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# NRI NEWS

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## Honesty Is The Best ... And Only Policy

We were all taught in childhood that "honesty is the best policy." As we grew older we heard and read things which sometimes caused us to wonder whether this is strictly true or if it's just a pious statement handed down by some who assume respectability but do not always practice what they preach. But in time we learned that while an occasional man makes a little money by shady practices, the really sound successes are built upon a foundation of integrity.

Many years ago, even before the advent of Radio, I attended a political rally. Men were debating the merits of their party candidates. I remember one man who talked for about fifteen minutes. His object was to convince his listeners that his candidate was inherently honest. He dwelt at great length on that one point. He made quite an impression.



J. E. Smith

Then came the time for a man on the other side of the political fence to speak. He said, "My friend has used all of his time in an effort to convince you that his candidate is honest. I feel that he has told you little of importance—not that we are unwilling to concede that his candidate is honest but because I feel you will agree with me that it is no credit to a man to say that he is honest—he is supposed to be honest." With that simple truth he swept aside, in a few words, all the effect of what the other man had spent fifteen minutes to build up.

(Continued on page 2)

## U.S. Office of Education Recognizes Accrediting Commission of National Home Study Council

see page two

## Old TV's Never Die They Just Fade—More Often!

The Electronics Industries Association's marketing data department recently completed a statistical study which indicated an average TV set retirement age of *nine* years. And—according to the same survey, the life span of receivers is expected to increase.

Proof that the training and equipment for tackling the old jobs as well as new sets is a definite asset in today's service business.

HOPING FOR shirts, socks, and neckties this Christmas? Fine!

But for increased profits, greater efficiency, and satisfied customers in 1960, why not also plan an addition to your servicing equipment?

The NRI Supply Division can provide you with up-to-date professional quality, instruments-tools-accessories at reasonable cost. See pages 16-17 this issue and the December-January issue for a complete listing of available items.

Remember, in addition to the above features, all equipment sold by NRI is *fully* guaranteed. Also, repair service, consultation service and replacement parts are available direct from the Supply Division if ever needed.

"Each young American owes it to himself and to his country, to prepare to meet the demands and opportunities of the future. Toward the achievement of this goal, education and training are essential."

Dwight D. Eisenhower

## **Honesty—The Only Policy**

*(from page one)*

In the Radio-TV business, as in most businesses, here and there some shrewd operators (they call themselves) will pop up with unethical methods for making a fast dollar. Shun these practices like you would the plague. Don't feel that you've got to meet this competition if it is not strictly honest. The public is wise nowadays—they'll catch on soon enough. No one can stay in business long without the full confidence of everyone in his community.

I want every student and graduate of the National Radio Institute to uphold the dignity of the Servicing profession and of this institution. NRI men are taught to conduct their business affairs in a manner which must be above reproach. We insist upon that principle, for only through strictly ethical practices is an NRI man worthy of the high regard in which our graduates are held.

"Honesty is the best—and ONLY policy" in life and in business.

J. E. Smith  
Founder

## **U. S. Office of Education Recognizes Accrediting Commission of National Home Study Council**

Since its founding in 1926, the National Home Study Council (NHSC) has been primarily concerned with establishing sound educational standards and ethical business practices among home-study schools. In 1954, the Council decided that further improvements could be made in examining and granting recognition to home study schools. This led to the development and adoption of an accreditation program similar to that of other recognized accrediting associations.

On April 20, 1959, in view of the gains and improvements made by home study schools through the Council, the U. S. Office of Education formally recognized the Accrediting Commission of the NHSC.

This recognition offers a challenge to NRI and every school that has earned NHSC accreditation to maintain the highest kind of education and ethical standards. As an estimated 1,500,000 persons are pursuing private home study courses this year, it is gratifying that the U. S. Government has given just credit to home study training as an important method of improving the level of education in America.

Before any school can be listed as an accredited school by the NHSC, it must undergo an exacting examination by the Accrediting Commission consisting of Dr. Robert Allen, Executive Director of the Council; Dr. Herold Hunt, Eliot Professor of Education, Harvard University; Dr. John Studebaker, Chairman of the Board of Editors, Scholastic Magazines,

and former U. S. Commissioner of Education; J. Morrison Smith, President, National Radio Institute; Mr. William Bethke, Vice-President of LaSalle Extension University; Earl Bedell, Divisional Director of Vocational Education, Detroit Public Schools; Dr. Edward Estabrooke, Education Director, American School; William Rogers, Vice-President; Jack Staehle, Vice-President, Industrial Relations, Aldens, Inc.; and John Villaume, President, International Correspondence Schools.

The NHSC accrediting process requires four steps:

1. The school makes a thorough study of its own operation, its purpose and programs, and assembles pertinent data for examination.
2. Qualified subject specialists review the instruction materials for completeness, authenticity, and up-to-dateness.
3. An Examining Committee visits the school and thoroughly studies its entire operation.
4. An Accrediting Commission reviews all pertinent data, serves as a judicial body, and decides whether or not the school satisfactorily meets the required standards.

Briefly, NHSC accreditation means that competent judges vouch for the quality of a school. An accredited school is a first-rate school; it offers sound instruction and is reliable.

NRI is proud to be an accredited member of the National Home Study Council.

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### **Reminder**

—to all students and graduates. Whenever you write to NRI—whenever you send a lesson, order, or payment, please be sure to give your full name, complete address, and

your NRI student number. If you are a graduate, write "G" after your student number. That way, you can be sure whatever you send us will be handled as promptly and efficiently as possible.

# Servicing Etched Circuits

by  
**J. B. Straughn**  
*Chief, Consultation Service*



**J. B. Straughn**

In the repair of receivers using etched circuit boards there are four factors not encountered in receivers with conventional wiring. Each of these factors will be considered in turn as space permits.

They are:

1. Locating Parts
2. Removing Defective Parts
3. Installation of Replacement Parts
4. Repair of Broken Wiring on Boards
5. Soldering in Etched circuits

## **Locating Parts**

In a receiver with conventional wiring the location of any part shown on the schematic diagram is a simple matter. First you see on the diagram how the part connects to some point easily identified on the receiver. This point is generally a particular tube or transistor socket terminal. It might also be some point readily identified by its physical appearance or placement such as a volume control lug, a lug on the on-off switch, a lead or lug of an electrolytic capacitor, a loop lead, the lugs on the tuning capacitor gang, etc. When you have located this easy to find point in the receiver it is just a matter of tracing the wiring from this point to the part in question. The same locating points are also easily identified on etched circuit boards, but here the difficulty begins.

It is not an easy matter to trace from the locating point to the part you wish

to find because the part is on the side of the board opposite to the wiring, as shown in Fig. 1. If you could hold the board in your hand and readily turn it over, part location would not be so hard. However, it is seldom possible to do this and even then you may choose the wrong part.

If the part is a color coded resistor or a capacitor with its value clearly marked, then location becomes easier when you have traced the etched wiring and know the approximate location of the part.

## **Index**

<b>Article</b>	<b>Page</b>
Editorial .....	1
Servicing Etched Circuits .....	3
TV Remote Controls ....	11
Christmas Suggestions .....	16
Hi-Fi Corner .....	22
Aligning AM Receivers .....	23
NRI AA Primary Election Results .....	25
Chapter Chatter .....	26
New TV Thrills—"Live" .....	29

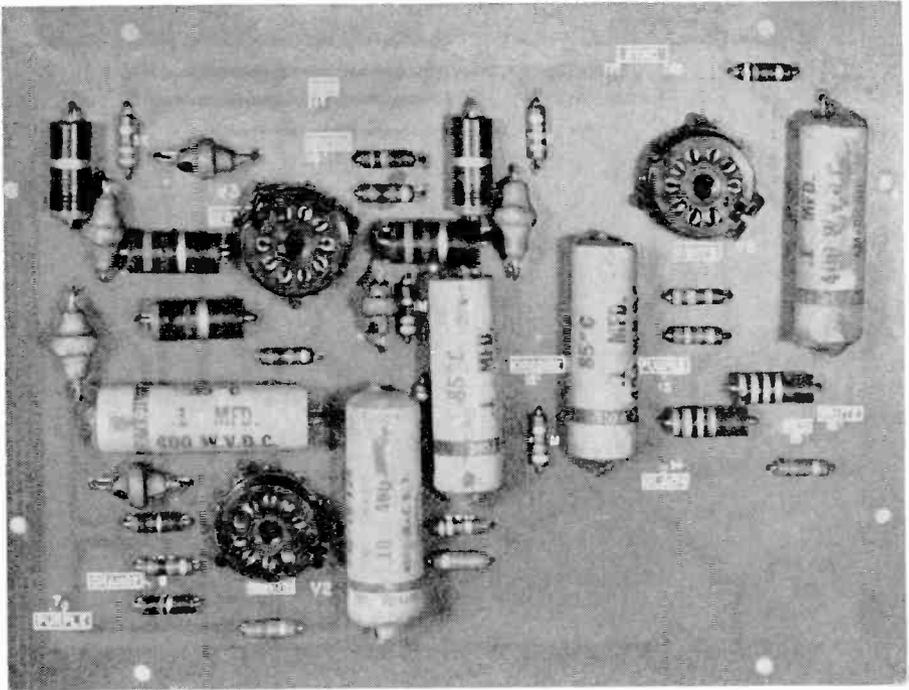


Fig. 1 (A) The parts, locating points, and connecting leads are not visible at the same time.

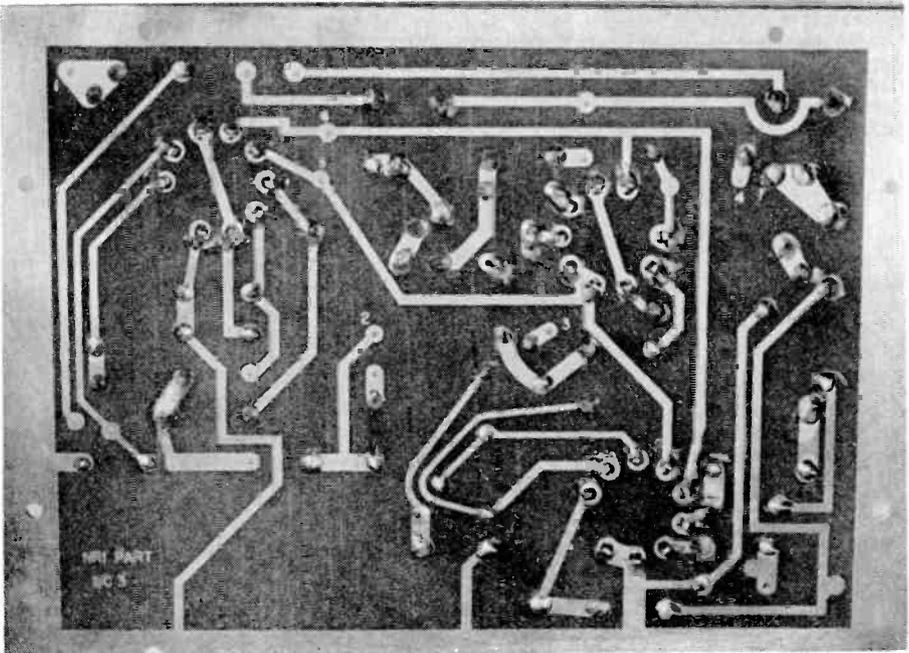


Fig. 1 (B) Here you can easily find particular tube-socket terminals and the copper strips attached to them, but the parts are hidden.

Manufacturers are quite aware of the trouble encountered by some technicians in servicing etched circuit equipment. They have gone to great lengths to make it easy to find parts on a board. An excellent example is in the RCA TV receiver, chassis #KCS126A. In this set the video and sound i-f amplifiers as well as the sound and video output stages are shown in pictorial form in Fig. 2A. This is the way these receiver sections actually appear. The schematic is shown in Fig. 2B.

