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INSTALLATION AND OPERATION MANUAL

CAMBRIDGE MK-IV NAV DIRECTOR

1. MODELS COVERED BY THIS MANUAL:

CNAV-50 ---------- Knots/FPM units

CNAV-40 ---------- Meters/Sec units

Revision 5

February 21, 1984

3. INTRODUCTION

This manual covers the installation and operation of the MK-IV NAV DIRECTOR, when used in conjunction with Cambridge Variometers.

The NAV is a state-of-the-art, sophisticated instrument which will provide you with good service. It is important that it be correctly installed and adjusted. Take time to thoroughly familiarize yourself with all aspects of operation, so it becomes automatic. In this way, you will be prepared to make fullest use of the instrument, and soon develop preferred ways of your own of using it.

Familiarization with quickly and accurately entering altitude and distance is of particular benefit. It can be extensively practiced on the ground until it becomes second-nature.

4. FEATURE SUMMARY

Features of the MK-IV NAV System depend on the type of Variometer that is used, as follows:

FEATURE	USED WITH	USED WITH
Variometer	All MK-IV Varios. CPT40-60.	CVS40-60. CVS140-160 After S/N 1300.
Relative Vario	Yes, selectable at user option.	No
Altitude Compensation	Yes	No
Repeater For Second Seat	Yes	Yes
Speed-To-Fly Function	Yes	Yes
Averager	Yes	Yes
4-Function Audio	Yes	Yes
Full Final Glide Computer	Yes	Yes
Distance Flown Computer	yes, after s/n 270	yes,from s/n 270
"Bug Polars"	yes, from s/n 270	yes, from s/n 270
Variable Wing Loading in flight	yes from s/n 270	yes, from s/n 270

Please note that any Cambridge Variometer used with the NAV must be effectively T. E. Compensated.

For the MK-IV Variometer (CPT40-60), compensation is internal, and only PITOT and STATIC are required. Please refer to Vario instructions for fuller explanation.

For other CAMBRIDGE Variometers, Compensation should be provided for a T. E. Probe and optional GUST FILTER. Refer to Vario instructions for fuller explanation.

5. OPTION AND POLAR ADJUSTMENTS

5.1 Access to Selector Switch

To find Option and Polar Selector Switch, first remove the left-hand cover (4 screws), as viewed from front of unit. (Figure 1.)

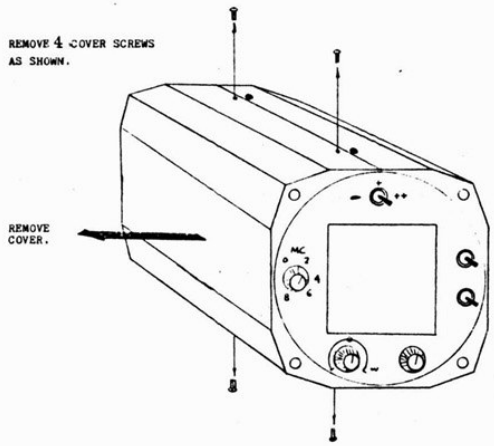
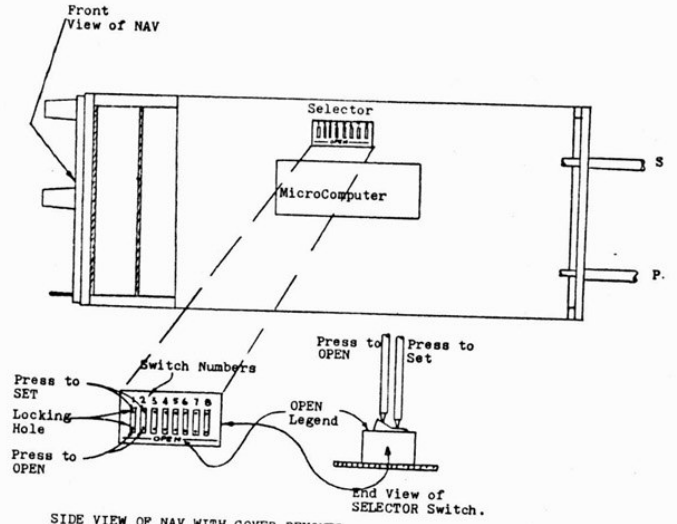


FIGURE 1
MKIV NAV.
Side Cover Removal to Access Adjustments

Now find the Selector Switch as shown in Figure 2. The Selector Switch consists of 8 switches, marked 1 through 8.



SIDE VIEW OF NAV WITH COVER REMOVED
Acces to POLAR and OPTION Selector Switch
FIGURE 2

To SET or OPEN any one of these switches, use a ball-point pen. Locate the pen on the side of the switch desired (in a convenient locking hole or the switch). If the switch is already pressed down, there is no need to go any further. If not, press down on the pen until the switch SNAPS to its new position. Little force is required.

5.2 Calibration Selection

This selection is normally made at the factory or authorized dealer. However, if a change is made subsequently, the following table applies. Note that the front face-plate may have to be changed to correspond correctly.

