- Planning a TV Antenna Installation
- More Adventures in TV Servicing

journal

May/June 1975

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journal

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In this issue, top NRI technical consultant James Crudup details the careful planning required to properly install a TV antenna. And veteran Journal author J. B. Straughn adds still another chapter to his widely acclaimed series on practical TV servicing techniques.

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Planning a TV Antenna Installation

by James Crudup, C.E.T.

Recently I made a service call. Before I left on that call I checked with the customer to find out the symptoms as I normally do. The symptoms were ghosts, snow, and overall poor reception on most channels. Before starting out on the service call, I checked with the customer to find out what type of antenna he was using. I was told that it was an outside antenna, less than five years old, and that it had worked well in the past. He also told me that when he disconnected it from their color set and connected it to a black-and-white portable, they got a very good picture. For this reason he didn't think there was anything wrong with the antenna. I'm quite sure he didn't realize that a color set requires a stronger signal for a good picture than does a black-and-white set. To play it safe I decided to take a pair of rabbit-ears with me on this service call.

As I neared the customer's house I noticed that the antenna was leaning to one side and it looked like the lead-in was broken. The color set was located in a corner of the recreation room at the rear of the house. One glance at the lead-in crushed under the closed window told me that this antenna had not been installed by a professional.

I turned the set on and everything the customer had described was true. Some channels produced pictures with ghosts; other channels produced pictures with snow. None of the channels would produce a good sharp picture. Disconnecting the lead-in affected the picture very little.

I connected the rabbit-ears to the set and found that I could get satisfactory pictures on all but one channel. The unsatisfactory channel had ghosts. Moving the rabbit-ears from the top of the set to a spot near the window eliminated the ghost problem. The results were just about what I had expected, but the customer was quite surprised to see such good pictures on each channel with the rabbit-ears connected. I pointed out that the picture wasn't sharp and crisp. I also demonstrated that the color faded in and out as I walked about in the room. A good outside antenna would eliminate this problem.

After talking with the customer about his antenna, I learned that he had purchased it almost five years ago from a drug store and had installed the antenna himself. He did not have any prior experience installing antennas, nor was electronics his hobby. For him, the do-it-yourself antenna project was strictly an economy measure.

I pointed out a few of the more obvious problems of the antenna job that would affect the quality of his picture. Then I suggested that we take a look on the roof for other problems. The flat roof was easily accessible through a skylight on the second floor of the house. A six-foot ladder was adequate for climbing up to the roof.

Once on the roof, I noticed several other things that were wrong with the installation. As a matter of fact, I was surprised the antenna was still standing.

The antenna was on a pipe quite near a power line, the mast was not grounded, and the inexpensive lead-in was brittle and cracked and wasn't properly secured. The mounts holding the mast were loose. The antenna itself was apparently of poor quality since it was quite rusty.

Operating the set for five years from an antenna that was not protected against lightning and the fact that the antenna was about to fall on the power line was enough to convince the customer that it was time for a new antenna. He asked me if I would install a new antenna system for him, and if so, about what would it cost. Spring is a nice time of year to install antennas, and since I only had one service call scheduled for the following Saturday, I decided I could do the job.

As for an estimate, I told the customer it would be in the neighborhood of $75. Judging from what I had seen so far, the job wouldn't be too difficult. I added that I could make my estimate a little more precise after I checked the complete site to see exactly how the system could best be connected. The customer nodded in approval and said $75 sounded fine as long as I didn't go much over that.

I then told him that I had to finish surveying the site to determine exactly what material would be required. I could pick up the material and come back on Saturday at noon to do the job. He agreed.

PLANNING THE JOB

The first step in installing an antenna is planning the job. We do this in order to find out exactly what needs to be done, what material will be required, and to decide

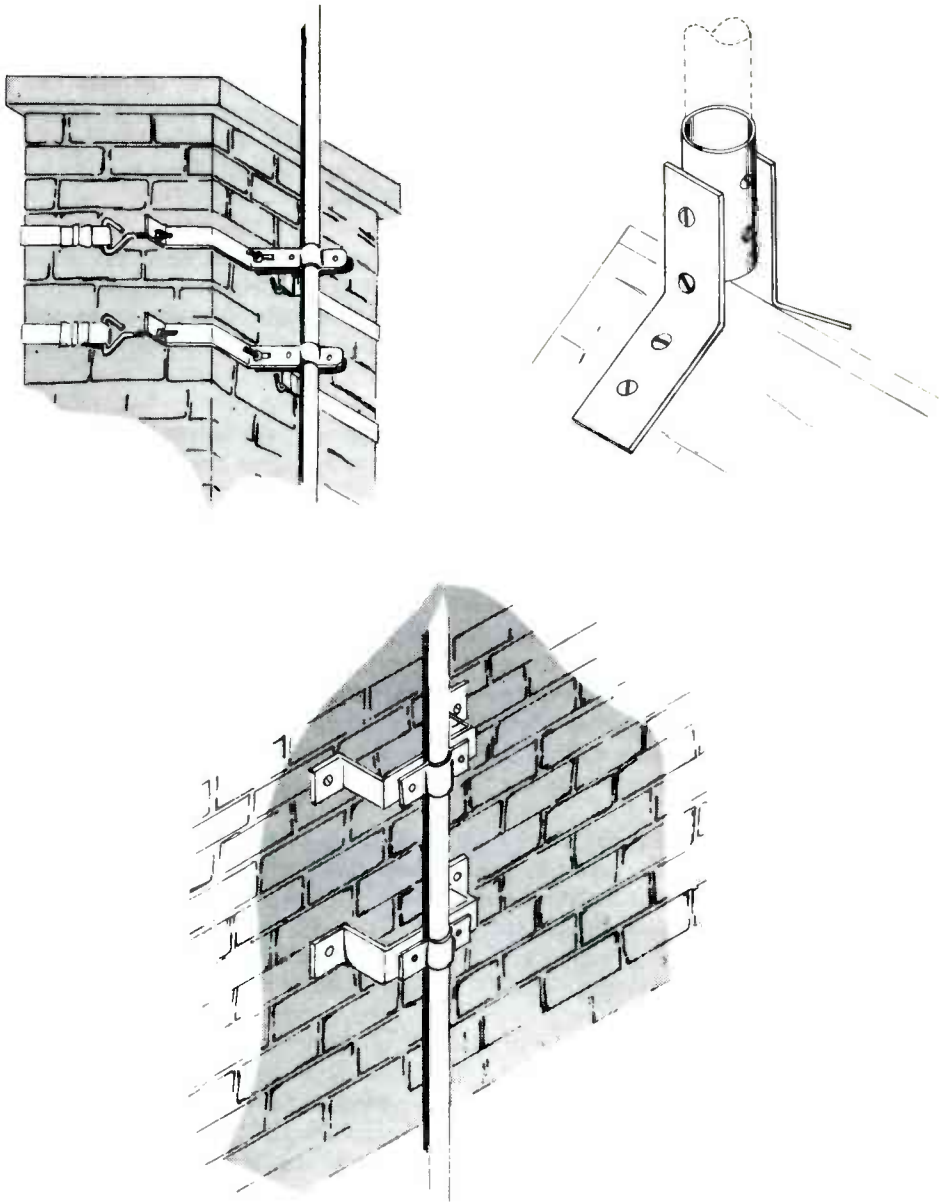


FIGURE 1. THREE EXAMPLES OF MOUNTING FIXTURES FOR ATTACHING THE ANTENNA MAST TO THE HOUSE.

on the most efficient way to do a professional job. Planning this way also allows one to come up with a fairly close estimate for the customer.

