

...a significant advance in marine safety!

ECHOMAX

Active-X-Band

Radar Target Enhancer

OPERATION MANUAL



**Manufactured by
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Active-X-Band

Radar Target Enhancer

GENERAL INTRODUCTION

The Echomax Active-X Radar Target Enhancer (RTE) is designed to respond to interrogating X band radar (9.30 – 9.5GHz) by receiving a transmitted pulse and amplifying the pulse and re-transmitting the pulse back to the radar at the same frequency with minimum delay, thereby improving the radar detection range and visibility of small targets. It will not enhance significantly vessels with large radar cross section. Low power consumption is an important feature of the design as the RTE may well be used where the power source is a solar panel or wind generator with battery back up. The RTE will give an immediate response the moment it is switched on.

The RTE is primarily intended for small vessels with no radar fitted and typically should enhance the RCS (radar cross section) of vessels up to 25M in length. For small craft /rigid inflatables improvements will start to be seen at around 1-2 miles extending to 8-10 miles or more depending on prevailing conditions.

The performance of the RTE will vary according to a number of factors e.g. range, RTE and radar height above sea level (due to the curvature of the earth), radar power and condition. Poor weather, sea state and precipitation will greatly reduce the response e.g. moderate precipitation can attenuate a return signal by 70%. Over a distance of 10nm a 10M² target will return just 0.001M². Please refer to www.echomax.co.uk section Echomax in action - radar reflectors explained, where attenuation is dealt with more fully.

Owners of the Echomax Active-X may take comfort that the very high RCS response from the unit affords them the best possible chance that the RTE response will show up consistently as a larger target by an interrogating radar making it easier to identify as a larger target and not mistaken for clutter, helping to improve both your safety and navigation.

IMPORTANT

The fitting of the Echomax Active-X to your vessel does not exclude you from exercising common prudence and safe navigational judgement for your vessel and crews safety under the International Regulations for the Prevention of Collisions at Sea and to keep a proper look out at all times and take what ever action is required to avoid a collision.

LICENSING

OFCOM- has requested that you ask them for a Letter of Variation to include the Echomax Active-X RTE on your VHF radio licence.

ECHOMAX ACTIVE-X COMPONENTS, CONSTRUCTION, USE AND INSTALLATION

If you feel that there is the slightest doubt in your mind that you are not able to safely install the unit yourself you are advised to seek the services of a competent person or company to install the RTE.

COMPONENTS

Echomax Active-X mast head radome fitted with 24 meters of 2 core cable
Control box
User manual

RADOME FITTING

Mast head radome is made from UV resistant Polypropylene and contains the receiver, transmit antenna and PCB. The antenna has provisions in the base for a 1 inch -14 female thread mast fitting or deck mount bracket for cabin roof or A frame. Plastic mounts should not be used.

To ensure a permanent fixing 'LOCTITE' or PTFE or plumbers tape should be wrapped around the male thread and the RTE must be a screwed down tightly. Care must be taken to ensure that as the RTE is tightened on the base the cable is not twisted but allowed to turn freely.

For mast fitting the radome must be fitted in a vertical position as high as possible and have a clear 360 degree azimuth. It should be fitted at least 6 inches/150mm from the mast on the offset bracket. It should not be fitted on a back stay or where its vision is obscured or is close to any metal object otherwise performance could be significantly impaired.

The radome unit must never be painted as this will seriously impair performance.

The radome must not be fitted in or close to the vessels Radar transmitting beam width of 23 degrees as this may seriously damage the PCB. Whilst the RTE has built in protection to safeguard against such damage a 30 minute plus sustained interrogation by a >15M 25KW radar may damage the PCB.

The RTE should be fitted below or preferably above the radar.

The unit is supplied with 24M of cable and it is preferable that this is not joined as any such join may lead to water penetration. Whilst a through deck plug may be used a through deck gland is preferable. However a good and permanent joint will not affect the performance. It is possible to shorten or extend the cable by a further 25 meters without affecting the performance. If extension is required a cable rated at 3A at 300V must be used. Allow a short length of cable looped under the radome so that any water drips from this and that strain is never applied to the cable gland.

