

MODERN

1963 "WSBP"
Award Winner



electronic service dealer

THE OFFICIAL PUBLICATION OF THE CALIFORNIA STATE ELECTRONICS ASSOCIATION

VOL. 3, NO. 9

JANUARY, 1964

KNOW YOUR ADVISORY BOARD

How's Your Charity Philosophy?

Horizontal Sweep Circuit Measurements Part 3

ctc-5 and ctc-7 color crt conversion series

OPEN HOUSE TO COMMEMORATE 10 YEARS OF COLOR

Picture Tube Excluded From New Repair Law

ANDREWS ELECTRONICS
AND
R.C.A. DISTRIBUTORS PRODUCTS DIVISION
OF
RADIO CORPORATION OF AMERICA
ANNOUNCE A SPECIAL SHOWING
ON
JANUARY 21ST, 1964 — 7 P.M. TO 10 P.M.

*The Ten Years of Color With a Historical
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Models of these sets will be on display at
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All RCA test equipment that is used in conjunction
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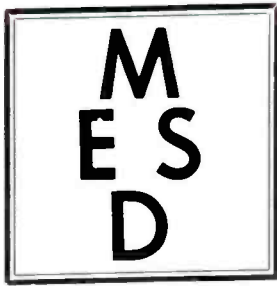
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Refreshments



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VOL. 3, NO. 9

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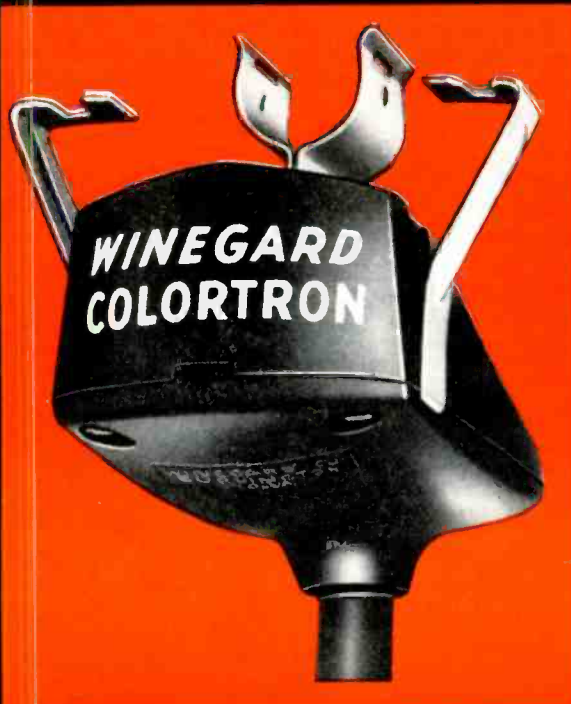
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WHITE



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DON MARTIN

EDITORIALLY SPEAKING

10 YEARS OF COLOR

December 17th 1963 was no different than any other date, to most people, but to the Television Industry it marked the ten year anniversary of the beginning of color Television. When you stop to think that commercial Television actually began in 1946 it doesn't seem possible that color has actually been with us for over half of this period.

After ten years, color is really only coming into its own today. Why has it been so long in coming? What has been some of the direct results? Where do we go from here?

The service industry may have been responsible for the principal delay in the acceptance of color. Actually, the service dealer himself falls into one of three categories. One group of dealers awaited any opportunity to hear about, see, operate, and service a color receiver. The majority of these by and large have enjoyed color programming since 1954. Since they watched color they were in an excellent position to judge whether customers receivers were operating properly, and they could speak from experience when the newest proud owner, having become a color expert overnight, became confused over transmission variations and color quality. Also, because of this approach to the new color receivers, this group purchased the very latest in color test equipment and rejected the gimmick type of instruments that began to flood the market.

A second group followed an opposite course. Some of these dealers shuddered and closed their eyes and hoped that color would die a natural death. In a way it did fade like a sleeping giant until the last few years.

The third group, and very likely the largest number of dealers simply ignored the problem until they were asked to perform service. They took no part in the discussion, attended few meetings where convergence and setup were demonstrated, and in many cases never actually make a setup, or even operated a color receiver.

The members of this group may find it difficult to compete with the men who have serviced color for years, because people with experience and interest can deliver more performance and enjoyment to the customer.

I am not placing the blame on the service industry because half of the problem came from the retailer as well. This dealer was faced with a high ticketed product with a small margin of profit. How much easier was it to sell down color in place of a high ticketed long profit black and white set? The stock answers to customer questions usually fell in two or three categories. First was the "wait until it is perfected." How about the "we usually send along a midget service man with each set." Each of these had there effect on the customer.

The service dealer . . . then the product dealer . . . and then, of course, the network battles to present or suppress color certainly added to the confusion.

These are the basic reasons why color was a long time coming. Its effect will add new jobs, upgrade pay scales and, because of the requirements of more knowledge, will tend to raise the status of the service group.

The future, of course, is up to the individual service dealer. Estimates now indicate that 1963 will be the first year that color sales will reach the billion dollar mark. Al-

ready many manufacturers are estimating that color in 1964 will reach 1.7 million sets. This is close to 20% of the entire Television Production for 1964 and is only the beginning.

If we, the members of the service profession, use our skill and energies to make entertainment more enjoyable and important to our customers we should see our future expand and improve in a direct ratio to our efforts. Since color can bring so much more into the home, it will be worth more to all who have it.

In keeping with this trend to more and more color MESD will continue to provide articles that relate directly to color servicing. Ten years of color begins in this issue. We would appreciate any comments you might like to make.

CABLE TV GETS STRONG OPPOSITION

In a recent issue of MESD we ran an article about the formation of a new organization called TAME, Inc. This association is composed of major antenna manufacturers throughout the United States and was formed to "fight against the indiscriminate franchising of community antenna systems that seem to be cropping up in different parts of the country."

In certain States, such as Georgia, a full scale attack on the problem is shaping up. TAME officials are doing everything possible to inform the government bodies of the need for certain regulations. Another part of this attack will be spearheaded by newspapers, radio and television mediums to inform the public about CATV. Special dealer meetings are also being held to obtain the full backing of our industry in this fight.

"TAME's prime purpose in engaging in these campaigns will be to bring all the facts to light in the interest of the viewing public, so that a clear and authoritative choice between being a life-long subscriber with CATV, and the owner of a paid-up antenna system can be made." This statement was taken from a recent news release that was sent to us and is pretty indicative of what is involved.

As for the Service Dealer, his problem with CATV is a little different. The fight, of course, is the same but the choice is being a life-long subscriber of television service with CATV or the independent service dealer who is a vital part of every community in America.

In writing this report I kind of wonder just how far along our Industry would be today if the major independent manufacturer of parts would have taken the same stand against captive service? A great deal of the captive service business includes "captive parts" doesn't it?

Anyway, our tip-of-the-hat to TAME and its members who have the foresight to combat a problem in the antenna market. Every service dealer in the country should voice his opinion to his customers when the question presents itself.



* dates

* dealer news

* programs

WESTON NAMED AS NEW CHIEF OF BUREAU

Daniel John Weston, 4312 Pembroke, Concord, California has been officially appointed Chief of the Bureau of Electronic Repair Dealers.

Weston is a former District Attorney of Contra Costa County and is well respected in the northern part of the State by the Television Repair Service Dealers.

PICTURE TUBES EXCLUDED FROM NEW LAW BY ADVISORY BOARD

The Electronic Repair Advisory Board of the State of California acted quickly, at their first meeting, to recommend a change in the interpretation of the new registration law.

During the organizational meeting it was brought out that the new law requires the return of all replaced television parts to the customer. With a very

strict interpretation this would mean the return of the used Picture Tube as well as the customary receiving tubes, parts, etc.

In making this recommendation, the Board pointed out that the return of the used picture tube would be a hazard to the health and welfare of the public and therefore should be excluded from this portion of the registration law.

After the formal action was taken it was forwarded to the new chief of the Department for further action. The Advisory Board itself does not have the power to make any changes but acts only as an advisory committee to the Department.



Color Demonstrator (Iron Monster) ownership transferred to Society of Radio and Television Technicians (SRTT). Andy Futchik of Dean's Electronics, Burbank, accepts check from Arnold J. Meyer, President, as Bob Albright, Vice President, and Stan Auerbach, Technical Director, look on. The year was 1954, Remember?

Entries in the "Iron Monster Log" read like a "Who's Who" of the Service Organizations. For those who are interested the Log will be attached to the Demonstrator when it is shown at Andrew's Electronics January 21, 1964, ten years to the day from the first public showing.

EMERGENCY REGULATION ON PICTURE TUBES SIGNED BY CHIEF

The new Chief of the Bureau of Electronic Repair, Dan Weston, has just signed an emergency regulation that had been recommended to him by the new Advisory Board concerning Picture Tubes.

Under this new regulation, Chapter 27 paragraph 2700 of the code now states. "Return of Replaced Parts, exemption. Cathod Ray Tubes, otherwise known as "Picture Tubes" are exempt from the provision of section 9843 of the Bureau and Professions Code requiring the return of replaced parts to the Customer."

This new exemption became effective on December 30th.

At the same time, it was announced, Mr. James Margetts has just been named as the Assistant Chief to Dan Weston.

ANDREW'S ELECTRONIC OPEN HOUSE TO COMMEMORATE "YEARS OF COLOR"

January 21st, Andrew's Electronics will hold open house to mark the 10th anniversary of color. At the same time customers and friends will be able to see the extensive addition to the building which is scheduled for completion on that date.

January 20th, 1954, saw a tremendous crowd of people gather at the same location, but operated as Dean's Electronics, to watch the first demonstration of color on the "Iron Monster."

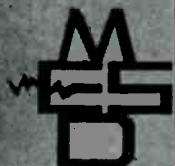
Every effort is being extended to have on hand an interesting display of outstanding developments that have taken place during this first decade of color television.

Barring effects of old age, the "Iron Monster" will be on hand and operating. A working model of the 15 inch "CT-100," a 19", and if it can be located,

a 22" Westinghouse will also be featured. Plans, have been completed to have a number of museum pieces such as a 1936 black and white receiver on hand, in addition.

Invitations will be extended in early January, and if you are new to color, come out and see what it was like in the early days. If you were there ten years ago, plan to renew acquaintanceships, because many of the people, who made the "Iron Monster" possible will be there in person.

CSEA Board Meets
January 19th at
The International Inn
in San Francisco



MODERN
electronic
service dealer



PRESIDENT'S MESSAGE

By
**EMMETT
MEFFORD**

The past year has been one of action and accomplishments, true we have had our trials and tribulations but what association doesn't have when they are new and growing. Without some dis-

agreement there would probably be no well developed plans of action and to try to get even an eighty percent agreeing among a group of independent service dealers is a major accomplishment.

The efforts and perseverance of some Service Dealers through out the state these past several years are being recognized more and more. The formation of the California State Electronics Association and the accomplishments this organization has made in creating a more professional attitude among service dealers is outstanding and to, it is the representative of the independent service dealer in legislative action for the benefit of all.

