RADIO HI-FI TV
Techni-talk
COMPLETE ELECTRONIC SERVICING INFORMATION
Vol. 21, No. 3 & 4 Fall-Winter, 1969

COLOR TELEVISION--NTSC STANDARDS-V

In the last issue the development of chrominance signals was described and will be continued in this issue.

DEVELOPMENT OF SUBCARRIER

There still remains two color difference signals which must be placed somewhere within the six megacycle band already occupied by the brightness signal and the audio signal.

One approach would be to minimize the bandwidth of the "Y" signal and place the 600KC color signals at the high end of the band. The reason this cannot be done is shown in Figure 11A. The "Y" signal must be cut to about 2.1 mc in order to fit the two signals in, which is not enough bandwidth for satisfactory definition.

Fig. 11B indicates another possible approach to the transmission method.

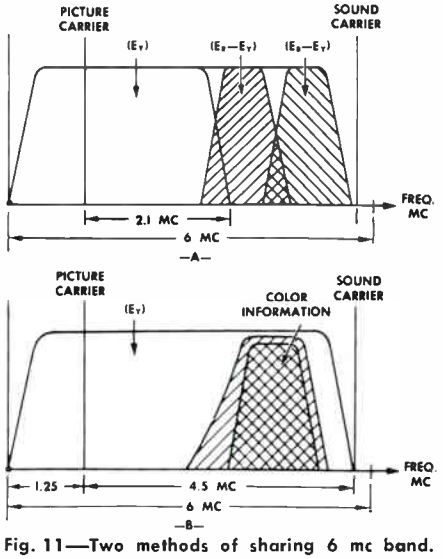

Fig. 11—Two methods of sharing 6 mc band.

This would mean that some portion of the 6 megacycle band must be shared by both the high definition brightness signal and the low definition color information. The next step is to determine how this could be accomplished.

INTERLEAVING PRINCIPLE

An interesting phenomenon was observed in 1934 by two men connected with Bell Laboratories. They saw, while observing a television signal, that the video spectrum was not completely filled with information. In fact, they saw that the entire information was carried by means of energy at discrete frequency intervals, and the remainder of the spectrum was empty and unused. Upon closer examination, it was seen that the discrete frequency intervals had a definite relationship to the synchronizing frequencies used in the television signal. Figure 12 shows what would be seen if a monochrome signal were spread out. Notice that the predominant frequency interval is 15,750 cycles per second, which is, of course, the horizontal scanning frequency. Surrounding these energy points are smaller amounts of energy separated by 60 cycles per second. There are actually energy points at 30 cps intervals. The energy in this case, however, is very low and need not be considered at this time. This will vary with the particular scene being scanned. The average result, however, is as seen in Figure 12.

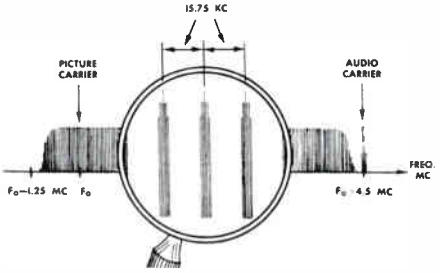

Fig. 12—Sideband spacing in monochrome channel.

The previous fact makes one inquire into the possibility of making use of the gaps in between the energy points. If a subcarrier were to be built up whose frequency was a multiple of one half the line frequency, it would lie in one of the empty spaces. An important point to bring out immediately is the effect of modulating this subcarrier with color information. The sidebands set up would have the same sideband spacing and would, therefore, fit between energy points of the "Y" signal, as seen in lower half of Figure 13.

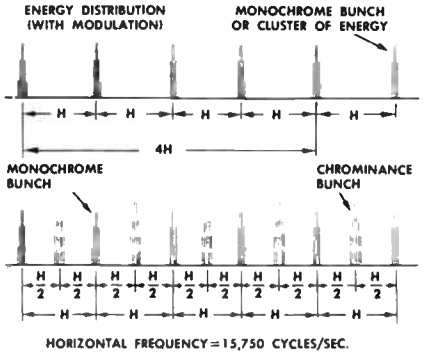

Fig. 13—Interleaving of brightness signal and chroma signal using sideband spacing effect.

Having decided that such a subcarrier is possible, the next point is to choose the frequency of the subcarrier.

There is, as might be expected, some interaction between the two signals being interleaved. This must be considered when choosing the frequency of the subcarrier. The first step in minimizing the interaction is to understand how interleaving occurs and, therefore, why there is some interaction.

