

**SHINE MICRO
TESTING THE FOUR
LEADING AIS
ANTENNAS ON THE
MARKET**

Shine Micro testing the four leading AIS antennas on the market

Shine Micro's judgement: AC Marine antennas are best in test

In a test conducted by Shine Micro, AC Marine antennas are ranked as the best within the field of AIS Antennas. The two AC Marine antennas were compared to antennas from Morad and Digital Antenna, which they were able to beat in terms of performance, ease of installation as well as overall quality.

The gentle art of choosing the right antenna

If you have an interest in the headlines above, you are most likely one of the many people who has just purchased an AIS transceiver or receiver and now trying to figure out which antenna to use.

We have good news for you; this report will provide you with a thorough introduction to four of the leading antennas on the market. As you might know, a radio is only as good as the antenna it is connected to.

Therefore we have decided to compare a few high end consumer AIS antennas in order for us to conclude which ones will give the most favorable results when coupled with one of our AIS products.

Criteria

We have found 4 criteria that we experience are being commonly cared about amongst the masses of boaters we deal with. These four criteria are listed below and will be covered later in this article:

- 1. Performance**
- 2. Cost**
- 3. Ease of installation**
- 4. Overall Quality**

In order for us to compare performance, we used the RSSI (Received Signal Strength Indication) for the local AIS traffic and the on channel noise floor as the basis of making our measurements.

We did not get into measuring transmitted power performance since this is a much more difficult aspect to measure accurately.

However, it generally applies that if an antenna exhibits good receiving performance, then the transmitting performance will most likely be good as well. Since we had neither the resources nor the time to run a test for transmitted performance, the scope of this review will be based on the overall quality of received AIS antennas.

The antennas selected for this comparison includes the AC Marine CX3 5/8AIS, AC Marine Cx4AIS, Digital Antenna 578-SW and Morad VHF 159 HD-AIS. All of the antennas are similar since they are all omni-directional antennas with vertical elements specifically tuned for AIS and intended to be mounted on top of a mast.

The setup of the test

In order to minimize variables, we chose to mount each antenna on top of an identical 20 foot tower approximately 20ft above sea level which gave a total elevation of 40ft above sea level. All four antennas were connected through identical 100ft LMR400 cables to a single Shine Micro SM1680 “Octopus” receiver. This receiver contains four individual pairs of AIS receivers. Each pair monitors AIS channels 1 & 2 (161.975 MHz and 162.025 MHz) continuously with independent data output for each receiver/antenna. Due to the risk of the antennas interfering with each other, the antennas were spread out in different locations. In order to log measurements in all four locations and account for the differences in each location, the antennas were rotated among the four different tower positions.



The tests were conducted over a period of four days using a one hour snap shot from 1-2pm from each day. Due to the purpose of this experiment, only packets received by all four antennas were compared, meaning that a packet was not used unless it was received by all of the four antennas. In this way we can accurately compare the four separate signal strength measurements for one specific packet and determine which antenna and location that yielded the strongest signal.

The course of the one hour sample each day showed that all four antennas anywhere between 2000 and 4200 packets, giving us a large number of samples to analyze in order to rule out any anomalies.

