INTRODUCTON TO THE NAVIGATE FUNCTION

The NAVIGATE function relates present position to a planned route stored in the DYN memory. The result is a display of infomation required to follow that route.

The route is made up of a number of positions (waypoints) in succession. The DYN assumes straight lines between positions. Distance off track, course to steer and distance to next waypoint are displayed.

Start planning your passage on the chart by defining the series of tracks to your destination. Each alteration of course (waypoint) in latitude and longitude is keyed into the memory of the DYN III. Space is available for up to 20 waypoints. The DYN III uses the numbers 1 to 20 to refer to them.

The DYN III assumes that you will use the waypoints as you key them into the memory, starting by heading for the first point keyed in from the departure position, as the first track. Departure position (waypoint no. 0) is your actual position when the first waypoint in the plan was keyed in. After the waypoints have been keyed in, the DYN III calculates the following data for you:

Distance off track - course to steer - distance to next waypoint - Estimated time of Arrival (ETA) - remaining total distance - heading and distance between waypoints in the plan.

In addition the ALERT system can be programmed to monitor distance off track as well as to giving a warning before a waypoint is reached.

DEFINITIONS

WAYPOINT — LAT/LON position taken from the chart and stored in the waypoint memory of the DYN III. The waypoint can then be used as a position in the NAVIGATE function, or as a "centre" position. The memory stores up to 20 waypoints each being identified by a number between 1 and 20. The numbers are then used in the Routeplan to refer to the waypoint positions.

SAILPLAN (i.e. ROUTE PLAN) — Series of waypoint numbers being used in the NAVIGATE function specifying the waypoints that will be used, and the sequence. As the waypoints are passed they will be deleted from the plan. At first the Route plan always contains the departure position (no 00) which is stored as soon as the first waypoint is entered into the plan.

TRACK — Straight line between two waypoints in the route plan. A track is displayed as heading (0-359°) from one waypoint to the next, and as distance between them.

DISTANCE OFF TRACK — Deviation from planned track in nautical miles. The display includes a symbol indicating whether to adjust course to port or starboard to regain track.

NAVIGATE — Displays vessel's position relative to a track, distance off track, course to steer and distance to next waypoint.

ETA — Estimated Time of Arrival at a waypoint; normally the last in the route plan, but any earlier waypoint may be selected instead. The ETA is calculated from present speed and distance to go. If passage time exceeds 24 hours, the displayed ETA has a minus sign.

LATITUDE (LAT) Measure of distance from equator North or South. Latitude is measured in degrees (0-90), and minutes of arc (0-60) with decimals. Latitude is read from the left or right borders of a chart. One minute of latitude equals a nautical mile (n m).

LONGITUDE (LON) Measured from the Greenwich meridian East or West. Longitude is measured in degrees (0-180) and minutes of arc (0-60) with decimals. Longitude is read from the top or bottom of the chart. The length of a minute of longitude varies with the latitude; at 60° N it is 0.5 n.m. (at 50°N it is 0.64 n.m.).

DESCRIPTION OF FUNCTIONS ASSOCIATED WITH THE NAVIGATE FUNCTION

WAYPOINTS

Waypoints form the basis of the NAVIGATE function and its derived functions.

The waypoint function has two initiating levels followed by input of required waypoint positions.

At the first stage of the WAYPOINTS function (display SAILPLAN AUTO ON) you decide whether a Route plan is to be entered automatically or not when waypoints are keyed in. With SAILPLAN AUTO ON the DYN III assumes that you key in waypoints in a logical sequence, starting with the first point on your route.

If a route plan already exists, the SAILPLAN AUTO ON will add new waypoints at the end of the plan.

With the "+/-" key the SAILPLAN AUTO can be switched OFF, and the Route plan unaffected during the input of waypoints.

Normally just leave the SAILPLAN AUTO at ON. The ROLL key is then used to go to the next function stage. At this stage (INPUT POINT no) the number of the first waypoint to be keyed in is shown.

The DYN III remembers previously entered waypoint numbers and selects the next higher number. You can CLR this number and key in any other starting number.

The ROLL key is then used to go to the last stage (P no LAT / P no LON) which is waypoint position entry. This is in LAT/LON. If a previously stored position exists, this has to be CLR'ed before entering a new one.

If for instance you plan to proceed first to P1 (56:04.00 - 12:44.00) and then to P2 (56:20.00 - 12:14.00), the following key sequence programmes the DYN III:

KEY	DISPLAY
L 3	SAILPLAN AUTO ON
ROLL	INPUT POINT 1
ROLL 56:04	P01 LAT 56:04
ROLL 12:44	P01 LON 12:44
ROLL	APPENDED SAILPLAN
56:20	P02 LAT 56:20
ROLL 12:14	P02 LON 12:14
ENT	APPENDED SAILPLAN
	SAILPLAN 00-01-02

As long as the ROLL key is used to enter waypoints, the DYN III continues in the entry mode and increases the waypoint no. by one for each new waypoint.

Finally the ENT key is used to complete the waypoint entry sequence.

If the SAILPLAN AUTO has been ON, the DYN III then shifts to the NAVIGATE display.

WAYPOINT check

After waypoints have been keyed in, positions can be checked if the WAYPOINT function is called again, SAILPLAN AUTO switched OFF and a point number specified. Then ROLL and LAT/LON will be displayed. If a wrong LAT or LON appears, CLR the display and enter correct value, then ROLL for further checking. You leave the function with the ENT key.

WAYPOINT editing

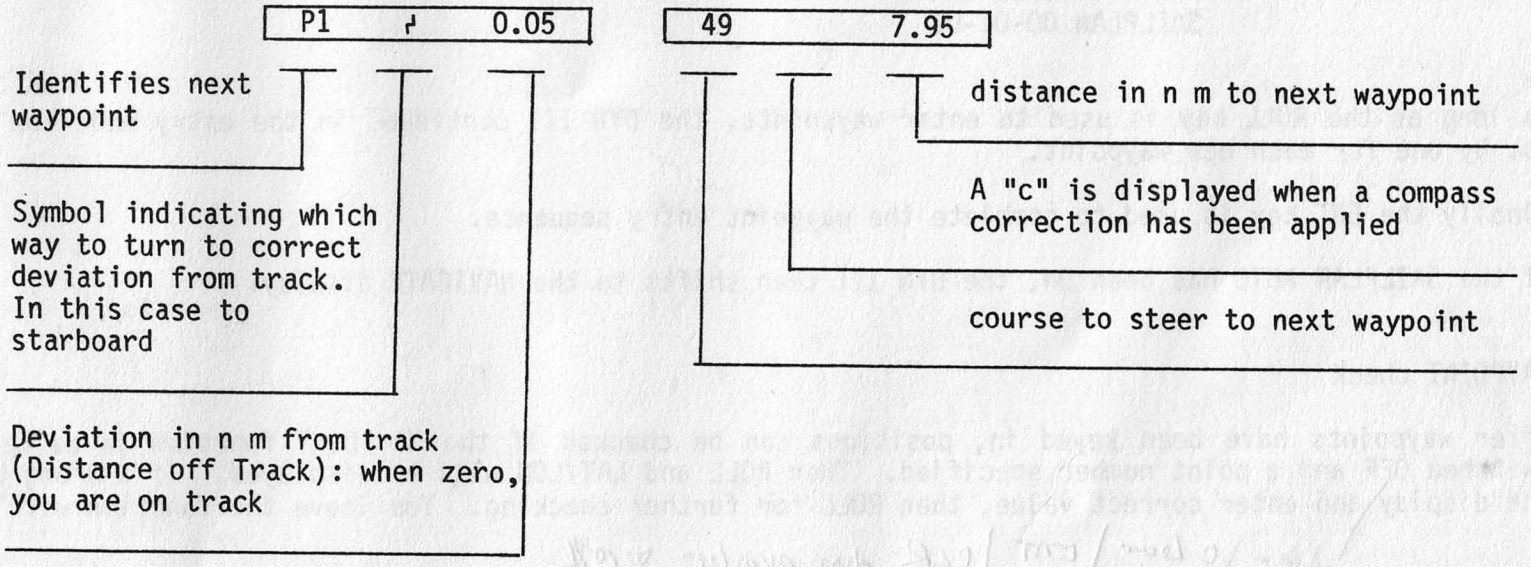
To change the position in one of the stored waypoints the SAILPLAN AUTO is switched OFF and the appropriate input point number is keyed in. Then the LAT/LON can be changed, and by use of ENT for entering the LAT and LON editing is performed on one waypoint only.

NAVIGATE

This function displays the steering information required to follow a track between two waypoints.

