Operation Manual

PR-414 AM-SW-FM/DAB+ and TV Marine Antenna

National Stock Number (NSN): 5985-01-657-3426
CAGE CODE: 0GMC3
Part No: PR-414

CE RoHS

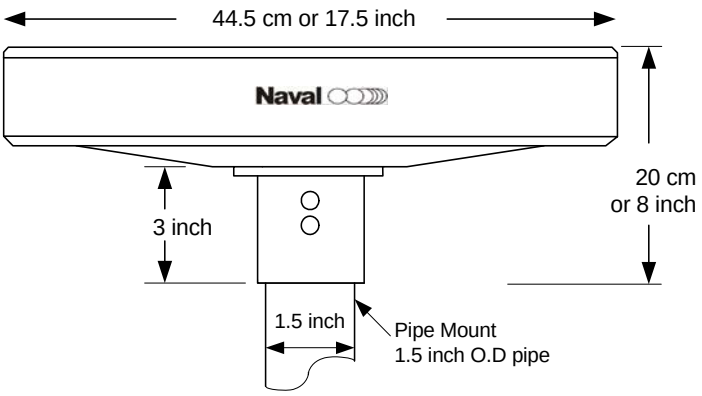
Printed in USA

Naval Electronics, Inc
7028 West Waters AVE, Suite#393, Tampa, FL 33634-2292, Ph: (813) 885-6091, Fax: (813) 885-3601
Email: sales@naval.com, Website: www.naval.com

PR-414 AM-SW-FM/DAB+ and TV Marine Antenna

The PR-414 is an omnidirectional, active, wideband terrestrial AM-SW-FM/DAB+ and TV receiving antenna (0.1MHz - 860 MHz) for marine use, specially designed for commercial craft equipped with one or two Radio and TV sets as on Coasters in limited international trade, Fishing Boats, Tugs, Pilot Service Craft and Rescue Cruisers, where extra performance in a robust package is appreciated.

PR-414 is a low profile product, based on 3 independent low noise amplifiers integrated directly to the omnidirectional multi-element antenna. The antenna's exterior is made of UV protected thick ABS plastic, which requires no maintenance. All interior parts are embedded in solid polyurethane foam for protection from heavy vibration, moisture and sub zero temperatures. Mounting hardware is made of Marine Grade Almag Aluminum alloy. The integral low noise 3 band 6 transistor amplifier increases the sensitivity of the system as well as compensating for cable losses in the antenna. Separating the amplifiers benefits intermod rejection and allows for more gain with less noise. The PR414 features high performance 5 GHz bipolar microwave transistors, which are protected against static charge.



Specifications: PR-414 Antenna

- Frequency range: 0.1-860 MHz
- Average AM HF SW gain: 0.1~26.5 MHz, 12-15 dB (Ka=0.12)
- Average Band 1/FM gain: 40~110 MHz, 25dB
- Average VHF/DAB+ gain: 170~240 MHz, 25dB
- Average UHF gain: 470~890 MHz, tilt 20-25 dB (amp)
- VHF Noise figure: 3.0 dB
- UHF Noise figure: 2.5 dB
- Max output level: 106 dBuV min (2 signals 60 dBIM)
- Third order intermod: >20 dB IP3
- Filters: Band pass 100 kHz-30 MHz., 40-110 MHz. 174-230 MHz.,470-860 MHz.
- Broadband rejection filter: 140-165 MHz.
- Polarization: horizontal
- Antenna pattern: omni-directional
- Supply voltage to antenna: 15VDC nominal
- Current consumption: approx, 120 mA (with LED) approx, 80-90 mA (w/o LED)
- Operating temperature: - 40 to +55 C.
- Radome material: UV protected ABS
- Flange material: Stainless Steel, Almag or Powder Coated Almag Marine Alloy Flange 3" high and mount on a 1.5" O.D. pipe
- Element material: copper foil
- Element type: Two looped dipoles with Z match pcb
- Antenna dimensions: 17.5 inch x 8 inch
- Shipping weight: 9-14 lbs (depend on cable lengths)
- Shipping container dim: 19 x 19 x 9 inches

The PR-414 utilizes a "dual broadband dipole element configuration" with each element covering a 360 degree view of the surroundings and a much improved omnidirectional antenna pattern when compared with other antennas.

