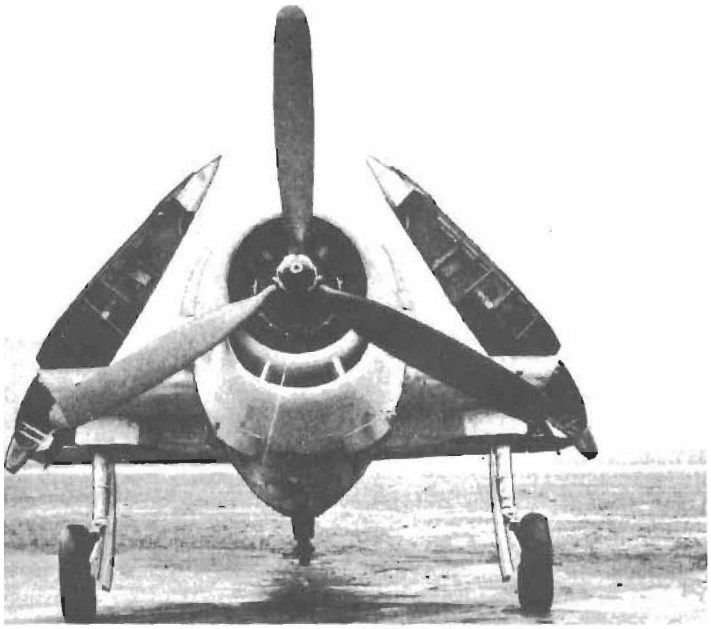


Fig. 3 – Airplane with wings folded.

Description

1. Airplane

a. GENERAL.-The airplane is a Class VF single engine, single place, folding low wing fighter designed to take off from the deck of an aircraft carrier and land either in an arresting gear or on land. It is equipped for catapulting from a carrier deck.

b. DIMENSIONS.-The over-all dimensions of the airplane are as follows:

Length	33	ft.	10	in.
Height (propeller in 3 pt. position)	14	ft.	5	in.
Span (wings - spread)	42	ft.	10	in.
Span' (wings - folded)	16	ft.	2	in.

2. Power

PLANT

The engine is a Pratt & Whitney Twin Row Model R-2BOO-I0, 18 cylinder, two stage radial, geared 2:1. Take-off rating, 2000 BHP at 2700 RPM at sea level. Recommended grade of oil varies with prevailing temperature. Follow latest service instructions and applicable technical orders.

Fuel - Grade 100/130 AN-F-2B.
OIL - Grade 1120, Spec. AN-VV-0-466a.

3. Propeller

The propeller is a three bladed Hamilton Standard Hydromatic, 13'1" diameter. The basic propeller pitch settings at the 42" radius are:

Low pitch - 26°
High pitch 65°
-

4. Pilot Protection

The pilot is protected forward and aft by armor plate, also by a bullet proof windshield. Enemy gunfire originating within the areas illustrated in Appendix I should not reach the pilot.

5. Armament

The armament consists of six .50 caliber machine guns located in the outer wing panels with a maximum of 2400 rounds of ammunition. Two 1000# bombs can be carried under the center section or one full sized torpedo under the belly. When the airplane is operating with the torpedo or 1000# bomb under the belly, 100 gallon droppable fuel tanks can be carried under the wing center section.

6. Access to Airplane

Access to the cockpit is gained from the right hand side of the airplane. Push in the button (see Figure 4 located just below the windshield then slide hood aft.

7. Cockpit Seat

Upon gaining access to the cockpit adjust the seat to the necessary height. The control lever for vertical adjustment is located on the right hand side of the seat; Maximum adjustment is 6". The control lever for adjustment of the shoulder type harness is located on the left hand side of the seat. Make certain the harness straps are over the crossbar.

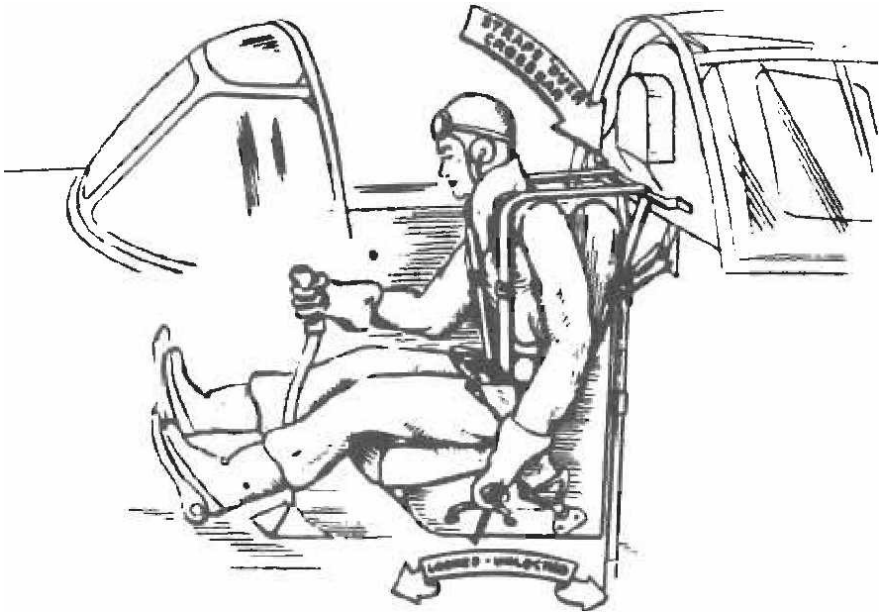


Fig. 5 – Harness strap adjustment

8. Oxygen System

The shatterproof oxygen cylinder of 514 Cu-in. capacity is located on the aft side of the crash bulkhead. The cylinder should be charged to 1800 lbs. per sq. in. The shut-off valve hand wheel extension is located to the left of the pilot's seat.
The diluter demand type regulator with breathing tube and face piece 15 located on the bulkhead to the left of the pilot's seat. Refer to Section V.

ROTATE HAND WHEEL COUNTER-CLOCKWISE TO CLOSE ROTATE HAND WHEEL CLOCKWISE TO OPEN

9. Fuel System

a. TANKS.-There are two main fuel cells located left and right of the center line oj' the wing center section. The reserve cell is located in the fuselage tinder the pilot's seat. A 1.50 gallon droppable steel tank is carried under the belly of the airplane. Two 100 gallon droppable fuel tanks can be installed on the 1000# bomb racks located under the wing center section.

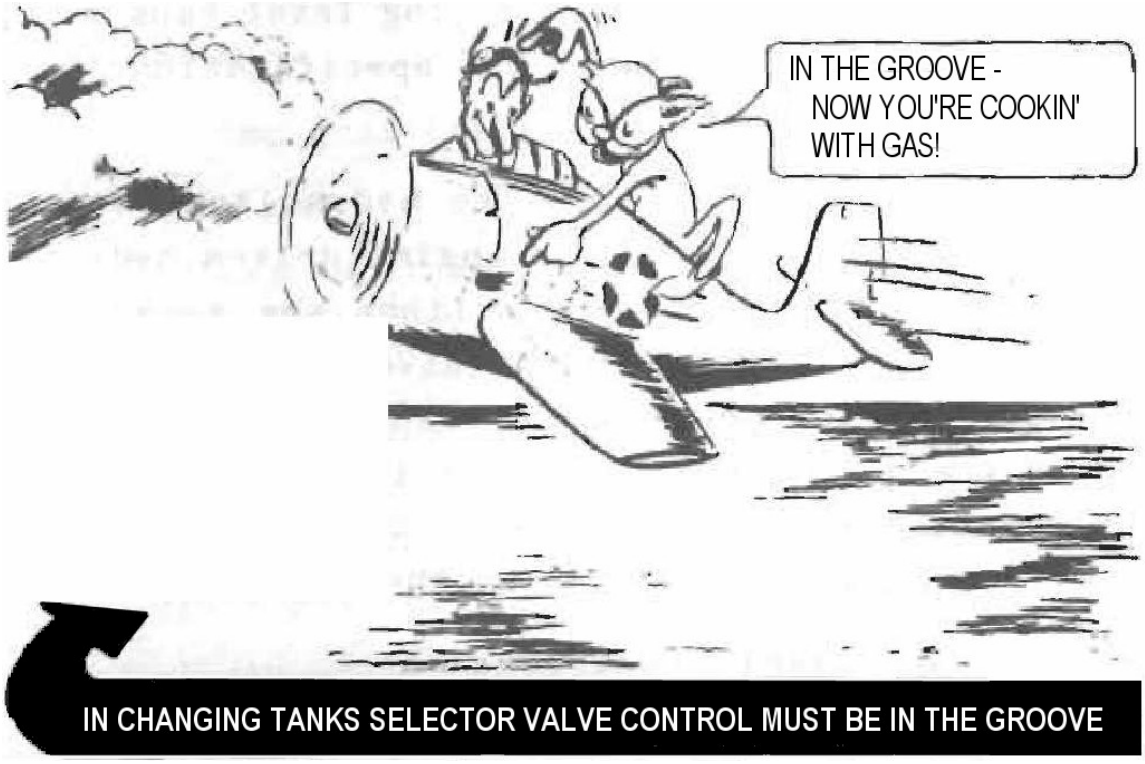
TANK CAPACITIES

Left Main	– 87.5 U.S. gals.	72.9 Imperialgals.
Right Main	– 87.5 U.S. gals.	72.9 Imperialgals.
Reserve	– 75.0 U.S. gals.	62.5 Imperialgals.
Droppable	-150.0 U.S. gals.	P..9 Imperialgals.

b. RESERVE TANK WARNING LIGHT
The reserve tank fuel level warning light Is located on the fuel control panel on the left hand side of the cockpit. When the reserve tank contains 50 gallons or less the light will glow. The fuel quantity gage shall then be closely watched and the pilot shall fly at the most economical speed, if possible.

c. FUEL TANK SELECTOR
The fuel tank selector valve dial has the following designations, reading counter-clockwise:
OFF
LEFT MAIN
RESERVE
RIGHT MAIN
DROPPABLE

Fig. 6 Fuel tank selector valve



The vapor return line from the carburetor leads to the right main tank, and may discharge as much as eight gallons of fuel per hour.

