k. Upper surface of wings, wing flaps, control surraces and tabs for loose rivets, torn fabric or buckling that might be evidence of structural failure.

l. Fuel filler caps for condition of seals and security (including skate tanks).

30. LEFT GUNNER. Responsible for checking aft bomb bay and rear pressurized compartment.

a. Aft Bomb Bay. Check the following:

(1) Down locks installed. (External safety lock open).

(2) Hydraulic reservoir for proper fluid level.

(3) Circuit breakers on wing flap relay motor shield "IN."

(4) Portable emergency motor for proper installation.

(5) Main landing gear hand cranks for installation.

(6) Landing gear emergency clutch "T" handles in place.

(7) Condition of bomb bay door air compressor.

(8) Condition of normal bomb door operating mechanism.

(9) Condition of emergency bomb door operating mechanism.

(10) All control cables, pulleys and fairleads for condition and freedom from any object that might cause binding.

(11) All electrical connections for security.

(12) All fuel and hydraulic lines, hoses and units for leaks.

(13) Security of loading and lashing.

(14) Bomb bay fuel tank cap securely latched.

(15) All bomb bay lights operational

(16) Fuel manifold drain cock for full closed position.

b. Rear Pressurized Compartment.

(1) Operational condition of bulkhead door at station number 646.

(2) Salvo switch at station 646 safety wired to "OFF" position; safety switch "OFF" and circuit breakers "IN."

(3) Condition and stowing of walk around oxygen bottles.

(4) Tunnel baffle door for operational condition.

(5) Proper stowing of emergency bomb door closing ratchet jack handle; access door closed and latched.

(6) "T" handle safety wired "IN" for emergency cabin air pressure release valve.

(7) All electrical equipment connections and circuit breakers for condition, security and normal position.

(8) Installation and condition of first aid kits (seal intact).

(9) At least one operational aldis lamp stowed in rear pressurized compartment.

(10) All interior lights operational with spare bulbs available.

(11) All control cables, pulleys and fairleads for condition and freedom from any object that might cause binding.

(12) Cabin pressure regulator handle safety wired to the open or automatic position.

(13) Left and right exciter regulators for condition, security of mount, electrical connections, regular fuses and spare fuses available.

(14) Fire extinguisher for proper stowing and seal not broken.

(15) UAT well cover and access door properly seated and latched.

(16) Chemical Toilet - liner inserted, paper available.

(17) Camera door by-pass valve in closed position (Ground Safety) and hand crank stowed.

(18) Emergency cabin air pressure release valve for proper position.

(19) Vacuum relief valve for freedom of movement.

(20) No loose or unnecessary equipment in rear pressurized compartment such as ammo cans, etc.

(21) Oxygen pressure in rear pressurized compartment, indicator should read between 425 - 450 pounds PSI.

(22) All trouble lights, installation and operation.

31. RIGHT GUNNER. Responsible for checking forward bomb bay and lower turrets.

a. Forward Bomb Bay. Check the following:

(1) External safety latch (safe or out position).

(2) Down locks installed.

(3) UFT well cover and access door properly seated and latched.

(4) All bomb bay lights operational.

(5) Bomb door air compressor for condition.

(6) Condition of emergency bomb door operating mechanism.

(7) Condition of normal bomb door operating mechanism.

(8) All control cables, pulleys and fairleads for condition and freedom from any objects that might cause binding.

(9) All electrical connections for condition and security.

(10) All fuel and hydraulic lines, hoses and connections for signs of leaks.

(11) Cabin heaters and fuel panels for condition, security and signs of leaks.

(12) All D.C. circuit breakers atop center wing for normal position.

(13) Security of loading and lashing.

(14) Life rafts and Gibson girl installed (if over water flight).

b. Lower Turrets. Condition and security of turret domes; locking wires engaged and handles locked, also J pins engaged if applicable; all TDM brakes or latching solenoids manually engaged; turrets properly stowed; all access doors closed and securely latched; turret indicating lights out on airplane commanders instrument panel. (If on gunnery mission, guns will be pointed straight down until just prior to entering airplane).

32. TAIL GUNNER. Responsible for checking aft unpressurized and tail compartments.

a. Aft Unpressurized. Check the following:

(1) Operational condition of bulkhead door at station number 834.

(2) Operational condition of rear entrance door, and ditching bolts on door.

(3) Crash landing cushions installed on bulkhead number 834.

(4) Safety belts installed on floor at station number 834.

(5) All lights operational in unpressurized section.

(6) Fire extinguishers for security and seal intact.

(7) Battery condition; security of quick disconnect fitting and contents and security of overflow jar.

(8) Vacuum panel for condition and all circuit breakers in normal position.

(9) APU for condition, security and oil servicing; security of oil cap; signs of fuel leaks; asbestos covering on exhaust pipe; emergency starting rope aboard; cleanliness of drip pan under APU.

(10) Condition of APU heater and fuel leaks from APU to tail thermal heaters.

(11) Hydraulic leaks in rudder boost system (very important as oxygen bottles are beneath these units.)

(12) Tail skid condition (if applicable).

b. Tail Compartment.

(1) Check entrance door for operational condition.

(2) Emergency escape window for condition and security.

(3) Tail auxiliary heater switches off and circuit breakers pulled.

(4) Installation and condition of fire extinguisher; seal intact.

(5) Tail cabin pressure regulator full open (knob up) and safety clip inserted.

(6) Tail altimeter for condition and security.

(7) Oxygen walk around bottle for pressure, condition and stowing.

(8) Tail oxygen pressure reading (425 - 450 pounds PSI).

(9) Security of gunnery equipment.

(10) Installation of first aid kit (seal intact).

(11) Free air duct valve for movement.

(12) Plexiglass for cleanliness (clean if necessary).

(13) Trouble light - installation and operation.

33. ENGINE OPERATIONAL CHECK. ALL FOUR GUNNERS IN COORDINATION WITH THE FLIGHT ENGINEER - One gunner stationed under each engine and any crew member under the nose wheel well to relay instructions called by the flight engineer as outlined below.

NOTE: If only three gunners are present, engines will be checked in pairs with the third gunner at the nose wheel well station relaying instructions.

a. Fuel Check. Check the following: That fuel is draining from each fuel trap drain line. For leaks at all boost pumps, fuel stainers, valves and lines at trailing edge of wing, rear bomb bay, center wing and heater panel.

b. Cowl, Oil and Intercooler flaps. Check for freedom of operation, full range of travel and behind each flap for any abnormal condition such as burns, leaks, breaks, etc.

c. Induction System. The following motors in sequence as called by the engineer:

(1) Waste gate closed (check with light).

(2) Cruise valve closed.

(3) Cruise valve open.

(4) Surge bleed (automatic).

(5) Surge bleed (manual).

(6) Take off pre-heat (surge bleed motor runs).

(7) Normal pre-heat (surge bleed motor runs).

(8) Cruise valve closed.

(9) Cruise valve open.

(10) Surge bleed valve closed (check visually).

(11) Waste gate open (check with light).

(12) Check turbo by-pass doors for freedom of movement (use dip stick).

(13) Check the compressor wheel for end play, freedom of rotation and for balance.

(14) Turbo oil tank for quantity and copy engaged.

d. Light Check.

(1) Two landing lights.

(2) The navigation lights - wing tip and tail.

(3) Three wheel well lights.

(4) Two taxi lights (if applicable).

SECTION IV

CREW INSPECTION

At the aircraft commander's order "remove down locks and prepare for crew inspection," the left gunner will remove left main gear down lock and down locks from the left side of the bomb bays. The right gunner will remove the right main gear down lock and down locks from the right side of the bomb bays. Top gunner will remove the nose gear down lock. The down locks will be placed in line with the rest of the equipment. The crew will line up behind their personal and emergency equipment for inspection. (Oxygen equipment, parachute, life vest, dinghy, etc.) At the aircraft commander's order to board the aircraft, gunners will load down locks, spare parachutes, and auxiliary equipment. Top gunner will be responsible for stowage of auxiliary equipment in the aft pressurized compartment. Tail gunner will be responsible for stowing down locks, ladder and auxiliary equipment in the aft pressurized compartment. Tail gunner will be responsible for stowing down locks, ladder and auxiliary equipment in the aft unpressurized compartment so that it will not interfere with the operation of the lower aft turret, movement of the bulkhead doors, escape hatches, and control cables. Left and right gunners will go immediately to their stations and check in on interphone.

SECTION V

BEFORE TAKE OFF CHECKS

A. BEFORE STARTING ENGINES.

34. At the aircraft commander's order to board aircraft, gunners will manually stow the lower turrets to normal stowed position if they have previously been stowed "HOT."

35. The tail gunner will start the APU immediately when the battery switch is turned on and then go to the tail compartment for station check. After station check, return to take off position, back against the bulkhead of station 834.

36. Right and left gunners go immediately to take off stations and go on interphone.

37. Top gunner will place the bomb bay tank safety switch to the position directed by the bombardier and the bomb door safety shut-off valve (if installed) to the UNSAFE position. The right

gunner will report by interphone, "Bomb bay tank safety switch in _____ position" and if installed, "Bomb door safety shut-off valve in the _____ position."

38. When the pilot calls for interphone check, the gunners will check-in following order: Top gunner will report after the last man in the forward compartment, then the left gunner, right gunner, radio and/or radar operator and tail gunner.

39. FLIGHT CONTROL CHECK. At the pilots order, "check flight controls" controls will be checked in the sequence called for by the pilot. Left gunner will report first.

B. STATION CHECK. On order from aircraft commander "station check" top gunner will report after the last man in the forward compartment, then left gunner, right gunner, radio and/or radar operator and tail gunner. The following form will be used when reporting in: "_____ gunner alarm bell and phone call light OK, oxygen pressure _____ pounds, normal, normal station check complete, ready for take-off, sir."

C. ENGINE STARTING ALERT. Left and right gunners will be on the alert while engines are being started. Fireguards will be reported in the following manner: "Fireguard on number _____ engine, sir." Any abnormal operation of engines will be reported immediately to the flight engineer.

NOTE: On B-50 type aircraft, there will be a rudder boost check after engines have been started, in the following manner: Rudder full right, trim tab locked, sir." and then "Rudder neutral, sir." Top gunner will check hydraulic fluid level, and report quantity to flight engineer. Reservoir is atop the center wing section on the right side of the aft bomb bay.

D. TAXI ALERT. This is notification that the aircraft is ready to taxi.

40. Gunners should be in position with safety belt fastened.

41. Any obstructions of unusual operation of the aircraft should be reported to the pilot.

42. Gear and tire check. Immediately after starting to taxi, left gunner should check the left gear and tires for condition and then report by interphone: "Left gear and tires look OK, sir." Right gunner should check the right gear and tires for condition and report: "Right gear and tires look OK, sir."

E. ENGINE RUN-UP. Left and right gunners will closely observe operation of the engines during run-up, and report any unusual operation to the flight engineer.

F. WING FLAP REPORT.

43. Pilot will say over interphone "Wing flaps coming down" then the gunners will report:

a. "Left flap coming down, sir."

b. "Right flap coming down, sir."

44. The flaps will be run full down and the gunners will report:

a. Left flap full down, sir."

b. "Right flap full down, sir."

45. The flaps will be raised and the gunners will report:

a. "Left flap coming up, sir."

b. "Right flap coming up, sir."

46. The flaps will be raised to 25° and the gunners will report:

a. "Left flap about 25°, sir."

b. "Right flap about 25°, sir."

G. TAKE-OFF ALERT. The pilot will give the command "Crew check in for take-off." The crew will report in the same order as previously used. They will at this time have safety belt fastened or be in a reasonable crash landing position if not in their normal crew position. All equipment will be stowed ready for takeoff.

SECTION VI

TAKE-OFF AND IN-FLIGHT DUTIES

A. TAKE-OFF.

47. TAKE-OFF ROLL. During take-off, left and right gunners will closely observe the engine operation. Any abnormal operation will be reported immediately to the flight engineer. A full power check will be made during the first one-third of the runway.

a. Left gunner will report "One and two looking OK, sir."

b. Right gunner will report "Three and four looking OK, sir." (or any discrepancies or unusual operation noted)

48. GEAR FLAP AND ENGINE REPORT. As soon as the aircraft is airborne and the gear and flaps start to come up, they will be reported in the following manner:

a. "Left gear coming up, sir."

b. "Right gear coming up, sir."

c. "Left flap coming up, sir."

d. "Right flap coming up, sir."

e. "Left flap and gear full up, nacelle doors closed, one and two look OK, sir."

f. "Right flap and gear full up, nacelle doors closed, three and four look OK, sir."

B. IN-FLIGHT DUTIES.

49. TAIL GUNNER.

a. Tail gunner will cut the putt-putt at the direction of the flight engineer.

NOTE: If APU heater is installed, cover will be closed after stopping APU.

b. Turn ON LAT safety switches.

c. Check tail skid for full up position (if applicable).

NOTE: In the absence of the tail gunner, a crew member will be designated to perform above duties.

50. BLISTER GUNNERS.

a. Left and right gunners will observe operation of the engines at all times, and a report will be made to the flight engineer every half hour, unless otherwise directed by the aircraft commander. (An aldis lamp will be used during hours of darkness for all engine checks and gear and flap operation.)

NOTE: "Where there's smoke, there's fire," does not hold true when you are considering aircraft power plants. Smoke may be caused by several conditions when no fire is present and in other cases, a fire may burn for some time before any smoke is visible from the outside of the engine nacelle. However, smoke from an engine nacelle is an indication that some unusual condition exists, and every case of smoke should be carefully considered. Generally speaking, black smoke is an indication of burning oil or fuel and white smoke is an indication of burning metal. By keeping these smoke identification features in mind during engine checks you can be of great assistance in preventing fire damage and possible loss of lives.

b. Gunners will be alert at all times for any unusual occurrences, or aircraft outside of the formation and report some to the aircraft commander.

c. Gunners will clear the pilot on all turns.

51. TOP GUNNER. Periodically check general condition of the top of the aircraft (open life raft wells, lights at night, tops of engines, turret domes, etc.).

C. IN THE AIR GUNNERY CHECK.

52. On combat missions gunnery checks will be accomplished prior to entering combat zone. On air-to-air or air-to-ground practice firing missions, turrets will not be operated until the aircraft is on the firing range. In the air gunnery checks will be accomplished on all flights regardless of the type of mission, (preferably at altitude). Practice transferring control of turrets, search and fire area techniques. The top gunner will clear with the flight engineer prior to turning on the RCT system. The top gunner will call for an in the air check of the RCT system and the system will be turned on one station at a time in the following order to prevent overloading the aircraft electrical system. On B-29s; tail, blister, nose then ring station. On B-50s; nose, blister, tail then ring station. No station will begin its switching procedure until the station preceding it has reported over interphone that switching has been completed.

NOTE: In the combat zone, the station first sighting enemy aircraft will turn on his system first, and all other stations will follow in the normal order.

53. RETIFLECTOR SIGHTING METHODS. a. The computer, which makes it possible to sight directly at the target and hit it, must have certain information to function properly. The Navigator or Engineer must put into the computer, through the Handset at his station, the Barometric Altitude within 500 feet, the outside temperature within 5°, and the Indicated Air Speed within 5 miles per hour. If the plane is in level flight, these inputs should be checked every 10 minutes; but, if the plane is taking evasive action, the information must be corrected more often.

b. The gunner, through the use of his sight, supplies the rest of the information to the computer by setting the target dimension dial, by framing the target with the reticle, and by tracing, which, through the gyroscopes, gives the computer the speed of the target with respect to the bomber. To put this information into the computer, it is imperative that the Gunner correctly use his sight by setting the target dimension dial exactly, framing the target accurately with the reticles and tracking it smoothly.

(1) To set the target dimension dial exactly, the Gunner must be able to recognize targets at a glance and at maximum range, thinking of them in terms of wingspan, without a second hesitation.

(2) To frame and track accurately and smoothly, the Gunner must have his body in a comfortable position and well braced, especially his upper arms, from elbow to shoulder. His wrists and fingers must have absolute freedom of movement. The position of the hands on the range wheels or grips should not be changed while tracking a target.

c. The following sighting tips should prove helpful:

(1) Keep the head several inches back of the sight with both eyes open.

(2) If the target dimension dial has been incorrectly set and there is not time to change it during an attack, the correction can be made in framing. If the dial setting is larger than the actual wingspan, keep the reticle circle a little beyond the wingtips; if the dial setting is too small, let the wingtips overlap the circle slightly.

(3) If a target is seen from the side rather than head-on, a correction can be made by keeping the reticle circle slightly beyond the ends of the fuselage since, on most fighter planes, the fuselage is somewhat shorter than the wingspan .

(4) If the center dot of the reticle gets off the target, it should be moved back smoothly.

(5) If the Gunner's own aircraft is in an evasive action, he should continue to track smoothly keeping the target framed.

(6) In changing from one target to another, slew the sight quickly. When the sight is on the new target, wait a second or two (longer if possible) before firing in order to give the computer time to set up corrections for the new target.

54. SWITCHING PROCEDURE. Each sighting station will turn on his control box switches in the following order:

a. Press circuit breakers to reset.

b. Turn auxiliary power ON or Uni-switch to WARM-UP. Wait ten seconds before turning on next switch.

c. Turn AC power ON or Uni-switch to STAND-BY. Check the sight for proper operation. Wait ten seconds before turning on next switch.

d. Turn turret power ON or Uni-switch to OPERATION. If the UFT power switch is on the ring control box, wait ten seconds then turn UFT turret power switch ON.

e. Turn computer in-out switch to IN. This is done at OPERATION position on the Uni-switch.

f. Turn computer stand-by switch to IN.

g. Turn camera junction box switch on as needed (if installed).

h. Turn the gun safe-fire switch to FIRE or Uni-switch to COMBAT, if you are over the firing range or going to test fire the guns for a combat mission.

55. IN THE AIR OPERATION CHECK. See that all sights and turrets operate properly on primary, secondary and tertiary control combination. On combat missions, test fire from primary station only.

56. STOWING PROCEDURE. To stow the turret, keep the action switch closed, move the turret to the desired position, turn the turret power switch OFF or Uni-switch to STAND-BY and then release the action switch.

a. If the guns are not to be fired, stow them in normal stowed position and turn all switches OFF. (UFT 0° azimuth and 0° elevation, UAT 180° azimuth and 0° elevation. Tail-turret 180° azimuth and 0° elevation. LAT 180° azimuth and against the upper limits in elevation).

b. If on a combat mission, stow the turrets, turn the Uni-switch to STAND-BY or gun safe-fire switch SAFE and turret power switch to OFF. Computer stand-by switch to STAND-BY. On entering the combat zone, all switches will be turned ON. Computer STAND-BY switch to IN.

c. Firing in Combat.

(1) When the target's wingtips just touch the smallest reticle circle with the target dimension dial set at 35 feet, the target range is 1200 yards; for planes with a larger wingspan about 1500 yards.

(2) In a nose attack, begin firing as soon as the target is seen. The closing rate in this type of attack can be as high as 1000 feet per second, which means the duration of the attack may be only 3-1/2 seconds.

(3) Fire bursts as specified and avoid overheating the guns which cause cook-offs and burning out barrels.

d. On Gunnery Training Missions.

(1) Gun safe-fire switch will not be placed to FIRE or Uni-switch will not be placed to COMBAT position before entering the range or before being notified by the aircraft commander to do so.

(2) After each pass over the firing range, the gun safe fire switch will be placed to SAFE or Uni-switch placed to OPERATION position. Action switch will be held closed and guns pointed to a clear area while not actually firing and until next pass. Action switch is held closed to prevent stowing circuit from raising lower guns or lowering upper guns. (prevent damage due to cook-offs)

(3) All firing will be in bursts of twenty rounds or less. The interval between each burst should be thirty seconds. After ten bursts have been fired, the guns will be cooled for a minimum of five minutes before firing is resumed.

(4) After firing has been completed, guns will be stowed to the COOLING position (UFT 0° azimuth and plus 45° elevation. UAT 0° azimuth and plus 45° elevation. UAT 0° azimuth and plus 45° elevation. Tail against either azimuth limit stop. LAT 0° azimuth and minus 45° elevation. LFT 0° azimuth and minus 45° elevation).

(5) After the guns have cooled a minimum of thirty minutes, they should be moved to the normal stowed positions except tail turret which will be stowed 180° azimuth and plus 30° elevation.

(6) No gunner will leave his sighting station after firing without first stowing his turret in the colling position and turning OFF the TURRET POWER. This stipulation applies especially to training missions during which gunners alternate positions.

NOTE: Local regulations for certain air-to-ground gunnery ranges are different. Gunners should check to make sure they know all regulations pertaining to the gunnery range being utilized by their aircraft.

57. SAFETY PRECAUTIONS. a. Before transferring control of a turret to another gunner, ALWAYS notify him and receive an acknowledgement so that he can release his trigger. This applies also to the Blister Gunners in switching control of the lower aft turret.

b. In taking control of a secondary turret, ALWAYS RELEASE YOUR TRIGGER while the turret is swinging into correspondence with your sight. This is a safety precaution in the event of a malfunction of the OOSFI.

c. If the Nose Gunner is using the upper forward turret, he must not release his ACTION SWITCH without first notifying the Top Gunner. Even with the IN-OUT switch for the upper forward turret in the IN position, control of this turret will go to the Top Gunner (RCT) if the Nose Gunner releases his ACTION SWITCH.

d. The Gunner must realize that while he is tracking and firing at a target, the computer may be putting corrections into the guns pointing them ahead of the line of sight as much as 11 degrees. (The computer can make corrections up to 200 mils). For this reason, he must allow a safety zone of one clock angle around every bomber in his formation and release his triggers as soon as his sight gets into this zone.

NOTE: If the Gunner has to make a choice between letting an enemy fighter go and running the risk of firing into a friendly aircraft, he should let the enemy fighter go every time.

e. If the Gunner gets a "Runaway Gun," he should:

(1) Point the guns away from his own airplane and all other planes in the formation.

(2) Turn the gun switch to SAFE. (This may stop the gun).

(3) If this proves ineffective, turn the gun switch to FIRE and be ready to operate the other gun(s) in the turret when the runaway gun stops.

58. EMERGENCY SIGHTING METHODS.

a. If The Computer Breaks Down. The computers on the B-29 and B-50 are sturdily built and protected by flak plate; you should rarely have a case of computer failure during combat.

But if your computer should break down, you can still use the sight as an extremely accurate ring sight for applying the rules of position firing. Since the size of the ring is adjustable by moving the target size knob, you can use it to lay off accurate deflection, which will take into account your exact true air speed. IF YOUR COMPUTER FAILS, FOLLOW THESE RULES:

(1) Turn the computer switch off and the computer standby switch to "STANDBY."

(2) Ask the navigator for your true air speed, then set your target dimension dial according to the table printed on page 40. (Be sure a copy of the figures is pasted up at your sighting station, so that you will not have to rely on memory. The figures vary from station to station to allow for the distance between the sight and the guns.)

(3) Turn the range wheel or grip until the reticle circle is full size. On pedestal sights, pull out the range wheel to keep the setting.

(4) Use the sight like an ordinary optical sight to apply the standard rules of position firing, with this one exception--for planes attacking at 90°, allow 2-1/2 rads deflection instead of 3. (This gives a more accurate deflection at the B-29 or B-50's high speeds.) At 45° use 2 rads, 22-1/2° use 1 rad, at 11-1/4° use 1/2 rad and at 0° use 0 rads.

(5) If your bomber is moving along steadily and not taking evasive action, use the standard rule of laying off deflections between the fighter and your tail along the fighter's line of apparent motion.

(6) If you are taking evasive action, lay off the deflection along an imaginary line between the fighter and the point on the horizon toward which your tail is pointing.

(7) Start firing at the opening range recommended for position firing with the B-29 or B-50 in your theater. Pasteups of fighters should be provided on your window to show how big they look at 800 yards, the range at which you will usually start firing for keeps.

(8) On the breakaway of an attack, if the fighter seems to hang motionless in the air, hit him by using this system:

(a) Top or tail gunner: Aim point blank.

(b) Nose or side gunner: Aim one-half wingspan toward the nose of the bomber.

HOW TO SET THE TARGET SIZE KNOB
FOR POSITION FIRING IN THE B-29 OR B-50

TRUE AIR SPEED OF BOMBER	TOP GUNNER OPERATING		NOSE GUNNER OPERATING	SIDE GUNNER OPERATING			TAIL GUNNER OPERATING
	UPPER AFT TURRET	UPPER FORWARD TURRET	UPPER OR LOWER FORWARD TURRET OR BOTH	LOWER AFT TURRET	LOWER FORWARD TURRET	TAIL MOUNT	TAIL MOUNT
200 mph	51 ft	62 ft	51 ft	48 ft	62 ft	41 ft	51 ft
225 mph	58 ft	68 ft	58 ft	56 ft	68 ft	49 ft	58 ft
250 mph	66 ft	75 ft	66 ft	63 ft	75 ft	57 ft	66 ft
275 mph	73 ft	81 ft	73 ft	71 ft	81 ft	66 ft	73 ft
300 mph	80 ft	87 ft	80 ft	78 ft	87 ft	74 ft	80 ft
325 mph	88 ft	94 ft	88 ft	86 ft	94 ft	82 ft	88 ft
350 mph	95 ft	maximum	95 ft	94 ft	maximum	90 ft	95 ft

You may frequently have trouble setting the dial to the exact figure shown here. In that case, set it as nearly correct as possible. A difference of one or two points will not seriously effect your aim.

