

TV/FM

....on the move

Antennas for Mobiles

When you are receiving from a fixed location, most of these problems of interference can be dealt with by installing **directional antennas**, which is in direct line-of-sight to the station you want to receive.

Directional yagi type antennas concentrate all the power in the direction of the station and discriminate between the direct and reflected signals. Not only are they useful for building installations, but also for boats moored in marinas or alongside jetties, and ships at dockside.

However, if you are on the move in a vehicle or boat, at a campsite in the bush or swinging on an anchor, you will soon get tired of rotating the TV set - or the antenna! And directional yagi antennas are usually built for land usage, not to survive the harsh marine environment. Good old 'rabbit ears' can be difficult enough to get in the right position when you are stationary.

Non-directional antennas have equal pickup in all directions, so, as the boat or vehicle changes heading, signals are not lost. Typically antennas of this type are horizontal rings or loops of about 70cm or 26 inches in diameter. They are at home at sea or out in the bush.

To receive well, the size of the loop needs to be large enough for the VHF frequencies.

Since non-directional antennas receive equally from all directions they cannot discriminate between direct and reflected signals. Where the direct signal is strong and the frequency is low (less multipath effects and reflections), this type of antenna works well.

However, in fixed locations such as marinas with their mass of masts and rigging, or when close to large buildings or surrounded by hills and cliffs, competing

These days space is always at a premium on boats. Often the temptation is to go for compact types which take up less space. However, if the antenna is smaller than the required size for frequency, you will lose in performance, especially on the lower band VHF channels.

Frequently when you are on the move you will find yourself in difficult enough receiving locations without having the added handicap of an antenna that is not up to scratch.

With **amplified non-directional antennas** the signal amplified before being fed by cable to the receiver. Power for the amplifier is usually fed via the same cable using a control unit at the receiver end to provide amplifier power and outlets for TV and FM receivers.

When the VHF and UHF arrays are of a closed loop design, like the Moonraker TV Dome Mk II, this helps to minimise reception of lower frequency (mainly HF) radio transmissions from other electrical and electronic sources.

Mobile antennas are usually subject to the effects of vibration, shock and corrosion. This can interfere with performance and over time cause damage, shortening the life of the unit. Protection needs to be provided for the elements by sealing them within a radome which is

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Anyone familiar with Murphy's Law as it relates to inanimate objects will know that the part dealing with reception of TV signals goes something like

"The picture will roll and distort at the moment of greatest interest".

This is particularly true of TV receivers installed in boats and on vehicles. And, although Murphy cannot be totally defeated on this, something can be done to minimise this effect so all is not

Moonraker
Australia



TV Dome

The picture revolution



In recent years there has been a tendency for stations to move from VHF to UHF and now from analogue to digital. These changes have a direct impact on the quality of the signal received at your TV or radio.

While these changes are advertised as beneficial, often, unless you are sitting close to the transmitter or translator, you may not notice any improvement at all – in fact many have experienced quite the reverse.

To get the best possible reception, your antenna needs to have the same polarisation as that of the transmitted signal. Most TV and FM stations transmit horizontally polarised signals, so the receiving antenna should also be horizontally polarised – but some do transmit vertically polarised signals.

The most significant factor that affects reception is **polarisation reversal** due to the nature of the terrain between you and the station. This occurs sometimes at VHF but consistently at UHF frequencies.

Receiving only part of the signal, the picture quality suffers from fading, fading in and out of colour and sound distortions where the received signal is weak. Breaks in transmission can also occur where there is not enough information received to display an image. Moreover, as the frequency of the channel increases, these problems increase in magnitude and picture quality deteriorates correspondingly.

Added to the problems of polarisation reversal, are those associated with the move from analogue to **digital transmission**, which more than compounds the issue. As many have noticed from mobile phone usage, lack of signal in analogue systems leads to partial reception or fading. In digital systems, however, it usually results in the call dropping in and out, or out completely.

The same is true of digital television, where the effect is gaps in picture or picture and audio reception, or the inability to display a picture at all. These changes in

spectrum allocation and technological developments in television broadcasting, have made it necessary to design antenna systems specifically to overcome these problems. Where once it may have been adequate to have a single element to cover the whole band from 40 to 860 MHz, this is no longer adequate to give reliable performance on UHF.

The solution has been to provide separate VHF and multiple UHF arrays, enabling the **Moonraker TV Dome** to receive both vertically and horizontally polarised signals. In this way it becomes possible to receive the whole of the signal and translate it into a quality picture.

