



Special Edition Modeling Reference

Modeling US Army AFV Antennas of WWII and the Korean War

*There's more to the subject than a piece of
stretched sprue!*

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Introduction

I'm always looking for more details and accurate information for my armor models. In fact, searching out new, obscure facts and trivial details is one of the things connected with the hobby that I really enjoy, and I can find myself falling down the old research rabbit hole sometimes for hours on end.

Recently, as I was finishing up my Tamiya M10 tank destroyer, I started wondering about the details of the radio antenna and how (or even if) I could make it more accurate. One thing led to another, and after a few happy hours with Mr. Google along with cracking some of my own references, I developed enough information to finish my M10. However, the more I dug into the subject, the more I found out that I had only just touched upon it. There was much more to learn.

Building on my initial research, I discovered that the subject of the different antennas and antenna bases used on various vehicles was both more complex than I had once thought and also simpler than it looked at first glance. I think I now know the basics, and this special modeling reference is my attempt to share this information with my fellow enthusiasts. There's a lot more to US Army vehicle antennas than a piece of stretched sprue, and with a little effort and study, you can get these details correct.

General

During WWII, the US military fielded a bewildering array of radios. Seriously. It's actually hard to sort through what was really going on. My intention here is not to launch into even a brief review of this subject. It seems that almost every branch had its own, unique radios, and it would also seem that almost none of them could talk to any of the others. OK... That's a bit of an exaggeration, but, suffice it to say, communication between different radio systems was not even close to universal. Even on the battlefield, during intense tactical situations, combat troops from different branches of service, like armor, infantry and artillery, could not easily communicate by radio with one another.

Just before the Korean War, this situation began to be changed, and new radio sets, like the AN/GRC-3 through -8, were adopted that enabled more effective communication between the various small units organized on branch lines. Thus, by the time the Korean War was in full swing, it was common for armor, artillery and infantry units to be equipped with radios that could communicate across the previous battlefield branch divide.

For the modeler, what's important in all of that is to know that almost every different type of vehicle was equipped with its own specific type of radio, usually associated with the branch operating it. Each of these different radios had a particular antenna system. The good news is that almost all of the different antenna systems were made up from combinations of the same few basic components.

In an earlier version of this article, I based the descriptions of the most common antenna systems on the most common AFV radios in use. This is still a functional way to approach the subject. However, with a bit more study, I have come to understand that that is perhaps not the best approach. Because I now know that there were only a relatively small number of antenna system basic components in use, I think it's actually more useful for the modeler to understand those components first. After all, we're usually not modeling the actual radios inside our subject vehicles, but rather the more visible antennas

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mounted on them. As it turns out, it is pretty easy to research and determine which combination of antenna system components was used by any particular radio and equally easy to determine which radio was normally installed in any particular AFV. Or...

To put this another way, once you know the radio system, you can easily determine which antenna and antenna components was used by it. Another thing that is useful for the modeler to know is that with some study, it's actually pretty easy to identify the type of antenna in use in most photos by the visual identification of the base and mast (antenna sections). This also makes modeling the correct antenna easier.

Nomenclature

Before progressing too far a word about nomenclature might be in order here. When trying to discuss US WWII and Korean War radios, you should understand the differences between "SCR" and "BC." SCR stands for Set, Complete Radio. That is, the entire radio set falls under the SCR description. BC stands for Basic Component. BCs are the major boxes and other accessories that are put together in various combinations to make up the SCR. It's quite easy to get confused though, because a lot of references and after-market vendors will discuss or sell these radios using both or either of the two designations. Don't be confused. The main US WWII tank radio was the SCR-508 and not its component BC-603 or BC-604.

To add complexity to the terminology, towards the end of WWII, the US military began to institute a major change in the nomenclatures for much of its hardware and equipment. Of course, this included radios and radio components. During the Korean War, we see many of the older radio designations changed and a new nomenclature designation system being used for all the new radio equipment introduced. The new designations were much more complex and varied, but for our modeling purposes, there were VRC (Vehicle, Radio Communications), GRC (Ground, Radio Communications) and ARC (Air, Radio Communications – which also covered some air-to-ground radios). Some radio and component nomenclatures also received the prefix AN (Army-Navy) to indicate that they were joint service items. For simplicity I have omitted this AN prefix in this article.

An example of this changing nomenclature was the SCR-508 tank radio which was re-designated as the VRC-5 radio (but only in some applications). Another example was the infantry's SCR-300 backpack radio which was coupled to a vehicle power source (the PP-114 power pack) and re-designated the VRC-3 (while the infantry continued to use it in its SCR-300 backpack configuration).

There was also a specialized nomenclature for the various antenna system components. At the time, Signal Corps doctrine only called an antenna an antenna when it was connected to the radio. Until then, the antenna was simply a collection of parts identified individually in the radio's applicable technical manual. The two main parts of most antennas were the base, which was called a "mast base," and the antenna sections, which were called "mast sections." When researching these components, you will get more useful results using the correct terminology. Of course, there were often a number of additional parts (mounts, cables, guy ropes, etc.), and these will be discussed as they come up.

Common Antenna Systems (TB SIG-154 “General Standards for Vehicular Antenna Installations”)

So, now on to the meat of the subject – the antennas. Because we’re going to depict them assembled on our models, I’m now going to call them “antennas,” but keep in mind the nomenclature discussion above. These antennas will be described in terms of the various “mast bases” and “mast sections” that make them up, and these components will be called by their correct nomenclatures.

The basic reference for this information is War Department Technical Bulletin TB SIG-154, “General Standards for Vehicular Antenna Installations,” dated January, 1945. This document describes in detail most of the common components, the mast bases and mast sections used, along with specifying which combinations are used with most of the common radios in use at that time.

For the later radios introduced during the Korean War, I have generally referred to the R.P. Hunnicutt armor books to determine the radios in use and then referenced the applicable technical manuals for those radios to determine the antennas they used.

Mast Bases MP-48 and MP-48-A with Mast Sections MS-49 through MS-53

These are the most common of the WWII vehicular antenna system components. The MP-48 (and MP-48-A) mast base had a heavy OD coil spring to allow the antenna to deflect when it hit objects or to be bent over and tied down. At the top of the spring was a brown ribbed ceramic insulator and on top of that was an OD female socket which the mast sections screwed into. The bottom of the MP-48 was an OD metal flange with a central threaded tube protruding down into the vehicle hull or body.

There were two slightly different versions of the mast base MP-48 which differed in how their internal coax cable was arranged from the bottom mounting flange through the spring and insulator to the mounting socket for the mast. The MP-48 version also had an external coax cable connector at its top end while the MP-48-A did not. The clamps, which allowed for optional external routing of the coax cable, were removable on both versions and are usually missing in AFV photos (since the internal coax routing was normally used on AFVs). Both versions were used interchangeably although the MP-48-A was intended to supersede the MP-48.

The mast sections used with the MP-48 mast base were the MS-49 through MS-53. Each of the mast sections was approximately 39-1/2” long and made of tubular steel. When assembling an antenna, the mast sections screwed together in reverse numerical order starting with the larger sections (higher numbers) at the bottom. These mast sections are sometimes referred to as “fishing rod” or “fishing pole” antennas in contemporary reference sources. The mast sections graduated in size from about 1/2” diameter at the bottom of the MS-53 to a blunt point at the top of the MS-49 (not counting the diameters of the ferrules which were also graduated in size).

These mast sections screwed together with heavy, knurled male (bottom) and female (top) ferrules on each end of each section. There were two slightly different profiles for the ferrules, one that was a regular cylinder entirely knurled for its full length and another that was a smooth cylinder with a larger diameter knurled end portion. Note that many radios specified antennas made up of only two or three sections, while other antennas required more than just one of a particular section. In photographs, this type of antenna often appears to be a heavy, thick rod with the ferrules sometimes very visible.

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The knurled ferrules were color coded so that the user only had to match the color on the male end of one section with the same colored female end of the next section. The ferrule colors used were, starting at the top joint and going down: green to green; yellow to yellow; red to red; blue to blue; gray to gray (or gray terminating at the mast base); finally brown or black (also terminating at the mast base). This arrangement meant that the ferrule on each end of each rod was a different color. The rod portions of the sections between the ferrules were painted satin black when new, but present day existing mast sections are very often repainted OD. Nomenclature information was stamped on each mast section in indelible white or yellow ink near the bottom, male end.

In addition to the colored ferrules, there was a set of matching colored, screw on mast clamps (MC-423 through MC-426) that could be fastened over the joints between the sections to prevent them from vibrating loose. If the clamps were not available the operator was instructed by the technical manual to put two wraps of black electrical tape (winding in opposite directions) over the ferrule joints. The antenna system was also issued with components to tie it down consisting of a guy line (RP-5 rope), a ceramic insulator (IN-86) and an antenna hook. The rope was white and the insulator was brown ceramic with bare metal eyelets, and the metal antenna hook was bare metal. There was a later war green rope that was treated to prevent fungus and rot. Of course, there were also additional guy lines, insulators and stakes to support the antenna if it was erected for stationary, long range purposes. When not in use, the mast sections and other accessories were stored in a long OD canvas bag (technically a "roll") BG-56 with an additional small tubular canvas cover BG-67 provided to protect the mast base when the vehicle was out of service. Generally there were at least two of each required mast section issued for each radio which allowed for spares. These spares were stored in the BG-56 roll.