NOTE: The above chart is not applicable for use with sights having 75-foot limitation of target dimension dial.

b. If The Reticle Bulb Burns Out. If both filaments of your reticle bulb burn out and you have no spare, you will have to rely on an emergency ring and post sight which you will find mounted on the optic head where it can easily be pulled into position. This emergency sight is too small to use as a ring sight for laying off deflections in rads. Its only value is as a reference point to show where your guns are pointing.

D. BEFORE LANDING DUTIES.

59. TOP GUNNER. Top gunner will be responsible for proper stowing of the turrets.

a. If ammunition has not been fired, turrets will be stowed to their normal position.

b. If ammunition has been fired, the upper turrets will be stowed at 0° azimuth and plus 45° elevation. Tail turret will remain at 180° azimuth and plus 30° in elevation. The lower turrets will be left in their normal stowed position. Check that turret stowing indicator lights on aircraft commanders instrument panel are OFF.

c. The top gunner will be responsible for the stowage of all auxiliary equipment in the aft pressurized section.

d. Assume landing position, sitting on the floor of the rear pressurized compartment with back against the forward pressure bulkhead (safety belt fastened if installed) and remain in position until the aircraft is parked.

60. TAIL GUNNER. a. The tail gunner (or designated crew member) will start the APU on direction from the flight engineer.

b. Turn the LAT safety switches OFF.

c. Check extension of the tail skid (if installed) after gear is lowered.

d. Assume landing position. The tail gunner will be on interphone during landing. Assume landing position with back braced against the rear side of the aft pressure bulkhead. (Safety belt fastened if installed) and remain in position until the aircraft is parked.

61. BLISTER GUNNERS. a. Landing Gear Report.

(1) Soon after entering the traffic pattern, the pilot should say over interphone, "Gear coming down." The left and right gunners will check the main gear and report in order:

(a) "Left gear coming down, sir."

(b) "Right gear coming down, sir."

(2) Observe by the mark on each gear and/or by the action of the drag link, when the gear is full down, and report in order:

(a) "Left gear full down, sir."

(b) "Right gear full down, sir."

NOTE: On free-fall type gear, only the full down report will be given.

b. Flap Report.

(1) After the landing gear is full down, the flaps will be run down to 25°, and the gunners will report in order:

(a) "Left flap coming down, sir."

(b) "Right flap coming down, sir."

(2) After the flaps reach 25°, the gunners will report in order:

(a) "Left flap about 25°, sir."

(b) "Right flap about 25°, sir."

(3) On the final approach, the flaps will be lowered to the full down position, and the gunners will report in order:

(a) "Left flap coming down, sir."

(b) "Right flap coming down, sir."

(4) When flaps reach full down position, the gunners will report in order:

(a) "Left flap full down, sir."

(b) "Right flap full down, sir."

c. Landing Position. Left and right gunners will remain in positions with safety belts fastened. Make sure that everything at their station is ready for landing. Gunners will remain in position until after the aircraft is parked.

E. POST FLIGHT CHECKS.

62. FLAP CHECK. After turning off of the runway, the flaps will be raised. Gunners will report their movement in the normal manner.

63. BOMB DOORS. When the bombardier opens the bomb doors, they will be checked for the full open position and reported over interphone by either left or right gunner.

64. BOMB DOOR SAFETY VALVE (if installed). After the bomb bay doors have been opened and the aircraft is parked, the top gunner will enter the rear bomb bay and move the safety shut off valve to the SAFE position and report on interphone.

65. CAN-SALVO SWITCH OR TANK SAFETY SWITCH (if used). The top gunner will place the rear bomb bay can-salvo or tank safety switch to the off position, and report same on interphone.

66. Gunners will check off interphone before leaving the aircraft.

67. DOWN LOCKS. As soon as the engines are cut, the putt-putt will be shut off on direction of the flight engineer and the down locks will be installed. If ground crew is not present, install wheel chocks and wheel covers.

NOTE: External bomb bay safety latch must be open before bomb door down locks are installed. (If equipped)

68. Turn all turret safety switches OFF.

69. Clear guns (if ammunition was loaded). The gunners will remove domes, clear the guns and attempt to determine the cause of any malfunction that may have occurred.

CAUTION: Extreme care must be exercised while clearing the guns to prevent any accidental firing of the guns.

70. Drain the air compressor accumulators.

71. Post flight crew inspection. The crew will line up on the left of the nose wheel in the same manner used at crew inspection, with all equipment. The gunners will at this time give the aircraft commander all discrepancies for entry in the Form 1. They will also report to the aircraft commander that down locks are installed and that the aft section of the aircraft has been properly cleaned.

72. If ammunition was fired, it will be necessary to remove brass and links from the upper turret well covers, field strip the guns and thoroughly clean them. This must be accomplished for three successive days to prevent rust and corrosion from forming in the guns.

73. REMOVAL OF GUN RECEIVER.

a. To remove a gun receiver from the turret after the turret dome and gun enclosures have been removed:

(1) Disconnect electrical and air hose connections to the gun chargers and the feed chute adapters to the gun.

(2) Loosen the two bolts on the front mount.

(3) Raise the muzzle end of the gun so that bolts clear the saddle.

(4) Push receiver to the rear to release the slide mount.

(5) Remove receiver from the turret, muzzle end first, being careful not to bend link chute attached.

b. The procedure for removing a receiver from the tail mount is similar except that the bottom nut of the rear mount must also be removed.

NOTE: If necessary to remove receivers, do not remove more than one receiver at a time from a turret. Upon replacing a receiver it must be aligned with the other receiver with the other receiver with a boresight tool. This is to keep the guns harmonized.

74. Replace and secure gun enclosures, turret domes, canvas gun covers, turret well covers, tail armor plate, well access doors, etc.

CHAPTER 3

EMERGENCY PROCEDURES

SECTION I

GENERAL

A. Full coordinated effort of each crew member is required during an emergency. Drill is the nearest reality to the actual accomplishment and should be practiced at every opportunity, so the crew will know every procedure, learn to move quickly and make every movement count.

B. A well trained crew will know the problem, and if properly disciplined, will react properly and efficiently under any condition.

C. The success of a survival depends critically on the following items:

1. Communications equipment; to send frequent and accurate position reports.

2. Water, medical supplies and food that is salvaged and accompanies the crew.

3. Crew discipline; this is vitally important.

4. The ability of the aircraft commander to cope with any emergency. With the above items in mind, plan for any emergency, time and circumstances permitting.

D. EMERGENCY SIGNALS.

5. Prepare to bail out: Three short rings on the alarm bell.

6. Bail out: One long sustained ring on the alarm bell.

7. Prepare for ditching or crash landing: Six short rings on the alarm bell.

NOTE: One sustained ring on take-off constitutes crash-landing signal.

8. Ditching or crash-landing: One long sustained ring on the alarm bell.

NOTE: If time and circumstances permit, the crew should be warned and acknowledgement received by interphone.

SECTION II

BAIL-OUT

A. Crew members will not bail out until the order is given by the aircraft commander. He will warn the crew by interphone and three short rings on the alarm bell to prepare for bail-out. The aircraft commander will depressurize, make sure the bail-out exits are clear and if possible, descend to 10,000 feet or below, then give the signal to bail out; one continuous ring on the alarm bell. At this time, the crew members will leave the aircraft.

B. Due to the different location of crew members, availability of the rear bomb bay for bail-out and the different location of the door joining the CFC and the radar compartment, the aircraft

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commander should give the proper sequence for leaving the aircraft and appoint a last man out of the rear, that is most practical for the type of aircraft used.

C. Bail-out of injured crew members: Parachute static lines will be used when installed. If there are no static lines installed and time permits, static lines should be improvised from available material. One end of the static line must be secured to the aircraft to insure positive pulling of the rip cord.

CAUTION: Use material strong enough to eliminate the possibility of the static line breaking without pulling the rip cord.

D. In the event of bail-out, the crew will proceed as follows:

9. The top gunner will proceed as follows:

a. When the signal to prepare for bail-out is given:

(1) Help prepare any injured crew members for bail-out.

(2) Help destroy secret or classified material.

(3) If bail-out through the rear bomb bay is possible, he will open the bulkhead door leading to the bomb bay.

(4) If bail-out through the rear bomb bay is impossible, he will take his proper position at the rear entrance door.

b. When the signal to bail out is given:

(1) If bail-out through the rear bomb bay is possible, notify the aircraft commander when the left and right gunners are out, and bail out immediately.

(2) If bail-out through the rear bomb bay is impossible, leave through the rear entrance door in the proper order.

10. The left gunner will proceed as follows:

a. When the signal to prepare for bail out is given:

(1) Help prepare any injured crew members for bail-out.

(2) Help destroy secret or classified material.

(3) If bail-out through the rear bomb bay is possible, he will take his proper position for exit through the bomb bay.

(4) If bail-out through the rear bomb bay is impossible, he will take his proper position at the rear entrance door.

b. When the signal to bail out is given: Exit from the aircraft in the proper order.

11. The right gunner will proceed as follows:

a. When the signal to prepare for bail-out is given:

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(1) Help prepare any injured crew members for bail-out.

(2) Help destroy secret or classified material.

(3) If bail out through the rear bomb bay is possible, he will take his proper position for exit through the bomb bay.

(4) If bail-out through the rear bomb bay is impossible, he will take his proper position at the rear entrance door.

NOTE: If removable blister is installed, gunner concerned will remove sight and blister on prepare-to-bail-out signal.

b. When the signal to bail out is given: Exit from the aircraft in the proper order.

12. The tail gunner will proceed as follows:

a. When the signal to prepare for bail-out is given:

(1) If in the tail gunner's compartment, come forward to the rear entrance door (secondary, rear bomb bay), if conditions permit.

(2) Help prepare any injured crew members for bail-out.

(3) Help destroy any secret or classified material.

(4) Take proper position at the rear entrance door (secondary, rear bomb bay).

b. When the signal to bail out is given:

(1) Exit from the aircraft in the proper order.

(2) If unable to go forward to the rear entrance door, it will be necessary to bail out of the tail compartment escape hatch.

E. When bailing out, brace your feet against the aircraft and roll out head first. If at high altitude, free fall until reaching approximately 10,000 feet; or if you feel yourself losing consciousness, whatever your altitude, open your parachute. If available, make sure your bail-out bottle is properly attached to your parachute and oxygen mask.

F. When over water and bail-out is necessary:

13. Wear your Mae West under your parachute, have your one-man raft secured to your parachute, and the raft lanyard under your parachute harness and secured to your Mae West.

14. Immediately prior to bailing out, jettison the extra raft (if carried), Gibson Girl radio (if available). Designated crew member will pull the life raft release handles and bail out as near the emergency equipment as possible.

15. The aircraft commander will, if possible, circle the aircraft, ordering men from both front and rear to bail out each time the aircraft passes over the equipment. If equipment is not available, this method will still put the crew in a small area where they can give aid to each other.

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16. When about 500 feet above the water, shove yourself as far back in the parachute harness as possible and unhook your leg and chest snaps, holding yourself in the parachute with your arms and shoulders. When under water, slip out of your parachute and swim free of the snroud lines.

NOTE: If using a quick-release type parachute, do not release it until you hit the water.

17. Inflate one side of your Mae West after returning to the surface, inflate your one man raft, secure all loose equipment, then try to locate other crew members.

SECTION III

CRASH LANDING PROCEDURES

A. The B-29 and B-50 aircraft can be crash-landed with a minimum of injury to the crew.

B. Gunnery crew members will perform the following last-minute preparations:

18. Drop all bombs, auxiliary bomb bay tanks and flares.

19. To prevent jamming, open all escape hatches except the bomb bay doors.

20. Drain the oxygen systems (if time permits).

21. Stop the auxiliary power plant.

22. Use all cushions, parachutes, etc, for padding wherever possible.

C. CREW PROCEDURE.

23. STANDARD B-29 AIRCRAFT.

a. Top Gunner.

(1) Acknowledge in turn, "TOP GUNNER PREPARING FOR CRASH LANDING."

(2) Remove the flak suit (if used) and parachute. Wear the flak helmet (if used), emergency kit, and gloves.

(3) Aid in jettisoning all unnecessary equipment.

(4) On order, "STATIONS FOR CRASH LANDING, IMPACT IN_____SECONDS," assume crash landing position in aft pressurized compartment, sitting on the floor, back braced against forward pressure bulkhead, on the right side. Use parachute and cushions for padding. (Fasten safety belt if installed.)

(5) When aircraft comes to rest, exit through rear escape hatch. Aid in removing injured crew members and emergency equipment.

b. Left Gunner.

(1) Acknowledge in turn, "LEFT GUNNER PREPARING FOR CRASH LANDING."

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(2) Remove the flak suit (if used) and parachute. Wear the flak helmet (if used), emergency kit, and gloves.

(3) Aid in jettisoning all unnecessary equipment.

(4) On order, "STATIONS FOR CRASH LANDING, IMPACT IN _____ SECONDS," assume crash landing position in seat, safety belt fastened, and feet out of the well. Brace with hands behind head. Use parachute and cushions for padding.

(5) When aircraft comes to rest, follow top gunner through rear escape hatch. Aid in removing injured crew members and emergency equipment.

c. Right Gunner.

(1) Acknowledge in turn, "RIGHT GUNNER PREPARING FOR CRASH LANDING."

(2) Remove flak suit (if used) and parachute. Wear the flak helmet (if used), emergency kit, and gloves.

(3) Aid in removing battery, APU, and camera. Jettison down locks and all loose equipment.

(4) On order, "STATIONS FOR CRASH LANDING, IMPACT IN _____ SECONDS," assume crash landing position in seat, safety belt fastened, and feet out of the well. Brace with hands behind head. Use parachute and cushions for padding.

(5) When aircraft comes to rest, follow radar operator through rear entrance door. Aid in removing injured crew members and emergency equipment.

d. Tail Gunner.

(1) Acknowledge in turn, "TAIL GUNNER PREPARING FOR CRASH LANDING."

(2) Remove flak suit (if used) and parachute. Wear the flak helmet (if used), emergency kit, and gloves.

(3) Aid right gunner and radar observer in removing battery, APU, and camera. Open upper escape hatch. (Check bulkhead door secured open.) Aid in jettisoning down locks and loose equipment.

(4) On order, "STATIONS FOR CRASH LANDING, IMPACT IN _____ SECONDS," assume crash landing position in aft unpressurized compartment, back against aft pressure bulkhead on left side. Use parachute and cushions for padding. (Fasten safety belt if installed.)

(5) When aircraft comes to rest, exit through rear escape hatch. Aid in removing injured crew members and emergency equipment.

NOTE: If tail gunner is in tail position: Jettison escape hatch, tail sight, and all loose equipment. Assume crash landing position in seat, safety belt fastened. Use parachute and cushions for padding. Exit through tail gunner's escape hatch.

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(6) Procedure for releasing tail gunner from the tail compartment, in case of injury.

(a) Open the door approximately one inch.

(b) Pull the hinge pin (lift the door slightly to prevent binding).

(c) Remove the wing bolts and access plate in the door.

(d) Move the door forward and remove it.

(e) Free the tail gunner's feet and place them near the centerline of the aircraft.

(f) Pull the rod down to release the seat.

(g) Pull the ring to raise the back of the seat.

(h) Unfasten the safety belt and remove the gunner.

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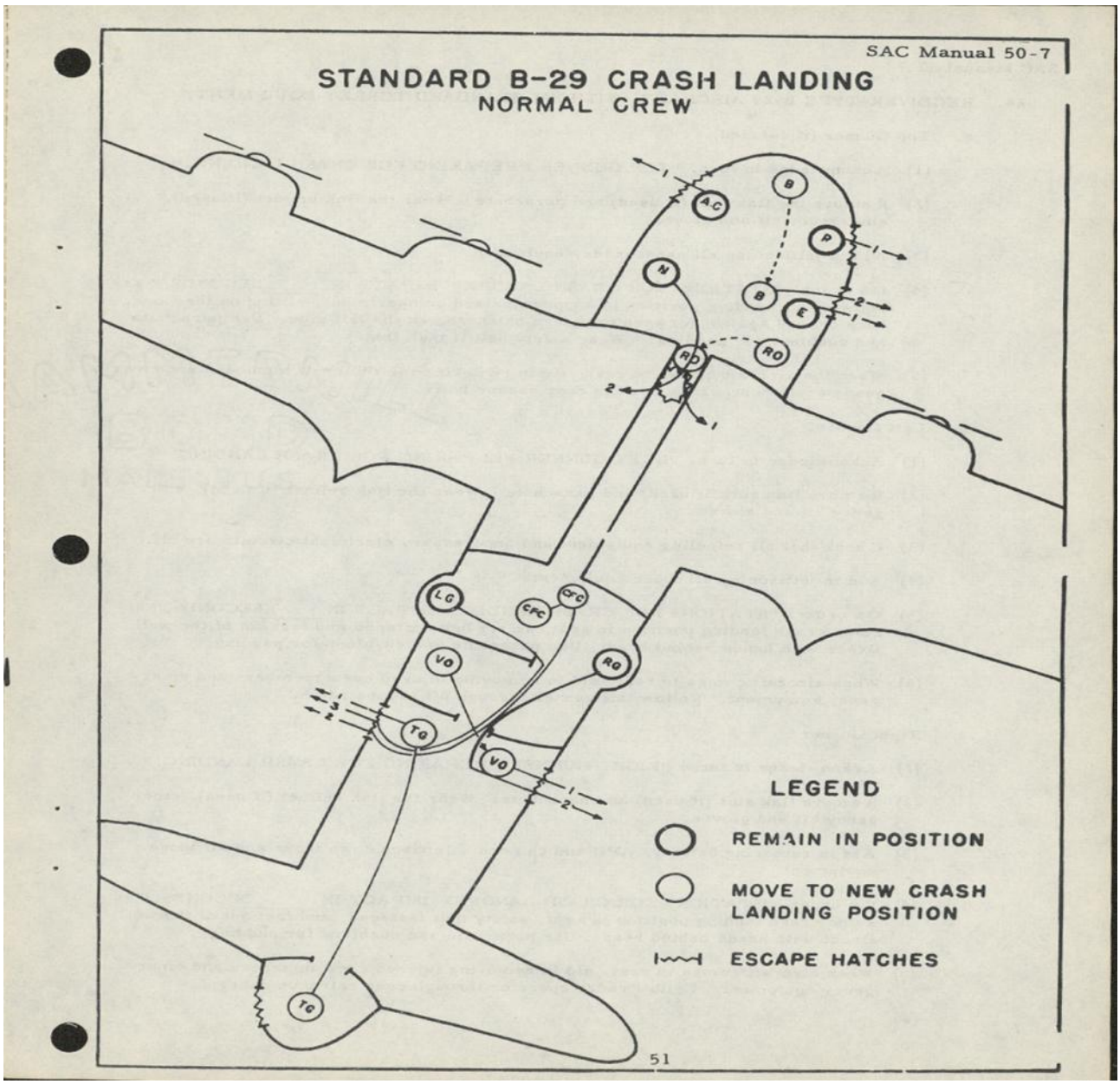

Page 53 (marked 51 in book) – Standard B-29 Crash Landing normal crew diagram

24. RECEIVER-TYPE B-29 AIRCRAFT, WITHOUT STANDARD TURRET EQUIPMENT.

a. Top Gunner (if carried).

(1) Acknowledge in turn, "TOP GUNNER PREPARING FOR CRASH LANDING."

(2) Remove the flak suit (if used) and parachute. Wear the flak helmet (if used), emergency kit and gloves.

(3) Aid in jettisoning all unnecessary equipment.

(4) On order, "STATIONS FOR CRASH LANDING, IMPACT IN _____SECONDS," assume crash landing position in aft pressurized compartment, sitting on the floor, back braced against forward pressure bulkhead, on the left side. Use parachute and cushions for padding. (Wear safety belt if installed.)

(5) When the aircraft comes to rest, aid in removing injured crew members and emergency equipment. Exit through rear escape hatch.

b. Left Gunner.

(1) Acknowledge in turn, "LEFT GUNNER PREPARING FOR CRASH LANDING."

(2) Remove flak suit (if used) and parachute. Wear the flak helmet (if used), emergency kit and gloves.

(3) Check that all refueling equipment and unnecessary electrical circuits are off.

(4) Aid in jettisoning all loose equipment.

(5) On order, "STATIONS FOR CRASH LANDING, IMPACT IN_____SECONDS," assume crash landing position in seat, safety belt fastened and feet out of the well. Brace with hands behind head. Use parachute and cushions for padding.

(6) When aircraft comes to rest, aid in removing injured crew members and emergency equipment. Follow tail gunner through aft escape hatch.

c. Right Gunner.

(1) Acknowledge in turn, "RIGHT GUNNER PREPARING FOR CRASH LANDING."

(2) Remove flak suit (if used) and parachute. Wear the flak helmet (if used), emergency kit and gloves.

(3) Aid in removing battery, APU and camera. Jettison down locks and all loose equipment.

(4) On order, "STATIONS FOR CRASH LANDING, IMPACT IN _____SECONDS," assume crash landing position in seat, safety belt fastened, and feet out of the well. Brace with hands behind head. Use parachute and cushions for padding.

(5) When aircraft comes to rest, aid in removing injured crew members and emergency equipment. Follow radar operator through rear entrance door.

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d. Tail Gunner.

(1) Acknowledge in turn, "TAIL GUNNER PREPARING FOR CRASH LANDING."

(2) Remove flak suit (if used) and parachute. Wear flak helmet (if used), emergency kit and gloves.

(3) Aid right gunner and radar observer in removing battery, APU and camera. Open upper escape hatch. Aid in jettisoning down locks and other loose equipment.

(4) On order, "STATIONS FOR CRASH LANDING, IMPACT IN _____SECONDS," assume crash landing position in aft unpressurized compartment, back against pressure bulkhead on left side. Use parachute and cushions for padding. (Fasten safety belt if installed.)

(5) When aircraft comes to rest, aid in removing injured crew members and emergency equipment. Exit through rear escape hatch.

NOTE: If tail gunner is in tail position: Jettison escape hatch, tail sight, and all loose equipment. Assume crash landing position in seat, safety belt fastened. Use parachute and cushions for padding. Exit through tail gunner's escape hatch.

(6) Procedure for releasing tail gunner from the tail compartment, in case of injury.

(a) Open the door approximately one inch.

(b) Pull the hinge pin (lift the door slightly to prevent binding).

(c) Remove the wing bolts and access plate in the door.

(d) Move the door forward and remove it.

(e) Free the tail gunner's feet and place them near the centerline of the aircraft.

(f) Pull the rod down to release the seat.

(g) Pull the ring to raise the back of the seat.

(h) Unfasten safety belt and remove the gunner.

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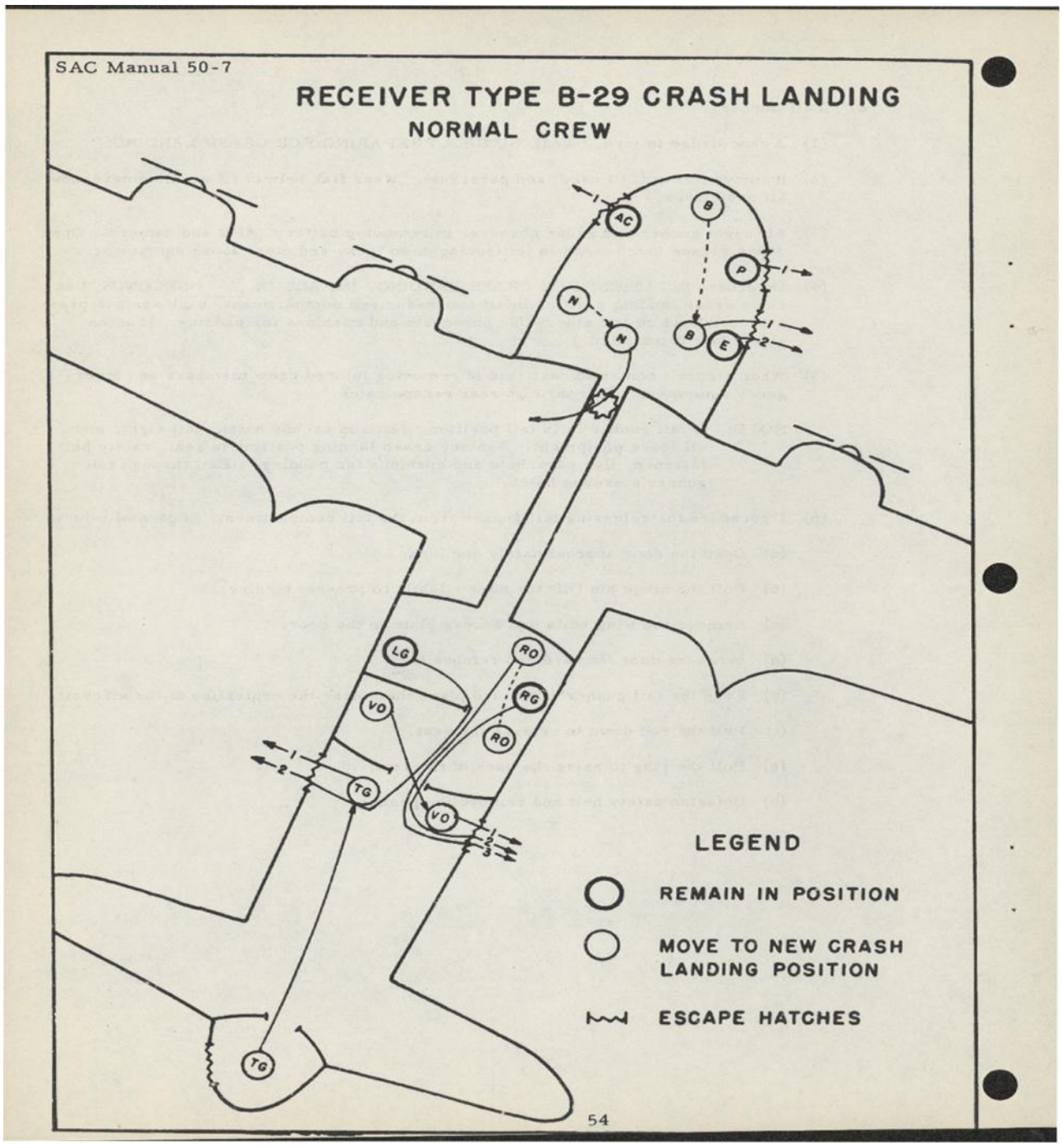

Page 56 (marked 54 in book) – Receiver Type B-29 Crash Landing Normal Crew diagram

25. B-50 TYPE AIRCRAFT.

a. Top Gunner.