Now with a well founded and functioning organization I hope to see in the coming year several important problems solved, such as apprenticeship training in the electronics industry to develop qualified Technicians and in doing so, protect the consuming public against incompetent and unethical Service Dealers. On the other hand I would like to see Service Dealers develop better business procedures for dealing with the consuming public, as to what constitute legitimate pricing policy for the services they perform. This problem is compounded in many shops because of the negligence in bookkeeping procedures used, in not showing a break even point before a profit can be realized.

A major problem as I observe the industry is by not having a procedure developed for properly qualified men who enter this industry as to their Technical qualifications I believe with an operating apprenticeship program within the Electronics industry it will be possible to amend the Electronic Repair Dealer Registration Law to include an article on the qualification procedures. I hope the Board of Directors of the California State Electronics Association makes a sincere study of this problem and will work towards accomplishing this feature.

**PICTURE
TUBE
SAVINGS!**



COLOR

**BONDED FACE &
BLACK & WHITE**

- TOP QUALITY
- ALL SIZES
- ONE YEAR GUARANTEE

WHOLESALE ONLY—DIRECT FACTORY TO YOU

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Know Your STATE BOARD OF ELECTRONICS AND REPAIR DEALERS' REGISTRATION MEMBERS

THOMAS SCHNEIDER

Thomas Schneider, new president of the State Board of Electronics and Repair Dealers' Registration is a native of New York and now an Oakland attorney with the Law Offices of Smith, Parrish, Paduck & Clancy. He has had an outstanding legal experience in relationship to the electronic servicing industry because of his work during 1962 and 1963 as consultant to the Consumer Counsel on the Television Servicing Industry. He also authored an enlightening report, "The Television Servicing Industry."

Schneider attended Columbia University School of Law, New York City, where he received his LLB in 1955 and previously earned his AB in 1952 from Harvard College, where he graduated Cum Laude. He received all earlier education from the New York City Schools.

Past legal experience includes serving as Law Clerk to Mr. Justice Traynor, California Supreme Court, 1957 to 1958 and in 1959 to 1961 was an instructor in Torts and Constitutional Law, San Francisco Law School.

He is affiliated with the State Bar of California, Alameda County Bar Association (Chairman, Committee on World Peace Through Law, 1959-1962) Legislation Committee), American Society of International Law.

CAPP LOUGHBORO

Capp Loughboro, a 34-year-old Venturan, was selected to serve as vice-president of the State Board of Electronics and Repair Dealers' Registration.

The Ventura TV Dealer is owner and operator of Capp's TV Electronic Store, 2170 E. Main St.

His firm installed the first closed circuit television system in any county school in the Rio School District and has a contract with the Navy at Point Mugu to maintain the master antenna system on the base that gives TV to more than 800 homes.

Loughboro is also a member of the Electronic Advisory Committee of Ven-

tura College, helping to determine whether the course of study followed by the college is beneficial in fitting the needs of the industry.

Other than his business activities, Loughboro has been involved with the Boy Scouts and Cub Scouts for the past 23 years and has an eight-year perfect attendance record in the Downtown Lions Club. He is a member of the Ventura Masonic Lodge, a 32nd degree Mason and a member of the Ventura Shrine Club.

He lives at 3182 Porter Lane, Ventura with his wife Dolly and their two children.

MILES J. RUBIN



Another new member of the five-man advisory board is Miles J. Rubin.

The Los Angeles attorney was admitted to the California Bar in 1957 and since 1961 has been in private practice with the firm of Klinger & Rubin.

A native of Brooklyn, New York, he received his B.A. from College of William & Mary in 1949 and proceeded to earn his LLB from Brooklyn Law School in 1954.

His background as Deputy Attorney General, State of California, 1957-1961 will of course be beneficial to the advisory board. During that time he was assigned to administrative law, consumer fraud and anti-trust sections of the Attorney General's office.

Rubin also was co-author of the Attorney General's report to the Governor on boxing.

A resident of California since 1956, he lives at 2940 Military Ave., Los Angeles 64, with his wife Renee and two daughters Mori and Joni.

KEITH V. ANDERSON



Fourth member of the board is Keith V. Anderson who grew up and attended elementary and high school in Iowa, where he was born in 1924.

Moving to California in 1942 he served in the United States Navy during World War II, and graduated from the Navy Electronics School. After being released from the service the new member of the advisory board attended Sacramento Junior College.

Anderson started his own business in 1947 and during the past 16 years has served one term as president of the Sacramento TV Dealers Association, a chapter of the California State Electronics Association, and served on the Board of Directors for eight years.

Among other duties he was also president of the Sacramento Valley Electric League in 1959.

At present, Anderson is president of Handy Andy TV & Appliance, Inc., President of Capital City Equity Co., and Vice-President of H&A Distributing Co., Inc., in Fresno. As for club activities he is associated with the Arden-Arcade Rotary Club.

Anderson resides at 3730 Winding Creek Road, Sacramento, with his wife Betty and their three children.

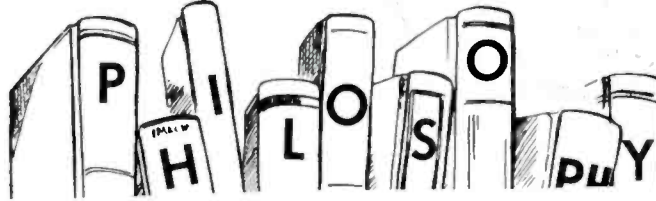
MRS. RUBIN E. JIMENEZ

The fifth member of the Board is Mrs. Rubin E. Jimenez, the only woman appointed by the Governor, who lives with her family at 607 Anderson Street in Manhattan Beach.

Mrs. Jimenez has been very active in local affairs and has been vitally interested in the educational activities throughout the State and the California Consumer's Council.

HOW'S YOUR

CHARITY



With the growth and development of many local and national charity funds, problems have arisen for not only the service dealer but all recipients of the plea for assistance. The legitimate charity fund drive is a delicate and important issue both morally and business wise.

These campaigns are often a two-way compromise, benefiting not only the charity but the reputation of your business. A major problem however is just which is the best charity to donate to, or is it wise not to allow partiality to any particular group, or should a lump sum be given to one group in particular, or small amounts of money or help to a number of different organizations. There are many aspects that must be looked into and it appears that too many individuals are being caught unprepared when such situations arise.

What is the best way to handle a request for charity then? As point number one it should be indicated that most service dealers operate within a given area, neighborhood, or community. Relations with the people in the general business district is of utmost importance in regards to your service and business reputation. It would then obviously be wise to support the popular charity of the customer — the one that they are perhaps even working on. There reaction would naturally be that your very best interest is with that of the rest of the community and that you are willing to cooperate with the large group of customers that have preferable tendencies to one charitable fund. This is of course easier said than done. It is not always just as easy to recognize that one particular fund that the community is most sympathetic to. If any one had the time or the patience to delve into a study of charitable tendencies and leanings it would be of great value, but few have the opportunity to find out this information. The next best thing, would then be to develop your own

policy as to giving and stick to it religiously.

A budget system could be a prime asset to that policy, if charity allotments were figured into the yearly budget of the business, indicating the maximum amount that could be afforded, keeping in mind those limitations imposed for tax purposes.

Point two of the policy could include the division of the money set aside for charitable purposes, into groups of favorite charities in your community. If the community tends to lean heavily to one particular fund drive, donate the major portion to that and divide the rest among the smaller charities. It would be wise to set-aside a small amount for the unexpected that might occur, such as a local tragedy, etc.

Some shop-owners prefer to give only to those individuals who make personal visits to the shop in request for donations. All other requests made out-of-person are ignored and in-person requests are given contributions with the understanding that it is the most the budget can afford.

The giving of merchandise to replace cash donations can be extremely beneficial to both the organization needing door prizes, etc., and is one of the most successful and often times overlooked ideas. The merchandise gift itself looks more than actual cash and the merchandise is displayed, where participants in the affair can most readily see it. Perhaps the organization sponsoring the benefit will even give you recognition by displaying your calling card atop the merchandise. What could be a more perfect method of advertising?

It is found that some shop-owners prefer to work a two-way proposition to benefit a particular charity along with his employees, customers, or young children in the vicinity of the shop. It

works something like this — whenever there are charity tickets being sold the dealer hurriedly buys up his share and in turn gives them away to those he feels are most deserving. The charity benefits from his thoughtful contribution and he gains goodwill from the people who in the end will entertain themselves with the free tickets.

Buying advertisements included on the programs of charitable events is risky business, especially if there are numerous events such as this in your community. Stay clear of favoritism by advertising in one and not the other — this generally causes ill-will and an indication of your partiality. If it is impossible to advertise in all such publications it would be better to contribute in some other less conspicuous way, however if there are but a few of these charitable events it is a favorable means of advertising your business and helping financially with that charitable event.

That empty store window that generally is considered a trouble-spot can be put to good use with a charitable window dressing treatment. Make sure that the poster material being submitted to you is in decent condition for display purposes and by all means insist on the right to remove such a display whenever and for whatever reason you please. Under such circumstances it would be favorable to set-up both an installation and removal date. This window technique has been found to be most favorable as it draws attention to your store and save a donation.

Being firm in your standards and policies concerning charities and charitable organizations will bring nothing but the highest extent of respect from your community. If a sound program and set of rules is established there can be no possible reason for confusion, misunderstanding, or ill-feeling among community and your dealership.

YOU'VE NEVER, EVER SEEN BUYS LIKE THESE FROM WARSCO

T.V. ANTENNA

WIRE

300 OHM HEAVY DUTY

50 FT. COIL **39c**

1000 FT. SPOOL **\$7.25**

LOOK! BELIEVE IT OR NOT

T.V. CHEATER CORD

\$1.00 RETAIL

15c



AC-DC CORDS

U/L APPROVED

12c

HI-FI SPEAKER WIRE

⊗ LOW LOSS FOR STRONG AUDIO

25 FT. COIL **29c**
100 FT. COIL **89c**

50 FT. COIL **49c**
1000 FT. SPOOL **\$6.95**

NEW BRITISH MONARCH STEREO RECORD CHANGER

Complete with genuine Ronette stereo cartridge

case lot 4 to case **\$18.95** EACH



45 RPM Automatic Spindles for above . . . \$1.89 ea.
Mounting board 2.25 ea.
Full wooden finished base 3.95 ea.

HI-FI EQUIPMENT CABINET

MAHOGANY

\$12.95

LIMITED SUPPLY



WARSCO POLICY

We pledge to sell only the best nationally advertised and universally accepted products, at prices that are THE LOWEST ANYWHERE FOR COMPARABLE QUALITY. All prices include cash discount. No Salesmen to call on you. No charge accounts. We pass the savings on to you.

TERMS: Net cash-FOB our warehouse. COD orders-Please mail 25% deposit with order.

