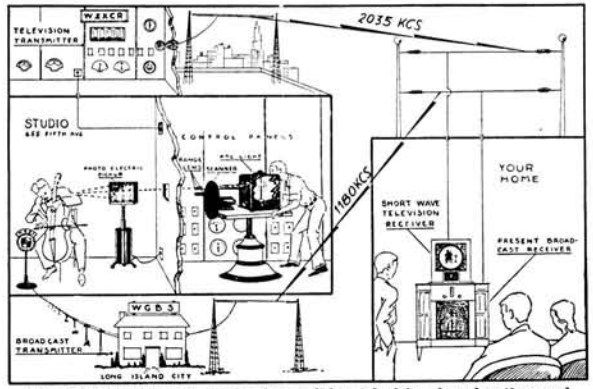
MAKING COMMERCIAL TELEVISION POSSIBLE

(Continued from page 7)

At other times the Television studios make use of standard motion picture film, which is run through a special form of pick-up apparatus so that every inch of the film is scanned and translated into electrical terms by a photo-electric cell. The films may be silent or accompanied by regular sound recordings, as desired or necessary.

In addition to the usual broadcast receiver tuned to 1180 kilocycles for the WGBS signals, a special short wave Television receiver is required, operating in the 3,000-2,000 kilocycle (100-150 meters) band in which television transmitters now operate. The television receiver is tuned to 2035 kilocycles, bringing in the W2XCR signals. The Televisor or image weaving device takes the place of the loudspeaker, when receiving Television signals.



Simplified diagram of a complete talking-television broadcasting and receiving system.

Located in the very heart of New York City, the leading entertainment and news center of the nation, the Radio talkies studio will bring no end of interesting features to its audience.

With suitable home receiving equipment now being made available, the Television art is rapidly taking its place alongside sound broadcasting as a most important and even indispensable aid.

Be a Pal—tear off here and mail

What about your Pal

When you're on top, will your old pal be able to blame you if he isn't enjoying success equal to your own?

Think of the fellow you've chummed around with. Maybe you went to school with him; or he's a fraternity brother; maybe you played on the same team.

You shared confidences; were real buddies. Will you let your future success separate you?

Radio's a great game—getting bigger every day. Don't let your pal get in a rut—get him into Radio. Send me his name—send me the names of the two friends you'd like to see succeed. I won't mention your name when I write them.

I'll help you "be a pal."

Mr. .....

Address .....

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

Occupation ..... Age .....

Interested in:

☐ Amateur Radio ☐ Service Work

☐ Set Building ☐ .....

Mr. .....

Address .....

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

Occupation ..... Age .....

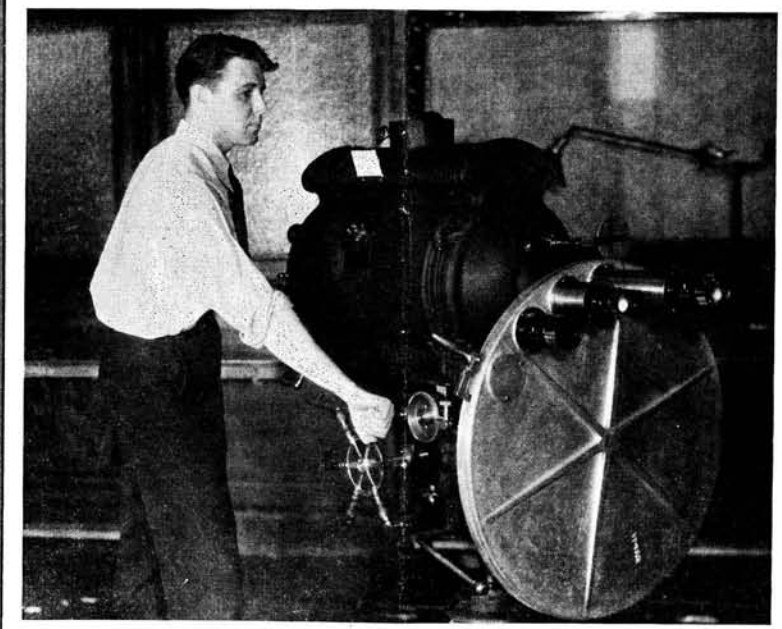
Interested in:

☐ Amateur Radio ☐ Service Work

☐ Set Building ☐ .....

NATIONAL RADIO NEWS

VOL. 4—NO. 1 WASHINGTON, D. C. AUGUST, 1931



(See Page Three)

TELEVISION ISSUE

My Own page

The Progress of Television

IT has become the usual thing for writers to tell us that "Television is just around the corner." Persons interested in the subject may wonder why all the delay—why doesn't Television turn the corner and show itself. It's about time to tell the whole truth about it—just where Television stands today.

Frankly—it is just coming out of its experimental stage—advancing toward commercial possibilities. It is where Radio was—several years ago—but with certain advantages—certain drawbacks.

Transmission and reception of pictures—Television—has been possible for years. But the Television manufacturer realized the lesson in improvements the Radio buyer of old had learned. Radio came when he was looking for something new. It sold like gold dollars. It was styled the last word in scientific achievement. Now he compares those sets with the fine Radio products of today.

He wouldn't buy a crude "lamp in a box" arrangement which brought him postage stamp size pictures without detail, and flickering like a 1914 movie. No—the buyer would await refinements—and the manufacturer has been refining for sales to the "Radio-wise" public of today. He is succeeding.

Television will develop more rapidly than Radio did because it is a form of Radio. Radio is well known now. It is merely an application of principle.

Television will arrive as soon as the manufacturers are satisfied they have a product which will sell in quantity. From all indications, they practically have that now.

Television will go over big. It will be a hit with the public. The men who know Television when it goes on the market on a big scale should be in on some big money.

Improving "The News"

LIVING up to his promise, the Editor brings you this issue in new clothes, so to speak. The gradual improvement of National Radio News has been meeting with great favor with its readers. This issue gives you a new size page for more material—longer articles—in a more attractive form. A higher grade paper improves its appearance and makes it easier to read. New departments in "The News" will also meet your approval.

Particular attention is called to the new department "TRADE NOTICES" which will be included whenever sufficient material is obtained. National Radio News does not publish these trade notices as a recommendation for the firms listed because as you know—N. R. I. never recommends nor says anything detrimental to any Radio organization. We always remain neutral. This department is merely for your assistance and information.