The NAVIGATE function starts when a route plan has been ENTered automatically or manually into the waypoint memory.

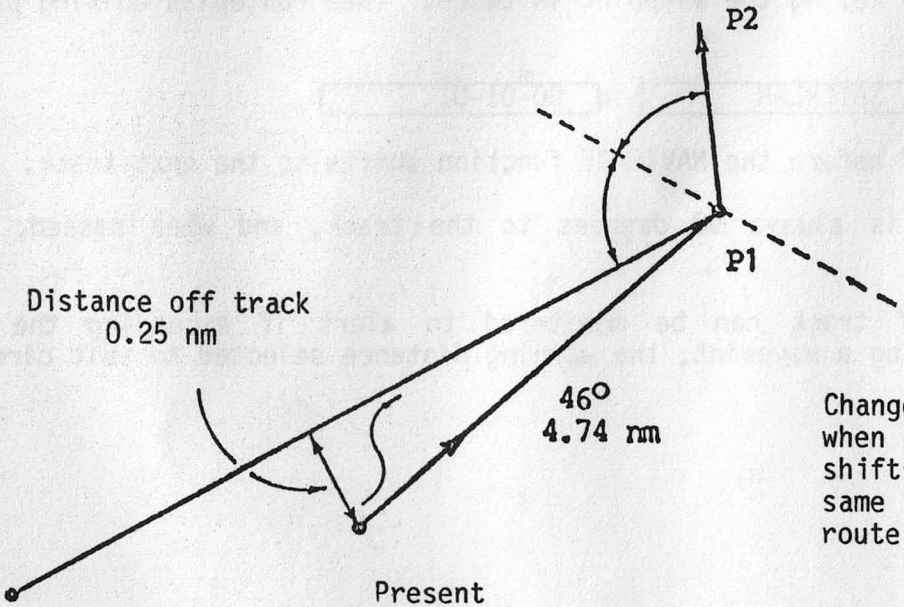
The NAVIGATE display is interpreted as follows:



When later the NAVIGATE display shows, for instance:

P1 ↳ 0.25	46 4.74

this can be illustrated as follows:



Change over line (bisector) when crossed, NAVIGATE display automatically shifts to next waypoint in route plan. At the same time the departure point is deleted from the route plan.

Departure point

Distance off track 0.25 n m, can be corrected by turning to port

When a waypoint is passed (passing the line bisecting the angle between two tracks), there are 15 short bleeps. Automatically the display shifts to the next waypoint in the plan, and the previous point is deleted.

The change over line is normally the bisector of the angle between two tracks. If the angle is very acute the bisector may be passed before the waypoint is reached. It is possible in the SAILPLAN to alter the change over line to 90 degrees to present track. This can be done by keying the waypoint in twice. (See routeplan editing page 62).

For instance | SAILPLAN | | 00-01-01 |

In the example waypoint no 1 must be "doubled" before the NAVIGATE function shifts to the next track.

At the last waypoint the change over line is always 90 degrees to the track, and when passed, the routeplan is completed.

Within the ALARM function the distance off track can be monitored to alert if exceeding the specified limit. Furthermore an alert can be given on approaching a waypoint, the warning distance selected to suit circumstances.

TRACKS

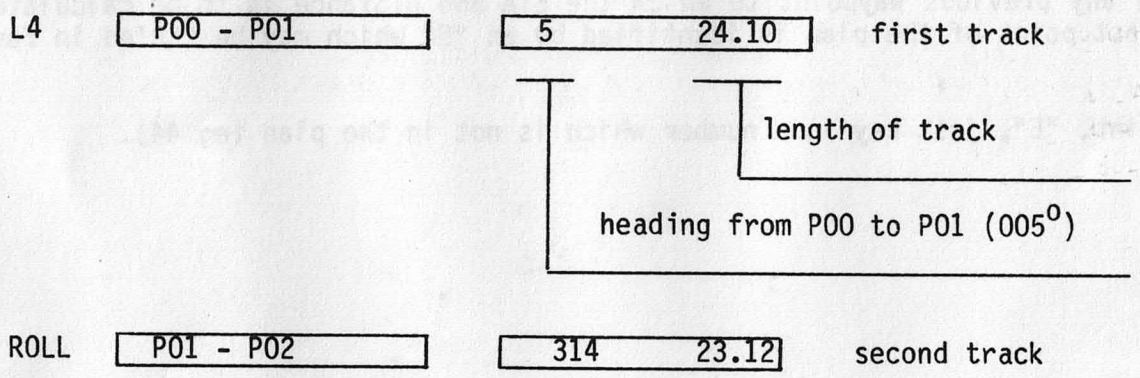
This function is mainly for access to any waypoint positions used in the routeplan.

The TRACK function has as many stages as the number of tracks in the plan. Each stage displays the reference numbers of two waypoints with heading (0-359 degrees) and length of track in nautical miles.

When the function is called up, first shown will be present track. ROLL to successive track displays.

ENT is used to leave the TRACK function.

EXAMPLE:



ENT Return to main display

ETA DIST

This function displays ETA (Estimated Time of Arrival) and distance to go.

The ETA function totals remaining distance and from present true speed, passage time is calculated; thus the ETA will be correct if speed remains constant. The ETA function assumes that planned tracks are used.

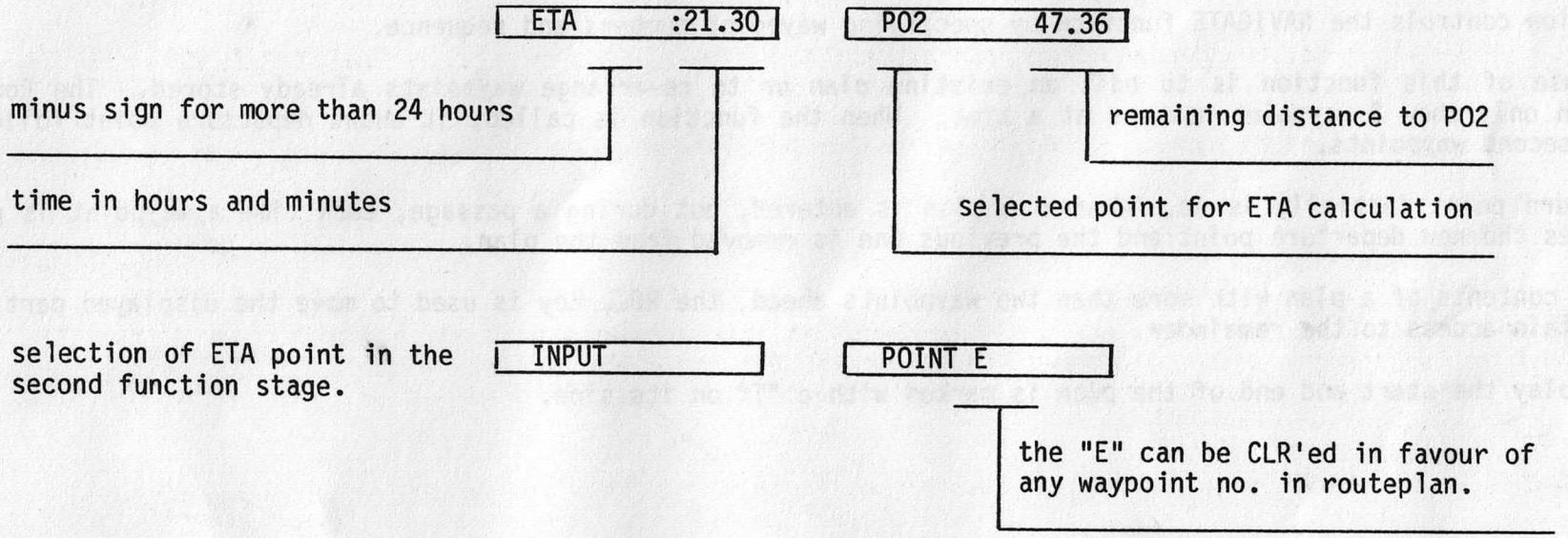
If total passage time exceeds 24 hours, a minus sign appears before ETA. ETA function will handle up to 10 days passage time.

With ETA, DISTance to go is shown; that is total distance along future tracks of routeplan including what remains of present leg.

Normally ETA and distance are calculated to final destination in routeplan, but in the second stage of the ETA function it is possible to specify any previous waypoint to which the ETA and DISTance is to be calculated. In the second stage of the ETA function the last point of the plan is identified by an "E" which may be CLR'ed in favour of any point in the plan.

To revert to the final point, "E", just key in a number which is not in the plan (eg 44).

Display example:



SAILPLAN
(ROUTEPLAN)

This function controls the NAVIGATE function by specifying waypoint numbers and sequence.