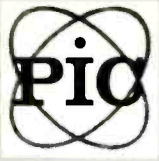


TUNG-SOL®

RADIO AND TV TUBES

Tube Type	Assorted				Tube Type	Assorted				Tube Type	Assorted			
	1-5	6-49	50-up	100-up		1-5	6-49	50-up	100-up		1-5	6-49	50-up	100-up
OZ4	1.20	1.08	.96	.86	4BQ7A	2.00	1.80	1.60	1.44	6AN8A	2.00	1.80	1.60	1.44
OZAG	1.30	1.17	1.04	.94	4BS8	1.92	1.73	1.54	1.39	6AQ5A	1.07	.97	.86	.77
1A3	3.27	2.95	2.62	2.36	4BU8	1.67	1.51	1.34	1.21	6A06	1.30	1.17	1.04	.94
1A5GT	2.12	1.91	1.70	1.53	4BZ6	1.12	1.01	.90	.81	6A07GT	2.00	1.80	1.60	1.44
1A7GT	2.87	2.59	2.30	2.07	4BZ7	2.02	1.82	1.62	1.46	6A08	1.57	1.42	1.26	1.13
1AD2	1.50	1.35	1.20	1.08	4CB6	1.15	1.03	.92	.83	6AR5	1.32	1.19	1.06	.95
1AF4	2.65	2.38	2.12	1.91	4CS6	1.17	1.06	.94	.85	6AR8	2.57	2.32	2.06	1.85
1AX2	1.52	1.37	1.22	1.10	4CY5	1.42	1.28	1.14	1.03	6AR11	2.17	1.96	1.74	1.57
1B3GT	1.45	1.30	1.16	1.04	4DE6	1.32	1.19	1.06	.95	6AS5	1.45	1.30	1.16	1.04
1C5GT	2.65	2.38	2.12	1.91	4DT6A	1.12	1.01	.90	.81	6AS8	1.90	1.71	1.52	1.37
1DN5	1.25	1.12	1.00	.90	4EH7 See YF183/4EH7					6AS11	2.50	2.25	2.00	1.80
1G3GT/1B3GT	1.45	1.30	1.16	1.04	4EJ8 See YF184/4EJ8					6AT6	.95	.85	.76	.68
1H5GT	2.07	1.87	1.66	1.49	4ES8	2.30	2.07	1.84	1.66	6AT8A	1.90	1.71	1.52	1.37
1J3	1.45	1.30	1.16	1.04	4EW6	1.32	1.19	1.06	.95	6AU4GTA	1.80	1.62	1.44	1.30
1K3	1.45	1.30	1.16	1.04	4GK5	2.07	1.87	1.66	1.49	6AUSGT	2.15	1.93	1.72	1.55
1L6	3.40	3.06	2.72	2.45	5AM8	1.77	1.60	1.42	1.28	6AU6A	1.05	.94	.84	.76
1LA6	3.10	2.79	2.48	2.23	5AN8	2.00	1.80	1.60	1.44	6AU8A	1.90	1.70	1.52	1.37
1LB4	4.32	3.89	3.46	3.11	5AQ5	1.17	1.06	.94	.85	6AV5GA	2.32	2.09	1.86	1.67
1LC6	4.15	3.73	3.32	2.99	5AR4	2.25	2.02	1.80	1.62	6AV6	.82	.74	.66	.59
1LE3	3.50	3.15	2.80	2.52	5AS4A	1.32	1.19	1.06	.95	6AV11	1.80	1.62	1.44	1.30
1LG5	3.40	3.06	2.72	2.45	5AS8	2.07	1.87	1.66	1.49	6AW8A	1.85	1.66	1.48	1.33
1LH4	4.02	3.62	3.22	2.90	5AT8	1.82	1.64	1.46	1.31	6AX3	1.35	1.21	1.08	.97
1LNS	4.07	3.67	3.26	2.93	5AU4	1.70	1.53	1.36	1.22	6AX4GT	1.32	1.19	1.06	.95
1NSGT	2.60	2.34	2.08	1.87	5AV8	2.02	1.82	1.62	1.46	6AX5GTB	1.55	1.39	1.24	1.12
1R5	1.52	1.37	1.22	1.10	5AW4	1.40	1.26	1.12	1.01	6AX8	1.85	1.66	1.48	1.33
1S4	2.17	1.96	1.74	1.57	5AZ4	2.82	2.54	2.26	2.03	6AY3	1.37	1.24	1.10	.99
1S5	1.45	1.30	1.16	1.04	5B8	2.65	2.38	2.12	1.91	6A28	2.77	2.50	2.22	2.00
1T4	1.45	1.30	1.16	1.04	5BC3	1.15	1.03	.92	.83	6B4G	7.50	6.75	6.00	5.40
1U4	1.45	1.30	1.16	1.04	5BE8	1.65	1.48	1.32	1.19	6B8	3.65	3.28	2.92	2.63
1U5	1.32	1.19	1.06	.95	5BK7A	1.70	1.53	1.36	1.22	6B10	1.75	1.57	1.40	1.26
1V	2.92	2.63	2.34	2.11	5BQ7A	2.02	1.82	1.62	1.46	6BA6	1.00	.90	.80	.72
1V2	1.05	.94	.84	.76	5BR8	1.82	1.64	1.46	1.31	6BA7	2.97	2.68	2.38	2.14
1X2A	1.52	1.37	1.22	1.10	5BT8	1.65	1.48	1.32	1.19	6BA8A	1.92	1.73	1.54	1.39
1X2B	1.52	1.37	1.22	1.10	5BW8	1.70	1.53	1.36	1.22	6BC4	2.67	2.41	2.14	1.93
2A3	5.25	4.72	4.20	3.78	5CG8	1.67	1.51	1.34	1.21	6BC5	1.17	1.06	.94	.85
2AF4B	2.02	1.82	1.62	1.46	5CL8A	1.75	1.57	1.40	1.26	6BC7	1.90	1.70	1.52	1.37
2AH2	1.60	1.44	1.28	1.15	5CM8	1.90	1.71	1.52	1.37	6BC8	2.00	1.80	1.60	1.44
2AS2	3.20	2.88	2.56	2.30	5CQ8	2.02	1.82	1.62	1.46	6BD6	1.22	1.10	.98	.88
2BN4A	1.27	1.15	1.02	.92	5CZ5	2.17	1.96	1.74	1.57	6BE6	1.10	.99	.88	.79
2CW4	2.22	2.00	1.78	1.60	5DH8	2.55	2.29	2.04	1.84	6BF5	1.77	1.60	1.42	1.28
2CY5	1.52	1.37	1.22	1.10	5DJ4	1.32	1.19	1.06	.95	6BF6	.95	.85	.76	.68
2EN5	1.70	1.53	1.36	1.22	5EA8	1.57	1.42	1.26	1.13	6BG6G	3.22	2.90	2.58	2.32
2ER5	1.75	1.57	1.40	1.26	5EU8	1.67	1.51	1.34	1.21	6BG6GA	3.25	2.92	2.60	2.34
2FH5	1.52	1.37	1.22	1.10	5EW6	1.32	1.19	1.06	.95	6BH6	1.35	1.21	1.08	.97
2F85	1.55	1.39	1.24	1.12	5FG7	1.37	1.24	1.10	.99	6BH8	1.82	1.64	1.46	1.31
2FY5	1.40	1.26	1.12	1.01	5FV8	1.57	1.42	1.26	1.13	6BJ6	1.30	1.17	1.04	.94
2GU5	3.20	2.88	2.56	2.30	5GM6	1.32	1.19	1.06	.95	6BJ7	1.57	1.42	1.26	1.13
2HA5	4.05	3.64	3.24	2.92	5J6	1.42	1.28	1.14	1.03	6BJ8	1.75	1.57	1.40	1.26
3A2	2.42	2.18	1.94	1.75	5T4	6.05	5.65	4.89	4.40	6BK4	4.00	3.60	3.20	2.88
3A3	1.70	1.53	1.36	1.22	5T8	1.82	1.64	1.46	1.31	6BK5	1.85	1.66	1.48	1.33
3AF4A	2.02	1.82	1.62	1.46	5U4G	1.05	.94	.84	.76	6BK7B	1.70	1.53	1.36	1.22
3AL5	.92	.83	.74	.67	5U4GB	1.05	.94	.84	.76	6BL7GTA	2.10	1.89	1.68	1.51
3AU6	1.07	.97	.86	.77	5U8	1.85	1.48	1.32	1.19	6BL8A	1.97	1.78	1.58	1.42
3AV6	.87	.79	.70	.63	5V3A	1.92	1.73	1.54	1.39	6BM8 See ECL82/6BM8				
3B2	4.92	4.43	3.94	3.55	5V4GA	1.90	1.71	1.52	1.37	6BN4A	1.25	1.12	1.00	.90
3BC5	1.17	1.06	.94	.85	5V6GT	1.20	1.08	.96	.86	6BN6	1.60	1.44	1.28	1.15
3BE5	1.12	1.01	.90	.81	5X4G	1.67	1.51	1.34	1.21	6BN8	1.52	1.37	1.22	1.10
3BN4A	1.52	1.37	1.22	1.10	5X8	1.72	1.55	1.38	1.24	6BQ5	1.20	1.08	.96	.86
3BN6	1.92	1.73	1.54	1.39	5Y3GT	.87	.79	.70	.63	6BQ6GTA	2.17	1.96	1.74	1.57
3BU8	1.67	1.51	1.34	1.21	5Y4GT	1.32	1.19	1.06	.95	6BQ8GA	2.17	1.96	1.74	1.57
3BY6	1.45	1.30	1.16	1.04	5Z3	1.85	1.48	1.32	1.19	6BQ6GTB/6CU6	2.17	1.96	1.74	1.57
3BZ8	1.15	1.03	.92	.83	5Z4	4.17	3.76	3.34	3.01	6BQ7A	1.97	1.78	1.58	1.42
3CB6	1.15	1.03	.92	.83	6A7	4.25	3.82	3.40	3.06	6BR8A	1.90	1.71	1.52	1.37
3CE5	1.17	1.06	.94	.85	6A8	3.42	3.08	2.74	2.47	6BS8	1.87	1.69	1.50	1.35
3CF8	1.35	1.21	1.08	.97	6A8GT	4.30	3.87	3.44	3.10	6BU8	1.55	1.39	1.24	1.12
3C96	1.32	1.19	1.06	.95	6AB4	1.07	.97	.86	.77	6BV8	1.57	1.42	1.26	1.13
3CY5	1.82	1.46	1.30	1.17	6AB5/6NS	4.02	3.62	3.22	2.90	6BW4	1.45	1.30	1.16	1.04
3DG4	1.82	1.64	1.46	1.31	6AB7	4.12	3.71	3.30	2.97	6BW6	1.75	1.57	1.40	1.26
3DK6	1.20	1.08	.96	.86	6AC5GT	3.12	2.81	2.50	2.25	6BX7GT	2.17	1.96	1.74	1.57
3DT6A	1.10	.99	.88	.79	6AC7	2.75	2.47	2.20	1.98	6BY5GA	2.55	2.29	2.04	1.84
3EH7 See XF183/3EH7					6AD7G	4.70	4.23	3.76	3.38	6BY8	1.32	1.19	1.06	.95
3EJ7 See XF184/3EJ7					6AF3	1.45	1.30	1.16	1.04	6BY8	1.32	1.19	1.06	.95
3ER5	1.75	1.57	1.40	1.26	6AF4A	2.00	1.80	1.60	1.44	6BZ8	1.12	1.01	.90	.81
3F85	1.52	1.37	1.22	1.10	6AF8G	3.10	2.79	2.48	2.23	6BZ7	2.00	1.80	1.60	1.44
3GK5	2.07	1.87	1.66	1.49	6AF11	2.50	2.25	2.00	1.80	6BZ8	2.22	2.00	1.78	1.60
3HAS	4.05	3.64	3.24	2.92	6AG5	1.37	1.24	1.10	.99	6C4	.92	.83	.74	.67
3HF4	3.20	2.88	2.56	2.30	6AG7	3.10	2.79	2.48	2.23	6C5	2.12	1.91	1.70	1.53
3Q4	1.77	1.60	1.42	1.28	6AG11	1.77	1.60	1.42	1.28	6C8	4.15	3.73	3.32	2.88
3Q5GT	2.82	2.54	2.26	2.03	6AH4GT	1.72	1.55	1.38	1.24	6CBG	4.42	3.98	3.54	3.19
3SA	1.80	1.44	1.28	1.15	6AH6	2.35	2.11	1.88	1.69	6C10	1.80	1.62	1.44	1.30
3V4	1.15	1.12	1.00	.90	6AK5	2.20	1.98	1.76	1.58	6CA4	1.05	.94	.84	.76
4AU8	1.27	1.08	.94	.85	6AL5	.92	.83	.74	.67	6CA5	1.57	1.42	1.26	1.13
4AV8	.82	.83	.74	.67	6AL7GT	2.87	2.59	2.30	2.07	6CA7	2.80	2.34	2.02	1.87
4BC5	1.17	1.06	.94	.85	6AL11	2.20	1.98	1.76	1.58	6CB5A	4.27	3.85	3.42	3.08
4CB6	2.02	1.82	1.62	1.46	6AM4A	2.95	2.65	2.36	2.12	6CB6A	1.12	1.01	.90	.81
4CB8	1.92	1.73	1.54	1.39	6AMB4	1.72	1.55	1.38	1.24	6CB5/6BC5	1.17	1.06	.94	.85
6CD6GA	2.90	2.61	2.32	2.08	6AN4A	3.27	2.95	2.62	2.36	6Y3A	2.27	2.05	1.82	1.64
6CF6	1.27	1.15	1.02	.92	6FM7	1.72	1.55	1.38	1.24	6Y6	3.37	3.04	2.70	2.43
6CG7	1.22	1.10	.98	.88	6FM8	1.50	1.35	1.20	1.08	6Y6GTA	1.10	.99	.88	.79
6CG8A	1.65	1.48	1.32	1.19	6FQ									

