Techni-talk

COMPLETE ELECTRONIC SERVICING INFORMATION

radio • tv • hi-fi

VOL. II No. 6 NOV.-DEC., 1959; JAN., 1960

HUM OR BUZZ IN TV RECEIVERS I

One of the frequent complaints regarding television receiver performance is that of hum or "buzz" in the audio. It may occur early in the life of a receiver or appear at any time, with aging of tubes and components. Under certain conditions the problem may appear in any model and yet not be due to a condition within the receiver. The difficulty is usually more prevalent in the lower price range receivers, since certain circuits common to "Top of the Line" models are not present in these chassis.

This should not be considered as any criticism of "price leaders" since these circuits are part of the "step-up" features required in any product line. For this reason the technician should endeavor to gain as much knowledge as possible of the principles involved, rather than simply telling customers that they should purchase a better set. Through a thorough understanding of basic principles, practically any well known make of receiver may be made to perform satisfactorily under average conditions.

Hum and Buzz Defined

Since the terms hum and buzz are frequently confused and used interchangeably, it is necessary that they be defined, prior to any discussion of cures.

The term hum is normally used to indicate a noise in the audio, which is basically due to introduction of either 60 or 120 cycle ripple from the power supply or leakage from an AC circuit. Since this condition exists independently in the receiver, it will be present even when the receiver is operated with no signal input and with antenna terminals shorted together. Although hum may usually be recognized as such, if any doubt exists, it should be checked as indicated above. Should the problem be resolved as hum, all power supply and decoupling electrolytic capacitors should be checked. All tubes should be checked for heater-cathode leakage, by substitution or other means.

HUM

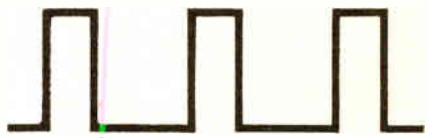
Frequencies:

1. 60 Cycle
2. 120 Cycle

Sources:

1. Tubes
   - Heater-Cathode leakage
2. Power Supply
   - Defective filter capacitors
   - Defective decoupling capacitors

BUZZ



Frequency: 60 Cycle

Sources:

1. Vertical Circuit
   - Defective decoupling
   - Incorrect wire dress
2. Signal Distortion
   - FM Detector adjustment
   - Antenna adjustment
   - Transmission errors
   - Overload

When correctly applied, buzz is the term used to denote a certain objectionable 60 cycle noise in the audio of a television receiver. It has a rough tonal quality, noticeably different from hum. Buzz may be found under both signal and no-signal conditions, due to different causes. When buzz is encountered with no signal, as described under hum, it is being picked up from the vertical oscillator or output stage. When a doubt exists as to whether a "no signal" noise is hum or buzz, the vertical hold control should be rotated through its range.

Buzz from Vertical

If the problem is due to buzz from the vertical circuit, the frequency and tone will vary with control setting. Vertical interference may be coupled to audio circuits through defective de-coupling networks in the power supply to the vertical. It may also be caused by incorrect wire dress, such as a hold control wire being dressed near an audio grid circuit, where a substantial amount of gain is present. In the case of vertical leads to the yoke, buzz may result through coupling to relatively low gain circuits because of the high peak voltages present.

The remaining source of buzz is the result of a distortion of the video or audio signals, which may be external or within the receiver. Since these signals are radiated from the transmitter with a definite power relationship, this condition must be maintained at the receiving end from antenna to picture tube and speaker, or operation difficulties will appear. For instance, an incorrectly adjusted antenna or reflections may result in a reduction in audio carrier to a point where buzz is unavoidable even in a perfect receiver. The fact that the picture is satisfactory is no assurance that the audio carrier is being received properly.

(Continued in next issue)

SUCCESSFUL SERVICE MANAGEMENT

PROFILE OF THE "BOSS"

by
Louis M. Robb
Administrator,
Distributor Sales
G-E Electronic
Component Division

Call him owner, proprieter, manager, or just plain "boss." His key position is a demanding one, calling for not only superior sales and executive talents, but a marked display of leadership, vision, self-confidence, flexibility, open-mindedness and especially, ambition.

Since store success or failure depends on his innate ability to cope with a roving variety of daily tasks, he must be a diplomat, creator, advisor, innovator, planner, improvisor and often, a psychologist. He must also be a top-flight buyer, have an understanding and flair for finance, and certainly he should be a congenial boss and outstanding citizen.

In short, every manager should be a doer and a thinker.

Managerial Functions

The manager of today's modern store cannot cling to narrow concepts of managerial functions. His outlook must be sweeping and bold, charged with sales-ability and enthusiasm. His views on leadership must be broad so that he can look at the entire picture of a situation, problem or prevailing condition and make decisions affecting the whole.

