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**VOLPAR TURBO BEECH**

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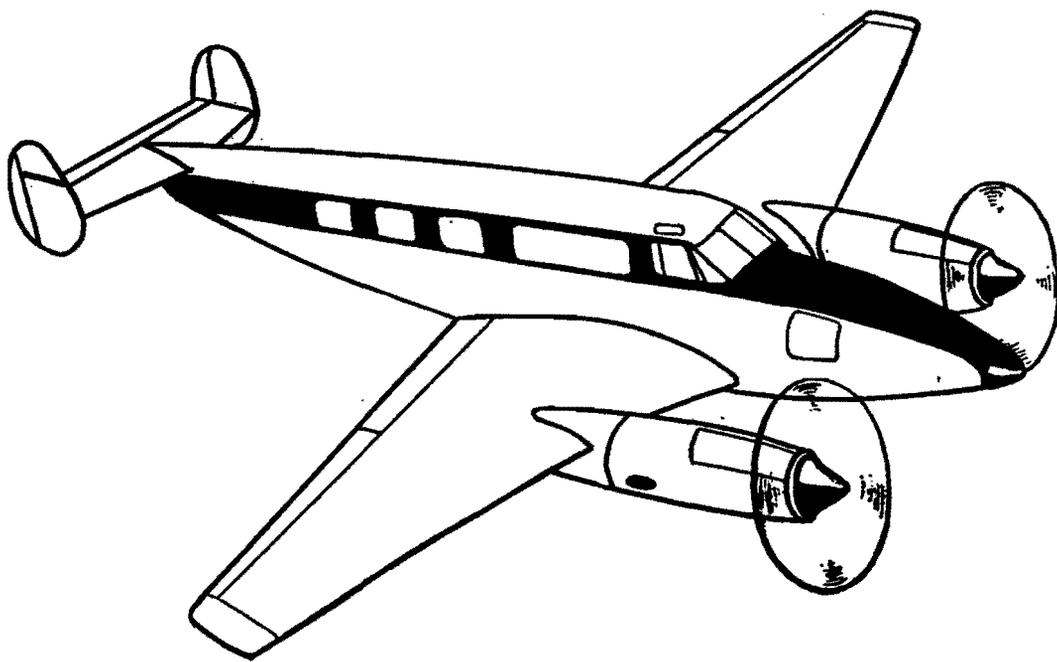
**[SECTION 9.60L]**

**OPERATIONS TRAINING**

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# Volpar Turbo Beech



***SECTION 9.60 L***

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## GENERAL DISCUSSION

### 1. Objective

The purpose of this training section is threefold:

- a. It provides a syllabus of instruction for the pilot, who is in training for First Officer or Captain checkout in the Volpar Turbo Beech aircraft.
- b. It serves as a guide to the instructor throughout the maneuvers which he is required to instruct, therefore standardizing the student's instruction.
- c. It provides a refresher for those qualified pilots who are about to receive a proficiency flight check.

Although all flight maneuvers are thoroughly described in this training section, there is no substitute for good judgement on the part of the pilot when performing these and any other maneuvers.

### 2. Crew Coordination

Operational requirements often dictate that only one pilot be assigned to a flight. When confronted with this type of operation, the pilot may have a tendency to lose his proficiency and professionalism by improperly planning the flight, disregarding checklists, and ignoring his own errors.

The necessity for professionalism becomes more apparent when operating solo. The pilot must establish good habits and demonstrate them throughout his training, and on check flights. He must treat the entire mission as though he were coordinating the efforts of two crewmembers, and by doing so will avoid the pitfalls of flying solo.

It is essential that the pilot have a thorough understanding of the aircraft performance data and be prepared to execute decisions based on this knowledge. For example, even though the pilot has an excellent feel for the airplane which he flies, he must, before take-

off, firmly fix in his mind  $V_{mc}$ ,  $V_2$  and stall speed (Fig. 1) and have a course of action to be taken in the event of an engine failure at any time during the takeoff maneuver. During short field operation the time lost "making" a decision instead of "executing" a previously decided course of action can mean the difference between a successful abort and a crash landing.

### 3. Use of Checklist

The checklist (Section 9.70) will be used at all times. When the crew consists of two pilots, the checklist will be read by the first officer and the responses will be as indicated. Do not skip items on the checklist. Complete each item before going to the next.

### 4. Performance Data

The performance data indicated in this section has been taken from the Airplane Flight Manual and will be used where applicable.

<u>ABBREVIATION</u>	<u>IAS (Kts)</u>	<u>REMARKS</u>
$V_a$	133	Design maneuvering speed.
$V_b$	133	Design speed for maximum gust intensity (turbulence).
$V_{fe}$	121	Flap Extension speed (Power off).
$V_{fe}$	104	Flap Extension speed (Power on).
$V_{le}$	138	Landing Gear extension speed.
$V_{mc}$	84	Minimum Control.
$V_{ne}$	208	Never exceed.
$V_{no}$	208	Normal operating
$V_R (1.05V_{mc})$	88	Rotation Speed.
$V_{so}$	See Fig. 1	Power off stall speed in landing configuration.

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## VOLPAR TURBO BEECH

### TAKEOFF & LANDING STALL & PERFORMANCE SPEEDS

(FLIGHT IDLE POWER)

GROSS WT. LBS	LANDING GEAR DOWN								
	V <sub>2</sub>	45° FLAP				0° FLAP			
	0°	FINAL	V <sub>50</sub>	V <sub>td</sub>	V <sub>so</sub>	FINAL	V <sub>50</sub>	V <sub>td</sub>	V <sub>s</sub>
	FLAP	1.3	1.2	1.1		1.3	1.2	1.1	
	V <sub>so</sub>	V <sub>so</sub>	V <sub>so</sub>		V <sub>s</sub>	V <sub>s</sub>	V <sub>s</sub>		
7500	93	82	76	69	63	92	85	78	71
8000	93	84	78	72	65	95	88	80	73
8500	93	87	80	74	67	97	90	83	75
9000	93	90	83	76	69	100	92	85	77
9500	93	92	85	78	71	103	95	87	79
9772	93	94	87	79	72	104	96	88	80
// MAXIMUM GROSS LANDING WEIGHT //									
10000	93	95	88	80	73	105	97	89	81
10286	93	96	89	81	74	107	98	90	82

Figure 1

ABBREVIATION	IAS (Kts)	REMARKS	MANEUVER	ITEM	ALLOWABLE TOLERANCE
V <sub>x</sub>	93	Best angle of climb (single engine).	Steep Turns	Angle of bank	± 5°
V <sub>x</sub>	100	Best angle of climb (two engine).	"	Airspeed	± 5 knots
V <sub>y</sub>	108	Best rate of climb (single engine).	"	Altitude	± 100 Ft.
V <sub>y</sub>	122	Best rate of climb (two engine).	"	Roll Out	± 5°
V <sub>2</sub> (V <sub>1</sub> )	93	Takeoff Safety speed.	Slow Flight	Airspeed	+ 5 Knots
	130-140	Long range climb speed.		Altitude	± 50 Ft.
V <sub>10</sub>	1.50 V <sub>so</sub>	Lift off speed	Approach to Stalls	Heading	± 5°
				Altitude	- 100 Ft.
				Heading	± 5°
5. <u>Standards and Grading Criteria</u>			Normal Turns (and holding)	Angle of bank	± 5°
While in training, the pilot is expected to improve with each successive flight. This improvement must take place in knowledge and flying ability if a successful checkout is to be accomplished. Therefore, as a measurement for expected performance during the proficiency check, the following tolerances are established for the training maneuvers:			"	Airspeed	± 5 Knots
			"	Altitude	± 50 Ft.
			Level Flight (and holding)	Airspeed	+ 5 Knots
				Altitude	± 50 Ft.
				Heading	± 5°
			Tracking	Heading	± 5°

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<u>MANEUVER</u>	<u>ITEM</u>	<u>ALLOWABLE TOLERANCE</u>
Approaches (including rapid descent and pullup)	Airspeed	+ 5 Knots
	Glide patch	within 50 Ft.
	Altitude	± 50 Ft. except at minimums + 50 - 0.

All other areas must be graded on knowledge, judgement, and aircraft control. This is especially true during takeoff, landing, and engine out maneuvers. Deviations (momentarily) from the above tolerances should not be cause for alarm. However, continued flight outside these tolerances will result in lower grades.

Grading of items within this section will be on the FAA standards which are listed below:

<u>GRADE</u>	<u>EXPLANATION</u>
1	Well above average (90-100)
2	Above average (85-89)
3	Average (80-84)
4	Below average (70-79)
5	Unsatisfactory ( 0-69)

## FLIGHT MANEUVERS

### Proficiency Requirements: Flight Maneuvers

#### Group I Ground Operations

1. Personnel Documentation and Logbook check.
2. Examination - Briefing.
3. Preflight Visual Inspection.
4. Engine Starting Procedure
5. Taxiing Procedure
6. Engine Runup.
7. Pre Takeoff Checks.
8. Area Departure and ATC Procedures.

#### Group II Takeoff and Climb

1. Normal Takeoff.
2. Rejected Takeoff.
3. Takeoff with Engine Failure.

4. Crosswind Takeoff.
5. Short-Field Takeoff.
6. Climb and Climbing Turns.

#### Group III Basic Airwork

1. Steep Turns.
2. Approach to Stalls.
3. Maneuvering at Minimum Speed (Slow Flight).
4. Rapid Descent and Pullup (Canyon Approach).
5. Recovery from Unusual Attitudes.

#### Group IV Landings

1. Normal Landing.
2. Single Engine Landing.
3. No-flap Landing.
4. Cross-wind Landing.
5. Short-field Landing.
6. Balked Landing.

#### Group V Instrument and Radio Navigation

1. VOR Orientation.
2. Aural Null Orientation and Time Check.
3. Area Arrival and Holding Procedures.
4. ADF Approach.
5. VOR Approach.
6. ILS and Radar Approach.
7. Missed Approach.
8. Circling Approach.

#### Group VI Emergency Procedures

1. Engine Failure Fire.
2. Fires: Electrical, Brake and Cabin.
3. Propeller Unfeathering.
4. Runway Propeller, Engine Overspeed.
5. Emergency Gear Extension.
6. Emergency Flap Extension.
7. Smoke Evacuation.
8. Passenger Evacuation.
9. Emergency Descents.
10. Brake Failure.
11. Fuel System.
12. Backing the Aircraft.

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## I. GROUND OPERATIONS

### 1. PERSONNEL DOCUMENTATION & LOGBOOK CHECK

Prior to the flight check or initial training flight, the trainee will present to the check pilot his Pilot Licenses, logbook, Medical Certificate, and Radio Operators Permit for inspection. On subsequent training flights he need only present his logbook.

### 2. EXAMINATION & BRIEFING SESSION

This session is actually made up of a briefing session, de-briefing session, and an oral or written exam. Below is a summary of the items which will be covered during the exam.

- a) Aircraft general: Description and location of components.
- b) Performance and limitations.
- c) Power plants and propellers.
- d) Systems:
  1. Fluid systems - fuel and oil.
  2. Heating and Cooling.
  3. Anti-icing.
  4. Electrical & Ignition.
  5. Fire Control: Location, type effectiveness and limitations.
  6. Landing gear.
  7. Flaps.
  8. Brakes.
  9. N.T.S.
- e) Emergency Procedures.
  1. Location and operation of propeller feathering, shutoff valves, electrical circuit breakers & fuses, fire extinguisher switches, and gear and flap extension handles.
  2. Location and operation of all emergency gear including rafts, life vests, first aid kits, fire extinguishers, portable oxygen, emergency radio, crash axe, etc.
  3. Knowledge of emergency procedures outlined in the Aircraft Flight

#### Manual:

- a. Engine Failure/Fire
- b. Cabin and Cockpit Fire.
- c. Brake Fire.
- d. Smoke Evacuation.
- e. Passenger Evacuation.
- f. Loss of Engine Oil Pressure.
- g. Loss of Electrical Power.
- h. Emergency Gear Extension.
- i. Emergency Flap Extension.
- j. Engine-Propeller over-speed and surge.
- k. Brake Failure.
- l. Fuel System.

### 3. PREFLIGHT & VISUAL INSPECTION

As a part of the briefing session a complete walk-around inspection of **the aircraft is required as outlined in Chapter 9 of the Airplane Flight Manual.**

- a) General external inspection will be conducted under the supervision of the check pilot.
- b) The interior inspection will include a check of cargo stowage, emergency equipment, etc.

### 4. ENGINE STARTING PROCEDURE

The pilot will demonstrate his ability to accomplish all items on the Pre-Starting and Engine Start, Checklist and start the engines in accordance with the procedures outlined in the Aircraft Flight Manual. The N.T.S. Check and strict adherence to standard starting procedures is important. The Pre-Taxi check list will be completed including the over-speed governor check, and the start locks will be disengaged before requesting taxi clearance.