By placing the amplifier right at the antenna rather than at the end of the cable, only the signal is amplified. This eliminates cable losses and amplification of associated noise, maximising the quality of reception to give excellent results across the bands from 40 to 860 MHz – all TV channels. System losses are further eliminated by use of special quality coaxial cable with both tinned inner and outer conductors for high endurance in the marine environment, and F type

How the signal gets to you

Television and FM terrestrial signals are normally transmitted at VHF and UHF wavelengths from 40 -860 MHz. How the signal gets from the transmitter to your set can be quite complex and, when you are moving around, the situation becomes very much more complex.

Quality of reception is subject to many environmental factors, and, because the waves at UHF frequencies are shorter than at VHF and provide less range, these are affected most of all. Having a high performance antenna is all important, but how well it performs will depend on where you are and having the right type of antenna for the right circumstances. Of course you have to be in range of the station to start with!

As the signal travels across land, the direct line -of-sight signal will come across obstacles in its path. These obstructions cause reflection and scattering of the signal, giving rise to what is known as **multipath propagation**. Signals can be reflected from almost any object, including hills, cliffs, buildings, aircraft, rigging and vehicles.

Obstructed signals arrive at the receiver later than those that are unobstructed and from different paths, resulting at best case in fading, at worst case in total disruption of the signal. At UHF these effects are more noticeable. Mobile communications suffer most of all.

Often there is no direct line -of-sight path to the station transmitter or translator, so that the received signal is made entirely of multiple reflections and scattered waves. The amount of fading can vary from around 20dB or less to more than 30dB, so that a vehicle moving at 50km/h can experience several fades per second.

Also, because the direct wave is longer at VHF frequencies, it has the ability to bend around obstacles through a process known as **diffraction** - to fill in around corners to some extent.

However, as the frequency increases this ability diminishes progressively, and the size of the **shadow zone** where no signals reach becomes larger, with the result that, when you are in a built-up area or a hilly terrain, reception on VHF channels is often much more successful than on UHF channels.

Boat anchorages or camping sites tucked away close under cliffs, headlands and hills may provide excellent shelter from the weather but be in a very low signal area due to all the reflections, and if the station is in the direction of the cliff, the signal may not be able to reach down to you at all.

Sometimes, just a slight change in the position or direction of the vehicle or boat can make all the

MOONRAKER AUSTRALIA

A good TV/FM multi-distribution system
adjusts to fit your ship, large or small
gives excellent performance at every outlet
withstands challenging environments

A Moonraker multi-distribution system is
designed and manufactured to
give you the very best and
keep on doing so year after year
after year...



TV/FM receiving systems for Multi-users
high performance solutions for demanding environments

Moonraker TV & Radio on the Move

High Performance Antenna for Mobiles

Getting good television reception when you are on the move involves special design criteria. Poor solutions often mean you spend most of your time chasing the picture instead of enjoying your favourite program.

The type of antenna required is quite different from the directional type you use at home, as you need to be able to receive the strongest signal no matter what direction you are heading in at the time: a non-directional or omnidirectional type.

There are many problems associated with mobile television reception. Fortunately reception at sea is generally free of the picture rolling, fading and ghosting associated with signal weakness and reflections on land. However, changes of polarisation can take place in the reflection process in space. This means that an antenna which is only polarised in one direction, cannot receive all of the signal and picture quality suffers significantly.

All these problems are becoming of greater importance today as television channels move to digital transmission and from the VHF to the UHF frequency bands. This is because at UHF frequencies, the wavelengths are significantly shorter, less able to compensate for man-made and natural obstructions in the path of the line-of-site signal, and more prone to changes in polarisation

As the frequency of the channel increases, these problems increase in magnitude and picture quality deteriorates.

The Moonraker TV AM/FM Dome system is designed specifically to overcome these problems. It features separate VHF and multiple UHF arrays enabling the antenna to receive both vertically and horizontally polarised signals.

With a 20dB amplifier located right at the antenna base, only the signal is amplified, eliminating cable losses and amplification of noise to give you excellent results across the bands from 40 to 860 MHz (all TV channels).

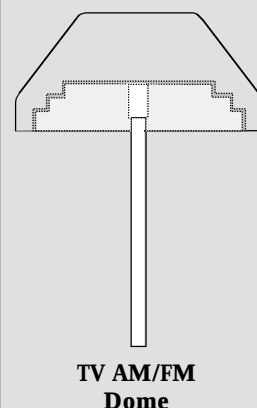
The antenna radome is completely filled with closed cell foam to guard against any vibration or shock problems. The system exhibits minimum pickup from other communications equipment, often a problem in marine installations, and is protected from lightning static discharge.