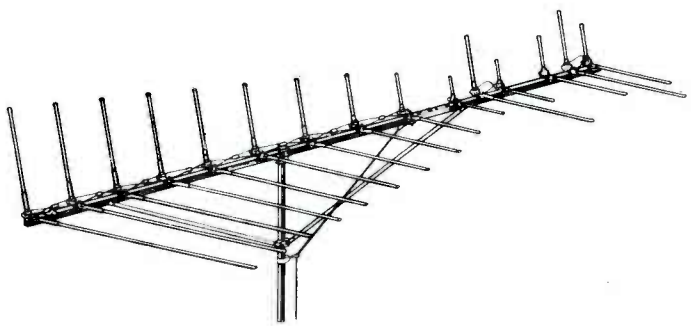
I told the customer that of the three popular mounts for antenna installations, the chimney mount was the best one to install in his case. He agreed to a chimney mount. The wall mount and the roof (peak) mount (shown in Figure 1) are not as popular and are a little more difficult to install than a chimney mount. Of course, you would have to use one of these others if a customer did not have a suitable chimney. In any case, the mount must securely hold the antenna mast in place.

The customer's old mast had started to rust and I didn't want to use it. I figured a five-foot mast would be adequate. There were no tall obstructions around and antenna height didn't seem to be a problem since we had gotten a fair picture with the rabbit-ears. A five-foot mast is very easy to install because guy wires are generally not required.

Most masts are generally available in five- and ten-foot lengths. They usually have a swaged, tapered end so that they can be stacked to make a taller mast. However, any mast that extends ten feet or more above the mount will have to be guyed to keep the mast from blowing over.

For this job I decided to use a five-foot galvanized steel mast because it is strong and won't rust. I could have used an aluminum or painted steel mast but aluminum is expensive and the cheaper painted steel mast will eventually rust.

Choosing an antenna that will provide your customer with good reception is extremely important. This customer's house was less than fifteen miles from most of the VHF stations and no more than thirty miles from the three UHF stations in the area. In addition, all of the stations were located in the same general direction. Because of the relatively short distance between the house and the stations, this is considered a secondary signal reception area and I decided to use an all-channel log periodic antenna. The antenna I had in mind was a combination VHF/UHF/FM antenna with good gain and a flat bandwidth, similar to the one shown in Figure 2.



Courtesy The Finney Company

FIGURE 2. ALL-BAND LOG PERIODIC ANTENNA FOR USE IN SECONDARY SERVICE AREAS.

I felt that this type of antenna would provide excellent reception. I had also noticed antennas of this type on other roofs in the area. This antenna is light and strong and is made of anodized aluminum to withstand harsh weather. It should provide many years of service.

It looked like I would need about 45 feet of lead-in for this job, but I couldn't be sure until I checked to see exactly how I would bring the lead-in into the house. I couldn't run it through the attic because there wasn't enough room to work in. Checking in the basement, I decided that I could drill through the outside brick wall to bring the lead-in through the basement. I could easily run the lead-in through the open basement and drill a hole through to the recreation room, very near the set.

This all looked fairly easy and the lead-in run was fairly simple. My estimate of 45 feet of lead-in would probably be adequate, but I would rather be safe than sorry so I would bring an extra ten feet. I wrote down 55 feet on my list.

There are two basic types of lead-in: 300-ohm twinlead and coaxial cable. I decided to use twinlead since its 300-ohm impedance would match the antenna without having to use a balun. In addition, twinlead does not attenuate the UHF signals as much as coax.

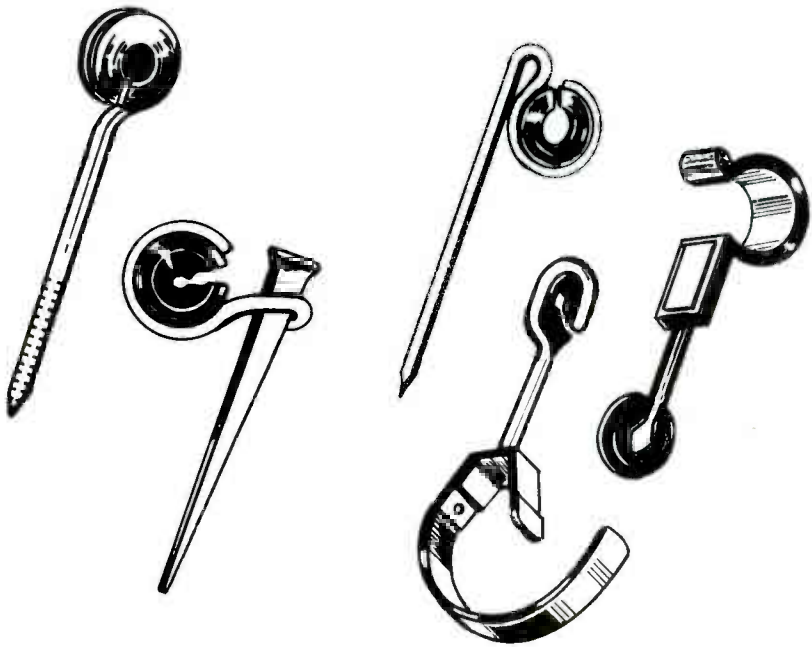


FIGURE 3. SEVERAL TYPES OF TWINLEAD STANDOFFS.

Twinlead comes in quite a few different types. Tubular, shielded, and foam-filled are a few. Each type has its own advantages and disadvantages. For this job I figured on using the foam-filled twinlead. Due to the way it is constructed it has excellent dielectric properties. Dirt and moisture have very little effect on it. Another advantage of this lead-in is its durability and long life. I didn't want to use a lead-in that would crack and become brittle after one hard winter.

For this job I would also need standoffs to support the twinlead and keep it away from grounded objects. Figure 3 shows some typical standoffs. There are screw-in types for wood, pointed types for masonry, and clamp-on types for the antenna mast. Most types come in two sizes, 3-1/2" and 7". Standoffs are usually placed every four feet of the lead-in run. I figured I would need about 15 for this job. To be on the safe side I planned on getting 20. Again, it is better to have more material for a job than not enough. Besides, you'll probably need them for another job.

If I had used coaxial cable for this job, I wouldn't have needed any standoffs. Coaxial cable can be taped to the antenna mast and routed down the side of a building without any problems.

Since I was going to use a combination VHF/UHF/FM antenna, I would also need a signal splitter at the set. A signal splitter separates the UHF and VHF (and the FM if you want) signals at the set so you can connect the proper signal to the two sets of antenna terminals.

I was about to call this service call quits for the day, but before I left I wrote out my list and checked it over to make sure I wasn't missing or overlooking anything:

(1) Antenna
(2) Chimney mount
(3) Five-foot galvanized mast
(4) Fifty-five feet of foam twinlead
(5) Twenty standoffs (clamp, screw and masonry)
(6) Signal splitter

I had almost forgotten that I would need at least a twenty-foot ladder to install the standoffs down the side of the house. Everything else was in order so I picked up my tool box but left the rabbit-ears with my customer. I would pick them up Saturday when I came back to install the antenna.

Something was bugging me as I pulled away, and all of a sudden it came to me that I had forgotten lightning protection. I pulled off to the side of the road and added a lightning arrestor, ground wire, and a ground rod to my list. Fortunately, I had given a large enough estimate to cover these items.