The comparison

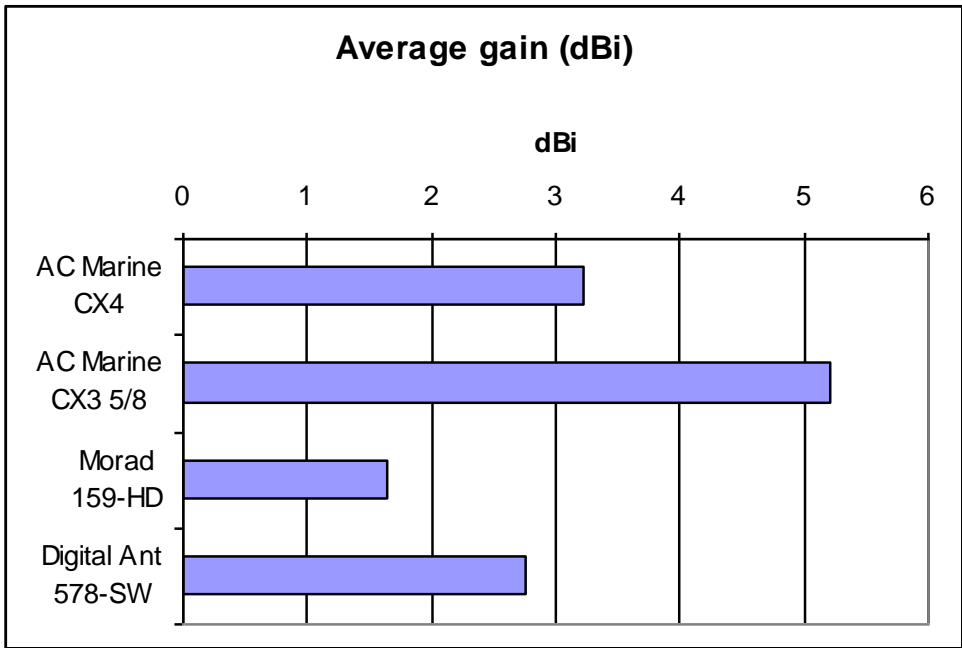
1. PERFORMANCE

	Normalized Average Deviation in Signal Strength			
Day	AC Marine CX4AIS	AC Marine CX3 5/8AIS	Morad HD159-AIS	Digital Ant 578-SW
1 (January 25,2013)	3.42	1.53	1.65*	5
2 (January 28, 2013)	-6.31	2.06	1.65*	3.72
3 (January 29, 2013)	5.39	2.8	1.65*	-5.62
4 (January 30, 2013)	10.38	14.45	1.65*	7.9
Average:	3.22	5.21	1.65*	2.75
Performance Ranking	2 nd Place	1 st Place	4 th Place (Baseline)	3 rd Place
* Isotropic value assigned for baseline comparison				

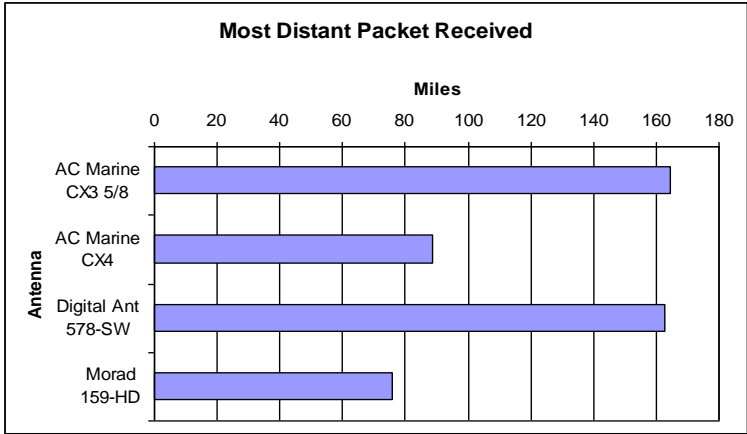
The values in the table above represent gain in dBi. Since this test is only a comparison test and therefore does not deal with absolute values, we chose one antenna (the Morad) as the baseline to which the other antennas were compared.

The delay between day 1 and 2 is because of the weekend where we chose to make no measurements in order to ensure that less or different AIS traffic during the weekend would not affect the accuracy of the measurements.

Below you will find a chart showing the averages from the data above. An arbitrary value of 1.65 was used for the Morad antenna as the value for isotropic. For those of you readers who do not know what isotropic is, we can tell you, that it refers to an antenna that has the same value when measured in different directions, also known as a point source with a spherical gain pattern.

