SYLVANIA NEWS

Technical Editor
R. A. Humphreys

TECHNICAL SECTION

August 1969 VOL. 36—ISSUE 3

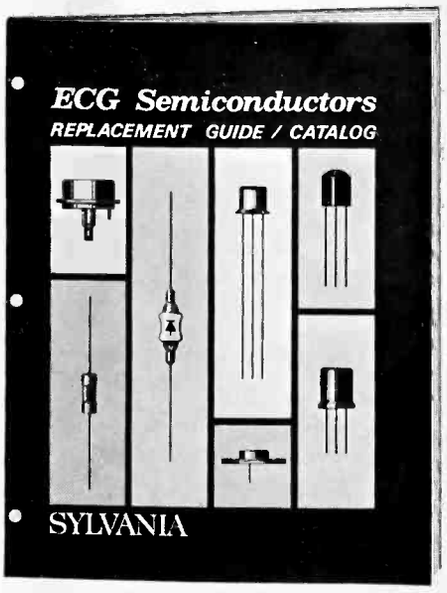
60 SYLVANIA ECG SEMICONDUCTOR TYPES REPLACE 28,000 TYPES

The advent of solid-state devices and their constantly increasing use in entertainment electronic equipment have created some problems over the years for the service technician. Once the technical know-how had been acquired which permitted isolating the set malfunction down to the defective semiconductor, the problem became one of securing a suitable replacement type. This could be especially difficult if the equipment was built by an "off-shore" manufacturer or the part number looked like a combination zip code and telephone number.

Compounding the replacement problem has been the rapid proliferation of solid-state device types, making it nearly impossible for the parts distributor or service technician to maintain a reasonably representative number of types in stock. Unless the service technician is located in an area where the particular set manufacturer has a parts depot, the time consumed in obtaining the replacement part could prove to be extensive—and irritating to both customer and technician.

To alleviate this situation, Sylvania has evolved a high-quality line of replacement semiconductor devices and made them available through the Sylvania Electronic Tube Distributors who now serve your electron tube and other parts needs. Each replacement type is prefixed by the letters ECG followed by a three-digit number. Sylvania ECG semiconductors are intended to minimize the number of replacement parts the service technician must stock and yet meet the replacement needs of the wide variety of entertainment equipment which he encounters. All 60 types of these ECG devices are available in regular carton pack or display pack.

As an invaluable aid in finding the Sylvania semiconductor device to fill your particular replacement need, we have just completely revised the **Sylvania ECG Semiconductor Replacement Guide/Catalog,** identified as ECG212B, which cross references approximately 28,000 JEDEC types and manufacturers' part numbers to the Sylvania semiconductor replacement type. This 67-page guide is now the most comprehensive in the industry and will be periodically revised as the need arises; it is available from Sylvania Electronic Tube Distributors.



Also recently introduced is a solid state repair kit, the ECG303, containing the new ECG212B Replacement Guide and 24 of the most commonly used semiconductors from the replacement line —packaged small enough to fit into your tube caddy and replacing about 15,000 types. Rounding out the line is a group of accessories, which includes such items as transistor sockets, pilot lamp assemblies, miniaturized circuit breakers, etc.

Brief descriptions of the ECG replacement semiconductors and their technical data are provided on the following pages.

technical data / TRANSISTORS

MAXIMUM RATINGS AT 25° C AMBIENT UNLESS OTHERWISE NOTED

Type	Description	Applications	Collector-Base Voltage (BVCBO)	Collector-Emitter Voltage (BVCEO)	Base Emitter Voltage (BVEBO)	Max. Collector Current	Max. Collector Dissipation	Typical Current Gain (H_{FE})	Package Basing
ECG100	PNP-Germanium	RF Amp, Oscillator, Mixer, IF Amp of AM Radios	25V	20V (CER) min	20.0V	300 Ma	150 Mw	40 (at 455 KHz)	TO-5
ECG101	NPN-Germanium	RF Amp, Oscillator, Mixer, IF Amp of AM Radios	25V	20V (CER) min	20.0V	300 Ma	150 Mw	40 (at 455 KHz)	TO-5
ECG102	PNP-Germanium	Audio Driver, pre-amp, Power Output	30V	16V (CER) min	20.0V	250 Ma	150 Mw	90 (at 1 KHz)	TO-5
ECG103	NPN-Germanium	Audio Driver, pre-amp, Power Output	30V	16V (CER) min	20.0V	250 Ma	150 Mw	90 (at 1 KHz)	TO-5
ECG104 ECG104MP	PNP-Germanium Matched Pair of ECG104	Audio Power Output	50V	35V (CER) min	20.0V	7 Amps	90 Watts	90	TO-3
ECG105	PNP-Germanium	Audio Power Output	50V	35V (CER) min	20.0V	15 Amps	100 Watts	90	TO-36
ECG106	PNP-Silicon	RF Amp, Oscillator, Mixer, IF Amp, All Band and FM Radios	35V	15V min	1.0V	75 Ma	250 Mw	20 min	TO-18
ECG107	NPN-Silicon	RF Amp, Oscillator, Mixer, IF Amp in UHF and VHF Applications	35V	15V min	1.0V	75 Ma	250 Mw	20 min	TO-92
ECG108	NPN-Silicon	RF Amp, Oscillator, Mixer, at VHF, UHF, IF Amp, Video Amp	35V	15V min	0.5V	75 Ma	250 Mw	10 min	RO-97A
ECG121 ECG121MP	PNP-Germanium Matched Pair of ECG121	Audio Power Output for Stereo and Hi-Fi, etc.	65V	45V (CER) min	15.0V	7 Amps	90 Watts	80	TO-3
ECG123	NPN-Silicon	Audio Pre-Amp, Driver, Video Amp, Sync Separator	30V	20V	5.0V	500 Ma	500 Mw	180	TO-5
ECG124	NPN-Silicon	High Voltage Audio Power Output for 120 Volt Line Operated TV, Phono, Stereo, etc.	300V	300V	5.0V	400 Ma	10 Watts	140	TO-66
ECG126	PNP-Germanium	RF Amp, Oscillator, Mixer, IF Amp for All Band Radios and VHF Service	25V	25V	2.0V	200 Ma	200 Mw	60	TO-24
ECG127	PNP-Germanium	Horizontal and Vertical Deflection Amplifiers—Audio Power Output	350V	350V (CES)	2V	10 Amps	56 Watts	15 Min.	TO-3
ECG128	NPN-Silicon	Audio Pre-Amp, Driver Output Video Amplifier	100V	80V (CER)	7V	1.0 Amps	1 Watt	90	TO-5
ECG129	PNP-Silicon	Audio Pre-Amp, Driver Output Video Amplifier	100V	80V (CER)	7V	1.0 Amps	1 Watt	90	TO-5
ECG130 ECG130MP	NPN-Silicon Matched Pair of ECG130	Audio Power Amplifier	80V	60V (CER)	5V	15 Amps	115 Watts	40	TO-3
ECG131 ECG131MP	PNP-Germanium Matched Pair of ECG131	Audio Power Output Auto Radio, Auto Stereo Tape Players, etc.	32V	20V	10V	3 Amps Peak	6 Watts (63°C)	110	Similar to TO-66
ECG152	NPN-Silicon	Audio Power Output	60V	60V	5V	3 Amps	40 Watts	60	"P-66" (Plastic)
ECG153	PNP-Silicon	Audio Power Output	60V	60V	5V	3 Amps	40 Watts	60	"P-66" (Plastic)
ECG154	NPN-Silicon	Color/BW TV Video Output Amplifier	300V	300V	7V	50 Ma	1.0 Watts (25°TA) 7.0 Watts (25°TC)	100	TO-39
ECG155	NPN-Germanium	Audio Power Amplifier	32V	20V	10V	3 Amps Peak	7.5 Watts	110	Similar to TO-66

