NET TAKE-OFF FLIGHT PATH

NET GRADIENT OF CLIMB

The net gradient of climb between 50 ft. height and 1000 ft. height is shown in figure V-6 for varying air temperatures, aerodrome altitudes, weights, and reported wind components.

ASSOCIATED CONDITIONS

Engine	Full throttle
Wing Flaps	Retracted
Airspeed	74 MPH I.A.S.

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Rev. 3
Rev. 13
Rev.

The example given by the arrowed dashed lines shows that with an air temperature of 21° C (I.S.A. + 10°C) at an aerodrome altitude of 2000 ft. and a weight of 1650 lb. with a reported headwind component of 15 knots the net gradient of climb is 8.4%.

NOTES:

(1) The data given in figure V-5 has been derived from gross performance reduced by a margin of 2.0% gradient.

(2) The wind correction grids are factored so that 50% of headwinds and 150% of tailwinds are obtained. Reported winds may therefore be used directly in the grids.

RADIUS OF A STEADY TURN

Rev. 3

The radius of a steady "Rate One" turn (180°/ minute) may be taken as 2420 ft. (for maximum ambient conditions of 5000 ft. and I.S.A. + 30°C).

NET GRADIENT OF CLIMB - o/o

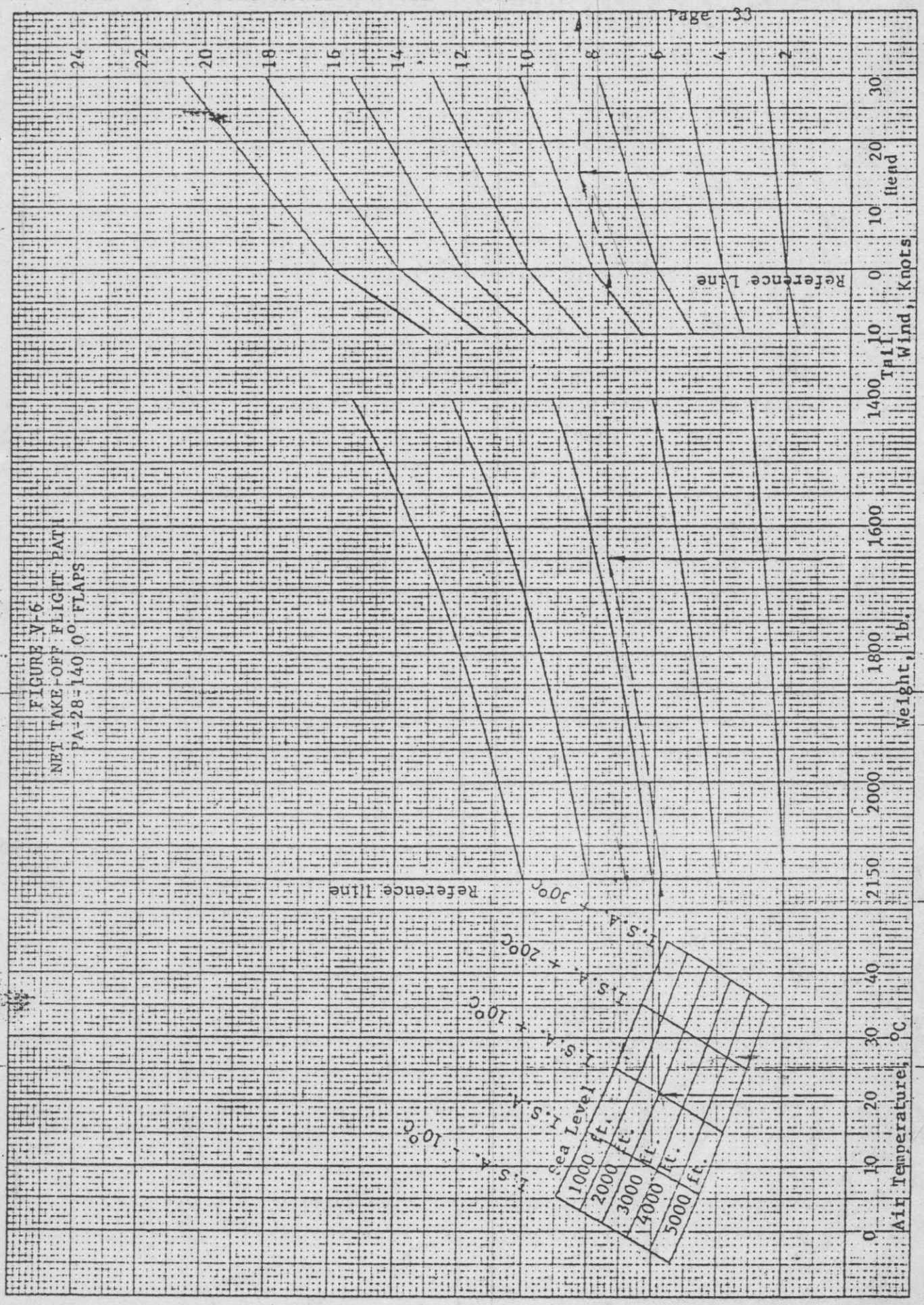


FIGURE V-6
NET TAKE-OFF FLIGHT PATH
PA-28-140 0° FLAPS