The PR4-14 antenna is delivered with 4ft (around 1.2 meters) or 50ft (15.24 meters), or 80ft (24.38 meters) of 75 Ohm RG6U low loss coaxial cable and custom lengths can be arranged. The antenna includes a coax seal F connector splice kit. Our special taps and splitters are needed for AM and SW operation and reverse path is not available in this case.

PR-414 antenna dimension : 17.5 inches diameter and 2.5 inches thick,
Antenna Flange : 3 inches high and it mounts on a 1.5 inches od pipe.
PR-414 antenna RG6 cable lengths available in 4ft, 50ft or 80ft
Antenna easy to install, no additional parts and no adjustments

Installation Instructions for: TV Antenna System.

The antenna should be mounted as high as possible and placed away from funnels, radio antennas and radars to avoid reflections and interference. The best location is at the mast head free of obstructions in all directions. The antenna can be mounted on a 1.5in or 38 mm mast tube, deck mount flange or mast mounting bracket.

The coaxial cable downlead, should be well protected and secured to the mast. Unload the downlead cable by means of cable clamps and protect it from mechanical damage. Avoid outdoor cable splices. If a cable splice must be made, make it waterproof, by using Coax Seal which we have in stock. Avoid excessive bending of the coaxial cable.

The range of reception is determined mostly by the height of the Transmitting Station Antenna and the height of the TV Antenna on the vessel.

Power supply for PR-414 antenna

Option 1: PR-11, DC Power supply

PR-11 DC Power supply for either 12 or 24 VDC, with power switch. It covers the entire RF spectrum, from 0.1 MHz to 860 MHz. This power supply is RF passive, and has no extra amplification stages. It can be used for small vessels, where you only need to supply signal for up to **two** TVs or radios. If you need to supply signal to more than 2 TV or radio outlets, you should use an external amplifier, or you could purchase our PRA-422 instead (see PRA-422 below).

Option 2: PR-12BE, 110-220 VAC or 12-24 VDC Power supply

PR-12BE uses a small transformer that is very limited to the output current and can handle 1 antenna. It can be configured to use either 110v or 220v AC, shorting jumper selectable. It has a diode isolated 24v DC input terminal on the board. It has a 15v Voltage regulator to lower the input voltages from the transformer or the 24v DC input to the 15v to power the antenna. It covers the entire RF spectrum, from 0.1 MHz to 860 MHz. This power supply is RF passive, and has no extra amplification stages. It has a 20dB attenuator, to reduce stronger signals. It can be used for small vessels, where you only need to supply signal for up to **two** TVs or radios

Option 3: PR-20BE, 110-220 AC and 12-24 DC Power supply

PR-20BE, AC-DC Power Supply (110-220 VAC and 12-24 VDC) similar to PR-12BE, but can handle the higher current needs of our PR-422 antenna or PR-414 antenna. It can be configured to use either 110v or 220v AC, shorting jumper selectable. It has a diode isolated 24v DC input terminal on the board. It has a 15v Voltage regulator to lower the input voltages from the transformer or the 24v DC input to the 15v to power the antenna. It covers the entire RF spectrum, from 0.1 MHz to 860 MHz. This power supply is RF passive, and has no extra amplification stages. It has a 20dB attenuator, to reduce stronger signals. It can be used for small vessels, where you only need to supply signal for up to **two** TVs or radios.

If you need to supply signal to more than two TV or radio outlets, you should use an external amplifier, or you could purchase our PRA-422 instead (see PRA-422 below).