Type	Effective Serial Nr.	Selector Switch # 6		Primary Countries
		OPEN	CLOSED	
CNAV-40,50	up to s/n 74	Knots/Feet Dist. St. Miles	All Metric	All, except Australia
CNAV-50	s/n 75 and up	Knots/Feet Dist. St. Miles	Knots/Feet Dist. Naut. Mi.	USA, UK
CNAV-40	s/n 75 and up	INVALID	All Metric	Europe, except UK
CNAV-50S	s/n 75 and up	Knots/Feet Dist. KMS.	All Metric	Australia

5.3 Relative Variometer (Super-Netto) Selection

If the NAV is operated with a MK-IV Variometer (CPT 40-60), the user may choose to have the Relative Variometer Option, or not.

If the NAV is operated with a Standard Cambridge Variometer (CVS 40, 50, 60, 140, 150, 160), the Relative Variometer must NOT be selected.

An explanation of Relative Variometer follows this section.

Selection	Selector Switch #7	Note
Relative Variometer	SET	For CPT (40-60) only
No Relative Variometer	OPEN	For All CVS (40-60, 140-160) Optional For CPT (40-60)

5.4 Explanation of Relative Variometer (or Super-Netto)

This concept originated in Western Europe, and it since has won wide acceptance, combining as it does a normal variometer with a Netto variometer on a single instrument without the need for switching.

The concept arose from several observations of pilot/ship requirements. The first observation was that the real problem to which the Netto variometer was a solution, was the high-speed cruise. With a normal variometer, the higher sink rates at these speeds tended to hide what the air was doing. So, a Netto (airmass) variometer was of considerable benefit. On the other hand, while it was possible to thermal with a Netto variometer, no actual benefit was achieved by doing so.

The second observation was that thermal circles were nearly always done below 60 Knots and cruising above 60 Knots.

The Relative Variometer concept relies on a transition, which takes place at the polar sink caused by about 60 Knots airspeed. As long as the ship is below this speed, the MK-IV Variometer (to which the NAV is attached) will be a conventional TE-Compensated Variometer. As the ship transitions to a higher speed, the MK-IV Variometer will give the pilot the vario reading he would have if he circled in the airmass being flown through. Additionally, an indicator "R" is lit up on the display of the MK-IV NAV. (Hence the term Super-Netto.)

Since, at the transition point, the actual vario reading is the same as the one he would have if he circled, the transition from one to the other is smooth and continuous.

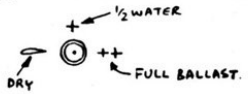
5.5 Wing-Loading Selection

5.5.1 Up to NAV s/n 269

To adapt the system to different ships, the pilot should estimate the percentage increase in wing-loading when full water is carried. This is now entered via Switches 4 and 5 on the Selector as follows:

% Increase In WING LOADING When Fully Ballasted.	Switch #4	Switch #5
25%	SET	SET
35%	OPEN	SET
45%	SET	OPEN
55%	OPEN	OPEN

The front panel control provides a 3-position Wing-Loading Switch, as shown:



If you have entered, say, 20% max. percentage increase, then + position would give you a 10% ballast position.

This + position can be used, also, if your ship has a limited water capacity giving only a 10% increase.

5.5.2. From NAV s/n 270 on, and on NAVS which have been updated.

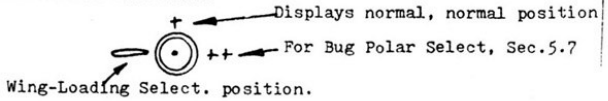
Switches 4 and 5 are inactive. Wing-Loading is entered via the Wing-Loading/Bug Polar Selector switch (formerly Wing-Loading Selector). See Figure 7.

Switch this to the LEFT. The displays will blank out, except for the top numerical display. (normally the Averager). This will show the Wing-Loading currently being used, expressed as a % increase due to however much water is being carried. If no water is being carried, it should be set to zero.

The Wing-Loading may be changed by using the IN +/- switch, to increase or decrease it.

Wing-Loading may be changed at any time, even during the GO Mode. The Go mode is not lost during the change, and the new Wing-Loading will be reflected in the information provided by the NAV from that point on.

Return this top switch to the middle position (+), and the displays will resume their normal functions.



5.6 Polar Selection

The ship's polar is entered through Switches 1, 2, 3, 8 of the Selector, according to the following table. The CUSTOM position is only used if you have a ship not conforming to the polars in the table, and the factory has provided a special calibration.

For the POLAR, use the max. L/D you believe most closely corresponds to your ship.

