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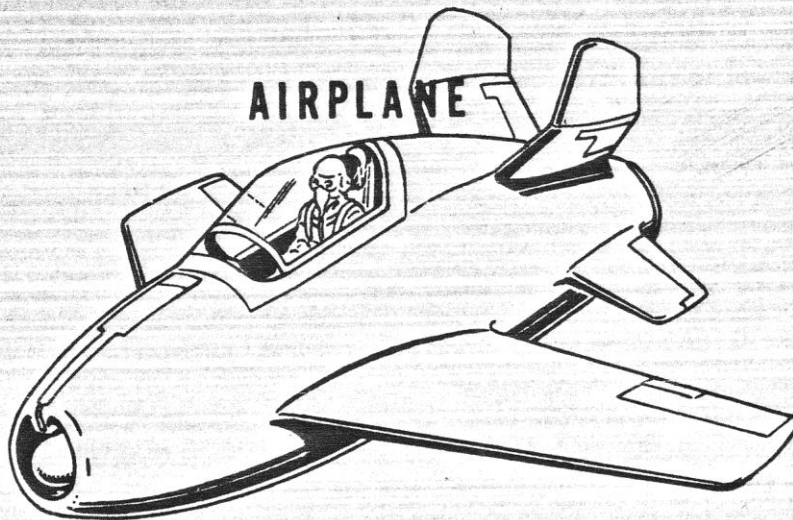
PRELIMINARY  
PILOT'S HANDBOOK

*for*

ARMY MODEL

XP - 85

AIRPLANE



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## SECTION I

### FAMILIARIZATION

1-1. AIRPLANE. The XP-85 is a high altitude parasite type fighter and escort plane, designed to be launched from the aft bomb bay of a B-29 long range bomber. The airplane, in the normal gross weight fighter condition, weighs approximately 5600 pounds and carries 690 pounds (115 gallons) of fuel. In the overload condition, the airplane carries fuel in two integral, pressurized wing tanks, 180 pounds (30 gallons) each, and two ammunition compartment tanks, 78 pounds (13 gallons) each. The parasite is drawn up under the parent plane as closely as possible, with wings spread, when in the stowed position. A wing-fold mechanism is installed for test purposes only, and instructions for its use are included in this handbook, but must not be construed to be a necessary operation during launching or retrieving. The airplane is propelled by one Westinghouse, Model J-34 Turbo-Jet Engine, and is equipped with speed brakes, an ejectible pilot's seat, sky hook (parent plane attachment), and a pressurized cabin.

1-2. PILOTEJECTION. For seat ejection instructions see 'EMERGENCY'.

1-3. SKY HOOK. The XP-85 attaches, by means of a retractable sky hook to a trapeze mechanism (herein referred to as the 'ARRESTING BAR') lowered from the aft bomb bay of the B-29. The sky hook is electrically actuated by a toggle switch located on the right side of the cockpit, outboard of the bearing temperature selector switch. The switch has 'UP' and 'DOWN' positions. The hook is released from the arresting bar by means of a manual release handle located on the left side of the cockpit, forward of the throttle control. After each release, the spring loaded hook head automatically re-cocks itself.

#### Note

The sky hook cannot be released unless the wings are spread and locking pins locked.

1-4. POWER PLANT. The throttle control, normal starter switch and air start switch are the only power plant controls.

1-5. THROTTLE CONTROL. Cracking the throttle past the 'OFF' position automatically turns on the fuel booster pump in the fuselage tank and actuates an electrical fuel control positioning valve to the 'ON' position. The range selector switch button and gun firing trigger are incorporated on the throttle handle.

1-6. GROUND START SWITCH AND IGNITION. The ground start switch is a momentary contact toggle switch, with 'ON' and 'OFF' positions and is located on the left side of the cockpit, aft of the throttle quadrant. The ground start switch energizes the starter and the ignition system.

1-7. AIR START SWITCH AND IGNITION. The air start switch is located on the left side of the cockpit aft of the throttle quadrant. The switch supplies power only to the ignition system, directly from the battery and operates independently of the ground start switch.