NOTE
To prevent overflow, when operating with full right main tank, always use about 15 gallons from it before drawing fuel from other tanks.

d. AUXILIARY ELECTRIC FUEL PUMP SWITCH
This switch is located on the left hand side of the cockpit forward of the engine control quadrant. The switch shall be ON when starting engine, when shifting from one fuel tank to another, and at any other time when use of auxiliary pump is necessary to maintain adequate and steady pressure required for proper engine operation.

e. DROPPABLE FUEL TANK SWITCH.- A spring loaded switch is located on the left hand side of the cockpit Just above the cowl flaps control. A safety guard is provided to prevent inadvertent operation.

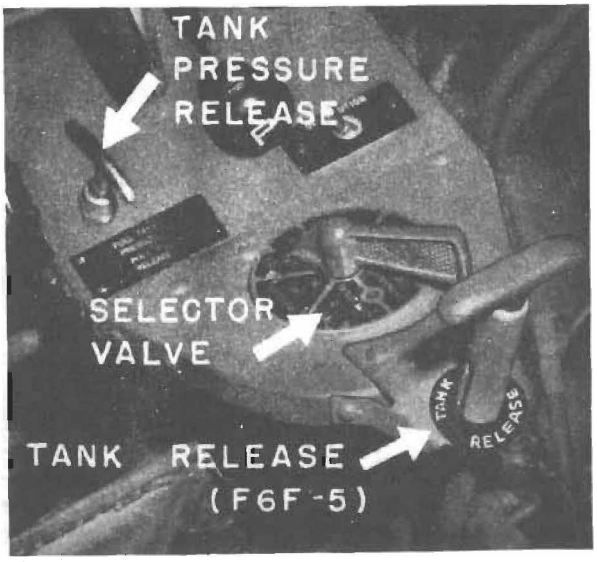


Fig. 7 – Fuel control panel

f. FUEL PRESSURIZING SYSTEII CONTROL.-The fuel tanks are equipped with the Bendix Fuel Pressurizing System. The manual shut-off valve for this system is controlled by a push-pull "T" handle located on the fuel control panel.
PULL TO RELEASE PRESSURE PUSH TO RESTORE PRESSURE

g. FILLER CAPS.-On left hand side of fuselage for left main. on right hand side for right 8ain and reserve.

10. Oil System

a. TANK - The oil tank is located in the upper part of the engine accessory compartment, just forward of the firewall. Access is gained to the filler neck and sounding rod by releasing the Dzus-fastened ,door located on the left hand side of the engine cowling. The maximum filling capacity of the tank is 19 US gallons leaving a three gallon foaming space. The tank is provided with a warm-up compartment.

b TEMPERATURE CONTROL VALVE
The oil system incorporates an automatic rotary oil temperature control valve installed on the oil cooler. This valve, in conjunction with the cooler, maintains the oil-in temperature at approximately 71°C (160°F) to 79°C (175°F). The shutter which controls flow of cooling air to the air cooler is manually operated. The oil cooler shutter and intercooler flaps open and close together, and are operated by the same control. On the F6F-5 airplane these units have individual controls.
The control valve causes the oil to bypass the cooler when the oil from engine temperature is below 54°C (130°F), directing the outlet oil from engine back to the bottom of the oil tank for warm up. Consequently, the tank supply of oil is virtually bypassed when starting the engine, until the oil from engine temperature reaches approximately 54°C (130°F). The 011 is passed through the core of the cooler and returned to the top of the oil tank.
When the engine is not operating, a check valve unit prevents oil flow from the tank to the engine and back through the oil out line from the engine to the control valve.

OIL TEMPERATURES	°C	°F
Min. for takeoff & flight	40	104
Desired	75-85	158-185
Maximum level flight	85	185
Maximum climb	100	212
OIL PRESSURES		PSI
Desired at 2000 RPM at 60 °C		75-90
Min. at rated RPM at 100 °C		75
Min at 2100 at 85 °C		60
Min at 1200 at 85 °C		50
Min. idling		25

c. OIL DILUTION SWITCH.-The oil dilution switch is located on the fuel control panel. For oil dilution procedure see Section II.

11. Hydraulic System

a. GENERAL.-This airplane is equipped with a hydraulic system for the operation of the following units:
Wing flaps
Cowl flaps
Landing gear – Main and tail wheels
Inter coolers and oil cooler shutters
Wing hinge locking pins
Gun charging

The hydraulic reservoir filling level capacity is 1.7 gallons. Use fluid, A~A Specification AN-VV¬0-366 (red color)

b. NORMAL OPERATION. -The hydraulic system is normally operated by the engine driven hydraulic pump, and its various functions are governed by hydraulic selector control valves. The normal hydraulic system operating pressure is 1500 PSI, and the normal pump pressure is zero except when operating some circuit (]500 PSI). The system pressure gage is located on the right hand shelf.

c. The hydraulic hand pump is located on the cockpit floor to the right of the pilot's seat. Use this pump to operate the system if the engine driven pump is not functioning. When the hydraulic hand pump is used, the hydraulic hand pump selector valve control must first be turned to the desired position marked on the adjacent nameplates. This control is located on the right hand cockpit shelf. When this selector valve is moved, the system pressure gage indicates the pressure in the particular hydraulic circuit selected. Thus, if the valve is kept on SYSTEM, the system gage will indicate malfunctioning of the engine pump if pressure falls below 1200 PSI. Also a malfunctioning of any circuit may be found by watching this gage while moving the selector from point to point. The positions of the lever, for the operation of the various controls are as follows:
(a) System.
(b) Wing Flaps Only.
(c) Landing Gear Only.
(d) Gun Charging, Wing Hinge Lock, Engine Cowl Flaps.

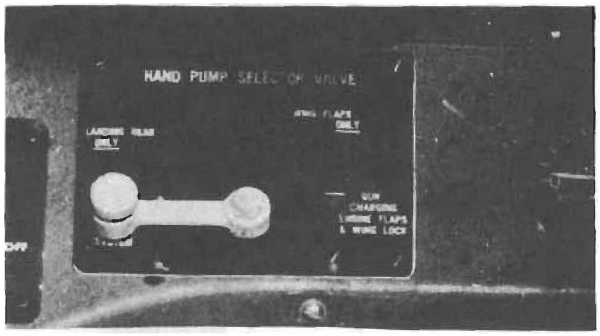


Figure 8 – Hydraulic Hand Pump Selector Valve

In the event of hydraulic system failure, due to an opening in a line or unit, each individual system can b~ checked with the hydraulic hand pump. Approximately eight to ten strokes are sufficient to determine whether or not pressure can be built up in that system. When the leak is located, the pilot shall then refrain from using the damaged system in order to retain the hydraulic fluid for operation of the other units.

12. WING FOLDING AND SPREADING

a. GENERAL

The wings are spread and folded manually from the ground and are automatically locked in the folded position. The wings are locked in the spread position, and unlocked before folding, by hydraulically operated locking pins controlled from the cockpit. The two position hydraulic lever valve control operating the locking pins, is located on the right hand shelf. The wing safety lock pins are operated by a "T" handle control located on the lower center control panel. This control is used to safety the main locking pins after the outer panels are moved to the SPREAD position and the main locking pins are FULLY /HOME. These safety lock pins, when engaged, prevent the main locking pins from disengaging, regardless of hydraulic pressure.

As the safety lock pins 'are withdrawn during the folding operation, red warning cylinders appear through the upper surface of the wing center section, one on the left and the other on the right hand side. Before take-off, check the cylinders which will be flush with the wing surface if the wings are spread and locked properly.

b. TO FOLD WINGS.

Wing Flaps - UP.

Disengage Safety Lock Pins - To Unlock, push "T" handle LEFT & FULL UP.

Push lever on Wing Folding Hydraulic Valve Control operating the main locking pins to FOLD position - FORWARD.

Operate hydraulic hand pump if engine is not running. Hand pump selector on SYSTEM or WING LOCK position.

Push wing panel back until folded lock engages.

CAUTION

The clearance between part of the wing and cockpit enclosure during folding is small: therefore. do not fold wings with anyone standing on walkway, or with arms or any part of the body projecting outside of the cockpit.

c. TO SPREAD WINGS.

Wing flaps - UP.

Push lever on wing folding hydraulic valve control operating the main locking pins to SPREAD position - AFT.

Release jury lock pin lock control handle located in the wheel well. CAUTION - Lift wing tips when releasing jury lock pin before spreadin8 outer panels.

If engine is not running, place hand pump selector valve on SYSTEM and pump until system gage reads about 1500 PSI. Before pushing wings UP to SPRFAD position. This operation will charge the hydraulic accumulator which has sufficient capacity to engage the main locking pins the instant the wing reaches the SPREAD position. After pins are engaged, pump a few extra strokes to make sure pins' are FULLY HOME.