In meeting his responsibility as a financier for his store, today's manager must earn the confidence of the local bankers by building a strong reputation as an imaginative businessman. He should be at ease in discussing basic accounting involving cost controls or corporation profit margins for quarters or the year.

As a creator, innovator or improvisor, the store manager faces a sharp challenge. He must be aware of competition's attitude in advertising, public relations, special store attractions or promotions.

Sales Drive

In mapping a sales drive, there must be an awareness of the fact that in competition a good offense is the best defense, a policy that will pay rich dividends. To this end, the store manager must provide the stimuli which will result in a successful campaign. In advertising, he might suggest copy or slogans revolving about his personal merchandising philosophy. The accent could be on store loyalty of a growing number in the community, thanks to excellent service, larger up-to-date inventories and attractive pricing.

In the realm of innovations and improvisations, store managers have a robust assignment, which pursued with an imaginative spirit can produce spectacular results. In this direction, the agenda could call for consideration of new-look policies involving speedy deliveries, streamline shopping areas, demonstration and exhibit enclosures, or auditoriums.

A number of stores have developed a shatterproof following by taking the pains to accommodate frantic last-minute requests—always a problem in stores where technical products are sold. By creating such a personal atmosphere, the store becomes *home* to the buyer — even when the desired item is not available. Even here, management ingenuity—using the friendly approach to an irksome situation — can come to the rescue.

Many have found that notes, mailed out promptly, apologizing for a delay in supply, and noting when delivery might be expected, are always effective, in holding orders. Message phrasing is the key, and once again management must be alert to the requirements of the job.

Character

Probably the most important asset of a good manager is sturdy character. Such a person will have a good sense of proportion and will not be blown hither and yon by whims, desires or fads. Neither will he shirk a responsibility. Since he is boss, he must make decisions and shoulder any blame, if the decision should be wrong.

A person of such stature cannot be manufactured overnight, but rather built over a period — and matured by observation, reasoning and study.

He must have faith in his ability to do a real job — and share this with his employees — and in addition, be capable of meeting a situation and handling people. He must have the vision to sense opportunities, and the courage to seize them. He should also possess the ability to recognize new possibilities and make changes, but only if they have substance.

Employee Morale

It is this makeup that bolsters employee morale and serves to develop as espirit de corps among a staff — a genuine feeling of belonging and being associates in the striking adventure of running a business.

Those who lack such character will take credit for success, but blame his environment for failures. And all too often, he is an optimist about himself, a pessimist about others, admire the superman and believe in but one gospel — he is a great leader if people will only recognize his talents.

The man with moral strength and backbone reaches the level of our ever-increasing intellectual enlightenment, commands respect and builds within, in his immediate environs — his store — and his home and community.

But not only must one possess an aggregate of organizational ability, he must be skilled in knowing how and when to act, think clearly and plan carefully for the morrow — the bright road ahead.

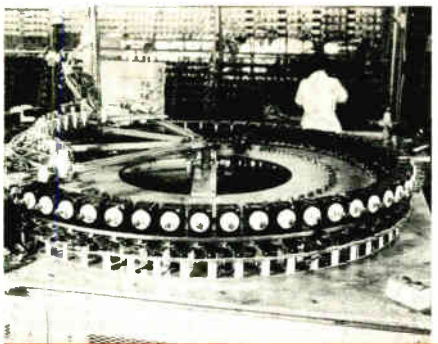
G-E Packaging on SMALL WORLD

A television spot commercial which features General Electric picture tubes will be seen on the SMALL WORLD television show sponsored by the Olin Mathieson Chemical Corporation on March 6, 1960 and May 1, 1960. This show is normally shown late Sunday afternoon. This program is carried by the CBS network and will be aired over about 135 television stations.

This type of exposure is certain to help you in your everyday work of selling the General Electric Black-Daylight picture tube.

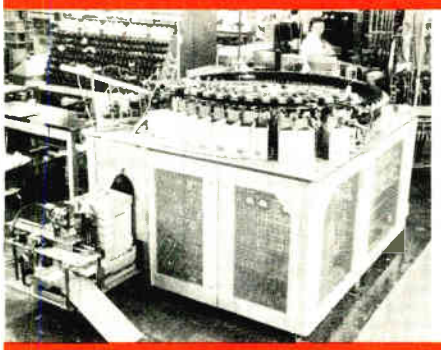
How G-E Receiving Tubes Are Tested

General Electric receiving tubes now tested on Automatic Tube Tester.