1-8. TAIL SURFACES. The flight controls are an 'X' type, consisting of upper and lower ruddervators. The upper and diagonally opposite lower ruddervators operate as a unit. The ruddervators are designed to perform the functions of both rudder and elevators. Differential movement of the ruddervators provides directional control. Co-directional movement of the ruddervators provides pitch control. The ruddervators are controlled conventionally by the control stick and rudder pedals.

1-9. RUDDERVATOR TRIM AND BALANCE TABS. Trim and balance tabs are provided on the upper ruddervators, and are electrically operated by means of a momentary contact switch located atop the control stick. The switch has 'NOSE UP', 'NOSE DOWN', 'NOSE LEFT', 'NOSE RIGHT' and 'OFF' positions.

1-10. AILERONS. The ailerons are conventionally controlled by the control stick. The left aileron only is equipped with an electrically actuated trim tab. The trim tab switch is a momentary contact slide switch located on the left side of the control stick. The switch has 'RAISER. WING', 'RAISE L. WING', and 'NEUTRAL' positions. Each aileron is equipped with a balance tab. The left tab is also used for trim.

1-11. LEADING EDGE FLAPS. Leading edge flaps are installed to improve the stall characteristics of the airplane. The flaps are automatically operated by an air speed switch which deflects the flaps at approximately 135 knots IAS, and raises the flaps at 145 knots IAS. A momentary contact type manual override switch is provided on the left side of the cockpit and allows the pilot full control of his flaps at all speeds.

1-12. SPEED BRAKES. Electrically controlled speed brakes extend from the belly of the fuselage, aft of the pilot's seat. The brakes are used to reduce the speed of the airplane during dives and to act as a drag increasing device whenever desired by the pilot. The brakes are automatically extended at a speed above maximum controllable speed of the airplanes by means of a preset Mach number switch. A manual override switch is provided on the inboard side of the throttle handle and allows the pilot manual control over the automatic extension.

1-13. FUEL SYSTEM CONTROL. Fuel is forced, by pressure regulated nitrogen, when the generator is operating properly, from the auxiliary tanks into the main tank, by means of three fuel transfer switches located in the forward cockpit area. For emergency

fuel control see 'EMERGENCY'.

1-14. ELECTRICAL SYSTEM. The alighting gear (sky hook), leading edge flaps, speed brakes, wing fold mechanism and trim tabs are electrically operated.

1-15. ELECTRICAL SYSTEM CONTROLS.

1-16. BATTERY SWITCH. The battery switch is an 'ON' and 'OFF' position toggle switch located on the left side of the cockpit aft of the throttle quadrant.

1-17. GENERATOR CONTROLS. Power is normally supplied by the generators, and is automatically controlled by a reverse current relay voltage regulator system set at 28.5 volts. No generator switch or voltmeter - ammeter switch is provided. A green light on the instrument panel indicates proper operation of the generator.

1-18. INVERTER CONTROL. The inverter is controlled by a momentary contact toggle switch located on the circuit breaker panel, and a remote circuit breaker.

1-19. WING FOLD CONTROLS. The wing fold mechanism is controlled by a toggle switch located on the left side of the instrument panel. The switch has 'FOLD' and 'SPREAD' positions. A mechanical warning flag, when retracted flush with the wings, closes a safety switch in the wing fold mechanism, and allows the sky

hook to be released.

1-20. COCKPIT AND INSTRUMENT LIGHTS. Two lights are located on the canopy portion of the instrument panel (one on each side), and one each on the side of the cockpit. The lights are controlled by a switch breaker and the dimming rheostat is located on the instrument panel.

1-21. EXTERIOR LIGHTING. The exterior lights consist of two wing tip lights and twin tail lights, controlled by a switch breaker located on the forward portion of the circuit breaker panel.

1-22. RUDDER PEDAL ADJUSTMENT. The rudder pedals are adjustable fore and aft by pressing inboard on the release tab located on the pedal hangar arm. This movement releases a plunger and allows the rudder pedal to slip completely aft. Push pedal forward to one of three positions for desired adjustment.

1-23. EXTERIOR CANOPY CONTROL. The canopy may be opened manually from the outside of the airplane by pressing the flush fastener and pulling handle aft. The fastener is located aft of the canopy hatch.

1-24. INTERIOR CANOPY CONTROL. The canopy is opened manually from the inside of the airplane by means of a control handle located forward of the canopy hatch.