Energy bunching depends upon the modulation signal being repetitious. A good example of such a repetitious signal is the square wave shown in Figure 14. This illustrates a step-by-step development (or harmonic-by-harmonic development) of the square wave. A square wave is made up of a fundamental frequency (fundamental A) and harmonics of that fundamental. The first wave form in Figure 14

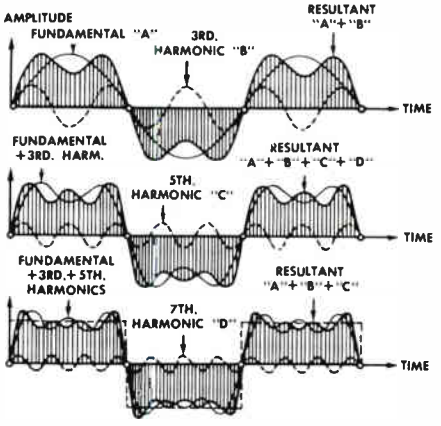

Fig. 14—Development of square wave.

shows the fundamental frequency "A" plus the third harmonic "B." The resultant waveform, even with only one harmonic, is beginning to take the form of a square wave. The second series of waveforms indicates the result of adding another harmonic (harmonic "C"). The resultant waveform approaches even more the desired square wave. The third series is, of course, still another harmonic (harmonic "D") and a resultant which is still closer to the square wave. It can be shown mathematically that the previous explanation holds for any wave form which is repetitious. Any wave which repeats itself periodically is made up of the fundamental frequency and harmonics of that fundamental.

(Continued next issue)

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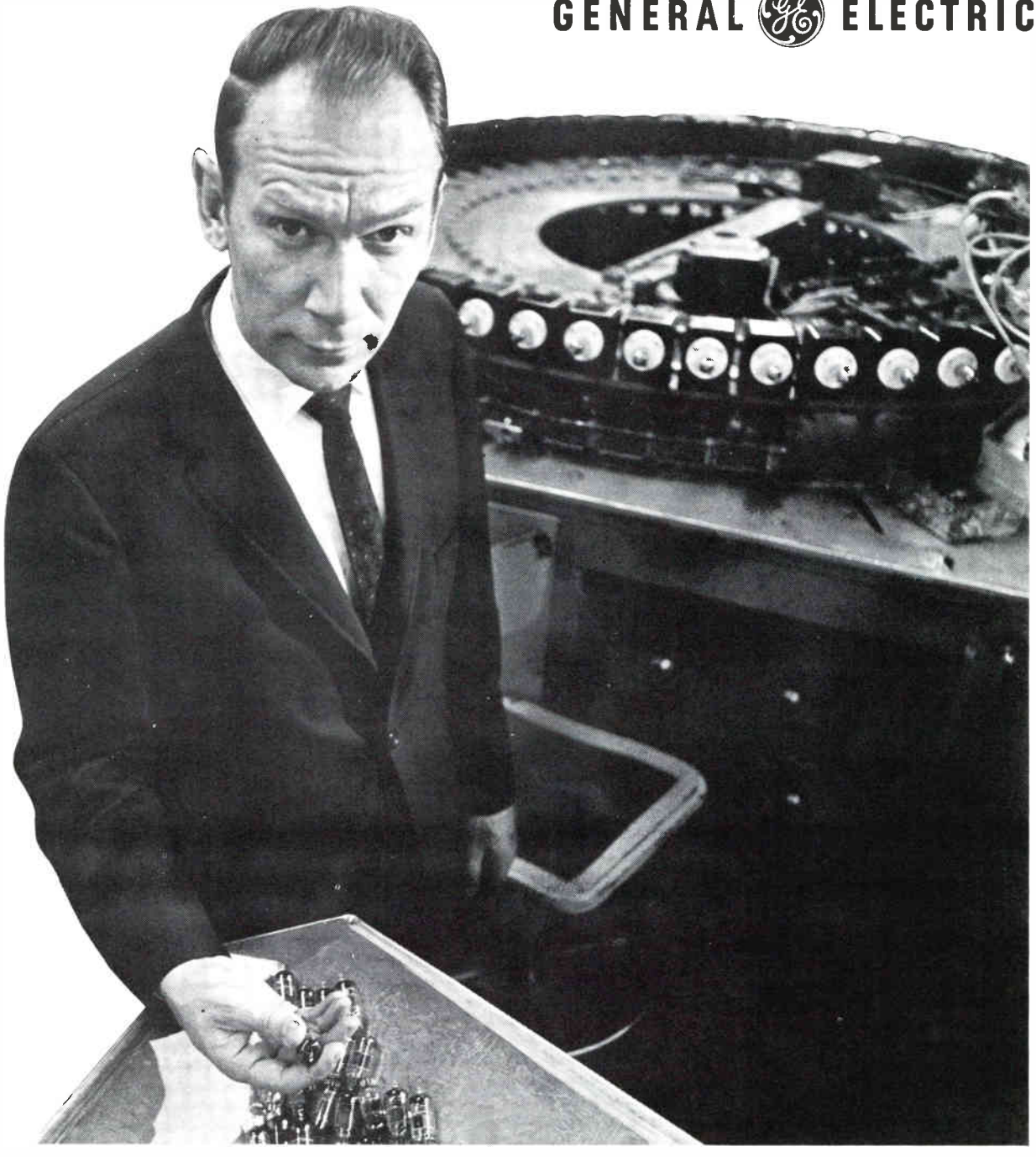
Each General Electric tube you buy gets the OK from John Snyder, our quality control chief. He's a real *tough customer* who puts GE tubes through the industry's roughest testing routine. He tests 100% for plate current, grid and heater voltage, seal and many other critical factors. Samples of every lot undergo life tests, some up to 2000 hours for lifespan performance evaluation. Actual TV set usage is simulated in a unique heater cycling test which imitates the on-off-on-off punishment tubes must take on the job. If a tube flunks just one test, it's fed to the grinder! No wonder you can stake your reputation on every GE tube from the "service designed" line for all your replacement needs. Stock up at your GE distributor today.