In a later issue of the Journal I'll tell you about the actual installation of the antenna system for this customer. This is a "typical" installation and should help you on any antenna jobs you might have to work on.

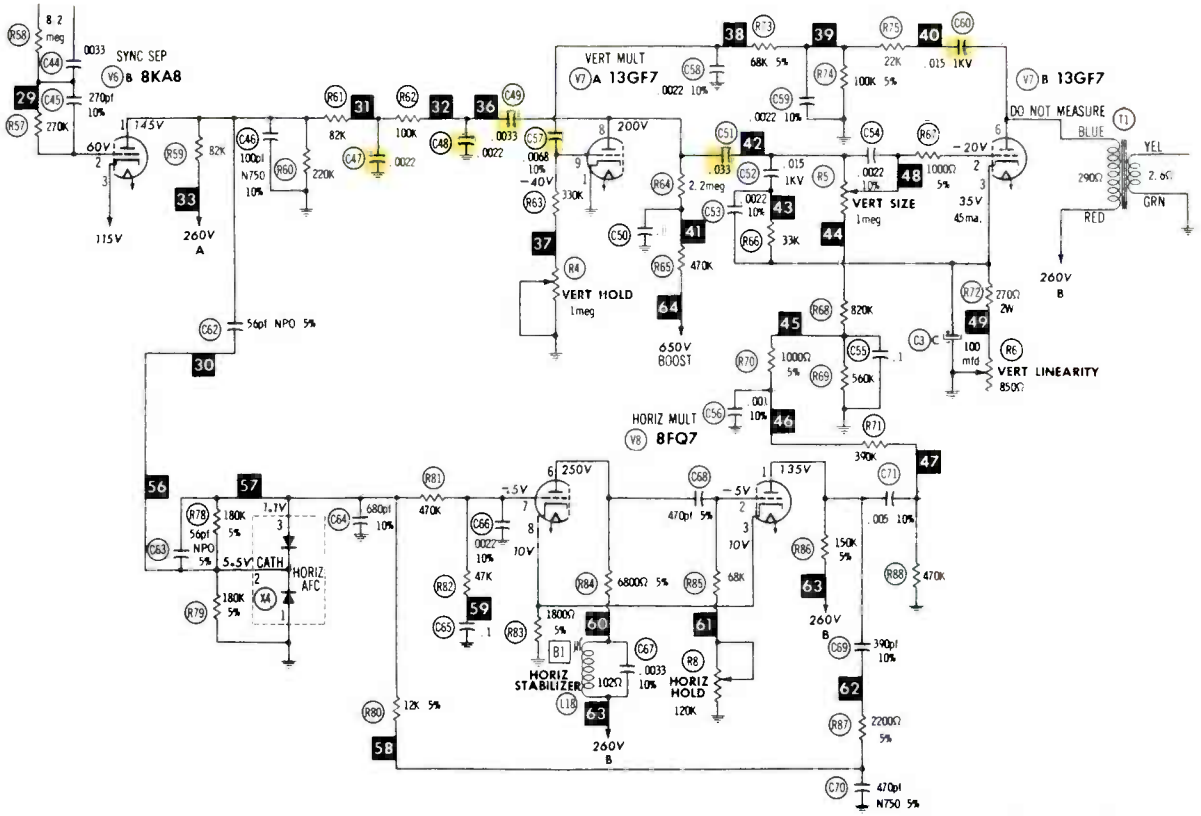
More More More Adventures in TV Servicing

J.B. Straughn

CURTIS MATHES CHASSIS TV 16

This set was brought in with the complaint that it didn't work. At the bench I found the tubes did not light, and the cause was quickly traced to an open in the circuit breaker. This was temporarily shorted out with a jumper cable—a one-foot length of wire with insulated clips at either end. I buy these by the pack and lose them with great rapidity. They come in two sizes—regular and heavy-duty. I get the regulars because the wire is thin enough to burn out if there is a short in the circuit. The clips pull off the regulars easily under rough treatment, but are just as easily resoldered.

With the tubes lighted, good sound was obtained but there was no raster. When the set was first turned on I could hear the high voltage (a slight crackling sound) as it arrived at the anode of the picture tube. This is far more noticeable in a color set, where you may have 25,000 or more volts generated, but is often inaudible in black-and-white receivers. Because I believed high voltage was being applied to the picture tube, I suspected that the 23EGP4 picture tube was at fault. A check with the picture-tube tester showed that the tube had no measurable emission. After rejuvenating the tube several times I could measure a lower-than-normal emission. I had an old tube brightener, retrieved from a set in which a new picture tube had been installed. With the brightener installed, the heater voltage of the 23EGP4 was increased enough to give a fairly good picture.



Courtesy Howard W. Sams

FIGURE 1. SYNC SEPARATOR, VERTICAL AND HORIZONTAL OSCILLATOR STAGES.

Now my troubles started. The vertical frequency could be adjusted with the hold control, but the picture would soon begin to roll. Readjustment would fix things for a short time only. The agc control seemed to have more effect than it should and led me to believe that clipping was taking place in the video i-f amplifier. This would, of course, remove the sync tips from the video signal. I checked the rf tube in the tuner and i-f tubes and found the first i-f, which is agc-controlled, to be weak. I didn't have another 4JD6 but after looking the tube up in the tube manual, where it was listed as a sharp-cutoff pentode, I figured a 4EJ7 would be a suitable replacement so I installed one.

The trouble continued so I decided that some of the capacitors in the vertical circuit were leaky or had changed in value. I replaced the capacitors which are shown shaded in color in the schematic in Figure 1. The vertical sync was now much better but it would still roll, and I found that the horizontal was also unstable and was subject to pulling.

I now decided that I had trouble in the sync separator. I installed a new 8KA8, which did not help. I then checked all resistors in the circuit and found them to be okay. The only thing left was C44 and C45, which I proceeded to replace. I found that C44 did not test okay as far as leakage was concerned and that it had a small dc voltage across it after removal from the circuit. At first the set seemed fine, but after a time the trouble returned with severe horizontal pulling—and also the agc setting seemed very critical. I set the receiver to one side until I could get to town and pick up some capacitors for substitution in the agc circuit.

In the meantime, I thought about the set. When I had the parts I wanted, I got back to the receiver and figured it would be smart to clamp the agc line before starting out on a parts-swapping expedition. By clamping the line, we mean that the voltage on the agc line is held constant. This was done with a bias voltage box which, when set, will produce fixed dc voltages to be connected across the agc network.

With the voltage adjusted to give about 2.5 volts negative, the set played and played. After some hours the horizontal became a little unstable and the slug in the horizontal stabilizer coil required readjustment. I knew this must be due to a change in the capacitance of C67, the 0.0033 μf capacitor across the stabilizing coil.

I removed the bias box and by carefully adjusting the agc control, I could get good sync but the control should not have been so touchy. I started looking over the circuit, noting that the 4JD6 was used in the first i-f and was agc-controlled while a 4JC6 was used in the second i-f, which did not employ agc. It also occurred to me that the first i-f tube should have remote cutoff characteristics. I looked again in the manual and while the 4JD6 was marked "sharp cutoff," its curves indicated that it was a remote cutoff type, which would be expected in an agc-controlled stage. I broke down and bought a new 4JD6, and with it installed, everything was okay.