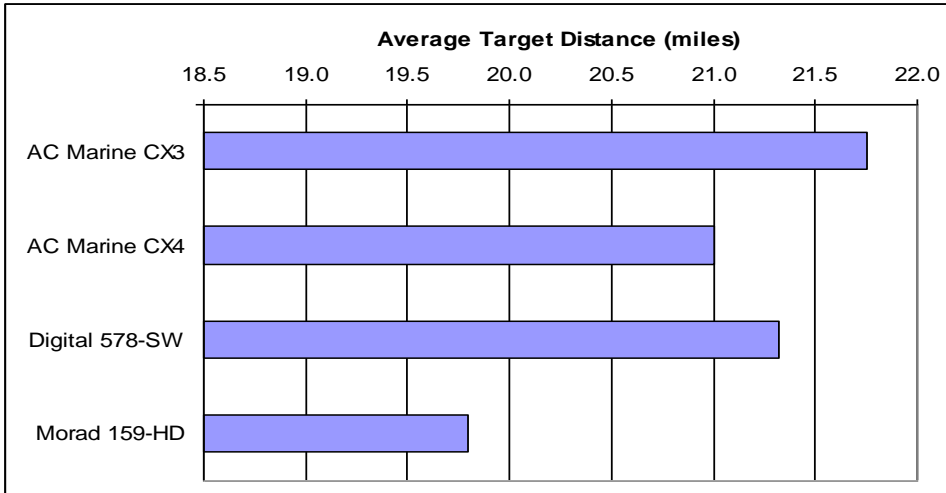


The following chart and table show the most distant received packet for each of the four antennas. Note that the generally accepted range for AIS transmissions on 20-25 miles can be extended considerably when using the best antennas and receiving equipment.

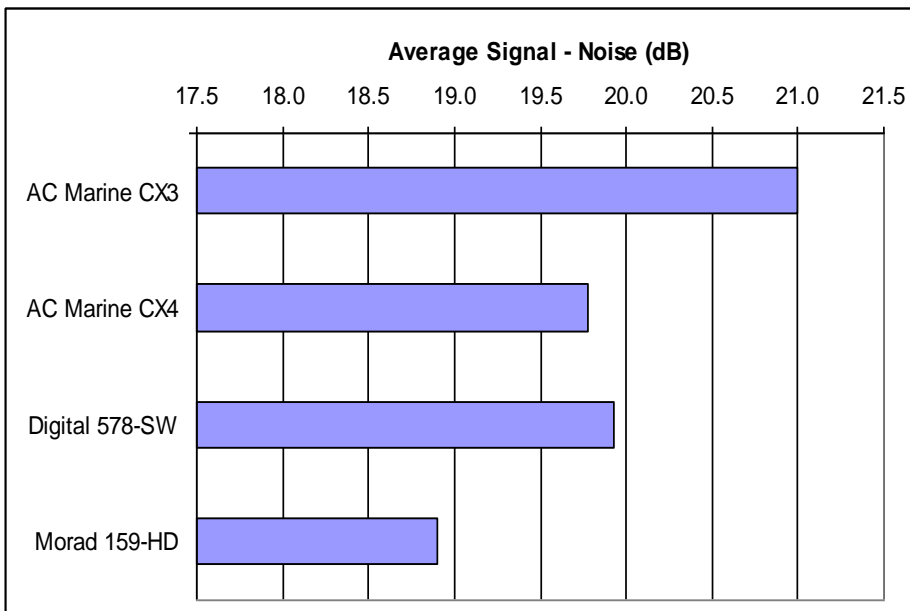


Antenna	Most Distant Received Packet (mi.)
AC Marine CX3 5/8AIS	164.7
AC Marine CX4AIS	88.6
Digital Antenna 578-SW	162.9
Morad HD159 AIS	75.9

The chart below showing the Average Target Distance compares the average distances between the antenna location and the targets received by it. The values are dependent on the receiver location, the proximity of the major portion of AIS targets, and local terrain. The differences between the values here tell the story rather than the absolute values.



The chart below showing the Average Signal – Noise compares the average strengths of signals received by the various antennas. The values represent the difference between signal level and the noise floor. Again, it is the values here telling the story rather than the absolute values.



The data shown in this article is just a summary of the large amount of the data collected. Please contact info@shinemic.com if you are interested in learning more about the data analysis.

