Product: <u>Decca BridgeMaster E Series Radars</u>

Subject: <u>Optimising the Video Display and Tracking performance</u>

Introduction

The BridgeMaster E is a world-class marine navigation radar that is renowned for its video presentation and tracking performance. Like any such device, its settings can be tuned to give optimal performance. This guide details the procedures to be performed in order to get the best out of the radar system.

As each topic is covered, the effect is described and also which Video is affected. It may affect the Manual or Automatic Visual Video (the radar video the operator sees on the PPI) or the Autotrack Video (the radar video the Tracking system sees). The operator does not see the Autotrack Video directly but incorrect setting up can adversely affect this video resulting in poor tracking.

Also with each topic the relevant setting up page(s) in the Manual will be referred to. If there is a revised setting for this topic this will be stated then.

It is recommended that a copy of this document is kept in Chapter 4 of the Ship's Manual.

Preparation

With some settings, the value to be set depends on the Software Version and/or the Hardware Issue of certain PCBs. The Software Version can be found at the bottom right hand of the Display when switched on. The Hardware Issue can be found by looking at the actual label on the PCB. It will be the number after the 'minus sign' following the part number of that PCB e.g. 65800814-6 means the PCB is an issue 6.

Before proceeding the following preparation must be done:

a) Ensure you have a copy of the Ship's Manual (65800010B *issue 3 or higher*).

b) Establish the Software Version of the Display(s).

c) Establish the issue of the Radar Processor PCB in the Electronics Processor Unit. The only way to know this is to physically look at the PCB. In most cases this will mean opening up the Electronics Processor Unit and removing the Radar Processor PCB to see. If this exercise is part of a multi-display interswitched system then you need to know the hardware issue of **ALL** the Radar Processor PCBs.

   If any Display is an EPA (L) model, software version SC x.xx, then it is not necessary to carry out the above on that Display.

d) Establish details of all the Coaxial cable lengths and types including ISW runs, Ship's Length and Beam and the Turning Unit(s) offsets.

e) Ensure you have read this whole document before proceeding.

Commissioning and Setting Up

As there are many combinations of systems the following procedure must be followed.

- For a stand-alone system carry out the Commissioning and Setting Up as detailed.

- For a permanent Slave Display, do the Master Display first then do the Slave Display last.

- With Interswitched systems, carry out the procedures at *each* Display for *every* Transceiver available for that Display.

Initialisation

First carry out the System Configuration, I/O Options and the Transceiver Settings in the Initialisation page. This is covered in Chapter 4.

In the Transceiver Settings menu ensure the correct values are entered for the RF Feeder Length and, with V4.xx software, the Video Cable Length and the Beamwidth. Inaccurate values entered here will affect the Visual Video and the Autotrack Video.

When setting the cable length, ensure that the *total* Video Cable Length is used (Tx to DU via ISW, if fitted). The length of cable types FSJ1/75A, AS60P and FSJ4/75A must have a multiplication factor applied first, as shown in the table below:

Cable Type	Actual Cable Length	Correct selection on Transceiver Settings
PT1YM	0 to 10 m	0 to 10 m
	11 to 40 m	11 to 40 m
	41 to 70 m	41 to 70 m
	> 70 m	> 70 m
FSJ1/75A AS60P	0 to 25 m	0 to 10 m
	26 to 100 m	11 to 40 m
	101 m to 175 m	41 to 70 m
	> 175 m	> 70 m
FSJ4/75A	0 to 50 m	0 to 10 m
	51 to 200 m	11 to 40 m
	201 to 350 m	41 to 70 m
	> 350 m	> 70 m

Select the appropriate value from the pre-defined values for the Antenna Beam Width:

0.5°	1.0°	1.3°	1.6°	2.0°	2.4°	2.8°	3.3°
	8′X	6′X		4′Xor12′S		9′S	

Exit the Initialisation page.

Video Settings

Select 3nm range or above.

Select System Menu

Select the VIDEO SETTINGS page and ensure all the parameters are set as follows:

VIDEO	INTEGRATED
DECREMENT	nn (not adjustable)
ALGO1	ON
ALGO4	ON
ALGO4	HIGH RANGES

Exit the Video Settings page and select the TX SETTINGS page.

With Interswitched systems, carry out the following procedures at **each** Display for **every** Transceiver available for that Display.