This set had a multiplicity of troubles, some of which masked others. The capacitor replacements made in the vertical and sync stages were necessary. Don't ask why I didn't get out my scope to check the stages and why I didn't monitor the agc

voltages with a voltmeter. This would have speeded things up—live and learn, I hope.

I remembered to replace the clip lead with a new circuit breaker and charged the customer $35. I told him that if he later decided on a new picture tube, I would allow him $5 for the return of the tube brightener. Parts cost me about $6.50, but considering the time spent, I did not make very much.

OLYMPIC MODEL 9P46

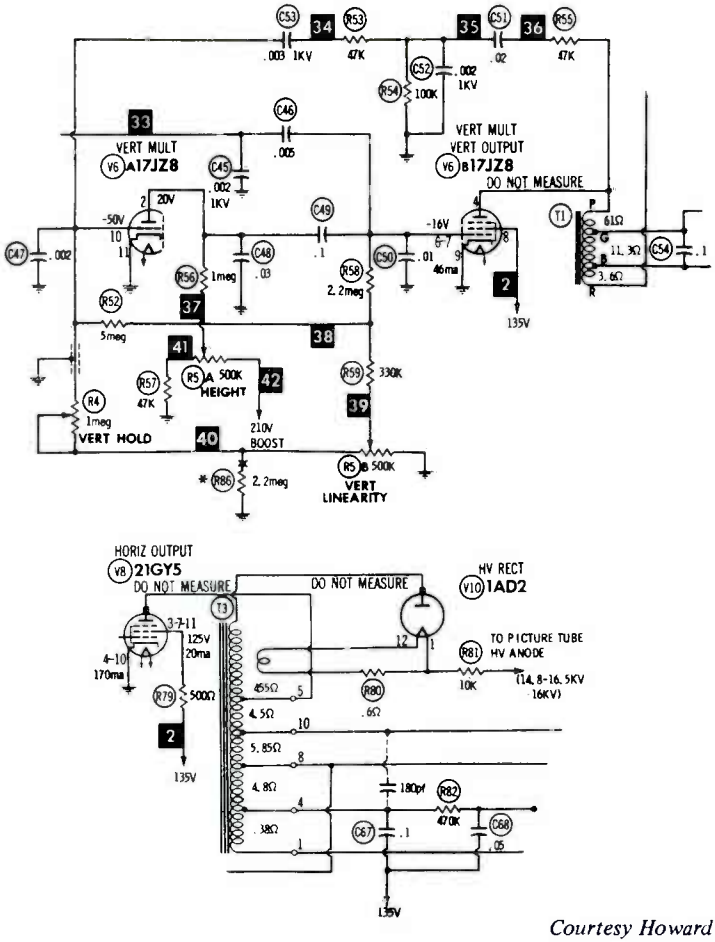
When the customer brought this set in, he said that it rolled and that the sound was weak. He also said the trouble was "probably just a little tube." They always say this—wishful thinking, I guess. However, rolling as often as not is due to a defective vertical tube so I didn't contradict him.

By the time I had the back off the set he was in his car. I took one look and rushed to head him off, but he had made good his escape. The reason I wanted him around was to see if I wanted the job as I could see someone had done a lot of work in the vertical circuit. There were red capacitors sticking up like they were on stilts all around the 17JZ8 vertical tube. Apparently the leads to the originals had been clipped and the end leads of the new capacitors soldered to the old leads without their removal from the printed circuit board. This is the lazy way to replace parts on a board as the chassis doesn't have to be removed. It also makes it hard to identify parts from the pictorial layout in the Sams manual and very difficult to make any more replacements.

I hoped the former serviceman had been successful and that the set had worked properly after he finished with it. I turned the set on and found that the picture took up about half of the screen vertically. Also, there were five or six semi-horizontal white lines crossing each other at the top of the picture. I adjusted the size and linearity controls for a full-size picture. The picture started to roll and the linearity was poor. Without much enthusiasm I inserted a new 17JZ8 tube. My lack of enthusiasm was justified because this didn't help. I started checking the red capacitors on top of the chassis with the aid of the pictorial and the schematic and found that the following capacitors had been replaced: C45, C46, C47, C48, C49, C51, and C53. These are shown in Figure 2. It looked like the shotgun technique had been used, whereby you just replace the parts most likely to cause the complaint in question. Trouble in vertical circuits is, when not due to tubes, most often caused by capacitors, although high-value resistors will also change in value and upset circuit action.

Before removing the chassis I noted some blue-colored capacitors (originals) on the side of the high-voltage compartment. My attention was attracted because most of the blue covering had come off one of the capacitors. I started lifting one lead of these capacitors one at a time so I could make an ohmmeter check. I wound up replacing C54, C67, C68, and C70. C54 was almost a dead short and it was a wonder there was any vertical deflection as it parallels the vertical yoke.

Wishful thinking led me to think this improved matters somewhat. On the rear of the circuit board I found another one of these blue capacitors and, as I had no

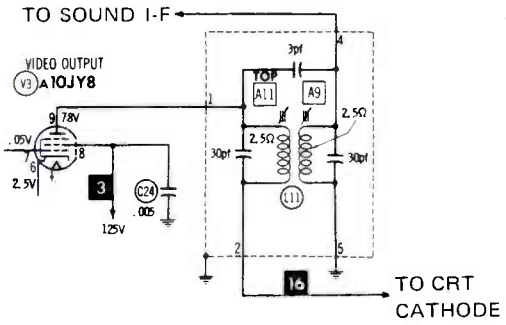


Courtesy Howard W. Sams

FIGURE 2. VERTICAL AND HORIZONTAL CIRCUITS IN OLYMPIC MODEL 9P46.

confidence in them at all, I checked it and found it to be leaky. This was C50 from the grid of the pentode section of the 17JZ8 to the chassis. Replacement improved matters considerably although there was still a tendency to roll. If the former serviceman had removed the chassis he would doubtless have replaced this capacitor on general principles.

I saw a rather large resistor marked 5M and measured its value. It turned out to have about 8 megs of resistance and when a hot iron tip was brought close the resistance varied all over the place. A check showed this to be R52. Replacing R52 resulted in more improvement but not enough. I looked at all the resistors in the circuit and noted that R54 showed signs of overheating. It measured 80,000 ohms instead of 100 kilohms. When a resistor in this circuit has been burned, the capacitor in shunt with it has usually changed in value or is open, so I decided on a replacement.



Courtesy Howard W. Sams

FIGURE 3. VIDEO OUTPUT AND SOUND I-F.

You might wonder why I would replace a part such as C52 without checking it. The reasons are twofold. In the first place, this capacitor was hard to get at because of the other capacitors sticking up on the circuit board; and in the second place, capacitors are inexpensive. I reached down to the board with a pair of small side cutters and clipped one lead of both R54 and C52. Then I soldered the new R54 in parallel with the new C52 and connected them to the correct leads of R53 and C51 which, sticking up in the air, were easy to reach, and I soldered the other leads to a ground connection. I now had good vertical hold, size, and linearity.

Unfortunately, the small conglomeration of bright lines at the top of the picture was still evident. Since everything which didn't check okay had been replaced, I was led to believe the vertical output transformer might be at fault. No replacement was available so I made a slight sacrifice in linearity and moved these troublesome (to me) lines up and out of sight.

The set seemed to have normal volume so I let it play. Soon, however, the sound decreased and grain showed up in the picture. Shortly thereafter, it was not worth listening to or looking at. The grain was the 4.5-MHz sound signal reaching the cathode of the picture tube instead of the sound i-f amplifier. This section of the receiver is shown in Figure 3. The fine tuning would not clear up the trouble.