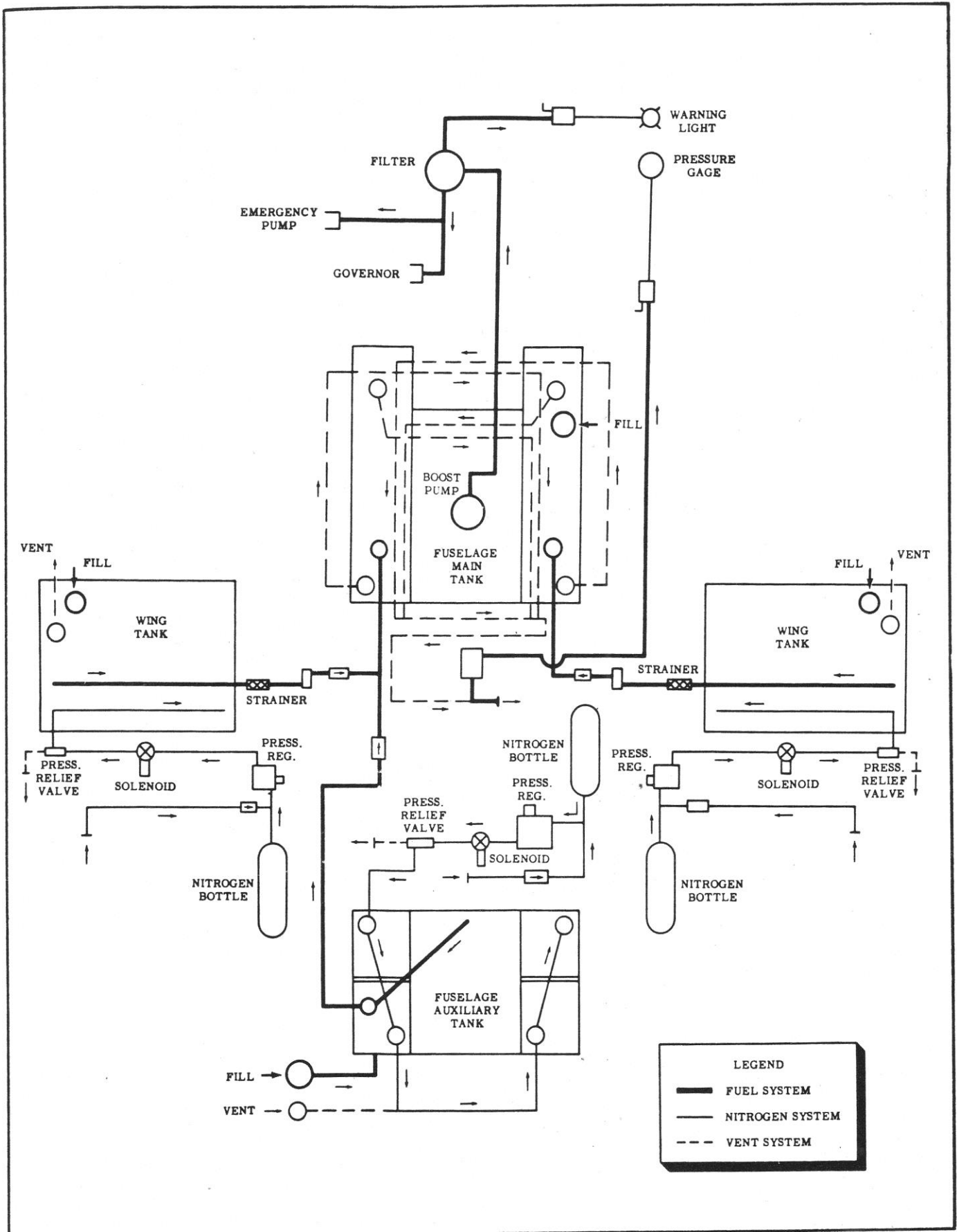


Figure 1-1. Fuel System Diagram

## SECTION II

### NORMAL OPERATING INSTRUCTIONS

#### 2-1. ENGINE STARTING PROCEDURE - GROUND START.

- a. Battery switch 'OFF'.



Battery switch must be 'OFF' when starting on ground, using external power.