Polar (L/D Max)	Switch #1	Switch #2	Switch #3	Switch #8	Notes
32	OPEN	SET	SET	SET	
34	SET	OPEN	SET	SET	
36	OPEN	OPEN	SET	SET	
38	SET	SET	OPEN	SET	
40	OPEN	SET	OPEN	SET	
42	SET	OPEN	OPEN	SET	
44	OPEN	OPEN	OPEN	SET	
46	SET	SET	SET	OPEN	
48	OPEN	SET	SET	OPEN	
50	SET	OPEN	SET	OPEN	
52	OPEN	OPEN	SET	OPEN	
54	SET	SET	OPEN	OPEN	
56	OPEN	SET	OPEN	OPEN	
CUSTOM	SET	SET	SET	SET	CUSTOM POLARS ONLY
TEST #1	SET	OPEN	OPEN	OPEN	FOR SERVICE USE ONLY
TEST #2	OPEN	OPEN	OPEN	OPEN	

You may now replace the side cover. The MK-IV NAV is ready for installation.

Section 5.7

Bug Polar Entry, on NAVS s/n 270 on, and Updated NAVS.

Ships polars are not always what they should be, due to dirt, bugs, rain ice, etc. If necessary, the pilot should estimate the degradation in performance, as a percentage (%), and enter this as follows:

Switch the Top Selector Switch (Wing-Loading/Bug Polar Selector Switch) to the Right.(++). See Figure 7.

The displays will blank out, except for the top numerical display (normally the Averager). This will now show the Bug Polar % currently being used, expressed as a percentage reduction in performance. When a ship is 'clean', no reduction is required, and '0' should be the value required.

The percentage reduction may be changed by the +/- IN Switch, to increase or decrease it.

The Bug Polar information may be changed at any time, even during the "GO" Mode. The GO Mode is not lost during the change and the new percentage entered will be reflected in the information provided by the NAV from that time on.

Return the Top Switch to the middle (+) position, and the displays will resume normal functions.

6. INSTALLATION

6.1 Loudspeaker

Refer to Figure 3. Install loudspeaker in a part of the cockpit where it can easily be heard by the Pilot.

If a loudspeaker different to the one supplied is used, be sure that it has an impedance of approximately 80-120 ohms.

Route the supplied twisted pair away from antenna cables, microphone cables, and press-to-talk switch cables. Cut off excess length.

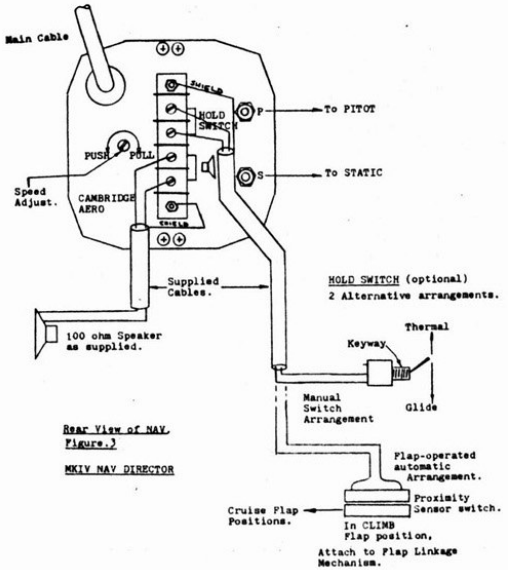
6.2 Hold Switch

Install the Hold Switch (if one is fitted) as shown in Figure 3.

(a) On flapped ships, install the proximity switches so that the switch operates when the flap is put into CLIMB (+) position.

(b) On non-flapped ships, install the Hold Switch where it can be easily reached in flight.

Observe the same wiring precautions as for the loudspeaker, and cut off excess length.



Rear View of NAV, Figure 3

MKIV NAV DIRECTOR

6.3 Actual Mounting, Cabling, Plumbing

The NAV installs into a standard, round, 80mm (3-1/8") panel opening. Install it close to, or adjacent to, its driving VARIOMETER.

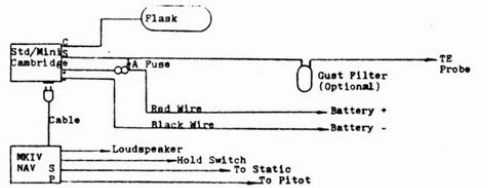
Figures 4, 5, and 6 will show cabling and plumbing connections. Refer to the variometer instructions (supplied with variometer) for further information.

6.4 Positioning

The NAV and driving VARIOMETER should be placed as far away as is practicable from radios, antenna cable, microphone cable, etc.

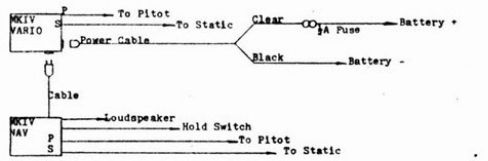
6.5 Fusing

The VARIOMETER should be fused with ½A fuse, as shown. This is IMPORTANT.