(1) Acknowledge in turn, "TOP GUNNER PREPARING FOR CRASH LANDING."

(2) Remove the flak suit (if used) and parachute. Wear the flak helmet (if used), emergency kit and gloves.

(3) Aid in jettisoning all unnecessary equipment. Remove the top escape hatch by pulling the release lever.

(4) On order, "STATIONS FOR CRASH LANDING, IMPACT IN _____SECONDS," assume crash landing position in the aft pressurized compartment, sitting on the floor, back braced against forward pressure bulkhead, on the right side. Use parachute and cushions for padding. (Fasten safety belt if installed.)

(5) When aircraft comes to rest, exit through top escape hatch just inside rear entrance of tunnel (secondary exit through rear escape hatch). Aid in removing injured crew members and emergency equipment.

b. Left Gunner.

(1) Acknowledge in turn, "LEFT GUNNER PREPARING FOR CRASH LANDING."

(2) Remove the flak suit (if used) and parachute. Wear the flak helmet (if used), emergency kit and gloves.

(3) Aid in jettisoning all unnecessary equipment.

(4) On order, "STATIONS FOR CRASH LANDING, IMPACT IN _____SECONDS," assume crash landing position in seat, safety belt fastened and feet out of the well. Brace with hands behind head. Use parachute and cushions for padding.

(5) When aircraft comes to rest, aid in removing injured crew members and emergency equipment. Exit through top escape hatch just inside rear entrance of tunnel (secondary exit through rear escape hatch).

c. Right Gunner.

(1) Acknowledge in turn, "RIGHT GUNNER PREPARING FOR CRASH LANDING."

(2) Remove flak suit (if used) and parachute. Wear the flak helmet (if used), emergency kit and gloves.

(3) Aid in removing battery, APU and camera. Jettison down locks and all loose equipment.

(4) On order, "STATIONS FOR CRASH LANDING, IMPACT IN _____SECONDS," assume crash landing position in seat, safety belt fastened and feet out of well. Brace with hands behind head. Use parachute and cushions for padding.

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(5) When aircraft comes to rest, aid in removing injured crew members and emergency equipment. Exit through top escape hatch just inside rear entrance of tunnel (secondary exit through rear escape hatch).

d. Tail Gunner.

(1) Acknowledge in turn, "TAIL GUNNER PREPARING FOR CRASH LANDING."

(2) Remove flak suit (if used) and parachute. Wear the flak helmet (if used), emergency kit and gloves.

(3) Aid right gunner and radar observer and/or radio operator in removing battery, APU and camera. Open upper escape hatch. Aid in jettisoning down locks and loose equipment.

(4) On order, "STATIONS FOR CRASH LANDING, IMPACT IN_____SECONDS," assume crash landing position in aft unpressurized compartment, back against aft pressure bulkhead and left side. Use parachute and cushions for padding. (Fasten safety belt if installed.)

(5) When aircraft comes to rest, aid in removing injured crew members and emergency equipment. Exit through rear escape hatch.

NOTE: If tail gunner is in tail position: Jettison escape hatch, fire extinguisher, walk around oxygen bottle, tail sight and all loose equipment. Assume crash landing position in seat, safety belt fastened. Use parachute and cushions for padding. Exit through tail gunner's escape hatch.

(6) Procedure for releasing tail gunner from the tail compartment, in case of injury.

(a) Open the door approximately one inch.

(b) Pull the hinge pin (lift door slightly to prevent binding).

(c) Remove the wing bolts and access plate in the door.

(d) Move the door forward and remove it.

(e) Free the tail gunner's feet and place them near the centerline of the aircraft.

(f) Pull the rod down to release the seat.

(g) Pull the ring to raise the back of the seat.

(h) Unfasten safety belt and remove the gunner.

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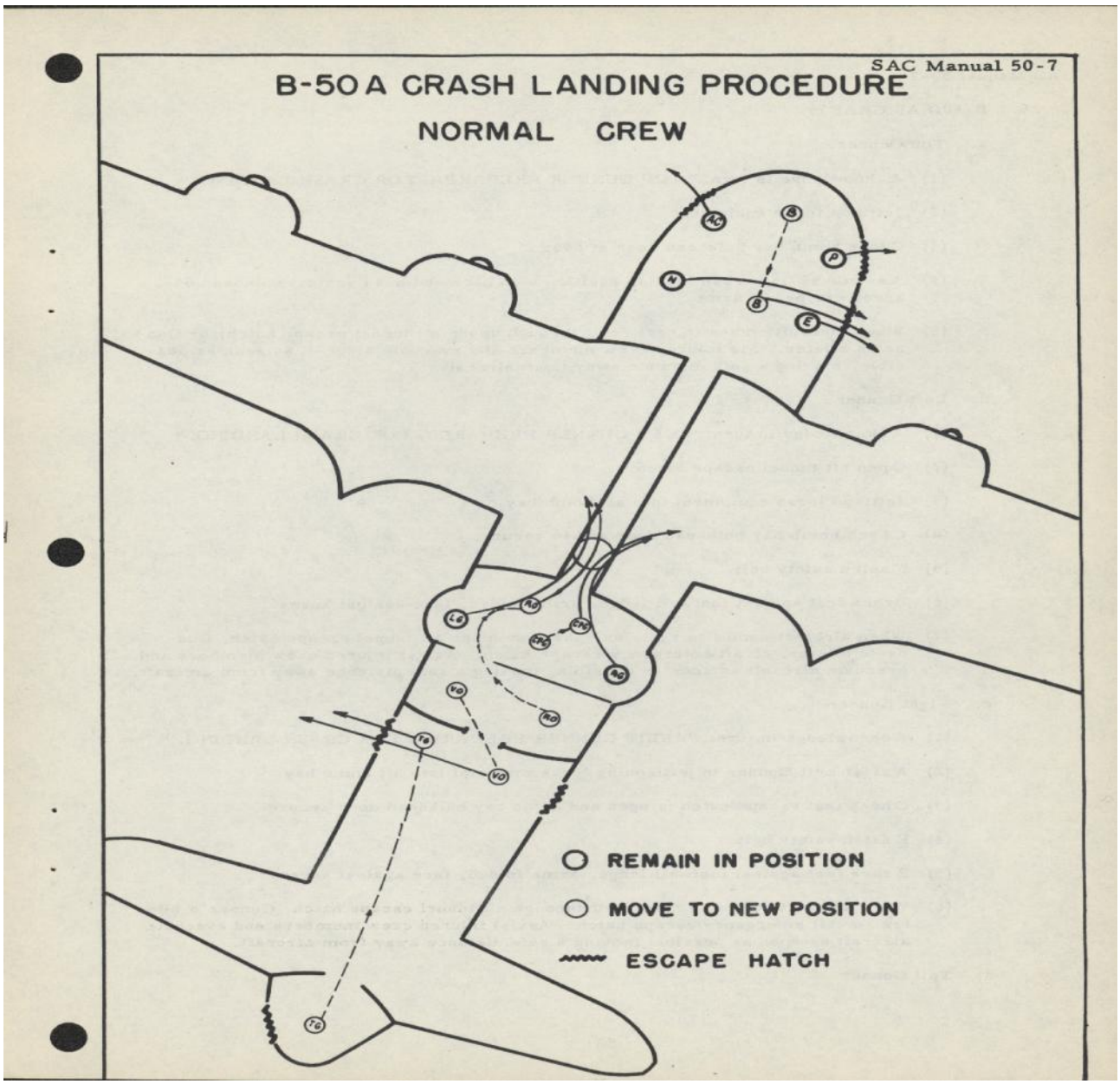

Page 59 – B-50 A Crash Landing Procedure Normal Crew diagram

26. B 50D AIRCRAFT.

a. Top Gunner.

(1) Acknowledge in turn, "TOP GUNNER PREPARING FOR CRASH LANDING."

(2) Jettison loose equipment.

(3) Close bomb bay bulkhead door at 646.

(4) Assume sitting crash landing position with back and head against bulkhead 646, knees clasped in arms.

(5) When aircraft comes to rest, exit through upper aft tunnel escape hatch, or Gunner's blister. Aid injured crew members and evacuate aircraft as soon as possible, moving a safe distance away from aircraft.

b. Left Gunner.

(1) Acknowledge in turn, "LEFT GUNNER PREPARING FOR CRASH LANDING."

(2) Open aft tunnel escape hatch.

(3) Jettison loose equipment into aft bomb bay.

(4) Check bomb bay bulkhead door at 646 secure.

(5) Fasten safety belt.

(6) Brace feet against footwell ledge, arms folded, face against knees.

(7) When aircraft comes to rest, exit through upper aft tunnel escape hatch, Gunner's blister, or aft emergency escape hatch. Assist injured crew members and evacuate aircraft as soon as possible, moving a safe distance away from aircraft.

c. Right Gunner.

(1) Acknowledge in turn, "RIGHT GUNNER PREPARING FOR CRASH LANDING."

(2) Assist Left Gunner in jettisoning loose material into aft bomb bay.

(3) Check that escape hatch is open and bomb bay bulkhead door secure.

(4) Fasten safety belt.

(5) Brace feet against footwell ledge, arms folded, face against knees.

(6) When aircraft comes to rest, exit through aft tunnel escape hatch, Gunner's blister, or aft emergency escape hatch. Assist injured crew members and evacuate aircraft as soon as possible moving a safe distance away from aircraft.

d. Tail Gunner.

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(1) Acknowledge in turn, "TAIL GUNNER PREPARING FOR CRASH LANDING."

(2) If crash landing in unpressurized compartment proceed to right side of bulkhead 834.

(3) Check aft emergency escape hatch open.

(4) Plug in interphone at station aft of entrance door.

(5) Assist in jettisoning loose equipment.

(6) Acknowledge to Flight Engineer when APU is off.

(7) Assume crash landing position with back and head against bulkhead 834, knees clasped in arms. Use parachute and cushions for padding.

(8) If crash landing in Tail Gunner's position.

(9) Open escape hatch.

(10) Jettison loose equipment.

(11) Assume crash landing position.

(12) When aircraft comes to rest, exit through aft emergency escape hatch or Tail Gunner's escape hatch. Assist injured crew members and evacuate aircraft as soon as possible, moving a safe distance away from aircraft.

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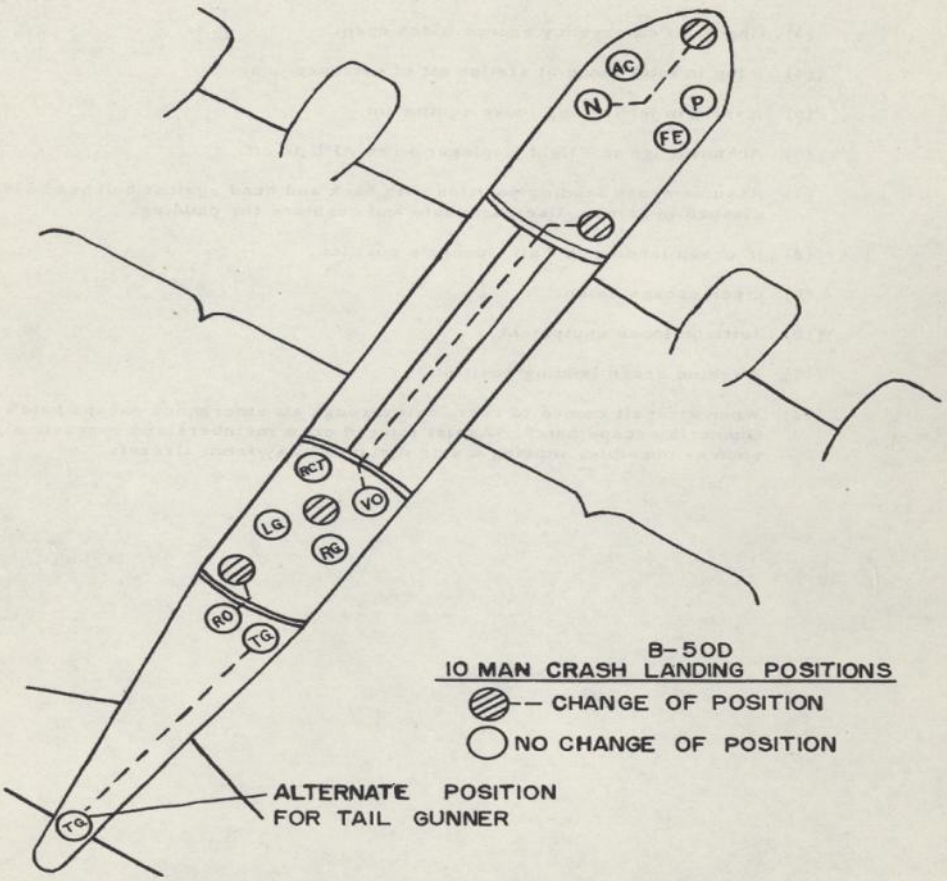

Page 62 – diagram with crashing landing positions

SECTION IV

DITCHING

A. These instructions are based on the arrangement of the aircraft. If required, necessary changes in procedures may be made to insure recovery of all useful equipment.

B. CREW RESPONSIBILITIES. Ditching requires more coordinated effort on the part of the crew than does any other emergency procedure. Before each over-water flight, an inspection must be accomplished of every life raft, CO_2 cartridge, hand air pump, flashlight, emergency ration, anti-exposure suit, first-aid kit, life-jacket, etc. Each crew member must check his life-jacket inflation by mouth and see that the CO_2 cartridge has not been punctured. Replace all defective jackets and cartridges. Make sure all emergency equipment is in its proper place and is in readiness to enable the crew to evacuate the aircraft quickly. Crew members are dependent upon each other for survival, and the success of survival depends critically on the amount of emergency equipment rescued. It is up to each crew member to see that the equipment assigned to him has been brought aboard the rafts. Uninjured personnel, where necessary to minimize further injury, assist injured men to their ditching stations and take over their ditching responsibilities. After impact see if anyone requires help before leaving the aircraft.

C. PREPARATION FOR DITCHING. Ditching equipment should be in readiness at all times when flying over water. As soon as the necessity for ditching is evident and the aircraft commander has given the order to prepare for ditching, all unessential equipment that might tear loose on impact should be jettisoned. Some of these items include the bombsight, bombs, ammunition, flares, fuel tanks, gun sights, cameras, Putt-putt, and all escape hatches that are removable. After the equipment is jettisoned, close the bomb bay doors and install ditching braces (if equipped). After the aircraft commander has been notified that the jettisoning of equipment has been completed, all crew members will remove parachute harness, winter flying boots and loosen shirt collars. Flack suits should be removed and jettisoned. Put on anti-exposure suits if time permits. It will take about a minute to put on the suit. The suit would be worn over flying clothing. Mittens will be found in leg pockets of the suit. Wear emergency kit, life vest, gloves and flak helmet, unless directed otherwise. Flak helmets will be worn by personnel able to brace their heads and necks against a solid structure. If position does not allow for bracing head and neck, do not wear flak helmets, as the added weight may break your neck upon impact. Complete your assigned duties and pad your ditching station with a parachute, one-man raft and the cushions available.

D. When the aircraft commander determines that a ditching will be necessary, he will notify the crew, "PREPARE FOR DITCHING IN _____ MINUTES," and give six short rings on the alarm bell. At this time, the crew members will acknowledge and proceed with their ditching duties. The radar operator will notify the aircraft commander when all extra equipment is jettisoned from the rear and the crew is ready for ditching. The navigator will notify the aircraft commander when all extra equipment is jettisoned from the navigator's compartment and the crew is ready for ditching. Approximately 30 seconds before impact, the aircraft commander will give the command, "STATIONS FOR DITCHING, IMPACT IN _____ SECONDS," and give one long continuous ring on the alarm bell, at which time the crew will assume ditching positions.

E. CREW PROCEDURE.

27. STANDARD B-29.

a. Top Gunner.

(1) Acknowledge in turn, "TOP GUNNER PREPARING FOR DITCHING."

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(2) Remove the flak suit (if used), parachute and boots. Wear the flak helmet (if used), emergency kit, life vest and gloves. Remove the one-man raft from the parachute harness.

(3) Take the one-man raft and go forward through the tunnel to the forward compartment. Remove the astrodome by pulling the release cord or by using the crash axe.

(4) Aid in jettisoning all loose equipment through the bomb bay.

(5) Aid in installing ditching braces.

(6) On order, "STATIONS FOR DITCHING, IMPACT IN ____SECONDS," assume ditching position on the lower forward turret, with back and head braced and padded against the upper turret. Brace feet against the bulkhead door, keeping knees flexed. Fasten safety belt, if installed, and place one-man raft on your knees.

(7) When the aircraft comes to rest, verify that the life raft release handles have been pulled. Take your life raft and follow radio operator through the astrodome atop the aircraft.

(8) Aid in removing injured crew members and emergency equipment.

(9) Proceed to the left wing and take position in the left life raft.

b. Left Gunner.

(1) Acknowledge in turn, "LEFT GUNNER PREPARING FOR DITCHING."

(2) Remove flak suit (if used), parachute and boots. Wear the flak helmet (if used), emergency kit, life vest, and gloves. Remove the one-man raft from parachute harness.

(3) Install the aft ditching braces.

(4) Proceed to the rear unpressurized compartment. Take parachute, one-man raft and cushions for padding.

(5) Aid radar observer in removing battery, APU and camera. Jettison all loose equipment through the rear entrance door and open the upper escape hatch. (The rear entrance door should be closed after equipment is jettisoned.)

(6) On order, "STATIONS FOR DITCHING, IMPACT IN ____SECONDS," assume ditching position in aft unpressurized compartment, back against aft pressure bulkhead on left side. Use parachutes and cushions for padding.

(7) When aircraft comes to rest, take one-man raft, Gibson Girl from rear and first aid kit and exit through aft escape hatch.

(8) If aircraft is not on fire, inflate the life vest at the escape hatch ledge and climb atop the aircraft.

(9) Assist in removing injured crew members and emergency equipment.

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(10) Proceed to the left wing and take position in the life raft.

c. Right Gunner.

(1) Acknowledge in turn, "RIGHT GUNNER PREPARING FOR DITCHING."

(2) Remove the flak suit (if used), parachute and boots. Wear the flak helmet (if used), emergency kit, life vest and gloves. Remove the one-man raft from the parachute harness.

(3) Take the one-man raft and go forward through the tunnel. Aid in installing forward ditching braces.

(4) On order, "STATIONS FOR DITCHING, IMPACT IN ____ SECONDS," assume ditching position in the tunnel, on back, safety belt fastened, body well padded and face covered. Brace feet against upper forward turret, keeping knees flexed.

(5) When the aircraft comes to rest, take the one-man raft and exit through the astrodome. Inflate the life vest and receive the equipment passed out by the radio operator and top gunner. Aid in removing injured crew members and emergency equipment.

(6) Proceed to the left wing and take position in the life raft.

d. Tail Gunner.

(1) Acknowledge in turn, "TAIL GUNNER PREPARING FOR DITCHING."

(2) Remove the flak suit (if used), parachute and boots. Wear the flak helmet (if used), emergency kit, life vest and gloves. Remove the one-man raft from parachute harness.

(3) Jettison the escape hatch and sight.

(4) On order, "STATIONS FOR DITCHING, IMPACT IN _____ SECONDS," assume ditching position in seat, head and body well padded and safety belt fastened.

(5) When aircraft comes to rest, take one-man raft, first aid kit and exit through escape hatch.

(6) If aircraft is not on fire, inflate life vest on escape hatch and climb atop aircraft.

(7) Assist in removing injured crew members and emergency equipment.

(8) Proceed to the left wing and take position in the life raft.

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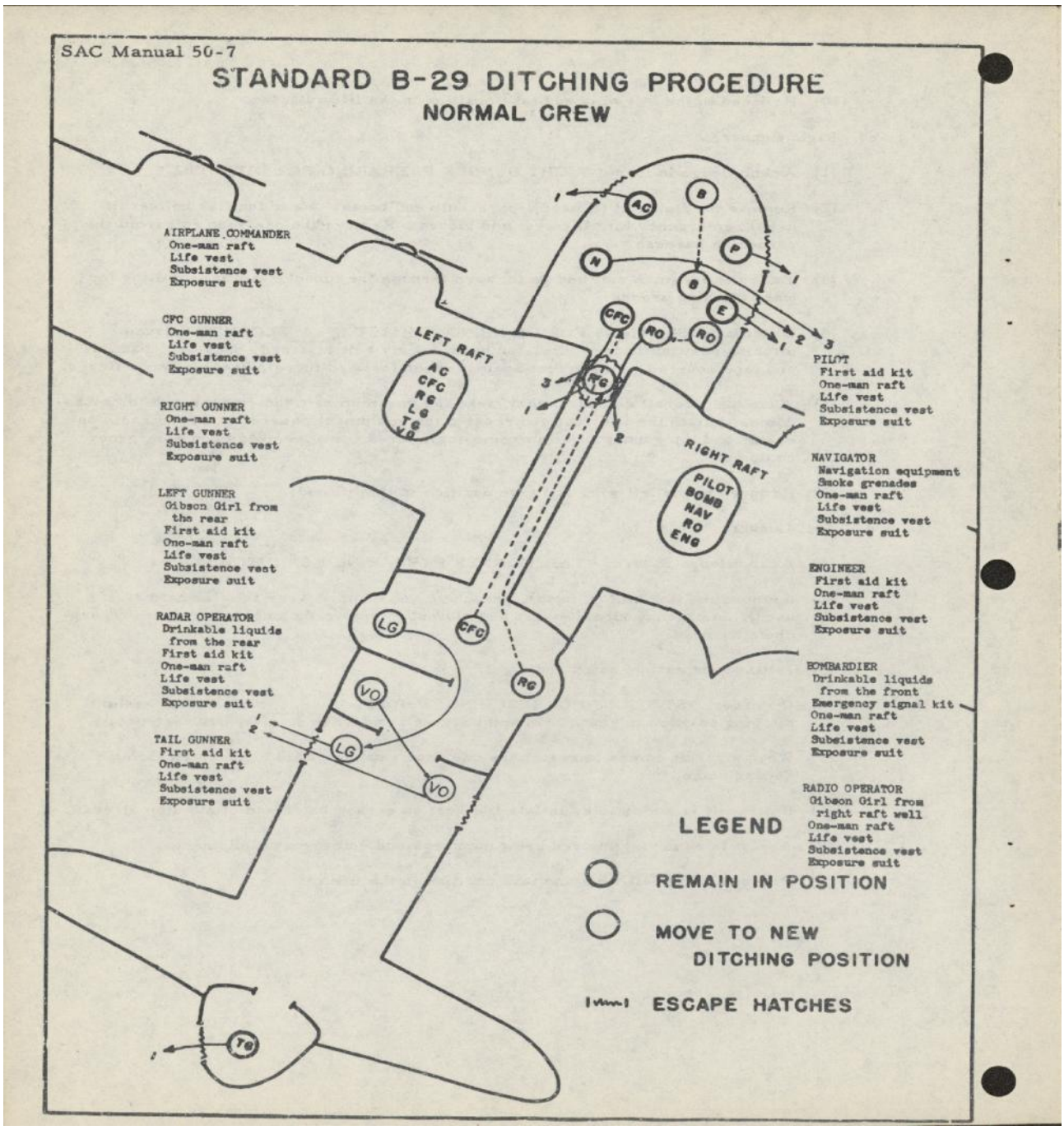

Page 66 – Standard B-29 Ditching Procedure normal crew diagram

28. RECEIVER-TYPE B-29 AIRCRAFT, WITHOUT STANDARD TURRET EQUIPMENT.

a. Top Gunner (if carried).

(1) Acknowledge in turn, "TOP GUNNER PREPARING FOR DITCHING."

(2) Remove the flak suit (if used), parachute and boots. Wear the flak helmet (if used), emergency kit, life vest and gloves. Remove the one-man raft from the parachute harness.

(3) Take the one-man raft and go forward through the tunnel to the forward compartment.

(4) Aid in jettisoning all loose equipment through the bomb bay.

(5) Aid in installing ditching braces.

(6) On order, "STATIONS FOR DITCHING, IMPACT IN ____SECONDS," assume ditching position lying on the floor, feet braced against nose wheel well step. Pad head and body with parachute and cushions. (Fasten safety belt if installed.)

(7) When the aircraft comes to rest, verify that the life raft release handles have been pulled. Take your life raft and exit through the astrodome atop the aircraft.

(8) Aid in removing injured crew members and emergency equipment.