As mentioned, many different radios used this same mast set, but with different mast section combinations to make up different length antennas. For example, the SCR-508 (and its variations SCR-528, SCR-538 and VRC-5) tank radio used the MP-48 mast base with a 3-section antenna composed of the MS-51, MS-52, and MS-53 that was approximately 10' long. Note that this combination would have ended on top with the yellow female ferrule of the MS-53 mast section. This was what the technical manual for the radio called for. However, the same length antenna could have been made up terminating with the pointed MS-49 section with MS-50 and MS-51 sections on the bottom.

(For the sake of completeness, I will mention that there were also MS-54 and MS-55 mast sections that were even larger and heavier than the MS-53 and into which the MS-53 could be screwed. These larger mast sections required an MP-47 mast base which was threaded to accept either the MS-53 or MS-54. In photos, the MP-47 looks like a cross between the MP-48 and the MP-57 mast bases. This combination was only used on higher echelon command radio stations, such as the SCR-399 and SCR-499 van-mounted radios and could be used to make antennas up to 65' long, suitably guyed for stability.)

Mast Bases MP-37 and MP-57 with Mast Sections MS-49 through MS-53

The next most common antenna system seen on WWII vehicular antenna systems was very similar to that described above. It used the exact same mast sections, clamps and tie down rope. However, the mast bases were different from the MP-48 mast base being of a somewhat heavier construction with large ceramic insulators on their bottoms. This system was used in higher powered command radios, like the SCR-506 used in the Sherman tanks at battalion HQ level. In this application, the mast base MP-37 or MP-57 was mounted on the tank's front hull antenna mounting "pot" with the radio installed in

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the hull next to the bow gunner (who was also the radio operator). These mast bases pre-dated the MP-48, so they are also seen in pre-war and very early war use on many vehicles equipped with radios such as the SCR-245 and SCR-210.

Since the mast sections have already been described in detail above, all we need to concern ourselves with here are the two new mast bases, MP-37 and MP-57. The MP-57 superseded the earlier MP-37. Both were constructed nearly the same, and for modeling purposes, the only significant difference was that the bottom ceramic insulator on the MP-37 was slightly larger in diameter than the same part on the later MP-57. Both bottom ceramic insulators were brown with heavy, satin black coil springs. At the top end of the coil spring was a heavy OD colored female socket into which the bottom mast section screwed.

Most of the radios that used this antenna system also used longer antenna arrangements. For example, the SCR-506 command tank radio used a five (5) segment antenna, MS-49 through MS-53, approximately 15' long. If the tank was stationary, the antenna could be extended to about 25' in length by adding three (3) additional MS-53 sections to the bottom end. If this was done, the extended antenna was also secured using guy ropes with insulators staked to the ground and / or tied off on the tank.

The New Antenna Systems

Near the end of WWII, the two earlier antenna systems described above were superseded. I could not find an introduction date for this change, but the January, 1945 dated TB SIG-154 describes both of the new systems as the standard "replacements" for the earlier systems. It's not clear that both of the newer, replacement systems were introduced at the same time. However, my copy of Technical Manual, TM 11-630 "Radio Set SCR-506-A," dated November 1944, does not mention the new replacement system. This suggests to me that new antenna systems were probably not fielded until the final few months of the war. Photos clearly show the earlier systems still in use into the early post-war occupation period and the beginning of the Korean War. The newer systems don't become nearly universal in photos until the middle of the Korean War. My references suggest that by late in the Korean War, the new antenna systems were in almost universal use. You should let your references be your guide.

Replacement Mast Base AB-15/GR and Mast Sections MS-116 through MS-118

The replacement for mast base MP-48 was the mast base AB-15/GR. This new mast base replaced the MP-48 in all applications that previously called for it. However, there was clearly a "transition" period in which both the old and new mast bases can be seen in use, sometimes literally side by side on the same vehicle (notably tanks in the early part of the Korean War).

The AB-15/GR mast base was about 13-1/2" tall. Its bottom was made up of a ribbed, brown ceramic insulator about 3-1/8" in diameter and about 2-1/2" tall. Above this portion was a black, flexible rubber stalk about 9" long. On the top end of this was an OD metal female socket about 4-1/2" long into which the bottom mast section screwed. The flexible black stalk provided the same function as the earlier coil spring on the MP-48 allowing the antenna to deflect against obstacles and to be tied down when necessary.

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The new antenna mast sections, MS-116, MS-117, and MS-118 were hollow copper tubes with male (bottom) and female (top) screw threads formed into the metal. They were tapered with the final, top section, MS-118 forming a blunt point. The sections were painted OD green except for the male and female screw ends which were left in bare metal. Nomenclature data was stamped in indelible yellow ink. These new mast sections were about the same length as the earlier MS-49 through MS-53, so in any given antenna application, the same number of new mast sections would be used as old mast sections.

Sticking with our example of the SCR-508 tank radio, with the new AB-15/GR mast base, one (1) each of the three new mast sections, MS-116, MS-117 and MS-118, were used for an antenna the same 10' length as with the older system.

In photos, the MS-116, MS-117 and MS-118 mast sections appear much "slimmer" and lack the heavy knurled ferrules seen on the earlier masts. The new mast base, AB-15/GR also appears very different than the earlier MP-48. Thus the new antenna system is quite easy to tell apart from the earlier system.

Replacement Mast Base MP-65 and Mast Sections MS-116 through MS-118

The new mast base MP-65 replaced the earlier MP-37 and MP-57 in all previous applications. As with the AB-15/GR and MP-48, there was also a transition period when the older (mostly) MP-57 and the newer MP-65 are seen in use together. The new MP-65 mast base also used the same MS-116, MS-117 and MS-118 mast sections, again in combinations making antennas the same length as the earlier masts.

The MP-65 is very similar in appearance to the AB-15/GR, and in most photos it is almost impossible to tell them apart. The general construction, materials and colors of the MP-65 are nearly identical to the AB-15/GR. The MP-65 is, however, slightly taller at 13-3/4." The lower black rubber flexible stalk is also thicker, having a beveled shoulder about halfway up it before it narrows down to the same terminal diameter at the top mast socket. Overall the MP-65 appears a bit heavier duty than the AB-15/GR.

With the new mast sections, if the required antenna length exceeded that possible with the three (3) standard sections, additional MS-116 sections were added to the bottom until the specified length was reached. For example, with the MP-65 mast base the SCR-506 command tank radio still used five (5) of the new mast sections, three (3) each of the MS-116, and one (1) each of the MS-117 and MS-118. The overall length was the same 15'.

One More New Addition – Mast Sections AB-24/GR and AB-22/GR

In about 1951, the VRC-7 radio system was introduced. This was a very short range (about 1 mile) tactical radio that employed (at that time) a relatively short antenna system. The mast base used was still the new AB-15/GR (already described) but with two mast sections AB-24/GR and AB-22/GR. Each of these sections was about 23-1/2" long (total length about 40") and when screwed together formed a taper ending in a blunt point. They were constructed, painted and marked the same as the MS-116, -117 and -118 mast sections.

Note that these new mast sections continued in use (with additions) with newer radio and antenna

systems introduced after the Korean War, but for the purposes of this article there's no need to go on about them. You may encounter them, though, if you're conducting further research.

How to Apply this Information to Modeling Projects

Once you see that the common antenna components are limited, you can also see that there are really only a few combinations that would likely be correct for most US Army WWII and Korean War AFVs. There were, of course, exceptions and deviations, but those can be handled on a case by case basis by a close study of your references. Matching the correct combination of the antenna components to your subject, using photos or documentation about the type of radio installed in it, is straight forward.

What follows are brief descriptions of the most common AFV radio sets along with the antennas specified for them in their applicable Technical Manuals. Once again, keep in mind that there were literally dozens of different radios used in both wars, so all that I can do here is cover the ones that seem most likely in use in AFVs according to my own study.

SCR-210 and SCR-245 Pre-War and Very Early War Vehicular Radios (TM 11-272 "Radio Sets SCR-210 and Radio Sets SCR-245")

The SCR-210 and SCR-245 radios were the first crystal controlled radios fielded in general use by the US Army. The SCR-210 radio was mainly composed of just the BC-312 receiver and was consequently a "receive only" set. The SCR-245 radio also used the same BC-312 receiver along with the addition of a BC-223 transmitter for two-way communication.

Both of these radios used the MP-37 mast base and a five (5) section antenna assembled from one (1) each, MS-49, MS-50, MS-51, MS-52 and MS-53 mast sections for a total length of approximately 15.' It is very doubtful that any of the SCR-210 or SCR-245 radio sets remained in service long enough to be equipped with the new antenna system. However, if any did, they would have used the MP-65 mast base and three (3) MS-116 mast sections with one (1) each MS-117 and MS-118 mast sections.