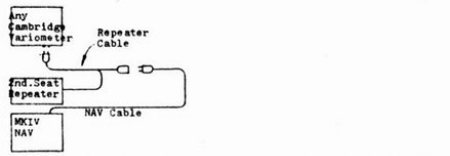
Installation With Standard and Mini Cambridges Only.(CVS40-60, CVS140-160)

FIGURE 4



Installation With MKIV CAMBRIDGE VARIOMETERS (CPT40-60)

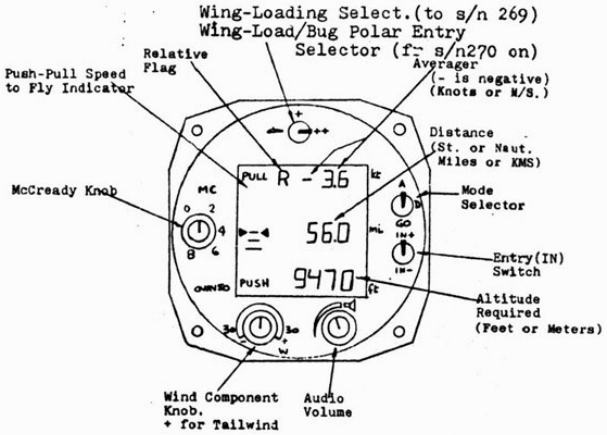
FIGURE 5



Cabling Variation for use of NAV with any Variometer with a REPEATER for 2-seatGliders

FIGURE 6

7. OPERATION



MKIV NAV CONTROLS AND READOUT

FIGURE 7

Operation of the MK-IV NAV falls into 3 distinct categories, as follows:

7.1 The Variometer

The NAV is connected to a MK-IV or Standard Cambridge Variometer. Operation of these variometers is covered in their own instructions, and will not be further discussed here, except for the following points:

(a) The Variometer can be left in any range and response speed without affecting the operation of the MK-IV NAV.

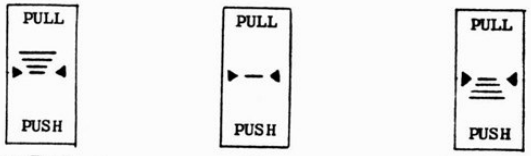
(b) With a MK-IV Variometer (CPT 40-60), the vario will function as a Relative Vario, if this option has been selected in the NAV.

(c) The "R" Flag is visible if Variometer is in Relative mode.

7.2 Speed-To-Fly

(a) Before take-off, set WING-LOADING SELECTOR Switch to the correct position:
⬭ ---------- No Ballast
\+ ---------- 1/2 Water
++ ---------- Full Water
(Up to s/n 269, then see(c).

(b) During the flight, use the McCREADY Knob, as you would a Speed Ring. Set it to your next anticipated thermal (or some value which best expresses your confidence-level at this time), then fly the SPEED-TO-FLY INDICATOR for zero, as shown:



Too Fast. Slow Up. | OK | Too Slow. Speed Up.

or, fly the Audio for Speed, as described next.

(c) From NAV s/n 270 on, and on updated units.

Wing-Loading/Bug Polar Select Switch (top of instrument) should be in middle (+) position, except when Wing-Loading (⬭) or Bug Polar (++) is being entered.

7.3 Audio

The Audio is a multi-function device with 4 distinct modes of operation. These modes mean different things, depending on whether the pilot wishes to CLIMB or CRUISE. After a brief period of familiarization, the Audio is very simple to follow.

Interrupted Tone -- rising in pitch with increasing climb.

Continuous Tone --- falling in pitch with increasing sink.

Silence ---------- this is the dead-band for correct speed.

Alarm Tone -------- falling in pitch with increasing sink.

The pilot interprets these modes slightly differently, depending on whether he is climbing or cruising, as follows:

	Pilot Wishes To	
	Climb Or Fly Around	Cruise
Interrupted Tone	Climbing	Slow Up, Going Up!
Continuous Tone	Sinking	Slow Up
Silent Band	Sinking Faster	Correct Speed
Alarm Tone	Sinking Even Faster	Speed Up

If the pilot has selected the adjustable Audio CLIMB threshold option, the interrupted tone will commence not at zero variometer reading, but at the variometer reading equal to the McCready Knob setting. In this case, the continuous tone tells the pilot that the variometer reading is below this threshold, instead of below zero.

Thus the pilot can look, or he can listen. His only manual operation is to occasionally adjust the McCready Knob, based on his achieved climb, and an assessment of the conditions ahead.

The Audio volume is controlled via the Volume Knob (See Figure 7).

7.4 WARNING

The Cambridge MK-IV NAV is not an Airspeed Indicator, and must not be used as such. It cannot replace the ASI in any way, and does not relieve the pilot of responsibility from maintaining safe operating airspeeds at all times.

7.5 Averager

The Averager digital indicator always reads the average variometer reading for the previous 20 seconds of the flight. When the reading is negative, a - sign precedes the readout.

Note: Averager indicator has alternative uses. See Sections 5.5.2, 5.7. Applies to s/n 270 on only.

7.6 Speed-To-Fly Fine Adjustment

Please reference Figure 3. Find location of PUSH/PULL Speed Adjustment on rear of instrument.

To carry out this adjustment, it will be necessary to fly the ship at max L/D speed in smooth air (late evening or early morning is recommended).