288-26

Reach for this when you ask, "What else needs fixing?"

GENERAL ELECTRIC



RECEIVING TUBE POPULARITY LISTING

Listed below are over 600 receiving tubes in alpha-numerical order. The figure, multiplied by 10,000 represents the estimated usage during 1969.

OZ4/OZ4A	32	5HZ6	1	6BW11	2	6FY5	2	6LT8	9	12AF6	1	17CT3	5
1AD2	7	5JK6	1	6BX7GT	3	6FY7	5	6LU8	12	12AL5	2	17CU5/17C5	2
1AY2	2	5KE8	12	6BY6	4	6GB5/EL500	1	6LX8/LCF802	1	12AL11	2	17D4/17DM4A	5
1BC2	17	5KZ8	1	6BY8	5	6GC5	6	6M11	2	12AQ5	5	17DE4	3
1G3GT/1B3GT	45	5LJ8	10	6BZ6	105	6GE5	19	6MD8	7	12AT6	6	17DQ6B/17GW6	8
1K3/1J3	26	5MB8	2	6BZ7/6BQ7A	74	6GF5	1	6ME8	10	12AT7/ECC81	28	17GJ5	2
1R5	8	5T8	2	6C4	13	6GF7A	95	6N7	2	12AU6	16	17GT5A	5
1S2A/DY87	2	5U4GB/5AS4A	149	6C5	1	6GH8A	365	6S4A	14	12AU7A/ECC82	40	17GV5	1
1T4	1	5U8	18	6C9	2	6GJ5A	1	6SA7	1	12AV5GA	4	17JB6A	15
1U4	5	5V3/5AU4	2	6CA4	7	6GJ7/ECF801	9	6SC7	3	12AV6	38	17JM6	6
1U5	4	5V4GA	3	6CA5	1	6GK5/6FQ5A	22	6SF5	1	12AV7	7	17JN6	6
1V2	57	5X8	2	6CA7/EL34	5	6GK6	15	6SG7	1	12AX3	2	17JT6A	2
1X2A/B	18	5Y3GT	29	6CB5A	4	6GM6	46	6SH7	1	12AX4GTB	20	17JZ8	38
2AS2	7	6AB4	8	6CB6A/6CF6	105	6GN8/6EB8	35	6SJ7	9	12AX7/ECC83	31	18FW6	1
2AV2	45	6AC7	2	6CD6GA	18	6GT5A	2	6SK7	3	12AX7A/7025	20	18FX6	1
2BN4A	4	6AC10	3	6CE5/6BC5	5	6GU7	72	6SL7GT	13	12AY3A/12BS3A	1	18FY6	1
2CW4	2	6AD10	4	6CG3/6CE3/ 6CD3	19	6GV5	7	6SN7GTB	60	12AZ7A	14	19AU4GTA	4
2CY5	13	6AF3	10	6CG8A	91	6GWB/ECL86	6	6SQ7	3	12B4A	12	19CG3	2
2DZ4/2AF4B	3	6AF4	17	6CJ3/6DW4B/ 6CL3	239	6GX7	8	6T8A	15	12BA6	55	19HV8	1
2FS5	4	6AF9	6	6CK3	2	6GY5	2	6T10	8	12BE3	3	19JN8/19CL8A	1
2GK5/2FQ5A	8	6AF11	8	6CK4	1	6GY6/6GX6	48	6U8A/6KD8/ 5KD8	93	12BE6	53	19T8	6
2HQ5	1	6AG5	3	6CL6	8	6H6	3	6U10	13	12BF6	1	20AQ3/LY88	7
3A3A/3AW3/3B2	120	6AG7	2	6CL8A	22	6HB5	3	6V3A	1	12BH7A	30	21GY5	20
3AL5	2	6AG9	2	6CM6	3	6HB6/6HA6	2	6V4/EZ80	1	12BL6	3	21HB5A	3
3AT2	62	6AH4GT	2	6CM7	25	6HB7	25	6V6	3	12BR7	2	21JS6A/23JS6A	2
3AU6	3	6AH6	6	6CM8	1	6HE5	16	6V6GTA	32	12BY7A/12BV7/ 12DQ7	75	21JZ6	5
3AW2	8	6AH9	3	6CN7	6	6HF5	10	6W4GTA	2	12CA5	5	21KA6	2
3BL2	2	6AK5/EF95	16	6CQ8	11	6HF8	9	6W6GT	10	12CU5/12C5	10	21LG6	1
3BN6	4	6AK6	12	6CS6	7	6HG8/ECF86	1	6X4	20	12DB5	2	21LR8	7
3BS2A	5	6AL3/EY88	17	6CS7	6	6HJ8	1	6X5GT	9	12DQ6B/12GW6	13	21LU8	3
3BU8/3GS8	4	6AL5	38	6CU5	16	6HL8	2	6X8A	27	12DS7	3	22BH3A	2
3BZ6	24	6AM4	2	6CU8	4	6HM5/6HA5	50	6X9/ECF200	4	12DT5	4	22BW3	11
3CA3	6	6AM8A	15	6CW4	12	6HQ5	19	6Y6GT	1	12DT8	8	22DE4	8
3CB6/3CF6	13	6AN8A	18	6CW5/EL86	10	6HS5	17	6Y9	3	12DW4A	1	22JF6	13
3CE5/3BC5	2	6AQ5A/6HG5	117	6CX8	11	6HS6	1	6Z10/6J10	18	12ED5	1	22JG6A	7
3CN3A	4	6AQ6	1	6CY5	14	6HS8	20	7AU7	6	12EK6/12DZ6/ 12EA6	1	22JR6	5
3CS6	1	6AQ7GT	1	6CY7	5	6HV5	5	7C5	1	12F8	1	22JU6	8
3CY5	5	6AQ8/ECC85	5	6CZ5	6	6HZ6	29	7F7	2	12FX5	8	23Z9	16
3DB3/3CY3	5	6AR11	1	6DA4A/6DM4A	5	6J5	4	7HG8/PCF86	1	12GC6	1	24BF11	1
3DC3	2	6AS5	12	6DB5	1	6J6A	15	8AR11	1	12GE5	4	24JZ8	2
3DG4	18	6AS8	6	6DC6	2	6J7	4	8AW8A	15	12GN7A	22	24LQ6/24JE6C	4
