Appendix II

NIGHT FIGHTER EQUIPMENT

B-1. F4U-5N NIGHT FIGHTER.

B-2. DESCRIPTION. The F4U-5N airplane is a completely equipped single seat night fighter which can easily be distinguished from the F4U-5 day fighter by the radar nacelle on the right wing. This airplane incorporates the following systems and miscellaneous units which are not installed in the F4U-5 day fighter: (1) P-1 Auto Pilot, (2) AN/APS-19A Radar Set, (3) AN/ARC-28 Communication (VHF) Equipment, (4) AN/APX-6 IFF Equipment, (5) Windshield Degreaser, (6) MK 20 Gunsight, (7) T-20 Flash Hiders mounted on the gun muzzles, and (8) Exhaust Collector Flame Dampeners. The flash hiders and flame dampeners minimize at night the visible gun flash and exhaust flame. The throttle ranging grip used on the F4U-5 airplane is replaced by a conventional throttle grip and microphone switch.

B-3. FLIGHT CHARACTERISTICS. The F4U-5N airplane retains all of the excellent flight characteristics of the day fighter. The increase in weight caused by the night fighter equipment imposes but one minor limitation. The operating flight strength limitations of the F4U-5N airplane are similar to those shown in figure 2-6 with the major exception being a 7.0 g maximum limitation for operating altitudes of 10,000 feet or below.

B-3A. A-C POWER SUPPLY. A-C power is supplied by an inverter which generates three-phase 400-cycle 115-volt alternating current. On airplanes Bureau Serial No. 124519, 124551 and subsequent, a stand-by inverter and a "MAIN"—"STAND-BY" inverter control switch is installed. In case of failure of the main inverter, a warning light indicates that the pilot should switch to the stand-by inverter. This inverter supplies a-c power to the a-c instruments and lights only. All other a-c circuits will be inoperative.

B-3B. On airplanes Bureau Serial No. 124666 and subsequent the cockpit is rearranged as indicated in figure B-2A. The gun firing circuit breakers are now located in the main junction box and are the automatic reset type. A modified exterior lights control panel, cockpit flood light and individually controlled flight and engine instrument lights are installed. The rocket selector system is completely controlled by the MK-2 station selector, thus eliminating the "Pairs-Single" toggle switch. A G-2 master compass indicator and its components are installed on these airplanes. The master direction indicator dial consists of the following:

a. A calibrated dial to indicate the stabilized heading of the aircraft at all times.

b. A correspondence indicator to indicate the unstabilized heading of the aircraft.

c. A resetting knob for rapid initial setting of the gyro.

B-3C. To operate the G-2 master direction indicator, proceed as follows:

a. Start the gyro by setting the G-2 compass switch to "COMPASS CONTROL."

b. After 3 minutes, set the master direction indicator heading to agree with the correspondence-indicator heading.

c. Maintain course of airplane on desired dial heading.

d. If auto pilot is to be used, it may be turned on after 3 minutes.

B-4. P-1 AUTOMATIC PILOT.

B-5. DESCRIPTION. The P-1 automatic pilot is a system of automatic controls which hold the aircraft on any selected heading, bring it back without overswing when momentary displacements occur, and simultaneously keep the airplane stabilized in pitch and bank. While under automatic control, the aircraft can also be made to climb, dive, and execute perfectly banked turns. The automatic pilot is engaged and disengaged from the surface controls electrically, by means of a clutch switch. It can also be disconnected by a cable system in an emergency. When the auto pilot is engaged with the surface controls, it maintains the airplane in the same heading and flight attitude it was in prior to engagement. Changes in heading, and flight attitude can be made with the auto pilot by operating the controller unit. The auto pilot is controlled by a number of autosyn transmitters located in the compass, turn and bank, and gyro horizon indicators. As the indicators register changes in direction, pitch, bank, and turn, they simultaneously actuate the autosyns which send out signals to the system. These signals cause the auto pilot servo motors to move the control surfaces in a manner which will enable the airplane to regain its original heading, flight attitude, and flight track.

