COMPU~NAV

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To obtain warranty service, the customer shall take or deliver the product pre-paid to Southdell or its authorised agents. Proof of purchase that the unit is within warranty period must be presented. This warranty does not cover claims for damage due to abuse, misuse or accident.

COMPU-NAV
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Compu-Nav design and specification subject to change.

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INTRODUCTION

Thank you for purchasing COMPU-NAV, the Electronic Pilot Navigation Computer. COMPU-NAV has been estblished for some five years to date and its popularity is expanding at a remarkable rate. We trust you will find it a practical and indispensible tool and that you will enjoy many years of flying using COMPU-NAV. The design philosophy of COMPU-NAV is to provide a fast, accurate and easy to use pilot aid to relieve the pilot of normally time consuming tasks. We believe that we have achieved our design objective.

This new model incorporates many new features that truly render the old fashion, archaic circular slide rule and other forms of pilot aids obsolete. COMPU-NAV utilizes the exceptional qualities of the latest generation pocket computer, the Casio FX-795P. This compact unit has a maximum memory capacity of 16 Kilobytes. This is sufficient to store the programs and approximately 250 navigational waypoints.

Optional equipment available for your Compu-Nav computer include the Casio FP-40/FP-12S thermal printers to provide a printed copy of calculations and the Casio FA-5 Cassette Interface to enable long-term program storage on a standard audio cassette recorder.

According to Casio's specifications, the FX-795P computer will provide up to 80 hours of continuous operation, or up to 180 hours when used continuously for 1 hour per day. The 2 Lithium batteries (CR-2032) used in the computer need replacing when the display reaches a low level of contrast with the display contrast dial set to maximum. The separate auxiliary battery (CR-1220) in the computer provides memory backup protection for up to 2 years, however should you not have a copy of the program saved onto tape, via the optional cassette interface, then it is recommended that this battery be replaced at least every 18 months. (Refer to 'Power Supply', page 11 of the FX-795P user manual).

The best way to learn how to operate your Compu-Nav computer and obtain maximum benefit is to use it. Follow through the examples in this manual and after only a short time you will be proficient in the use of Compu-Nav, the pilot's computer designed for pilots by pilots.

Happy Aviating and Happy Computing.

COMPU-NAV NAVIGATION PROGRAM

The prime objective of this program is to provide a fast, accurate and easy to use method of calculating the magnetic Track, Distance, Heading, Ground Speed and Time Interval (or Speed required for a given Time Interval) between any two user selected positions, or waypoints. These starting and finishing positions can be specified by either:

(1) WAYPOINTS (eg Aerodromes, Nav Aids, Turning Points)
(2) RNAV Position (Bearing and Distance from a Waypoint)
(3) INTERSECTION OF TWO RADIALS
(4) LATITUDE, LONGITUDE and Variation

The flexibility of the Navigation program makes Compu-Nav useful, and somewhat indispensable, in both flight planning and in-flight situations.

To facilitate usage, the program will prompt the user as required. It is self-learning so that it will only be necessary to enter the waypoint's Latitude, Longitude and Magnetic Variation once. Editing facilities are also provided to enable easy updating of pre-stored waypoints in Compu-Nav's memory. Waypoint is the technical name used to describe a place or location such as an aerodrome, radio navigation facility or turning point.

OPERATING INSTRUCTIONS

1. Switch on the Compu-Nav computer by moving the sliding Power Switch on the left hand side of the keyboard to the ON position. The display will now show "READY P0".

2. Select the Navigation program by first pressing the pink SHIFT [S] key (a small boxed S will appear in the display near the top left hand side of the display to confirm this key press) and then by pressing the 0 (ZERO) key. The display will now display "COMPU-NAV Pilot Computer", pause, then display "Copyright.Southdell.1990", pause, and then display the prompt "From Waypoint (*=Ed)?".

3. From here it is possible to do one of the following:
   (a) Enter a pre-stored waypoint.
   (b) Enter a new waypoint and proceed with saving its latitude, longitude, and variation into memory.
   (c) Press the EXE key once for RNAV (Radial/Distance) position selection
   (d) Press the EXE key twice for INTERSECTION of two radial positioning.
   (e) Press the EXE key three (3) times to specify a position based on latitude, longitude, and variation (and not saving the waypoint into memory).
   (f) Edit the waypoint data in memory.

3(a) ENTER A PRE-STORED WAYPOINT

In response to the "FROM WAYPOINT (*=Ed)?" prompt, enter your selected waypoint using the approved D.O.T.A.C. abbreviation. For Example, enter SY and press EXE (ie press the S key then the Y key and then press the EXE key). This will select SYDNEY as the starting waypoint (position).

The display will now show "To Next Waypoint?". Now enter your next position (waypoint), or any of the other options as shown in section 3. For example, enter KAT and press EXE. This will select KATOOMBA as the next position or waypoint.

After a few seconds calculating, the display will show "Track 276 M Dist 46 nm". This tells us that the track and distance from Sydney to Katoomba is 276 degrees magnetic and 46 nautical miles. The Time Interval can be calculated by simply pressing the EXE key. In reply to the "TAS/Ground Speed (Kts)?" prompt enter the desired aircraft TAS (True Air Speed) or Ground Speed, should this be known. For example, enter 170 (ie 170 knots). The display will now show "Wind (0 / 0Kt)?". This prompt displays the current default wind in brackets. Should you wish to use the default wind then press EXE. If you do not wish to calculate the Heading or Ground Speed at this time simply press EXE. The display will now show "Time Interval 16mins", which tell us the time to fly from SY to KAT at 170 knots is 16 minutes. However if we do wish to calculate the Heading and Ground Speed for a given wind, then in reply to the "Wind (0./ 0Kt)?" prompt, enter the wind direction (in degrees magnetic) and speed in the conventional aviation format, eg 300/25 and press EXE. The display will now show "HDG 279M 147 Kts 19min". Thus with a forecast wind of 300 degrees magnetic at 25 knots the required heading to fly from Sydney to Katoomba is 279 degrees magnetic, the ground speed will be 147 knots and the time interval will be 19 minutes.

Another press of the EXE key will display the prompt "1=Wrong EXE=Next 2=End?". From this point it is possible to do one of three things.

1. If the wrong information was entered during the last flight leg then press 1 and EXE. Compu-Nav will display the message " Repeat Last Leg ", and then prompt "To Next Waypoint?". Here we can re-enter the same route as before with the correct data, or compute a new flight route.

2. If we have finished entering all waypoints for our flight we can obtain the summation of total flight time and total flight distance by entering 2 and pressing EXE.

3. If we wish to continue calculating navigation data for more flight legs then simply press EXE and the display will prompt "KAT To Next Waypoint?". Compu-Nav is ready to calculate the next leg of the flight.

3(b) ENTER A NEW WAYPOINT

In the case of a waypoint not being stored in the Compu-Nav's memory it is quite a simple matter to store its details. (The Compu-Nav comes Pre Programmed with over 200 Australian radio navigation aids). For example, say we wish to save details of Bathurst NSW into memory. In reply to the "FROM WAYPOINT (*=Ed)?" prompt, input BTH and press EXE. The display will show "LATITUDE?". This indicates that BTH is not stored in memory and Compu-Nav wants to know the Latitude of Bathurst.