- b. External power connected.
- c. Throttle cracked past closed position.
- d. Momentarily engage ground start switch.
- e. Allow engine to reach at least 1200 rpm and advance throttle slowly to 'IDLE'.
- f. If engine 'lights-off' very late in cycle, immediately re-engage starter switch a second time so that the starter will assist the engine to accelerate. This procedure will prevent hot starts caused by late ignition.
- g. Battery 'ON' after external power source is disconnected.
- h. Advance throttle to 8000 rpm and check fuel pressure and bearing temperatures. The readings will vary for each installation.

#### 2-2. FAILURE OF ENGINE TO START - ON GROUND.

If the engine fails to start after the foregoing procedure, it is a definite indication of malfunctioning of the engine and the engine should be checked. Unsuccessful starting attempts may result in flooding the combustion chamber and tail pipe with fuel. The presence of this fuel will cause a flaming start, with resultant 'hot spots' within the engine, and occasionally a jet of flame will be emitted from the engine exhaust nozzle. This fuel must be swabbed out, prior to attempting a start a second time. The starter and ignition coils should be allowed to cool for at least 20 minutes after making unsuccessful starting attempts.

#### 2-3. PRE-LAUNCHING CHECK LIST.

- a. Adjust rudder pedals.
- b. Adjust seat harness and radio gear for flight.
- c. Flight controls thru full throw.
- d. Shoulder harness locked.
- e. Check position of seat arm rests.
- f. Ascertain that oil quantity has been checked.
- g. Wings 'SPREAD' and locked.
- h. Test operate oxygen system.
- i. Check fuel quantity gage.

#### 2-4. ENGINE STARTING PROCEDURE - AIR START.

- a. Throttle 'CLOSED'.
- b. Allow engine to windmill to at least 1500-2000 rpm.
- c. Advance throttle to 'IDLE' position.
- d. Hold air start switch 'ON' until engine 'lights-off'.
- e. Watch green light on instrument panel, indicating

proper operation of generator.

#### CHECK LIST AT IDLING RPM - (4500 - 5500)

- Oil Pressure - - - - - 10-30 psi.
- Fuel Pressure - - - - - 5-20 psi.
- Turbine Out. Temp. - - 480-540°C (864-972°F)

#### CHECK LIST - NORMAL RATED RPM - (11000)

- Oil Pressure - - - - - 40-80 psi.
- Fuel Pressure - - - - - 50-120 psi.
- Turbine Out. Temp. - - 480-585°C (864-1053°F)

#### CHECK LIST AT MILITARY RPM - - (12000)

- Oil Pressure - 60-90 psi. normal, 140 psi. max.
- Fuel Pressure - - - - - 100-180
- Turbine Out. Temp. - See Engine Log Book for maximum allowable.

#### Note

Above operating limits taken at Sea Level.

#### 2-5. LAUNCHING PROCEDURE.

- a. Request trapeze operator to lower airplane from the stowed to the extended position.
- b. Ascertain that engine is operating satisfactorily.
- c. Leading edge flaps to 'OUT' position.
- d. Speed brakes 'OUT'.
- e. Request trapeze operator to raise nose stabilizing structure.

#### Note

The attitude of the airplane must be controlled by normal operation of the flight controls. With power off, the airplane is stable with respect to attachment on the arresting bar. With the application of power, the airplane has a tendency to be unstable.

- f. Open throttle until it is felt that no drag is imposed on the arresting bar, and the airplane is flying in formation with the B-29 although still attached.
- g. Release hook head and drop clear.
- h. Retract sky hook, leading edge flaps, and speed brakes when sufficiently clear from the B-29.

#### 2-6. LAUNCHING PROCEDURE FOR TRAPEZE OPERATOR.

- a. Turn selector valve No. 1 to 'EXTEND' position in order to lower trapeze.
- b. When trapeze is fully extended, turn valve to 'OFF' position. The trapeze is now locked in this position.
- c. Turn selector valve No. 2 to 'RELEASE' position.

## Paragraph 2-7 to 2-11

This position opens nose clamps and raises nose stabilizing structure. (As soon as the nose ring is sufficiently clear, the airplane is ready to be released from the arresting bar).

d. When nose stabilizing structure has been fully elevated, turn selector valve No. 2 to the 'OFF' position. The nose stabilizing structure is now locked in this position.