FIELD EFFECT TRANSISTORS—N—Channel Junction Types

Type	Application	Trans-Conductance (μMhos)	Drain Source Voltage VDS (Volts)	Current (MA d.c.)	Gate-Source Breakdown Voltage V(BR) GSS (Volts)	Gate Reverse Current IGSS (nA d.c.)	Zero-Gate Voltage Drain-Current IDSS (mA d.c.)	Total Device Dissipation (MW)
ECG132	R.F. Amplifier and Mixer into the VHF Region	2000 Min. at 100 MHz	25	10 Ig	25	2	2-20	200
ECG133	General Purpose Audio Amplifier and Switch	4000 Typical	25	10 Ig	25	1	0.5-15	300

DIODES and RECTIFIERS

TYPE	DESCRIPTION
ECG109	Germanium general purpose 75 volt P.R.V.
ECG110	Germanium matched pair
ECG111	Silicon UHF TV mixer diode
ECG112	Silicon UHF TV mixer diode
ECG113	Selenium dual diode common cathode TV horizontal AFC
ECG114	Selenium dual diode series connected TV horizontal AFC
ECG115	Selenium dual diode common anode TV horizontal AFC
ECG116	Silicon rectifier 600 volt P.R.V. 1.00 amp (d.c. resistive)
ECG117	Silicon rectifier 600 volt P.R.V. 1.0 amp (d.c. resistive) max
ECG118	Selenium color TV focus rectifier—peak reverse voltage 6500
ECG119	Selenium color TV boost rectifier—peak reverse voltage 800, d.c. output current, 2 MA resistive
ECG120	Selenium color TV convergence rectifier—peak reverse voltage 18 V, RMS volts 12, output current 65 MA
ECG125	Silicon rectifier 1000 volt P.R.V. 1.0 amp (d.c. resistive)

ZENER DIODES (1 Watt ± 10% Voltage Tolerance)

Type	Nominal Zener Voltage V_Z at I_{ZT} (volts)	Test Current I_{ZT} (Ma)	Zener Impedance Z_{ZT} at I_{ZT} (ohms)	D.C. Zener Current I_{ZM} (Ma)
ECG134	3.6	69	11.0	252
ECG135	5.0	50	8.0	182
ECG136	5.6	45	6.0	162
ECG137	6.2	41	3.0	146
ECG138	7.5	33	6.0	120
ECG139	9.1	28	6.0	95
ECG140	10.0	25	7.0	85
ECG141	11.5	22	9.0	78
ECG142	12.0	21	10.0	76
ECG143	12.8	19	11.0	73
ECG144	14.0	18	13.0	65
ECG145	15.0	17	15.0	56
ECG146	27.0	9.5	36.0	30
ECG147	33.0	7.5	46.0	26
ECG148	55.0	4.5	110.0	16
ECG149	62.0	4.0	126.0	13
ECG150	82.0	3.0	200.0	10
ECG151	110.0	2.3	450.0	7.2

ECG122	Silicon Controlled Rectifier (Shipped Complete With All Mounting Hardware)	Continuous and Peak Forward and Reverse Blocking Voltage Continuous Anode Forward Current at or Below 70°C Case Temp. Average Anode Forward Current (180 Conduction Angle) at or Below 70° Case Temp. Peak Anode Surge Current (60 Hz—1/2 Sinewave) Gate Trigger Current (Max). Gate Trigger Voltage (Max). Holding Current	200 Volts 7.0 Ampere 5.0 Ampere 100 Ampere 25 Ma 4.0 Volt 25 Ma Max.

LINE OF LINEAR INTEGRATED CIRCUITS AVAILABLE FOR THE HOBBYIST AND EXPERIMENTER

Sylvania is now marketing a family of the latest in linear integrated circuits which feature many possible applications for a variety of electronic projects. The miniature package size and low power requirements ideally adapt them for use in construction of battery-powered portable equipment. A booklet which provides a complete description, schematic, electrical characteristics, and a number of applications is packaged with each integrated circuit. These integrated circuits are available from your nearest Sylvania Electronic Tube Distributor. A brief description and some of the applications for each circuit are provided here.

ECG 370 AGC/Squelch Amplifier The ECG 370 is a direct-coupled monolithic amplifier which utilizes an external DC voltage to control gain. In addition to communication system squelch and AGC applications, the ECG 370 is useful as a constant-amplitude audio oscillator, linear low frequency modulator, single-

sideband automatic load control, and as a variable DC gain element in analog computation.

ECG 371 RF/IF Amplifier—The ECG 371 integrated circuit is a monolithic RF-IF amplifier capable of emitter-coupled or cascade operation from DC to 250 MHz. Other applications of the circuit are as mixer, oscillator, detector, and modulator.

ECG 372 AM IF Strip—The ECG 372 is a broadband AM receiver subsystem, including a high-gain amplifier, an active detector, and self-contained automatic gain control. It is intended for IF or TRF applications from 50 KHz to 2 MHz.

ECG 703 RF/IF Amplifier, Oscillator, and Mixer—The ECG 703 integrated circuit is intended for use as a limiting or nonlimiting amplifier, harmonic mixer, or oscillator useful to frequencies in excess of 100 MHz. Circuit applications include 10, 30, 100, and 200-MHz RF Amplifiers, 10.7-MHz FM IF amplifier, 10-MHz oscillator, color TV sound IF amplifier, and a 3.58-MHz injection-locked oscillator for color TV.

ECG 716 Audio Amplifier—The ECG 716 is an integrated circuit audio amplifier capable of delivering up to 250 mW of power to an 8-ohm speaker or headset. Voltage gain of X10, X20, X100, or X200 can be chosen by selection of the appropriate circuit terminals.

BULK RATE
U.S. POSTAGE
PAID
Permit No. 3402
Buffalo, N.Y.

SYLVANIA NEWS
SYLVANIA
ELECTRIC
Products Inc.
1100 Main St.
Buffalo, N.Y.
14209

A

David E. Zarin
11905 Ivahar Street
Wheaton, Md. 20902

"RETURN REQUESTED"

Printed in U.S.A.

SYLVANIA NEWS

Technical Editor
R. A. Humphreys

TECHNICAL SECTION

February 1969 VOL. 36—ISSUE 1

Measurement Of Color TV High Voltage

by

W. J. Sember

High Voltage - - Care and Caution

Color TV sets have one control which has not been seen for quite a while on monochrome TV. Variously called the HV Adjust, Horizontal Adjust, or just plain HV, its function is to adjust the high voltage to the manufacturer's recommended values. This control **should never be used to restore brightness to an aging picture tube.** The recent publicity on X-radiation has brought to everyone's attention that color sets can produce measurable soft X-ray radiation; in fact, any time electrons are accelerated by a voltage exceeding 16 KV, it is possible to produce X-rays; and the higher the voltage, the greater the likelihood of X-rays being produced. Color sets leaving the factory are tested from the radiation standpoint to insure that the design meets radiation requirements **so long as the manufacturer's recommended voltages are not exceeded.** The easiest way for the serviceman to assure his customers that their sets have not degraded from the radiation standpoint is to make sure that the high voltage is still at the manufacturer's recommended setting.