From ERC 2 (Enroute Radio Chart) extract the Latitude of Bathurst -- S33 24.9 (ie South 33 degrees 24.9 minutes). This format decimalizes the seconds part of the latitude. The latitude and longitude information can also be obtained from other publications such as IAL's, Aerodrome Directory and of course from the W.A.C.. To decimalize the seconds simply divide the seconds by 60. (eg S 33deg 24min 54sec = S 33 deg 24min 54/60sec = S 33deg 24.9min).

Now in reply to the "LATITUDE?" prompt input S33249 and press EXE. (Note: Do not include the decimal point). The display will now show "LONGITUDE?". Similarly, determine the Longitude of Bathurst (East 149 deg 39.4 min). Enter E149394 and press EXE. The display will now show "MAGN VARN?". From the W.A.C., the magnetic variation of Bathurst is East 11.1 degrees. Enter E11.1 and press EXE.

After a few seconds the display will show "BTH To Next Waypoint?". Compu-Nav has saved the details, provided the memory is not full, and is now ready for your next waypoint.

NOTE 1. We recommend naming waypoints by their approved DOTAC abbreviation, however Compu-Nav will recognize a waypoint name up to seven characters in length.

NOTE 2. When entering latitudes and longitudes, ensure you enter the numbers according to the correct format, excluding the decimal point and not leaving off any trailing zeros. Example. For a latitude of South 34 degrees enter S34000 and not S34.

NOTE 3. If in reply to the "TAS/Ground Speed (Kts)?" prompt the EXE key is pressed, ie a null entry, then the display will show "TIME INTERVAL?". From here it is possible to calculate the ground speed required for the time interval entered into the computer. This is useful for the situation where an ATC clearance is given with a time restriction. For example "ABC cleared to Katoomba at 10,000, crossing Katoomba not earlier than time 30". Say that from overhead Sydney this would give us a time interval required of 18 minutes, thus enter 18 and press EXE in reply to the "TIME INTERVAL?" prompt and the display will show "Ground Speed 152Kts". Thus we would need to achieve a ground speed no

greater than 152 Kts in order to satisfy this clearance. Try this example on your Compu-Nav. If in reply to the "TIME INTERVAL?" prompt you make a null entry, ie press EXE, then you will return to the "1=Wrong EXE=Next 2=End?" prompt, ready to start again.

3(c) RNAV COMPUTATION

Compu-Nav offers the ability to calculate the Track and Distance from a RNAV position (That is, a position specified as a Bearing and Distance from a known waypoint).

For example, say we wish to track from a place on the 195 radial and 41 nm from Sydney, to Shellys (SLS). In reply to the "FROM WAYPOINT (*=Ed)?" prompt press EXE. The display will now show "RNAV : Radial/Distance?". Enter 195/41 and press EXE. The display will show "RNAV : 195 41nm FROM?". This confirms we have entered the correct RNAV information prior to continuing. Input SY and EXE. A few seconds later the display will show the computed RNAV position "Posn: S 34332 E 150479". Press EXE and the display will prompt "To Next Waypoint?". Now enter SLS and press EXE.

The display will now show "Track 244 M Dist 40nm" indicating a track of 244 degrees magnetic and a distance of 40 nm. In actual fact the RNAV position selected was Wollongong and the ERC track and distance from WOL to SLS is 245 deg, 40 nautical miles. Check ERC 2 and try a few examples for yourself. Also try a few examples from one RNAV position to another RNAV position (eg 220/40 from SY to 243/55 from SY (ie SLS to BIK).

Should you make an error entering the information into the computer and you have NOT pressed the EXE key, then press the CLS button (clear) and re-enter the information. (You can also use the editing cursors <- and -> to make correction).

If you have pressed the EXE key, then you can use the "1=Wrong " option to re-enter the data.

3(d) INTERSECTION OF TWO RADIALS

Compu-Nav offers the ability to calculate the Track and Distance from a position specified by the intersection of two radials or bearings from either a VOR, NDB or a combination of both.

For example, say that we are in flight and within the range of both Sydney and Bindook VORs. We are on the 220 radial from SY and on the 179 radial from BIK. Our position can be determined from the intersection of these two radials. In reply to the "FROM WAYPOINT (*=Ed)?" prompt press the EXE key twice. The display will now show "xBRG :

Radial/Waypoint?" Enter 220/SY and press EXE. This is defining the first radial of 220 from Sydney. The display will now show "Radial/Waypoint?". Enter 179/BIK and EXE. (BIK Lat S34108 Long E150063 Varn E12). The display will now show the Latitude and Longitude of the computed position, "Posn: S34429 E149590. Press EXE and the display will show "To Next Waypoint?". Say we wish to divert to Katoomba from this position, then simply enter KAT and press EXE. The Track and Distance from our present position to KAT is 003 degrees magnetic and 62 nautical miles.

NOTE 1. (RAC/OPS 1-46). A positive fix can be determined by the intersection of two or more position lines which intercept at an angle not less than 45 degrees and within the rated coverage of the radio aid. If a radio fix is determined by use of 2 NDBs, the position lines will be acceptable to a range no further than 30nm from any NDB concerned.

NOTE 2. The Latitude and Longitude calculated from two position lines extracted from the ERC to a position shown on the ERC (such as our example defining Shellys) will generally not be exactly the same as the latitude and longitude shown on the ERC. This is due to many factors including radial scalloping, site and position errors, distance from nav aid, rounding up of 1/2 degrees and so on. The magnitude of these factors are so small that the computed position is more than accurate enough for the purpose of aircraft navigation.

3(e) LATITUDE, LONGITUDE, NO SAVE

This is used in the case of wanting to track to or from a place specified by its Latitude and Longitude only and not wishing to save its details into memory.

In reply to the "From Waypoint (*=Ed)?" or "To Next Waypoint?" prompt press the EXE key three times. The prompt "LATITUDE?" will appear to which one replies by entering the latitude in the format as described in section 3(a). The next prompt is "LONGITUDE?" to which one enters the Longitude and the EXE key. Then to the prompt "Magnetic Variation?" enter the appropriate variation.

3(f) EDITING THE WAYPOINT MEMORY DATA

For total flexibility an editing feature is provided to enable waypoints stored in Compu-Nav to be Listed, Deleted and displayed as required.

In response to "From Waypoint (*=Ed)?", press the * key and the EXE key. The star (*) is a special symbol recognized by the program to mean 'I want to edit data'. The display will show "L=List/D=Delete/WP name?".

To list all the waypoints stored simply press the L key and press EXE. Waypoints will start to appear in the display. When finished the editing menu prompt will reappear. (To discontinue listing waypoints press and hold any key,except EXE, until the display stops).

To delete a waypoint press D and EXE, and the prompt "Enter name to delete?" will appear. To delete a waypoint enter its abbreviation and EXE. (Eg To delete Katoomba enter KAT and press EXE). The display will temporarily blank and the prompt will reappear. When you have finished deleting waypoints press the EXE key, ie a null entry, to return to the editing menu prompt.