Two versions are available: **TV/S** with single TV outlet; and type **TV AM/FM** with both TV and FM outlets, together with an input for a separate AM antenna (eg type 15BC) to facilitate connection to an AM/FM receiver

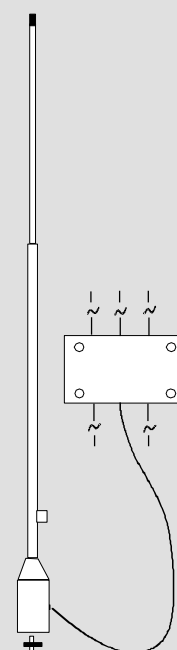
Single or Multi-distribution for Radio

The fully marinised HF RXA active system provides excellent broadband reception from 70 kHz to 30 MHz for single or multiple users. It is ideal for shipboard and oil rig use as well as in buildings, covering all LF beacon, AM radio and short wave bands, including GMDSS Navtex

The system features a low noise 10dB integral broadband amplifier totally enclosed in the antenna base. It comes with either a single feed or 5 outlet multicoupler power supplies, which cascade in multiples of 4 (eg 5, 9, 13... outlets) to enable fully isolated distribution to every receiver.



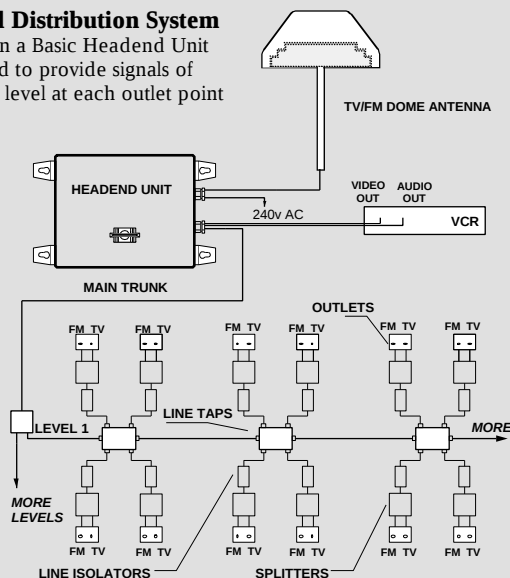
TV AM/FM
Dome



HF RXA with
Multicoupler
Power Supply

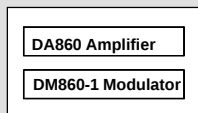
Typical Distribution System

based on a Basic Headend Unit designed to provide signals of uniform level at each outlet point



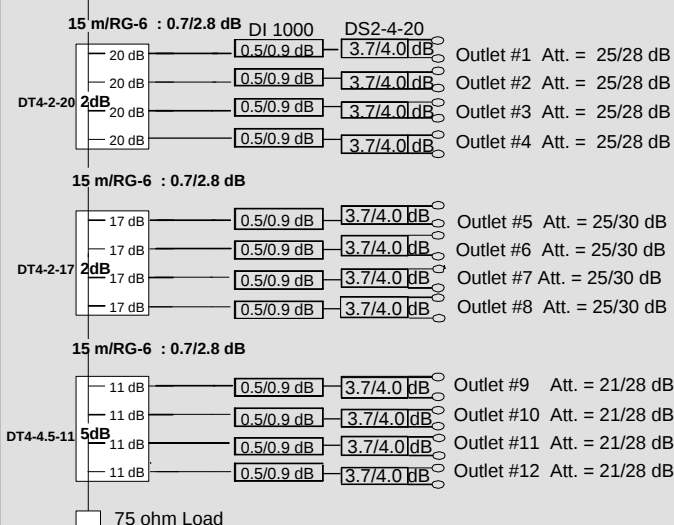
Demonstration Distribution Network Calculations

DH 860-1 Type 2B Headend Unit



Approximate Headend Unit Control Settings to achieve 65 dBuV (+/-5dB) at the Outlets

Frequency Range	DA 860 Amplifier	DM 860 - 1 Modulator
40 - 144 MHz.	90 dBuV	N/A
174 - 300 MHz.	90 dBuV	N/A
470 - 860 MHz.	94 dBuV	94 dBuV



Fully Marinised Multi-Station Multi-media Distribution

No longer do you have to make do with poor picture quality which changes from outlet to outlet. Now you can get the same picture from wheelhouse to crew quarters.