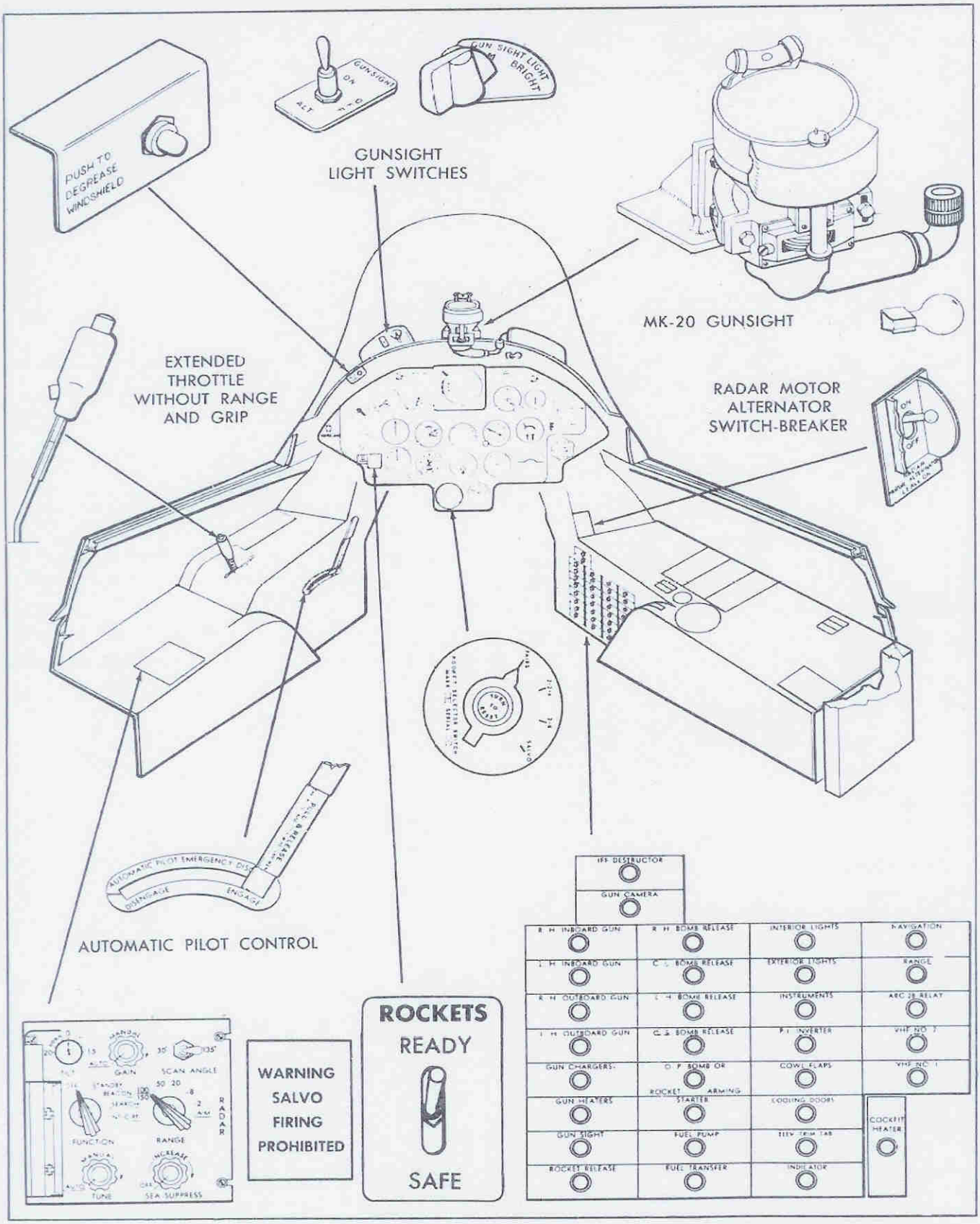


Figure B-2. Cockpit—Looking Forward (Airplanes Bureau Serial No. 121816 through 124560)

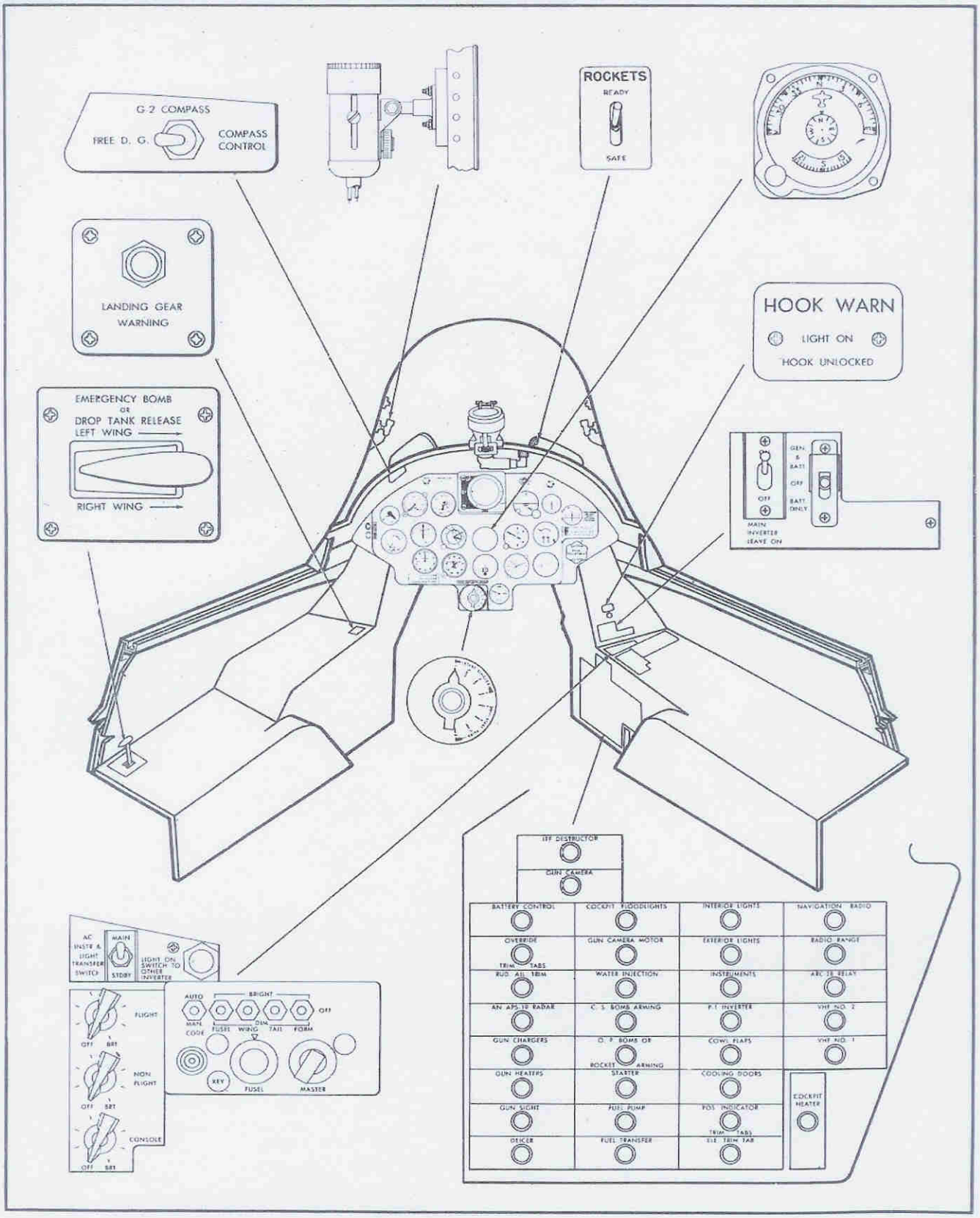


Figure B-2A. Cockpit—Looking Forward (Airplanes Bureau Serial No. 124666 and Subsequent)

Note

The G-2 compass switch has two positions, "COMPASS CONTROL" and "FREE DG." The compass control position provides control of the gyros in the system. The "FREE DG" position frees the gyros and should be used when flying over a magnetic field such as the north or south pole.

B–6. AUTO PILOT CONTROLS.

B–7. DESCRIPTION. *(See figure B–2.)* The auto pilot control switches with the exception of the caging knob are located on the right-hand control panel. They are as follows:

a. INVERTER CIRCUIT BREAKER. This switch is located on the circuit breaker panel and is normally closed. It completes the 28-volt d-c power circuit to the a-c inverter.

b. AUTO PILOT CIRCUIT BREAKER. This circuit breaker is located on the circuit breaker panel and is normally closed. It completes the 28-volt d-c power circuit to certain units in the auto pilot and gyro compass system. When "out" this switch breaks the holding circuit to the clutch switch preventing the clutch switch from being pushed "ON."

c. MAIN — STAND-BY INVERTER SWITCH. When the inverter warning light is on, switch to "STAND-BY." This switch should be in "MAIN" position for normal operation.

d. CAGING KNOB. The caging knob located on the gyro horizon indicator is used to cage this instrument before flight and prevents the automatic pilot clutch from being pushed "ON" when the gyros are caged. The cage knob also automatically cages the P-3 compass transmitter if it is not the self-erecting type.

e. AUTO PILOT POWER SWITCH. This is an ON-OFF switch which controls the 115-volt a-c current from the inverter to the auto pilot. It also controls the clutch switch holding circuit so that when it is "OFF" the clutch switch cannot be pushed "ON." Note that the power switch must be on 30 seconds prior to engaging the clutch switch to permit the auto pilot amplifiers to warm up. If the clutch switch is engaged immediately after power switch is placed in the "ON" position, controls will creep and control stick movement may be violent.

f. CLUTCH SWITCH. This is a push-button switch which, when depressed, closes its own holding circuit to keep it in the "ON" position. The clutch switch will "pop" out if the gyros are caged or if the power switch or auto pilot circuit breaker is "OFF." The clutch switch engages the auto pilot system to the controls.