Set McCREADY = 0, and observe the PUSH/PULL Indicator. It should indicate around ZERO (the center position). Note if it is on the PULL or PUSH side.

After landing, carry out the following adjustment to the Speed Adjustment. Be careful. Only small adjustments needed.

(a) If the Indicator was on the PULL side, rotate the Speed Adjust CCW (to PUSH).

(b) If the Indicator was on the PUSH side, rotate the Speed Adjust CW (to PULL).

8. FINAL GLIDE COMPUTER AND DISTANCE COMPUTER

8.1 Controls (Refer to Figure 7.)

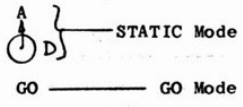
The Computer section of the MK-IV NAV is controlled from the MODE SELECTOR Switch.

Distance and Altitude are entered via the DATA ENTRY Switch.

The pilot's estimate of Wind Component along his flight track is entered via the WIND COMPONENT Knob. Headwind (-) and Tailwind (+) Components of up to 30 Knots are entered via this Knob.

8.2 Operational Modes

The NAV operates in a STATIC and a GO Mode, selected on the MODE SELECTOR thus:



(a) In the STATIC Mode, the NAV functions much like a highly versatile knee-pad calculator. Distance-to-Go (D position) and Finish Altitude (A position) can be entered in the STATIC Mode, using the DATA ENTRY Switch.

(b) In the GO Mode, the NAV continually updates the Distance Readout as you go along, and the Altitude Required Readout with it. Thus, you get a constantly updated picture of your glide along the final glide slope.

Refer to the subsequent examples in Section 8.4 to obtain a fuller understanding of how to use the NAV.

(c) From s/n 270 on, The Go Mode has a second Distance Computer mode. In this mode, the GO Mode starts at 0, and the air distance travelled is displayed to the pilot. This mod is signalled to the pilot by the message EL20 in the Altitude Readout. For details on the DISTANCE COMPUTER Mode, see Section 8.3(c).

8.3 Data Entry

Data Entry for the Distance and Altitude readouts may only be effected during the STATIC Mode, up to s/n 225

From s/n 226 on, Data may be entered during the GO Mode also. Note that if Finish Altitude is changed during the GO Mode, switch from GO to A quickly. Do not stop in the D position(if you do, you will lose the GO mode). Now change the Finish Altitude, and return quickly to GO. To change the Distance, do not touch the GO Mode switch, but simply enter it via the IN Switch. The NAV will then reflect this information from then on.

Mode Selector Switch	A / D / GO	A / D / GO	A / D / GO	A / D / GO	A / D / GO	A / D / GO
IN Switch	IN+ / IN-	IN+ / IN-	IN+ / IN-	IN+ / IN-	IN+ / IN-	IN+ / IN-
Altitude Readout	Decrease and Display Finish Altitude	Increase and Display Finish Altitude	Display Finish Altitude	Calculate and Display Altitude Required	Calculate and Display Altitude Required	Calculate and Display Altitude Required
	Not Required for Distance Computer Mode.			EL20 is displayed in the Distance Computer Mode.		
Distance Readout	Display Distance To Go	Display Distance To Go	Display Distance To Go	Increase and Display Distance To Go	Decrease and Display Distance To Go	Display Distance To Go
				Enter 0 with IN Switch, to enter Distance Computer Mode.		

DATA ENTRY

FIGURE 8

Please note the fundamental difference between Finish Altitude and Altitude Required.

(a) Finish Altitude is altitude at which you wish to arrive at Finish Point. (Safety Margin and Finish Point Altitude.)

(b) Altitude Required is that which is needed to complete the Distance Required (as displayed in Distance-to-Go Readout), (including the Finish Altitude).

The DATA ENTRY Switch has a 2-speed operation, which enables quick entry with precision. Some practice is required to use it most effectively.

What happens is this: when Data Entry is first started (by putting Switch to "IN+" or "IN-"), the display is changed very slowly for about 3 seconds. The rate then accelerates smartly. Releasing the Switch momentarily -- and then returning it again to "IN+" or "IN-" -- restores the slower change speed for 3 seconds again before accelerating once more.

In this way, as the correct Data Entry is almost complete, toggle the Switch to slow the rate, and arrive with precision on the Correct Value.

(c) DISTANCE FLOWN COMPUTER

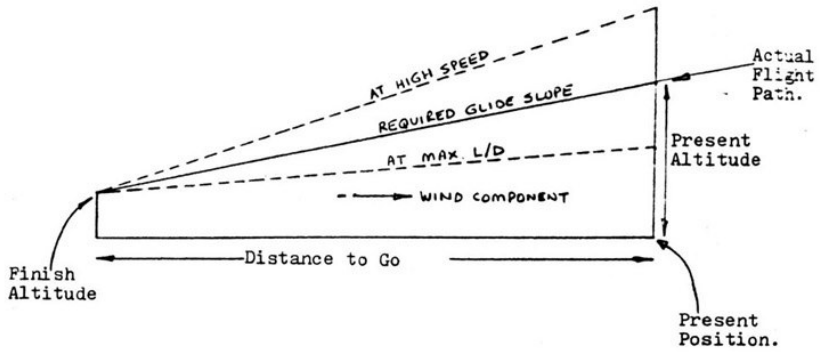
In this Mode, the Computer will count up the Air Miles flown from the start of the GO Mode, taking wind into account. It will not provide Altitude information. It is useful for navigation on intermediate legs of a flight.