To check the Latitude and Longitude of a pre-stored waypoint enter the name or code of the waypoint you wish to view and press EXE. For example enter SY. The display will now show "SY ,S33567,E151103,-12" (where -12 represents EAST 12 degrees). Pressing EXE again returns to the editing menu prompt.

On completion of editing, press EXE after the editing prompt to return to the "From Waypoint (*=Ed)?" prompt.

4. ERROR MESSAGES

Should an ERR message be displayed, then an error has occurred during program execution. The Casio user manual has a full explanation of error message on page 242.

ERR1 ... Memory overflow. There is insufficient space to save any more waypoints. It will be necessary to delete unwanted waypoints prior to saving new ones.

ERR2 ... Syntax Error. Wrong type of information has been entered following the prompt. Example an letter has been entered where a number should have been.

ERR8 ... Password Protected. This will be displayed if an attempt is made to list or delete the Compu-Nav program.

An error can be cleared by pressing the CLS key. Should a "?" appear in the display then simply re-enter the data and press EXE to continue operation. If this does not clear the error, then press the orange BRK key and restart the program.

As with any method of calculation common sense must prevail and it is good practice to perform a mental check to confirm the validity of results. This will help guard against erroneous results being obtained from incorrect data input. Compu-Nav is meant to be a Pilot Aid, not a Pilot replacement. Remember the old computer saying "Garbage in, Garbage out"!.

VERY IMPORTANT NOTICE:

The Casio FX-795P computer, in which the Compu-Nav program is stored, will corrupt program memory if it is switched off during program execution. Refer to 'Prior to Operation' in the Casio User Manual. 'During program execution' refers specifically to that period when the display is blank and the computer is either calculating, storing or retrieving data from its memory. Thus to ensure the program remains intact:

DO NOT SWITCH OFF THE COMPU-NAV COMPUTER DURING PROGRAM EXECUTION WHILE THE DISPLAY IS BLANK

FLIGHT PLAN FUEL PROGRAM

This program is designed to speed up and improve the accuracy of that part of flight planning that many pilots guesstimate ... the flight plan fuel calculations.

Similar to the Navigation program, this program is self learning so that it will only be necessary to enter your selected aircraft fuel flow figures once. Editing facilities are also provided to enable easy updating of the aircraft data stored in Compu-Nav's memory.

Fuel selection is available in pounds (LB), kilograms (KG), litres (LT) and US gallons. Adjustment of fuel weight is based on the S.G. (specific gravity) of the fuel used.

Program execution is simple and follows the format of the D.O.T.A.C. flight plan fuel column. It provides the option to select the amount of Variable and Fixed reserves to suit your operational requirements.

This program will suit Private, Commercial, RPT, VFR, IFR, Charter, fixed and rotary wing, piston and small turbine aircraft. It is not suitable, nor designed, for heavy jet aircraft whose fuel flow varies over a large range, although it is possible to store various fuel flow figures at different power settings, levels, etc under different names for the same aircraft. Example PA3155%, PA31-10.

OPERATING INSTRUCTIONS

1. Switch on the Compu-Nav computer. The display will show "READY P0".

2. Select Flight Plan Fuel by pressing the pink shift key and the 1 key. The display will show "Flight Plan Fuel" pause and then prompt "1=LB 2=KG 3=LT 4=US GAL?". Select the fuel units you wish to use by pressing a number from 1 to 4. For example to select Litres, press number 3. The display will now prompt "Aircraft (L=List D=Del)?"

3. From here it is now possible to do one of the following:

(a) Select a pre-stored aircraft.
(b) Enter a new aircraft into memory.
(c) List or Delete aircraft in memory.

3(a) SELECT A PRE-STORED AIRCRAFT

In response to the "Aircraft (L=List D=Del)?" prompt, enter the name of the aircraft whose fuel data has been pre-stored, and press EXE. Proceed to Step 4.

If this aircraft is not pre-stored then you will need to enter its details. Proceed to Step 3(b).

3(b) ENTER A NEW AIRCRAFT INTO MEMORY

Compu-Nav has the ability to store fuel flow data for many types of aircraft. For example, say we wish to store details of a Piper Navajo into the Compu-Nav's memory. In reply to the "Aircraft (L=List D=Del)?" prompt enter PA31 and EXE.

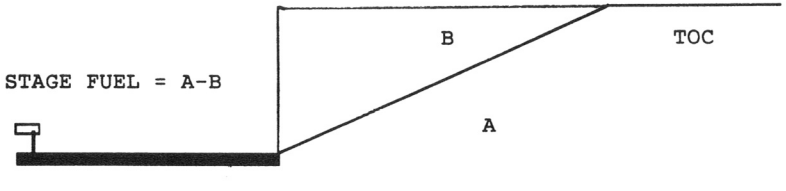
The display will prompt "Cruise FuelFlow(Lts)?". Compu-Nav is asking for the cruise fuel flow in Litres per hour. (Compu-Nav will automatically adjust to the fuel units selected in step 2). For our example enter 162 and press EXE. (That is, 162 Litres per hour).

The display will now prompt "Holding FuelFlow?". This is asking for the holding fuel flow once again in Litres per hour. For our example enter 113.6 and EXE.

The display will now prompt "Fix Res 1=Rate 2=Qty?" This allows the Compu-Nav Fuel program to cater for different types of aircraft and operational requirements. If the Fixed Reserve needs to be calculated on a hourly fuel flow basis then enter 1. If the Fixed Reserved needs to be based on a fixed quantity, such as the case of larger aircraft, then enter 2. In this case the Fixed Reserve will always be this quantity irrespective of the Fixed Reserve time interval. For our example enter 1. The display will prompt "Fix Reserve FuelFlow?" For our example enter 113.6 and EXE.

The display will now show "Stage Fuel?". Stage fuel is used to account for taxi and climb out fuel consumption and is determined by the following method.

TOTAL fuel required for start, taxi, takeoff & Climb
MINUS
Fuel required to cruise from overhead the departure aerodrome to the top of climb position.



In our example input 37.5 and EXE. (That is, 37.5 Litres used for taxi and extra fuel used during takeoff and climb).

The display will show "Fuel S.G. (AG.69)?". This is asking for the specific gravity of the fuel normally used in your aircraft so that accurate fuel calculations can be made. Typically 100LL Avgas has a S.G. of 0.69, while Avtur has a S.G. of 0.79. For more accurate figures on the S.G. used in your aircraft, contact your local fuel agent. In our example enter .69 and press EXE. After a few seconds the "Aircraft (L=List D=Del)?" prompt is displayed. Enter PA31 and press EXE. The display will now show "Cruise Time (mins)?".

4. Enter the Cruise time interval in minutes. For example, 104 and EXE will select a time interval of 104 minutes. The display will now show "104min 281Lts" (for the case of the PA31 example). These figures should now be written on your flight plan form fuel column. Press EXE and the display will show "Alternate TI?". This is asking for a time interval to your alternate aerodrome. Should you require an alternate then enter the alternate time interval in minutes, press the EXE key and the display will show the alternate fuel time interval and fuel requirements. After writing these details in the fuel column of your flight plan form press the EXE key.