Normally, the controls are neutralized prior to engaging the clutch switch.

g. CONTROLLER. The controller is employed to maneuver the airplane, change the heading (direction of flight), or fly in a set course other than a straight heading (circle) with the auto pilot. The controller consists essentially of a turn control, bank-trim control, and pitch-trim control. The turn control (knob on top of controller) operates all control surfaces to make a coordinated turn of the airplane with the auto pilot. The pitch-trim and bank-trim controls can be operated to adjust individually the position of the elevators and ailerons for climbing, diving, or banking. The controller is provided with three adjustments which must be made whenever a new controller is installed (see figure B-5). All three adjustment screws are trimmed so that the turn control will make a correctly coordinated turn. After a ground adjustment, further adjustments must be made while the airplane is in flight.

h. EMERGENCY DISCONNECT HANDLE. This handle is located on the vertical face of the engine control unit. It actuates a cable system which manually disengages the auto pilot from the control surfaces, should the auto pilot fail to do so normally.

Note

After the emergency disconnect handle has been pulled, the auto pilot cannot be re-engaged while in flight

B-8. OPERATION IN FLIGHT. To engage the auto pilot while in flight proceed as follows:

a. Check to see that inverter circuit breaker and auto pilot circuit breaker are "ON."

b. Turn auto pilot power switch "ON" and wait from 30 seconds to 1 minute for auto pilot system to warm up.

c. Set controller so that turn control, pitch-trim, and bank-trim controls are in neutral.

d. Set rudder and control stick for straight and level flight and on the heading desired.

e. Depress clutch button. Auto pilot is now engaged with surface controls. Any change now in heading flight track or altitude will be corrected by auto pilot.

CAUTION

Do not engage the auto pilot while in a turn, or in climbs, dives, or banks of more than 10 degrees because to do so may result in insufficient trim adjustment being available, at the controller, to return the airplane to level flight.

f. If desired to maneuver the airplane or to make coordinated turns with the auto pilot, operate the knobs on the controller.

WARNING

Do not attempt to adjust the trim tabs while the auto pilot is engaged. The auto pilot will merely correct for trim tab movement. If the trim tabs are adjusted while the auto pilot is engaged, the airplane flight attitude may change violently when the auto pilot is disengaged.

g. To disengage the auto pilot yet permit it to remain in operation, pull the clutch switch "OFF." To disengage the auto pilot and discontinue operation, throw the power switch "OFF" making certain that the clutch switch goes "OFF" automatically.

h. To disengage the auto pilot in an emergency, pull the emergency disconnect handle to the "DISENGAGE" position. Note that the auto pilot cannot now be re-engaged while in flight.

CAUTION

After any sudden change in load, disengage the auto pilot (using clutch switch), retrim the airplane while in manual flight, then re-engage the auto pilot. Generally, when flying on auto pilot it is well to retrim the airplane in manual flight every hour.

B-9. PREFLIGHT OPERATIONAL TEST. The auto pilot should be checked prior to flight as follows:

a. Connect an auxiliary power supply to the aircraft or have engines running at high enough rpm to insure 28-volt d-c generator output.

b. Make certain that P-1 inverter circuit breaker and auto pilot circuit breaker are "ON."

c. Turn caging knob on gyro horizon indicator to cage gyros. Leave in caged position until indicator dial rocks back and forth and moves within 30 degrees of airplane's heading.

d. Uncage gyros and jar instrument panel to make certain indicator gyro is uncaged. Allow compass dial to settle on correct heading. This will take as long as 15 minutes on an east or west heading, and approximately 5 minutes on a north or south heading if airplane is in a 3-point position.

e. Check freedom of all control surfaces.

f. Turn auto pilot power switch "ON." Wait for 30 seconds to 1 minute for servo amplifier to warm up.

g. Set controller so that turn control, pitch-trim, and bank-trim controls are in neutral.

h. Neutralize all control surfaces with control stick. Surface controls and auto pilot are now aligned for engagement.

AUTO PILOT CONTROLLER OPERATING POSITIONS

CONTROL BEING OPERATED	TURNING DIRECTION OF CONTROL	CORRECT MOVEMENT OF SURFACE CONTROLS
TURN CONTROL (knob on top of controller)	To Right	Right Aileron — "UP" Rudder — "RIGHT" Elevators — "UP"
	To Left	Left Aileron — "UP" Rudder — "LEFT" Elevators — "UP"
PITCH-TRIM CONTROL (small wheel, right-hand side of controller)	To Left Toward "UP"	Elevators — "UP"
BANK-TRIM CONTROL (large wheel under knob)	To Left	Left Aileron — "UP"

i. Depress clutch button. Auto pilot should now be engaged with controls. To check, overpower auto pilot by manually operating control stick and rudder pedals. Auto pilot should cause definite drag, particularly strong on rudder pedals. If any control drags, then lets go, then drags, etc., it is an indication that a servo disconnect is not properly engaged.

j. Pull clutch switch "OFF." All controls should go free. Make certain all controls are free by moving control stick and rudder pedals around.

k. Return controls to neutral, and depress clutch switch again. Make certain again that auto pilot is engaged by checking for drag. Check for disengagement of auto pilot from controls when caging knob is turned to "CAGE," when power switch is turned "OFF" and when auto pilot circuit breaker is pulled "OFF." Repeat the same procedure used for the clutch switch. Clutch switch should also "pop" out when any of the three switches above are positioned as directed.

l. With the auto pilot re-engaged to the neutralized controls after the check above, operate controller as shown in table above.

Note

After checking each control on the controller, return it to neutral before checking the next control. The control surfaces should move proportionately with the movement of the controls on the controller.

m. If desired, the emergency operation may be checked by overpowering auto pilot for drag and at the same time pulling the emergency disconnect handle to "DISENGAGE." All controls should go free. Note that auto pilot servos must be manually reset after this operation.

B–10. TABLE OF ELECTRONIC EQUIPMENT.