If plans which we have in mind, go through, there will be a change in policy of "The News" which will probably be made known within the next month or two. It will have a direct bearing on the National Radio Institute Alumni Association, which as you know, is the first known Alumni Association of a Home Study School, membership to which is only available to N. R. I. graduates—something for each student of the Institute to look forward to—the day when he may become a member of this exclusive yet world-wide organization. **Watch "The News."**

J. E. Smith
President.

Making Commercial Television Possible

By J. A. DOWIE, *Chief Instructor*

J. A. DOWIE, Chief Instructor

RADIO Talkies, or combined sight and sound Television programs, have made their debut in the New York metropolitan area, as a means of entertainment, by combining the Television facilities of Station W2XCR with the sound broadcasting facilities of the Broadcasting Station WGBS.

The Television transmitter, with an output of 5,000 watts, operates on 2035 kilocycles—(147.5 meters). WGBS operates on 1180 kilocycles (254 meters). Signals of Station W2XCR are tuned in by means of a special Television short wave receiver with Radiovisor, for the pictorial component of the program. Tuning the broadcast receiver to 1180 kilocycles provides the synchronized sound component transmitted by WGBS. The visual and aural combination is practically the same idea as the present-day talkies contrasted with the former silent pictures.

The Television transmitter and Radio talkie studios are in the same building, the latter is not unlike the usual broadcasting studio with heavy draperies and other acoustic treatment.

Using the flying spot direct pick-up at the Jenkins Television Station W2XCR. The boxes on each side of the object contain photoelectric cells and amplifiers.

The Television studios now operate on a regular schedule from 3 to 5 and 6 to 8 P. M.

The studios are provided with both direct pick-up apparatus for transmitting living subjects, and film pick-up apparatus for handling motion picture films, either silently or with synchronized sound accompaniment, providing a wide range of program possibilities.

In a room adjoining the studio is the control equipment. Here control room engineers switch from film pick-up to direct pick-up, on the various program features according to schedule, as well as from disc record or film sound pick-up, to the microphone before the flesh-and-blood performer. Control room engineers follow the visual and aural pick-ups by Radiovisors and loud-speakers. Looking into the Radiovisors, they see the pictures exactly as they go out over the air. Listening to the loud-speakers, they hear the sound component as it is going out. The picture and sound pick-ups must be amplified to a greater or less degree so as to strike the happy medium for uniform results at the home end, this function being served by the control room.

In addition to the microphone, the Television performer faces the direct pick-up which may be either the so-called flying spot, which is a beam of light which scans or analyzes the image to be transmitted, and which is placed in a small room directly off the main studio, or the Television camera.

The flying spot method of scanning the subject is employed in these studios. The front cover of this issue pictures H. G. Brown, of the Jenkins Television Corporation, with the flying spot scanner built by the DeForest Radio Company for Station

(Page seven, please)

A Chat With the N. R. I. Director

Who Pays the Broadcasting Bill?

A SHORT time ago, Mr. M. H. Aylesworth, President of the National Broadcasting Company, estimated that operating costs and fees for talent in the case of the National Broadcasting Company would approximate $30,000,000 during 1931.

It is logical to assume that the expenses of the Columbia Chain are equal to this amount. The total runs to an enormous figure, especially when the independent stations, not affiliated with the chains, are also taken into consideration.

Another authority further states that under the present system of sponsored programs, the popularity of Radio will increase the country's broadcasting bill to $150,000,000 annually within the next five years.

The present estimated cost of broadcasting is $75,000,000 a year. There are approximately 14,000,000 Radio receiving sets in the country. At this rate, if we were operating in this country on the plan followed by some foreign countries, it would cost the set-owner about $5.36 a year in taxes to own and operate a receiver.

It is easy to see, from these figures, that the Radio public, under the American system of broadcasting, is extremely lucky. They are presented with this entertainment free of cost by the sponsors of the programs, and under this system there is no doubt that the authority quoted above has a logical reason to believe in the future popularity of Radio.

This "tax free" system of Radio is a good selling point for the receiving-set-buying public, although, one which I fear has not been advantageously used by Radio salesmen. Stress the point, to your prospective purchaser, when selling a set, that $75,000,000 worth of entertainment is on the air, each year, free to him. Someone else is paying his broadcasting bill.

Aviation-Radio experience is coming to N. R. I. graduate Alfred J. Handel who is in the U. S. Marine Aviation, located with Radio Headquarters Company at Coronado, Calif.

Graduate Riley Jenks reports that with the assistance of the N. R. I. Employment Department he has landed a position as Radio service man with Riddle's Radio Service, Saranac Lake, New York. Incidentally, Mr. Riddle is also an N. R. I. graduate.

A Thought for the Month

If there are some of us who still doubt the value of **character** in the business world, let us turn to the classified section of any newspaper and read one ad after another in which employers are looking for men.

We'll find an abundance of requirements such as the following:

—who are "loyal"
—who have "initiative"
—who are "honest"
—who are "dependable"
—who are "ambitious"

These things which go to make up character can be built up without cost. A man's most valuable possession is his character.

E. R. HAAS,
Vice President and Director.

RADIO-TRICIAN SERVICE SHEET

COMPILED SOLELY FOR STUDENTS & GRADUATES

CLARION SUPERHETERODYNE MODELS 80 AND 81

Poor Sensitivity

This might be due to a high resistance connection in antenna coil, first detector, intermediate, second detector or oscillator primary or secondary windings, short circuited turns in these windings or grounds due to loose strands of wire or excess solder or poor contact at control grid cap and at tube prongs, should be looked for.

Poor Selectivity

This condition may arise from the same causes and appear simultaneously with poor sensitivity. Where tuning is usually broad and the local broadcasting station is not causing the trouble, it is a good idea to check for high resistance in the grid circuits.

A high resistance connection in an r.f. circuit need not run to thousands or hundreds of ohms, especially in the oscillatory circuit, i. e., the circuit comprising the variable condenser and secondary, or tuned primary winding, and tests with a continuity meter may not give sufficient indication of the poor connection. In a case of this type where the connections are suspected, a practical remedy would be to go over these connections with a hot soldering iron. An improvement should be immediately apparent.

