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90 SQDN.

GUNNERS STANDING OPERATING PROCEDURES

FOR THE

B-29 & B-50 SUPERFORTRESS

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SAC MANUAL
50-126-7

RESTRICTED

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

FOREWORD

1. SAC Manual 50-126-7 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. 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.

3. Initial distribution is to all MB units of this command.

4. Additional copies of this manual may be obtained by request to this headquarters. ATTENTION: Publications Section, Adjutant General Division.

BY COMMAND OF LIEUTENANT GENERAL LeMAY:

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CHAPTER 1

INTRODUCTION TO SOP FOR MB GUNNERS

1. Information contained in this manual has been directed toward helping the MB gunner attain a thorough knowledge of his equipment and knowledge of his duties as a combat crew member. Only through knowledge can the success of a mission be assured.

2. This manual has been devised for B-29 and B-50 Gunners.

3. Gunners will be held responsible for proper demonstration of procedures contained in this manual. This includes standard preflight, operating, and post flight procedures with the gunnery equipment; assistance to the maintenance crew and flight engineer; and proficiency in emergency procedures.

4. Useful gunnery checks and inspection procedures have been placed in Chapters 2, 3, and 4. Techniques, aids, and description of equipment have been placed in Chapters 6, 8, and 9. Emergency procedure has been placed in Chapter 5, and gun camera information and procedure has been placed in Chapter 7. Understanding of information and techniques discussed in these chapters will aid considerably in the safe and efficient use of gunnery equipment and in preservation of lives.

5. Gunners will be thoroughly trained in emergency procedures, so that, if an emergency arises, they will be able to perform their duties in a highly efficient and effective manner.

6. Live ammunition will not be fired from any turret until all safety precautions have been taken, and then only on authority of the airplane commander or fire control officer. In all cases, the firing of live ammunition will be conducted only over designated water or land gunnery ranges. Weather must be such as to permit visible

inspection of the gunnery range for possible unauthorized trespassing of personnel, other aircraft, vehicle or boats. This precautionary measure does not apply to the firing of blank ammunition or the exposing of gun camera film.

7. Safety Regulations in AR 750-10, dated 22 January 1944, as amended, and regulations of local organisations will be strictly adhered to.

CHAPTER 2

STANDARD CONDENSED POSITION CHECK LISTS

SECTION I - INTRODUCTION

1. The following condensed check lists are designed for each gunner's position. There should be one of these check lists in each airplane. These are reminders to use for your own safety and the safety of your fellow crewmen. Use your check list on every flight. Presently installed check lists will be revised to conform with those contained in this manual.

2. An amplification of the gunnery equipment check will be found in Chapter 3 of this manual. An amplification of all steps in the entire check list will be found in Chapter 4 of this manual.

SECTION II - RCT (TOP) GUNNER'S POSITION CHECK LIST

1. BEFORE STARTING ENGINES

a. Preflight inspections: Gunnery and engineering.
b. Clothing.
c. Parachute, oxygen, life vest, and individual dinghy.
d. Crew inspection.
e. Check stowage of auxiliary equipment.
f. Interphone check.
g. Flight controls check.
h. Check rear bomb bay door emergency accumulator pressure and compressor oil level.
i. Engine alert.

2. BEFORE TAXIING

a. Combat station inspection, alarm bell and call light.
b. Bomb bay doors. Open shut-off valve and place fuel tank safety to ON or CAN SALVO position.
c. Taxi alert.
d. Check bomb bay doors closed.

3. BEFORE TAKE-OFF

a. Prepare for take-off.

b. RCT POWER-AUX "ON" or WARM UP position on B-29s using 2CFR55D1, 2CFR55D2, 2CFR55W1, 2CFR55W2 RCT systems. (Gunnery missions only.)

4. AFTER TAKE-OFF

a. Visual check of engines.

b. In-the-air RCT operational checks: sight, turrets, guns and navigator's handset.

c. Crew coordination.

d. Periodic visual check of engines.

5. BEFORE LANDING

a. RCT equipment stowed and switches OFF, when pilot gives order, "Prepare for landing." Normal stowing of upper turrets is: upper forward 0° azimuth and 0° elevation; upper aft 180° azimuth and 0° elevation. If landing with upper guns loaded, stow both upper turrets at 0° azimuth and 45° elevation.

b. Check stowage of auxiliary equipment.

c. Prepare for landing.

6. AFTER LANDING

a. Bomb bay doors OPEN.

b. Taxi alert.

c. Bomb bay door safety shut-off valve CLOSED and fuel tank safety switch OFF. (After the parking brakes are set and/or wheel chocks are in place.)

d. Bomb bay door "downlock" safety spacers in place.

e. Guns cleared manually.

f. Crew inspection.

g. Drain bomb bay compressor accumulators and emergency accumulators.

h. Field strip guns for cleaning and drain charger pressure cylinder.

i. Enter RCT and armanent discrepancies on Form 1A.

SECTION III - LEFT (E) AND RIGHT (M) GUNNER'S POSITION CHECK LIST

1. BEFORE STARTING ENGINES

a. Preflight inspections: Gunnery and engineering.
b. Clothing.
c. Parachute, oxygen, life vest, and individual dinghy.
d. Crew inspection.
e. Stow auxiliary equipment in rear pressurized compartment.
f. Interphone check.
g. Flight controls check.
h. Check forward bomb bay door emergency accumulator pressure and compressor oil level.
i. Engine alert.

2. BEFORE TAXIING

a. Combat station inspection, alarm bell and call light.
b. Report position of bomb bay door shut-off valve when directed by the RCT gunner.
c. Taxi alert.
d. Report bomb bay doors closed when directed by RCT gunner.

3. BEFORE TAKE-OFF

a. Engine report.
b. Wing flap report (down 25°).
c. Prepare for take-off.
d. RCT POWER-AUX "ON" or WARM UP position on B-29s using 2CFR55D1, 2CFR55D2, 2CFR55W1, 2CFR55W2 RCT systems. (Gunnery missions only.)

4. AFTER TAKE-OFF

a. Report flaps up, landing gear up and landing gear well door closed.
b. Visual check of engines.

c. In-the-air RCT operational checks: sight, turrets, gun and navigator's handset at the RCT gunner's direction.

d. Crew coordination.

e. Periodic visual check of engines.

5. BEFORE LANDING

a. RCT equipment stowed and switches OFF, when pilot gives order, "Prepare for landing." Normal stowing of lower aft turret is 180° azimuth and 0° elevation.

CAUTION: IF LOWER AFT TURRET GUNS ARE LOADED THEY WILL BE CLEARED MANUALLY AND COVERS RAISED IN FLIGHT BEFORE LANDING.

b. Stowage of auxiliary equipment in rear pressurized compartment

c. Landing gear report (down and locked).

d. Flap report (25° and full down).

e. Prepare for landing.

6. AFTER LANDING

a. Taxi alert.

b. Chocks in place.

c. Bomb bay door "downlock" safety spacer in place.

d. Guns cleared manually.

e. Crew inspection.

f. Field strip guns for cleaning and drain charger pressure cylinder.

g. Report RCT and armament discrepancies to RCT (Top) Gunner.

SECTION IV - TAIL GUNNER'S POSITION CHECK LIST

1. BEFORE STARTING ENGINES

a. Preflight inspections: Gunnery and engineering.

b. Clothing.

c. Parachute, oxygen, life vest, and individual dinghy.

d. Stow auxiliary equipment in rear unpressurized compartment.

e. Crew inspection.

f. Start AUX POWER UNIT (putt-putt) when battery switch is turned ON and at the flight engineer's command. Report "putt-putt ON the line."

g. Interphone check.

2. BEFORE TAXIING

a. Combat stations inspection, alarm bell and call light.

b. Taxi alert.

3. BEFORE TAKE-OFF

a. Prepare for take-off.

4. AFTER TAKE-OFF

a. AUX POWER UNIT (putt-putt) OFF at the command of the flight engineer.

b. Report tail skid UP.

c. RCT POWER-AUX "ON" or WARM UP position on B-29s using 2CFR55W1, 2CFR55W2, 2CFR55D1, 2CFR55D2 RCT systems. (Gunnery missions only.)

d. In-the-air RCT operational checks: Sight, turrets, and guns at the RCT gunner's direction.

e. Crew coordination.

5. BEFORE LANDING

a. RCT equipment stowed and switches OFF when pilot gives order, "Prepare for landing." Normal stowage of tail guns is 180° azimuth and 0° elevation. (30° elevation if guns are loaded.)

CAUTION: IF TAIL GUNS ARE LOADED THEY WILL BE CLEARED MANUALLY IN FLIGHT BEFORE LANDING.

b. Start AUX POWER UNIT (putt-putt) at the command of the flight engineer. Notify the flight engineer when AUX POWER UNIT (putt-putt) is ON the line.

c. Report the tail skid down.

d. Prepare for landing.

6. AFTER LANDING

a. AUX POWER UNIT (putt-putt) OFF at the command of the flight engineer.

b. Guns cleared manually.

c. Crew inspection.

d. Field strip guns for cleaning and drain charger pressure cylinder.

e. Report RCT and armament discrepancies to RCT (Top) Gunner.

SECTION V - BOMBARDIER'S POSITION GUNNERY CHECK LIST

1. BEFORE STARTING ENGINES

a. Preflight gunnery equipment.

2. BEFORE TAKE-OFF

a. RCT POWER-AUX "ON" or WARM UP position on B-29s using 2CFR55D1, 2CFR55D2, 2CFR55W1, 2CFR55W2 RCT systems. (Gunnery missions only.)

3. AFTER TAKE-OFF

a. In-the-air RCT operational check: Sights, turrets and guns upon notification by RCT (Top) Gunner.

b. Crew inspection.

4. BEFORE LANDING

a. RCT equipment stowed and switches OFF when pilot gives order, "Prepare for landing." Normal stowage of lower forward turret is 180° azimuth and 0° elevation.

CAUTION: IF THE LOWER FORWARD TURRET GUNS ARE LOADED THEY WILL BE CLEARED MANUALLY IN FLIGHT BEFORE LANDING.

5. AFTER LANDING

a. Guns cleared manually.

b. Supervise field stripping, cleaning and re-installation of guns on all turrets and draining of bomb bay compressor and emergency accumulator.

c. Check to see that the RCT (Top) Gunner has correctly entered RCT and armament discrepancies on the Form 1A.

CHAPTER 3

GUNNERY EQUIPMENT PREFLIGHT CHECK LISTS

SECTION I - INTRODUCTION

1. The following steps will be taken by each gunner in preflighting his gunnery equipment. These preflight inspections are designed as checks on maintenance, which should never be assumed to be perfect. These inspections must be performed conscientiously and thoroughly.

2. An amplification of these checks will be found in Chapter 4 of this manual.

SECTION II - RCT (TOP), BLISTER AND BOMBARDIER'S GUNNERY EQUIPMENT PREFLIGHT CHECK LIST

1. VISUAL INSPECTION

a. All switches OFF.
b. Remove turret dome and gun enclosure.
c. Clear and inspect guns. (Install guns, if necessary.)
d. Reset gun chargers.
e. Check turret, AN connections, mounts, and air hose connections.
f. Check air pressure cylinder; oil quantity, and fan guard.
g. Check sighting station.
h. Check gun camera.

2. OPERATIONAL CHECK

a. External power ON and used if an external power source is available. When using the ship's putt-putt, do not operate more than one turret at a time. When using external power source, caution will be used to prevent overloading of unit.
b. Reset power breakers.
c. Manually engage latching solenoids.
d. Turn turret safety switches ON.
e. Air compressor, RCT POWER-AUX "ON" WARM UP position on newer systems. Wait 10 seconds before turning "ON" POWER-AC.

f. Sight: POWER-AC "ON". (STANDBY position on newer systems.)

g. Operation of turrets with sight, POWER-TURRET "ON". (OPERATIONAL position on newer systems.)

h. Latching solenoids for electrical pick-up.

i. Selsyn system, 1 and 31 speed in azimuth and elevation.

j. Contour follower.

k. Backout, holding, and stowing circuits.

l. Computing system operational; COMPUTER "ON" (STANDBY position on newer systems) and COMPUTER STANDBY SWITCH "IN."

m. Firing circuit; gun chargers and booster motors. GUNS switch FIRE (COMBAT position on newer systems.)

n. Limit switches and stops.

o. Fire interrupters.

p. Harmonization.

q. Secondary and tertiary control of turrets.

r. All switches OFF.

3. COMBAT ARMING

a. Inspect and load ammunition.

b. Reset gun chargers.

c. Replace domes and gun enclosures.

d. Engage latching solenoids.

e. Close and secure access doors.

f. Turn turret safety switches ON.

g. Replace well covers.

SECTION III - TAIL GUNNER'S EQUIPMENT PREFLIGHT CHECK LIST

1. VISUAL INSPECTION

a. All switches OFF.

b. Remove armor plate door and tail turret cowling.

c. Clear and inspect guns. (Install guns, if necessary)

d. Reset gun chargers.

e. Check turret, mounts, A/N connections, and air hose connections.

f. Check air pressure cylinder; oil quantity, fan guard, and accumulator.
g. Check sighting station.
h. Check gun cameras.

2. OPERATIONAL CHECK

a. External power ON. Caution will be used to prevent overloading of auxiliary or external power unit.
b. Position drive motor brakes and replace armor plate door. (This places turret safety switch ON.)
c. Operation of air compressor, RCT POWER-AUX "ON". (WARM-UP position on newer systems.)
d. Sight, POWER-AC "ON". (STANDBY position on newer systems.)
e. Operation of turret with sight, POWER-TURRET "ON". (OPERATIONAL position on newer systems.)
f. Selsyn system, 1 and 31 speed in azimuth and elevation.
g. Computing system operational, COMPUTER switch IN. (STANDBY position on newer systems.)
h. Firing circuit; gun chargers and booster motors. GUNS switch FIRE (COMBAT position on newer systems.)
i. Limit switches and backout circuit.
j. Harmonization.
k. All switches OFF.

3. COMBAT ARMING

a. Remove armor plate door and ammunition cover.
b. Inspect and load ammunition.
c. Replace ammunition cover and turret cowling.
d. Reset gun chargers.
e. Replace armor plate door.

CHAPTER 4

AMPLIFIED GUNNER'S CHECK LIST

SECTION I - INTRODUCTION

1. The following amplification of each gunner's position check list and gunnery equipment preflight check is designed to provide detailed instruction for each gunner.

2. The gunner's preflight responsibilities as a crew member are: Performing individual inspections on the gunnery equipment, assisting the flight engineer in his preflight duties, and assisting the bombardier in bombing equipment preflight and loading, fusing and arming of bombs. The gunner will perform inspection on the gunnery equipment far enough in advance of the flight to assist the flight engineer and bombardier in their preflight duties. The gunner will be responsible for reporting to the flight engineer and bombardier when the engineering and bombing equipment checks are completed and the discrepancies found.

3. All gunners will aid the flight engineer in pulling through the propellors.

4. Personal equipment checks before taxiing, and performing scanning duties during all aircraft operation are equally important as gunnery preflight checks and RCT operation. Laxity in the performance of any of the duties as a crew member may be the cause of a very serious mishap to every member of the crew.

5. On training missions on which no gunnery is performed, gunners will complete their regularly assigned inspections and, in addition, will assist the flight engineer. All gunners will perform additional duties upon instruction from the flight engineer. Before every mission, it will be the responsibility of the RCT (Top) Gunner to check the security of all RCT equipment, including the following items:

a. Turrets properly stowed and pilot's indicating lights OUT.

b. Turret domes and gun enclosures ON and locked.

c. Latching solenoids engaged.

d. Access doors closed and secured.

e. Turret well covers ON and properly seated.

6. The designation of responsibility for performing gunnery inspections will be:

a. Left gunner (E): Lower aft turret, and right and left blister sights.

b. Right gunner (M): Upper forward and lower forward turrets and the nose sight.

c. Tail gunner: Tail mount and sight.

d. RCT (Top) Gunner: Upper aft turret and ring sight. (This gunner is responsible for complete preflight inspection and can reallocate gunner's assignment or duties.)

7. Gunners are encouraged to refer to pertinent AF manuals and Technical Orders for details not covered in this manual.

SECTION II - AMPLIFIED RCT (TOP) GUNNER'S CHECK LIST

1. BEFORE STARTING ENGINES

a. Preflight inspections: gunnery.

(1) Visual inspections:

(a) Turret dome and gun enclosure.

CAUTION: Check all switches OFF.

1. Removal of domes from 2-gun turrets. Open the elevation access door by loosening Dzus fasteners with screwdriver. Unlatch the elevation latching solenoid inside the access door. Move the guns

approximately 45° away from horizontal. Release the safety catch on the dome handle by pressing it back, then turn the handle. Be sure the handle is latched in the "Unlocked" position. Remove the turret dome and secure in a safe place.

2. Removal of domes from upper 4-gun turret. Open both elevation and azimuth access doors. Unlatch elevation latching solenoid. Hold guns at approximately 45° elevation until the elevation latching solenoid is relatched. Release the 4 J-shaped latching mechanisms on the inside of the dome. Raise the safety latch on dome locking handle and release the handle by turning it to the right. Lift off the dome and secure in a safe place.

3. Removal of gun enclosures. (CAUTION: Remove canvas covers from gun barrels before removing gun enclosures.) Release the four lock pins by pulling them out as far as they will go. On lower turrets, two Dzus fasteners will have to be opened first. Slip enclosure off over gun barrels and secure in a safe place.

(b) Guns:

CAUTION: CLEAR GUNS MANUALLY AND INSPECT THE CHAMBER FOR LIVE

ROUNDS OF AMMUNITION.

1. Check for worn or broken parts, burrs, proper oiling, cleanliness of receiver. Check oil buffer adjustment and quantity of oil in oil buffer tube. Check position of bolt switch (right-hand guns feed from the right and left-hand guns feed from the left). Check position of the sear slide (the square end should be towards the side of the gun on which the charger is mounted). Check for proper headspace adjustments (.202" GO - .206" NO GO). Check seating of bolt stud in bolt. Check mounting of guns. Check safety wiring and cotter pins.

(c) Chargers: Check for proper timing of charger (FIRE .020" - NO FIRE .116"). Check air hose connections. Check mounting of charger and safety wiring.

(d) Turrets: Check for tightness of all A/N connectors and selsyn caps. Check link ejection chutes for position (be sure they are not bent or dented) and ammunition guides for proper position and mounting. Reset the chargers. Manually latch solenoids prior to plugging IN external power. Plug IN the external aux-power source. Turn TURRET SAFETY SWITCHES "ON".

(e) Air Compressor: Check the fan guard (it should not be bent), the fan for free movement, the oil sump to be full within ½" of the

top. Loosen the nut at the bottom of the pressure cylinder, drain and retighten.

(f) Rear bomb bay emergency accumulator: Check emergency accumulator in the rear bomb bay door pneumatic system for 700 to 850 PSI indicated on the gauge. If it is below 700 PSI, recharge the emergency accumulator after the putt-putt is ON the line. To recharge:

1. CLOSE emergency valve.
2. Place safety shut-off valve in SAFE position.
3. OPEN emergency charging valve slowly until the desired PSI is indicated on the emergency pressure gauge.

(g) Sighting Station: Clean the blister and the sight (see T.O. series 01-1-1 for cleaning plexiglass.) Check spare lamp bulbs. Check the friction adjustment in azimuth and elevation for proper tension.

(h) Gun Camera: Check the camera lens for cleanliness and the shutter speed and aperture for proper setting. (See Chapter 7 of this manual.)

(2) Operational Check: NO GUNS WILL BE LOADED UNTIL OPERATIONAL CHECK OF ALL TURRETS HAVE BEEN COMPLETED.

(a) Power supply. You must have an external power unit connected to the airplane or the auxiliary power unit (putt-

putt) must be ON the line before an operational check is made. When using the putt-putt do not operate more than one turret at a time. If an external power source is used be careful not to overload it.

(b) Power Breakers. Push hard on the POWER BREAKER buttons on your turret control box. Be sure they are reset before attempting to operate the RCT system.

(c) Latching Solenoid. Manually engage the azimuth and elevation latching solenoids in the turret.

(d) Turret Safety Switch. Be sure that everyone is clear of the turret, then turn the TURRET SWITCH "ON".

(e) Air Compressor. Turn the RCT POWER-AUX switch ON (WARM-UP on newer systems). The compressor should start to operate and should run from 3 to 5 minutes at sea level to build up pressure in the accumulator. Above sea level the running time will increase slightly. Wait 10 seconds after starting the compressor before turning ON the next switch. Continue with the next steps while the compressor is building up pressure.

(f) Sight. Turn the POWER-AC switch ON (STANDBY position on newer systems), and check the following for proper operation: both filaments of the reticle lamp, rheostat, target dimension dial ranging wheel and computer

warning lamp. (Warning light should be ON. Throw computer standby switch to IN, warning light should go OUT.)

1. Check parallax by moving the head several inches up and down and from side to side. The reticle should not move from sighted object.
2. Check azimuth and elevation movement of sight, adjust friction to suit personal requirements. If the gunner expects to wear gloves on the mission, he should check the friction adjustment while wearing the gloves. The proper adjustment of friction is vital to smooth tracking and the "feel" of the sight is entirely different with gloves.
3. Check gyroscopes for operation (Computer IN).

(g) Latching Solenoid. Turn the POWER-TURRET switch ON (OPERATIONAL position on newer systems.) You will hear the solenoid pick-up or unlatch when current is supplied to the drive motors.