TYPE	*DESIGNATION*	*USE*	*RANGE*	*ILLUSTRATION OF CONTROLS*	*REMARKS*
1. Radar	AN/APS-19 or AN/APS-19A			Fig. B-2. Fig. B-4.	Allow three minutes for set to become operative.
a. Beacon		Navigation.	150 miles.		
b. Search		Detection and location of targets.	100 miles.		
c. Intercept		Detection of air-borne targets.	20 miles		
d. Aim		Aim fixed guns.	1500 yds. (.85 miles)		
2. IFF	AN/APX-6	Identification; distress.	Line of sight.	Fig. B-3.	Check for proper mode setting.
3. VHF	AN/ARC-28	Relay for two-way radio communication; local two-way operation.	Line of sight.	Fig. B-3.	Allow 30 seconds for set to become operative.
4. Navigation Equipment	AN/ARR-2A	Navigation receiver.		Fig. 4-6.	Frequency range 234 to 258 megacycles
5. Range Receiver	AN/ARC-5	Low-frequency range reception.		Fig. 4-6.	Frequency range 190 to 550 kilocycles.
6. Radio Altimeter	AN/APN-1	Measure absolute altitude over terrain.	Low: 0-400 ft. High: 400-4000 ft.	Fig. 1-6. Fig. 1-7.	High range cannot be used below 400 feet.

B-11. AN/APS-19 RADAR SET.

B-12. DESCRIPTION. *(See figure B-2.)* F4U-5N aircraft Bureau Serial No. 121816 through 122206 are equipped with AN/APS-19 radar equipment; F4U-5N aircraft Bureau Serial No. 123144 and subsequent are equipped with AN/APS-19A radar equipment. The AN/APS-19A radar indicator is equipped with adjustments which were not included on the AN/APS-19 set. These adjustments allow the pilot to alter the focus and brilliance of the radar scope and the brilliance of the radio altimeter limit light on the radar scope bezel by turning the three knobs located on the radar scope bezel. The radar equipment is employed for search, intercept, aim, and beacon purposes. Search operation is used when the pilot wishes to detect targets on the earth's surface. The targets may be water-borne or located on the ground, and may be as far away as 100 miles. Intercept operation is used to look for airborne targets. The equipment should enable the pilot to detect other aircraft at distance up to 20 nautical miles. Aim operation is used when the pilot wishes to shoot down a target. Fifteen hundred yards is the maximum range of effectiveness for aim operation. Beacon operation is for homing navigation and can be used on ranges up to 150 nautical miles. Power for the radar system is supplied by a motor generator. (Refer to paragraph B-3A for complete a-c power information.) A pilot's control unit is located on the left control panel. Before operation of the control unit is effective, the motor generator power switch and the radar circuit breaker must be "ON." The motor generator switch is located on the inclined section of the right-hand control panel. The radar circuit breaker is located on the horizontal face of the right control panel. The control unit is provided with a hinged cover which may be placed over the TILT, FUNCTION and TUNE controls during aim operation. A detachable hood for the radar scope is stowed around the control stick when not in use. The switches on the pilot's control unit are as follows:

a. FUNCTION. This switch turns the radar equipment on and off and selects for "BEACON," "SEARCH," or "INT'C'PT" operation. If the pilot desires temporarily to discontinue operation, turn to "STANDBY" until another tactical operation is wanted.

b. TUNE. When this control is in the extreme clockwise "AUTO" position the AFC (automatic frequency control) is in operation and will maintain maximum echoes automatically. If the AFC becomes inoperative, turn this control to "MANUAL" and tune the receiver until maximum echoes are seen.

c. GAIN. This control regulates the strength of the signals coming from the receiver and the amount of "snow" that is applied to the indicator screen. Manipulation of the GAIN control is seldom necessary if it is left in the "AUTO" position. At short ranges from surface and beacon targets, use of the "MANUAL" position will allow finer azimuth bearing readings. In manual operation gain is low if signals disappear, high if "snow" tends to blot out signals.

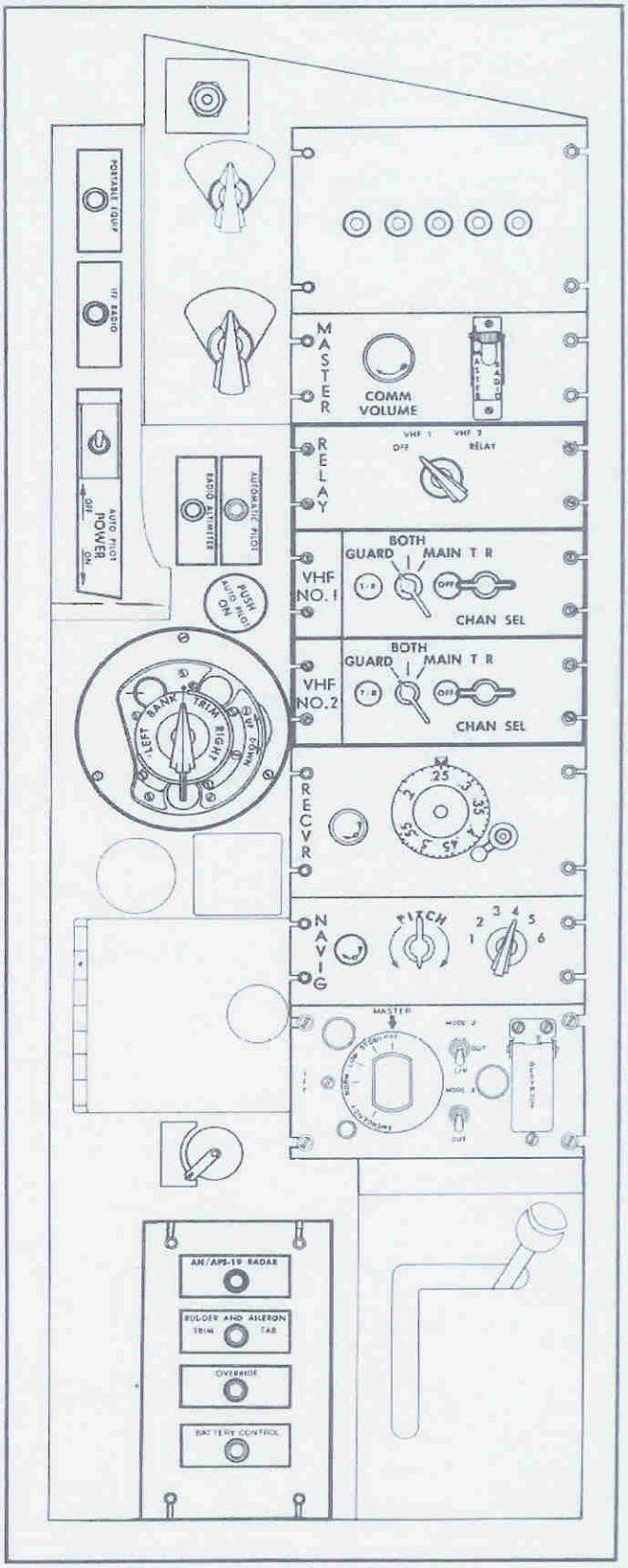


Figure B-3. Right-Hand Console

d. TILT. There is a screwdriver adjustment for changing the antenna tilt vertically. This adjustment must be made by qualified personnel only.