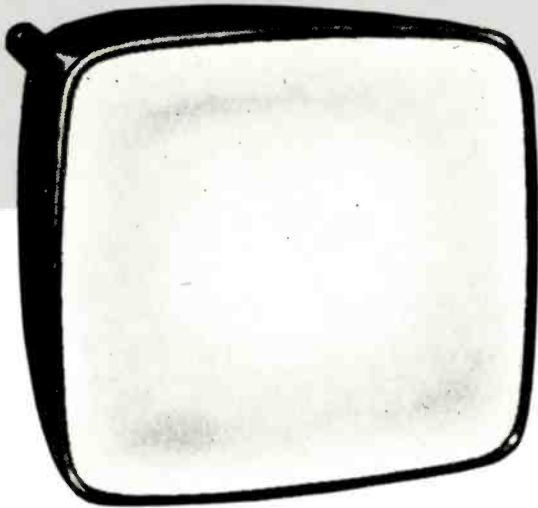
Tube Type	Assorted				Tube Type	Assorted				Tube Type	Assorted			
	1-5	6-49	50-up	100-up		1-5	6-49	50-up	100-up		1-5	6-49	50-up	100-up
6DB6	1.07	.97	.85	.77	6HS8	1.60	1.44	1.28	1.15	7E7	3.35	3.01	2.68	2.41
6DC6	1.70	1.53	1.36	1.22	6HZ6	2.65	2.38	2.12	1.91	7EY6	1.57	1.42	1.26	1.13
6DE4	1.42	1.28	1.14	1.03	6I5	2.17	1.96	1.74	1.57	7F7	3.97	3.58	3.18	2.86
6DE6	1.27	1.15	1.02	.92	6I5GT	1.82	1.64	1.46	1.31	7F8	4.37	3.94	3.50	3.15
6DG6GT	1.27	1.15	1.02	.92	6I6	1.40	1.26	1.12	1.01	7H7	3.20	2.88	2.56	2.30
6DJ2	1.67	1.51	1.34	1.21	6I6A	1.40	1.26	1.12	1.01	7HG8	1.77	1.60	1.42	1.28
6DK6	1.17	1.06	.94	.85	6I7	2.47	2.23	1.98	1.78	7K7	4.70	3.87	3.44	3.10
6DN6	3.72	3.35	2.98	2.68	6I7GT	2.90	2.61	2.32	2.09	7L7	3.20	2.88	2.56	2.30
6DN7	1.75	1.57	1.40	1.26	6I8	2.27	2.05	1.82	1.62	7N7	3.77	3.40	3.02	2.72
6DQ5	4.17	3.76	3.34	3.01	6I8GT	1.52	1.37	1.22	1.10	7Q7	3.10	2.79	2.48	2.23
6DQ6A	2.07	1.87	1.66	1.49	6I8GT	9.00	8.10	7.20	6.48	7R7	3.32	2.99	2.66	2.39
6DQ6B	2.07	1.87	1.66	1.49	6I9	2.60	2.34	2.08	1.87	7V7	2.45	2.20	1.96	1.76
6DR7	1.70	1.53	1.36	1.22	6I9A	2.17	1.96	1.74	1.57	7W7	3.50	3.15	2.80	2.52
6DS4	2.22	2.00	1.78	1.60	6I9B	1.67	1.51	1.34	1.21	7X6	1.65	1.48	1.32	1.19
6DS5	1.75	1.57	1.40	1.26	6I9C	2.95	2.65	2.36	2.12	7X7	4.05	3.64	3.24	2.92
6DT5	1.62	1.46	1.30	1.17	6I9D	3.75	3.37	3.00	2.70	7Y4	3.57	3.22	2.86	2.57
6DT6A	1.07	.97	.86	.77	6I9E	2.17	1.96	1.74	1.57	7Z4	3.45	3.10	2.76	2.48
6DT9	1.90	1.71	1.52	1.37	6I9F	1.32	1.19	1.06	.95	8AUBA	2.02	1.82	1.62	1.46
6DW5	2.02	1.82	1.62	1.46	6K6GT	2.47	2.23	1.98	1.78	8AWBA	1.85	1.66	1.48	1.33
6DX8 See ECL84/6DX8					6K7	2.47	2.23	1.98	1.78	8BABA	1.82	1.64	1.46	1.31
6E5	2.55	2.29	2.04	1.84	6K7GT	2.47	2.23	1.98	1.78	8BH8	1.77	1.60	1.42	1.28
6EA7	1.90	1.71	1.52	1.37	6K8	3.75	3.37	3.00	2.70	8BN8	1.62	1.46	1.30	1.17
6EA8	1.60	1.44	1.28	1.15	6K11	1.92	1.73	1.54	1.39	8BQ5	1.45	1.30	1.16	1.04
6EB9	2.10	1.89	1.68	1.51	6L6	4.30	3.87	3.44	3.10	8CG7	1.25	1.12	1.00	.90
6EH5	1.52	1.37	1.22	1.10	6L6GC	2.17	1.96	1.74	1.57	8CM7	1.45	1.30	1.16	1.04
6EH7 See EF183/6EH7					6L7	3.87	3.31	2.94	2.85	8CN7	1.40	1.26	1.12	1.01
6EH8	1.57	1.42	1.26	1.13	6N7	2.50	2.25	2.00	1.80	8CS7	1.85	1.48	1.32	1.19
6EJ7 See EF184/6EJ7					6N7GT	2.82	2.36	2.10	1.89	8CWS	2.60	2.52	2.24	2.02
6EM5	1.70	1.53	1.36	1.22	6O7	2.65	2.38	2.12	1.91	8CX8	2.17	1.96	1.74	1.57
6EM7	2.55	2.29	2.04	1.84	6Q7GT	2.82	2.54	2.26	2.03	8EB5	2.00	1.80	1.60	1.44
6EQ7	1.45	1.30	1.18	1.04	6R7	2.72	2.45	2.18	1.96	8E77	2.20	1.98	1.76	1.58
6ER5	1.90	1.71	1.52	1.37	6SA4	1.22	1.10	.98	.88	8FQ7	1.37	1.24	1.10	.99
6ES5	1.52	1.37	1.22	1.10	6S7	3.60	3.24	2.88	2.59	8GN8	1.97	1.78	1.58	1.42
6FS8	2.90	2.61	2.32	2.09	6S8GT	2.20	1.98	1.76	1.58	8JV8	3.25	2.92	2.60	2.34
6EU7	1.35	1.21	1.08	.97	6SA7	2.15	1.93	1.72	1.55	9A8	2.00	1.80	1.60	1.44
6EU8	1.65	1.48	1.32	1.19	6SA7GT	2.15	1.93	1.72	1.55	9AU7	1.40	1.26	1.12	1.01
6EV5	1.50	1.35	1.20	1.08	6SB7Y	3.15	2.85	2.52	2.27	9CL8	1.57	1.42	1.26	1.13
6EV7	1.45	1.30	1.16	1.04	6SC7	2.25	2.02	1.80	1.62	9EA8	3.20	2.88	2.56	2.30
6EW6	1.25	1.12	1.00	.90	6SF5	1.85	1.66	1.48	1.33	10AL11	4.45	4.00	3.56	3.20
6EW7	2.90	2.61	2.32	2.09	6SFSGT	1.80	1.44	1.28	1.15	10C8	2.12	1.91	1.70	1.53
6EY6	1.70	1.53	1.36	1.22	6S7	3.12	2.81	2.50	2.25	10DE7	1.70	1.53	1.36	1.22
6EZ5	1.80	1.62	1.44	1.30	6SC7	2.30	2.07	1.84	1.66	10EG7	2.30	2.07	1.84	1.66
6EZ8	1.90	1.71	1.52	1.37	6SH7	2.32	2.09	1.86	1.67	10HF8	2.32	2.09	1.86	1.67
6F5	2.30	2.07	1.84	1.66	6SHT	2.07	1.87	1.66	1.48	10JA8	3.80	3.42	3.04	2.74
6F6	2.92	2.63	2.34	2.11	6SHTGT	2.07	1.87	1.66	1.48	11CY7	1.62	1.46	1.30	1.17
6F6G	2.92	2.63	2.34	2.11	6SK7	1.97	1.78	1.58	1.42	12A8GT	4.42	3.98	3.54	3.19
6F6GT	2.92	2.63	2.34	2.11	6SK7GT	2.10	1.89	1.68	1.51	12AB5	1.75	1.57	1.40	1.26
6F7	5.85	5.27	4.68	4.21	6SL7GT	1.75	1.57	1.40	1.26	12AC6	1.10	.99	.88	.79
6F8G	4.47	4.03	3.58	3.22	6SN7GT	1.30	1.17	1.04	.94	12AD6	1.20	1.08	.96	.86
6FA7	1.45	1.30	1.16	1.04	6O7GT	1.87	1.69	1.50	1.35	12AEB	1.20	1.08	.96	.86
6FD7	2.52	2.27	2.02	1.82	6SR7	1.90	1.71	1.52	1.37	12AE7	1.87	1.69	1.50	1.35
6FG5	2.60	2.34	2.08	1.87	6SR7	1.95	1.75	1.56	1.40	12AF3	1.45	1.30	1.16	1.04
6FG6 See EM84/6FG6					6SS7	2.75	2.47	2.20	1.98	12AF6	1.37	1.24	1.10	.99
6FG7	1.45	1.30	1.16	1.04	6T4	2.72	2.45	2.18	1.98	12AH7GT	2.77	2.50	2.22	2.00
6FH5	1.45	1.30	1.16	1.04	6TB	1.70	1.53	1.36	1.22	12AL5	.95	.85	.76	.68
6FH8	1.82	1.64	1.46	1.31	6U5	2.77	2.50	2.22	2.00	12AL8	3.27	2.95	2.62	2.36
6FJ7	1.82	1.64	1.46	1.31	6UB	1.85	1.48	1.32	1.18	12AQ6	1.30	1.17	1.04	.94
12AT6	.92	.83	.74	.67	12SA7GT	2.15	1.93	1.72	1.55	25BQ6GTB	2.30	2.07	1.84	1.66
12AT7	1.52	1.37	1.22	1.10	12SC7	2.75	2.47	2.20	1.98	25C5	1.07	.97	.86	.77
12AUB	1.07	.97	.86	.77	12SF3	2.05	1.84	1.64	1.48	25CA5	1.55	1.39	1.24	1.12
12AUB7A	1.22	1.10	.98	.88	12SF7	3.30	2.97	2.64	2.38	25CD6GB	3.05	2.74	2.44	2.20
12AV5GA	2.02	1.82	1.62	1.46	12SG7	2.32	2.09	1.86	1.67	25DN6	3.17	2.86	2.54	2.29
12AV6	.82	.74	.66	.59	12SH7	2.87	2.59	2.30	2.07	25EC6	2.85	2.56	2.28	2.05
12AV7	1.82	1.64	1.46	1.31	12SJ7	2.10	1.89	1.68	1.51	25EH5	1.25	1.12	1.00	.90
12AW6	1.65	1.48	1.32	1.19	12SJ7GT	2.10	1.89	1.68	1.51	25L6	4.42	3.98	3.54	3.19
12AX4GTA	1.35	1.21	1.08	.97	12SK7	1.95	1.78	1.58	1.42	25L8GT	1.32	1.19	1.06	.95
12AX4GTB	1.35	1.21	1.08	.97	12SK7GT	1.95	1.78	1.58	1.42	25W4GT	1.35	1.21	1.08	.97
12AX7A	1.27	1.15	1.02	.92	12SL7GT	1.87	1.69	1.50	1.35	25Z5	2.30	2.07	1.84	1.66
12AY7	2.37	2.14	1.90	1.71	12SN7GT	1.35	1.21	1.08	.97	25Z6GT	1.52	1.37	1.22	1.10
12AZ7A	1.37	1.24	1.10	.98	12SN7GTA	1.35	1.21	1.08	.97	27	2.70	2.43	2.16	1.94
12BA4	1.42	1.28	1.14	1.03	12SQ7	1.87	1.69	1.50	1.35	32EC6	1.27	1.15	1.02	.92
12BA6	.82	.74	.66	.59	12SQ7GT	1.87	1.69	1.50	1.35	35A5	3.00	2.70	2.40	2.16
12BA7	2.97	2.68	2.38	2.14	12U7	1.32	1.19	1.06	.95	35B5	1.70	1.53	1.36	1.22
12BD6	1.22	1.10	.98	.88	12V6GT	1.45	1.30	1.16	1.04	35CS	1.07	.97	.86	.77
12BE6	.87	.79	.70	.63	12W6GT	1.60	1.44	1.28	1.15	35EH5	1.15	1.03	.92	.83
12BF6	1.10	.99	.88	.79	12X4	.95	.85	.76	.68	35GL6	1.26	1.12	1.00	.90
12BH7A	1.52	1.37	1.22	1.10	12DE7	1.47	1.33	1.18	1.06	35L8GT	1.20	1.08	.96	.86
12BK5	2.00	1.80	1.60	1.44	13DR7	1.70	1.53	1.36	1.22	35W4	.55	.49	.44	.40
12BL6	1.32	1.19	1.06	.95	13EM7	2.57	2.32	2.06	1.85	35Y4	2.40	2.16	1.92	1.73
12BQ6GTB	2.25	2.02	1.80	1.62	13GB5	3.85	3.46	3.08	2.77	35Z3	2.50	2.25	2.00	1.80
12BQ6GTB/12CU6	2.22	2.00	1.78	1.60	13GF7	4.60	4.14	3.68	3.31	35Z4GT	1.35	1.21	1.08	.97
12BR7	1.65	1.44	1.28	1.15	13J10	5.35	4.81	4.29	3.86	35Z5GT	.82	.83	.74	.65
12BV7	1.75	1.57	1.40	1.26	14A7	2.95	2.65	2.36	2.12	36AM3	.80	.72	.64	.58
12BW4	1.45	1.30	1.16	1.04	14B6	2.80	2.52	2.24	2.02	41	2.90	2.61	2.32	2.09
12BY7A	1.60	1.44	1.28	1.15	14C7	3.30	2.97	2.64	2.38	42	2.57	2.32	2.06	1.85
12BZ6	1.12	1.01	.90	.81	14F7	4.47	4.03	3.58	3.22	43	3.80	3.42	3.04	2.74
12BZ7	2.20	1.98	1.76	1.58	14FB	3.35	3.01	2.68	2.41	47	4.57	4.12	3.66	3.29
12C8	4.85	4.36	3.88	3.49	14GT8	1.60	1.44	1.28	1.15	50A1	3.32	2.99	2.66	2.39
12CA5	1.42	1.28	1.14	1.03	14Q7	3.10	2.79	2.48	2.23	50A5	3.12	2.81	2.50	2.25