If there is no alternate requirement, such as the case in our example, then simply press the EXE key in reply to the "Alternate TI?" prompt.

6. The display will now prompt "Variable Res (0%)?". If there is no requirement for a variable reserve, such as the case in our example, then enter 0 and press EXE. If your flight category requires a variable reserve of 15% then enter 15 and press EXE. The display will show the variable fuel reserve required in minutes and fuel units selected. If your operation allows some different percentage, example 10%, then enter this percentage and press EXE.

7. The display will now show "Fixed Res (45min)?". Press EXE and a fixed reserve of 45 minutes will be displayed. In our example the display will show "Fix Res 45mins 85Lts". (Should your operation require some other fixed reserve then simply enter than fixed reserve time).

8. The display will now show Holding TI?". This is asking for the holding time interval requirement. Enter this holding requirement and press EXE. For example, input 30 minutes. The display will show "Holding 30mins 57Lts". Again if there is no holding requirements then simply press EXE in reply to the prompt.

9. The display will now show "Number of STAGES?". As described earlier this is referring to the number of flight stages (Takeoff - cruise - landing) and is used to calculate

taxi , climb and sundry fuel requirements. Say we wish to fly Sydney to Canberra. This would constitute one flight stage, so we enter 1. However should you consider a particular sector does not require this adjustment then enter 0. For our case enter 1. The display will show "Stage 38Lts", a figure that for convenience we can add to the taxi column. Press EXE and the display will show "FUEL RQD 179mins 460Lts". Thus the fuel requirements of our flight is 179 minutes and 460 litres.

10. Press EXE and the display will prompt "Fuel on Board (Lts)?". This is obviously asking how much fuel is on-board the aircraft. Input the quantity of fuel in the units previously selected. For example, assume there is 590 litres of fuel on-board, input 590 and press EXE. (If the EXE key is pressed without entering a fuel figure, then the program assumes the fuel on board is that quantity that remained from the previous calculation. If this is the first fuel calculation then there was no fuel remaining, hence a negative value will occur).

11. The fuel margin will be displayed "MARGIN 48mins 130Lts". Press the EXE key to display the total flight fuel endurance, which in our example is "Endurance 227mins".

12. Press EXE and the display will show the fuel remaining as "Fuel Remaining 272Lts".

13. Press EXE to continue calculation of fuel for the next flight leg and the "Cruise Time (mins)?" prompt will reappear.

3(e) EDITING AIRCRAFT IN MEMORY

For total flexibility an editing feature is provided to enable aircraft stored in Compu-Nav to be Listed or Deleted as required.

LISTING In reply to the "Aircraft (L=List D=Del)?" prompt press L and EXE. The display will show the aircraft stored in memory, along with the cruise flow, the holding flow, fixed reserve flow (or quantity if preceded with a - sign) and stage fuel. Press EXE after each aircraft displayed to continue listing the stored aircraft. When complete, the display returns to the "Aircraft (L=List D=Del)?" prompt.

DELETING To delete an aircraft from the memory simply press D and EXE in reply to the "Aircraft (L=List D=Del)?" prompt and the display will show "Delete Aircraft (name)?". Simply enter the name of the aircraft to delete and press EXE. For example, to delete the Navajo previously entered enter PA31 and EXE. The display will momentarily blank and then return to the "Aircraft (L=List D=Del)?" prompt.

CAUTION

Care must be taken with fuel calculations as finger trouble could give erroneous results. As with any computational device, be it a simple circular slide rule or an advanced computer, always use a quick mental check to check results.

RUNWAY WIND COMPONENT

HEADING - GROUND SPEED - TIME INTERVAL

This program make simple the calculation of runway headwind and crosswind components. It also makes calculating the Heading, Groundspeed and Time Interval for a given TAS, Track required, Track distance and Forecast wind, a breeze!

After using this you will never want to use the wind side of the old circular slide rule (the confuser) again.

OPERATING INSTRUCTIONS

1. Switch on the Compu-Nav computer.

2. Select the Runway Wind Component and Wind Heading/ Ground Speed program by pressing the pink shift key, and then the 2 key. The display will show "WIND: RUNWAY & HDG/GS/TI" pause, then display "Runway Dir?".

3. It is now possible to select either the Runway Wind component program or the Heading/Groundspeed and TI program.

3(a) RUNWAY WIND COMPONENT
In reply to the "Runway Dir?" prompt enter the runway direction in degrees magnetic. (Runway directions can be entered in their two digit format. For example runway 07 would be entered as either 070 or 07, but not 70.)

3(b) Say we wish to calculate the components for runway 25 with a wind of 350 degrees magnetic at 25 knots. Hence input 25 and EXE in reply to the "Runway Dir? prompt. The display will now show "Wind Dir?". Input 350 and EXE.

3(c) The prompt "Wind Speed?" will be displayed. Input 25 and press EXE. The result "HWC -4 XWC 25R" will be displayed. The runway headwind component is -4 knots, that is a 4 knot tailwind, while the runway crosswind component is 25 knots from the right.

3(d) Press EXE and the "Runway Dir? prompt returns for further calculations. To calculate new components, say for another runway, simply repeat the above. To leave this program and start Heading/Groundspeed calculations press EXE in reply to the "Runway Dir? prompt.

NOTE. Pressing EXE after the "Wind Dir?" prompt without entering numbers (ie a null entry) will assume the value used for that particular prompt last time is required for

this calculation. For example, calculate the wind component for runway 36 with the same wind. In reply to the prompt "Runway Dir?" enter 36 and EXE. In reply to the "Wind Dir?" prompt press EXE. A wind of 350/25 is assumed and the result "HWC 25 XWC 4L" is displayed.

4(a) HEADING - GROUND SPEED - TIME INTERVAL
To start this program press EXE in reply to the "Runway Dir?" prompt. The prompt "TAS?" will be displayed.

4(b) Enter the aircraft's TAS (true airspeed) and press EXE. For example say our TAS is 120 knots. Enter 120 and EXE. The display will prompt "Track?".

4(c) Enter the required track, eg 270 (degrees magnetic) and press EXE. The display will prompt "Dist?".

4(d) Enter the track distance, say 140 (nautical miles) and press EXE. (Note: This is needed to compute the Time Interval after the ground speed has been calculated). The display will prompt "Wind Dir?".

4(e) Enter the forecast wind direction and press EXE. For example assume the wind at our altitude is 340 degrees (magnetic) and 25 Knots. Enter 340 and press EXE. The display will prompt "Wind Speed?". Enter 25 and EXE.

4(f) The display will now show the result "HDG ... ",which in the case of our example is "HDG 281 M 109Kt 77min". Thus the heading to fly is 281 degrees magnetic, the ground speed achieved is 109 knots and the time to fly 140 nm is 77 minutes.

4(g) Pressing the EXE key will return the "Track?" prompt, ready to recalculate again.

Try a few examples for yourself. We are sure that you will be more than happy with the ease at which you can calculate runway wind components and headings/ground speeds. The old fashioned circular slide rule was never this much fun!

ENROUTE WIND PROGRAM

This program will calculate the actual wind direction and speed based on information obtained whilst in-flight.