Let's suppose that the sound is badly distorted at high volume levels. Looking at the schematic you see that as the volume control is advanced more resistance is inserted between the control grid of the 6BQ5 (V203) and the chassis. This points either to gas in the tube or leakage in coupling capacitor C209. You can easily try a replacement tube and if the trouble is still present you can connect a dc vtvm between pin 2 of V203 and the chassis. If you find a positive voltage on the grid

**PW200  
COMPONENT  
LOCATION  
GUIDE**

C201	..	B5
C208	..	C2
C209	..	B2
C210	..	B1
C212	..	B4
C215	..	B2
C216	..	A1
C217	..	C1
C218	..	C1
C219	..	C1
C220	..	C2
C221	..	D2
C224	..	D4
C225	..	C3
C226	..	C4
C227	..	C5
C228	..	D5
C229	..	C6
C230	..	C5
C232	..	B5
C234	..	C6
C235	..	A5
C238	..	D3
C239	..	A6
CPR201	..	C5
CPR202	..	B5
CPR203	..	C4
CR201	..	C6
L201	..	C3
L202	..	C5
L203	..	D6
L204	..	D6
L205	..	D6
L206	..	A4
L207	..	A2
L208	..	C6
PC201	..	B4
PC202	..	D3
PC203	..	A5
R203	..	B4
R209	..	C2
R210	..	C2
R212	..	B3
R213	..	B2
R214	..	D1
R215	..	C1
R216	..	D1
R217	..	C2
R222	..	D3
R226	..	D5
R227	..	C6
R228	..	A4
R229	..	A3
R230	..	D1
R231	..	A2
R232	..	A2
R234	..	B6
R235	..	A4
R236	..	A6
R237, R238	..	A4
R239	..	A4
R243	..	B2
T201	..	B6
T202	..	C4
T203	..	B3
T204	..	D1
T205	..	C1
T206	..	D3
T207	..	D4
T208	..	D6
T209	..	A5

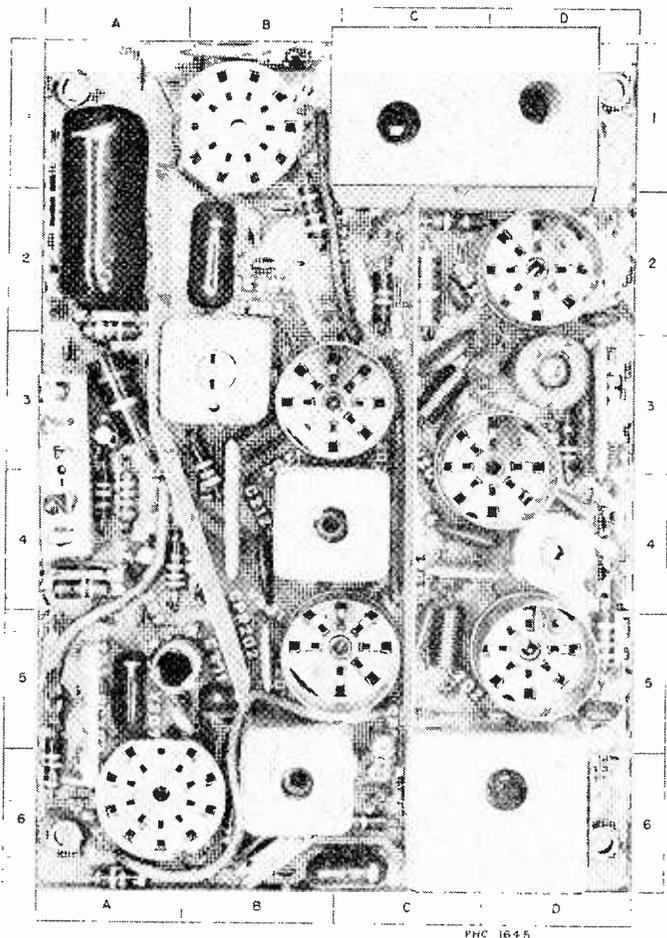


Fig. 2 (A) The etched wiring on the reverse side of the circuit is duplicated in the white printing on the part side, thus enabling you to see everything at once.

Even though some of the part numbers are shown in Fig. 2A, location of a particular part would be quite a task.

The addition of the phantom view in Fig. 2C makes it a simple matter for any serviceman to find any parts in this circuit.

which increases as the volume is advanced this is sufficient evidence to warrant replacement of C209. How will you locate this capacitor? From the schematic you see that it connects to pin 5 of the 6DT6 (V202). Find V202 in Fig. 2B. Then find pin 5 and trace from there to C209. The volume control lug V connects to the other side

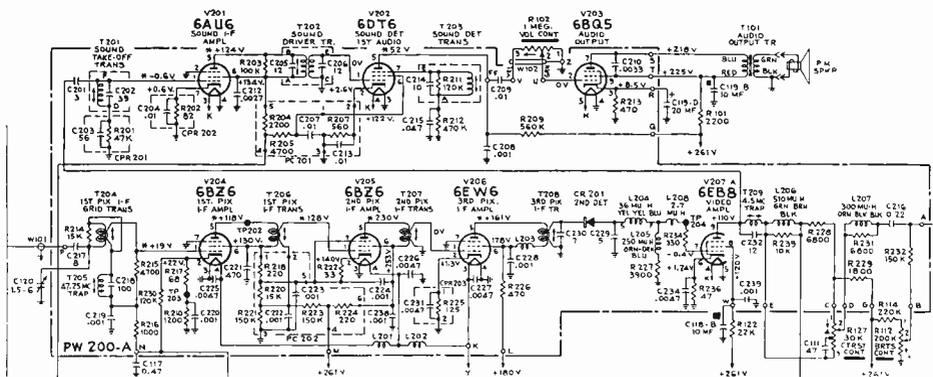


Fig. 2 (B) The schematic diagram for that portion of the circuit in 2A.

of this capacitor so you can identify it without a doubt and without danger of confusing it with C208, which also connects to pin 5.

The manufacturer has gone a step further for those not used to locating parts by tracing from a known point to the part. Fig. 2B is divided off by numbers and letters like a map. Looking at the location guide to the left of the Figure you see that C209 is located approximately at B2. Find the B column at the top of Fig. 2B and follow down to the area covered horizontally by the numeral 2 at the left of the Figure. C209 is thus easily spotted. However, as a technician you had better know the proper way to locate parts because not all manufacturers would make a map of their pictorials!

When pictorial service information is not available you can look at the part side of the board when a strong light (a 100-watt gooseneck lamp is ideal) is played on the etched side. Most boards are translucent and you will be able to see the outlines of the foil wiring through the board. This will be quite similar to the phantom view in Fig. 2B, and by using the procedure outlined earlier any part can be quickly located. Sometimes looking at the copper side of the board and shining the light through from the part side will give better results. Then the outline of the parts will be seen through the board and you can pinpoint any parts with a lead pencil or anything that will throw a shadow. With a little practice you will be able to locate parts on an etched circuit board almost as fast as in a conventionally wired circuit.

### Removing Defective Parts

When a part is suspected of being leaky, shorted, or having changed in resistance, the possible defect is checked with an

ohmmeter. One lead of the part must be removed from the circuit so a false reading will not be obtained through some parallel connected part.

In a circuit using conventional wiring the usual procedure is to unsolder one lead of the part from the rest of the circuit. If the part lead is wrapped tightly around a lug, the lead is cut or part of the lug itself may be cut away. If the part proves to be good, the connection is easily reestablished with a soldering iron.

In the case of a part mounted on an etched circuit board it would be difficult to melt the solder at one lead and pull that lead out of its hole in the board. Such a course is not at all impossible, but then you would be faced with the difficult task of getting the lead back in its hole without pushing the foil off the board. Again the task is not impossible, as you will see, but there is an easier method.

You cannot cut a lead of the part since the leads are generally so short that reconnection, if the part checks good, would be impossible. However, the foil wiring to the part lead can easily be opened by cutting through it with a sharp knife. The open in the wiring is later repaired by flowing solder over it with a hot iron. The connection will then be as good as new. See Figs. 3 and 4.

If you find that a part on an etched circuit board is defective, then the part itself must be completely removed. Parts with only two or three leads present no problem.

**THERE IS ONE IMPORTANT FACT THAT MUST BE BORNE IN MIND. IF THE CIRCUIT FOIL IS HEATED AND IF ANY FORCE IS EXERTED WHICH**

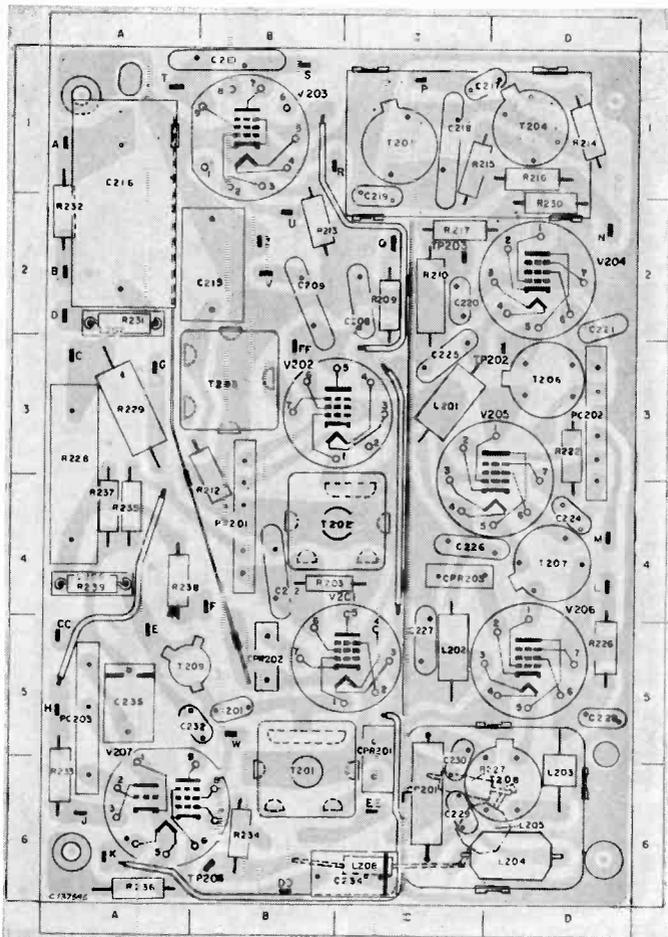


Fig 2 (C) Phantom view showing the printed wiring superimposed on the part layout. Locating points easily identified here and on the schematic are, in this case, the tube socket terminals.

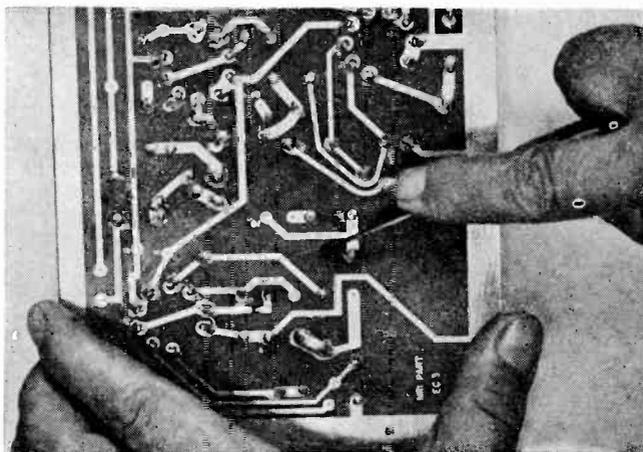


Fig. 3. A sharp knife or razor blade will slice through the foil to isolate the part you wish to test.

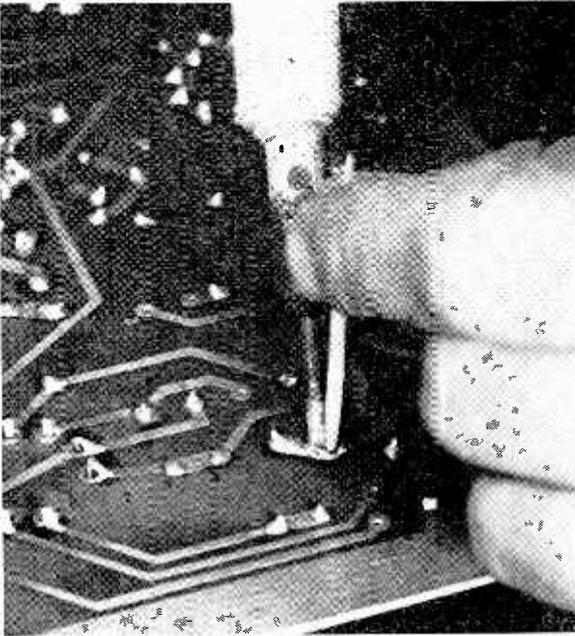


Fig. 4. The cut connection can be restored by means of a soldering iron and solder. The solder will bridge the cut, and the circuit will be as good as new.