Engage Safety Lock - to LOCK, push "T" handle FULL DOWN and RIGHT.

Check red warning flag to make sure of its retraction flush with top surface of wing.

WARNING

Do not allow the wings LO fall free when spreading as damage may result to the wing folding axis.

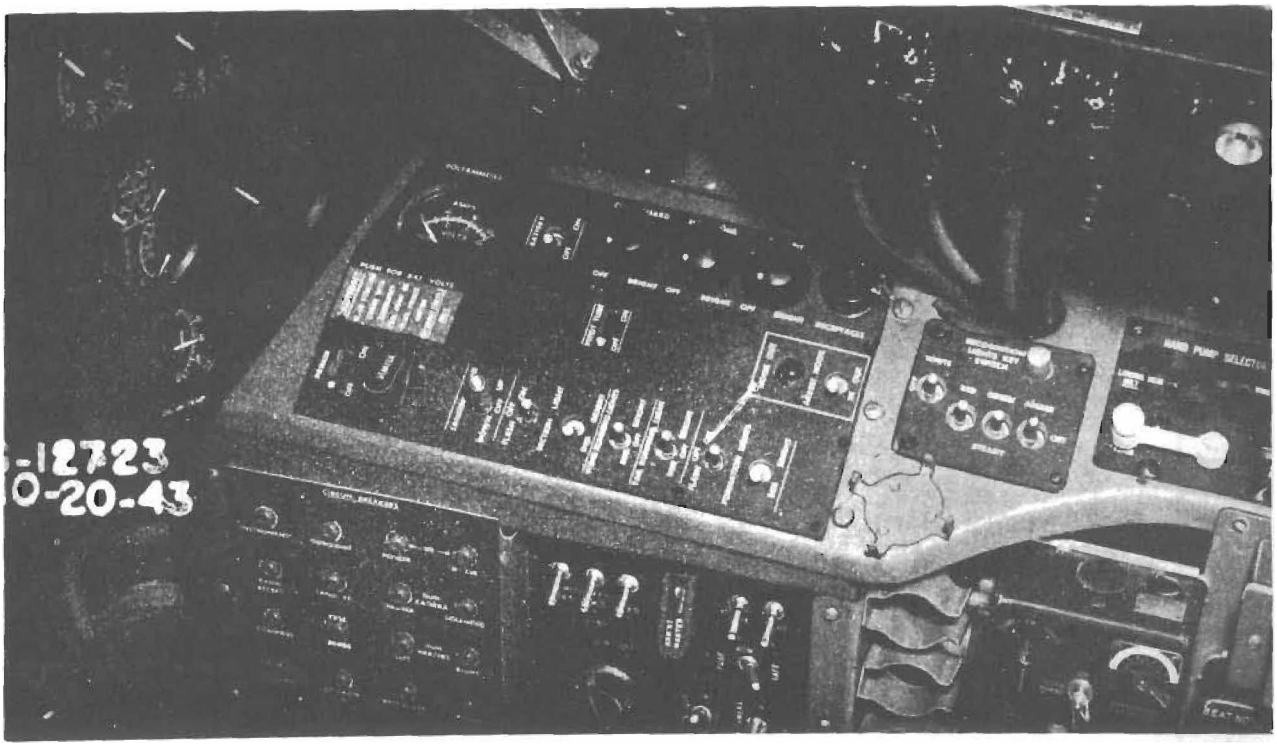


Figure 9 – Main electrical distribution panel - F6F-3

13. ELECTRICAL SYSTEM

a. DESCRIPTION.-The electrical system includes generator, battery, switches, rheostats, circuit breakers and lights controlled mainly from the electrical distribution panel and switch box. The following-units operate electrically:

WING FLAPS VALVE	GUN SELECTOR & WASTER SWITCHES
ARRESTING HOOK	GUN TRIGGER SWITCH
PRIMER	GUN CAMERA
AUXILIARY FUEL PUMP	GUN SIGHT LIGHTS
GUN HEATING (AUTOMATIC)	COCKPIT HEATER
DROPPABLE FUEL TANKS-RELEASE	FUSING & SELECTING OF BOMBS
PITOT TUBE HEATER	

b. GENERATOR AND BATTERY

The generator normally supplies the current for the electrical system, and is the sole source of power for normal operation of the electrical units, after the engine has started.

The battery switch, located on the electrical distribution panel, has two positions: ON and OFF. Battery switch must be 1n OFF position before leaving airplane. Recognition Lights and Radio Control Switches are not affected by this switch. They are energized regardless of' battery switch position with their respective control.

NOTE
The battery switch must be ON to prime and start the engine.

c. ELECTRICAL DISTRIBUTION PANEL & SWITCH BOX

The electrical system of the airplane is controlled mainly by switches, rheostats and circuit breakers on the electrical distribution panel and switch box, which is located on the right hand cockpit shelf. Operation of the control is on the electrica1 distribution panel is directed by the instructions printed on the adjacent nameplates.

SWITCHES

Section Light	Starter
Wing Running Light Tail Running Light	Cartridge Firing
Formation Lights (2)	Primer
Bomb Selector	Battery
Bomb Fusing	Gun Selectors
Arresting Hook	Gun Sight
Pitot Tube Heat	Gun Camera
	Gun Master

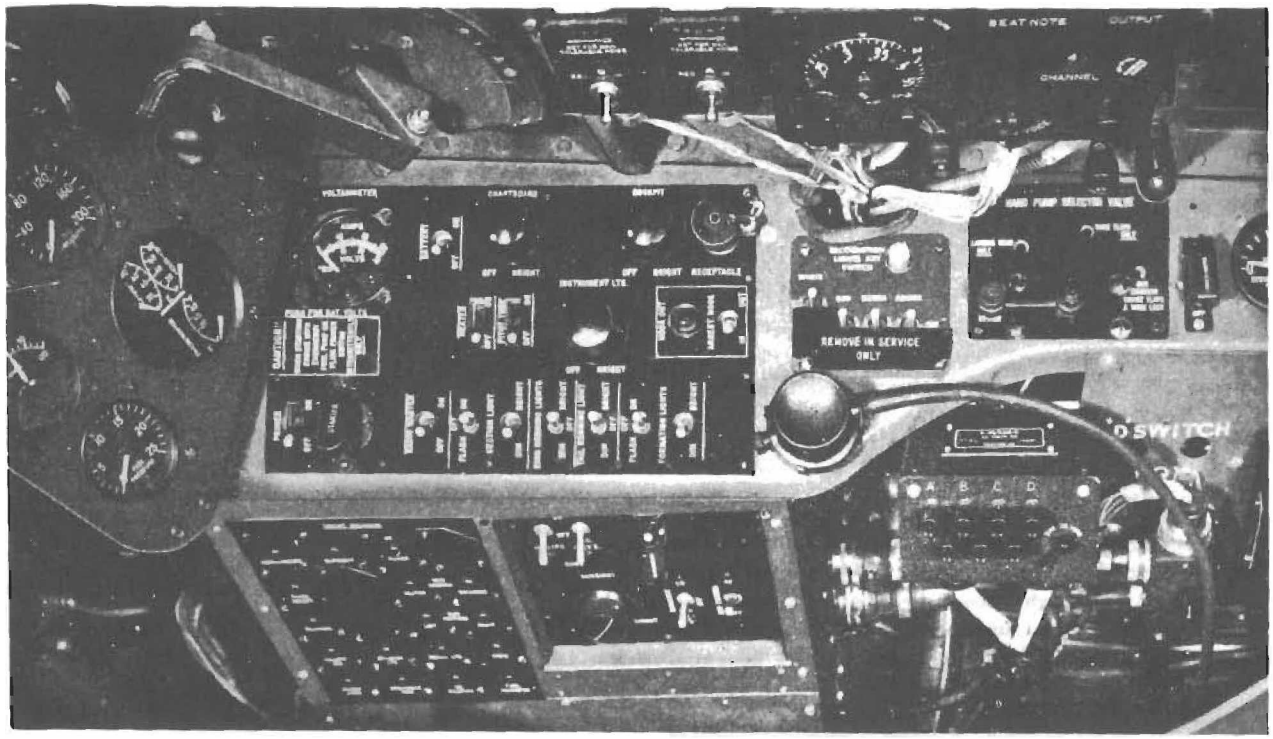


Figure 10 - Main Electrical Distribution Panel – F6F-5

RHEOSTAT LIGHTS

Chartboard	Cockpit
Electrical Panel	Gun Sight

CIRCUIT BREAKERS – MANUALLY RESET

Radio (2)	Gun Camera
Gun Sight	Solenoid
Exterior Lights	Recognition Lights
Instruments	Gun Heaters (2)
Cockpit Lights	Panel Receptacle
Bomb Fusing	Compass
Cockpit Heater	Arresting Hook
	Droppable Tank

d. VOLT-AMMETER.-The volt-ammeter is located on the electrical distribution panel. It normally shows generator amperes. Battery volts may be read by pushing the button on the face of the meter when the engine is not running over the generator cutting speed. System volts are read when the generator is operating at engine speeds above 1300 RPM.

e. COCKPIT LIGHTS.-The cockpit lights are controlled by. the cockpit lights rheostat located on the electrical distribution panel. The intensity of the chartboard light and the electrical panel light 1s regulated by the rheostat for each one, marked on the adjacent nameplates. Turning any of these rheostats to the OFF position will shut off the lights they control.

f. EXTERIOR LIGHTS.-The exterior lights are controlled from the electrical distribution panel.

