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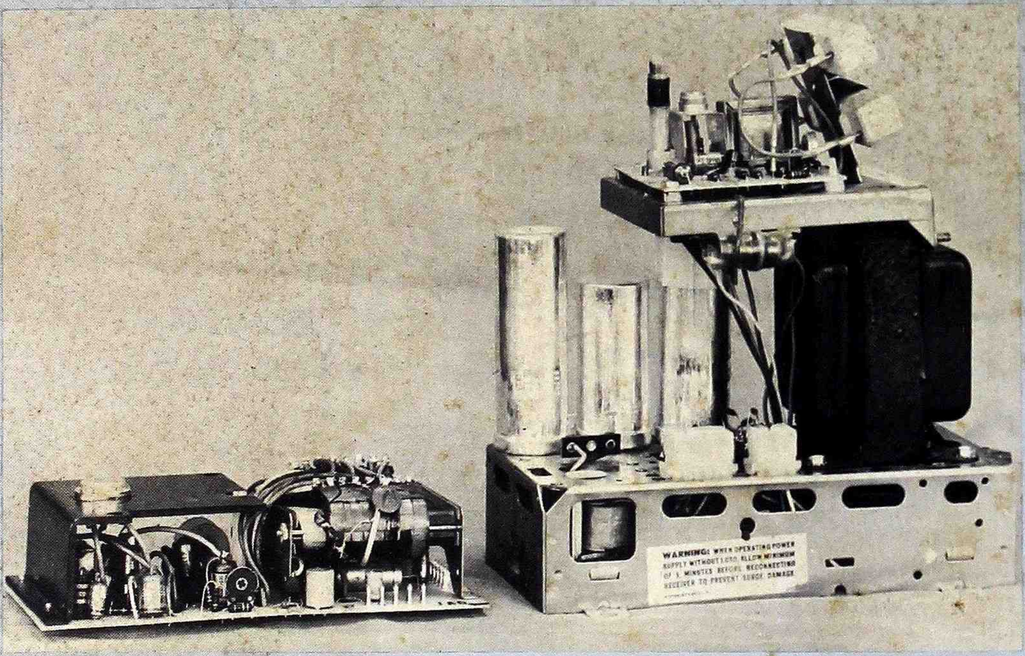

IN THIS ISSUE:

Harold Turner discusses the latest developments in power supplies

J. B. Straughn gives more TV servicing tips

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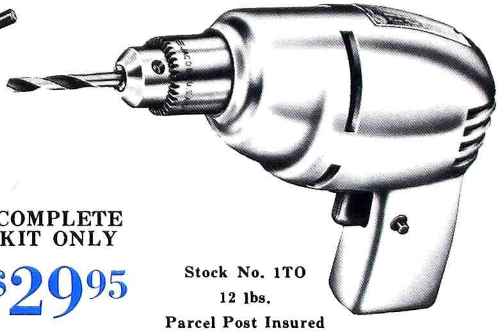

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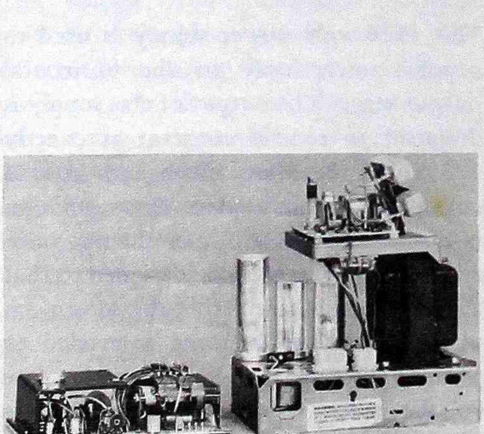
CONTENTS

On the Cover: Motorola's new Color TV power supply is shown in comparison to last year's model. To get the most up-to-date information on what is happening to power supplies, read Harold Turner's article on page 2.



Don't Forget the Power Supply

by harold j. turner, jr.

Why an article on power supplies? Power supplies are all alike; they all use pretty much the same simple circuits, over and over. If you've seen one, you've seen them all. . . or have you? Two of this year's color TV models show us that not all power supplies are simple and unsophisticated. Let's take a close look at the Zenith and Motorola solid-state color TV power supplies that show us that television designers didn't overlook the power supply when they set out to design the ultimate in color TV receivers.

DOUBLE-DUTY REGULATOR

Fig. 1 is a simplification of the +125 volt power supply used with the Zenith 25CC55 solid-state color TV chassis. Here we have a very sneaky way of getting two functions out of a single circuit. Let's take a look at the regulating function first, then we'll see how this circuit performs its other task.

The +125 volt power supply is used to supply power only to the horizontal output stage. The output of this supply is designed to remain constant at exactly 125 volts, regardless of changes in load current or ac line voltage. This regulation is desirable because it permits the horizontal output stage to be designed so that the raster just barely fills the screen; no picture-distorting overscan is needed to prevent picture pull-in when the line voltage is low. Most television receivers are designed to overscan an inch or two on each side of the screen, so that when the line voltage is low, the picture doesn't pull in from the sides. In this set, since the B+ supply to the horizontal output stage is regulated, only about 1/2" overscan is needed. This allows the complete transmitted picture to be seen.

The heart of the regulator circuit is Zener diode D_1. This diode is used to generate a reference voltage for the regulated supply. D_1 will maintain a constant 140 volt drop across itself, regardless of load or line voltage changes. This constant voltage is applied through R_2 to the base of Q_1, which is an emitter follower. The function of the emitter follower is to increase the amount of current that can be drawn from the reference voltage source, without causing the voltage to vary. Transistors Q_2 and Q_3 also serve as emitter followers and further increase the current capacity of the supply. If the base of Q_2 were connected directly to the

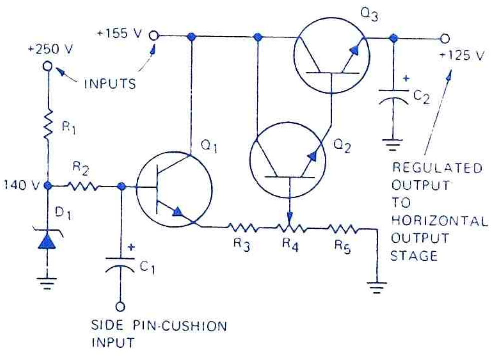


Fig. 1. Simplified diagram of +125V power supply used in Zenith solid-state color TV.

emitter of Q_1, the output voltage at the emitter of Q_3 would be nearly equal to the Zener voltage. However, this is more voltage than is needed to operate the horizontal output stage, and some means of adjusting the voltage is desired. Therefore, the voltage divider consisting of R_3, R_4, and R_5 is included to reduce the reference voltage. R_4 provides the adjustment capability. Once R_4 is properly set, the regulated output voltage will be within a volt or so of 125 volts, regardless of load or power line voltage fluctuations.

The second duty of the regulator is to provide side pincushion correction. As those of you who have studied color TV know, rectangular-screen color TV receivers naturally suffer from what is known as pincushion distortion because of the geometry of the color CRT. What this means is that the sides of the raster are not perfectly straight; they tend to bow in the middle. To eliminate this problem, all large-screen color TV receivers use some type of pincushion correction circuit. In some receivers a tube or transistor is used to amplify the pincushion signal. In many, a saturable reactor is the answer. In this Zenith chassis, however, the regulated power supply serves to amplify the pincushion signal fed in through C_1.

Remember, the output of this supply is used to feed the horizontal output-stage only. This means that the pincushion signal can be introduced into the output of the supply without interfering with the operation of any other circuit in the receiver. The pincushion correction signal comes from the vertical sweep circuit, and it is of the correct phase and amplitude to cancel out the pincushion distortion in the picture.

Since the B+ adjustment control (R_4) will affect the amount of pincushion correction if the setting of the B+ control is ever changed, the amplitude of the pincushion signal must be readjusted to restore the proper amount of pincushion correction. This is easily done by watching the effect of the adjustment on a crosshatch pattern.

AUTOMATIC SHUTDOWN

The power supply circuit, used in the same Zenith chassis, is another dual-function circuit. In addition to its ordinary job of supplying a regulated 24 volts to most of the circuits in the receiver, it also automatically removes power from these circuits if the high voltage becomes too high.

As you know, all television manufacturers must comply with certain regulations set down by the U.S. Department of Health, Education, and Welfare. The purpose of these regulations is to protect consumers from exposure to possibly harmful amounts of X-radiation. All color TV receivers produce a small amount of radiation, but the intensity of the radiation is directly related to the amount of high voltage. Thus, television receivers must be designed to prevent excess high voltage from being developed. In some receivers, the design of the horizontal output stage inherently limits the amount of high voltage that can be developed. In others, power to the entire receiver is interrupted when the high voltage exceeds a preset amount. In this Zenith chassis, however, when the high voltage goes too high, the receiver stops working, but not completely. Only the 24 volt supply is turned off, and the effect of this is to eliminate all sound and video infor-

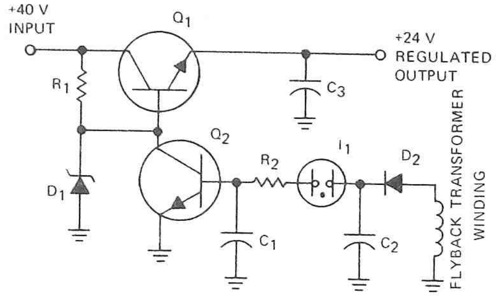


Fig. 2. The +24V supply, with automatic shutdown circuit.

mation. However, a normal raster may still be produced. HEW regulations state that the high voltage cannot exceed the prescribed limit *as long as a viewable picture is present.* The assumption is that if the picture and sound disappear, even though the raster remains, the customer will have sense enough to turn off the set and call a repairman. Now let's take a look at Fig. 2 to see how the automatic shutdown circuit works.