To use this mode, enter 0 for distance with Mode Selector at D. The Altitude Display will show EL20 in this mode. Enter a Wind estimate via the Wind knob, and switch to the GO Mode.

The NAV will now count air-miles flown, based on Airspeed and your wind estimate.

Distance and Wind Data may be changed during the GO Mode.

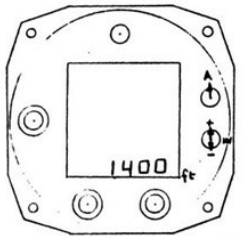
8.4 Use of the NAV in STATIC Mode



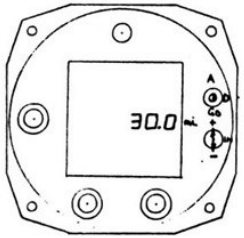
Hypothetical Situation

You are 30 miles from home. Your Altitude is 7000' ASL, and your FINISH ALTITUDE (Goal Airport and Safety Margin) is 1400' ASL. You are flying a 1:44 sailplane, and you have a headwind of 10 Kts.

STEP 1
Enter Finish Altitude using IN Switch
This step may be done before Take-off

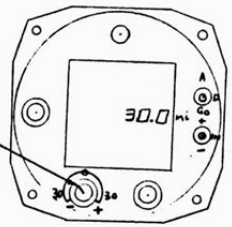


STEP 2
Enter Distance-to-Go using IN Switch



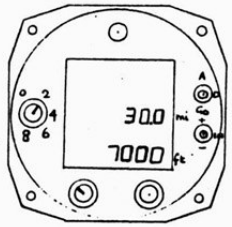
STEP 3
Enter Wind Component Estimate

10Kts, Headwind



STEP 4
Rotate MC Knob until ALTITUDE REQUIRED Readout equals your present Altitude on your Altimeter. (In this case 7000 ft.).

For 1:44 Ship, this should be at a MC Setting of about 2, under these conditions.



(a) What if you are not high enough?

You would not be able to obtain an ALTITUDE REQUIRED less than what you have on your Altimeter, for any MC setting.
You are below the Max. L/D glide slope, as shown in Section 8.4.

(b) What if you are too high?

You would not be able to obtain an ALTITUDE REQUIRED equal to what you have on your Altimeter, for any MC setting. The ALTITUDE REQUIRED would be always less than what you have.
In this case, fly as fast as you safely can. You may have height to spare at the end.

(c) Note About ALTITUDE READOUT:

Upto s/n225 If the ALTITUDE READOUT should exceed 9990 ft, the Altitude will be expressed as a multiple of thousands.
For example: 12,800 ft. would read H13 (13x1000).
14,250 ft. would read H14 (14x1000).

s/n226 on..If the Altitude readout should exceed 9990 ft., the Altitude will be expressed as multiple of 100 ft.
For example: 12800 ft. would read H128
14300 ft. would read H143

8.5 Use of the NAV in GO Mode

8.5.1 Once you have established DISTANCE-TO-GO, ESTIMATED WIND, and MC in the NAV (using the Instructions for the STATIC Mode), the GO Mode can be entered via the MODE SELECTOR Switch.

Based on the actual speeds being flown (the Pilot uses the PUSH/PULL Zero Reader for this), and on the WIND COMPONENT estimate the Pilot has entered, the NAV now counts the distance travelled, and reduces the DISTANCE- Readout to show the updated distance left to the goal.

Monitoring the Final Glide

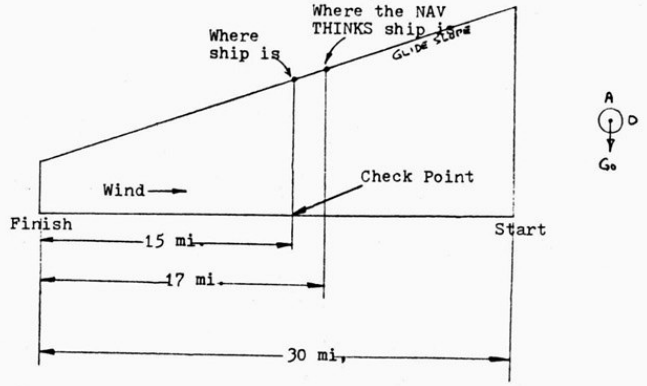
There are two major sources of error on the Final Glide, which may require corrective action on the part of the Pilot. The first is an incorrect wind estimate, and the second is airmass sink or lift on the glide. Ways of dealing with each of these two are detailed next.