Option 4: PRA-422, AC 110-220 AC and 12-24 DC Power Supply and Line Amplifier

PRA-422, AC 110-220 AC and 12-24 DC Power Supply and Line Amplifier, has the same higher current transformer of the PR-20. It can be configured to use either 110v or 220v AC, shorting jumper selectable. It has a diode isolated 24v DC input terminal on the board. It has a 15v Voltage regulator to lower the input voltages from the transformer or the 24v DC input to the 15v to power the antenna. It has 2 separate amplifier paths, each with a 20dB attenuator, to reduce stronger signals. These amplifier stages can provide more signal for a larger vessel, up to 32 cabins. The AM and Shortwave Broadcast Band amplifier from 0.1 to 30 MHz, has 20dB of amplification. The TV and FM amplifier (40 MHz to 860 MHz) has 40dB of amplification, and can be also be adjusted by the attenuator.

Compare table on each power supply

Model	Support	Max Current	Frequency Range	Can Supply Number of Outlets
PR-11	DC only Power supply 12-24V DC	100mA	0.1 MHz to 860 MHz	1 to 2 TV or radio outlets (unless amplified)
PR-12BE	120-240 AC or 12-24V DC Power supply	100mA	0.1 MHz to 860 MHz	1 to 2 TV or radio outlets (unless amplified)
PR-20BE	120-240 AC or 12-24V DC Power supply	100-150mA	0.1 MHz to 860 MHz	1 to 2 TV or radio outlets (unless amplified)
PRA-422	120-240 AC or 12-24V DC Power supply with **Line Amplifier**	100-150mA	0.1 MHz to 860 MHz	1 to 32 TV or radio outlets (has amplifiers)

Remark: If you have any questions or special configuration need please contact us by
- Email: sales@naval.com or sales@naval.net
- Phone: +1-813-885-6091 (USA Eastern Standard Time (EST) (9AM - 2PM Monday - Friday))

Installation PR-414 antenna with PR-11 Power Supply

Fig. 1

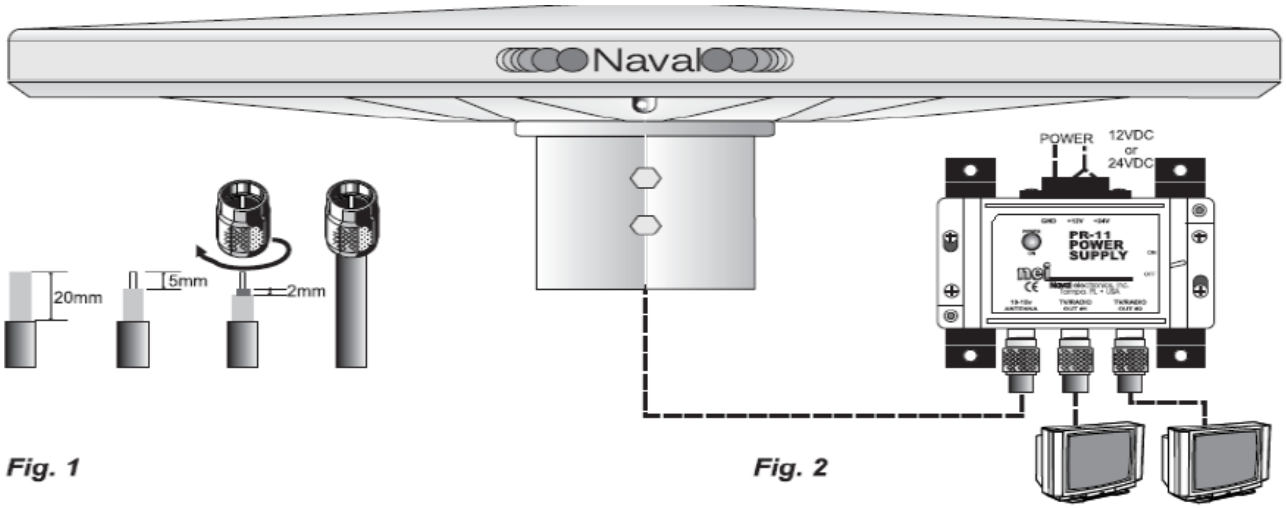


Fig. 2

A. Mount the power supply inside on the bulkhead by means of two screws.

Note: The PR-11 Power supply is not waterproof. Do not connect the supply voltage until the installation is completed.

