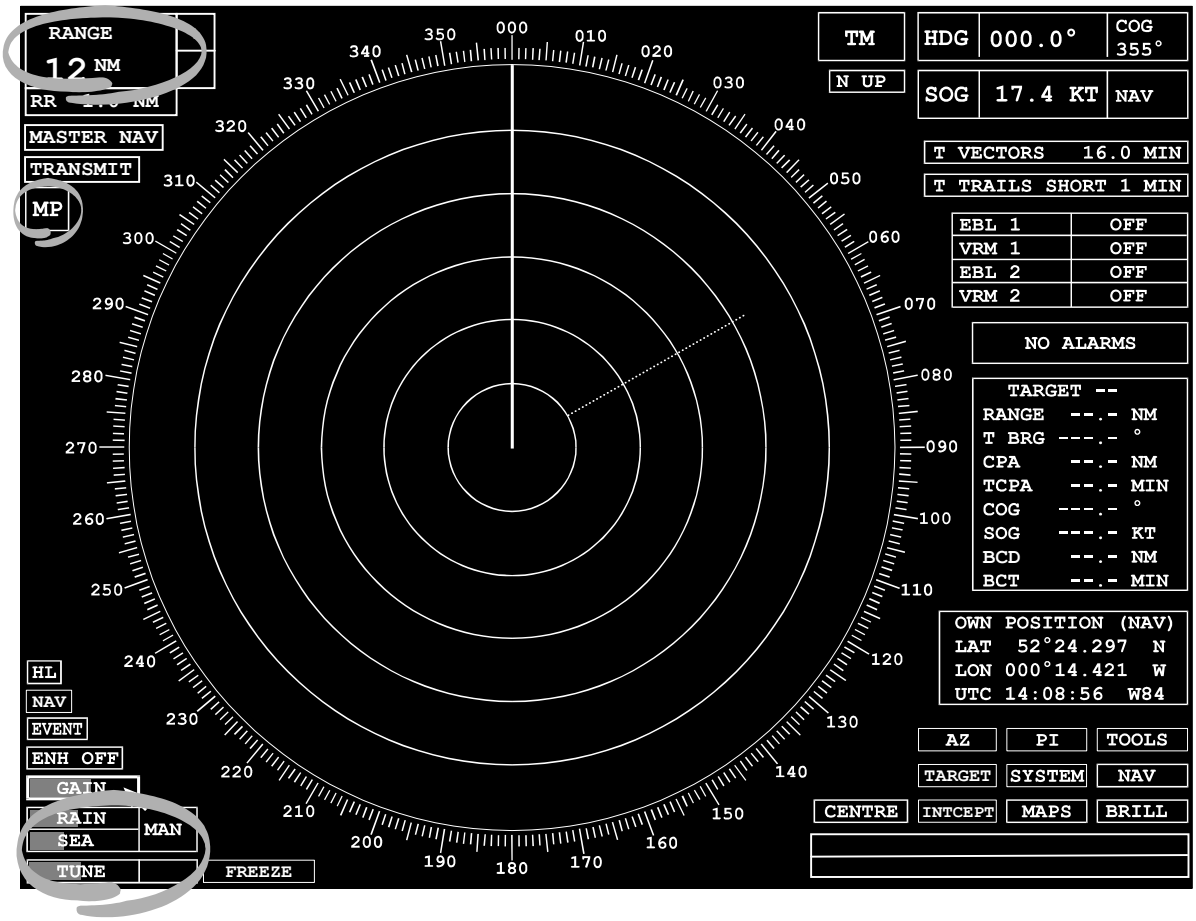
ANNEX

A

Search and Rescue (SART) Detection

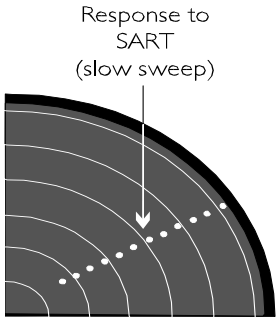


Covered in this chapter:

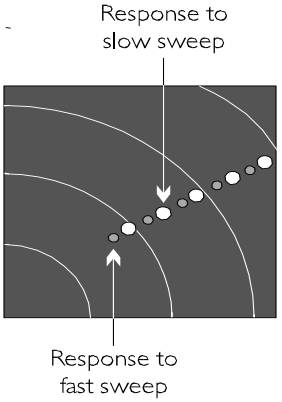
- Radar response to Search and Rescue Transponder (SART).
- Range scale selection.
- SART range errors.
- Setting the radar controls for best SART detection.

WARNING! A SART will only respond to the X-Band NAV radar. It will NOT be seen when the SCOUT transceiver is selected.