These early radios were installed in the M2 and M3 light tanks, and the M2 and M3 medium tanks. They were also installed in the M3 armored car and the Dodge command car. I could not determine a clear cut transition date from the SCR-210 / -245 to the SCR-508 series. The only copy of Technical Manual, TM 11-272 "Radio Sets SCR-210 and SCR-245" that I could find was dated February, 1942. It is possible that some of these early radios were still in active service with the US Army during the Allied Torch landings in North Africa.

SCR-508, SCR-528, SCR-538 and VRC-5 Tank Radios (TM 11-600 "Radio Sets SCR-508, SCR-528 and AN/VRC-5")

These were the most common of the US AFV radios in use during WWII. Essentially the different sets just represent different combinations of the same basic components. The SCR-508 was the main tank radio set. It employed one each BC-604 transmitter and BC-603 receiver for two-way communication between tanks. The SCR-528 was the platoon and company commander radio set. It employed the same BC-604 transmitter and two of the BC-603 receivers. Thus, the SCR-528 could monitor two different channels (platoon and company or company and battalion) while transmitting on a third. The SCR-538 was composed of just the BC-603 receiver and was only used during the early part of the war. It was a "receive only" set. Later in the war, as radio production caught up with demand, SCR-538 radios

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were upgraded to SCR-508 standards by adding BC-604 transmitters. The VRC-5 radio also used the same two basic receiver and transmitter components but used a different mounting tray that separated them allowing the radio to be installed in some newer AFVs, like the M19 40mm Self-Propelled AA Gun (used in Korea). In all combinations the receiver and transmitter components shared a common antenna, so there is only ever one antenna system used for all of these radio sets.

The antenna consisted of the MP-48 (or MP-48-A) mast base and three (3) mast sections, MS-52, MS-51, and MS-50. Newer installations used the AB-15/GR mast base with three mast sections, MS-116, MS-117, and MS-118. Both of these antenna configurations were about 10' long.

This is the radio set most likely installed in all types of US tanks during WWII into the early part of the Korean War. It was also installed in many other AFVs.

SCR-610 Vehicular Radio (TM 11-615 "Radio Sets SCR-609 and SCR-610")

This radio set was the most common alternative to the SCR-508 in AFVs. Its main component was the BC-659 receiver-transmitter. There was also a ground-mounted, battery operated version of this set designated the SCR-609 making it a very common radio seen in use throughout WWII and into the Korean War.

The vehicle mounted SCR-610 employed the exact same antenna configurations, mast bases and mast sections, as the SCR-508, that is the MP-48 (MP-48-A) mast base with the MS-51, MS-52 and MS-53 mast sections. Again, newer installations used the AB-15/GR mast base with the MS-116, MS-117 and MS-118 mast sections.

The SCR-610 was commonly installed on US Tank Destroyers like the M10, the M36 and the M18. You can also find it installed on Jeeps and even in vehicles like the M29 Weasel. (The ground mounted, battery operated SCR-609 set usually used a special telescoping antenna, the AN-29-C, which is beyond the scope of this study.)

SCR-506 Command Tank Radio Set (TM 11-630 "Radio Set SCR-506")

The SCR-506 was a long-range AM voice and CW (Morse code) radio set used at battalion and higher echelons. It was composed of two main components, the BC-652 receiver and the BC-653 transmitter mounted together on a common FT-253 mounting.

The SCR-506 radio employed an antenna configured with either the MP-37 or MP-57 mast bases. When configured for moving operations the antenna consisted of five (5) mast sections, MS-49, MS-50, MS-51, MS-52 and MS-53. This antenna was approximately 15' long. When configured for stationary operation, the antenna was extended to about 25' in length by adding three (3) additional MS-53 sections to the bottom. When the antenna was extended to 25,' guy lines with ceramic insulators staked to the ground or tied off on the vehicle were used to stabilize it.

The SCR-506 radio could also be configured with the newer MP-65 mast base and five (5) mast sections, three (3) each MS-116, and one (1) each MS-117 and MS-118. Again, the total length of this configuration was about 15.' Unfortunately, I could not find a copy of the Technical Manual dated later

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than November, 1944, so I could not confirm that the replacement antenna configuration could be extended to the full 25' by adding three (3) more MS-116 sections. This seems likely, though.

When installed in the Sherman command tank, the SCR-506 was mounted in the hull sponson next to the bow gunner's position. The mast base, MP-37, MP-57 or MP-65, was mounted on the right front hull antenna "pot." The bow gunner also operated the radio using either voice or CW. When sending CW messages, the operator usually used the J-45 "leg" key. This was a Morse code key that had a spring metal clamps that fitted around the operator's thigh allowing him to brace his hand against his upper thigh or hip enabling him to tap out messages even in a moving vehicle.

VRC-3 Vehicular Mounted Infantry Radio Set (TM 11-637 "Radio Set VRC-3" and TM 11-983 "Vibrator Power Supply PP-114/VRC-3")

The VRC-3 was a modified version of the infantry back-pack carried SCR-300 radio. The main component, the BC-1000 receiver-transmitter, remained the same. However, while the SCR-300 was battery powered, the VRC-3 was powered by a PP-114 unit connected to the vehicle's electrical system. Note that the VRC-3 radio would have been used in addition to the standard SCR-508 or SCR-610 AFV radios.

Also note that the VRC-3 could not be connected to and integrated with the tank's existing intercom (interphone) system. The VRC-3 required one of the crewman (usually the loader) to operate it separately using a second set of headphones (or external speaker) and a second microphone. This meant that the commander and loader had to verbally pass messages for the infantry back and forth between them while also performing their normal crew duties fighting their tank.

The common late WWII expedient of installing a field phone in a metal ammunition can welded to the rear hull of the tank and wired into the tank's intercom system did allow the infantryman to talk directly with the tank commander. Post WWII tanks were equipped at the factory with such external "infantry phones." However these infantry phones required the infantryman to physically expose himself in combat while also trying to safely keep up with an oftentimes moving tank. Direct radio communication with the tank commander was certainly desirable in many combat situations. The VRC-3 provided a partial solution to this need.

The VRC-3 employed the AB-15/GR mast base with only one (1) each of the MS-117 and MS-118 mast sections assembled to a length of about 6.'

The reason for this shorter overall antenna length was because of the need to connect the external vehicle antenna – AB-15/GR mast base and mast sections – to the radio set using a long coax wire lead. The additional length of the wire lead caused issues with "loading" if the antenna was extended to the full 10' length. The SCR-300 radio set's BC-1000 receiver-transmitter was designed to have the antenna installed directly to it. Consequently, while the SCR-300 employed its own collapsible 10' long AN-131-A connected directly the chassis of the BC-1000 the same could not be done with the vehicle mounted antenna.

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The AB-15/GR mast base location could have been either in the second cast in mounting point on the turret roof or on a separate mount welded to the rear of the turret bustle. Photos from the Korean War suggest that at that time the second standard turret mounting point was most commonly used on Sherman tanks. M24 Chaffee tanks in Korea seemed to have used a second expedient mounting point on their turrets or hulls.

I could not confirm the earliest introduction date for the VRC-3 radio. The earliest Technical Manual, TM 11-637 "Radio Set VRC-3," that I could find was dated October, 1944. This suggests that it is possible that it could have been installed in some US tanks during the last few months of WWII. It does seem, at least to me, that by the Korean War the VRC-3 was in fairly wide spread use.

GRC-3 through GRC-8 Ground Radio Sets (TM 11-284 "Radio Sets AN/GRC-3, -4, -5, -6, -7 and -8")

Until now, all of the radio systems discussed could be considered WWII "legacy" equipment. These older radios had many drawbacks. Perhaps the most significant of these was the lack of interoperability at the small unit tactical level. At the lowest echelons, very few of the radio sets in use by any one branch (armor, infantry, or artillery) could communicate directly with those of another branch. A partial solution was the modification of the SCR-300 to the VRC-3 configuration which at least allowed the infantry and armor to communicate (albeit not very efficiently). In about 1950 this situation improved dramatically with the introduction of the GRC-3 through GRC-8 radios.

The GRC-3 through -8 radios consisted of two different receiver-transmitter units (referred to as set 1 and set 2) mounted together on a common MT-297 mounting base. Once again, though, the different radio sets were constructed around radio frequency bands divided between the three main branches, armor, artillery and infantry. Following these branch divisions, the GRC-3 and GRC-4 were intended for the armor, the GRC-5 and GRC-6 for the artillery, and the GRC-7 and GRC-8 for the infantry. Externally all of these sets appear nearly identical.

Fortunately this division by branch of built-in frequency bands only applied to the number 1 sets of each GRC-3 through -8 radio. All of the number 2 sets shared a common frequency band across all six different radios. Thus, it was finally possible for small units in one branch to communicate directly with small units in another (assuming that each had a GRC-3 through -8 radio) using the number 2 sets. This was still less than an ideal situation since the number 2 set would often have been tuned in to that user's next higher echelon. Still, better than before...