TENDS TO PUSH OR PULL THE FOIL AWAY FROM THE BOARD THE CEMENT WILL LOOSEN AND THE FOIL WILL STRIP OFF THE BOARD. Avoid this by always pulling out leads from the part side of the board. Never pull them through from the copper side of the board.

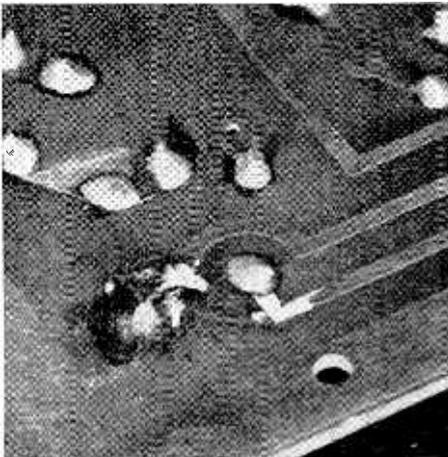


Fig. 5. The part lead would not go through the hole in the foil, and as the serviceman pushed on the part while heating the foil, the latter was pushed off the board.

There are four methods for part removal which can be used with equal effectiveness.

1. Cut through the body of the part with side cutters, dividing it into the same number of segments as there are leads. Then put your soldering iron on the foil (copper) side of the board and pull out each segment and its attached lead, one at a time. This is a good procedure for resistors and printed circuit parts such as PC201 in Fig. 2B.

2. Place a thin screwdriver blade between the part and board so you can pry up. This is only good where there are two part leads. Heat one of the lead connections on the foil side. The lead will come out when you pry. You can then pull on this lead while heating the other connection and remove the part in one piece.

3. Cut the leads at the body of the part and remove the part. Pull out each lead from the part side as the foil side of the board is heated. This is good for switches, sockets, i-f transformers, shields, etc.

4. Cut off all protruding part leads possible on the foil side of the board. Heat each lead in turn, rocking the part nearest the hot lead away from the board. In a short time all leads will come out of their holes.

Special shaped soldering iron tips are available for removing large odd-shaped connections such as tube sockets, electrolytic capacitors, etc. However, need for them seldom exists and most parts can be taken off using one of the methods mentioned above.

#### Installation of Replacement Parts

If an identical replacement part is available there is no more to its installation than inserting its leads in the holes in the board and soldering them to the copper foil. However, you cannot get leads through holes partly or completely plugged with solder. Never try to force a part lead through a hole while your iron is on the foil side of the board to melt the solder. You will only succeed in pushing the foil right off the board, as in Fig. 5. If the replacement part leads will not slip easily through the mounting holes then the holes must be cleaned of excess solder. Pick up all the solder you can with the tip of a clean hot iron. This will frequently clean

out the hole. If not, secure a round wooden toothpick. Wet its sharp end, heat the hole and insert the toothpick point through the hole from the copper foil side, as shown in Fig. 6. Remove the iron. When the moistened toothpick is removed the hole will be as large and free from solder as when the board came from the factory. With clean holes slip the part leads in place and solder to the foil. **DON'T BE AFRAID TO USE ENOUGH HEAT.** Remember, that physical force, as well as heat, is required to loosen the bond between the copper foil and the board.

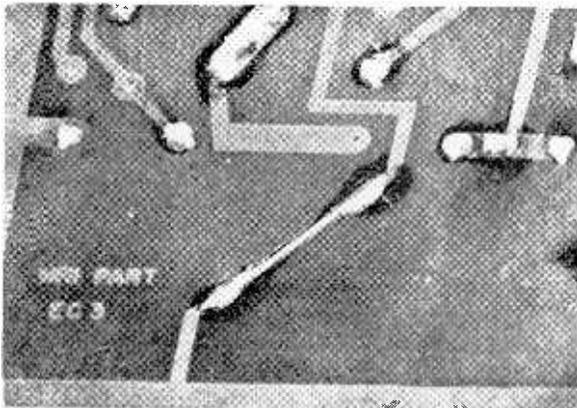


Fig. 7. The hookup wire, when soldered across the broken foil leads, will restore the circuit electrically and strengthen it mechanically.

At times you will have a replacement part that is not a duplicate and will not fit on the board. This is often true in the case of electrolytic capacitors. Then leads may be attached to the replacement and connected into the proper holes in the circuit board. The part can generally be allowed to hang by its leads. If the part is a metal-clad electrolytic it is wise to cover the exposed metal with rubber tape to prevent the possibility of a short.

### Repair of Etched Circuit Boards

A number of conditions may arise necessitating repair of an etched circuit board.

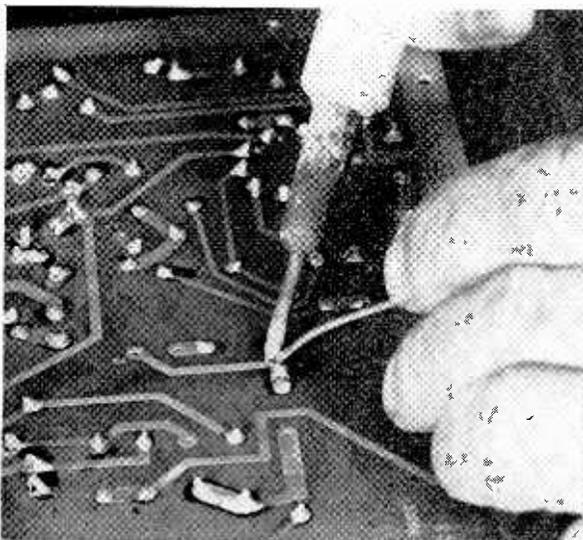


Fig. 6. The wet toothpick will keep the hole open and free from solder.

1. The board may break.
2. The foil may pull away from the board.
3. Microscopic cracks can occur in the foil "wiring."
4. The board may be charred by overheating of some part.

### The Board Breaks

This usually involves one or more foil leads. If the board does not support heavy objects, lay pieces of bare hookup wire over the broken leads. Solder them to the foil. This will repair the connection, as shown in Fig. 7, and may strengthen the board sufficiently to permit its continued use. If greater reinforcement is required, try cementing thin strips of metal across the break on the part side of the board. You can use "speaker cement" or "coil dope" for this purpose. How successful you will be, depends on the severity of the break, the space available for the reinforcing and the effect of coupling between circuits caused by the metal strips. Laminations from a defective transformer can be tried, also thin slabs of glass or plastic may work.

Of course there will be rare cases where replacement of the entire board is the only solution to the problem.

### Foil Pulls Away from the Board

If there is no danger of the foil breaking do not worry about this condition. As long

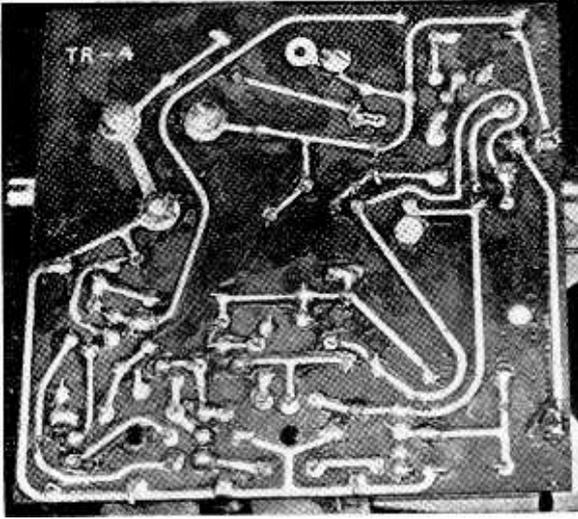


Fig. 8. It does not take much time to flow solder over all foil leads, and this will often clear up obscure intermittent defects.

### Microscopic Cracks in Wiring

Cracks in the wiring can seldom be determined by a visual examination. If the receiver "acts up" when the board is flexed this condition is probably present or rosin joints exist. If desired you can clip your ohmmeter to opposite ends of a foil lead and flex the board. Any change in the ohmmeter reading when the board bends slightly points to a break, or you may be able to see the break.

Most servicemen don't try to track down a crack to a specific lead. Instead they flow solder over all the foil with a hot iron. If no further bending of the board occurs the trouble generally clears up. Tinning the foil also applies sufficient heat to all part leads to boil out excess rosin in the joints. A board treated in this manner has the appearance shown in Fig. 8.

as the circuit is electrically intact it will work satisfactorily whether or not the foil is loose on the board. Attempts to reconnect the foil to the board may lead to a break in the foil or to an extension of the loose foil.

If the condition is too unsightly, the loose foil can be cut away with a sharp knife or razor blade. Then bridge the gap with a piece of bare hookup wire and solder to the remaining foil ends.

### Charred Spots on Board

Sometimes this is due to a part breakdown that results in excess current through a resistor mounted on the board. Such a resistor will overheat and the board may have a burned or charred area. Scrape away any burned material and paint over the area with coil dope or speaker cement. In other cases a large wattage resistor may  
*(Continued on page 21)*

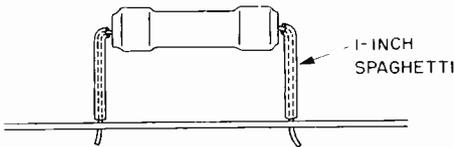


Fig. 9. The spaghetti acts as a spacer and holds the resistor away from the board while the leads are being soldered in place.

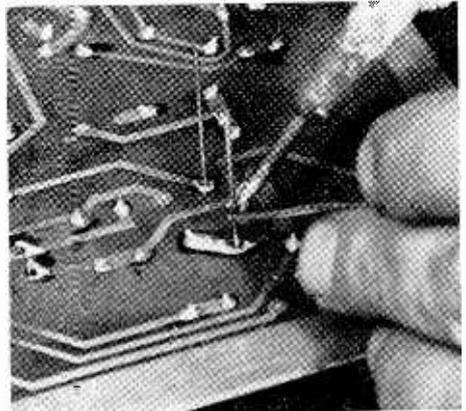


Fig. 10. When the melted rosin reaches the board, slide the iron tip down the lead and press the tip firmly against the foil for several seconds. This allows the solder to spread out on the foil around the lead and electrically joins the lead and foil.

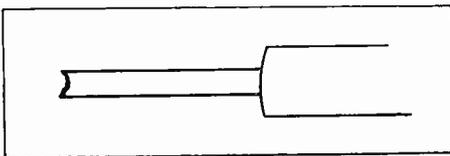


Fig. 11. These little horns can catch in the foil and pull it away from the board when the iron is withdrawn. File or clip them off.



Dale Stafford

TV receiver manufacturers are always searching for ways to make the viewing of TV programs more enjoyable for the general public. Among the conveniences which have been developed to add to this enjoyment is the remote control which allows the viewer to operate his set without moving from his easy chair.

Practically all manufacturers now make some sort of remote control device for use with their sets. Some are furnished as a standard part of the set while others are offered as an optional accessory. They differ in the degree of control over the set which they allow the user to exercise and the manner in which this control is secured.

Several different arrangements have been used in the last few years. In some cases, cables are used to connect the remote control units to the receivers. In others, there is no physical connection between the control device and the receiver.

Common examples of the latter type are the Zenith "Space Command" and the Hoffman "Beamrider" controls.

The Zenith "Space Command" control uses ultrasonic sound waves to turn the set on and off, change channels, and mute the sound. Four aluminum rods about  $2\frac{1}{2}$  inches in length are mounted in a small hand-held control unit. Pressing one of the keys on this unit compresses a spring which is suddenly released causing a small hammer to strike one of the rods. This, in turn, causes the rod to vibrate at its natural resonant frequency, in the neighborhood of 40 kc. Each rod has a different natural frequency determined by the length of the rod. Each of the rods has a slightly different length.

# TV REMOTE CONTROLS

by  
**Dale Stafford**  
*NRI Consultant*

The ultrasonic sound waves produced are picked up by a condenser microphone mounted on the upper edge of the picture tube escutcheon. The mass of the thin strip of "Mylar" film used in the microphone and the stiffness of the air gap are made mechanically resonant at about 40 kc.