(h) Turrets. All of your necessary control box switches are already ON. Press the action switch on the sight. Move the sight both in azimuth and elevation; the turret should follow the movement of the sight. If a turret fails to follow the sight, it may be that the circuit breakers, located on the control box, have opened one of the power circuits (AUX, AC, TURRET). These switches

are similar to fuses in their function and will open an overloaded or overheated power circuit.

1. On some model B-29s, an additional circuit breaker button, or sometimes a toggle switch, is attached to the control boxes to protect the air compressor only. Its action is similar to the other circuit breakers.

2. To check the Circuit Breaker Buttons:

   a. Turn OFF the power switches.
   b. Push hard on the power breaker buttons to reset them.
   c. Turn ON the TURRET POWER. The latching solenoid should pick-up.

(1) Selsyn. FOR THE SELSYN CHECKS THE COMPUTER STANDBY SWITCH WILL BE IN THE "STANDBY" POSITION. Check the 1 speed selsyn system in azimuth by unstowing the sight and moving it 45° away from the guns, then close the ACTION SWITCH. The guns should move into alignment with the sight. Check the 1 speed selsyn system in elevation in a similar manner. Check the 31 speed selsyn system in azimuth by closing the ACTION SWITCH and moving the sight slowly in azimuth. The guns should follow the sight smoothly. Check the 31 selsyn system in elevation in a similar manner.

(j) Contour Followers. Check that the CONTOUR FOLLOWER prevents the guns from striking the curved fuselage or from pointing at the top sighting station or the astro dome.

(k) Backout, Holding and Stowing Circuits. To check the BACKOUT CIRCUIT: Move the sight, bring the guns against a limit stop then away from the stop. If the backout circuit is not working the guns will not move off the limit stop. The HOLDING CIRCUIT, if working properly, will prevent the turret from moving from a set position of the sight when the action switch is closed. To check the STOWING CIRCUIT release the action switch, the guns should automatically come to 0° elevation.

(l) Computing System. Set the navigator's handset to maximum airspeed and minimum altitude. This is to amplify observed movements during computer check. To check the computing system, turn COMPUTER switch on the control box to IN (OPERATIONAL) and the COMPUTER STANDBY switch on the sight to IN. In making these checks, you will have to be extremely observant, as movement of guns will be slight. (Caution should be taken not to run any computer more than 15 minutes at a time on the ground if the temperature in the airplane is high enough to be uncomfortable.)

1. Lead Check. Turn the range knob 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 move back. Repeat this in the opposite direction. Now lock the sight in azimuth and repeat the lead check for elevation.

2. Windage Check. With the range set to maximum on the sight, stow the sight broadside and horizontally. Throw the COMPUTER STANDBY switch to STANDBY. The guns should swing slightly to the rear. Throw the COMPUTER STANDBY switch to the IN position. The windage correction will come back in and move the guns slightly forward.

3. Gravity Drop. Stow the sight aft and slightly above 5° horizontal where windage effect is minimum. In this check keep the upper turret's contour follower above the contour cam rather than horizontal. With range still set to maximum and the ACTION SWITCH closed, turn COMPUTER STANDBY switch to STANDBY. The guns should move down slightly. Turn COMPUTER STANDBY switch to IN and the guns should jump up.

4. Elevation Limit Switch and Back-out Circuit. When the guns are leading the line of sight, it is necessary for the computer to cut out before the line of sight reaches zenith or nadir, otherwise the guns will try to drive through the stop, a limit

switch, set to operate at approximately 85° elevation, decreases the power by 75% and cuts out the computer.

a. Elevate the sight for lower turrets or depress the sight for upper turrets beyond limits of guns. The guns should engage a mechanical stop and remain firmly seated. Computer warning light should go ON.

b. Reverse the movement of the sight, bringing it back within the limits of the guns. The guns should rise or depress off the stops and follow the sight smoothly.

(m) Firing Circuits. In checking the firing circuit, place the GUN SWITCH on "FIRE" (COMBAT position on newer systems) and point the guns at an uninterrupted firing area (off the limit stop switches and not at the tail surface or within the propeller arcs). Press the action switch and triggers. The charging and firing solenoids should operate. The ammunition booster motors should run when triggers are depressed.

(n) Limit Switches. To check: Bring the guns with the sight to a limit stop. While the guns are against the stop the firing solenoids should fail to operate.

(o) Fire Interrupters. In checking the fire interrupter, point the guns at wings, tail and propeller

arcs, being sure that the guns are not against a limit switch. Press trigger and action switch. Firing solenoids should not operate. With the action and trigger switches depressed, move the turrets slowly out of the interrupter areas. Firing solenoids should operate as the guns pass out of the interrupter area. (Remember that each gun has a separate fire interrupter.)

(p) Harmonization. Aim the sight at a distant object (desired minimum distance is one mile) with the computer STANDBY switch in STANDBY position. Then with a bore sight tool in the guns concerned, check to see if the guns are pointing at the same object at which the sight is aimed.

(q) Controls Other Than Primary. Check all operations of the secondary controlled turrets, as is done above on primary controlled turrets. On B-29s using one of the following remote control turret systems: 2CFR55D1, 2CFR55D2, 2CFR55W1, 2CFR-55W2, check tertiary control of turrets the same as in checking primary control.

(r) Switches "OFF". When all of the above checks are completed, turn OFF all switches.

(3) Combat Arming.

(a) Ammunition.

CAUTION: Turn OFF all turret control and safety switches and inspect gun chamber for live rounds.

1. Inspection of Ammunition. This inspection is to be accomplished before loading ammunition in the turret. Ammunition will be inspected for corroded 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 a hand linker-delinker. Be sure there is a round in the double link that is to be placed in the feedway of the gun.

2. Loading of Ammunition

a. 2-Gun Turrets (Upper and Lower. 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 cases from the frames; but on the upper aft turret, the cases should be lowered with the chain hoists.

(1) Place single link end of belt into case first with rounds pointing INBOARD. Fill cases in zigzag layers, leaving a space at top equal to the thickness of one row of ammunition so that the belt will

not bind in feeding. (On upper turrets, after raising the ammunition cases into position, be sure they are properly locked and hoisting chains properly stowed.)

(2) Then feed the double link end of the belt through the ammunition chute, over the booster assembly, and to the guns. Attach a 3 foot length of safety wire to the double link end of the ammunition belt for ease in loading.

b. 4-Gun Turrets (Upper. Ammunition should be taken to the turrets in boxes to avoid stretching of links. Remove turret dome and unlatch the azimuth latching solenoid. Check the four elastic stop nuts that hold each of the ammunition cases in the frame to be sure they are properly tightened. To load ammunition in the right outboard gun, rotate the turret approximately 150° right of 0° until the right front ammunition case is facing directly aft. Open

access door on case. Lower single link end of ammunition belt from top of plane with rounds pointing OUTBOARD (ammunition may be loaded in the cans from inside the plane). Fill the case in zig-zag layers. To load ammunition for right inboard gun, rotate the turret approximately 65° to the right of 0°, until the access door on the right rear ammunition case is facing aft. Load the two remaining ammunition cases by rotating the turret to the left of 0° or until the access door is directly aft. Attach 3 feet of safety wire to the double link end of the ammunition belt (or use small belt of ammunition from top of turret) for ease in loading.

(b) Arming the Guns. With the gun covers down and latched, push the first round over the belt-holding pawl and charge the guns once to position the round against the cartridge stops. Either one of two methods may be utilized to charge the guns. A hand-charging tool can be used to retract the bolt; or if no hand-charging tool is available, a screwdriver can be inserted into "C" socket of the charger (the hole in the charger nearest the muzzle end of the gun), and pushing the handle of the screwdriver gently toward the muzzle end of the gun, to actuate the charging solenoid.

CAUTION: IF THE AUTOMATIC GUN CHARGER IS USED TO POSITION THE FIRST

ROUND, EXTREME CARE MUST BE TAKEN THAT THE SCREWDRIVER IS PLACED IN "C" (CHARGE) SOCKET AND NOT IN "F" (FIRE) SOCKET.

(c) Reset Chargers. Press red reset button at back of each charger.

(d) Domes, etc. Replace turret domes and gun covers. (IMPORTANT: Check visually through inspection ports and access doors that dome security wire is properly engaged over holding lugs and that dome latch lock plunger is engaged.)

(e) Latching solenoids. Manually engage the latching solenoids.

(f) Close and secure access doors.

(g) Turret Well Covers. Replace turret well covers and check for proper sealing.

(h) Turret Safety Switch. Turn ON TURRET SAFETY SWITCH at rear of upper forward turret (upper 4-gun turret requires turret safety switch to be turned ON before replacing the turret well cover).

b. Preflight Inspections: Engineering.

You will assist the flight engineer in any manner he may direct and will assist in pulling props through. Check all rear pressurization hatches for fit and seal.

c. Preflight Inspections: Personal Equipment.

(1) Clothing.

(a) Check that you have proper clothing for the mission to be performed.

(b) Check operation of your heated suit if one is to be worn.

(2) Parachute.

(a) The parachute or harness will be worn by you and all crew members 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.

(b) Check your leg strap for proper fit, check snaps, seal, and pins.

(c) Check the Parachute Log Record; the 10-day inspection date and repack date must both be current.

(3) Oxygen.

(a) Check the fit of your mask by holding a hand over the quick disconnect fitting and inhaling gently. gently. No air should leak in around the edges of the mask.

(b) Be sure the gasket is on the male quick disconnect fitting. The fitting should fit snugly, requiring about a ten pound pull to separate.

(c) Be sure the knurled collar on the regulator is tight. Check to see that the diaphragm is intact.

(d) 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.

(e) Check your oxygen pressure; it should be 425-450 PSI. Check your walk around bottles for the same pressure.

(f) Check that one crew member in the rear pressurized compartment is using oxygen when pressurized above 15,000 feet. During pressurized flight above 15,000 feet the other crew members will have their oxygen masks connected to their helmets and oxygen supply ready for instant use.

(4) Life Vest.

(a) Life vests will be worn under your parachute harness on all over water flights.

(b) Check your life vest for leaks by inflating it with your breath; deflate the vest and close the valves.

(c) Check your CO_2 bottles to be sure that they have not been punctured and check that CO_2 puncturing lever is safetied.

(5) Dinghy.

(a) Check your pack for any visible damage or contamination (oil, mildew, etc.).

(b) Examine corners of the pack cover for wear.

(c) Check CO_2 cylinder union nut for proper tightness.

(d) Check locking pin in valve for easy removal.

(c) Insure that the rope from the pack cover grommet is securely tied to the life raft. Be sure that when the dinghy raft is attached that it is attached to the life vest and not the parachute harness. (See T.O. Series 04-15.)

NOTE: In the event any of the above equipment is found to be defective, it will be returned to the personal equipment officer or supply.

d. Crew Inspection.

(1) At the airplane commander's order, you will line up with the rest of the crew in front of the airplane with your personal effects and flying equipment for inspection (identification tags, oxygen masks, parachute, etc.). The parachute will be on and buckled, personal effects and flying equipment will be placed in front of you.

e. Stowage of Auxiliary Equipment. You will be responsible for the proper stowage of all auxiliary equipment and proper stowage of the turrets, pilots indicating light out, latching solenoids engaged, turret domes and gun enclosures on and locked, access doors closed, turret well covers on and properly seated. You will direct the tail gunner to check that the lower aft turret is clear of down-locks, ladders, and other loose equipment and report to you before taking his position in the tail.

f. Interphone Check. At the airplane commander's order to board the plane, gunners will go immediately to their respective stations and adjust their headsets and throat mikes. See that the jack box is on INTER and standby for interphone check by the pilot. The Top (RCT) Gunner will report after the Radio Operator, then the Left (E), Right (M) and Tail Gunner.

g. Flight Controls. Upon pilot's order to check flight controls, you will check on the rudder, elevator and aileron movements; if discrepancy is noted in blister gunner's report, you will correct them.

h. Engine Alert. You will be on the alert while engines are being started, watching for any abnormal operating condition; if observed, they will be immediately reported to the flight engineer.

2. BEFORE TAXIING.

a. Combat Station Inspection. At this inspection, set your Jack Box on INTER and standby. You will check to see that your call light and alarm bell work OK when they are turned ON. You will then acknowledge that your station is in order in the following manner; You will report after the radio operator and will say, "Alarm bell OK, light OK, top gunner OK, sir".

b. Bomb Bay Doors. OPEN the bomb bay door shut-off valve and place the fuel tank safety switch to ON or CAN SALVO position.

c. Taxi Alert. This is notification that the ship is ready to roll and that you should get out of the bomb bay.

d. Check Bomb Bay Doors Closed. You will visually check to see that the rear bomb bay doors close properly, and report same through right blister gunner to pilot.

3. BEFORE TAKE-OFF.

a. Prepare For Take-Off. You will sit on the deck of the rear pressurized compartment with your back against the forward pressure bulkhead of this compartment. You will remain in this position until the airplane has cleared the field.

b. RCT Power-Aux "ON". Just before the take-off roll, on missions when the RCT system is to be operated, you will notify each gunner (with the exception of the tail gunner) to turn his POWER-AUX "ON"

(WARM UP position on B-29s using newer systems). You will turn ON both FWD AUX and REAR AUX switches. Leave POWER-AUX "ON" so that the RCT system can be put into operation in a minimum of time.

4. AFTER TAKE-OFF.

a. Visual Check of Engines. Immediately after take-off, you and the blister gunners will visually check the engines for any abnormal conditions, i.e., oil and gas leaks, gas fumes in cabin, engine fire, etc. You will immediately report all engine fires in flight using the CALL position on the jack box in reporting same. First report the fire, then follow up with detailed information.

NOTE: "Where there's smoke, there's fire", does not hold when you are considering airplane 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, white smoke is an indication of burning metal. See Chapter 9 of this manual for table of types of smoke that may be seen and their probable cause. By keeping these smoke identification features in mind during engine checks, you can be of great assistance in preventing fire damage and possible loss in lives.

b. In-the-Air Gunnery Checks.

(1) After take-off, the RCT gunner will call for an in-the-air check of the RCT system. To avoid overloading the electrical system, the stations should be turned ON one at a time in the following order: Tail, Blister, Nose, and Top. No station will begin its switching until the station preceding it has reported, by interphone, that he

has completed his switching. You will be responsible to check with the navigator to be sure the handset is properly adjusted and thereafter check periodically. Since the POWER-FWD AUX and REAR AUX (WARM UP position on newer systems) switches have been turned ON during the take-off roll, the remaining switches should be turned ON as follows:

(a) PRESS POWER BREAKERS to reset.
(b) POWER AC "ON": (STANDBY position on newer systems.) Be sure to wait at least 10 seconds before turning ON FWD and REAR POWER-TURRET.
(c) POWER-TURRET FWD and REAR "ON" (OPERATIONAL position on newer systems).
(d) Turn COMPUTER switch ON (OPERATIONAL position on newer systems).
(e) Turn COMPUTER STANDBY switch to IN position.
(f) Turn CAMERA switch ON as needed.

(2) Make sure that each turret is operating properly under primary, secondary and tertiary control.

(3) On the sight, adjust the target dimension knob to the span of anticipated fighter interception.

(4) Move range wheel to set the reticle at its smallest circle.

(5) Adjust sky filters (use as little as possible).

(6) Check friction adjustments for azimuth and elevation.

(7) Turn GUN switch to FIRE (COMBAT position on newer systems) AIMING AWAY FROM YOUR OWN SHIP AND OTHERS IN THE

FORMATION, fire 4 test rounds. NOTE: On training missions, no test rounds will be fired. The GUN switch will be turned to FIRE only on the gunnery range and then only upon the command of the airplane commander or the fire control officer.

(8) After completing the in-the-air checks on the RCT system, stow the turrets and turn your control box switches to the position ordered by the fire control officer.

CAUTION: AFTER COMPLETION OF FIRING, ALL GUNS WILL BE COOLED. DESIRED POSITION FOR COOLING UPPER TURRETS IS 45° ELEVATION AND 0° AZIMUTH. DESIRED POSITION FOR COOLING LOWER TURRETS IS HAVING THE GUNS STRAIGHT DOWN. DESIRED POSITION FOR COOLING TAIL GUNS IS RIGHT OR LEFT AGAINST THE LIMIT STOPS. WARNING: In any event the guns will not be pointed at any other ship in the formation. Usually the POWER-AUX and the POWER-AC switches (STANDBY on newer systems) will be left ON so that the system can be put into operation quickly.

(9) The setting of your selector switches will be determined by the position of your airplane in its formation.

c. Crew Coordination. You will be on the alert at all times for aircraft outside of your formation. Your search areas and fields of fire will be determined by AF Manual 91-126-4, "Tactical Use of B-29 Equipment", and "HB Gunnery Training Program", SAC Manual 50-126-8, unless otherwise directed.

d. Periodic Visual Check of Engines. You will make a visual check of the engines periodically (as outlined in paragraph 4 a. above of this section) as directed

by the pilot or flight engineer.

5. BEFORE LANDING.

a. Stowing of RCT Equipment.

(1) When the pilot gives the command, over the interphone, "Prepare for landing", top gunner will acknowledge in proper order and stow the two upper turrets. If the guns are loaded they will be cleared manually. Normal stowing of upper turrets is: upper forward 0° azimuth and 0° elevation upper aft 180° azimuth and 0° elevation. If landing with guns loaded, stow both upper turrets at 0° azimuth and 45° elevation. The RCT gunner will be responsible to check the proper stowing of all turrets and will be the first to report that turret is stowed and all switches are OFF.

(2) To stow the turrets:

(a) Run the guns to their correct stowed position.
(b) Hold ACTION SWITCH "CLOSED".
(c) Turn POWER TURRET "OFF". (Rotary switch "OFF" on newer systems.)
(d) Turn all other control box switches OFF.
(e) Release the ACTION SWITCH.

b. Check Stowage of Auxiliary Equipment. You will be responsible that down locks, ladders, and other loose equipment have been stowed.

c. Prepare for Landing. You will sit on the deck of the rear pressurized compartment with your back against the forward pressure bulkhead of this compartment. Remain in this position until the aircraft is on the ground.

6. AFTER LANDING.

a. Bomb Bay Doors Open. As soon as the bomb bay doors are opened you will report to the pilot through one of the blister gunners.

b. Shut-Off Valve Closed. (After parking brakes are set.) If the aircraft is equipped with pneumatic bomb bay doors, you will place the shut-off valves or safety switch in OFF position, and turn OFF bomb bay door air compressor circuit breaker located on fuse panel behind the right gunner. Throw the fuel tank safety switch to OFF.

c. Down Locks. If the airplane is equipped with pneumatic bomb bay doors, you will place the "DOWN LOCK" safety spacer on the aft bomb bay door actuating arm.

d. Bomb Bay Door System. Drain the bomb bay door compressor accumulators and emergency accumulators.

e. Guns Cleared. You will check that all gunners have cleared their guns by removing the ammunition belts and hand-charging until inspection shows no rounds on the feedway or chamber. UNTIL ALL GUNS ARE CLEARED? ALLOW NO ONE TO WALK OR PASS IN FRONT OF THEM.

f. Crew Inspection. At the airplane commander's order, you will line up with the rest of the crew in front of the airplane with your personal effects and flying equipment for inspection (identification tags, oxygen masks, parachute, etc.).

g. Field Stripping the Guns. Field strip the guns for cleaning and drain the air compressor. If it is necessary to remove the gun receivers, only one at a time should be removed from each turret. Upon replacing the gun which has been removed, it must be aligned with the other, by boresighting, to keep the harmonization accurate.

h. Recording Discrepancies. You will be responsible to the bombardier to assure that all RCT and armament discrepancies are entered on the Form 1a.

SECTION III - AMPLIFIED LEFT (E) OR RIGHT (M) GUNNER'S CHECK LIST

BEFORE STARTING ENGINES.

a. Preflight Inspections: Gunnery.

(1) Visual Inspections.

(a) Turret Dome and Gun Enclosure.

CAUTION: CHECK ALL SWITCHES OFF.

1. Removal of domes from 2-gun turrets. Open the elevation access door by loosening Dzus fasteners with screwdriver. Unlatch the elevation latching solenoid inside the access door. Move the guns approximately 45° away from horizontal. Release the safety latch on the dome handle by pressing it back, then turn the handle. Be sure the handle is latched in the "Unlocked" position. Remove the turret dome and put it in a safe place.

2. Removal of gun enclosures.

CAUTION: REMOVE CANVAS COVERS FROM GUN BARRELS BEFORE REMOVING GUN ENCLOSURES.

Release the four lock pins by pulling them out as far as they will go. On lower turrets, two Dzus fasteners will have to be opened first. Slip the enclosure off over gun barrels and put it in a safe place.

(b) Guns.

CAUTION: CLEAR GUNS MANUALLY AND INSPECT THE CHAMBER FOR LIVE ROUNDS OF AMMUNITION.

1. Check for worn or broken parts, burrs, proper oiling, cleanliness of receiver. Check oil buffer adjustment and quantity of oil in oil buffer tube position of bolt switch (right-hand guns feed from the right; left-hand guns feed from the left). Check position of sear slide (the square end should be towards the side of the gun on which the charger is mounted). Check for proper headspace adjustment (.202"-GO - .206" NO GO). Check seating of bolt stud in bolt. Check mounting of guns, safety wiring and cotter pins.

(c) Chargers. Check for proper timing of charger. (FIRE .020" - NO FIRE .116"). Check air hose connections and electrical connections. Check mounting of charger and safety wiring.

(d) Turrets. Check for tightness of all A/N connectors and selsyn caps. Check link ejection chutes for position (be sure they are not bent or dented.) and ammunition guides for proper position and mounting. Reset the chargers. Manually latch solenoids prior to plugging IN external power. Plug IN the external aux-power source. Turn TURRET SAFETY SWITCHES "ON".