Oscillation

It should be remembered that with an intermediate frequency of 175 k.c., a heterodyne whistle, similar to oscillation, will be picked up at 700 k.c. This is due to the fourth harmonic of the receiver's oscillator frequency beating with the carrier frequency of the broadcasting station to produce an audio note in the loudspeaker. However, this condition has been minimized in CLARION receivers and the intermediate frequency of 175 k.c. has been selected by all manufacturers as the one intermediate frequency having most advantages and least disadvantages.

In addition, oscillation may be brought about by a poor ground, or no ground at all being used. High line voltage may also cause oscillation. Omission of tube shields aggravates this condition. "Hot tubes" will seldom cause oscillation in a superheterodyne due to the wide tolerance shown by this circuit.

(1) An open screen grid by-pass condenser.
(2) An open r.f. cathode by-pass condenser.
(3) An open det. cathode by-pass condenser.
(4) Poor ground at the installation.
(5) A high resistance connection in series with a by-pass condenser.
(6) Tube shields removed and high line voltage.

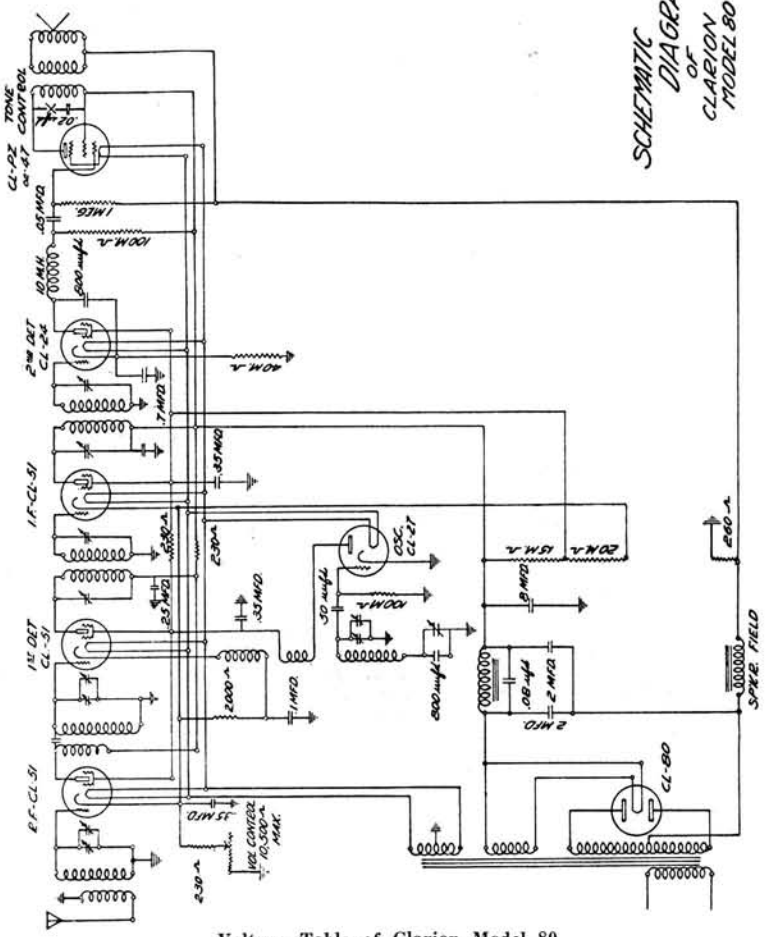
Noisy Operation

Due to its extreme sensitivity, the superheterodyne may appear a trifle noisy on distant reception. However, it will be found that in turning down the volume on any station to equal that of a tuned radio frequency receiver, the superheterodyne will perform as quietly, and possibly more quietly, than the tuned radio frequency set does.

Other than this, loose connections causing intermittent open circuits or short circuits are probable causes. Ninety percent of noisy operation arises in location, installation or 110-volt supply. Tubes are the most common source of noisy operation, but we are assuming, of course, in all these texts that everything external to the chassis and speaker are known to be good.

Where loose connections are suspected, go over all connections with a wood or fiber stick, moving each connection firmly BUT NOT ROUGHLY, listen for clicks or rasping noises from the speaker. A vibration at a particular tone occurring repeatedly during the playing of music generally is due to a loose or vibrating part on the speaker and roughness or rasping at all tones is usually due to a rubbing voice coil. A rattle may develop if the tube shields bear against one another.

Readers who file Service Data in separate binders remove page carefully; trim on dotted line for same size as Data published heretofore.



Voltage Table of Clarion Model 80

Position	Tube	Fil. Volts	Plate Volts	Grid Volts	Screen Grid Volts	Cathode Volts	Normal Plate M.A.
R.f.	CL-51	2.2	233	3.	66	3.	5.
1st Det.	CL-51	2.2	233	7.	73	7.	2.3
Osc.	CL-27	2.2	80	0	0	0	4.
I.F.	CL-51	2.2	233	3.	77	3.	5.
2nd Det.	CL-24	2.2	162	6.2	73	7.2	.5
Output	CL-PZ	2.2	228	15.	233	0	27.
Rect.	CL-80	4.8	300	0.	0	0	50.

Volume control position Full. Line Voltage 115.

Note: Since resistance tolerances in the sets are plus or minus 10%, and tubes may vary over 20%, your readings may disagree with the above by plus or minus 30%. CL-PZ is also known as CL-47, the latter being the final type number.

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NATIONAL RADIO INSTITUTE
Washington, D. C.
J. E. SMITH, President. E. R. HAAS, Director.

What N. R. I. GRADUATES ARE DOING

Some notes made by the Editor while glancing through the N. R. I. Employment Department records:

Raymond W. Terry is Radio Operator on the S. S. President Harding.

Earl Downey is with Station WBIG, Greensboro, N. C.

Alfred Hissong's job is Production Manager for the Trimm Radio Mfg. Co. of Chicago.

Louis Bruchiss is European Editor for Radio Industries Magazine.

Roy McConnell is Service Manager for Fisher-Armstrong Co., Princeton, Ind.

C. S. Mao is in the U. S. studying Radio and automatic Telephone systems for the Chinese Government.

Fred Nichols is proprietor of the Eaton Radio Co., Sound Specialists, Greeley, Colo., and employs four other N. R. I. men. A 100% N. R. I. organization.