The basic 24 volt regulator circuit consists of Q_1, R_1, D_1, and C_3. It is very similar to the regulator circuit shown in Fig. 1. The remaining parts in Fig. 2 constitute the automatic shutdown circuit. Q_2 functions as a switch; that is, it has only two possible states: either completely off (open or not conducting) or completely on (closed, or heavily conducting). When the switch is open, the regulator circuit operates as usual. If the transistor is turned on, however, the base of Q_1 is effectively shorted to ground, and the output voltage becomes almost zero. Of course, Q_2 will turn on whenever enough current is forced into its base. Normally, no Q_2 base current flows, since there is no bias resistor connected to a positive power supply. The pulses supplied by the flyback transformer winding are rectified by D_2, and develop a positive dc voltage across C_2. When the high voltage is at its usual level, the dc voltage across C_2 is not enough to fire the neon lamp, I_1. If the high voltage should happen to increase too much, however, the neon lamp will fire and Q_2 will saturate, thus turning off the 24 volt supply and killing the sound and video. Q_2 will remain turned on indefinitely, since it takes less voltage to maintain current through a neon lamp than it does to initially fire it. To reset the circuit, the receiver power switch must be turned off, then back on. If the circuit shuts down repeatedly, the high voltage may be too high, or there may be a fault in the shutdown circuit. However, an occasional accidental shutdown may be expected.

NOW FOR SOMETHING REALLY DIFFERENT

If the Zenith circuits impressed you as being unusual, stick around. The Motorola power supply circuit to follow will make the circuits we've just examined seem as common and ordinary as a 5U4.

The schematic of the Motorola power supply is much too complex to reproduce here. Fig. 3 is a much-simplified block diagram which will serve to illustrate how the circuit operates. Note that the power transformer is at the right-hand side of the diagram, nowhere near the ac line where it would ordinarily be found. This means that all the circuits to the left of the power transformer are connected directly to the power line. They are therefore isolated from the chassis of the receiver. A full-wave voltage doubler is used to obtain +280 volts from the ac line without the use of a transformer. This 280 volts is used to operate only the regulator portion of the receiver.

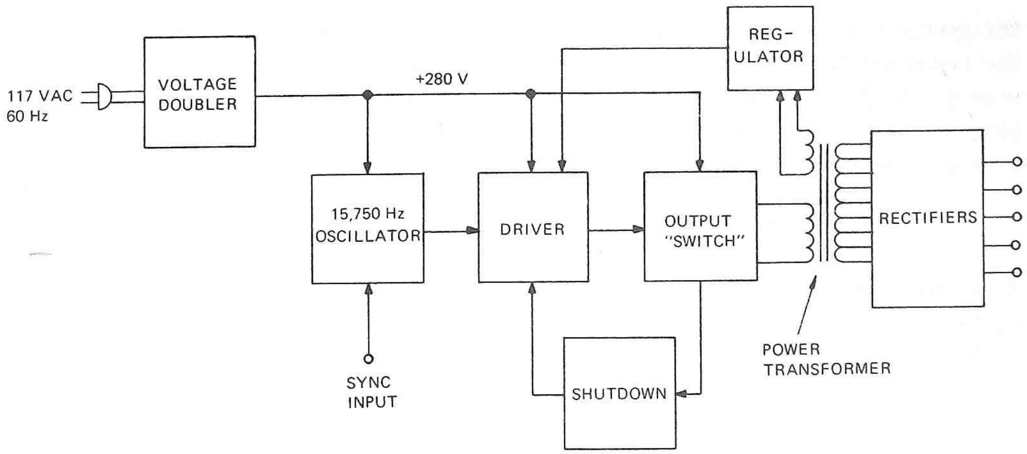


Fig. 3. Block diagram of power supply used in 1972 "QUASAR" by Motorola.

As you can see from Fig. 3, the regulator circuit consists of a high-frequency oscillator, a driver stage, and an output "switch", which drives the power transformer. The output of the transformer is then fed in conventional fashion to the various rectifier circuits which then furnish correct dc operating voltages to the remaining circuits in the set. The important thing to note is that the frequency of the signal handled by the power transformer is the frequency generated by the oscillator which is a part of the regulator system. This oscillator operates at quite a high frequency, the same frequency, in fact, as used for the horizontal sweep (15,750 Hz or 15,734.262 Hz during color broadcasts). The oscillator is synchronized to the horizontal oscillator in the receiver to prevent the regulator circuit from creating moving interference patterns in the picture. Otherwise the oscillator frequency is not especially critical. The signal generated by the oscillator is amplified by the driver stages and applied to the output stage, which functions as a switch, much the same as Q_2 in Fig. 2. In this case, the switch is used to interrupt the power supplied to the power transformer at a rate determined by the oscillator frequency. An auxiliary winding on the power transformer is used to sense the output of the supply in order to provide regulation. The sample of the output is used to control the shape of the signal fed to the output "switch" transistor. If the output voltage tends to rise, the shape of the drive signal is altered so that the average power in the signal is reduced, and the output voltage is held at the desired level. A control in the regulator circuit permits the service technician to adjust the output voltage to the desired level.

The real beauty of this circuit is that the power transformer doesn't have to handle the low-frequency power line voltage, and thus the transformer windings needn't have much inductance. In practical terms, this means that no heavy iron core is required. In fact, the transformer used in this set closely resembles an ordinary color TV flyback transformer. The result is a well-regulated power supply that does away with the customary heavy power transformer, yet still provides complete isolation between the receiver chassis and the power line. An added bonus is that the entire regulator circuit, including the power transformer, is mounted on a plug-in printed circuit board whose total weight is about two pounds!

WHAT ABOUT HEW?

As mentioned before, different manufacturers have different ways of complying with the radiation regulations set down by the U.S. Department of Health, Education, and Welfare. The Motorola circuit complies by removing all power from the set in the event that the output of the "switch" circuit reaches a certain predetermined level. Above this level, of course, B+ voltage would be higher than normal, so the amount of high voltage developed would be more than desired. The automatic shutdown circuit in this receiver also protects the power supply against the effects of accidental short circuits in the B+ distribution circuit.

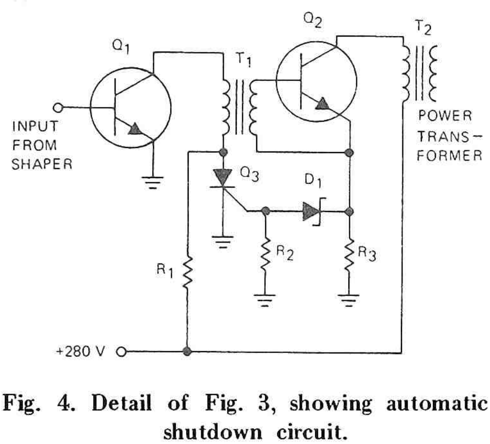


Fig. 4. Detail of Fig. 3, showing automatic shutdown circuit.

Fig. 4 shows the automatic shutdown circuit in detail. Q_1 is the driver transistor, and Q_2 is the output "switch". Circuit operation is as follows: The average output of the circuit is such that a certain amount of dc voltage is developed across R_3. If the output power increases for some reason, the voltage across R_3 will increase. Normally the voltage across R_3 is not high enough to overcome the Zener voltage of D_1, so the Zener diode does not conduct. However, when the output of Q_2 reaches a certain predetermined level, the voltage across R_3 will increase to the point where D_1 will conduct, since its Zener voltage has been reached. This conduction causes silicon controlled rectifier Q_3 to "fire" (conduct heavily), and power is removed from the driver stage by shorting the top end of R_1 to ground. Once this happens, Q_3 will continue to conduct until ac power is interrupted since all SCRs have a "memory". That is, once it is turned on by applying gate current, it can be turned off only by removing the anode current. To reset the automatic shutdown circuit, the power would have to be turned off, then back on. In this receiver design, since all power to the receiver is eliminated when the automatic shutdown circuit takes over, the sound, video, and raster would all disappear simultaneously. As in the case of the Zenith circuit mentioned earlier, an occasional accidental shutdown may be encountered.

If the circuits presented here are any indication of things to come, the smart technician will keep himself busy by studying the operation of similar new circuits as they are introduced. No matter how complete your technical education is now, you must keep current if you are to keep yourself from becoming technically obsolete. This article has been presented with these thoughts in mind. It is the hope of the author that his readers won't stop here in their search for understanding of things new and different.

SELF-TEST QUESTIONS

Test yourself to see what you have learned. Answer the five true-false questions below. Correct answers are given on Page 18.

1. Capacitors C_1 and C_2 in Fig. 1 serve similar purposes.
2. In Fig. 1, the power supply output voltage is dependent upon the breakdown voltage of D_1.
3. Since I_1 in Fig. 2 is normally lit it might be used as a pilot lamp to show that the set is turned on.
4. When Q_3 in Fig. 4 turns on, the 280 volt line is shorted to ground, thereby causing the circuit breaker to trip, removing power from the receiver.
5. Q_2 in Fig. 4 serves as a single-ended class A amplifier.

● ● ●

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More On. . .

TV SERVICING EXPERIENCES

By J. B. Straughn

Zenith 16Z26

This set, an old timer, came in with no sound or picture, but with a raster. A check showed several bad tubes, including those in the tuner. Replacing them restored the picture, but the sound was still absent. The 6AQ5 sound output tube did not seem warm enough to the touch, and a check of the operating voltages in this stage showed no plate voltage on the 6AQ5.

Like most Zenith receivers, this set was easy to work on since there is a bottom plate which can be removed, exposing most parts without removal of the set from the cabinet. The ohmmeter showed no continuity between the plate and screen of the 6AQ5 but screen voltage was present. An open was located with the ohmmeter in the primary of the output transformer, which I noted was a replacement unit.

Such a coincidence as failure of the original part and its replacement was a little hard to buy. This seemed to indicate that the plate current of the tube had become excessive and opened the transformer primary. What would cause this? The tube could be shorted or could be gassy. There might have been no bias, or the coupling capacitor feeding the control grid of the 6AQ5 might be leaky. The tube had already been tested. An ohmmeter check from the cathode to chassis was normal so the cathode resistor was not shorted and cathode-to-chassis voltage should be present. This is the bias voltage. Left was the possibility of leakage in the coupling capacitor going to the control grid of the tube.