(e) Air Compressor. Check the fan guard (it should not be bent) the fan for free movement, the oil sump to be full within 1/2" of the top. Loosen the nut at the bottom of the pressure cylinder, drain and re-tighten.

(f) Rear bomb bay emergency accumulator. Check the emergency accumulator in the rear bomb bay door pneumatic system for 700 to 850 PSI indicated on the gauge. If it is below 700 PSI, recharge the emergency accumulator after the putt-putt is ON the line. To charge:

1. CLOSE emergency valve.
2. Place safety shut-off valve in SAFE position.
3. OPEN emergency charging valve slowly until the desired PSI is indicated on the emergency pressure gauge.

(g) Sighting Station. Clean the blister and the sight. (See T.O. series 01-1-1 for cleaning plexiglass.) Check spare lamp bulbs. Check the friction adjustments in azimuth and elevation for proper tension.

(h) Gun Camera. Check the camera lens for cleanliness and the shutter speed and aperture for proper setting. (See Chapter 7 of this manual.)

(2) Operational Check. NO GUNS WILL BE LOADED UNTIL OPERATIONAL CHECK OF ALL TURRETS HAVE BEEN COMPLETED.

(a) Power Supply. You must have an external power unit connected to

the airplane or the auxiliary power unit (putt-putt) must be ON the line before an operational check is made. When using the putt-putt do not operate more than one turret at a time. If an external power source is used be careful not to overload it.

(b) Power Breakers. Push hard on the POWER BREAKER buttons on your turret control box. Be sure they are reset before attempting to operate the RCT system.

(c) Latching Solenoid. Manually engage the azimuth and elevation latching solenoids in the turret.

(d) Turret Safety Switch. Be sure that everyone is clear of the turret, then turn the TURRET SAFETY SWITCH to ON.

(e) Air Compressor. Turn the RCT POWER-AUX switch ON (WARM-UP on newer systems.) The compressor should start to operate and should run from 3 to 5 minutes at sea level to build up pressure in the accumulator. Above sea level the running time will increase slightly. Wait 10 seconds after starting the compressor before turning on the next switch. Continue with the next steps while the compressor is building up pressure.

(f) Sight. Turn the POWER-AC switch ON (STANDBY position on newer systems), and check the following for proper operation: both filaments of the reticle lamp, rheostat, target dimension dial,

ranging wheel and computer warning lamp (Warning light should be ON. Throw computer standby switch to IN, warning light should go OUT).

1. Check parallax by moving the head several inches up and down and from side to side. The reticle should not move from sighted object.

2. Check azimuth and elevation movement of sight, adjust friction to suit personal requirements. If the gunner expects to wear gloves on the mission, he should check the friction adjustment while wearing gloves. The proper adjustment of friction is vital to smooth tracking and the "feel" of the sight is entirely different with gloves.

3. Check gyroscopes for operation (computer IN).

(g) Latching Solenoid. Turn the POWER-TURRET switch ON (OPERATIONAL position on newer systems). You will hear the solenoid pick up or unlatch when current is supplied to the drive motors.

(h) Turrets. All of your necessary control box switches are already ON. Press the action switch on the sight. Move the sight both in azimuth and elevation; the turret should follow the movement of the sight. If a turret fails to follow the sight, it may be that the circuit breakers, located on the control box, have opened one of the power circuits (AUX, A.C., TURRET).

These switches are similar to fuses in their function and will open an overloaded or overheated power circuit.

1. On some model B-29's, an additional circuit breaker button, or sometimes a toggle switch, is attached to the control boxes to protect the air compressor only. Its action is similar to the other circuit breakers.

2. To check the circuit breaker buttons:

   a. Turn OFF the power switches.
   b. Push hard on the power breaker buttons to reset them.
   c. Turn ON the power switches allowing the proper time interval between switches.
   d. Turn ON the TURRET POWER. The latching solenoids should pick up.

(1) Selsyn. FOR THE SELSYN CHECKS THE COMPUTER STANDBY SWITCH WILL BE IN THE "STANDBY" POSITION. Check the 1 speed selsyn system in azimuth by unstowing the sight and moving it 45° away from the guns, then close the ACTION SWITCH. The guns should move into alignment with the sight. Check 1 speed selsyn system in elevation in a similar manner. Check the 31 speed selsyn system in azimuth by closing the ACTION SWITCH and moving the sight slowly in azimuth. The guns should follow the sight smoothly. Check the

31 speed selsyn system in elevation in a similar manner.

(j) Contour Followers. Check that the CONTOUR FOLLOWER prevents the guns from striking the curved fuselage or from pointing at the top sighting station or the astro dome.

(k) Backout, Holding and Stowing Circuits. To check the BACKOUT CIRCUIT: Move the sight, bring the guns against a limit stop then away from the stop. If the backout circuit is not working the guns will not move off of the limit stop. The HOLDING CIRCUIT, if working properly, will prevent the turret from moving from a set position of the sight when the action switch is closed. To check the STOWING CIRCUIT release the action switch; the guns should automatically come to 0° elevation.

(l) Computing System. Set the navigator's handset to maximum airspeed and minimum altitude. This is to amplify observed movements during computer check. To check the computing system, turn COMPUTER switch on the control box to IN (OPERATIONAL) and the COMPUTER STANDBY switch on the sight to IN. In making these checks, you will have to be extremely observant, as movement of guns will be slight. (CAUTION: should be taken not to run any computer more than 15 minutes at a time on the ground if the temperature in the airplane is high enough to be uncomfortable.)

1. Lead Check. Turn the range knob 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 move back. Repeat this in the opposite direction. Now lock the sight in azimuth and repeat the lead check for elevation.

2. Windage Check. With the range set to maximum on the sight, stow the sight broadside and horizontally. Throw the COMPUTER STANDBY switch to STANDBY. The guns should swing slightly to the rear. Throw the COMPUTER STANDBY switch to IN position. The windage correction will come back in and move the guns slightly forward.

3. Gravity Drop. Stow the sight aft and slightly above 5° horizontal where windage effect is minimum. In this check keep the upper turret's contour follower above the contour cam rather than horizontal. With the range still set to maximum and the ACTION SWITCH closed, turn COMPUTER STANDBY switch to STANDBY. The guns should move down slightly. Turn COMPUTER STANDBY switch to IN and then guns should jump up.

4. Elevation Limit Switch, and Backout Circuit. When the

guns are leading the line of sight, it is necessary for the computer to cut out before the line of sight reaches zenith or nadir, otherwise the guns will try to drive through the stop. A limit switch, set to operate at approximately 85° elevation, decreases the power by 75% and cuts out the computer.

a. Elevate sight for lower turrets or depress sight for upper turrets beyond limits of guns. The guns should engage a mechanical stop and remain firmly seated. Computer warning light should go ON.

b. Reverse movement of sight, bringing it back within limit of the guns. Guns should rise or depress off the stops and follow the sight smoothly.

(m) Firing Circuits. In checking the firing circuit place the GUN SWITCH on FIRE (COMBAT position on newer systems) and point the guns at an uninterrupted firing area (off the limit stop switches and not at the tail surface or within the propellor arcs) and press the action switch and triggers. The charging and firing solenoids should operate. The ammunition booster motors should run when triggers are depressed.

(n) Limit Switches and Stops. To check: Bring the guns, with the sight, to a limit stop. While the guns are against the stop,

the firing solenoids should fail to operate. Guns should not bang against the mechanical stop. If they do, limit switches are not properly adjusted.

(o) Fire Interrupters. In checking the fire interrupter, point the guns at wings, tail, and propeller arcs, being sure that the guns are not against a limit switch. Press trigger and action switch. Firing solenoids should not operate. With the action and trigger switches depressed, move the turrets slowly out of the interrupter areas. Firing solenoids should operate as the guns pass out of the interrupter area. (Remember that each gun has a separate fire interrupter).

(p) Harmonization. Aim the sight at a distant object (desired minimum distance is one mile) with the computer STANDBY switch in STANDBY position. Then with a bore sight tool in the guns concerned, check to see if the guns are pointing at the same object at which the sight is aimed.

(q) Controls Other Than Primary. Check all operations of the secondary controlled turrets, as is done above on primary controlled turrets On B-29s using one of the following remote control turret systems: 2CFR55D1, 2CFR55D2, 2CFR55W1, 2CFR55W2 check the tertiary control of turrets the same as in checking primary control.

(r) Switches Off. When all of the above checks are completed, turn OFF all switches.

(3) Combat Arming.

(a) Ammunition.

CAUTION: Turn OFF all turret control and safety switches and inspect gun chambers for live rounds.

1. Inspection of Ammunition. This inspection is to be accomplished before loading ammunition in the turret. Ammunition will be inspected for corroded 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 a hand linker-delinker. Be sure there is a round in the double link that is to be placed in the feedway of the gun.

2. Loading of Ammunition.

a. 2-Gun Turrets (Lower). 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 cases from the frames.

(1) Place single link end of belt into case first with the rounds pointing INBOARD, Fill the cases in zig-zag

layers, leaving a space at the top equal to thickness of one row of ammunition so that the belt will not bind in feeding.

(2) Then feed the double link of the belt through the ammunition chutes, over the booster assembly and to the guns.

(b) Arming the Guns. With the gun covers down and latched, push the first round over the belt-holding pawl and charge the guns once to position the round against the cartridge stops. Either one of two methods may be utilized to charge the guns. A hand-charging tool can 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 (the hole in the charger nearest the muzzle end of the gun), and pushing the handle of the screwdriver gently toward the muzzle end of the gun, to actuate the charging solenoid.

CAUTION: IF THE AUTOMATIC GUN CHARGER IS USED TO POSITION THE FIRST ROUND, EXTREME CARE MUST BE TAKEN THAT THE SCREWDRIVER IS PLACED IN "C" (CHARGE) SOCKET AND NOT IN THE "F" (FIRE) SOCKET.

(c) Reset Chargers. Press the red reset button at the back of each charger.

(d) Domes, etc. Replace turret domes and gun covers. (IMPORTANT: Check visually through inspection ports and access doors that dome security wire is properly engaged over the holding lugs and that the dome latch lock plunger is engaged.)

(e) Latching solenoids. Manually engage the latching solenoids.

(f) Close and secure access door.

(g) Turret Well Covers. Replace turret well covers and check for proper sealing.

(h) Turret Safety Switch. Turn ON TURRET SAFETY SWITCH at rear of upper forward turret (upper 4-gun turret requires turret safety switch to be turned ON before replacing the turret well cover).

b. Preflight Inspection: Engineering.

(1) All gunners will aid the flight engineer in pulling through the props and perform any engineering duties that he may assign.

(2) The right gunner (M) will check the following items:

(a) Fuel quantities: 1._____ 2._____ 3._____ 4._____

(b) Bomb bay tanks_____ midwing tank _____. If they are not full to capacity, he will use a dipstick to determine the number of gallons in each.

(c) Oil quantities: 1._____ 2._____ 3._____ 4._____

(d) Hang the oil caps outside the access ports while checking oil quantities, so that access ports cannot be closed until oil caps are replaced.

(e) Check the following top surfaces for dents, loose rivets, surface cracks, cleanliness: Wings, ailerons, flaps, fuselage and empennage.

(f) Check proper installation of life raft doors.

(g) Check condition of de-icer boots.

(h) In the absence of the tail gunner, he will preflight the putt-putt and operate it at the flight engineer's direction.

(i) Perform the tail gunner's engineering preflight duties, in his absence, assisted by the left gunner.

(3) The left gunner (E) will check the following items located in the aft pressurized section:

(a) Operation of interior lights.
(b) Fuse panels - all fuses in place plus 100% replacement.
(c) Spare bulbs.
(d) Auxiliary equipment: First aid kits for broken seal, fire extinguisher for broken seal, axe, thermos jugs (forward and aft compartments) filled.
(e) Anti-icer tank - servicing and leaks - fill to 20 gallons.
(f) Oxygen pressure (425 to 450 PSI).
(g) Proper fit of pressure bulkhead doors.

(h) Cabin pressure regulators closed for all ground operations.
(i) Tool kits in place.
(j) Condition of chemical toilet.
(k) Emergency pressure relief valve at station 834 - rear bulkhead of the rear pressurized compartment - CLOSED.
(l) Vacuum release valve - freedom of movement.

c. Preflight Inspection - Personal Equipment.

(1) Clothing.

(a) Check for proper clothing for mission to be performed.
(b) Check operation of your heated suit if one is to be worn.

(2) Parachute.

(a) The parachute or harness will be worn by you and all crew members 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.

(b) Check your leg straps for proper fit, check snaps, seal, and pins.

(c) Check the parachute log records; the 10-day inspection date and repack date must both be current.

(3) Oxygen.

(a) 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.

(b) Be sure the gasket is on the male end of the quick disconnect fitting. The fitting should fit snugly, requiring about a ten pound pull to separate.

(c) Be sure the knurled collar on the regulator is tight. Check to see that the diaphragm is intact.

(d) Breathe from the regulator normally with auto-mix OFF to check operation of the flow indicator. Turn the auto-mix to the ON position.

(e) Check your oxygen pressure; it should be 425 to 450 PSI. Check your walk around bottles for the same pressure.

(f) One crew member in the rear pressurized compartment must be on oxygen when pressurized above 15,000 feet. During pressurized flight above 15,000 feet the other crew members will have their oxygen masks connected and on their helmets for instant use.

NOTE: Leave auto-mix ON at all times to conserve oxygen supply.

(4) Life Vest.

(a) Life vests will be worn under your parachute harness on all over-water flights.

(b) Check your life vest for leaks by inflating it with your breath; deflate the vest and close the valve.

(c) Check your CO_2 bottles to be sure that they have not been punctured and check that CO_2 puncturing lever is safetied.

(5) Dinghy.

(a) Check your pack for any visible damage or contamination (oil, mildew, etc.).

(b) Examine corners of pack cover for wear.

(c) Check CO_2 cylinder union nut for proper tightness.

(d) Check locking pin in valve for easy removal.

(e) Insure that the rope from the pack cover grommet is securely tied to the life raft. Be sure that when the dinghy raft is attached that it is attached to the life vest and not the parachute harness. (See T.O. series 04-15.)

NOTE: In the event any of the above equipment is found to be defective it will be returned to the personal equipment officer or supply.

d. Crew Inspection. At the airplane commander's order, you will line up with the rest of the crew in front of the airplane with your personal effects and flying equipment for inspection (identification tags, oxygen masks, and parachute). The parachute will be on and buckled, personal effects and flying equipment will be placed in front of you.

e. Stowage of Auxiliary Equipment. The left gunner will stow all auxiliary equipment in the rear

pressurized compartment.

f. Interphone Check. At the airplane commander's order to board the plane, gunners will go immediately to their respective stations and adjust their headsets and throat mikes. See that the jack box is on INTER and standby for interphone check by the pilot. The Top (RCT) Gunner will report after the Radio Operator, then the Left (E), Right (M), and Tail Gunner.

g. Flight Controls.

(1) The airplane commander will give the order, "Gunners, check the flight controls". Controls will be checked in sequence as called for by the pilot.

(a) Left gunner: "Left elevator UP (or DOWN), Sir".

(b) Right gunner: "Right elevator UP (or DOWN), Sir".

(c) Left gunner: "Rudder left, Sir".

(d) Right gunner: "Rudder right, Sir".

(e) Left gunner: "Left aileron UP (or DOWN), Sir".

(f) Right gunner: "Right aileron UP (or DOWN), Sir".

h. Engine Alert. You will be on the alert while engines are being started, watching for any abnormal operating conditions. If observed, they will be immediately reported to the flight engineer.

2. BEFORE TAXIING.

a. Combat Station Inspection. During inspection set your jack box on INTER and standby. You will check to see that your call light and alarm bell work OK when they are turned ON. You will then acknow-

ledge that your station is in order in the following manner: The left gunner reporting after the RCT top gunner will say, "Alarm bell OK, light OK, left gunner OK, Sir", and the right gunner reporting after the left gunner will say, "Alarm bell OK, light OK, right gunner OK, Sir".

b. Bomb Bay Door Shut-Off Valve. The right gunner will report the position of the bomb bay door shut-off valve when notified by the RCT gunner.

c. Taxi Alert. This is notification that the ship is ready to roll and the scanner should be in his position, with safety belt fastened and observing everything in his scanning area: Notify pilot of any unusual happenings or of forthcoming danger.

d. Bomb Bay Doors Closed. The right gunner will report the bomb bay doors closed when notified by the RCT gunner.

3. BEFORE TAKE-OFF.

a. Engine Report. After engine run-up the left and right gunners will report on the left and right engines whether or not they are operating normally. If an engine is not operating normally, the gunners will report the engine by number and give a detailed report of type of smoke, oil or gas leak, or abnormal conditions observed.

b. Wing Flap Report.

(1) During engine run-up, flaps will be run down to full flaps and back to 25° position, while the flight engineer is checking the generators. The pilot will say over the interphone, "Flaps coming down". The gunners will report as follows:

(a) Left gunner: "Left flap coming down, Sir".

(b) Right gunner: "Right flap coming down, Sir".

(2) When the flaps have reached their full down position, the gunners will report as follows:

(a) Left gunner: "Left flap full down, Sir".

(b) Right gunner: "Right flap full down, Sir".

(3) When the flaps have reached 25° on the way up, the gunners will report as follows:

(a) Left gunner: "Left flap 25°, Sir".

(b) Right gunner: "Right flap 25°, Sir".

c. Prepare for Take-Off. The pilot will give the command on the interphone, "Prepare for take-off". The left and right gunners will be in their seats with their safety belts fastened and make sure that everything at his station is set for take-off. Remain in this position until the airplane has cleared the field.

d. RCT POWER-AUX "ON". Just before the take-off roll, on missions when the RCT system is to be operated, you will be notified to turn the RCT POWER-AUX "ON" (WARM-UP position on B-29s using newer system). Leave the POWER-AUX "ON" so that the RCT system may be put into use in a minimum of time.

4. AFTER TAKE-OFF.

a. Flap and Gear Report.

(1) After take-off, the gears and flaps will be retracted; the gunners will report as follows:

(a) Left gunner: "Left gear (and/or left flap) coming up, sir."

(b) Right gunner: "Right gear (and/or right flap) coming up, sir."

(2) When the landing gear or flaps are full up, gunners will report as follows:

(a) Left gunner: "Left gear (and/or left flap) full up, nacelle doors closed, sir."

(b) Right gunner: "Right gear (and/or right flap) full up, nacelle doors closed, sir."

(3) On night flights, the left and right gunners will use the Aldis Lamp to check landing gear and flaps. The Aldis Lamp will also be used, during flight, for regular and frequent checks of the engines; and to check the landing gear and flaps down in the traffic pattern. In the absence of the Aldis Lamp, a flashlight or the station trouble light may be used.

b. Visual Check of Engines.

(1) Immediately after gear is up on take-off, you will observe engine performance and report any abnormal conditions, i.e., oil and gas leaks, gas fumes in the cabin, engine fire, etc. You will immediately report all signs of smoke and fire by using the CALL position on the jack box. First report the fire, then follow up with detailed information.

NOTE: "Where there's smoke, there's fire," does not hold when you are considering airplane 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, white smoke is an indication of burning metal.

(2) See Chapter 9 of this manual for the table of types of smoke that may be seen and probable causes. By keeping these smoke identification features in mind during engine checks, you can be of great assistance in preventing fire damage and possible loss in lives.

c. In-the-Air RCT Checks.

(1) After take-off roll, the fire control officer or the RCT top gunner will call for an in-the-air check of the RCT system. To avoid overloading the electrical systems, the stations should be turned ON one at a time in the following order: Tail, blister, nose and top. No station will begin its switching procedure until the station preceding it has reported by interphone that it has completed its switching. Since the POWER-AUX switch (WARM-UP position on newer systems) has been turned ON on the take-off roll, the remaining switches should be turned on as follows:

(a) Press POWER BREAKERS.

(b) Turn POWER AC "ON" (STANDBY position on newer systems). Be sure to wait 10 seconds.

(c) Turn COMPUTER switch (right and left) ON (OPERATIONAL position on newer systems).

(d) Turn COMPUTER STANDBY switch to IN position.

(e) Turn CAMERA switch ON as needed.

(2) Make sure that each turret is operating properly under primary, secondary, and tertiary control.

(3) On the sight, adjust the target dimension knob to the span of the anticipated fighter interception.

(4) Move range wheel to set the reticle at its smallest circle.

(5) Adjust the sky filters (use as little as possible).

(6) Check friction adjustments for azimuth and elevation.

(7) Turn GUN SWITCH to FIRE (COMBAT position on newer systems). AIMING THE GUNS AWAY FROM YOUR OWN SHIP AND OTHERS IN THE FORMATION, fire 4 test rounds.

NOTE: On training missions, no test rounds will be fired. The GUN switch will be turned to FIRE only on the gunnery range and then only upon command of the airplane commander or the fire control officer.

(8) After completing the in-the-air checks on the RCT system, stow the turret and turn your control box switches to the position ordered by the fire control officer.

AFTER COMPLETION OF FIRING, ALL GUNS WILL BE COOLED. DESIRED

POSITION FOR COOLING LOWER TURRETS IS TO POINT THE GUNS STRAIGHT DOWN.

WARNING: IN ANY EVENT THE GUNS WILL NOT BE POINTED AT ANOTHER SHIP IN THE FORMATION. USUALLY THE POWER-AUX AND THE POWER-AC SWITCHES (STAND-BY POSITION) WILL BE LEFT ON SO THAT THE SYSTEM CAN BE PUT INTO OPERATION QUICKLY.

(9) The setting of your selector switches will be determined by the position of your airplane in its formation.