In AFVs the GRC-3 and GRC-4 radios are characterized by two AB-15/GR mast bases each with an antenna made up of three (3) mast sections, MS-116, MS-117 and MS-118. These identical, duel antennas are usually easily seen on the turrets of tanks.

Note that the GRC-5 and GRC-6 artillery radio sets also used the exact same AB-15/GR mast bases and three (3) mast antennas. However, the infantry's GRC-7 and GRC-8 radio sets only used two (2) masts on each antenna, the MS-117 and MS-118. (Go figure..!)

Korean War tanks are commonly seen with these GRC-3 and GRC-4 antenna configurations, and the later in the war the photo is from, the more likely it is to show this. Note that all photos that I could find of the M46 Patton tanks and most photos of M26 and M45 tanks showed these duel AB-15/GR based

Modeling US Army AFV Antennas of WWII and the Korean War

antennas. Most Sherman tank photos from later in the war also showed this configuration. M24 Chaffee tanks and M8 armored cars generally showed either all “legacy” radio set antennas or a combination of one of each, a “legacy” MP-48 and an AB-15/GR based antenna.

A couple of Korean War Outliers: The VRC-7 and ARC-27 (TM 11-285 “Radio Set AN/RC-7”)

Using Hunnicutt as a reference, there were at least two more radio sets installed in US Army AFVs during the Korean War period. These were the VRC-7 and ARC-27 sets.

The VRC-7 was a very short range tactical radio set (only about 1 mile). Note that the VRC-7 used the same receiver-transmitter RT-70/GRC and control units C-434/GRC and C-433/GRC as the GRC-4, -6 and -8. In the GRC-4, -6 and -8 radios these components comprised the “set 2” portion of the radio. In the VRC-7 they were used by themselves. The VRC-7 could be installed in any vehicle (such as jeeps, etc.), but in AFVs with the “legacy” SCR-508 radios the VRC-7 would have added the capability to communicate with the newer GRC-3 through -8 radios installed in other AFVs. Note that the remote control unit C-433/GRC allowed the operator to connect to the RT-70/GRC by a standard field phone wire. Thus the actual radio could be located some distance from the operator in tactical situations such as artillery forward observers working in covered and concealed positions. The VRC-70 could also be operated without using the control unit as a normal GRC-3 through -8 “set 2.”

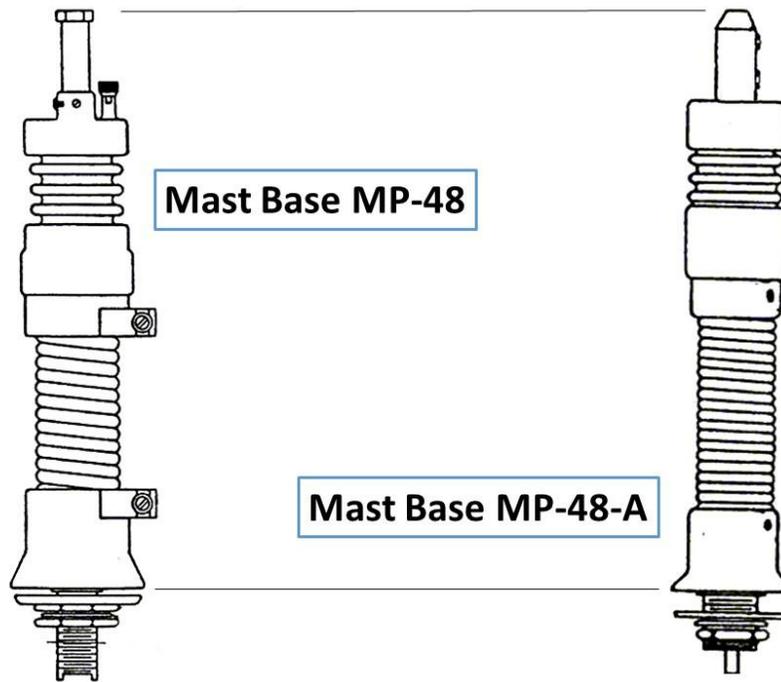
The VRC-7 also employed the, by now familiar, AB-15/GR mast base but with two shortened mast sections, the AB-24/GR and AB-22/GR. Each of these was about 23-1/2” long with the AB-24/GR section tapering to a blunt point forming a total antenna length of about 40” when screwed together and into the base. As with the MS-116, et al, masts, these were made from hollow copper tube with male and female threads formed into the ends. They were painted OD with yellow indelible ink stamped data.

The ARC-27 radio was an air-to-ground system. According to RP. Hunnicutt’s “Patton” book, it was an installation option in the M46 and M47 tanks. Aside from a few photos of the main receiver-transmitter components, I couldn’t uncover any information about the antenna systems used by it.

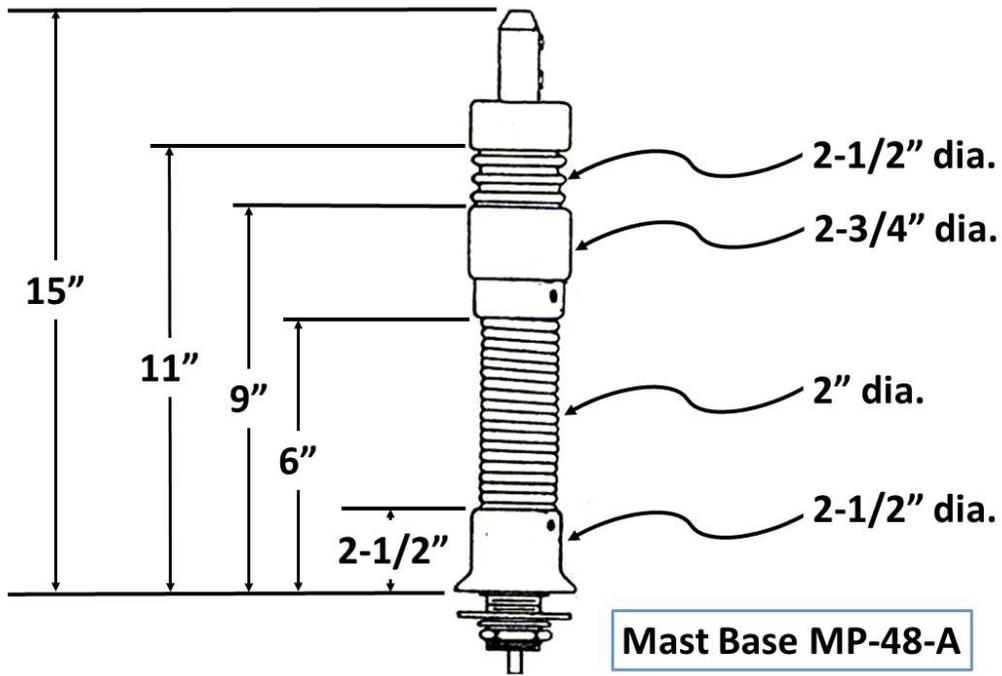
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Mast Sections MS-49 through MS-53
(From Bottom to Top)



Roll BG-56



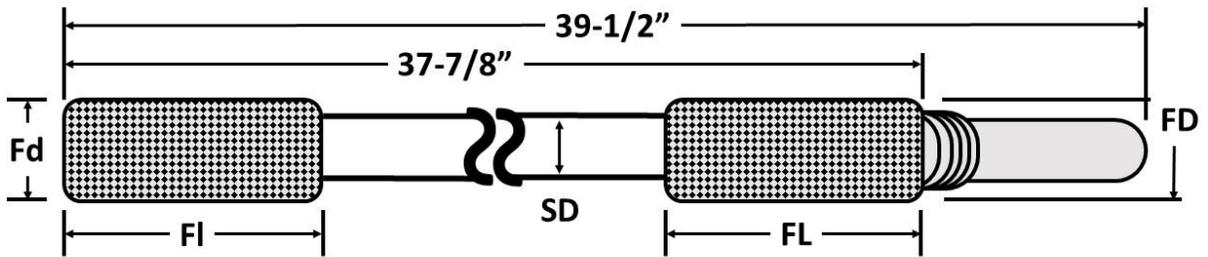
Male Ferrule Details,
Markings and
Colors