3DK6	4	6AT6	2	6DE4/6CQ4	24	6JB6A	21	8B10	9	12HE7	1	25AV5GA	1
3DT6	7	6AT8A	3	6DE6	9	6JC6A	55	8BA11	4	12HG7	13	25C5	6
3DZ4/3AF4B	2	6AU4GTA	45	6DE7	6	6JC8	3	8BM11	1	12HL7	8	25CD6GB	3
3ER5	1	6AU5GT	3	6DG6GT	2	6JD6	9	8BN11	1	12JQ6	2	25DN6	3
3FS5	2	6AU6A	76	6DK6	9	6JE6B	133	8BQ5	4	12JT6A	1	25EH5	3
3GK5	34	6AU8A	14	6DN7	8	6JE8	2	8BQ11	1	12L6GT	1	25L6GT/25W6GT	7
3HM5/3HA5	12	6AV5GA	2	6DQ5	41	6JF6	8	8BU11	2	12MD8	2	27GB5/PL500	1
3HQ5	9	6AV6	22	6DQ6B/6GW6	117	6JG6A	3	8CS7	2	12SA7	4	31AL10	1
3V4	5	6AW8A	83	6DR7	12	6JH6	31	8CX8	1	12SJ7	1	31JS6A	3
4AU6	2	6AX3	8	6DS4	12	6JH8	10	8EM5	1	12SK7	5	32ET5A	1
4AV6	1	6AX4GTB	89	6DT5	2	6JK6	1	8ET7	1	12SL7GT	2	32HQ7	1
4BU8/4GS8	2	6AX5GT	3	6DT6A	26	6JM6	19	8FQ7/8CG7	73	12SN7GTA	6	33GT7	2
4BZ6	26	6AY3B/6BS3A	35	6DT8	2	6JN6	12	8JU8A	2	12SQ7	6	33GY7A	25
4BZ7/4BQ7A	3	6AZ8	2	6DX8/ECL84	10	6JN8	5	8JV8	9	12T10	1	34CE3	6
4CB6	8	6B10	10	6DZ4/6AF4A	11	6JS6B	106	8KA8	3	12V6GT	3	35C5	22
4CS6	3	6BA6/EF93	22	6E5	1	6JT6A	5	8LC8	2	12W6GT	3	35EH5	2
4DK6	1	6BA8A	4	6EA8	171	6JT8	18	8LT8	9	12X4	1	35L6GT	4
4DT6	8	6BA11	19	6EH4A	4	6JU8A	50	9A8/8A8/ PCF80	8	13CW4	1	35W4	90
4EH7	7	6BC4	1	6EH5	3	6JV8	2	9AU7	2	13DE7	3	35Y4	1
4EJ7	6	6BC8/6BZ8	10	6EH7/EF183	17	6JW8/ECF802	4	9GV8	1	13DR7	8	35Z5GT	15
4GK5	5	6BD11	1	6EH8	2	6JZ6	1	10CW5/LL86	8	13EM7/15EA7	6	36AM3A	3
4HM6	1	6BE3	4	6EJ4A	1	6JZ8	7	10DE7	17	13FD7	3	38HE7	15
4HS8	5	6BE6	17	6EJ7/EF184	33	6K6GT	9	10DX8/LCL84	1	13GF7A	15	38HK7	5
4JC6A	6	6BF5	1	6EM5	17	6K11/6Q11	1	10EG7	3	13Z10/13J10	1	40KD6	4
4JD6	4	6BF6	2	6EM7/6EA7	55	6KA8	39	10GF7A	2	14BL11	1	42KN6	7
4KE8	2	6BF11	1	6ER5	5	6KD6	19	10GK6	7	14BR11	1	50B5	2
4LJ8	1	6BG6GA	3	6ES5	2	6KE8	25	10GN8	9	14GT8	1	50C5	104
5AM8	5	6BH6	24	6ES8/ECC189	2	6KM6	21	10HF8	4	15BD11A	5	50DC4	1
5AN8	1	6BH8	5	6EU7	8	6KN6	6	10JT8	6	15CW5/PL84	4	50EH5	15
5AQ5	14	6BH11	8	6EU8	2	6KS6/6BN6	18	10JY8	5	15DQ8	1	50HK6	5
5AR4/GZ34	5	6BJ6	10	6EV5	8	6KT6	2	10KR8	2	15FM7/13FM7	3	50L6GT	12
5AT8	4	6BJ7	1	6EW6	63	6KT8	44	10KU8	1	15FY7	19	53HK7	2
5BC3A	3	6BJB	5	6EW7	8	6KV8	2	10LE8	1	16AK9	1	60FX5	2
5BK7A	1	6BK4C/6EL4A	170	6EZ5	3	6KY8A	7	10LZ8/10JA8	3	16AQ3/XY88	7	5879	6
5BZ7/5BQ7A	2	6BK5	2	6EZ8	1	6KZ8	45	11AR11	2	16BQ11	1	6931	7
5CG8	18	6BK7B	17	6FD7	2	6L6	4	11BQ11	2	16BX11	1	7027A	3
5CL8A	8	6BL7GTA	9	6FG7	16	6L6GC	35	11BT11	2	16GK6	1	7189A	7
5EA8	6	6BL8/ECF80	25	6FH5	5	6LB6	17	11FY7	3	16GY5	1	7199	7
5EU8	1	6BM8/ECL82	6	6FH8	1	6LC8	2	11HM7	1	17AB10/17X10	1	7355	2
5EW6	4	6BN4A	8	6FJ7	2	6LE8	10	11JE8	2	17AX3	1	7408	1
5FG7	5	6BN8	10	6FM7	20	6LF6	4	11KV8	12	17AX4GTA	5	7543	1
5FV8/5BR8	4	6BN11	4	6FM8	1	6LF8	23	11LQ8	5	17AY3A/17BS3A	23	7591A	10
5GH8	10	6BQ5/EL84	40	6FQ7/6CG7	295	6LH6A	3	12AB5	5	17BE3	8	7868	7
5GJ7	5	6BQ6GA/6CU6	3	6FS5	5	6LJ6	3	12AD6	8	17BF11	10	8426A/12AU6	2
5GM6	3	6BQ6GTB	6	6FV6	4	6LJ8	11	12AE6A	2	178R3/17R-K19	2		
5GS7	2	6BS8	5	6FV8A/6BR8A	13	6LM8	10	12AE10	5	17C9	2		
5HG8/LCF86	1	6BU8	23	6FW5	1	6LN8	4	12AF3	5	17CK3	3		
		6BW4	1			6LQ8	3						
		6BW8	1			6LR6	2						

