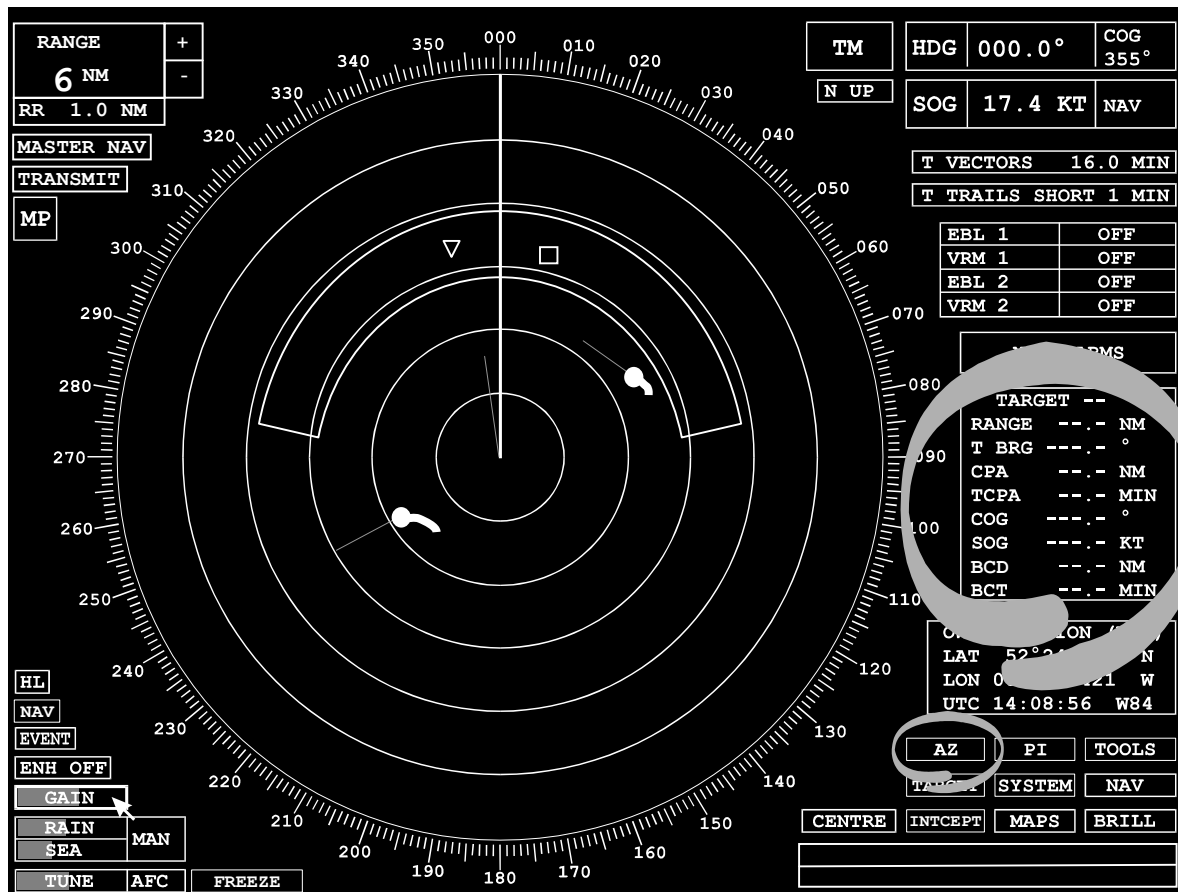


# CHAPTER 7

## Acquisition and Zone Functions



### Covered in this chapter:

- Manually acquiring a target for tracking.
- Automatically acquiring a target for tracking using auto-acquisition zones.
- Defining auto-acquisition zones.
- Displaying target data.

### **Introduction**

In transmit mode, any target that appears on the radar display within the range of 0.25 to 40 nm can be tracked. The method used is manual target acquisition and auto-tracking. Once a target has been acquired, information relating to the target's proximity to own ship and its speed and bearing is maintained until the target is 'cancelled'.

Autotrack synthetics are not displayed on the 0.25NM and 0.125NM ranges

Information on one or more tracked targets can be displayed in a target box, see **Target Data** later in this chapter.