### 5. TAXIING PROCEDURE

Maintain a careful lookout for obstructions during taxiing. Taxi slowly. When taxiing at night, taxi lights are

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used as required. Avoid blinding landing aircraft by turning them off.

Use power levers for directional and speed control whenever possible. Never start a turn from a parked or stopped position; let the aircraft roll a few feet forward first. Pivoting on one wheel causes excessive tire wear and should be avoided.

- CAUTION:** The propeller tips on the VTB have a level ground clearance of approximately 17 inches, however, during the first two months of operation, two propellers were damaged due to propellers striking the ground. Several explanations can be given for these propellers. (1) The propellers are  $2\frac{1}{2}$  feet forward of the nose wheel and will strike the ground if moving up a steep slope or the nosewheel drops in a deep depression. (2) The propellers are directly in line with the main gear and will strike the ground if a main wheel dips into a steep depression in the ground. (3) Pilot technique may also cause the propellers to strike the ground if the following are not strictly observed;
- a. Check struts for proper inflation and evenness on preflight before every flight.
  - b. Taxi the aircraft slowly on rough terrain.
  - c. Do not make high speed turns which may depress a main gear strut.
  - d. Do not use abrupt braking which will cause the nosewheel strut to depress..
  - e. Do not allow a main wheel or the nose wheel to enter an unusually steep or deep depression in the ground.

To slow or stop the airplane, apply pressure on the brakes gently to feel out the

braking action. Intermittent use of the brakes usually will give adequate braking action with the least amount of wear. Move the power levers towards reverse thrust to slow down and to assist in turns. Normally, align the nose wheel before stopping the airplane.

Listening to the sound level of the propellers can provide the pilot with an indication of each propellers pitch and thrust action during taxi.

## 6. ENGINE RUN-UP

Engine and propeller checks will be completed in accordance with procedures outlined in the Airplane Flight Manual. All temperature, RPM, and pressure limits or tolerances must be strictly complied with while performing the checks and during all phases of operation.

## 7. PRE TAKE OFF CHECKS

The trainee will be required to strictly adhere to standard procedure. He will be graded on the care and thoroughness used in completing the Pre-Take-Off check list and other preparations prior to taking off.

## 8. AREA DEPARTURE & ATC PROCEDURES

### 1) Description:

Knowledge of the procedures will be reviewed and demonstrated as follows:

- a. Definitions of control zones and areas.
- b. Hemispherical and quadrantal rules.
- c. Standard instrument departures, and area departure procedures.
- d. Altitude and time separation requirements.
- e. Compulsory reports.
- f. Clearance limit.
- g. Holding procedures.

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h. Traffic priority.

2) Demonstrate

- a. Ability to copy and adhere to clearance.
- b. Radio voice procedures.
- c. Preparation of navigational aids for the clearance received.

3) Standards

- a. Accurately record the clearance.
- b. Strict adherence to clearance.
- c. Judgement in accepting modified clearance.

## II. TAKEOFF AND CLIMB

### 1. NORMAL TAKEOFF (Figure 2)

A normal takeoff is performed in the same general manner as in other nose wheel aircraft; however, there are some precautions which must be observed. First, there is no nose-wheel steering system on this aircraft. Directional control during the initial portion of the takeoff roll should be accomplished by coordinated rudder application and differential power. Second, as the aircraft accelerates, ram effect will increase torque and exhaust gas temperatures (EGT). Therefore, the EGT indicators and power levers must be closely guarded to prevent the occurrence of over temperature conditions. Also, there is some lag between power lever movement and EGT indications. The net result can be as much as a 50° rise in EGT during takeoff. (The expected takeoff fuel flow and torque for existing temperatures can be found in the Airplane Flight Manual, Section 2).

Beginning the take-off, align the aircraft with the runway centerline with the nose-wheel straight. Release the brakes and move the power levers forward to maximum power. Bring the control column back to the neutral position thus streamlining the elevator

which will cause less drag and, consequently, faster acceleration.

### 2. REJECTED TAKEOFF (Figure 3)

The decision to abort a takeoff must occur prior to  $V_2$ . Continue the takeoff if  $V_2$  is reached. The procedures for take-off after reaching  $V_2$  are discussed in paragraph 3.

Figure 3 outlines the steps required for a rejected takeoff after engine failure, and must be followed in sequence as rapidly as possible. Directional control cannot be maintained below  $V_{mc}$  with maximum power on the good engine:

**CAUTION:** During the abort, single engine reversing is very critical and requires a high degree of pilot skill; therefore, only brakes should be used to stop the aircraft. During the course of training, the effects of single engine reversing may be demonstrated by the instructor.

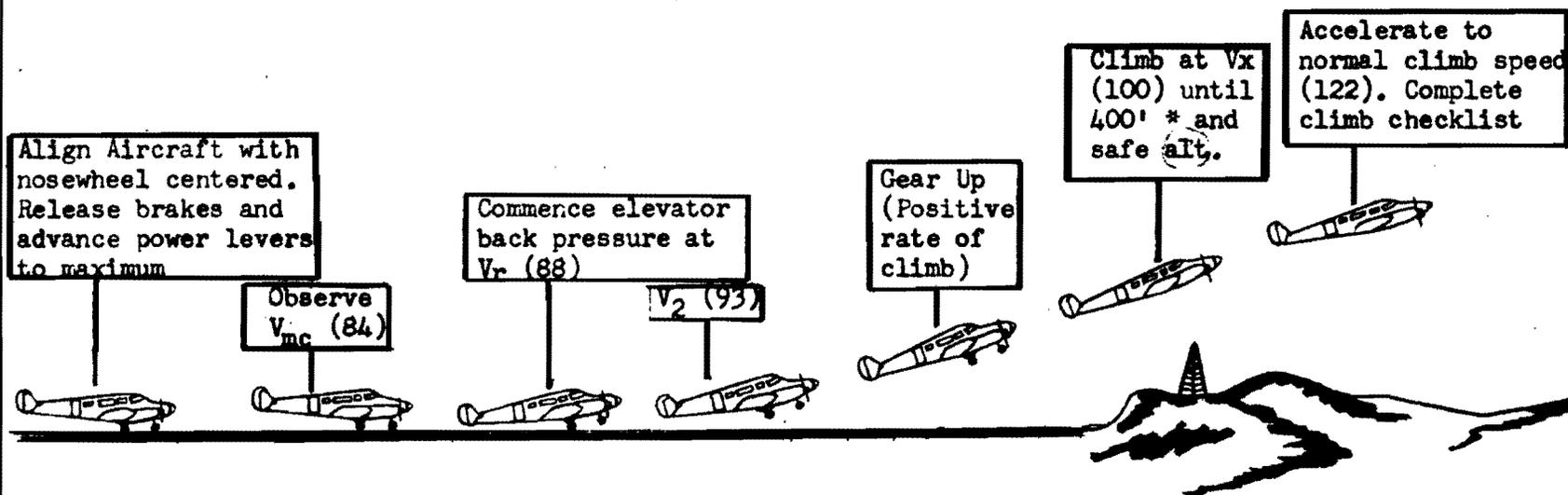
If the rejected takeoff is accomplished for any reason with both engines operating; brakes and reverse thrust will be used as required to stop the aircraft.

### 3. TAKEOFF WITH SIMULATED ENGINE FAILURE AT $V_2$ (Figure 4 and 4a)

During this training exercise, engine failure at  $V_2$  is accomplished by reducing power on the simulated failed engine (Approx. 25 SHP or 12 pounds of torque). Since simulated engine failure occurs at the moment of lift off ( $V_2$ ) the pilot must maintain  $V_2$  as directional control is marginal below this speed and impossible below  $V_{mc}$  (84Kts). Full rudder deflection and of bank into the good engine will be required to maintain directional control at  $V_2$ . See Figure 4 and 4a.

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NOTE: Turns are not normally made below 500'  
 \*\* Rolling takeoff is permitted



1. NORMAL TAKEOFF (\*Note: Maximum power limit is 5 minutes)

Figure 2

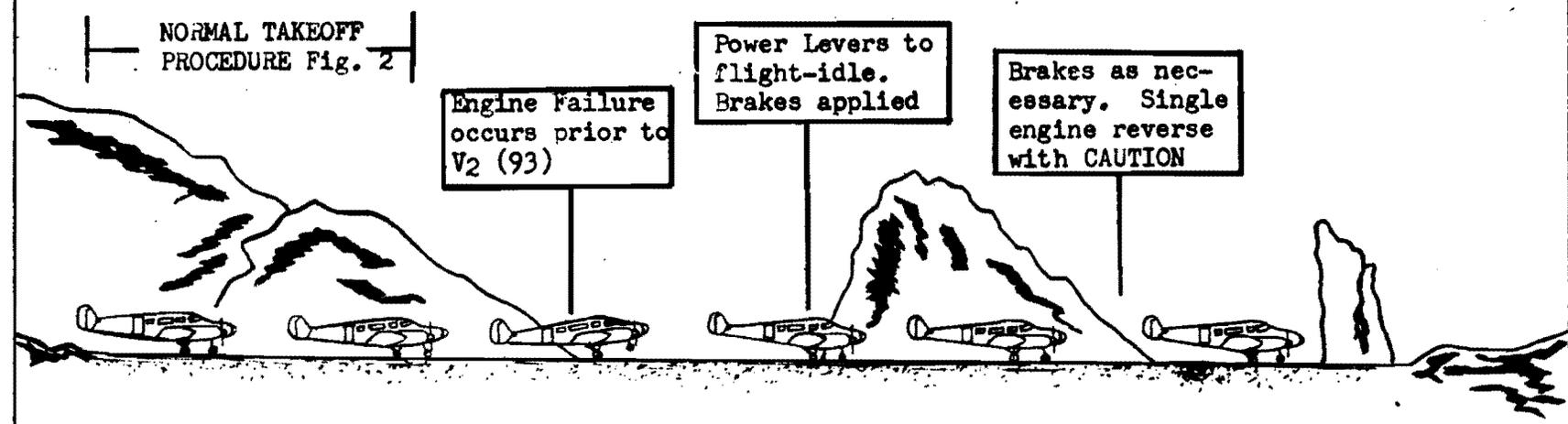
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## 2. REJECTED TAKEOFF