An amplifier section containing a 6CB6 and the pentode section of a 6AU8 follows the microphone as shown in Fig. 1. (Fig. 1 shows only the Space Command receiver in the TV set. The transmitter is not shown.). The triode section of the 6AU8 is used as a tripler to increase the frequency of the signal to about 120 kc. A 6BN6 limiter following the tripler supplies a signal of constant amplitude to the discriminators. These are two in number and are so arranged that two opposite control voltages may be secured from each, thus providing a control channel for each function. The discriminator transformers are tuned to center frequencies of 122.25 kc for the upper two channels and 114.75 kc for the lower two. The frequency separation between the peaks of each discriminator is 3 kc. The aluminum rods are so selected that the natural frequency of each, after tripling, coincides with a discriminator peak as shown in Fig. 2.

The junctions of  $R_2-R_3$  and of  $R_4-R_5$  are connected to one plate of a 25Z6 rectifier which supplies a negative bias voltage of approximately -28 volts to keep the 6CM7 relay control tubes from conducting with no signal applied. Using the center tap as a reference point, whenever the voltage across  $R_6$  swings in a positive direction the voltage across  $R_3$  will swing negative by the same amount and vice versa. The same thing applies to  $R_4-R_5$ .

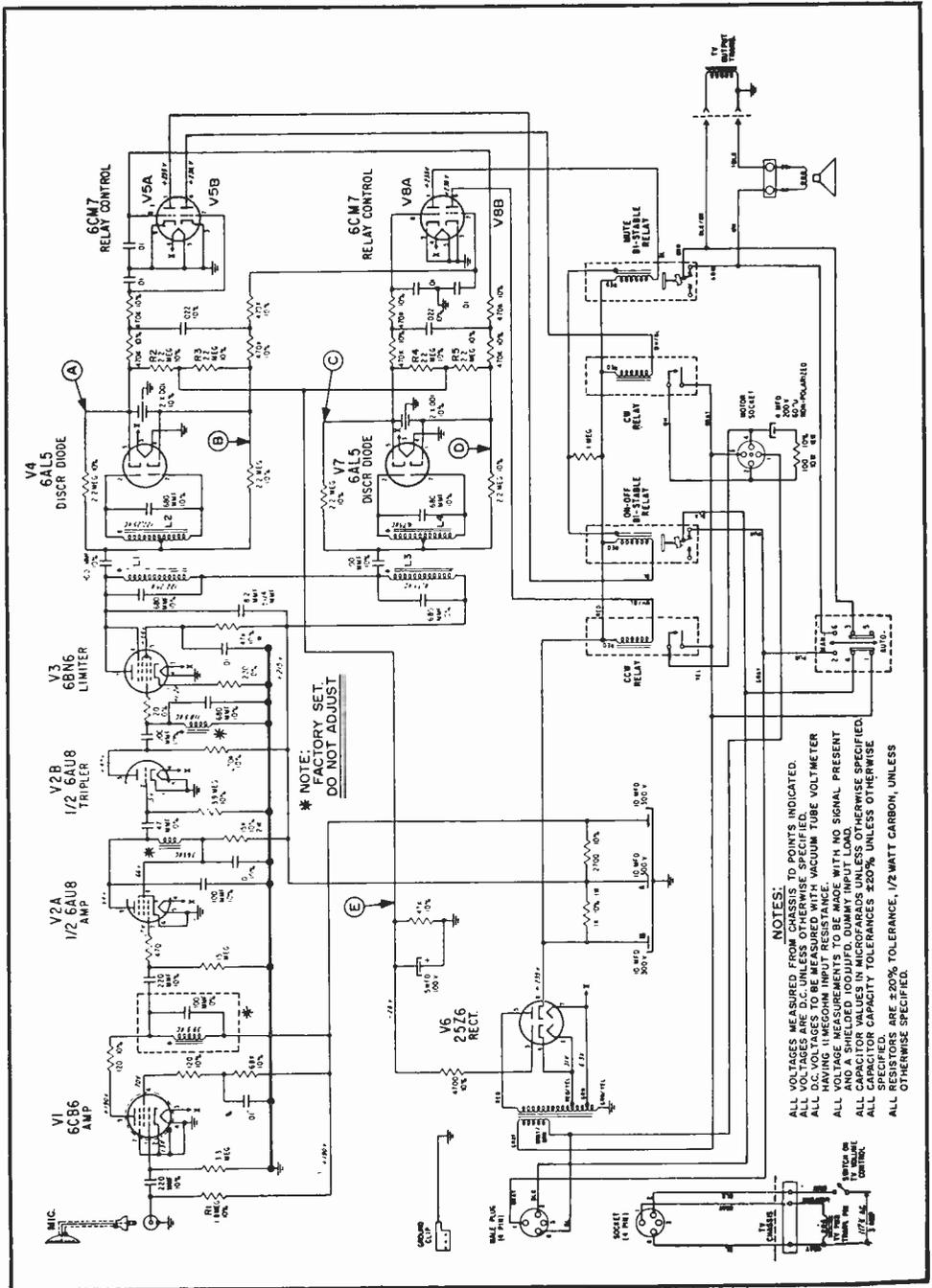


Fig. 1. Zenith "Space Command" receiver, model 400.

Function	Key Frequency	Discriminator Peak Frequency
On - Off	37.75KC	113.25KC
Mute	38.75KC	116.25KC
Tune Left	40.25KC	120.75KC
Tune Right	41.25KC	123.75KC

Fig. 2. Key frequencies and corresponding discriminator peak frequencies for Space Command Model 400 unit.

Channel Osc. #1 41.75 kc  
Osc. #2 38.25 kc  
Difference 3.5 kc

A microphone on the front of the receiver picks up the sound waves, converts them into electrical signals and passes them on to a receiver section, a partial schematic of which is shown in Fig. 3, which amplifies and detects them.

Suppose that the "tune right" key is pressed. The resulting signal causes the cathode end of  $R_2$  to swing positive with respect to the junction of  $R_2-R_3$ . This removes the negative bias from relay control tube V5B and the tube conducts. This closes relay CW in the plate circuit of V5B and starts the turret motor. This is a reversible capacity-start motor having two windings, one for each direction.

The motor continues to rotate after it has started due to contacts on the turret drive assembly which remain closed until a tab on the index wheel causes the switch to open. These index tabs can be turned to one position for the desired channels or left in a different position so the turret passes over the unused channels.

Had the "tune left" key been pressed, the cathode end of  $R_3$  would have swung positive removing the negative bias from tube V8B, closing relay CCW and turning the turret to the left. The RC networks between the discriminator outputs and the grids of the relay control tubes are to prevent noise pulses from triggering the control tubes.

The lower discriminator turns the set on and off and opens the speaker voice coil to mute the sound, when desired, by operating the two bistable relays shown.

Another control which uses ultra-sonic sound waves is RCA's "Wireless Wizard." Two transistorized (2N407) oscillator circuits each tuned to a different frequency are used in the battery-powered transmitter. The output of both oscillators is inductively coupled to the base of a third 2N407. This transistor drives the transducer which converts the signal to sound waves.

The oscillator frequencies are as follows:

On-Off Osc. #1 41.75 kc  
Osc. #2 40.5 kc  
Difference 1.25 kc  
Sound Osc. #1 40.5 kc  
Osc. #2 38.25 kc  
Difference 2.25 kc

After passing through the amplifier section (not shown in Fig. 3), the signals are applied to a 6AL5(V4A) which recovers the difference frequency. The resulting signal is amplified by V5A and passed along through cathode follower V5B to the junction of three capacitors shown just above and to the left of V6A. From here the signal goes to the appropriate LF rectifier (only one is shown) according to which of the three difference frequencies is being received.

As shown the "sound" 2.25 kc beat signal is applied across the tuned circuit at the plate of tube V6A which conducts heavily. This causes a greater positive voltage to be developed across the cathode resistor. This is applied to the grid of V7A which conducts and energizes a relay in its plate circuit. This, in turn, energizes a relay which cuts the remote volume control (on the control unit) in or out of the circuit. (When this volume control is out of the circuit, the volume is determined by the setting of the main volume control on the TV set.). The "On-Off" and "Channel" circuits operate in a similar fashion.

When selecting channels, the channel relay closes momentarily and starts the motor when the remote control channel button is pressed. The motor armature is drawn in toward the field coils when power is applied allowing the motor hold-in switch to close. When the shaft starts to turn away from any on-channel position, a cam on the shaft closes still another switch. So long as these two switches, in series, remain closed, the motor continues to rotate.

When the shaft approaches the next on-channel position, the tuner shaft switch opens and breaks the motor circuit. A 13 position wafer switch, called the programmer switch, geared to the tuner shaft allows the tuner to travel through unused channel positions. Thirteen parallel circuits, each containing a slide switch, are connected to this switch. When the slide switches (mounted on the back of the TV set) are closed, the programmer switch connects a short across the tuner shaft

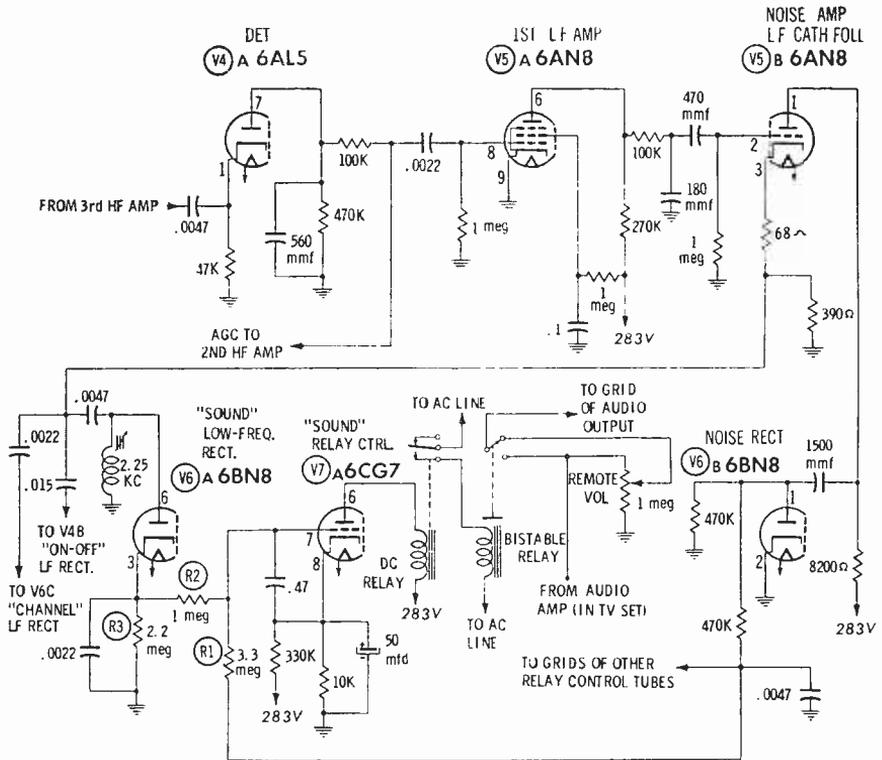


Fig. 3. Partial schematic of RCA Wireless Wizard (receiver section).

switch as the tuner reaches a "stop" position and the motor keeps running. If the slide switch is open at any channel position, the circuit is open when the tuner shaft switch opens and the tuner stops.

The Hoffman "Beamrider" shown in Fig. 4 is a simple unit which is used only to switch channels. The control unit is a crystal controlled oscillator operating at 26.25 mc. A superregenerative type receiver (2 tubes—four sections) in the set picks up this signal and operates a relay. The relay shorts out the microswitch which ordinarily actuates the tuning motor.

The 1959 Motorola remote controls also use mechanically produced ultrasonic radiation. In these systems, "remote-local" switching is practically automatic. Removing the portable transmitter from its holder on the back of the TV set turns on the power to the remote-control receiver in the TV set. Replacing the transmitter turns the power off again.

Two systems are offered. The Golden Satellite system turns the TV set on or off, changes channels, and mutes the sound.

The Golden Satellite IV system does the same things and also controls the volume of the sound.