The Moonraker TV / FM Distribution System is designed to be truly versatile and to satisfy your multi-media distribution requirements, whether your network is large or small, no matter what size your ship. This is a high performance system that provides balanced output from station to station. Each installation is custom tailored to ensure signal output is kept uniform giving you continuity of performance throughout.

The system receives, mixes and distributes television and FM radio signals to multiple outlets. At its heart is the Headend Unit, housing the amplifier and modulator modules, power supply and coaxial terminations. From this unit, a distribution network of cabling, directional couplers, splitter / combiners and line isolators carries the signal to the outlets. A main RF trunkline is used with taps and efficient directional couplers to supply individual outlets.

Amplifier modules are used to distribute TV, FM and satellite channels throughout the system. Modulator modules make it possible to distribute audio and video signals from DVDs, VCRs, cameras, and the like as well as non modulated satellite signals.

As everyone's needs vary, so can the system, which is available in different size modules that can be assembled to suit individual installations. For small installations the Basic Headend Unit of main drive, line isolator and power supply, which can accommodate 2 modules, may be large enough.

For more complex large installations a variable Advanced Headend Unit with a mixture of, say, 6 amplifier and modulator modules would normally be used. With several decks and long cable runs, further amplification in the form of a line amplifier unit may also be required in the trunk line to maintain signal strength.

A complete range of accessories from line isolators to protect the system and personnel from faulty TV receivers through to special cables and connectors. System design is rugged for long life with O ring sealed F type industry standard connectors and corrosion inhibited low loss coaxial cable.

for one and all

Moonraker Australia TV On the Move

Technical Specifications

TV Dome Antenna

Frequency Range	VHF TV 40-220MHz; UHF TV 525-860 MHz; FM Radio 88-108 MHz
Polarisation	Horizontal at VHF frequencies Horizontal & Vertical at UHF frequencies
Radiation Patterns	Omnidirectional
Gain (Internal Preamplifier)	20dB
Supply Voltage	14-18 volts DC

Headend Amplifier DA860-1

Frequency Range	44-860 MHz
RF Output (adjustable)	44-144 MHz = 20dB 174-300 MHz = 37dB 470-860 MHz = 40-44dB Sloped
Supply Voltage	14-18 volts DC

Headend Amplifier DA860-2

as per DA860-1 but includes 300-470 MHz coverage of CATV frequencies

Headend Modulator DM860-1

Frequency Range	471-860 MHz
RF Output (adjustable)	20dB
Supply Voltage	14-18 volts DC

Power Supply

Output	18 volts DC @ 1700 mA
Input	240v AC 50 Hz

In Line Amplifier/Power Supply

12v, 24v or 220/240v AC, specifications as per Headend Amplifier

Line Isolators

Capacity	7 Kv peak (protects from AC mains power injection from faulty receivers)
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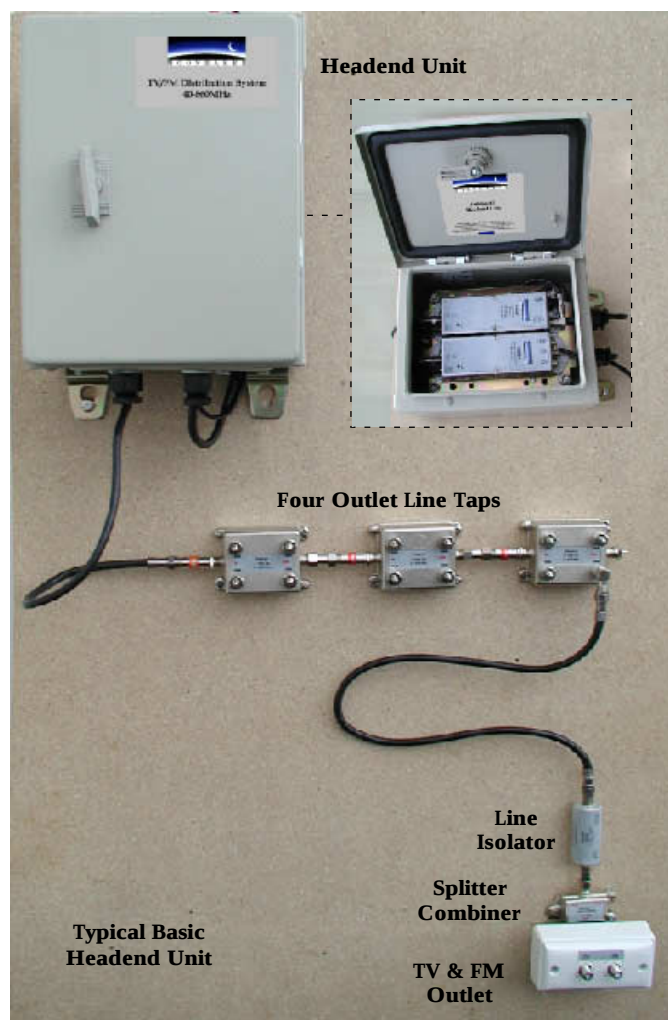
Socket Outlets