I decided to think a little and study the schematic. The output of the 10JY8 video amplifier is fed to the primary of L11 which, being tuned to 4.5 MHz, removes this signal so it is not passed on to the cathode of the picture tube with the video information. It is applied to the secondary of L11 and to the control grid of the 6GH8 sound i-f tube for amplication, as the 4.5-MHz signal is normally quite weak. A little thought and I could see that if the 30-pf capacitor across the primary of L11 should short when it warmed up, the 4.5-MHz signal would be fed to the picture tube and would not be applied to the 6GH8! I was proud of myself—such reasoning was uncanny!

I had to go to two wholesalers before I got a sound-takeoff transformer. I installed it in the receiver and sat back to admire the results of my labor. In about ten

minutes I could see the grain coming back in the picture and the sound lost volume. Adjusting the fine tuning only brought things back to normal for a while.

I pulled off the selector and fine tuning knobs, exposing the trimmer slugs for each oscillator coil in the tuner. Adjusting the slug for Channel 12 (which I was using) brought things back but again the trouble reappeared in full force. This was now definite proof to me that something in the vhf oscillator was changing in value with heat. I should have thought of this in the first place! I removed the tuner and sent it off to the United Tuner Repair Company in Atlanta. When it was returned and installed, my drift problem was solved.

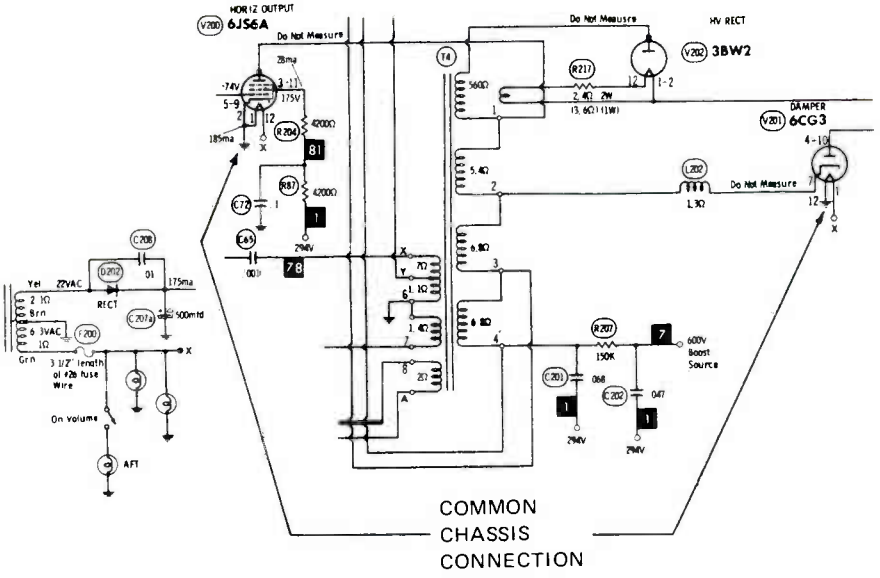
However, now that I had sound, I found it to be distorted by hum and not loud enough. I noted from the schematic that the set used a ratio detector for sound. I tried adjusting the secondary core in the circuit and found it would not move. The next time I went to town I started to buy a discriminator transformer but found, to my horror, that a replacement would cost me $9! I already had too much in the set so I decided to try some free advice given me by a customer at the counter. He said that if I put an Allen wrench in the core slug and heated the wrench, the heat would unfreeze the core and it could then be adjusted. I tried this and it didn't work—perhaps there was not enough heat transfer from the Allen wrench to the core. I removed the transformer from the printed circuit board and broke up the core with a small screwdriver so it would come out in pieces. Then I inserted a "new" core taken from a defective horizontal ringing coil, first coating the new core with some silicone grease. The core could now be easily turned with an alignment tool.

With great expectations I reinstalled the transformer on the circuit board and tuned in a station. I adjusted the core and was able to get sound, nice and clear. It wasn't loud enough to suit me so I decided to check the 12FX5 audio output tube. I was surprised to find a 12CA5 in the set, which tested okay. I looked up the characteristics of both tubes and found that, while similar as to base terminations, the 12FX5 called for 0.45 ampere heater current while the 12CA5 needed 0.6 ampere heater current. Since the set uses a series heater string, the current in the string is 0.45 ampere. With this amount of current through the 12CA5 heater, its voltage was only 9 volts instead of the required 12 volts. I rechecked the tube with 9 volts on its heater and it checked bad! For sure, the 12CA5 is not a satisfactory substitute for the 12FX5. With the right tube in the circuit, the volume level was satisfactory. The vertical output transformer still made me unhappy but I didn't want to put any more money into the set to see what I could do in the way of redesign to use another transformer.

I charged the customer $35 because I didn't have enough nerve to ask for more and have had my fingers crossed ever since because the old transformer could go at any time.

PHILCO CHASSIS 20KT40B-20KT41B

This color set belongs to our local probate judge and he wanted it fixed so much that he carried it from his house and put it in the trunk of my car. It had sound but



Courtesy Howard W. Sams

FIGURE 4. SINCE THE POWER TRANSFORMER IS AT THE OPPOSITE END OF THE CHASSIS FROM V200 AND V201, THE CHASSIS MUST CARRY THE HEATER CURRENT OF THESE TUBES AND THE CATHODE CURRENT OF V200.

no raster and with the back off I noted that the damper and horizontal output tubes did not light up to expected brilliancy. I wiggled the damper around in its socket and both tubes lit in a normal manner. While watching them they suddenly dimmed and after a bit came back strong.

I pulled the chassis and found a wire running from one heater and cathode lug of the horizontal output tube to a heater terminal of the damper and from there to the chassis ground. The chassis connection did not look too good so I heated it up and burned off the excess rosin in the joint. This seemed to correct the trouble and I got a good (more or less) color picture. I played the set over the weekend and at eight o'clock Sunday night the raster disappeared! Looking at the light from the heaters of the two tubes in question, it seemed as though they were okay, although you can't determine current by the light from heaters.

On Monday night I returned from the office and put the set on the workbench, removed the back, and fired the set up—and in a normal length of time the raster came on! I let it play until I went to bed. Next morning I turned it on and there was no raster. The tubes were lit but the tube envelopes did not get as hot as normal. I looked at the heater-chassis connection and this time I noted that the chassis seemed to be chrome-plated. You can't solder properly to such a surface with the tools ordinarily available to a serviceman. I roughed up the chassis at the point of connection and resoldered. This cleared up the trouble. The circuit is shown in Figure 4. Note that the cathode of the 6JS6A also uses the heater path to ground. Perhaps this had something to do with the resultant action.

Now that the set didn't cut off any more, I was faced with being able to satisfy myself that $25 was not too much to charge for repairing a single solder connection. The color was not too hot in that there was a pink smear in the upper left-hand corner of the raster, even with a black-and-white picture.

I decided that the purity was off so I started to set up the color system. The first thing was to check on the center dot convergence. With my Conar color bar generator connected and set for dots, I found that the colors did not converge on the center dots. By readjusting the red and blue dots I obtained excellent white dots at the center of the screen, showing that the beams for the red, blue, and green guns were now converged since equal amounts of green, blue, and red produce white.