The main use of this function is to edit an existing plan or to re-arrange waypoints already stored. The Routeplan display can only show 3 waypoint numbers at a time. When the function is called, it shows departure point followed by first and second waypoints.

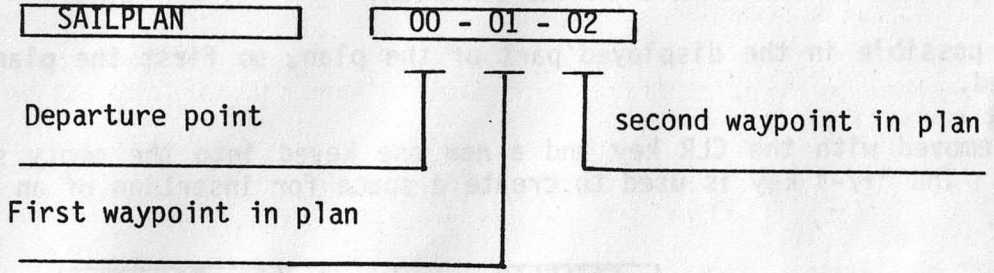
The departure point initially is no. 00 when a plan is entered, but during a passage, each time a waypoint is passed, that becomes the new departure point and the previous one is removed from the plan.

To see the contents of a plan with more than two waypoints ahead, the ROLL key is used to move the displayed part to the left to obtain access to the remainder.

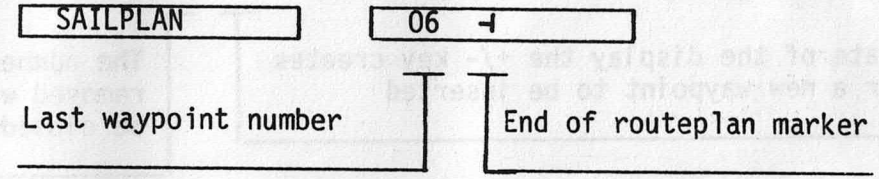
In the display the start and end of the plan is marked with a "T" on its side.

Display examples:

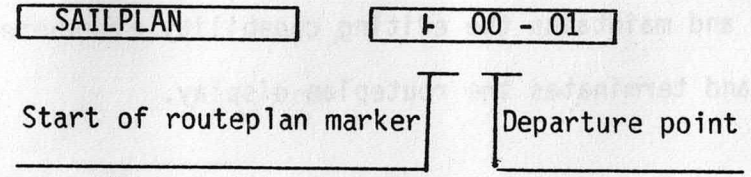
Routeplan when called up:



Routeplan when ROLL'ed to the end



The beginning of the plan is shown if ROLL'ed further 2 steps (followed by a bleep)

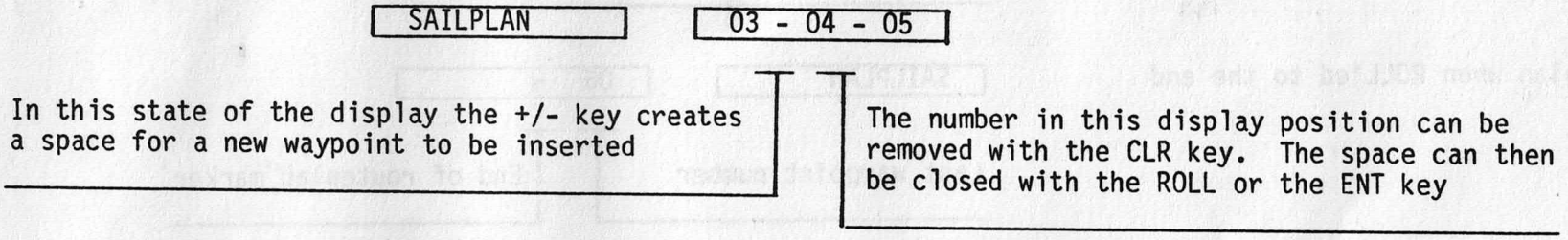


ROUTEPLAN EDITING

At any time the routeplan may be altered if passage plans are changed. This may involve removal, change or insertion of one or more waypoint numbers somewhere in the sailplan.

Editing is only possible in the displayed part of the plan, so first the plan is shifted with the ROLL key to show the part to be edited.

A waypoint is removed with the CLR key and a new one keyed into the empty space. If just ROLL is used instead, the space is closed. The "+/-" key is used to create a space for insertion of an extra waypoint number.



The ROLL key enters the changes and maintains the editing capability elsewhere in the plan.

The ENT key enters the changes and terminates the routeplan display.

ROUTEPLAN deletion

The whole routeplan can be deleted by special function 8. The key sequence is L ENT 8 ENT +/- ENT. The result is a cleared routeplan store:

SAILPLAN	00 - -1

ROUTEPLAN manual input

If the routeplan store is empty when called up, space is ready for the first waypoint no. to be keyed in. ROLL then accepts the point no. and shifts the sailplan by one to enable the next waypoint no. to be keyedin. Finally the ENT key is used to complete the entry, and once more to store the plan in the memory.

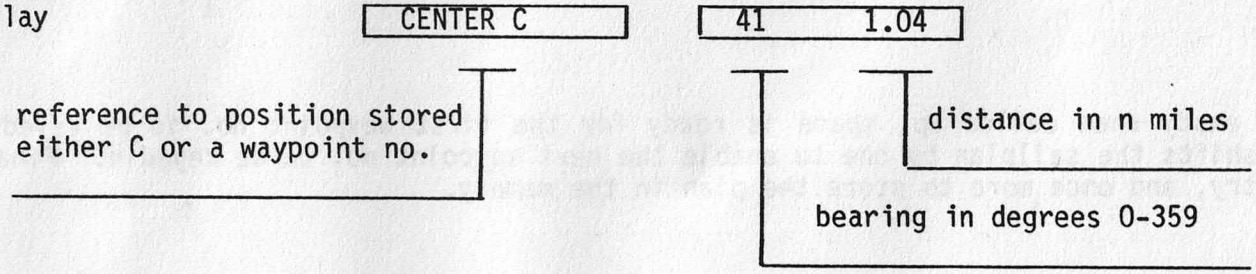
CENTER

The CENTER function is similar to the NAVIGATE function but simplified. CENTER displays bearing and distance from own position to a single selected point. The CENTER function has its own memory for a position "C", but any waypoint may be selected by number in lieu.

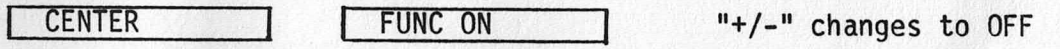
CENTER is used to recall positions of special interest (wrecks or similar) or in combination with the anchor alert to check that the distance to a position is less than a chosen amount.

The function has 5 stages:

(i) Main display

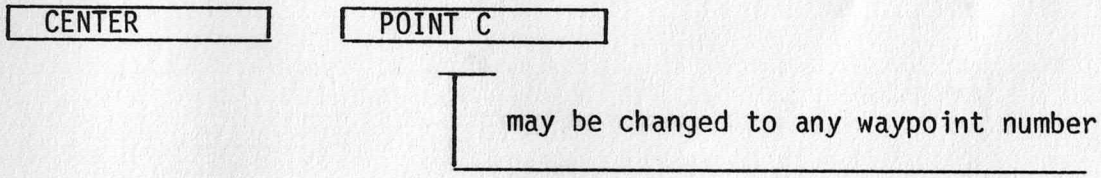


(ii) ON to OFF control of CENTER



"+/-" changes to OFF

(iii) Center point selection



(iv) Position display

(v)

) the position may be keyed in directly

If OFF, the CENTER function automatically switches to ON when called with "U 5" or just "5". Switching to OFF can only be done manually within the second stage of the CENTER function.

When CENTER switches to ON, present position is immediately stored in the "C" memory. Thus CENTER can be used as a single key position store.

If one of the waypoints has been selected instead of the "C" position, it is still possible to change the waypoint no., but the position in the "C" memory is lost as the only way to revert CENTER to "C" is to switch the CENTER function OFF and then ON again.

POS STORE

This function stores present LAT LON position in either the "C" memory or the waypoint memory. When called the function proposes the use of "C", which can be CLR'ed in favour of any of the waypoint numbers.

If ROLL then is used the position just stored is displayed, whereas the ENT key terminates the function immediately.

ANCHOR

When the anchor is dropped, the ANCHOR function may be switched to ON giving an automatic anchor watch alert setting. This ensures:

1. Anchor position is stored in "C" memory.
2. CENTER is switched ON.
3. Center display will be selected as main display.
4. The anchor alert is switched ON.
5. The alert limit will be equal to present position uncertainty.