An easy check is to measure for dc voltage between the control grid and the chassis. Normally there should be no voltage at this point. On making the test the control grid was found to be 5 volts positive to the chassis. This, of course, is abnormal and would result in excessive plate current which could damage the primary winding of the audio output transformer. Actually, 5 volts is not as much as one would expect to find with a leaky coupling capacitor. To check the part, one lead (the one going to the grid) was disconnected and the ohmmeter was used to check across the capacitor leads. A slight amount of leakage was present but not enough in my estimation to cause the trouble. However, an ohmmeter test is not always reliable so the set was turned on (the capacitor lead still disconnected) and the voltage checked from the free end of the capacitor to the chassis, as shown in Fig. 1.

Again 5 volts was measured, the same as with the circuit connected. In other words, the

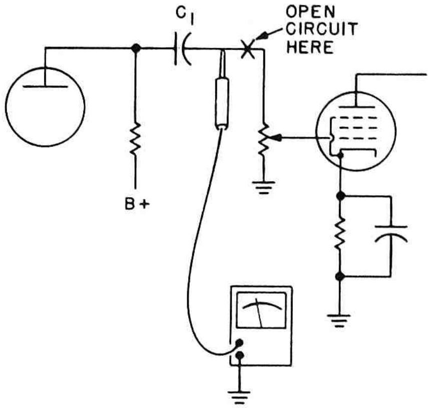

Figure 1.

resistance of the 6AQ5 grid return was the same as that of the vtvm input resistance, 12.2 megohms. The grid return resistance should have been between 250,000 ohms and 1 megohm. The measured resistance was well over 200 megohms! An examination showed the circuit to be as shown in Fig. 2.

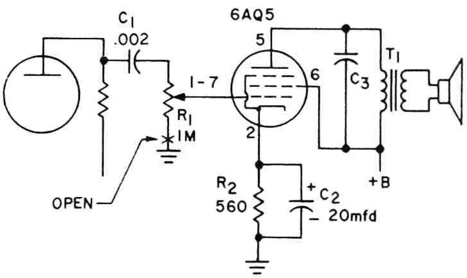

Figure 2.

I found by looking at a diagram at the wholesalers (most will let you do this at no charge) that the volume control was 1 megohm. I got a suitable replacement and installed it, which reduced the grid-to-chassis voltage of the 6AQ5 to zero as expected.

Next, from force of habit, I cut the insulation on the side of the output transformer and folded it back, exposing the coil windings. I was lucky; I found the break in the wire and was able to resolder it. You can do this about one time in ten, so it never hurts to try. In most cases you can't find the open or will damage the winding beyond repair. Since the transformer is shot anyway, it doesn't matter.

The sound was now restored. If the transformer had been fixed or replaced first, the sound would have been quite distorted and the volume would have been at maximum regardless of the control setting.

With the sound restored I noted the tuner contacts seemed dirty. Noise was present and the gain seemed to be low. I removed the tuner and its shield, and sprayed the contacts with contact cleaner. I then rotated the channel selector to exercise the contacts and wipe off the dirt.

On trying the set out again, the horizontal sync was lost and could not be brought back with the adjustment of the slug in the horizontal ringing coil. As a matter of fact, there was violent oscillation on most channels and broad horizontal bands, whose number could be changed with the horizontal control but not synced in. The sound was still OK. After tearing my hair for some time I finally gave in and purchased a schematic. I moved the slug from the horizontal coil to see if it was cracked, and I carefully measured the resistance of the coil windings. The resistance was off, but not enough to cause the condition – at least I put off buying a replacement. I put the set to one side to give my overheated brain a chance to cool off.

When I tried the set out some time later, I was reminded of a case where overall oscillation had caused a similar pattern on the screen. On thinking about oscillation and its causes the light dawned. I had neglected to replace the chassis bottom plate as well as the tuner shield. Before cleaning the tuner contacts the gain was too low to sustain oscillation, but now it was a different matter. With the shielding all back in place, it was possible to achieve a good picture and sound. **Moral: Don't ever forget to replace all shields.** I get many sets with the tuner shield missing; due, no doubt, to some technician removing the shield in order to spray the tuner contacts and then neglecting to put the shield back. This is sometimes impossible without removing the tuner. In the previous cases, the lack of the tuner shield just caused dust to accumulate in the tuner, so it was easy to forget about the real purpose of the shield. No doubt the oscillation would not have occurred if the bottom plate had not been left off, too.

Philco Chassis 12J27

When I received this set it had no vertical stability. I suspected the 13FD7 tube, so I tried another, even though the original tested OK. This came from finding so many similar troubles due to bad vertical output tubes. I thought at first I had the trouble licked because I could sync the set vertically. I put the set to one side to play and cook while I went to something else. In a short time the picture shrank vertically to about half normal size. When the height was readjusted the vertical sweep could no longer be synced. I had a Sams' set for this chassis, parts of which are shown in Figs. 3 and 4. These manuals give ohmmeter checks on the tube pins to various points. At times this can be a real help, since you don't have to stop and figure out the effect of various series and parallel combinations which may exist in the circuits. I found that the resistance between pin 2 of the vertical output tube and the chassis was about 4 megohms rather than the specified 2 megohms.

In looking at the circuit in Fig. 3 you can see that the path to ground is through R43 and R52, the latter in shunt with a 560k-ohm resistor in printed circuit K4. A check from the control grid of the 17DQ6 to ground measured over 2.5 megohms, although the chart called for 1 megohm. In this case the path is through the 470k-ohm and 560k-ohm sections of K4, the latter in shunt with R52. These two tests pointed to an open in the 560k-ohm section of K4.

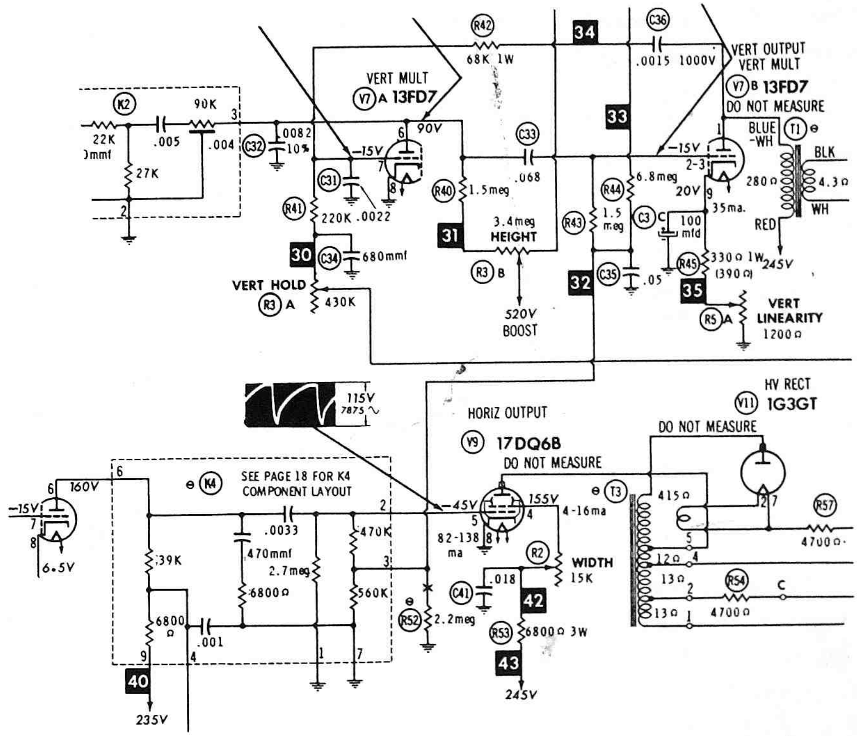

Figure 3.

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V7	13FD7	†310Ω	2meg	NC	12Ω	8Ω	• †2.2meg	•900K	0Ω	•1000Ω

- • THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
- † MEASURED FROM OUTPUT OF X1.
- † MEASURED FROM PIN 3 OF V10.

NC NO CONNECTION

Figure 4.

Printed circuit K4 is handy on the rear of the chassis. I bent it backwards so it was parallel to the top of the chassis and so the marked back of the printed circuit was in full view. The package is shown in Fig. 5. I was originally thinking about shunting R52 with a 560k-ohm resistor. Looking at the back of K4 I noticed that the exposed solder connection of the 560k-ohm unit, supposed to go to terminal number 7, looked a little "fat." A fat connection is one that has too much bulk. I applied my soldering iron to the fat joint and up rose a thin spiral of smoke due to the rosin in the joint vaporizing!

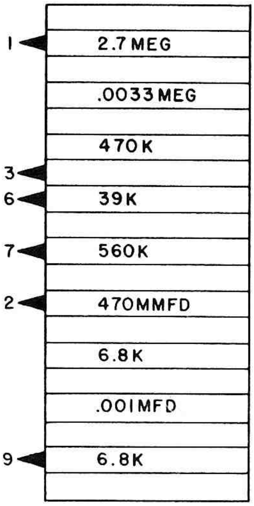

Figure 5.

When the ohmmeter measurements were repeated they were normal. I treated the rest of the exposed connections on the base of K4 to the hot iron treatment and got some more smoke. I couldn't blame the quality control at the factory, as the set has been OK for some ten years. Rosin joints cause many peculiar effects. In the old days of TRF receivers, a frequent trouble was cross modulation. Very often, by reheating all joints in the tuned circuits this trouble would disappear. The odd thing about a rosin joint is that it acts like a semiconductor, showing greater resistance in one direction than in the other. Rosin joints often take years to act up, but remember, it never hurts to reheat a suspected joint. If there is no rosin left in the joint there will be no vapor, but even if smoke or vapor is present the joint may not have been causing trouble. Don't get in the habit of reheating all joints willy-nilly. This is just as bad as replacing all capacitors in a circuit because you once found a bad one in another set. Cleaning up the joint in this Philco cleared up the trouble.