J. G. Dewar is Radio operator on the Canadian National Railway.

Carl Bischoff is operator at WPAD.

Robt. Brady is sales and service man for Montgomery Ward, Las Vegas, N. Mex.

Warren Thurston is with the Palmer Radio Co., Kansas City, Mo.

Making Commercial Television Possible

(Continued from page 3)

W2XCR. The scanning mechanism comprises a powerful arc light, a scanning disc, three lenses mounted on a turret for ready interchangeability, adjustable mirrors and stand. The operator can direct the scanning beam by means of lenses and mirrors, so as to pick up a close-up, a half length or a full length of the performer or performers. By means of lenses of different focal lengths, the operator can change from a close-up to a long shot without altering the relative positions of performer and scanner, adding greatly to the entertainment possibilities, as in motion picture technique. The photoelectric cells may be placed at any angle with relation to the subject, thereby obtaining various lighting effects in picking up the reflected light.

A nearby microphone picks up the voice music or other desired sounds while the performers face the televisor pick-up and converts these sounds into electrical values and greatly amplifies them. They are then impressed on the carrier waves of the WGBS broadcast station.

Since at any instant the subject is illuminated by a single spot of light, the reflection from which is picked up by the photoelectric cells and subsequently transmitted, while at the receiving end a single dot of corresponding light value appears before the looker-in, it is essential that both dots be exactly at the same point with respect to the entire image. This function is called **synchronization.** Where a common A.C. power system is available, the receiving and transmitting scanners are kept in perfect step by means of synchronous motors electrically geared together. Where different A.C. power systems are employed, there are other methods of maintaining the essential synchronism, including a synchronizing feature included in the television signal.

The change from the former 48-line, 15 pictures per second scanning to the present 60-line, 20 pictures per second scanning system of W2XCR and other television stations, provides not only greater pictorial detail but also reduces flicker to a negligible minimum.

At the home end the usual broadcast receiver is tuned to 1180 kilocycles, bringing in the usual sound program of Station WGBS, which, when the stations are operating together serves as the sound accompaniment for the television program.

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THE FARNSWORTH TELEVISION SYSTEM

By A. C. KALBFLEISCH
N. R. I. Consultant on Television

THE system of television, invented by Philo T. Farnsworth, a graduate of N. R. I., is of vast importance to the television enthusiast for two reasons. First, he has successfully transmitted pictures of far greater detail within the limits of a single broadcast channel, namely, 10 Kc. Secondly, he has eliminated the cumbersome and noisy scanning disc which is a necessary part of the transmitter in the "Flying Spot" method of transmission.

A brief description of the frequency band required for the "Flying Spot" method of television might serve to show why the Farnsworth system is such a stride toward the reception of good pictures. About the best detail that has been obtained so far with the use of the scanning disc, is a 72 line picture. By this we mean a picture one inch square with 72 horizontal lines across it. Now suppose we divide our picture into 72 vertical rows. Our one inch square is now divided into 72 x 72 or 5144 picture elements. In order to have a continuous scene, that is, a moving picture, which does not appear to be a series of snapshots to the observer, we must have 16 complete pictures transmitted per second. Then for the transmission of our 72 line picture we must have 5,144 x 16 or 82,204 current pulses which are produced by the photo-electric cell as it responds to the variations of light and shade impressed in it by the 72 small holes in the scanning disc. As two pulses constitute one cycle, we have for the frequency of the system

$\frac{82{,}204}{2}$ or 41,102 cycles, or approximately a range of 41 Kc. If transmitted by radio a channel width of 41 x 2 or 82 Kc. will be needed. This you will see is a band width equal to 8 broadcast channels. This fact at once limits the number of available channels for television.

The problem for engineers who have pioneered in this new field has been increasing the detail or clarity of television transmission and reception, yet cutting down on the frequency band required to do it. Obviously the scanning disc is not the way to do it, as our example illustrates. It remained for Farnsworth, a young engineer, on the West Coast to revolutionize present day methods of television transmission and reception by the invention of a form of cathode ray tube which will be discussed in detail.

Philo T. Farnsworth, backed by a group of men in San Francisco, is said to have made more progress in solving the problems of television than any other engineer at present in the field. Realizing the scanning disc was too clumsy and that true reproduction could not be obtained with it, he scans the scene with an elaborate form of photo-electric cell. The ray at the transmitting end and the one at the receiving end are kept in exact synchronism by a control current which is transmitted along with the high frequency currents. Mr. Farnsworth has stated that wherever a ten-kilocycle channel, or broadcast channel, is available, he can transmit a 400 line picture.

We saw a moment ago that the nearest approach to this detail with a scanning disc was 72 lines and it took four broadcast channels, or 80 Kc., to do it. Real progress has been made if we can get almost six times the detail in one eighth the frequency band required.

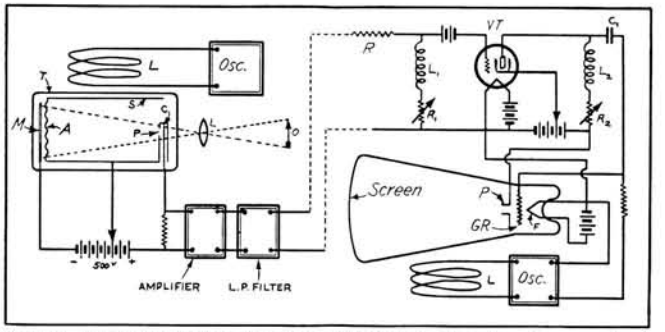


Figure 1—The simplified schematic layout of the Farnsworth system for narrow band transmission of moving pictures. The portion to the left of the dotted connecting lines is the transmitter while the receiver is to the right. (Courtesy Radio News.)

Let us study for a moment the circuit that has caused such radical changes in the television field. A simplified diagram of the Farnsworth transmitter and receiver is shown in Fig. 1. An optical image of a moving object O is focused through a lens L on a silvered mirror M, this being coated with a light sensitive substance which emits electrons when exposed to light. These parts constitute a sensitive photo-electric cell of the vacuum type enclosed in a cylindrical glass tube T. The mirror M is the cathode. Closely adjacent and parallel to it is an anode A which is maintained 500 volts positive with reference to the mirror M by means of B batteries, or other direct current source. The anode consists of a finely woven wire cloth through the meshes of which the liberated electrons are projected into a space formed by the shield S.