Wall Mount	Dual for TV/FM; Single TV only
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Headend/Amplifier Housings

Material/Rating	Steel - IP66
Finish	Epoxy powder hammer finish grey 7032
Approvals	UL Bureau Veritas; Lloyds Register of Shipping
Dimensions	Dependent on options installed: (minimum 250H x 200W x 150D; large typically 500H x 400W x 50Dmm)

Distributed by:



Moonraker Australia is a specialist antenna company with a long history working with professionals to design systems that will stand the test of time in the most challenging of environments from the tropics to the polar regions.

All manufacture is to ISO9001 standard for quality assurance. A number of products have been allocated NATO stock numbers.

For a more indepty view of our product range, please visit our website at <http://www.moonraker.com.au>.

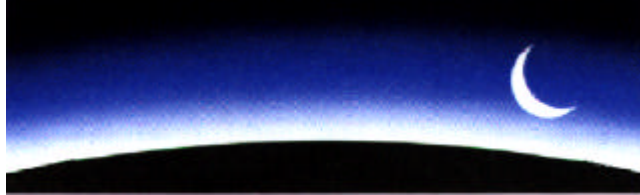
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MOONRAKER TV AM/FM DOME

New Model

Land Mobile/Shipboard Non-directional TV and FM Radio Reception Antenna System

The Moonraker TV/FM Antenna is a compact active antenna system, designed to provide improved reception of TV and FM signals in both the VHF and UHF bands for both analogue and digital transmissions.



The system is truly omnidirectional and features separate VHF and multiple UHF arrays. These two arrays are suitably coupled via a built-in diplexer. Reception at UHF frequencies is also optimised through the ability to receive both horizontally and vertically polarised signals.

Completely sealed within a low profile ABS plastic radome, foam filled for complete protection from vibration and the marine environment, the antenna exhibits minimum pickup from other shipboard communications equipment and is protected from lightning static discharge. It may be roof mounted on buses, camper vans, and the like, providing a low profile, streamlined and rugged installation. It is supplied with 6 metres of low loss co-axial cable for connection to a remote control unit. There are two types of control unit available.

The AM/FM Antenna system has TV and AM/FM receiver outlets and input for a separate AM/BC receiving antenna for installations where a combined AM/FM receiver is used. The AM/BC signal is combined with the dome's FM signal and connected to the AM/FM receiver outlet via the control unit. A suitable AM antenna is the Moonraker type 15BC/Marine with matching transformer or the standard AM antenna on vehicles.

The TV/S Antenna is designed for installations where only a TV receiver outlet is required.

Specifications

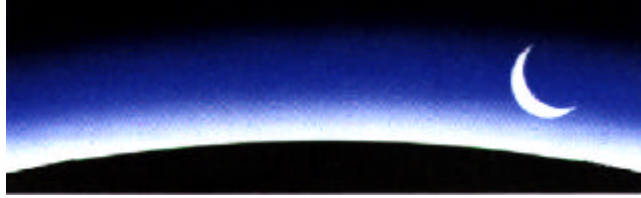
Frequency Range	TV Bands: VHF 40-220 MHz; UHF 400-850 MHz; FM Band: 76-108 MHz
VHF Marine Band	Integral band stop filter reduces VHF marine transmitter interference
Polarisation	Horizontal at VHF; horizontal and vertical at UHF frequencies
Pickup Pattern	Omnidirectional
Amplifier	Gain: VHF 26dB UHF 34dB (replaceable unit)
Impedance	75W
Supply Voltage	TV AM/FM: 12 or 24v; TV/S: 12v only. Reverse polarity protected. Negative earth
Current Drain	60 milliamps (approx)
Cable Connections	75W co-axial via F type connector on antenna
Connecting Cable	6 metres x 6.5mm OD 75? high quality co-axial cable and F type connector (F type connection to dome)
Radome	White ABS plastic 380mm (diameter) x 185mm (height) (15 x 7.1 in)
Mountings	Supplied with threaded stainless steel mounting tube 25.4mm x 300mm (length) and flange base mount
Wind Loading	4.3 kg at 100 km/h (9.5 lbs at 60 mph) 6.8 kg at 130 km/h (15 lbs at 81.25 mph)
Control Unit	TV AM/FM: 110x60x30mm (4.3 x 2.4 x 1.2 in);
Size	TV/S: 54x33x22mm (2.1x1.3x0.9 in)
Protection	Reverse polarity protection with 3AG 250 mA fuse
Packed Weight	3.25kg ((7.2 lbs); cubic weight: 6.2kg (13.6 lbs)