Arvin 69K48

This set, about 5 months old, was brought to me with no vertical sweep, just a horizontal line on the screen, and with normal sound. "Aha," I thought, "an easy job for a change, probably just a bad vertical tube." Investigation showed that the vertical sweep tube, a 17JZ8, tested good. However, I was bound and determined it was the tube so I tried another. Still no sweep.

This called for an investigation of the circuit. To my dismay I found that the set was so recent that Sams had not yet prepared a manual. Therefore, I was faced with either working without a schematic (I detest this) or writing for a factory diagram. I decided to trace out the circuit and draw my own, if necessary.

As a start I removed the 17JZ8, which is in a series filament string. This removes filament voltage from all tubes and, although dc voltages from the low voltage supply are present, there are no voltages dangerous to measure, such as the plate voltages of the vertical and horizontal output tubes, or the cathode voltage of the damper tube. With the aid of a tube chart to locate the 17JZ8 pins, the voltages at the tube socket terminals were checked. Things seemed to be about as expected, except that the control marked "Linearity" controlled the plate voltage on the triode section of the tube and the vertical "Size" control could be adjusted to make the control grid of the pentode output section of the tube go positive. In most sets the size control is used to adjust the plate voltage of the triode and the linearity control adjusts the bias voltage of the output section. I wondered how come; had the manufacturer marked the controls wrong or was there some peculiar defect causing this strange action? With the back off this set, the printed circuit sticks out over the chassis and most of the bottom of the circuit is in view. Without removing the set from the cabinet I located the coupling capacitor between the pentode and triode sections of the tube, disconnected one end and checked across the capacitor leads with an ohmmeter. The needle swung first to almost zero ohms and then rapidly to infinity. The initial swing and then the climb showed that the capacitor was not open; the final reading showed there was no leakage. It was nice to know that the coupling capacitor on the foil side of the board was not open or leaky, but this didn't solve the problem.

Before testing further it was necessary to have some idea of what to test. The action of the linearity and height controls bothered me. The only thing left was to trace out the circuit of the feedback system between the pentode plate and triode grid. I felt sure the trouble was there, since the vertical oscillator did not oscillate and there were no opens in the measurable circuits. Tracing a circuit is nothing in a set using conventional wiring. When a printed circuit board is used, however, it's a horse of another color! Fortunately the manufacturer had the components marked on the foil side of the board showing the connection points, and the foil showed the connections between the parts, so the task was not hopeless. To make the job as easy as possible I hunted through my supply of schematics for a set using 17JZ8 in the vertical sweep circuit and found several. I had made some ohmmeter checks in the circuit and had found that the cathodes of both halves of the tube were directly grounded to the chassis, so I chose a schematic that had grounded cathodes.

I drew the tube elements in at about the same position as on my sample schematic and started tracing the circuit from the triode grid toward the pentode plate, which is the normal feedback path in vertical sweep systems. The numbers of the resistors and capacitors marked on the board were used in drawing the schematic, and the tube pin numbers were taken from the sample diagram. To determine the values of resistors and capacitors, it is necessary to locate the parts on the other side of the board and read the values printed on the bodies of the capacitors and the color codes of the resistors. I found a resistor marked VDR in the oscillator feedback path from the junction of two capacitors to ground. The value of the voltage-dependent resistor was not given. It measured 25,000 ohms, which seemed reasonable. What I came up with was the schematic shown in Fig. 6. A check from the junction of C_{404} and C_{405} measured about 2 megohms. I found that by moving the sync control the value went from 2 megs to about ½ meg. This showed the sync control to be a 1.5 meg unit and R_{407} to be about ½ meg. Its color code showed it to be 560k-ohms.

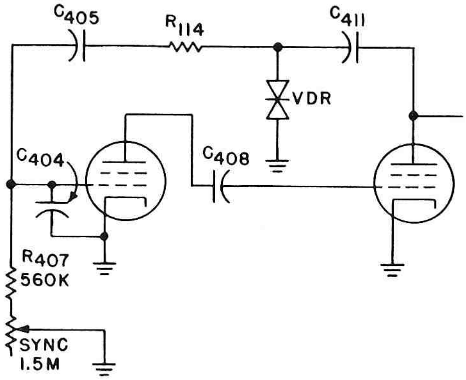

Figure 6.

To be on the safe side, one lead of C_{404}, C_{405}, C_{411}, and C_{408} (again) was lifted from the printed circuit board and the capacitors checked with the ohmmeter. They were then put back in place, as nothing wrong showed up. The resistors were then checked for continuity and proved to be OK. I finally decided I needed a complete schematic. Since the local dealer didn't have one, I wrote to NRI for a schematic. This was on a Tuesday evening and so help me Hannah I got the schematic on Saturday. (Someone in the Post Office was pushing for a raise, no doubt!) However, I'm getting ahead of my story. I studied the circuit board from time to time and made additions and corrections to my drawing. I put in the plate and control grid returns of both tube sections and ended up with the circuit shown in Fig. 7.

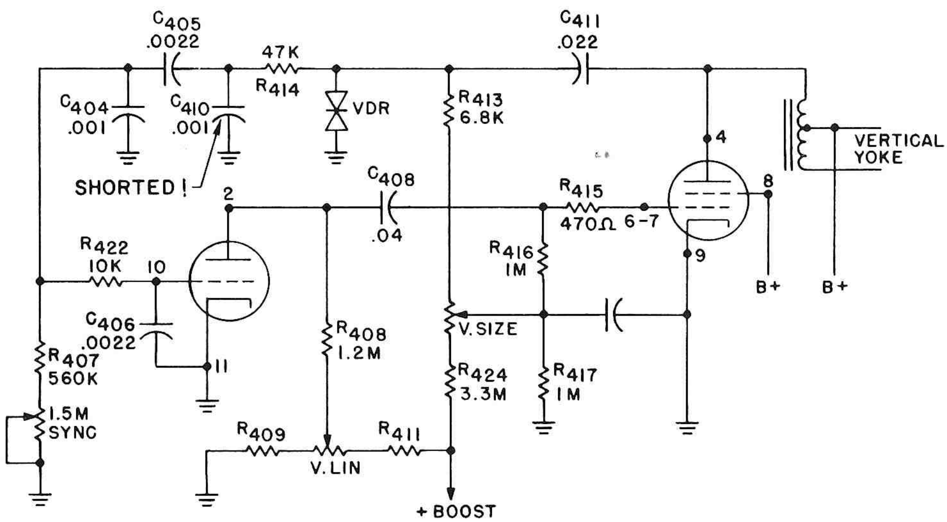

Figure 7.

This looked pretty good and I could see why the adjustment of the vertical "Size" control put a positive voltage on the pentode control grid and why it did not vary the voltage on pin 2. The "Lin" control looked like it should be the "Size" control to me. However, the set still had no vertical sweep.

I then began making rather aimless ohmmeter tests from the chassis to various points. I checked from pin 10 to the chassis and from the junction of C_{404} and C_{405} to the chassis, then from the other side of C_{405} to the chassis. Wow! Zero ohms here. Of course, such a value would short out the feedback path and make it impossible for the vertical oscillator to function.

A close examination of the printed board showed the presence of a capacitor (C_{410}) which did not convey feedback from pin 4 to pin 10 in the circuit, but which was used as a bypass to shape the feedback signal. It goes from the junction of C_{405} and R_{414} to the chassis. I had missed this one, which was shorted and the cause of the trouble. I had no .001, but did have two .002 mfd capacitors. Putting these in series gave a value of .001 and when soldered to the bottom of the board (old capacitor removed) the sweep worked fine. I couldn't get anything to sync as I had turned the "Size", "Sync" and "Horiz Range" controls way out of position. First I put the "Horiz Range" control in the center of its adjustment range and turned the "Horiz Hold" to get horizontal sync. Next I adjusted the vertical "Size" and "Lin" controls for about normal and was able to get vertical sync, completing the job. Incidentally, the "Lin" and "Size" controls were properly marked.

In the next article of this series I plan to give some information on defective color sets I have serviced and on color picture tube replacement.

• • •

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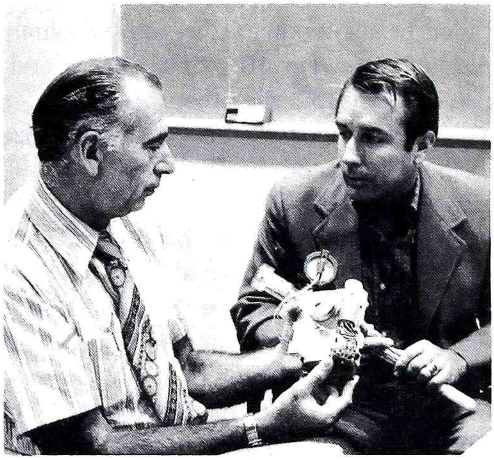

Joe Schek, right, and Thomas Wright when they met at NRI.

It isn't a mousetrap, and the world isn't exactly beating a path to his door at 6013 Monteverde Drive, San Jose, California. But Thomas S. Wright, NRI student in Industrial and Military Electronics, has developed an industrial device, now duly patented and being marketed, that is netting him financial returns as well as the fun and games he had in the process.

The device, an electrified soil moisture-content sensor, technically called a tensiometer, stemmed from an idea of three or four years ago "of trying to develop a 'rainbird' type of sprinkler for our lawn", Wright recalled on a recent visit to National Radio Institute headquarters in Washington, D.C. (He was sort of in the neighborhood, anyway, since he and his wife, Jo Ann, were on their annual visit to her parents in Baltimore with their children, a boy, 4, and a girl, 2.) Wright specifically came to NRI to see Joseph Schek, his personal consultant throughout his studies, and NRI's senior instructor. Joe, he says, "has always helped a lot, with ideas and reference material" in development of ideas.