Anchor function	L 0	ANCHOR	FUNC OFF	
	+/-	ANCHOR	FUNC ON	
drag limit	ROLL	ANCHOR	dri : 00.20	ENT

At the second stage of the ANCHOR function the alert is displayed for checking/alteration. A warning (TOO HIGH UNC: 2.34) will be given if the chain uncertainty exceeds 1 n m (in this case it was 2.34 n m), the DYN III will then assume a limit of 1 n m.

The DYN III cannot distinguish between real anchor drag and change of position due to skywave disturbance of the signals. Therefore the alert limit must be a compromise.

The POSITION STORE function can quickly correct the reference position if needed.

When, later on, Anchor function is switched OFF, the anchor position is maintained in "C" memory.

HELP (remotely controlled by an electrical contact)

This function is very similar to that of CENTER. However, the HELP function is specially designed for emergency use.

HELP is remotely controlled from a switch which for instance can be placed near the helmsman. The switch momentarily connects the MOB input to ground (at the rear terminal of the receiver).

When activated, the HELP function automatically performs the following:

1. Stores the present position in the centre point memory "C".
2. Activates the HELP display showing bearing and distance to the "C" position.
3. Locks the keyboard except for single key functions.
4. Switches ON the display backlight.
5. Activates the 20 second update bleeps.

If a MAYDAY is to be transmitted the "C" position can be displayed if the CENTER key (5) is activated.

In the HELP mode, any operation other than single key operations will be rejected with the text "HELP FUNC ON".

The keyboard is released again with the KEY LOCK function (U ENT) using the +/- to switch the key lock off.

(Electrically the HELP function is switched ON when terminal 4, MOB, for a moment is short circuited to terminal 6, REF GND. This is done by connecting a twin cable to the two points on the connector on the mounting bracket. The cable is, at the other end, connected to a short-circuiting switch, which, for instance, can be placed close to the helmsman.)

COMPASS CORRECTION

Bearing in the NAVIGATE and CENTER displays refers to true North, but with the CPSS CORR function, variation can be applied in order to display bearings with reference to magnetic North.

When a compass correction is applied, a small "c" is displayed alongside the displayed bearing.

P1 0.08	240c 12.13
CENTER C	98c 0.19

The CPSS CORR function has two stages, the first being ON/OFF. The second memorizes the size of correction East or West (controlled by the "+/-" key), (Westerly variation is added to true bearing).

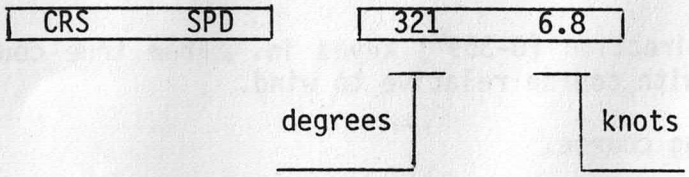
CPSS COR	FUNC OFF	
CPSS COR	E/W , 5	variation 5 degrees West

COURSE and SPEED

The displayed values for course and speed are calculated from the change of position, updated every 20 seconds. Thus displayed values show true motion over the ground independent of set and drift. (Course and speed made good.)

To give a stable display course and speed are averaged over a period of time, normally 5 minutes.

The averaging time is determined in the AVER TIME function.



AVER TIME

At the first stage of this function the sampling period for course and speed is selected between 2 and 99 minutes. A longer time gives a more stable and precise display, but also slows down the response to changes. Therefore a compromise suited to the actual reception conditions must be found.

In good reception conditions (high SIGNAL levels and low position UNCertainty) a sampling period of 5 minutes is appropriate. Typically the random speed error then will be ± 0.5 knots. The accuracy of the course is dependent on speed. At higher speeds (5-10 knots) the distance sailed during the sampling period is substantial and small errors in the measured positions have less influence on the calculated course than at low speed.

Typically the random course error is ± 5 degrees at 5 knots with sampling interval of 5 minutes when reception conditions are good. At 10 knots the course error would be halved.

At the second stage of the AVER TIME function the position filter is switched ON/OFF. When ON, position becomes a mean value of the positions measured during the sampling period, each position being updated with course and speed to form a mean value of the actual position. The position filter may be used if reception conditions are poor to stabilize readings, but it should only be used when the boat's course and speed are reasonably steady as changes are not reflected immediately in the LAT/LON readings.

When the position filter is ON the FILTER marker appears in the display.

"TRIM" FUNCTION

When beating to windward, what is the optimum course? - stay closehauled or bear away and increase speed? The aim is to maximise speed to windward. Optimum course can be found by dividing the boat's speed into up-wind and cross-wind components and applying wind direction.

"TRIM" function is switched ON and wind direction (0-359^{o}) keyed in. From true course and speed and wind direction, speed up-wind is calculated and displayed with course relative to wind.

Speed up-wind is then maximised by adjusting course.

The "TRIM" function may also be used down-wind.

An example to illustrate the idea:

Course is varied and speed is noted down for various courses; it could for instance be:

degrees off the wind:	15	20	25	30	35	40	45	50
resultant speed:	4.2	4.8	5.5	5.9	6.3	6.5	6.7	6.8
calculated "TRIM" speed in the DYN	4.1	4.5	5.0	5.1	5.2	5.0	4.7	4.4

And hence the optimum appears to be around 30 to 35 degrees off the wind.

KEY OPERATION:

To switch ON the "TRIM" function and set in wind direction of say 254 degrees:

1.	Call up function	L 9	t-COURSE	Func OFF
2.	Switch ON function	+/-	t-COURSE	Func ON
3.	Roll to next stage	ROLL	t-COURSE	0
4.	Clear previous wind direction	CLR	t-COURSE	
5.	Key in present wind direction	2 5 4	t-COURSE	254
6.	Enter	ENT	previous main display is now shown	
7.	Select CRS SPd display	U 2	CRS SPd	38 4.9t

which means that course is 38 degrees off the wind and speed up wind is 4.9 knots.

To distinguish true course and speed from relative course and speed this last display has a "t" next to speed figure.

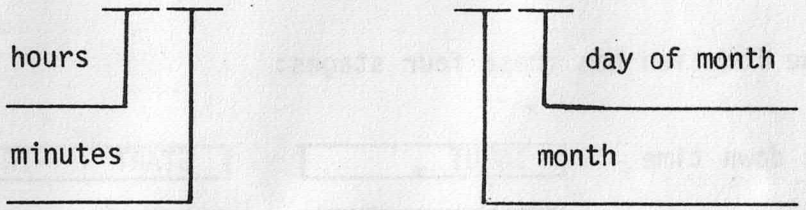
As for true course and speed, the "TRIM" course and speed is a mean value over the selected time interval 2 to 99 minutes (AVER TIME). A short time interval gives unstable readings whereas a long interval responds very slowly to changes in course and speed. The best compromise will in most cases be around 5 to 10 minutes.

CLOCK AND CLOCK ALARM

Display of time and date in combination with an alarm clock.

The function has 5 stages:

(i)	Main display	U 7	Hr: 13.51	DAY: 05.16	
(ii)	Alarm clock ON/OFF	ROLL	AL BEEP	ti OFF	switch ON/OFF with the "+/-" key
(iii)	Alarm clock setting	ROLL	INPUT	AL : 17.59	must be keyed in with all four digits
(iv)	Date setting	ROLL	INPUT	DAY : 02.16	
(v)	Time setting	ROLL	INPUT	Hr : 13.52	



The calendar uses a normal year of 365 days. In leap years, after the 28th February the calendar requires adjustment.

The CLOCK is used as back-up for the TIMER function and consequently a warning is given (RACING FUNC ON) if the TIMER is ON when you wish to re-set time or date.

The calculated ETA in the NAVIGATE function uses the CLOCK setting as basis; hence the ETA will be wrong if the CLOCK has not been set correctly.

The CLOCK is quartz controlled and runs independently of power supply.

TIMER

The TIMER is a dual function stop watch as it will both count down to zero (race start) and thereafter count up elapsed time until switched OFF.

Count Down

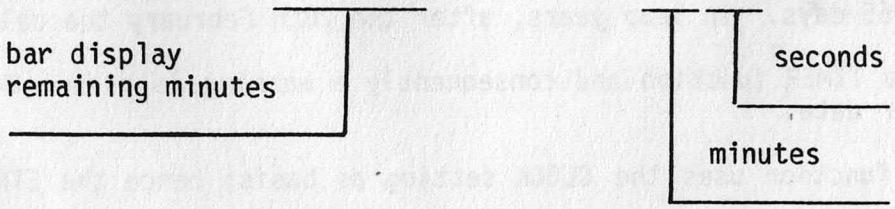
The TIMER will count down from any time between 0 and -60 minutes; the DYN III itself proposes the conventional 10 minutes before start, but this may be changed to suit the conditions of a particular race. The TIMER starts when the ON setting is ENT'ered.

