

## SUMMARY OF DATA

## PURPOSE

A Navigational Aid using the Decca Navigator System.

## GENERAL DESCRIPTION

The Decca Navigator System is a system of a navigation using as its basis the geometry of the hyperbola. This principle is derived from the fact that between any two fixed points, a series of lines may be drawn which have the property that at any point of each line, the difference in the distance between any two fixed points has the same value. The lines thus formed take the form of hyperbolic curves. The distance difference between the receiver and two fixed transmitting stations some distance apart was the measurement used in earlier navigational aids such as Gee and Loran.

The Decca system is, however, somewhat different; it consists of a number of groups or chains of transmitting stations. - Each chain consists of four stations - a master and three slaves (known as the purple, red and green slaves respectively). The approved range of the system is approximately 240 nautical miles radius from the master station so that a series of chains could give continuous coverage. All the stations radiate cw, each on a prescribed frequency. The four frequencies are harmonically related to a common fundamental frequency and the phase of each slave's transmission is controlled at all times, by the master transmission. The chain should be regarded as three pairs of stations, each pair consisting of the master and one slave.

The radio waves sent out by the master and each slave station are converted in four separate channels in the receiver to a common frequency and their phase relationships are compared. This comparison of phase achieves a similar but more accurate result than that of difference distance measurement already discussed. Each phase change of  $360^\circ$  produces a separate lane, a fixed number of lanes (different for each pair) constituting a zone. The width of these lanes varies greatly from 400-600 yards on the base line to 3 miles at the edge of the coverage.

In Outfit QM10, a system of lane identification is embodied so that a continuous check may be kept of lane numbers. A "freezing" circuit prevents jitter of the decommeter pointers during the lane identification transmissions.

Provision is made for reception of 9 chains. The frequencies allocated in any one operational area may be re-used in other areas providing there is sufficient geographical separation to prevent mutual interference between two chains on the same set of frequencies.

The chains currently receivable on the nine settings of the chain switch are:

- Chain 1: S.W. British. Master Station at Kingsbridge in Devon.  
South Persian Gulf. Master Station at Das Island.
- Chain 2: East Newfoundland. Master Station at Port Blandford.
- Chain 3: N.W. British. Master Station at Kircudbright.
- Chain 4: Swedish Baltic. Master Station at Nyaeshamn.
- Chain 5: English. Master Station at Puckeridge. 18 miles N. of London.  
North Persian Gulf. Master Station at Bandar Delam.
- Chain 6: North Scottish. Master Station at Kirkwall.  
Cabot Straits. Master Station at Magdalen Island.
- Chain 7: Danish. Master Station on Island of Samsø.  
Nova Scotia. Master Station at Chester Basin.  
India (West). Master Station at Savarkundia, Nr. Bombay.
- Chain 8: French. Master Station at Montlucen.  
South Bothnian. Master Station at Njwanda (Red/Green patterns only).  
East India. Master Station at Balasore, S.W. of Calcutta.
- Chain 9: German. Master Station at Brielen.  
Anticosti. Master Station at Port Menier, Anticosti, Canada.

## MAJOR UNITS

PATTERN NO.	DESCRIPTION	PHYSICAL DATA		
		HEIGHT	WIDTH	DEPTH
AP 102443A	Receiver (Decca Navigator Marine Model Mk. VM) Type 133, 9 chain	2 ft 10 in.	1 ft 8 in.	10½ in.
AP 10244	Decometer Display Unit (Decca Marine Model Mk. VM) Type 134, 9 chain	2 ft 2 in.	1 ft 5½ in.	1 ft 1 in.

Total weight of Outfit QM10 – 127 lb (approximately)

## FREQUENCIES

The nominal frequency groups represented by Chains 1 to 9 are as listed below. Where two or more chains share the same nominal frequency groups, a change of +5 Hz or -5 Hz at master frequency with proportional change in slave frequencies may be made to minimise residual mutual interference. To identify the precise frequencies, suffix letters A, B or C are normally appended to the chain number. These suffix letters signify:

- A – Master frequency 5 Hz low.
- B – Standard master frequency as listed below.
- C – Master frequency 5 Hz high.

These suffix letters will appear in due course on Decca navigational charts but may be ignored for QM10 operation; the outfit will operate satisfactorily on, for example, Chain 5A or 5C when the chain selector is set to '5'.

	BLACK (MASTER)	RED (SLAVE)	GREEN (SLAVE)	PURPLE (SLAVE)
CHAIN 1	84.280 kHz	112.373 kHz	126.420 kHz	70.233 kHz
CHAIN 2	84.460 kHz	112.6133 kHz	126.690 kHz	70.3833 kHz
CHAIN 3	84.645 kHz	112.860 kHz	126.968 kHz	70.537 kHz
CHAIN 4	84.825 kHz	113.100 kHz	127.2375 kHz	70.6875 kHz
CHAIN 5	85.000 kHz	113.333 kHz	127.500 kHz	70.833 kHz
CHAIN 6	85.180 kHz	113.5733 kHz	127.770 kHz	70.9833 kHz
CHAIN 7	85.365 kHz	113.820 kHz	128.048 kHz	71.137 kHz
CHAIN 8	85.545 kHz	114.060 kHz	128.318 kHz	71.288 kHz
CHAIN 9	85.720 kHz	114.293 kHz	128.580 kHz	71.433 kHz

## POWER REQUIREMENTS

85 to 250 V, 40-60 Hz at 250 watts.

## POWER SUPPLY OUTFITS

A.C. Supply Outfit DQB when no suitable power supply is available.

## AERIAL

The aerial consists of Pattern 611A Insulated Cable approximately 30 feet in length and a special concentric feeder. Whip Aerial Outfit AWM is fitted on small ships where a 30 ft aerial cannot be supported.

## HANDBOOKS

BR 2017, BR 2383

## ESTABLISHMENT LIST

E1000

## INSTALLATION SPECIFICATION

4686