Wright's patented invention, No. 3,559,-062 as of Jan. 26, 1971, is titled a "Radial Readout Gauge Having Cooperating Visual and Automatic Signification Means". It "is a method and means for converting a radial readout gauge, which normally indicates values for visual observation, to a radial readout gauge which combines visual observation of a value signified by the gauge with automatic signification of the attainment of a selected value on the gauge through electrical means," reads the "Abstract of the Disclosure" from the United States Patent Office.

More broadly speaking, it is an amplification and refinement of existing conventional systems, which usually incorporate a calibrated dial face with scales, a rotating pointer adapted to sweep across the scale as changes occur in the parameter, and a probe extending into the ground to assess moisture content in the soil, all of which require constant monitoring.

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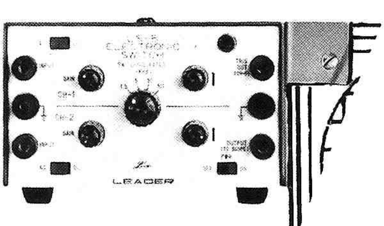

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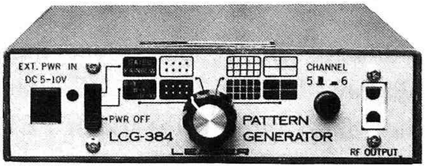

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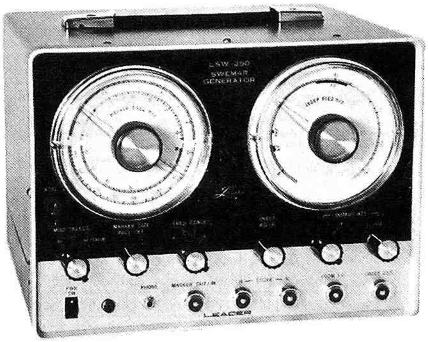

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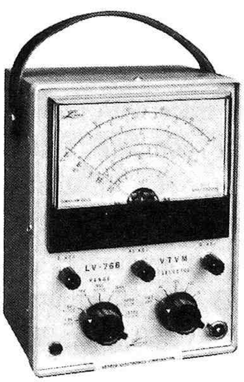

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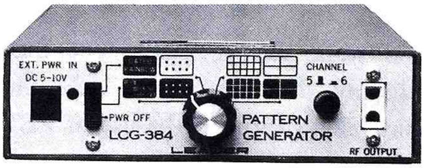

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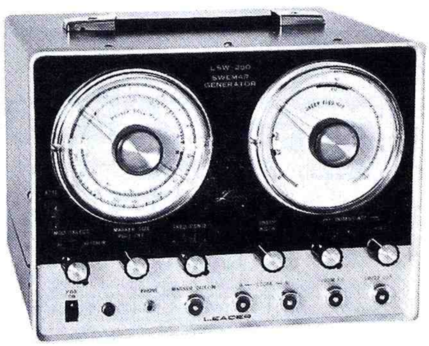

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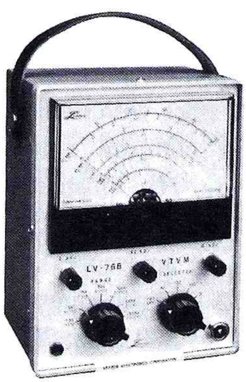

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80.01- 90.00	8.00	7.75	10.10	5.00
90.01-100.00	9.00	8.75	12.60	5.25
100.01-110.00	10.00	9.75	14.80	5.50
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Wright started working on the control system in 1967, "using basics learned mostly from NRI" and kept it running continuously without a mishap for a year before submitting it for a patent. It was held up because of a "possible conflict" with another flow meter application, but his claims stood up.

As with most patent descriptions, Wright's invention is covered in very broad terms. The particular device cited in the patent, however, is quite simple and is shown in Fig.1. This is an exploded view of a pressure gauge which has a drive mechanism (37), dial face (36), pointer (31, 33), and knob (41, 42). On the center of the pointer is a small permanent magnet (2).

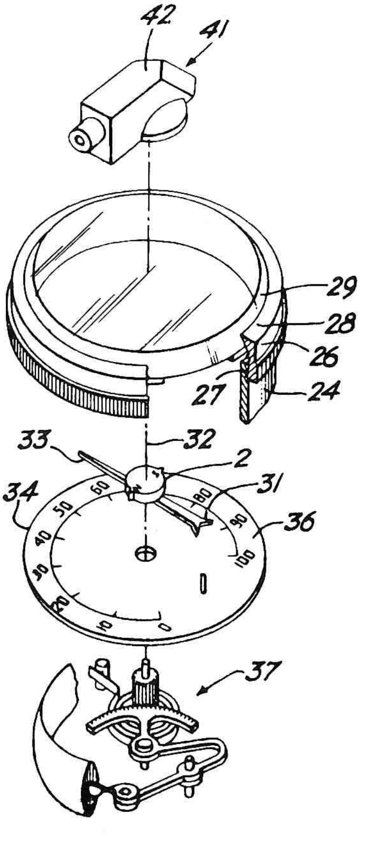


Figure 1.

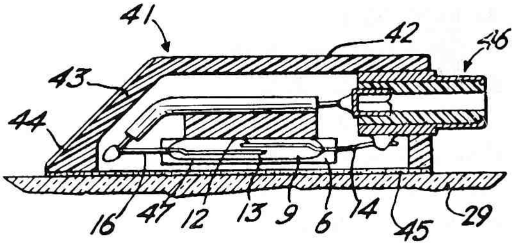


Figure 2.

Fig. 2 is a sectional view of the knob. Inside the knob there is a magnetically-operated reed switch (13) and a bias magnet (6). The weak field of the bias magnet combined with the field of the magnet on the pointer keeps the switch contacts open until a certain critical alignment of the two magnets occurs (as the pointer turns). Then the switch closes and remains closed for further rotation of the pointer (approximately 180°). The switch will open when the pointer drops back to its "safe" position. The point at which the switch closes can be controlled by rotating the knob.

Wright is by profession a pilot – he's been with Pan American Airways for seven years. Before that he was graduated from Michigan State University and spent several years with the Air Force where his job was checking test flight specifications.

"And that started my interest in electronics. I wanted to learn more, but on a practical level." This led to becoming an electronics hobbyist, and in turn, to taking an NRI course. So far he's only had "available space" in his home to practice his hobby, but the Wrights are in the process of building a new home which will include a built-in, "fully equipped" workshop.

As to his NRI course, he's self-admittedly a "slow" student, perhaps because he never has time between his jaunts "all over the world, but lately the South Pacific, Japan" to study. What he does is pack a couple of lessons in his flight bag when he's going to have a fairly extended stay somewhere. Joe Schek and our student records division rate him an "extremely good" student when he does manage to get to it. He's completed about 90% of his course now, and intends to finish. "I consider my NRI texts as more of a reference library. I don't intend, now anyway, to earn my living in electronics."

The tensiometer itself, applicable in many industrial uses, is doing quite well. It is used now primarily for irrigation purposes. It is being made and marketed by the Irrometer Company of Riverside, California, under a broad-based contract with Wright which remunerates him pretty well right now, allows him a larger percentage of sales if he develops ramifications of the existing patent, the option to change manufacturers after five years, but a much larger percentage if he stays with the same company.

And the ideas haven't stopped germinating since the patent. Wright is envisioning all kinds of other devices he wants to develop in his workshop, "oh, sophisticated burglar alarms, things like that." The particular patent also gives him room to grow, with an open clause written in:

> "It is to be understood, however, that the invention is not limited by said description and drawings, but may be embodied in various forms within the appended claims."

Under existing laws, application for a foreign patent must be made within a year after obtaining a U.S. patent, "or else it (the invention) can be pirated". He's not especially worried about that, he's checked, and it can be produced as cheaply in the U.S.A. as, say, in Japan.

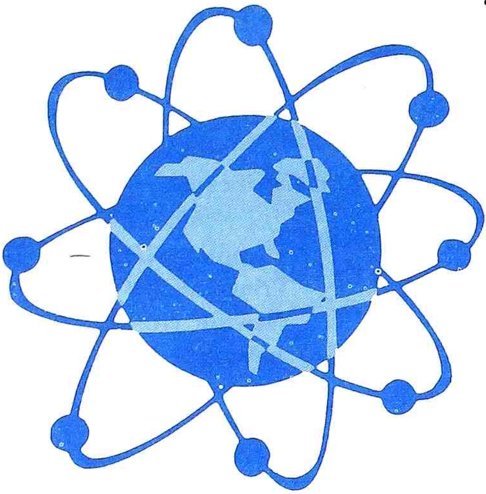
Wright credits his first patent, and the turn his mind seems to be taking, to the "very useful" help of Joe Schek and to NRI in general.

● ● ●

ANSWERS TO SELF-TEST QUESTIONS

From page 7

1. False. C_2 is an ordinary filter capacitor which serves to limit the ripple output of Q_3 to a reasonable level. C_1 is a coupling capacitor through which the pincushion signal is applied to the base of Q_1.
2. True. Zener diode D_1 provides the reference voltage for the +125 volt power supply. If the voltage across this diode changed (due to temperature variations, etc.), the 125 volt line voltage would change. However, the Zener voltage will, in practice, change very little, so the output voltage will be quite stable.
3. False. Neon lamp I_1 will light only when current is passing through the lamp; that is, when it has fired. This condition is present only when the automatic shutdown circuit has been activated. Normally, I_1 will be dark.
4. False. When Q_3 conducts, its anode current is limited by R_1 to a safe level. However, no voltage is applied to the collector of Q_1, so the circuit cannot operate.
5. False. Q_2 in Fig. 4 acts as an electronic switch. A class A amplifier is one designed to provide linear amplification of a signal.



Ham News

BY TED BEACH, K4MKX

Welcome to 1972! I trust that everyone had a fine holiday and that Santa brought the long-awaited "dream rig" you've always drooled over. If not that, perhaps a bit of rare DX was put in your stocking. At any rate, we certainly hope that 1972 will be **your** year for the best of everything.