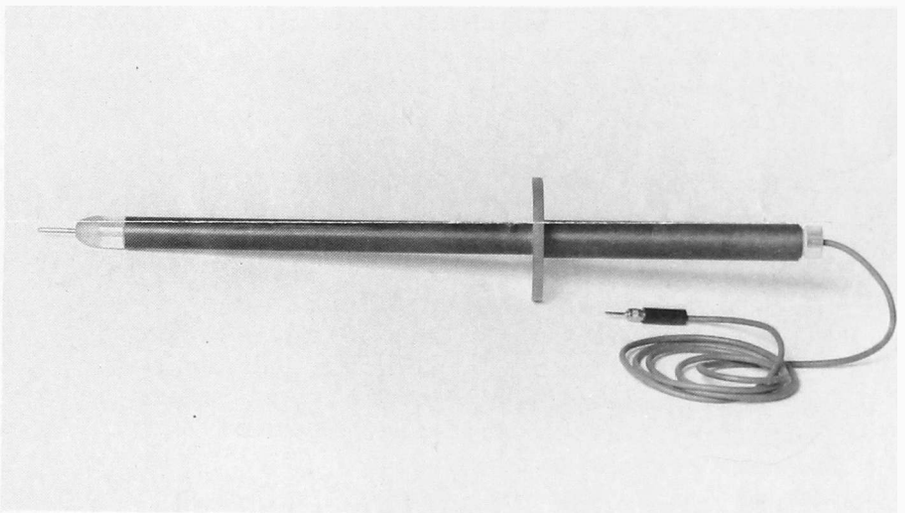


Figure 1. H V Probe

Why A High Voltage Control?

Modern black and white sets do not have any means of adjusting the high voltage. If the screen was dark and a pulse was available at the top cap, you replaced the 1B3 and that usually cleared up the trouble without any further adjustments. However, these sets usually operated at an anode current of 100 to 200 μa and roughly 18 to 20 KV, and it did not matter much whether the high voltage "squatted" slightly at high beam currents, since this only resulted in a slight loss of brightness. The total power drain taken from the horizontal output stage by the high voltage amounted to only about four watts, and changes in this would not adversely affect scan or component life. It is possible, with this relatively low power drain, to design the flyback system to take into account normal production tolerances on components and still provide satisfactory performance.

On the other hand, the energy-absorbing shadow mask in a color picture tube dictates high beam currents and second anode voltages to produce satisfactory bright-

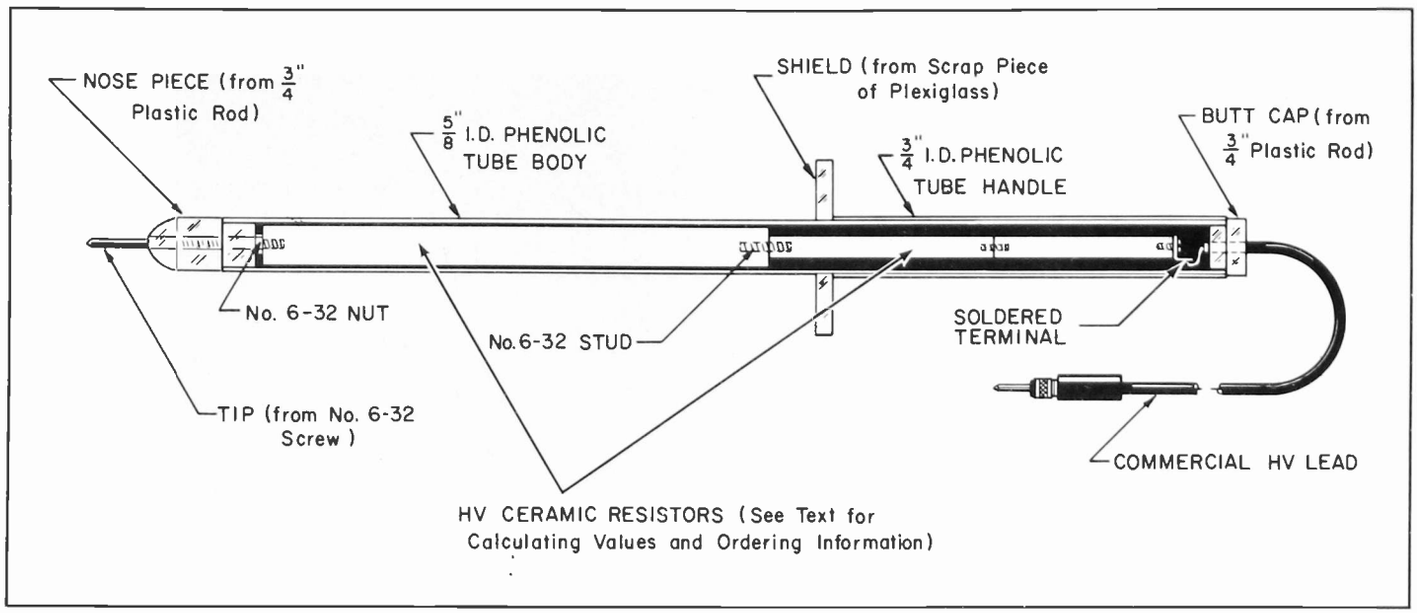


Figure 2. Cross-Sectional View of HV Probe

ness at the picture tube screen. The average 23-inch color picture tube operates at 25 KV and 1 milliampere of total anode current in the three guns; this is a total of 25 watts of power consumed in the high voltage. This power must come from the horizontal deflection stage, and to design a "stiff" system to support this amount of power would mean that the deflection system alone would have to be as large physically as most modern color sets. The color picture tube requires a relatively-constant high voltage to prevent purity, focus, and convergence problems, so the obvious answer is a regulator (see **Sylvania News**, December, 1967 and February, 1968: "Color TV—High Voltage Regulation," by L. J. Songer and C. Droppa) to keep the high voltage relatively constant with changes in beam currents and loading on the flyback. A regulator system entails more components (with their tolerances) than a black and white flyback system, and the least expensive way of handling these tolerances in production is the use of a high voltage control which can be factory adjusted to a specified value of high voltage.

The high voltage control usually is capable of quite a wide range of adjustment, (eight to ten KV centered around the design voltage of the receiver) hence the serviceman should be careful while adjusting this control. In sets using a shunt regulator, high voltage may increase with life, so it is safe to turn the high voltage control **down** if snapping and arcing indicate that the high voltage is excessively high, but the control should **never** be turned up unless a meter is available to set the voltage to the recommended value for the receiver. Excessively high voltage not only can produce X-rays, but it will almost certainly guarantee short life for the components in the horizontal deflection system, since most of these systems are very closely designed.

Meter Required

Although several high voltage probes are presently available on the market, it is possible to construct your own to use with a commercial meter which you may already have. Any meter having an internal resistance of 20 K ohms per volt or higher can be adapted to measure the high voltage of present-day color sets if enough resistance is added externally to take care of the excess voltage above the highest range designed into the meter. For example, if you have a 20 K ohm per volt meter with a 3 KV scale, this can be easily converted to a 30 KV full scale by the addition of 540 M ohms in an external probe.

The calculation for determining the required resistance is shown in the following example. Remembering that a 20 K ohm per volt meter needs a current of 50 μa for full scale deflection, use ohms law to determine the required resistance.