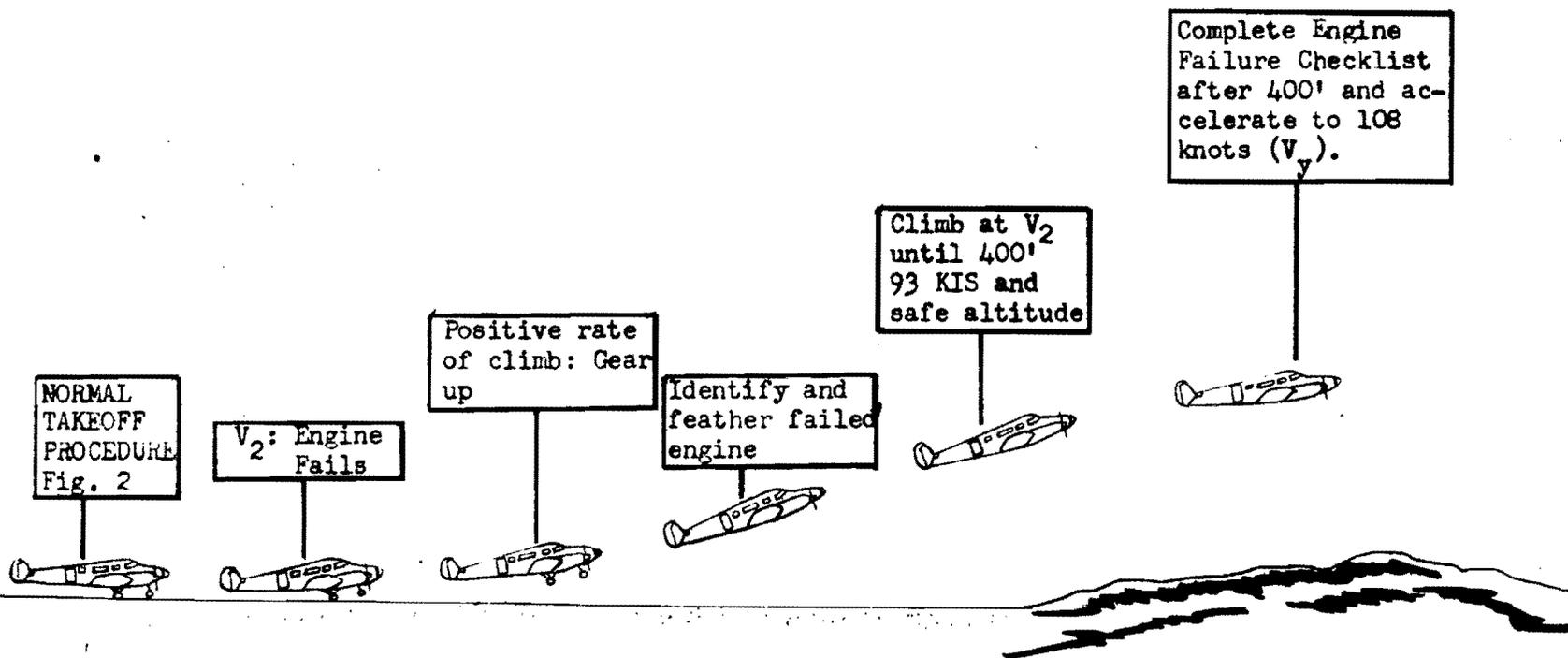
Figure 3

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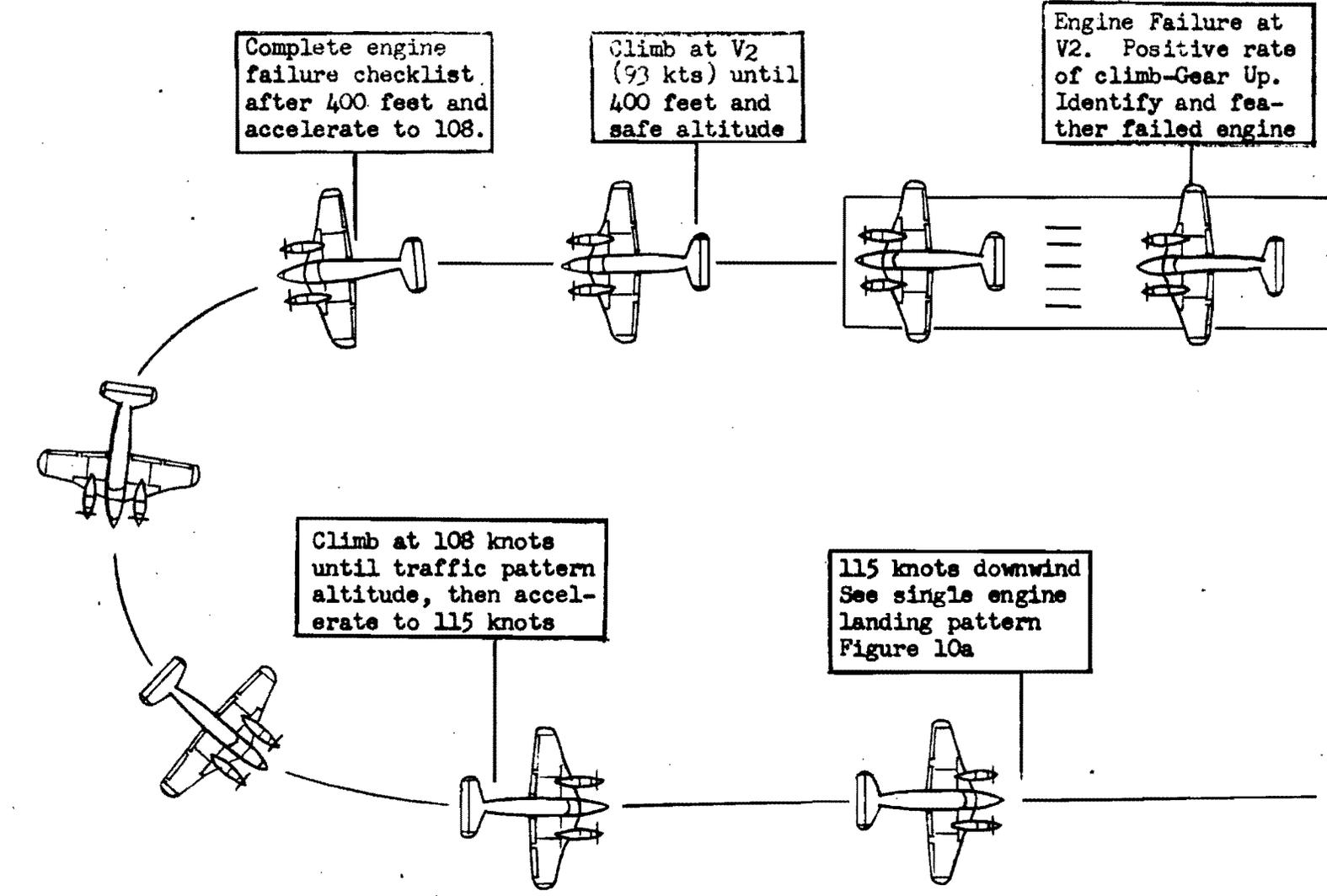
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3. Takeoff with Simulated engine Failure at  $V_2$ .

Figure 4



3. Takeoff with simulated engine failure at V2

FIGURE 4a

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## 4. CROSSWIND TAKEOFF

In addition to the procedures and techniques used in a normal takeoff, lead with the up-wind throttle sufficiently to correct for weather cocking tendencies. The application of aileron into the wind is effective as an assist to maintaining directional control.

## 5. SHORT FIELD TAKEOFF (Figure 6 and 6a)

A short field takeoff will permit operations on those airfields where insufficient runway is available for a normal takeoff. It is also used where obstacles to the takeoff path prevent a normal climb out after takeoff. Accomplishing a short field takeoff permits the airplane to become airborne as soon as practical and climb at maximum performance until clear of obstacles. It must be understood, however, that while performing this maneuver the aircraft is airborne before  $V_{mc}$  and any loss of power prior to attaining  $V_2$  could result in the loss of aircraft control. This is especially true of this aircraft as a result of the high angle of climb which results when climbing at less than  $V_2$ .

## 6. CLIMB AND CLIMBING TURNS

This maneuver will be practiced on all VFR flights while climbing to altitude. An area departure (simulated ATC clearance) will also be given during this training. The pilot will execute these maneuvers on instruments in the clean configuration.

AIRSPPEED - 122 Knots  
POWER - Maximum continuous

A base heading for climbing turns is usually selected by the instructor pilot, and standard rate turns of  $45^\circ$  on each side of the base heading are required. Roll from one turn into an

opposite turn until reaching the desired altitude.

For example: Base heading is  $270^\circ$   
Begin a turn from a heading of  $225^\circ$  to  $315^\circ$ , roll out momentarily, and turn back to  $225^\circ$  and so on. Fig.5.

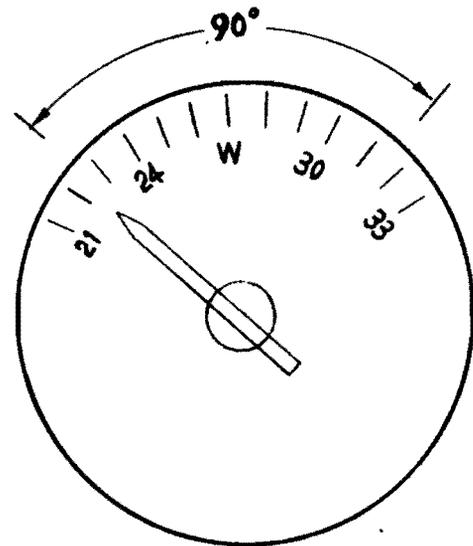


FIGURE 5

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A/C Wt	V <sub>10</sub>	V <sub>50</sub>
7500	66	63
8000	68	65
8500	70	67
9000	73	69
9500	75	71
10000	77	73
10286	78	74
V <sub>10</sub> = 1.05% V <sub>50</sub>		

SHORT FIELD TAKEOFF

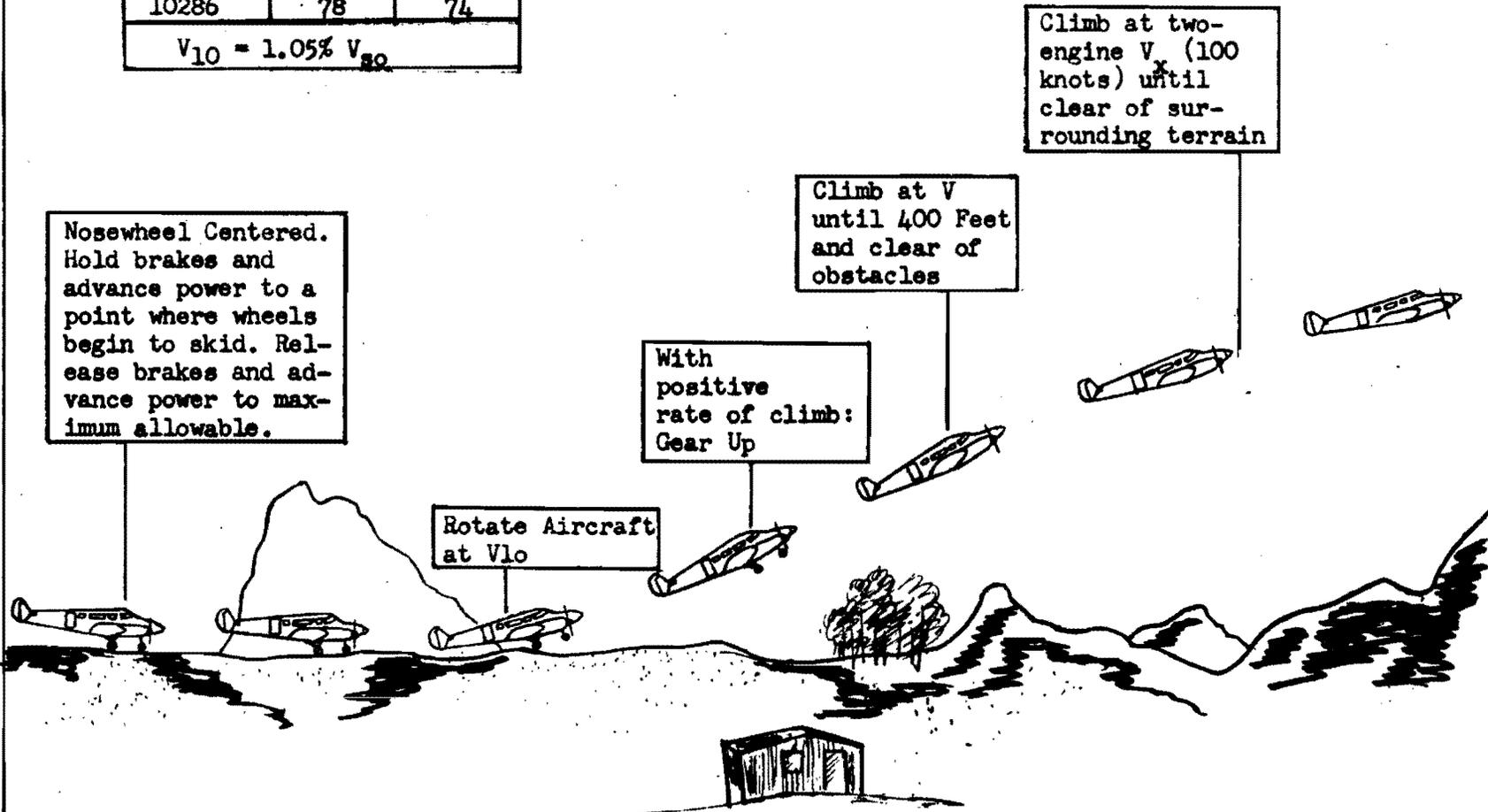


Figure 6

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## CALCULATED VOLPAR SHORT FIELD TAKE-OFF PERFORMANCE

$$15^\circ \text{ FLAP} - V_{LO} = 105\% V_{SO}$$

GROUND ROLL AND (TOTAL DISTANCE TO 50 FEET)  
HOT DAY AND ZERO WIND\*

TAKE-OFF WEIGHT (LBS)	V <sub>LO</sub> LIFT OFF SPEED	FIELD ELEVATION FEET					
		SEA LEVEL	1000	2000	3000	4000	5000
7400	65	540 (960)	570 (1005)	605 (1055)	640 (1110)	675 (1170)	715 (1240)
7800	67	605 (1170)	635 (1215)	670 (1265)	715 (1320)	750 (1380)	795 (1450)
8200	69	680 (1260)	710 (1305)	745 (1355)	780 (1410)	820 (1470)	870 (1540)
8600	70	750 (1360)	780 (1405)	815 (1460)	850 (1515)	890 (1575)	950 (1650)
9000	72	840 (1460)	870 (1505)	905 (1555)	940 (1610)	985 (1680)	1045 (1755)
9400	74	910 (1570)	940 (1615)	975 (1665)	1010 (1725)	1060 (1800)	1120 (1875)
9800	76	1010 (1670)	1040 (1715)	1075 (1765)	1110 (1825)	1165 (1900)	1235 (1975)

\*Take-off weights may be increased 100 pounds for each knot of headwind and should be decreased 150 pounds for each knot of tailwind.

Figure 6a

Data is based on 30°C temperature at sealevel. Take-off weights should be decreased by 75 pounds for each 1°C higher than base temperature.