The information required is as follows:

TAS	(True airspeed)
HEADING	(the heading held to maintain track)
GROUND SPEED	(Obtained from either DME or Ground speed check)
TRACK MADE GOOD	(actual track flown obtained from either the VOR or measured from a WAC)

OPERATING INSTRUCTIONS

1. Switch on the Compu-Nav computer and select the Enroute Wind program by pressing the pink shift key and the 3 key. The display will show "ENROUTE WIND", pause, then prompt "TAS?".

2. Input the TAS (True airspeed) and press EXE. For example, assume a TAS of 175 knots. The display will prompt "Heading?".

3. Input the HEADING that has been used to maintain track and press EXE. For example, assume the heading was 090 degrees magnetic. Enter 90. The display will now show "Track Made Good?".

4. Input the TRACK MADE GOOD and press EXE. For example, assume the TMG, obtained from the omni, was 080 degrees magnetic. Enter 80. The display will prompt "Grnd Spd?".

5. Input the GROUND SPEED and press EXE. Assume our ground speed has been 200 knots. Enter 200. The display will now show "WIND 212 M 41Kts". For our example the enroute wind has been 212 degrees magnetic and 41 knots. If we wish to determine the ground speed based on the distance and time interval as would be done using a ground speed check during VFR navigation then in reply to the Grnd Spd?" prompt press EXE. The display will prompt "Dist?". Say we have travelled 100nm in 30 minutes, then enter 100 and press EXE. The display will prompt "Time Interval?". Enter 30 and EXE. The display will show "G/S 200 kts". Press EXE and calculation continues to give the resultant enroute wind.

6. Press the EXE key and the program returns to step 2.

Try a few examples for yourself and get a feel of this program.

CLIMB AND DESCENT CALCULATIONS

This program will calculate the distance and time required for a climb or descent. It can be used during preflight planning to compute climb data for our flight plan or it can be used inflight to determine a top of descent point based on either time or distance from our destination. It can also calculate the average rate of climb/decent required to achieve a specific climb/descent distance or time. The information required is as follows:

START ALTITUDE	(entered in FEET)
END ALTITUDE	(entered in FEET)
RATE OF CLIMB/DESCENT	(entered in Feet per Minute)
GROUND SPEED	(entered in KNOTS)

OPERATING INSTRUCTIONS

1. Switch on the Compu-Nav computer and select the Climb and Descent program by pressing the shift key and the 4 key. The display will show "Climb/Descent Calcs", pause, then prompt "Start Altitude?".

2. Input the Starting Altitude and press EXE. For example, assume our descent will start at 8000 feet. Enter 8000 and press EXE. The display will now prompt "End Altitude?".

3. Input the Ending Altitude, say overhead the sea level aerodrome at 1500 feet. Enter 1500 and press EXE. The display will now prompt "ROC/ROD?".

4. From here it is now possible to do one of the following:

(a) Calculate the Climb/Descent distance and time.
(b) Calculate the Rate of Climb/Descent and time for a given distance.
(c) Calculate Rate of Climb/Descent and distance for a given time interval.

(A) CALCULATE CLIMB/DESCENT DISTANCE AND TIME.

1. Say our average rate of descent is 500 feet per minute, enter 500 and press EXE. (Compu-Nav determines this is a descent). The display will prompt "Ground Speed?".

2. Enter the ground speed and press EXE. For example, assume our ground speed during descent will be 160 knots. Enter 160 and EXE. The display will show "Dist 34.7nm Time 13.0min". Thus the top of descent point will be 34.7nm from our destination aerodrome and the descent will take 13 minutes.

3. Press EXE to return to the start.

(B) CALCULATE RATE OF CLIMB/DESCENT AND TIME.

1. In reply to the "ROC/ROD?" prompt press EXE (null entry). The display will prompt "Ground Speed?". Enter the ground speed anticipated for the climb/descent. For example assume 130 knots. Enter 130 and EXE. the display will prompt "Climb/Desc Dist?"

2. Say we require a distance of 45nm for our descent. Enter 45 and press EXE. The display will show "VS-313fpm Time 20.8min". Thus to achieve a descent from 8000 feet to 1500 feet at a ground speed of 130kts, starting the descent at 45nm from the required aerodrome would require the aircraft to achieve a rate of descent of 313 fpm, taking 20.8 minutes for the descent. (VS means vertical speed where '-' indicates a descentand '+' indicates a climb).

3. Press EXE to return to the start.

(C) CALCULATE RATE OF CLIMB/DESCENT AND DISTANCE

1. In reply to the "ROC/ROD?" prompt press EXE. In reply to the "Ground Speed?" prompt enter 130 and press EXE. The display will now show "Climb/Desc Dist?". Press EXE and the display prompts "Climb/Desc Time?". This is asking for the descent time interval required to be achieved.

2. Say we want the descent to take 10 minutes. Enter 10 and press EXE. The display will show "VS-650fpm Dist 21.7nm". Thus to achieve a descent from 8000 feet to 1500 feet at 130 knots in 10 minutes would require a 650 fpm rate of descent. During this descent we would cover a distance of 21.7nm.

3. Press EXE to return to the start.

OFF TRACK HEADING CORRECTION

This program will calculate the track error (TE), closing angle (CA) and Alteration of Heading in order to solve off track heading corrections. Although we have called this "1 in 60 Track Correction" it is in actual fact more accurate than the 1 in 60 method of off track correction.

The information required is as follows:

DISTANCE FLOWN	As measured along the intended track.
DISTANCE OFF TRACK	As measured at right angles to intended track.
DISTANCE TO GO	As measured along the intended track.

OPERATING INSTRUCTIONS

1. Switch on the Compu-Nav computer and select the 1 in 60 program by pressing the pink shift key and the 5 key. The display will show "1 in 60 Track Correction", pause, then prompt "Dist Flown?".

2. Input the distance flown as measured of the intended track and press EXE. For example, assume we have flown 40 nautical miles. Enter 40 and press EXE.The display will prompt "Dist Off Track?".

3. Input the Distance off our intended track (that has been measured at right angles to our intended track) and press EXE. For example say we are 5 nautical miles to the left of our intended track. Enter 5 and press EXE. The display will now show "Dist To Go?".

4. Input the 'distance to go' to the next waypoint, or the distance required to regain the intended track and press EXE. For example say we have 80 nautical miles to go to the next waypoint. Enter 80 and press EXE.

5. The display will show the result "TE= 7 CA= 4 AH= 11 ". For our example the track error was 7 degrees, the closing angle is 4 degree and the alteration of heading to regain our track by the next waypoint is 11 degree right.

6. Press the EXE key and the program returns to step 2.

SPECIFIC RANGE PROGRAM

This program provides you with the ability to determine:

(a) The Maximum Safe Endurance remaining
(b) Maximum Range
(c) Specific Range (Ground or Air Nautical Miles per 100 units of fuel)

With this information it is possible to determine the best cruising level, latest divert time & maximum safe endurance.

OPERATING INSTRUCTIONS

1. Switch on the Compu-Nav computer and select the Specific Range program by pressing the pink shift key and 6 key. The display will show "Specific Range", pause, then prompt "Fuel Qty Remaining?". For example say we have 800 litres of fuel remaining in tanks. Enter 800 and press EXE.