## Automatic Targeting and Radar Plotting Aid Radars

### Target Acquisition

Targets can be acquired manually by the operator or automatically using operator definable auto-acquisition zones. When a target enters an auto-acquisition zone, an alarm is raised and the target is automatically 'acquired'. Auto acquisition zones are available in all presentation and motion modes. Targets cannot be acquired within 0.25 nm of own ship.

### Target Tracking Limitations

- When the maximum number of targets are being tracked, the TRACKS FULL alarm is raised and another target cannot be acquired until one or more targets are cancelled or automatically dropped.
- If the radar is switched to standby, all targets will be cancelled automatically.
- Already acquired targets are dead reckoned (**DR**) when within 0.25 nm of own ship.

The integrity of tracking is a function of many variables which include clutter conditions, signal-to-noise ratio, sensor errors (log, compass, nav input etc), scanner speed, speed and manoeuvrability of the target and the number of targets being tracked. The design of the tracker minimises the effects of these errors but the operator must be aware that such errors will produce discrepancies in derived tracked target information such as true speed, course, bearing, CPA and TCPA.

The tracker can track targets with relative speeds of up to 150kts.

The possibility of target swap is minimised by the use of damped plot predictions in the tracker. The ARPA and ATA tracker employs advanced rain and sea clutter rejection techniques independent of the display settings. A fully established tracked target will not be affected by large levels of sea or rain clutter, however attempting to acquire a target at close range in severe clutter conditions, may

cause the occasional appearance of the lost target symbol and its associated alarm.

When changing from one speed mode to another, and particularly between a water speed and a ground speed mode, the vectors take some time to resetttle. Three minutes should be allowed to obtain full accuracy when switching between speed modes.

### **Compass Errors**

If targets are being tracked, a compass error will cause affected target data to change from green to red. The affected data being TBRG, CPA, TCPA, COG (or CSE), SOG (or STW), BCR and BCT. After 1 minute all targets will be cancelled; auto acquisition zones and the constant radius turn facility will be switched off and it will not be possible to use these facilities, or select a stabilised mode, until a valid compass heading is available. The system will reset to the H-Up presentation mode.

## Target Alarm Symbols

If an alarm is raised against a target currently in the video circle, a red alarm symbol is displayed. This symbol flashes until the alarm is acknowledged. The alarm symbol then remains displayed as long as the alarm condition exists.

Even if the target is not currently displayed in the video circle, an alarm will still be raised. An unacknowledged alarm always has a higher priority than an acknowledged alarm. The following alarm symbols, listed in order of priority, are used.

- ◇ If the radar hasn't been able to obtain successfully the position of a target, which is being used as an echo reference, during the last three radar scans, a LOST REF alarm is raised.
- ‡ If a target infringes the bow crossing limits, a BOW CROSS alarm is raised.
- △ If a target infringes the CPA and TCPA limits, a CPA/TCPA alarm is raised.
- ▽ When a target enters an auto-acquisition zone, an AZ ENTRY alarm is raised.
- ◇ If the radar hasn't been able to obtain successfully a target's position during the last six radar scans, a LOST TARGET alarm is raised.

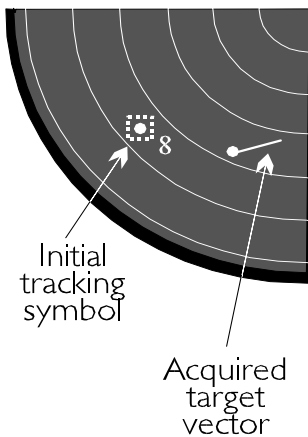
## Manual Acquisition of Targets

Manual acquisition is only available on range scales of 0.5 nm and above. When a target is acquired it is automatically assigned an identification number. Target numbering always starts at 1 and goes up to a maximum of 60. A target is assigned the next number in the sequence. Up to 60 targets can be acquired manually. Gaps which occur due to targets being cancelled or dropped, are not filled until the maximum number has been reached.

### Acquiring a Target

1. Position the cursor over the target in the video circle.
2. Left click to acquire the target.

An initial tracking symbol is displayed centred on the target's estimated position. After 16 good plots, this initial tracking symbol is replaced by the target vector indicating the acquired target's speed and direction – see Vector Mode in Chapter 5.