The pilot will be required to determine the expected fuel flow to give limit EGT and torque, or power, available for take-off at limit EGT from the charts and graphs in Chapter 2 of the Airplane Flight Manual.

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## III. BASIC AIRWORK

### 1. STEEP TURNS

Steep turns are accomplished in a clean configuration at a minimum altitude of 4000 feet above the ground. Normally the first turn will be to the right to enable the instructor pilot to clear the area.

**AIRSPEED - 150 Knots**

Turns will be at least 180° but generally 360° of turn with 45° of bank. The pilot will normally be required to roll smoothly from a steep turn in one direction to a steep turn in the opposite direction.

When entering the turn, as the airplane rolls through 30° of bank angle, thrust must be increased 2 or 3 pounds of torque to maintain airspeed while in the turn.

Roll out of the turn should be initiated approximately 15° prior to the predetermined heading.

### 2. APPROACH TO STALLS (Figure 7a)

Approaches to stalls are practiced to familiarize the pilot with the stall characteristics, recognition of the impending stall, and proper recovery techniques. These maneuvers are practiced not less than 4000 feet above the ground in both the clean and landing configurations.

Refer to Figure 7a for the description of the approach to stalls maneuver. Approaches to stall will also be done in standard rate turns. The recovery technique is the same with the added action of correcting out of the turn with rudder primarily, and ailerons. The range of synthetic stall warning (stick shaker) should be

thoroughly explored while performing this maneuver.

### 3. MANEUVERING AT MINIMUM SPEEDS (Slow Flight)

AIRSPEED - 85 Knots  
POWER - As required  
RPM - 100%

Slow the aircraft by reducing power to flight Idle, and as the airspeed approaches 85 Knots, and power to maintain 85 Knots.

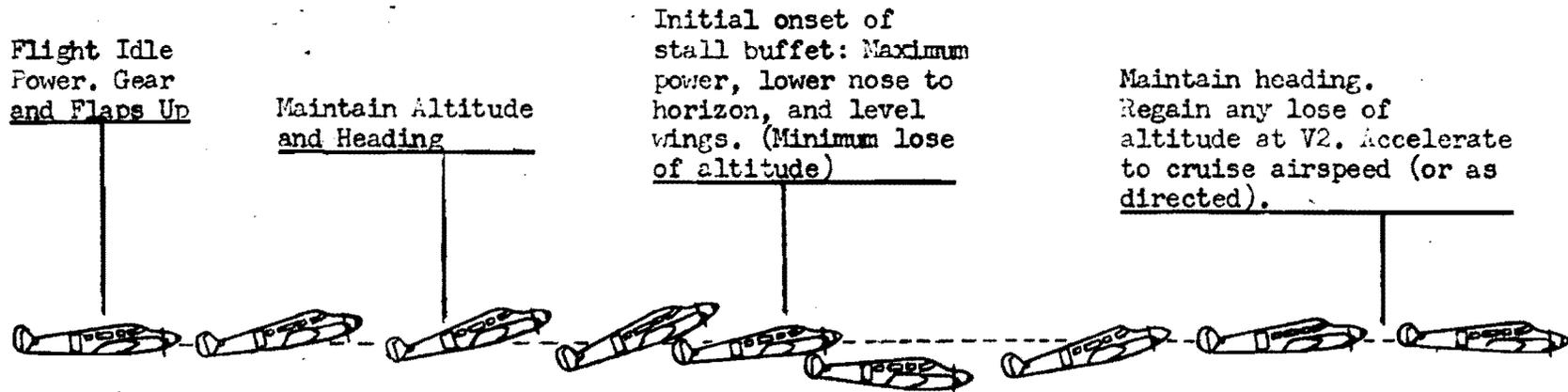
Once the airspeed has stabilized the instructor will change the aircraft configuration with flaps and gear combinations. The pilot will be expected to maintain airspeed, altitude, and heading within the prescribed tolerances. Level, climbing and descending turns with 20° of bank will be a part of this maneuver. Although the power setting to maintain 85 Knots will vary with gross weight, the following table provides a reference torque value for the configuration indicated:

Clean	- 20 lbs. Torque
Gear down	- 22 lbs. Torque
Gear down; Flaps 15°	- 24 lbs. Torque
Gear down; Flaps 30°	- 27 lbs. Torque
Gear down; Flaps 45°	- 29 lbs. Torque

The following figures have been taken from Figure 1 and are placed here as a reminder of the indicated stall speed for the VTB:

GROSS WEIGHT	Gear Down 45° Flaps V <sub>so</sub>	Flaps 0° V <sub>s</sub>
7500	63	71
8500	67	75
9500	71	79
10000	73	81

Figure 7



NOTE: 1. Apply Maximum power by a smooth positive motion, but not abruptly, as at low airspeeds the VTB has a strong tendency to roll if maximum power is suddenly applied.

NOTE: 2. Excessive control surface deflections aggravate the stall and can induce a secondary stall.

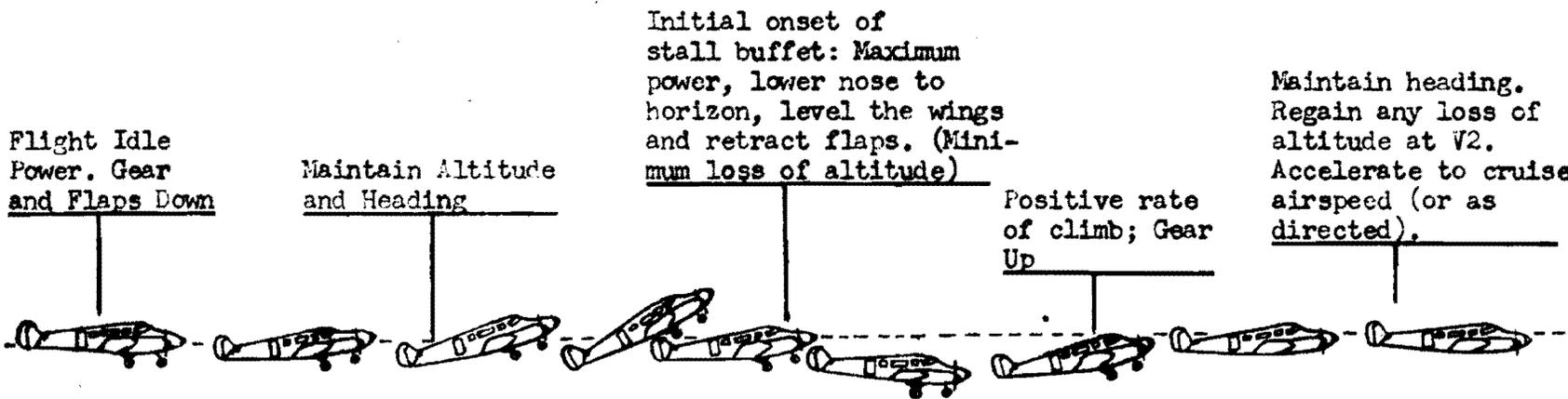


FIGURE 7a

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## 4. RAPID DESCENT AND PULL-UP (CANYON APPROACH) - (Figure 8)

The Canyon Approach is an instrument practice maneuver which tests a pilot's ability in many of the aspects of instrument flying and aircraft control. Figure 8 outlines this maneuver; however, the station portrayed is imaginary and is based purely on a time to begin the maneuver. When this time is established, the pilot must complete the sequence according to a set schedule. Sometime during the maneuver, which is must be performed above 4000 feet, an engine may be failed, and the pilot will be expected to complete the maneuver as described.

Altitude, airspeed, rate of descent, and missed approach must be controlled with precision, and executed precisely at the correct time. Correct performance of the emergency check list is of importance.

When engine failure/fire is given, the pilot will call out and perform the immediate action items of the Engine Failure/Fire Check List while continuing the assigned maneuver. Completion of the "clean up" items on the Emergency Check List should be done as soon as practicable, however this is secondary to precise control of the aircraft to completion of the maneuver.

Subsequent to propeller feathering, an air start will be performed according to Company check list procedure.

**NOTE:** Gear Extension and Retraction Time is 9 seconds.  
Flaps Extension Time is 5 seconds.  
Flaps Retraction Time is 3 seconds.

## 5. RECOVERY FROM UNUSUAL ATTITUDES

Recovery from unusual flight attitudes are performed at least 5000 feet above

the ground, and on partial panel instruments. Aside from the proficiency gained by flying partial panel, the pilot will be subject to vertigo and benefit from this experience.

The instructor pilot will ask the pilot to cover his eyes and lower his head forward. The instructor will place the aircraft in an unusual attitude and ask the trainee to recover.

Recovery is accomplished in the following manner:

### PARTIAL PANEL

Determine whether the aircraft is in a climb or dive by referring to the airspeed indicator, altimeter, and vertical velocity indicator.

- a. Apply or reduce power as appropriate.
- b. Center the turn needle with rudder, center the ball with aileron and recover from the climb or dive. Reversal of the airspeed, altimeter, and at times the vertical velocity, trends, will show that level flight attitude has been reached. If the nose was extremely high (airspeed very low or decreasing rapidly) recovery may be aided by maintaining approximately a standard rate turn until the nose reaches the horizon.

### FULL PANEL INSTRUMENTS

Recovery from unusual flight attitudes, by reference to full panel flight instruments, is made in basically the same manner as above. Reference to the attitude indicator (gyro horizon) enables a more rapid and positive interpretation of the aircraft attitude and greatly facilitates an accurate correction.

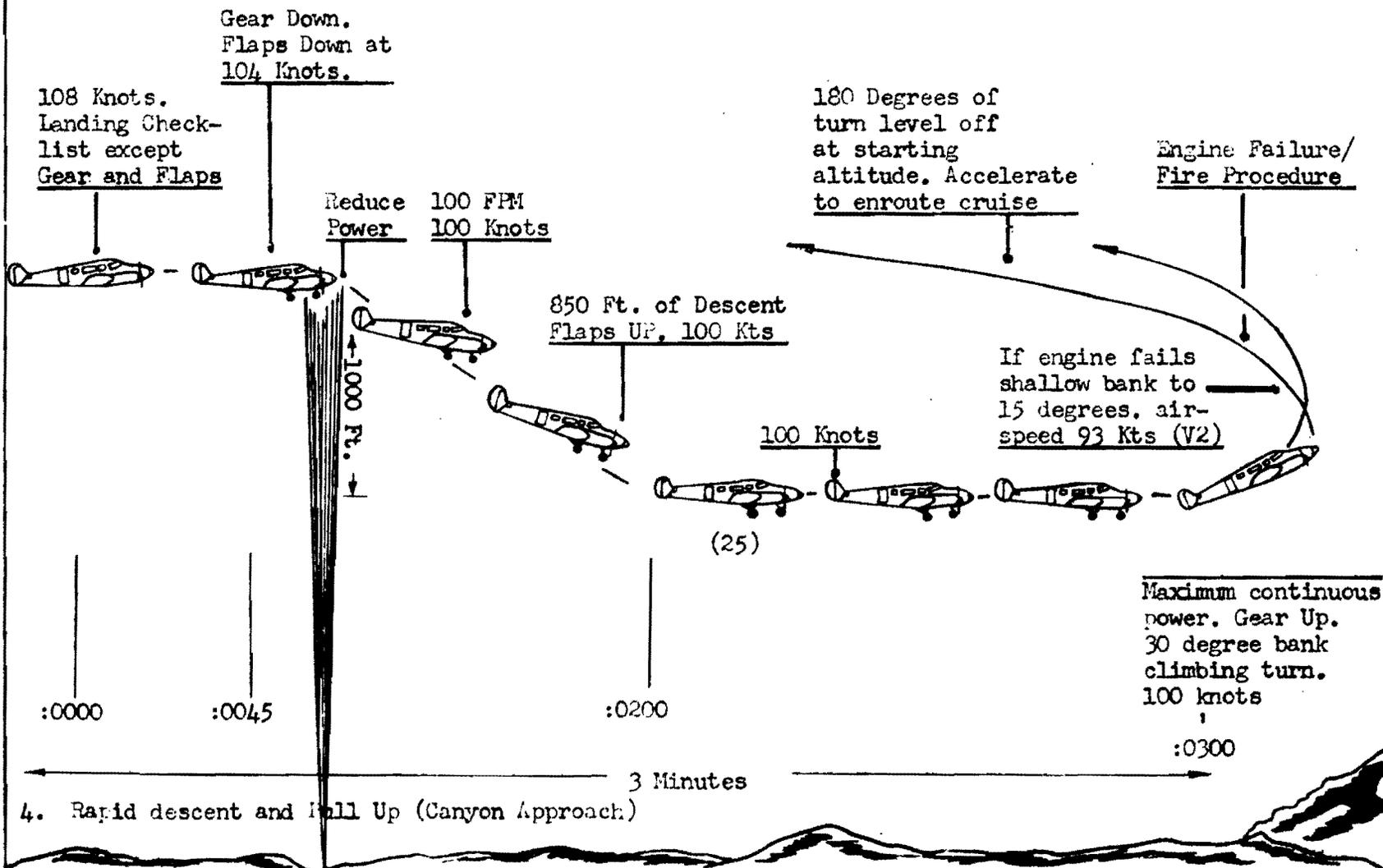
**NOTE:** The instructor/check pilot may eliminate the requirement for recovery on partial panel instruments, at his discretion.