Introduction



A Search and Rescue Transponder (SART) may be triggered by any X-Band (3 cm) radar within a range of approximately 8 nm. Each radar pulse received causes it to transmit a response which is swept repetitively across the complete radar frequency band. When interrogated, it first sweeps rapidly (0.4 μsec) through the band before beginning a relatively slow sweep (7.5 μsec) through the band back to the starting frequency. This process is repeated for a total of twelve complete cycles. At some point in the sweep, the SART frequency will match that of the interrogating radar and be within the pass band of the radar receiver. If the SART is within range, the frequency match during each of the 12 slow sweeps will produce a response on the radar display, thus a line of 12 dots equally spaced by about 0.64 nm will be shown.

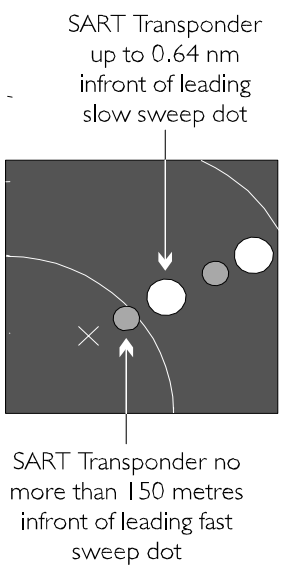


When the range to the SART is reduced to about 1 nm, the radar display may also show the 12 responses generated during the fast sweeps. These additional dot responses, which are also equally spaced by 0.64 nm, will be interspersed with the original line of 12 dots. They will appear slightly weaker and smaller than the original dots.

Radar Range Scale

When looking for a SART, it is preferable to use either the 6 or 12 nm range scale, see Chapter 3, Range Scales and Range Rings. This is because the total displayed length of the SART response of 12 (or 24) dots may extend approximately 9.5 nm beyond the position of the SART and it is necessary to see a number of response dots to distinguish the SART from other responses.

SART Range Errors



When responses from only 12 low frequency sweeps are visible (when the SART is at a range greater than about 1 nm), the position at which the first dot is displayed may be as much as 0.64 nm beyond the true position of the SART. When the range closes so that the fast sweep responses are seen also, the first of these dots will be no more than 150 metres beyond the true position.

Radar Bandwidth

This is normally matched to the radar pulse length and is usually switched with the range scale and the associated pulse length. A narrow bandwidth of 3-5 MHZ is used with long pulse on long range scales, and a wide bandwidth of 10-25 MHZ with short, or medium pulse on shorter range scales.

A radar bandwidth of less than 5 MHZ will attenuate the SART signal slightly, so it is preferable to use medium pulse with the wide bandwidth to ensure optimum detection of the SART, see Chapter 3, Radar Transmission Pulse Length.

Radar Side Lobes

As the SART is approached, side lobes from the radar antenna may show the SART responses as a series of arcs or concentric rings. These can be removed by the use of the anti-clutter sea control although it may be operationally useful to observe the side lobes as they may be easier to detect in clutter conditions and also they will confirm that the SART is near to own ship.

Detuning the Radar

To increase the visibility of the SART in clutter conditions, the radar may be detuned to reduce the clutter without reducing the SART response. The BridgeMaster E Radar is equipped with automatic/manual frequency control and can be detuned manually, see Chapter 3, Transceiver Tuning. Care should be taken in operating the radar in the detuned condition as other wanted navigational and anti-collision information may be removed. The tuning should be returned to normal operation as soon as possible.

Video Gain

For maximum range SART detection the normal gain setting for long range detection should be used, i.e. with a light background noise speckle visible, see Chapter 3, Video Processing Controls.

Anti-clutter Sea Control

For optimum range SART detection this control should be set to the minimum. Care should be exercised as wanted targets in sea clutter may be obscured. Note also that in clutter conditions the first few dots of the SART response may not be detectable, irrespective of the setting of the anti-clutter sea control. In this case, the position of the SART may be estimated by measuring 9.5 nm from the furtherest dot back towards own ship.

The BridgeMaster E Radar has automatic/manual anti-clutter sea control facilities, see Chapter 3, Video Processing Controls. Because of the way in which the automatic sea control functions, the operator is advised to use manual control initially until the SART has been detected. The effect of the auto sea control on the SART response can then be compared with manual control.

Anti-clutter Rain Control

This should be used normally (i.e. to break up areas of rain) when trying to detect a SART response which, being a series of dots, is not affected by the action of the anti-clutter rain circuitry. Note that Racon responses, which are often in the form of a long flash, will be affected by the use of this control.

The BridgeMaster E Radar has automatic/manual anti-clutter rain control facilities, see Chapter 3, Video Processing Controls. Because of the way in which the automatic control functions, the operator is advised to use manual control initially until the SART has been detected. The effect of the auto rain control on the SART response can then be compared with manual control.