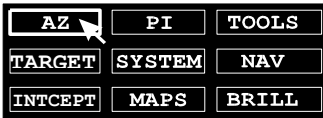
*Note - When using the enhance facility, position the cursor over the nearest anti-clockwise edge of the target video to acquire the target.*

### Cancelling Target Acquisition

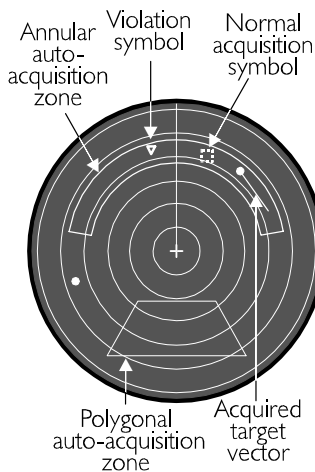
1. Position the cursor over an acquired target in the video circle.
2. Right click to cancel the target acquisition.  
The target vector and associated target information are removed from the targets.

### Auto-Acquisition Zones

An **AZ** soft key is used to select and define the zones.



Two annular and two polygonal acquisition zones are available, they are displayed relative to own ship's head. Auto-acquisition zones can only be displayed on range scales from 0.75 nm to 96 nm (annular zones), or from 0.5 nm to 96 nm (polygonal zones).

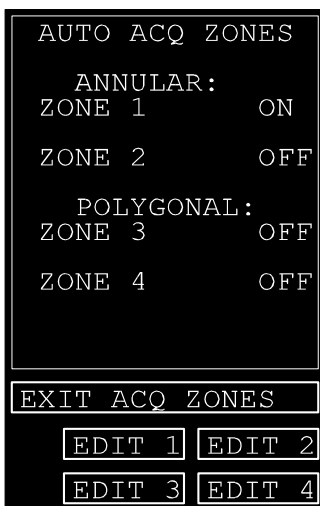


When a target enters an auto-acquisition zone, an **AZ ENTRY** alarm is raised and the auto-acquisition zone violation symbol is displayed. This flashes until the alarm is acknowledged, when the violation symbol is replaced by the normal acquisition symbol for a target. After 16 good plots, the normal acquisition symbol is replaced by the target vector indicating the acquired target's speed and direction – see Vector Mode in Chapter 5.

When a target is acquired it is automatically assigned an identification number. Target numbering always starts at 1 and goes up to 60. A target is assigned the next unused number.

### Accessing the Auto-acquisition Zones Menu

1. Position the screen cursor over the **AZ** soft key.
2. Left click to reveal the **AUTO ACQ ZONES** menu shown on the left.



A left click on the **EXIT ACQ ZONES** soft key will close the **AUTO ACQ ZONES** menu.

### Turning Acquisition Zones On/Off

**Note** – Acquisition zones retain their definitions when turned off.

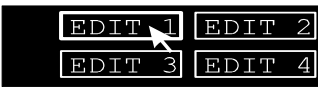
1. Position the screen cursor over a ZONE line in the menu.
2. Left click to toggle the selected zone ON and OFF.

**Note** – If an attempt is made to switch on a zone on which exceeds systems capacity, the following prompt will be displayed.

Not enough room - Switch off other zones

### Defining an Acquisition Zone

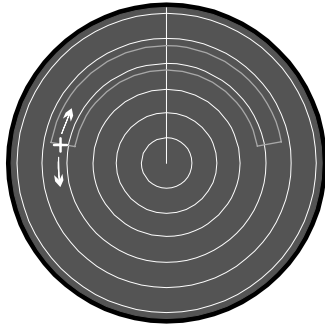
**Note** – An acquisition zone is not active while it is being defined.



1. Position the cursor over an EDIT soft key.
2. Left click to select edit mode for the associated zones. All other zones will temporarily be displayed at their last settings for reference purposes (provided the range in use is suitable), but will not detect any infringements unless they are currently ON. The selected zone is displayed in a different colour and the associated ZONE ON/OFF line in the menu shows EDIT.
3. For zones 1 and 2, edit the zones as described in **Annular Zone Editing**. For zones 3 and 4, edit the zone as described in **Polygonal Zones Editing**.
4. When creating a new zone (ie without dragging) it will automatically store the new zone and switch it ON.
5. If editing an existing Annular Zone, select either the EDIT soft key for that ZONE or the EXIT ACQ ZONES soft key to store the new zone and switch it on.