EUGENE DIETZGEN CO.
MADE IN U. S. A.
NO. 340A-20 DIETZGEN GRAPH PAPER
20 X 20 PER IN.

EN ROUTE PERFORMANCE

EN ROUTE PERFORMANCE CEILING AND GROSS RATE OF CLIMB

The performance ceiling may be obtained from Figure V-7 for varying weights altitudes, and air temperatures. The chart may also be used to determine the gross pressure rates of climb.

ASSOCIATED CONDITIONS:

Engine	Full throttle
Wing Flaps	Retracted
Air Speed	83 MPH. I.A.S.

The example (A) given by the arrowed dash lines shows that for a weight of 1600 lbs. in an atmosphere of I.S.A. + 10°C, the performance ceiling is 14,600 feet.

Rev. 3

The example (B) shows that at an altitude of 5400 feet, in an atmosphere of I.S.A. + 20°C at a weight of 1750 lbs., the gross pressure rate of climb is 460 feet/min.

NOTE:

The performance ceiling is the maximum altitude which may be assumed when establishing compliance with the operating regulations dealing with en route flight. It does not prohibit flying at a higher altitude (although at some altitudes, the operating regulations may require oxygen to be carried), but it is unlikely that the performance ceiling will be achieved unless full throttle and the air speed quoted are used towards the end of the climb.