(10) The lower forward turret IN-OUT switch on the blister control box will be left OUT until the blister gunners have been notified to take control of this turret. The same stipulation applies to the tail mount IN-OUT switch. Also, this applies to the blister gunner's tertiary control over the lower forward and tail mount. Tertiary control may occur only for a blister gunner's control of the lower forward turret and the tail mount. There are two lights - a red one for the tail mount and a white one for the lower forward turret, which indicate whether the tail and nose gunners are operating these turrets. If the white light is ON, the nose gunner is using the lower forward turret; if the red light is ON, the tail gunner is operating the tail mount.

d. Crew Coordination. You will be on the alert at all times for aircraft outside of your formation. Your search areas and fields of fire will be determined by AF Manual 91-126-4, "Tactical Use of B-29 Equipment" and SAC Manual 50-126-8, "HB Gunnery Training Program", which covers the normal allocations of search

areas and fields of fire.

e. Periodic Visual Check of Engines. You will make a visual check of the engines periodically (as outlined in paragraph 3 above) as directed by the pilot or flight engineer.

5. BEFORE LANDING.

a. Stowing of RCT Equipment.

(1) Before your airplane enters the local flight area, the guns in the lower turrets will be cleared. To clear the guns, lift the gun covers, remove the ammunition belt from the guns, and hand charge them a minimum of three times. When the pilot gives the command over the interphone, "Prepare for landing", the crew members will acknowledge in the proper order. The right gunner will follow the tail gunner in doing this. The right gunner will stow the lower aft turret 180° in azimuth and against its upper limits in elevation. You will report in turn that your turret is stowed and all switches are OFF.

(2) To stow the turrets:

(a) Run the guns to their correct stowed position.

(b) Hold ACTION SWITCH CLOSED.

(c) Turn TURRET POWER OFF.

(d) Turn all other control box switches OFF.

(e) Release the ACTION SWITCH.

(f) Check with pilot for operation of stowage lights.

NOTE: The right gunner operates the putt-putt in the absence of the tail gunner.

b. Stowage of Auxiliary Equipment. The left gunner will check and stow all auxiliary equipment in the rear pressurized compartment. In the absence of the tail gunner, the left gunner will stow auxiliary equipment in the aft unpressurized compartment.

c. Landing Gear Report.

(1) Soon after the ship enters the traffic pattern, the pilot will say over the interphone, "Gear is coming down". You will check the main gear and announce in order:

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

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

(2) You will observe, by the marks on each gear and by the action of the drag link, when the gear is down and locked. You will then report:

(a) "Left gear down and locked, Sir".

(b) "Right gear down and locked, Sir".

d. Flap Report.

(1) After the landing gear is down and locked, the flaps will be run down 25°. The pilot will say over the interphone, "Flaps coming down". The gunners will report as follows:

(a) Left gunner: "Left flap 25°, Sir".

(b) Right gunner: "Right flap 25°, Sir".

(2) On the final approach, the flaps will be fully extended. The pilot will say over interphone, "Flaps coming full down." Gunners will report as follows:

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

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

e. Prepare for Landing. The left and right gunners will be in their seats with their safety belts fastened and make sure that everything at their position is set for landing. You will remain in this position until the airplane has parked.

6. AFTER LANDING.

a. Taxi Alert. You will remain alert for other aircraft and obstructions on both sides and to the rear of the plane while taxiing, advising the pilot of any hazards. You will also observe engine operation and landing gear while taxiing.

b. Chocks in Place. After the parking brakes are set, the blister gunners will place the wheel chocks in place on the right and left main gear, and install down locks on landing gear and bomb bay door actuating cylinders.

c. Guns Cleared. You will clear your guns by removing the ammunition belts and hand-charging until inspection shows no rounds in the feedway or chamber. UNTIL ALL GUNS ARE CLEARED, ALLOW NO ONE TO WALK OR PASS IN FRONT OF THEM.

d. Crew Inspection. Crew members will line up in the same manner as before the flight to be checked by the airplane commander.

e. Field Stripping the Guns. Field strip the guns for cleaning and drain the air compressor. If it is necessary to remove the gun receivers, only one at a time should be removed from each turret. Upon replacing the gun which has been removed it must be aligned with

the other, by boresighting, to keep harmonization accurate.

f. Reporting Discrepancies to the RCT Gunner. Report RCT and gun discrepancies to the RCT top gunner in order that he may enter them on the Form 1A.

SECTION IV - DUTIES OF ARMORER GUNNER (612) RELATIVE TO AIDING THE BOMBARDIER

1. You will assist the bombardier in performing first and second echelon maintenance on bomb racks, and bomb release mechanisms.

2. You will assist the bombardier in all bombing equipment preflights.

3. You will aid bombardier in the loading, fusing, and arming of all bombs.

NOTE: Refer to Bombardier's SOP for correct bomb loading procedure, and operation of C-3 and C-6 bomb hoists.

SECTION V - AMPLIFIED TAIL GUNNER'S CHECK LIST

1. BEFORE STARTING ENGINES.

a. Preflight Inspections: Gunnery.

(1) Visual Inspections.

CAUTION: CHECK ALL SWITCHES "OFF".

(a) Tail Cowling, Gun Enclosure and Armor Plate Door. Be careful not to lose rubber washers and wing nuts when removing the armor plate door. The removal of the armor plate door automatically turns OFF the tail turret safety switches. Release the azimuth and elevation brakes if you wish to move the guns by hand.

(b) Guns.

CAUTION: CLEAR GUNS MANUALLY AND INSPECT THE CHAMBER FOR LIVE ROUNDS OF AMMUNITION.

1. Check for worn or broken parts, burrs, proper oiling, cleanliness of receiver. Check oil buffer adjustment, and quantity of oil in oil buffer tube. Check position of bolt switch (right-hand guns feed from the right; left-hand guns feed from the left). Check positions of sear slide (the square end should be towards the side of the gun on which the charger is mounted). Check proper head space adjustment (.202" GO - .206" NO GO). Check proper seating of bolt stud in bolt, proper mounting of guns. Check safety wiring and cotter pins.

(c) Chargers. Check for proper timing of charger (FIRE - .020", NO FIRE .116".). Check air hose connections. Check electrical connections. Check mounting of charger and safety wiring.

(d) Tail Turret. Check for tightness of all A/N connectors and selsyn caps. Check link chutes for position (be sure they are not bent or dented), and ammunition guides for proper position and mounting. Reset the chargers. Do not replace armor plate door until second step in OPERATIONAL CHECK.

(e) Air Compressor. Check the fan guard (it should not be bent), the fan for free movement, the oil sump

should be full within ½" of the top. Loosen the nut at the bottom of the accumulator, drain and retighten.

(f) Sighting Station. Clean the windows and the sight. Check the spare lamp bulbs. Check the friction adjustments in azimuth and elevation for proper adjustment.

(g) Gun Camera. Check the camera lens for cleanliness and the shutter speed and aperture for proper setting. (See Chapter 7 of this manual.)

2) Operational Check. NO GUNS WILL BE LOADED UNTIL OPERATIONAL CHECK OF ALL TURRETS HAVE BEEN COMPLETED.

(a) Power Supply. You must have an external unit connected to the airplane or the auxiliary power unit (putt-putt) must be ON the line before an operational check is made. When using the putt-putt do not operate more than one turret at a time. If an external power source is used, be careful not to overload it.

(b) Drive Motor Brakes and Armor Plate Door. Engage the drive motor brakes located on the azimuth and elevation drive motors. Replace the armor plate door. (Don't put it on backwards.) Replacing the armor plate door automatically turns ON the turret safety switch. Push hard on the POWER BREAKER button on your turret control box. Be

sure they are reset before attempting to operate the RCT system.

(c) Air Compressor. Turn the RCT POWER-AUX switch ON (WARM-UP on newer systems). The compressor should start to operate and should run from 3 to 5 minutes at sea level to build up pressure in the accumulator. Above sea level, the running time will increase slightly. Wait 10 seconds after starting the compressor before turning on the next switch. Continue with the next steps while the compressor is building up pressure.

(d) Sight. Turn the POWER-AC switch ON (STANDBY position on newer systems), and check the following for proper operation: both filaments of the reticle lamp, rheostat, target dimension dial, ranging wheel and computer warning lamp. Warning light should be ON. Throw computer standby switch to IN, warning light should go OUT.

1. Check parallax by moving the head several inches up and down and from side to side. The reticle should not move from sighted object.

2. Check azimuth and elevation movement of sight, adjust friction to suit personal requirements. If the gunner expects to wear gloves on the mission, he should check the friction adjustment while wearing gloves. The proper adjustment of friction is vital to smooth tracking and

the "feel" of the sight is entirely different with gloves.

3. Check gyroscopes for operation (Computer IN).

(e) Turrets. Turn both the POWER AZ and EL switches ON (OPERATIONAL on newer systems). Press the action switch on the sight. Move the sight both in azimuth and elevation; the turret should follow the movement of sight. If a turret fails to follow the sight, it may be that the circuit breakers, located on the control box, have opened one of the power circuits (AUX, A.C., TURRET). These switches are similar to fuses in their function and will open an overloaded or overheated power circuit.

1. On some model B-29s, an additional circuit breaker button, or sometimes a toggle switch, is attached to the control boxes to protect the air compressor only. Its action is similar to the other circuit breakers.

2. To check the Circuit Breaker Buttons:

a. Turn OFF the power switches.

b. Push hard on the power breaker buttons to reset them.

c. Turn ON the power switches allowing the proper time interval between switches.

d. Turn ON the TURRET POWER. The latching solenoids should pick up.

(f) Selsyn. FOR THE SELSYN CHECKS THE COMPUTER SWITCH WILL BE IN THE "STANDBY" POSITION. Check the 1 speed selsyn system in azimuth by unstowing the sight and moving it 45° away from the guns, then close the ACTION SWITCH. The guns should move in alignment with the sight. Check the 1 speed selsyn system in elevation in a similar manner. Check the 31 speed selsyn system in azimuth by closing the ACTION SWITCH and moving the sight slowly in azimuth. The guns should follow the sight smoothly. Check the 31 speed selsyn system in elevation in a similar manner.

(g) Computing System. Set the navigator's handset to maximum airspeed and minimum altitude. This is to amplify observed movements during computer check. To check the computing system, turn COMPUTER switches on the control box to IN. In making these checks, you will have to be extremely observant, as movement of guns will be slight.

CAUTION: CAUTION SHOULD BE TAKEN NOT TO RUN ANY COMPUTER MORE THAN 15 MINUTES AT A TIME ON THE GROUND IF THE TEMPERATURE IN THE AIRPLANE IS HIGH ENOUGH TO BE UNCOMFORTABLE.

1. Lead Check. Turn the range knob 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 move back. Repeat this in the opposite direction. Now lock the sight in azimuth and repeat the lead check for elevation.

2. Windage Check. With the range set to maximum on the sight, stow the sight and guns at approximately 25° right or left of aft in azimuth and horizontal. Do this with the action switch closed. Turn the COMPUTER SWITCH on the control box to OUT position (WARM-UP position on newer systems). Guns should swing slightly to the rear. Turn the COMPUTER SWITCH to IN (OPERATIONAL position on newer systems), the guns swing slightly forward.

3. Gravity Drop. Stow the sight and guns aft and horizontal, where windage effect is minimum. With range still set to maximum and the ACTION SWITCH closed, turn the COMPUTER SWITCH on the control box to OUT (WARM-UP position on newer systems). The guns should move down as the range correction washes out.

4. Elevation Limit Switch and Back-out Circuit. When guns are leading line of sight, it is necessary for the computer to cut out before line of sight reaches 30° in elevation or depression, otherwise guns will try to drive through the stop. Limit switches are set to

operate at approximately 30° in elevation and depression.

a. Elevate sight above limits of the guns, or depress the sight below limits of guns. Guns should come to rest firmly against limit stop. Computer warning light should go ON.

b. Return the sight to within the range limits of the guns. Guns should come into alignment with sight and follow it smoothly.

(h) Firing Circuits. In checking the firing circuit, place the GUN SWITCH on FIRE (COMBAT position on newer systems). Move the guns off the limit stop switches. Press the action switch and triggers. The charging and firing solenoids should operate. The ammunition booster motors should run when micro-switches in the ammunition chutes are depressed.

(i) Limit Switches. The tail mount has limit switches and back out circuits in both elevation and azimuth. Move the guns against the limit switches in azimuth and elevation. The guns should not fire. Check the back out circuits by moving the guns off the limit switches.

1. There are no fire interrupters on the tail mount.

(j) Harmonization. Aim the sight at a distant object (desired minimum distance is one mile) with computer STANDBY switch in STANDBY position. Then with a bore sight tool in the guns concerned, check to see if the guns are pointing at the same object at which the sight is aimed.

(k) Switches Off. When all of the above checks are completed, turn OFF all switches.

(3) Combat Arming.

(a) Ammunition.

CAUTION: TURN OFF ALL TURRET CONTROL AND SAFETY SWITCHES AND INSPECT GUN CHAMBERS FOR LIVE ROUNDS.

1. Inspection of Ammunition. This inspection is to be accomplished before loading ammunition in the turret. Ammunition will be inspected for corroded 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 a hand linker-delinker. Be sure there is a round in the double link that is placed in the feedway of the gun.

2. Loading of Ammunition. Remove the armor plate door, ammunition cover and turret

cowling. Ammunition should be taken to the tail mount ammunition cans in boxes to avoid stretching of links. The ammunition cans for the tail mount cannot be removed and must be loaded in place inside the airplane just forward of the tail sighting station.

a. First feed a 100 round belt into each ammunition chute from the cans toward the guns, double-link end first and rounds pointing outboard. Have a round in the first double link of each belt. Then go outside the airplane and pull the belts over the ammunition rollers and insert the first round of each belt over the belt holding pawl in the feedway of the guns.

b. Load each can with rounds pointing outboard, 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.

c. As a final step, connect the belts in the ammunition chutes with the belts in the cans.

(b) Arming the Guns. On the tail mount, the ammunition must be loaded into the guns from outside the plane. With the gun covers

down and latched, charge the guns once to position the round against the cartridge stops. Either one of two methods may be utilized to charge the guns. A hand-charging tool can 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 (the hole in the charger nearest the muzzle end of the gun), and pushing the handle of the screwdriver gently toward the muzzle end of the gun, to actuate the charging solenoid.

(c) Reset Charger. Press the red reset button at the back of each charger.

(d) Armor Plate Door. Replace the armor plate door. This automatically turns ON the turret safety switch.

Preflight Inspections: Engineering.

(1) You will assist the flight engineer in pulling through the props and perform any other duties that he may assign.

(a) You will check the following equipment in rear unpressurized section and in the tail gunner's compartment:

1. Fire extinguisher - for broken seal.
2. Starter crank.
3. Putt-putt.

a. Fuel and oil quantities.
b. Circuit breaker.

c. Starter rope.
d. Battery disconnect in place.

4. Operation of interior lights.
5. Fuse panels - all fuses in place plus 100% replacement.
6. Spare bulbs. (100% replacement.)
7. First aid kit - for broken seal.
8. Proper fit of pressure bulkhead doors.
9. Oxygen pressure (425 to 450 PSI).
10. Emergency escape hatch.

c. Preflight Inspection: Personal Equipment.

(1) Clothing.

(a) Check that you have the proper clothing for the mission to be performed.

(b) Check operation of your heated suit, if one is to be worn.

(2) Parachute.

(a) The parachute or harness will be worn by all crew members during the entire flight. If wearing only a harness, always keep your pack within reach.

(b) Check your leg straps for proper fit. Check snaps, seal, and pins.

(c) Check the Parachute Log Record; the 10-day inspection date and repack date must be current.

(3) Oxygen.

(a) Check the fit of the mask by holding a hand over the quick disconnect fitting and inhaling gently. No air should leak in around the edges of the mask.

(b) Be sure the gasket is on the male end of the quick disconnect fitting. The fitting should fit snugly, requiring about a ten pound pull to separate.

(c) Be sure the knurled collar on the regulator is tight. Check to see that the diaphragm is intact. Check the emergency valve to see if oxygen flows, then close the valve firmly.

(d) 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.

(e) Check your oxygen pressure; it should be 425 - 450 PSI.

(f) Check your walk around bottles for the same pressure.

(g) When pressurized above 10,000 feet, you will have your oxygen mask connected and on your helmet for instant use.

(h) CAUTION ON SMOKING: Several reports of tail compartment fires have indicated that gunners started to smoke immediately after use of oxygen. Make certain that all parts of the compartment have

been thoroughly aired before lighting up after being on oxygen.

(4) Life Vest.

(a) Life vests will be worn under your parachute harness on all over-water flights.

(b) Check your life vests for leaks by inflating it with your breath; deflate the vest and close the valve.

(c) Check your CO_2 bottles to be sure that they have not been punctured and check that CO_2 puncturing lever is safetied.

(5) Dinghy.

(a) Check your pack for any visible damage or contamination (oil, mildew, etc.).

(b) Examine corners of pack cover for wear.

(c) Check CO_2 cylinder union nut for proper tightness.

(d) Check locking pin in valve for easy removal.

(e) Insure that the rope from the pack cover grommet is securely tied to the life raft. Be sure that the dinghy raft is attached to life vest and not the parachute harness. (See T.O. series 04-15)

NOTE: In the event any of the above equipment is found to be defective, it will be returned to

the personal equipment officer or supply officer.

d. Crew Inspection. At the airplane commander's order, you will line up with the rest of the crew in front of the airplane with your personal effects and flying equipment for inspection (identification tags, oxygen masks, and parachute). The parachute will be on and buckled; personal effects and flying equipment will be placed in front of you for inspection.

e. Stowage of Auxiliary Equipment. You will properly stow all auxiliary equipment in the aft unpressurized compartment, making sure it is secure and will not foul the lower aft turret.

f. Aux Power Unit (Putt-Putt).

(1) At the airplane commander's order to board the plane, you will check and prepare to start the putt-putt on interphone call from the flight engineer.

(a) Fuel quantity (100/130 octane).
(b) Oil quantity (1065 or SAE 30).
(c) Start putt-putt at the flight engineer's command:

1. EQUALIZER switch OFF.

2. Putt-putt control lever to IDLE. (If outside air temperature is zero or less, place in CHOKE.)

NOTE: Some putt-putts do not have a control lever; control is automatic.

3. IGNITION switch ON.

4. Hold GENERATOR field and generator armature switches to START position until engine starts; then release both switches.

5. Run putt-putt about three minutes, or until cylinder baffles feel warm to the hand.

6. Move control lever to RUN position. (If putt-putt has control lever.)

7. GENERATOR switch to RUN or ON position.

8. EQUALIZER switch ON.

9. Oil pressure limits are 45 to 75 PSI.

g. Interphone Check. After starting the putt-putt, the tail gunner will go immediately to his station and adjust his headset and throat mike. See that the jack box is on INTER and stand by for interphone check by the pilot. The top (RCT) gunner will report after the Radio Operator, then the Left (E), Right (M), and Tail Gunner.

2. BEFORE TAXIING.

a. At this inspection, set your jack box on INTER and stand by. You will check to see that your call light and alarm bell work OK when they are turned ON. You will then acknowledge that your station is in order in the following manner: You will report after the right gunner and will say, "Alarm bell OK, light OK, tail gunner OK, Sir."

b. Taxi Alert. You will remain on the alert for other aircraft and obstructions on both sides and to the rear of the plane while taxiing, advising the pilot of any hazards.

3. BEFORE TAKE-OFF.

a. Prepare for Take-Off.

(1) The pilot will say on the interphone, "Prepare for take-off". You will be on the interphone, using an extension from the radar compartment, and you will be with your back firmly placed against the rear side of the rear bulkhead of the rear pressurized compartment.

4. AFTER TAKE-OFF,

a. Aux Power Unit (Putt-Putt).

(1) Shut the putt-putt OFF at the direction of the flight engineer:

(a) Generator switch OFF.
(b) Control lever to IDLE and permit the engine to cool.
(c) Equalizer switch OFF.
(d) Ignition switch OFF.

(2) Report the tail skid up.

(3) RCT Power-Aux ON.

(a) You will occupy your sighting station and turn your power-aux ON (WARM UP position on B-29s using the newer systems) and leave it ON so that the system can be put into operation in a minimum length of time.

b. In-the-Air Checks.

(1) After take-off, the fire control officer or the RCT gunner will call for an in-the-air check of the RCT system. To avoid overloading the electrical systems, the stations should be turned ON one at a time in the following order: Tail, Blister, Nose and Top. No station will begin its switching until the station pre-

ceding it has reported, by interphone, that it has completed its switching. Since the Power-Aux (WARM UP) switch has been turned ON, the remaining switches should be turned ON as follows:

(a) Press POWER BREAKERS.
(b) Turn "ON" AC POWER. (STANDBY position on newer systems.) Wait 10 seconds before turning "ON" POWER-TURRET.
(c) POWER-TURRET "ON" (OPERATIONAL position on newer systems).
(d) Turn COMPUTER SWITCH "ON" (OPERATIONAL position on newer systems).
(e) Turn CAMERA switch "ON" as needed.

(2) Check with the blister gunners that the tail mount is operating properly under primary, secondary and tertiary control.

(3) On the sight, adjust the target dimension knob to the span of the anticipated fighter interception.

(4) Move the range wheel to set the reticle at its smallest circle.

(5) Adjust the sky filters (use as little as possible).

(6) Check friction adjustments for azimuth and elevation.

(7) Turn GUN switch to FIRE (COMBAT position on newer systems), AIMING THE GUNS AWAY FROM OTHER SHIPS IN THE FORMATION, fire 4 test rounds.

NOTE: On training missions no test rounds will be fired. The GUN switch will be turned to FIRE

only on the gunnery range and then only upon command of the airplane commander or the fire control officer.