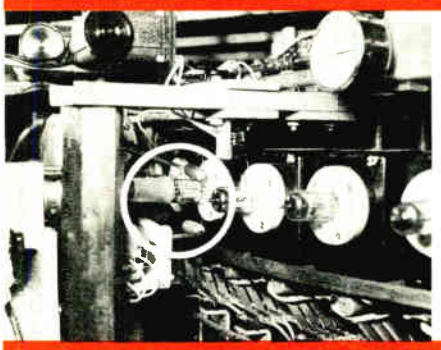
Tubes Preheated Before Testing

Tubes are loaded into sockets on the automatic testing machine. The circular section with the numbered black boxes and tube sockets rotate clockwise over a number of stations which apply operating voltages. Tube testing, to be effective, must be done under operating conditions. The positions shown in this picture are used to preheat the tubes and apply operating voltages before they reach the test positions shown below.



Test Positions

After the tubes are preheated they reach the various test positions. Each test position has a box for rejects. The testing of General Electric receiving tubes is done on automatic equipment with precise circuitry. Tubes are rejected automatically rather than by visually reading meters for manual rejections.

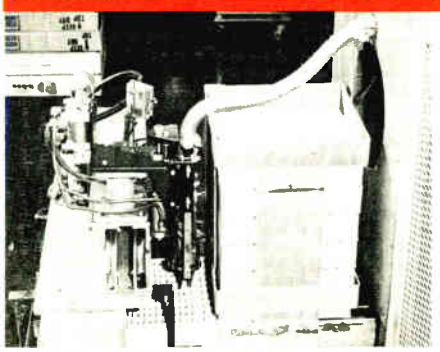


Short Test

The test for shorted elements has a sensitivity as high as 250,000 ohms for a permanent short and 100,000 ohms for a short as little as 100 microseconds duration. During this test the tubes are tapped around the periphery of the bulb by a rotating tapping device. This device (near center of photo) taps the tube in six planes and is very much more effective in detecting short circuits than the normal tapping in one plane.

Automatic Ejection

This photo shows the automatic reject positions. Tubes which do not meet the General Electric standards for electrical characteristics are automatically rejected. These tubes are counted and analyzed before they are destroyed. Results of these tests are immediately fed back into the quality control system for further analysis and study.



Tubes Automatically Packed

After tubes are thoroughly tested, the mechanism shown here automatically packs them into cases for warehouse stocking. Each tube is ejected into the flexible tube which is moved automatically over an open space in the egg-crate-type shipping container. When full, the container moves down the conveyor and the next container is pushed into the correct loading position.

This is the first of a series of articles which will describe a few of the manufacturing and testing procedures used by General Electric to assure high standards of quality for receiving tubes.

Every Tube Tested

Each and every receiving tube manufactured by General Electric is individually tested at the factory to make as certain as possible that the customer will receive a tube which will perform satisfactorily and with good reliability.

Tubes tested on the automatic testing machine shown in the photographs are loaded into test sockets which are indexed through a sequence of testing stations. Each station uses standard modular circuits to establish the desired test. These same modular circuits on each test station may be interchanged to alter the sequence of tests, and they may be quickly changed to establish desired tests for different tube types.

The instrumentation used for determining out-of-limit characteristics is based on analogue computer techniques. If at any station the tube does not measure up to G.E.'s high standard of quality, it is automatically ejected into the box below that station.

Tubes Automatically Tested

Tubes are loaded into sockets on the testing machine and the machine is so indexed that tubes are preheated at the first station. This preheat allows the tubes to be brought up to operating temperature by applying rated voltages to the tube elements.

The automatic testing machine checks both the dynamic and static tube characteristics. Typical tests are grid current, plate current, screen current, mutual conductance, a.c. amplification, plate current cut-off, diode emission, power output, microphonic output and heater-to-cathode leakage. It can be readily seen that the tests performed on the machine are much more comprehensive and thorough than is possible with commercial type tube testers. These tests simulate as close as possible the most stringent requirements which will be required when used in actual circuit applications.

Automatic testing gives consistently uniform results. The possibility of meter reading errors, which may occur in manual testing, is removed. This machine performs more tests to more exacting specifications than was heretofore possible.

General Electric tubes are the result of good engineering, good manufacturing and good testing.

YOU'RE AS SUCCESSFUL GENERAL ELECTRIC'S

AS YOU WANT TO BE WITH NEW PSM* METHOD!

*PROFITABLE SERVICE MANAGEMENT

Earn the good things of life for yourself and your family by following the Profit signposts on every page of General Electric's PSM* Method! The engraved Certificate which says you have completed this instruction program, will mean new success for you as a TV technician.

Says Dr. John K. Pfahl of Ohio State University, under whose direction the new General Electric program was prepared: "The electronic service dealer must be, at the same time, a technician, good businessman, and sales manager." You learn step-by-step how to realize these aims, by following General Electric's Profitable Service Management Method. You are shown how to *assure* a satisfactory profit margin, not merely hope for it—how to increase business by methods others have found unfailingly effective.