Sweeping across this space are two electromagnetic fields which are set up by alternating currents, in two sets of coils placed at right angles around tube T. When one set of coils, represented by L, is supplied with a 16 cycle current having a saw-tooth shape from a oscillator OSC, it causes a magnetic field to sweep vertically across the tube 16 times every second. When the other set of coils, which is not shown in the diagram, which can be seen in Fig. 2 is supplied with a 3,200 cycle alternating current also of saw-tooth shape a magnetic field is swept horizontally across the tube T 3,200 times per second. The result of this horizontal and vertical motion of the two magnetic fields is to cause the electrons to form into a cathode ray image which successively issues from each tiny picture element, corresponding to $\frac{3200}{16}$ or a 200 line picture. This cathode ray is then magnetically focussed through the small opening P onto the target or electron collector C.

A series of electrical pulses of $\frac{200^2 \times 16}{2}$ or 320,000 cycles in width, is produced on the collector. Each pulse corresponds to an instantaneous change in light and shade in each picture element which is successively scanned by the cathode ray. Thus the variations in light and shade in the picture are converted into corresponding variations in electrical current. These small current pulses are passed through a five-stage amplifier AMP. which is designed to pass a band of frequencies 600 kc. wide. Naturally the amplifier must have no distortion over the entire band and this in itself was a serious problem.

Let us consider for a moment the receiving end of Fig. 1. Neglecting the filter F and the network between transmitter and receiver we will assume that a 640 kc. radio channel is available to transmit the amplified current through our receiver. The receiver is another cathode ray tube which is swept by two sets of magnetic fields in exactly the same way as was outlined at the transmitting end. The two currents for creating these magnetic fields are 16 cycle and 3,200 cycle components of the 320 kc. band. These low frequency components have a very peculiar shape so that they are readily extracted or filtered out from other frequencies and are used through local oscillators OSC. to induce the required magnetic fields which cause a cathode ray to sweep across the receiver screen thus reproducing a moving picture in exact synchronism with the original moving object O at the transmitter.

In the receiving tube, or "oscillite" as it is called, the electron emitting element is a hot filament F. The emitted electrons are attracted to and projected through the aperture of a plate P, the number of projected electrons being controlled by the current pulses on the grid GR. The intensity of these current pulses

(Page thirteen, please)

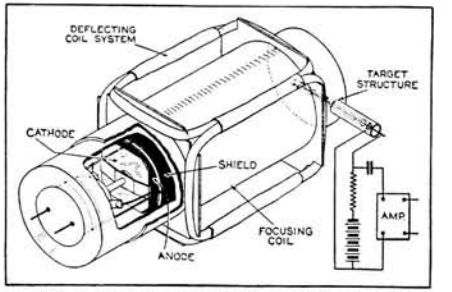


Figure 2—A perspective drawing of the "Dissector Tube," employed in the Farnsworth System, showing design details. (Courtesy Radio News.)

"Wholesaling" Radio Service

By P. J. MURRAY, *Manager,*
Employment and Graduate Service

TWO classes of Radio organizations offer the Radio-Trician the best market in the Wholesale Radio Service field.

One class comprises Radio Sales Organizations, which do not care to handle service, not having space, time, nor personnel to render efficient work. The other class includes the small dealer who cannot afford to operate his own service due to limited capital, lack of mechanical knowledge, or the fact that he handles Radio sales as a side-line.

In either case, they must let out their service and installation, because whether they like it or not—service is a necessity—demanded by purchasers of their products.

The far-sighted Radio-Trician will soon have as many of these firms as possible under contract for all their service work. This in short is what is meant by **Wholesaling Radio Service.**

I know of one organization which did a business of $35,000 in one year—the year of 1930. During that time they employed from five to thirty-five service men. The peak of the business was around the holiday season—Christmas and New Year.

Usually the service wholesaler will not handle the sale of any Radio sets. In this way he is looked upon more favorably by his dealers; he is not acting in competition to them. On his service calls he endeavors to keep the individual customers of these dealers sold on Radio and on the store from which they bought. He must often be a diplomat in this regard.

Wherever possible, he conceals the fact that he is the "wholesaler" or the "wholesaler's service man," as the case may be. He acts as the direct representative of the store which sold the receiver in the first place.

The "wholesaler" service man must be capable of repairing any make Radio he comes up against—he cannot be a specialist on any one set, but must know them all. He must never show partiality to any receiver. To the customers they must all be good—wonderful, helpful inventions.

At least one case is on record where the representative of a wholesale Radio service company lost his firm the account of a large department store, and lost himself a good job by criticizing the set owner's selection of a particular Radio.

It will not be possible to stick to any "cut and dried" contract arrangement. You may find it necessary to make a slightly different deal with each of your dealers. The essentials will be the same, naturally, and governed by the business policy you set out to follow, but the details will be altered to the mutual satisfaction of yourself and the dealer.

For instance, in the matter of replacement material for service work, you can either supply it at cost, plus 10%, or allow the store, whose work you contract, to furnish it. The former plan is preferable. It saves time and gives you an added profit—but it must be remembered that it also necessitates carrying parts in stock—ordering, and other details.

Rates usually run at $1.50 per hour flat unless the set must be brought to your shop. In that case make a $2.50 charge for the regular service and a shop charge of $1.50 per hour with a minimum shop charge of $1.50—making the total minimum $4. Of course, to large customers—those giving several hundred service calls a year for instance, a special price of $1.25 or $1.35 per hour should be offered. These rates, however, are only tentative—and must be governed more or less by the standard rate for Radio service work in the particular locality in which you are operating the business.

If the size of the business permits, a special "aerial crew" can be used—to save time for the more experienced service man. Give a good aerial job and don't try to make a big profit on it. For about $6 you can afford to give two ten-foot steel poles, lightning arrester of the best type, wire, lead-in, etc., carried to the aerial binding post of the receiver. Add approximately 40% to this price if the aerial installation is to be on a peaked roof.