(8) After completing the in-the-air checks on the RCT system, stow the mount and turn your control switches to the position ordered by the fire control officer.

CAUTION: AFTER COMPLETION OF FIRING, ALL GUNS WILL BE COOLED. DESIRED POSITION FOR COOLING TAIL GUN IS RIGHT OR LEFT AGAINST THE LIMIT STOPS.

WARNING: In any event the guns will not be pointed at any other ship in the formation. Usually the Power-Aux and the Power-AC switches will be left ON (STANDBY position on newer systems) so that the system can be put into operation quickly.

c. Crew Coordination. You will be on the alert at all times for aircraft outside of your formation. Your search areas and fields of fire will be determined by AF Manual 91-126-4, "Tactical Use of B-29 Equipment", and SAC Manual 50-126-8 "HB Gunnery Training Program", unless otherwise directed.

5. BEFORE LANDING.

a. Stowing of RCT Equipment.

(1) Before the airplane enters the local area, the guns will be cleared. To clear the guns, lift the gun covers, remove the ammunition belt from the guns, and hand charge a minimum of three times. When the pilot gives the command, "Prepare for landing", the

crew members will acknowledge in the proper order. The tail gunner doing so first. Normal stowage of the tail guns is 180° and 0° elevation.

(2) Stow the tail mount in the following manner:

(a) Run the guns to their correct stowed position.
(b) Hold ACTION SWITCH "CLOSED."
(c) Turn all other control box switches OFF.
(d) Release the ACTION SWITCH.

b. Aux Power Unit (Putt-Putt). Start the AUX POWER UNIT (putt-putt) at the direction of the flight engineer, as was done under paragraph 1 f. of this section. Notify the engineer when the AUX POWER UNIT (putt-Putt) is ON the line.

c. Tail Skid.

(a) Report the tail skid DOWN.

d. Prepare for Landing.

(b) The pilot will give the command on the interphone, "Prepare for landing." You will be on the interphone, using an extension from the radar compartment, and you will sit with your back firmly placed against the rear side of the rear bulkhead of the rear pressurized compartment.

6. AFTER LANDING.

a. Aux Power Unit (putt-putt). Turn OFF at the direction of the flight engineer, as was done under paragraph 4 a. of this section.

b. Guns Cleared. You will clear your guns by removing the ammunition belts and hand charging until inspection shows no rounds in the feedway or chamber.

UNTIL ALL GUNS ARE CLEARED, ALLOW NO ONE TO WALK IN FRONT OF THEM.

c. Crew Inspection. You will line up in front of the airplane for inspection as before take-off.

d. Field Stripping the Guns. Field strip the guns for cleaning and drain the air compressor. If it is necessary to remove the gun receivers, only one at a time should be removed from the mount. Upon replacing the gun which has been removed, it must be aligned with the other by boresighting, to keep the harmonization accurate.

e. Reporting Discrepancies to the RCT Gunner. You will report RCT and gun discrepancies to the RCT top gunner in order that he may enter them on the Form 1A.

SECTION VI - AMPLIFIED BOMBARDIER'S POSITION CHECK LIST

1. BEFORE STARTING ENGINES.

a. Preflight Inspections: Gunnery.

(1) Visual Inspection.

(a) Turret Dome and Gun Enclosure.

CAUTION: CHECK ALL SWITCHES OFF.

1. Removal of domes from 2-gun turrets. Open the elevation access door by loosening Dzus fasteners with screwdriver. Unlatch the elevation latching solenoid inside the access door. Move the guns approximately 45° away from horizontal. Release the safety catch on the dome handle by pressing it back, then turn.

the handle. Be sure the handle is latched in the "Unlocked" position. Remove the turret dome and secure in a safe place.

2. Removal of upper 4-gun turret domes. Open both elevation and azimuth access doors. Unlatch elevation latching solenoid. Hold guns at approximately 45° elevation until the elevation latching solenoid is relatched. Release the 4 J-shaped latching mechanisms on the inside of the dome. Raise the safety latch on dome locking handle and release the handle by turning it to the right. Lift off the dome and secure in a safe place.

3. Removal of gun enclosures.

CAUTION: REMOVE CANVAS COVERS FROM GUN BARRELS BEFORE REMOVING GUN ENCLOSURES.

Release the four lock pins by pulling them out as far as they will go. On lower turrets, two Dzus fasteners will have to be opened first. Slip enclosure off over gun barrels and secure in a safe place.

(b) Guns.

CAUTION: CLEAR ALL GUNS MANUALLY AND INSPECT THE CHAMBER FOR LIVE ROUNDS OF AMMUNITION.

1. Check for worn or broken parts, burrs, proper oiling, cleanliness of receiver. Check oil buffer adjustment and quantity of oil in oil buffer tube. Check position of bolt switch (right-hand guns feed from the right; left-hand guns feed from the left). Check position of the sear slide (the square end should be toward the side of the gun on which the charger is mounted). Check for proper headspace adjustments (.202" GO - 206" NO GO). Check seating of bolt stud in bolt. Check mounting of guns. Check safety wiring and cotter pins.

(c) Chargers.

1. Check for proper timing of charger (FIRE .020-NO FIRE .116"). Check air hose connections. Check electrical connections. Check mounting of charger and safety wiring.

(d) Turrets.

1. Check for tightness of all A/N connectors and selsyn caps. Check link ejection chutes for position (Be sure they are not bent or dented) and ammunition guides for proper position and mounting. Reset the chargers. Manually latch solenoids prior to plugging IN external power. Plug IN the external

aux-power source. Turn TURRET SAFETY SWITCHES "ON".

(e) Air Compressor. Check the fan guard (it should not be bent), the fan for free movement, the oil sump should be full within ½" of the top. Loosen the nut at the bottom of the pressure cylinder, drain and retighten.

(f) Sighting Stations. Clean the blister and the sight (see T.O. series 01-1-1 for cleaning plexiglass). Check spare lamp bulbs. Check the friction adjustment in azimuth and elevation for proper tension.

(g) Gun Camera. Check the camera lens for cleanliness and the shutter speed and aperture for proper setting. (See Chapter 7 of this manual.)

(2) Operational Check. NO GUNS WILL BE LOADED UNTIL OPERATIONAL CHECK OF ALL TURRETS HAVE BEEN COMPLETED.

(a) Power Supply. You must have an external power unit connected to the airplane or the auxiliary power unit (putt-putt) must be ON the line before an operational check is made. When using the putt-putt do not operate more than one turret at a time. If an external power source is used be careful not to overload it.

(b) Power Breakers. Push hard on the POWER BREAKER buttons on your turret control box. Be sure they are reset before attempting to operate the RCT system.

(c) Latching Solenoid. Manually engage the azimuth and elevation latching solenoids in the turret.

(d) Turret Safety Switch. Be sure that everyone is clear of the turret, then turn the TURRET SAFETY SWITCH to ON.

(e) Air Compressor. Turn the RCT POWER-AUX switch ON (WARM UP on newer systems). The compressor should start to operate and should run from 3 to 5 minutes at sea level to build up pressure in the accumulator. Above sea level, the running time will increase slightly. Wait 10 seconds after starting the compressor before turning on the next switch. Continue with the next steps while the compressor is building up pressure.

(f) Sight. Turn the POWER-AC switch ON (STANDBY position on newer systems), and check the following for proper operation: both filaments of the reticle lamp, rheostat, target dimension dial, ranging wheel and computer warning lamp. (Warning light should be ON. Throw computer standby switch to IN, warning light should go OUT.)

1. Check parallax by moving the head several inches up and down and from side to side. The reticle should not move from sighted object.

2. Check azimuth and elevation movement of sight, adjust friction to suit personal

requirements. If the nose gunner (bombardier) expects to wear gloves on the mission, he should check the friction adjustment while wearing gloves. The proper adjustment of friction is vital to smooth tracking and the "feel" of the sight is entirely different with gloves.

3. Check gyroscopes for operation (Computer IN).

(g) Latching Solenoid. Turn the POWER-TURRET switch on (OPERATIONAL position on newer systems). You will hear the solenoid pick up or unlatch when current is supplied to the drive motors.

(h) Turrets. All of your necessary control box switches are already ON. Press the action switch on the sight. Move the sight both in azimuth and elevation; the turret should follow the movement of the sight. If a turret fails to follow the sight, it may be that the circuit breakers, located on the control box, have opened one of the power circuits (AUX, A.C., TURRET). These switches are similar to fuses in their function and will open an overloaded or overheated power circuit.

1. On some model B-29's, an additional circuit breaker button, or sometimes a toggle switch, is attached to the control boxes to protect the air compressor only. Its

action is similar to the other circuit breakers.

2. To check the Circuit Breaker Buttons:

   a. Turn OFF the power switches.
   b. Push hard on the power breaker buttons to reset them.
   c. Turn ON the TURRET POWER. The latching solenoid should pick up.

(i) Selsyn. FOR THE SELSYN CHECKS, THE COMPUTER STANDBY SWITCH WILL BE IN THE "STANDBY" POSITION. Check the 1 speed selsyn system in azimuth by unstowing the sight and moving it 45° away from the guns, then close the ACTION SWITCH. The guns should move into alignment with the sight. Check the 1 speed selsyn system in elevation in a similar manner. Check the 31 speed selsyn system in azimuth by closing the ACTION SWITCH and moving the sight slowly in azimuth. The guns should follow the sight smoothly. Check the 31 selsyn system in elevation in a similar manner.

(j) Contour Followers. Check that the CONTOUR FOLLOWER prevents the guns from striking the curved fuselage or from pointing at the top sighting station or the astro dome. (The top gunner can do this at your request.)

(k) Backout, Holding and Stowing Circuits. To check the BACKOUT CIRCUIT: Move the sight, bring the guns against a limit stop, then away from the stop. If the backout

circuit is not working, the guns will not move off of the limit stop. The HOLDING CIRCUIT, if working properly, will prevent the turret from moving from a set position of the sight when the action switch is closed. To check the STOWING CIRCUIT, release the action switch; the guns should automatically come to 0° elevation.

(1) Computing System. Set the navigator's handset to maximum airspeed and minimum altitude. This is to amplify observed movements during computer check. To check the computing system, turn COMPUTER SWITCH on the control box to IN and the COMPUTER STANDBY switch on the sight to IN. In making these checks, you will have to be extremely observant, as movement of guns will be slight. (Caution should be taken not to run any computer more than 15 minutes at a time on the ground if the temperature in the airplane is high enough to be uncomfortable.)

1. Lead Check. Turn the range knob 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 move back. Repeat this in the opposite direction. Now lock the sight in azimuth and repeat the lead check for elevation.

2. Windage Check. With the range set to maximum on the sight, broadside and horizontally.

Throw the COMPUTER STANDBY switch to STANDBY. The guns should swing slightly to the rear. Throw the COMPUTER STANDBY switch to the IN position. The windage correction will come back in and move the guns slightly forward.

3. Gravity Drop. Stow the sight aft and slightly above 5° horizontal where windage effect is minimum. In this check keep the upper turrets contour follower above the contour cam rather than horizontal. With range still set to maximum and the ACTION SWITCH closed, turn COMPUTER STANDBY switch to STANDBY. The guns should move down slightly. Turn computer standby switch to IN and guns should jump up.

4. Elevation Limit Switch. When guns are leading the line of sight, it is necessary for the computer to cut out before the line of sight reaches zenith or nadir, otherwise the guns will try to drive through the stop. A limit switch, set to operate at approximately 85° elevation, decreases the power by 75% and cuts out the computer.

   a. Elevate sight for lower turrets or depress the sight for upper turrets beyond limits of guns. Guns should engage a

mechanical stop and remain firmly seated. Computer warning light should go ON.

b. Reverse movement of sight, bringing it back within the limits of the guns. The guns should rise or depress off the stops and follow the sight smoothly.

(m) Firing Circuits. In checking firing circuit, place the GUN SWITCH on FIRE (COMBAT position on newer systems) and point the guns at an uninterrupted firing area (off the limit stop switches and not within propeller arcs). Press the action switch and triggers. The charging and firing solenoids should operate. The ammunition booster motors should run when triggers are depressed.

(n) Limit Switches. To check: Bring the guns, with the sight, to a limit stop. While the guns are against the stop, the firing solenoids should fail to operate.

(o) Fire Interrupters. In checking the fire interrupter, point the guns at wings and propeller arcs, being sure that the guns are not against a limit switch. Firing solenoids should not operate. With the action and trigger switches depressed, move the turrets slowly out of the interrupter area. Firing solenoids should operate as the guns pass out of the area. (Remember that each gun has a separate fire interrupter.)

(p) Harmonization. Aim the sight at a distant object (desired minimum distance is one mile) with the computer STANDBY switch in STANDBY position. Then with a boresight tool in the guns concerned, check to see if the guns are pointing at the same object at which the sight is aimed.

(q) Controls Other Than Primary. Check all operations of the secondary controlled turrets, as is done above on primary controlled turrets. On B-29's using one of the following remote control turret systems: 2CFR-55D1, 2CFR55D2, 2CFR55W1, 2CFR-55W2 check the tertiary control of turrets the same as in checking primary control.

(r) Switches Off. When all of the above checks are completed, turn OFF all switches.

(3) Combat Arming.

(a) Ammunition.

CAUTION: TURN OFF ALL TURRET CONTROL AND SAFETY SWITCHES AND INSPECT GUN CHAMBERS FOR LIVE ROUNDS.

1. Inspection of Ammunition. This inspection is to be accomplished before loading ammunition in the turret. Ammunition will be inspected for corroded 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 a hand linker-delinker. Be sure there is a round in the double link that is to be placed in the feedway of the gun.

2. Loading of Ammunition.

a. 2-Gun Turrets (Upper and Lower). 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 cases from the frames; but on the upper aft turret, the cases should be lowered with the chain hoists.

b. Place single link end of belt into case first with the rounds pointing INBOARD. Fill the cases 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. (On upper aft turret, after raising the ammunition cases into position, be sure they are properly locked and hoisting chains properly stowed.)

c. Then feed the double link end of the belt through the ammunition chutes, over the booster assembly, and to the guns. Attach a 3 foot length of safety wire to the double link end of ammunition belt for ease in loading.

d. 4-Gun Turret. Ammunition should be taken to the turrets in boxes to avoid stretching of links. Remove turret dome and unlatch the azimuth latching solenoid. Check the four elastic stop nuts that hold each of the ammunition cases in the frame to be sure they are properly tightened. To load ammunition in the right outboard gun, rotate the turret approximately 150° right of 0° until the right front ammunition case is facing directly aft. Open access door on case. Lower single link end of ammunition belt from top of plane with rounds pointing OUTBOARD (ammunition may be loaded in the cans from inside the plane). Fill the case in zig-zag layers. To load ammunition for right inboard gun, rotate the turret approximately 65° to the right of 0°, until the access door on the right rear ammunition case is facing aft. Load the two remaining ammunition cases by rotating the turret to the left of 0° or until the access door is directly aft. Attach 3 feet of safety wire to the double link end of the ammunition belt (or use small belt of ammunition from top of turret) for ease in loading.

(b) Arming the Guns. With the gun covers down and latched, push the first round over the belt-holding

pawl and charge the guns once to position the round against the cartridge stops. Either one of two methods may be utilized to charge the guns. A hand-charging tool can 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 (the hole in the charger nearest the muzzle end of the gun), and pushing the handle of the screwdriver gently toward the muzzle end of the gun, to actuate the charging solenoid.

CAUTION: IF THE AUTOMATIC GUN CHARGER IS USED TO POSITION THE FIRST ROUND, EXTREME CARE MUST BE TAKEN THAT THE SCREWDRIVER IS PLACED IN "C" (CHARGE) SOCKET AND NOT IN THE "F" (FIRE) SOCKET.

(c) Reset Chargers. Press the red reset button at the back of each charger.

(d) Domes, etc. Replace the turret domes and gun covers. (IMPORTANT: Check visually through inspection ports and access doors that dome security wire is properly engaged over the holding lugs and that the dome latch lock plunger is engaged.)

(e) Latching Solenoid. Manually engage the latching solenoid.

(f) Close and secure access doors.

(g) Replace turret well covers and check for proper sealing.

(h) Turret Safety Switch. Your last act before leaving the turret is to turn ON the TURRET SAFETY SWITCH. (Lower 2 gun turret requires the turret safety switch to be turned ON before replacing the turret well cover.)

2. BEFORE TAKE-OFF.

a. Power-Aux "ON." (WARM UP position on newer systems.)

(1) Just before the take-off roll, on missions when the RCT system is to be operated, you will direct the RCT gunner to have each gunner (with the exception of the tail gunner) to turn his POWER-AUX "ON" (WARM UP position on newer systems). Leave POWER-AUX "ON" so that the RCT system can be put into operation in a minimum of time.

3. AFTER TAKE-OFF.

a. In-the-Air Checks.

(1) After take-off, the RCT gunner will call for an in-the-air check of the RCT system. To avoid overloading the electrical system, the stations should be turned ON one at a time in the following order: Tail, Blister, Nose, and Top. No station will begin its switching until the station preceding it has reported, by interphone, that he has completed his switching. You will have the RCT gunner check with

the navigator to be sure the handset is properly adjusted and there-after checked periodically. Since the POWER-AUX (WARM UP position on newer systems) switch has been turned ON during the take-off roll, the remaining switches should be turned ON as follows:

(a) Press POWER BREAKERS to reset.

(b) POWER AC "ON" (STANDBY position on newer systems).

(c) Turn COMPUTER SWITCH "ON" (OPERATIONAL position on newer systems).

(d) Turn COMPUTER STANDBY switch to IN position.

(e) Turn CAMERA switch ON as needed.

(2) Make sure that each turret is operating properly under primary, secondary, and tertiary control.

(3) On the sight, adjust the target dimension knob to the span of anticipated fighter interception.

(4) Move range wheel to set the reticle at its smallest circle.

(5) Adjust sky filters (use as little as possible).

(6) Check friction adjustments for azimuth and elevation.

(7) Turn GUN SWITCH to FIRE (COMBAT position on newer systems), AIMING AWAY FROM YOUR OWN SHIP AND OTHERS IN THE FORMATION, fire 4 test rounds.

CHAPTER 1

INTRODUCTION TO SOP FOR MB GUNNERS

1. Information contained in this manual has been directed toward helping the MB gunner attain a thorough knowledge of his equipment and knowledge of his duties as a combat crew member. Only through knowledge can the success of a mission be assured.

2. This manual has been devised for B-29 and B-50 Gunners.

3. Gunners will be held responsible for proper demonstration of procedures contained in this manual. This includes standard preflight, operating, and post flight procedures with the gunnery equipment; assistance to the maintenance crew and flight engineer; and proficiency in emergency procedures.

4. Useful gunnery checks and inspection procedures have been placed in Chapters 2, 3, and 4. Techniques, aids, and description of equipment have been placed in Chapters 6, 8, and 9. Emergency procedure has been placed in Chapter 5, and gun camera information and procedure has been placed in Chapter 7. Understanding of information and techniques discussed in these chapters will aid considerably in the safe and efficient use of gunnery equipment and in preservation of lives.

5. Gunners will be thoroughly trained in emergency procedures, so that, if an emergency arises, they will be able to perform their duties in a highly efficient and effective manner.

6. Live ammunition will not be fired from any turret until all safety precautions have been taken, and then only on authority of the airplane commander or fire control officer. In all cases, the firing of live ammunition will be conducted only over designated water or land gunnery ranges. Weather must be such as to permit visible

4. AFTER LANDING.

a. Guns Cleared. The RCT gunner will be responsible to you that all gunners have cleared their guns by removing the ammunition belts and hand-charging until inspection shows no rounds on the feedway or in the chamber. UNTIL ALL GUNS ARE CLEARED, ALLOW NO ONE TO WALK OR PASS IN FRONT OF THEM.

b. Field Stripping the Guns. You will supervise field stripping of the guns for cleaning and the draining of the pressure cylinders. If it is necessary to remove the gun receivers, only one at a time should be removed from each turret. Upon replacing the one which has been removed it must be aligned with the other, by boresighting, to keep the harmonization accurate.

c. Recording Discrepancies. The RCT gunner will enter all RCT and armament discrepancies on the Form 1A. You will check that this is properly done.

CHAPTER 5

EMERGENCY PROCEDURES

SECTION I - GENERAL

1. Full coordinated effort of each crew member is required during 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.

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

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

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

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

c. Crew discipline; this is vitally important.

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

4. EMERGENCY SIGNALS.

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

b. Bail out: One long sustained ring.

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

d. Ditching or crash landing: One long sustained ring.

NOTE: If time and circumstances permit, the

crew should be warned, and acknowledgement received, by interphone.

SECTION II - BAIL-OUT

1. BAIL-OUT OVER LAND.

a. Crew members will not bail out until the order is given by the airplane commander. He will warn the crew by use of the interphone or alarm bell, using the standard signals outlined above.

b. If bail-out becomes necessary, the airplane commander will, if altitude and time permits, descend to 10,000 feet or below, release the cabin pressure and, if at night, turn ON the landing lights. The flight engineer lowers the nose gear, if the aircraft is equipped with a separate nose gear switch. If not so equipped, the pilot lowers the landing gear for approximately 10 seconds or until the nose gear is completely extended.

c. When ordered to do so by the airplane commander, crew members will proceed as follows:

(1) The pilot will turn the IFF switch to EMERGENCY position.

(2) The bombardier will open the bomb bay doors, salvo the bombs, bomb bay tanks and leave the bomb bay doors open.