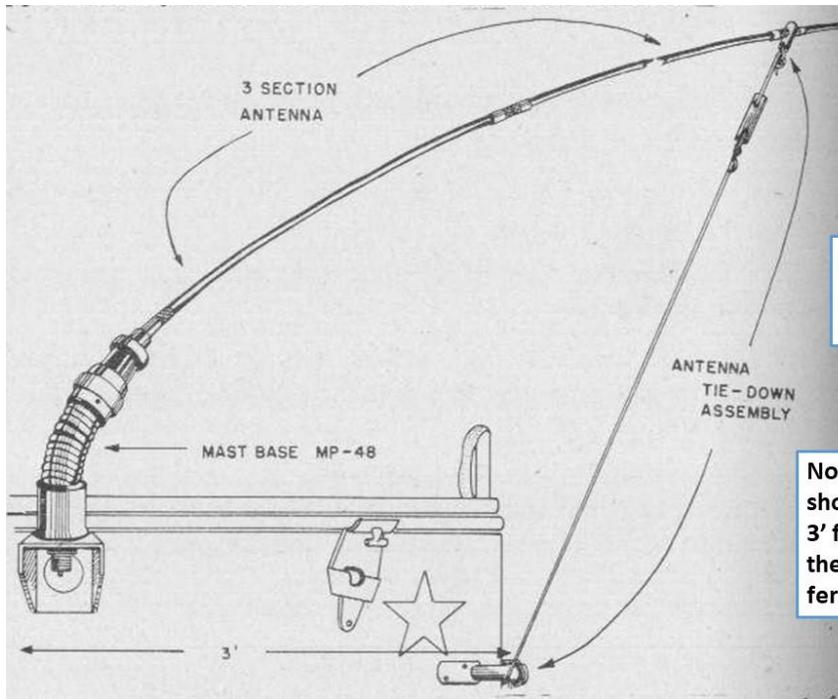
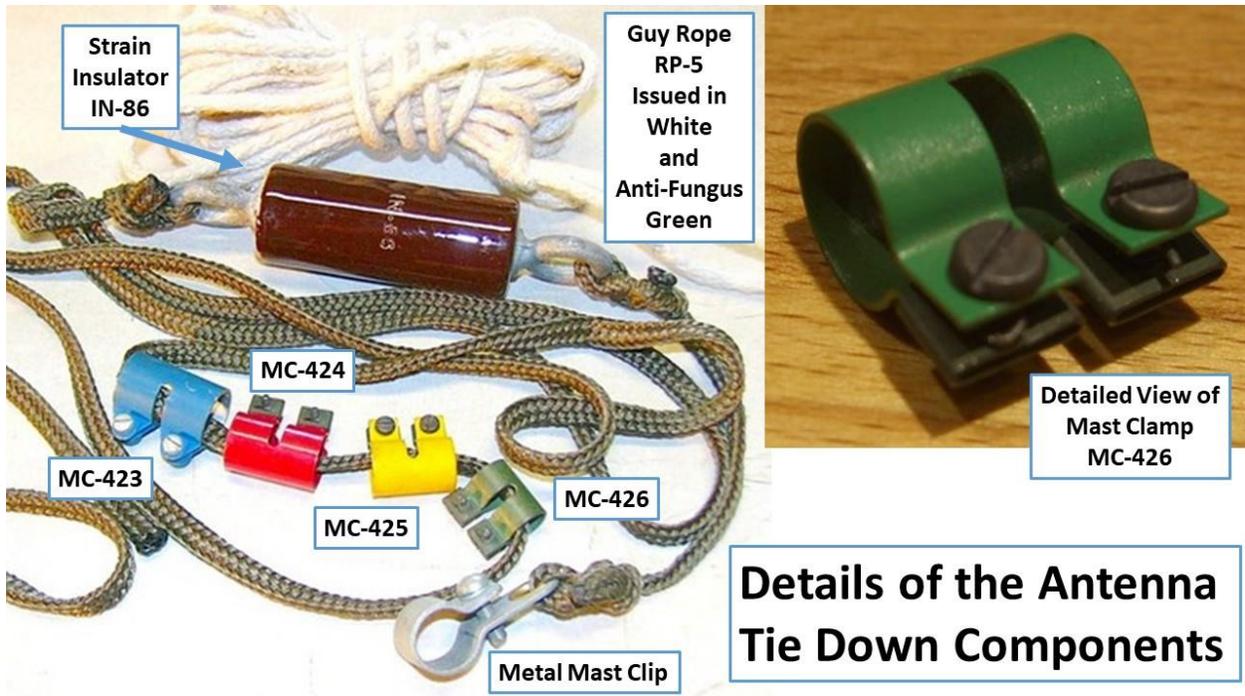
Detailed Examination of MS-52 Mast Section

Mast Section Dimensions



Mast Section	Shaft Dia. - SD	Bottom Ferrule Length - FL	Bottom Ferrule Dia. - FD	Top Ferrule Length - FL	Top Ferrule Dia. - Fd
MS-53	1/2"	1-7/8"	3/4"	1-7/8"	5/8"
MS-52	7/16"	1-3/4"	5/8"	1-3/4"	9/16"
MS-51	3/8"	1-5/8"	9/16"	1-5/8"	1/2"
MS-50	5/16"	1-5/8"	1/2"	1-5/8"	7/16"
MS-49	3/16"	1"	7/16"	N/A (Dull Point)	N/A (Dull Point)

Modeling US Army AFV Antennas of WWII and the Korean War



Guy Rope / Tie Down Components in Use

Note that the tie-down should be secured at least 3' from the mast base and that the mast clip is secured at one ferule joints.