2. The display will prompt "Fuel Flow?". For our example let us assume the fuel flow is 250 litres per hour. Enter 250 and press EXE.

3. The display will prompt "Des'd Reserve?". The program is now asking for the Desired Reserve, that is the fuel you would like left in tanks after landing. Say we want 180 litres of fuel to remain in tanks. Enter 180 and press EXE.

4. The display will now show "Flt Fuel 148.8 min". Thus for our example the flight endurance based on the amount of flight fuel available is 148.8 minutes.

5. To calculate the maximum range available with this flight fuel press EXE. The display will prompt "Grnd Speed?" Continuing our example, say we have a ground speed of 240 knots. Enter 240 and press EXE. The display will now show "Max Range 595.2 nm".

6. To calculate the Ground Nautical Miles per unit of fuel press EXE. The display will show "NM/100 units 96.0". Thus the Ground Nautical Miles Per 100 litres is 96.0.

7. Press EXE to start a new calculation.

NOTE: This program can also be used to calculate the Specific Air range or Air Nautical Miles per 100 units of fuel. This is achieved by entering your True Air Speed (TAS) instead of the ground speed at the "Grnd Speed?" prompt. In this case the Max Range would be referring to your Air Nautical Miles, while the NM/100 units would be referring to your Specific AIR Range.

ON TRACK CRITICAL POINT - PNR PROGRAM

This program will very quickly calculate the on track Critical Point and Point of No Return between two places.

The CRITICAL POINT, sometimes referred to as the equi-time point (ETP), is the point on track where the time taken to return to the place of departure is the same as the time required to reach the destination. It is calculated in the event that an emergency situation, such as an engine failure or medical emergency, will occur during the flight. Would it be quicker to return to our place of departure or proceed to our destination? (assuming there are no suitable alternate aerodromes on track). Engine failure gives added complications, as the twin engine TAS would be faster than the single engine TAS, and the single engine ceiling would be lower.

The ETP makes the pilot's decision easier. If we haven't reached the ETP (place or time) then we return.

The ETP is dependant on:

(1) True Air Speed outbound (to destination)
(2) True Air Speed return
(3) Wind Component enroute (outbound and inbound)

$$\text{ETP Distance} = \text{Track Distance} \times \frac{\text{Ground Speed (Return)}}{\text{(G/S outbound + G/S return)}}$$

The distance to the ETP from the place of departure is calculated on TAS (outbound), TAS (return), Track distance and enroute wind components.

The time to the ETP is calculated on the outbound ground speed and the distance to the ETP.

The POINT OF NO RETURN (PNR), sometimes referred to as the radius of action, represents the point on track at which passing will result in there being insufficient fuel to return to the place of departure.

The PNR is dependant on:

(1) True Air Speed outbound (to destination)
(2) True Air Speed return
(3) Wind Component enroute
(4) Flight Fuel Endurance (in minutes)

Note that the flight fuel endurance is the remaining flight fuel only and excludes mandatory fuel reserves.

$$\text{PNR Time} = \text{Flight Fuel Endurance} \times \frac{\text{Ground Speed (Return)}}{(\text{G/S outbound} + \text{G/S return})}$$

The time to the PNR from the place of departure is calculated on TAS (outbound), TAS (return), flight fuel endurance and enroute wind components.

The distance to the PNR is calculated on the TAS (outbound) and time to the PNR.

OPERATING INSTRUCTIONS

1. Switch on the Compu-Nav computer and select the ETP-PNR program by pressing the shift key and the 7 key. The display will show "Critical Point / P.N.R.", then prompt "TAS -> ?".

2. Enter the outbound TAS (true air speed) and press the EXE key. For example, assume the outbound TAS is 150 knots. Enter 150 and press EXE. The display will now show "TAS <- ?". This is asking for the return TAS.

3. Assume for example the return TAS is also 150 knots. Enter 150 and press EXE. The display will now prompt "Wind Comp -> ?". This is asking for the outbound wind component that we wish to base our calculations on.

4. Assume the wind component is 30 knots tailwind. Enter 30 and press EXE. (Note a 30 knot headwind component would be entered as -30). The display will prompt "Wind Comp <- ?", which is asking for the inbound (return) wind component. Note We may wish to calculate a Critical Point/ PNR based on an engine failure in which our single engine flight may be at a lower level where the wind component may be different.

5. Assume the return wind component is 30 knots headwind (at the same level). Enter -30 and press EXE. The display will now prompt "Dist?". This requires the entry of the track distance between the place of departure and the destination, or some place ontrack on which we wish to calculate the ETP and PNR to the destination.

6. Enter the track distance. For example, enter a track distance of 1000nm, enter 1000 and press EXE. The display will now prompt "Flight Fuel (mins)?".

7. Enter the flight fuel endurance (excluding reserves) that is available for the flight, or that part of the flight from which we are to calculate the PNR. For example assuming 500 mins flight fuel, enter 500 and press EXE.

8. The result " To CP 400.0nm 133.3min " will now be displayed. This indicates that the distance from the place of departure to the ETP is 400 nautical miles. So for these conditions, flying beyond 400nm, it would be quicker to fly the remaining 600 nm to the destination than to return 400nm to our place of departure. (Over the 1000nm distance the 30kt tailwind component has moved the ETP 100nm towards the place of departure from the nil wind mid point of 500nm). For convenience we can add 133 minutes to departure time to indicate a time at which we will be at the ETP, so that any time after this time it would be quicker to continue than to return.

9. Press EXE and the display will show "To PNR 600.0nm 200.0min". This indicates that with 500 minutes of flight fuel under these conditions will give a point of no return of 600 nautical miles from the place of departure or 200 minutes after departure time. Beyond this place there would be insufficient fuel to return to the place of departure and hence committed to continuing to our destination.

10. Pressing EXE will restart the program again.

To some the concept of ETP and PNR will be new, while to others it may be quite familiar. Whichever the case you may wish to try a few exercises using this program. Initially it is recommended that you make a few sketches illustrating the flight profile and distances of the exercises you are trying out on the Compu-Nav.

For example.

We wish to fly a twin engine aircraft from Sydney to Lord Howe Island. The distance SY-LHI is 424 nm (calculated from the nav program). Met information gives the enroute wind component at our cruising level to be a 40 kt tailwind, while the wind component at a lower (single engine) level is 20 kt tailwind (outbound from SY). Our aircraft's TAS is 175 kts, while it's single engine TAS is 140 kts. The flight fuel endurance, excluding all reserves, is 175 minutes.

Exercise 1. Calculate the ETP and PNR for this flight assuming twin engine performance both ways.

Exercise 2. Calculate the ETP and the PNR based on experiencing an engine failure at the worst place (ie at the ETP). Hint. TAS outbound = 175 kt, TAS return = 140 kt.

Aren't you glad you've got a Compu-Nav to work this out!