I checked the purity by loosening the wing nuts on the yoke and moving the yoke away from the bell of the tube. The blue and green screens were now cut off. The red "fireball" was present at the center of the screen without any adjustments, showing that the purity was now okay. I moved the yoke up against the bell of the picture tube envelope. I had good uncontaminated red over the entire screen. Then I tightened the yoke wing nuts and turned on the blue and green guns. I switched the generator to the crosshatch position and found everything perfect except that the blue horizontal lines did not overlap the red and green lines. I then made the proper adjustments so correct overlapping took place. The crosshatch pattern was now perfect since it was black and white with no colors showing to amount to anything. Everything in life including adjustments on convergence circuits is a compromise. The moral is to let well enough alone.

Next I adjusted the gray scale by throwing the setup switch on the rear chassis apron to the service position. This cuts off the vertical sweep and gives a thin horizontal line in the center of the screen. The red, blue and green screen controls were turned down so nothing could be seen. Then the red screen control was advanced to give a red line just visible. The green and blue screen controls were then advanced so that the line became white. With the setup switch in the normal position, a good white raster was obtained. The color was now excellent with no pink smear in the corner. It took longer for me to type this than it did to make the above adjustments and my conscience didn't even give a small wiggle when I made up a bill for $40.

Whenever you set up the color on a receiver, follow in detail the instructions for that particular set. These will be found either in the Sams manual or in the factory manual. The only equipment required is a set of alignment tools and a color bar generator.

A Reminder

Always be sure to include your student number whenever you contact NRI. This will help to ensure that we can serve you promptly and efficiently.

HAM NEWS

By Ted Beach K4MKX

I don't know how long it's been since I last owned a grid-dipper (and it *was* a grid-dipper!), but in working on various projects recently I have found myself more and more in need of one. As a result, I stopped borrowing and bought one of the new Heath HD-1250's.

This one is billed as a "solid-state dip meter" but I still find myself referring to it as a grid-dipper. I guess you can't teach an old dog new terms. At any rate, I am quite impressed with this little package—particularly with regards to its being independent of the ac power lines. This one I can use in the car, on the roof, or any other place remote from the power lines as it is powered by a lowly 9-volt transistor radio battery.

The unit comes with seven color-coded coils that cover from 1.6 MHz to 250 MHz. Each coil covers about a 2-to-1 frequency spread which makes for a very nice tuning rate. My previous dipper covered a 3-to-1 frequency spread and you really zipped by the frequencies in a hurry with that one—particularly on the higher ranges.

If I had my choice, I think I would have liked some lower-frequency plug-ins as well. You never know when you might need to do some tuning and pruning in the broadcast band or on a low-frequency i-f strip. Since Heath chose to use a phono connector for the coil socket, it shouldn't be too much of a chore to wind some coils for the lower frequencies. I'll have to try that one of these days.

In addition to seven color-coded bands on the tuning dial, there is a zero-to-eighteen logging scale that could be used for making a tuning chart for any band you wanted. There is no "calibration" as such for the meter, so you're sort of stuck with the printed dial readings. All scales checked fairly close when I coupled the meter to my frequency counter. One band, 12.5 MHz to 26 MHz, was right on the money from one end to the other. The other bands were so-so, but after all, this is not intended to be a frequency standard. Besides, if I have a need to know any of the frequencies accurately, all I have to do is link-couple the dipper to the old frequency counter.

Unfortunately my counter will not cover the two top bands of the dipper (48 MHz to 250 MHz) and these are the two bands I have found the most use for recently. Oh well, the counter is ac-operated anyway so I can't conveniently use it outdoors for checking antennas. But for bench use I just may have to build a prescaler. Hmmmm. . .this just may have to be my next project!

No, on second thought I think I'd like to experiment first with some lower-frequency coils for the dipper. I already have some real dandy ideas for coil forms and if and when I come up with something definite I'll fill you in. In the meantime, if you don't already have a dipper, I heartily endorse and recommend the Heath HD-1250.

I have received several letters recently asking what my thoughts were on the new restructuring proposal (FCC Docket 20282). Well, as I said before, this is really a matter for each individual to consider carefully for himself. I strongly recommend that each of you get a copy of the docket and read it over several times before passing judgement. Then write down your thoughts on the various points and study what you have written. Finally, summarize your thoughts and write down your opinions, both pro and con. Type up your results and make 14 copies and zip them all off to the Commission. Then your comments will be on record and will have to be considered by the FCC. The more comments they receive, the more likely they will be to reconsider their position. At least we'll let them know that there are a lot of active amateurs who care about the amateur service enough to write in.

My own feelings on the docket are that, in general, the proposals are in the best interests of amateur radio. That is, the no-code class (Communicator) is overdue and should significantly increase the amateur ranks.

I wouldn't be too concerned about the "quality" of the new licensees. They will have to have *some* technical know-how and when they get on with us "old-timers" they will find out very quickly just what Ham radio is. I *don't* think we'll have another 11-meter situation on our hands since the opportunity to work skip is, for the most part, not available at vhf without equipment and operating technique. The CB type will quickly become disenchanted and fall by the wayside. Those who are truly interested in amateur radio will grow and become an asset to our ranks—if they receive the proper help along the way.

With an increase in the numbers of amateurs we can expect that manufacturers will get on the bandwagon with new gear. Who knows, maybe in two or three years we could all afford synthesized rigs (technology + sales volume = lower prices).

As a second general thought, the docket may do more to increase technology than incentive licensing has done so far. At the present time well over 50 percent of all amateurs in the United States hold a General or Conditional license. If these guys want to continue to enjoy their current privileges they will have to upgrade at least to Advanced Class in order to be "grandfathered" into the new structure. At the present time this is not really such a tough task as some might imagine. Anyway, my advice is be prepared for any eventuality—study *now* and get your Advanced Class license. If you have a Conditional or other class with a C, take your Ad-

vanced test at a Commission office, even if you have to bone up on cw, or you'll really be in deep water if the docket goes through in anywhere near its present form.

Well, I guess I haven't said a great deal about the docket, but I have a feeling we can expect some changes to be made in the near future, so take heed and do something now—today. Tomorrow may be too late. The deadline for filing comments on 20282 is June 16.

Now, let's see who we have news of from the amateurs in the NRI family. We've got a pretty goodly crowd this time—the first 15 listed are students or graduates of the Amateur Course while the last five belong to other NRI courses.

WN8UJM was so pleased with his new license that he got on the phone and called us from Ohio. Al wanted to be sure that he made the Journal this time and he just did get in under the wire. Welcome aboard, Al.

I think Hank is the first KL7 we've had in the Amateur Course, but I could be wrong since I don't keep my records up-to-date and **hate** to thumb through past issues of the Journal! Anyway, welcome one and all—it is very nice to hear from you.

Wouldn't you know, this time (when I rambled on so much about my new toy and 20282) I received no fewer than 11 letters from the below listed people which should be reported on here. Unfortunately, we will probably be forced to skimp a little bit in reporting on their activities this time. Sorry about that, gang—we'll just have to plan a bit better in the future!

Jim	WN1UQY	N	Springfield MA
Bill	WN2YGN	N	Newburgh NY
Dick	WA4DGF	G	Shelbyville TN
Ron	—	A	Washington NC
Phil	WN4GFF	N	Fayettville NC
Phil	WN4JKN	N	Amissville VA
Hans	WN5NOG	N	Seagoville TX
Don	WN6ISC	N	Bieber CA
John	WN6JBP	N	Sacramento CA
Russ	WN7YSA	N	Olympia WA
Al	WN8UJM	N	Mt. Orab OH
Chuck	WN8UJP	N	Breckenridge MI
Skip	WAØWOB	G	Leawood KS
Jorge	KP4DQS	G*	Maunabo PR
Hank	KL7IBG	A*	Ketchikan AK
Henry	WA4MSY	—	Seminole FL
Lennart	WB4USY	T	Shaw AFB SC
L.A.	WN4VML	N	Virginia Beach VA
Ray	W7YKN	A	Reno NV
Sam	WN9QKF	N	Watseka IL

*Just upgraded - congratulations!