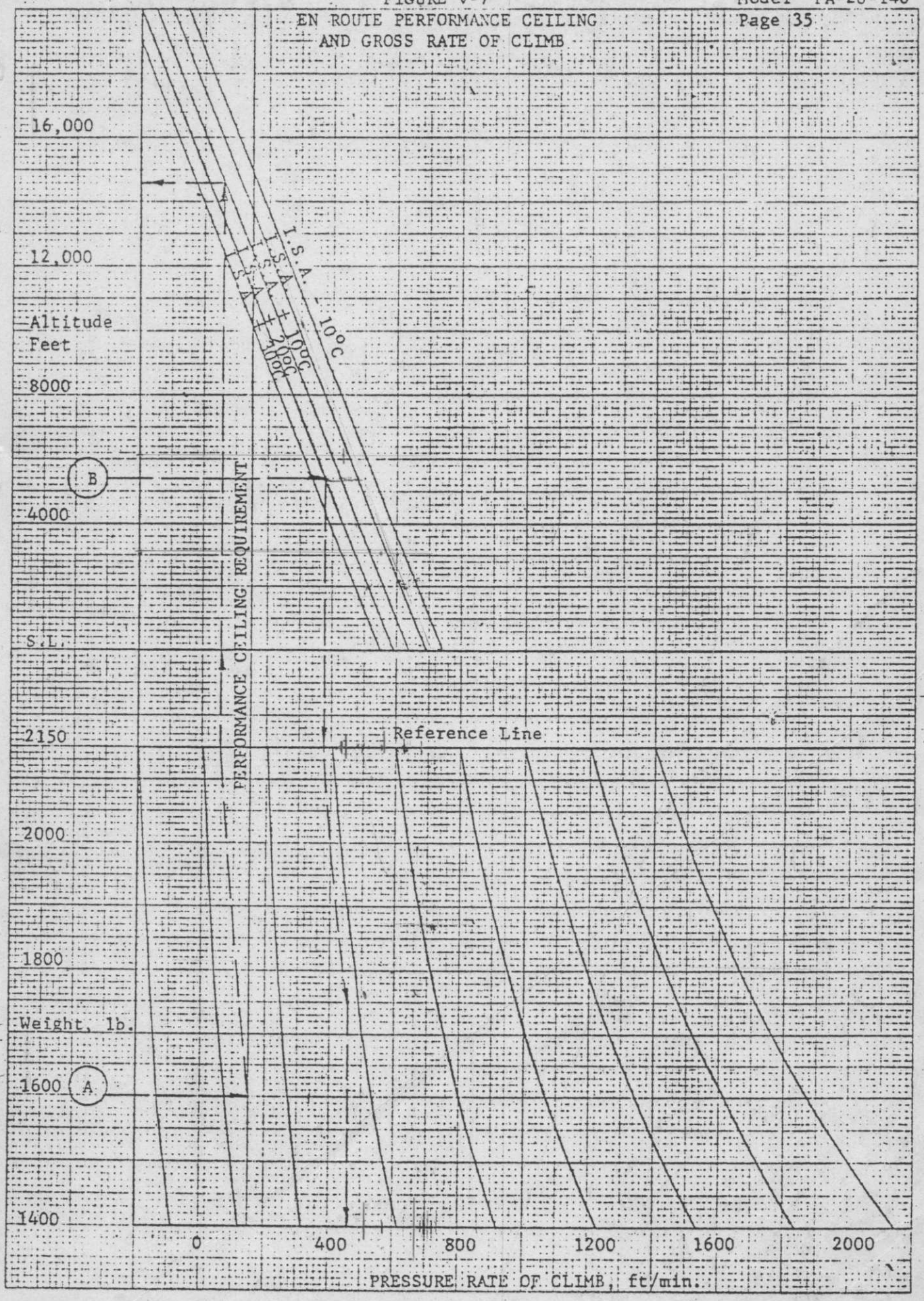
GLIDE:

Rev. 3

With the engine inoperative and flaps fully retracted and 83 MPH. I.A.S., the aeroplane has a net glide of 1.73 nautical miles per 1,000 feet of altitude loss, or a loss of 578 feet per nautical mile traveled. This net glide is 1% gradient steeper than the gross glide.

FIGURE V-7

EN ROUTE PERFORMANCE CEILING AND GROSS RATE OF CLIMB



LANDING DISTANCE REQUIRED

The landing distance required is shown in Figure V-8 for vayring air temperatures, aerodrome altitudes, weights, forecast wind components and uniform runway slopes.

ASSOCIATED CONDITIONS:

Engine	Idling
Wing Flaps	40° (fully extended)
Technique	Approach speed 1.3 V_{SO}. This is 59 knots IAS (68MPH) at 2150 lbs. decreasing linearly to 49 knots IAS. (56MPH) at 1500 lbs.
	immediately after touchdown.
Runway	Dry Tarmac runway.

Rev 3
Rev. 13
Rev. 14

The example given by the arrowed dotted lines shows that at an altitude of 500 ft at a temperature of 20°C (I.A.S. + 6°C) at a weight of 1700 lbs. with a forecast headwind component of 10 knots and with an uphill runway slope of 1.0%, the landing distance required is 1160 feet.