Fig. 5 shows a block diagram of the Golden Satellite system. The transmitter frequencies are 40 kc for sound muting,

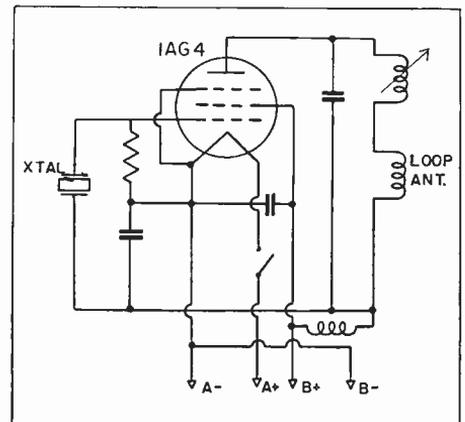


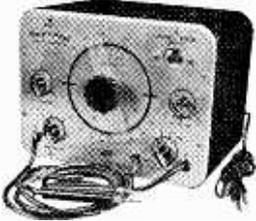
Fig. 4. Hoffman Beamrider transmitter.



# Christmas Suggestions

As the Christmas season approaches each year, relatives and friends of NRI men write us about buying one or more items as gifts. For the benefit of our readers, this issue of NRI News and the December-January issue will feature a condensed catalog of available instruments, tools, and parts.

Convenient monthly terms can be arranged on all items priced over \$16.00. To place your order or receive detailed information about the Supply Division monthly payment plan, simply fill in the coupon on page 17 and mail it to the address shown. But as a reminder, mail moves a bit slower during the holiday season so be sure to place your order early. Rest assured, we'll do all we can from here to help you have a truly MERRY CHRISTMAS.

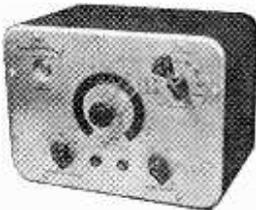


**New NRI Professional Model 35 Signal Tracer.** A Multi-Purpose instrument; traces signals and aligns receivers. Tuned-type. Separate AF and RF inputs; built-in output indicator; visual and speaker output; calibrated attenuators; four bands with tuned circuits; range 170 kc. to 11.6 mc. plus audio. Actual weight 10¼ lbs.; shipping weight 12 lbs. Shipped Express Collect, 50-60 cycle, 110-120 volts AC. Sturdy black crackle finish case with brushed aluminum panel and deep etched lettering. A "twin" to the Model 114 R-C Tester in size and general appearance. Only \$57.50 with instruction manual and test leads.

**New Model 71 NRI Professional Tube Tester.** Features ease of operation; four position element switches for flexibility; triple window, high-speed geared roll chart; freedom from obsolescence; impressive—professional in appearance and operation. Checks for shorts, "opens," leakage, and emission. Giant 4½" jeweled D'Arsonval meter with plus-minus 2% accuracy. Eight tube sockets, seventeen filament voltages. Actual weight 11 lbs.; shipping weight 15 lbs. Sent Express Collect, Price \$59.50 with detailed operating instructions.



**Picture Tube Adapters for Use with the Model 71.** Checks shorts—emission. 70°-90° Adapter \$1.98. 70°-90° and 110° Adapter—both for \$9.75.

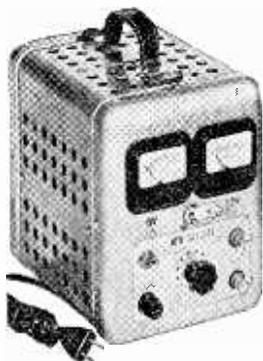


**New Model 114 R-C Tester.** Measures resistance, capacity, leakage, power factor. Has a definite place in every service shop for greater profits, more satisfied customers, quicker, more efficient servicing. The Model 114 uses highly-accurate bridge-type circuit with a guaranteed accuracy of plus-minus 5% or better. Tuning eye null indicator. Extra sensitive leakage test circuit. Applies actual DC working voltages up to 400 volts. A basic test instrument that will not become obsolete. Shipped Express Collect, Price \$39.95 complete with detailed, step-by-step operating instructions.

**ARGOS Tube Caddies.** The easy, orderly way to store tubes or carry tubes and tools on service calls. Just the thing for spare-time servicing. Choice of two Caddies. Popular Carry-All Caddy built of sturdy ¾" and ¼" plywood covered with tough, luggage-type pyroxilin fabric. Size: 21" x 15" x 8". Capacity—262 tubes. NRI Price \$13.95.



**Junior Tube Caddy.** Size 15¾" x 12½" x 8". Holds 143 tubes. \$9.95.

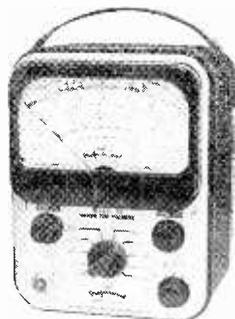


**ATR "A" Battery Eliminator.** A "must" for auto Radio servicing. Provides 6 volts at 10 amps continuous or 12 volts at 6 amps continuous. Will operate all 6-12 volt and transistor auto sets. Features accurate voltmeter and ammeter, variable output voltage control, on-off switch, safety-locking voltage selector, fuse, and leather handle. Can also be used as a battery charger. Uses full-wave dry disc selenium rectifier assuring noiseless, interference-free operation and extreme long life. Size: 6½" x 9½" x 8½".

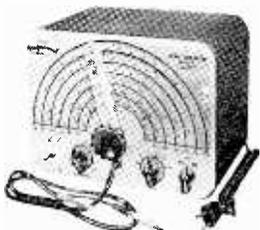
Shipping weight: 22 lbs. Shipped Express Collect. NRI price \$42.95.



**Model 12 Vacuum Tube Voltmeter.** Top performance—ease of operation—professional appearance—at a low price. Five ranges, 0-1200 volts AC-DC. Ohmmeter measurements to 1000 megohms in five ranges. Peak-to-peak AC volts. Metal black ripple case with aluminum panel. Size 7¾" x 5¾" x 3½". Actual weights 5¼ lbs.; shipping weight 7 lbs. 50-60 cycle, 110-120 volts AC. Shipped Express Collect; test leads and complete instructions included. Price just \$45.00.



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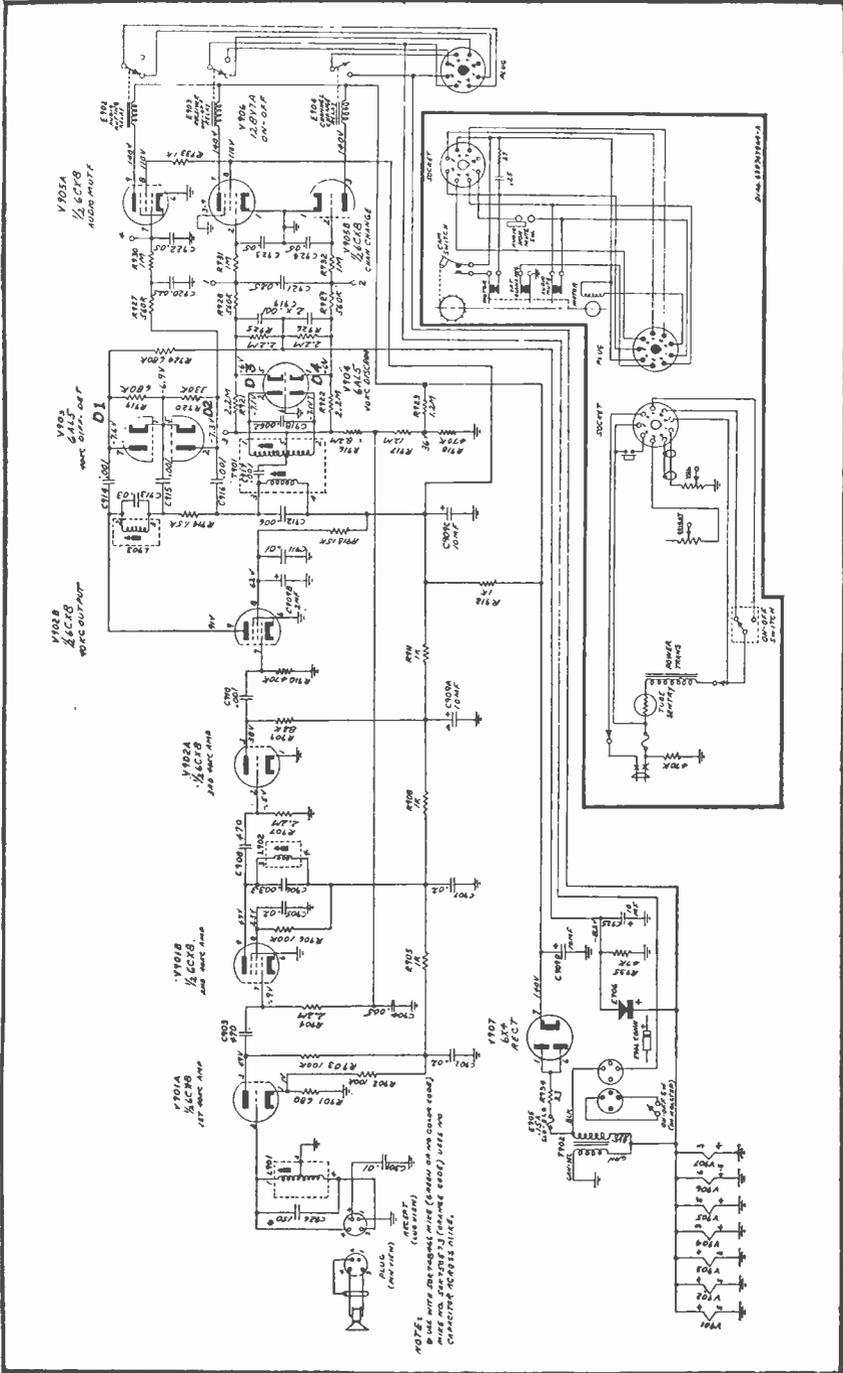


Fig. 6. Receiver schematic, Motorola Golden Satellite.

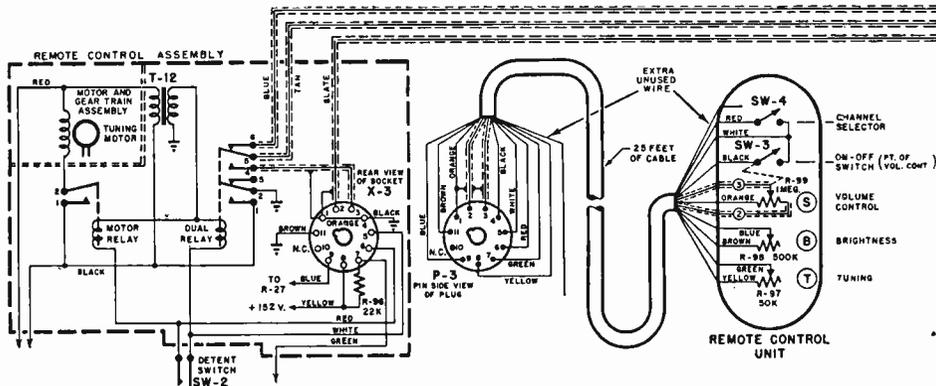


Fig. 7 The tuning motor, through its relay, moves one channel at a time in this Emerson remote station selector.

the power line.

Some manufacturers have used both single-step channel switching and the type in which the tuner turns past the unused channels.

Where the control contains a provision for fine tuning, this is usually accomplished by varying the voltage on the oscillator tube. Some Emerson controls use a crystal diode connected across the oscillator circuit and vary the current through the diode to shift the oscillator frequency. Some RCA controls used the current variations through a neon bulb for the same purpose.

Those control systems which contain transmitting or receiving tubes and tube circuits are, of course, subject to the same troubles as similar circuits in other equipment, namely defective tubes, open or shorted coils or capacitors, burned out resistors, parts which have changed value, etc. However, most troubles which occur in either the wired or wireless type can

be found by the use of an ohmmeter (and a diagram if you aren't familiar with the control).

It is quite possible that the control fails to operate simply because someone has absent-mindedly or accidentally changed the position of the remote switch on the TV set. In most cases, there is a switch on the back of the TV receiver for selecting remote control operation. If this switch is in the "Direct" position, only the controls on the receiver affect the set's operation.