In the LP record "Sounds of Success" you will hear from the lips of experienced TV technicians just how they have built greater incomes. After completing the two volumes of instruction that make up the study course, a questionnaire is available to check your acquired knowledge, prior to receiving your Certificate.

All come handsomely packaged for your bookshelf. Check the highlights of General Electric's PSM* Method given below! Then see your G-E tube distributor! *Distributor Sales, Electronic Components Division, General Electric Company, Owensboro, Kentucky.*

HERE ARE SOME OF THE MANY SUBJECTS YOU WILL STUDY:

BOOK NO. 1. "SOUND BUSINESS PRACTICES"

BUSINESS FOR PROFIT: Your reasons for owning a business...How much money should you make?...How to make your business profitable.

PLANNING YOUR BUSINESS: Planning expansion...Cash planning...Shop planning.

ORGANIZING YOUR BUSINESS: Overhead costs...Pricing...What it costs you to make a service call...What it costs you to make a shop repair...Inventory control...Credit organization...Choosing a form of organization.

CONTROLLING YOUR BUSINESS: Why use records?... What records are needed...Taxation...Use an accountant.

BOOK NO. 2. "SELLING ELECTRONIC SERVICE"

ARE YOU ATTRACTING NEW CUSTOMERS?: Attracting new business...Businesslike appearance...Effective selling...Good identification...Basic market research.

PROMOTING YOUR BUSINESS: Advertising technique...Advertising campaign planning...Special offers...Seasonal planning...Customer contact.

KEEPING YOUR CUSTOMERS SATISFIED: Customer relations...Customer grievances...Guaranteeing repairs...Building new customers.

Progress Is Our Most Important Product

GENERAL ELECTRIC

311-401

New Super-Sensitive G-E Camera Tube Needs 90% Less Light

General Electric has developed a new super-sensitive television camera tube which will widen the scope of black-and-white television, and promises to extend radically the general application of color television.

The new image orthicon tube, type GL-7629, interchangeable with standard camera tubes, requires from 1/10 to 1/20 the light required by standard image orthicons. It can produce pictures of usable black-and-white quality at one foot candle of scene illumination or less, compared to the ten foot candles required by standard image orthicons for black-and-white at the same lens setting.

The new I. O. tube will permit for the first time the origination of colorcasts from studios under normal black-and-white lighting levels. The high lighting requirements (400 foot candles and higher) of standard image orthicons have been one of the barriers to the wide-spread use of color programing. Also possible now are colorcasts from sports arenas, auditoriums and light-equipped ballparks without special lighting, since the new General Electric tube produces quality color pictures with light levels as low as 40 foot candles.

The extreme sensitivity of the GL-7629 results mainly from a high-gain, thin-film target of magnesium oxide approximately two millionths of an inch thick. It is approximately 1/100 of the thickness of the targets used in conventional camera tubes. If 1,500 of the new thin-film targets were stacked, they would equal the thickness of a single human hair.

Targets ultimately become "sticky" — they retain the image for longer and longer periods of time.

Another limitation of conventional targets has been their susceptibility to permanent damage from "burn-in" caused by aiming the camera at a bright, stationary highlight for too long a time. When this happens, the target acquires a permanent after-image evident in all transmitted pictures from that time on.

Targets in the new GL-7629 utilize the principle of electron conduction instead of ion conduction.

This is a reversible process, and the life of a tube is not limited by the exhaustion of charged carriers. Thus, the problems of "stickiness" and "burn-in" are virtually eliminated so that expected tube life is appreciably extended.

The new G-E I. O. also makes dramatic lighting effects in color television easier and more economical.

Application of the new G-E tube was initiated by WLW-T, Cincinnati. The station originated the first colorcasts of professional basketball games over a major network on November 21 and 22. The station is also planning transmission of other basketball games in the current season, and has scheduled 10 Cincinnati night baseball games during 1960.

The new GL-7629's price is about twice that of the conventional image orthicons.

BENCH NOTES

Drifting Capacitors

Here are two tricks we use to help spot a drifting capacitor especially in vertical or horizontal circuits. First we put a large pointer knob on the hold control. Then carefully mark the upper and lower limites of hold control range when set is first turned on. Next heat suspected capacitor with solder gun noting any changes in hold range. Now if any definite change has taken place we reverse our tactics and blow a jet of cold air onto the capacitor through a piece of plastic tubing. If you're working on the "culprit" you will soon notice the area of hold returning to your cold set markings. The knob idea is also very good to check the hot and cold ranges with set operating under normal self-heat conditions. It may be necessary to mount a piece of cardboard to provide a panel on which to make the markings. Try it . . . it really takes the guess-work out of knowing the exact range of hold.