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- NOTE: 1. Minimum starting altitude for this maneuver is 5000 feet
- NOTE: 2. Engine failure/fire may occur at any time throughout this maneuver
- NOTE: 3. Figures in parentheses () beneath the aircraft indicate the approximate torque setting



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FIGURE 8

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## IV. LANDINGS

### 1. NORMAL LANDING (Figure 9 and 9a)

Traffic patterns must be flown in accordance with local rules; however, most traffic patterns are flown at 1000 feet above the airport elevation. Figure 9 and 9a depict the normal sequence of events in the traffic pattern. The distance of 4000 feet from the end of the runway (Figure 9a) is the minimum final approach. Normally the aircraft should be established on final approach at approximately one mile from the end of the runway at an elevation of at least 600 feet above the runway surface. Rate of descent on final will be approximately 500-800 FPM.

### 2. SINGLE ENGINE LANDING (Figure 10 and 10a)

Immediately upon failure of an engine, identify the failed engine, and apply the correct emergency procedures, i.e. increase thrust and retract the landing gear and flaps as required, complete the immediate action items, and follow with the Engine Failure/Fire Check List. The minimum desired airspeed throughout the landing pattern is 108 Kts. until the landing is assured. The use of flaps for landing is not mandatory unless runway conditions (length) require their use.

**CAUTION:** Safe single engine speed (V2) is 93 KIAS. This is an absolute minimum speed for all modes of single engine flight until the landing is definitely assured.

### 3. NO-FLAP LANDING

A normal traffic pattern will be flown for a no-flap landing. Power adjustments must be made in sufficient time to arrive at the speeds depicted in

Figure 1 (0° flap); otherwise, the only significant difference from a normal landing will be the touchdown at a higher angle of attack and an increased ground roll distance due to the higher approach and touchdown speeds.

For convenience, the 0° flap portion of Figure 1 is reproduced here:

GROSS WT. LBS.	FINAL	0° FLAP		V <sub>s</sub>
	V <sub>so</sub>	V <sub>50</sub>	V <sub>td</sub>	
7500	92	85	78	71
8000	95	88	80	73
8500	97	90	83	75
9000	100	92	85	77
9500	103	95	87	79
10000	105	97	89	81
10286	107	98	90	82

### 4. CROSS-WIND LANDING

The wing-down method should be used to correct for drift while on final approach, and during touchdown. Apply sufficient control displacement to keep the longitudinal axis of the airplane aligned with the runway. After touchdown, continued application of aileron into the wind is an effective assist to directional control. Asymmetric reverse thrust may also be used for directional control. Pilots should be familiar with the maximum cross wind chart in section 5 of the Airplane Flight Manual.

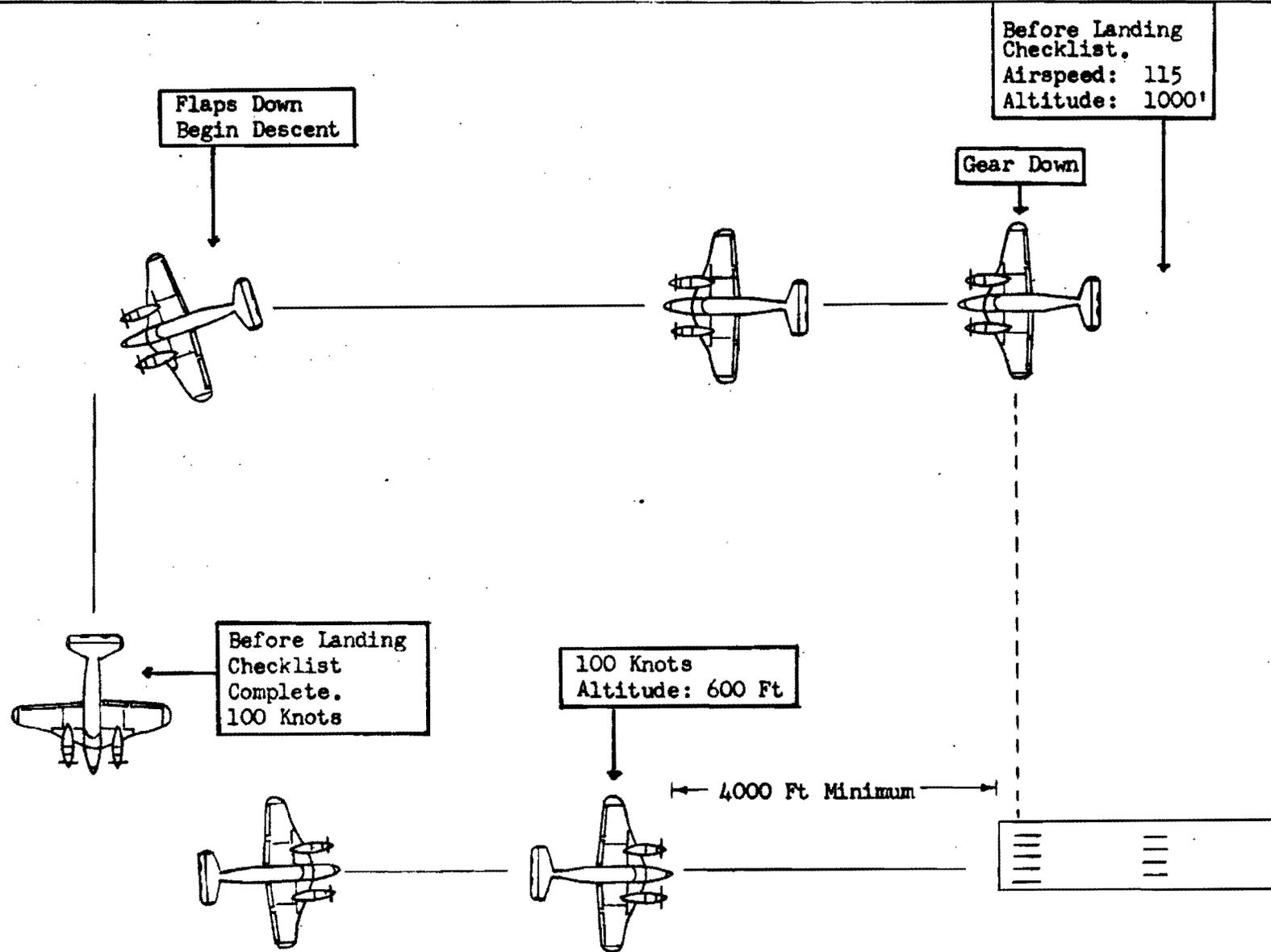
**CAUTION:** During gusty wind conditions, increase final approach airspeed. As a general rule, increase final approach speed by at least one half of the reported gust velocity.

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(For final approach segment - see Figure 9a)

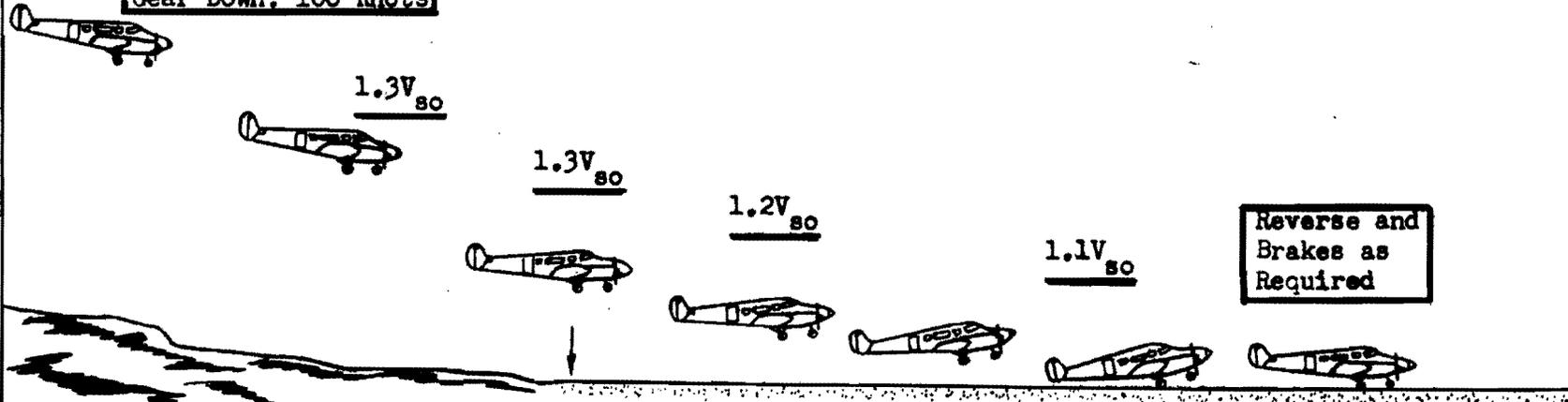
1. NORMAL LANDING

Figure 9

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GROSS WT. LBS	LANDING GEAR DOWN								
	V <sub>2</sub>	45° FLAP				0° FLAP			
	0°	FINAL	V <sub>50</sub>	V <sub>td</sub>		FINAL	V <sub>50</sub>	V <sub>td</sub>	V <sub>s</sub>
	FLAP	1.3 V <sub>so</sub>	1.2 V <sub>so</sub>	1.1 V <sub>so</sub>	V <sub>so</sub>	1.3 V <sub>s</sub>	1.2 V <sub>s</sub>	1.1 V <sub>s</sub>	V <sub>s</sub>
7500	93	82	76	69	63	92	85	78	71
8000	93	84	78	72	65	95	88	80	73
8500	93	87	80	74	67	97	90	83	75
9000	93	90	83	76	69	100	92	85	77
9500	93	92	85	78	71	103	95	87	79
9772	93	94	87	79	72	104	96	88	80
<b>MAXIMUM GROSS LANDING WEIGHT</b>									
10000	93	95	88	80	73	105	97	89	81
10286	93	96	89	81	74	107	98	90	82

← Landing Checklist Completed. Flaps 45° Gear Down. 100 Knots



Reverse and Brakes as Required

(After Landing Checklist when clear of runway)

1. NORMAL LANDING (Final approach segment)

Figure 9a

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Before Landing  
Checklist Except  
Gear & Flaps.  
115 knots (108  
Minimum)

Gear Down  
begin  
Descent

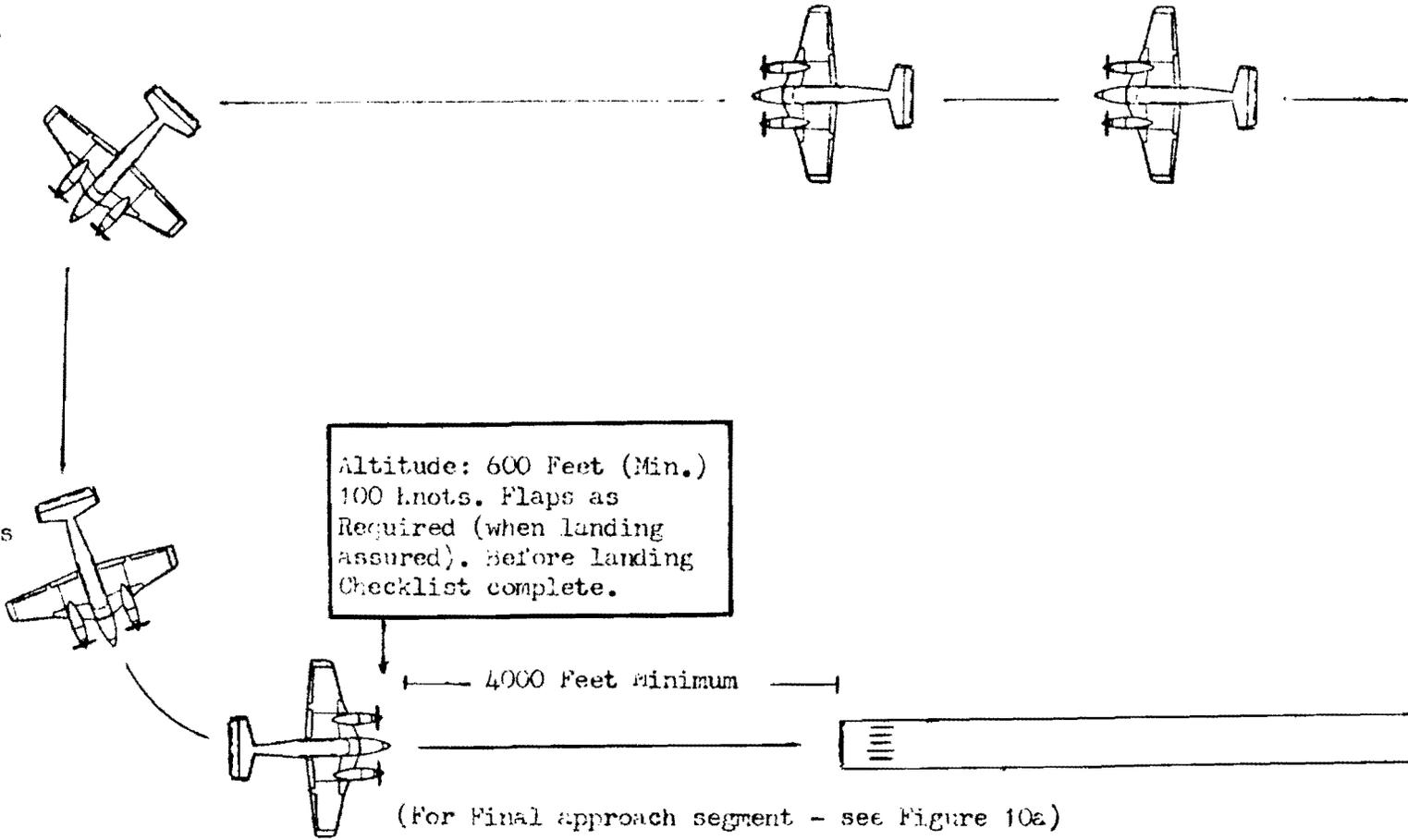
100 knots

Altitude: 600 Feet (Min.)  
100 knots. Flaps as  
Required (when landing  
assured). Before landing  
Checklist complete.