8.5.2 For NAVS s/n 226 on, and Updated Units.

The Distance Computer Mode. If the Distance entry made is 0, the NAV will show EL20 in the Altitude readout. It will, upon entry to the GO Mode, count air distance travelled from the time of entry into the GO Mode, and display it in the Distance Readout.

Wind components may be corrected during the GO Mode, as in 8.6

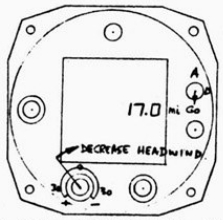
8.6 Correction For Wind



To carry out this correction, you will need to be over a known checkpoint between the start-point of the glide and the goal. Let us continue the example in the previous section.

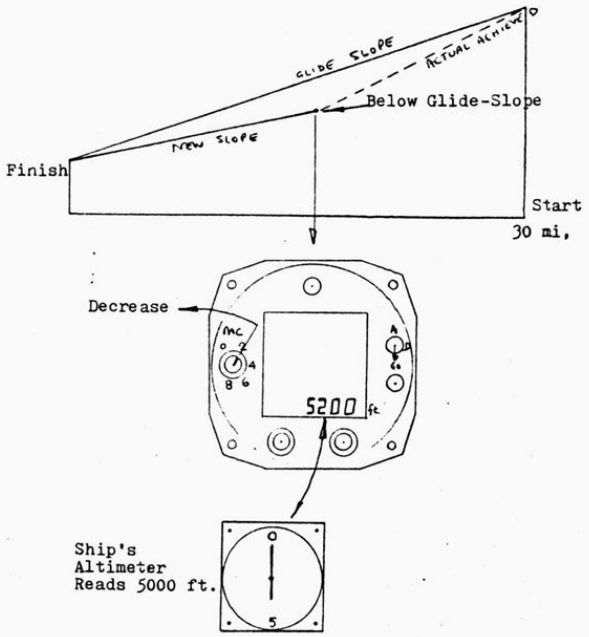
The Pilot started the glide 30 miles out. Over his checkpoint, he is 15 miles out, but the NAV indicates 17 miles. His headwind is less than the entry from the WIND Knob.

Adjust the WIND Knob to decrease the Headwind Component. The DISTANCE-TO-GO Readout will start changing. When the DISTANCE-TO-GO Readout shows 15 miles (which is where the ship is), the correct WIND Component has been established for the remainder of the glide.



This correction may be made, whether the NAV is in the FINAL GLIDE COMPUTER (count down) Mode, or DISTANCE COMPUTER(count up) mode. This latter mode applies to units s/n 226 upwards only, and updated Units.

8.7 Correction for Airmass Variations



During the glide, a ship may find itself above or below the correct glide slope. Consider an extension of the same example discussed previously.

After a period of time, the illustration above shows the position of the ship below glide slope (either due to en-route sink, or perhaps the Pilot was flying too fast).

The ALTITUDE REQUIRED Readout shows 5200 ft, while the ship's Altimeter shows only 5000 ft. This means that more altitude is required than the ship actually has for this glide slope.

So, it is necessary to adopt a different glide slope. To do this, simply rotate the MC Knob until the ALTITUDE REQUIRED Readout agrees with the ship's Altimeter.

Now fly the PUSH/PULL Indicator as before.

If, after rotating the MC Knob all the way to "0", it is not possible to obtain an ALTITUDE REQUIRED less than or equal to what you have, more lift will have to be found!

8.8 The Hold Switch

The Hold Switch (available either as a simple toggle switch for manual control or a magnetic proximity switch mounted on the flap linkage) is only active with the NAV in the GO Mode. At other times, it will have no effect at all.

The Hold Switch should be turned ON (CLOSED) when CLIMB FLAP (positive) is engaged, or when the ship starts to circle. This can be automatic from the flap linkage on flapped ships, or be done manually by the Pilot when he starts to thermal.

When the HOLD Switch is ON, the NAV acts in the following way (provided it is in the GO Mode):

(a) The PUSH/PULL Speed-to-Fly Display is extinguished (or blanked-out, so it is not seen).

(b) The NAV assumed the ship is drifting with the wind, but making no forward progress through the air.

Thus, the DISTANCE Readout will be affected only by drift due to the wind. If the glide is interrupted for a thermal (perhaps the ship is too low, and below minimum glide slope), there is no need to stop the Computation and start the Data Entry again.

9. OTHER WAYS OF USING THE NAV

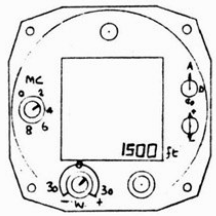
9.1 Static Mode

(a) You've been flying at McCREADY set to 3. Cloudbase is at 9000 ASL. Finish Altitude is 1500 ASL. There is a 10-Knot Tailwind. How far out from Cloudbase can you come in?

Set MC to 3

Set Finish Altitude to 1500 ft.

Set WIND to +10 kts.