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A NEW
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ELEMENTS OF SWEEP CIRCUITS

technical section

An MESD special feature

Irv Tjomsland, Editor

HORIZONTAL SWEEP CIRCUIT MEASUREMENTS

3-1: THEORETICAL OR PRACTICAL

The new man who enters the television service field will soon encounter horizontal and vertical sweep problems. If he has a normal run of sweep defects he will solve some by adjustment, some by tube substitution, and some by replacement of wired-in components. Unless he is unfortunate enough to encounter a number of cases of multiple trouble he may decide that eight out of ten sweep jobs are easy, and if he does not find the work particularly interesting or challenging he may attempt to limit his efforts to the simple jobs.

Why then, make such a federal case out of the balance of the problem? Why study so hard to understand trace, retrace, blanking, the sweep cycle, and power conditions?

Is this just another instance of over-emphasis of the theoretical when attention should be concentrated on the practical?

3-2: BUSINESS ASPECTS

There are many good reasons why a thorough technical understanding is important, but here are two practical, not theoretical, considerations that may shed some light on the subject.

FIRST: A performance record of 80% on sweep circuit service is not good enough to build a growing customer line, because it is only fair to assume that the same man will be only 80% satisfactory on other phases such as sync, video, or audio problems. Service of this calibre could be expected to cause loss of the average customer within three years, and it is doubtful if any kind of advertising or promotion work could bring in enough new customers to permit the business volume to grow.

SECOND: If the new serviceman acquires a good fundamental knowledge of raster characteristics he can supplement the basic AC and DC measurements with invaluable information taken from the most convenient display of operating results which appear on the face of the picture tube.

As mentioned in 3-1 the difficult problems will be related to repair jobs that call for solution of more than one defect, but since every individual trouble will not necessarily cause loss of raster it is entirely to return a receiver to a customer with "call-back" built in just like a time bomb!

The customer judges your work by the appearance of the picture on the CRT, and you can avoid a lot of problems if you better understood the part he looks at, and the less obvious indications that can keep you out of trouble.

3-3: THE BASIS OF PERFORMANCE

The purpose of this article is to try to convince the new man that accurate measurement and careful analysis of re-

sults are important if business is to prosper, and the customer line to expand.

It is far beyond that capacity of this article to cover all phases of measurements and raster analysis, but an effort will be made to emphasize some basic factors with the hope that if enough interest can be aroused the new serviceman will undertake further study in one of the excellent books on the subject.

Good sweep service procedure is the art of reducing the unknown to a set of values that you "know for sure." Some of this data should be taken from your schematic information, and some should be developed by careful attention to your method of test and the accuracy of your equipment.

3-4: AC LINE

The voltage and current data you find in your schematic information is of utmost importance to fast accurate service, but it can be very misleading if you do make certain that you operate the receiver under test at the correct line voltage.

In the recent instrument calibration check sessions very few shops owned test equipment that would determine line voltage within 5%, let alone the necessary 1%. A 5% error will permit a 12 volt variation in your bench line voltage and this can change your plate voltage readings from 6 to 30 volts, your boost voltage from 10 to 30 volts, and your high voltage as much as 1 to 2 KV! You are defeating your own purposes if allow such discrepancies because with such errors you have no methodical way to prove "for sure" that operating conditions are correct or incorrect.

Every new man who equips a work bench will make better progress if he will obtain a line voltmeter capable of 1% accuracy. If he will add to this some form of line voltage adjustment device to establish his line voltage correctly before proceeding with other tests he will avoid many of the problems he will encounter otherwise.

3-5: PLATE SUPPLY OR "B PLUS"

Many sweep failures result from variations in plate supply (B plus) voltage. Excessive or inadequate width, high plate or screen current, and many other dangerous problems start here. If you know that your line voltage is correct, it follows that your plate voltage must be correct or you have some form of rectifier deviation. Many a serviceman makes a callback because he, or a predecessor, made an incorrect change of the power transformer, rectifier, or protection system.

Most shop test equipment is fairly accurate in B plus measurements, but again it is hard to have too good a measuring device. A safe tolerance for B plus is to look for a "plus nothing-minus five percent" situation. Plate current in the horizontal output stage may increase as much

as 1 milliamperes per each volt of excess B plus, and 20 volts excess B plus could cause an added 20 milliamperes to appear in the horizontal output tube.

Many receivers can endure this, although with shorter component life, but if the receiver is also asked to operate at a higher line voltage in the home the trouble will be compounded. If B plus is abnormal, try to locate the reason before checking further. Maybe a higher output power has been installed, maybe silicones have been substituted for seleniums without compensation, or maybe the individual receiver is off standard and the problem will have to be cured before it will give the customer long life and good performance.

3-6: BOOST VOLTAGE

If the line voltage and plate supply voltage have been found satisfactory, the measurement of boost can be a very valuable addition to the facts you "must know for sure."

According to 2-4 (December MESD) boost voltage is developed at the boost capacitor as a result of recovery of stored energy from the horizontal sweep cycle.

If the line and plate voltages are correct, the resulting boost voltage is very significant in that it is directly related to the operating condition of the AC factors, such as the inductance of the flyback and yoke, the circuit capacitance, and losses in general.