CONTROL BOX facilities and fitting

The control box must be fitted internally as it is not waterproof and can be fitted in the navigation area or within sight of the helm if this is possible. The control box can also be flush mounted and can be wired from the base or back as required. Ensure that there are no electrical wires or other items behind the prescribed location area. Check for free access for both mounting and wire.

Control box operation

The control box features a triple alarm facility as standard, namely visual green LED light flashes when painted by radar, switchable integral buzzer will sound when painted by radar when mobilized. There are provisions for an 8 Amp external alarm for deck mounted light or horn for single handed sailor or night watchman. The 8A supply is more than sufficient for this purpose but if more power is required an optional relay must be used to avoid damage to the control box. A fused or circuit breaker ships electric supply of no more than 3-5A should be used and ideally not a direct supply from the ships batteries. The control box has an externally replaceable 0.5A fuse averting the need to remove the control box from its mounting.

The unit requires a 12v DC supply and is surge and cross polarity protected. Should the vessel have a 24V supply then either a dropper must be used or a dedicated 12V supply via a 3 amp fuse box from a 12V battery as stated above. If a long cable run is required then larger cables must be used to ensure that there is no power loss. The DC supply can either be negative grounded or have both positive and negative supply 'floating' above the vessel's ground.

The red switch turns the power on causing the red LED to light. When painted by a single radar the green LED will give one short flash every 2.4 seconds. If multiple flashes occur within 2.4 seconds this indicates multiple radar signals. It is not possible to establish an accurate number of painting radar at any one time as multiple radar may be painting in sync or high speed radar will repeat every 1.5 seconds. The green switch will turn the integral buzzer on or off as required. The control box has provision for seven wires, one block of two for the extension alarm and one of five for the RTE and the power supply and upon selecting the desired position, may be wired from either the rear or from underneath.

The diagram below shows the correct wiring installation

GENERAL OPERATION OF ECHOMAX ACTIVE-X RTE

Operation of the RTE is easy and straight forward and user friendly. Once the red power switch is turned on the unit is in the quiescent mode and will consume up to 15mA. When interrogated by a radar the green LED light will flash every 2.4 seconds. If the flash lengthens then this indicates that more than one radar is painting the antenna. If painted by a high speed radar which rotates every 1.5 seconds then the LED light will flash correspondingly quicker. If the flashing sequence quickens is not possible to tell the number of radar in the area as some may be painting in sync.

Turning on the green switch will mobilize the internal buzzer, which is set to actuate for approximately half a second at a time, once the antenna has been painted and buzzer sounds it is considered that once alerted you would wish to turn the buzzer off and watch for the vessel concerned.

The control box also has facilities for an external 8A volt free connection to the vessels own horn, deck light or deck alarm. This facility may be very useful for the single handed sailor or night watchman. Wiring instructions are shown above

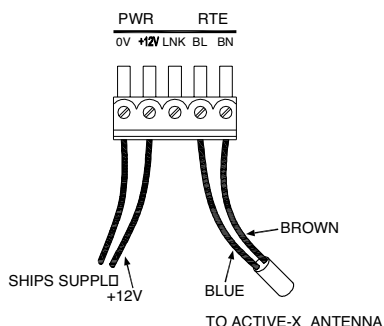
Whilst the control box is cross polarity protected care should be exercised when the unit is being installed. Should the fuse be damaged then this is located at the base of the control box and can be replaced with the control box in situ.

The unit is fitted with a 0.5A Quickblow 20mm fuse.