## 2-7. PRE-APPROACH CHECK LIST.

- |   |
|---|
| <ul style="list-style-type: none"> <li>a. Check fuel quantity gage.</li> <li>b. Shoulder harness locked.</li> <li>c. Leading edge flaps 'OUT'.</li> <li>d. Speed brakes extended as required.</li> <li>e. Sky hook 'UP'.</li> </ul> |
|---|

## 2-8. APPROACH AND RETRIEVING PROCEDURE.

- a. Request B-29 pilot to prepare for stowaway.

**Note**

The airspeed of the B-29 should be at least 20% higher than the stalling speed of the XP-85.

- b. Request trapeze operator to extend trapeze.

## 2-9. APPROACH.

a. Approach directly from and below the rear of the B-29 at an approximate flight angle of 10°. Much less turbulence is encountered in this approach than at other angles. Hold approach speed differential to the minimum and cautiously approach the trapeze.

b. As the approach closes, the sky hook should be aft of and in line with the center of the arresting bar. Exact lateral and longitudinal positioning can be obtained by correct use of the ailerons and throttle.

**Note**

It will be found that the critical condition encountered is the up and down (bobbing) motion of the airplane in the turbulent wake created by the B-29 and its trapeze.

c. Apply necessary throttle to finally close sky hook head onto arresting bar. When determined from what point in the oscillation the vertical motion is a minimum for a given time interval, apply necessary throttle to finally close the sky hook head onto the arresting bar.

## 2-10. RETRIEVE.

- a. Retard throttle to 'IDLE' immediately upon engagement with arresting bar.
- b. Request trapeze operator to lower nose stabilizing structure.

**Note**

When the nose clamps are closed, control of the airplane is no longer required by the pilot. Therefore, the request should be made immediately upon engagement.

- c. Leading edge flaps 'IN'.
- d. Speed brakes 'IN'.
- e. Close throttle.
- f. Battery switch 'OFF'.
- g. Request trapeze operator to retract trapeze and airplane into the stowed position.

## 2-11. RETRIEVING PROCEDURE FOR TRAPEZE OPERATOR.

a. Upon request by the pilot to extend the trapeze prior to approach, turn selector valve No. 1 to the 'EXTEND' position.

b. After hook-on, at pilot's request, turn selector valve No. 2 to the 'RETRIEVE' position. This position lowers nose stabilizing structure. In this process the ring and nose clamps close over and around the nose section of the XP-85.

c. When the nose clamps are fully closed, turn selector valve No. 2 to the 'OFF' position. The structure is now locked and the XP-85 is fully stabilized.

d. Turn selector valve No. 1 to 'RETRIEVE' position in order to return trapeze structure to the stowed position. In this position the trapeze is mechanically locked.

e. Turn selector valve No. 1 to the 'OFF' position.

### SECTION III FLIGHT RESTRICTIONS

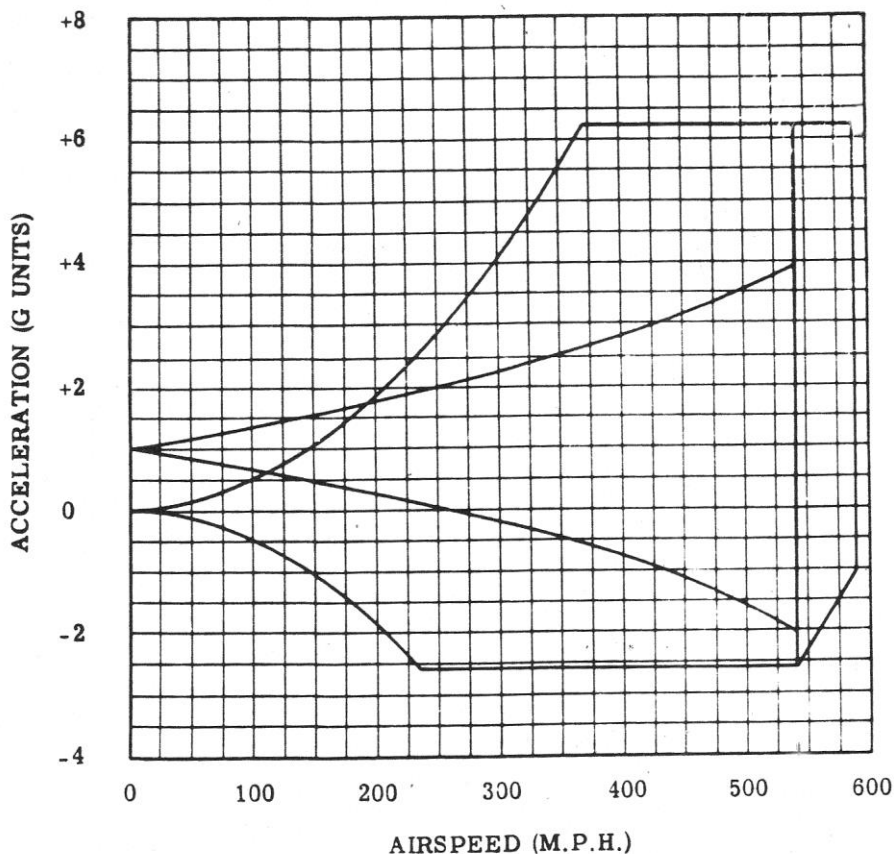
#### OPERATIONAL LIMITS Indicated Air Speed