WN2YGN writes us that he is at present using a Heath HW-16 although he still uses his Conar rig on occasion. Bill had been studying and practicing copying W1AW and has his code speed up to almost 20 wpm. Gosh, Bill, I sure wish I could get mine up there—I still have that Extra to look forward to!

WA4DGF has had his General call a little over a year now and enjoys working on the phone bands. Dick has a Swan 500C which he uses with a Mosley TA33 Jr. on 10, 15, and 20, and radiates with a 14AVQ on 40 and an inverted vee on 75. Quite a farm there, Dick. He says that he likes to work 75 the best and has had many contacts with ZL's, DL's, and F's on that band. I know what you mean. It sure is fun to work DX on the low bands. In addition to all that gear, Dick has a Genave CTX-200 (big brother to my GTX-2) and a GLB Channelizer on two meters. With this combo he worked many repeaters on a trip down through Florida back in February.

We also had a note from a student not listed above this time. In this note, Ron Myers let us know that he had just gotten his Advanced Class license after graduating from that Amateur Course in December of 1974. Unfortunately Ron did not tell us what his call was down there in Washington NC or we'd pass it along to you. At any rate, congratulations to you Ron, and best of luck!

We had a newsy note and QSL from Jim, WB5ITZ, who is not listed above because his name appeared there very recently. Jim writes that he is staying very busy studying engineering at Texas A&M but still finds time to do a little hamming with his SB102, ICOM 22 and the school's club rig at W5AC. He says he is going to try for Extra and First Phone this summer some time. Good luck, Jim.

KP4DQS writes that he is very pleased with the Amateur Course and has built a Heath SB102 recently which worked first crack. Jorge is studying "very hard" at the present time so that he can get his Advanced Class license real soon. In the meantime, Jorge's 14-year-old son is using his study material and Conar rig preparing himself for a license too. That's the way to do it, Jorge!

KL7IBG writes that when he got his General license the FCC changed his call from KL7HIF to the present call. Hank even sent in a QSL with the new call overprinted to prove it. He says that now that he has gotten through the Advanced Class test he hopes he won't have to go through another call change. I don't know, that sounds kind of weird, Hank. Maybe someone down here doesn't like you. Hank says he operates a good deal on 14,292 kHz if there are any of you guys and gals that are looking for an Alaska QSO and QSL. He's usually on from 1700Z "until the band goes out." He uses a Heath HW101 and SB200 into a two-element quad so should have a pretty decent signal down here. Hank has all-band capability including 6 meters and 2 meters, so you might contact him on 14,292 to set up a sked for a try at another band.

Ray, W7YKN, writes that he is an enthusiastic supporter of the Ham Column in the Journal. I sure am glad to hear that, Ray. Like I said also, everyone to their own choosing, and even with no active interest in a subject (such as Ham radio) doesn't mean a person can't get something

from it. At any rate, thanks for the nice letter, Ray, and we will see what we can do about coming up with some more construction articles in the near future.

WN9QKF dropped us a line to say that he had just gotten his new call and at the same time got himself elected president of his radio club. Sam says he has a Hallicrafters (no model given) that he uses on all bands except 80 into an 18AVT/WB antenna. 80 is unusable since he can't seem to get the SWR down. Good luck, Sam—maybe you need to do a little tuning and pruning on that thing.

Well, that about wraps it up this time, Do write and let us know what you all are doing out there. Very 73 for now—

Ted—K4MKX

Job Ops

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Stock No. EN15; Weight: 2 lbs.; P.P.Ins. — ONLY $49.95

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Stock No. EN13; Weight: 2 lbs.; P.P.Ins. — ONLY $34.50

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Raymond O. Quelch, Monticello, FL
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Salvador Rivera, Rio Piedras, PR
H. J. Roberts, Preston, IA
Thomas Robinson, Long Beach, CA
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DIRECTORY OF ALUMNI CHAPTERS

CHAMBERSBURG (CUMBERLAND VALLEY) CHAPTER meets at 8 p.m., 2nd Tuesday of each month at Gerald Strite's TV-Radio Service Shop, RR2, Chambersburg, Pa. Chairman: Gerald Strite.

DETROIT CHAPTER meets 8 p.m., 2nd Friday of each month at St. Andrews Hall, 431 E. Congress St., Detroit. Chairman: James Kelley, 1140 Livernois, Detroit, Mich. 841-4972.

FLINT (SAGINAW VALLEY) CHAPTER meets 7:30 p.m. second Wednesday of each month at Andy's Radio and TV Shop, G-5507 S. Saginaw Rd., Flint, Michigan. Chairman: Larry McMaster, (517) 463-5059.

NEW YORK CITY CHAPTER meets 8:30 p.m., 1st and 3rd Thursday of each month at 199 Lefferts Ave., Brooklyn, N.Y. Chairman: Samuel Antman, 1669 45th St., Brooklyn, N.Y.

NORTH JERSEY CHAPTER meets at 8 p.m. on the second Friday of each month at The Players Club, located on Washington Square.

PHILADELPHIA-CAMDEN CHAPTER meets 8 p.m., 4th Monday of each month in RCA Building, 204-1, Route 38 in Haddonfield Rd., Cherry Hill, New Jersey 08034. Chairman: Joe Szumowski.

PITTSBURGH CHAPTER meets 8 p.m., 1st Thursday of each month in the basement of the U.P. Church of Verona, Pa., corner of South Ave. and 2nd St. Chairman: George McElwain.

SAN ANTONIO (ALAMO) CHAPTER meets 7 p.m., 4th Thursday of each month at Alamo Heights Christian Church Scout House, 350 Primrose St., 6500 block of N. New Braunfels St. (3 blocks N. of Austin Hwy.), San Antonio. Chairman: Robert Bonge, 222 Amador Lane, San Antonio. All San Antonio area NRI students are always welcome. A free annual chapter membership will be given to all NRI graduates attending within three months of their graduation.

SOUTHEASTERN MASSACHUSETTS CHAPTER meets 8 p.m., last Wednesday of each month at the home of Chairman Daniel DeJesus, 12 Brookview St., Fairhaven, Mass. 02719.

SPRINGFIELD (MASS.) CHAPTER meets at 7:30 p.m. the second Saturday of each month at the shop of Norman Charest, 74 Redfern Dr., Springfield, Mass. 01109. (413) 734-2609.

TORONTO CHAPTER meets at McGraw-Hill CEC, 330 Progress Ave., Scarborough, Ontario, Canada. Chairman Branko Lebar. For information contact Stewart J. Kenmuir (416) 293-1911.

Thomas Schnader

Mr. Thomas D. Schnader, the incumbent President of NRIAA, was killed on the afternoon of March 31 in an automobile collision near Pittsburgh. He was on his way to accept a new position.

Tom was born on May 16, 1919, in Reading, Pennsylvania. He attended public schools in that area and graduated from National Radio Institute in 1946. He had an extensive background in radio and television servicing and was a member of the Pittsburgh Chapter of NRIAA. As a member of that organization, he served at various times as officer and brought a wealth of knowledge to that Chapter. He was one of the mainstays in furnishing programs at the Chapter meetings.