Although things have been quite busy around NRI, we did not hear from too many new Hams this time. I guess that the press of the festive season and trying to keep up with the studies (hopefully!) kept the number down. Remember, this is your column and we would like to hear from you if you are a Ham. Send us a QSL, a note, or something letting us know you are out there, and what you would like to see in your column. Let us know your call, student number, name and QTH, the class of your license and what your interests in Ham Radio are. We will pass this along and perhaps you can make some new acquaintances among the NRI Ham fraternity.

Some time ago I mentioned something about homemade QSLs. Well, so far I have not had a great deal of time to try anything out (I need some new cards as we have a new QTH and I have finally started making some QSOs with the QRPP rig!). A bit further on in the column, however, you will see a couple of references to people who do make their own QSLs. I still feel the best way to go is to use the silk screen process. You can buy a basic kit (from art supply houses) which has everything you need to do creditable work with very little effort. These kits include a screen, various color inks, a squeegee, knife-cut film and an instruction booklet. The instructions in the booklet are very basic, to say the least, but if you supplement these instructions by doing a little reading at your local library, you should soon be able to make very decent and professional looking QSLs at very little expense.

A bonus of this process is that it can be used to make almost anything that you want to reproduce, including Christmas cards (a real good and fun family project). Closer to home, it can also be used for printed circuits. (Did you know that almost **all** commercial printed circuits are made using a silk screen resist?) If you decide to make circuit boards, you will almost certainly want to use a photographic silk screen process. In the next column I'll relate a couple of ideas on how to do this.

Right now, let's see which Hams are taking our Course for Amateur Licenses:

John	WN1PIY	N	Hampton, NH
Merlin	WN4UEJ	N	Princeton, KY
Gene	WN4VKN	N	Newton, NC
E.S.	WN4WVG	N	Lake Park, FL
John	WN5ØLM/8	N	Shinnston, WV
Russel	WN6MDQ	N	San Pablo, CA
Irene	WN7RYA	N	Wendell, ID
R.L.	WNØCZG	N	La Porte City, IA
Charles	WNØDEH	N	Arkansas City, KS
Ralph	KP4BPH	T	Mayaguez, PR

Not too many, but ten is better than none. It is always gratifying to be able to report the NEW Hams in this slot.

WN1PIY reports that he recently got his new call and that he is already up to 10 to 12 wpm on the code. John didn't say if that was sending or receiving, but at any rate it looks like he will have the old cw up to 13 wpm in a hurry. A little practice on the air should really help, and then comes General.

At the end of Training Kit 1R (the Novice code kit) WN4UEJ reports good solid copy at 10 wpm, and at 13 and 15 wpm Merlin copies 65 or more consecutive characters without error. That's very FB for a beginner. Merlin has found out that the nightly W1AW code practice sessions really help. He has been an avid listener for some time. (I **know** you've heard me recommend this many times before). Consult the Operating Schedule published in QST for dates and times of their code practice sessions.

WN4WVG wrote asking for a copy of the crystal lattice filter modification mentioned by WNØBEK (now WBØBEK) back in the September/October Journal. The last request I had for this modification was last year, and the original letter has been "misplaced" by my secretary. Fortunately I discovered one copy in a folder on my desk and I sent this on to E.S. (the only handle given by WN4WVG). However, if anyone else should write for this modification, they will be out of luck as the copy sent to E.S. was the last one.

Now let's take a look at the Rogues in the gallery of students and graduates of NRI not enrolled in the Course for Amateur Licenses:

Skip	WB2DXP	G	Batavia, NY
Al	K3VRS	G	Baltimore, MD

Clarence	WB5BYV	–	DeQueen, AR
Randall	WB5FPH	T	Albuquerque, NM
Bill	K6RGY	G	Pacifica, CA
Virgil	K8UBI	G	Huntington, WV
Ken	WA8UXH	G*	Hinckley, OH
Charlie	W8WAV	A	Ravenna, OH
John	WB9BJC	A	Moline, IL
Oliver	K9MRR	G	Belleville, IL
Bob	KH6AD	E	Kaneohe, HI

*Just upgraded. Congratulations!

I don't want to put things out of order, but I feel that I should first mention the last name on the list – KH6AD – our FIRST Hawaii QSL! And a long time in coming, I might add. Now all we have to do is scare up someone in Wyoming to send in a QSL and we will have the fifty-state WAS we've been shooting for these many years.

Bob is a recent enrollee in our Math for Electronics course and says that he works 40 cw almost exclusively. Although he holds an Extra ticket, he hangs out mostly around 7030 or 7035. Bob runs 150 watts with "... an antenna that is constantly in a state of change." Right now he is using a top loaded vertical with a director pointed toward the mainland. Eight hundred feet of wire went into the ground radial system for the antenna and he "guesstimates" that the two element vertical gives about 4dB gain over the vertical alone in the forward direction.

Like so many good ops and real Hams, Bob likes to operate in the Novice bands frequently and would be willing to set up schedules with anyone wanting a KH6 QSO. He says that he would be willing to meet them on Friday or Saturday nights, Hawaii time, about 0730 GMT. Write him at: 46-353 Kumoo Loop, Kaneohe, HI, 96744 for a definite sked.

Bob has two receivers, both homebrew. One is an all-tube job he built about fifteen years ago and the other is an all-transistor unit of recent vintage which uses both FETs and bipolar transistors. The KW transmitter remains idle most of the time since they have TVI problems on Oahu, and besides the 150 watt rig works almost as well most of the time. Bob didn't say, but I'd bet that both the KW and 150 watt rigs are also homebrew. At any rate, if you need Hawaii, write Bob and set up a sked for a cw QSO on forty.

Now, back to the list. WB2DXP says that he agrees 100% with the comments published recently here regarding poor operating practices. Skip says he can excuse the Novices but that the oldtimer is another matter. Right on, Skip!

Skip is also one of the ones mentioned earlier who works with homebrew QSL cards. He is a professional photographer and says that he will send some details on how to make photographic QSLs. Sounds good to me, and I'll certainly be looking forward to Skip's letter.

Another item of interest in WB2DXP's letter was concerning QRP operation. As everyone should know, a good antenna is perhaps the "secret" to putting out a good signal, regardless of the power involved; and Skip pointed this very true fact out to me. My aluminum clothesline antenna with questionable ground system and "matching" network is probably the reason why I have had so few contacts with my Ten Tec. You'd better believe that now that the cold weather is here I'm not about to be climbing around outside running **any** kind of antenna. If the mess I've got strung up outside won't hack it, it will just have to wait until the weather gets a lot better.

The reason K3VRS has his six meter rig for sale (see Ham Ads) is that he just upgraded to General from Technician and there just isn't any room on his tower for the 4-element, six meter beam along with the new tri-bender, 11-over-11 for two and the 432 MHz collinear. The new HF rig consists of a Heath SB-102 driving an SB-200 linear, which Al is very anxious to fire up.

WB5FPH is the other respondent mentioned earlier who makes his own QSL cards. I might add, however, that Randall's card could well be the most expensive QSL around – it was printed by an IBM 360! A copy of his QSL is shown below.

```
W     W BBB   5555 FFFF PPPP H   H
W     W B   B 5    F    P   P H   H
W     W B  B  5    F    P   P H   H
W     W BB      55 FFF  PPPP HHHH
W  W  W B  B      5 F   P    H   H
WW   WW B   B    5  F   P    H   H
W     W BBB   55   F    P    H   H
```

WA8UXH was a victim of circumstances. It seems that his Technician license expired September 2, and Ken was determined to upgrade to General rather than invest more money to renew the Technician. So, on September 10 he invested in a General test and made it with flying colors. Nice going, Ken, and I'm sure that all that practice put in on cw will really pay off.

Ken also asked if the magazine "73" was still in business; he hadn't seen it on the newsstands recently. Yep, it is still well and healthy as far as I know (got my copy just the other day). Maybe their local distribution has been cut down in your area, Ken.

W8WAV wrote a very nice letter to tell us how much he enjoyed reading the Journal, and particularly the "Ham News" part of it. Charlie said that after reading about the Ten Tec gang in Tennessee in this column he wrote them a note asking about their line. Their reply was an almost illegible scrawled note on the bottom of his letter thanking him for his inquiry, etc., but giving absolutely no information on the line. That doesn't sound at all right, as I have had various correspondence with the factory and all of it has been well written and informative. Perhaps you just got a dud one time, Charlie. For another eight cents why not have a second go at it? I like their products, and I really think that their prices are very reasonable. I am a really active experimenter and I know that I could not possibly homebrew gear the quality of the Ten Tec gear for anywhere near the price they get. And it's all assembled – no kits to build. Like, wow!

WB9BJC works 40 and 15 with a Drake TX-4/R4B combo along with a 1300 watt 813 linear. John likes the homebrew art and says the quad and power supply for the linear are all his.

By the time you read this he will probably have made the second big jump in his Ham activities. John went from Novice to Advanced and planned to take the Extra test in December. Here's hoping that we will be reporting another "upgrade" in these pages real soon.

Well, it looks like it's QRT time again, fellows (and gals); we haven't had much correspondence and even less time to prepare any real stuff for the homebrew QSL bit, but with luck we can do a little better next time.

VY 73, es CUL. – Ted – K4MKX

HAM ADS

FOR SALE: Complete 6M station. Heath HX30 SSB, AM, cw rig; $100.00. Knight T-175 linear, 300 W PEP; $50.00. Tecraft converter, 14 – 28 MHz i-f; $30.00. 4-element beam; $10.00. Also Knight 80 – 6 transmitter, T-150; $35.00. Al Lind, K3VRS, 1251 Sulphur Spring Road, Baltimore, MD, 21227.

FOR SALE: Knight model KG-686 rf generator; Knight model KG-687 sweep/marker generator with crystal. Original cost, $225.00. Will sacrifice both units for $100.00 plus shipping. Bill Beckerley, K6RGY, 1077 Grand Teton Dr., Pacifica, CA, 94044.