4000 Feet Minimum

(For Final approach segment - see Figure 10a)

## 2. LANDING (Single Engine)

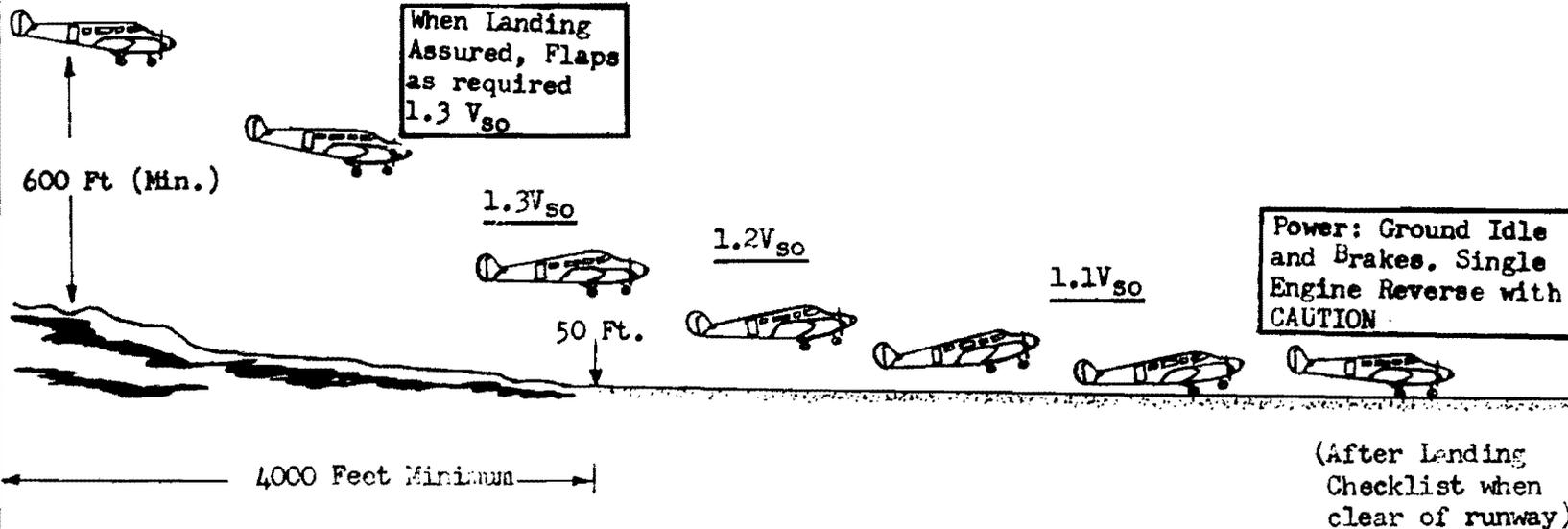


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GROSS WT. LBS	LANDING GEAR DOWN								
	V <sub>2</sub>	45° FLAP				0° FLAP			
	0° FLAP	FINAL 1.3 V <sub>so</sub>	V <sub>50</sub> 1.2 V <sub>so</sub>	V <sub>td</sub> 1.1 V <sub>so</sub>	V <sub>so</sub>	FINAL 1.3 V <sub>s</sub>	V <sub>50</sub> 1.2 V <sub>s</sub>	V <sub>td</sub> 1.1 V <sub>s</sub>	V <sub>s</sub>
7500	93	82	76	69	63	92	85	78	71
8000	93	84	78	72	65	95	88	80	73
8500	93	87	80	74	67	97	90	83	75
9000	93	90	83	76	69	100	92	85	77
9500	93	92	85	78	71	103	95	87	79
9772	93	94	87	79	72	104	96	88	80
// // // // // MAXIMUM GROSS LANDING WEIGHT // // // // //									
10000	93	95	88	80	73	105	97	89	81
10286	93	96	89	81	74	107	98	90	82

← Landing Checklist Completed. Gear Down  
1.3 V<sub>so</sub> Minimum

When Landing Assured, Flaps as required  
1.3 V<sub>so</sub>



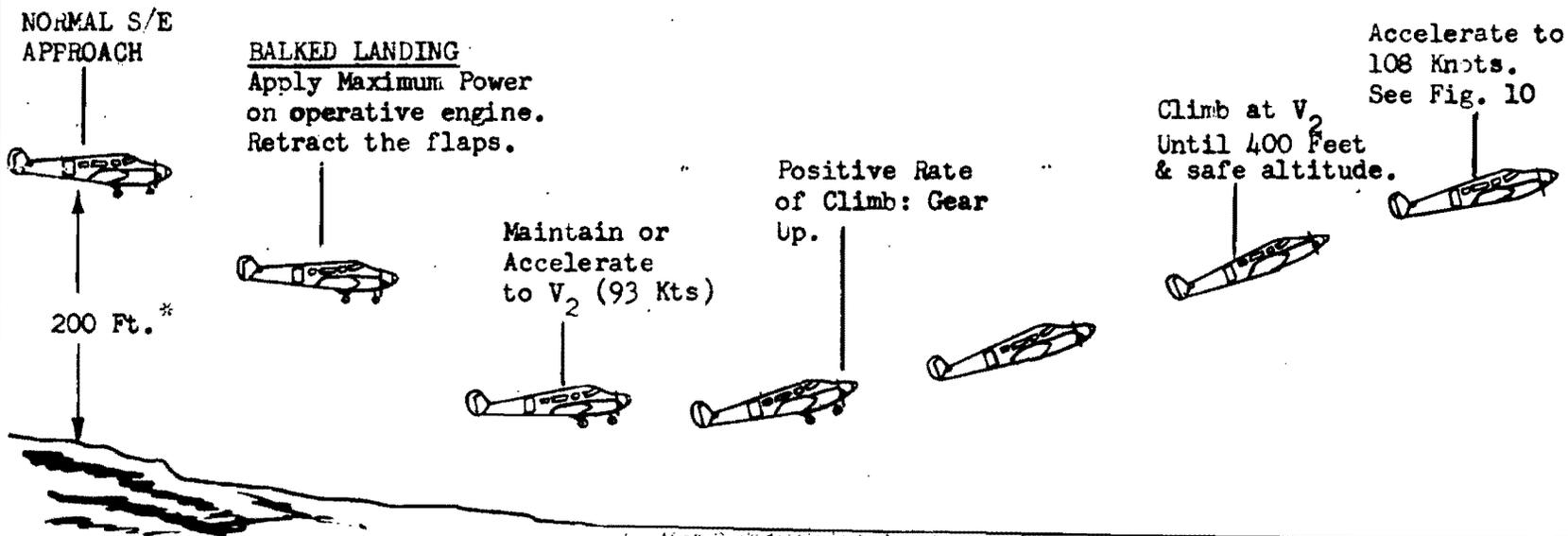
## 2. LANDING (Single Engine)

Figure 10a

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\* Minimum altitude for safely completing this maneuver: 200 Ft.



6. BALKED LANDING (Single Engine)

Figure 10b

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## 5. SHORT FIELD LANDING (Figure 11 and 11a)

Short field landings are accomplished in order to stop the airplane in the shortest possible distance. Usually this maneuver is only performed on those airfields which have unprepared surfaces, and the length of which is inadequate to accomplish a normal landing. **WARNING** Final segment of approach speeds are slightly lower than  $V_{mc}$ . It is imperative that the approach be planned and carefully flown, and that the aircraft speed remain above  $V_{mc}$  until the landing is assured. A normal traffic pattern is depicted in Figure 9; however, it may be adjusted to fit local conditions where necessary. Figure 11 outlines the final approach segment and is designed to give the best possible performance commensurate with safety. Figure 11a will give short field landing performance.

**NOTE:** The factors effecting the long term success of short field operation are varied and numerous. It is imperative that pilots who engage in short field operation be intimately knowledgeable of all performance data pertaining to the aircraft and power plants and, be completely acquainted with the physical characteristics of the landing site. Due consideration and compensation must be given to aircraft gross weight, temperature, elevation, wind, runway gradient(s) and surface condition, braking action, and surrounding terrain, plus many other factors and considerations. All of this must be included in a plan of careful action with a further plan for action in the event that the initial plan should fail or be abandoned at any point. Then the plan must be carefully executed with skill tempered by good judgement.

## 6. BALKED LANDING

### TWO ENGINE (Fig. 11b)

A balked landing (go-around) may be accomplished from any position on the final approach:

- Apply maximum power and establish a positive rate of climb at or above the two engine balked landing climb speed of 87 knots.
- Retract the flaps after attaining a positive rate of climb.
- Retract the landing gear.
- Climb at  $V_x$  100 to 400 feet and clear of obstacles.
- Proceed as during takeoff (normal Fig. 2 or short field Fig. 6).

### SINGLE ENGINE (Fig. 10b)

Executing a single engine balked landing after flaps have been extended is impossible unless the following procedure is followed:

- Apply maximum power on the operative engine (Minimum airspeed  $V_{mc}$ )
- Retract the flaps and accelerate to  $V_2$ .
- When a positive rate of climb is established, retract the landing gear.
- Proceed as during takeoff with engine failure.

THE MINIMUM ALTITUDE FOR COMPLETING A SINGLE ENGINE BALKED LANDING IS 200 FEET.

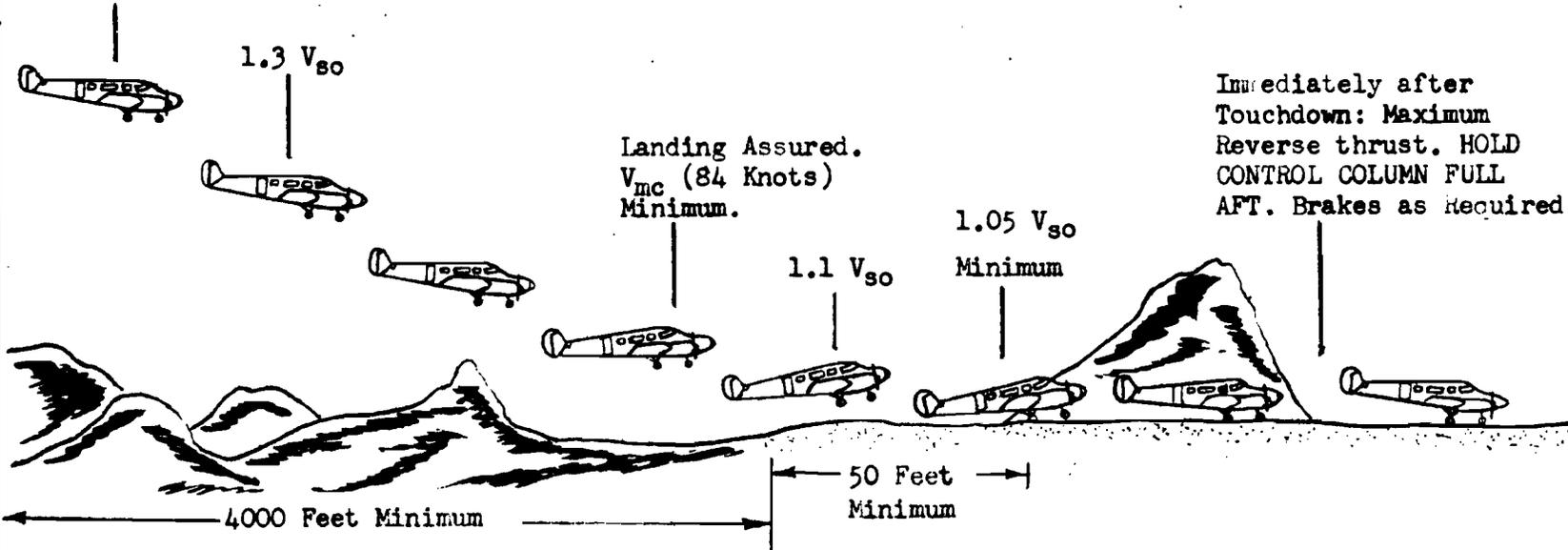
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GROSS WT. LBS.	LANDING GEAR DOWN								
	V <sub>2</sub>	45° FLAP				0° FLAP			
	0°	FINAL	V <sub>50</sub>	V <sub>td</sub>	V <sub>so</sub>	FINAL	V <sub>50</sub>	V <sub>td</sub>	V <sub>s</sub>
	FLAP	1.3 V <sub>so</sub>	1.2 V <sub>so</sub>	1.1 V <sub>so</sub>		1.3 V <sub>s</sub>	1.2 V <sub>s</sub>	1.1 V <sub>s</sub>	
7500	93	82	76	69	63	92	85	78	71
8000	93	84	78	72	65	95	88	80	73
8500	93	87	80	74	67	97	90	83	75
9000	93	90	83	76	69	100	92	85	77
9500	93	92	85	78	71	103	95	87	79
9772	93	94	87	79	72	104	96	88	80
MAXIMUM GROSS LANDING WEIGHT									
10000	93	95	88	80	73	105	97	89	81
10286	93	96	89	81	74	107	98	90	82