(9) Proceed to the left wing and take position in the left life raft.

b. Left Gunner.

(1) Acknowledge in turn, "LEFT GUNNER PREPARING FOR DITCHING."

(2) Remove the flak suit (if used), parachute and boots. Wear the flak helmet (if used), emergency kit, life vest and gloves. Remove the one-man raft from parachute harness.

(3) Check that all refueling equipment and unnecessary electrical circuits are off.

(4) Aid in installing rear bomb bay ditching braces, and aid the right gunner in jettisoning all loose equipment.

(5) Take one-man raft and go forward through tunnel to forward compartment. Remove astrodome by pulling release cord or using crash axe.

(6) On order, "STATIONS FOR DITCHING, IMPACT IN ____SECONDS," assume ditching position, lying on floor, between navigator and right gunner, feet braced against nose wheel well step. Pad head and body with parachute and cushions (safety belt fastened if installed).

(7) When the aircraft comes to rest, follow right gunner through the astrodome with one-man raft and parachute.

(8) If aircraft is not on fire, inflate life vest and assist in removing injured crew members and emergency equipment.

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(9) Proceed to left wing and take position in life raft.

c. Right Gunner.

(1) Acknowledge in turn, "RIGHT GUNNER PREPARING FOR DITCHING."

(2) Remove flak suit (if used), parachute and boots. Wear the flak helmet (if used), emergency kit, life vest and gloves. Remove the one-man raft from parachute harness.

(3) Close and secure the aft pressure bulkhead door and install ditching braces.

(4) Take one-man raft and go forward through tunnel to forward compartment. Aid in carrying emergency equipment to forward pressurized compartment.

(5) On order, "STATIONS FOR DITCHING, IMPACT IN ____ SECONDS," assume ditching position, lying on floor, beside left gunner, feet braced against nose wheel well step. Pad head and body with parachute and cushions. Keep knees flexed on impact. (Fasten safety belt if installed.)

(6) When the aircraft comes to rest, exit through the astrodome with one-man raft. Inflate life vest and remove Gibson Girl radio from right wing raft compartment and take position in the right raft. Aid in stowage of equipment aboard the raft.

d. Tail Gunner.

(1) Acknowledge in turn, "TAIL GUNNER PREPARING FOR DITCHING."

(2) Remove the flak suit (if used), parachute and boots. Wear the flak helmet (if used), emergency kit, life vest and gloves. Remove the one-man raft from the parachute harness.

(3) Jettison escape hatch and sight.

(4) On order, "STATIONS FOR DITCHING, IMPACT IN ____ SECONDS," assume ditching position in seat, head and body well padded and safety belt fastened.

(5) When aircraft comes to rest, take one-man raft and first aid kit and exit through escape hatch.

(6) If aircraft is not on fire, inflate life vest on escape hatch and climb atop aircraft.

(7) Assist in removing injured crew members and emergency equipment.

(8) Proceed to the left wing and take position in the life raft.

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Page 69 (marked 67 in book) – Receiver Type B-29 Ditching Normal Crew diagram

29. B-50A.

a. Top Gunner.

(1) Acknowledge in turn, "TOP GUNNER PREPARING FOR DITCHING."

(2) Remove the flak suit (if used), parachute and boots. Remove the one-man raft from the parachute harness. Wear the flak helmet (if used), emergency kit, life vest and gloves.

(3) Take the one-man raft and go forward through the tunnel to the forward cabin. Remove the astrodome by pulling the release cord or by using the crash axe.

(4) Be sure that all loose equipment has been jettisoned through the bomb bay.

(5) On order, "STATIONS FOR DITCHING, IMPACT IN ____ SECONDS," assume a sitting position to the rear of the upper forward turret, next to the left gunner. Back and head braced and padded against the upper turret. Brace feet against the bulkhead door, keeping knees flexed. (Fasten safety belt, if installed.)

(6) When the aircraft comes to rest, verify that the life raft release handles have been pulled, and exit through the astrodome atop the aircraft. If the aircraft is not on fire, inflate the life vest.

(7) Aid in removing injured crew members and emergency equipment.

(8) Proceed to the left wing and climb aboard the life raft.

b. Left Gunner.

(1) Acknowledge in turn, "LEFT GUNNER PREPARING FOR DITCHING."

(2) Remove the flak suit (if used), parachute and boots. Wear the flak helmet (if used), emergency kit, life vest and gloves. Remove the one-man raft from the parachute harness.

(3) Take the one-man raft and go forward through the tunnel. Aid in jettisoning equipment.

(4) On order, "STATIONS FOR DITCHING, IMPACT IN ____ SECONDS," assume ditching position on the lower forward turret, with the back and head braced and padded against the upper forward turret. Brace feet against the bulkhead door, keeping knees flexed. (Fasten safety belt, if installed.)

(5) When aircraft comes to rest, pull both life raft release handles. Exit through the astrodome with one-man raft, and if the aircraft is not on fire, inflate the life vest.

(6) Aid in removing injured crew members and emergency equipment.

(7) Proceed to center wing section; remove Gibson Girl and place it in right wing life raft. Take your position in the right raft.

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c. Right Gunner.

(1) Acknowledge in turn, "RIGHT GUNNER PREPARING FOR DITCHING."

(2) Remove the flak suit (if used), parachute and boots. Wear the flak helmet (if used), emergency kit, life vest and gloves. Remove the one-man raft from the parachute harness.

(3) Take the one-man raft and go forward through the tunnel. Aid in jettisoning equipment.

(4) On order, "STATIONS FOR DITCHING, IMPACT IN ____SECONDS," assume a reclining position in the tunnel. Brace the feet against the four-gun turret, keeping the knees flexed.

(5) When the aircraft comes to rest, throw the one-man raft from, and exit through, the astrodome; and receive the equipment passed out by the left and top gunners.

(6) If the aircraft is not on fire, inflate the life vest and proceed to the left life raft.

d. Tail Gunner.

(1) Acknowledge in turn, "TAIL GUNNER PREPARING FOR DITCHING."

(2) Remove the flak suit (if used), parachute and boots. Wear the flak helmet (if used), emergency kit, life vest and gloves. Remove the one-man raft from the parachute harness.

(3) Jettison the escape hatch and sight.

(4) On order, "STATIONS FOR DITCHING, IMPACT IN ____SECONDS," assume ditching position in seat, head and body well padded and safety belt fastened.

(5) When aircraft comes to rest, take one-man raft and first aid kit and exit through escape hatch.

(6) If the aircraft is not on fire, inflate the life vest on the escape hatch. Climb atop the aircraft and assist in removing injured crew members and emergency equipment.

(7) Proceed to the left wing and climb aboard the life raft.

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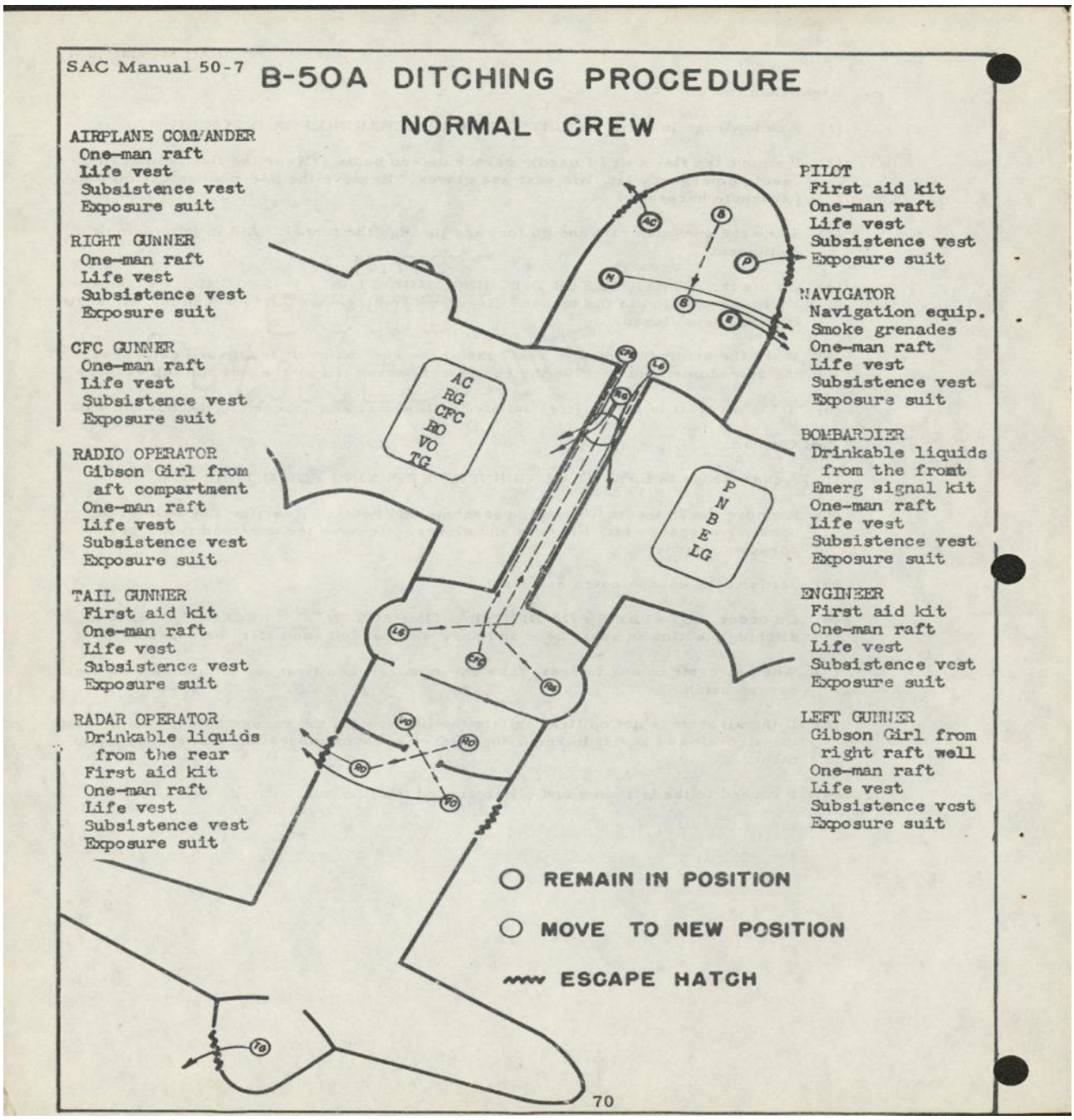

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30. B-50D.

a. Top Gunner.

(1) Acknowledge in turn, "TOP GUNNER PREPARING FOR DITCHING."

(2) Remove: Flak suit, parachute harness, flying boots.

(3) Loosen: Shirt collar.

(4) Wear: Exposure suit (if time permits. Approximately 1 minute to don.) Subsistence vest, life vest, gloves and flak helmet (if able to brace head and neck.)

(5) Shoot out ammo from upper forward and upper aft turrets.

(6) Proceed with equipment to ditching station at forward end of pressurized tunnel.

(7) Check astrodome open, and inform Co-pilot.

(8) Assist in jettisoning loose equipment into bomb bay.

(9) On order, "STATIONS FOR DITCHING." Lie on your back in tunnel, feet braced against upper turret, with knees slightly flexed. Pad back and buttocks with parachute and cushions.

(10) On order, "READY FOR IMPACT." Keep knees flexed. More than one shock may be felt. Do not relax until aircraft has stopped. Do not inflate life vest until outside aircraft.

(11) After aircraft has stopped: Pull life raft "T" handles (2). Exit through astrodome. Guide right raft forward of outboard engines in front of right wing. Get Gibson Girl radio from right life raft compartment. Proceed with equipment to right raft.

b. Left Gunner.

(1) Acknowledge in turn, "LEFT GUNNER PREPARING FOR DITCHING."

(2) Remove: Flak suit, parachute harness, flying boots.

(3) Loosen: Shirt collar.

(4) Wear: Exposure suit (if time permits. Approximately 1 minute to don.) Subsistence vest, life vest, gloves and flak helmet (if able to brace head and neck.)

(5) Shoot out ammo in lower forward and lower aft turrets.

(6) Jettison loose equipment.

(7) Close and secure the bulkhead door at station 646.

(8) Open and jettison aft tunnel escape hatch, notifying Co-pilot if time permits.

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(9) On order, "STATIONS FOR DITCHING." Proceed to ditching position at aft end of tunnel. Check compression door closed. Place parachute and cushions against the door.

(10) On order, "READY FOR IMPACT." Lie on back with feet braced against top of compression door, knees slightly flexed, back and buttocks padded with cushions. More than one shock may be felt. Do not relax until aircraft has stopped. Do not inflate life vest until outside aircraft.

(11) After aircraft has stopped: Exit through aft tunnel escape hatch, inflate life vest, and proceed to left raft, guiding it forward of outboard engines in front of left wing.

c. Right Gunner.

(1) Acknowledge in turn, "RIGHT GUNNER PREPARING FOR DITCHING."

(2) Remove: Flak suit, parachute harness, flying boots.

(3) Loosen: Shirt collar.

(4) Wear: Exposure suit (If time permits. Approximately 1 minute to don.) Subsistence vest, life vest, gloves and flak helmet (if able to brace head and neck).

(5) Proceed to compartment aft of bulkhead 834. Install aft entrance door bolts. Open rear emergency escape hatch, and report to Co-pilot.

(6) Jettison loose equipment not to be used for survival.

(7) Stay on interphone and report progress to Co-pilot.

(8) On order, "STATIONS FOR DITCHING." Pad station with parachute, one man dinghy and available cushions. Get in position and keep knees flexed.

(9) On order, "READY FOR IMPACT." More than one shock may be felt . Do not relax until aircraft has stopped. Do not inflate life vest until outside aircraft.

(10) When aircraft has stopped: Assist injured crew members.

(11) Proceed to exit with emergency survival equipment and then into aft left raft (or right raft, if third raft is not carried.) Assume responsibility for inflating and positioning third raft, if carried.

d. Tail Gunner.

(1) Acknowledge in turn, "TAIL GUNNER PREPARING FOR DITCHING."

(2) Remove: Flak suit, parachute harness, flying boots.

(3) Loosen: Shirt collar.

(4) Wear: Exposure suit (if time permits. Approximately 1 minute to don.) Subsistence vest, life vest, gloves and flak helmet (if able to brace head and neck).

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(5) Shoot all ammo from Tail Guns.

(6) Open and jettison emergency escape hatch.

(7) Secure first aid kit.

(8) Jettison loose equipment.

(9) If ditching against 834, assist right gunner in jettisoning equipment.

(10) On order, "STATIONS FOR DITCHING." Fasten safety belt, back and head braced, against window frames, knees flexed. If ditching against 834, pad position with parachute, one man dinghy and cushions.

(11) On order, "READY FOR IMPACT." More than one shock may be felt. Do not relax until aircraft has stopped. Do not inflate life vest until outside of aircraft.

(12) After aircraft has stopped: Exit through emergency escape hatch, assist in unloading equipment from aft section and proceed to aft left raft. (Or left raft if third large raft is not carried.)

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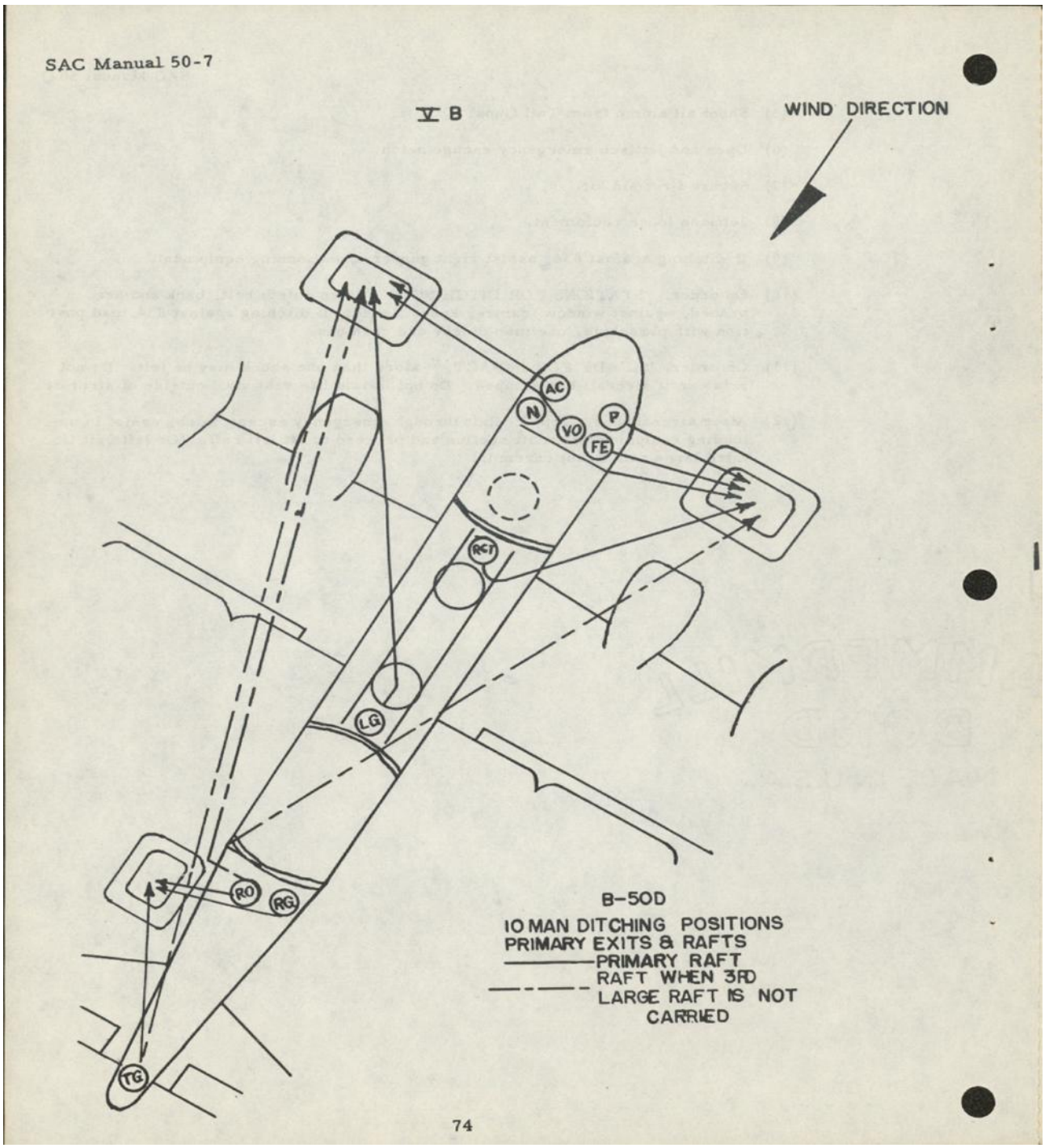

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SECTION V

CABIN FIRES

A. CABIN FIRE ON THE GROUND.

31. Report the fire on CALL position to the aircraft commander, giving the location and type of fire.

32. Put on the oxygen mask and position the regulator selector lever to 100% oxygen.

33. Combat the fire with the portable fire extinguishers.

NOTE: In the event of electrical fire, the engineer should turn off all unnecessary electrical circuits.

B. CABIN FIRE IN FLIGHT.

34. Report the fire on CALL position to the aircraft commander, giving the location and type of fire. (If at altitude, the aircraft commander will depressurize.)

35. Put on oxygen mask and position the regulator selector lever to 100% oxygen.

36. The person nearest the fire should fight the fire with the portable fire extinguisher, and the person next nearest should keep the aircraft commander informed.

NOTE: If the fire is uncontrollable, the aircraft commander should order the crew to bail out.

C. HAND-HELD FIRE EXTINGUISHERS.

37. LOCATION OF FIRE EXTINGUISHERS.

a. There are three CO_2 hand fire extinguishers in the standard B-29. One is on the upper forward turret by the engineer; another is on the auxiliary panel of the rear pressurized compartment, and the third is in the rear unpressurized compartment by the entrance door.

b. Receiver type B-29 aircraft have an extra fire extinguisher located at the receiver operator's position.

c. B-50A type aircraft have an extra fire extinguisher at the receiver operator's position and one in the tail gunner's compartment.

d. B-50D type aircraft have two carbon tetrachloride and either three or four (CO_2) portable fire extinguishers aboard. The carbon tetrachloride bottles are located at the engineer's station and at the auxiliary equipment panel in the aft pressurized compartment. The CO_2 bottles are located as follows: One on aft side of upper forward turret, either one or two just aft of the rear entrance door in the aft unpressurized area, and one in the tail gunner's compartment.

38. USE OF HAND-HELD FIRE EXTINGUISHER.

a. To use the CO_2 extinguisher, put on oxygen mask wtih 100% oxygen, stand as close to the fire as practicable, raise the nozzle, pull release trigger (if equipped) and direct the CO_2

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charge at the base of the fire until the fire is extinguished. To stop the flow of CO_2 gas, replace the nozzle in the clip on the side of the cylinder. (Some extinguishers are equipped with a trigger type release.)

CAUTION: Hold on to the rubber insulation on the nozzle to avoid frosting or freezing your hand.

SECTION VI

ENGINE OR NACELLE FIRES

A. ENGINE OR NACELLE FIRE ON THE GROUND. Close observation should be made on the engine during starting, warm-up, taxiing and ground power checks prior to take-off. If smoke or flame occur:

39. Call the aircraft commander on CALL position on the jackbox, "FLAMES," or "SMOKE ON NUMBER____ENGINE," then attempt to determine the type and location of the fire.

40. Keep close observation on the engine and report to the aircraft commander as to the progress being made in extinguishing the fire.

B. ENGINE OR NACELLE FIRE IN THE AIR. Frequent observation should be made on all engines, and an engine check should be made to the flight engineer every 30 minutes or as directed by the aircraft commander. If smoke or flame is observed, proceed as follows:

41. Notify the crew on CALL position, "FLAME," or "SMOKE FROM NUMBER___ENGINE." Attempt to determine the type and location of fire.

42. Keep close observation on engine and report to the aircraft commander as to the progress being made in extinguishing the fire.

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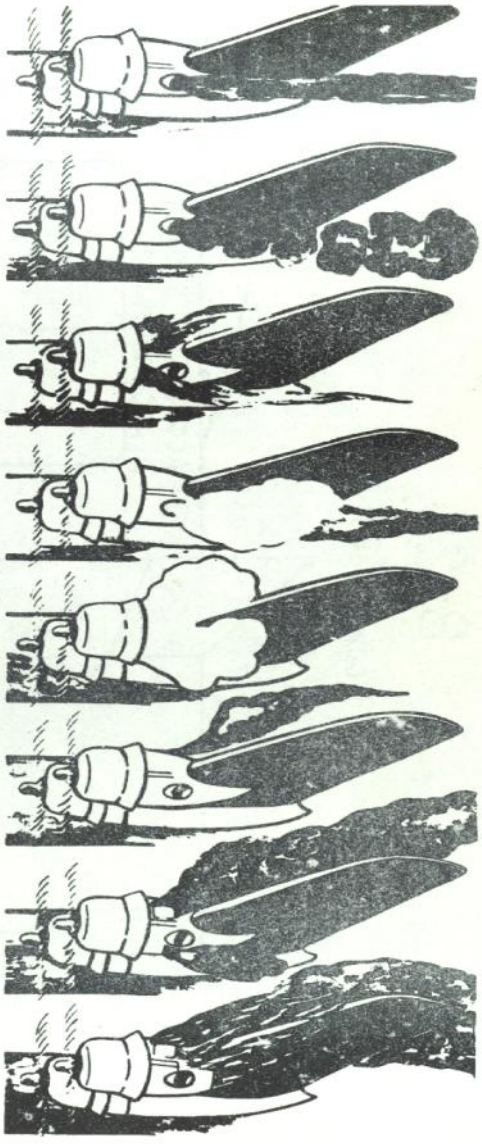
SMOKE	CAUSE
Thin black smoke from exhaust stacks.	Carburetor too rich—improper combustion.
Puffs of black smoke from exhaust.	Engine detonating or backfiring.
Thin grey smoke coming from cowl flaps.	**Exhaust stack or cylinder head failure.**
Thin black smoke followed by large volume of white smoke from exhaust system.	Induction system fire that has ignited magnesium and/or aluminum engine parts.
Large volume of white smoke from cowl flaps.	Indicates induction system fire that has burned through intake pipes.
Smoke from intercooler flap.	Accessory section fire burned through intercooler.
Large volume of dense black smoke from any area aft of cowl flaps.	Oil fire in accessory section, probably due to broken line.
Black smoke with orange-yellow flame from any area aft of cowl flap.	Fuel fire in accessory section, probably due to broken line.