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Holds over two hundred and fourty tubes. Egg-crate separators hold miniatures, GT's and compactrons in position. Size—22⅛" x 8⅞" x 13¾".

ETRS-3750 ARMORED VINYL SERVICE MASTER "240" SERVICE CASE

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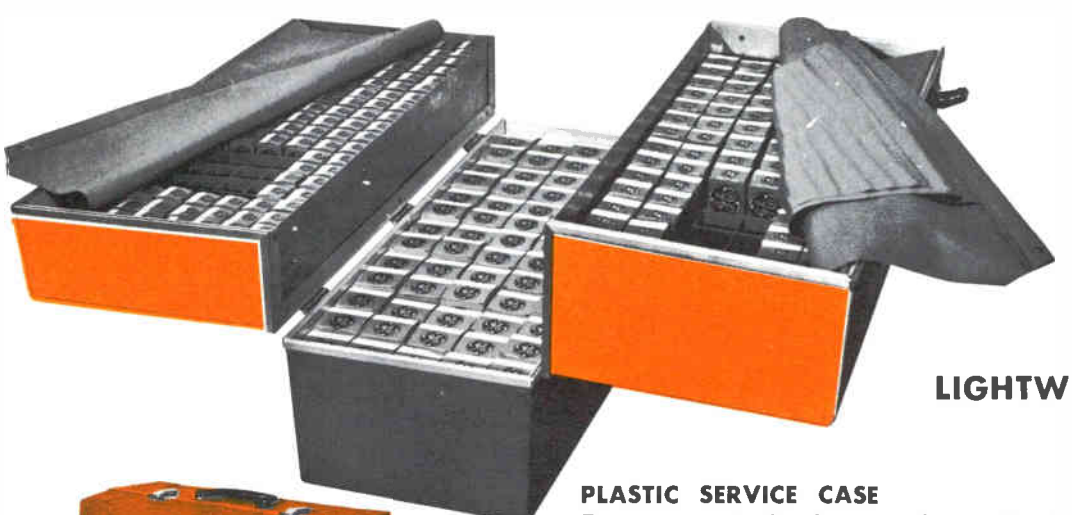