Open or shorted leads in cables or connectors are a likely source of trouble. Relays, where used, may have defective contacts or may not be receiving sufficient current to operate them. If the spring which holds the armature away from the pole piece is too tight, the magnetic force generated by the relay current may be insufficient to operate the relay. If the spring tension is just on the borderline, the armature may be attracted to the pole piece, bounce back, be pulled away by the

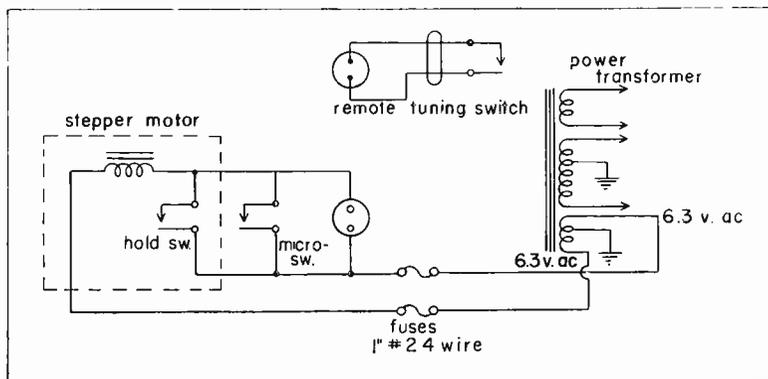


Fig. 8. Simple channel switching control used with some Philco TV receivers.

spring, and then pulled back to the pole piece over and over again. This chattering may also be caused by insufficient relay current or sometimes by a shorted turn in the relay coil.

Arcing may occur if the contacts do not open wide enough or close tightly. It is usually possible to bend the springs on which the contacts are mounted to vary the contact spacing. This sometimes takes considerable time and patience and, in some cases, it may be more practical to replace the relay. Contacts can be dressed with an ignition file or double piece of emery cloth inserted between the contacts. Arcing and relay chatter are usually audible and the technician can locate these defects by ear.

A broken lead is the most likely cause for a tuner motor failure. In some cases, a mechanical failure in the gear train will prevent the motor from operating. The latter can be found by operating the gears by hand while an ohmmeter check will take care of the former.

In the Zenith "Space Command" system, troubles which occur are usually found in the ultrasonic receiver, frequency dis-



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RELAY TUBE VOLTAGES - TR-3

	6CX8		On-Off		Audio Mute	
	Channel Grid (pin 2)	Change Plate (pin 3)	Grid (pin 2)	Plate (pin 7)	Grid (pin 7)	Plate (pin 9)
Normal	-5	135	-5	125	-6	115
Transmitter Activated	0	100	0	25	0	20
Relay - Activated	-2	110	-2	70	-2	55

RELAY TUBE VOLTAGES - TR-4

	6CX8		12VY7		6CX8		12BY7	
	Chan- Grid (pin 2)	Change Plate (pin 3)	On-Off Grid (pin 2)	Plate (pin 7)	Mute Grid (pin 7)	Plate (pin 9)	Vol-Con. Grid (pin 2)	Plate (pin 7)
Normal	-9.5	130	-9.5	120	-9.5	130	-9.5	130
Transmitter Activated	0	90	0	20	0	20	0	25
Relay Activated	-2.5	110	-2.5	70	-2.5	60	-2.5	60

CHART A

Chart. A. Relay tube voltages, Motorola Golden Satellite.

criminator, and control circuitry. The remote unit is unlikely to give any trouble unless a mechanical failure occurs.

The remote transmitter in the RCA "Wireless Wizard" system can be checked by holding the transducer to the ear while pressing the control buttons one by one. Three faint humming sounds (each one a different pitch) should be heard. Another check is to remove the transmitter chassis from its case and measure the ac voltage across the output coil terminals. This should be 35 to 55 volts. The most likely troubles are a defective transistor or weak battery.

If the transmitter is working properly, a few checks should isolate the trouble in the receiver. The detector plate voltage should shift several volts in a negative direction when a signal arrives if the front end circuits are working. A similar shift should be observed at the grid of the cathode follower if all circuits ahead of this point are in good condition.

The ac voltage at the plate of any low-frequency rectifier should increase from 10 to 30 volts when a signal of the proper frequency is fed in. Of course, the "Sound" button on the transmitter must be pressed to check the "Sound" rectifier and the "Channel" button to check the "Channel" rectifier, etc. An oscilloscope wave-form at the plate of an LF rectifier should show an almost pure sine wave (about 70 to 80 volts peak-to-peak) when a signal of the proper frequency arrives.

The grid and cathode voltages of the relay control tubes should become more positive when the proper signal is applied. The bias of the control tube should drop from about 20 volts without signal to 10 volts or less with signal.

The most likely defects in the Hoffman "Beamrider" are defective tubes in the transmitter or receiver or a weak transmitter battery.

In the Motorola Golden Satellite controls, the transmitter can be checked by unplugging the microphone from the receiver and connecting it to the vertical input of an oscilloscope. Place the transmitter near the microphone and depress the button for the channel to be tested. A wave-form should appear on the scope face if the transmitter is operating.

Trouble in the relay tube section can be

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### Servicing Etched Circuits (cont'd.)

be pushed right up against the board. Remove the resistor, clean out the mounting holes and install a replacement with leads long enough to hold the part about an inch from the board. If necessary, leads may be added to the original part, lengthening them so the part will be held away from the chassis, as shown in Fig. 9. Solder the joints where the leads are added first and then solder the extensions in place on the board.

### Soldering in Etched Circuits

If you build any equipment using etched circuits you should use the correct soldering technique to avoid trouble.

First, the parts are mounted on the board with the leads bent slightly so they cannot fall out of the holes. Then the tip of the soldering iron is held against the lead about  $\frac{1}{4}$  inch from the foil, as shown in Fig. 10. Apply your solder to the iron tip and lead, melting about  $\frac{1}{8}$  inch of solder. Keep your iron tip in place until the rosin runs down the lead and spreads on the foil around the hole. Then slide your iron tip down the lead and press it FIRMLY against the foil. The solder will spread out on the foil. Remove the tip—any excess solder will come off with the tip and can be wiped from the tip or thrown off with a flick of the wrist. Repeat on the other leads. When the connections have cooled the leads should be clipped off close to the board with your side cutters. The above procedure will insure a good rosin free joint between the lead and the foil. Cold joints and rosin joints cause untold

located by checking the voltages against those given in Chart A.

Trouble shooting and alignment in the amplifier section is best accomplished by using a scope and a 40 kc signal source mechanically coupled to the receiver (using one microphone for the signal generator and one for the receiver). With the input adjusted to .1 VPP on the plate of V901A (pin 3), you should find approximately these peak-to-peak voltages throughout the amplifier stages: 2.5 volts on pin 9 of V901B; 44 volts on pin 3 of V902A; 150 volts on pin 9 of V902B; 45 volts from terminal 3 of T901 to ground.

Few of the troubles which occur in remote control systems should give an alert technician any real difficulty. In most cases, a few simple checks will locate the trouble.

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amounts of trouble in etched circuits. This applies both to manufactured and kit-constructed boards. *Don't be afraid of pressing your iron tip against the board.* The idea that this will cause the foil to defy the laws of gravity and float up in the air is "strictly for the birds." Physical force, as well as heat, is necessary to loosen the foil from the board.

In soldering I always use a soldering iron as I have found the guns unsuitable for semi-production work. They get too hot and continue to get hotter as their triggers are held down. Since a small tip is a necessity because of limited working space, I prefer a pencil-type iron, with a wattage rating between 35 and 50 watts.

With these small tips, continued use results in the tip wearing, as shown in Fig. 11. The horns of the crescents can catch in holes in the foil and pull the foil off the board. Remove these horns by means of a file, or clip them off with side cutters.

Attention to the points covered in this article should take much of the headaches out of servicing equipment using etched boards.

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### It Has Been Said:

"Far better it is to dare mighty things, to win glorious triumphs, even though checkered by failure, than to take rank with those poor spirits who neither enjoy much nor suffer much, because they live in the gray twilight that knows not victory or defeat."

# Hi-Fi Corner

by John G. Dodgson

## Stereo Records

Like color TV, stereo records were in the home when they should have been in the laboratory. Stereo, however, has progressed in leaps and bounds in its first year whereas it has taken several years for color to reach its present practical state. Experts in the recording industry are predicting the death of mono records in 1963. After then we'll have stereo 45's and stereo l.p.'s.

Stereo discs are not new, of course. Some companies had experimented with them for decades but up until Sidney Frey of Audio Fidelity first offered them to the public (with no cartridges yet available) little progress was made. Perhaps this premature release was all for the good since with records on the market the resulting pressure on the industry brought rapid improvement.

The oft repeated story of how stereo started bears repeating. Westrex (a recording equipment company) developed stereo record cutting equipment and stamped out some records.

Then they invited the recording industry to a private demonstration of these records using one of their own handmade cartridges. The audience was impressed, particularly Sidney Frey of Audio Fidelity Records. He induced Westrex to cut a stereo master disc for him with tapes he supplied. However, not wishing to release stereo yet Westrex cut up the tape and injected noise. The resulting record had holes in the music and was full of various noise but this didn't bother Frey. He took out a full page ad in one of the trade papers and offered the record to the industry—for experimenting, he said! This, of course, let the proverbial cat out of the bag. Everyone rushed to buy a Westrex cutter and stereo records and cartridges appeared like magic.

Unfortunately, as Westrex apparently knew, their first stereo cutter was not fully developed and the first stereo discs were poor.

Eventually Westrex improved their cut-



ter and records cut with this second cutter head are very good. I understand now that an even newer version is available. The resulting records should be excellent.

On the other side of the pond, London either didn't accept the first Westrex head or they didn't even buy one. At any rate they collaborated with Telefunken and made a new cutter which is apparently excellent. London stereo records have been without doubt technically superior to domestic records. In fact, the difference in quality between early London and early domestic discs is amazing. Lately, however, some domestic records are approaching London.

Some specific examples: One of the first demonstration records, London's "Journey Into Stereo Sound" (PS100), is still one of the very best. Typical of early domestic demonstration records is RCA's "Bob and Ray Throw a Stereo Spectacular" Victor (LSP 1773). Although released after London's PS100 this Victor is technically inferior. Specifically, the bass is good and the low mid-range up to 1KC-2KC is good. The top highs, over 10KC, are missing but the most aggravating aspect is that the so-called presence range between about 2KC and 6KC seems to be unusually emphasized. In addition, separation is tremendously exaggerated. This results in a burring, somewhat screechy texture, particular on voice. The exaggerated separation results in the instruments occasionally jumping from one side of the room to the other. But there are three interesting aspects to this record. First, it has, by virtue of the exaggerated separation, sold stereo to more guests in my home than all the Londons put together. Second, it has been raved about by almost all of the record reviewers—and I haven't figured that out yet. Third, I heard it on a small (\$200) package hi fi and it sounded surprisingly good. The loss of bass in the package system balanced nicely with the loss of highs on the record, and the

two foot speaker separation was just right for the record's exaggerated separation.

More recent Victor releases are better. "Victory At Sea" (LSC 2335), for example, is superb in fidelity and depth. It may not be quite as good as London's best but it would take a trained ear to tell the difference. Another excellent domestic release is Capitol's "Sounds of the Great Bands" (SW 1022). It is interesting to note the records chosen by the local high fidelity show rooms to demonstrate equipment. Without fail 95% of such records are London. The remaining 5% are a mixture of Capitol, Audio Fidelity and Kapp.

To put it lightly then, there are problems in choosing stereo records. Besides these problems, which were also encountered with mono discs (but to a lesser degree), there are the problems of microphone placement and mixing techniques. Because of different mike techniques at the present time London records tend to have greater depth and spaciousness than do-

mestic discs which tend to concentrate on separation. The best records are a result of a proper mixture of depth and separation.

In conclusion stereo has come a long way in its first year. It is undeniably very, very good but it's also very tricky and troublesome. Is it worth the cost of a new cartridge, amp, and speaker? Well that depends on the individual but let me cite a case in point. Recently I brought home a new stereo record, put it on, and sat down to listen. It sounded dull, flat, and uninteresting—like unseasoned food. Then I noticed the pre-amp function switch was set to "mono" combining both channels. I turned it to "stereo" and the music came alive. Each instrument stood out with unmistakable clarity and yet blended perfectly with the whole sound. The wall behind the speakers became the front of the stage with the orchestra spread out across it and extending back into the next room. It's worth it!

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# Aligning AM Receivers

by *NRI Consultation Service*

For alignment purposes AM receivers may be divided into two classifications. These are:

1. Sets that can be aligned without the aid of a factory manual.
2. Sets that are best aligned by a beginner with instructions in the factory manual.