FOR SALE: University expenses force sale of entire rig, mint condition, all less than one year old. I pay shipping. Heath SB-303 with AM, cw, SSB filters and SB series speaker; DX60B, HG10B and all cables including 100′ RG-58A/U and connectors; Tuner 254C microphone; key; headset; relay; vertical antenna for 10 through 80 meters; spare parts. First check for $325.00 takes all. Ralph D. Miller, KP4BPH, c/o C.A.A.M., Mayaguez, PR, 00708.

FOR SALE: NC 105 gen. coverage recvr/ham bandspread. Excellent condition, recently aligned. $65.00. Mike Davidson, WN3NXP, 638 N. Belnord Ave., Baltimore, Md., 21205.

WANTED: Schematic (or copy) of EICO model 753 transceiver. Virgil Hicks, K8UBI, 425 New York St., Huntington, WV.

WANTED: Transformer for DuMont 304A oscilloscope. O.M. Voelker, K9MRR, 4102 S. Park Dr., Belleville, IL, 62223.

WANTED: Schematic or other information pertaining to Eldico SSB-100 MIL transmitter. Wayne D. Mears, Box 4144 (CMR), APO San Francisco, 96323.

NRI honors program awards

For outstanding grades throughout their NRI courses of study, the following September and October graduates were given Certificates of Distinction with their NRI Electronics Diplomas.

WITH HIGHEST HONORS

John S. Bartlett, Jr., Washington, D.C.
William A. Engdahl, Annandale, VA
Larry C. Gordley, Westminster, CA
Bernard Gottlieb, Los Angeles, CA
Dean Hendricks, Edmond, OK
Robert G. Jacobs, Adelphi, MD
Zenon Janowski, Binghamton, NY
Kenneth H. Mayen, Poughkeepsie, NY
Barnabas S. Ndebe, Amherst, MA
Donald R. Pairmore, Memphis, TN
Robert Pietrzak, APO New York
Francis S. Pulaski, Northampton, MA
James W. Smith, Minneapolis, MN
Norman D. Sullivan, Chicago, IL

WITH HIGH HONORS

Richard V. Abbott, College, AK
Robert L. Ballou, Hampton, VA
Jay L. Benbow, Durham, NC
Vernon C. Blanke, Cotati, CA
John D. Bochon, Seattle, WA
Robert L. Brittingham, Berwyn Heights, MD
Denny W. Bryant, Fairborn, OH
Guy P. Buck, Torrance, CA
Scott Wayne Burchill, Philipsburg, PA
William J. Byrne, Bronx, NY
John E. Campbell, Jr., Pittston, PA
Robert A. Childrez, Jr., Charlotte, NC
Utah Coleman, McArthur, OH
Orville E. Coon, Hilton Head Island, SC
G. D. Dobler, Bel Air, MD
James E. Drake, Des Plaines, IL
Dennis Dunn, Dracut, MA
Gary L. Eidson, Kingsport, TN
Gerhard H. Erftenbeck, West Chester, OH
John E. Fuller, Stratford, CT
Ernest C. Geithmann, Toledo, OH
Jacob S. Grainger, Medway, MA
David C. Hanson, Loma Linda, CA
Ernest A. Harris, Sr., Ellicott City, MD
Lloyd L. Hedges, Indian Head, MD
Robert N. Herrell, Las Vegas, NV
Mark G. Hocker, West Chester, PA
Philip H. Jones, Glenolden, PA
Philip T. Jones, Sherman Oaks, CA
William A. Keown, Phoenix, AZ
Frank Kudlow, Pittsburgh, PA
Thomas M. Lecki, Philadelphia, PA
James W. Lehman, Orlando, FL
Alfred Leitner, Jr., Dedham, MA
James Ambrose Martin, New Glasgow, NS Canada
Joseph L. Mercolino, Spring Lake, NJ
Kieran J. Moyle, Livermore, CA
Mike Mueckler, Racine, WI
Eldon E. Mumpower, Eglin AFB, FL
Jerrold M. Neil, Star Prairie, WI
I. Floyd Padgett, W. Columbia, SC
Francis Pressley, Chicago, IL
Richard G. Rowe, Quantico, VA
Charles F. Royer, Vallejo, CA
Earl E. Shaw, Jr., Moundsville, WV
Patrick M. Sheedy, Groveland Station, NY
Billy A. Sheldon, Alameda, CA
Richard James Sieber, Lawton, OK
A. G. Spencer, Quincy, IL
J. W. Terrill, Freeport, TX
Kerry G. Thuloweit, San Jose, CA
Ronald C. Utterbeck, Dearborn Heights, MI
Gordie Whittington, Camden, NJ
Jerry A. Williams, Coronado, CA

WITH HONORS

Richard J. Archer, Portland, OR
Subramaniam Arumugam, Toronto, ON Canada
Arnold Earl Barnett, Lakewood, CO
Norton L. Bassett, Jr., Glen Burnie, MD
Frank A. Beck, JR., New Castle, DE
Phillip G. Bernhard, Commerce City, CO
Jack W. Berryhill, Decherd, TN
Tom Bradley, Rankin, IL
James E. Brugh, Pittsburgh, PA
Nicholas A. Butcher, Cincinnati, OH
Jerry W. Catrow, Martinsburg, WV
Edward T. H. Chen, Toronto, ON Canada
George Clarren, Kensington, MD
Thomas Cooke, Lake Charles, LA

Howell M. Covert, San Antonio, TX
Wilford G. Cozzens, Vandenberg AFB, CA
Ronald R. DeLyser, Annandale, VA
David L. Denner, Hartsville, SC
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David A. East, Bronx, NY
H. L. Eddins, Borger, TX
Ray Edwards, Longview, TX
John W. Ellis, Huntsville, AL
Gene D. Eshleman, Kansas City, MO
Robert J. Fischer, Council Bluffs, IA
Francis D. Fontanesi, Springfield, VA
Joe W. Fuller, Phoenix, AZ
Ronald Gabbard, Lexington, KY
Shirley J. Geoffroy, New Iberia, LA
Robert Goldberg, Los Angeles, CA
Nelson L. Gray, Thurmont, MD
Todd Avery Greene, Lake Odessa, MI
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James R. Hartung, Palm Harbor, FL
Stephan Hauki, Kitimat, BC Canada
Joseph L. Hicks, Huntsville, AL
Robert G. Hinkle, Hoopeston, IL
Donald Howat, Sherwood Park, AB Canada
Marvin Hutto, Augusta, GA
Gregory P. Johnson, Norfolk, VA
Alvin R. Keiek, Aiea, HI
Vernon L. Kendrick, Dumas, TX
Frederick B. Kopp, FPO New York
Albert P. Koster, Jr., Bayside, NY
Robert T. Kotyk, Scott AFB, IL
Albert C. LeTellier, Central Falls, RI
Chester Ludlam, Wichita Falls, TX
Herbert K. Marnholtz, Davenport, IA
Walter O. May, Baltimore, MD
John M. Mayeux, Plaucheville, LA
Arnold G. McCardell, Fort Benning, GA
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Joseph R. Prisella, Corning, NY
Carl R. Quale, Seattle, WA
Rev. Sister Mary J. Quintos, Cotabato City Philippines
Ronald A. Ramey, Lynchburg, VA
Amborse Ray, Hancock, MD
Robert F. Reichert, APO San Francisco
Vernon J. Rhodes, Whiteman AFB, MO
David A. Rother, Citrus Heights, CA
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Don M. Saltsgaver, Palmyra, IN
Delno I. Seitz, Columbus, OH
John F. Shubert, Middlebury, VT
Joseph D. Simpson, Great Falls, MT
David L. Smith, Mount Juliet, TN
Wayne Douglas Smith, Sacramento, CA
John D. Spencer, Greenfield, MA
Jerome C. Stephan, APO New York
Charles D. Stinson, Tampa, FL
William J. Tomecek, Jamaica, NY
Richard L. Weaver, Zarephath, NJ
Craig W. Weber, Huntsville, AL
Edwin M. Wehrman, Sacramento, CA
William B. Welsh, APO San Francisco
William T. West, Inchon, Korea
Edward W. Wilson, North Plainfield, NJ
Richard M. Wonner, Salem, OH

CORRECTION: The Honor students whose names appeared in the September/October Journal were graduated in May and June; those Honor students whose names appeared in the November/December Journal were graduated in July and August.

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I certify that the statements made by me above are correct and complete. Allene J. Magann

PS Form 3526 July 1971

Alumni News

Andrew Jobbagy	President
Charles Traham	Vice-Pres.
John Rote	Vice-Pres.
William Simms	Vice-Pres.
Andrew Perry	Vice-Pres.
T. F. Nolan	Exec. Sec.

NEW TORONTO CANADA CHAPTER WINS CHARTER

The brand new Toronto Canada Chapter received their charter from NRIAA and held their charter meeting on the 14th of October, 1971. They elected their officers: Chairman, Mr. Branko Lebar, 6 Canerough Drive, Etobicoke, Ontario; Secretary, Mrs. Branko Lebar; Treasurer, Mr. R. Taylor, 15 Brigadoon, Agincourt, Ontario. Congratulations, new officers.

The members of the new Toronto Chapter are happy to receive their NRIAA Charter.

Mr. Steward J. Kenmuir, General Manager of the McGraw-Hill Continuing Education Company of Canada, has been the spark plug in forming the NRI Toronto Chapter No. 1 of the Alumni Association.

He had as guests for this charter meeting Mr. and Mrs. Jack Thompson and Mr. and Mrs. Tom Nolan. Mr. Thompson is the Marketing Manager of McGraw-Hill Continuing Education Company of the USA.

Tom gave a lecture on solid-state transistor theory, testing, and troubleshooting which was well received by the 46 Alumni and students present for the charter meeting.

It might be of interest to note that two students came from as far as 878 miles away, four from 172 miles, four from 170 miles, one from 152 miles and four from 144 miles. The people in Canada certainly do get around. With this type of attendance record for the charter meeting there is no doubt that this Chapter is off to a flying start.