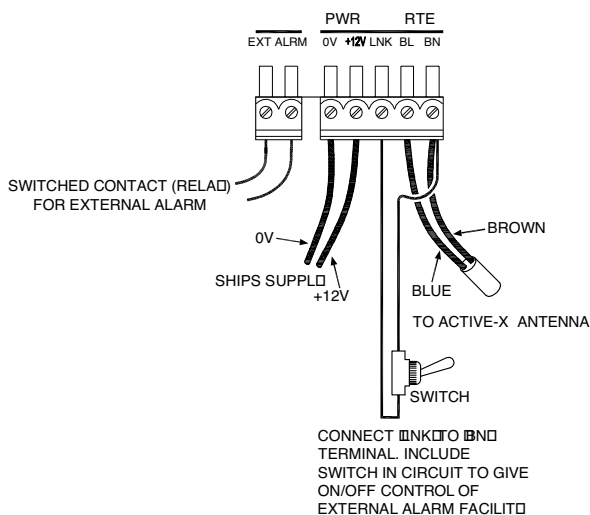


RTE CONNECTIONS

BASIC OPERATION - NO EXTERNAL ALARM



OPERATION - WITH EXTERNAL ALARM



PERFORMANCE CHECK

When your RTE is installed you will wish to check with other vessels that you are being seen on their radar screen. No improvement can be expected at close range as the RCS of your vessel may exceed the RCS of the RTE. The trial is best carried out at 0.5 miles as the target can be easily identified. The range should then be increased at intervals of 0.5 nm and the RTE switched on and off noting the change in response.

As the range increases the bare target, with the RTE off will not be seen and it is suggested that whilst moving the RTE is left on so that the test target can be seen at all times. This is especially important in busy waters to avoid confusion with other vessels.

If the target is lost experience has shown that it can be acquired by turning the RTE on and off and watching the display for change in target response.

In normal weather and sea conditions, with RTE and interrogating radar mounted at four meters above sea level you would expect your RTE returns to appear on the radar screen as shown below. If the mounting heights vary so will the response due to curvature of the earth. These figures are for guidance only and should not be relied upon.

2KW radar up to 4 nm :

5KW radar up to 10 nm :