NOTE:

(1) The landing distance required includes the Air Regulation field length factor $\frac{100}{70}$. This means that distances obtained from Figure V-8 may be equated directly to the landing distance available.

(2) For operations from dry grass runways with freshly cut grass and firm subsoil, the distances fro a dry tarmac shojld be increased by 8%.

(3) The wind grids are factored so that 50% of headwinds and 150% of tail-winds are obtained. Reported winds may, therefore; be used directly in the grids.

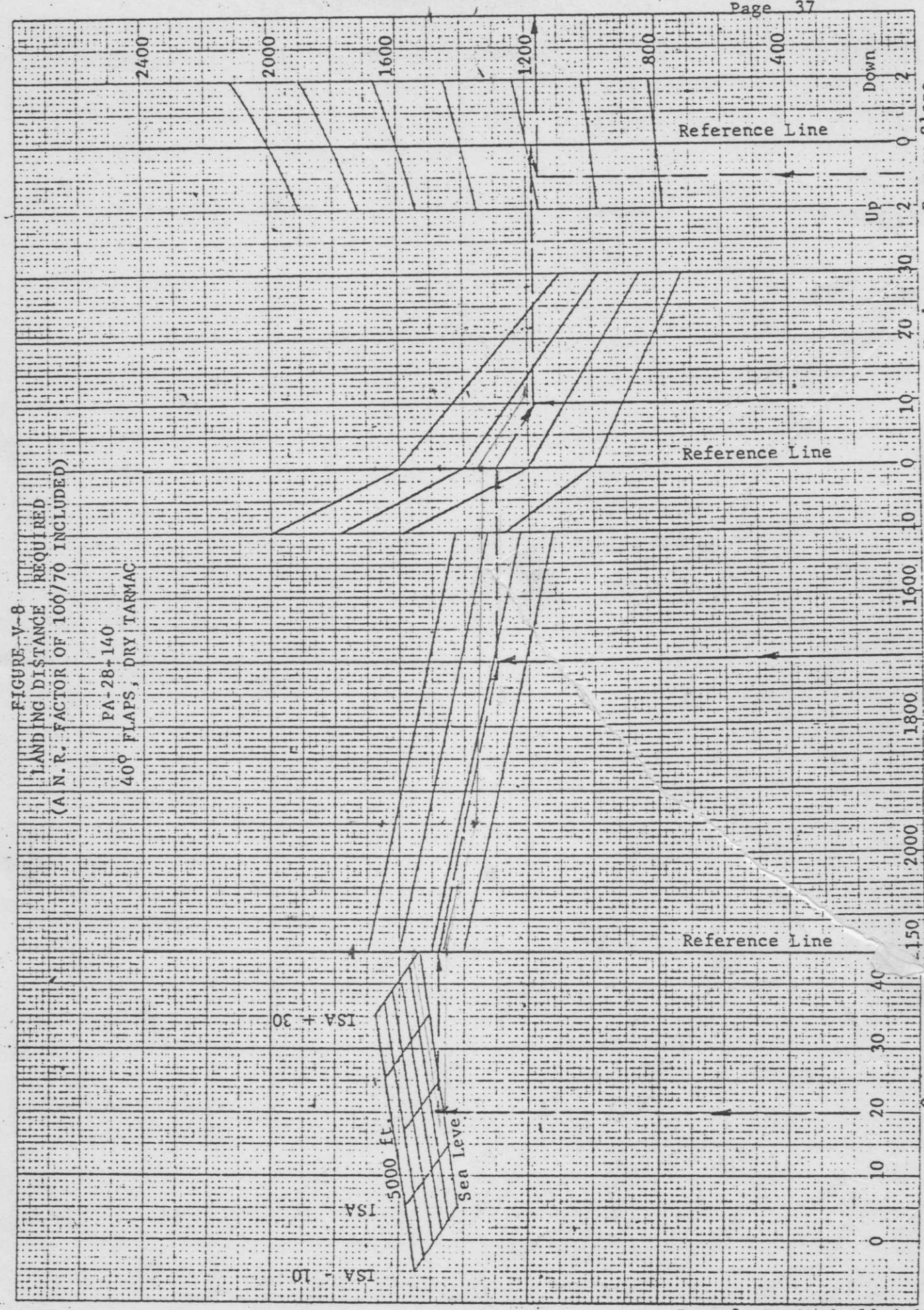


FIGURE V-8
LANDING DISTANCE REQUIRED
(A.N.R. FACTOR OF 100/70 INCLUDED)
PA-28-140
40° FLAPS, DRY TARMAC

EUGENE DIETZGEN CO.
MADE IN U.S.A.
NO. 340A-20 DIETZGEN GRAPH PAPER
20 X 20 PER INCH

SECTION VI

WEIGHT AND LOADING DATA

The weight and centre of gravity schedule shall be inserted to follow this page.

This section is not subject to the approval of the Air Registration Board.

SECTION VII

SUPPLEMENTS

INTRODUCTION

This section contains supplements covering items affected by installations designed by the manufacturer of the aeroplane or by other organizations, but which do not normally form part of the basic specification of the aeroplane.

No.: JRB/AC/013/2 Issue 1

J.R.B. AVIATION LTD

SOUTHEND MUNICIPAL AIRPORT,
SOUTHEND-ON-SEA, ESSEX.
TEL: (0702) 545430 (2 LINES) FAX: (0702) 541873

Weight and Centre of Gravity Schedule

Manufacturer: PIPER **A/C Type:** PA28-140 **Regn.:** G-AVWM

S/No.: 28-24005 **Reference:** 3674 **Date:** 8-6-94

Max. Authorised Weight: 2150 lbs.

Centre of Gravity Limits refer to Flight Manual ref: VB39

Part "A" Basic Weight

The basic weight of the aircraft is calculated from weighing

Report No.: ATS-110-3674 **is** 1338 **lbs Dated:** 3-6-94