When the TIMER is off, the function has these four stages:

(i)	Selection of count down time	INPUT	START -10	the DYN III proposes -10 minutes
(ii)	OFF to ON control	RACING	FUNC OFF	+/- for ON, TIMER starts at ENT
(iii)	Display of elapsed time	LAP Hr	04 09 43	display in hours, minutes and seconds
(iv)	Display of elapsed time	LAP SEC	14983	display in seconds only

When the TIMER has been started and is in the count down period, the display will be:

Main display	-----IIIIIIIII	-09 53	9 minutes 53 seconds to start



During the last 10 minutes of the count down period the TIMER activates the bleeper to give a group of 5 bleeps at each whole minute, and a single bleep at each of the last 5 seconds. At zero 15 bleeps are sounded, and the display changes to count up elapsed time.

ELAPSED TIME

After the start the TIMER counts hours, minutes and seconds (HMS) up to 99 hours. The ROLL key is used to freeze the display to note intermediate times, and a further ROLL will convert that time to seconds. ENT reverts to main display.

In Elapsed Time mode the function has these four stages:

(i)	Main display, HMS	RACE Hr	01 08 57	
(ii)	Intermediate time frozen; HMS	LAP Hr	01 09 18	the ENT key returns to main display
(iii)	Intermediate time frozen; seconds	LAP SEC	4158	
(iv)	ON/OFF control	RACING	FUNC ON	TIMER stops when OFF is entered

When the TIMER has been switched OFF, total elapsed time will be stored until next time TIMER is switched ON.

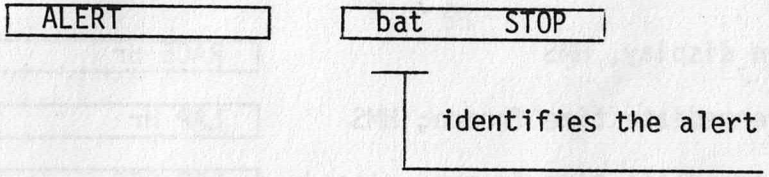
ALERTS

The alert system provides a check of up to 10 different parameters.

The audible alert is groups of 3 bleeps every 5 seconds and a marker above the word ALARM on the display. All alerts can be switched ON/OFF and most of them have a limit which can be adjusted to suit your own requirements.

A single press on the Alarm key "0" will stop the audible alert, and the cause will be displayed with an abbreviated text of the parameter which exceeds the alarm limit. The cause for alert is displayed each time the alarm key is pressed. When there is more than one, they are automatically displayed in succession.

Display if, for instance, supply voltage is below set limit:



ALERT PARAMETERS

Distance off track alert refers to NAVIGATE function; checks that the deviation from track is within the programmed limit, (maximum 9.99 nautical miles).

Typically a value between 0.05 and 0.50 would be selected.

APP Approaching a waypoint. The alert will be triggered when distance to next waypoint is less than programmed setting.

dri Drift alert relates to the CENTER function. Alert will be triggered when the distance to a Centre point exceeds the programmed limit (zero to 99.99 nautical miles).

The drift alert can be used as an anchor watch. (ANCHOR function programmes both the CENTER and ALARM functions.)

SPd Speed alert. Triggered if displayed speed (true or "TRIM" speed) falls below programmed limit (from zero upwards).

Unc Uncertainty. The set monitors predicted position uncertainty within the CHAIN function. Alert will be triggered if the uncertainty exceeds the programmed limit.

A value between 0.20 and 2.00 is usual.

The UNC alarm will warn if the selection (manually) of chain or slave has led to a large position uncertainty. Manual selection of chain or slave prevents the DYN III from selecting optimum chain or slave automatically.

FUE Not in use at present.

bAt Battery voltage. The set monitors supply voltage, and gives a warning in two cases; (i) if voltage exceeds 15V, which is the highest allowed operational voltage; (ii) if voltage drops below programmed limit.

The realistic range is between 9 and 15V. Normally the limit would be chosen near 12V (11.5 to 12.2).

To a certain extent the battery alert is able to monitor remaining capacity of a battery or to warn if the battery is being overcharged (voltages above 14.5 to 15V).

UPd Updating stopped. An alert will be given if the DYN III for any reason has been unable to measure a position for more than 15 minutes.

Ant Antenna cable failure. In the event of short circuit or broken cable an alert will be given. This also includes a malfunction of the buffer stage in the antenna coupler.

3rd Third slave error. When only two of three slaves are used for position updating (see CHAIN function), the set compares the line of position from the third slave with the measured position. An alert is given if the discrepancy becomes too large (large cocked hat). The alert is of less significance if the third slave signal is weak or disturbed.

ti Time alert is controlled within the CLOCK function.

Alert Programming

Some of the alerts should always be ON as they concern the basic use of the receiver (Unc - bAt - UPd - Ant - 3rd).

The individual alert is accessed with a dual key operation (U O) followed by ROLL which runs through the various alerts.

For instance:	AL BEEP	SPd OFF	the "+/-" key will switch ON/OFF
limit:	INPUT	SPd : 01.50	(alert if speed is below 1.5 knots)

The limit is changed by first CLR'ing the old value and then entering a new one. Four digits must always be keyed in as the decimal point is fixed. This means that for instance 1.1 knots has to be keyed in as 01.10.

The choice of the alert limit is a compromise. A narrow limit may give unnecessary alerts: conversely, wide limits may not trigger an alert when required.

DISPLAY SHIFT

The DYN III is able to change the display automatically between four selected main functions during the 20 second updating period.

The display shift is switched ON/OFF at the first function stage, and at the second stage the four displays are selected as a four digit number. Each digit refers to one of the upper functions nos. 1 to 9.

(i)	SHIFTING	DISP : OFF	"+/-" key shifts ON/OFF
(ii)	SHIFTING	DISP : 3174	CLR and enter a new number

In the example, NAVIGATE function (3) will be displayed, just after the DYN has made a new updating, for 5 seconds, followed by LAT/LON (1), CLOCK (7) and finally ETA DIST (4).

Any four digit number which does not contain a zero is valid for DISPL SHIFT selection.

Single key functions are still accessible for other short term information as well as other main functions but if a main function is called using the Upper key, then the display shift will be switched OFF.

LIGHT

Night illumination of the display is switched ON/OFF with the CLR key directly. When the display back light comes ON, the traffic light is dimmed and vice versa.

CLR | LIGHT | FUNC : ON |

BEEP

The 20 second bleep at each new updating is switched ON/OFF with Lower CLR:

L CLR | UPdate | BEEP : ON |

KEY LOCK

The key lock function is used to protect the DYN III from unauthorized use by locking the keyboard with a code consisting of four digits.

Short term single key functions are still accessible when the keyboard is locked.

The keyboard is locked thus:

U ENT | INPUT | | CODE : OFF | the OFF must be CLR'ed

Instead of OFF a four digit code is now entered:

eg CLR 1234 | INPUT | | CODE : 1234 | which then is ENT'ered

The keyboard is now locked and any attempt to change settings will be met with "INPUT CODE ON" in the display.

To unlock the keyboard, ON must be CLR'ed first and then the same four digit code must be entered into the key lock function again. Any other code input is ignored.

It may happen that the key lock code has been forgotten. In this case the only way out is to delete the contents of that part of the memory, which also contains position, waypoints etc. This is done in the second stage of the SPECIAL function 10 (DELETE ON ENT), the key sequence being: L ENT 10 ENT ROLL +/- ENT.

After this you must again key in estimated position, waypoints, time and date.

SIGNALS

The function is used for monitoring reception conditions; it has 3 stages:

			M R G P	
(i)	U +/-	LEVEL	9 8 9 9	amplitudes of signals received from Master, Red Green, Purple stations
(ii)	ROLL	NOISE	1	noise in the master signal
(iii)	ROLL	OSC OFFS	-10	local oscillator offset

The LEVEL display shows four digits, each in the range 0 to 9. Good reception conditions (optimum chain in use) exist if the first digit and at least one of the others is 9; none should be below 8. The first figure is the master signal followed by the slave signals red, green and purple respectively.

The level of the master signal should always be at least 8 (on optimum chain); if one of the slave signals is very weak (below 5), it may be advantageous to reject it using the second stage of the CHAIN function, and use only two slaves. If a more distant chain has been selected manually, levels may be lower than 8. Down to 5 or even lower may still be useable in this case.