10- 25KW radar up to 15-20 nm



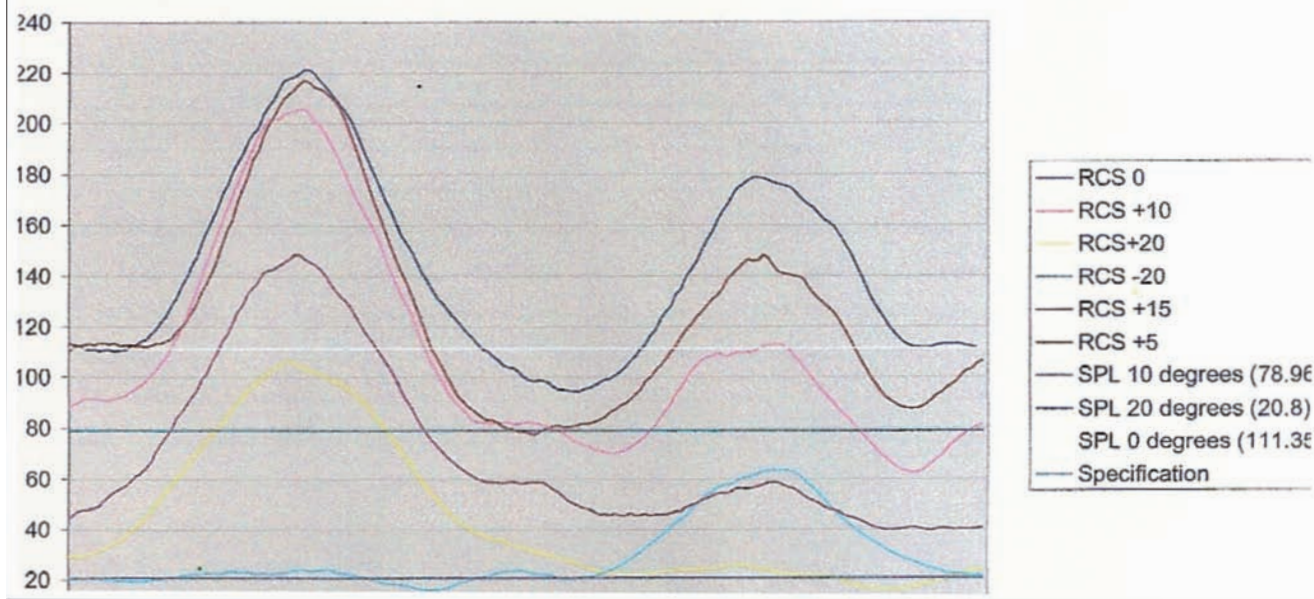
FAULT FINDING CHART

No Red LED light when red switch is turned on	Check fuse or circuit breaker Check polarity of wiring Check power supply at control box Damaged cable or wrong connection
Unit switched on and continuous green LED light shows, in harbour or when saturating RTE	Local radar on, or radar operating moored nearby(<15M) Moored close to large metal object Being activated by ships own radar Relocate to more suitable position
Unit on and buzzer on and unit fails to operate when it clearly is interrogated	Check all above faults. Is RTE in shadow of interrogating radar as it will not operate if masked
Buzzer switched on but does not sound when painted by radar	Buzzer faulty – return control box to Echomax for inspection

TECHNICAL SPECIFICATION

Operating frequency	X band (9.30-9.5GHz)
Position Accuracy	Within 1 meter
Dimensions and Weight of radome ex cable	L 478mm W 40.5mm wt 327 grms
Cable	24M 2 core 0.5mm ² wt 969grms
Base Mounting	1 inch – 14 NF female thread
Dimensions of control box	W 92mm H 51mm D 38mm
Externally accessible fuse	0.5A
Power supply	12V DC – 30% - 10% voltage surge and cross polarity protected
Stand by current consumption in quiescent state	< 15mA
	5 interrogating radar 23mA (typically)
	10 interrogating radar 32mA (typically)
	1W (typically)
EIRP	Stated Performance Level (SPL)
Radar Cross Section Response	zero degrees 111.36M ²
QinetiQ – Funtington 13th March 09	+/- 10 degrees of heel 78.96M ²
	+/- 20 degrees of heel 20.80M ²
Compass safe distance	1 metre

Test 8-13



GUARANTEE

The Echomax Active-X band RTE is guaranteed for 12 months from the date of purchase and provides for the complete replacement at our discretion of the complete unit or any of the components providing failure is attributed to component failure or defect which is not attributed to accidents, misuse, fair wear or tear or neglect.

The guarantee is invalidated by any attempt whatsoever to open up or interfere in any way with the unit. It is the users responsibility to return the unit at his expense to us to inspect and report on the reason for failure. No exchange unit will be given until a full inspection and report is issued.

This guarantee does not affect your statutory consumer rights or those governed by English Law.

For comparison with competing products see www.echomax.co.uk.

Declaration of Conformity

(As required by Article 6.3 of Directive 1999/5/EC-RTTE Directive)

Declares under his sole responsibility that the active radar target enhancer manufactured by;

AQUAMATE PRODUCTS LTD. t/a ECHOMAX
PO Box 6032
Dunmow
Essex CM6 3AS U.K
Telephone + 00 44 (0) 1371 830216 fax 831733

Email: echomaxsales@aol.com

Intended for Worldwide use as an X Band active radar target enhancer aboard non SOLAS vessels and identified by the type number Active-X to which this declaration refers has been tested to the essential radio, EMC & safety test suites required by the notified body and is in conformity with the standards

EN60945: 2002 (Clauses 9, 10 & 12)
And complies with the essential requirements of Directive 1999/5/EC

Conformity procedure under Annex IV of 1999/5/EC (Technical Construction File) has been undertaken by QinetiQ (0191) of Cody Technology Park Ively Road, Farnborough GU14 0LX UK

The Technical Construction File is held by:-
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Signed

John H. Simpson
Managing Director

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