Martin N Kita

SYLVANIA

TELEVISION MARKER GENERATOR

TYPE 501

OPERATING MANUAL

SYLVANIA ELECTRIC PRODUCTS INC.

Price $1.00

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TELEVISION MARKER GENERATOR

TYPE 501

SYLVANIA ELECTRIC PRODUCTS INC.
1740 BROADWAY
NEW YORK 19, NEW YORK

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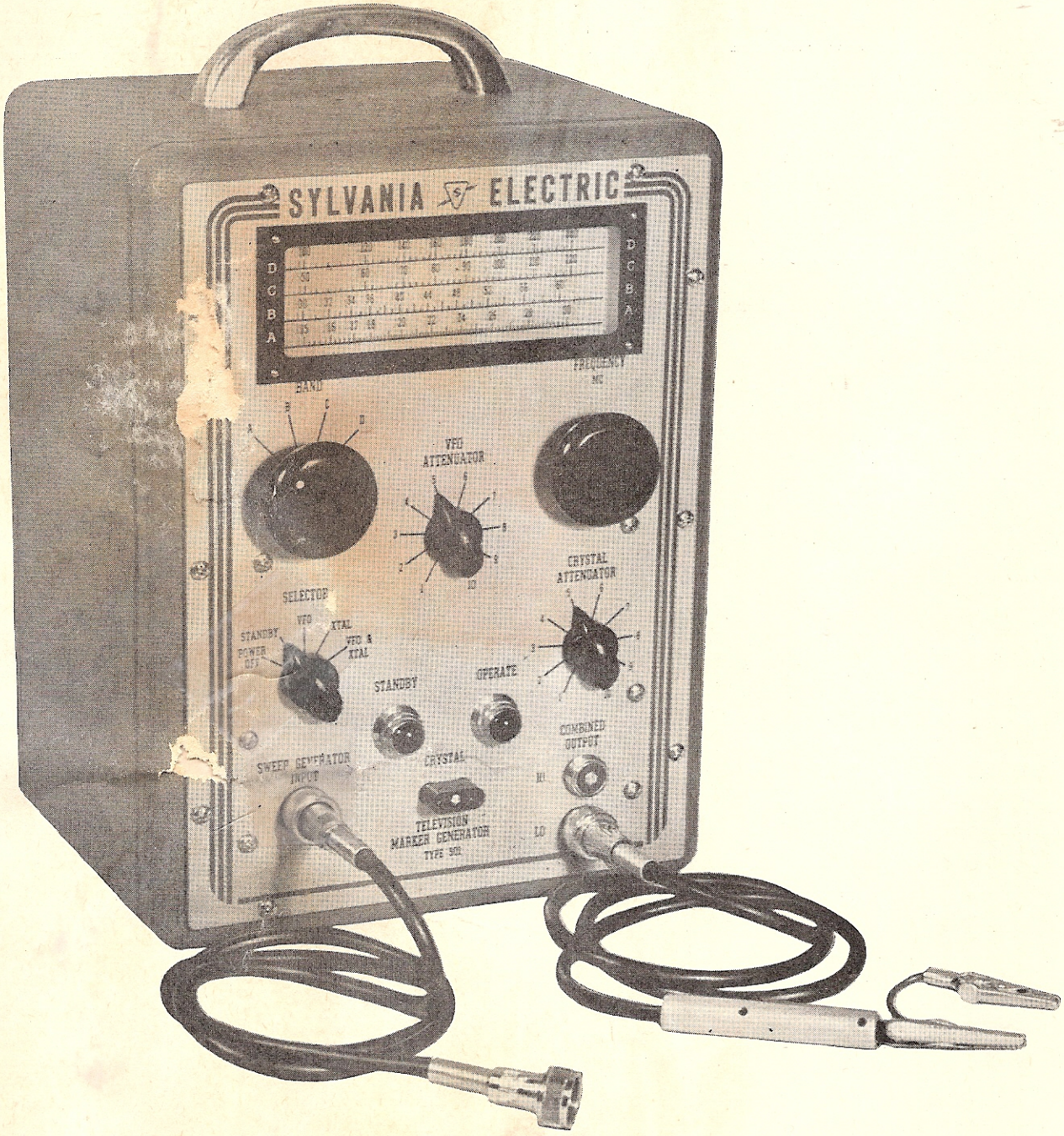

SYLVANIA TV MARKER GENERATOR
TYPE 501

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SYLVANIA TV MARKER GENERATOR TYPE 501

GENERAL DESCRIPTION

The Sylvania TV Marker Generator Type 501 is intended for use separately or in conjunction with a sweep signal generator such as the Sylvania Sweep Generator Type 500 for the purpose of providing a simple, accurate method of aligning a tv receiver. Two separate oscillators are employed; a v f o covering from 15-240 mc in four bands, and a crystal-controlled oscillator designed to operate from a crystal having a fundamental frequency in the range of 2-20 mc. The latter is used for the alignment of inter-carrier tv receiver sound systems and for checking the calibration of the v f o. The output from each oscillator is individually controlled by attenuators. The selector switch has five positions: (a) OFF, (b) STANDBY, (c) VFO, (d) XTAL, (e) VFO & XTAL. In the STANDBY position only the filament voltage is applied to the tubes, while in the operating positions the plate voltage is also applied. Indicator lights are used to denote STANDBY and operating positions. Separate HI and LO output jacks provide signals as high as 0.1 volt and as low as 50 microvolts.