(3) The radio operator will obtain information from the navigator and broadcast a position report.

d. Crew members will destroy all secret or confidential equipment and prepare any disabled crew members for bail-out; report to the airplane commander that everything is in order. On order of the airplane commander, bail-out through the following exits:

(1) Navigator, radio operator, bombardier, flight engineer, pilot and airplane commander, in that order, through the nose wheel well (secondary exit through

the front bomb bay).

(2) Right, left, and RCT gunners, in that order, through the rear bomb bay (secondary exit through the rear entrance door).

(3) Radar operator and tail gunner through the rear entrance door (secondary exit through the rear bomb bay).

When bailing out, brace your feet against the airplane and roll, head first, toward the ground. If at altitude, fall free (without pulling the ripcord) until reaching approximately 10,000 feet. If you feel yourself losing consciousness, whatever your altitude, open your parachute. Always check your bail-out bottle and recharge it, if necessary, before leaving the airplane.

CAUTION: DO NOT USE THE TOP ESCAPE HATCHES OR WINDOWS FOR BAIL-OUT.

2. BAIL-OUT OVER WATER.

a. In some instances, ditching the airplane will be impossible. In such cases, the plan for bail-out is important. Certain things should be remembered:

(1) If surface help is available, it is much easier for rescue crews to find and rescue 2 or 3 men at a time in a small area than to rescue 10 or more men strung out in a long line in the water.

(2) If surface help is not available, it is still important to keep the crew as close together in the water as possible. Individual members can aid each other, especially in regard to injured crew members. Most important of all, a group of men or life rafts are much easier to find than a single individual. This is true whether

the search is from a surface vessel or aircraft. In view of the above, the airplane should be flown in as tight a circle as conditions will permit, bailing out 3 or 4 men at a time, then coming around in relation to the other men or the surface vessel, before bailing out the other crew members. This should be accomplished to place the crew members as close as possible to the other men or the surface vessel.

b. When the bail-out warning is given, each crew member removes the individual life raft (dinghy) from its position near his station and snaps it on to his parachute harness and on to the ring of his life vest waist strap. The method of attachment should be tested to insure that when the parachute is released in the water the lanyard is so arranged that it does not become entangled with the parachute harness. Crew members should check the equipment of each other to insure that all straps and packs are properly secured and adjusted. Upon receiving the bail-out signal, crew members will exit with the least possible delay, through the normal bail-out exits, in accordance with the above procedure, or as prescribed by the airplane commander to cope with the existing emergency.

c. Before giving the bail-out signal, the airplane commander will:

(1) Order the navigator to give the radio operator a position report for immediate broadcast.

(2) Order the navigator or radio operator to pull the life raft release handles in the forward pressurized compartment, and throw the life raft, stowed in the forward compartment, overboard. Then order the tail or RCT gunner to throw the life raft, stowed in the rear unpressurized compartment, overboard.

NOTE: The aircraft should be circled, as specified above, in order for equipment and personnel to drop in the same vicinity.

d. After you have bailed out and when you are about 500 feet above the water, push your body as far back into the parachute seat as possible. Unfasten the leg and chest straps, making sure to hold your body in the parachute harness with your arms and shoulders. When immersed in the water, slide out of the harness and swim free, under water, to avoid becoming entangled in the parachute or shroud lines.

NOTE: If using the Quick Release Type parachute harness, do not Release until you hit the water.

WARNING: Do not inflate the life vest until returning to the surface.

e. After the life vest is inflated, inflate the one man life preserver (dinghy) and climb in from the end, being careful not to capsize the raft. Check all emergency equipment in the raft and attempt to locate other crew members.

SECTION III - DITCHING

1. GENERAL. Ditching calls for more coordinated effort on the part of the crew than does any other emergency procedure. Prior to an over-water flight, everyone who is associated with the mission of the crew must cooperate to see that the crew has all necessary equipment in event of mishap. An inspection must be made of each life raft, CO_2 cartridge, hand pump, flashlight, emergency ration, safety wiring, medical kit, and life jacket. Everything must be in readiness to enable the crew to evacuate the airplane if necessary, and survive until rescued.

2. Ditching drill is the nearest approach to the reality of ditching. Practice it. You must learn to move quickly and to make every movement count.

3. A well trained crew will understand the problems and know how to handle them when they occur. Talk ditching over with the rest of the crew and practice it again and again. Use the emergency equipment when practicing. Your survival depends critically on the water supply, the signals, the medical equipment, and the food that you can take with you.

4. If ditching becomes inevitable, there are some vitally important factors to be taken into consideration. They are as follows:

a. Wind Direction. Wind is one of the uncontrollable factors during ditching. Plans for ditching cannot be made without taking the wind into consideration. Waves move down-wind. Spray from wave crest too is blown down-wind. Swells, however, do not always indicate wind direction and can, in fact, be very large when the wind is calm. Swells are a result of past disturbance. Study the sea whenever possible and learn its characteristics.

b. Wind Speed. Surface winds are fairly predictable from the way they affect the water. Here are some aids that will help to estimate surface wind velocity.

(1) No white caps - 0 to 10 MPH.
(2) A few white caps - 10 to 20 MPH.
(3) Many white caps - 30 to 40 MPH. From low altitude, spray will be visible sometimes with many white caps. This indicates a very strong wind (40 to 50 MPH).

c. Altitude. Altitude can be judged without difficulty if there is wind. On a calm sea, the airplane commander must be more alert in his judgement of height. There are many advantages that accompany a forced landing on a calm sea. If power is available and the altitude is not needed to look for land or surface vessels, descend to a lower altitude and study surface conditions. At night, the landing lights can be tried at various angles. They may be helpful. If fog or spray is present, they may be more harmful than good.

d. Preparation. Ditching equipment should be in readiness at all times when flying over water. As soon as the necessity of ditching is evident and the airplane commander has given the order to prepare for ditching, jettison all equipment that is unessential. Some of the items to release include the bombsight, bombs, fuel tanks, gunsights, cameras, accessory power plant when not in use, and all escape hatches that are removable. Stay away from the putt-putt during ditching if jettisoning is not possible. After the equipment is jettisoned, close the bomb bay doors and install the ditching braces. The two ditching braces for the forward pressurized compartment are located by the step to the airplane commander's compartment and the two ditching braces for the aft door are located in the rear pressurised compartment.

WARNING: It is vitally important that the ditching braces be installed to prevent the pressure bulkhead doors from being broken in on impact with the water.

5. CREW PROCEDURE FOR DITCHING.

a. General.

(1) When no personnel injuries have been sustained, each crew member will proceed with his individual responsibilities. If a crewman is injured, his responsibility will be accepted by the nearest of the crew. After the impact, look around for injured members to help, then get out to the leading edge of the wing. The first out will go for the raft if ejected, or to the life raft release handle if not ejected.

(2) Crew preparation and procedures begin before the mission. The following are general reminders.

(a) Before a mission, check the location of emergency equipment. IT HAS TO BE THERE.

(b) Each crew member will test inflate his life vest, by mouth, before a mission. If inoperative draw a new one. Also check to see that CO_2 cartridge is in place.

(c) Carry a flashlight.

(3) If you have to ditch - Remember

(a) Release or break the astrodome. The opening makes an excellent exit in a ditching emergency.

(b) After boarding the life raft, toss out the sea anchors. These anchors aid greatly in maintaining a stationary position. By staying close to the vicinity of the aircraft you will increase your chances of being sighted by rescue planes.

(c) The radio operator will lock the transmitting key DOWN before he leaves his station for the ditching operation.

(d) Parachutes and one-man rafts will not be taken off until the aircraft's altitude is less than 1,000 feet above the water.

(e) Use cushions and open parachute canopy for padding. Keep the lines folded in the pack. Remove one-man raft from parachute harness.

(f) Keep knees flexed on impact.

b. Airplane Commander.

(1) Give the warning, if interphone is operative, "Prepare for ditching in minutes and turn the IFF.

emergency switch ON." If the interphone is inoperative, give six short rings on the alarm bell.

(2) Open and secure the window; jettison, if possible.

(3) Remove the flak suit and parachute. Remove the one-man raft from the parachute harness and leave it in the seat. Wear the flak helmet, emergency kit, life vest, gloves and if installed, the shoulder harness.

(4) Radio other aircraft of your distress and have the radio operator broadcast a position report.

(5) Give the order: "Stations for ditching; impact in _____seconds."

(6) Check to see that the crew is clear; throw the one-man raft from, and exit through, the left window. If the aircraft is not on fire, inflate the life vest on the window ledge and climb stop the aircraft, using the guns as a hand hold.

(7) Supervise the removal of injured crew members and securing the emergency equipment and life rafts.

(8) Keep the knees flexed at impact.

(9) Take position in the life raft at the left wing, proceed away from the aircraft, and when at a safe distance, order the life rafts tied together with the ropes provided.

c. Nose Gunner (Bombardier).

(1) Acknowledge in turn: "Nose Gunner (Bombardier) ditching."

(2) Remove parachute, winter flying boots, and flak suit. Loosen shirt collar. Keep helmet on. Wear flying gloves, life vest, and emergency kit.

(3) Destroy bombing data and remove bombsight. Pass bombsight back to rear of forward pressure compartment to be jettisoned out bomb bay doors. Assist in jettisoning all unnecessary equipment.

(4) Open bomb bay doors and salvo bombs. If bomb bay tanks are empty, retain them for their flotation value and reinforcement they offer the bomb bay doors. When all loose equipment is jettisoned, close bomb bay doors.

(5) Shoot out ammunition from front turrets.

(6) Assume ditching position on floor next to the flight engineer with back and head padded and braced against pilot's armor plate. Brace right foot across the aisle with knees flexed. Fasten safety belt, if installed. Protect head with arm or pillow.

(7) After airplane comes to rest, throw the one-man raft through the escape hatch, exit through right (engineer's) window, inflate life vest and climb to top of aircraft.

(8) Assist in removing injured crew members as directed by airplane commander or pilot.

(9) Proceed to right wing and climb aboard life raft.

d. Right Gunner.

(1) Acknowledge in turn: "Right Gunner

Ditching."

(2) Remove parachute, flak suit, and winter flying boots. Keep flak helmet on and loosen shirt collar. Wear flying gloves, life vest, and emergency kit.

(3) Install ditching braces.

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

(5) Aid the left gunner in chopping away the camera and putt-putt supports with the fire axe. Remove the battery and bend the supports back. Jettison all loose equipment through the rear entrance door and open the escape hatch. (The rear entrance door should be closed after the equipment is jettisoned.)

(6) Assume ditching position, with the head and back securely braced and padded, against the right side of the bulkhead.

(7) After airplane stops, throw out life rafts and all emergency equipment, and exit through the escape hatch.

(8) Board third raft; if not available, proceed to right wing and board raft.

e. Left Gunner.

(1) Acknowledge in turn: "Left Gunner Ditching."

(2) Remove parachute harness, flak suit, and winter flying boots. Keep flak helmet on and loosen shirt collar. Wear flying gloves, life vest and emergency kit.

(3) If the interphone is operative, report the progress in the gunner's compartment to the airplane commander.

(4) Shoot out all ammunition in lower rear turret.

(5) Install the ditching braces.

(6) Proceed to the rear unpressurized section with the radar operator. Take parachutes, one-man raft, and seat cushions for padding.

(7) Use the fire axe to chop away the camera and putt-putt supports. Remove the battery and bend the supports back. Jettison all loose equipment through the rear entrance door and open the escape hatch. (The rear entrance door should be closed after equipment is jettisoned.)

(8) Make sure that the extra life raft and emergency kits are securely lashed down.

(9) Assume ditching position with the head and back securely braced and padded against the left side of the bulkhead.

(10) Fasten the safety belt. Wear flak helmet, emergency kit, life vest, and gloves.

(11) Throw out one-man rafts and all emergency equipment, and exit through the escape hatch.

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

(13) Assist in removing injured crew members and emergency equipment as directed by the airplane commander or pilot.

(14) Board third raft; if it is not available, proceed to left wing and board raft.

f. RCT (Top) Gunner.

(1) Acknowledge in turn: "Top Gunner Ditching."

(2) Shoot out all ammunition from rear upper turret. Check gunners to see that lower rear and tail turret ammunition has been shot away.

(3) Remove parachute, flak suit, and winter flying boots. Keep flak helmet on and loosen shirt collar. Wear flying gloves, life vest and emergency kit.

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

(5) Be sure pressure door to bomb bay is closed and ditching braces are installed, if possible.

(6) Take the one-man raft and go forward through the tunnel to the forward cabin. Remove the astrodome by pulling the release cord. If the astrodome fails to open by pulling the release cord, chill the plexiglass dome with CO_2 from the fire extinguisher and break it out with an axe.

(7) Assume ditching position in forward pressurized compartment on lower forward turret, the same as the radio operator, with back placed against upper turret.

(8) After airplane comes to rest, verify that both life raft release handles at tunnel entrance have been pulled and exit through astrodome opening.

(9) Throw the one man raft from the astrodome and climb atop the aircraft. If

the aircraft is not on fire, inflate the life vest.

(10) Aid in removing injured crew members and emergency equipment as directed by the airplane commander or pilot.

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

NOTE: If the astrodome cannot be removed or broken out, the navigator will exit through the airplane commander's window, the radio operator through the pilot's window, the top gunner and extra passengers through the flight engineer's escape hatch.

g. Tail Gunner.

(1) Acknowledge in turn: "Tail gunner ditching."

(2) Remove parachute harness, flak suit and winter flying boots. Keep flak helmet on and loosen shirt collar. Wear flying gloves, life vest, and emergency kit.

(3) Shoot out ammunition in tail guns.

(4) Jettison the escape hatch and sight.

(5) Pad body against ditching impact and fasten safety belt.

(6) When airplane comes to rest, tail may be low in water or under water. Dive out escape hatch, make way to left wing, and climb aboard life raft.

(7) If the tail is not under water, nor the airplane on fire, inflate the life vest while on the escape hatch ledge, and climb atop the aircraft.

(8) Assist in removing injured crew members and emergency equipment as directed by the airplane commander or pilot.

h. Extra Passengers.

(1) Acknowledge the ditching order.

(2) Aid in jettisoning unnecessary equipment.

(3) Assume ditching position in accordance with SAC Regulations 60-3, safety belt fastened, facing aft, with the back braced and knees flexed.

(4) Throw the one man raft from, and exit through, the appropriate escape hatch.

(5) The airplane commander or pilot will direct which raft the passengers will board.

6. DITCHING B-29As

a. Crew procedure is identical to that of the standard B-29 with turret wells installed except as follows:

(1) Right Scanner.

(a) Duties before impact.

1. Jettison all loose, unnecessary equipment.

2. Carry emergency equipment forward through the tunnel into the forward pressurized compartment.

(b) Position.

1. Lie down on back on the floor alongside the radio operator, with head facing aft. Brace feet against wheel well step. Pad head and body with parachute and cushions as necessary.

2. Keep the knees flexed at impact.

(2) Left Scanner.

(a) Duties before impact.

1. Jettison all loose unnecessary equipment, aid in carrying emergency equipment into forward pressurized compartment to be ready for removal from the airplane.

(b) Position.

1. Lie down on back on the floor between the right scanner and the navigator with head facing aft. Brace feet against the wheel well step. Pad head and body with parachute and cushions as necessary.

2. Keep knees flexed at impact.

7. DITCHING EQUIPMENT.

a. Drift Signals. Twelve drift signals are stowed under the navigator's table. The drift signal chute is on the floor behind the navigator.

b. Hand Axes. There is a hand axe at the navigator's station near the fire extinguisher. There is another on the aft compartment auxiliary panel.

c. Life Rafts. There is a six-man life raft in each of the two raft compartments stop the fuselage. The release handles for these rafts are at the forward entrance to the tunnel. A pull on the handles automatically releases the raft and inflates them. There are external release levers on top of the fuselage next to the compartment doors. The rafts are inflated by pulling a ripcord on the CO_2 cylinders. Don't jump from the plane into a raft. If a raft inflates inverted, don't jump on it to right it. Two or three men can right a raft, if they are standing on the wing, or, one man in the water can right a raft, if he throws the raftline over the far side and pulls hand over hand. Send the rafts off the leading edge of the wing; wing flaps are usually torn loose in ditching and offer jagged edges which can easily puncture a raft. When all the men are aboard, tie the rafts together.

d. Raft Accessory Kits. There is an accessory kit for each raft. Ordinarily the kit is stowed inside the raft, but sometimes stowage problems make it necessary to stow the kit separately. If the kits in your plane are not in the rafts, be sure to assign the kits to crew members. When you're adrift, keep the items of your kit inside the raft; tie the kit to the bottom of the raft. Keep signaling equipment near; when the time comes to use it, you will want it in a hurry.

e. Dinghy Radio. The emergency dinghy transmitter is attached to the right side of the life raft, or is in the right life raft compartment or under its hinged bottom, except in a few airplanes where it is temporarily stowed by the rear entrance door. Turn the handle to free the grease once a month and repack the parachute every 60 days.

8. MISCELLANEOUS EMERGENCY EQUIPMENT.

a. First-Aid Kits. Five first-aid kits are in the airplane, one of each at the following locations: Flight Engineer's auxiliary equipment panel, side wall of the flight engineer's stand, the back of the right-hand side gunner's seat rear compartment auxiliary panel, and the tail gunner's compartment.

b. Flashlights. Each pressurized compartment is provided with a flashlight, one is on the flight engineer's auxiliary panel and the other is on the rear compartment auxiliary panel.

c. Parachutes. If time permits, take one or more parachutes from the ditched aircraft. The silk can be used to catch rain water and the shrouds have no end of use.

d. Water Canteen. The web belt, which supports the canteen, should be buckled on after removal of flak suit.

SECTION IV - CRASH LANDING

1. The B-29 can be crash-landed with a minimum of injury to the crew. All crew positions for crash landing B-29 aircraft are the same as those specified for ditching, with exception of the radio operator, who will assume a sitting position facing aft against the flight engineer's control stand, back well braced and cushioned, hands behind head, and knees flexed.

2. The airplane commander will give crew members, not needed to assist in crash landing the aircraft, permission to bail out. The bail out procedures will be the same as outlined in Section II.

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

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

b. Close the wheel well nacelle doors, if possible.

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

d. Drain the oxygen systems.

e. Stop the auxiliary power plant.

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

g. No one will remain in the area to the rear of either lower turret for crash landing, as lower turrets are likely to tear loose and be forced into the cabin.

4. The remaining crew members will then take up crash landing position. The suggested crash landing positions for the gunnery element of the crew are as follows:

a. Nose Gunner. Will assume crash landing position on floor, next to the engineer, with back and head padded and braced against co-pilot's armor plate. Brace right foot across the aisle. Fasten safety belt, if available. Protect head with arm or cushions.

b. Left and Right Blister Gunners. Will remain in respective seats.

c. RCT Gunner. Will go to the rear unpressurized compartment by the putt-putt, remain there with back and head against the rear pressure bulkhead of the rear pressurized compartment.

d. Tail Gunner. Will go forward to the rear pressure bulkhead of the rear pressurized compartment by the putt-putt and remain there with back and head against this bulkhead or may remain in tail compartment.

5. RELEASE OF TAIL GUNNER.

a. In case of injury, the tail gunner can be removed from the tail gunner's compartment as follows:

(1) Open the door approximately (1) inch.

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

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

(4) Move the door forward and remove it.

(5) Free the tail gunner's feet and place them near the counterline of the air

craft
(6) Pull the rod down to release the seat.
(7) Pull the ring to raise the back of the seat.
(8) Unfasten safety belt and remove the gunner.

SECTION V - FIRE

1. CABIN FIRE FIGHTING EQUIPMENT. There are three CO_2 hand fire extinguishers in the airplane. One is mounted on the front of the upper forward turret near the flight engineer, another is mounted on the left wall of the rear pressurized compartment, and the third is mounted in the rear unpressurized compartment by the rear entrance door.

2. OPERATION OF CABIN FIRE FIGHTING EQUIPMENT

a. While using the extinguisher, hold on to the rubber-insulated tubing. During discharge of CO_2 gas, the metal horn gives off "dry ice" and frost bite must be avoided by not holding the horn.

b. To use the CO_2 extinguisher, stand as close to the fire as practicable, raise the horn, and direct the CO_2 charge at the base of the fire until the fire is extinguished.

c. To stop the flow of gas, replace the horn in the clip on the side of the cylinder.

3. CABIN FIRE ON THE GROUND. Report the fire to the airplane commander immediately. If the fire is from electrical wiring, report its type and nature so that proper measures to combat it may be taken. Get busy with a fire extinguisher.

4. CABIN FIRES IN FLIGHT.

a. Report the fire to the airplane commander immediately.

b. If the fire is of an electrical nature, report it as such so that the flight engineer may be

directed to turn OFF generator switches, battery switches, and putt-putt ignition switch. Repair the malfunction before turning the power ON.

c. Depressurize the cabin by pulling the emergency cabin pressure release cable on the airplane commander's control stand.

d. Close the cabin air control valves which are located on the flight engineer's control stand.

e. Open nose wheel nacelle doors. Open rear emergency escape hatch and rear entrance door for ventilation.

f. If flying at altitude, the airplane commander will order you to use oxygen and will have the airplane depressurized. IMPORTANT: If your oxygen mask is connected to the station outlet, be sure to turn the AUTO-MIX to the OFF position. Get busy with a fire extinguisher.

g. If the cabin becomes unbearably smoky or gaseous after using the fire extinguisher, oxygen masks will be worn and plugged into either station outlets or portable bottle and the AUTO-MIX Control set on pure oxygen.

h. If a fire gets out of control, and there is danger of an explosion, the airplane commander will order the crew to abandon the airplane.