The centre of gravity of the aircraft in the same condition at this weight with the landing gear extended is 85.71 ins. aft of datum.

The total moment about the datum in this condition is 114,686.4 **lbs in.** The datum is 78.4" Fwd of L/Edge This is defined in the Flight Manual. All lever arms are distances in inches aft of the datum.

The basic weight includes the weight of 12 lbs. unusable fuel and FULL total oil and the weight of the following items which comprise the list of "basic equipment".

Item	Weight (lbs)	Lever Arm (ins.)
Standard Instruments		
Radios		
First Aid Kit		
Fire Extinguisher.		

Part "B" Variable Load

The weight and lever arms of the variable load are shown below. The variable load depends upon the equipment carried for the particular role.

Item	Weight (lbs)	Lever Arm (ins.)	Moment (lbs.ins.)
Pilot	Use actual	85.5	

NOTE: The actual weight of the Pilot must be used for aircraft not exceeding 12,500 lbs and with less than 12 person seating capacity.

Form No.: JRB/AC/013/3 Issue 1

J.R.B. AVIATION LTD

SOUTHEND MUNICIPAL AIRPORT,
SOUTHEND-ON-SEA, ESSEX.
TEL: (0702) 545430 (2 LINES) FAX: (0702) 541873

Part "C" Loading Information (Disposable Load)

The total moment change when the landing gear is retracted in lbs.ins. is N/A. The appropriate lever arms are:-

Item	Weight (lbs)	Lever Arm (ins.)	Capacity
Fuel in tanks		95.0	41.6
Engine oil			
Forward baggage			
Rear baggage	200	117.0	
Passengers Row 1 Seats	ACTUAL	85.5	
Passengers Row 2 Seats	ACTUAL.	117.0	
Passengers Row 3 Seats			
Passengers Row 4 Seats			
Passengers Row 5 Seats			
Passengers Row 6 Seats			
Passengers Row 7 Seats			
Passengers Row 8 Seats			
Passengers Row 9 Seats			
Passengers Row 10 Seats			