Landing Checklist  
 Completed  
 Flaps: 45°  
 Gear: Down  
 1.3 V<sub>so</sub> Minimum



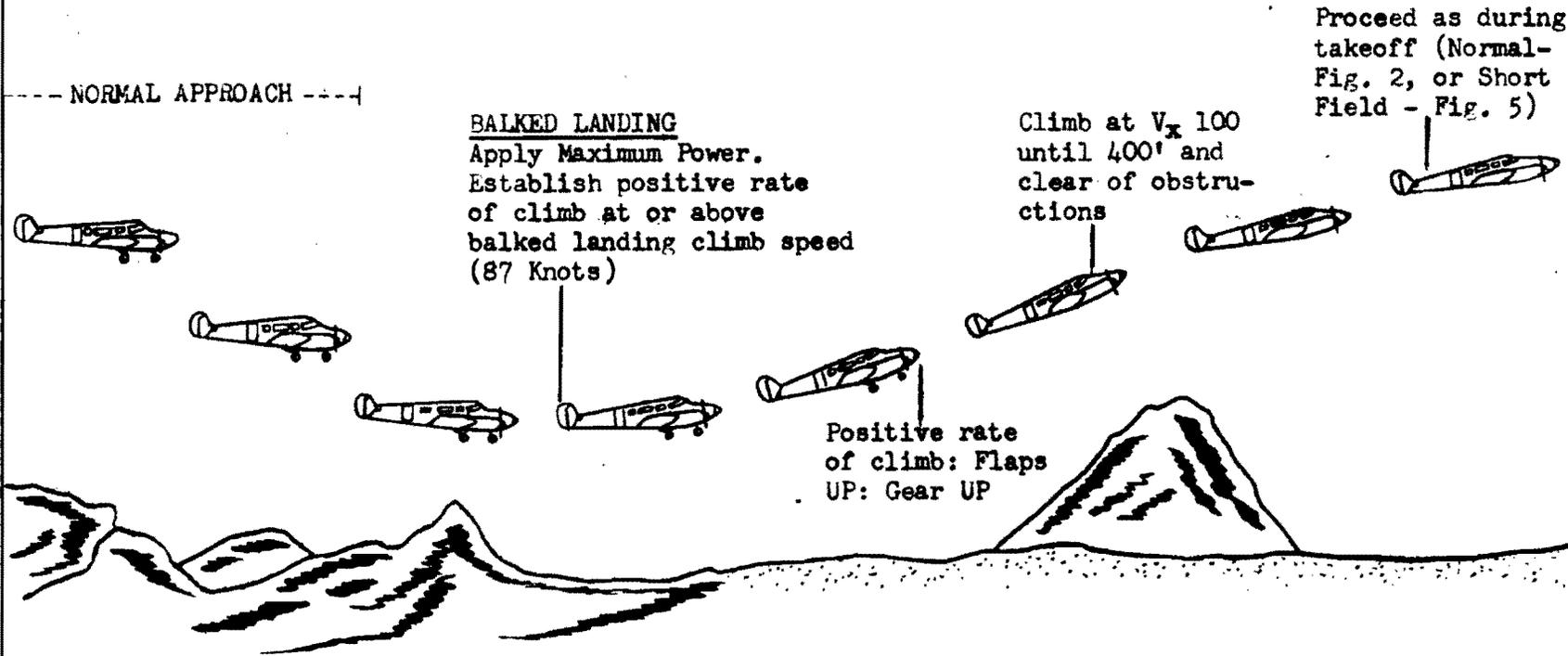
5. SHORT FIELD LANDING (Maximum Performance)

Figure 11

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6. BALKED LANDING (Two Engine)

Figure 11b

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## V. INSTRUMENT AND RADIO NAVIGATION

### 1. VOR ORIENTATION

After tuning the VOR to the proper station and identifying it, complete a VOR orientation utilizing the CDI only:

- Rotate the course selector to determine which radial the aircraft is on.
- Turn the aircraft to a  $90^\circ$  intercept heading.
- Begin a  $10^\circ$  time check and orientation.
- After completing the  $10^\circ$  time check advise the instructor of the ETA over the VOR.

The following formula will be used to determine the time from the station.

$$\frac{\text{TIME IN SECONDS}}{\text{DEGREE OF BEARING CHANGE}} = \frac{\text{TIME TO THE STATION IN MINUTES}}{1}$$

### 2. RADIO COMPASS AURAL NULL ORIENTATION

Tune the radio compass to the proper station, identify it, and using the LOOP, complete an orientation and time check as outlined below:

- Adjust the radio compass volume for a null width of  $5-8^\circ$ .
- Using the radio compass bearing indicator, complete the orientation and time check as outlined under VOR procedures.

Ambiguity is solved by the following:

- If the bearing to the station INCREASES, the station is on your right.
- If the bearing to the station DECREASES, the station is on your left.

## 3. AREA ARRIVAL AND HOLDING PROCEDURES

An area arrival will be accomplished and may be simulated or an actual area arrival. This will include holding, tracking and intercepting theoretical intersections. Standardized holding procedures will be used. (Figure 12). Holding is accomplished at 120 knots (clean), and the aircraft will begin deceleration to 120 knots within three minutes of the station.

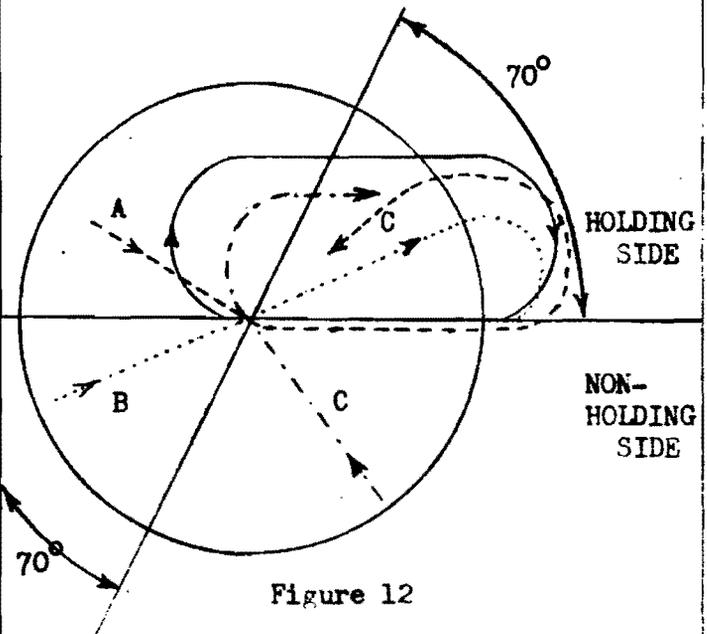


Figure 12

Entry Procedures:

#### A. Parallel Procedure

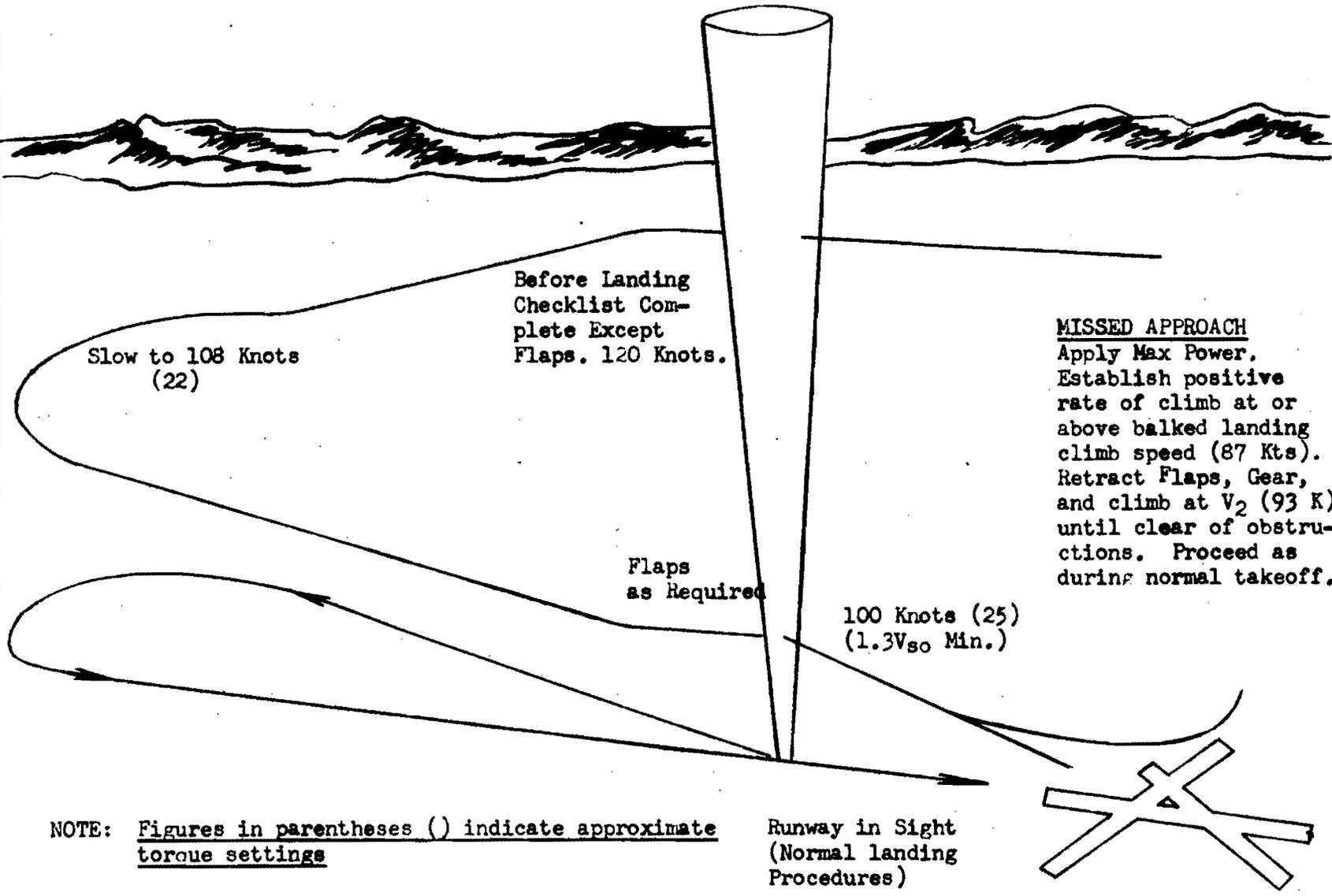
Parallel the holding course, turn left and return to the holding fix or intercept the inbound holding course.

#### B. Tear Drop Procedure

Proceed on outbound track of  $30^\circ$  to holding course, turn right to intercept holding course.