LIGHTWEIGHT PLASTIC

PLASTIC SERVICE CASE

Rugged . . . built of tough plastic. Plenty of space to carry tubes and tools. Has egg-crate tube holders, separate tool compartment and a plastic curtain which holds job tickets, alignment tools, drop cloth, etc. Size — 22 3/16" x 8 15/16" x 15" high. A real featherweight at only 8 lbs. And that's about 4 lbs. less than most cases of comparable capacity. Colors — red-orange and grey.

ETRS-2700 PLASTIC SERVICE CASE

Cost $26.95

Available at your General Electronic Compe-

MATCHED PLASTIC TOOL CASES

Here is an assortment of plastic tool cases that will fulfill your complete requirements. Top section is orange-red and bottom grey as shown.

All three cases are made of high-impact polystyrene and are practically indestructible under normal usage. These cases are warp-free, impervious to grease, oil, salt water and even battery acid.

The top cover has overlapping edges which prevents water from dripping into case. ETR-3517 and ETR-3280 have two cantilever trays which open automatically as the cover is opened. ETR-3516 also has two cantilever trays which are easily opened manually. Each individual tray has various size compartments to keep tools, parts, fuses, etc. separated and easy to locate and remove.

ETRS-3517 TOOL CASE
18¼" long, 9½" wide, 9½" high
Cost $10.75

ETRS-3280 TOOL CASE
15¾" long, 8" wide, 8¼" high
Cost ..... $ 7.75

ETRS-3516 TOOL CASE
14" long, 6" wide, 5½" high
Cost ..... $ 4.40

SERVICE MASTER "240" SERVICE CASE

Holds over two hundred and forty tubes. Carrying a large tube inventory with you eliminates costly, time-consuming trips back to the shop. Egg-crate separators keep tubes in place. Size—22¼" x 9" x 14½". Weight — 9½ lbs.

ETRS-2701, "240" SERVICE CASE
Cost $17.20

THE SPECIAL "160"

Holds over one hundred and sixty tubes. This junior-size case can also be utilized as a small-parts case. Tubes held in position with egg-crate separators. Size — 18" x 8⅜" x 11⁷⁄₁₆". 8 lbs.

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Cost $12.50

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Combination tube and tool case . . . holds 365 tubes plus tools to get the job done. Egg-crate separators keep tubes in position. 22⅛" x 10⅝" x 15¹³⁄₁₆".

ETRS-2704, GIANT "365"
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Here, you've got the tools at hand for almost any home service job. Case is divided into compartments to provide an orderly arrangement of service tools . . . they're easy to see and right at your finger tips. Separate compartment for VOM. Size — 20¹³⁄₁₆" x 6⅞" x 9⁵⁄₁₆". Weight — 5½ lbs. Colors — red-orange and grey.

ETRS-2703 HOME SERVICE TOOL CASE
Cost $14.88

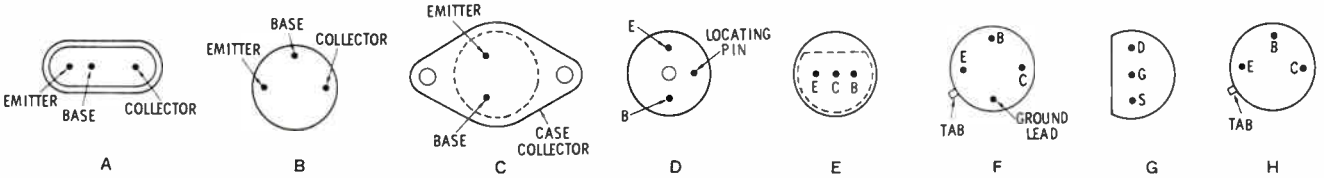
»nents Distributor or see coupon on page 7.