UNIT CONVERSION PROGRAMS

Compu-Nav incorporates a set of unit conversion programs which will quickly convert the following:

FUEL UNIT CONVERSION: Converts Litres,Gallons,KG,Pounds
WEIGHT CONVERSION: Converts Pounds & Kilograms
SPEED-DISTANCE-TIME : Given any two we can find the third
SPEED CONVERSION : IAS to TAS to Mach Number
MACH CONVERSION : TAS to MACH Number to TAS
DISTANCE CONVERSION: Converts NM, kilometers & Statute Mile
TEMPERATURE : Converts Degrees Celsius & Fahrenheit
ALTIMETRY : Pressure Altitude to Density Height

OPERATING INSTRUCTIONS

1. Switch on the Compu-Nav computer and select the Unit Conversion program by pressing the shift key and the 8 key. The display will show " Unit Conversions ", pause, the display the selection menu "FUEL.Wt.Spd.Dst.Tmp.Alt?"

2. From here it is possible to select the type of conversion required. The method adopted to select the required conversion is simple, just press a letter corresponding to the conversion required and program execution begins. Thus F = Fuel, W = Weight, S = Speed, D=Distance, T = Temperature and A= Altimetry Conversions.

FUEL UNIT CONVERSION

Conversion between Litres, US Gallons, Imperial Gallons, Kilograms and Pounds is provided by this selection. Fuel specific gravity (SG) is taken into account when converting between fuel volumes and weights.

For example, convert 200 Litres of AvGas to Kilograms.

1. Select Fuel conversion by pressing the F key. The display will prompt "(Lts->USG) Litres?". Enter 200 and press the EXE key. The display will show "52.8 US GAL". Press the EXE key again and the display will show "44.0 IMP GAL". Press the EXE key again and the display will prompt "FUEL SG?". Of course to calculate weight from a fuel quantity we need to know the fuel specific gravity. As a guide, the typical SG for Avgas 100LL is 0.69, while the SG for Avtur is 0.79. Assuming Avgas, enter .69 in reply to the "FUEL SG?" prompt. The answer of "138.0 KG 304.3Lbs" is displayed. Thus 200 litres = 138 kgs of Avgas. Press EXE to return to the unit conversion menu.

2. Say we want to convert 120 US gals to Litres. Press F to select Fuel conversions. The display prompts "(Lts->USG)

Litres?". This is unknown so press EXE. The display now prompts "(USG->Lts) US Gal?". Enter 120 and press EXE. The display now shows the answer "454.3 Lts". Press EXE and the display shows "99.9 Imp Gal". Press EXE and the prompt "Fuel SG?" is displayed. As we do not wish to convert this fuel quantity to weight, simply press EXE to return to the main menu.

WEIGHT CONVERSIONS

Conversions between kilograms and Pounds is provided by this selection.

1. Say we wish to convert 1000 kilograms to pounds. Press W in response to the main menu prompt to select weight conversions and the display prompts "(lbs->Kg) Lbs?". This is unknown so press EXE and the display prompts "(Kg->lbs) KGS?". Enter 1000 and press EXE. The display now shows "2204.60 Lbs". Similarly 850 lbs can be converted to Kgs. Try it. (The answer is 385.56 Kg)

SPEED CONVERSIONS

This sub module of the unit conversion program makes it possible to:

* Calculate speed, distance or time interval by inputing any two of these three variables.
* Calculate IAS/CAS (Indicated/ Calibrated Airspeed) to TAS and True Mach number.
* Convert TAS to TMN.
* Convert TMN to TAS.

1. Press S in response to the main menu prompt to select Speed conversions.

For example, find an aircraft's speed given it took 54 minutes to fly 180 nautical miles.

(a) In reply to the "(S->D<-T)Speed Kt?" prompt press EXE as we do not know the speed.

(b) The display will prompt "DIST?". Input the distance of 180 nm and press EXE. In reply to the "TI mins?" prompt enter 54 and EXE. The display will show "200Kts 180nm 54min". Thus 180nm in 54 minutes equates to 200 kts. Similarly any combination of two variables can be used to find the third.

(c) Press EXE to return to step (a).

2. To convert IAS to TAS press EXE in reply to the "(S->D<-T)Speed Kt?" and "Dist?" prompts. The display will show "(SPEED) IAS/CAS/Mach?". Assume the CAS, (which in almost every case is close enough to the IAS), is 200 kts. Enter 200 and press EXE. The display will prompt

"(Alt->Palt->Dalt) ALT?". This is asking for the aircraft's altitude. The calculation will require Pressure Altitude (Palt is height based on 1013 hpa) to determine the True Air Speed. If required the Palt will be computed automatically at this stage of the calculation. Assume the Palt is 5000 feet. Enter 5000 and press EXE. The display will now prompt "QNH(Standard)?". As we have used an altitude based on the standard 1013 hPa pressure level then there is no need to enter any value at this prompt. Press EXE. The display will now prompt "OAT deg C?". Enter the outside air temperature, say 15 degrees celsius and press EXE. The display will now prompt "OAT: 1=Indicated 2=True". From here it is possible to make allowances for True or Indicated air temperature. Indicated Air temperature is that temperature that is read from the standard light aircraft OAT gauge. The OAT indicated is heated by the frictional effect of airflow. For our example select Indicated OAT by pressing 1. The display will now prompt "Rec Cf(1)?". This is asking for the recovery coefficient of you aircraft. For light aircraft this value is generally 1. Press EXE for thi default value.

The display shows the result "TAS 216 Kts Mach 0.331". Press EXE again to return to the main menu.

3. To convert TAS to true Mach number press EXE in reply to the "(S->D<-T)Speed kt?", "Dist?" and "(SPEED) IAS/CAS/Mach?" prompts. To convert 400 knots to Mach number enter 400 in reply to the "(TAS->Tmn) TAS?" prompt and press EXE. Assume the OAT is minus 20 degrees C, hence in reply to the "OAT C?" prompt enter -20 and press EXE. The display shows the answer "TAS 400Kts Mach 0.645". Similarly to convert TMN to TAS simply follow the same procedure, but press EXE in reply to the "(TAS->Tmn) TAS?" prompt.

DISTANCE CONVERSIONS

Conversion between Nautical miles, Kilometres, Statue miles and hence also Knots, KPH and MPH is provided by this selection.

For example, to convert Knots to kilometers select Distance conversions by pressing the D key. The display will prompt "Nt Mile or Kts?" prompt. Enter the speed, say 300 knots and press EXE. The display shows "Km-KPH 555.60". Press EXE and the display shows "Sm-MPH 345.23". Pressing EXE returns the "Nt Mile or Kts?" prompt.

TEMPERATURE CONVERSIONS

Conversion between degrees Celsius and degrees Fahrenheit is achieved by pressing T in reply to the main menu prompt. To convert 30 degrees C enter 30 in reply to the "deg C?" prompt. The display will now show "86 deg F". Pressing EXE returns the main menu.

ALTIMETRY

Conversion between Pressure altitude and density height, metres and feet, and inches of mercury and Hectopascal is achieved by pressing A in reply to the main menu prompt.

1. To convert 10,000 metres to feet (handy if you are operating in countries using metric altitudes) press EXE in reply to the "(Alt->Palt->Dalt) ALT?" prompt. In reply to the "(m->ft) Metres?" prompt enter 10000 and EXE. The result 32808.40 feet is displayed. Pressing EXE returns the main menu.