7025-7528

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NOTE: Figures in parentheses () indicate approximate torque settings

ADF or VOR Approach (with Missed Approach)

Figure 13

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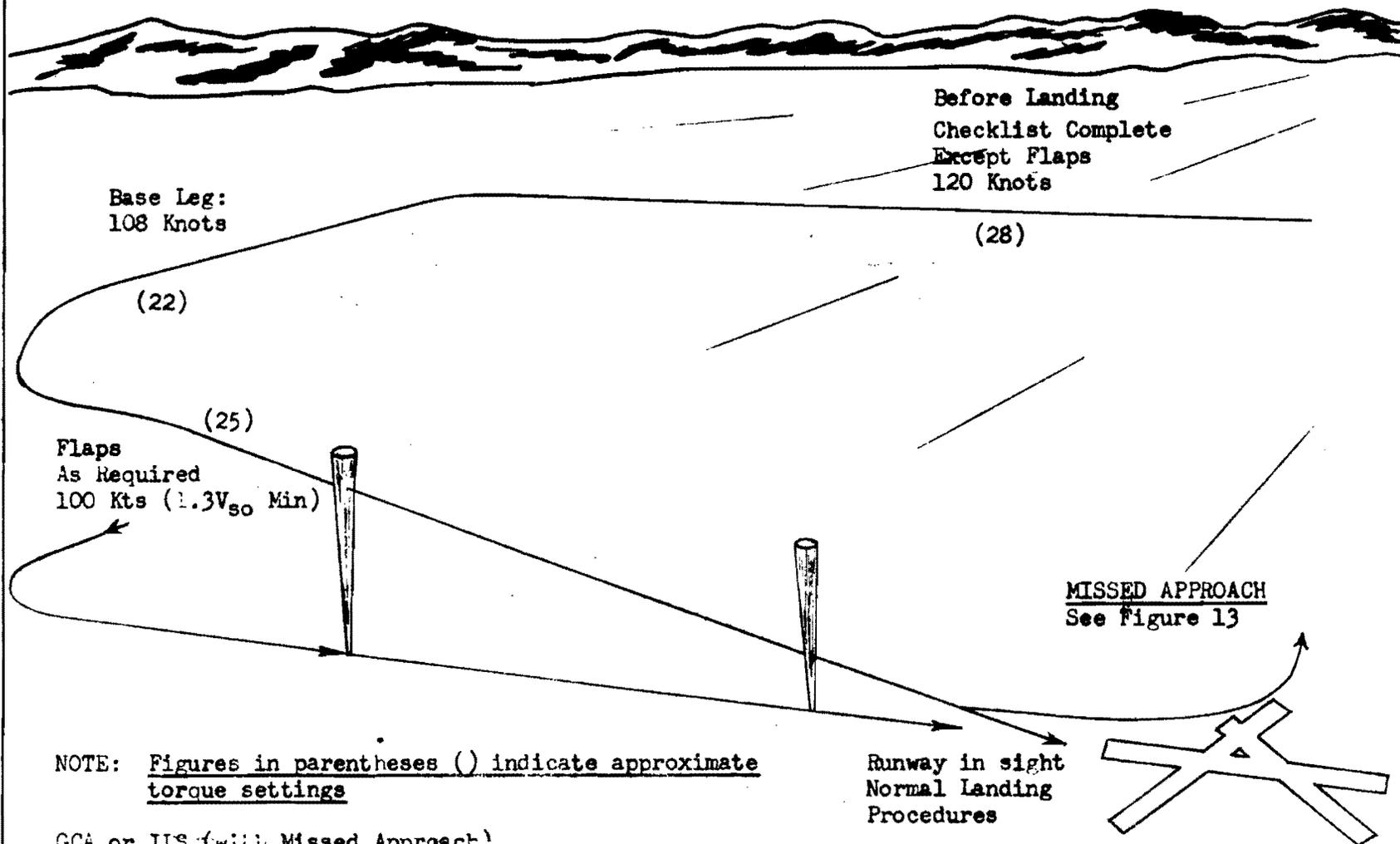


Figure 14

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## C. Direct Entry Procedure

Turn right and fly the holding pattern.

**NOTE:** For non standard holding patterns, the above procedures will be reversed.

4. ADF APPROACH (See Figure 13)
5. VOR APPROACH (See Figure 13)
6. ILS and RADAR APPROACH (See Figure 14)

**NOTE:** During the above maneuvers (ADF, VOR, ILS, and GCA) with an engine failure all procedures remain basically the same. However the pilot must decide when to put gear and flaps down (or to retract them). These procedures are discussed under single-engine

takeoff and landing procedures.

## 7. MISSED APPROACH

A missed approach must be accomplished when it is determined that the aircraft is not in the correct, or safe, position to continue the approach, or when directed by ATC. The procedures to be followed are outlined in Fig. 13 and 14. Instructions either printed on the approach plate, or as issued by ATC must be followed. The instructor will advise the pilot when to execute a missed approach.

## 8. CIRCLING APPROACH (Figure 15.)

If an approach is made with the intent of circling, maintain 108 knots while on final approach. After the runway is in sight, maintain 108 knots

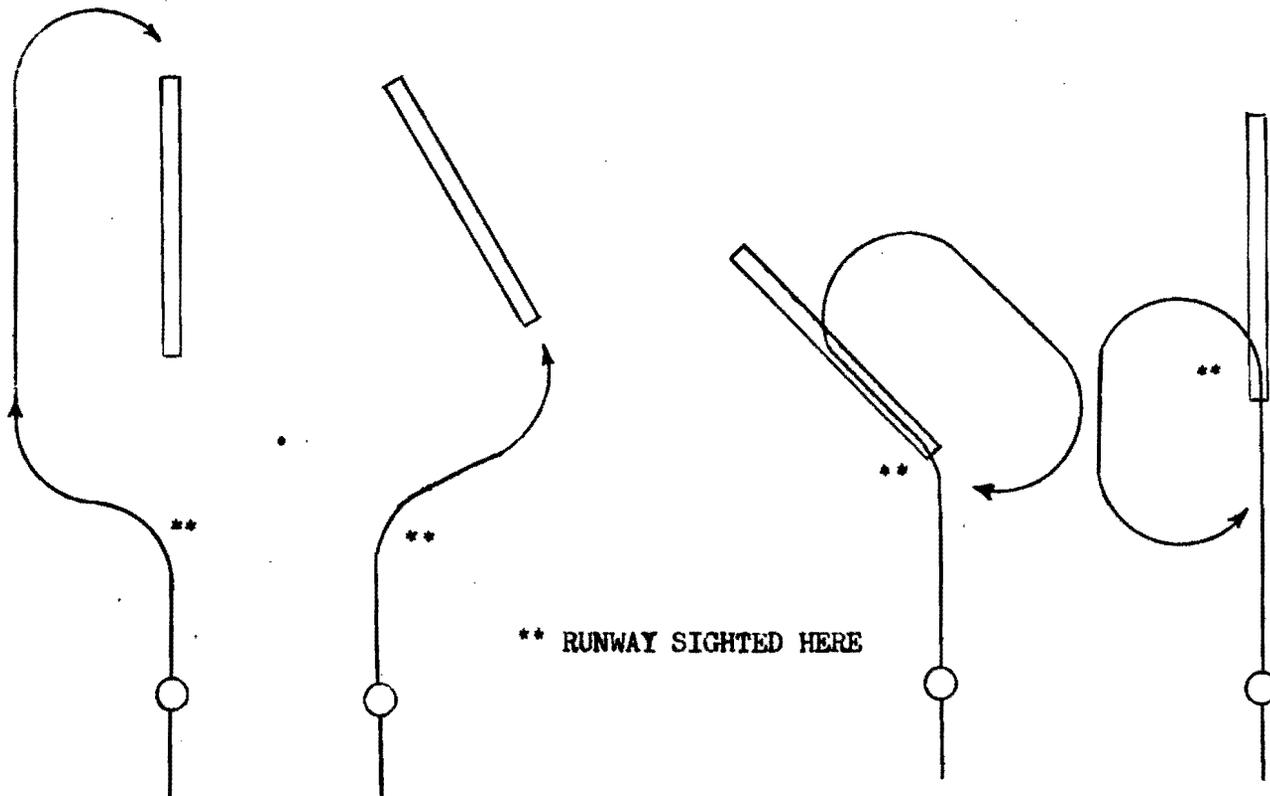


Figure 15

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until on final approach to the landing runway. When on final approach to landing, proceed as outlined under landing, Figures 9 and 10. Circling approaches may be made from any of the positions outlined in Figure 15.

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## VI. EMERGENCY PROCEDURES

Emergency procedures will be reviewed during preflight and post flight briefings. While taxiing and airborne, various emergencies will be called out or simulated by the instructor. For emergencies that require immediate action the pilot, while continuing the assigned maneuver, will be expected to call out from memory the immediate action items as he performs (simulates) them. In all cases the appropriate Emergency Check List will be used to confirm the performance of memory items and to ensure that other items are performed in sequence to their entirety.

The pilot will be graded on:

- a. Correct analysis of the emergency.
- b. Correctness of immediate action items from memory.
- c. Adherence to the check list.
- d. Judgement and planning.
- e. Correct management of power, landing gear, and flaps, etc.
- f. Control of the aircraft.
- g. Proper radio procedure and flight plan action for the emergency.

### 1. ENGINE FAILURE/FIRE

Engine failure/fire may be simulated at any time that the engines are started, running, or being shut down. A propeller will be feathered only when at an altitude above the ground of 4000 feet or greater. Below 4000 feet propeller feathering will only be simulated.

During training flights, flame-out and immediate relight will be performed and the effects of the NTS system demonstrated.

### 2. AIR START (Propeller Unfeather)

The propeller will be unfeathered with strict conformity to the Air Start Check List.

The following emergency procedures will be discussed and performed (where applicable) during flight training. During proficiency flight checks, actual performance of these emergencies may be eliminated at the discretion of the instructor if, in his opinion, the pilot receiving the flight check demonstrates adequate knowledge of the emergency procedures.

### 3. FIRES

Electrical and Cabin Fire. The procedure for handling electrical fires in the cockpit and cabin will be discussed with particular emphasis on immediate action items and smoke evacuation.

Brake Fire. During taxi operations, before takeoff or after landing, a simulated brake fire will be given to acquaint the trainee with the most effective method of combating the fire. When this occurs:

- a. Bring the aircraft to a complete stop with the nosewheel cocked toward the brake which is on fire. Use reverse thrust to assist in stopping the aircraft.
- b. Depress the good brake pedal and advance the power on the engine over the wheel which is on fire.
- c. Request fire and rescue equipment.
- d. Evacuate the passengers.
- e. When fire and rescue equipment arrives, shut down the engines and abandon the aircraft.

### 4. RUNAWAY PROPELLER - ENGINE OVERSPEED

A review will be conducted by the instructor to insure that the trainee understands thoroughly:

- a. The technical reason for a runaway propeller or an engine overspeed.

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- b. Control of the propeller.
- c. The affect of true airspeed and altitude on a runaway propeller.
- d. Performance of the airplane in this situation.

## 5. EMERGENCY LANDING GEAR EXTENSION

The pilot will discuss the landing gear system and demonstrate the proper procedures for extending the landing gear by the emergency system.

## 6. EMERGENCY FLAP EXTENSION

The pilot will discuss the flap system and demonstrate the proper procedures for extending the flaps by the emergency system.

## 7. SMOKE EVACUATION

A discussion will be conducted of the procedures involved in smoke evacuation.

## 8. PASSENGER EVACUATION

This items will be discussed and demonstrated during a simulated brake fire.

## 9. EMERGENCY DESCENT

Emergency descents are performed when it is necessary to descend from altitude as rapidly as possible.

The high speed descent is normally performed when there is a fire in an engine nacelle and there is a possibility of extinguishing the fire as a result of increased speed. The high speed configuration is clean, and:

POWER : Flight Idle  
DESCENT: 204 KIAS Maximum

The slow speed descent is used when there has been structural damage and high airspeed would damage the air-

- c craft further or when it is desirable to descend in a relatively short horizontal distance. The slow speed configuration is gear down and flaps full down, and:

POWER : Flight Idle  
DESCENT: 121 KIAS Maximum

During descent in either of the above configurations, initiate recovery approximately 500 feet above the desired level-off altitude.

## 10. BRAKE FAILURE

A simulated brake failure will be given to evaluate the pilots judgement, his knowledge of the aircraft brake system, and his ability to control the airplane with the use of propeller thrust.

## 11. FUEL SYSTEM

The pilot will be expected to discuss the fuel system and the failures which could occur, and emergency action which may be applied.

## 12. BACKING THE AIRCRAFT

Backing the aircraft will be done only in an emergency, however if this situation should arise the following must be observed:

- a. Clear the area to the front and rear of the aircraft.
- b. A wing walker must be stationed forward of the right wing-tip.
- c. A signalman must be stationed to the left of the pilot to provide hand signals for stopping the aircraft.
- d. Back the aircraft with the use of reverse thrust until the aircraft is in the desired position.
- e. Arrest the rearward movement of the aircraft with forward thrust, and then apply brakes.

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- NOTE:
1. Do not use brakes to stop the aircraft while it is moving rearward as the aircraft may settle on it's empennage.
  2. Use differential power to turn the aircraft while in a rearward movement.