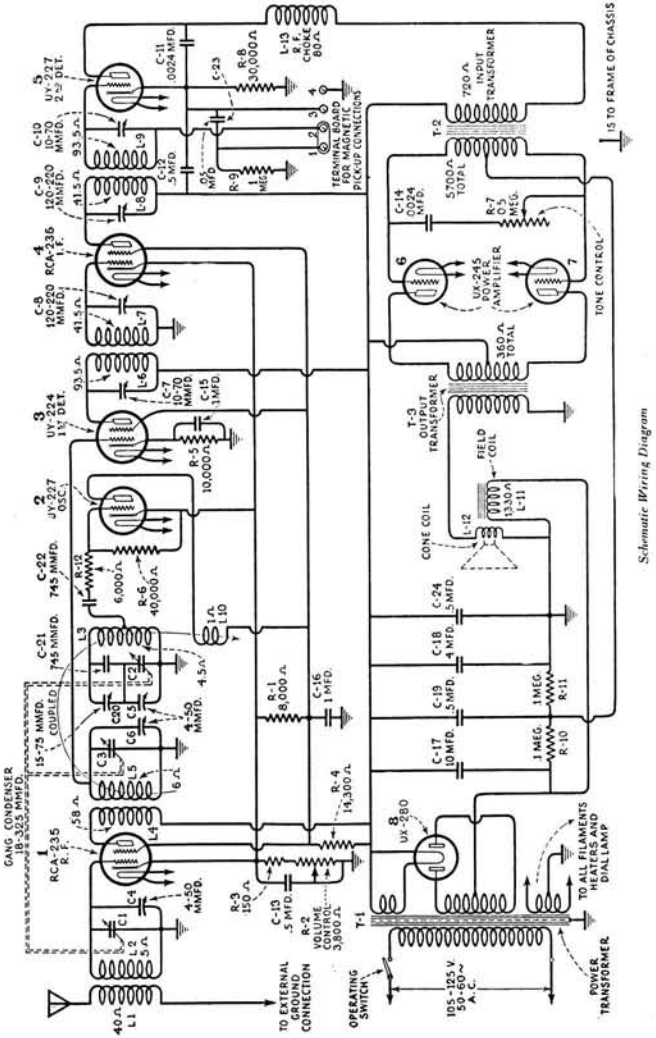
(Page fourteen, please)

RADIO-TRICIAN SERVICE SHEET

REG. U. S. PAT. OFF.

COMPILED SOLELY FOR STUDENTS & GRADUATES

GENERAL ELECTRIC S-22 AND VICTOR-RADIOLA SUPERETTE



Readers who file Service Data in separate binders remove page carefully; trim on dotted line for same size as Data published heretofore.

VOLTAGE READING SERVICE DATA CHART

VOLUME CONTROL AT MAXIMUM

VOLTAGE CHARACTERISTICS	1 R. F.				2 OSC.			3 1st DET.				4 I. F.				5 2nd DET.			6 PWR. A. F.			7 PWR. A. F.			CAUSE OF INCORRECT READING
	C.G. Volts	S.G. Volts	Plate Volts	Plate M.A.	Grid Volts	Plate Volts	Plate M.A.	C.G. Volts	S.G. Volts	Plate Volts	Plate M.A.	C.G. Volts	S.G. Volts	Plate Volts	Plate M.A.	Grid Volts	Plate Volts	Plate M.A.	Grid Volts	Plate Volts	Plate M.A.	Grid Volts	Plate Volts	Plate M.A.	
Normal	3.5	70	240	5.0	0	65	5.5	5.0	70	235	0.5	3.5	70	240	5.0	5.0	220	0.5	30	245	25	30	245	25	
No C. G. Voltage on Tube No. 1	0	70	240	9.0																					Open Secondary of R. F. Transformer L-2
No C. G. Voltage on Tube No. 3								0	70	235	1.5														Open 1st Det. Grid Coil L-5
No C. G. Voltage on Tube No. 4												0	70	240	9.0										Open Secondary of 1st I. F. Transformer L-7
No C. G. and Low Plate Voltage on Tube No. 5																0	70	5.5							Open Sec. of 2nd I. F. Trans. L-9 or 1 Meg. Res. R-9
Low Voltages on All Tubes	2.0	35	150	2.5	0	35	3.0	3.0	35	140	0.5	2.0	35	150	2.5	5.0	100	0.25	0	140	80	30	150	0	Open One-Half Secondary of Interstage Transformer T-2
Low Voltages on All Tubes	2.0	35	150	2.5	0	35	3.0	3.0	35	140	0.5	2.0	35	150	2.5	5.0	100	0.25	30	150	0	0	140	80	Open One-Half Secondary of Interstage Transformer T-2
No Voltages on Tube No. 2					0	0	0																		Open Oscillator Plate Coil L-10
No Plate Voltage on Tube No. 1	3.5	60	0	0																					Open R. F. Plate Coil L-4
No Plate Voltage on Tube No. 3								4.0	70	0	0														Open Primary of 1st I. F. Transformer L-6
No Plate Voltage on Tube No. 4												3.5	60	0	0										Open Primary of 2nd I. F. Transformer L-8
No Voltages on Tube No. 5																0	0	0							Open R. F. Choke L-13 or Primary of Transformer T-2
No Plate Voltage on Tube No. 6																			20	0	0				Open One-Half Primary of Output Transformer T-3
No Plate Voltage on Tube No. 7																						20	0	0	Open One-Half Primary of Output Transformer T-3
No C. G. Voltage on Tubes Nos. 1 and 4	0	70	240	9.0								0	70	240	9.0										Shorted 0.5 Mfd. Condenser C-13
No C. G. Voltage on Tube No. 3								0	70	240	4.0														Shorted 0.1 Mfd. Condenser C-15
No C. G. or S. G. Voltages on Tubes Nos. 1, 2, 3 or 4	0	0	240	0	0	0	0	0	0	235	0	0	0	240	0										Shorted 1.0 Mfd. Condenser C-16
Low Voltages on All Tubes	1.0	20	100	1.0	0	20	1.5	1.0	20	100	0.25	1.0	20	100	1.0	5	60	0.5	+8	80	50	+8	80	50	Shorted 0.5 Mfd. Condenser C-24
No. C. G. Voltage on Tube No. 5																0	180	30							Shorted 0.5 Mfd. Condenser C-12
Low Plate Voltage on Tube No. 5																0	60	1.5							Shorted 0.05 Mfd. Condenser C-23
No Plate Voltage on Tube No. 5																25	0	0							Shorted .0024 Mfd. Condenser C-11
Low Plate M. A. on Tubes Nos. 6 and 7																			50	260	10.0	50	260	10.0	Shorted 100,000 Ohm Resistor R-10
Low Voltages on All Tubes	1.5	25	100	0.25	0	25	0.5	1.5	25	100	0.25	1.5	25	100	0.5	5.0	100	0.25	0	100	40	0	100	40	Shorted 100,000 Ohm Resistor R-11
High C. G. Voltage on Tubes Nos. 1 and 4	200	0	0	0	0	0	0	20	200	215	0	200	0	0	0										Open Volume Control R-2 or 150 Ohm Resistor R-3
High S. G. Voltages	7.0	160	210	25	0	100	12	14	160	200	2.0	7.0	160	210	25										Open 8,000 Ohm Resistor R-1
No C. G. or S. G. Voltage on Tubes Nos. 1, 2, 3 and 4	0	0	250	0	0	0	0	0	0	240	0	0	0	250	0										Open 14,300 Ohm Resistor R-4
No Voltages on Tube No. 3								0	0	0	0														Open 10,000 Ohm Resistor R-5
No Plate Voltage on Tube No. 5																20	0	0							Open 30,000 Ohm Resistor R-8