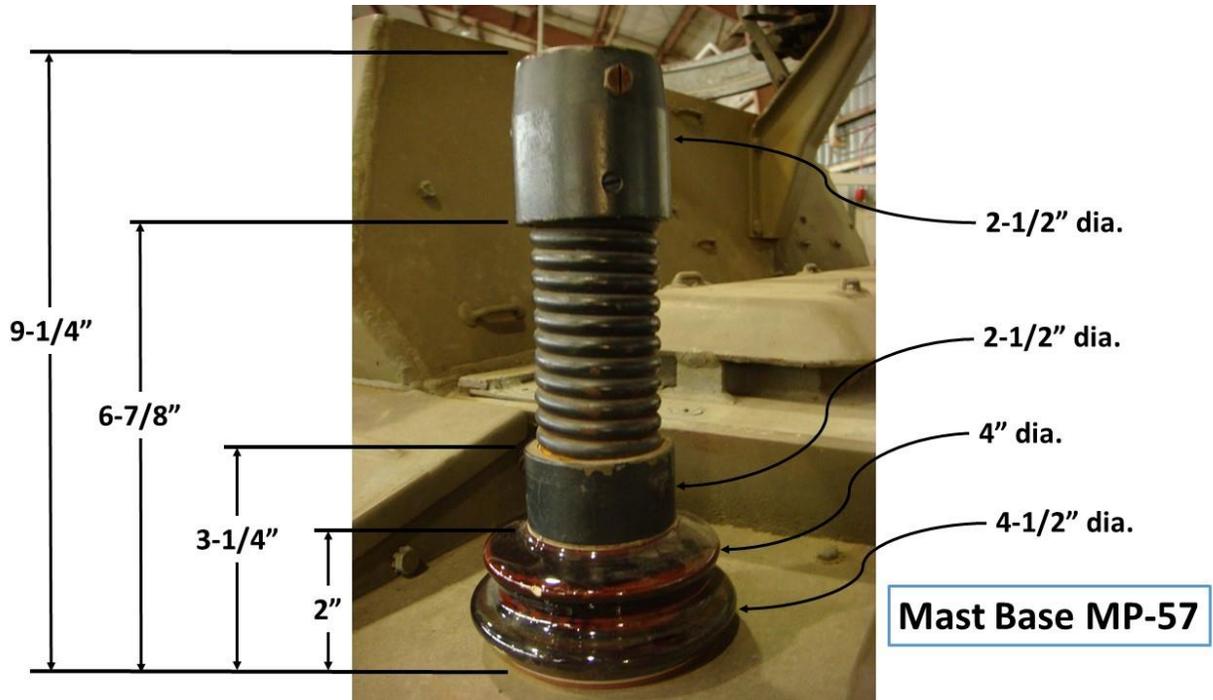
Complete Antenna System



Mast Base MP-37



Mast Base MP-57

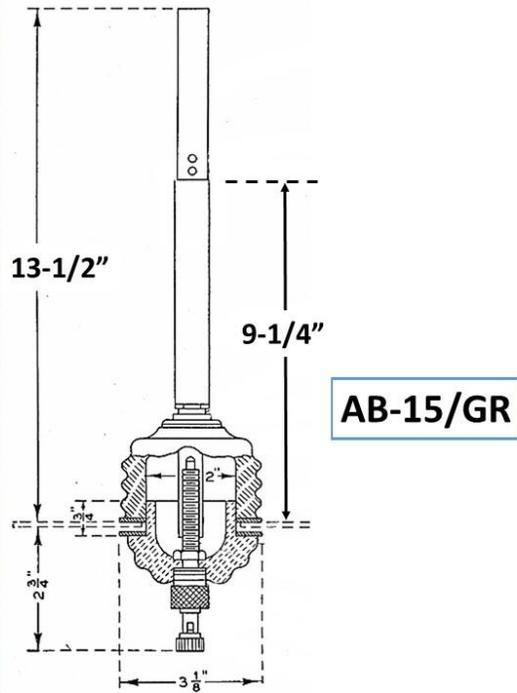
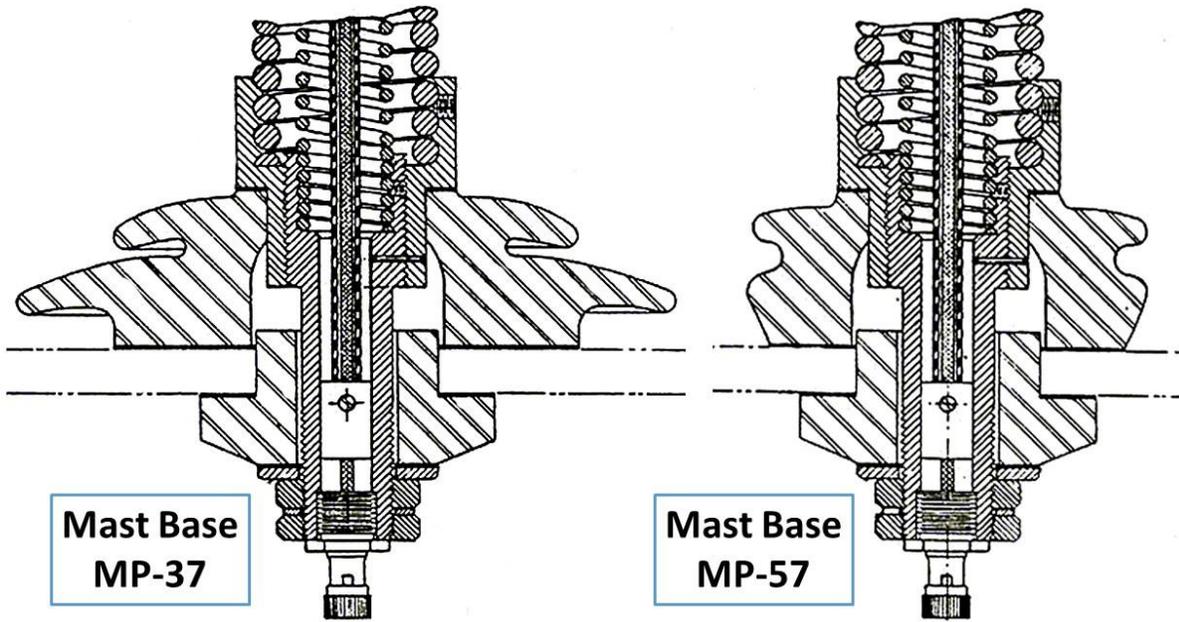


Early Hulls



Late Hulls

Mounting Locations for Mast Bases MP-37 and MP-57 when used with SCR-506 in Sherman Command Tanks

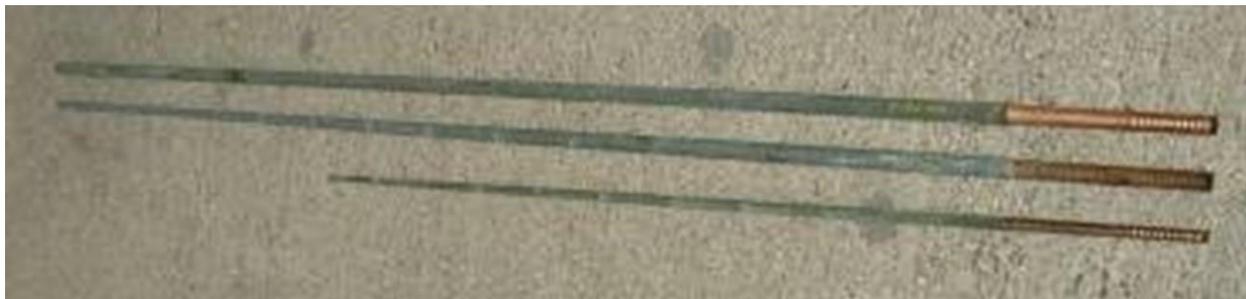
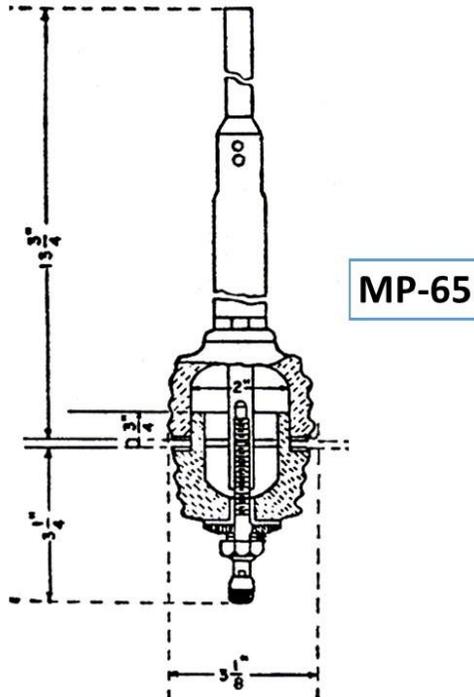
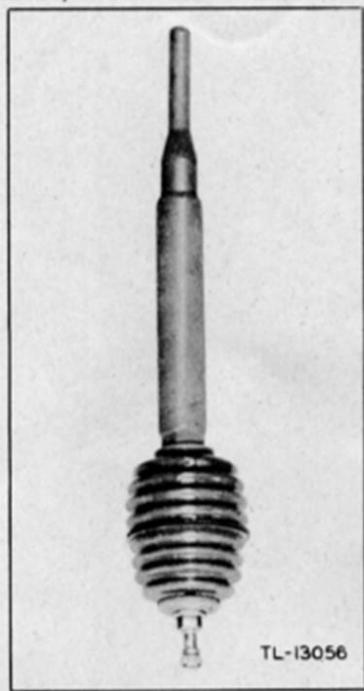




**Mast Sections MS-116, MS-117 and MS-118
Along with Storage Roll BG-56**



**Detailed Views of the
Construction, Colors and
Markings of the Replacement
Mast Sections**

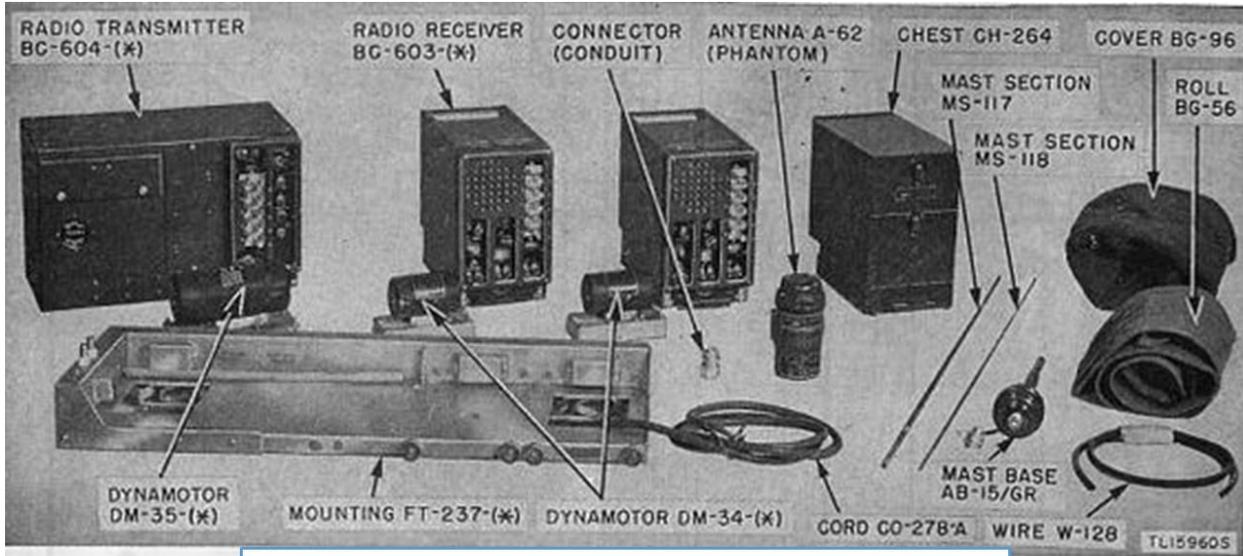


Top: MS-117 and MS-118 Mast Sections

Bottom: AB-24/GR Mast Section

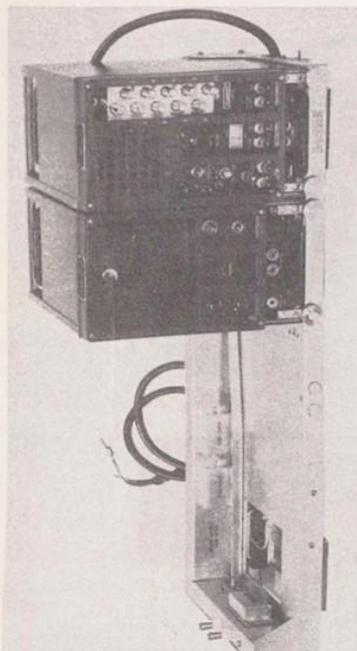
Note the difference in length.