Coarse Tuning

This sets the frequency of the Local Oscillator to achieve the required IF signal.

This adjustment will affect the Visual Video and the Autotrack Video.

Select 24nm range, Transmit, Long Pulse. This ensures the Receiver is in the narrow bandwidth mode.

To adjust follow procedure in Chapter 4.

Video Input Level

The raw incoming Video is normalised to a pre-defined level. Incorrect levels will result in wrong Video levels being sent to the processing circuits.

This will affect the Visual Video and the Autotrack Video.

To set, follow the procedure in Chapter 4, even if 'SET OK' is already displayed. See Appendix 1 for additional information.

Trigger Delay

This adjustment will compensate for the time difference between the Trigger Pulse and the raw Video returns. Incorrect setting will result in ranging errors.

This will affect the Visual Video and the Autotrack Video.

To set, follow the procedure in Chapter 4 or follow the alternative procedure in Appendix 2.

Turndown

The Turndown level is the amount of dynamic threshold compensation applied to the Video in the A/C Auto mode.

This will affect the Auto Visual Video and the Autotrack Video.

This has been revised and now depends on the issue of the Radar Processor PCB (which should have been noted under Preparation). It is now very important to check the values and set it accordingly as follows:

	Turndown Value		
	SP	**MP**	**LP**
Radar Processor PCB			
65800814/15 issue 4, 5, 6, 7	14	11	8
65800814/15 issue 8 and above	6	7	8
65800812 issue 1 and above	6	7	8
Combined Processor PCB			
65800839 issue 1 and above	6	7	8

Sample Start

This sets the time when the A/C Auto circuit samples the close range video.

This will affect the Auto Visual Video and the Autotrack Video.

Set this value according to the table below:

Antenna Height (m)	**SP**	**MP**	**LP**
00 – 10	48	90	250
11 – 20	75	150	250
21 – 30	100	150	250
31 – 40	130	180	250
41 – 50	160	200	260
51 – 60	180	200	280

Sample Width

This sets the duration of the A/C Auto sampling process. Check this value is set to 14.

This will affect the Visual Video and the Autotrack Video.

A/C Law

This sets the 'range' of the swept gain waveform for the A/C Sea control. Set this value according to the table below.

This will affect the Manual Visual Video only.

Antenna Height (m)	A/C Law Setting
32 and above	7
28-31	6
24-27	5
20-23	4
16-19	3
12-15	2
4-11	1
3 and below	0

NOTE: Vessels in the lower height range that encounter deep sea conditions where high seas are experienced may require an A/C Law setting higher than given in the table, up to a maximum of 7.

A/C Spike

This sets the size of the initial spike component of the swept gain waveform for the A/C Sea control.

This will affect the Manual Visual Video only.

Check this value is set to 3.

Offset

This aligns the Heading Marker relative to Ship's Head.

Incorrect setting will produce incorrect Bearing readings with the EBL control and the ATA/ARPA Data.

To set, follow the procedure in Chapter 4.

This is the end of the setting up procedure for ONE Display with ONE Transceiver. This whole process **MUST** be repeated for **each** Display for **every** Transceiver available for that Display.

Appendix 1

Video Input Level

In addition to the normal Commissioning and Setting Up procedures, the Video Input Level setting up procedure must be carried out when ever *any* of the following components are replaced:

- Magnetron
- Receiver/LNFE
- Circulator
- Limiter
- Display Processor PCB
- Radar Processor PCB
- Combined Processor PCB

Failure to do this will result in incorrect levels being applied to the Video circuits. This *must* be done even if 'SET OK' is displayed on the Video I/P line.

Appendix 2

Trigger Delay Setting

This is an alternative procedure to set the Trigger Delay.

1. The vessel must be stationary preferably tied alongside. Ships at anchor will move and swing and this will cause inaccurate settings. Also when at sea it may not be possible to find a target close enough.

2. Find and identify a target as close as possible to own ship and on the lowest range scale possible.

3. Set the Radar picture controls to suit so that this target is clearly identifiable on the PPI.

4. Get a Navigating Officer to calculate that target's range from the vessel (*not* using the Radar).

5. Set the VRM to the range given by the Officer.

6. Go to the TXn setting up page.

7. Adjust the Trigger Delay value so that the leading edge of the target touches the VRM.

8. Exit the Menu.