Landing	Wing Running
Section	Tail Running
	Formation

NOTE
Landing lights are installed in early airplanes and night fighters only.

g. FLUORESCENT LIGHTS.-The fluorescent lights are controlled by rheostats located on the lower center instrument panel. To start the lights, turn the rheostats from the OFF to the START position, and hold there (or a few seconds until the lights turn ON. Then turn the rheostat to dim or bright position. In order to obtain ordinary or bright lights, turn the head of the light 900, to whichever is desired. If the lights fail to operate, push the fluorescent lights circuit breaker reset button.

h. APPROACH LIGHT SWITCH.- This switch is provided in the Mid-fuselage junction box thereby l8lI.k1ng it possible to open the approach light circuit when simulating carrier operations on land. Prior to carrier operations, the switch located in the mid fuselage junction box should be checked to insure that it is in the OFF position.

i. SPARE LIGHT BULBS.-A spare bulbs container is provided in the fuselage at Station #127. A spare bulb for the gun sight is held in place by a clip mounted on gun sight mount bracket. On the F6F-5 airplane, spare instrument panel bulbs are located on the left hand side of the iNltru8ent panel.

j. RECOGNITION LIGHTS SWITCHES.-The recognition lights and keying switches are located on the right band shelf. A switch is provided to select each light as desired. Throwing any switch opposite the steady position will not cause the light to glow until the recognition lights keying switch is operated. If any light fails to operate, the circuit breaker, for this circuit located on the panel, should be pushed.

k. PITOT TUBE HEATER. - The pitot tube heater, which is located on the distribution panel. This switch shall be turned ON when icing conditions are encountered. If apparently incorrect airspeed 18 indicated during icing conditions, check the position of the switch to be sure it is in the ON position.

14. CONTROLS

AIRPLANE CONTROLS

1. RUDDER CONTROL. -The rudder pedals are suspended from a horizontal bar below the instrument panel. The pedals are adjustable to four positions by a toe lever on each inner pedal.
2. AILERON AND ELEVATOR CONTROLS.-A conventional type stick, equipped with pistol type grip provided with gun trigger and bomb button is installed in the airplane. To lock controls neutralize rudder pedals and hook up the lashing device.
3. TRIM TAB CONTROLS.-The trim tab controls for the left aileron, elevators and rudder are mounted as a unit on the left hand side of the cockpit.
4. WING FLAP CONTROL SYSTEM
    a. GENERAL-The wing flaps, of the low drag TYPE, are actuated by four hydraulic cylinders controlled from the pilot's cockpit. Two cylinders are installed in each wing, one inboard and one outboard.
    b. HYDRAULIC CONTROL VALVE. -During normal conditions the flap hydraulic control valve, governing the cylinders, is operated by an electric servo motor controlled by a toggle switch located on the left hand shelf, adjacent to the control quadrant. If electric power falls, the flaps are controlled by the wing flap manual control lever located on the lower left hand side of the cockpit. If the normal hydraulic pressure system fails, the flaps are controlled by the auxiliary hydraulic pressure system.
    c. COMPRESSION SPRING UNITS - Four blowup spring units, one connected to each flap, are arranged to allow the flaps to "blow-up" with increasing; airspeed. These automatically control the flap angle in flight when the flap linkage is all the way out, example, when the flaps are down. This feature is not controllable from the cockpit and is entirely independent of the hydraulic cylinders. The range of flap angle is 50° at 93 Knots airspeed and up to 15° at 150 Knots airspeed.
    d. AUTOMATIC CONTRUL SYSTEM.-The flaps will not come down at speeds in excess of 170 Knots even though the electric control switch is in the FLAPS DUWN position. An airspeed switch, located in the wing center section, is connected in parallel with the airspeed indicator. The airspeed switch will automatically retract the flaps when the airspeed exceeds 170 Knots. If the flap switch is left on the FLAPS DOWN position, this switch will extend the flaps again when the airspeed drops below 170 Knots.
    e. MANUAL CONTROL SYSTEM - In the event of electric power failure, the flaps are raised or lowered by operating the spring loaded control lever located on the lower left hand side of the cockpit.
    f. EMERGENCY OPERATJON.-In the event the engine driven hydraulic pump is not operating, the wing flaps are raised or lowered by operating the hydraulic hand pump in conjunction with the hydraulic hand pump selector valve located on the right hand cockpit shelf.
5. LANDING GEAR CONTROL GENERAL.-
    a. The airplane is equipped with hydraulically operated main and tail wheels which are retracted or extended by double acting hydraulic cylinders. The operating pressure is normally supplied by the engine driven hydraulic pump or by the hand pump for auxiliary operation. An air cylinder supplies pressure for emergency extension of the wheels.
    b. NORMAL OPERATION. -The main and tail wheels are normally retracted or extended by manual operation of the two position square knob control lever located on the left hand instrument panel. This square knob lever is distinct in appearance from any other control, being designed to prevent inadvertent retraction or extension of the landing gear by the pilot in flight.
    c. AUXILIARY OPERATION.- In the event that the engine driven hydraulic pump is not operating the main and tail wheels may be retracted or extended by operating the hydraulic hand pump in conjunction with the hand pump selector valve on the right hand shelf. Set the square knob control lever to the

desired position, move the hand pump selector valve lever to LANDING GEAR and operate hand pump. Approximately 90 double strokes required to Raise; Approximately 70 double strokes required to Lower. NOTE When lowering by hand pump, considerably less effort will be required If the airspeed is reduced to 100 Knots or less.

d. EMERGENCY OPERATION

i. In the event of complete hydraulic system failure, the main and tail wheels may be fully extended and locked by manual operation of the landing gear emergency release "T" handle control located on the lower center control panel. The emergency landing gear extending system consists of' the "T''' control handle, an air bottle, valves and pipe lines.

ii. When the "T" handle is pulled, the up locks are released, the air system vent valve closes, the air bottle valve opens and the ON~OFF hydraulic dump valve opens, all functioning simultaneously. This system will operate regardless of the position of the square knob control lever. No other part of the hydraulic system is affected by the use of this control. Normal operation of the landing gear hydraulic system is restored when the "T" handle is returned to its normal position. This should not be done until after land1ng and the reason for hydraulic failure determined. Time required to Lower - 10 seconds approximately.

iii. If it Is desired to make a wheels up landing after the landing gear has been lowered by the emergency control, the wheels may be retracted by placing the emergency "T" handle control back to its normal position, square knob control lever to wheels UP position, hand pump selector valve to LANDING GEAR and operating the hand pump.

iv. To read the L.G. dump bottle air pressure, turn valve to open position only long enough to read gage, then close. Only a slight hand pressure is required when closing the valve. Bottle pressure 1950 PSI.

e. WHEEL LOCK

i. The mechanical Inter connector, between the landing gear square knob control lever and the nutcracker arm on the left hand shock strut, prevents landing gear retraction on the ground.

ii. On the ground, a mechanical lock prevents the drag strut knuckle from breaking under any loading condition. In flight, as the wheels retract, this lock is released during the initial motion of the hydraulic cylinders. The position of this lock is indicated electrically by a micro switch operated by the lock itself connected to the position indicator in the cockpit.

f. POSITION OF WHEEL INDICATOR - The position of the main and tail wheels are shown on the combination flap and landing gear indicator, located on the left hand instrument panel. This indicator, ill addition to showing the approximate position of each wheel, also shows whether or not they are locked up or down.

g. TAIL WHEEL LOCK

i. The tail wheel drag lock is equipped with a lock pin which locks the caster in the trailing position. The lock pin is controllable by the cable from the lock lever control on the pilot's left hand side. The primary purpose of the lock is to reduce the possibility of ground looping in landing.

ii. Lock the tail wheel immediately after taxiing into position for take-off. The tail wheel will then remain locked during flight and during landing. Unlock after the landing run has been completed in order to facilitate taxiing.

6. ARRESTING CONTROL

a. ELECTRICAL OPERATION.-The arresting hook switch and circuit breakers are located on the electrical distribution panel. To EXTEND the hook, throw the

control switch to the OUT position (right). When the hook is fully extended, the light adjacent to the switch will glow. The running OUT of the hook will also turn On the approach light in the wing. If the hook fails to operate, push the circuit breaker reset button. CAUTION – The pilot shall insure that the hook is in the OUT position prior to landing on a carrier.

7. POWER PLANT CONTROLS

a. ENGINE CONTROL QUADRANT.-The engine control quadrant is located on the left hand shelf and is equipped with a friction adjustment hand wheel, located on the inboard side, to adjust the friction on the throttle and propeller governor control levers. It contains the following controls:

SUPERCHARGER - AUXILIARY
THROTTLE, WITH MICROPH0NE SWITCH
MIXTURE
PROPELLER GOVERNOR & VERNIER HANDWHEEL

b. SUPERCHARGER CONTROL.-The supercharger control lever is located on engine control quadrant.