Editor's Note: Congratulations on our first Canadian Chapter and may it long exist as an asset to the NRI Alumni Association.

DETROIT Chapter Entertains Executive Secretary

The Detroit Chapter looks forward to Tom Nolan's yearly visit. All of us came away from his lecture on testing and troubleshooting with a better knowledge of transistors. Through the use of slides, voltmeters, and test instruments he showed how to test transistors without ruining them in the process. A demonstration with an oscilloscope showed us how to align color TV receivers and where to make the critical adjustments.

After the meeting coffee and sandwiches were served.

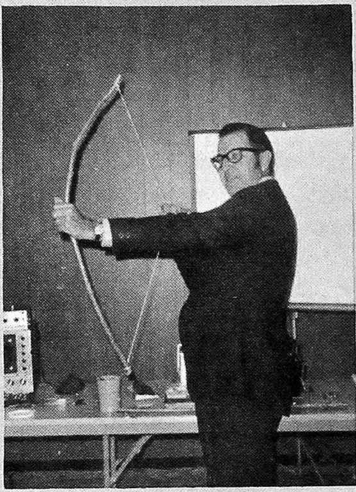
All members of NRI, graduates or not, are welcome. Bring us your friends and your electronics problems. We welcome both.

Executive Secretary Enjoys FLINT SAGINAW Hospitality

When Tom Nolan delivered his yearly lecture at the October meeting, the membership pulled a bit of a surprise on him.

The highlight of the meeting was electing a King of the Coho and Wildlife. Mr. Nolan beat out three other candidates. They are: runner-up Steve Avetta from Beaver Allen district, all-time trapper and fisherman. Second runner-up, George Maker from Canadian border, moose country. Third runner-up, George Rashead from black bear country, bow and arrow hunting district.

Mr. Nolan received his crown and diploma from the Michigan College of "Hunting and Fishing", presented by



Tom Nolan receives a diploma from the Michigan College of "Hunting and Fishing," above, and various pieces of necessary equipment, right, which he is anxious to try out.

Saginaw Valley Chapter President Andrew Jobbagy. Along with the diploma, Tom received all the necessary equipment: a bow and arrow, high wader boots, all the fishing lures, a knife, a pistol for hunting, a cane pole, a sailor's hat, a captain's cap, a moose horn from Canada, a license for bass fishing (with a trout stamp), and a bucket full of worms. All of the gear was donated by the members. Mr. Nolan also received the Amy award and an elephant head, which will remind him of the Saginaw Valley Chapter every time he looks at it.

Steve Avetta and Frederick Malek served coffee and donuts.

Editor's Note: I wish to thank the Saginaw Valley Chapter for a most pleasant evening, and also to congratulate Andrew Jobbagy on his elevation to National President of NRIAA.

NEW YORK Chapter as Strong as Ever

At the September meeting Mr. Jim Meany did a little troubleshooting on a Zenith color TV which was very noisy in the sound section. This was due to a bad high voltage rectifier tube (3DC3) which was arcing over to ground through the tube socket. A new assembly was installed which corrected the trouble. Pete Carter worked on a GE color chassis and corrected its trouble. Ontie Crowe repaired a small radio that had an open primary in the transformer. He was able to repair the transformer, and the radio now works just fine.

Mr. Jim Eaddy gave a talk on high voltages. Mr. Sam Antman explained a tuner problem that he had come across recently. He thought that it was due to lack of cleaning the tuner, but it turned out to be something more serious. A conductor break was found and repaired.

The Chapter is looking forward to a good working season.

New Member Added to NORTH JERSEY Chapter

At the September meeting Mr. Andrew Manno was welcomed into the membership. Andy is working as a TV serviceman.

George Stoll brought in a Silvertone TV which was found to have a bad tuner and color problems. Andy checked the CRT and tried to rejuvenate it, but the red gun was still weak. The tuner was cleaned and minor adjustments were made to the color, which greatly improved the picture. Further studies and checks will be made at the following meeting.

The Chapter members are thinking about purchasing a color bar generator for use at these meetings.

PITTSBURGH Chapter Takes In New Members

At the October meeting three new members were taken into the Chapter. They are Stanley A. Kurpakus, Leo W. McCarthy, and Robert C. Persuda.

This was an excellent meeting with 15 members and one visitor present. Mr. Tom Schnader, one of the members and a good serviceman, gave a talk on shortcuts and kinks in service work. Tom explained how to inject the high voltage from a good TV receiver into a TV set which has no high voltage and thereby determine if the yoke or flyback is faulty.

The Chapter is looking forward to a program by General Electric at the November meeting, and by Sencore at the December meeting.

SAN ANTONIO Entertained by TV Manufacturers

At the September meeting Mr. Dennis O'Neill, the RCA technical consultant, gave a talk on horizontal deflection and high voltage circuits. Included in his lecture were slides and a very attractive 46-page booklet which was given to all of the men present. Also in September the membership was fortunate to attend the Zenith Company's technical discussion on their new Titan 110 Zenith chassis and a review of the common problems encountered in the older Zenith TV chassis.

Mr. Ted Walker, the Zenith technical consultant for Joe Thiele Co., the South Texas Zenith Distributor, gave a talk at the October meeting. His subject was "Servicing Color Oscillators, Phase Detectors, and Color Bandpass Amplifiers". One of the best programs of all time! Ted simply knows everything about TV servicing!

Sam Stinebaugh will present a "What's My Line?" servicing program at the November meeting.

Programs like these really add to the

knowledge of the membership of the NRIAA Chapters. Keep up the good work, fellows!

Everyone is anxiously awaiting the annual Christmas dinner which is scheduled for mid-December.

SPRINGFIELD Chapter Starts New Season

At the September meeting Al Dorman gave a very interesting talk on a Sylvania TV problem he experienced. Mr. Park brought in a small portable GE TV and during his discussion of the defects, Mr. Richardson, Mr. Dorman and Mr. Charest repaired the TV set. The men in the Springfield Chapter are becoming experts. The problem was a shorted diode, an open resistor, and a low voltage supply.

A new idea was brought up at the October meeting. Mr. Arthur Byron suggested a Swap Shop. Members would list their available equipment on the bulletin board, and then swap things among themselves.

Frank Koslowski brought in a GE portable color TV which the Chapter will troubleshoot at their next session.

There was a large turnout at the Southeastern Mass. Chapter the night Tom Nolan paid his annual visit.

COMING IN THE NEXT ISSUE: Tom Nolan writes about his trip to Hawaii and the outlook for another new NRIAA Chapter – this time in our fiftieth state!

Directory of Chapters

CHAMBERSBURG (CUMBERLAND VALLEY) CHAPTER meets 8 p.m. 2nd Tuesday of each month at Bob Erford's Radio-TV Service Shop, Chambersburg, Pa. Chairman: Gerald Strite, RR1, Chambersburg, Pa.

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., 2nd Wednesday of each month at Chairman Andrew Jobbagy's shop, G-5507 S. Saginaw Rd., Flint, Mich.

LOS ANGELES CHAPTER meets 8 p.m., third Friday of each month at Graham D. Boyd's TV Shop, 1223 N. Vermont Ave., Los Angeles, Calif., 662-3759.

NEW YORK CITY CHAPTER meets 8:30 p.m., 1st and 3rd Thursday of each month at 218 E. 5th St., New York City, Chairman: Samuel Antman, 1669 45th St., Brooklyn, N.Y.

NORTH JERSEY CHAPTER meets 8 p.m., last Friday of each month at The Players Club, Washington Square. Chairman: George Stoll, 10 Jefferson Avenue, Kearney, N.J.

PHILADELPHIA-CAMDEN CHAPTER meets 8 p.m., 4th Monday of each month at K of C Hall, Tulip and Tyson Sts., Philadelphia. Chairman: John Pirrung, 2923 Longshore, Philadelphia, Pa.

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. & 2nd St. Chairman: Tom Schnader, RFD 3, Irwin, Pa.

SAN ANTONIO (ALAMO) CHAPTER meets 7 p.m., 4th Friday of each month at Alamo Heights Christian Church Scout House, 350 Primrose St., 6500 block of N. New Braunfels St. (3 blocks north of Austin Hwy.), San Antonio. Chairman: Joe R. Garcia, 8026 Cinch, San Antonio, Tex., 694-3461.

SAN FRANCISCO CHAPTER meets 8 p.m., 2nd Wednesday of each month at the home of J. Arthur Ragsdale, 1526 27th Ave., San Francisco. Chairman: Isaiah Randolph, 60 Santa Fe Ave., San Francisco, Calif.

SOUTHEASTERN MASSACHUSETTS CHAPTER meets 8 p.m., last Wednesday of each month at the home of Chairman John Alves, 57 Allen Boulevard, Swansea, Massachusetts.

SPRINGFIELD (MASS.) CHAPTER meets 7 p.m., 2nd and 4th Saturday of each month at the shop of Chairman Norman Charest, 74 Redfern Dr., Springfield, Conn.

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

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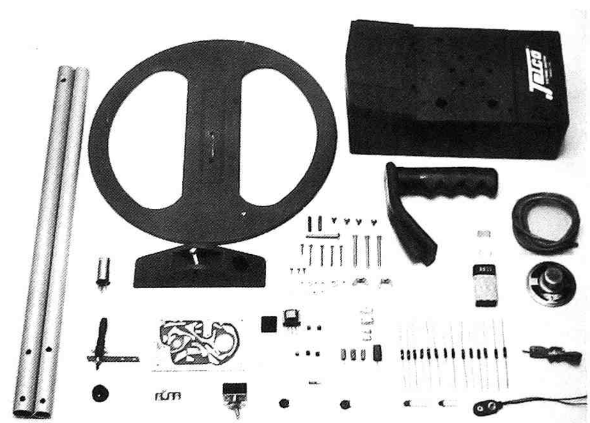

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3

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