NOTE: When at altitude, depressurization will aid in extinguishing or controlling a fire due to the resulting lack of oxygen. There are two emergency cabin pressure release valve handles. One is in the pilot's compartment and is on the top right side of the forward pressure bulkhead, of the rear pressurized compartment, above the right gunner's head. If pressurized when the fire occurs, the pilot will pull his pressure release valve handle or he will direct that one of the gunners pull the pressure release valve in the rear compartment.

5. NACELLE FIRES ON THE GROUND. If the fire is known to be a torching turbo; it can be put out by momentarily increasing the throttle setting. For other engine or nacelle fires, proceed as follows:

a. The airplane commander notifies the control tower to send a fire truck.

b. Mixture controls - fuel cut-off.

c. Fuel shut-off valves - off.

d. Fuel boost pumps - off.

e. All switches - off.

f. Set the CO_2 selector on the proper engine and pull the CO_2 release cable (s).

g. If necessary, direct the ground crew or flight crew members to use the portable CO_2 extinguishers.

NOTE: The engine CO_2 system is for fires in the nacelle and is not effective against fires in the engine proper.

6. NACELLE AND ENGINE FIRE IDENTIFICATION.

a. Gunners will observe engine performance during flight and report any abnormal CONDITIONS: I.E., OIL AND GAS LEAKS, GAS FUMES IN CABIN, ENGINE FIRES, ETC. Gunners will immediately report all engine fires in flight. First report the fire; then follow up with detailed information.

b. Generally speaking, black smoke is an indication of burning oil or fuel; white smoke is an indication of burning metal.

c. Fires in the induction system (frequently started by an engine backfire) can be identified by dense clouds of black smoke coming from the exhaust, followed by dense clouds of white smoke. A small trail of black smoke coming from the exhaust is an indication of fouled plugs.

d. If the engine has been throwing oil, and the oil gets hot enough to burn, small trails of black smoke may be seen around the cowl flaps and intercooler flaps.

e. Fires caused by a leaking exhaust stack (such as cracks in a ball-joint) will, when flames reach the shroud, send a trail of white smoke from the shroud, at the side of the engine.

f. A broken fuel line may be identified by a trial of black smoke coming from the accessory (rear) section of the nacelle.

g. By studying these identification features and by watching the engines carefully at all times, gunners can be of incalculable assistance in preventing fire damage.

7. NACELLE OR ENGINE FIRES IN FLIGHT.

a. The crew member spotting the fire places his jackbox position selector on "call" and reports "Fire on_____ engine" (if possible, the crew member identifies the type and location of the fire).

b. The airplane commander closes the throttle, feathers the propeller, and orders the flight engineer to "use the engine fire procedure."

c. The flight engineer moves the mixture control on the feathered engine to fuel cut-off, closes the fuel shut-off valve, turns the boost pump off, and adjusts the cowl flaps to 10°. (Oil shut-off valve OFF, if applicable.)

d. The airplane commander will increase the airspeed, by diving the airplane, in an attempt to blow out the fire.

CAUTION: DO NOT DIVE THE AIRPLANE UNLESS THE PROPELLER IS FULLY FEATHERED.

e. If the fire cannot be blown out, set the CO_2 selector valve to the proper engine and pull the release cable (s).

f. If the fire is uncontrollable, the airplane commander will order the crew to abandon the airplane.

NOTE: If the fire is in an inboard engine, close the proper cabin air valve control and transfer the vacuum selector valve to the remaining inboard engine. The airplane commander orders the radio operator and gunners to open the pressure doors for ventilation. If additional ventilation is required, the pilot may open his window.

8. INDUCTION FIRES. Indications of an induction fire are as follows:

a. A sudden increase in CAT to the maximum limit.
b. A decrease in manifold pressure.
c. Dense black smoke from the exhaust.
d. Dense white smoke billowing from the exhaust (advanced stage).

The fire procedure is the same as for nacelle or engine fires.

SECTION VI - CABIN PRESSURE EMERGENCY OPERATION

1. CABIN PRESSURE REGULATORS. The flight engineer is responsible for maintaining proper cabin pressure. If the cabin air pressure deviates from proper limits, the flight engineer will direct the side gunners to check the pressure regulators one at a time. To check one regulator, close the other regulator by screwing down the knurled knob and close the shut-off cock. The faulty regulator will be turned OFF and the regulator operating properly will be left ON.

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 REGULATOR BEING

TESTED IS JAMMED CLOSED? IT IS POSSIBLE TO BUILD UP CATASTROPHIC PRESSURE BY CLOSING THE OTHER.

NOTE: For all normal air operation, the knurled knob 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 knob will be screwed DOWN on the regulator.

2. PRESSURE RELIEF VALVES. If both automatic regulators fail, the flight engineer will regulate cabin pressure manually from his position.

3. WARNING HORN. The warning horn sounds when the cabin pressure equivalent to 12,000 feet is exceeded. The horn will also blow when the airplane is above 30,000 feet; when it does, in this case, the warning horn will be turned OFF by the engineer. Late model airplanes have no cabin pressure warning horns.

4. EMERGENCY DEPRESSURIZATION. If sudden depressurization is necessary, the pilot will pull the cabin pressure emergency release handle at his station or will direct that the cabin pressure relief valve handle above the right gunner's head be pulled.

SECTION VII - LANDING GEAR EMERGENCY OPERATION.

1. ELECTRICAL POWER OPERATION (MAIN LANDING GEAR).

a. The electrical emergency operation of each main landing gear is accomplished by use of the portable auxiliary flap motor which is normally stowed in the aft bomb bay on the rear wing spar in position for emergency flap operation. Drive shafts are routed from each main landing gear retraction screw to separate gear boxes in the aft bomb bay. The gear box for the left gear is located above the left catwalk just aft of the rear wing spar. The gear box for the right gear is similarly located above the right catwalk. The emergency flap motor can be installed in these gear boxes to operate either the left or right main gear.

b. If the normal main gear system fails and you are ordered by the airplane commander to operate the emergency system, proceed as follows:

(1) Make sure all operating generators and the putt-putt are turned ON.

(2) The pilot will place the landing gear switch in the OFF position and the flight engineer will check the fuse in the pilot's aisle stand. The flight engineer will replace the fuse, if necessary, and the pilot will try the normal gear switch again. If the fuse burns out again, the gear switch will be returned to OFF? fuse replaced and emergency procedures accomplished.

(3) Install the portable auxiliary flap motor in lower position of the desired gear box and connect the motor cannon plug. (NOTE: It is desirable, if time permits, to crack the gear loose with the hand crank prior to installation of the auxiliary flap motor.)

(4) Pull the emergency nacelle door and clutch handle out and secure in the OUT position by dropping the waged ball on the cable behind the slot in the handle bracket. If the doors do not open when the handle is pulled, place the emergency switch in the UP position for approximately 5 seconds in order to lift the gear off the doors. If the doors still do not open, be sure the door release handle is all the way out and try to force the gear through the doors. The emergency gear motor, in some cases, will force the gear to push the door open,

provided the release handle is held completely out during the operation of the emergency motor

(5) If the emergency gear switch does not operate the emergency motor as indicated by current draw or motion of the gear, it may be possible that the solenoid is not operating. This may be checked by removing the cover of the solenoid and watching for operation of the plunger while the switch is actuated. IF the solenoid fails to close electrically, it may be closed manually by pushing on the contact arm. If the defective gear does not move within ten seconds, return the emergency gear switch to neutral or discontinue manual operation of the solenoid.

CAUTION: IF MORE THAN ONE GEAR IS DEFECTIVE, OPERATE ONLY ONE AT A TIME. WHEN THE GEAR IS DOWN, DO NOT CONTINUE OPERATING THE EMERGENCY MOTOR SINCE THERE ARE NO LIMIT SWITCHES IN THIS SYSTEM. OPERATOR SHOULD ALWAYS BE ON INTERPHONE WHILE PERFORMING EMERGENCY OPERATIONS.

(6) If the foregoing attempts to lower the gear have been unsuccessful, and the nacelle doors are open, it is possible to energize the gear screw with both the normal and emergency gear motors. This may be accomplished by placing both the normal and emergency gear switches to the DOWN position at the same time.

(7) If the nose gear alone fails to extend, the emergency procedure outlined in paragraph 3, page no.132, this Section, may be followed, except that the wheel

well doors operate mechanically and have no effect on lowering the gear.

(8) Report to the pilot, by interphone, that the emergency system is ready for operation or has been operated.

(9) Extend or retract the gear at the command of the pilot by operation of the switch on the emergency motor. It takes approximately 40 seconds to extend the gear and approximately 1 minute to retract it.

WARNING: The pilot should not use the emergency flap switch on the pilot's aisle stand to control the portable 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. Interphone connections are provided on the tunnel wall just aft of the rear wing spar and the operator should be on interphone at any time operation is attempted.

CAUTION: THE MOTOR SHOULD BE STOPPED APPROXIMATELY 2 TO 3 SECONDS AFTER THE GEAR REACHES EITHER LIMIT. THERE ARE NO LIMIT SWITCHES IN THIS CIRCUIT. YOU WILL DAMAGE THE MOTOR OR CLUTCH IF YOU OPERATE IT IN EXCESS OF THE ABOVE TIME LIMITS. YOU WILL FEEL THE CLUTCH SLIPPING WHEN THE LIMITS ARE REACHED.

(10) Release the nacelle door and clutch cable immediately after gear has been extended.

(11) Stow the emergency motor.

2. MANUAL OPERATION (MAIN LANDING GEAR).

a. A manual system for the extension and retraction of the landing gear is accomplished by the use of hand cranks which are stowed in the aft bomb bay just above the forward end of each cat-walk. Drive shafts from the main landing gear retraction screws are routed into the rear bomb bay where they may be operated by the portable emergency motor, or by a hand crank. Cable control clutches disconnect the normal motors from the landing gear mechanism when the manual system is to be used. The same cable also releases the nacelle doors.

NOTE: On later airplanes, the nacelle door motors have been removed and replaced by a mechanical linkage. Pull handles, which formerly released the nacelle doors and disengaged the normal landing gear motor, now perform only the latter operation.

b. If all landing gear power fails, and you are ordered by the airplane commander to operate the emergency system, proceed as follows:

(1) Pull the nacelle door and clutch handle out and secure it in the out position by dropping the waged ball on the cable behind the slot in the handle bracket.

(2) Report to the pilot, by interphone, that the emergency system is ready for hand operation.

(3) At the command of the pilot, extend or lower the gear.

(4) To extend the gear, insert the crank in the lower socket of the gear box. Turn clockwise until the stops are engaged. This requires 387 turns taking approximately 12 minutes.

(5) To retract the gear, insert the crank in the upper socket of the gear box. Turn clockwise until the stops are engaged.

(6) Release the nacelle and clutch cable immediately after the gear has been extended.

(7) Stow the crank.

3. MANUAL OPERATION (NOSE LANDING GEAR): The flight engineer will first try the emergency electrical system by operating the switch installed on upper left of the flight engineer's panel near the cabin heat control switches. If emergency electrical system fails to work the nose gear may be operated manually from a gear box installed at the top of the nose gear screw. To operate the nose gear with this emergency manual system, proceed as follows:

a. Remove the beam from the clamp on the pilot's armor plate stanchion and rotate to a horizontal position.

b. Secure the beam with the bolt and wing nut to the bracket on the airplane commander's armor plate stanchion.

c. Remove the hand crank from under the entrance hatch and insert into the hole in the beam.

d. Unscrew the pressure sealing plug in the floor, using the hand crank as a wrench.

e. Insert the crank in the gear box.

f. If the crank does not turn easily, open the entrance hatch and disengage the motor with the clutch lever. Moving the lever towards the right (facing forward) disengages the motor. A spring clip is provided on the handle to retain it in the engaged or released position. Extension and retraction are accomplished in 3 to 5 minutes.

g. Always return the clutch handle to the engaged position after hand cranking if the clutch has been released.

h. Remove and stow the hand crank and the beam.

NOTE: Instruction decals are installed in the airplane near the gear boxes to explain the operation of the manual landing gear systems.

SECTION VIII - WING FLAP EMERGENCY OPERATION

1. A portable emergency motor, mounted in the aft bomb bay on the rear wing spar, permits the emergency operation of wing flaps. This motor is normally stowed in the flap operation position.

2. If the normal wing flap system fails and you are ordered by the airplane commander to operate the emergency system, proceed as follows:

a. Place the flap switch in neutral and check the fuse. Replace fuse, if necessary.

b. Connect the emergency motor cannon plug and report to the pilot by interphone that the emergency system is ready for operation.

c. At the command of the pilot, place the switch on top of the motor in the FLAPS DOWN position. Return the switch to NORMAL when informed by the co-pilot that the flaps are in the desired position.

WARNING: Do not operate the motor beyond the flaps full up or full down position. When operating the emergency motor, stay on the interphone, at all times.

d. Use the reverse procedure to raise the flaps.

e. As a last resort, if the above procedure fails, place the normal flap and emergency motor switch

in the FLAPS UP or DOWN position as may be desired. This will allow both the normal and emergency motors to operate the flaps in case of binding actuating screws or a warped torque shaft. However, the switch on top of the emergency motor must be in the same corresponding position as the normal flap switch or the normal and emergency motors will work against each other.

f. Recent B-29 modifications incorporate a control for the emergency wing flap motor on the pilot's aisle stand for use by the airplane commander. This switch is connected in parallel with the switch on the emergency motor noted in the preceding paragraph. Stay on interphone for instructions.

NOTE: For emergency flap operation, do not depend on the hand crank stowed forward of the rear entrance door, or the landing gear crank. Neither of these cranks will fit the flap socket.

SECTION IX - BOMB DOOR OPERATION

1. Before any emergency procedures are attempted, when electrical power is available, the following checks should be made to make sure the normal system is inoperative.

a. Circuit breakers ON.

b. Warning lights - push to test.

c. Bombardier's switches (Master switch ON; door selector switch - proper position).

d. Forward and aft bomb bay safety shut-off valve OPENED.

e. Normal door switches - operate.

CAUTION: BEFORE ANY EMERGENCY OPERATION IS ATTEMPTED, THE BOMBARDIER'S MASTER SWITCH AND CIRCUIT BREAKERS MUST BE TURNED OFF TO PREVENT THE LOSS OF ALL AIR PRESSURE.

2. With proper pressure in both normal accumulators and the electrical system is inoperative.

a. To open doors.

(1) Pull emergency release on either airplane commander's position or aft of bulkhead 218 until both doors open.

b. To close doors.

(1) Turn OFF master switch and bomb door circuit breaker switch on bombardier's panel.

(2) OPEN emergency actuating valve in bomb bay affected.

(3) Pull emergency retraction "T" handle aft 218 bulkhead to close forward doors.

WARNING: The forward bomb bay doors must be closed first in order to release the 4-way valve on the rear door. Any effort to close the rear doors first will result in complete loss of air pressure in the rear accumulator.

(4) Pull emergency retraction "T" handle on right rear catwalk to close rear doors.

3. If electrical power is present and normal accumulators are charged, the doors may be operated from the pilot's aisle stand or bombardier's panel in place of using the retraction handle.

4. With proper pressure in only one accumulator:

a. Open the interconnect valve on the forward bomb bay valve panel.

b. Operate doors with normal door operating switch.

c. If electrical system is inoperative, operate doors manually as listed above.

5. When pressure is absent from both normal accumulators and emergency accumulators are charged.

a. To open doors.

(1) Pull emergency release handle at airplane commander's position or aft of bulkhead 218.

b. To close doors. Follow procedures outlined in paragraph 2 b. above.

6. EMERGENCY PROCEDURE FOR REVISED B-29 BOMB BAY DOORS EMERGENCY OPENING.

a. Emergency opening can be accomplished by Pilot's "T" Handle or Pull Handle on catwalk at bulkhead 218.

b. Emergency closing of bomb bay doors can be accomplished by an emergency manually cable retraction system for both doors. The jack for the forward doors is located in the floor alongside the navigator and the jack for the aft doors is located in the floor forward of the top gunner's seat support. Included on the jackshaft is a plate which is connected by cable to the four-way selector valve and by a push rod to the jack access door. This plate also acts as a cam that disengages the ratchet pawls when the access door is closed. When emergency retraction of the bomb doors is required, the operator lifts the access door in the floor. This exerts tension on the four-way selector valve control cable actuating the selector valve to the "door CLOSE" position, and at the same time engages the ratchets between the retraction handle and retraction drum. Since lifting the access door throws the four-way selector valve to the "door CLOSE" position and if any reserve air remains in the pneumatic system, the

doors will close or partially close. If sufficient air is not available for closing the doors, the retraction handle may be inserted in the retraction mechanism and pumped until the doors are closed (approximately 25 strokes). Closing the access door will disengage the retraction mechanism ratchets and allow the doors to be operated normally.

SECTION X - BOMB RELEASE (SALVO)

1. With normal electrical power, salvo release of bombs, unarmed, is accomplished by closing any one of three salvo switches located on the pilot's aisle stand, bombardier's panel, and the right sighting station in the aft pressurized compartment. With any one of the 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.

2. If the electrical system is inoperative, open the bomb doors by pulling the emergency bomb door release, located on the airplane commander's control stand. Bombs may then be dropped singly by manually tripping the release lever on each bomb shackle.

3. EMERGENCY BOMB RELEASE (Revised): a. On later model aircraft fuel tank safety switches are arranged to salvo bomb bay tanks selectively. By this means, both tanks, or the lower tank only, in either or both bomb bays, may be salvoed. The switches for the forward bomb bay tanks are located in a salvo shield on the forward side of bulkhead 218. The switches for the rear bomb bay tanks are located in the salvo shield on the rear side of bulkhead 646.

b. This installation allows operation of the tank safety switches from within the pressurized compartments. The salvo time delay relays formerly located in the forward and aft bomb bays are included in the new salvo shields.

c. When the tank safety switches are in the "OFF" position, their respective tanks will not be salvoed even when the salvo switches are thrown. In order

to salvo any particular tank, its safety switch must be "ON" and one of the four salvo switches must be held closed for a period of four seconds.

CAUTION: BEFORE ENTERING THE BOMB BAY WHEN THE AIRPLANE IS ON THE GROUND, ALWAYS TURN SAFETY SHUT-OFF VALVES TO THE "SAFE" POSITION.

CHAPTER 6

SIGHTING TECHNIQUES

1. COMBAT SWITCHING.

a. If fighter aircraft are sighted before switching is started, the station sighting the aircraft will switch ON immediately and report the target position. The other stations will switch ON in the proper order continuing from the station sighting the aircraft.

b. If switching is completed before any aircraft are sighted, and if the Gunner is using his sight in searching, the ACTION SWITCH should be left OPENED.

2. 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 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 tracking, 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's hesitation.

(2) To frame and track accurately and smoothly, the Gunner must have his body in a comfortable position but 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.

3. FIRING IN COMBAT.

a. 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.

b. 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 3½ seconds.

c. Fire bursts as specified and avoid overheating the guns which caused cook-offs and burned out barrels.

d. Cool the guns at every opportunity. The best cooling positions are straight forward or straight aft in azimuth and approximately 30° in elevation. In cooling the guns, be sure they are pointing away from your own plane and all other planes in your formation.

NOTE: An automatic stowing circuit which is incorporated into all turrets except the tail mount returns the guns to their stowed position in elevation as soon as the action switch is released. In stowing a turret in its cooling position, the ACTION SWITCH must be kept closed until TURRET POWER is turned OFF.

4. FIRING ON TRAINING MISSIONS.

a. The gun switch will be turned to FIRE only at the Airplane Commander's command, "Commence Firing." The gun switch will be turned to SAFE immediately upon the command "Cease Firing."

b. All firing will be in bursts of twenty (20) rounds or less. The interval between each burst should be thirty (30) seconds. After ten (10) bursts have been fired, the guns will be cooled for a minimum of five (5) minutes before firing is resumed.

c. Whenever possible, position of the guns during cooling period will be either 0° or 180° azimuth and approximately 30° elevation.

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

5. SAFETY PRECAUTIONS.

a. Before transferring control of a turret to another gunner, ALWAYS notify him and receive an acknowledgment 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, otherwise the guns will continue to fire.

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 around every bomber in his formation and release his trigger 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 <u>let the enemy fighter go every time.</u>

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 for action when the "Runaway Gun" stops.

6. <u>EMERGENCY SIGHTING METHODS.</u>

a. If the computer is damaged, the sight can still be used as an accurate optic sight for using the Position Firing technique. These rules should be followed:

(1) Turn STANDBY switch on sight to STANDBY and COMPUTER switch OFF.

(2) Turn range wheel or grip until the reticle circle is as large as possible on pedestal sights: pull out the wheel to keep the setting.

(3) Obtain aircraft's True Air Speed from Navigator and set target dimension dial according to the proper chart printed on the following pages. The figures vary from station to allow for the difference in distance between the sighting stations and the turrets they control.

(4) Use the retiflector sight like an ordinary optic sight to apply the standard rules of position firing with one exception; for attacks at 90° allow 2½ rads deflection instead of 3 rads. This gives a more accurate deflection at the higher speeds.

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

(6) If the bomber is taking evasive action, lay off the deflection along an imaginary line between the fighter and the point on the horizon at the tail of your bomber.

(7) On the breakaway of an attack, if the fighter seems to hang motionless in the air, use this system:

(a) Top and Tail Gunner aim point blank.

(b) Nose and Blister Gunner aim ½ wingspan towards the nose of the bomber.

b. If both filaments of the reticle bulb burn out, and no spare is available, it will be necessary to use the emergency ring and post sight mounted

on the optic head. This sight is too small to use as a ring sight for laying off deflections in rads; it can be used only as a reference point to show where the guns are pointing.