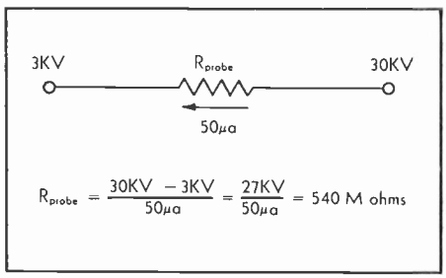


Table One

Meter Resistance Ohms/Volt	Converts Full Scale KV	To KV	Probe Resistance M Ohms
20,000	5	50	900
20,000	6	60	1080
50,000	3	30	1350

SYLVANIA NEWS

Editor
D. James McCue

PROMOTION SECTION

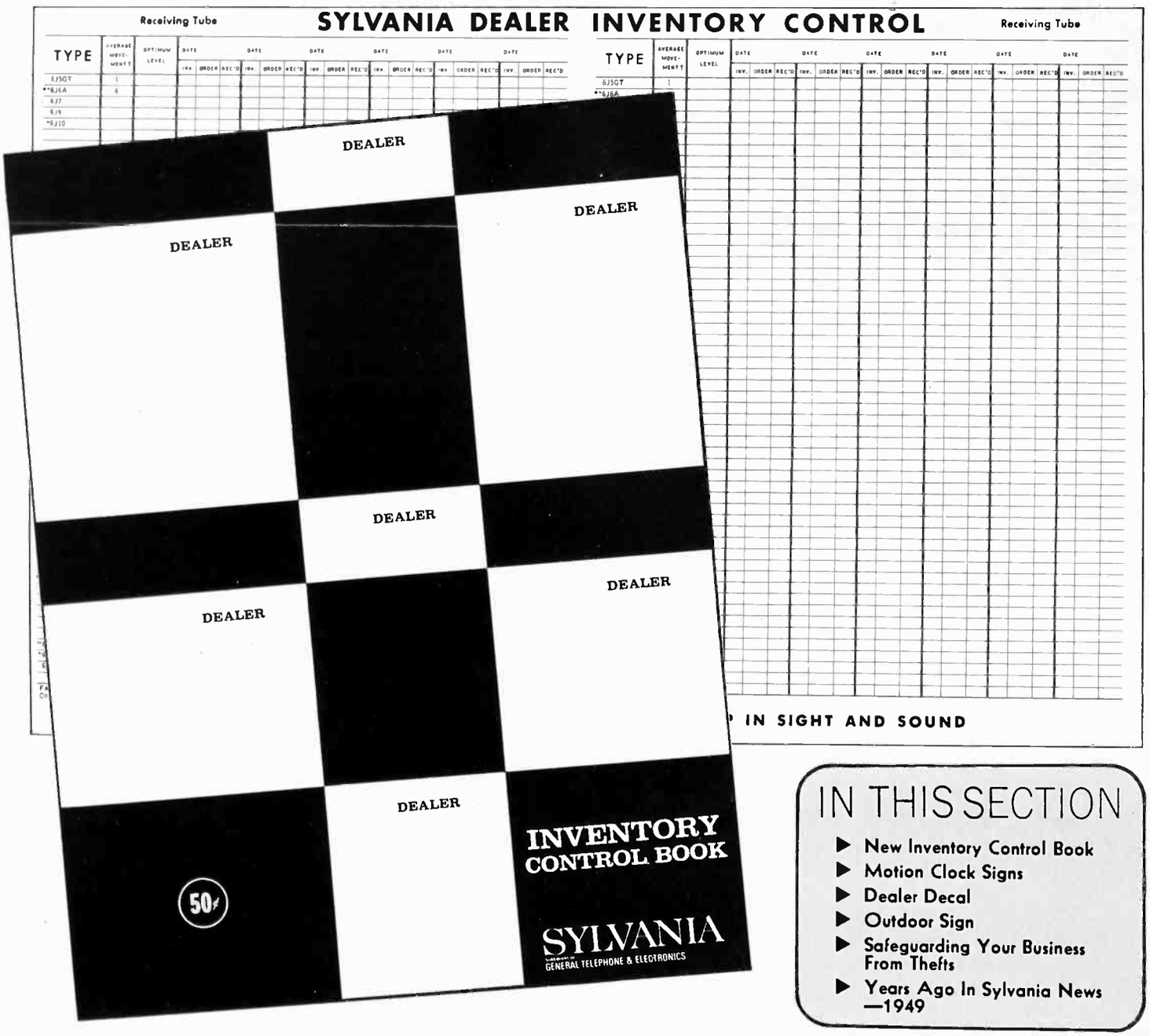
February 1969 VOL. 36—ISSUE 1

Get Organized!

With Sylvania's New Inventory Control Book

The new Dealer Inventory Control Book will help you maintain an accurate, up-to-date, organized accounting of your quality Sylvania receiving tubes. All Sylvania tube types currently available are listed alpha-numerically with ample space provided for inserting any new types that are added during the year. To further assist you busy dealers, we have clearly indicated all the color types and fastest moving types with special markings.

Each book contains a detailed inventory procedure explanation. These books provide a workable, easy-to-use method of inventory control—if you use them! ET-1856



IN THIS SECTION

Safeguarding Your Business From Burglary and Robbery Loss

Burglary: Any unlawful entry to commit a felony or a theft even though no force was used to gain entrance.

Robbery: Taking anything of value by force, violence or use of fear.

Small stores are prime targets for burglars and hold up men. Seeking dark and easy-to-enter stores, burglars usually operate at night. Attracted by careless displays of cash, holdup men often strike at opening or closing time or when customer traffic is light.

Because you could be the next victim, you should be aware of the precautionary measures that are available to lessen the possibility of robbery or burglary.

Locks

Using the right kind of lock is extremely important. In addition to being an obstacle to unwanted entry, a strong lock requires a burglar to force his way into the store. Under standard burglary insurance policies, a **forced entry is necessary to collect on burglary insurance.**

Most experts on locks agree that the **Pin-Tumbler Cylinder Lock** provides the best security. They are made with 3 to 7 pins but locksmiths report that a burglar can easily pick a lock with less than 5 pins. (There are few non-pin tumbler locks that give high security.)

Dead bolt locks should be used since they cannot be opened by sliding a piece of flexible material between the door edge and door jamb. When you use a double cylinder dead lock, the door cannot be opened without a key on either side. This means that on a glass door there is no handle for a burglar to reach by merely breaking the glass.

Safeguarding entrance ways, especially the rear door, cannot be over emphasized. Because many burglars favor back doors, they should be barred as well as locked.

Key control of course is important. To keep keys from falling into the hands of burglars, issue as few keys as possible, keeping a record of all keys issued. **Don't use a key chain with a tag carrying the store's address.**

Burglar Alarms

The silent central-station burglary alarm system gives your store the best protection. The reason: it does not notify the burglar as does a local alarm—such as a siren or bell—outside the store. A silent alarm alerts only the specialists who know how to handle burglaries.

In large cities, central alarm systems are available on a rental basis from private firms in this business; in small cities, they are often tied directly into police headquarters. Part of the cost for installing a silent alarm system will sometimes be defrayed by a reduction in your burglary insurance premium.

Although a building-type local alarm is cheaper and easier to install, it too often only warns the thief and is not considered by specialists to be as effective as a central stations alarm. Of course, if no central alarm service system is available, or such an alarm is not economically feasible, then by all means install a building alarm.

Your Safe

Insurance companies recognize the E Safe as adequate for most merchant risks. Most insurance companies give a sizeable reduction in premiums for use of the E Safe which, over the years, can pay for the added cost. **The safe should always be bolted to the building structure.**

Other burglary preventing measures are: good lighting—**indoor and outdoor.** When a store is lighted at night the risk of burglary is greatly reduced. Leave your cash register drawer empty and open at night. A burglar is more likely to break in when a closed register is spotted. Heavy metal window screens are a good idea. They are relatively inexpensive and may be stored during business hours.

Following the precautions discussed here may prevent burglars from making **you** their next victim.

Identify Yourself As An Expert In TV Servicing

This colorful dealer decal highlights you as an expert in color TV servicing, and identifys you as the person to contact for top quality Sylvania color bright 85® picture tubes.

It adheres firmly to any smooth surface: windows, counters and trucks . . . no water required. When placed on your window, the 14" x 8¾" double face sells your services inside and out.

Made of weather and fade resistant material, this decal will last for years.

Order your supply today . . . ET-1921R—25c each.

Sylvania Motion/Clock Signs Light Up The Profit Picture

This is actually a choice of four different signs. You can select a clock (A) or motion segment (B) with either of two copy panels (1 or 2). The reverse side of the signs (3) promotes Silver Screen 85® and color bright 85® picture tubes.