The boost voltage present follows changes in drive, linearity or efficiency coil adjustments, and variations in second anode current. Boost is usually lower at high brightness settings, and will vary with demands of other circuits such as the vertical output load, so all other adjustments should be normal when boost is measured.

Unless major components changes have been made, trouble should be expected if boost does not follow specification. If boost is low, the second anode supply will tend to be low, brightness may suffer, and focus may be sub-standard. On the other hand if boost is high, plate current through the flyback and horizontal output tube will tend to increase with the ever present possibility of a flyback and tube "cook-out."

Many show voltmeters are inaccurate on boost measurements. Some meters, particularly early VTVMs may respond to the presence of RF at the boost connection and give erroneous readings. Another reason for inaccurate readings is the lack of comparison voltages, since it is not practical to use batteries for calibration purposes because of the large number of cells required.

A good point to remember is to adjust width, height, and brightness to normal values at the recommended boost voltage, and if this voltage is recorded on the worksheet it may be valuable for future reference.

3-7: HIGH VOLTAGE

The serviceman's evaluation of the receiver's picture quality is dependent on the knowledge that the high voltage is at the design value. Contrast and brightness depend on adequate high voltage, and too many variables are present if poor performance can be due to many factors such as a poor CRT, poor video amplifier, low signal, or poor high voltage.

If the high voltage measurement is made and compared to the manufacturers specification this factor can be eliminated and attention devoted to progressively checking other possibilities.

Unfortunately, very few servicemen measure and record high voltage. The main reason is that most high voltage checkers are purchased as accessories, rather than as complete units. Probes suffer from excessive size and bulkiness, probably in the name of safety (and superstition) but it seems odd that servicemen handle second anode leads with less than 1/8th inch of insulation, but must have a four-

teen inch probe to measure the voltage inside the anode lead.

Many servicemen find it hard to buy a probe that has the correct resistance to work with voltage ranges on the meter, and of course when the high voltage probe is connected it is usually necessary to remove the normal probe.

It is earnestly recommended to the new serviceman that he obtain a good meter movement and the necessary resistor and probe to enable him to make accurate measurements in the 5 to 30KV neighborhood. The cost will be minor compared to the benefits of accuracy, and the setup can be made to be so convenient that high voltage measurements will be as easy to make and record as any other as any other test.

3-8: RASTER ANALYSIS

When the operating voltages such as the line, plate, boost, and second anode voltages have been measured and recorded, examination of the raster will reveal many details of actual receiver operation.

As the new man gains experience he will make ever increasing use of the evidence on the face of the CRT. This is well because this is also the point on which the customer will rate the quality of his workmanship.

Obviously if the receiver has the correct high voltage, a good CRT should develop a raster of acceptable focus and line structure, or it will be suspect. It is a fact that quite a few picture tubes have been changed because the serviceman did not realize that high voltage was low. If the service procedure had been methodical and such factors as line, B plus, boost, and high voltage had been known for sure, it would be much easier to pin down responsibility for an inferior raster.

However there are many details of performance visible by careful examination of the raster that are useful to the serviceman. In addition to the fact that it is advisable to know more about the raster than the customer does, many factors are visible that may show the receiver to be in good condition, or be positive signs of future trouble. A couple of examples will illustrate the point.

3-9: HORIZONTAL BLANKING

In 1-10 horizontal trace time is listed as 56 microseconds (abbreviated to usec) and retrace time as 7.5 usec. Transmitted blanking signals will be about 10 to 11 usec, and are intended to cut off the CRT illumination from a time 2 usec. before the beam reaches the right hand side of the screen, keep it cut off during retrace and for 1 usec. after the new line trace is initiated. (1-12 Nov MESD).

You the serviceman can easily verify this operating condition if you will decenter the raster on a receiver that does not employ horizontal blanking. If the raster is normal and the receiver employs a 21" CRT this blanking area will become visible when contrast and brightness are adjusted. Video information will be seen to end about 2/3rds of an inch before the end of the line is scanned.

If the raster is again decentered to expose the left hand side of the raster about 1/3rd inch of dark or blanked area will be seen.

All very interesting, you might say, but how does it help to make money or get the job done?

3-10: VALUE OF INFORMATION

This information will help you make money by improving customer satisfaction and preventing callbacks. Let us examine a typical instance:

If instead of finding 2/3 inch on the right edge and 1/3 inch on the left, you find 1 inch on one side and none on the other you can be quite sure your customer will experience "foldover" due to unblanked retrace. The effect may be very elusive, for it may bother on some stations and not on others, or it may bother only on certain types of program material.

HORIZONTAL SWEEP CIRCUIT MEASUREMENTS *(Continued)*

If the blanking does not occur both before and after retrace, the beam may actually illuminate the screen slightly during retrace. The customer will describe the effect as "veiling" or "interference" and he will usually object to the defect.

If all the blanking is on one side and none on the other, the problem will usually be solved by adjustment of the horizontal oscillator, correction of sync or comparison pulse problems.

If inspection shows that almost no blanking is visible on either side there is good reason to suspect major changes in sweep components, wrong or excessive shunt capacity, or variations in drive waveform, to name a few.

The important point is that a minute spent on this inspection will help you know for sure that things are right or must be corrected.

3-11: SHORT RETRACE TIME

Let's take up a more serious symptom: Too much blanking time showing.

It is not too difficult to find a modern television receiver that can be altered to show much greater blanking time (by speeding up retrace time). This may happen if normal capacitance is eliminated from the flyback circuit and this illustration will show how this can happen.

One manufacturer of replacement yokes was plagued by excessive failures of insulation in a yoke that had given no trouble previously. The problem arose in many parts of the country which tended to eliminate local conditions such as line voltage or humidity as the reason.

Field investigation developed an interesting fact: The

failure was associated with one model receiver. Further investigation revealed that when this series of receivers had been in service about a year they might require a service call because of a "no raster" complaint.

The trouble was caused by failure of a 150 mmfd capacitor connected across part of the flyback, and outside servicemen found that this could be clipped out without removing the chassis. Since the picture was restored and apparently normal no replacement was installed.

Soon afterward the yoke would short, and many servicemen would install a replacement yoke, also without removing the chassis. The new yoke would last a few weeks, and then it in turn would fail.

Apparently the removal of the capacitor shortened retrace time with a consequent increase in surge voltage. Sharp voltage spikes of tremendous amplitude attacked all parts of the sweep circuit and caused the insulation to puncture. The first replacement was on the customer, but the subsequent units were on the serviceman, distributor, and manufacturer.

When a typical receiver was checked for blanking time almost two inches of total blanking were visible with the capacitor removed, and this returned to normal with the capacitor properly installed. (And the same series of yokes gave normal service also).

3-12: CONCLUSION

This material has not been presented with the idea that you must make special raster examinations or you will be in trouble. Many such tests are very difficult due to inaccessibility of centering, brightness or contrast controls, or the presence of internal receiver blanking.

If you do, however, make use of orderly measurements and inspections you will find that you encounter less "mysteries" and more proved cures.

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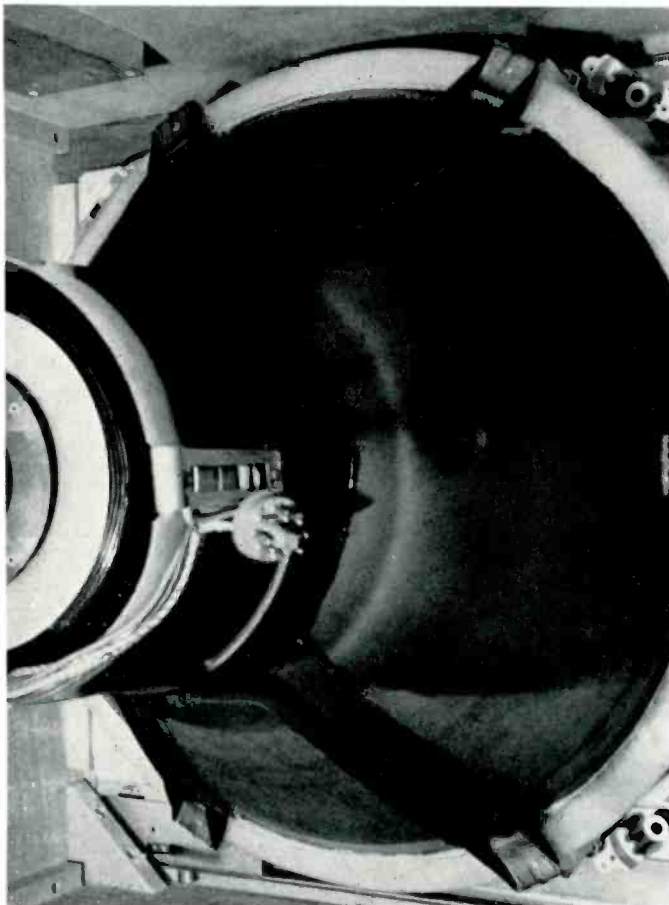
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COLOR CRT CON

21 FBP 4 Substitution For 21 AXP 22 A

Anyone who doubts that the customer gets his money's worth from the television service profession should see the early color receivers after a color expert has converted a receiver to use the latest color picture tube. It isn't often that a customer's television improves with age, but when the latest glass tube is substituted for the early metal type the



improvement in brightness, contrast range, and ease of performance is almost unbelievable.

Does it take a lot of time, is it tricky or complicated, or are there engineering changes that must be made to do it safely?

The answer to all these questions is No.

If you follow the suggestions of Ralph Johannot and Jimmy Songer of Tri-Color TV in Burbank (see photo) your biggest problem will be to substitute slightly longer mounting bolts for the original boot.

If you use the RCA Glass Conversion Kit you will find complete instructions, hardware, and latest style yoke adapter to simplify the job. A word of warning on the RCA Kit: This kit was brought out when the 21CYP22 (A) was the latest improvement. Servicemen will find that the 21FBP22 will provide tremendous advantages over the already improved—CYP type.

As shown in the Photo Tri-Color cut out the segments of the boot to provide space for the slightly rounded bell of the glass replacement. Now, several conversions later, they advise that the top and bottom sections do not need to be cut out, saving a few minutes more.

Servicemen who are tempted to replace a metal with a metal color CRT might remember that purity, convergence, and tracking are much more simple with the glass bottle than with the metal, and any lost time on adapting the glass tube is more than recovered in the better and easier setup of the completed job. Then there is the owner's side: Who ever heard of a customer that wouldn't appreciate the unexpected bonus of "double the brightness in a seven year old receiver"?

A final point: The new tube will show a lot more of everything than the old dim job: It just won't deliver the ultimate unless the tubes, controls, and adjustments are carefully checked and up-graded.

VERSION SERIES:

Quite a number of service shops in Southern California have furnished data on color CRT conversion of the CTC-7 chassis. Bob Albright of Allbrite TV has added some refreshments and his suggestions are outlined here.

MECHANICAL:

The mounting retaining ring tends to be in the vicinity of the High Voltage (Ultor) connection, and as shown in the photo Bob cuts out a 5" segment of the ring to remove any danger of corona or arc-over. Since the ring is very sturdy, adequate mechanical rigidity remains to hold the CRT under all conditions Bob has encountered.