The Farnsworth Television System

(Continued from page 9)

depends upon the intensity of the light which creates them. Consequently, as they emerge from the aperture in the plate into the space beyond, through which the two magnetic fields are sweeping, they are formed into a cathode ray which rapidly scans the area of the receiver screen, thereby forming the moving picture.

Up to the present time in our discussion we have considered a 640 kc. channel to be available. In actual practice we cannot do this because in the entire 960 kc. band used by broadcasting stations in America there are only one and a half such channels available. Farnsworth claims to have solved this greatest problem in television; namely, to use a narrow channel for the production of moving pictures with sufficient clarity and detail. Mr. Farnsworth actually worked out this problem and as was stated at the beginning of this article he was able to transmit a 400 line picture within the space of 10 kilocycles.

The picture signal is amplified at the transmitter by means of a special type of amplifier known as an admittance neutralized amplifier. This amplifier must respond to band widths of 600 kc. which was a problem in itself.

The amplified signal now is fed to a low pass filter which eliminates the higher harmonics of the picture signal, permitting the transmission of a 200 lens picture on a channel 6 kc. wide. A peculiar circuit at the receiving end, of which the circuit details are not known as yet, is capable of reproducing the harmonics along with the fundamental picture signal, thus restoring the 320,000 cycle signal at the receiving end.

Let us return again to a study of the receiver circuit. Connected in series with the line is a resistor R which feeds a shunt circuit consisting of an inductance L_1 and a variable resistor R_1. The resistive impedance of resistor R is of sufficiently high value to control the current regardless of the effect of L_1. The flow of current through R_1 causes a voltage drop E_1 and through inductance L_1 a voltage drop E_2 which is proportional to the rate of change of current in line. The sum of the two voltages, $E_1 + E_2$, is impressed on the grid of a vacuum tube VT which has a high output impedance, such as the screen grid tube. Its

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Trade Notices

National Radio News accepts no advertising. Trade notices are published solely for the information of our readers. We assume no responsibility nor can we handle correspondence for these firms. They are glad to give full information. In writing them please mention National Radio News.

TRIMM HEADPHONES

The Trimm Radio Manufacturing Company, 1528 Armitage Avenue, Chicago, has developed and placed on the market a FEATHER-WEIGHT Headphone weighing but four ounces. Cobalt steel magnet gives it a super-sensitivity. All bakelite case and cap. No outside connection. Especially adapted for Service Men, Amateurs, Aviators and Hard of Hearing.

SUPREME RADIO DATA BOOKLET

Supreme Instruments Corporation, Greenwood, Mississippi, announce their new Radio Data Booklet, containing eighty-five pages of analytical data and Radio diagrams are now available. Request for copy should be accompanied with twenty-five cents in stamps or coin to defray postage and mailing expense.

BELDEN LIGHTNING ARRESTER

Belden Manufacturing Company, 4689 W. Van Buren Street, Chicago, announces a new Lightning Arrester with a $100 guarantee that lists for twenty-five cents.

The new arrester, or Lightning Buster, as they have named it, is resistor type with a bakelite shell. Unit approximately 2" long; weighs one ounce. Small size makes for convenient handling and neat, unobtrusive installation. In performance it does everything that a larger size arrester does. Compact housing encloses same size and type resistance parts used in the large arresters.

"Wholesaling" Radio Service

(Continued from page 10)

A profitable side-line to this service, for those having a car or truck, is to maintain a delivery service for sets sold by the dealer. You can charge fifty cents a delivery for a midget, seventy-five cents for a console, and $1 for a highboy model. It stands to reason that your man has to go to the job to install the Radio anyhow—it's a simple matter to have him call on the dealer on his way, pick up the set—and in that way the dealer pays you for the trip your car, or truck, has to make.

Your business depends on the amount of sales your dealers get. Work with the dealer. If he is in competition for a sale—it's a good idea to have a special "wooden pole aerial job" you can offer for $4.50, or some other such scheme which will allow him to meet the competition of price. But on the whole—be wary about cutting prices. You may educate the dealer to expect it. If you find the competition for a sale is between two of your "customer-dealers," play safe and let them fight it out. Don't cut prices for either. You'll get the job anyway, regardless of who sells the set.

Be alert—be wide-awake—get in on some of this wholesale service. It's a quick way to work up a big business.

The Farnsworth Television System

(Continued from page 13)

plate current, which is an amplification of the line current, in flowing through resistor R_2, causes a voltage drop E_3 which is proportional to I_1 and I_2. The same currents in inductance L_2 cause a voltage drop proportional to their rates of change, thus producing two new currents which are fed into the condenser C_1, which stores up the pulses fed to it. The pulses which are fed to the grid, control the intensity of the cathode ray which creates the picture. Resistors R_1 and R_2 are variable so that the values of the different parts of the circuit can be adjusted until the picture has the greatest detail.

Figure 2 is a perspective drawing of the "dissector tube" used in the Farnsworth system of television and is intended to show the constructional details of the tube.