These 10⅛" x 37⅛" signs are sturdily constructed of long lasting polystyrene and durable aluminum. They are made in four bright colors: yellow, red, white and black to add a cheerful note to any repair shop.

Ideal for hanging in store window or over counter (hanging chain and a font of letters for your copy are provided with each unit at no extra charge).

ET-2944—$38.50

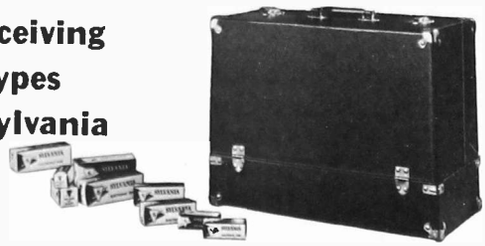
Outdoor Sign . . .

Outstanding Value!

Anyway you look at it, this outdoor dealer sign is an exceptional value. Big . . . Bright . . . Bold . . . it will lead new customers right to your door! In four brilliant colors, it measures 2½' high by 3⅓' long. The durable plexiglass facing and sturdy aluminum frame will stand up over years of outdoor use.

Three 36" high-intensity Sylvania lamps are included to assure you that your name will be up in lights for quite a while! ET-1954—$58.00.

New Receiving Tube Types From Sylvania



Type	Description
2BA2	Filamentary half-wave diode intended for service as a focus rectifier in color TV. Used by GE and Admiral.
3CX3	Compactron with rapid warmup heater cathode designed for use in color TV receivers as the high voltage rectifier. Used by GE.
4JC6A	Sharp-cutoff pentode designed for use in the intermediate frequency amplifier stages of TV receivers. Used by Magnavox and GE.
5GH8A	Sharp-cutoff pentode and a medium-mu triode used primarily for service as an oscillator in the horizontal deflection system of TV receivers. Used by RCA.
6EX6	Beam power pentode designed for use as the horizontal deflection amplifier in TV receivers. Used by GE.
6EY6	Beam power pentode used as the vertical deflection amplifier in TV receivers. Used by GE.
6JC6A	Sharp-cutoff pentode designed for use in the intermediate frequency amplifier stages of TV receivers. Used by Zenith and RCA.
6JS6C	Beam power pentode used as horizontal deflection amplifier in color TV receivers. Replaces 6JS6A and 6JS6B.
6MG8	Miniature tube containing a sharp-cutoff pentode and a medium-mu triode for use in horizontal deflection circuits and also AGC amplifier or sync separator applications. Used by Philco.
10BQ5	Beam power pentode audio amplifier designed for service in the output stage of high quality audio amplifiers. Used by Philco.
10LY8	Miniature triode-pentode containing a high-mu triode and a sharp-cutoff pentode for use as a video amplifier. Used by Sylvania.
14JG8	Duplex diode-triode used for detector and AF voltage amplifier applications. Used by GE.
17CT3	High perveance half-wave vacuum rectifier used as damper diode in horizontal deflection circuits of black and white and small screen color TV receivers. Used by GE.

New Picture Tube Types

Type	TV Set Usage
12DEP4	Motorola Magnavox Sears-Silvertone
12DFP4	RCA
12DGP4	Zenith
16DCP4A	Emerson
22ZP4	Motorola
23JHP4	Setchell Carlson

Years Ago In Sylvania News: 1949

Ban On Auto TV

When the Connecticut state legislature meets in January, a representative will introduce a bill to prohibit the installation of a television receiver in either an automobile or a locomotive. The bill will provide a penalty of a $1000 fine for offenders.

(Now, that's no laugh-in!)

INFORMATION FOR SYLVANIA TUBE TESTER OWNERS

Coletronics Service, Inc., 1744 Rockaway Avenue, Hewlett, Long Island, New York, is a source for tube data and adapters for Sylvania tube testers. Data is now available for models 139/140, 219/220 and 620.

For information concerning your particular model tube tester, fill out the convenient card and mail it to Coletronics.

Coletronics Service, Inc.
1744 Rockaway Avenue
Hewlett, Long Island, New York 11557

Please send me information regarding my Model No. Tube Tester

NAME.....

ADDRESS.....

CITY..... STATE..... ZIP CODE.....

ORDER COUPON

Order any item from your Sylvania distributor or mail this order form to:
Sylvania Electric Products Inc., 1100 Main Street, Buffalo, New York 14209

Quantity	Description		Price	Total
.....	**ET-1856**	Inventory Control Book	@ $ .50 each	.....
.....	**ET-1954**	Outdoor Sign	@ $58.00 each	.....
.....	**ET-1921R**	Dealer Decal	@ $ .25 each	.....
.....	**ET-2944**	Motion/Clock Sign	@ $38.50 each	.....

(Circle One Letter and One Number—A B - 1 2)

Include Applicable Tax $.....

Grand Total $.....

.....
NAME

.....
STREET ADDRESS

.....
CITY, STATE and ZIP

(Please Print)

The numbers can be adjusted to accommodate other meters; some samples are tabulated in Table 1. The resistance values seem quite large, but so are the voltages you are dealing with.

Construction of The Probe

The probe shown in Figures 1 and 2 was constructed using the last figures in the table for use with a 50 K ohm per volt (20 μa) meter with a full scale deflection of 3 KV. A piece of 5/8-inch I.D. phenolic tubing was used for the probe body. Any common plastic which does not absorb moisture, such as Bakelite, Lucite, or Nylon, may be used for the pieces at the ends of the probe. The circular shield for the handle was made from a piece of plexiglass 2 3/4 inches in diameter, but this dimension is not critical. The pieces at the ends of the probe were cut from 3/4-inch diameter rod. Drill and tap the nose piece to receive the No. 6-32 screw which is used for the tip of the probe. Turn down the end to fit into the phenolic tube body. Similarly, the butt cap is drilled for the HV lead and the end turned down to fit into the rear end of the tube body. The tip is made from a No. 6-32 screw which is something less than 3 1/2-inches long after the head is cut off and the tip is filed to a point. This dimension is not critical, but make sure the tip is long enough to fit under the high voltage button. Be sure to remove all threads over the exposed area of the tip. The handle may be of any substance of good dielectric quality, such as phenolic tubing. For convenience, plastic parts may be glued together; use cement sparingly.

Figure 2 shows a cross-sectional view of the probe which depicts the special high voltage resistor which is necessary to obtain high resistance in a relatively short space. The standard carbon resistor has only a 600 to 1000-volt rating, so it would take a fairly long string of high value resistors to accommodate the 25 KV of the modern color set. The special resistors used for this probe are ceramic tubing with resistance material applied in screw-thread fashion around the outside. Connection to the resistor is made via standard No. 6-32 threaded holes in the ends, and it is possible to "stack" resistance to obtain exact values. The resistor shown here is made by Resistance Products Corporation, Harrisburg, Penna., Part No. BP-6; they are available in values from 40 K ohms to 50 M ohms, $\pm 2\%$, rated at 30 KV. These resistors are handled through larger distributors at reasonable cost. The exact length of the probe will depend on the value of resistance used, so check this before starting construction of the probe.

One caution is extremely important when working with these high value resistors; **Do Not** allow bare hands to come into contact with the outside surface of the resistor. A sweaty hand can turn a 1000-M ohm resistor into 500 M ohms in a hurry, so if it is necessary to handle the resistor, use a clean, dry cloth between the hands and the resistor. Also, when soldering the wire lead to the solder lug at the low side of the probe, use excess solder on joints to keep sharp points from forming. Sharp points at these voltages can cause corona discharge and subsequent loss of high voltage. Make sure that this lead is insulated for the voltage which it will have to carry, i.e., if the 3 KV scale of the meter is being used, the lead will have to be insulated for at least 3 KV. Incidentally, if it is necessary to "trim" the value of resistance to exactly match your particular meter, conventional carbon resistors may be added to the low side of the probe for exact accuracy. Calibration should be checked against a meter of known accuracy.