The NOISE display is a more sensitive way of checking reception conditions; therefore it is useful as an installation check. The noise figure should be as low as possible. In good reception conditions the figure will be below 2; figures above 7 are extremely bad.

The OSC OFFS display is for checking the internal oscillator frequency. The figure should be within -50 to +50; up to +/- 90 can be accepted, but the set needs adjustment.

SPECIAL

Apart from the functions indicated on the keyboard some extra functions are accessible as special functions, identified with a number from 8 to 12.

A special function is called with the key sequence L ENT N ENT, where N is the number of the function to be called. The function numbers 8 and 9 relate to normal key functions of the same number (sailplan and fuel).

SPECIAL 8 SAILPLAN ON to OFF using the "+/-" key. The function will delete the route plan and is useful if the plan has to be changed radically (simpler than with the "SAILPLAN" editing capability).

SPECIAL 9 Concerns fuel option to be included later.

SPECIAL 10 This function has two stages, RESET and DELETE. When switched ON with the +/- key the first stage will reset the DYN III to standard settings without disturbing the waypoints and clock setting.

The second stage will also reset the receiver, but in addition delete the contents of the memory: present position, waypoints, clock setting, key lock code etc. The programme memory remains unaffected.

In both cases the function is linked to the EST POS input.

SPECIAL 11 Displays the voltage of the boat's supply. Accuracy is ± 5% from 10 to 15V. The voltage measurement is useful when checking the condition of the ship's battery, eg when the battery alert has been activated.

SPECIAL 12 Displays the software version in the receiver, as in the first display when power is switched ON:

TEST

The DYN III is able to test its own circuitry to check overall performance. In the event of difficulties with position updating, the TEST function enables you to detect whether the receiver or the chain in use is the cause.

The TEST function will test keyboard, display, back light, traffic light, the receiver and central processor. Each stage is accessed with the ROLL key.

When the function is called, it identifies itself with:

L +/-	SELF	TEST ON	"+/-" will cancel the TEST function
the next stage is for keyboard test	U 12345 - C	L 67890 ° E	

Each key should then be used to remove the corresponding character in the display. After 16 different key entries the display should be blank, and with a bleep the next level appears:

	Display test 1	8888:88.88	8888:88.88	back light off, traffic lights all lit
(ROLL)	Display test 2	8888:88.88	8888:88.88	back light on, traffic lights dimmed

The display is without fault when the above display is complete.

After the keyboard and display have been tested, the DYN III automatically tests the rest of the set.

(ROLL)	Receiver test	TESTING	INPUT

Calculator test	TESTING	C P U
When the DYN is satisfied	Found no	Error

In case of faults the set should be taken to an authorized dealer; excepting codes 345 (antenna cable short circuited) and 346 (antenna cable not connected).

SPECIFICATION

Environmental

Temperature:	Receiver	0 to +50°C
	Antenna	-25 to +70°C
Humidity:	Instrument	10 to 95%
	Antenna	5 to 100%
Vibration:	10 to 60 Hz; 1 to 5 G linear 60 to 150 Hz; 5 G linear	
Burn in:	Each equipment is tested for not less than 75 hours at high temperature.	
Compass safe distance:	0.5 meters	
Radio interference:	FTZ approval no S34 50113	

Power

Voltage:	DC 9 to 15V continuously. Withstands 40V in short surges. Operates down to 7V for short periods
Current:	0.20 Ampere
Back up:	Built-in 50 mAH NiCd battery for memory back up of approximately 6 months. Charging, power ON: 5mA. Charging, power OFF: 1mA. (i.e. trickle charge if set is switched off but connected to power supply).

Physical

Case	Diecast ABS plastic
Dimensions:	H x W x D = 126 x 257 x 54mm
Weight:	1.1 kg
Antenna box:	Anodized aluminium
Dimensions:	H x W x = 200 x 50mm
Weight:	0.35 kg including whip
Whip length:	1.05m

Antenna cable

Type:	Coaxial, uncritical type
Length:	20 metres standard
Max extension:	100 metres

Pack includes

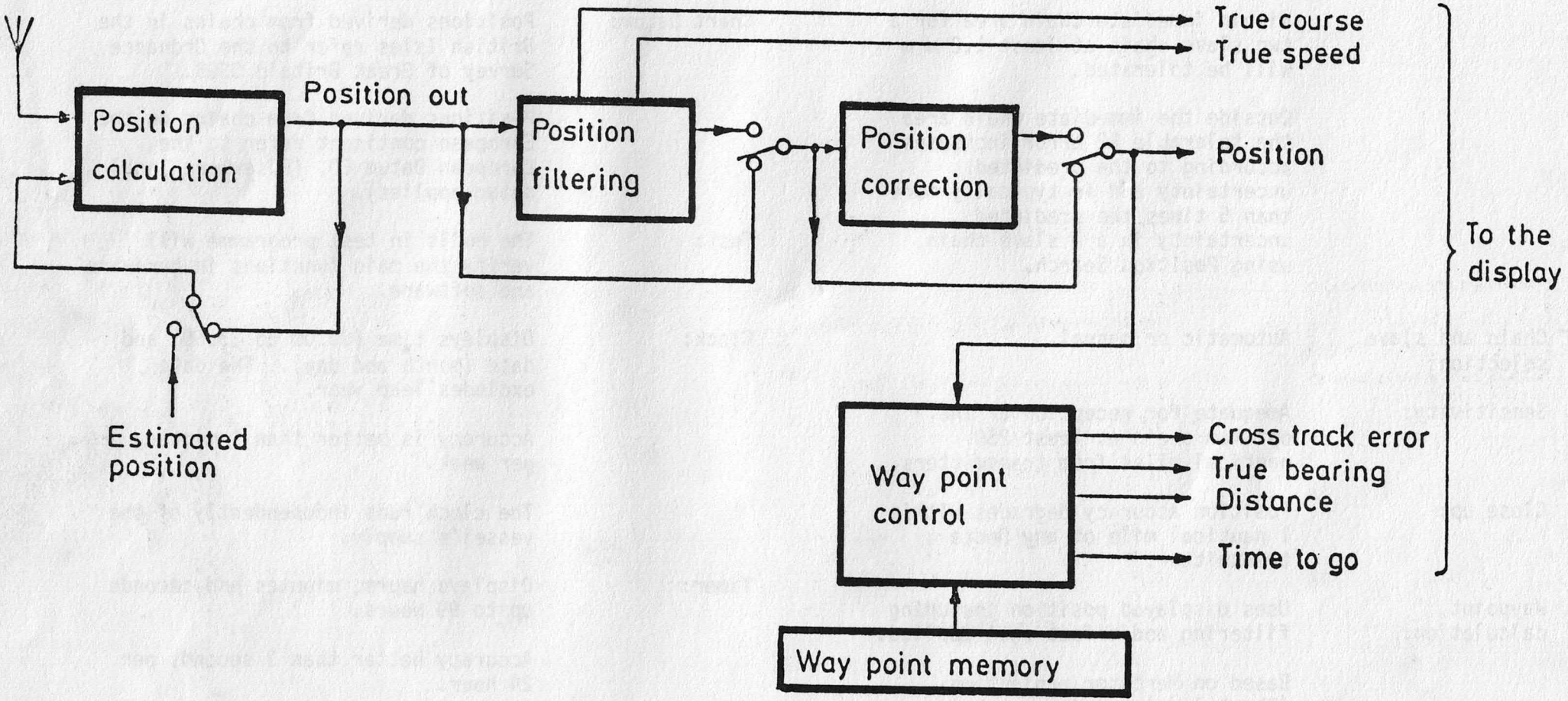
Receiver with bracket.
Antenna coupler with 20m cable.
Universal mounting bracket for antenna.
(Whip and operating manual provided separate from pack).