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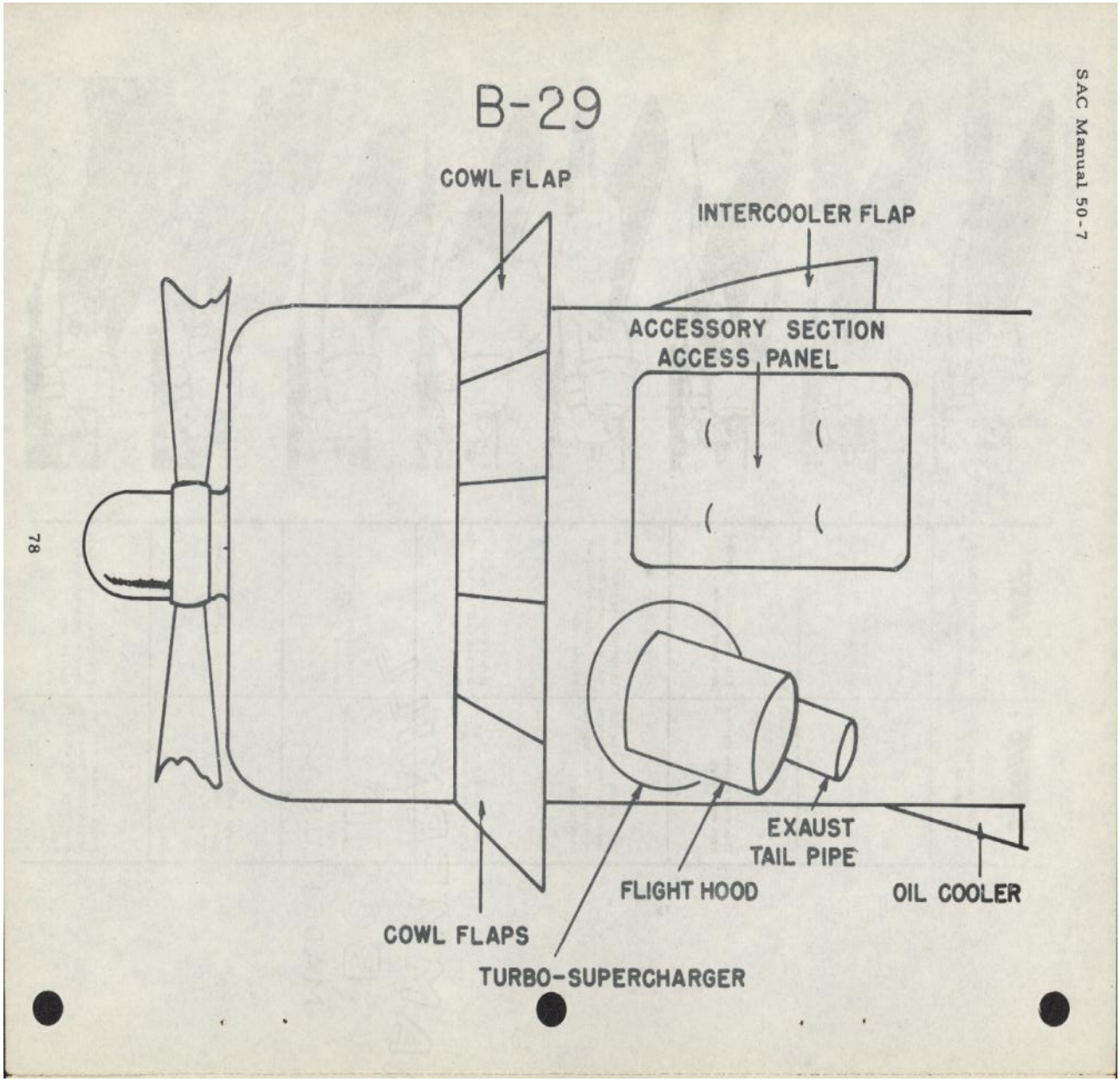

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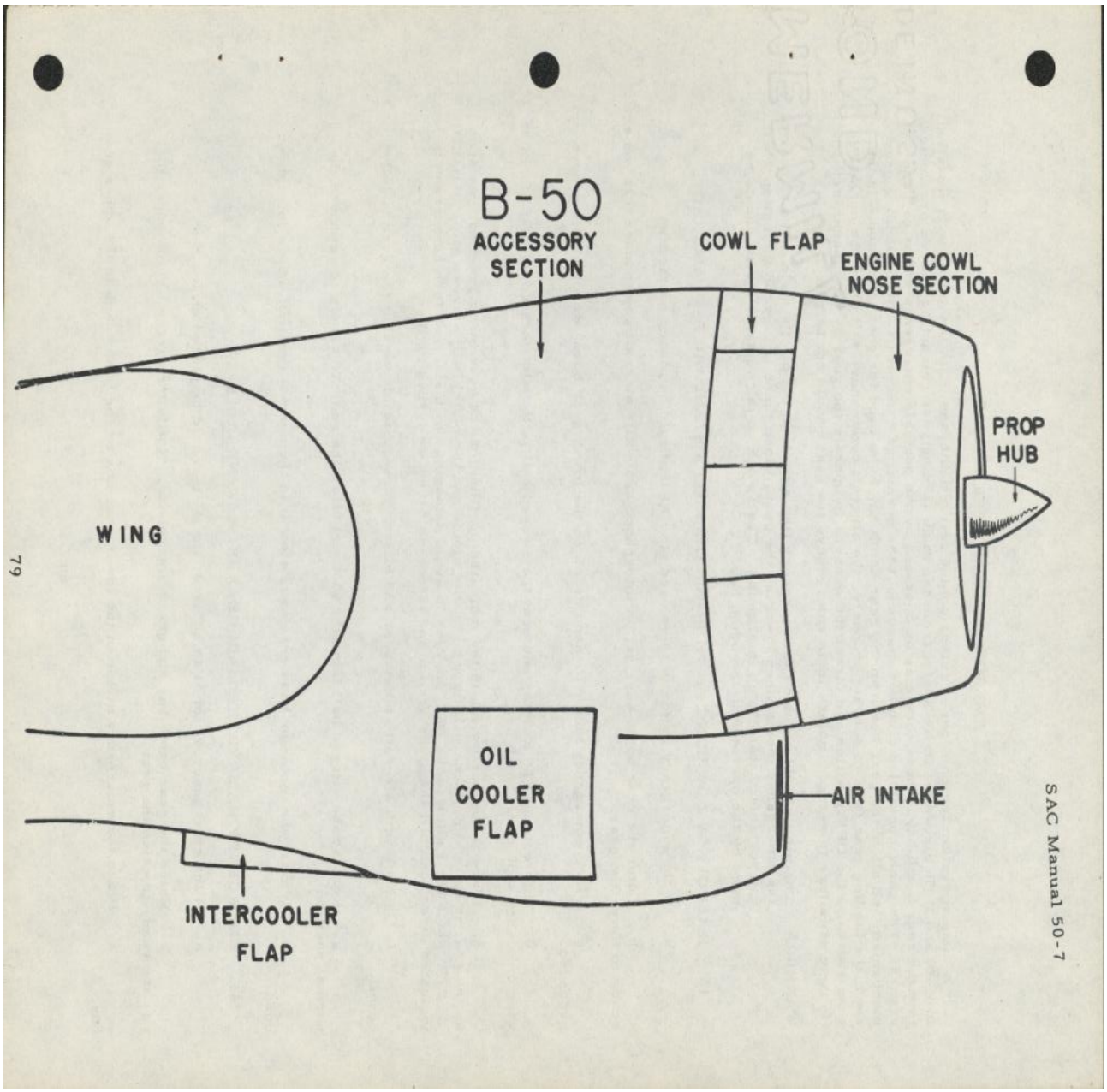

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SECTION VII

EMERGENCY GEAR OPERATION

A. A manual system for emergency extension and retraction of the main landing gear is installed in B-29 and B-50 aircraft. Drive shafts from the main landing gear retracting screws are routed into the rear bomb bay, where they may be operated by the portable emergency motor or hand cranks. The cable controlled clutches disconnect the normal gear motors from the landing gear mechanism and allow the gear boxes in the rear bomb bay to be used for gear operation. In the event the landing gear fails to operate properly, the aircraft commander will place the normal gear switch to the OFF position and direct the gunners to operate the gear by the manual method. (In case of failure to retract, unless in an emergency, the gear should not be raised.)

WARNING: The pilot should not use the emergency flap switch on the pilot's aisle stand to control the emergency motor when lowering the gear, since there is no good indication when the portable motor clutch is slipping. The switch on the portable motor should be used by the operator in the bomb bay.

43. EMERGENCY LOWERING OF THE MAIN GEAR ON A STANDARD B-29 AIRCRAFT.

a. If the emergency motor is to be used, the APU should be placed on the line.

b. Enter the rear bomb bay, get on interphone and notify aircraft commander that you are ready to lower the gear.

c. Place emergency motor or hand crank on the lower gear box. Be sure it is secure and grounded.

d. Pull out red "T" handle, and seat the swaged ball in the slot located on rear of center wing on either side of aft bomb bay.

e. Place the motor switch in the indicated position for the gear being lowered. As soon as the gear is full down, there will be a jar of the motor and the clutch will start to slip. IMMEDIATELY place the switch to the OFF position to avoid damaging the motor, or turn hand crank in indicated direction until the stops are hit and the crank cannot be turned further.

f. Check with aircraft commander and blister gunners to insure that the gear is fully down.

g. Release the swaged ball from the slot and allow the red "T" handle to return to the normal position.

h. Remove the motor or hand crank and stow it in the normal position. Stow interphone cord.

44. EMERGENCY RAISING THE MAIN GEAR ON A STANDARD B-29.

a. If the emergency motor is to be used, the APU should be placed on the line.

b. Enter the rear bomb bay and get on interphone. Notify the aircraft commander that you are ready to raise the gear.

c. Place the emergency motor in the lower gear box or the hand crank in the upper gear box.

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d. Pull out the red "T" handle and seat the swaged ball in the slot.

e. Place the motor switch in the indicated position for the gear being raised. As soon as the gear is full up, there will be a jar of the motor, and the clutch will start to slip. IMMEDIATELY place the switch to the OFF position to avoid damage to the motor, or turn the hand crank in the indicated direction until the stops are hit and the crank cannot be turned further.

f. Check with the aircraft commander and blister gunners to insure that the gear is fully up.

g. Release the swaged ball from the slot and allow the red "T" handle to return to the normal position.

h. Remove the motor or hand crank and stow it in the normal position.

45. EMERGENCY LOWERING OF THE MAIN GEAR ON A MODIFIED B-29 OR A B-50 AIRCRAFT (FREE FALLING GEAR).

a. Enter the bomb bay and get on interphone. Notify the aircraft commander that you are ready to lower the gear.

b. Place the hand crank in the gear box.

c. Pull out the red "T" handle and seat the swaged ball in the slot. (Check with blister gunners to see if nacelle door is open.)

d. Turn the crank in the indicated direction ten turns.

e. Release the swaged ball from the slot and allow the red "T" handle to return to the normal position. The gear should free fall; if not, oscillate gear handle. Check with blister gunner to see if gear has extended.

WARNING: Do not attempt to re-engage clutch for five seconds. The pause is to prevent damage to the clutch when it is re-engaged.

f. Pull red "T" handle and seat swaged ball in slot to re-engage clutch. Turn the crank in the indicated direction until the stops are hit and the crank cannot be turned further.

g. Check with aircraft commander and blister gunner to insure that the gear is fully down.

h. Release the swaged ball from the slot and allow the red "T" handle to return to the normal position. Oscillate crank to insure disengagement of emergency clutch.

i. Remove the hand crank and stow it in the normal position. Stow interphone cord.

46. EMERGENCY RAISING OF THE MAIN GEAR ON A MODIFIED B-29 OR A B-50 AIRCRAFT (FREE FALLING GEAR).

a. Enter bomb bay, get on interphone, check with aircraft commander to insure main gear switch is in neutral or OFF position.

b. Pull red "T" handle and seat the swaged ball in the socket to engage the clutch.

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c. Insert the crank and rotate it in the direction indicated until the stops are contacted and the lock is engaged (490 turns are required).

d. Check with scanner to insure the gear is full up and check with pilot to see if indicator lights show that gear is full up.

e. Unseat swaged ball, return red "T" handle to original position, oscillate crank to insure disengagement of emergency clutch.

f. Remove and stow hand crank.

CAUTION: Always return red "T" handle to its normal position, engage hand crank and oscillate crank rapidly to insure disengagement of emergency clutch after emergency operation is completed.

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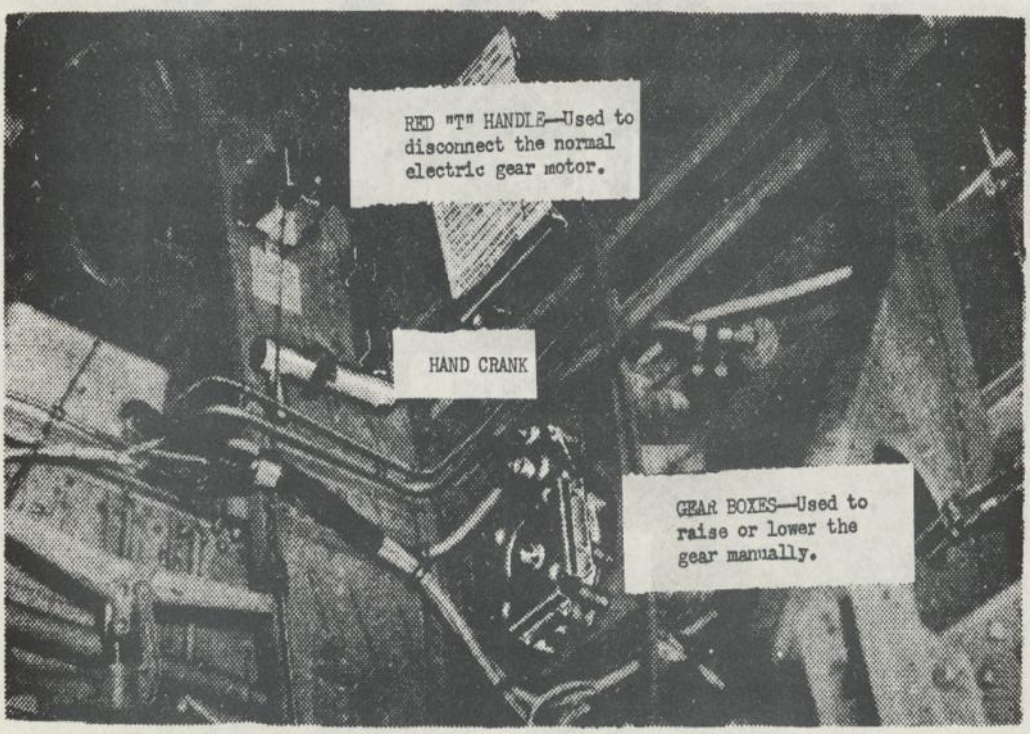

LOCATION OF B-29 EMERGENCY GEAR OPERATION EQUIPMENT

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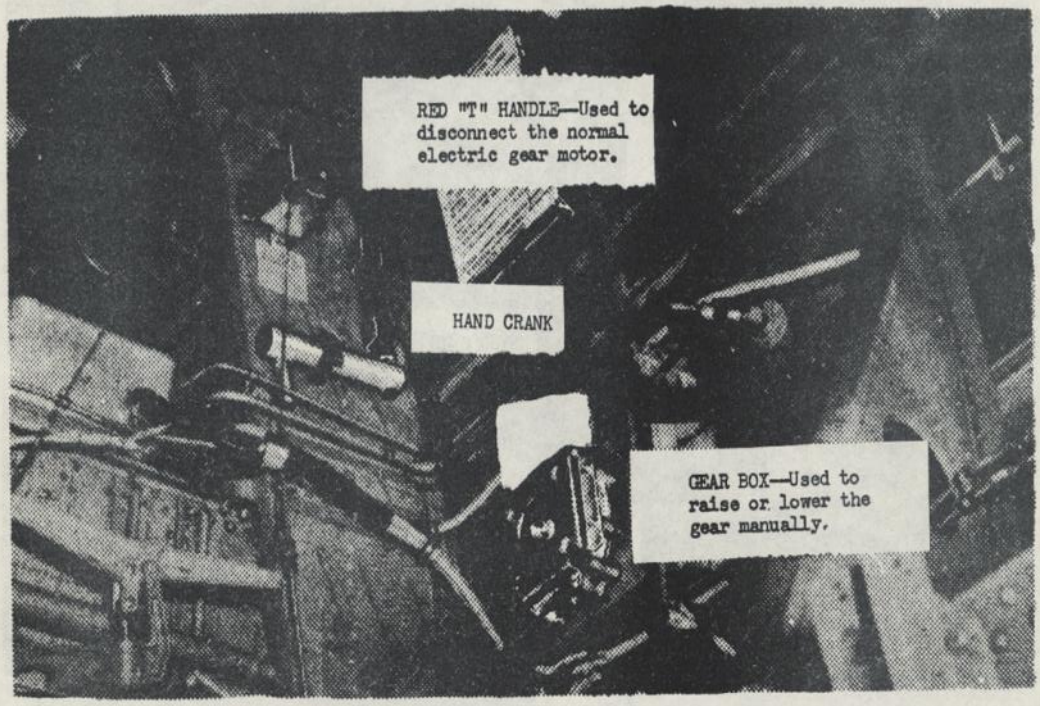

LOCATION OF B-50 EMERGENCY GEAR OPERATION EQUIPMENT

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SECTION VIII

BOMB BAY DOOR EMERGENCY OPERATION

A. EMERGENCY OPERATION OF BOMB BAY DOOR SYSTEM FOR B-29.

47. LOCATION OF EQUIPMENT.

a. Emergency Opening "T" Handles.

(1) One at left of aircraft commander, on engine control stand.

(2) One at left of bulkhead door, on cross walk at station 218.

b. Emergency Retraction "T" Handles.

(1) One at right of bulkhead door, on cross walk at station 218.

(2) One below the forward part of right catwalk in rear bomb bay.

c. Emergency Actuating Valves.

(1) One on forward bomb bay pneumatic panel.

(2) One on rear bomb bay pneumatic panel.

d. Safety Shut-off Valves.

(1) One on forward bomb bay pneumatic panel.

(2) One on rear bomb bay pneumatic panel.

e. Interconnect Valve. On forward bomb bay pneumatic panel.

48. EMERGENCY DOOR OPENING. a. Electrical Failure Only. If there has been a failure in the circuit controlling the solenoids at the four-way valves but there is air pressure, the doors may be opened by pulling the emergency opening "T" handle. This will release the latches and manually operate the four-way valve. The air pressure will open the doors.

b. Air in One Main Accumulator Only. If one main accumulator has lost its air or the air compressor is inoperative, the interconnect valve may be opened. This will equalize the pressure in both main accumulators and the doors may be operated normally.

c. No Air Pressure in Normal Accumulators. If the compressors have failed and all the air in the normal accumulators is exhausted, the emergency accumulators may be used. Open the emergency actuation valve and then operate the four-way valve by either normal or emergency methods. (The above procedure should be used only in cases of extreme emergency.)

d. No Air Pressure. If there is no air in either the normal or emergency system, the doors may be opened by the emergency opening "T" handle. Pulling this "T" handle releases the latches and the doors drop down. The slip stream working on the air wedges at the rear of the doors forces the doors fully open and holds them open.

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49. EMERGENCY CLOSING. a. Proper Pressure in Both Normal Accumulators and the Electrical System Inoperative.

(1) Turn off master bomb door switches on bombardier's panel.

(2) Pull emergency retraction handle in the bomb bay affected.

NOTE: If both bomb bay doors are open, close the forward doors first. This repositions the four-way valve so the rear doors can be latched and prevents the possibility of bleeding all air from the complete system.

b. Proper Pressure in Only One Accumulator, Electrical System Operative.

(1) Open interconnect valve on the forward bomb bay pneumatic panel.

(2) Operate doors with normal door operating switch.

c. Proper Pressure in Only One Accumulator, Electrical System Inoperative.

(1) Turn off master switch at bombardier's panel.

(2) Open interconnect valve on the forward bomb bay pneumatic panel.

(3) Pull emergency retraction handle in the forward then rear bomb bay.

d. No Pressure in Either Normal Accumulator.

(1) Turn off master switch at bombardier's panel.

(2) Open emergency actuating valve in the bomb bay affected.

(3) Pull the emergency retraction handle in the forward then rear bomb bay.

B. EMERGENCY OPERATION OF BOMB BAY DOOR SYSTEM FOR MODIFIED B-29 AND B-50.

50. LOCATION OF EQUIPMENT.

a. Emergency Opening "T" Handles.

(1) One located at the aircraft commander's engine control stand.

(2) One located in the center of the crosswalk in the front of the forward bomb bay.

b. Emergency Bomb Door Retraction Jacks.

(1) One located in the floor, to the left rear of the lower forward turret.

(2) One located in floor, just forward of the ring gunner's pedestal.

c. External Bomb Door Safety Lock. One located outside the aircraft, on the left just forward of the front bomb bay door.

51. EMERGENCY OPENING. The same procedure is used as applies to the B-29 type aircraft.

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52. EMERGENCY CLOSING. a. Turn off master bomb door switch at bombardier's panel.

b. Open access door for emergency bomb door retraction jack for doors affected; insert handle and move handle back and forth until the doors are fully closed. Handle for rear doors is stowed to forward leg of top gunner's stand. Handle for forward doors is stowed at rear bulkhead in forward pressurized compartment (station 218).

c. When the access door is raised, the four-way valve is placed in the "doors closed" position, so that the doors will be latched properly.

d. When the access door is closed, the drum cable and ratchet assembly is disengaged, so that normal operation of the doors is possible.

NOTE: If the doors open when the access door is closed, it will be necessary to jack the doors closed again and leave the access door open.

C. BOMB RELEASE (SALVO).

53. B-29 SALVO SYSTEM. a. Electrical Salvo. With normal electrical power, salvo release of bombs, unarmed, is accomplished by closing any one of the three salvo switches located (1) on the pilot's aisle stand, (2) bombardier's control panel and (3) on salvo shield just forward of right gunner's station. With any one of the three salvo switches closed and the bomb bay tank safety switches in the "CAN SALVO" position, power goes directly to the bomb door open solenoid, salvo indicator lights and the bomb salvo relay, releasing the bomb shackle.

WARNING: The bomb salvo switch must be held to the "SALVO" position for a minimum of four seconds to insure complete operation of the salvo circuit.

b. Manual Salvo. If the electrical system is inoperative:

(1) Open the bomb doors by pulling either of the emergency bomb door release "T" handles.

(2) Drop bombs by manually releasing the bomb shackle releases (lowest bombs will be released first).

54. MODIFIED BOMB SALVO SYSTEM. The fuel tank safety switches are located on the salvo shields beside the salvo switches, near the forward and rear tunnel entrances. On some model aircraft, fuel tank safety switches are arranged to salvo bomb bay tanks selectively, "UPPER," "LOWER" and "OFF." Other models have only "DROP" and "OFF" positions of the safety switch. By the select method, both tanks or the lower tank only in either or both bomb bays may be salvoed.

a. Electrical Salvo. With normal electrical power, salvo release of bombs, unarmed, is accomplished by closing any one of the four salvo switches located:

(1) On the pilot's aisle stand.

(2) Bombardier's control panel.

(3) Right side of forward tunnel entrance (station 218).

(4) Right side of rear tunnel entrance (station 646). With any one of the four salvo switches closed the bomb bay tank safety switches to "DROP" (some models have

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"UPPER," "LOWER" and "OFF") and all salvo circuit breakers "IN," power goes directly to the bomb door open solenoid, salvo indicator lights and the bomb salvo relay, releasing the bomb shackle.

WARNING: The bomb salvo switch must be held to the "SALVO" position for a minimum of four seconds to insure complete operation of the salvo circuit.

b. Manual Salvo. If the electrical system is inoperative:

(1) Open the bomb doors by pulling either of the emergency bomb door release "T" handles.

(2) Drop bombs by manually releasing the bomb shackle releases (lowest bombs will be released first).

SECTION IX

EMERGENCY FLAP OPERATION

A. A portable emergency flap motor is installed in the aft bomb bay on the center wing spar. As installed, it permits emergency operation of the wing flaps.

B. If emergency operation of the wing flaps is indicated, proceed as follows:

55. Enter rear bomb bay and go to interphone.

56. At order of aircraft commander, place the switch on top of motor to desired flap position.

57. Operate motor until notified that flaps are approximately 5° from "FULL UP" or "FULL DOWN" limits. Return switch to normal position.

NOTE: Some B-29 type and all B-50 type aircraft have a switch installed on the pilot's aisle stand, for operation of portable emergency flap motor.

58. Properly secure interphone cord before leaving bomb bay.

SECTION X

CABIN PRESSURIZATION

A. CABIN PRESSURE REGULATORS. The flight engineer is responsible for maintaining proper cabin pressure. If the cabin air pressure deviates from the proper limits, the flight engineer will direct the gunners to check the pressure regulators.

59. B-29 TYPE AIRCRAFT. To check one regulator, close the other regulator by screwing down the knurled knob. After locating the faulty regulator, turn it off by screwing down the knurled knob. With the operational regulator in the OPEN position, pressure should be maintained satisfactorily.

CAUTION: Stay on interphone in contact with the flight engineer. The flight engineer must watch the cabin pressure closely when using this procedure, because if the

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regulator being tested is jammed closed, it is possible to build up dangerous pressure by closing the defective regulator.

NOTE: For all normal in-flight operation, the knurled knobs on top of the regulators are to be in the OPEN position that is, screwed UP off the regulator. For all ground operation, the knurled knobs will be screwed DOWN on the regulators.

60. B-50 AIRCRAFT. The cabin pressure regulator emergency control handle is located inboard of the right gunner's seat. This handle is normally safety-wired in the OPEN position; but in the event of a failure of the automatic cabin pressure regulator and at the direction of the flight engineer, the handle should be rotated 90° counter-clockwise to the CLOSED position, thus allowing the cabin pressure to be manually controlled by the flight engineer's emergency relief valve.

NOTE: If the tail gunner's compartment is equipped with a separate cabin pressure regulator shut-off valve, it should be opened. A safety clip is available; it will be installed to prevent accidental closing of the valve.