Tips For Metering High Voltage

When using any high voltage metering device, it is wise to remember that you should use extreme caution. Remember to connect the ground lead **first**; if you don't, the lower end of the probe and the ground lead will have 25 KV on them after the probe contacts the high voltage, and the ground lead especially isn't insulated for this voltage.

Make sure the probe actually makes contact with the bare wire under the high voltage button. Many of the newer receivers have an oversize rubber suction cup covering the connection; considerable force is necessary to push the probe to the bare wire, but take care not to scratch the glass of the picture tube.

If you don't actually touch the wire, the meter will still read, but inaccurately, due to the electrostatic field near the wire.

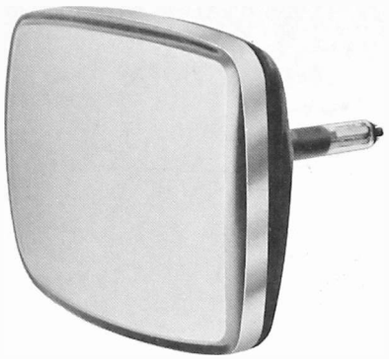
This same electrostatic field around the bell of the picture tube can cause false meter readings if it is close enough to actually affect the meter movement itself. So, unless the meter is specially shielded to be used near a strong electrostatic field, keep it away from the bell of the picture tube, the yoke, and the horizontal section, where strong fields are present.

The values of high voltage recommended by the set manufacturers are given for a dark screen condition. The easiest way to obtain this when you are behind the set is to flip the service switch. However, if the set doesn't have a service switch, it will be necessary to turn down the brightness to give a "barely visible" picture before setting the high voltage.

Finally, but by far the most important, keep your body away from grounds when using any probe to read the high voltage. The electrostatic field near the picture tube will induce a charge on the insulated parts of the probe and on your arm, similar to the charge that can build up on a hard rubber rod when it is rubbed by cat's fur. If you touch a ground, this will discharge, and while you will not get a severe shock, it could startle you into dropping the probe or meter.

It cannot be stressed too strongly, when you are making measurements or adjustments in the high voltage circuits of a color TV set, that you should treat the job with the care and respect it deserves.

NEW 12DMP4 MONOCHROME TV CHECK TUBE AVAILABLE



The 12DMP4 is the latest addition to the line of receiver check tubes innovated by Sylvania as industry firsts—the 5AXP4, 8XP4, and 8YP4. Type 12DMP4 receiver check tube is a valuable aid in servicing monochrome television receivers. Substitution of 12DMP4 for the picture tube of an inoperative receiver will usually indicate at once whether the picture tube or the chassis is at fault. Access to chassis components of very compact receivers can be improved by substitution of type 12DMP4 for a larger picture tube. Use of the check tube can often save removal and re-mounting of a large picture tube in the receiver cabinet.

Type 12DMP4 is a 110° deflection picture tube with $1\frac{1}{8}$" diameter neck, B7-208 base, and 8HR basing. An adapter is supplied with the tube for operating it in B6-185 or B6-214 sockets wired for 7FA basing. Electrically, 12DMP4 has a 6.3 volt/600 ma heater and is designed for operation with 200 to 500 volts dc on Grid No. 2 and 10 to 22KV dc on anode. Best focus is obtained within the range −200 volts to +200 volts dc on Grid No. 4. This type has no external conductive coating on the bulb, but the metal tension band around the tube and the conductive anode coating inside, form a capacitor of approximately 150 pf.

As a receiver check tube, 12DMP4 can be substituted for almost any 110° or 114° picture tube, regardless of size or type of implosion protection. Just slip the neck of the 12DMP4 into the deflection yoke, attach the high voltage lead and the socket (using the adapter where necessary), and the tube is ready to operate. Type 12DMP4 operates without an ion trap magnet.

Type 12DMP4 will work but is not recommended as a substitute for 50°, 70°, or 90° deflection types. With a proper base adapter, it will operate, but it may not produce a usable raster. The 8XP4 receiver check tube is recommended for servicing receivers using tubes with deflection angles less than 110°, and having $1\frac{7}{16}$" diameter necks.

While 12DMP4 gives its best picture at rated operating conditions, it can be used in any 600 ma or 450 ma heater string. (Cathode temperature and consequently screen brightness, will be lower in 450 ma strings). It will operate at any anode voltage and at any Grid No. 2 voltage above about 100 volts. Operation in a chassis providing 30 to 50 volts on Grid No. 2 will not harm the tube, but may produce a picture too dim to be useful. It will check operation of the focus voltage (Grid No. 4) supply, but since the tube is not sensitive to focus voltage change, several hundred volts variation may produce only a small change in appearance of the picture or pattern displayed. The receiver picture tube may not be in best focus at the same voltage as the check tube. Final receiver adjustments should always be made with the regular picture tube operating in the receiver.

SYLVANIA NEWS

Technical Editor
R. A. Humphreys

TECHNICAL SECTION

May 1969 VOL. 36 — ISSUE 2

ANTENNA PERFORMANCE
Key to Good Color Reception

A National Pastime

Virtually no one in this day and age goes about discussing the reception quality of his telephone. The telephone works, so he takes it for granted. Yet every day millions of people discuss their television reception. "How's your picture?" is a nationally discussed question. Obviously, the person who inquires is seeking to compare his "picture" with that of someone else's. He is doing this because in his mind he is doubtful about the quality of his own reception. He has good reason to be doubtful, for he and millions of others are the victims of sub-standard reception. This is especially true of color.

"My color set is no good," is the usual explanation advanced by the householder to explain away a poor picture, and he believes it.

Ingredients of a Good Color Picture

Let's examine the facts. The vast majority of popular color receivers manufactured today are perfectly capable of delivering high-quality color pictures. To prove this, a visit to any of the plants where the sets are made will afford you an opportunity to see thousands of color receivers "lit up like Christmas trees" as they come through final test. How then is it possible that these sets give good color results at the factory and yet perform poorly in the living room? The answer is simple: at the factory they are being fed with the proper color signal, and in the home of the user, they are not. There is no mystery or magic involved in good color reception. Besides the presence of a well functioning color receiver, you need only these three additional ingredients: a reasonable level of interference-free signal, a well designed color antenna, and a proper transmission line. Put them all together and you have excellent color—every time. Leave one out, and there goes the color picture!

The level of available signal at the receiving site is usually a matter over which you have limited control. However, the choice of which antenna to use is far more broad. Everyone and his brother has some sort of antenna that they are pushing. In far too many cases the decision is made to use the cheapest and most readily available color antenna on the theory that, "what's the difference—all antennas are pretty much the same." This simply is not true, and if the installer wishes to avoid customer complaints about picture quality, he should not make this assumption. *Many of the antennas on the market today are poorly suited to the task of providing quality color reception consistently over a long period of time.*

The "Lens" of The Color Receiver

What then is a good color antenna? It is, simply stated, a device which has been designed to process each television channel individually in the most linear possible fashion and for the longest possible time. Does this mean that antenna gain is no longer important? No, the forward gain of the antenna is just as important for color as it is for black and white TV. However, since the black and white transmission utilizes only a segment of the bandwidth for each six-MHz television channel, abrupt variations in gain across a channel and from channel to channel could be tolerated.