Operational

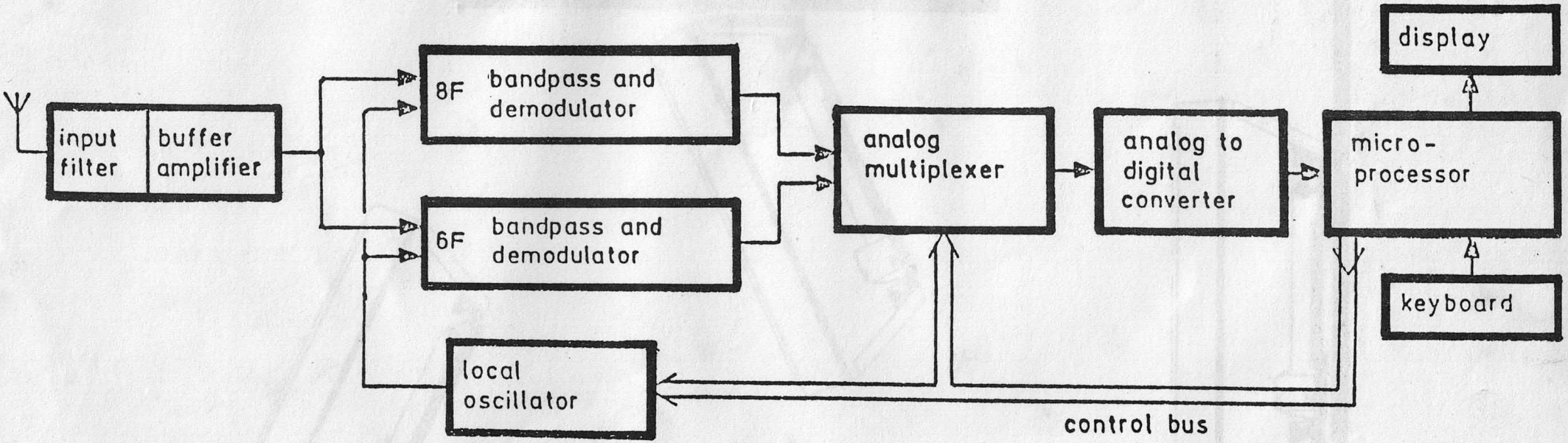
Displays:	LAT/LON position. Course and speed. Distance off track, heading and distance to destination/waypoint. ETA. Time and date. Stop watch. Heading and distance to a centre position.
Updating:	Every 20 seconds for all displays.
Fix accuracy:	According to the quality of the received signals (ie transmitter distance and relative positional geometry of the chain). Typical 0.1 to 0.2 nautical miles within the immediate chain area.
Predicted uncertainty:	Calculated from present position in relation to the transmitter positions. The values are typical and may be exceeded locally.
Inherent instrument error:	Less than 10% of the predicted positional uncertainty.
Max vehicle speed:	30 knots; at higher speed the accuracy degrades.
Averaging time for course, speed and position:	Standard 5 minutes. Variable from 2 to 99 minutes. The random error will be halved for quadrupling of the averaging time.
True course and speed:	Calculated from change of position.
True speed accuracy:	Depends on stability of received signals and selected averaging time. Typically ±0.5 knot random error for 5 minutes averaging in the immediate chain area.
True course accuracy:	Depends on stability of received signals, selected averaging time and speed Typically ±8 degrees random error for 5 minutes averaging at 5 knots in the immediate chain area. At lower speed the random positional error will affect accuracy.
Max tolerable E.P. error at start up:	Within immediate chain area for a three slave chain at least 3 n m will be tolerated using the Position Search facility.

	Within immediate chain area for a two slave chain at least 1.2 n m will be tolerated. Outside the immediate chain area the tolerable EP error increases according to the predicted uncertainty and is typically more than 5 times the predicted uncertainty in a 3 slave chain, using Position Search.
Chain and slave selection:	Automatic or manual.
Sensitivity:	Adequate for reception of the optimum chain at least 250 nautical miles from transmitters.
Close up:	Position accuracy degrades within 1 nautical mile of any Decca transmitter.
Waypoint calculation:	Uses displayed position including filtering and offset when applied. Based on Mercator projection (Rhumb line).
Chart Datum:	Positions derived from chains in the British Isles refer to the Ordnance Survey of Great Britain OSGB. Positions derived from chains on the European continent refer to the European Datum ED. (Elsewhere local datum applies).
Test:	The built in test programme will verify the main functions in hardware and software.
Clock:	Displays time (00.00 to 23.59) and date (month and day). The date excludes leap year. Accuracy is better than 1 minute per week. The clock runs independently of the vessel's supply.
Timer:	Displays hours, minutes and seconds up to 99 hours. Accuracy better than 3 seconds per 24 hour.

SOFTWARE BLOCK DIAGRAM



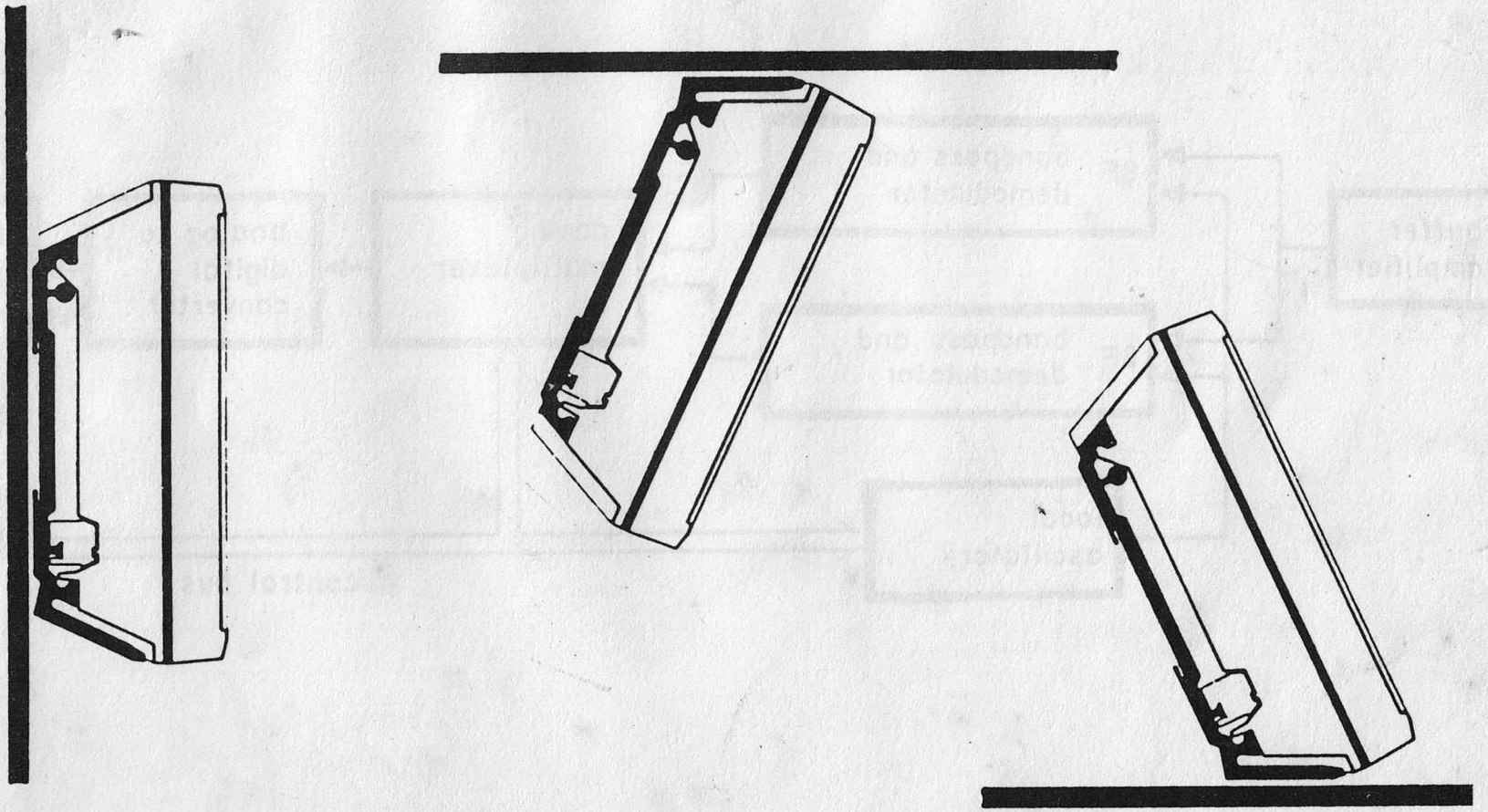
HARDWARE BLOCK DIAGRAM



The DYN III is not watertight, and should be installed in a protected, dry place on board. To avoid excessive temperatures the DYN III should not be exposed to direct sunlight for prolonged periods.

The mounting bracket may be screwed to a table top, bulkhead or mounted overhead.

For overhead mounting the bracket is mounted upside down, and the terminal block moved to the opposite side of the bracket. As the bracket in other respects is symmetrical, the DYN III fits equally well when the bracket is mounted overhead.



CONNECTION

The electrical wiring is connected to the terminal block on the bracket.

In the simplest form the only connections are the coaxial antenna cable and the plus and minus wires from the boat's 12V battery. The DYN III also has connections for a man over board (MOB) switch, a proposed fuel transducer input and an output for a slave display unit.

All the wiring is kept in place by the rectangular bracket next to the terminal block.

