

MOTORCAR RADIOS, BASICS AND INSTALLATION

BY STUART A. EDMONDSON

This is the 2nd in a series of articles about the RR Radios used today in our motorcars, speeders, and HyRailers. I am writing these articles to help all NARCOA members have a great operating radio system in their motorcar, especially for **SAFETY** and **EMERGENCY** purposes. Some excursion coordinators and some host railroads require a working radio, so why not be ready? On many excursion I hear some radios that sound great and others not so great, let's see how we can make them all work great!

NARCOA rule 4.24; Radios used in association with NARCOA events and/or on the NARCOA license frequencies must meet current FCC regulations and be operated in accordance with those regulations. The FCC and NARCOA as of January 1, 2013 requires all motorcar radios be 12.5 kHz narrow band type.

So a narrow band radio, whether it is new, remanufactured, or used from Motorola, Kenwood, ICOM, programmed with a minimum of the 3 NARCOA, AAR 2-96, PRO, Alaska, Weather channels will work. To prepare for the future (2025 and beyond) Class 1 railroads and the AAR are testing new narrow-band digital 'next step' technologies such as P25 and NXDN for communicating in congested areas. For us NARCOA members a solid 12.5 kHz narrow band unit will be fine for many, many years to come.

Radios, besides being a **SAFETY** item, can be an enjoyable learning motorcar accessory. I live in Columbus Ohio, and have non-stop CSX and N&S railroad communications to listen to. When working on my motorcar I set my radio to the scan-function. I have pre-set 35 AAR channels used in Ohio that let me listen to real, Class

up to 110, is up to you. Most 30 to 55 watt units are about the same physical size and will work on most motorcar with a 12 volt electrical system. A 110 watt unit is physically bigger and requires an electrical systems big enough to handle this unit, such as an A-car or larger.

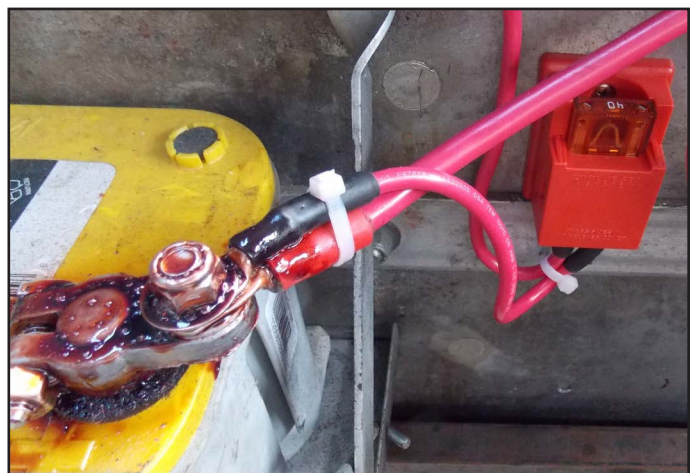
If you operate an older motorcar with a 6 volt system you can mount a 12 volt deep-cycle battery just for the radio. I have tested this and a after an entire weekend using the radio the battery was still at 60% of capacity, allowing me to re-charge when I get home.



1 radio talk such as the dispatchers talking to train crews, or train crews talking about when we can get a signal to proceed, or a hot-box alarm on axle 122 for example. I remember listening last year when a very dumb person was seen sitting on very active CSX tracks, or when another RR fan was fouling very active N&S tracks with his truck and camera tripod!

Picking a Radio
The size of unit, i.e. its wattage, usually 30, 55, or

Now that you have the radio mounted 'securely' where you want it, let's wire it up well. Radios in the 30-55 watt range need to be connected to the battery via 10 gauge wire. A 110 watt unit needs 8 gauge wire. The



‘Black’ ground wire can be attached to the negative battery cable at the point where the ground connects to the motorcar’s frame, but no further away from battery. The ‘Red’ positive wire also needs to be as close as possible to the battery. Use an inline fuse, 30A, is best, so if a short happens everything after the fuse is saved, and there will be no fire! That’s a good thing! Don’t connect the radio’s heavy red supply lead on the fuse block, or accessory side of the ignition switch, or even the alternator battery stud. The direct-to-battery connection acts as a big capacitor for the radio, eliminating power spikes or drop outs. Many radios can be turned on and off with

using the ignition switch using the thinner red secondary control wire. This is normally an 18-22 gauge wire needing a separate 2A fuse. When you transmit, the radio needs high amperage with little voltage drop. This is Ohm’s law. To choose a wire type, regular automotive wire is fine, but I personally like marine wire as it is more flexible, has better insulation, better corrosion rating, and a higher voltage rating. Please don’t use residential or industrial THHN or MTW wire.

Let’s talk about radio noise or static from our engine. Some belt driven alternators have internal noise capacitor by design, on others types it is mounted on the outside of the alternator. If an alternator has brushes on the inside, a noise capacitor is needed or static will be heard on the radio.