FORWARD - NEUTRAL
CENTER - LOW RATIO
AFT - HIGH RATIO

i. SUPERCHARGING SHIFTING PROCEDURE

1. Do not shift the supercharger control more often than at five minute intervals, while in flight except in an emergency, to allow the dissipation of heat from the clutches. The control must be at the extremity of its travel in either ratio to prevent clutch slippage and to insure the availability of greater power at all times. At if at least once during each five hour period of operation in HIGH or LOW ratio, shift to NFUTRAL for a period of five minutes to eliminate sludge accumulation in the clutches. If operations require exception to this practice, de-sludge at the earliest opportunity. Failures have resulted from oil carbonation due to excessive time between de-sludgings.
2. To change from NEUTRAL to LOW ratio or from LOW ratio -to HIGH ratio, the following procedure shall be used:
   a. Retard throttle as necessary to avoid exceeding desired manifold pressure after shift.
   b. Reduce RPM if practicable.
   c. Shift rapidly.
   d. Readjust RPM throttle setting as necessary to obtain desired power.
3. To shift from HIGH ratio to LOW ratio or from LOW ratio to NEUTRAL, the following procedure shall be used:
   a. Shift rapidly
   b. Readjust RPM throttle setting to obtain desired power. WARNING - Never close throttle even momentarily and avoid as far as possible any abrupt movement of the throttle while operating in LOW or HIGH blower.
4. Blower shifts should be made at the altitudes specified in the Specific Engine Flight Chart, Figure 39. The amount which the manifold pressure should be decreased before shifting to the next higher blower ratio is best learned by experience. Until familiar with the airplane, reduce the manifold pressure 3" to 4" before shifting. The amount of surge in manifold pressure depends on how quickly the auxiliary stage regulator reacts, and this may vary with temperature conditions, and from airplane to airplane.

5. The auxiliary supercharger regulator permits any desired manifold pressure below military power limits to be obtained with the throttle alone when operating in the auxiliary stage (either LOW Or HIGH blower) at any altitude below critical altitude. Use of the auxiliary supercharger below the recommended shift altitudes, however, will cause a rise in carburetor air temperature which is undesirable. Such use will also cause an increase in fuel consumption, because power that would otherwise be available at the propeller is wasted in driving the auxiliary stage.
6. Under certain conditions, use of the auxiliary stage at lower altitudes than necessary will result in the phenomenon of "surge" in the auxiliary stage system. The surge is a breakdown in airflow somewhat analogous to the stalling of an airfoil. It is brought on by attempts to operate at very low airflows (small throttle opening) with high impeller speeds (high blower RPM). It is most likely to occur when all the following conditions exist:
   a. Altitude - about 25000 ft.
   b. Supercharger - HIGH.
   c. RPM - (1) 2200, (2) 2500.
   d. Manifold pressure - (1) below 30", (2) below 33".
   e. Outside air temperature - 10°C to 20°C below standard
7. Surge will be evident by very rough engine operation, and probably by a rumbling noise or loud "puffing" sound in the ducting. The natural reaction would be to "ease up" by retarding the throttle. This would only aggravate the condition and might result in the engine quitting al together. If the condition is recognized, it can be eliminated promptly by any one of the following courses of action:
   a. Shift to the next lower blower speed, unless the tactical situation makes this undesirable.
   b. Open the throttle and reduce RPM to maintain desired power.
   c. Shift to a1ternate air.
8. It is recommended that pilots explore the region of operating conditions described, so that they may learn to recognize supercharger surge when it is encountered. It is unlikely that it can be found unless outside air temperature is below standard. Operating for short periods in the surge range will do no harm, but it should not be allowed to continue as heavy surge may open up leaks in the inter coolers or ducting. The condition is not readily subject to correction by design change, and it is therefore desirable that pilots be thoroughly familiar with the phenomenon, and method of dealing with it.

c. ENGINE THROTTLE CONTROL – The throttle control lever is located on the throttle quadrant.

LEVER FORWARD	-	THROTTLE OPEN
LEVER AFT	-	THROTTLE CLOSED

d. MIXTURE CONTROL

i. The mixture control has three effective positions:

IDLE CUT – OFF
AUTO LEAN
AUTO RICH

The fourth position FULL RICH has been or should be rendered inoperative. Therefore, no attempt should be made to use it. Fuel will be discharged into the supercharger at any fuel pressure above 4 PSI when the mixture control is in any position except IDLE-CUT. The mixture control should be kept in the IDEL-CUT position whenever the engine is not running to insure against flooding of the supercharger in case the auxiliary fuel pump is turned on.

NOTE

Upon stopping the engine, particularly in hot weather, fuel trapped in the carburetor (with the mixture control in IDLE-CUT) may boil from residual heat in the engine.

This procedure requires that adequate precautions be taken to insure that:

1. The auxiliary fuel pump is turned OFF before stopping engine.
2. The mixture control is placed in the IDLE-CUT position as soon as practical after the engine has cooled.
3. Neither the main battery switch nor the auxiliary fuel pump switch is turned ON until the mixture control is checked to see if it is in IDLE-CUT position.

CAUTION

Failure to observe these precautions may result in hydraulic lock and rod failure, as well as the obvious fire hazard.

ii. AUTO RICH should be used for takeoff, approach and landing, and in all ground operations. It is also available for additional cooling under adverse conditions that would otherwise require a reduction in power or excessive opening of the cowl flaps to maintain cylinder head temperature (CHT) within allowable limits.

iii. AUTO LEAN should be used for all flight operations except under adverse cooling conditions as noted above.

NOTE

Unnecessary use of AUTO RICH should be avoided whenever possible because of the increase in fuel consumption.

iv. Test have been shown that when properly adjusted, present carburetor settings demonstrate best economy at 60% power and below. For this reason manual leaning is not recommended and should not be attempted unless there is conclusive evidence that carburetor metering is erratic.

v. Compare fuel consumption with records of previous f1ights. (IAS, gross weight, configuration, power conditions, and density altitude must be approximately the same for flights compared.) A difference in fuel consumption of more than ±4% may be considered an indication of unsatisfactory metering.

vi. If over-richness is definitely shown by tests, by adjustment or replacement of the offending carburetor is not practicable, manual leaning may be used at approximately 50% power, and below, to control mixture strength. The following method should be used:

1. Fly level at desired IAS, using 32" Hg. (but not more) or full throttle, AUTO LEAN, 1300 to 1700 RPM. If IAS is too high at 32" (or full throttle) and 1300 RPM, reduce MP as necessary. Allow a few minutes for engine temperatures to stabilize, then note head temperatures.
2. Move mixture control slowly out of AUTO LEAN toward IDLE CUT until surging of RPM begins. Then move mixture control into adjacent notch toward AUTO LEAN. If this reduces surge to ±10 RPM or less, the setting is satisfactory. If surge is excessive, move mixture control one more notch toward AUTO LEAN. Repeat if necessary.
3. While making the foregoing adjustments, maintain a close watch on head temperatures. Head temperatures must not go more than 5°C above or 15°C below the head temperatures. Return mixture control to AUTO LEAN immediately if head temperatures go outside limits. Wait until temperatures stabilize before repeating attempt. DO NOT STOP SHORT OF AUTO LEAN when enrichment is necessary to control CHT. Do not exceed 232°C CHT at any time.

vii. Manual leaning at more than 50% power is not recommended, and should be avoided except in extreme emergencies. Engine damage may result when manual leaning is done incorrectly at any power, and the operation is particularly hazardous above the cruising power range.

viii. If over-enrichment develops during a flight, the usual indications are low CHT, loss of power, and in extreme eases, a visible smoke trail. If possible, confirm suspected over-richness by a tank test before resorting to manual leaning. Indiscriminate leaning is dangerous.

e. PROPELLER CONTROL - The propeller pitch is controlled hydraulically by a governor unit located on the nose of the engine. The propeller governor control is located on the aft end of the engine control quadrant.

LEVER UP	DECREASE RPM (increase pitch)
LEVER DOWN	INCREASE RPM (decrease pitch)

Propeller vernier control hand wheel located inboard of governor control.

ROTATE CLOCKWISE	DECREASE RPM (increase pitch)
ROTATE COUNTER-CLOCKWISE	INCREASE RPM (decrease pitch)

f. CHANGING POWER CONDITIONS – In order to prevent excessive pressures within the cylinders, the following procedures shall always be used when changing power:
   i. Adjust the propeller control to obtain the desired RPM.
   ii. Adjust the throttle to obtain the desired manifold pressure.

g. WATER INJECTION SYSTEM
   i. TANK – The water tank is located on the upper part of the fuselage. Access is gained to the filler neck by releasing the door on the right hand side of the upper fuselage.
   ii. QUANTITY – The quantity gage for this tank is located on the right hand side of the main instrument panel.
   iii. WATER PUMP CONTROL – The switch is located on the cockpit left hand shelf just outboard the of the engine throttle quadrant.
   iv. WATER REGULATOR – The water regulator is located in the engine accessory compartment. A line extends from the regulator to the carburetor spray nozzle unit.

h. CARBURATOR INDUCTION SYSTEM
   i. The carburetor air induction system consists of three ducts. The main stage inlet doors are located in the engine accessory compartment, below the inter coolers. Air f11ters may be inserted at this point when operating under bad dust conditions. The auxiliary stage inlet duct is located in the lower section of the nose spinning. This duct also directs the cooling air to the oil cooler.