1	-	12V DC positive
2	-	12V DC negative
3	-	DATA output to slave display
4	-	MOB switched to reference ground via external switch
5	-	FUEL transducer input from interfacing unit
6	-	Reference ground for DATA, MOB and FUEL
7	-	Antenna central wire
8	-	Antenna screen

INSTALLATION HINTS

Antenna principle

The principle of the antenna operation is that the whip picks up a voltage from the signals received.

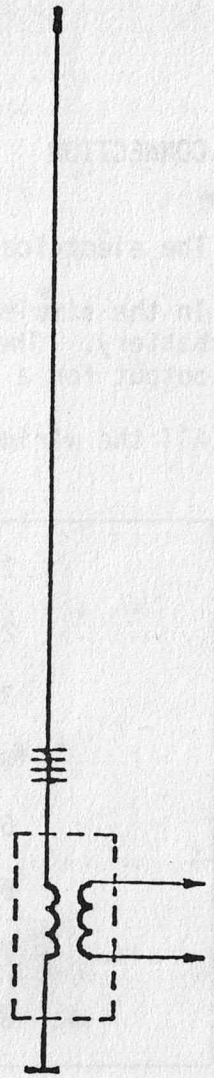
If the lower end of the whip is earthed (effectively connected to sea), the signals received will produce a current from the whip to earth.

To measure this current a transformer is inserted between the whip and earth. The output of the transfomrer is amplified and fed via the antenna cable to the DYN III. In this way the DYN III receives a replica of the current in the transformer. With a perfect earth this will also be a replica of the signals received.

However, if the earth is less than ideal and contains electrical noise, this noise will also generate a current in the transformer. The DYN III will receive an inferior signal, giving less than perfect performance.

Therefore the proper earthing of the antenna is essential for the optimum performance of the DYN III. Physically it is the metal part of the antenna coupler which must be earthed.

As the antenna cable is galvanically isolated from the whip and the antenna coupler, the DYN itself should be earthed separately.

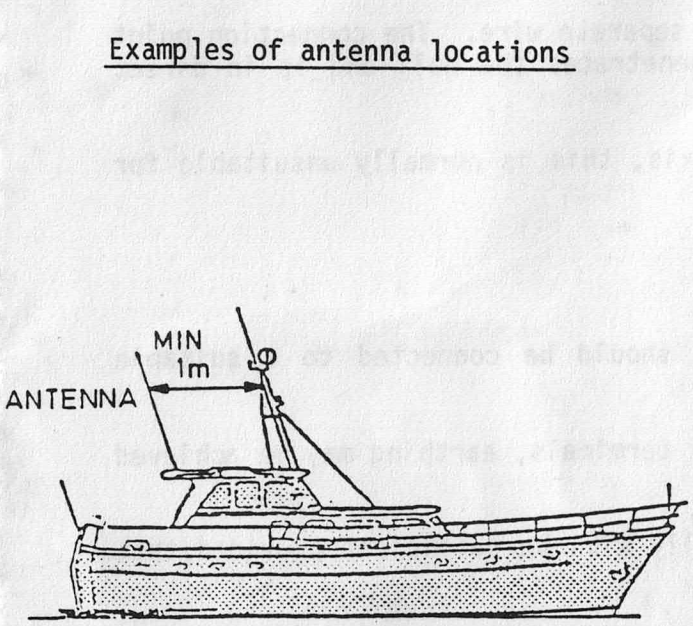


Antenna Location

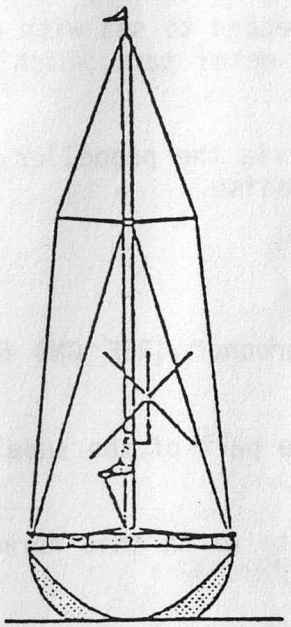
The antenna whip must be placed in a position as far away as possible from equipment generating electrical noise, and in a position where little or no screening effects from masts and stays is present.

Therefore the optimum position is at the top of a mast. Normally other more accessible mounting positions will also give satisfactory performance.

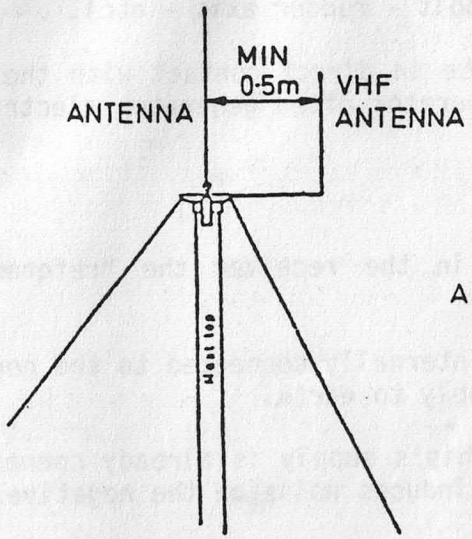
Examples of antenna locations



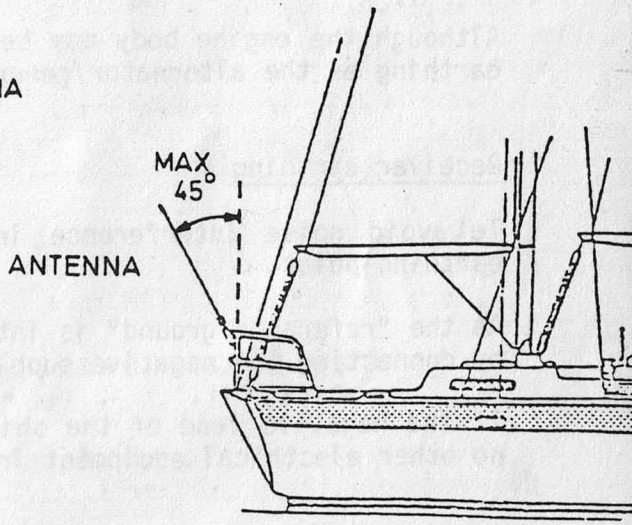
ACCEPTABLE



BAD



OPTIMUM



ACCEPTABLE

NOTE: When the antenna is mounted near the sea keep the antenna box top free of salt spray in order to avoid occasional short circuiting of the antenna signal.

Antenna Earthing

In a steel or aluminium boat an ideal earthing of the antenna coupler is easily obtained if it is mounted in direct electrical contact with the hull.

In a glass fibre or wooden boat the antenna coupler must be connected to sea with a separate wire. The connection point to the sea may be via a special earth electrode or any other metal part which penetrates the hull and is in direct contact with the sea. (Keel bolt - rudder axis - etc).

Although the engine body may be in direct contact with the sea via the propeller axis, this is normally unsuitable for earthing as the alternator/generator often generates electrical noise.

Receiver earthing

To avoid noise interference in the receiver the "reference ground" (REF GND 6) should be connected to a suitable earthing point.

As the "reference ground" is internally connected to the negative part of the supply terminals, earthing may be achieved by connecting the negative supply to earth.

If the negative lead of the ship's supply is already connected to earth this normally will be sufficient provided that no other electrical equipment induces noise on the negative lead.

Isolated Earthing

If the electrical power system of the ship has to be kept "floating", the "reference ground" must be connected to earth via a capacitor of minimum 0.1 microfarad capacitance.

Alternatively a galvanic isolating DC-DC power converter may be inserted in the supply lines to the DYN III; then the "reference ground" must be connected directly to earth.

Installation check

After the installation has been completed, check the quality of the installation of the DYN III and the suppression of noise from other electrical machinery on board.

This may be done in the following way:

The boat must be at a place clear of external sources of electrical noise. (High tension power lines etc).

Stop the engine, switch off all electrical equipment except the DYN III. Using the optimum chain for the area, note down the NOISE reading obtained from the SIGNALS function.

Start the engine, wait one minute, note down the NOISE reading once more.

Ideally the reading should not increase when starting the engine (generator), but an increase of 2 of the NOISE reading is acceptable. Stop the engine again.

Then switch on electrical units, one by one, waiting one minute between each. Note down the corresponding NOISE reading.

If a piece of equipment causes an increase of more than 2 in the NOISE reading, the noise from this equipment may impair performance of the DYN III and precautions must be taken to reduce the noise to an acceptable level. If in doubt, your dealer can assist you in solving the problem.

LIST OF GENERAL AGENTS

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