B. PRESSURE RELIEF VALVES. If both automatic regulators fail, the flight engineer will regulate the cabin pressure manually from his position by using the pressure relief valve.

C. EMERGENCY CABIN RELEASE VALVE. The emergency cabin pressure release valve is located on the pressure bulkhead (station 834), just forward of the rear entrance door on the right side of the aircraft, just above the level of the floor. This valve is used when necessary to depressurize rapidly and can be operated from the aircraft commander's engine control stand, just above the right gunner's head, or at the valve itself (can be reset by repositioning the "T" handle at the valve).

D. VACUUM RELIEF VALVE. The vacuum relief valve is located on the pressure bulkhead (station 834) just forward of the rear entrance door on the left side of the aircraft, about middle distance between the floor and top of the aircraft. Its function is to allow air to enter the pressurized section of the aircraft if the outside air pressure is greater than the air pressure inside the cabin of the aircraft.

SECTION XI

CAMERA DOORS

A. EMERGENCY OPERATION OF HYDRAULICALLY OPERATED CAMERA DOORS.

61. Raise the access door in floor just forward of station 834.

62. Position the manual hydraulic by-pass valve to the CLOSED position, thus shutting off the hydraulic pressure to the camera door actuators.

63. Obtain the hand crank from the underside of the access door and engage it with the hand crank shaft located near the manual hydraulic by-pass valve.

64. Rotate hand crank to desired position.

WARNING: Do not engage the hand crank while the manual hydraulic by-pass valve is in the OPEN position, as the doors can then be operated automatically and serious injury might result.

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SECTION XII

EMERGENCY APU OPERATION

A. GENERAL INFORMATION. A two-cylinder gasoline engine drives a generator which provides an auxiliary source of 28 V.D.C. 175 AMPS power. The engine, generator and controls are installed as a unit in the aft unpressurized compartment. A carbon pile type voltage regulator, a reverse current relay, an overvoltage relay, and a generator field control relay switch are on the APU control panel. Control switches and indicators on the APU control panel and on the engineer's panel provide for both normal and emergency operation of the unit. The APU control panel includes a generator field switch, generator armature switch and ignition switches. The generator field switch has "START-RUN" positions and is spring loaded to "RUN" position. The armature switch has "START-OFF-RUN" positions and is spring loaded from "START" to "OFF." Three ignition switches provide control of the APU. One of the APU marked "EMERGENCY IGN" provides a means of ungrounding the APU engine magneto when manual starting is required because of insufficient battery power to operate the normal ignition control. Normally, ignition control is accomplished by the "NORMAL IGN" switch on the APU control panel. This switch is connected electrically with an APU switch on the engineer's panel. An indicator light adjacent to each switch in both locations indicates ignition on when the light is illuminated.

B. OPERATING PROCEDURES.

65. NORMAL OPERATION.

a. Starting APU.

(1) Connect battery, turn battery switch "ON."

(2) Place throttle control to "IDLE" position.

(3) Turn on APU "NORMAL" ignition.

(4) Check oil temperature and enclosure temperature (if equipped) with indicators.

(5) Hold generator field and armature switches to "START."

(6) When engine starts, release generator field and armature switches.

(7) Allow APU to idle until rocker-box cover feels warm to the hand.

(8) Place throttle to "RUN."

(9) Place generator armature switch to "RUN."

NOTE: If APU is extremely cold, throttle control may have to be placed to "CHOKE" position for starting.

b. Stopping APU.

(1) Generator armature switch to "OFF."

(2) Throttle control to "IDLE."

(3) Allow APU to idle for approximately 3 minutes for cooling.

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(4) Turn "NORMAL" ignition "OFF."

(5) If leaving aircraft, turn battery switch "OFF" and disconnect battery.

66. EMERGENCY OPERATION WITH BATTERY POWER AVAILABLE.

a. Starting APU.

(1) Connect battery, turn battery switch "ON."

(2) Place throttle control to "IDLE" position.

(3) Turn "NORMAL" ignition "ON."

(4) Turn generator armature switch "OFF."

(5) Crank manually with starting rope.

(6) Place throttle control to "RUN."

(7) Place generator armature switch to "RUN."

b. Stopping APU. Use normal stopping procedure.

67. EMERGENCY OPERATION WITHOUT BATTERY POWER.

a. Starting APU.

(1) Connect battery, turn battery switch "ON."

(2) Place throttle control to "IDLE" position.

(3) Turn generator armature switch "OFF."

(4) Hold emergency ignition switch "ON."

(5) Crank manually with starting rope.

(6) Place throttle control to "RUN."

(7) Place generator armature switch to "RUN."

(8) Turn normal ignition switch "ON."

(9) Turn emergency ignition switch "OFF."

b. Stopping APU. Use normal stopping procedure.

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CHAPTER 4

GUN CAMERA

SECTION I

GENERAL INFORMATION

A. Gun camera training is a means of improving a gunner's skill and proficiency in tracking, ranging and triggering an aerial target with his sight. A 16 MM, electrically driven moving picture camera is provided for mounting on all sighting stations in the remote control system.

B. The immediate objective of the gun camera program is to train gunners to spot the attacking fighters soon enough, to accurately track and frame it long enough and fire the guns without burning out the barrels or hitting friendly aircraft.

C. The AN-N-6 camera manufactured by Fairchild is the principal type now in service. There are two other types of cameras in limited use only, Fairchild N-6 and the Bell and Howell.

D. During the gun camera mission, fighters attack the bomber from alternate sides of the aircraft under realistic combat interception conditions. The camera films a complete picture of each attack, through the sight that the gunner is tracking with.

E. The film exposed by the gunner at the attacking fighters should be processed and reviewed within 24 hours after the completion of the mission. A gunnery instructor should score and analyze the processed film in the presence of the gunner concerned. Constructive criticism of the gunner's sighting and shooting ability will be given at this presentation.

F. MAGAZINE HANDLING.

1. Top gunner will report to Gun Camera Section and draw the required number of magazines for the mission.

2. Magazines should be placed in a suitable carrying case by the Gun Camera Section; if cases are not furnished, it is advisable for the gunner to furnish a suitable case. (Pockets, bags or boxes without proper separation are not considered to be a suitable carrying case.)

3. Magazines will remain in carrying case until such time as they are loaded into the camera. Immediately replace the magazine in the carrying case upon removal from the camera.

4. Care must be exercised in keeping the magazines in a cool place after drawing them from the Gun Camera Section.

G. HARMONIZATION OF GUN CAMERA.

5. The harmonization of the gun camera should be accomplished on the preflight inspection.

a. Open the camera shutter by running the camera until it stops with the shutter open, or place the shutter speed knob in a neutral position and turn the spline gear by hand until it is open.

b. Insert the magazine shaped part of the boresight tool in the camera, with the open side toward the camera mechanism. (Be certain that this part is all the way in.)

c. Insert the scope into the socket provided at the rear of the boresight tool.

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d. Turn the A.C. power "ON" and adjust the reticle for maximum brilliancy.

e. View the picture that the camera will take through the scope.

f. If the reticle does not appear close to the center of the picture as shown by the cross hair, it must be repositioned.

(1) Loosen the screws that hold the camera combining glass and readjust it until the reticle appears in the center of the cross hair.

(2) Tighten all parts firmly; check that the alignment has not been disturbed, then remove the boresight tool.

g. The harmonization of the camera is a very critical item in the accomplishment of a successful gun camera mission. The camera will become misaligned very easily even after boresighting, so exercise care in handling the sight during the mission.

h. While harmonizing, clean the glass optical pieces in the sight, camera and camera mount as these parts cannot be reached at a later time without destroying the harmonization.

(1) Never use any liquids in cleaning the glass pieces, lens or camera.

(2) If necessary breathe on the optical parts and then wipe them with lens tissue.

(3) Dust or fingerprints on these parts will materially effect the exposure.

H. USE OF SIGHT AND CAMERA.

6. An image of the fighter and the reticle is reflected into the camera lens by the camera combining glass.

7. This combining glass is chromed slightly on one side to give it the reflecting qualities of a mirror.

8. Although the gunner must sight directly through this glass to see the reticle, it does not impair his vision if it is installed with the shiny side toward the camera lens.

9. During the attack, the gunner tracks and frames the fighter with his sight reticle in the prescribed manner, but all switches that would cause a similar movement of the turrets are turned off.

10. The camera films a complete picture of the attack by nature of its over-run control, a built in device that keeps the camera running for two seconds after the trigger is released. It is possible to tell if the trigger was depressed (firing) or the camera was running on over-run when viewing the film, by means of the over-run indicator that appears on the film.

I. SCORING OF FILM.

11. Scoring is a mathematical process that determines:

a. What percentage of the attack the gunner's tracking was on the target and his framing was correct (OT or On Target score).

b. What percentage of the attack was the gunner on target long enough to enable the computer to be on the target (COT or Computer On Target score).

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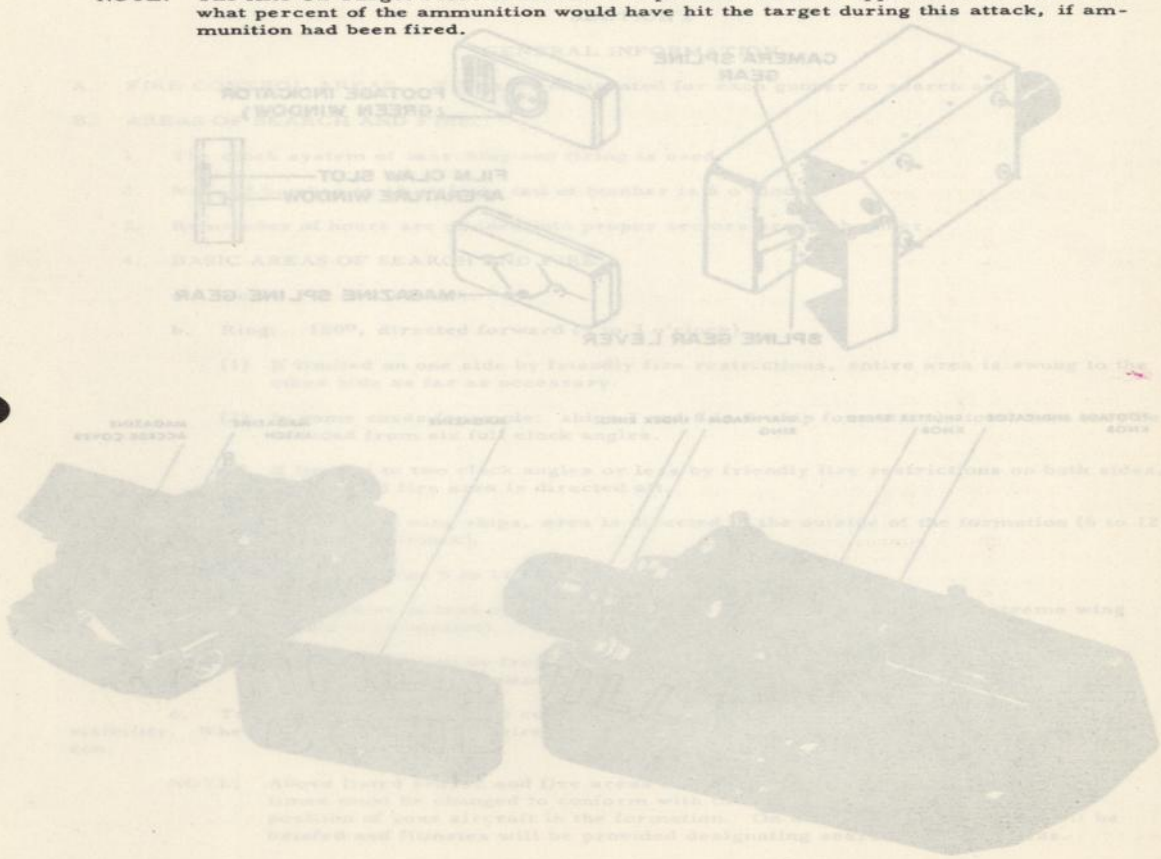
c. What percentage of the attack was the computer on target and the gunner firing (HOT or Hits on Target score).

NOTE: The Hits On Target score is the most important and is an approximate index as to what percent of the ammunition would have hit the target during this attack, if ammunition had been fired.



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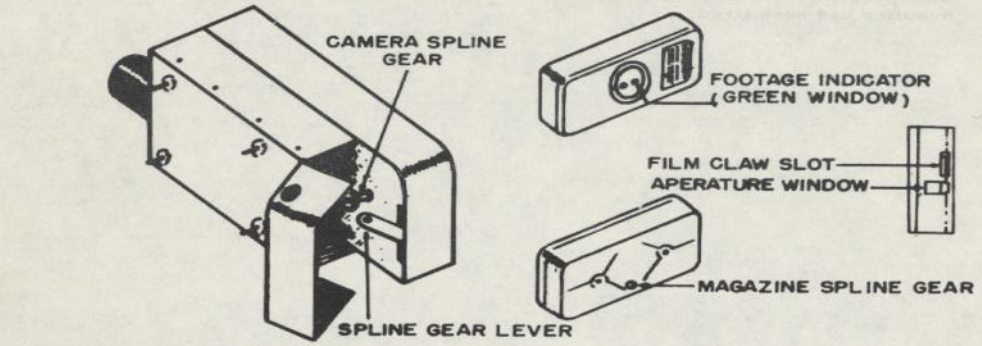

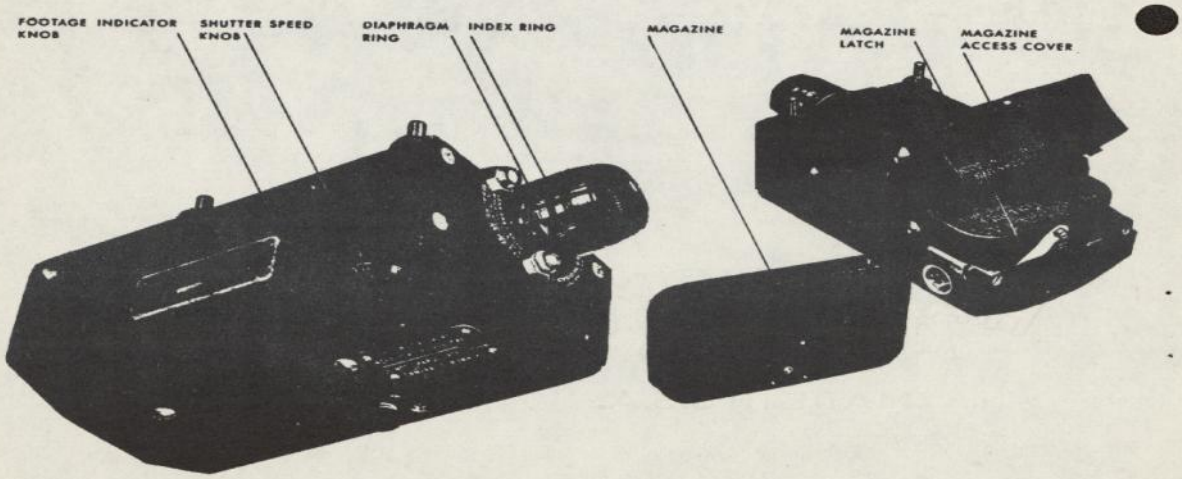

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CHAPTER 5

SEARCH AND FIRE TECHNIQUES

SECTION I

GENERAL INFORMATION

A. FIRE CONTROL AREAS. That area designated for each gunner to search and fire.

B. AREAS OF SEARCH AND FIRE.

1. The clock system of searching and firing is used.

2. Nose of bomber is 12 o'clock; tail of bomber is 6 o'clock.

3. Remainder of hours are divided into proper sectors around bomber.

4. BASIC AREAS OF SEARCH AND FIRE.

a. Nose: 10 to 2 o'clock.

b. Ring: 180°, directed forward (9 to 3 o'clock).

(1) If limited on one side by friendly fire restrictions, entire area is swung to the other side as far as necessary.

(2) In some cases (example: ships 7 and 8 in 9-ship formation), total area may be reduced from six full clock angles.

(3) If limited to two clock angles or less by friendly fire restrictions on both sides, search and fire area is directed aft.

(4) On extreme wing ships, area is directed to the outside of the formation (6 to 12 or 12 to 6 o'clock).

c. Blisters: 1 to 6 or 6 to 11 o'clock.

(1) All blisters of lead element cover 9 to 12 or 12 to 3 (except on extreme wing planes of formation).

(2) If area is limited by friendly fire restrictions to region forward of the beam, area is extended forward to 12 o'clock.

d. Tail: Area of fire--entire coverage of turret; area of search--entire region of visibility. When tail fire must be restricted, it is limited to the region above or below the horizon.

NOTE: Above listed search and fire areas are BASIC search and fire areas and at times must be changed to conform with the type of formation used and the position of your aircraft in the formation. On all missions, gunners will be briefed and flimsies will be provided designating search and fire areas.

C. IDENTIFICATION OF BOUNDARIES OF SEARCH AND FIRE AREAS.

5. TO DETERMINE CLEARANCE ANGLE FROM ENDANGERED PLANE.

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a. At arms length with hand widespread, the distance from the tip of the thumb to the tip of the little finger will subtend an angle of approximately 15°.

b. When looking through the sight (except the ringsight) with the forehead against the pad, the angle subtended by the far posts supporting the gyro is about 20°.

6. BRIEFING CURRENTLY EMPLOYED.

a. 15° clearance from endangered plane should be allowed for lead and dispersion.

b. Additional allowance of 15° for safety.

c. Total of 30° (1 clock angle) clearance from endangered plane should be allowed when adjusting search and fire areas.

7. THE PARALLAX ANGLE PROBLEM.

a. Allowance must be made for the fact that the gun may be as much as 40 feet away from sight.

(1) Line of fire and line of sight are essentially parallel but separated by distance from sight to turret. Therefore, a friendly plane may appear comfortably clear and yet directly in the line of fire.

(2) Gunner must allow for parallax to neighboring planes, just as computer allows for parallax to the target.

(3) This difficulty is avoided if he estimates the required clearance (1 clock angle), not from the endangered plane itself but from a point some constant distance from it.

(a) By choosing this distance equal to the distance from the sighting station to turret on his own plane, the parallax is correctly allowed for at all ranges.

(b) A distance of one-half the length of the bomber can be used in all cases. (This is slightly more than the greatest sight turret distance encountered.)

D. HOW AREAS OF SEARCH AND FIRE ARE ADJUSTED.

8. All areas are limited by the strict rule that: Search and fire area boundaries must stop in azimuth one full clock angle (30°) away from any other bomber in the formation. (plus additional allowance for parallax, if applicable).

9. All areas except tail are adjusted in azimuth only, NEVER in elevation. Tail may be RESTRICTED TO EITHER ABOVE OR BELOW THE HORIZON.

10. All areas, with exception of TOP GUNNER and TAIL GUNNER, are adjusted by cutting down the total area in AZIMUTH.

a. TOP GUNNER can swing his whole area around in azimuth, or in some cases (example: Ships 7 and 8 in 9-plane formation), total area may be reduced from six full clock angles.

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b. TAIL may be RESTRICTED TO EITHER ABOVE OR BELOW THE HORIZON.

E. BRIEFING OF FORMATIONS.

11. The turret allocations and areas of search and fire shown in the following tables are examples and are used only when the formations are stacked high right. When other formations are used, search and fire areas must of necessity be changed.

12. When fire areas are restricted to avoid own formation damage, the planes causing the restriction are indicated by numbers in parenthesis.

13. Letters in parenthesis have the following meaning:

(d)--plane is interpreted as an extreme wing ship, so that top gunner is briefed to the side; (p)--parallax rule applies and reduces area by one hour; (s)--lower turrets switched between blister gunners to avoid parallax rule.

14. In all cases, the formation is assumed to be on the bombing run. The lower forward turrets of the lead plane and deputy lead plane are assigned to blister gunners instead of nose gunners, as would be the case on the cruising run.

THREE PLANE FORMATION, STACKED HIGH RIGHT, ON THE BOMBING RUN

SHIP	ALLOCATION	NOSE UFT	NOSE LFT	TOP UFT	TOP UAT	R. BLISTER LFT	R. BLISTER LAT	L. BLISTER LFT	L. BLISTER LAT	TAIL
A1 1	NOSE OUT	-	-	9-3	9-3	-	12-3	9-12	-	5-7
A2 2	BROADSIDE	-	-	12-6	12-6	1-6	1-6	-	-	5-7
A3 3	HI MAN	-	10-2	6-12	6-12	-	-	-	6-11	5-7

FOUR PLANE FORMATION, STACKED HIGH RIGHT, ON THE BOMBING RUN

SHIP	ALLOCATION	NOSE UFT	NOSE LFT	TOP UFT	TOP UAT	R. BLISTER LFT	R. BLISTER LAT	L. BLISTER LFT	L. BLISTER LAT	TAIL
A1 1	NOSE OUT	-	-	8-2	8-2	-	1-6	9-12	-	5-7 (low 4)
A2 2	BROADSIDE	-	-	10-4	10-4	1-6	1-6	-	-	5-7
A3 3	HI MAN	-	10-2	6-12 (d)	6-12	-	-	-	6-11	5-7
A4 4	ONE EACH	10-2	-	-	9-3	- (2)	4-6	6-8 (3)	-	5-7

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SIX PLANE FORMATION, STACKED HIGH RIGHT, ON THE BOMBING RUN

SHIP	ALLOCATION	NOSE UFT	NOSE LFT	TOP UFT	TOP UAT	R. BLISTER LFT	R. BLISTER LAT	L. BLISTER LFT	L. BLISTER LAT	TAIL
A1 1	NOSE OUT	-	-	9-3	9-3	-	12-3	9-12	-	5-7
A2 2	BROADSIDE	-	-	8-2 (4)	8-2	12-3	12-3	-	-	5-7
A3 3	HI MAN	-	10-2	6-12	6-12	-	-	-	6-11	5-7
B1 4	HI MAN	-	11-2 (1)	9-3	9-3	-	12-3 (5)	-	-	5-7
B2 5	HI MAN	-	11-2 (1)	12-6	12-6	-	1-6	-	-	5-7
B3 6	ONE EACH	10-2	-	-	9-3	-	4-6 (5s)	6-9	- (3s)	5-7

NINE PLANE FORMATION, STACKED HIGH RIGHT, ON THE BOMBING RUN

SHIP	ALLOCATION	NOSE UFT	NOSE LFT	TOP UFT	TOP UAT	R. BLISTER LFT	R. BLISTER LAT	L. BLISTER LFT	L. BLISTER LAT	TAIL
A1 1	NOSE OUT	-	-	9-3	9-3	-	12-3	9-12	-	5-7
A2 2	BROADSIDE	-	-	8-2 (4)	8-2	12-3	12-3	-	-	5-7
A3 3	HI MAN	-	10-2	6-12 (1)	6-12	-	-	-	10-12 (7)	5-7
B1 4	HI MAN	-	11-2 (1)	12-6 (d)	12-6	-	12-6 (5)	-	-	5-7
B2 5	HI MAN	-	11-2 (1)	12-6 (d)	12-6	-	1-6	-	-	5-7
B3 6	ONE EACH	10-2	-	-	9-3	-	4-6 (5)	6-8	- (8)	5-7
C1 7	HI MAN	-	10-2	9-1 (9&1)	9-1	-	-	-	6-11	5-7
C2 8	HI MAN	-	10-2	4-7 (6&9p)	4-7	-	-	-	6-11	5-7
C3 9	HI MAN	-	10-1 (7)	6-12 (d)	6-12	-	-	-	6-11	5-7

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ELEVEN PLANE FORMATION, STACKED HIGH RIGHT, ON THE BOMBING RUN

SHIP	ALLOCATION	NOSE UFT	NOSE LFT	TOP UFT	TOP UAT	R. BLISTER LFT	R. BLISTER LAT	L. BLISTER LFT	L. BLISTER LAT	TAIL
A1 1	NOSE OUT	-	-	9-3	9-3	-	12-3	9-12	-	5-7
A2 2	NOSE OUT	-	-	8-2 (4)	8-2	-	12-3	6-7 (11)	-	5-7
A3 3	HI MAN	-	10-2	6-12 (1)	6-12	-	12-3	-	-	5-7
B1 4	HI MAN	-	11-2 (1)	9-3	9-3	- (5)	12-3	-	-	5-7 (low 10)
B2 5	HI MAN	-	11-2 (1)	12-6	12-6 (d)	-	1-6	-	-	5-7
B3 6	ONE EACH	10-2	-	-	9-3	- (5)	4-6	6-8 (11)	-	5-7
C1 7	HI MAN	-	10-2	9-1 (9&1)	9-1	-	-	- (11)	8-11	5-7 (hi 11)
C2 8	HI MAN	-	10-2	4-7 (10&9p)	4-7	-	1-6	-	-	5-7
C3 9	HI MAN	- (7)	10-1	6-12 (d)	6-12	-	-	-	6-11	5-7
B4 10	ONE EACH	10-2	-	-	9-3	- (5)	3-6	6-8 (11)	-	5-7
C4 11	HI MAN	-	10-2	4-8 (10&9p)	4-8	-	-	-	6-11	5-7

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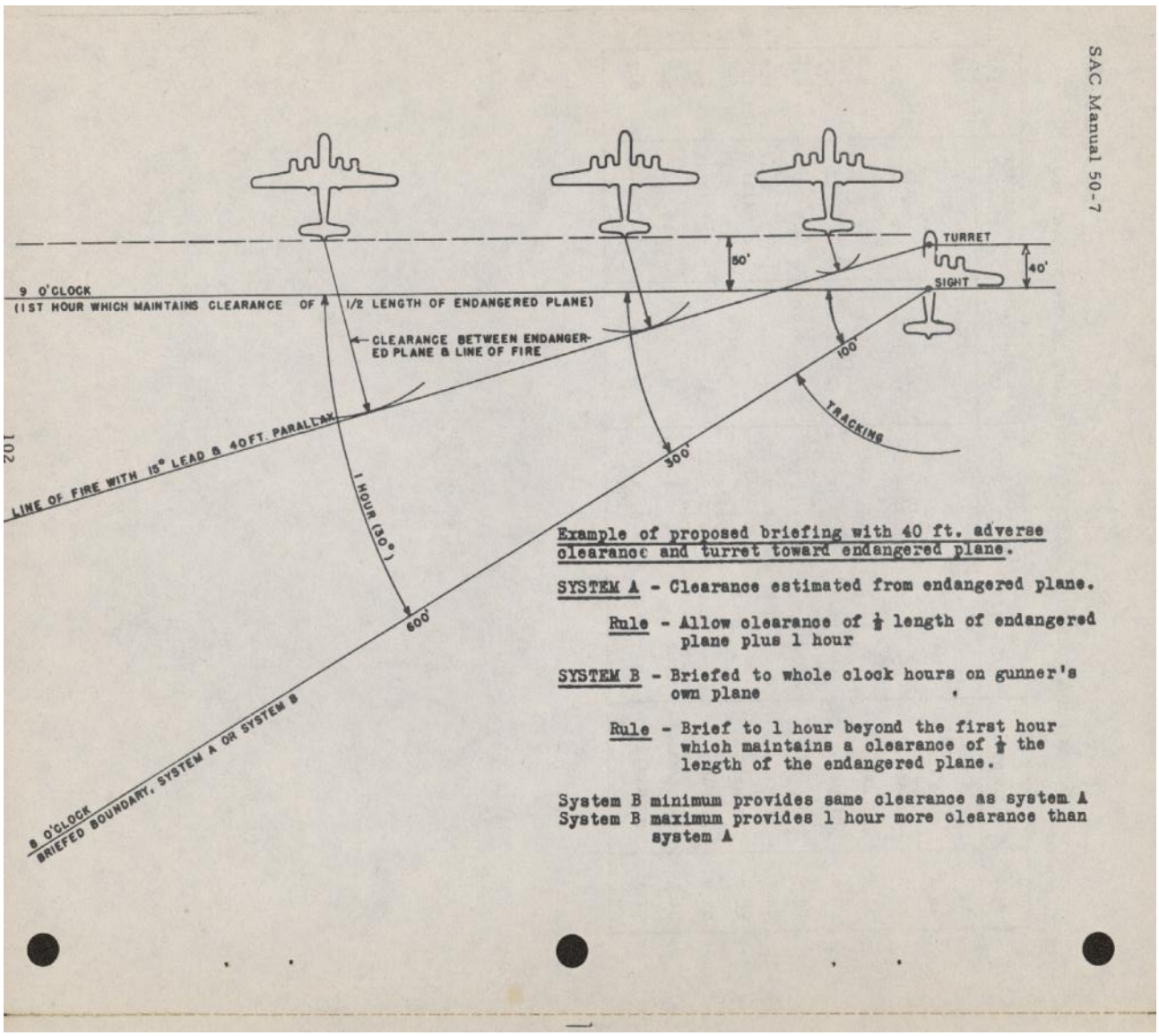

Example of proposed briefing with 40 ft. adverse clearance and turret toward endangered plane.