Fuel density: 7.2 lbs/gal.imp.
6.0 lbs/gal.US

Oil density: 9.0 lbs/gal.imp
7.5 lbs/gal.US

NOTE: To obtain the total loaded weight of aircraft, add to basic weight the weights of the variable and disposable load items to be carried for the particular role

This Schedule was prepared **(date)** 8-6-94 and supercedes all previous issues

Signed: [signature] 10241 **(Inspector/Engineer)**

On behalf of JRB Aviation Limited, Southend Airport, Southend-on-Sea, Essex
JAA Approval Ref: CAA 00325

NOTE: The Commander of an aircraft registered in the United Kingdom shall satisfy himself, before the aircraft takes off, that the load carried by the aircraft is of such a weight and is so distributed and secured that it may safely be carried on the intended flight.

CAA Supplement No. 1 issue 3 to F.A.A. approved Model PA28-140 Aeroplane Flight Manual report VB-39.

Piper	Constructor's	Registration
PA28-140	Serial No. 28-24005	Marks G-AVWM

The aeroplane must be operated in accordance with the following limitations in addition to those contained in the Airplane Flight Manual and those contained in any relevant supplement.

CAA ADDITIONAL LIMITATIONS FOR UNITED KINGDOM CERTIFICATION

LIMITATIONS

1 For the purpose of the first schedule of the Air Navigation Order, this aircraft is classified as an Aeroplane (landplane).

2 The Piper PA28-140 type of aeroplane is eligible for certification in the United Kingdom in the Transport Category (Passenger). This aeroplane may, however, be restricted to another category and a particular purpose and this will be stated in the certificate of airworthiness.

3 The total number of persons carried shall not exceed four nor exceed the number for which seating accommodation approved for use during take-off and landing is provided. Provided that aerobatic manoeuvres are not to be performed, children under the age of three years may be carried in the arms of passengers and may be left out of account for this purpose.

4 Aerobatic manoeuvres are limited to those listed in the flight manual. When aerobatic manoeuvres are performed the limitations associated with the Utility Category in the flight manual shall apply.

5 An Avco Lycoming O-320-E2D engine may be fitted. When this is done, 100 or 100LL is the minimum grade of fuel that may be used.

To be attached to the Aeroplane Flight Manual report VB-39.

17 July 1985

PA28 - SPINNING

A.U.W. 1950 lbs — MAX AFT C of G 86.5"

FRONT SEAT ADJUSTMENT MOVES C of G OF SEATS FROM 80.5" TO 90.5" IN 1.25" INCREMENTS

SEAT POSITION →	SEAT FULLY FORWARD		SEAT MID POSITION		SEAT FULLY AFT	
FRONT SEAT OCCUPANTS →	2 x 13 STONE	1 x 8 STONE	2 x 13 STONE	1 x 8 STONE	2 x 13 STONE	1 x 8 STONE
GATPN (140)	UNABLE TO GET INSIDE FWD C of G LIMIT, AT ANY FUEL LOAD	OK @ ALL WEIGHTS FROM ZERO TO FULL FUEL.	WEIGHT LIMITED 36 GALL MAX	AFT LIMIT EXCEEDED AT FUEL LOAD ABOVE 35 GALL	AFT LIMIT EXCEEDED AT FUEL LOAD ABOVE 8 GALL	AFT LIMIT EXCEEDED AT FUEL LOAD ABOVE 25 GALL
~~GAVLT (140)~~	~~AS ABOVE.~~	~~AS ABOVE~~	~~OK @ ALL WEIGHTS FROM ZERO TO FULL FUEL.~~	~~OK @ ALL WEIGHTS ZERO TO FULL FUEL~~	~~AFT LIMIT EXCEEDED AT FUEL LOADS ABOVE 17 gall~~	~~AFT LIMIT EXCEEDED AT FUEL LOAD ABOVE 33 GALL~~
GAV WM (140)	AS ABOVE	AS ABOVE	AS ABOVE	AS ABOVE	AS ABOVE	AS ABOVE
GAV U U (140)	AS ABOVE	AS ABOVE	WEIGHT LIMITED 34 GALL MAX	AS ABOVE	AS ABOVE	AFT LIMIT EXCEEDED AT FUEL LOAD ABOVE 36 GALL
~~GAV NP (180)~~	~~AS ABOVE~~	~~AFT LIMIT EXCEEDED AT FUEL LOAD ABOVE 35 GALL~~	~~WEIGHT LIMITED 24 GALL MAX~~	~~AFT LIMIT EXCEEDED AT FUEL LOAD ABOVE 26 GALL~~	~~WEIGHT LIMITED 24 GALL MAX~~	~~AFT LIMIT EXCEEDED AT FUEL LOAD ABOVE 35 GALL~~