F. C. Hoffman
Radio-TV Doctor
Kewaunee, Wis.

Venetian Blinds

In a model 21T178 RCA Receiver, the complaint was black-and-white lines across the screen which looked like venetian blinds. This occurred intermittently and was caused by an open in one of two electrolytic capacitors in the AGC line (C124 and C138 both 2MF, 10 V.).

If this ever occurs, you are better off replacing both capacitors to be safe. This could prevent a call back or even a shop job to locate the one causing trouble.

Mr. Sal Diamico
8858 - 15 Ave.
Brooklyn 28, N. Y.

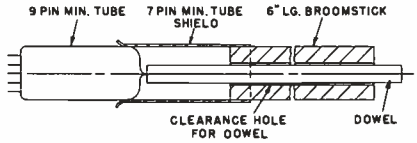
Soldering Clamps

Clips used by my wife when curling her hair make useful clamps for holding small components when soldering. The grip can be improved by bending the tips. These clips are sold on cards at many 5 and 10 cent stores.

Mr. Harry J. Miller
941 42nd St.
Sarasota, Florida

Tube Inserter

Here is a Bench Note that has saved a lot of time for me. It is a gadget for inserting 9 pin miniature tubes in out of the way places, such as 1X2 in narrow high voltage cages.



Materials needed are a 7 pin tube shield, 6 inch length of small broomstick and an 8 inch length of ⅜" dowel or plastic.

1. Drill ⅜" hole through length of broomstick.
2. Cut or grind off closed end of tube shield.
3. Drive broomstick into cut off end of tube shield.
4. Place ⅜" dowel into drilled hole in broomstick.

To use, put tube into open end of shield, then put tube into socket. Release by pressing end of dowel with thumb.

W. J. Schloeder
4237 Lexington Ave.
Los Angeles 29, Calif.

Service Hints

An otherwise good picture tube with an open heater connection in the tube base may be saved even though remelting the pin solder has no effect. Connect an ohmmeter across the heater pins and while the solder is soft insert a piece of tinned wire such as used on resistor leads until the ohmmeter shows continuity. This will keep another customer happy and build good will.

J. E. Post
Home Radio
120 Marion Ave.
Council Bluffs, Iowa

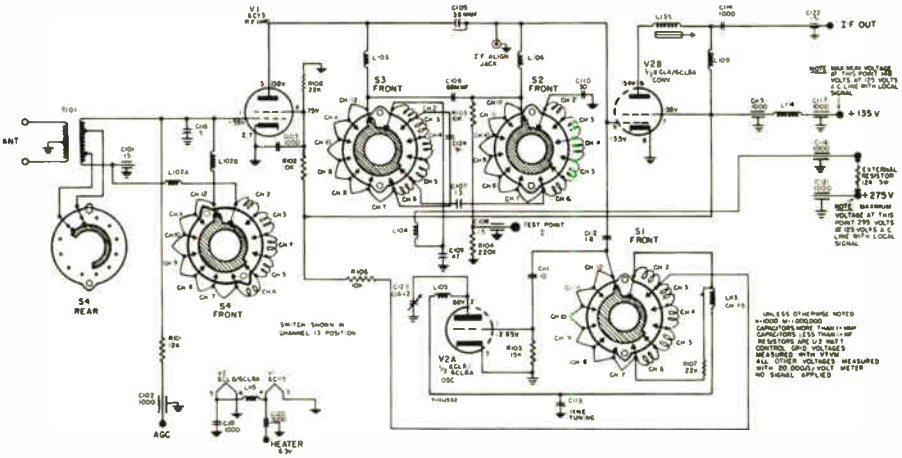
Those desiring to have letters published in this column should write the Editor Techni-Talk, Electronic Components Division, General Electric Company, Owensboro, Kentucky. For each such letter selected for publication you will receive $10.00 worth of General Electric tubes. In the event of duplicate or similar items, selection will be made by the Editor and his decision will be final. The Company shall have the unlimited right without obligation to publish or otherwise use any idea or suggestion sent to this column.

Caution: The ideas and suggestions expressed in this column are those of the individual writers. These ideas and suggestions have not been tried by the General Electric Company and therefore are not endorsed, sponsored or recommended.