TARGET DIMENSION DIAL SETTINGS FOR POSITION FIRING

Nose, Top and Tail Sighting Stations.		
	TAS *	TD *
	190	48
	200	51
	210	54
at 90° Use 2½ Rads.	220	57
	230	60
	240	63
	250	66
At 45° Use 2 Rads.	260	69
	270	72
	280	75
At 22½° Use 1 Rad.	290	78
	300	81
	310	84
	320	87
At 11¼° Use ½ Rad.	330	90
	340	93
	350	96
At 0° Use 0 Rad.	360	99
	370	102
	380	105
	390	108
	400	111
	410	114
	420	117
	430	120
	440	123
	450	126

*TAS - True Air Speed

*TD - Target Dimension

TARGET DIMENSION DIAL SETTINGS FOR POSITION FIRING

Blister Sighting Stations.		
	Tas*	TD*
	190	45
	200	48
	210	51
At 90° Use 2½ Rads.	220	54
	230	57
	240	60
At 45° Use 2 Rads.	250	63
	260	66
	270	69
	280	72
At 22½° Use 1 Rad.	290	75
	300	78
	310	81
At 11¼° Use ½ Rad.	320	84
	330	87
	340	90
	350	93
At 0° Use 0 Rad.	360	96
	370	99
	380	102
	390	105
	400	108
	410	111
	420	114
	430	117
	440	120
	450	123

*TAS - True Air Speed

*TD - Target Dimension

CHAPTER 7

GUN CAMERAS

SECTION I - GENERAL

1. All sighting stations on the B-29 are equipped with gun cameras. The use of a gun camera will permit the recording, photographically, of fighter attacks during combat or training missions, and will indicate your ability as a gunner. The camera is so connected with the sight that when the camera switch, on the Gun Camera Control Box is on, it will start taking pictures through the sight when you press the gun trigger. The sight action switch and the AC power switch must also be on, and in the ring position, the auxiliary power switch. The GSAP No type gun camera used on B-29s incorporates an automatic 2-second over-run control that operates to keep taking pictures for 2 seconds after the trigger is released. When the camera operates with a 2-second over-run, the 50-foot magazine contains not quite enough film to last through a mission during which all ammunition is expended from the turret. Therefore, don't waste film, and be sure your CAMERA SWITCH is OFF when firing test rounds.

SECTION II - PREFLIGHT CHECK OF CAMERA

1. VISUAL CHECK

a. Be sure the shutter speed knob and the index ring are set at 16 frames per second. DO NOT, under any circumstances, change the shutter speed while the camera is running.

b. Set the diaphragm ring for the weather you are likely to encounter as briefed by the gunnery officer. Under changing light conditions your diaphragm ring must be adjusted accordingly. Set it for Bright, Hazy, or Dull weather, as indicated by B, H, or D on the ring.

c. Check the cleanliness of the camera lens and filter. Remove dust with a camel's hair brush; clean the lens, if necessary, by breathing on it and wiping gently with lintless cloth or lens cleansing tissue. NEVER use water, cleaning fluid, or alcohol to clean the lens.

d. Check harmonization of the gun camera with a gun camera boresighting tool.

2. Operational Check - To check the operation of the camera, turn ON the Power-AC switch (STANDBY on the newer D1 and D2 systems), turn ON the turret action switch, (and the Auxiliary Power switch in the ring position), and turn ON the Gun Camera Junction box switch. The camera should operate when the gun trigger is pressed, and should continue to operate for the two-second overrun.

SECTION III - LOADING GUN CAMERA

1. Loading Film Magazines in the Fairchild A/N Gun Camera.

a. First release the magazine access cover by pressing the cover knobs forward. Then pull open the cover. Depress the magazine engaging gear lever and insert the magazine with its film aperature toward the camera which is mounted to the sight. Pull up the magazine engaging gear as far as you can. This engages the driving gear and the magazine gear. If the lever will not remain completely out, the gears are not properly engaged. To remedy this, apply light pressure to the lever and touch the trigger at the same time. This will engage the gears. Finally, push in the footage indicator knob on the camera body and turn until the reading on the dial corresponds to the number of feet of film in the magazine.

2. Loading Film Magazines in the Bell and Howell A/N Gun Camera.

a. First release the magazine access cover by pulling up on the spring latch of the cover, and pull

up the cover. Insert the magazine with the full aperature toward the camera lens and the footage indicator toward the side of the camera which is mounted to the sight. Close the access cover. Push in the footage indicator knob on the camera body and turn it until the reading on the dial corresponds to the number of feet of film in the magazine.

ARMAMENT AND ORDNANCE

SECTION I - MACHINE GUNS

1. GENERAL.

a. In all matters pertaining to gun maintenance; oiling, checking and adjusting headspace and oil buffer setting, the gunner should be guided by instructions from his armament department and TM 9-225, Browning Machine Gun Cal. .50 M-2 Aircraft Basic Cl, and VHB Gunnery Training Program, SAC Manual 50-126-8.

2. AMMUNITION.

a. 100 rounds of Linked Caliber .50 ammunition weigh approximately 30 pounds.

3. EMERGENCY HEADSPACE ADJUSTMENT.

a. In an emergency, headspace may be adjusted in this manner: With parts in BATTERY position, screw the barrel in as far as possible by using a strap wrench on the end of the barrel projecting from the barrel jacket. Reverse the strap wrench and back the barrel off THREE CLICKS.

4. GUN MOUNTS.

a. Each Caliber .50 machine gun on the B-29 has, as its front mount an E-10 Edgewater adapter, which is bolted to the saddle of the turret. The rear mount is an adjustable slide bolt on the rear trunnion.

5. 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 the 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.

REMOVE ONLY ONE RECEIVER FROM A TURRET AT A TIME AND RE-INSTALL THE RECEIVER REMOVED AND BORE SIGHT IT TO THE RECEIVER STILL IN THE TURRET. THEN YOU CAN REMOVE THE OTHER RECEIVER. THIS ELIMINATES THE NECESSITY FOR A COMPLETE RE-HARMONIZATION JOB WHEN RECEIVERS ARE REPLACED.

SECTION II - GUN CHARGER

1. GENERAL.

a. The gun chargers on the B-29 not only charge but also fire the guns. It is operated by compressed air.

b. The air compressor, which operates automatically, maintaining a pressure of 950-1100 PSI receives its power through the POWER-AUX (WARM-UP) switch.

c. The charger operates for approximately 4 seconds (7 to 12 charges) before the timing mechanism automatically cuts it off.

d. The guns can be hand-charged, using the charger, by inserting a screw driver into the "O" socket at the forward end of the chargers and pushing the handle gently toward the gun muzzle until the gun charges

e. 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.

2. TO TIME THE CHARGER.

a. WARNING: BE SURE THE GUNS ARE NOT LOADED.

b. Position the guns so they are not pointed at an exposed part of the airplane.

c. Cock the gun by placing a screw driver in the "C" socket and charge until the bolt moves to the rear.

d. Turn the sear pin adjuster as far clockwise as possible.

e. Insert the end marked "Fire .202" of the Timing Gauge Assembly.

f. Turn the sear pin adjuster counterclockwise a notch at a time.

g. After each notch of the sear pin adjustment, attempt to release the gun's firing pin by inserting a screw driver in the "F" socket of the charger. Fire the gun manually.

h. Continue to turn the sear pin adjuster one notch at a time and attempt to release the firing pin until it is released. A click will be heard when the firing pin is released.

i. Cock the gun again.

j. Close the action switch on the sighting station from which the turret is being operated.

k. Press the trigger on the sighting station. The firing solenoid should pick up and release the gun's firing pin.

l. If the firing pin is not released, advance the sear pin adjuster in a counterclockwise direction until energizing of the firing solenoid by pressing the trigger causes the firing pin to be released.

m. Insert the end marked "No fire .116" of the Timing Gauge Assembly.

n. Attempt to fire by pressing the trigger. The gun should NOT fire.

o. Insure that the spring loaded safety clip holds the adjustment of the sear pin adjuster.

3. RESETTING THE CHARGER.

a. 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.

4. SAFETY WIRING AND COTTER PINS.

a. The points to be checked at the turret for broken safety wire or cotter pins are:

(1) Safety wire both front gun mounts to each other.

(2) Safety wire all bolts holding the gun charger to the gun.

(3) Safety all ammunition guides with cotter pins.

(4) Safety both feed roller assemblies with cotter pins.

(5) Safety the belt holding pawl pin with a cotter pin.

(6) Safety the extractor switch with a cotter pin.

(7) Safety the breech lock cam with a cotter pin.

(8) Safety wire the azimuth-drive assembly.

(9) Safety wire the elevation-drive assembly.

(10) Safety the contour-follower gear with a cotter pin.

SECTION III - FIRE INTERRUPTERS

1. The fire interrupters on the turrets cut out the firing circuits when the guns are pointed at any part of the airplane: The tail, the wings, the propellers, etc. The interrupters on the lower turrets, however, do not protect the bomb bay doors when the doors are open.

SECTION IV - RETIFLECTOR GUN SIGHT

1. SIGHT LIMITS.

a. Nose Sight. The limits of the nose sight are: Elevation 80° up and 80° down. Azimuth 140° left and 185° right.

b. Blister Sight. The limits of the blister sight are: Elevation 60° up and 90° down. Azimuth 105° left and 105° right.

c. Tail Sight. The limits of the tail sight are: Elevation 60° up and 90° down. Azimuth 105° left and 105° right.

d. Ring Sight. The limits of the ring sight are: Elevation 5° below horizontal to plus 90°.

Azimuth 360°.

2. SIGHT FRICTION ADJUSTMENT.

a. Friction adjustments are provided on the sight in elevation and azimuth in order that each individual gunner may set in the proper amount of drag to suit his physical strength. Proper use of the friction adjustment will tend to permit smoother movement of the sight.

SECTION V - TURRET LIMITS

1. UPPER FORWARD TURRET

a. In azimuth - 360°.

b. In elevation - from 5° below horizontal to plus 90°, except on the contour follower, which raises the guns to 6° above horizontal when they are pointing straight aft. Contour follower action begins when the guns are 53° from straight aft.

2. LOWER FORWARD TURRET.

a. In azimuth - 360°.

b. In elevation - from 3½° above horizontal to minus 90°. The contour follower lowers the guns to 0° horizontal when they are pointing straight aft. Contour follower action begins when the guns are 28° from straight aft.

3. LOWER AFT TURRET.

a. In azimuth - 360°.

b. In elevation - from 5° above horizontal to minus 90°, except on the contour follower, which lowers the guns to minus 9° horizontal when they are pointing straight forward. Contour follower action begins when the guns are 65° from straight forward.

4. UPPER AFT TURRET.

a. In azimuth - 360°.

b. In elevation - from horizontal to plus 90°, except on the contour follower, which raises the guns to 11° above horizontal when they are pointing straight forward. Contour follower action begins when the guns are 57° from straight forward.

5. TAIL MOUNT.

a. In azimuth - 30° right or left.

b. In elevation - 30° up or down.

SECTION VI - COMPUTERS

1. GENERAL.

a. There are five computers in the RCT system, one for each sighting station. The computers for the nose and tail stations are single parallax, while those for both blister stations and the top station are a double parallax computers.

b. All of the computers, except the one for the nose station, are located under the floor just aft of the upper aft turret. The nose computer is just forward of the navigator's position.

c. The blister and top sighting station computers are equipped with limit switches which cut them out of the system when the guns reach approximately 83° elevation, up or down, depending on the turret.

2. COMPUTER VOLTAGE REGULATOR

a. To maintain the desired accuracy of computer correction, it is necessary to maintain the voltage of the DC power input constantly at 22.5 volts plus or minus .5 volts. This is done by the computer voltage regulator, located behind the left gunner.

3. DEFINITION OF A MIL.

a. A mil is the angle formed by two lines, starting at a common point, which are 1 foot apart at 1000 feet. There are approximately 17.8 mils in 1°.

4. DEFINITION OF "PUTT-PUTT ON THE LINE."

a. After the putt-putt is started, put the armature switch to "RUN" position; this is "PUTT-PUTT ON THE LINE."

5. DIRECT CURRENT AMPERAGE LOADS OF MAJOR UNITS OF RCT EQUIPMENT.

Turret Amplidynes	44 amps each
Tail Mount Amplidynes	88 amps each
Dynamotors	35 amps each
Turret Drive Motors	2.3 amps each
Tail Mount Drive Motors	3.63 amps each
Air Compressors	
GE	15 amps each
Cornelius	20 amps each
Tail booster motors	20 amps each

CHAPTER 9

MISCELLANEOUS - B-29 AIRCRAFT

SECTION I - FUEL AND OIL

1. B-29 APPROXIMATE MAXIMUM FUEL TANK CAPACITIES.

a. 1368 gals.
b. 1436 gals.
c. 1436 gals.
d. 1368 gals. Bomb bay tanks 640 gals. Mid-wing tanks 1315 gals. (Old plane midwing tanks 1125 gals.)

2. OIL TANK CAPACITIES.

a. All four oil tanks have 85 gallon capacities.

SECTION II - B- 29 ELECTRICAL SYSTEM

1. Electrical power is supplied by 6 engine-driven 28 volt, 300 ampere generators. There are 2 generators on each outboard engine, and one on each inboard engine. There is also a 24-volt, 200 ampere auxiliary generator and two 750 volt ampere inverters.

2. The engine-driven generators will cut in at 1100 RPM and reach maximum at 1375 RPM.

3. The auxiliary generator (putt-putt) is not supercharged; and, therefore, its voltage output will decrease at altitudes above 10,000 feet. At very high altitudes it will run only if the mixture is leaned out.

SECTION III - OXYGEN SYSTEM

1. GENERAL.

a. The B-29 Demand Oxygen System is supplied by eighteen C-1, low-pressure shatterproof, oxygen cylinders. The entire system is filled from a filler

valve, located on the outside of the fuselage just forward of the wing root of the left side.

b. Each of the fourteen oxygen stations is supplied from two distant distribution lines. Loss of one line or its associated cylinders still leaves each station with an alternate source of oxygen. The entire system is equalized by the use of crossfeeds controlled by automatic check valves. In the event of partial destruction of the system, all stations still functioning have equal access to the remaining oxygen supply.

c. When a crew member is suffering from lack of oxygen, open the emergency valve on his regulator, but leave the valve open only as long as necessary as it will empty the system quickly.

NOTE: Normally leave auto-mix ON to conserve oxygen supply.

d. Each sighting station includes the following oxygen equipment:

(1) Either demand or pressure regulator.
(2) Pressure gauge.
(3) Flow indicator.
(4) Pressure warning light. (Goes ON when pressure drops below 100 lbs.)

2. PORTABLE OXYGEN BOTTLES.

a. The portable oxygen bottles can be refilled from the main oxygen system.

b. A-4 bottles will last from 4 to 8 minutes; D-2 bottles, approximately 40 minutes, depending upon the activity of the user and the altitude.

c. These bottles are not equipped with automatic mix features and give only pure oxygen upon demand.

SECTION IV - ENGINE FIRES

Type of Smoke	Probable Cause
1. Thin black smoke from exhaust stacks.	1. Carburetor too rich
2. Puffs of black smoke from exhaust.	2. Engine detonating or firing.
3. Thin grey smoke coming from cowl flaps.	3. Exhaust stack or cylinder head failure.
4. Thin black smoke followed by large volume of white smoke from exhaust system.	4. Induction system fire that has ignited magnesium and aluminium engine parts.
5. Large volume of white smoke from cowl flaps.	5. Indicates induction system fire that has burned through intake pipes.
6. Smoke from intercooler flap.	6. Accessory section fire burned through intercooler.
7. Large volume of dense black smoke from any area aft of cowl flaps.	7. Oil fire in accessory section, probably due to broken line.
8. Black smoke with orange-yellow flame from any area aft of cowl flap.	8. Fuel fire in accessory section, probably due to broken line.
9. Trails of black smoke around cowl and intercooler flaps.	9. Engine may be throwing oil and oil gets hot enough to burn.

SECTION V - REFERENCES

More detailed information on the material contained in this manual can be found in the following publications; you are encouraged to refer to them:

Technical Manual 9-225, 15 Dec 43, Browning Machine Gun, Cal. 50 M2, Aircraft, Basic Cl.

Technical Order 01-20-EJ-2

Technical Order 01-20-EJA-1

Technical Order 11-1-28

Technical Order 11-70AA-29

Technical Order 11-70A-1

Technical Order 11-70A-29

Technical Order 11-70A-2

Technical Order 11-70A-16

AF Manual No. 91-126-1, May 44, Gunner's Information File Flexible Gunnery.

AF Manual No. 91-126-3, Aug 44, Gunnery in the B29.

AF Manual No. 91-126-4, Gunnery in the B-29, Tactical Use of Equipment, Jul 45.

SAC Manual No. 50-126-8, VHB Gunnery Training Program.

SAC Manual No. 50-126-9, Standard Procedure for A/N Gun Camera Flexible Gunnery Training.

CHAPTER 10

GUNNER'S QUESTIONNAIRE

SECTION I - GENERAL

1. Questions included in this manual cover some of the specific information with which every gunner should be thoroughly familiar. They are included here in order that each gunner may test himself on his knowledge of his duties, his equipment, and Standing Operating Procedures in general.

2. The answers to most of the questions can be found by referring to this manual. Every gunner should be able to answer the rest after his first flight in a B-29. It is recommended that technical publications be referred to on any matter not covered by this manual.

SECTION II - QUESTIONS

1. What are headspace tolerances for the Cal. .50 machine gun?

2. What are the tolerances for timing the Cal. .50 machine gun and charger?

3. How is timing checked and adjusted?

4. What determines the position of the bolt switch and the sear slide in the gun?

5. What should be checked in a preflight inspection of the air compressor?

6. What points, at the turret, should be checked for safety wiring and cotter pins?

7. Locate and give the purpose of the friction adjustments on the sight.

8. How are the sight gyroscopes checked in a preflight inspection?

9. Will the guns in a lower turret fire when they are stowed at their upper limits?

10. What do the fire interrupters protect? How are they checked?

11. What is the function of the contour follower?

12. What are the limits of movement of all turrets and sights?

13. Explain primary, secondary, and tertiary control of all turrets.

14. Why is it important to check ammunition before loading?

15. In loading ammunition into the cases of 2-gun turrets, which way should the projectiles point?

16. In loading ammunition in 4-gun turrets, which way should the projectiles point?

17. Which end of the ammunition belt is loaded into the case first?

18. What precautions must be observed in using the "P" socket on the charger?

19. At what approximate gun positions do the computers cut out? Why?

20. How should the sight and the camera lens be cleaned.

21. How is the film magazine loaded into the Bell and Howell gun camera?

22. Which control box switch is always turned on first? What position is this on the rotary type switches and what units does it energize?

23. What is the switching sequence and when does it begin.

24. What should the oxygen pressure be before take-off on a mission.

25. In what position should the oxygen regulator be for normal operation? Why?

26. How is the putt-putt started?

27. How is the putt-putt stopped?

28. What safety precautions must be taken when the bomb bay doors are opened on the ground?

29. On night flights, how should the gear and flap positions, and engine operations be checked?

30. In making the "in-the-air check" of the RCT equipment, in what order are the sighting stations turned ON?

31. When are guns stowed in other than normal stowing position? Explain procedure used.

32. How should the target dimension dial and rang wheel be set in the "in-the-air checks"?

33. What does white smoke from the engine exhaust system generally indicate?

34. How can fires in the induction system be identified?

35. How can a broken fuel line be identified?

36. If a gunner is using his sight in searching what precaution must be observed?

37. From what sources does the computer get the information it needs to function properly?

38. If a target's wingspan is known to be 35 feet and the Target Dimension Dial is set at 35", at what approximate range will it just fill the small reticle circle?

39. Why is it imperative that the gunner track and frame smoothly?

40. What is the best position of the guns for cooling?

41. What is the normal procedure for stowing a turret?

42. What safety precautions must be observed when control of a turret is transferred?

43. What is the procedure for clearing the guns in the lower turrets in the air?

44. If the power system fails, how can the lower turrets be stowed?

45. What is the normal stowing position of the turrets?

46. If the guns are loaded, how are the turrets stowed before landing?

47. If the gun receivers are to be removed from a turret, what procedure should be followed? Why?

48. For emergency operation of what units is the portable emergency flap motor used?

49. Where is the portable emergency flap motor normally stowed?

50. From what source does the portable emergency flap motor receive its power?

51. How is the portable emergency flap motor used in the emergency operation of the wing flaps?

52. Since limit switches have no effect in emergency operation of flaps and landing gear what precautions should be taken in operation of the portable emergency motor?

53. Is it possible to raise or lower the landing gear manually? Explain.

54. Where there is an auxiliary control of the putt-putt ignition at the flight engineer's panel, when is the ignition switch on the putt-putt itself used?

55. How can the bomb bay doors be opened from the rear pressurized compartment?

56. What is each gunner's position in a crash landing?

57. If time permits, what steps should be taken before a crash landing?

58. What is the signal to bail out?

59. What are the primary and secondary exits for all gunners?

60. Why shouldn't the top escape hatches be used in bailing out?

61. Explain briefly the complete ditching procedure, giving every gunner's position and duties.

62. What are the fuel and oil tank capacities?

63. How are the portable oxygen bottles refilled?

64. What are the main sources of electrical power on the aircraft?

65. What is the rated ampere output of each of these power sources?

66. What should be checked in a preflight inspection of the putt-putt?

67. What are the RCT equipment preflight duties of each gunner before <u>every</u> mission?

68. Locate all fuse panels and shields aft of station 646 (front pressure bulkhead of the rear

pressurized compartment).

69. At which panels or shields are interior lighting fuses located?

70. Where are the fire extinguishers located?

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