DO THEY BELONG TO YOU?

By

STUART M. ARMSTRONG

Director of Student Service

Lessons No. 1 and 2, in an envelope post-marked Franklinton, N. C., May 16, 1931, 2 P. M.?

If so, let me know. It would be a relief to return them. I've been trying to ever since "Chief" Dowie graded them. But I can't! I don't know whose they are! There's neither name or student number on either the lessons or envelope!

And that's not all! We receive quite a few lessons like this—without name or student number—every month! And in nine cases out of ten, I'll bet, the students who sent them in think the Service Department is "falling down" on the job!

What can I do?

Just what I'm doing—asking your co-operation—both for your sake and mine. **Be sure** your name, address, and student number appear on all lessons. Even if you're 100% certain we'll know whose they are by the name and student number on the **lessons**—make it 200% certain by putting them on the **envelope,** too.

AND HERE'S A COMPLAINT

We're getting so used to having bouquets tossed in our direction from "News" readers who like our style that maybe were slipping.

At least here's what we received from a Washington boy—just as the August issue goes to press:

"You're telling us too much in "The News" about what N. R. I. men are doing out in the field. I don't think that makes such good reading. Can't you improve?"

Maybe he's right. Perhaps we should cut out the Mailbag—the "How They Do It" and "Human Interest" stories and stick to straight editorial and technical matter.

The Mailbag is open to discussion of this matter. If you care to answer "Our Friend from Washington," address your letter to "The Mailbag."

The "Get-together" Corner

Where Radio-Tricians Meet

□ □ □ □ I saw the "Office Pup" article in National Radio News about "A Radio Service Contract." Well, I started one. I am getting along fine and have about 45 members.

A club has been formed at three dollars a year. I give one year's free service; the customer pays for parts and labor when necessary.—**J. H. Grass, Louisville, Ky.**

□ □ □ □ In the February "News" I read Oscar Prescott's experience on the sensitivity of the lower frequencies. I rummaged around for the wire, etc., when I happened to see an old R.F. transformer from a battery set. This gave me an idea! By shunting the secondary of this transformer across the ground and antenna, stations having high wave lengths, which formerly could hardly be heard with full volume, came in loud.

Also by connecting the primary of the transformer across the antenna and ground of the set and the secondary to the ground and antenna (in other words, in series with the ground and antenna), the stations of high frequencies came in much stronger. The coil was a regular basket-weave type.—**Charles Rosenfield, Richmond Hill, N. Y.**

□ □ □ □ I am sending you some information that I find valuable when servicing Radios.

Connect a Neon Glow Lamp and a Ten Watt Bulb in series. To the two remaining terminals attach test leads for convenient use in testing for open or closed circuits.

As every Radio-Trician knows, one side of the light line is grounded: with the plug inserted right in the socket and with the test lead coming from the glow lamp side, an ideal test can be made for good grounds and so forth.

This is a very cheap instrument ($1.50 or $2.00), but I find it more useful than some of the instruments that I have paid $50 for. That is, more useful for some things. **Dale C. Fox, North Girard, Pa.**

□ □ □ □ I received your check for enrolling the new student. Thanks.

I surely appreciate those business cards. They have been a great help. I have earned enough to pay for my course in spare time since I passed out the cards. Will be glad to recommend your course to anybody who wishes it of me.—**L. E. Kiser, Portsmouth, Ohio.**

□ □ □ □ I have secured a position with A. L. Held, of 7059 Garrett Road, Upper Darby, Pa. I thank you very much for your efforts in my behalf.—**Paul W. Seely, Philadelphia, Pa.**

□ □ □ □ The course cannot be beat and would be hard to equal. It has certainly helped me. I have made about $1000 since enrolling for your course, which I think is pretty good for a little town of 700 population. **D. I. Davis, LeRoy, Kans.**

Lady of the House—"You are making a terrible noise with that soup."

Tramp—"It ain't me, lady. It's de acoustics of dis soup plate what's bad."

□ □ □ □ I want to tell you about my travels and experiences since the last time I wrote you. I have visited quite a few places in the United Kingdom and Continental Europe. I made a trip to Liverpool and Manchester, England; one to Bremen and Hamburg, Germany; another to Antwerp, Belgium, and Rotterdam, Holland.

We were carrying loads of phosphate rock from Fernandina, Florida, to Malmo, Sweden, on one of these trips which took us through the Kiel Canal and the Baltic Sea. We remained in Sweden six days during which time I took a steamboat trip over to Copenhagen to see what the Capital of Denmark looked like.

And, by the way—during vacation time last year I assisted with the installation of a 500-watt Western Electric transmitter here and a 1,000-watt at Columbia, S. C., for the Southern Radio Construction Company.

This opportunity to travel and my knowledge of Radio I attribute to the N. R. I. Please be sure that I get National Radio News promptly every month—I file them away and keep my file complete. I certainly like to keep in touch with the doings of the Institute as well as what is going on in Radio. It broadens my knowledge.—**Carl O. Carlson, Savannah, Georgia.**

□ □ □ □ I can show bank deposit slips for $1,800 for the first fifteen weeks in 1931, and all from service work mostly done by me personally. About $200 of this was aerial work which I have done by someone else.—**Glenn C. King, Grand Rapids, Mich.**

□ □ □ □ I am busy as a bee—your cards did the trick. I have more work than I can handle, and besides, I secured a position with local Radio dealer on part time, but am handling all of his repair work. He pays me fair prices for my work; in fact I think I have earned enough to pay for my course. Besides, I bought a Weston set test model 565 for which I paid $143.63. The dealer I am working for is a square shooter and knows Radio, and he is helping me in every way.

If it were not for your guidance, I would be where I was when I started the course. As it is, I have you to thank for your efforts in showing me how to make more money without breaking my back.—**Brony Osevick, San Francisco, Calif.**

□ □ □ □ The business cards you sent have given wonderful results. Just the one hundred you sent have increased my income at least twenty-five per cent.—**John Schmeck, Findlay, Ohio.**

Some folks would be successful if success could be arrived at merely by pressing a push-button. But it takes a more strenuous sort of push.

—Jerome P. Fleishman.

Whoever admits he is too busy to improve his methods, has acknowledged himself to be at the end of his rope.

—J. Ogden Armour.