QUICK REFERENCE DATA

1. Power line requirements: 105-125 volts, 50-60 cycles. Uses 28 watts at 117 volts 60 cycles.
2. Tube complement:
   Two Sylvania Type 6C4 oscillators
   One Sylvania Type 6X4 rectifier
   One Sylvania Type OD3 voltage regulator
3. Frequency bands:
   A. VFO output frequency
      Band A 15-30 mc
      Band B 30-60 mc
      Band C 60-120 mc
      Band D 120-240 mc
      (harmonics of band C)
   B. Crystal-controlled oscillator output frequency 2-20 mc plus harmonics.
4. Dial calibration: Plus or minus 1%.
5. Maximum output: 0.1 volt from either oscillator on fundamentals.
6. Cabinet size: Height 11 3/16 inches, width 8 3/8 inches, depth 6 15/16 inches.
7. Weight: 13 3/4 lbs.

GENERAL OPERATING INSTRUCTIONS

NOTE: A. Use only the crystal-controlled oscillator when aligning intercarrier sound systems. Do not attempt intercarrier receiver alignment with the v f o.

B. Before using the marker generator it should be permitted to warm up for a minimum of 15 minutes to insure frequency stability.

C. Use LO output jack for high gain sets, as the minimum output from this jack is considerably less than from the HI jack.

1. To check the frequency response curves of a tv receiver.
   A. Set the SELECTOR switch to the position labelled VFO & XTAL and allow the unit to warm up.
   B. Connect the output of the sweep signal generator to the marker generator connector labelled SWEEP GENERATOR INPUT. Connect the output of the marker generator to the circuit under test in the manner designated for the sweep generator.
   C. Set the SELECTOR switch to the STANDBY posit[illegible] proceed to display the tv receiver re[illegible]rve on the oscilloscope using the s[illegible]erator only.
   D. Set the [illegible] to the proper position. Adjust [illegible]rator dial to correspond [illegible]requency of the sweep signal [illegible]
   E. Set the [illegible] switch to the position mar[illegible]rve the oscilloscope and ad[illegible]TTENUATOR until th[illegible]ears. If the marker pip i[illegible]zzy, shunt the input to the [illegible]h a .01 uf capacitor. The [illegible]marker generator should be [illegible]mum to avoid distortion of [illegible]rve.
   F. A[illegible]o marker pip to the desired [illegible]e response curve and read the [illegible] the v f o scale.
2. To[illegible] of inter-carrier tv sound sy[illegible]
   A[illegible]erator connected as [illegible]section 1-B select a crystal having a fundamental frequency of 4.5 mc and in[illegible]in the marker generator XTAL [illegible]t the SELECTOR switch to the [illegible]ition and allow the instrument to [illegible]up. (The Sylvania Type 229 crystal for 4.5 mc is available from Sylvania distributors).
   B. Set the SELECTOR switch to the STANDBY position and proceed to display the sound i f response curve on the oscilloscope as designated by the receiver manufacturer, using only the sweep generator.
   C. Set the SELECTOR switch to the XTAL position. Advance the XTAL ATTENUATOR until the XTAL marker pip appears on the oscilloscope.
   D. Use the XTAL marker pip as a reference guide to the exact inter-carrier sound i f center frequency and align the i f stages in accordance with the instructions supplied by the receiver manufacturer.

Other Applications.

The Sylvania Marker Generator Type 501 may also be used for:

1. Aligning stagger-tuned stages.
2. Peaking tuned circuits and traps.
3. Calibrating or aligning fm and am sets.

3. Checking VFO Calibration.

If extreme v f o accuracy is desired, it may be obtained by following these steps.

1. Display the response curve of the circuit under test on the oscilloscope and adjust the v f o marker pip to the proper position.
2. Select a crystal having either its fundamental or a harmonic of its fundamental frequency within the pass-band of the curve displayed on the oscilloscope and insert it in the XTAL socket.
3. Set the SELECTOR switch to the position marked XTAL & VFO. Adjust the XTAL ATTENUATOR until the crystal marker pip appears.
4. Adjust the v f o marker pip to coincide with the crystal marker pip. Check to see that the crystal frequency or the harmonic frequency of the crystal agrees with the frequency indicated on the v f o dial. If a slight inaccuracy is noted visual compensation may be made. (It has been found that Bliley MC-9 and James Knights H17L crystals work well in this circuit.)