MPL
3/2/89

CAA SUP H ISSUE 1

PIPER G-AVWM AFM.

SERVICE BULLETIN

No. 753

Piper Aircraft Corporation

Lock Haven, Pennsylvania, U.S.A.

December 15, 1982 S

Subject: Expanded Spin Recovery Procedures

Models Affected: PA-28-140 Cherokee

Serial Numbers Affected: 28-20000 through 28-7725290

Compliance Time: Upon Receipt

Purpose:

To provide expanded spin recovery procedures to assure that proper safety practices and procedures relative to utility category flight operations are in effect. Spin training is permitted only in the utility category.

Accompanying this Service Bulletin is an expanded information placard to be installed in the cockpit in full view of the pilot. This Service Bulletin is to be retained at all times in the airplane with the aircraft paperwork.

Instructions:

I. Weight and Balance

It is the responsibility of the pilot and aircraft owner to determine that the aircraft remains within the allowable weight versus center of gravity envelope while in flight.

The PA-28-140 is certified for operations in both normal and utility categories. Spins and certain other aerobatic maneuvers are permitted only when the aircraft is configured in the utility category which requires that the gross weight and center of gravity not exceed 1,950 pounds and 86.5 inches aft of datum, respectively. Fuel loading is the primary factor controlled by the pilot that affects the weight and center of gravity.

The pilot and copilot seat location of 85.5" as specified in the A.F.M. is the center position of the seat track. This may vary from a full forward position arm of 80.5" to 90.5" at the most rearward position. Each hole from the center position at 85.5" changes the arm of the seat location 1.25".

The seat position to be used for spins should be determined and the correct arm should be used in calculating the aircraft weight and center of gravity prior to beginning the flight.

To determine the weight and balance limitations refer to the Weight and Balance Section in the appropriate Airplane Flight Manual.

aneuvers

The PA-28-140 is approved for certain aerobatic maneuvers, provided it is loaded within the approved weight and center of gravity limits (refer to Limitation Section in the appropriate Airplane Flight Manual.) The approved maneuvers are spins, steep turns, lazy eights, and chandelles.

Intentional spins are prohibited in the normal category airplane.

III. Spins

A. Before Spinning

Carrying baggage during the spin is prohibited and the pilot should make sure that all loose items in the cockpit are removed or securely stowed, including the second pilot's seat belts if the aircraft is flown solo. Seat belts and shoulder harnesses should be fastened securely and the seat belts adjusted first to hold the occupants firmly into the seats before the shoulder harness is tightened. With the seat belts and shoulder harness tight, check that the position of the pilots' seats allows full rudder travels to be obtained and b full back and full forward control wheel movements. Finally, check that the seats are securely locked in position. The PA-28-140 is approved for intentional spinning only when the flaps are fully retracted. Spins should be started only at altitudes high enough to recover fully by at least 3,000 feet AGL, so as to provide an adequate margin of safety. A one-turn spin, properly executed, will require approximately 1,000 feet to complete; and a six turn spin will require approximately 3,000 feet to complete. The airplane should be trimmed in a power-off glide at approximately 96 MPH before entering the stall prior to spinning. This trim airspeed assists in achieving a good balance between airspeed and "g" loads in the recovery dive. Spin recovery has been demonstrated up through six turns.