On the other hand, color transmission utilizes a considerable portion of each six-MHz television channel, and its proper reception dictates that the color antenna present a relatively flat and linear response to the entire transmission of each channel to permit all of the transmission to reach the receiver. Failure of the antenna to do this causes the antenna to act effectively as a filter, which distorts much of the color information before it ever reaches the receiver. Further, to minimize color smear and other forms of distortion, the antenna should respond relatively little to unwanted signals. Thus, it may truly be said that the color

(*Continued on Last Page*)

Ten Requirements of Good Color Antennas

1. The antenna must have sufficient gain for the area in which it is installed. This is sizing the antenna for the particular location where it will be used. By sizing we mean selecting an antenna of such gain that the TV set will be provided with enough signal to properly drive it. Suitable signal strength would range from 200 μV to 2000 μV. The Sylvania broad line of color antennas provides a model for every location (Figure 1), from the near-suburban to the deep fringe areas.

The antennas provide more gain as frequency increases. This compensates for the propagation and feed line losses which increase with frequency. Figure 1 indicates the trend of the Sylvania line of antennas to show increasing gain with increasing frequency. The gains shown correspond to antenna response at mid-low VHF band (channel 4), FM (88 MHz), mid-high VHF band (channel 10), and mid-UHF band (channel 50).

2. Ideally, antenna response should be essentially linear across the six-MHz band of each channel. This assures that all of the transmitted video, color, and audio information is faithfully introduced to the transmission line. Wide variations in gain across a channel can destroy picture fidelity, particularly in a low-signal area. For example, a droop in antenna gain towards the high end of a channel (Figure 2A) will result in loss of color performance. Sylvania antennas are designed for a gain performance of ± one dB across each channel (Figure 2B).

3. The antenna should be directional, that is, signals appearing at the sides and rear should be largely cancelled or suppressed. These unwanted signals, if not greatly attenuated relative to the forward gain of the antenna, commonly appear in the set as ghosts, reflections, co-channel interference, and noise. Any of these can play havoc with a color picture. Figure 3 indicates the excellent front-to-back ratio of one antenna of the Sylvania line. At the two typical frequencies (channels 11 and 47) shown, the rear 180-degree response of the antenna is less than 10 per cent of the forward pickup. Notice the freedom of large, interference-producing side lobes.

4. To cover all present TV channels allocated by the FCC, the antenna must be receptive to VHF (54 to 88 MHz and 174 to 216 MHz) and UHF (470 to 890 MHz). It is also highly desirable for the antenna to include FM (88 to 108 MHz). All antennas of the Sylvania broad line were specifically designed to cover both the VHF and FM bands. For areas in which UHF is present, Sylvania provides antenna models which cover all bands (VHF, FM, and UHF).

5. Output impedance of the antenna should be matched to transmission line. Mismatch between antenna and lead wire can cause color smear and cut down on efficiency of the antenna. It is vital that a well matched transmission line be used. Basically, there are two impedances used in home receiving antennas: 300 ohm, and 75 ohm. A 75-ohm antenna is often effectively used in high noise areas and feeds directly into 75-ohm co-axial cable which provides complete shielding. The Sylvania broad line of color antennas is available in both 75 and 300-ohm impedances.

6. An antenna that has all of the previous electrical performance characteristics is of little value unless electrical integrity of all elements to feed lines is maintained over a long period of time. The antenna is an electrical circuit; therefore, if an element loses contact with the feed line, a part of the circuit is lost. Obviously, when this happens the antenna no longer functions as designed. Wind, rain, ice, and other environmental conditions combine to make this requirement a formidable task for the antenna designer to achieve.

Sylvania achieves this electrical integrity in its antennas through use of the double boom design, in which the booms themselves are the transmission lines. The rectangular boom provides a large, flat surface for solid mechanical and electrical contact with the positive-lock snap joints (Figure 4), which retain the driven elements. Carefully-formed shoulders on the snap joints assure long-lived electrical contact with the elements. This design makes the elements, effectively, electrically integral with the double boom transmission line.

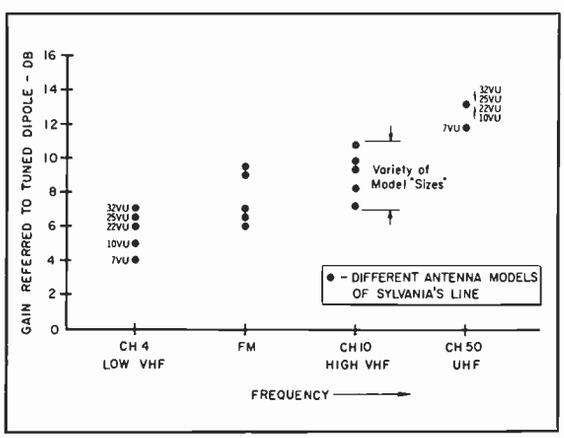
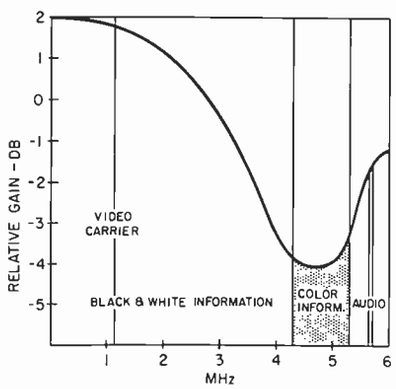
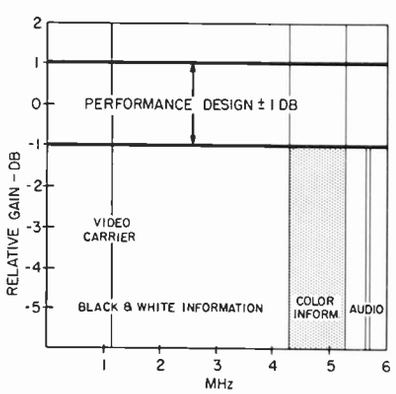


Figure 1—Variety of Model "Sizes"; Trend of Gain to Increase with Frequency

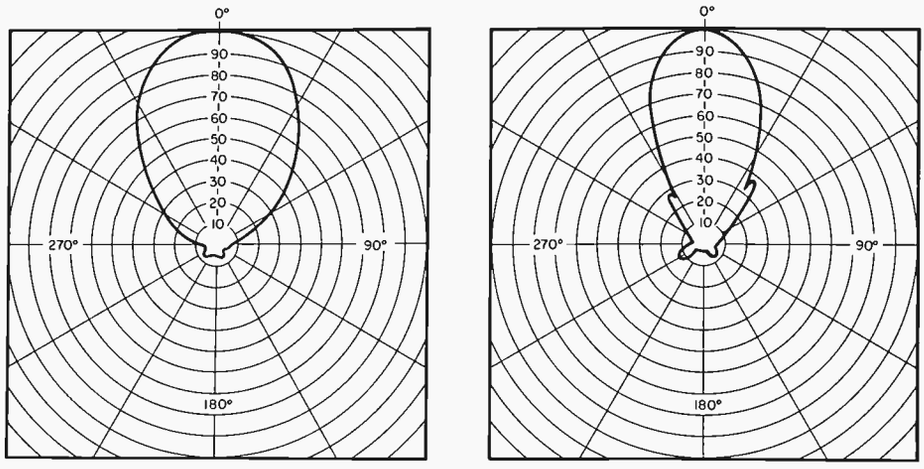


A. Antenna Showing Poor Channel Linearity and Loss of Color Information



B. Sylvania Antenna Showing Full Channel Linearity

Figure 2—Channel Response



A. Relative Sensitivity—Channel 11 B. Relative Sensitivity—Channel 47

Figure 3—Directivity of Sylvania Model 32 VU Fringe Area Antenna

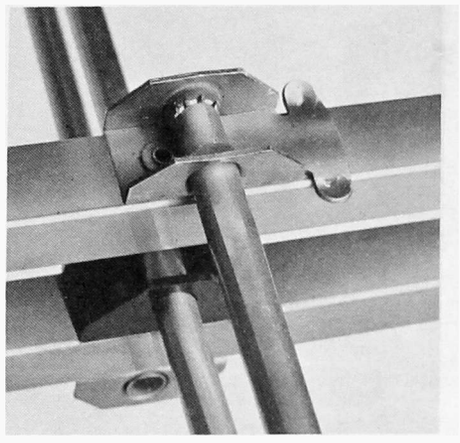


Figure 4—Driven Elements / Snap - Lock Joints / Double Boom Form Continuous Transmission Path