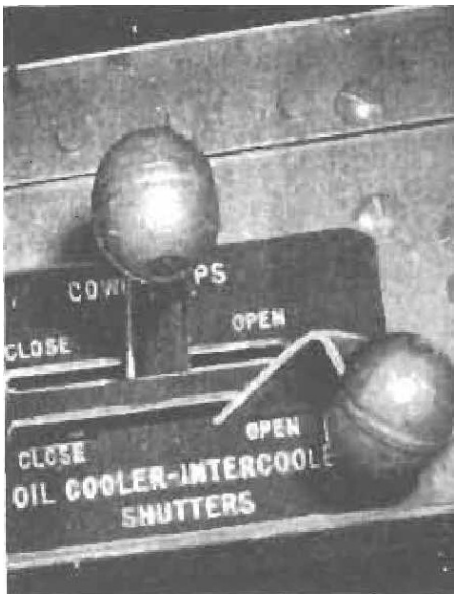
i. IGNITION SWITCH - The Ignition switch Is mounted Lo the left of the main instrument panel. The switch has the following positions: OFF-LEFT-RIGHT-BOTH.

j. STARTING CONTROLS
   i. The starter switch is located on the electrical distribution panel adjacent to the primer switch. The cartridge starter is a Type III unit. The cartridge breech is located on the starboard side of the engine mount structure and is accessible from outside the airplane through a hinged door locked by quick turn fasteners. Use Type "D" cartridge for starting under normal conditions. However, Type "E" may be used in cold weather or under other conditions where type “D” is attached to the inside door for spare cartridges.
   ii. The primer switch is located on top of the electrical panel adjacent to the starter switch. The battery switch must ON to prime and start the engine.

NOTE

The ignition booster Is energized only while the starter switch is held ON. It is therefore necessary to hold this switch in the ON position until the engine is turning over under its own power to take full advantage of the ignition booster facilities provided. This switch is of the trip free circuit breaker type. It wi11 trip itself if an overload condition exists. It may therefore be held on without inviting annoying circumstances previously encountered on airplanes equipped with fuse protection,

k. COWL FLAPS CONTROL - spring loaded three position cowl flap hydraulic control lever is located on the left hand shelf.

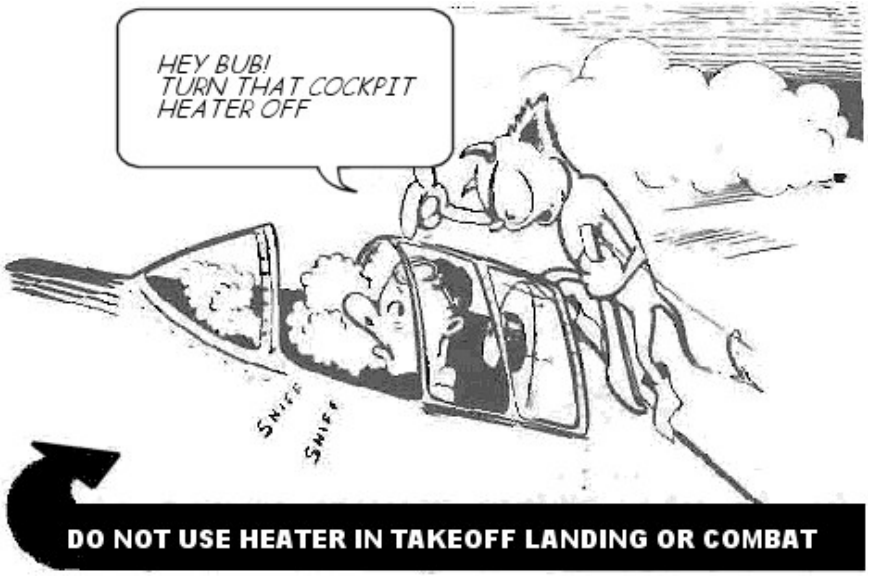


LEFT FORWARD	FLAPS OPEN
LEVER CENTER	NEUTRAL
LEVER AFT	FLAPS CLOSED

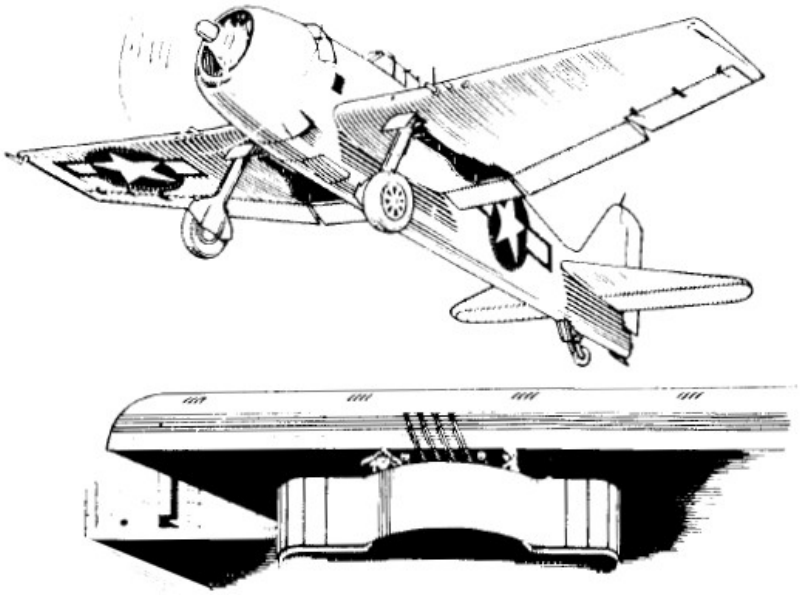
l. ACCESSORY EQUIPMENT CONTROLS

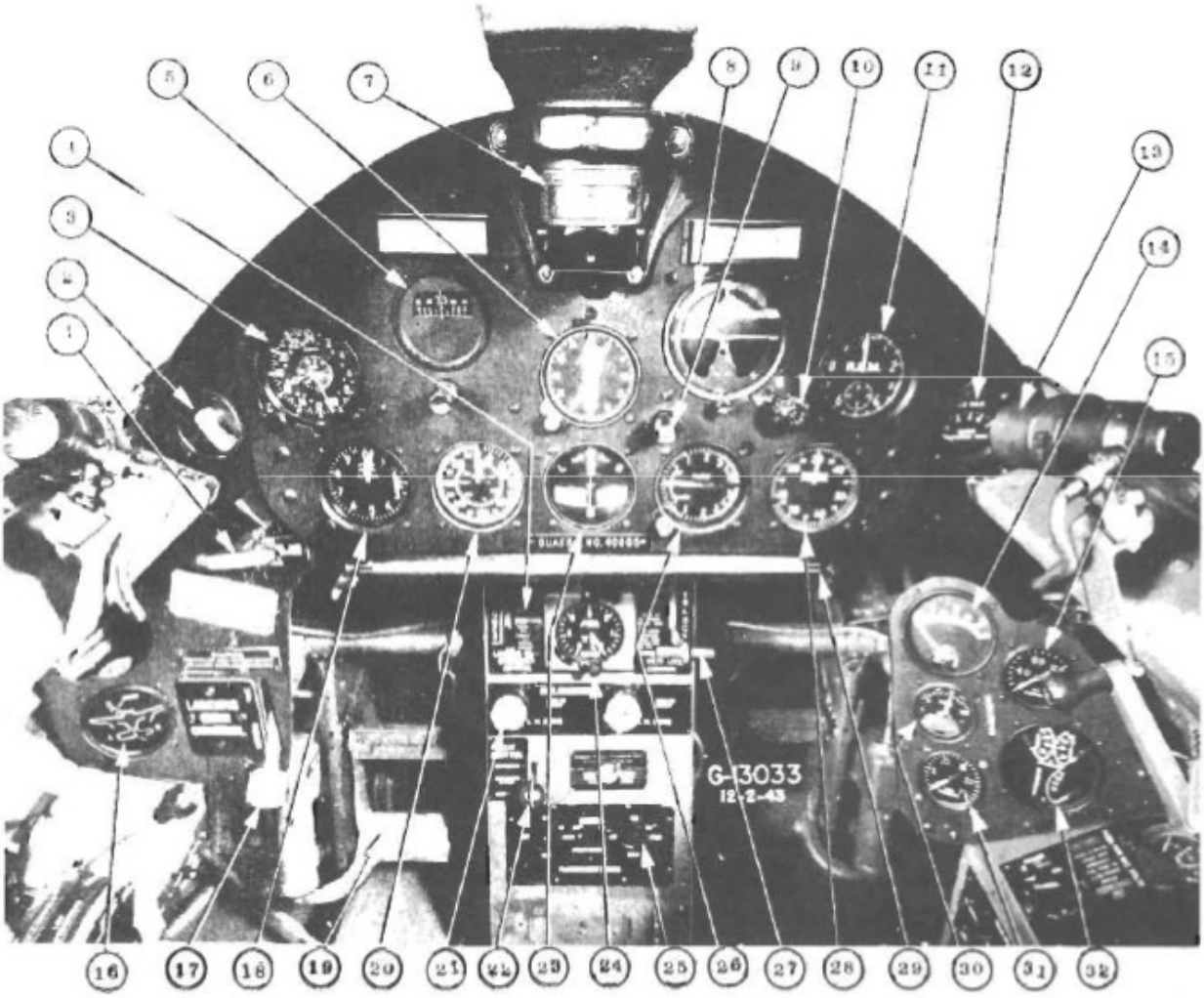
i. COCKPIT FRESH AIR CONTROL - The flow of fresh air into the cockpit is governed by manual control located on the lower center control panel. To operate, turn control to the desired position. To close - apply foot to upper side and push. To open apply foot to lower side and push.

m. COCKPIT HEATER - The cockpit heater switch is located on the lower center control panel. If the heater fails to operate, push the circuit breaker on the electrical distribution panel.