Specifications subject to change 03/07

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MOONRAKER

TV/FM Distribution System

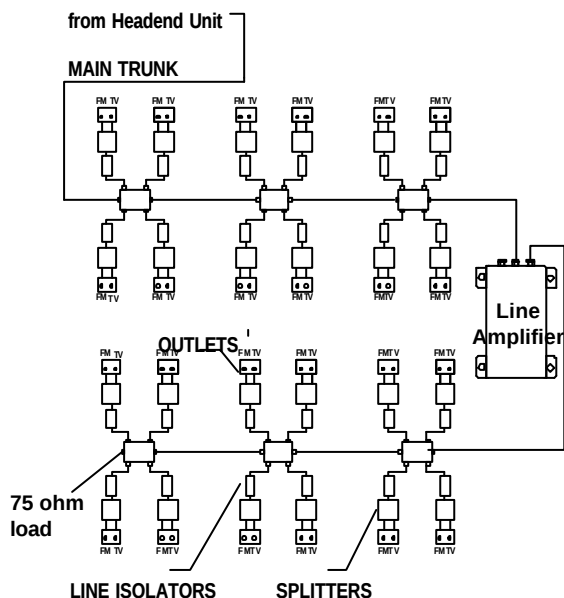
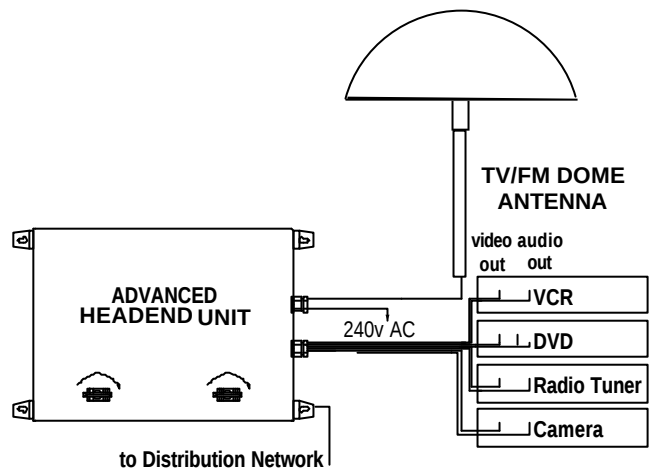
Fully Marineised Flexible Multi-Station Multi-Media Distribution



The Moonraker TV/FM Distribution System is designed to provide truly versatile distribution of television signals and audio visual output from VCR and DVD players, cameras, satellite receivers and FM tuners.

Specifications are fully adaptable to suit individual requirements, large or small, to ensure balanced quality signal output at every station on the vessel.

Amplifier modules for TV/FM broadcast and modulator modules for audio/visual distribution are housed within the Headend Unit, which also contains the power supply, combiner and line isolator. There are two sizes: standard (maximum 2 modules) and advanced (maximum 6 modules). The system is designed to be DC isolated from ground to avoid any electrolysis problems.



The distribution network of cabling, directional couplers, splitter/combiners and line isolators is custom designed to suit vessel requirements. Use is made of a main RF trunk line with taps at appropriate points and efficient directional couplers to supply individual outlets. Line amplifiers are used where necessary to ensure quality signal output for multiple decks, long cable runs and frequent outlets. The system is designed for long life with O ring sealed F type connectors and corrosion inhibited low loss coaxial cable.

The TV/FM Distribution System is designed to work at optimum capacity with the high performance Moonraker TV Dome MkII omnidirectional antenna, which provides multiple elements to eliminate signal deterioration due to polarisation reversal, which is common at UHF frequencies.

Specifications subject to change 5/08

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