e. SCAN ANGLE. This controls the selection of the wide or narrow scan angle and has two positions: "30°" and "130°" for AN/APS-19 equipment and "30°" and "135°" for AN/APS-19A equipment.

f. RANGE. This switch sets the range within which the operation takes place. The ranges "100," "50," "20," "8," and "2" can be used on "SEARCH" and "INT'C'PT" FUNCTION control. Range "150" can be used on "BEACON" only, and "AIM" (1500 yds.) can be used on "INT'C'PT" only. A mechanical interlock prevents positioning of the RANGE switch on "AIM" whenever the FUNCTION control is not on "INT'C'PT."

g. SEA SUPPRESS. This control enables the operator to suppress signals received, particularly heavy sea return. Turning the control clockwise suppresses the returning signals. It is only usable on intercept, that is, when the scanner is in spiral operation.

B–13. SEARCH AND BEACON OPERATION. To operate the radar system, the radar motor generator switch (paragraph B–3A) and the radar circuit breaker must be "ON." Prior to operating the radar system the control switches must be in the following position: FUNCTION-"OFF," TUNE-"AUTO," GAIN-"AUTO," SCAN ANGLE-"130°" for AN/APS-19 equipment and "135°" for AN/APS-19A equipment, RANGE-"100," SEA SUPPRESS-"OFF." As "SEARCH" and "BEACON" operations are similar, they are both given in one procedure as follows:

a. Turn the function selector to "SEARCH" (or "BEACON"). Wait for three minutes for equipment to warm up.

b. SCAN ANGLE switch should be at "130°" for AN/APS-19 equipment and "135°" for AN/APS-19A equipment. When target is within the 30-degree sector, turn switch to "30°."

c. When a target echo appears on the screen, switch the RANGE control to the lowest one that will accommodate the signal. The sequence of operating ranges permits switching to lower ranges, as the airplane approaches closer to the target. On "SEARCH" the operating range sequence is "100," "50," "20," "8," and "2," for "BEACON" operation, RANGE switch can be positioned on "150."

d. Bring the target echo into zero azimuth as soon as possible.

e. Switch the SCAN ANGLE to "30°" if narrow beam is desired.

f. If the echo indication seems erratic, the TUNE will have to be a "MANUAL" adjustment. Observe echoes in "AUTO" position. Then tune for maximum echoes using the TUNE control manually. The signals in both cases should be of equal intensity.

g. If the "snow" indication is not satisfactory, or if target is lost in sea return, "MANUAL" operation of the GAIN control is necessary. Slowly turn the GAIN knob until "snow" begins to appear on the screen. Switch to "AUTO." Approximately the same intensity pattern should be obtained.

Note

Strong beacon signals may require manual reduction of the GAIN to prevent saturation with a resultant distortion of the echo on the scope.

h. When "SEARCH" operation is completed, turn all controls back to their original position unless further operations are to be made. In that case, switch the FUNCTION control to the next operation desired or to "STANDBY."

B–14. INTERCEPT AND AIM OPERATION. To operate the radar controls for intercept and aim see first part of paragraph above and then proceed as follows:

a. Turn the function selector to "INT'C'PT." After three minutes the equipment is ready for operation.

Note

If FUNCTION control was previously on "STAND-BY," equipment is ready for operation immediately after switching FUNCTION control to "INT'C'PT."

b. Turn the range selector to "20."

c. SCAN ANGLE switch should be at "130°" for AN/APS-19 equipment and "135°" for AN/APS-19A equipment when target is about two-thirds of a mile distant.

d. When an aircraft target echo appears on the screen, switch the RANGE control to the lowest one that will accommodate the signal. The reference of operating ranges permits switching to lower ranges as the airplane approaches closer to the target. On "INT'C'PT" the operating range sequence is "20," "8," and "2."

e. Bring the target echo into "dead ahead" position as soon as possible. The midpoint of the two images should center on zero azimuth, and the two dots should be aligned horizontally.

f. Continue "INT'C'PT" operation to within two-thirds of a mile from the target, which is about one-third the distance up from the scope's lower edge on the two-mile RANGE.

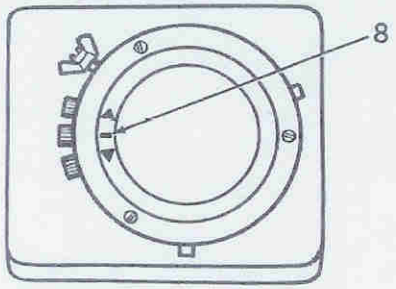
g. Switch the RANGE selector to "AIM" when the target is about two-thirds of a mile distant.

h. Continue approaching target on a collision course until the horizontal trace is halfway from the scope screen. If the horizontal trace does not cover the width of the screen the target is not dead ahead.

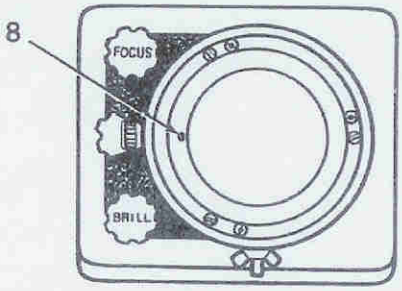
i. When the mission has been completed, turn all controls back to their original positions unless further operations are to be made. In that case, switch the FUNCTION selector to the next operation desired or to "STANDBY."