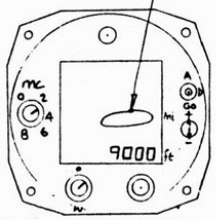


Distance-to-Go

Now SET MODE Switch to D

Enter a Distance-to-go via IN Switch, which is clearly less than you could glide.

Start INCREASING distance steadily, stopping frequently to examine ALT. REQd. Readout.



When Altitude Required Readout equals Cloudbase, the DISTANCE Readout shows the maximum distance you can come in from, using MC = 3.

(b) You've been flying at MC 3. You are at 6000 ASL, and Finish Altitude is 1500 ASL, with a 10-Kt Tailwind. Continuing to fly at the same MC CREADY setting, what is my Glide Range?

Carry out an identical procedure as in (a) until the Altitude Required Readout is 6000'. Then the Distance Readout will give you your range.

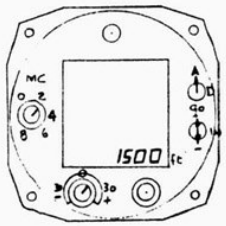
9.2 Go Mode

(a) You are at your last turn-point, starting home, flying at MC 3. Finish Altitude is 1500 ASL. There is a Tailwind of 10 Knots, and you wish to continue at MC 3. You are at 7000 ft, and the last leg is 100 miles.

Set MC to 3

Set Wind to +10 kt.

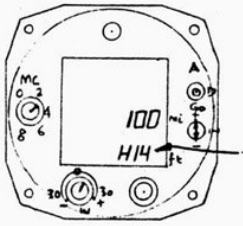
Enter Finish Altitude. (Mode A, IN Switch)



Enter Distance-to-Go (100 mi.) via Mode=D and IN Switch.

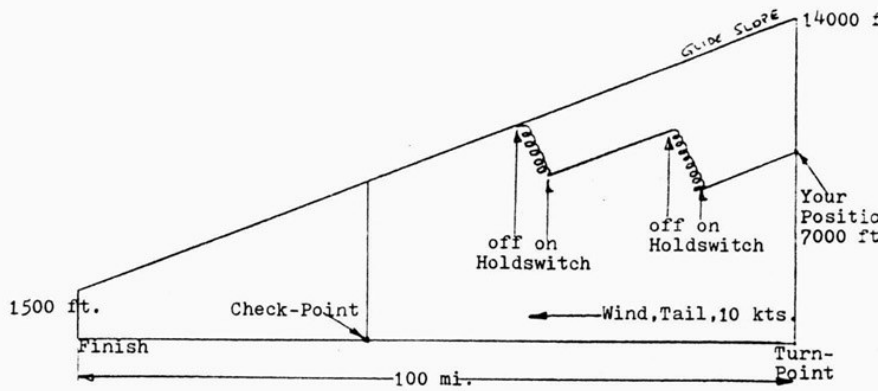
Result: Altitude reqd. =14000 ft.

This is for a typical flapped 15m ship.



The Altitude Required (14000') is obviously more than your present 7000', and this should not be surprising!

Now set Mode to GO, and set off on the final leg. Use the HOLD Switch (if not automatically operated by the flaps) to indicate when you stop for a thermal.



At some point, provided you have been finding lift, the ALTITUDE REQUIRED will agree with the ship's Altimeter, and the final glide can be started, with no further adjustments to the NAV.

A check-point correction for WIND (see Section 8.6) can be carried out at any point during this leg. It may be advisable to carry out 2 check-point corrections, because winds can vary over 100 miles quite significantly.

10. SUMMARY

With familiarity and practice, the Pilot can work out a number of methods of use of the NAV, and further explore its versatility.

For example, it could be used as a Distance-to-Go aid on intermediate legs of a triangle.

In the Count-down mode, it is most useful on final legs of a flight.

In the Count-up mode, (DISTANCE COMPUTER), it is most useful on intermediate legs of a flight.

11. USE OF THE NAV IN COLD WEATHER

The NAV will continue to function quite normally down to 32°F (0°C).

Below these temperatures, the Pilot will observe that the display changes a little slowly.

For normal operation, this will not be a noticeable problem; however, if information is being entered via the ± IN Switch, the entry will have to be stopped from time to time to allow the numbers to settle down.

12. SPECIFICATIONS

Voltage	11-18 DC, supplied by Variometer.
Consumption	80 m/a approximately.
Push-Pull Readout	LCD Bar Graph.
Averager	LCD 2-Digit, 9.9 Knots or 9.9 M/S max.
Distance	LCD 4-Digit, 199.5 mi. or 199.5 Km max.to s/n225 500 miles or 500 km fr.s/n226 up.
Altitude	LCD 4-Digit, 9990 ft. or 9990 M max. Over-Ranged H19 ft. = 19000 ft. max.up to s/n 225 Over-Ranged H420ft. = 42000 ft. max.fr.s/n226 on.
Dimensions	3-1/8" x 3-1/8" x 8" long (plus plumbing connections). Fits 80mm (3-1/8") standard round panel opening.
Weight	1.75 pounds (800 grams).