To keep interference to a minimum

resistor spark plugs should be used. The stories of resistor plugs fouling out quicker are not support by plug manufactures’ tests. Back in the 50’s and 60’s when we listen to our favorite doo-wop AM radio station, Champion Spark Plug had a marketing campaign; ‘*Champion Resistor sparks plugs gives radio its voice!*’ We should also use carbon



core spark plug wires, steel cord wires will make noise! There are many brands of carbon core wires available that are used in the high performance world and these will work for our motorcars.

Speakers:

Use the speaker the radio manufacture recommends, speaker voltage and resistances are not the same between manufactures. I like my Motorola unit because it has a High/Low toggle switch on it. ‘Low’ is used while operating the motor with a headset intercom system and ‘High’ for when you’re not using an intercom system, stopped for a break on the tracks, or at home listening to radio in shop or driveway with the snow flying outside.

Microphone

Use the microphone that the radio manufacture recommends. The mics that have the key-pad are not needed

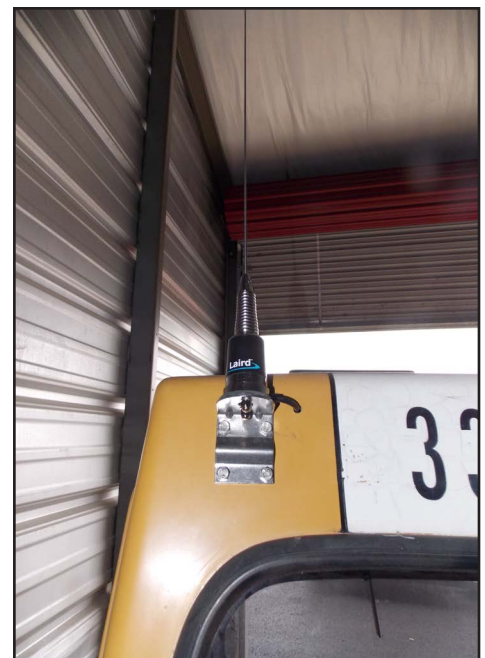
and they could become a **SAFETY** concern in my opinion.

Antennas

This is where we really need to get it right. A brand new \$2,000 radio will not work worth a darn with the wrong type or an incorrectly installed antenna system! My fellow NARCOA member and friend wrote last month about the importance of the antennas, and I second that. Key points: For our motorcars, it’s either ‘ground plane’ or ‘no ground plane’.

1) Ground Plane Unit (A)

This the most common antenna, the 1/4 wave Omni-directional antenna, about 17” long and luckily they needs no tuning, BUT, they do needs a ground plane. {A ground plane is a conducting surface large in comparison to the wavelength which is connected to the transmitter’s ground wire and serves as a reflecting surface for radio waves.- Ed.} I have seen many of these mounted on an angle bracket on the back of a motorcar, which is not good. Ideally these antennas need to be in the middle of a metal roof or roof to



create a metal ground plane. I know some don't like drilling a hole in the roof for antenna. Purchase an antenna with a magnetic base, plant it in the middle of your motorcar's metal roof in morning and at the end of the day take off for safe keeping.

2) Ground Plane Unit (B)

This antenna is a 5/8 wave 'base-loaded' or amplified unit. These units are about 42" long and need to be balanced tuned between NARCOA 1 and AAR 2-97 channels and *need a ground plane*. This type antenna will give any radio the most range.

3) Ground Plane Unit (C)

The last antenna is the roof mounted dedicated units that look like a skate or racing wing. These unit where first seen on the tops of the EMD, F & E units. They needed to be low so they didn't hit anything. They are still used today for

railroads and mass-transit systems but are tuned for that railroad's frequency, These units have a bandwidth of 2.5 MHz, so they are *NOT* a universal unit because they do not operate well on a large range of frequencies. If you want to use one of these units because it looks cool, have it tuned to NARCOA 1, but expect poor performance on AAR, frequencies 2-97. Also, these units need very large ground planes 42" x 62"!

4) No Ground Plain Unit

A motorcar that has a fiberglass cab and no metal ground plane, can mount this '*no ground plane needed*' antenna on your motorcar. Any motorcar could use these as well. These units are 1/2 wave and are about 37" long and are a 'base-loaded' or amplified unit. They also need to be balanced tuned to NARCOA 1 and AAR 2-97 channels,

but can be mounted on the back of the motorcar on an angle bracket! I have this antenna on my TAMPER motorcar as the roof was too small for a good ground plane. Laird and Comtelco both make great units of this type.

NOTE, if your motorcar is a fiberglass cab type, and has a metal ground plane on the roof, you should attach a wire from the ground plane down to the motorcar chassis.

Final thought, don't be afraid to ask for help with your radio install we are all on the same NARCOA team. Contact me if I can help you in any way with your radio questions or needs.

Be safe, treat others well, and have fun!

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Everett Railroad, Holidaysburg PA, photo by Jim Matalik