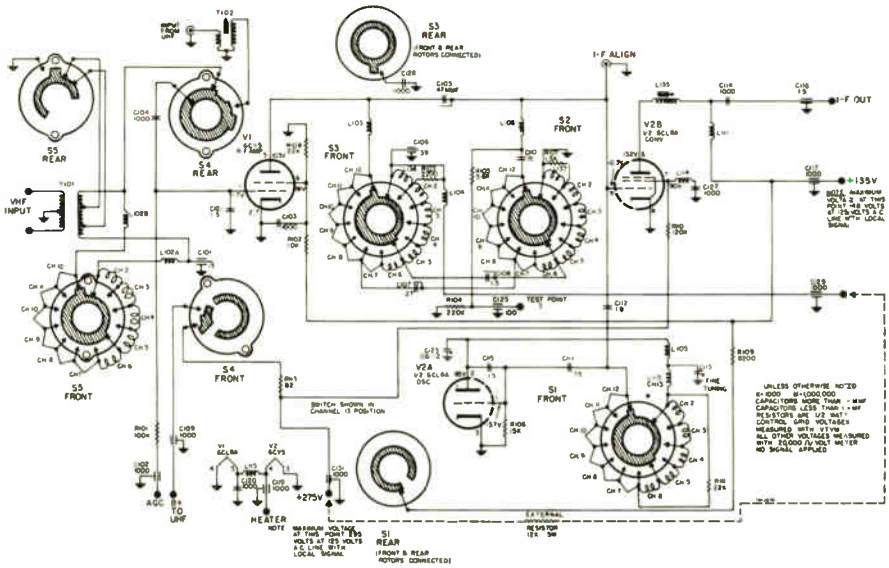
Tele-Clues

"M5" SCHEMATIC

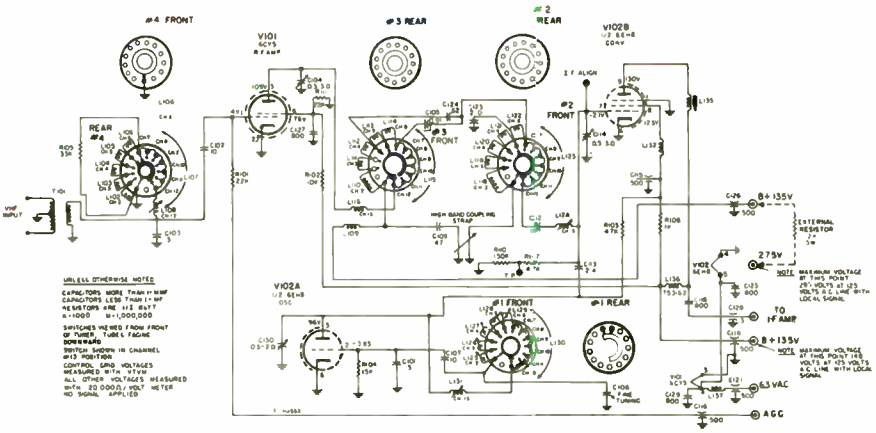
Schematic diagram for "M5" line of General Electric receivers. These receivers use the 110-degree electrostatic focus aluminized picture tubes.