7. The antenna must be strong enough to withstand the strong winds and other climatic influences encountered in its rooftop environment. Mechanical design is a primary consideration in meeting this requirement. Features of the Sylvania antenna design in this respect are:

- Double boom construction—much stronger than a single boom design (Figure 5). Booms connected and reinforced by sturdy bridge cross ties.
- One-half inch, seamless elements—a Sylvania exclusive. Being physically stronger, the elements hold their alignment much longer. The greater surface area provides a high Q. The absence of seams means better radial symmetry throughout the length of the element—all factors which provide a more efficient electrical element.
- No braces required from boom to mast—permits mounting an antenna rotor directly beneath the antenna. Rotor life is increased through elimination of a long mast extension.
- End caps on ends of booms—prevent corrosion-causing water traps.

8. As an additional requirement for long antenna life, booms and elements should be built of high quality aluminum tubing. Skimping here again means short antenna life. All Sylvania antennas incorporate rectangular cross-section, seamless booms of structural grade 3005-H-29 aluminum with 1-inch by 1-inch by 0.041-inch walls (Figure 6). Elements are half-inch seamless aluminum with 0.0165-inch walls. High-strength, injection molded plastic is used for all non-metal parts. Rivets, U-bolts, and all other hardware are of heavy-duty, industrial grade.

9. The antenna should be protectively coated to resist the effects of salt and other corrosive atmosphere. This coating should be applied to inner and outer surfaces. All aluminum parts of Sylvania antennas are processed through a seven-bath, weather-resisting alodine solution prior to assembly. This assures that all surfaces are completely covered. The high-conductivity coating penetrates the metal surface to a nominal depth of two-mils (Figure 6).

10. The antenna must be easy to install. There should be a minimum of loose parts and subassemblies in the box, and installation instructions should be clear. To ease the installer's job, Sylvania has incorporated these features into its broad line of color antennas:

- Quick, set-up snap joints lock the elements into place in minutes.
- Major parts are preassembled.
- All hardware is in place.

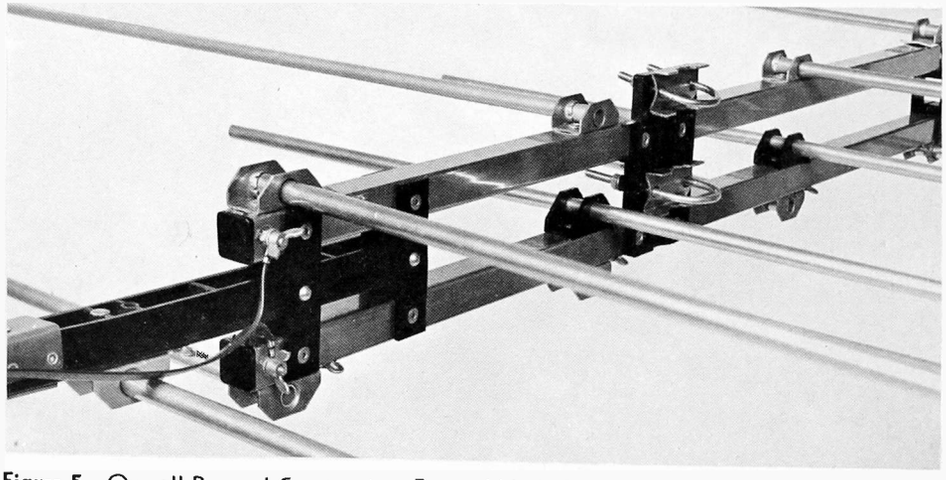


Figure 5—Overall Rugged Construction; Parts of High Quality Aluminum and Plastic

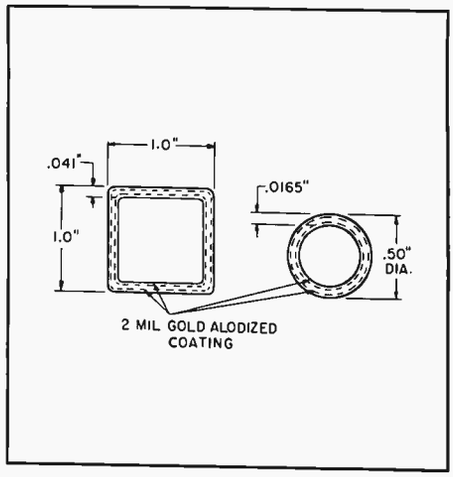


Figure 6—Full Alodine Protection of All Aluminum Internal and External Surfaces

antenna is the "lens" of the color receiver. Obviously, no one should use a poorly designed color antenna as the "lens" for a color set and expect optimum performance.

The Rugged Elements

Therefore, to develop the Sylvania line of color antennas, we were faced with the problem of designing a set of broadband, high-gain, directional, and effectively linear devices. But that's just the beginning. As a primary goal, our antennas would have to continue delivering their designed performance for three years, four years, and longer. While we were at it, we took particular care to include the FM spectrum as well. As a necessary measure to meet these goals, these antennas would be fabricated from materials substantially superior to those in general use today by other rooftop antenna makers. Mechanical design would also be of primary importance. We did this *not only to achieve a superior mechanical product, but particularly to insure the electrical integrity of the antenna, including both relative parts alignment and continuity, for the longest possible time.* Remember, an antenna is truly an electrical circuit. The longer each of the antenna parts resists the elements and corrosion, *the longer the antenna will permit the receiver to deliver good color pictures.* Simply stated, fine electrical design means little if the mechanical design is flimsy. The instant an element is bent out of alignment or snapped off — there goes electrical performance!

As an example of this, when our field experience clearly indicated the need for an antenna which could cope with the high incidence of salt and toxic corrosion so prevalent in many residential areas of the nation, salt corrosion tests were conducted. The results not only indicated a need for a completely aluminum antenna, but also one on which all surfaces of all parts, both inside and out, were treated with the immersion alodine process before assembly. This same process is now carried out with every Sylvania production antenna.

The Cost Factor and Long Life

For some reason many service and installation men are reluctant to sell quality antenna installations, perhaps in the mistaken notion that the customer has "shot his roll" when he purchased his color receiver. To the average householder, the entire matter of obtaining a color picture in his living room is indeed a mystery. Bluntly, he doesn't know what he needs, and it's up to the service man to intelligently tell him.

Your customer wants good color pictures. This is why he is constantly comparing his result with others. He is also willing to pay to get it, as evidenced by the thousands of householders who subscribe to community antenna systems to obtain better pictures. It logically follows that informed customers are also willing to pay for quality antenna installations—*they are less expensive in the long run.*

An antenna's initial performance is one thing—but what happens to performance after the antenna has been on the end of a mast for a year or two? The key to all of this is durability—durability through the materials used, through mechanical design, and through construction details.

The centerfold of this article examines these and other performance criteria in detail, and the degree to which the Sylvania line of color antennas meets them.

ERRATUM

The February issue incorrectly stated the values for a range of resistors available from the manufacturer in the article on color TV high voltage measurement. Instead of 40K ohms to 50M ohms, the resistors are available in values from 40K ohms to 50G (giga) ohms.