Tom is survived by his wife and stepson. He will be sorely missed by his family, by the members of the Pittsburgh Chapter of NRIAA, and by the National Radio Institute and the Executive Secretary of the Association.

NRI AA OFFICERS	
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Homer Chaney.....	Vice President
Angelo J. Colombo...	Vice President
William D. Harris.....	Vice President
Tom Nolan.....	Exec. Secretary

Alumni News

FLINT-SAGINAW VALLEY CHAPTER STARTS YEAR WITH CHICKEN DINNER

The January meeting chicken dinner with refreshments was enjoyed by one and all. Dennis Besser brought in a color TV which the members repaired in short order. It was a circuit breaker problem.

Steve Avetta has a black-and-white set which was fading in and out and it turned out to be a filter problem.

Cash Laferty demonstrated the method of checking a high-voltage transformer with an oscilloscope and a pulse from the scope to give a damped wave output on the screen. At the February meeting Andrew Jobaggy gave a talk on transistors compared with tubes and their use in circuits. Also, he brought up the fact that all TV's should have some sort of marking so that if they are stolen they could be recognized.

We learned at the meeting that Larry Myers was contacted by another Larry Myers who had seen his name in the NRI Journal. Quite a coincidence. At the March meeting, an RCA color receiver had a problem. We found that the only way to solve it was by changing the tube type from a 31LZ6 to a 36MC6. This solved the problem. Also, whenever a GE set having a 3CX3 tube gives trouble, replace it with a 3DA3.

One of our new NRI students is taking an automobile course and is interested in combining an "Alumni Chapter" which is devoted to auto mechanics.

All in all, the chapter had a busy first of the year.

DETROIT CHAPTER STUDIES TRANSISTOR CHECKERS

Ray Burris brought in a solid-state transistor checker. The checker is used with an oscilloscope. It is simply a go or no-go type of test.

Mr. Kelly brought in a resistance capacity substitution box and demonstrated with the solid-state checker. Mr. Kelly explained that you can still check the part even though there is resistance and capacity in the circuit.

At the March meeting, Mr. Kelly and Mr. Ceruti brought in their oscillo-

scopes. Mr. Kelly has a new Conar triggered scope while Mr. Ceruti's is a Bell and Howell.

Mr. Kelly described how peak-to-peak measurements are made on the scope and also the difference between the two scopes. He is to continue the use of the oscilloscope with the RCA transistor training boards.

Starting the first of the year, the chapter decided to give meetings a new look. We are going to shorten our business meeting and get on with the subject for the evening. We are studying the oscilloscope and our goal is to have all the members use a scope and see what a valuable instrument it is.

Mr. Dick Landsburg paid us a visit for the first time. Mr. Wilson Crane has joined the chapter and brought in a portable TV to fix. Mr. Carl Ceruti brought in a tape recorder to be fixed, and Charles Cope has an FM radio and phono amplifier that needed service.

Mr. Kelly had a lecture on the scope to prepare us for our programs to come. We has a real busy evening and everyone gained more experience in servicing.

SE MASSACHUSETTS CHAPTER LEARNS FROM EXPERT

Mr. Carl Merrill, Service Manager for the Bay State Television Company in New Bedford, Massachusetts, gave a talk on the intermediate frequency alignment of color television receivers including the video detector.

Mr. Merrill stated that he has always worked from the bottom of the chassis and if for any reason he has to work from the top, in most cases he would be lost. Working from the bottom and using an oscilloscope is the best method of determining what is wrong.

George Stoll

The National Radio Institute is deeply saddened by the passing of George Stoll, a past President of the NRIAA.

George, who was President of the National organization for 1973, suffered a fatal heart attack on February 8 while on a vacation trip to the Canary Islands.

He served as Chairman of the North Jersey Chapter in 1972, and also was its Chairman at the time of his death. Although he had suffered a serious heart attack six years ago, he continued to work every day and carried on the work of Chairman of the North Jersey Chapter. Said George's friend Bob Kreger, "Our Chairman was the sparkplug of the Chapter . . . he planned and moved the Chapter forward with an effort that was tireless."

George is survived by his wife Rena, a son Jeffery, a daughter Rena, and two grandchildren. He will be mourned by the Chapter, by the Institute, and by the Executive Secretary, who was a good friend of George and his wife.

Mr. Merrill plans to continue his lectures at future meetings.

At the February meeting, Mr. Preston Atwood, a self-employed radio and TV repairman, gave a talk on transistors. This was the first in a series of meetings to study transistors and we hope to take some of the mystery out of servicing this type of equipment.

At the March meeting, various members spoke of their experiences in TV repair, telling of the symptoms that appeared and the diagnosis. We then took up our study of transistors, the second in a series of lessons.

PITTSBURGH CHAPTER HEARS NATIONAL PRESIDENT

At the March meeting, Tom Schnader showed some Zenith slides with tapes to describe the various circuits in the Zenith receivers. The program was enjoyed by all and was very educational.

At the April meeting, a representative from Zenith is to be present and will go into the circuitry of their receivers still further.

NEW YORK CHAPTER CONTINUES SERVICING EXPERIMENTS

Chairman Sam Antman discussed an experience he had had with a battery eliminator which would not operate a small radio, although a 1.5-volt battery would. The conclusion was that the radio was at fault and the eliminator did not have sufficient current to supply the power supply.

Work was resumed on the chapter's Conar 600 receiver. We found some bad tubes and adjusted the high-voltage purity and center convergence.

At the March meeting, further work was done on a Conar 600 which was brought in by Bill Singleton. This receiver had many problems and it seems that most of the problems may be due to poor solder joints. Soldering can be a problem and it is an art that does not come easy.

After several points were resoldered, we finally got high voltage to where it was about right. We were able to get a picture, but the horizontal oscillator was not operating on the correct frequency. We will continue at the next meeting.

Helpful Hints 1

Proper ventilation is vital to the proper operation of electronic equipment, especially stereos and television receivers. A variety of methods can be used to allow proper ventilation. The most popular is venting. Cabinets are designed to take advantage of the airflow pattern of heated air by venting the cabinet's back, top, or bottom covers. Restricting the flow of air can cause premature equipment failure. Here are some don'ts:

- **Don't stack electronic equipment if there are vents in the bottom or top cover of the equipment (for example, a changer on top of a stereo amplifier).**
- **Never install electronic equipment in a closed-in recess, cubbyhole, or closely fitting shelf space.**
- **Never install equipment over or close to a heat duct, or in the path of heated air flow.**
- **Avoid conditions of high humidity such as outdoor patio installations where dew is a factor, or near steam radiators where steam leakage is a factor.**
- **Avoid placement where draperies may obstruct rear venting. Avoid the use of decorative scarves or other coverings which might obstruct ventilation.**
- **Don't remove supporting feet from electronic equipment such as stereos and portable receivers. Vents are often made in the bottom cover.**

—by James Crudup

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50.01- 60.00	4.15	5.50		
60.01- 70.00	5.50	6.00	6.40	4.50
70.01- 80.00	7.00	6.50	8.00	5.00
80.01- 90.00	8.00	7.75	10.10	5.00
90.01-100.00	9.00	8.75	12.60	5.25
100.01-110.00	10.00	9.75	14.80	5.50
110.01-120.00	11.00	10.75	16.20	6.00
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