Leading Edge Flaps - - - - -	150 Knots (175 mph)
Sky Hook - - - - -	175 Knots (200 mph)
Pilot Ejection - - - - -	435 Knots (500 mph)
Unrestricted Use Of Ailerons - - -	470 Knots (542 mph)

ADDITIONAL FLIGHT RESTRICTIONS PENDING DEMONSTRATION.

#### ESTIMATED STALLING SPEEDS Indicated Air Speed

NORMAL GROSS WEIGHT - - - - -	5600 LBS.
LEADING EDGE FLAPS 'UP' - - -	123 Knots (142 mph)
LEADING EDGE FLAPS 'DOWN' - -	118 Knots (136 mph)
GROSS WEIGHT - 4695 LBS. (3/4 of 201 Gal. Fuel Used)	
LEADING EDGE FLAPS 'UP' - - -	113 Knots (130 mph)
LEADING EDGE FLAPS 'DOWN' - -	109 Knots (126 mph)



V<sub>G</sub> DIAGRAM (GROSS WEIGHT 5600 LBS.)

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Section IV

Classification Cancelled Paragraph 4-1 to 4-5  
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*6 Dec 1950*

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## SECTION IV EMERGENCY

**WARNING**

4-1. PILOT EJECTION. Disconnect the anti-g connection, electrical receptacle for heated flying suit, radio jack plugs, and oxygen tubing prior to observing the following procedure for pilot ejection:

- a. Place heels in stirrups attached to seat.
- b. Pull up and inboard on pilot's seat arm rests to lock.

The following operations are automatically accomplished when arm rests are locked in the up position:

- (1) Head rest snaps back to jettison position.
- (2) Canopy and windshield assembly 'blows off', pulling catapult safety pin and cocking firing trigger on right arm-rest.
- (3) Squeeze the firing trigger on right arm rest to fire cartridge and eject seat.

4-2. SKY HOOK. To raise the sky hook manually in case of failure of the electrical mechanism, pull up on pneumatically operated release handle located on the cockpit floor, right side.

4-3. FUEL CONTROL. If the generator malfunctions, (as indicated by the green light on the instrument panel), the nitrogen bottles can be discharged manually. This is accomplished by a safety wired toggle switch located on the right side of the cockpit.

The nitrogen bottles must be recharged after each operation.

### 4-4. PRESSURIZATION.

- (1) Normal Flight. If cockpit pressurization fails, as indicated by cabin pressurization altimeter or warning light on instrument panel, operate as follows:
  - a. Pull handle on right cockpit floor aft. This operation dumps 'stale air', opens ram air door, and cuts off air supply from engine.
- (2) Combat. When entering combat, operate as follows:
  - a. Pull handle on left cockpit floor aft. This operation operates a combat override valve, and maintains constant optimum pressure at any altitude; thereby preventing decompression.

4-5. FIRE EXTINGUISHER. In case of engine fire, pull handle located on left cockpit floor. This operation releases four CO<sub>2</sub> bottles into engine compartment.

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