SYSTEM A - Clearance estimated from endangered plane.

Rule - Allow clearance of ½ length of endangered plane plus 1 hour

SYSTEM B - Briefed to whole clock hours on gunner's own plane

Rule - Brief to 1 hour beyond the first hour which maintains a clearance of ½ the length of the endangered plane.

System B minimum provides same clearance as system A
System B maximum provides 1 hour more clearance than system A

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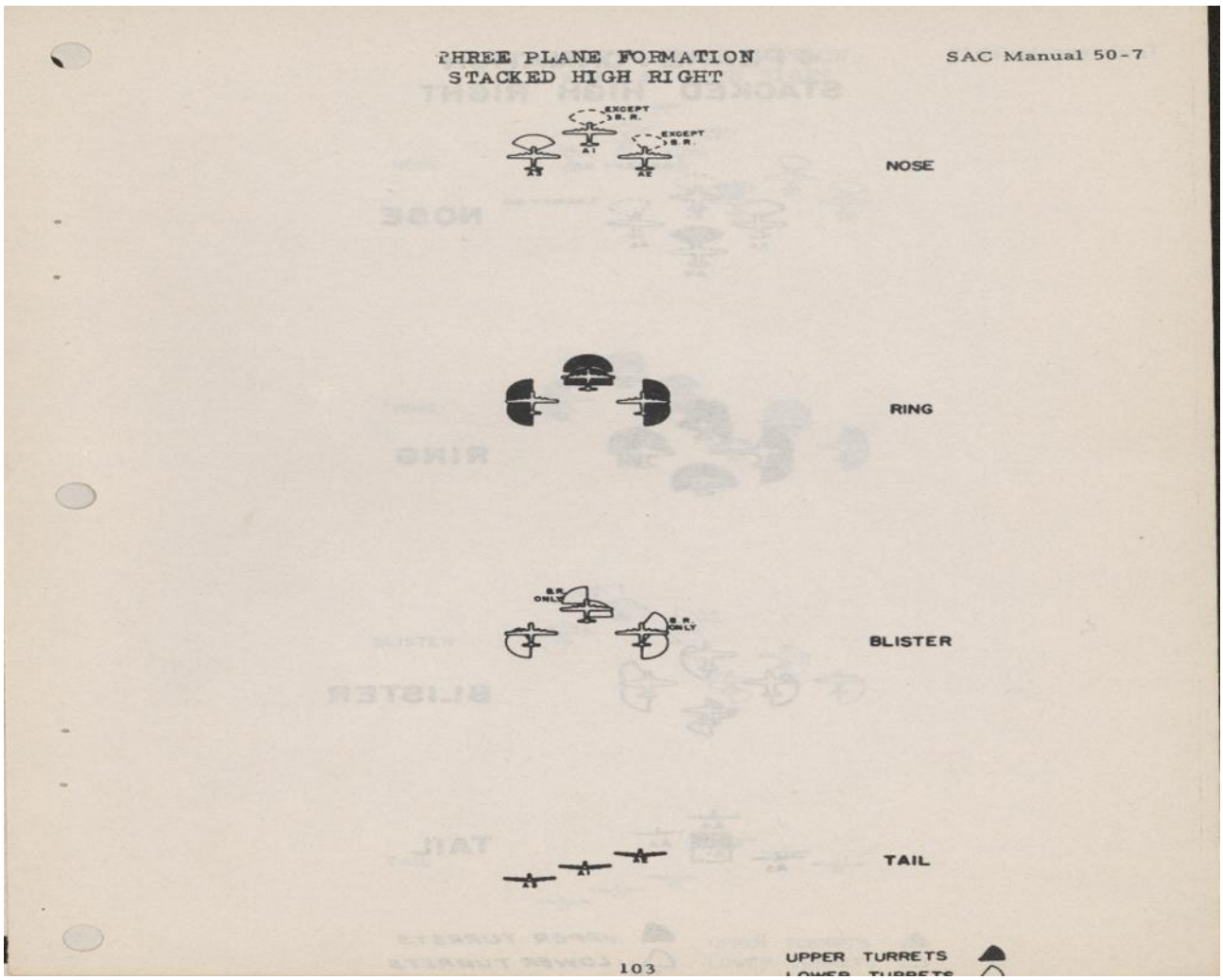

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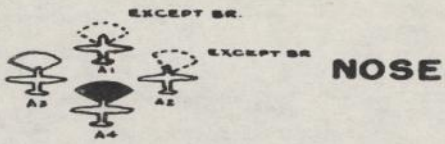
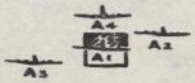
4 PLANE FORMATION
STACKED HIGH RIGHT



NOSE

RING

BLISTER



TAIL

UPPER TURRETS
LOWER TURRETS

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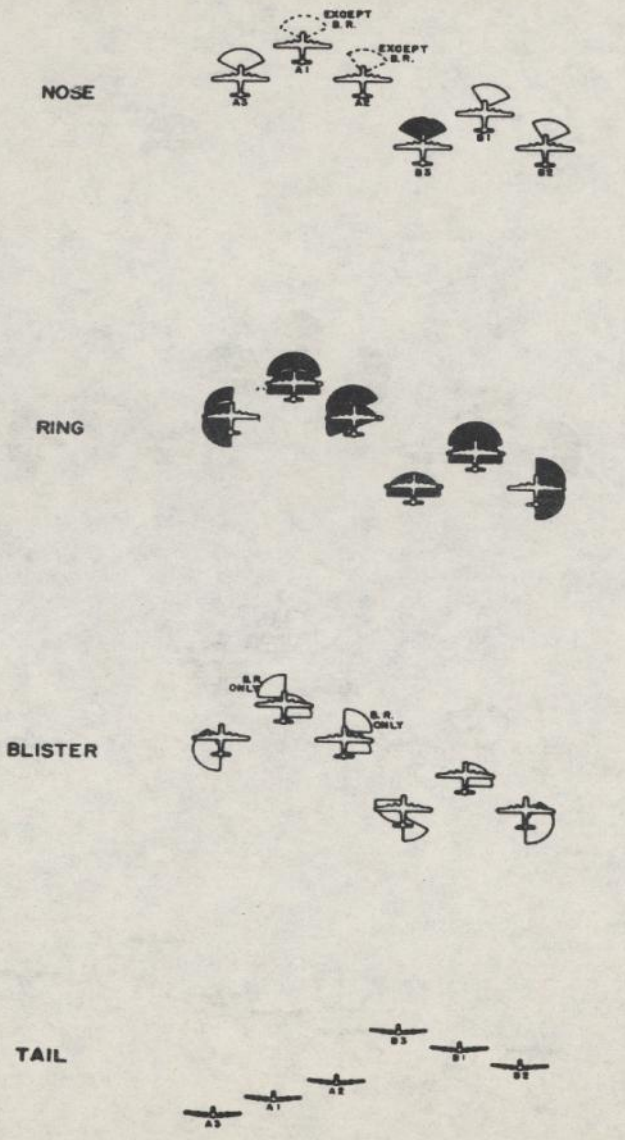
SIX PLANE FORMATION
STACKED HIGH RIGHT



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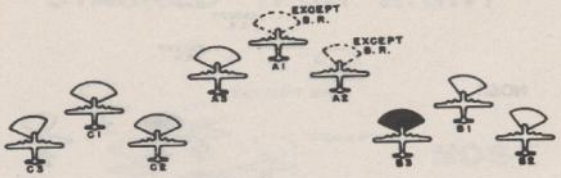
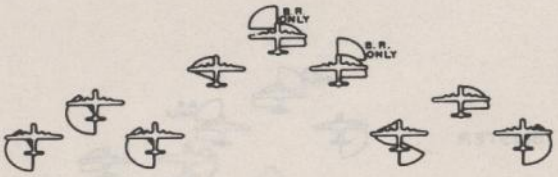
NINE PLANE FORMATION
STACKED HIGH RIGHT

NOSE



RING

BLISTER



TAIL

UPPER TURRETS ▲
LOWER TURRETS △

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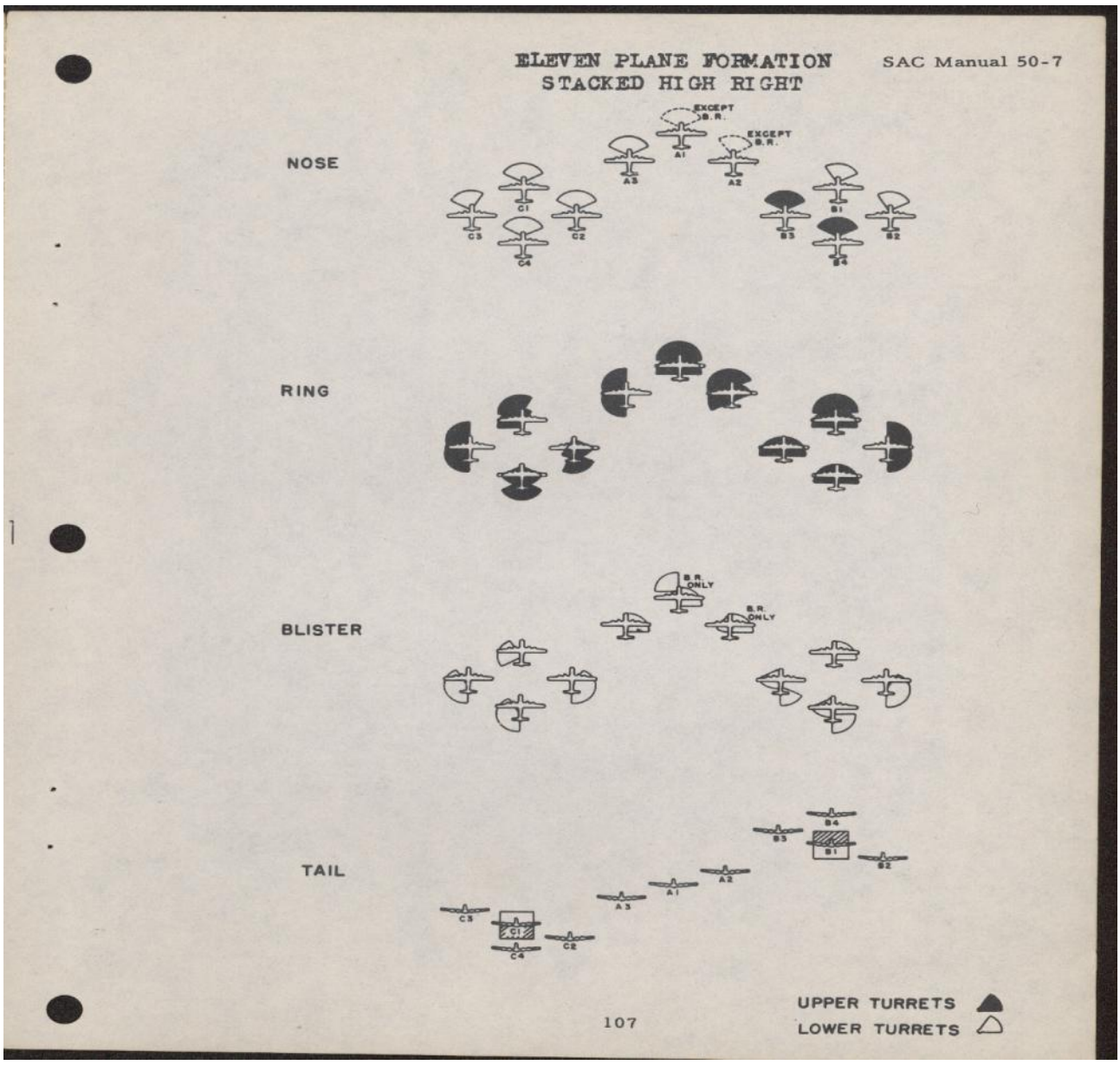

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CHAPTER 6

GENERAL INFORMATION

SECTION I

AUXILIARY POWER UNIT HEATING SYSTEM (IF INSTALLED)

A. GENERAL. The APU may be preheated on some aircraft when its oil temperature is below 10°C(50°F). The heating system consists of a metal enclosure around the APU and a combustion heater with automatic controls for regulating the heater output. Air for the heater is supplied by a blower which forces air through the heater and into the APU enclosure. The upper and inboard sides of the enclosure are formed as one piece and are removable. Two access doors, one in the inboard side and the other in the top of the enclosure, are removable. When the APU is running, the access doors or removable panel should be removed as necessary, to assure that the enclosure temperature does not exceed 66°C(150°F). The APU heating system may be started or stopped from the engineer's station or from the aft end of the APU enclosure.

CAUTION: Attempting to start the APU without preheat when extremely cold may result in blowing out the current limiter or may damage the APU.

B. APU HEATER SWITCHES. A "START" and a "STOP" switch for the APU heater are on the engineer's overhead panel and the APU control panel. Depressing either "START" switch will start the heater operating. Depressing either "STOP" switch will stop the APU heater.

C. INDICATORS.

1. OIL TEMPERATURE WARNING LIGHT. A red warning light near the APU heater switches, on the engineer's overhead panel and on the APU control panel, lights up when the APU ignition switch is "ON" if the APU oil temperature is 10°C (50°F) or below.

2. "HEATER ON" INDICATOR LIGHT. An amber light near the APU heater switches, on the engineer's overhead panel and on the APU control panel, will light up when the APU heater is operating.

3. APU TEMPERATURE INDICATOR. The APU temperature indicator, on the engineer's overhead panel, is a dual-type indicator and indicates the APU enclosure temperature and oil temperature in degrees centigrade.

D. NORMAL OPERATION. If the oil low temperature red warning light illuminates when the APU ignition switch is turned "ON," the APU must be heated as follows:

4. Hold the APU heater "START" switch down until the amber "HEATER ON" light illuminates.

5. Check that APU heater is operating. (It can be heard and hot air can be felt emitting from enclosure.)

6. When the red oil low temperature warning light goes out, hold the heater "STOP" switch down until the amber "HEATER ON" light goes out.

7. Start the APU in the normal manner.

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SECTION II

SIGHT AND TURRET LIMITS OF MOVEMENT

A. LIMITS OF SIGHT MOVEMENT.

8. Nose sight movement from normal stowed position (0° azimuth and 0° elevation) is 185° to the right, 140° to the left and 80° up or 80° down.

9. Ring sight movement from normal stowed position (180° azimuth and 0° elevation) is 360° left or right, continuous rotation, 90° up and 5° down.

10. Blister sight movement from normal stowed position (broadside and 0° elevation) is 105° left or right, 60° up and 90° down.

11. Tail sight movement from normal stowed position (180° azimuth and 0° elevation) is 105° left or right, 60° up and 90° down.

B. LIMITS OF TURRET MOVEMENT.

12. UFT. 360° continuous rotation in azimuth and from 5° below horizontal, except when pointed aft, to 90° above horizontal. When pointed aft, the guns are prevented from going below 5° above horizontal by the contour follower.

13. UAT. 360° continuous rotation in azimuth and from horizontal, except when pointed forward, to 90° above horizontal. When pointed forward, the guns are prevented from going below 11° above horizontal by the contour follower.

14. TAIL TURRET. 60° in azimuth (30° either side of straight aft) and 60° in elevation (30° either above or below horizontal).

15. LAT. 360° continuous rotation in azimuth and from 5° above horizontal, except when pointed forward, to 90° below horizontal. When pointed forward, the guns are prevented from raising above 9° below horizontal by the contour follower.

NOTE: G-4A turret can only be raised 3 1/2° above horizontal.

16. LFT. 360° continuous rotation in azimuth and from 5° above horizontal, except when pointed aft, to 90° below horizontal. When pointed aft, the guns are prevented from raising above 2° above horizontal by the contour follower.

NOTE: B-50 LFT: 360° continuous rotation in azimuth and from 3 1/2° above horizontal, except when pointed aft, to 90° below horizontal. When pointed aft, the guns are prevented from raising above 18° below horizontal by the contour follower.

SECTION III

COMPUTERS

A. There is a remotely located computer for each sighting station. It is designed to allow a gunner to sight directly on a target and causes the gun axes to change from a position parallel to the line-of-sight to a position which will cause the projectile to hit the target.

B. THE TOTAL COMPUTER CORRECTION CONSISTS OF THE FOLLOWING:

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17. THE BALLISTIC CORRECTION. Compensating for windage and gravity forces, which cause a projectile to change its path from a straight line after leaving the muzzle of the gun.

18. THE PARALLAX CORRECTION. Compensating for the distance between the turret and the controlling sighting station.

19. THE LEAD (PREDICTION) CORRECTION. Compensating for the distance the target travels from the instant the projectile leaves the gun until it strikes the target.

C. These three corrections are added together and appear as a single total correction. The total correction is introduced into the armament system by means of selsyn differential generators (located in the computer), which are electrically connected between the selsyn generators on the sighting station and the selsyn control transformers on the turret. When the rotors of the selsyn differential generators are rotated by the amount of the total correction (as determined by the computer), they cause the selsyn generator signals from the sighting station to be altered. This causes the guns on the turret to be changed from a position parallel to the line of sight by the amount of the total correction. This new position is the one which will cause the projectiles to strike the target.

D. The computer, as its name implies, is only a computing device. Before it can compute the desired corrections, it must obtain certain information. Each gunner supplies his computer with the following information:

20. The relative velocity of his target (by means of two gyroscopes on the sighting station).

21. The range of his target (by means of his range handwheel on the sighting station).

22. The azimuth and elevation gun positions (obtained from the selsyn signals).

23. In addition to the information supplied by the gunner and his sight, all computers are supplied with information on altitude, air-speed and temperature by the navigator's handset unit.

NOTE: It is very important that the gunner track smoothly and frame the target accurately to allow the computer to give the total correction as rapid, easy and correct as possible.

E. The nose computer is located in the navigator's compartment. All of the other computers are located together in the computer well under the floor boards of the central crew compartment (under the upper aft turret). Starting at the forward end of the well, the computers appear in the following order: Upper, right blister, left blister and tail.

F. Double parallax computers are used for those sighting stations (upper and both blisters) which can control two or more turrets whose parallax base-length is sufficiently different to require two different parallax corrections. (Double parallax computers are used in B-29 aircraft only.)

G. On B-50 type aircraft, there are five single parallax computers. Where two turrets are controlled from one sighting station, the computer corrects for parallax for only one of the turrets; the remaining turret's line of fire is parallel to the turret for which the parallax correction is made.

H. A computer voltage regulator is used for restrained gyroscope type computers (not needed on free gyroscope type computers). The regulator is electrically connected on the incoming power line to the computers to maintain a constant voltage. The regulator takes a variable voltage input and operates to maintain a constant output voltage of 22.5 volts, plus or minus 1/2 volt on a load current value of 3.9 amperes. Voltage control is accomplished by the use of a series of resistance steps which are introduced into, or shorted out of, the circuits by a set of 24 contact fingers and a silver bar. When using less than five restrained-gyroscope computers, it is necessary to connect

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an equivalent load to those terminals not connected to computers. The circuits are protected by five, five-ampere fuses, one for each computer. There are five spare fuses located inside the computer voltage regulator box.

SECTION IV

GUN CHARGER

A. GENERAL.

24. The gun chargers on the B-29 and B-50 not only charge but also fire the guns. It is operated by compressed air.

25. The air compressor, which operates automatically, maintaining a pressure of 950-1100 PSI receives its power through the POWER-AUX (Warm-Up) switch.

26. The charger operates for approximately 4 seconds (7 to 12 charges) before the timing mechanism automatically cuts it off.

27. The guns can be hand-charged, using the charger, by inserting a screw driver into the "C" socket at the forward end of the chargers and pushing the handle gently toward the gun muzzle until the gun charges.

28. The firing solenoid can be actuated by inserting a screw driver in the "F" socket at the center of the charger and pushing the handle gently towards the breech end of the gun.

WARNING: EXTREME CARE MUST BE EXERCISED, WHENEVER THIS METHOD OF FIRING IS USED, THAT THE GUN IS NOT LOADED. ALSO, EXTREME CARE MUST BE EXERCISED WHEN CHARGING THE GUNS, BY THE ABOVE METHOD, TO INSERT THE SCREW DRIVER INTO THE "C" SOCKET.

B. RESETTING THE CHARGER. The automatic timer which cuts off the charger after about four seconds of operation can be set back to zero by pressing the red reset button at the back of the charger. Always press this button before leaving the turret.

SECTION V

SAFETY WIRING AND COTTER PINS

A. The points to be checked at the turret for broken safety wire or cotter pins are:

29. Safety wire both front gun mounts to each other.

30. Safety wire all bolts holding the gun charger to the gun.

31. Safety all ammunition guides with cotter pins.

32. Safety both feed roller assemblies with cotter pins.

33. Safety the bolt holding pawl pin with a cotter pin.

34. Safety the extractor switch with a cotter pin.

35. Safety the breech lock cam with a cotter pin.

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36. Safety wire the azimuth-drive assembly.

37. Safety wire the elevation-drive assembly.

38. Safety the contour-follower gear with a cotter pin.

SECTION VI

CONTROL BOXES

A. The following diagrams are of different position control boxes and are included for comparison of the two different types.