Note

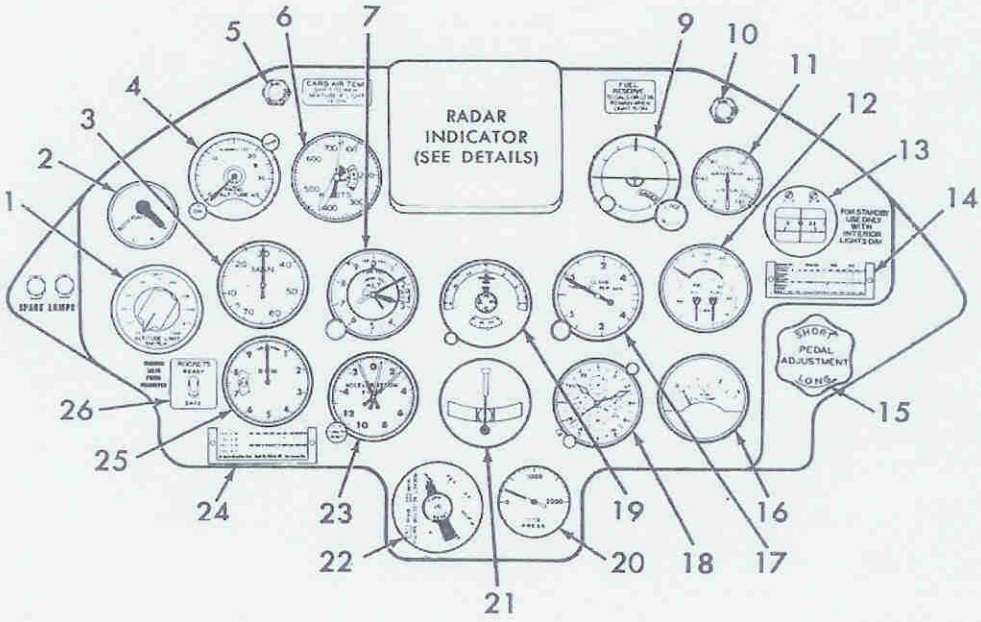
If the sea return becomes troublesome, rotate the SEA SUPPRESS control slowly clockwise until sea return does not interfere with the intelligibility of the target echoes. The SEA SUPPRESS can be used only when functioning on "INT'C'PT." For GAIN control or TUNE adjustments, refer to paragraph B-12.



ID-158/APS-19 RADAR INDICATOR
(used on airplanes Bureau
Serial No. 121816 through 122206)



ID-158A/APS-19 RADAR INDICATOR
(used on airplanes Bureau
Serial No. 122207 and Subsequent)



1. Radio Altitude Limit Switch
2. Ignition Switch
3. Manifold Pressure Gage
4. Radio Altitude Indicator
5. Carburetor Air Temperature Warning Light
6. Airspeed Indicator
7. Altimeter
8. Altitude Low Limit Indicator Light
9. Gyro Horizon Indicator (Vertical Gyro Control)
10. Fuel Reserve Warning Light
11. Fuel Quantity Indicator
12. Engine Gage Unit (Fuel Pressure, Oil Pressure, and Oil Temperature)
13. Stand-by Compass
14. Stand-by Compass Card Holder
15. Rudder Pedal Adjustment Knob
16. Engine Cylinder Temperature Indicator
17. Vertical Speed Indicator
18. Elapsed Time Clock
19. Master Direction Indicator
20. Hydraulic Pressure Gage
21. Turn and Bank Indicator
22. Rocket Selector Switch
23. Accelerometer
24. Airspeed Indicator Card Holder
25. Tachometer
26. Rocket Ready-Safe Switch

Figure B-4. Instrument Panel—F4U-5N Airplane

B-15. PREFLIGHT CHECK. The preflight check must be made with the engine running above generator cut-out speed. Prior to checking the radar set the control switches must be in the following positions: FUNCTION—"OFF," TUNE—"AUTO," GAIN—"AUTO," SCAN ANGLE — "130°" for AN/APS-19 equipment and "135°" for AN/APS-19A equipment, RANGE — "2," SEA SUPPRESS—"OFF." Turn a-c power switch (paragraph B-3A) on and proceed as follows:

a. Turn the FUNCTION selector to "SEARCH." Wait 3 minutes before proceeding since a delay of 3 minutes is required by a time delay relay.

b. Note the appearance of the base and sweep lines. Clear lines indicate proper focus.

c. Check the alignment and the centering of the representation on the indicator.

d. A little "snow" indicates proper brilliance.

e. If the echo images disappear or appear erratic, AFC is not functioning properly and "MANUAL" operation of TUNE is necessary. This control is very sensitive and adjustments must be made carefully.

f. Turn the RANGE knob counterclockwise to increase the range. New images should appear and the old ones should lower on the screen. At sea it is possible that as the range is increased no new images will appear.

g. Vary the angle of tilt and note fading and reappearance of echoes.

h. Check other FUNCTION settings. Do not turn to "OFF" since the radar set will be inoperative for three minutes.

i. Change the SCAN ANGLE to "30°." The sweep should be more rapid.

B-16. AN/APX-6 IFF EQUIPMENT.

B-17. PURPOSE. The Radar Identification Set AN/APX-6 is an airborne transpondor and is one of several equipments which may be operated together to provide a system of electronic identification and recognition. The purposes of the AN/APX-6 are:

a. To identify the airplane in which it is installed as friendly when correctly challenged by an interrogator-responsor associated with friendly shore, shipboard, and airborne radars.

b. To permit surface tracking and control of aircraft in which it is installed.

Functionally, the AN/APX-6 receives challenges which are initiated by an interrogator-responsor, and transmits replies back to the interrogator-responsor where the replies are displayed, along with the associated radar targets, on the radar indicators. When a radar target is accompanied by a proper IFF reply, as transmitted by the AN/APX-6, that target is considered friendly.

B-18. Before operation of the C-544/APX-6 control unit is effective the a-c power (paragraph B-3A) must be on.

B-19. OPERATION. All controls required for operation of the AN/APX-6 equipment are located on Radar Set Control C-544/APX-6. This unit is located at the aft end of the right-hand control shelf (figure B-3). Operation is as follows:

a. To turn equipment on, rotate MASTER selector to "NORM."

b. To indicate emergency or distress, press red dial stop (figure B-3) and rotate MASTER selector to "EMERGENCY."

c. To maintain the equipment ready for instant use but inoperative, rotate the MASTER selector to "STDBY."

d. The detent position labeled "LOW" on the MASTER selector should not be used except upon proper authorization.

e. The switches labeled "MODE 2" and "MODE 3" should be set to their "OUT" positions unless otherwise directed by proper authority.

f. To explode destructors within the equipment, raise the switch guard labeled "DESTRUCT" and raise the switch handle to the "ON" position.

WARNING

Do not fire destructors unless the AN/APX-6 is in danger of falling into enemy hands. When in doubt about the security of the area you are *forced* to land in, fire the destructors.

WARNING

Destructors will be fired if the DESTRUCT switch is turned on or if the impact switch is tripped regardless of the setting of the MASTER selector.

g. To secure the equipment, rotate the MASTER selector to "OFF."

h. If destructors were fired during the flight, notify your Commanding Officer.