## **Alignment Without the Factory Manual**

In this group are found most AC-DC and three way portable receivers. The i-f transformers are mounted in oblong metal cans and there are generally two holes in the top of each can where you can see the adjustment screws. If there are more than two i-f cans or only one i-f can refer to the factory manual.

The circuits to be aligned in the average receiver are six in number. There are four i-f adjustments (two on each i-f can) and an rf and an oscillator adjustment. These consist of trimmer capacitors mounted on the tuning capacitor gang. The oscillator section of the gang is a smaller capacitor than the rf section and since the oscillator trimmer is mounted on the oscillator section it is easily identified.

If a signal generator is available it should be used to align the i-f amplifier. Connect the ground lead of the signal generator to the frame of the tuning capacitor and the other lead to the stator (ungrounded terminal) of the oscillator tuning capacitor. Connect a high resistance DC voltmeter or VTVM across the 2nd detector diode load resistor which is usually the volume control. Turn on the receiver and signal generator. If a loud hum is heard the power plug of the receiver should be reversed at the wall outlet.

Turn the receiver volume control all the way up, set the dial of the signal generator and its band switch to produce a frequency of 455 Kc. This is the standard if used in all postwar and the largest percentage of prewar sets. The modulation switch of the signal generator should be set to produce a modulated rf signal. Turn up the attenuator control of the signal generator until its tone is heard in the loudspeaker and a deflection is noted on the output meter. Now adjust all four i-f trimmers (in any order) for maximum meter reading. Reduce the output of the signal generator by turning back its attenuator control and go over the i-f adjustments once more to see if you can get any further increase in output.

Disconnect the signal generator lead from the oscillator section of the tuning capacitor and attach it to the loop frame, near but not quite touching any bare loop leads. Tune the receiver and signal generator to the highest marking on the receiver dial. Turn up the signal generator attenuator if you cannot hear the modulating tone. Now adjust the oscillator trimmer for greatest output.

Next tune the set and signal generator about 300 Kc lower in frequency, at a point where a station is not picked up, and adjust the rf trimmer for maximum output. Disconnect the signal generator, turn it off and tune the receiver a slight amount in either direction until you pick up a weak station. Then adjust the rf trimmer only for maximum output. This completes the alignment and the voltmeter is now disconnected.

#### Sets With An Extra Trimmer On The Chassis Or With An Adjustable Oscillator Core

The same procedure for adjusting the receiver is followed. However after the final adjustment of the rf trimmer this trimmer is not touched again. The set and signal generator are tuned near 600 Kc (where a station is not picked up) and the receiver is tuned back and forth across the signal generator signal. While doing this turn the chassis trimmer or the oscil-

lator slug first in and then out. Leave it at the point of maximum receiver output. This is known as "rocking the receiver." Next tune the set and signal generator to 1500 or 1600 (where a station is not received) and adjust only the oscillator trimmer for maximum output. Repeat the rocking adjustment at 600 Kc, go to 1500 or 1600 Kc and repeat the oscillator trimmer adjustment. Repeat these high and low frequency adjustments until no further improvements can be noted. This completes the alignment procedure.

#### Alignment Without a Signal Generator

If stations come in at the right points on the receiver dial, tune in a station which is fairly weak near the high frequency of the dial. Adjust the volume control to produce a weak signal. Then adjust in the following order the i-f trimmers, the oscillator trimmer and the rf trimmer for maximum output. If the stations don't come in at exactly the right point set the oscillator trimmer so they do. If there is an extra chassis trimmer or an adjustable slug in the oscillator coil carry out the rocking procedure on the low frequency end of the dial using a station as the signal source.

If the customer has tampered with the adjustments, screw the i-f trimmers up tight and then back them off about one-eighth of a turn each. Rub a screw driver blade back and forth across the plates of the tuning capacitor gang. This will cause a noise to be heard in the speaker. Adjust the i-f trimmers with another screw driver for the loudest noise. The i-f amplifier will now be peaked near the correct frequency and the r-f and oscillator adjustments can be completed using station signals.

If stations are noticeably off the correct settings at the low end of the dial the i-f is aligned to the wrong frequency and rather than blindly shifting all the i-f trimmers to a higher or to a lower capacity a signal generator should be used.

In the case of auto and older AC receivers you can use the general procedures given above, but where possible you should refer to the factory manual for the receiver. This will explain any special adjustments which may be present and also give the location of the trimmers.

#### Transistor Receivers

These sets are aligned in the same manner as the simple AC-DC and three way receivers already described. However as an output meter use a low range AC voltmeter connected across the loudspeaker

(Page 30, please)



\*You said to come as soon as I could.

# NRI ALUMNI NEWS



John Babcock ..... President  
F. Earl Oliver ..... Vice President  
Jules Cohen ..... Vice President  
William Fox ..... Vice President  
Howard Smith ..... Vice President  
Theodore E. Rose ..... Executive Sect.

## NRIAA Primary Election Results

Thomas Hull of New York City  
And Jules Cohen Of Philadelphia  
Are Candidates For President

Our primary results have given us Thomas Hull of New York City and Jules Cohen of Philadelphia as candidates for President of the NRIAA in 1960.

A former Vice-President and President of the NRIAA, Thomas Hull has also held various offices, including the chairmanship, in the New York City Chapter, of which he has long been acknowledged as an outstanding leader. It would be difficult to find a man more qualified by character, ability, and experience to head up the NRI Alumni Association.

Jules Cohen is receiving strong support from the Philadelphia-Camden area, and understandably so. He is very popular with all those who know him and ever since he became secretary of the Philadelphia-Camden Chapter he has contributed his time and effort generously to the activities of the Chapter.

We are fortunate in having two such candidates, for whether Thomas Hull or Jules Cohen wins, we will have a fine President of the NRI Alumni Association for 1960.

The eight candidates nominated for a Vice-Presidency—of whom four will be elected—are Howard Smith of Springfield, Mass., F. Earl Oliver of Detroit, William Fox of New York City, John Babcock of Minneapolis, Walter Nicely of Chicago, Roland Tomlinson of San Francisco, J. D. Wilson of Buffalo, and Frank Catalano of New York City.

The first three named are of course current Vice-Presidents (probably Jules Cohen would have been nominated for a Vice-

Presidency again, too, if so many votes had not been cast for his nomination for the Presidency). F. Earl Oliver of Detroit and William Fox of New York City have served as Vice-Presidents continuously for so many many years that they threaten to become permanent fixtures in that office. Howard Smith was the chief organizer of the Springfield (Mass.) Chapter, of which he was elected Chairman and later Secretary, and was National President for 1958. John Babcock of Minneapolis has an almost identical Alumni Association background: He took the lead in organizing the Minneapolis-St. Paul (Twin City) Chapter, became its first chairman and later on Secretary, and was elected as National President for 1959.

Walter Nicely is the former chairman and continues to be a guiding light of the Chicago Chapter. Roland Tomlinson is a member of our newest local chapter, the San Francisco Chapter, whose members have a high regard for him. Frank Catalano has been a loyal and strong supporter of the New York City Chapter for many years; note that he will be competing with a brother member, William Fox, for office. J. D. Wilson of Buffalo has no local Chapter connections, it is quite a tribute to him to have been nominated for office without local chapter support.

From among these candidates the members of the Alumni Association are asked to vote for one man for President and four for Vice-President. Use the ballot on Page 26. The polls close at midnight on October 24. Your ballot must reach National Headquarters by that date. The successful candidates will be announced in the December-January issue of the NRI News,

## Election Ballot

All NRI Alumni members are urged to fill in this ballot carefully. Mail your ballot to National Headquarters immediately.

FOR PRESIDENT (Vote for one man)

- Thomas Hull, New York, N. Y.
- Jules Cohen, Philadelphia, Pa.

FOR VICE PRESIDENT (Vote for four men)

- F. Earl Oliver, Detroit, Mich.
- Howard Smith, Springfield, Mass.
- John Babcock, Minneapolis, Minn.
- Walter Nicely, Chicago, Ill.
- J. D. Wilson, Buffalo, N. Y.
- Roland Tomlinson, San Francisco, Calif.
- William Fox, New York, N. Y.
- Frank Catalano, New York, N. Y.

SIGN HERE:

Your Name .....

Your Address .....

City ..... State .....

Polls close October 25, 1959. Mail your complete Ballot to:

T. E. ROSE, Executive Secretary

NRI ALUMNI ASSOCIATION

3939 Wisconsin Ave.

WASHINGTON 16, D. C.

## NRI ALUMNI NEWS

### Chapter Chatter

Los Angeles Chapter has been holding meetings lately at Robert Belew's place of business, 521 South St. Louis Street, at which he has been a most gracious host. Incidentally, the Chapter has been trying to locate new, permanent quarters at which to hold its meetings.

Earl Dycus continues to show films that the members find very interesting. One he recently showed, called "Project Vanguard" was all about the Vanguard Rocket: how it and the satellite it put into orbit were made, its electronic components and how they were used, the various kinds of electronic equipment, the work performed by the engineers, etc. He also showed films on the Grand Canyon and on plastics. The members always enjoy these films, thanks to Earl.

Eugene DeCaussin brought in a color bar generator to be checked by Chairman Tom McMullen and Earl Dycus turned up with an auto radio for trouble-shooting.

Host Robert Belew has continued to serve refreshments at these meetings.

Southeastern Massachusetts Chapter played host to visitors from the Springfield Chapter, at a dinner held at "White's Restaurant at the Narrows" Westport, Mass. The visitors were Springfield Chapter Chairman Rupert McLellan, Vice-Chairman Thomas Glog, Secretary Howard Smith, Treasurer Norman Charest, Arnold Wilder, and Sam Infantino.

Rupert McLellan gave an unscheduled talk on chapter procedure, programs for the meetings, unity among the members, etc. Howard Smith added his views on these subjects and then gave his ideas on licensing technicians and "tube jockeys." A question and answer session was then conducted by the chairman of the Southeastern Massachusetts Chapter. Everyone at the dinner thoroughly enjoyed the occasion.

At the following meeting every member was asked to indicate what phase of electronics he would like to see taken up at future meetings. The majority agreed that the chapter's goal should be actual trouble-shooting on Radio-TV receivers, combined with a blackboard explanation on why a defect occurred. So, plans were made for two members to bring in their "dogs" after they have checked them for the more

common defects. The "dogs" will be set up on the bench and symptoms noted on the blackboard. Members will be asked what was done to the set. Then, probable causes will be noted on the blackboard. These will be checked out and noted. The cause should finally show up and this will be evaluated further by the more experienced members. The chapter is confident that this program will be of great interest to all members.

The most recent new member to join the chapter is Ted Murphy of Norton, Mass. A warm welcome to you, Ted!

**New Orleans Chapter** has been giving some attention to Citizens Band radios and transmitters. Due to the Federal Communications Commission's modifications of Citizens Band radio regulations, many individuals have become interested in operating in the Citizens Band, which was the old 11-meter amateur band.

Gaston Galjour has been conducting a TV clinic, to which members are asked to bring all their troubles (except their mothers-in-law) for discussion and solution, so that the entire group present at each meeting may benefit.

**Minneapolis-St. Paul (Twin City) Chapter's** John Berka gave an exceptionally fine talk on an always-important subject: charges made by the Radio-TV repairman for service calls. John explained some of the things that must be taken into consideration in arriving at the charge for a service call, in addition to the serviceman's time. He cited cases where TV servicemen advertise \$2 service calls and then make up for this low charge by the number of cases they pull into the shop and overcharge the customer for. The group had a thorough discussion on this subject and all profited from it.

**Chicago Chapter** was particularly pleased to welcome a special guest at one of its Service meetings. It was John Mead, son of Charles Mead, the Chapter's former Secretary. John is a chemical engineer residing in Virginia and has taken up the study of Radio. At the meeting he was accompanied by his two sons.

Graduate Minas Antablian is a new member of the Chapter. Right away he showed his willingness to participate in the activities of the Chapter. Along with Walter Oakley and Secretary Frank Dominski, he was appointed to the committee to be in charge of handling the Service Forum held on the fourth Wednesday of each month. One of the duties of the committee will be to see that there is enough work to keep the members busy during the evening. Chairman Teresi gave a demonstration on

the alignment of the sound section of the RCA 630 TV Receiver.