Modeling US Army AFV Antennas of WWII and the Korean War

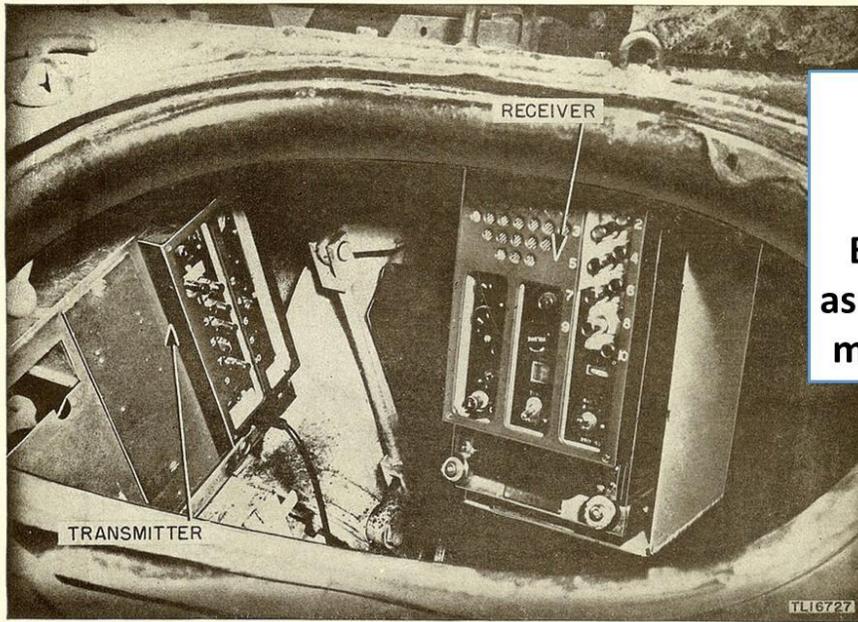


SCR-508 Tank Radio Set
 Note the Basic Components are the Same for the:
SCR-528, SCR-538 and VRC-5

THIS SHEET IS CLASSIFIED:

INSTRUCTIONAL LITERATURE: TM 11-600	STATUS: CHANGE IN STATUS:	STANDARD 29 Apr 41	NOTE: SEE INDIVIDUAL SECTIONS FOR SECTION CLASSIFICATION.	NOMENCLATURE DESIGNATION: <h2 style="text-align: right;">SCR-538</h2>			
 <p style="font-size: small; text-align: center;">RADIO SET SCR-538 FRONT VIEW</p> <p style="font-size: x-small;">RECEIVER ONLY. COMPRISES ONE RECEIVER AND A SEPARATE INTERPHONE AMPLIFIER. SAME MOUNTING BASE FT-237 IS USED AS FOR SCR-508 AND 528 PERMITTING USE OF THE COMPONENTS OF ANY OF THESE SETS; SCR-508 WHOLLY OCCUPIES THE MOUNTING BASE AND SCR-528 ONLY PARTLY. SEE SCR-508.</p>			PART A - TECHNICAL CHARACTERISTICS (CLASSIFICATION:) FREQUENCY RANGE (Mc) 20 to 27.9 (RECEIVER ONLY) NUMBER OF CRYSTALS: PRESET FREQUENCIES: 10 - PUSH BUTTON SELECTION ANTENNA: 9 FT. FISHPOLE TUNING: (MO OR XTAL) SENSITIVITY: SELECTIVITY: POWER SOURCE: VEHICLE BATTERY (12 V OR 24 V) SIMILAR SETS: POWER OUTPUT: (WATTS) TUBES: (TYPE AND NUMBER) SCR-538 USES: 1-BC-603-A; 1-BC-605-A; 1-BC-603-A; 2-6 SL 7 OT; 1-6H6; 1-6J5; 1-6V6 OT; 3-6AC 7/1852; 2-12SD7. 1-605-A; 2-1619 TUBES.	PART B - TACTICAL CHARACTERISTICS (CLASSIFICATION:) USE: Cav; Mco2 & Mtzd; ARMO F1 TANK AND MAINTENANCE UNITS. RANGE: (MILES) TO COMMUNICATE WITH: SCR-293; SCR-508; SCR-509; SCR-510; SCR-528. TO REPLACE IN PART: SCR-210; SCR-294. TRANSPORTATION: TRANSPORTED AND OPERATED IN VEHICLES TYPE OF SIGNAL: VOICE (FM)			
			PART C - PRINCIPAL COMPONENTS (CLASSIFICATION: RESTRICTED)				
		ITEM	DIMENSIONS			WEIGHT	CLASSIFICATION
			HEIGHT	WIDTH	DEPTH		
		RECEIVER BC-603, INTERPHONE AMP. BC-605	1 1/4 "	1 1/2 "	3/4 "	135 #	
		MOUNTING FT-237, MAST BASE MP-37 OR 57					
		COMBINED WEIGHT OF COMPONENTS:					
		COMBINED VOLUME:					
		SHIP TONNAGE:					

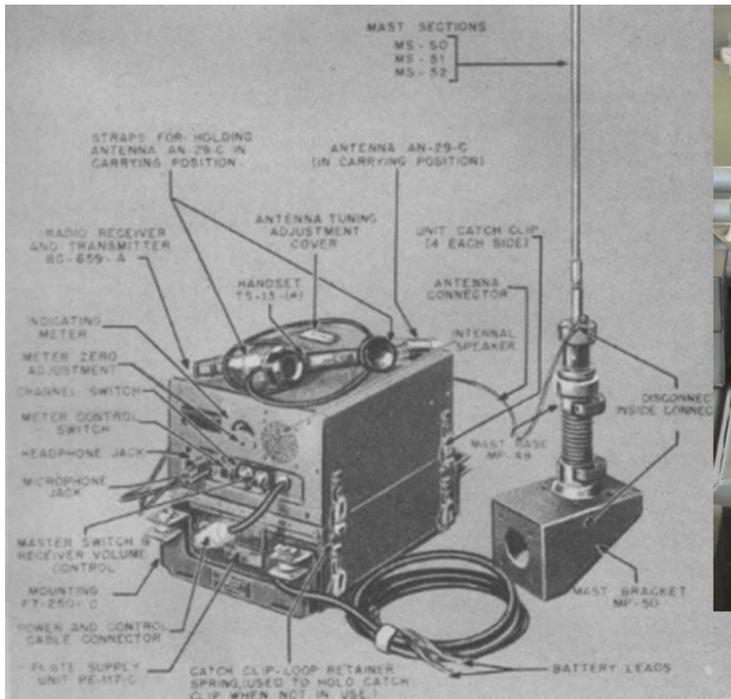
SCR-538 Tank Radio
(Receives Only)



VRC-5 Radio Set

Same
Basic Components
as SCR-508 separately
mounted in the AFV.

Figure 7. Radio Set AN/VRC-5, mounted in Twin 40-mm Gun Motor Carriage, M19.



SCR-610 Vehicular Radio



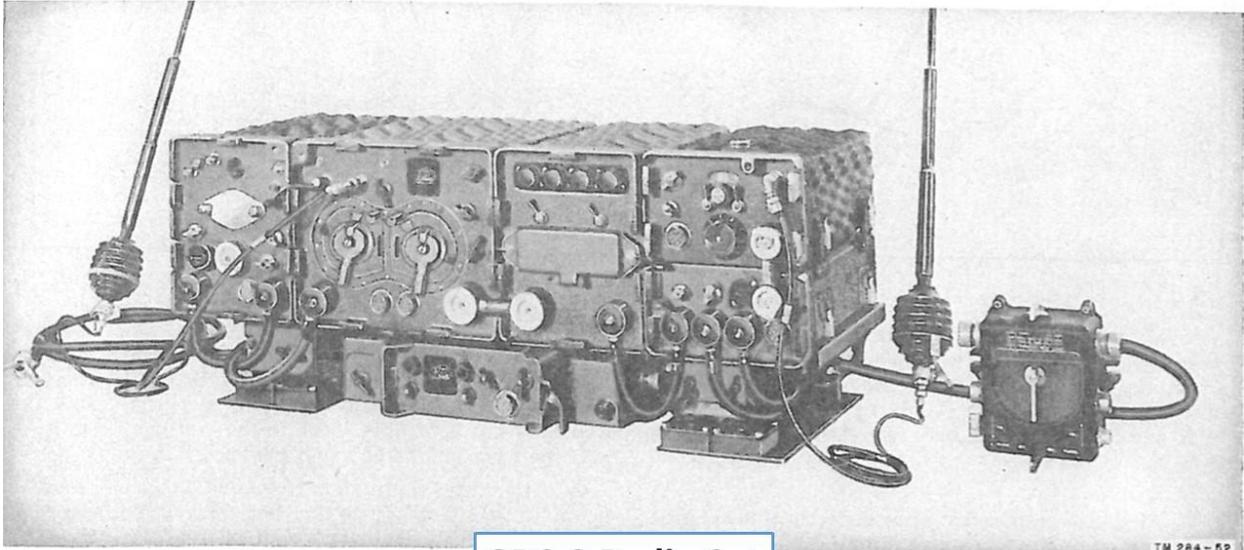
VRC-3 Radio Set
Vehicle Mounted Version of the
SCR-300 Backpack Carried Radio