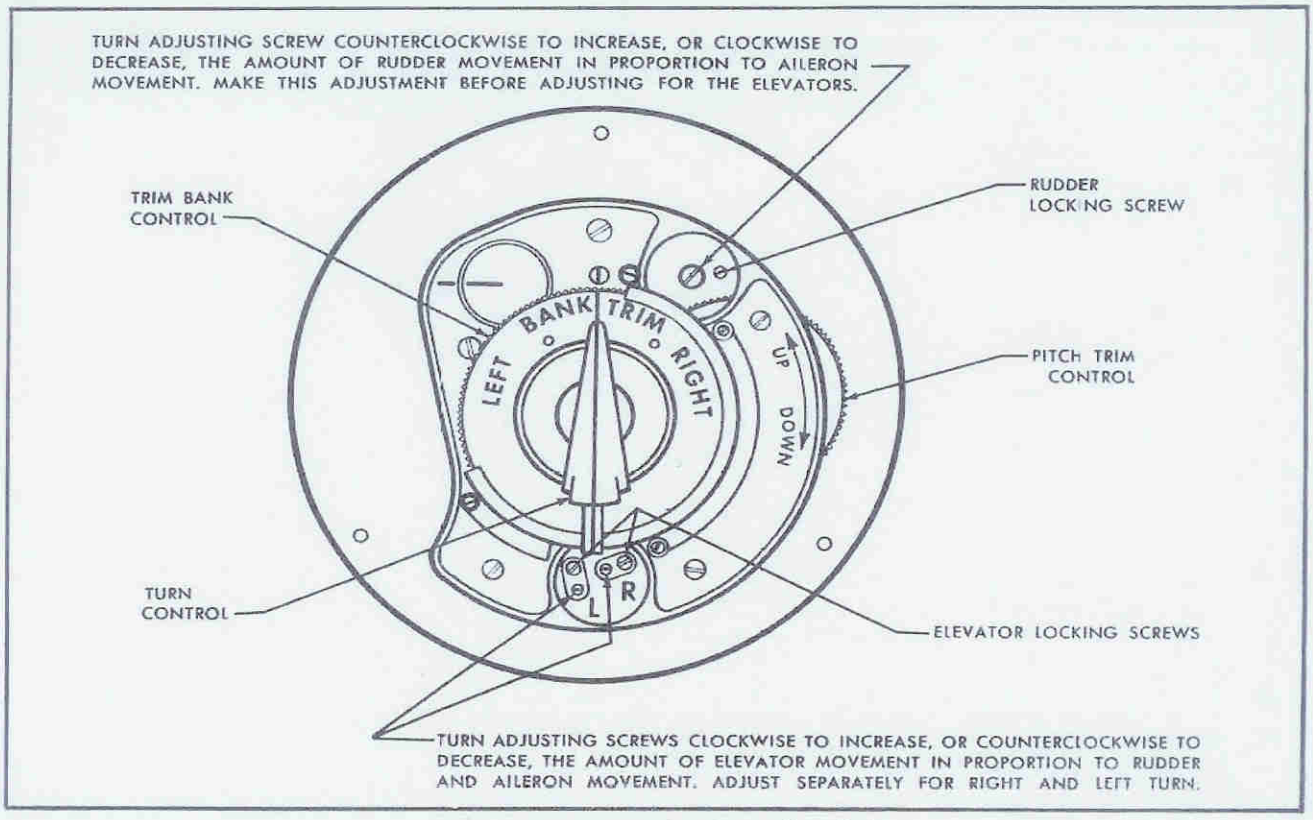


Figure B-5. Auto Pilot Controller Unit

B–20. AN/APN-1 RADIO ALTIMETER.

B–21. DESCRIPTION. The AN/APN-1 radio altimeter installation in the F4U-5N differs from that in the F4U-5 day fighter (refer to paragraph 4–41A) only in the location of the indicator, limit switch, and limit indicator light, as shown in figure B–4.

B–22. DELETED.

B–23. AN/ARC-28 COMMUNICATION (VHF).

B–24. DESCRIPTION. *(See figure B-3.)* The AN/ARC-28 communication equipment enables the airplane to serve as a relay point for extending the range of two-way VHF radio communication with modulated signals, as, for example, between a ground station or ship and a second aircraft in flight. By this method the equipment is capable of extending consistent VHF communication beyond the ordinary horizon limitation. The AN/ARC-28 equipment is made up of two Radio Transmitter-Receivers (RT-18/ARC-1) interconnected by a relay unit and three pilot control units located on the right-hand control panel and designated as: (1) RELAY, (2) VHF NO. 1, (3) VHF NO. 2. There are no individual transmitting-receiving facilities while the system is in "RELAY" operation. When not in "RELAY" operation, the pilot may select either the VHF NO. 1 or VHF NO. 2 transmitter-receiver for operation. Three protective circuit-breakers for the communication system are located on the circuit breaker panel. They are designated as "ARC-28 RELAY," "VHF NO. 1," and "VHF NO. 2." Power for the communication equipment is supplied when the three circuit breakers, the battery switch and the MASTER panel master radio switch are "ON." Reception volume is controlled by the "COM VOLUME" control also located on the MASTER panel. The engine must be running above generator cut-out speed to avoid draining the battery. The headphone and microphone extension is plugged into the radio jack plug. On airplanes Bureau Serial No. 121793 through 124480, the radio jack plug is located on the bulkhead aft of the pilot's right shoulder. On airplanes Bureau Serial No. 124481 and subsequent, the junction box and radio jack plug are located on the aft portion of the right-hand side panel. A microphone button is provided on the throttle for use with the microphone when transmitting.

B–25. AUTOMATIC RELAY OPERATION. For automatic relay operation, see figure B–3 and proceed as follows:

CAUTION

Each time the equipment is turned on, allow at least 30 seconds for the vacuum tubes to reach operating temperature before using the equipment for relay operation or before operating throttle switch if local control is desired.

a. Power control switch and master radio switch must be on. The ARC-28 RELAY, VHF NO. 1, and VHF NO. 2 circuit breakers must also be "ON." The engine must be running above generator cut-out speed or an external power source must be used when on the ground.

b. Rotate the RELAY control unit knob from "OFF" to "RELAY" position.

c. Rotate the channel selector switches on the VHF NO. 1 and VHF NO. 2 control units to the two frequency channels designated for relay operation, giving the desired frequency combination. The equipment will be ready for automatic relay operation as soon as the vacuum tubes reach operating temperature.

d. To change the frequency combination of the system, rotate the channel selector switches on the VHF NO. 1 and VHF NO. 2 control units.

e. Monitoring will give an indication to the operator that the equipment is operating properly.

B–26. LOCAL TRANSMITTER-RECEIVER OPERATION. To operate either the VHF NO. 1 or VHF NO. 2 transmitter-receiver individually, see figure B–3 and proceed as follows:

a. Power control switch and master radio switch must be on. The ARC-28 RELAY, VHF NO. 1 and VHF NO. 2 circuit breakers must also be "ON." The engine must be running above generator cut-out speed or an external power source must be used when on the ground.

b. Rotate the RELAY control unit knob to the "VHF 1" or "VHF 2" position, depending upon which transmitter-receiver is to be used.