APPLICATION AND TECHNICAL DATA CHART FOR UNIVERSAL TRANSISTORS

GE Type	Description	Applications	Power Dissipation (Watts)	Max. Collector Current (IC)	Breakdown Voltage		Freq. (Band Width Prod.)	Typical Current Gain	Case Package	Terminal Drawing	GE Type
					Collector To Base (BVCBO)	Collector To Emitter (BVCEO)					
GE-1	PNP Germanium	Mixer/Oscillator Convertor, RF & IF Amplifier (AM Radio)	150 MW	100 MA	20	(CER) Min. 12	5 MHz Min.	70	TO-5	H	GE-1
GE-2	PNP Germanium	AF Amplifier	200 MW	200 MA	20	20	3 MHz Typ.	60	TO-5	H	GE-2
GE-3	PNP Germanium	AF Power Amplifier	25	3 A	50	40	400 KHz Typ.	60	TO-3	C	GE-3
GE-4	PNP Germanium	AF High Power Amplifier	50	12 A	50	30	10 KHz Min.	55	TO-36	D	GE-4
GE-5	NPN Germanium	Mixer/Oscillator Converter, RF & IF Amplifier (AM Radio)	150 MW	100 MA	25	12	5 MHz Min.	165	TO-5	H	GE-5
GE-6	NPN Germanium	Mixer/Oscillator Convertor, RF Amplifier (AM Radio)	65 MW	20 MA	20	9 (CER)	9 MHz Min.	110	OV-5	A	GE-6
GE-7	NPN Germanium	IF Amplifier (AM Radio)	65 MW	20 MA	15	15 (CER)	8 MHz Min.	35	OV-5	A	GE-7
GE-8	NPN Germanium	AF Amplifier	150 MW	200 MA	25	20 (CER)	5 MHz Min.	130	TO-5	H	GE-8
GE-9	PNP Germanium	Mixer/Oscillator Convertor, RF & IF Amplifier (AM-FM Radio)	70 MW	10 MA	30	20 (CER)	108 MHz Typ.	140	TO-72	F	GE-9
GE-10	NPN Silicon	Mixer/Oscillator Converter, RF & IF Amplifier (AM Radio), AF Amplifier	200 MW	100 MA	25	25	200 MHz Typ.	150	TO-98	E	GE-10
GE-11	NPN Silicon	Mixer/Oscillator Converter, RF & IF Amplifier (FM Radio), VHF Tuner, UHF Oscillator	200 MW	25 MA	30	12	700 MHz Min.	75	TO-98	E	GE-11
GE-12	NPN Silicon	AF Power Amplifier For 120V Line Operated Stereo Phonographs, Television, Etc. – High Voltage	10	400 MA	300	300	30 MHz Min.	140	TO-66	C	GE-12
GE-13MP	PNP Germanium	Matched Pairs of GE-3, AF Power Amplifier	25	3 A	50	40	400 KHz Typ.	60	TO-3	C	GE-13MP
GE-14	NPN Silicon	AF Power Amplifier – High Power	115	15 A	100	60	800 KHz Typ.	45	TO-3	C	GE-14
GE-15MP	NPN Silicon	Matched Pairs of GE-14 for AF Power Amplifier	115	15 A	100	60	800 KHz Min.	45	TO-3	C	GE-15MP
GE-16	PNP Germanium	AF High Power Amplifiers, Switching	90	10 A	60	45	500 MHz Min.	60	TO-3	C	GE-16
GE-17	NPN Silicon	FM RF & Oscillator, TV and Other Low Noise Circuits	500 MW	100 MA	60	30	250 MHz Min.	80	RO-97A	B	GE-17
GE-18	NPN Silicon	AF Amplifier, Output or Oscillator	800 MW	500 MA	120	80	50 MHz Min.	80	TO-5	H	GE-18
GE-19	NPN Silicon	High Power AF Amplifier, Output Oscillator, Medium Current	90	4 A	50	50	800 KHz Min.	40	TO-3	C	GE-19
GE-20	NPN Silicon	Medium AF Amplifier, RF & IF Amplifier, Oscillator	500 MW	500 MA	25	25	100 MHz Min.	100	TO-18	H	GE-20
GE-21	PNP Silicon	AF Amplifier, RF & IF Amplifier, Oscillator	500 MW	500 MA	25	25	100 MHz Min.	65	TO-5	H	GE-21
GE-22	PNP Silicon	AF Amplifier, RF & IF Amplifier, Oscillator (AM & FM)	500 MW	500 MA	25	25	100 MHz Min.	50	RO-110	B	GE-22
GE-23	NPN Silicon	AF Power Amplifier for use in class A and B AF Power Amplifiers, Communications, Hi-Fi	15	2 A	60	40	50 MHz Min.	125	TO-66	C	GE-23
GE-24MP	NPN Silicon	Matched Pairs of GE 23	15	2 A	60	40	50 MHz Min.	125	TO-66	C	GE-24MP
GE-25	PNP Germanium	Horizontal and Vertical TV Sweep Circuits and Other High Voltage, High Current Amplifier Application	56	10 A	320	320	1 MHz Min.	60	TO-3	C	GE-25
GE-26	PNP Silicon	AF Power Amplifier – Stereo Tape Players, Communications and Hi-Fi	20	2 A	60	50	10 MHz Min.	100	TO-66	C	GE-26

Field Effect Transistor			Common Source Forward Transfer Admittance (MNHOS)	Power Dissipation @ 25°C Free Air	Gate Current (IG) (MADC)	Zero Gate Voltage Drain Current (1DSS)	Drain Gate Voltage	Drain Source Voltage VDS (VDC)	Gate Source Breakdown Voltage V (BR) GSS			
GE-FET-1	Silicon	N Channel Field Effect Transistor	6500 Max.	200 MW	10 MA	2 to 20 MA *	25	25	-25	TO-92	G	GE-FET-1

*Pulse Test: Pulse Width ≈ 100 MSEC, Duty Cycle ≤ 10%



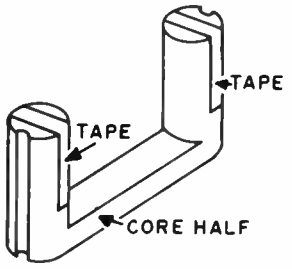
HIGH VOLTAGE TRANSFORMER SQUEAL 14 INCH COLOR G-1 CHASSIS

There have been some complaints of High Voltage Transformer fundamental frequency squeal in G-1 Chassis Receivers. Current production receivers (EN433 and higher) are being manufactured with an increased HVT core air gap.