## Annular Zone Editing



### Changing the Start/Stop Bearing

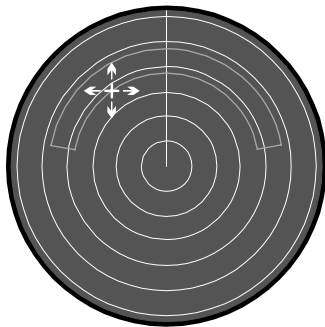
1. Position the cursor over the start or stop bearing as required.

**Note** – *If the zone is a complete annulus, the start/stop bearing line will be displayed as an aid to editing.*

2. Press and hold down the left key.
3. Drag the start or stop bearing to its new position.

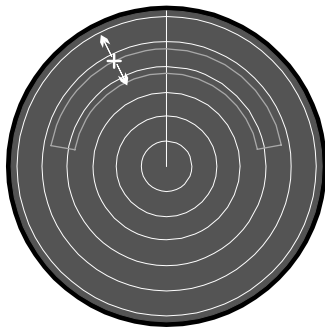
**Note** – *If the zone is a complete annulus, dragging the bearing line alters the start bearing.*

4. Release the key.



### Changing the Range of a Zone

1. Place the cursor over the inner arc of the annulus.
2. Press and hold down the left key.
3. Drag the entire zone to its new position.
4. Release the key.



### Altering the Depth of the Zone

**Note** – *This is only applicable to auto-acquisition zones, which can be adjusted from 0.4nm to 2nm*

1. Place the cursor over the outer arc of the annulus.
2. Press and hold down the left key.
3. Drag the outer arc to its new position.
4. Release the key.

### Creating a New Zone

1. Place the cursor, away from the original zone, at the required start bearing and range.
2. Left click to define the initial range and bearing.
3. Left click again to define the end bearing and depth for the acquisition zone.

### Notes

*Left clicking twice on the same point will define a complete annulus. The minimum width of a zone is 6° and the maximum is 354°, or 360°. Attempting to define a zone of more than 354° will result in a full 360° zone.*

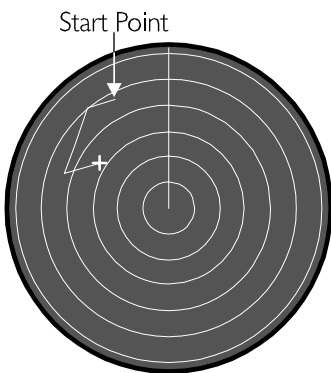
## Polygonal Zone Editing

The following procedure only applies to polygonal auto-acquisition zones. Each time a zone is selected for editing it must be created from scratch and the existing zone definition will be overwritten.

**Important Note** – Any part of a polygonal zone area within 1 nm of own ship will not detect new targets.

### Defining a Zone

1. Left click at the required position to define the start point.
2. Left click again to define the next point. A mauve line will appear joining this point to the previous point.
3. Continue defining points by left clicking. A right click will delete the last line drawn.
4. Complete the polygon either by left clicking again on the start point, or by defining ten points (when it will be closed automatically). The zone will be switched-on automatically on completion.



### Editing Warning Points

The self explanatory warning prompts listed below are associated with Polygonal Zone editing.

Angle too small (if <math>15^\circ</math>)

This side cannot cross another side

Zone too large

Point is too far away

Side too short

### Target Data

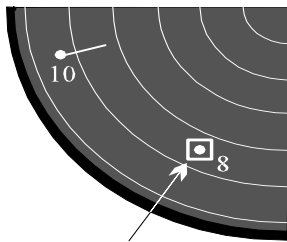
The target tote defaults to showing data for a single target.