The 21CYP22 required a dual Ultor connection with a resistor connected between the plugs. Since the 21FBP22 requires only one connection the resistor and extra plug are removed. Bob mentions that the only problem he has encountered subsequent to a conversion is one of corona if he uses the original "hook" connector. He recommends that a smooth "rosebud" type anode connector be substituted.

The 21FBP22 offers greater contrast range and Bob suggests that a slight circuit revision be made to take advantage of this and also improve the already easy tracking procedure. This change consists of disconnecting the green and blue cathode leads (yel-grn and yel-blue) from the original tie points on the tube cap assembly and reconnecting them to the red cathode lead (yel-red) terminal. He points out that some servicemen have attempted to accomplish the same thing by simply strapping the three connections together. Don't do it: It isn't the same, as you will see if you examine the schematic, and you can expect no result to "smear" the picture slightly.

Many servicemen report excellent results without making the change outlined above, which speaks well for the improvement, but Bob says that if you do make the modification and then change back you will be convinced.

What about convention maintenance work when the CRT conversion is done?

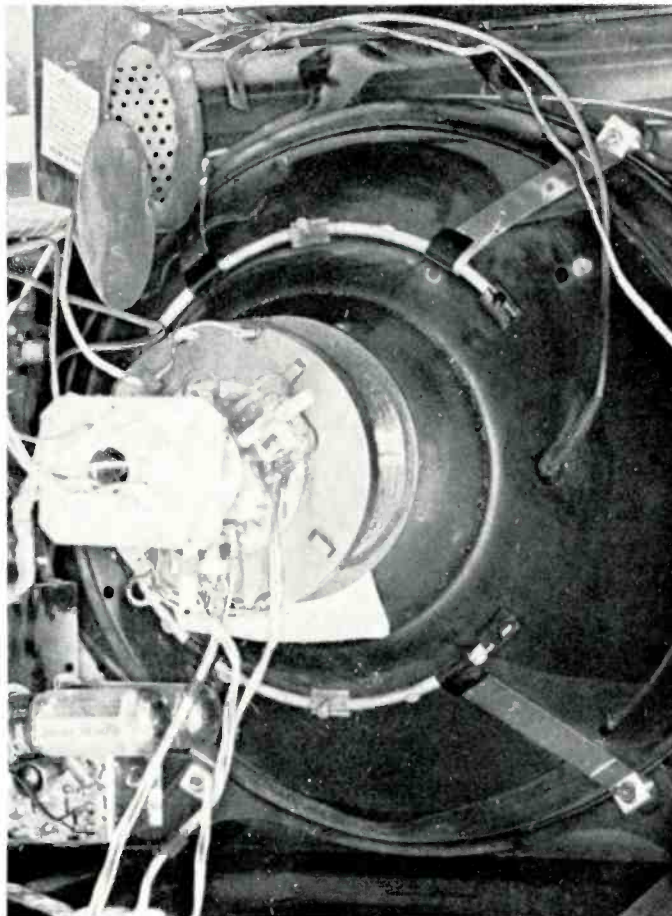
Again quoting Bob, be sure to check the adjustment of the Efficiency (Linearity) coil system. Most of the receivers he had modified have been out of adjustment and he has been able to reduce plate current through the horizontal output by as much as 20 milliamperes.

Bad sockets on the PC boards have been the outstanding problem with the CTC-7 series. Wax from the power transformer tends to run down thru the 12BY7, NAW8, and 6AQ5 sockets. Don't try to repair the original sockets, but install improved replacements to

permanently solve the problem.

Some servicemen might prefer to use parts of the RCA conversion Kit for this job, because the yoke liner and cover would change the yoke holder to the type in the current use which clamps the yoke to the neck of the CRT rather than mounts it to a separate harness. Others will find that there are a number of ways to use parts of the early boot material to insulate the mounting ring and prevent corona.

The fact that all experienced servicemen appear to be in agreement on is the extent of the improvement: They all say "Much better."





How To Talk

ANTENNAS TO YOUR CUSTOMERS

By ROBERT D. RAYNOR, President
Clear Beam Antenna Corp.

This is the final part of the Antenna Talk series by Robert D. Raynor, President of Clear Beam Antenna Corp. During the past months we have received numerous comments on this series and want to take this opportunity to thank Mr. Raynor for his fine articles.

3. When your customer agrees, you step out to the front of the house and make as close an inspection as you can **WITHOUT GOING UP ON THE ROOF**. Fill out the check form completely, including the lower right hand portion, which gives an estimate of the replacement cost.

Be sure to use the form and to fill it out completely. It serves to make the inspection and your recommendation more official and has the added benefit of permitting you to offer a quotation on the same sheet. When you are finished, explain the points you have checked off in the "Worn Out" column and particularly the effect they have on the TV picture. If your customer wants to wait and "talk it over with my husband" you can leave the sheet with her. Remember, many husbands have an attitude that service people try to sell unnecessary repairs to women. With the Check Up sheet your customer's husband can go out and "see for himself" that the antenna is worn out . . . and will have an explanation of why.

Being technically oriented, you will not have too much difficulty in explaining why an antenna is necessary, how it works or why it should be replaced. You may, however, feel a little strange about opening what might be considered a sales talk or how you can close the conversation on a sale. Here are a few sentences which you might try out on your customers to see if you feel natural saying them. They'll help you get started and help you build sales. After you've tried them, try developing a few of your own.

OPENING SENTENCES

- . . . how long have you had your present antenna?
- . . . that's about the best adjustment I can get at the set . . . how old is your antenna?
- . . . I notice Channel — isn't coming in too well . . . which is probably because of the antenna. Would you like me to check it?
- . . . The picture isn't as sharp as it could be, Mrs. Jones . . . but with an indoor antenna it's about the best I can do . . . Have you ever tried an outdoor antenna?
- . . . As I walked up to the house I noticed that you do not have an FM antenna . . . how's your reception? (Turn on set and get into discussion of how many stations she is receiving and how clearly.)

CLOSING SENTENCES

(or how to ask for the order:)

- . . . I have all the materials with me. Would you like me to install it now?
- . . . Would you like me to replace the entire installation or just the necessary parts?
- . . . Would you like me to replace it with one just like it or would you prefer one of the newer types with dura-gold protection?
- . . . If you like to save the installation cost I can offer a complete kit and you can have your husband put it up . . . or if you'd rather not bother him I can do it for you now. Which do you prefer?

Considering the number of hours you watch TV each week, Mrs. Jones, a new antenna . . .

- . . . is like an investment in your entertainment . . . or costs about the same as taking your family to the movies . . . or costs only 2¢ a day for the next three years.

Would you like to install it while I am here?

AND THAT'S HOW EASY IT IS

To sum it up and help you keep it in mind, remember:

LOOK UP

- . . . At your customer's antenna before every service call. See if there are missing or sagging elements, corrosion or other signs of worn out antenna. Check also for an FM antenna and if there are one or two antennas.

TALK UP

- . . . Ask your customer if she'd like a free TV antenna check up. Explain how an antenna loses up to 50% of its efficiency after three years. Explain how much clearer their TV picture will be with a new antenna.

PUT UP

- . . . Carry antennas with you on your truck and make the sale right on the spot . . . or sell a Do It Yourself Antenna Kit. Remember the possibility of selling an FM antenna or an antenna for the second set.

So to increase your antenna sales . . . and give your customers better service . . .

LOOK UP — TALK UP — PUT UP

CSEA Chapter Established in San Francisco

In a meeting on December 12th, at the Union Hall in San Francisco, 50 Independent Television Service Dealers formed a new chapter of the California State Electronics Association.

These same men formerly comprised the San Francisco Television Service Guild and have disbanded that group in favor of the CSEA chapter affiliation.

President of the new chapter is Jack Phillips of Jack's Mobile TV and he has announced that there will be a charter night scheduled as soon as possible. The charter actually goes into effect on January 1st.

Although a chapter of CSEA the group will be known as the San Francisco Television Service Dealers Association.

TEN YEARS OF COLOR SCHEDULED FOR HURLEY'S LONG BEACH JAN. 29

Fred Newton, manager, announces that arrangements have been completed to hold a Color Jamboree January 29th. The whole store will be given over to displays, demonstrations, and booths for the evening.

Field engineers, factory people, and manufacturers will be on hand to meet the members of the service profession. Naturally the latest in equipment and accessories will be featured and servicemen will be able to discuss questions and problems with specialists in many types of products.

Hospitality will include beverage and food, and door prizes will be drawn from registration cards. Invitations will be extended by sales and store personnel and all members of the profession, who plan to attend are urged to RSVP.

"WHICH ONE ARE YOU?"

Some members are like wheelbarrows

—No good unless they are pushed.

Some are like canoes—They need to be paddled.

Some are like kites—If you don't keep a string on them, they blow away.

Some are like footballs—You can't tell which way they will bounce next.

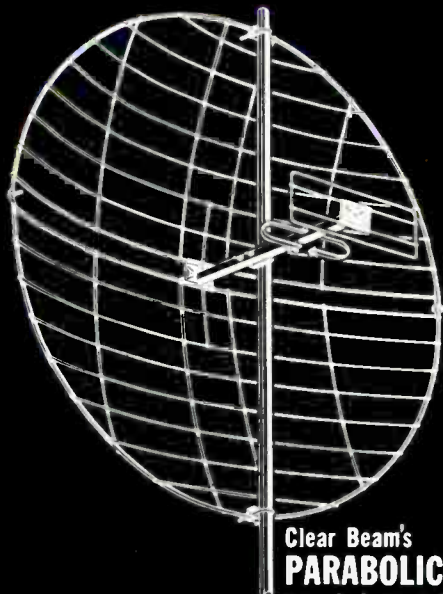
Some are like balloons—Full of wind and likely to blow away unless handled carefully.

Some are like trailers—No good unless pulled.

Some are 100% members—In regular attendance and very cooperative.

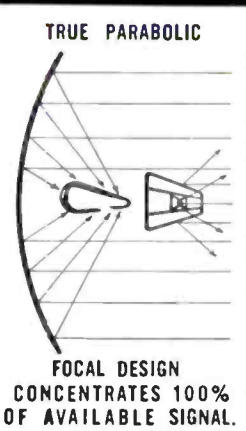
"WHICH ONE ARE YOU?"

Most POWERFUL UHF FRINGE ANTENNA EVER!



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PARABOLIC
Model P-100

New, from Clear Beam UHF Research



Focusing screen
selects directional signal
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Unique parabolic "big screen" design, single dipole feature, and all metallic construction provide maximum performance even in the toughest fringe and translator UHF areas. Prevents signal loss caused by weather deterioration and phasing harness mismatch. Preassembled screen and dipole for fast, strong installation! Up to 18 db gain. *Proven the most powerful UHF antenna ever designed!*

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Tarzian offers a 12-month guarantee against defective workmanship and parts failure due to normal usage. And, compare our cost of \$9.50 and \$15 for UV combinations. There is absolutely no additional, hidden charge, for **ANY** parts except tubes. You pay shipping costs. Replacements on tuners beyond practical repair are available at low cost.