VRC-3 with PP-114

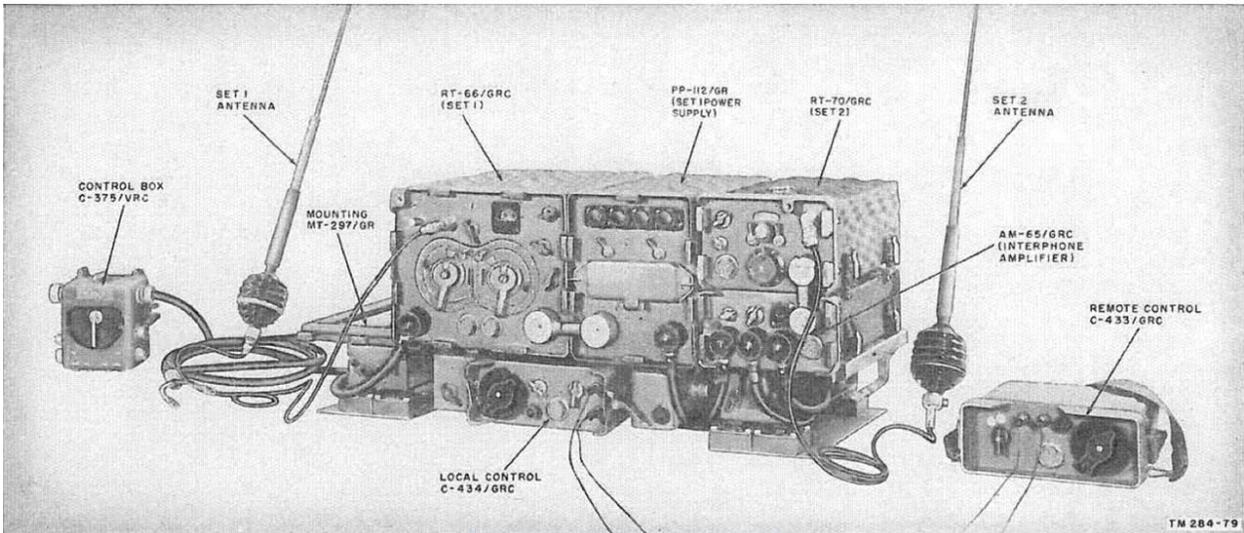


SCR-300 Backpack Carried Radio



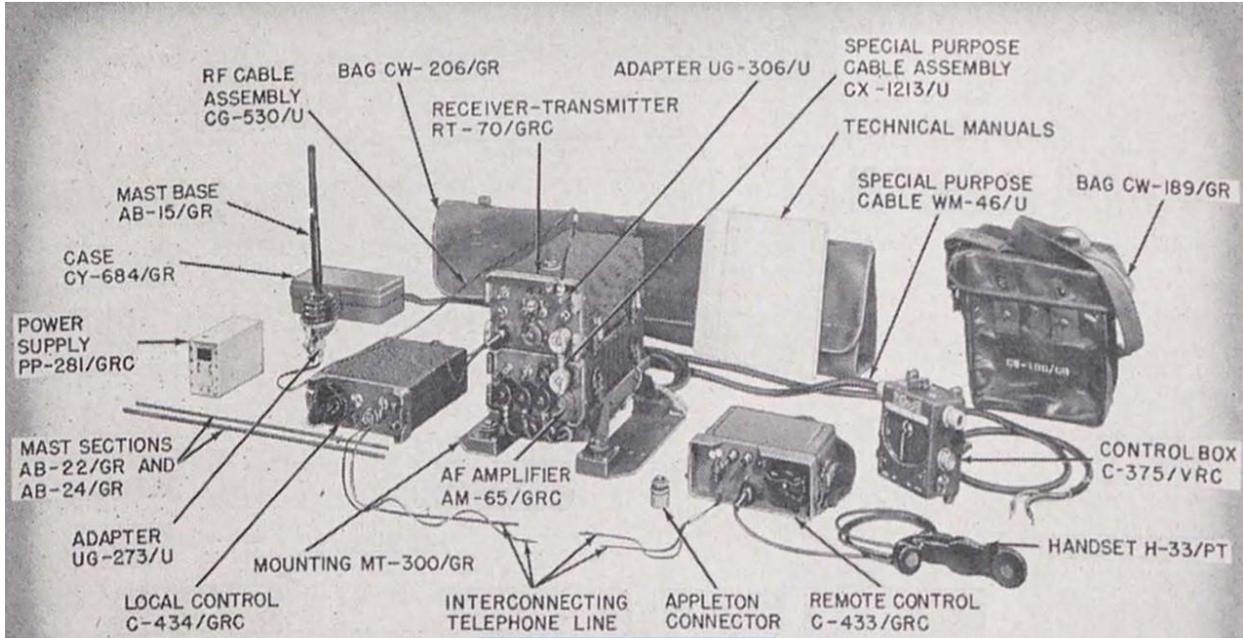
GRC-3 Radio Set

TM 284-52

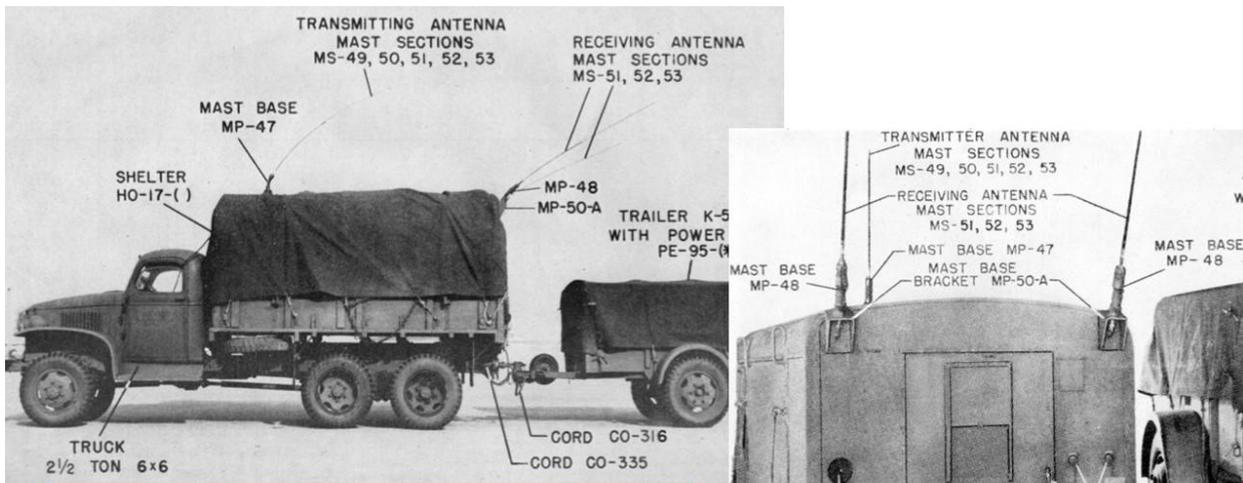


GRC-4 Radio Set

TM 284-79



VRC-7 Radio Set



SCR-399 Radio Station

Note that the antennas are constructed from the same common components. The multi-colored mast section ferrules would add a lot of interest if this were modeled.



Bibliography

Most of the radio technical manuals that I referenced for this study, along with data sheets and much other useful information, can be found on the Radio Nerds .com website.

http://radionerds.com/index.php/Main_Page

To determine the radios installed in most of the vehicles discussed above I turned to the tables in the back of R.P. Hunnicutt's series of books. Similar information can be found in other references.

Hunnicutt, R.P. "Patton: A History of the American Main Battle Tank." Volume 1. Presidio Press, Novato, CA 1984. ISBN 0-89141-230-1

----- "Pershing: A History of the Medium Tank T20 Series." 2nd Ed. Feist Publications, Bellingham, WA 1996. No ISBN listed.

----- "Sherman: A History of the American Medium Tank." 2nd Ed. Presidio Press, Navato, CA 1978. ISBN 0-89141-080-5

Technical Manuals:

TB SIG-154 "General Standards for Vehicular Antenna Installations"

TM 11-242 "Radio Set SCR-300"

TM 11-272 "Radio Sets SCR-210 and Radio Sets SCR-245"

TM 11-281 "Radio Sets SCR-399 and SCR-499"

TM 11-284 "Radio Sets AN/GRC-3, -4, -5, -6, -7 and -8"

TM 11-285 "Radio Set AN/RC-7"

TM 11-600 "Radio Sets SCR-508, SCR-528 and AN/VRC-5"

TM 11-615 "Radio Sets SCR-609 and SCR-610"

TM 11-630 "Radio Set SCR-506"

TM 11-637 "Radio Set VRC-3"

TM 11-983 "Vibrator Power Supply PP-114/VRC-3"

A special thanks to the National Armor & Cavalry Museum, Fort Benning, GA for permission to measure and photograph mast bases and mast sections in their collection holdings. One day the NACM will become the armor museum that AFV enthusiasts in the US all hope for. However, "hope is not a course of action," so until that day arrives, I highly encourage you to donate to the National Armor & Cavalry Heritage Foundation. Your generous donation and support will hasten that day. Their website can be found at - <https://www.armorcavalryheritagefoundation.org/>