2. COST

While some people may not care about prices, it is our experience that the majority of the boaters we encounter consider cost a driving force behind every purchase. Therefore we decided that the cost of the antennas should also be included as a criterion in this test. In the table below you can see the prices on the four different antennas.

MSRP (USD)	Manufacturer	Model	Available at Shine Micro
\$158.00	Morad	HD159 AIS	Yes
\$194.88	Digital Antenna	578-SW	No
\$183.00	AC Marine	CX4AIS	Yes
\$318.00	AC Marine	CX3 5/8AIS	Yes

3. EASE OF INSTALLATION

Ease of installation ranking summary: 1=the best, 4= the worst

1st AC Marine CX4 AIS

2nd AC Marine CX3 5/8AIS

3rd Morad HD159 AIS

4th Digital Antenna 578-SW

When it comes to the installing of the antennas, we had the best experience with the AC Marine antennas. One of the primary reasons for this is that these have the ability to accept both 1"-14 bases as well as more robust 1.25"-11 bases. Unfortunately, this was not the case with either the Morad or the Digital Antennas. Therefore we gave the AC Marine CX4AIS a 1st place since it was the quickest and easiest one to install, utilizing the N270F mounting adapter supplied by AC Marine as well.

We ranked the AC Marine CX3 5/8AIS a close number two using the N275f mounting hardware. We found that this antenna was slightly more challenging to install at the top of a mast due to its larger size.

We ranked the Morad HD159 AIS as the third best because even though it was relatively easy to install, it required a proprietary adapter to mount to a 1"-14 base which we found to be a disadvantage. However, if a M91 adapter is used then the HD159AIS can easily be installed on a standard 1"-14 antenna base while still allowing a UHF connector to pass through the side of the M91 adapter.

The Digital Antenna 578-SW receives a 4th place because while it uses a standard 1"-14 threaded base, it is our experience that unless you are able to run the cable out of the bottom of the base, you will either have to use a mini-UHF connector and min-UHF to UHF (PL259) adapter or solder/crimp on your own connector

after attaching the antenna to the chosen mounting hardware.

We consider adapters and non-standard connectors such as mini-UHF negative attributes which is why we have chosen to rank Morad as number four in this category.

4. OVERALL QUALITY

Quality comparison summary: 1 = the best, 3 = the worst

1st AC Marine CX4AIS (tied)

1st AC Marine CX3 5/8AIS (tied)

2nd Digital Antenna 578-SW

3rd Morad HD159 AIS

We believe that each of the four antennas is all products in a very high quality. However, we especially liked the quality and robustness of the included mounting hardware on the AC Marine antennas. Furthermore one of the stand out features of the AC Marine antennas is that they use the larger 1.25"-11 base thread that has become the new standard in Europe due to its increased strength over 1"-14 bases. The aluminum construction of the Morad antenna had a nice rugged feel and the quality of fiberglass and base hardware on the Digital and AC Marine antennas appeared to be top notch as well.

In this category we have ranked the two AC Marine antennas for a tied 1st and Digital Antenna as a close second. If Digital Antenna had the support for a 1.25"-11 threaded base, we would have tied them for a 1st as well. Unfortunately, Morad came in last because even though we initially liked the aluminum construction of the antenna, we have seen how the powder-coated aluminum in some environments, such as salty high humidity areas, has a tendency to corrode over time.

5. CONCLUSION (the lowest score = the best)

Category	AC Marine CX4AIS	AC Marine CX3 5/8	Morad HD159 AIS	Digital Antenna 578-SW
Performance	2	1	4	3
Cost	2	4	1	3
Ease of Install	1	2	3	4
Quality	1	1	3	2
Total (lowest = best)	6	8	11	12
Overall Ranking	1 st Place	2 nd Place	3 rd Place	4 th Place

Above you find our overall scoring and ranking of the four antennas in each category.

We would like to thank AC Marine, Digital Antenna and Morad for their support in running this experiment.

We are very excited to be able to offer high quality products from AC Marine and Morad at this time.

Please contact info@shinemicromicro.com if you are interested in obtaining more information about these products or more details about the experiment.