SCHEMATIC DIAGRAM WT86X80 VHF TUNER

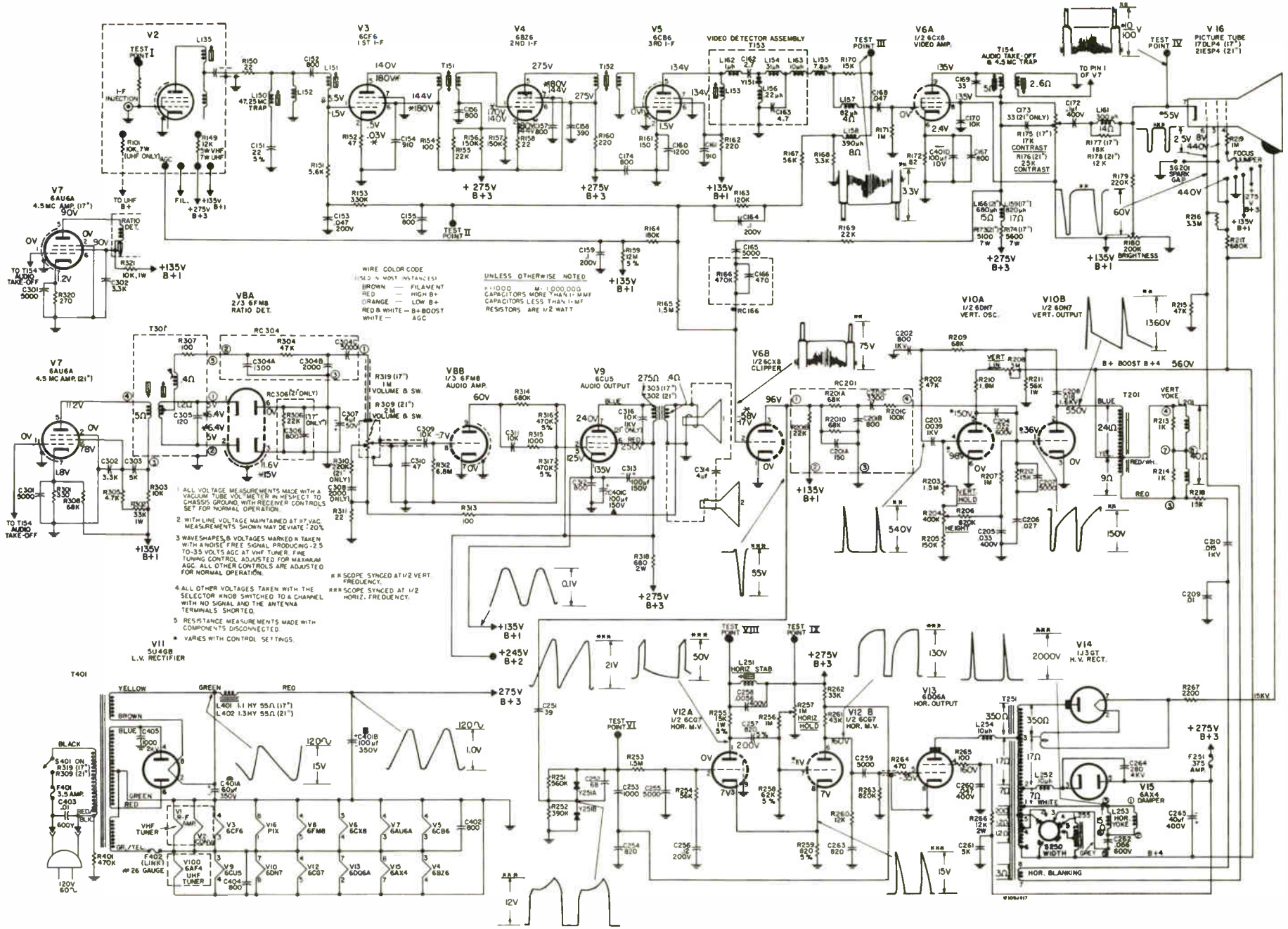


SCHEMATIC DIAGRAM
WT86X81 VHF TUNER



SCHEMATIC DIAGRAM
WT86X82 VHF TUNER

"M5" SCHEMATIC WITH VOLTAGES AND WAVESHAPES



SERVICE NOTES

TELEVISION

1960 T-V Manuals

Now is the time to insure receiving service manuals covering G.E. Television Receivers in 1960. Both preliminary data and complete service manuals are offered in a yearly subscription plan. The most accurate and timely information is direct factory information.

In addition, General Electric offers up-to-date parts information periodically; new chapters of "Television Servicing Techniques" (an informative series relating to general television service problems); monthly mailing of tips and information in a new form, "Service Talk."

A brand new reference, (listing frequently used parts on all models) will be included in the 1960 mailing. See your General Electric distributor soon and ask him about subscribing to Plan "D" mailing or fill out the coupon at the bottom of this page and mail it to: Editor, TECHNI-TALK, General Electric Company, Owensboro, Ky. Material is mailed direct from the factory and is always available when you need it. No rise in price, just $5.00 for a year of complete and timely information.

U2 Chassis
Vertical Sync Buzz Trouble

Vertical sync buzz may occur in early production receivers if the high impedance grid circuit of the 6T8 (VI14) 1st audio amplifier is subjected to the influence of the blue plate lead from the vertical output transformer. Beginning on 1-17-58, the factory included a special check to insure that the blue plate lead from the vertical output transformer was pushed down and bundled with the other leads at the bottom of the board, next to the chassis.

RADIO

Radio and Phonograph Service Guides and 1960 Manuals

The all new 1957-59 G.E. Radio/Phono Service Guide containing schematics, parts lists, and photos of every model manufactured from 1957 thru 1959 is now available.

Also available is the 1946-56 Radio Service Guide and Subscription Plan for forthcoming G. E. Radio/Phono Service Manuals. See your General Electric distributor or fill out the coupon at the bottom of this page and mail to: Editor, TECHNI-TALK, General Electric Company, Owensboro, Ky.

Models T120, T210, Speaker Buzz and Rattle

Vibrations caused by loose grille and speaker mounting screws will cause speaker buzz and rattle when radio is in operation.

The first step in troubleshooting is to firmly tighten all grille and speaker mounting screws, then assemble cabinet, turn receiver on, and recheck for the buzz and rattle.

This procedure will eliminate the replacement of many speakers which may be suspected of originally causing this buzz and rattle.

Techni-talk SUGGESTION AND INQUIRY COUPON

If you would like to receive additional information on some specific G-E Electronic Component, just clip out this coupon, write in the material desired, and send it to the Editor. Information, if available, will be sent to you by return mail.

_____

_____

Please check your name and address on the reverse side. Make any necessary corrections below.