2. Conversion of inches of HG to HPa is similarly achieved.

Note 1. To exit this program and return to another program it is necessary to press the orange BRK key. The display will then show Ready P8. To run another program press the Shift key and the desired program number.

Note 2. Follow this rule. Keep pressing EXE if the prompt for the unit conversion is not the required one. When you find the required unit conversion then enter the numbers and press EXE to display the result.

BEGINNING AND END OF DAYLIGHT PROGRAM

This program will calculate the beginning and end of civil twilight without the need to refer to daylight and darkness graphs.

Beginning and End of Daylight calculations assume unlimited visibility, clear sky and level terrain. Consequently, the presence of cloud cover, poor visibility or high terrain to the west of an aerodrome will cause daylight to end at a time earlier than that calculated. Allowance should be made for these factors when planning a flight having an ETA near the end of daylight.

This program not only makes use of pre-stored navigational waypoints, but it also allows the input of Latitude and Longitude information for direct calculation. Further, the program is self learning so that all information entered for a place name that is not contained in the data bank will be stored for future reference.

OPERATING INSTRUCTIONS

1. Switch on the Compu-Nav computer and select the Beginning and End of Daylight program by pressing the pink shift key and the 9 key. The display will show "First & Last Light", pause, then prompt "Place?".

2. At this point it is possible to do one of the following:

(a) Enter a place name whose positional data is pre-stored. Should the place name be pre-stored then the computer will extract data from the waypoint data bank. There will be no further prompts requesting positional information.

(b) Enter a place name whose data is NOT pre-stored. Should the place name not be pre-stored then Compu-Nav will prompt for the Latitude, Longitude and magnetic variation for the place name that has been entered. Although magnetic variation is not required for daylight calculations, the prompt is made so that full waypoint information can be stored for future retrieval.

(c) Press EXE and enter Latitude & Longitude data directly. Should there be no need to store a position permanently into the waypoint data bank then this allows the calculation of daylight information without saving positional data into the data base.

3. After the appropriate place or positional data has been entered the display will prompt "Day (dd)?". Enter the day required for the calculation and press EXE.

4. Next the display will prompt "Month (mm)?". Enter the month in a numeric format (from 1 to 12) and press EXE.

5. The display will show the First light calculation in GMT. Press EXE.

6. The display will show the Last light calculation in GMT.

7. Press EXE to return to the start.

For the purpose of the exercise we will make use of pre-stored information in the following example.

> Calculate the Beginning and End of Daylight at Sydney, NSW on June 23.
>
> In response to the "Place?" prompt enter SY and press EXE. The display will now prompt "Day (dd)?". Enter 23 and press EXE. The display will now prompt "Month (mm)?". Enter 6 and press EXE. The computer will now compute and display "First Light 2033 GMT". Press EXE again and the display will show "Last Light 722 GMT". Thus the beginning of daylight at Sydney on June 23 is 2033 GMT, while the end of daylight is 0722 GMT.

Note 1. Due to calculational constraints, the range of Latitude must be within 70 Degrees North and 70 Degrees South.

Note 2. When entering Latitude and Longitude information ensure the format of the data is equivalent to the foramt as used in the navigation section. Thus 34 degrees South would be S34000 and not S34. Also use the decimal part of the seconds and do not include the decimal point. Eg S33 24.9 is entered as S33249 and NOT S3324.9

NOTE:

THE AIDS AND AERODROMES LISTED BELOW ARE INSTLALED IN YOUR CN16 COMPU-NAV.

AD - ADELAIDE
AL - ALBANY
AS - ALICE SPRINGS
AV - AVALON
AY - ALBURY
AF - ARCHERFIELD
BH - BROKEN HILL
BN - BRISBANE
BR - BROOME
BK - BANKSTOWN
CB - CANBERRA
CN - CAMDEN
CC - COCOS ISLAND
CD - CEDUNA
CG - COOLANGATTA
CH - COFFS HARBOUR
CS - CAIRNS
CV - CHARLEVILLE
DN - DARWIN
DV - DEVONPORT
DU - DUBBO
ES - EAST SALE
ED - EDINBOROUGH
EN - ESSENDON
GV - GOVE
HB - HOBART
HM - HAMILTON ISLAND
JT - JANDAKOT
KG - KALGOORLIE
KA - KARRATHA
KU - KUNUNURRA
LM - LEARMONTH
LT - LAUNCESTON
LV - LAVERTON
ML - MELBOURNE
MB - MOORABBIN
MK - MACKAY
MI - MILDURA
MG - MOUNT GAMBIER
MA - MOUNT ISA
NW - NOWRA
NF - NORFOLK ISLAND
OK - OAKEY
PE - PEARCE
PH - PERTH
PD - PORT HEDLAND
PF - PARAFIELD
PC - POINT COOK
PN - PROSERPINE
RI - RICHMOND NSW
RK - ROCKHAMPTON
SY - SYDNEY
TW - TAMWORTH
TC - TENNANT CREEK
TN - TINDAL
TL - TOWNSVILLE
WG - WAGGA WAGGA
WP - WEIPA
WR - WOOMERA
WY - WYNYARD
KAT - KATOOMBA
SLS - SHELLYS
BIK - BINDOOK

YOU NOW HAVE 63 WAYPOINTS.

THERE SHOULD NOW BE 4276 BYTES AVAILABLE IN THE 795 COMPUTER OR 4404 BYTES IN THE 790 COMPUTER. AVAILABLE FOR STORAGE OF YOUR OWN WAYPOINTS OR AIRCRAFT DATA.

ONE WAYPOINT CONSUMES APPROX. 24 BYTES DEPENDING ON THE NUMBER OF LETTERS IN THE IDENTIFIER. YOU SHOULD BE ABLE TO STORE 178 OF THE THREE LETTER IDENTS (IN THE 795 COMPUTER). EACH AIRCRAFT INSTALLED CONSUMES ABOUT ONE WAYPOINT AREA, YOUR MAXIMUM CAPACITY WILL BE REDUCED BY ONE WAYPOINT FOR EACH AIRCRAFT STORED.

USING THE EDIT FUNCTION IN THE NAV PROGRAMME DELETE THOSE WAYPOINTS LISTED ABOVE WHICH YOU DO NOT REQUIRE. BY DELETING UNWANTED WAYPOINTS YOU INCREASE THE FREE CAPACITY FOR MORE OF YOUR OWN WAYPOINTS OR AIRCRAFT.

HINT:

FOR EASIER OPENING OF YOUR COMPU-NAV COMPUTER - SIMPLY GRASP THE TOP RIGHT HAND CORNER OF THE UNIT AND THE BOTTOM LEFT HAND CORNER AND PULL APART.

IF YOU APPLY PRESSURE IN THE CENTRE OF THE UNIT - YOU ONLY APPLY PRESSURE TO THE LATCH WHICH MAKES IT DIFFICULT TO OPEN.

NOTES

NOTES

NOTES

NOTES

WAYPOINTS

MRY

BENDIGO

ORANGE

TEMORA

GLD

MDG