### Acquired Target Data

The following data is shown.

|        |          |
|--------|----------|
| TARGET | nn/name  |
| RANGE  | nn.n NM  |
| T BRG  | nnn.n °  |
| CPA    | nn.n NM  |
| TCPA   | nn.n MIN |
| CSE    | nnn.n °  |
| STW    | nn.n KT  |
| BCR    | nn.n NM  |
| BCT    | nn MIN   |

|         |   |
|---------|---|
| TARGET  | Target identification number/name.                                      |
| RANGE   | Range of target from own ship.  |
| T BRG   | Bearing of target from own ship.  |
| CPA     | Closest point of approach to own ship.                                  |
| TCPA    | Time to closest point of approach.                                      |
| CSE/COG | Target's Course through the water (CSE) or course Over the Ground (COG) |
| STW/SOG | Target's Speed Through the Water (STW) or Speed Over the Ground (SOG).  |
| BCR     | Bow crossing range.   |
| BCT     | Bow crossing time.  |



Selected Target is shown with a box around it

The target, for which data is shown, is selected by left clicking on that target in the video circle. The selected target is identified in the video circle by a small solid square symbol centred on the plot origin.

Note that the Range and Bearing of a target is the Range and Bearing from the Turning Unit (Radar Head). All target calculations are made with respect to the Radar Head. Any suspect data (ie due to a sensor error) will be displayed in red.

### Closest Approach and Bow Crossing Limits

The CPA/TCPA and BCR/BCT limits can be viewed and changed as follows.

#### To View the Limits

1. Position the screen cursor over the appropriate line in the target box (CPA, TCPA, BCR or BCT).
2. Press and hold down the left key.  
The entered limit for the selected parameter is displayed in yellow for as long as the key is kept pressed.
3. Release the key.

#### To Change the Limits

A right click on the CPA, TCPA, BCR or BCT lines will reveal a drop down numeric keypad from which the required limit can be entered, see chapter 15.

Alternatively, the limits can be changed via the LIMITS & SETTINGS option of the TARGET menu, see chapter 8.

#### Changing the Data Shown in the Target Box

1. Right click on the top line in the target box to reveal the drop down menu shown on the left. The current selection is highlighted.
2. Position the cursor over the required option in the menu.
3. Left click to select.

A left click on the top line of the target box will toggle between the single target display and the last multi target display that was selected, CPA is the default at start up.

```
TARGET nn/name
RANGE nn.n NM
T BRG nnn.n
CPA nn.n NM
TCPA nn.n MIN
CSE nnn.n
STW nn.n KT
BCR nn.n NM
BCT nn MIN
```

```
SINGLE TARGET
MULTI TARGET BY CPA
MULTI TARGET BY RANGE
MULTI TARGET (USER)
```

### Multiple Target Displays

For each target in a multi-target tote, its ID number, TCPA and CPA are shown. Also its ID number is shown against the target in the video circle together with a tote target symbol. A left click on any of the targets in the list will switch to the single target display for that target.

| TARGET (CPA) |      |      |
|--------------|------|------|
| ID           | TCPA | CPA  |
|              | MINS | NM   |
| 02           | 4.7  | 3.6  |
| 01           | 3.2  | 4.8  |
| 03           | 5.7  | 7.2  |
| --           | --.- | --.- |
| --           | --.- | --.- |
| --           | --.- | --.- |

### Viewing Multiple Targets in Order of CPA

On selection of the MULTI TARGET BY CPA display option, up to 6 targets are listed in order of their CPA (lowest CPA at the top of the list) as shown in the example on the left. Targets with negative TCPA's will not be shown in the list.

| TARGET (RANGE) |      |      |
|----------------|------|------|
| ID             | TCPA | CPA  |
|                | MINS | NM   |
| 01             | -3.2 | 4.8  |
| 02             | 4.7  | 3.6  |
| 03             | 5.7  | 7.2  |
| --             | --.- | --.- |
| --             | --.- | --.- |
| --             | --.- | --.- |

### Viewing Multiple Targets in Order of Range

On selection of the MULTI TARGET BY RANGE display option, up to 6 targets are listed in order of their range from own ship (closest range at the top of the list) as shown in the example on the left.

| TARGET (USER) |      |      |
|---------------|------|------|
| ID            | TCPA | CPA  |
|               | MINS | NM   |
| 03            | 5.7  | 7.2  |
| 01            | -3.2 | 4.8  |
| --            | --.- | --.- |
| --            | --.- | --.- |
| --            | --.- | --.- |
| --            | --.- | --.- |

### Viewing up to 6 User Selected Targets

On selection of the MULTI TARGET (USER) display option, up to 6 user selected targets are listed as shown in the example on the left. To include a target in the list, left click on an acquired target in the video circle. To remove a target from the list, right click on that target in the **list**.

Intentionally Blank