39. Uni-switch.

40. Nose individual switch control box.

41. Nose Uni-switch control box.

42. Top individual switch control box.

43. Top Uni-switch control box.

44. Blister individual switch control box.

45. Blister Uni-switch control box.

46. Tail individual switch control box.

47. Tail Uni-switch control box.

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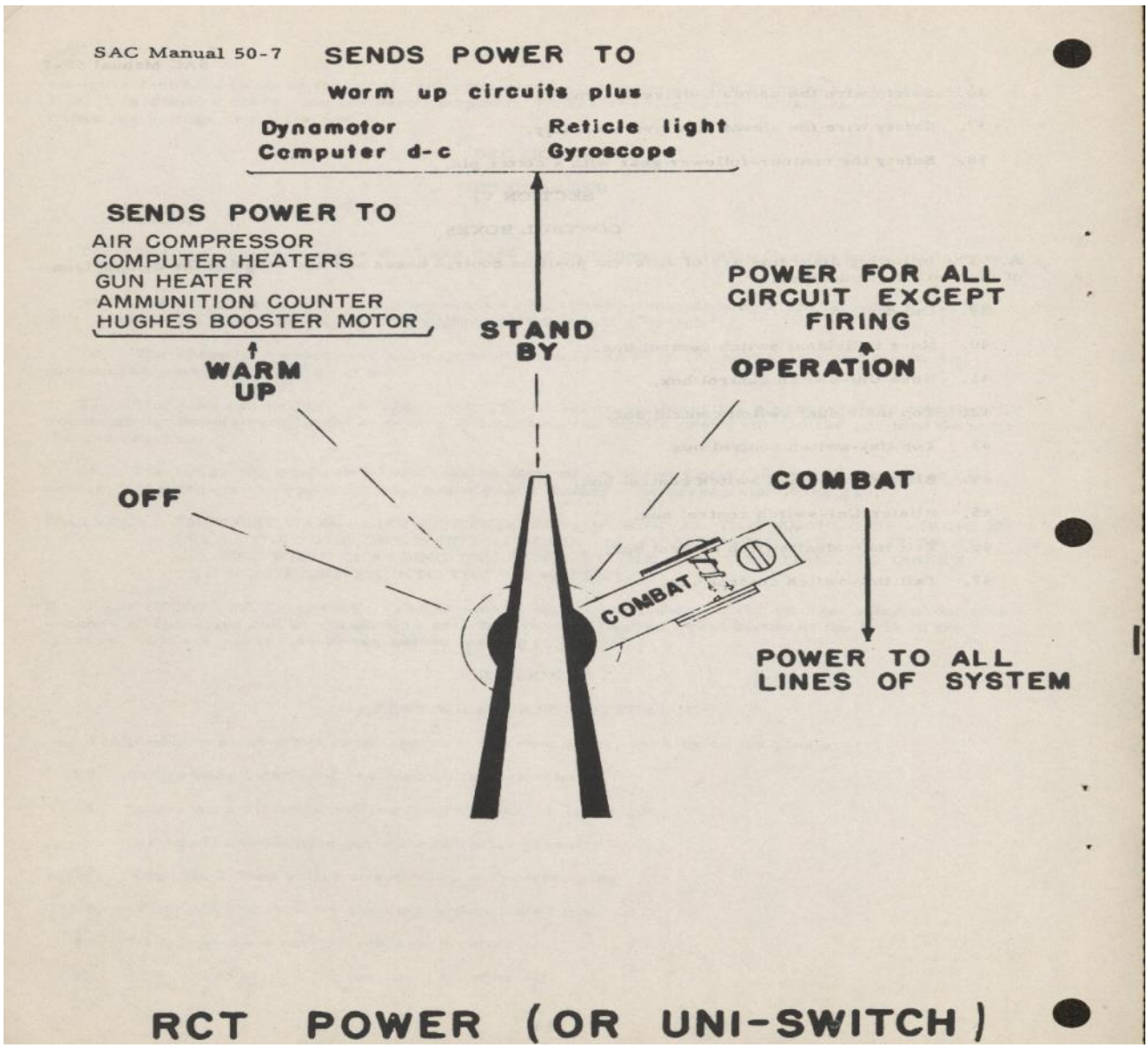

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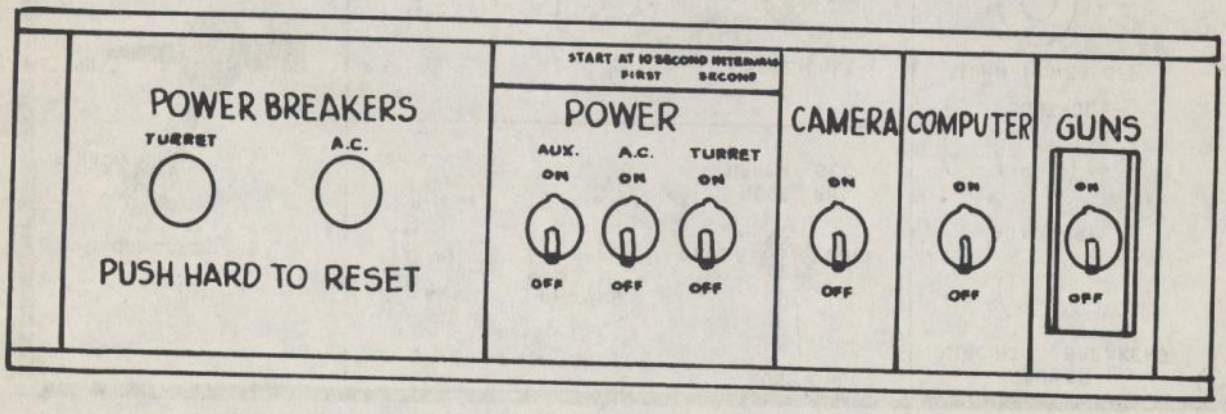
THE NOSE GUNNER'S SWITCHES



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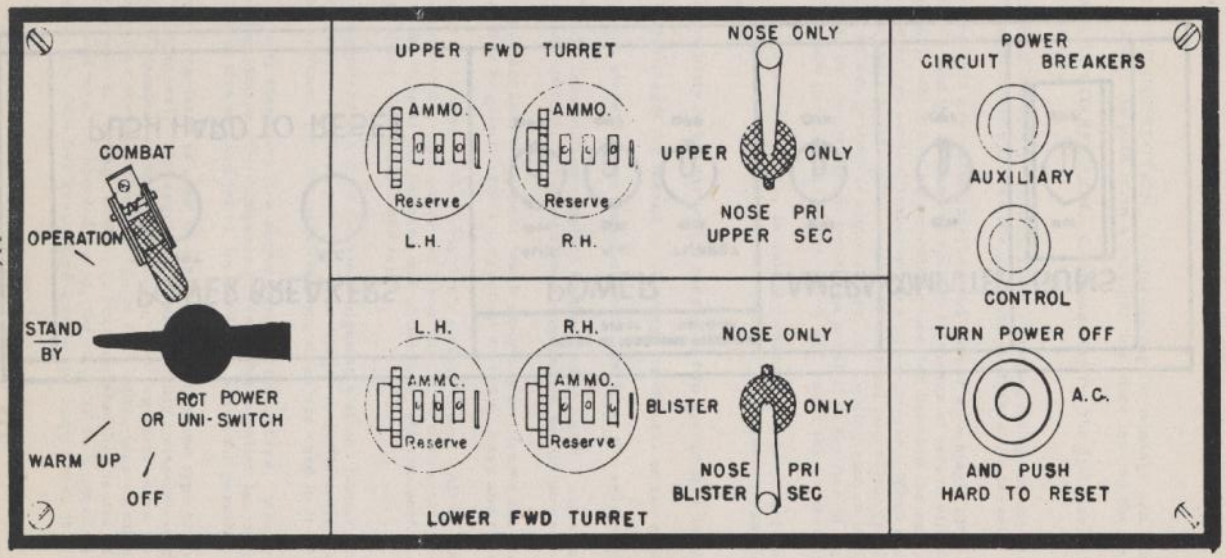

NOSE CONTROL BOX PANEL

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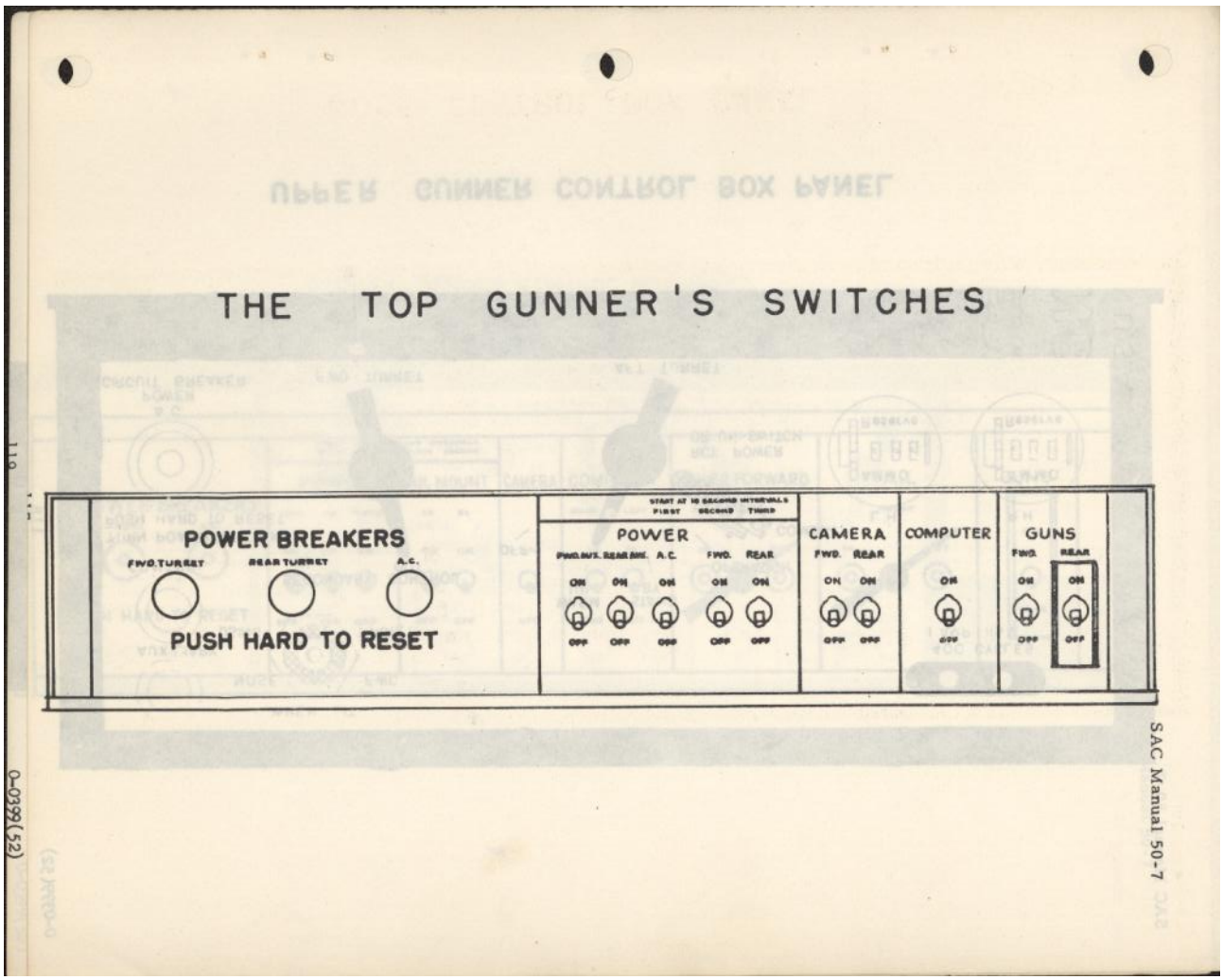

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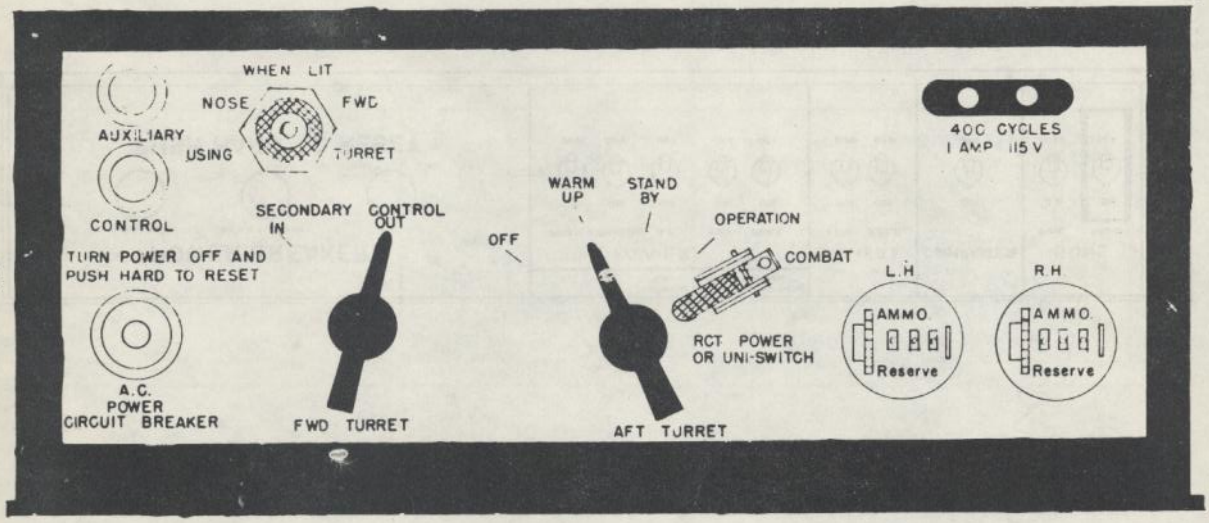

UPPER GUNNER CONTROL BOX PANEL

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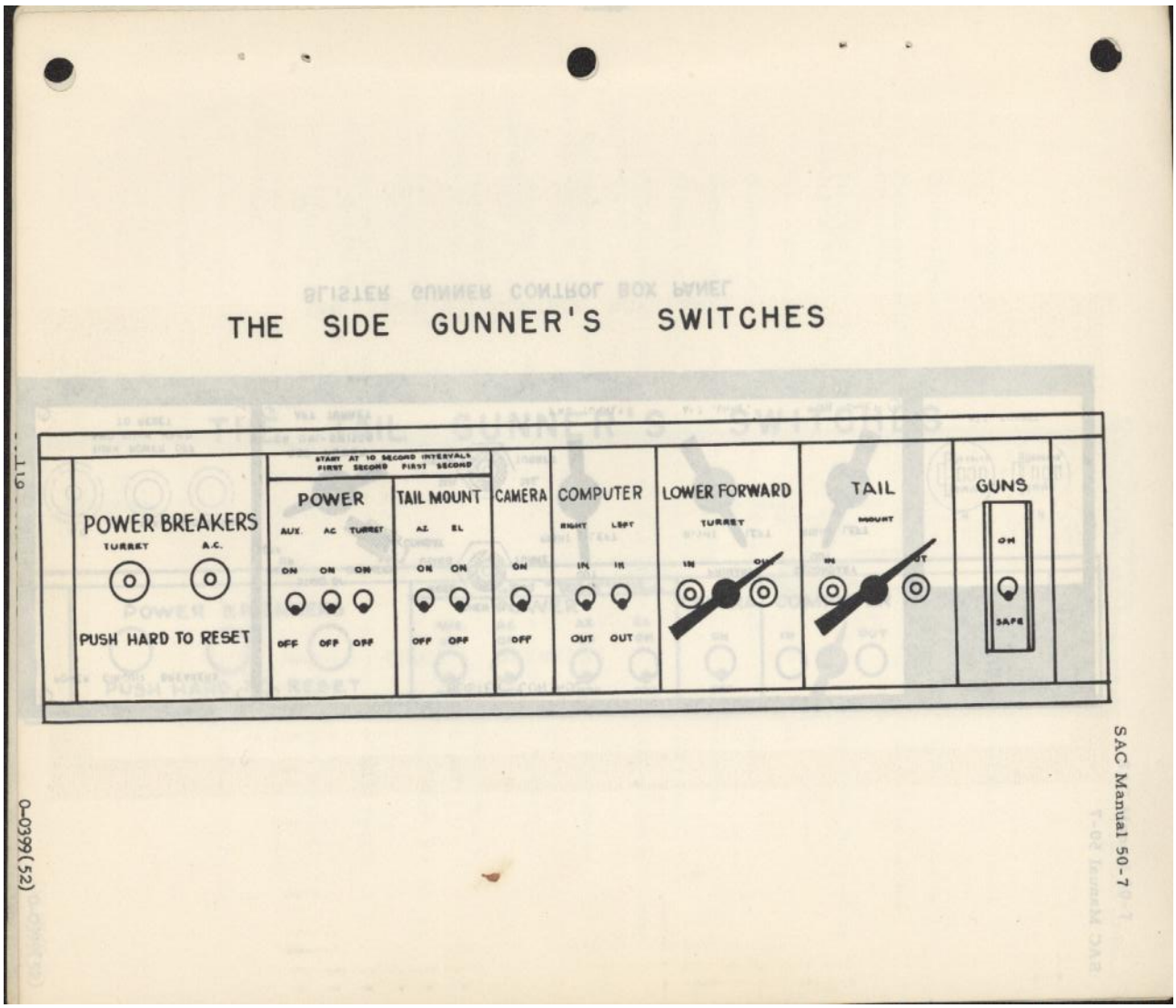

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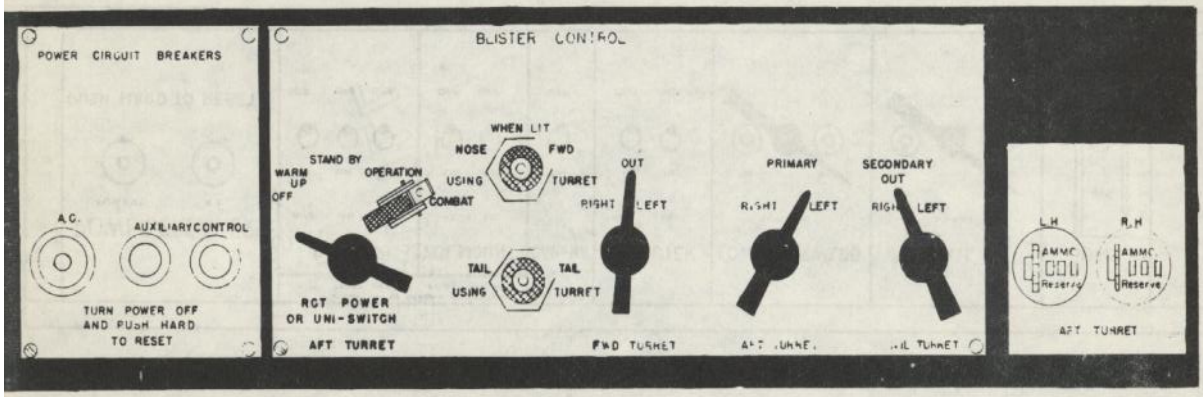

BLISTER GUNNER CONTROL BOX PANEL

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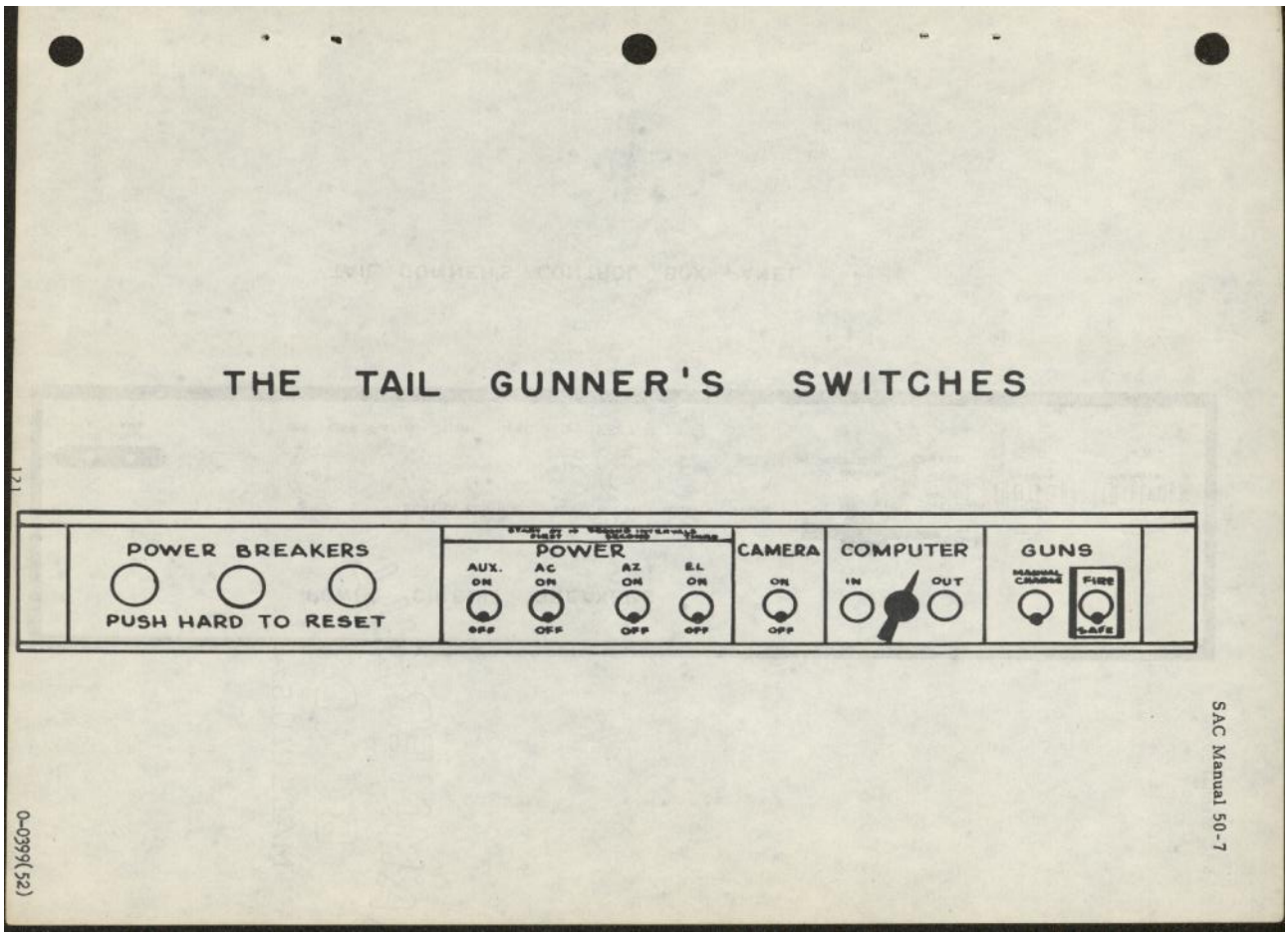

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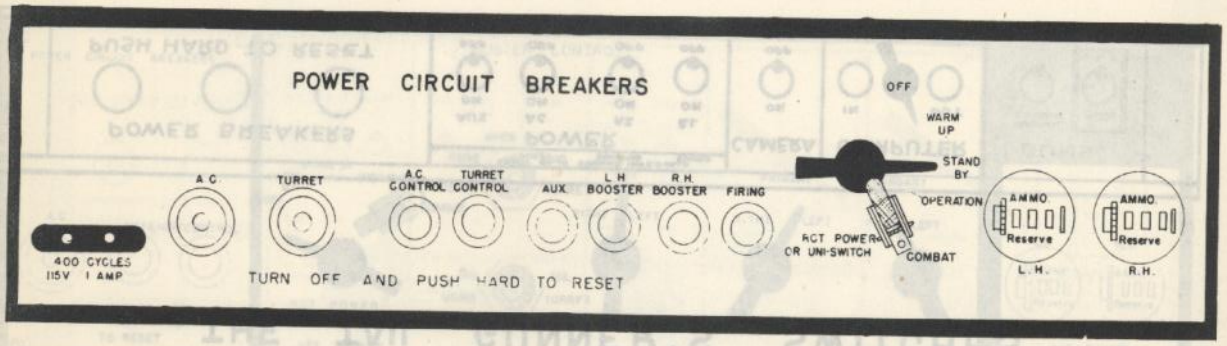

TAIL GUNNER'S CONTROL BOX PANEL

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SECTION VII

REFERENCE MATERIAL

More detailed information on the material contained in this manual can be found in the following publications; you are encouraged to refer to them:

1. Technical Order 01-20EJA-1. Flight operating instructions B-29 A, B, B-29 Receiver.

2. Technical Order 01-20ELA-1. Flight operating instructions B-50 A, D, Hose type and Boom type Receiver.

3. Technical Order 11-1-8. Operation, Service and Overhaul instructions with Parts Catalog -- Aircraft Machine Gun Caliber .50 (M-2).

4. Technical Order 11-1-28. Service instructions - Aircraft Weapons.

5. Technical Order 11-1-48. Ammunition Booster - Caliber .50 (Hughes).

6. Technical Order 11-70-4. Machine Gun Turret Domes - Install procedure.

7. Technical Order 11-70112. Out-of-Synchronism Relays - Instl in the Firing Circuit.

8. Technical Order 11-70A-9. Operation, Service and Overhaul instructions with parts catalog - Computers.

9. Technical Order 11-70A-20. Operation and Service instructions -- RCTS Models 2CFR55C1, C2, X1, X2.

10. Technical Order 11-70A-26. Operation and Service instructions -- RCTS Models 2CFR12C2, C3.

11. Technical Order 11-70A-29. Operation and Service instructions -- RCTS Models 2CFR55D1, D2, G1, W1, W2.

12. Technical Order 11-70AA-3. Overhaul instructions RCTS Models 2CFR55B1, B2, B3, B4, C1, C2, Y1, Y3, Y4.

13. Technical Order 11-70AA-9. Operation and Service instructions -- RCTS Models 2CFR55B1, B2, B3, B4.

14. Technical Order 11-70AA-28. Overhaul instructions -- RCTS Models 2CFR12C2, C3.

15. Technical Order 11-70AA-31. Operation and Service instructions -- RCTS Models 2CFR87B1, B2.

16. Training Manual 9-219 (AFM 136-6). Basic Aircraft Machine Gun Caliber .50 AN-M3.

17. Training Manual 9-225. Basic Aircraft Machine Gun, Caliber .50 AN-M2.

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