CAUTION

Whenever switching from "OFF" to "VHF 1" or "VHF 2," or from "VHF 1" to "VHF 2" ("VHF 2" to "VHF 1") or "VHF 1" or "VHF 2" to "RELAY," allow 30 seconds for warm-up of transmitter-receiver before operation.

c. For further operational procedures using either the VHF NO. 1 or VHF NO. 2 transmitter-receiver see paragraphs 4–30 to 4–40.

B–27. PREFLIGHT CHECK. Engine must be running above generator cut-out speed. Turn the ARC-28 RELAY, VHF NO. 1, and VHF NO. 2 circuit breakers, the battery switch and the master radio switch "ON." Proceed as follows:

a. Rotate the RELAY control unit knob to "VHF 1" and check transmitting and receiving with ship or ground station or another airplane.

CAUTION

Each time the equipment is turned "on" allow at least 30 seconds for warm-up of vacuum tubes before using the equipment. When change of RELAY control is made allow 30 seconds before operation.

b. Switch to "VHF 2" and check transmitting and receiving.

c. Rotate RELAY control unit knob to "RELAY" and rotate channel selector switches on VHF NO. 1 and VHF NO. 2 control units to the two frequency channels designated for relay operation, giving the desired frequency combination.

d. Monitoring will indicate proper operation of equipment.

B–28. EMERGENCY OPERATING PROCEDURE.

B–28A. AUTOMATIC PILOT EMERGENCY DISCONNECT.

B–28B. To disconnect the automatic pilot mechanically, move the emergency disconnect handle to the aft position. The automatic pilot cannot be re-engaged while in flight.

B–28C. A-C POWER FAILURE.

B–28D. If the main inverter warning light indicates a-c power failure, move the "MAIN–STAND-BY" inverter switch to "STAND-BY" position. The automatic pilot, the IFF radar, and the AN/APS-19(A) radar are inoperative on stand-by inverter.

B–29. MANUAL RADAR CONTROLS.

B–30. Should the echo indication appear erratic, AFC is malfunctioning and careful "MANUAL" adjustment of the TUNE control is necessary for maximum echoes. Unsatisfactory "snow" indication necessitates "MANUAL" operation of the GAIN control. Slowly turn the GAIN knob until a little "snow" appears, then switch to "AUTO." If the sea return is troublesome, rotate the SEA SUPPRESS slowly clockwise until the sea return does not interfere with the intelligibility of the target echoes. SEA SUPPRESS can only be used on "INT'C'PT."

B–31. IFF DESTRUCTOR.

B–32. In the event that the airplane may fall into enemy hands the IFF equipment must be destroyed. The destruction of the RT-24/APX-6 receiver-transmitter is accomplished by raising the guard latch on the IFF control panel and tripping the toggle switch "on."

B–33. IFF EMERGENCY SIGNAL.

B–34. Wide distress responses can be transmitted by pressing the dial stop on the IFF control panel and rotating the master control panel switch to the "EMERGENCY" position.

Note

Should any piece of electronic equipment fail to operate (other than the difficulties discussed in paragraph B–30), turn that piece of equipment "off."

B–35. MK 20 GUNSIGHT AND CONTROLS.

B–36. DESCRIPTION. *(See figure B–2.)* The MK 20 gunsight is supported on a mount which is centrally located on the instrument cowl. The gunsight consists essentially of a rotatable reticle disc incorporating three reticle patterns, a reticle selector knob, a series of lenses and a quick-disconnect reticle lamp housing. A spare lamp is stowed on a clip to the right of the gunsight. The quick-disconnect lamp housing facilitates replacement of the double filament gunsight lamp while in flight. To replace the lamp it is only necessary to rotate the housing aft, out of the support clip, and then depress the snap fasteners which lock the housing to the gunsight. The lamp which is mounted in the housing can now be easily removed and replaced with the spare. The reticle selector knob on the gunsight permits the pilot to select one of the three reticle images, each of a different pattern.

B–37. OPERATION. *(See figure B-2.)* The gunsight is controlled primarily by the "ON-OFF" master armament switch in the gunnery switch box. The gunsight switches are also located in the gunnery switch box. They are the "ON"-"OFF"-"ALT" switch and the gunsight "DIMMER" rheostat. A gunsight circuit breaker is located on the circuit breaker panel. When the "ON"-"OFF"-"ALT" switch is "ON" it completes the circuit to one of the two filaments in the gunsight lamp. If this filament burns out the switch may be turned to "ALT" to complete the circuit to the alternate filament. The "DIMMER" is a rheostat which may be adjusted to vary the light intensity of the reticle image.

B–38. GUN CAMERA LIGHTS AND REFLECTORS.

B–39. DESCRIPTION. *(See figure B-1.)* The gun camera lights and reflector installation consists of three trihedral prism retro-reflectors and gun lights mounted around the gun camera opening. The purpose of the equipment is to indicate on the gun camera film the pilot's aim after he has made a firing run (training) on the tail of another airplane at night. The lights around the gun camera of the attacking airplane cause the reflectors on the airplane being attached to reflect back this same light onto the gun camera film in the attacking airplane. The firing run is recorded photographically by the simultaneous operation of the lights and the gun camera when the trigger switch is depressed. Note that there is no special switch for the lights, as they operate whenever the gun camera operates. The pilot should endeavor to simulate operation of the camera and lights with that of normal gunfire time. Between each intercept camera they should be operated momentarily to separate the film records of each firing run.

Note

F4U-5N aircraft Bureau Nos. 124471 and subsequent are not equipped with gun camera lights and trihedral prism retro-reflectors.

B–40. WINDSHIELD DEGREASING.

B–41. DESCRIPTION. *(See figure B-1.)* The windshield degreaser system is employed to clean the outside surfaces of the bullet-resistant center windshield and left-hand side windshield at night. The degreaser system is electrically operated by a push-button switch on the left-hand side of the instrument cowl. Note that the portable equipment circuit breaker must be closed for the degreaser switch to operate. Use fluid sparingly since the reservoir contains but 0.9 gallons of fluid.

B–42. FLAME DAMPENERS AND T-20 FLASH HIDERS.

B–43. DESCRIPTION. *(See figure B-1.)* The F4U-5N airplane is equipped with six flame dampeners clamped on the engine exhaust collectors. Their purpose is to minimize the visible exhaust flames at night. Each assembly consists of a flame dampener which dissipates the flame before it reaches the outer air, and a shield which hides the flame dampener. The shield is necessary since the dampener becomes cherry red due to heat induction. Four T-20 flash hiders are attached to the muzzle end of the guns to minimize the visible gun-flash when the guns are fired at night.

CAUTION

Flash hiders and flame dampeners must be installed for all night missions.