The next meeting was devoted mostly to the i-f section of the TV receiver and a demonstration by former Chairman Walter Nicely on the aligning of a broadcast receiver with the signal generator. Treasurer Lerner assembled a tube tester kit and upon trying it out he discovered, much to his amazement, that it worked.

**Milwaukee Chapter** devoted almost an entire meeting to a discussion by Slavko Petrich, Philip Rinke, Ralph Lassen and Edward Lamm on the audio section of a TV circuit, the first phase of a program under which the Chapter has been concentrating on TV servicing.

For a good many years, the Chapter has published its own newspaper, the NRI AA Milwaukee Chapter News. Most of the work connected with it has heretofore been undertaken by one member, the editor. The Chapter has now decided that all the members will participate in the preparation and production of this publication.

**Springfield (Mass.) Chapter**, after suspending meetings during July and August, has now resumed its regular meetings. Scheduled for the first meeting of the new season was a movie "The Strange Case of the Cosmic Rays" a telephone company film, and a talk on the fundamentals of Electronics by John Michnovetz. John is the Chapter's newly elected Technical Advisor, succeeding Lyman Brown, who in the past has contributed so much to the meetings in that office.

**New York City Chapter** keeps its members very well informed about what goes on inside a TV set. Members get up on the floor and tell what they found to be wrong with the various sets they have worked on, and how they repaired them. In this way the entire membership gets the benefit of individual members' experiences, which the members find very helpful in their own service work.

Ralph Pincus has been giving several interesting lectures on ham operations. He has explained how to get an FCC license and what type of equipment, aerial, etc., is required to operate a ham station. He is even teaching the Morse Code to the membership, using the code practice records purchased by the chapter for this purpose.

All the members fully appreciate and enjoy Ralph Pincus' efforts on their behalf.

**Pittsburgh Chapter** has admitted two new members to membership. They are Frank Thomas and Robert Kelly. Our congratula-

tions to these new members.

A visit to Channel 4 (WTAE) studios was arranged and all who attended enjoyed it very much. Members of the chapter were also invited to attend a closed circuit meeting held by Raytheon on the subject of Raytheon Bonded Service and some of the members availed themselves of this opportunity.

At the next meeting Chairman Schnader reported the completion of the assembly of the NRI Model 240 Volt-Ohmmeter Kit donated to the chapter by National Headquarters and Secretary Bender donated a small TV set to the chapter for use in demonstrations at the meetings and for general use. The remainder of the evening was spent in servicing and giving demonstrations of scope tracers in the television set, for the benefit of those members who are not familiar with the scope and its uses. The chapter plans to put on more demonstrations of this type for the help of any member who may request it.

Correction: The August-September issue of the NRI News referred to Mr. William "Elder" and to "Tulsa" Okla. as the city at which special Federal Aviation Agency training courses are given. These should have been, respectively, "Elter" and "Oklahoma City." Our apologies, Mr. Elter.

**Philadelphia-Camden Chapter** customarily holds two meetings each month but during July and August held only one meeting in each of those months, the Service Night on the second Monday of the month. Considering what the weather was, it was surprising how many members showed up for these Service meetings. There can hardly be any question but what the Philadelphia-Camden Chapter holds the kind of programs that its members want.

The first regular meeting of the Fall Season was to feature as a guest speaker, a representative of the B&K Manufacturing Company, which manufactures the B&K Television Analyst. The manufacturer's representative was scheduled to discuss and demonstrate this instrument. All members attending the meeting were to receive a book entitled "Television Analyzing Simplified" free of charge.

Most of the Philadelphia-Camden Chapter's report appearing in the August-September issue of the NRI News was devoted to an account of the Chapter's Twenty-Fifth Anniversary Celebration. Through oversight proper credit was not given Joe Donnelly, who furnished the PA system and Hi-Fi music and who undertook a great deal of work and trouble to bring his equipment to the hall and operate it for the benefit and pleasure of the guests.

Please be assured, Joe, that everyone at the party fully appreciated the facilities you provided. The party could not have been the same without your valuable contribution.

**Detroit Chapter and Hagerstown (Cumberland Valley) Chapter** took their customary vacation from meetings during the summer months but are now in full swing again with their programs for the fall season.

**San Francisco Chapter** has admitted Ernest Glavez to membership as an associate member. Congratulations, Ernest!

Chairman Arthur Ragsdale, Vice-Chairman R. Tomlinson and Isaiah Randolph discussed and worked on the assembling of a probe for testing transformers, yokes, flybacks and other induction coils.

B. O. Kidd brought in a portable radio with which he was having trouble. There was no sound. The trouble was located as an open in the output transformer.

At another meeting Chairman Ragsdale gave a short talk on TV repairing, which was followed by a question and answer period and a general discussion on the subject. Sid Mahler showed two very fine films. One on "Dynamic Measurements," showed measurements made by oscilloscopes in Radio, the steel industry and medicine. The other picture entitled "The Grand Canyon Story" was educational as well as interesting.

The Chapter has been trying to arrange for a guest speaker from the Packard-Bell Laboratories to feature at one of its meetings.



Officers of the San Francisco Chapter, l to r, front row; George Chessen, Treasurer; Arthur Ragsdale, Chairman; and Phil Stearns, Secretary. Back row: Isaiah Randolph and Edward J. Persau, Financial Committee.



Part of members present at a meeting of the San Francisco Chapter.

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## New TV Thrills — "Live" —

Sniper bullets ricocheted through Havana. It was the Castro revolution—the last desperate hours of the Batista regime.

Americans everywhere turned to their television sets for vivid coverage—and got it. Something was different about this telecasting. Cameras on Havana's streets brought the scenes *live* to America's living rooms. There was action—aplenty! Rifles cracked. There were wild shouts. Milling crowds.

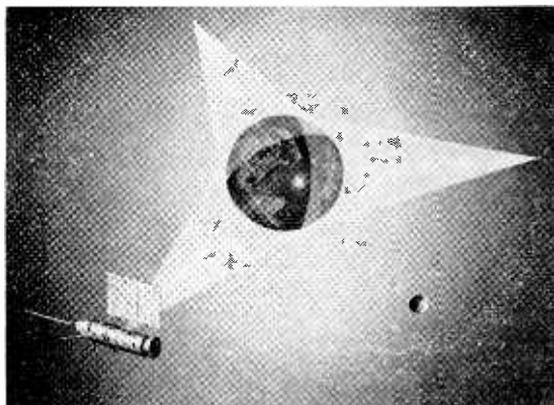


Photo Courtesy of ITT

Three satellites "fixed" in space make up this earth net dialing system designed to blanket the entire globe with television communication. Plastic slots contain solar cells to transmit power and to charge solar batteries for operation when satellites are in the earth's shadow.

This was on-the-spot coverage instantly transmitted over a new two-way Florida-Cuba radio link by a process called O/H (over-the-horizon) broadcasting. The technique employed huge 60-foot antennas resembling drive-in movie screens. Signals emanating from the giant antennas were fired skyward and literally bounced off a layer of the atmosphere. The reflected signal was picked up, far over the horizon in Florida, by sensitive receiving apparatus. Less than two years ago such an O/H broadcast between Cuba and Florida would not have been possible. Engineers of International Telephone and Telegraph Corporation, which pioneered O/H, had not finished building the link. Today, instantaneous transmission between the two countries of TV signals, as well as telephone calls and other radio-relayed information, is commonplace. And numerous other such links are being proposed, according to the ITT engineers.

One suggested hook-up is to Mexico via an O/H jump between Mexico City and Yucatan. The latter point would be linked by a water hop to Cuba, connecting with the already existing Florida-Cuba link.

An O/H link already exists between the islands of Sardinia and Minorca in the Mediterranean, helping to connect the communication systems of Italy and Spain. Another links American air bases in Spain and in Spanish Morocco—an across-the-water hop over the Straits of Gibraltar. Still another O/H chain, being built by ITT for the military will extend in a great arc across Europe from the Scandinavian countries to Turkey. It's now possible to ex-  
(Page 30, please)

## Aligning AM Receivers

voice coil. The volume control of the receiver should be turned all the way up.

To feed the signal generator signal into the antenna make a loop of a few turns of hook-up wire connected to the signal generator leads. Bring this near the loopstick of the transistor receiver. Final adjustment of the rf, oscillator trimmers and the rocking adjustment if one is provided is best done on signals from radio stations.

— n r i —

## New TV Thrills

tend TV transmission from the U. S. to South America by O/H methods.

Another TV innovation in the near future, will be space TV satellites, which will either circle the earth or remain in "fixed" positions.

At first they will help meteorologists—weather forecasters—to make far more accurate predictions. This may save up to \$4 billion a year by permitting improved crop planning, better distribution of weather-affected goods . . . and more accurate warnings of hurricanes and storms.

We have already made great progress in space satellites which may eventually bring telecasts from Europe to your home. Successful orbiting of the 8,500 lb. Atlas was a dramatic demonstration of how voice signals can be sent from a space satellite—a forerunner of tomorrow's space network.

The Defense Department hopes to launch the first unit perhaps by late 1960, followed by others—to create a complete space network . . . a global telecasting system!

Single satellites will also serve as "messengers;" they'll be able to receive a message, as it passes over New York for example, and "store" it. When the satellite passes over Paris it will deliver the message "on command." If the recipient is ready, he can even answer immediately. The reply will be received again in New York—an hour and a half later!

These messages will be either oral or by letter-message; a tremendous aid to global communications.

Most of us, however, are waiting to see opening night at Japan's Kabuki Theatre or Paris' Folies Bergere—live—on our living room TV sets.

And that day isn't far off!

Page Thirty



Photo Courtesy of ITT

Big Screen—Television and radio signals are sent more than 200 miles using 60-foot parabolic antennas like this. It is part of the technique of Over-the-Horizon transmission pioneered by International Telephone and Telegraph Corporation. The antennas, used to send television between Florida and Cuba, resemble the giant screens at drive-in theaters.

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## Success/Failure

The line between failure and success is so fine that we scarcely know when we pass it—so fine that we are often on the line and we do not know it.

How many a man has thrown up his hands at a time when a little more effort, a little more patience, would have achieved success! As the tide goes all the way out, so it comes all the way in.

Ofentimes, things seem darkest when they are really on the upturn. A little more persistence, more effort and what seemed a hopeless failure may turn to glorious success.

There is no defeat except in no longer trying. There is no defeat save from within, no really insurmountable barrier save our inherent weakness of purpose.

Elbert Hubbard

"WHAT I NEED MOST IS SOMETHING TO MAKE ME DO WHAT I CAN," the renowned poet and essayist Ralph Waldo Emerson once said. Although he may not have intended it as such, Mr. Emerson was really defining an important function of friendship.

One of the most rewarding experiences you can have is to be that "something" for somebody—to be that motivating force that triggered energy—brought out the best in someone you know.

Thousands of NRI men have found an extremely rewarding method of accomplishing this—a way to help a friend. That is, by *encouraging others* to train for the same success they themselves are enjoying or are working toward. It's not difficult for most of us to recognize the ever-growing need and opportunity for those with technical training—"know-how"—in the fast-moving field of Electronics.

But it's only human nature for many a man to sit back, daydream, *wait* for opportunity to fall in their laps. Often all that's needed is a few words of encouragement, a BOOST from a friend, to snap a fellow back into reality and DO THINGS!

Since you first enrolled with NRI, chances are some of your friends, relatives, or co-workers have expressed some interest in Electronics. It may have been just a passing remark or profound curiosity in watching you tackle a servicing job or kit experiment.

If your friend is not set—satisfied with his present work, perhaps some specific information and a bit of urging from us—*could* be the turning point in his career—a step toward increased income, greater personal contentment, security for himself and his family in the years ahead.

You can do your part—easily—simply. Just send me your friend's name and address. If you don't have one of our regular "Booster" cards, just a short note will do. I'll send him an NRI catalog—won't use your name. But be sure to note your name so you'll get credit for your friend's enrollment.

For each enrollment, you'll earn a cash reward—and equally important—the satisfaction and self-pride in knowing you've helped a friend to help himself. And—you'll have made a big contribution toward NRI's continued growth and leadership as the oldest, largest, "pioneer," Radio-TV home-study school.

J. M. Smith  
President

**NRI NEWS**

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