B. Strip the downlead coaxial cable and twist on the F connector, **See fig. 1.** Make sure that no parts of the braid are short circuiting the inner conductor. Connect the cord to the terminal marked Antenna". **See fig. 2.** Strip the Radio/TV coaxial cable and twist on the F connector. Connect the cord to one of the terminals marked "TV/ Radio Output".

Note: To achieve optimum performance, it is essential that the total cable length (between antenna and Radio/TV set) is not longer than 15 m (45 ft). The coaxial cable must be a low loss 75 ohm type. Secure the coaxial cable by means of clamps and avoid excessive bends and sharp edges. Always terminate terminate any unused Radio/TV Ports with the supplied 75 Ohm terminators for optimum results.

C. Connect the supply voltage input to the terminals marked GND, 12 VDC or 24 VDC. The 12 V terminal accepts 12-15 VDC and the 24 V terminal 18-30 VDC. Install the fuse holder with a 150mA fuse on the positive side of the power cable.

Note: Inspect the completed installation. Check for proper supply voltage before applying power. Turn on the power switch which is located on the right side of the PR11 to activate the built in low noise amplifier inside of the antenna. The power LED should light on the PR-11.

D. Tune your Radio/TV set and check sound/picture quality.

Note: In some ports severe reflections from buildings, cranes, ships, etc; can cause ghosting due to multipath reception. In some areas, close to transmitters, overloading can occur to the built in amplifier and/or Radio/TV Sets. Under these circumstances do not interfere with the installation or the Radio/TV set.

Trouble Shooting

If the system is not working satisfactory, please check the following:

1. Proper supply voltage to power supply
2. Connections
3. Output voltage from power supply (should be 15 VDC)
4. PR-414 Antenna current (approx. 82-97 mA)
5. 150mA DC Fuse (size 20x5mm) for Power supply

Remark:

For other Power supply (PR-12BE, PR-20BE and PRA-422) installation guide please see details on https://www.naval.com/help/

Using Coax-Seal® to waterproof a coax cable splice

This is a new space age plastic material which will quickly and effectively seal all types of coax cable fittings. COAX-SEAL stays flexible for years thus insuring moisture proof connections, good SWR and long coax-cable life. Make sure fittings and coax cable are clean and dry before applying. Peel six inches of COAX-SEAL and wrap around by winding from coax cover toward fitting with one half overlap with each winding.

Shown below is a short pigtail of RG-59U coax cable terminated in a Snap and Seal "F" connector which is then joined to a female-female adapter or barrel connector. The antenna shown is an Active Marine TV Antenna as used by the US Navy.

The next few photos will show how this barrel connector is used in a splice and how it is waterproofed for marine use.

This shows the cable from the amplifier to the barrel connector.

The second cable with connector is attached to the barrel adapter and wrench torqued. The connector on the right has an O ring in it's mouth and it is sealed to the coax internally with silicone grease.

A small roll of Coax-Seal. It is a putty like material in tape form. The white waxed paper keeps it from sticking to itself.

Note that the first wrap comes back on itself exactly and the second turn starts the diagonal wrap. Wrap from the coax cover toward the fitting with one half overlap with each winding.

The last wrap again comes straight back over the previous wrap without a diagonal. The seal is slightly sticky and should be molded now by hand to remove any gaps and to ensure that all the wraps are blending together. At some point the wraps will almost fuse together and the material may have to be cut away from the cable.

A view of the connectors with the coax seal cut away from the connectors

FOOTNOTE: This product is normally produced as **RoHS** but can be modified with 60/40 Tin-Lead (SnPb) Solder to increase reliability under extreme shock, temperature (thermal fatigue), and vibration at sea. Lead content is then less than 10 grams of Lead (Pb) total. Specify with order and note that RoHS certification and sticker are omitted. The product has an expected life of 15+ years at sea through experience since initial production. The leaded PCB is easily removed and can be shipped to the manufacturer for proper disposal as needed at no charge, at end of life.