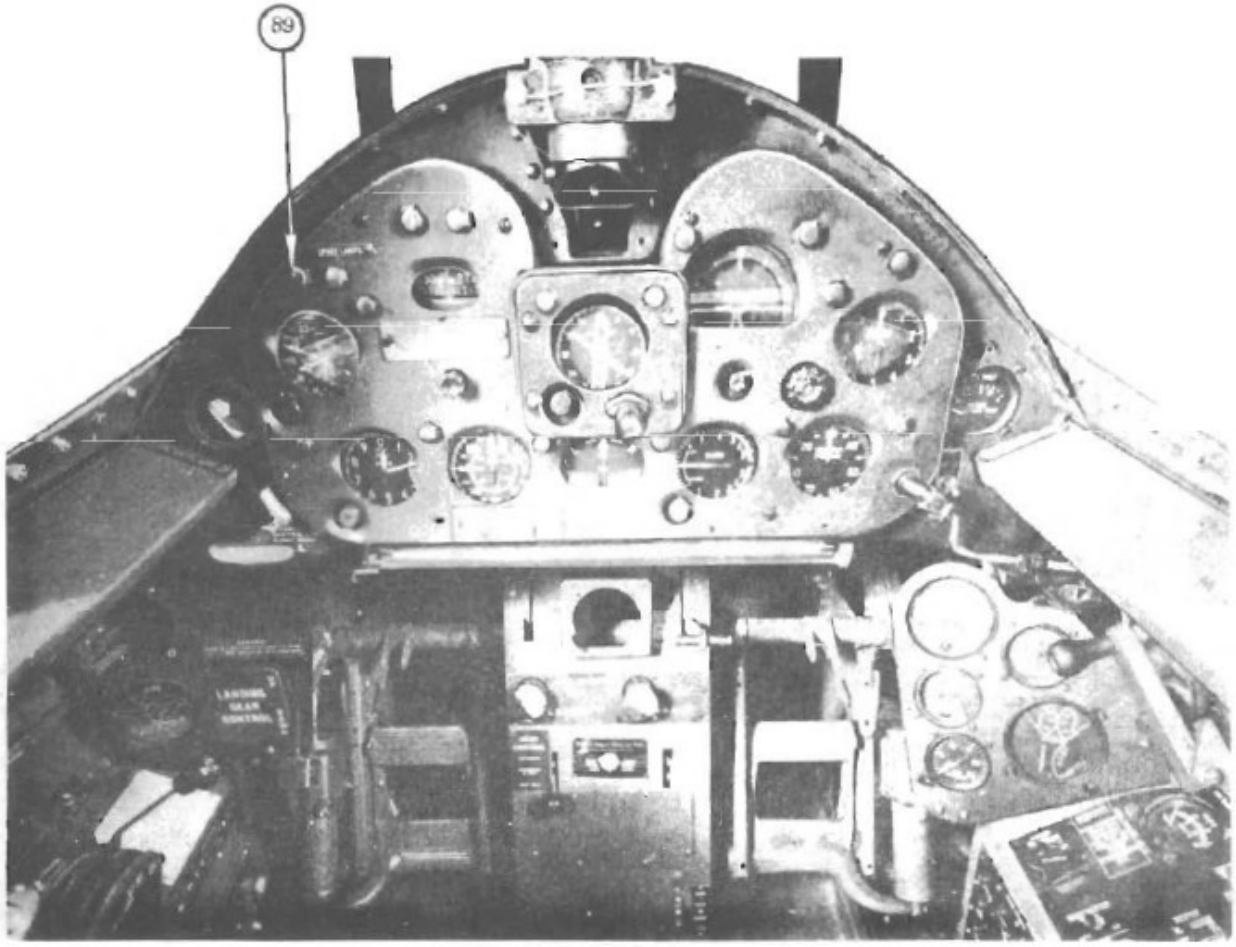


n. WINDSHIELD DEFROSTER - A lever, located on the lower center control panel, directs the flow of warm air to the windshield. With the lever at the top position, the air is directed to defroster only; in the center position, defroster and feet, and in the bottom position, feet only.





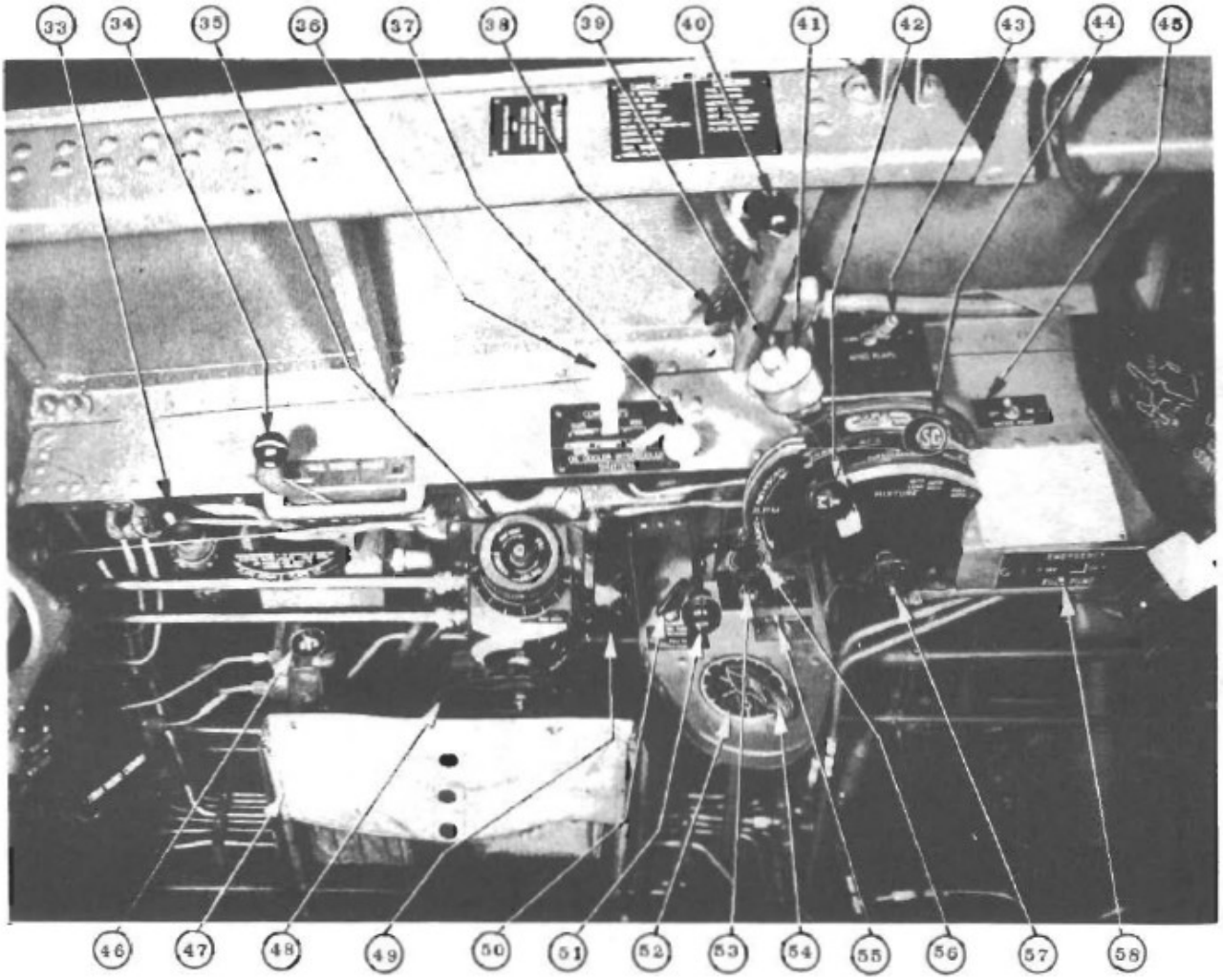
1. Carburetor Protected Air Control (Aux. Stage Only)
2. Ignition Switch
3. Clock
4. Landing Gear Emergency Lowering Control
5. Directional Gyro
6. Compass
7. Electric Gun Sight
8. Artificial Horizon Indicator
9. Chartboard Light
10. Caging Knob
11. Tachometer
12. Water Quantity Gage - A.D.I. System
13. Instrument Panel Fluorescent Light
14. Cylinder Head Temperature Gage
15. Oil Pressure Gage
16. Landing Gear & Wing Flap Position Indicator
17. Landing Gear Control
18. Altimeter
19. Rudder Pedals
20. Airspeed Indicator
21. Gun Charging Controls
22. Cockpit Heater Control
23. Turn and Bank Indicator
24. Ammunition Rounds Counter
25. Fluorescent Lights Control
26. Rate of Climb Indicator
27. Wing Lock Safety Control Handle
28. Manifold Pressure Gage
29. Sliding Chartboard
30. Oil-In Temperature Gage
31. Fuel Pressure Gage
32. Fuel Quantity Gages