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NEW G.E. TV SETS TO FEATURE SCHEMATIC ON EACH SET

SYRACUSE, N.Y.—To help TV servicemen complete home calls faster and more profitably, General Electric is packing an up-to-date, highly readable schematic diagram with each receiver in its 1964 line.

The schematic is permanently attached to the cabinet back. When a convenient mounting surface is lacking, it is included with the user manual as a separate sheet.

In announcing this service aid, P. D. Wexler, Product Service Manager for the Television Receiver Department here, noted that "a major factor contributing to time-consuming and thus unprofitable home service calls is the lack of an immediately available, current service schematic for the receiver being checked."

"And it just isn't practical to carry every necessary schematic on every call," he added.

"Now by supplying a schematic with each receiver, servicemen working on current and future GE sets can experience profitable time savings on home calls plus more satisfied customers whose sets can be accurately analyzed and serviced on the first home visit."

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USED—TV'S

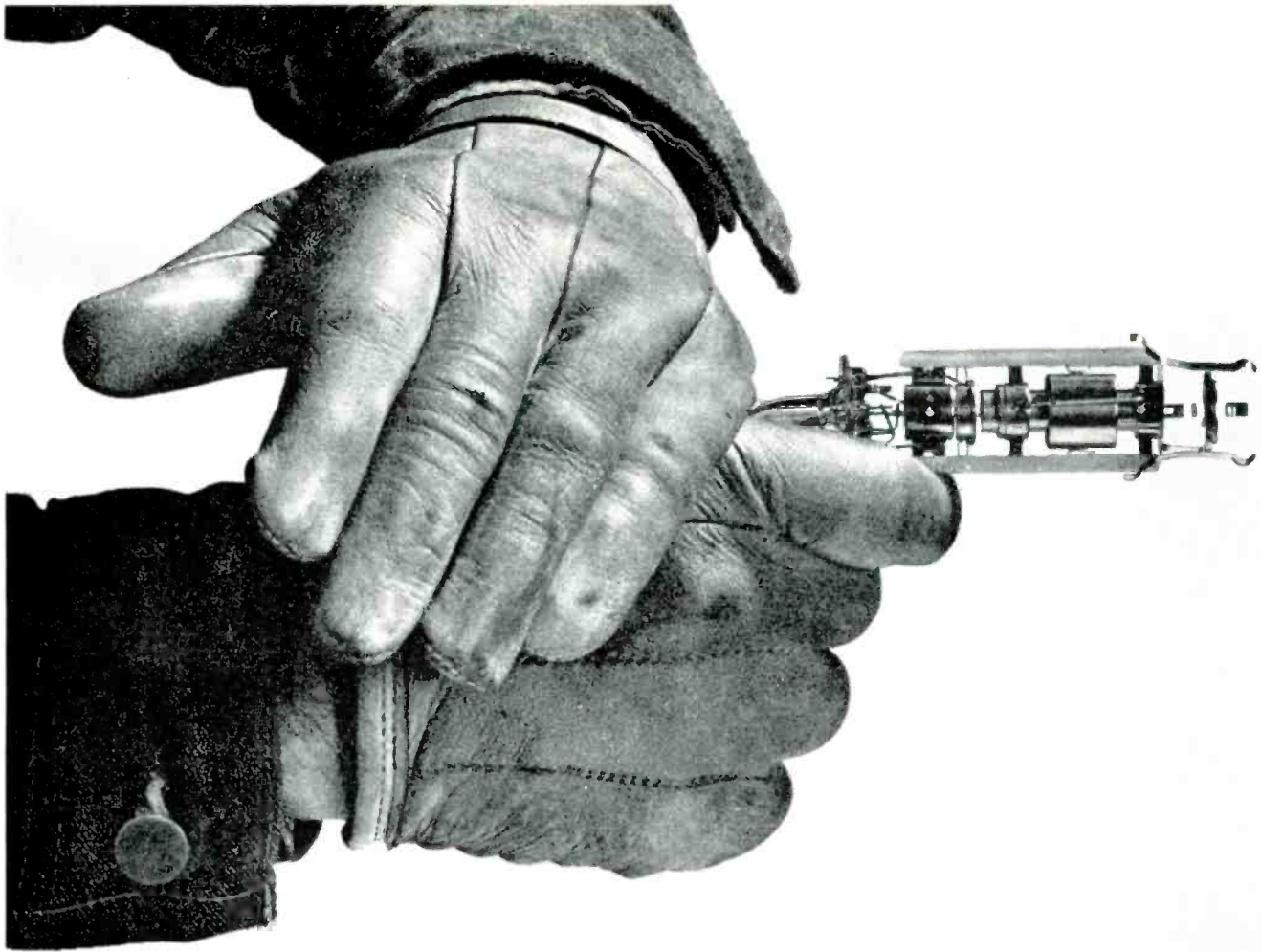
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This straight shooter never gets trapped

G-E "SG" straight gun picture tubes* do away with ion traps. No fuss, no call-backs. A G-E "SG's" rugged gun fires electrons with uncanny precision straight at the aluminized phosphor screen—assuring sharply resolved pictures up to 80% brighter. How's that for "Accent on Value"? These features save your time and give your customers thousands of hours of viewing pleasure.

And that's not all the value accents you get with these "straight shooters." A single G-E "SG" picture tube replaces as many as twenty other types, bent gun or straight gun—the types that get "trapped." In fact, with only 25 G-E "SG's", you're ready to replace 250 other picture tube types. You'll serve customers faster—and say *good-bye* to emergency pick-ups and the ion trap nuisance.

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GET THIS "ACCENT ON VALUE" BONUS, TOO!



This 16" x 12" x 1/2" polyurethane foam bench pad neatly protects the picture tube from marks and scratches. The handy pad's yours with the purchase of a G-ESG-21FLP4 Service-Designed "straight shooter." Your

reliable General Electric distributor is waiting for your order now. Call him today. General Electric Company, Distributor Sales, Electronic Components Division, Room 3018, Owensboro, Kentucky.

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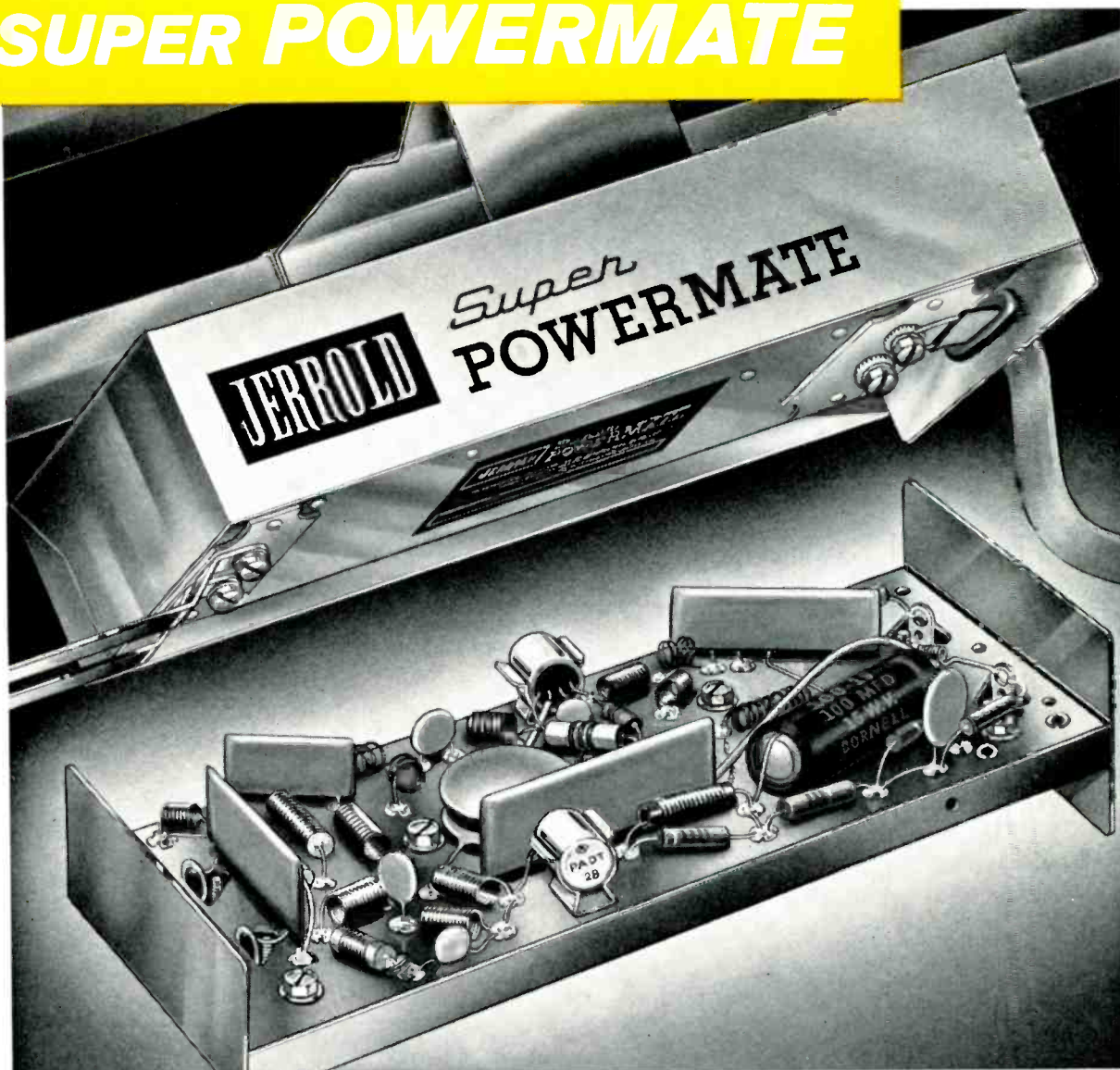
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NEW TWIN-TRANSISTOR SUPER POWERMATE

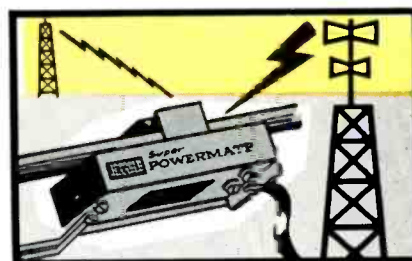


BREAKS THE GAIN/OVERLOAD BARRIER

Servicemen and the public long wanted it, but were told they couldn't have it—a transistorized TV antenna preamplifier with the overload capacity to handle local signals without sacrificing the gain that brings in distant stations.

But Jerrold did what couldn't be done. With the new twin-transistor SUPER POWERMATE, you have, for the first time, a transistor preamplifier with the high gain and low noise figure that made the original Jerrold Powermate famous—plus an unprecedented overload capability for local-signal situations. SUPER POWERMATE offers a gain range from 15.5db with 700,000 μ v max. output at Channel 2, to 11.3db with 200,000 μ v max. output at Channel 13. There are no tubes or nuvistors to replace. And frequency response is fantastically flat—a boon to color TV.

Sell new SUPER POWERMATE, the all-channel antenna preamplifier with G/O—the industry's best Gain/Overload capability. List \$44.95. See your Jerrold distributor or write Jerrold Electronics, Philadelphia 32, Pa.



GAIN to reach far-distant stations, OVERLOAD capability to prevent local-signal interference.

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