The air gap is controlled by special paper tape between the core halves. Originally, one thickness of tape was used to create this air gap. Now, two thicknesses of tape are used to create a 15 mil gap. The proper tape is Scotch Brand No. 280, which is available from your General Electric Parts Distributor under Catalog Number EP60X9.

To modify an early production receiver, dismantle the HVT and remove the original air gap tape from the core halves. There may be some versions with black plastic electrical tape used as pads between the core and high Voltage Cage. Remove these pieces of tape also. Use four pieces of new tape approximately 1½ inches long. Attach tape to *both* ends of both core halves as shown in the drawing. Be careful that the tape does not wrinkle or have foreign material stuck to it, as this air gap dimension is critical.

The second part of the modification is the elimination of the pincushion correction circuit. Remove the brass screws securing the pincushion transformer assembly to the HVT cage and clip the transformer winding leads close to the terminal board. Discard the pincushion transformer, but salvage the terminal board and insulating strip. Securely mount the terminal board and the fish paper insulator in the space formerly occupied by the transformer, using the same brass screws. Cut off any excess length of the screws. To restore continuity in the vertical yoke circuit, the green lead on the pincushion transformer terminal strip has to be moved one terminal to the rear which is a common ground point. This procedure leaves C275 (3 uf) and R275 (22 Ω) out of the circuit on the power supply board. They can be left on the board or removed at your discretion.



To insure proper performance of the set, it is essential that *both* steps of this procedure are performed. Eliminating the pincushion transformer will not adversely affect receiver performance, but will decrease the load on the horizontal output tube resulting in cooler operation and increased reliability.

Apply power to the receiver and *reset the High Voltage to 21KV* at Zero beam current (minimum brightness) with a line voltage of 120V AC.

Be sure to perform the Safety Check as specified in your G CHASSIS Service Manual after reassembling the receiver.

C-1 CHASSIS — 18 INCH COLOR IMPROVED DEGAUSSING ACTION

Some early production C-1 Chassis receivers were subject to complaints of repeated purity problems. Manual degaussing would correct the impurity but the problem recurred after a short period of time. This has been attributed to the charge remaining in electrolytic capacitor 2C405 after the receiver is turned off.

Degaussing action has been improved in current production receivers by the addition of a 100K, ½ watt resistor connected in parallel with 2C405. The resistor is physically located adjacent to 404 on the power supply board. Receivers bearing serial numbers 5D4 — and higher are equipped with this resistor. To improve performance, we recommend that the resistor be added to any early production C-1 Chassis which comes in for service.

KE CHASSIS—SERVICE INFORMATION HIGH VOLTAGE ARCING

A few reports have been received concerning intermittent high voltage arcing in the KE Chassis. In some cases this did not occur when the service man was present, hence repeat calls were sometimes necessary to discover the defect.

If you should encounter such a condition, the receiver should be inspected for evidence of high voltage arcing in the most likely places such as defective spark gaps, spark gap capacitors C116 or C117 damaged, anode lead and connector, or arcing to the picture tube shield or neck. If no indication of a defect is found, the 6LJ6 High Voltage Regulator Tube V17 should be replaced. Some cases of intermittent high voltage arcing have been traced to this tube.

After the problem has been rectified, it is very important that the high voltage be adjusted to the correct value for the particular receiver as described in the KE Chassis Service Manual, Page KE3-14. If the high voltage can not be adjusted, it is probable that the arcing has opened cathode resistor R132. The spark-gap capacitors C116 and C117 should also be checked for damage.

MORE OBSCURE PROBLEMS ON "KE" CHASSIS

Problem	*Cure*
1. Grayish hum bar floating vertically at low brightness.	Replace C201 and/or C202 (Either may be open)
2. No Video, Vertical retrace lines, no audio. (Short surge of normal audio immediately after set is turned off.)	Replace C202 (shorted)
3. Horizontal bending or pulling, black floating hum bar.	Replace C152 ("B" Section Open)

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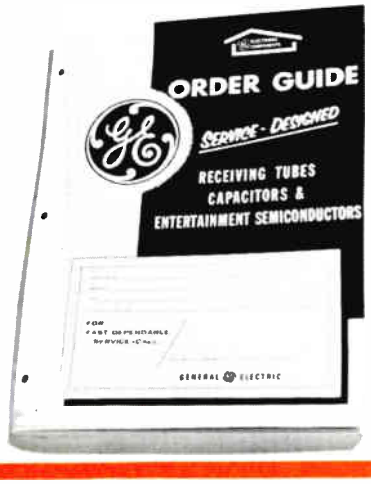

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