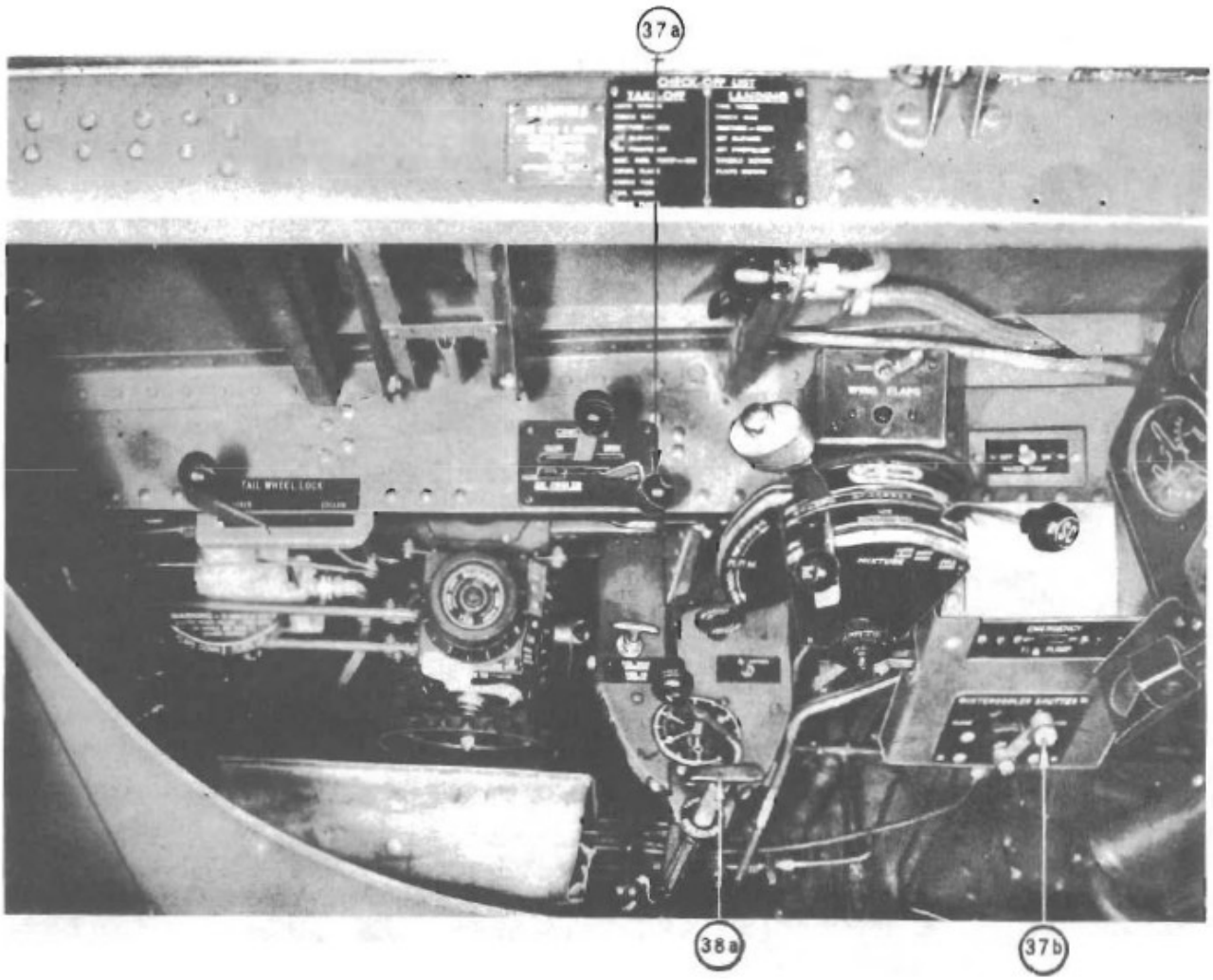
The F6F-5 differs from the F6F-3 in the following respects:

89. Spare Lamps

Removal of Fluorescent Lights & Control
Removal of Cockpit Heat Control Switch
to Main Electrical Distribution Panel

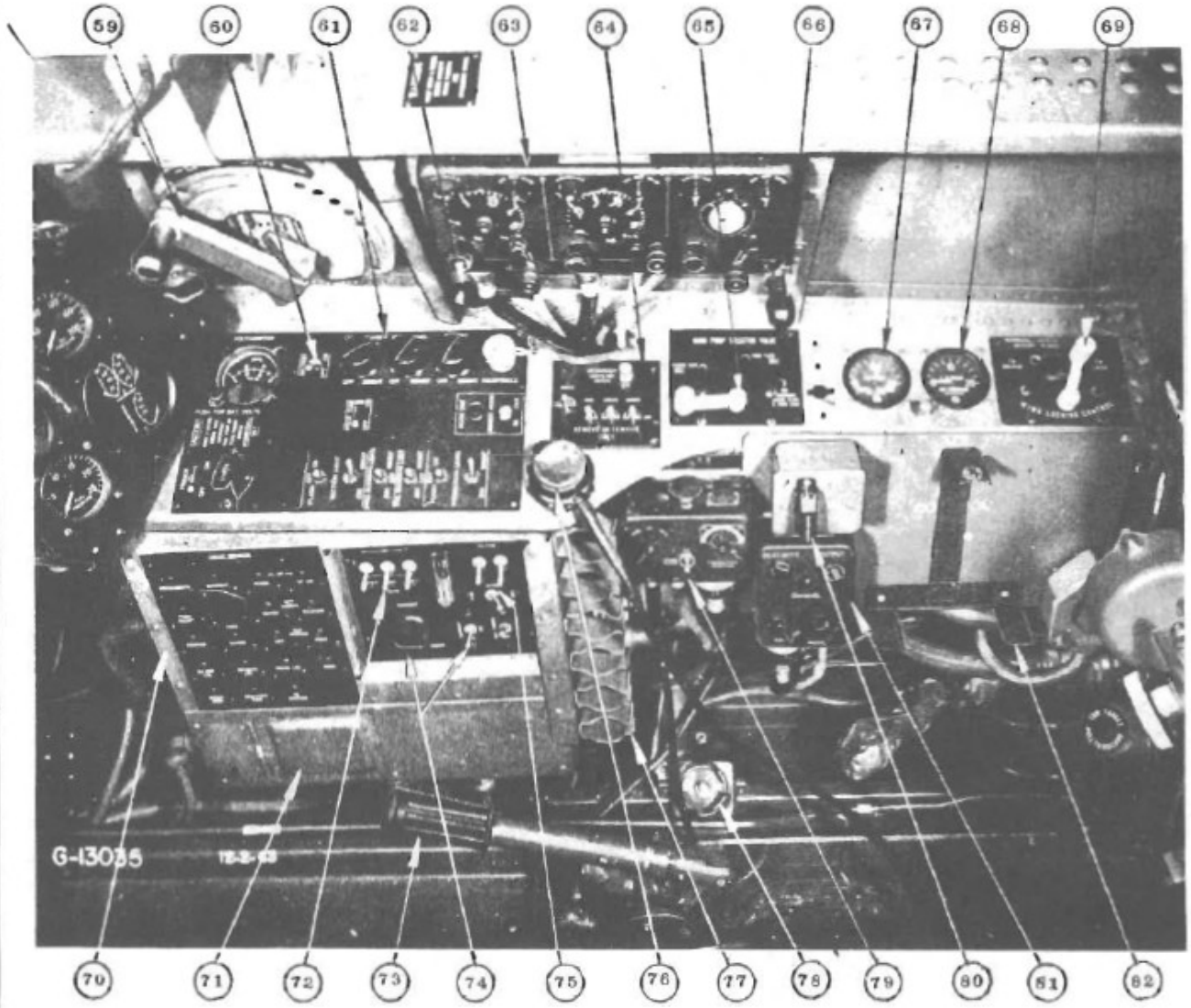


33. Lower Left Cockpit Light
34. Tail Wheel Lock Control
35. Rudder Trim Tab Control
36. Cowl Flaps Control
37. Oil Cooler-Intercooler Shutters Control
38. Droppable Fuel Tank Release Switch
39. Mask Microphone Switch
40. Upper Left Cockpit Light
41. Throttle Control
42. Mixture Control
43. Wing Flap Electrical Switch
44. Supercharger Control
45. A.D.I. Pump Control Switch
46. Wing Flap Manual Control
47. Map Case
48. Elevator Trim Tab Control
49. Aileron Trim Tab Control
50. Fuel Tank Pressurizing Control
51. Propeller Pitch Control
52. Fuel Selector Valve Dialface
53. Reserve Fuel Tank Warning Light
54. Fuel Tank Selector Valve
55. Oil Dilution Switch
56. Propeller Pitch Vernier Control
57. Engine Control Quadrant Friction Knob
58. Auxiliary Electric Fuel Pump Switch



The F6F-5 differs from the F6F-3 in the following respects:

37a. Oil Cooler Shutter Control
37b. Intercooler Shutter Control
38a. Manual Release Control, Droppable Fuel Tank



59. Cabin Sliding Hood Control
60. Battery Switch
61. Main Electrical Distribution Panel
62. Electrical Panel Light
63. Radio Controls
64. Recognition Lights
65. Hand Pump Selector Valve
66. Aft Right Cockpit Shelf Light
67. Hydraulic System Pressure Gage
68. Landing Gear Emergency Dump Pressure Gage
69. Wing Locking Hydraulic Control
70. Manual Reset Circuit Breaker Panel
71. Access to Reverse Current Relay
72. Machine Gun Switches
73. Hydraulic Hand Pump
74. Gunsight Rheostat and Switch
75. Bomb Control Switches
76. Hand Microphone
77. Pyrotechnic Cartridge Clips
78. Pyrotechnic Pistol Retainer
79. Radio Controls
80. Radio Destruction Switch
81. Microphone Jacks
82. IFF Equipment Support