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City, Zone No. and State.....

If you expect to move within next two months, please print new address above.

If you are receiving duplicate copies, please check this box ☐ and indicate mailing list number which appears at lower left corner of the address area on each copy you receive.

TELEVISION, RADIO AND PHONOGRAPH ORDER COUPON

Enclosed is money order or check payable to General Electric Company for:

.....A one year's subscription to Plan "D" TV Service Manuals..... $5.00 ea.
Subscription expires December 31, 1960.

.....Copies of 1957-59 Radio/Phono Service Guide.... $1.00 ea.

.....Copies of 1946-56 Radio Service Guide..... $1.00 ea.

.....A one year's subscription to Radio/Phono Service Manuals. Subscriptions run for one year from date of receipt..... $2.50 ea.

Name.....

Street Address.....

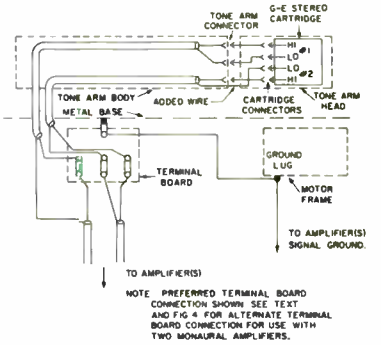
City, Zone No. and State.....

Mail to: Editor Techni-Talk General Electric Co., Owensboro, Ky.

THE STEREO HUM PROBLEM VI

In the last issue wiring modifications which might be required to minimize hum in stereo changers were described. In this issue additional wiring changes will be discussed.

FIGURE 1 FOUR WIRE CONVERSION CHANGER A



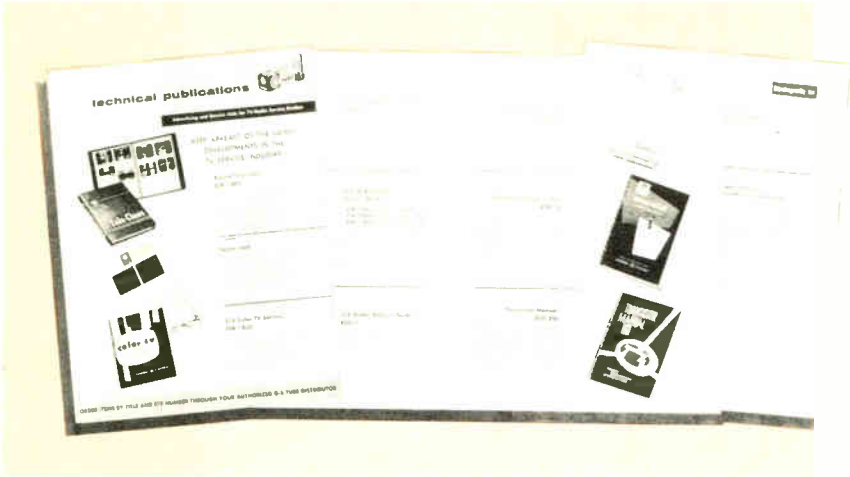
Modification required for four-wire cartridge connection:

1. Make the "minimum" modification suggested in Sept.-Oct. issue.
2. Separate the connection between the braided shields of the small signal wires at the tone arm head connector.
3. Shorten the length of braid from one of the small signal wires separated above and reconnect the other length of braid at the same connector terminal from which it was removed in Step 2 above.
4. Connect a short length of fine insulated wire to the shortened length of braid, and solder a cartridge pin connector to the other end.
5. Expose the braid of the small signal wire not previously connected from the tone arm, at the terminal board end.
6. Separate the shield braid of the two amplifier leads at the terminal board and reconnect the braid of that amplifier lead which is common with the tone arm wire whose shield is connected.
7. Connect the newly exposed shield braid of the small signal wire to the unconnected amplifier lead shield.
8. Remove the ground strap from between the lo-side terminals of the cartridge and use the fourth pin connector installed above as one of the lo-side connections to the cartridge.

Wiring changes which may be required to minimize hum in another type record changer will be described in the next issue.

NEW G-E BUSINESS BUILDERS

TECHNICAL PUBLICATIONS



Do you know about the various new General Electric TECHNICAL PUBLICATIONS? These are described in a four page folder ETR-1691 which illustrates the various technical publications that are now available from your General Electric Tube distributor. Ask him for a copy of ETR-1691.

Publications included are:

Bound Tele-Clues	ETR-1095
TECHNI-TALK Registration Cards	ETR-2123
Color TV Principles and Practices	ETR-1432
Television Fundamentals	ETR-827
TV Service Guides	ETR-1765 & 6 & 7
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- Red-Orange color makes it easy to locate on service bench or in service case.

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- Tapered to fit snugly over control shafts.
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