B. Spin Entry

The spin should be entered from a power-off glide by reducing speed at about 1 kt/sec. until the airplane stalls. Apply full aft control wheel and full rudder in the desired spin direction. This control configuration with the throttle closed should be held throughout th spin. The ailerons must remain neutral throughout the spin and recovery, since aileron application may alter the spin characteristics to the degree that the spin is broken prematurely or that recovery is delayed.

C. Spin Recovery

1. Apply and maintain full rudder opposite the direction of rotation.
2. As the rudder hits the stop, rapidly move the control wheel full forward and be ready to relax the forward pressure when the spin rotation has stopped.
3. As rotation stops, neutralize the rudder and smoothly recover from the dive.

Normal recoveries may take up to 1½ turns when proper technique is used; improper technique can increase the turns to recover and the resulting altitude loss.

Further Advise on Spinning

D. Spin Entry

Application of full aft control wheel and full rudder before the airplane stalls is not recommended as it results in large changes in pitch attitude during entry and the first turn of the spin.

E. The recommended procedure has been designed to minimize turns and altitude loss during recovery.

In all spin recoveries the control column should be moved full forward briskly. This is vitally important because the steep spin attitude may inhibit pilots from moving the control column forward positively.

The immediate effect of applying normal recovery controls may be an appreciable steepening of the nose down attitude and an increase in rate of spin rotation. It is essential to maintain full anti-spin rudder and to continue to hold the control wheel full forward until the spin stops. The airplane will recover from any point in a spin in not more than one and one half additional turns after application of controls as recommended.

F. Mishandled Recovery

Improper application or a delay in application of recovery controls can increase the number of turns to recover and the resulting altitude loss.

Delay in moving the control wheel forward may result in the aircraft suddenly entering a very fast, steep spin mode which could disorient a pilot. Recovery will be achieved by briskly moving the control wheel fully forward and holding it there while maintaining full recovery rudder.

In certain cases the steep, fast rotation has developed into a spiral dive in which the rapid rotation continues, but indicated airspeed increases rapidly. It is important to recognize this condition. The aircraft is no longer auto-rotating in a spin and the pilot must be ready to neutralize the rudder so as to ensure that airspeed does not exceed 129 MPH (Va) with full rudder applied.

G. Recovery to Level Flight

In most cases spin recovery will occur as the control wheel reaches the fully forward position. The aircraft pitches nose down quickly when the elevator takes effect and, depending on the control column position, it may be necessary to move the column partially back almost immediately to avoid an unnecessarily steep nose down attitude, possible negative "g" forces and excessive loss of altitude.

Because the aircraft recovers from a spin in a steep nose down attitude, speed builds up quickly in the recovery. The rudder should be neutralized as soon as the spin stops. Delay in neutralizing the rudder may result in yaw and "fish-tailing". If the rudder is not neutralized it would be possible to exceed the maximum maneuver speed (Va) of 129 MPH with the surface fully deflected.

H. Engine

Normally the engine will continue to run during a spin, sometimes very slowly. If the engine stops, take normal spin recovery action, during which the propeller will probably windmill and restart the engine. If it does not, set-up a glide at 83 MPH and restart using the starter motor.

IV. This Service Bulletin is to be kept with the aircraft paperwork at all times.

V. Install the placard provided with this Service Bulletin on instrument panel in full view of the pilot. Note: Peel protective cover from face of Placard.

VI. Make appropriate log book entry of compliance with this Service Bulletin.

Material Required:

One (1) each Placard, Piper Part Number 87369-44.

Availability of Parts:

Placard enclosed. Additional copies of Service Bulletin 753, if required, are available from Customer Services, Piper Aircraft Corporation, Lock Haven, PA.

Effectivity Date:

This Service Bulletin is effective upon receipt.

Summary:

This information is submitted to owner/operators of the above referenced aircraft to assist in insuring proper operation of the aircraft.

Each pilot should be made aware of the importance of absolutely observing these procedures.