APPLICATIONS

1. *Band Pass.* One of the major marker generator functions is to check the band pass of different circuits in a television receiver. Continual reference is made to the bandpass of various circuits throughout technical articles as well as actual receiver alignment data. Consequently, the term "band pass" should be well understood in the serviceman's mind. Band pass is specified for the r f section, video i f amplifiers, and the sound i f amplifiers. The generally accepted definition of band pass is illustrated in Fig 1. It may be defined as the numerical difference between the two frequencies at which the amplitude is equal to 0.707 of the maximum wave amplitude. The two points, A and A′ on the response curve, represent 0.707 of the peak amplitude and are known as half-power points. The marker pip is moved to point A and then to point A′. The difference in frequency is the band pass of the stage. For example, if the marker pip indicated that point A (lower-half power point) has a frequency of 5 mc, and that point A′ (upper-half power point) has a frequency of 8 mc, the band pass is 3 mc.

NOTE: The Sylvania Marker Generator was primarily designed to operate in conjunction with the Sylvania Sweep Generator Type 500. However, the information presented in this manual applies not only to the Sylvania Sweep Generator, but, in general, to any sweep generator the serviceman may be using. If specific instructions are supplied by the receiver manufacturer for applying the signal to the circuit under test, or for connecting the indicating instrument, they should be followed in preference to the data presented herein.

2. *Television Receiver I F Alignment.*

A. *Fundamental Marker Generator, Sweep Generator and Oscilloscope Connections.*

The input cable of the marker generator is designed to fit the output socket of the Sylvania Sweep Signal Generator Type 500. (Connections may be made as illustrated in Fig. 2). With this arrangement the sweep generator output is tied internally to the marker generator. The combined output signal is fed to the TERMINATING PROBE and there paralleled with a 68 ohm load resistor.

When using an alternate sweep generator it may be difficult to connect the output of the sweep generator directly to the marker generator. In this case, the marker and sweep generator signals are combined by paralleling the output leads at the point of signal application (Fig. 3). The 68 ohm load resistor contained in the TERMINATING PROBE serves as a common load resistor.

The oscilloscope vertical amplifier input should be clipped across the video detector load resistor.

B. *Marker Generator Adjustments.* Set the SELECTOR switch to STANDBY and, using the sweep generator only, proceed to display the receiver's i f response curve on the oscilloscope. The marker generator becomes only a conecting link for the sweep generator when placed in STANDBY.

The BAND switch and VFO frequency should be set to correspond with the sweep generator center frequency. This will place the marker pip within the band pass of the i f amplifiers, and eliminate the possibility of error in marker frequency that may occur if the VFO was simply tuned at random until the pip appeared on the response curve. Next, set the SELECTOR switch to the VFO position and observe the oscilloscope. Turn the VFO ATTENUATOR in a clockwise direction until the marker pip is visible. The marker generator output should only be high enough to provide an intelligible pip. Too high an output may completely destroy the response curve.

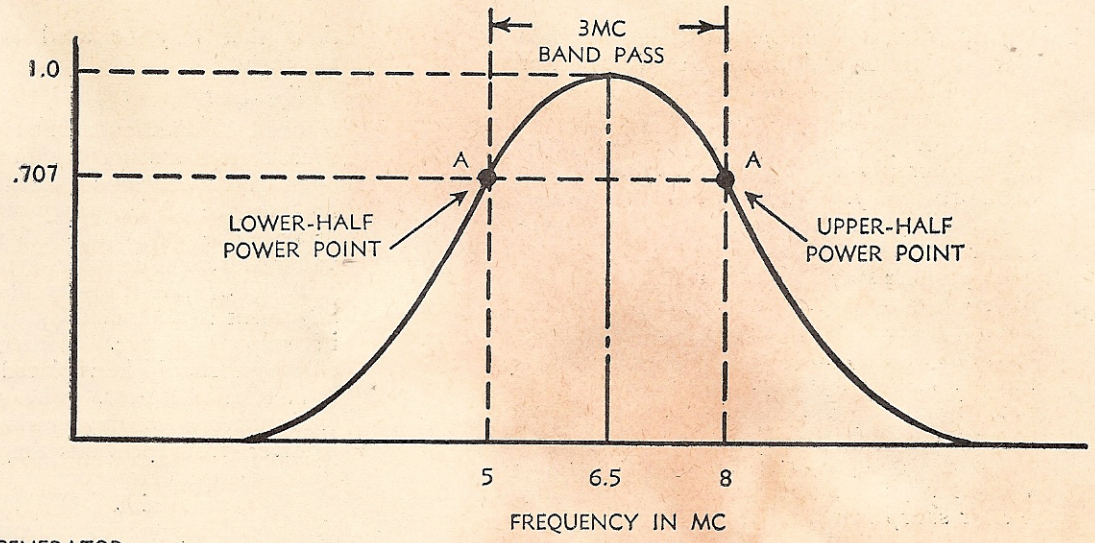

Figure 1—Typical Tuned R F Stage Response Curve

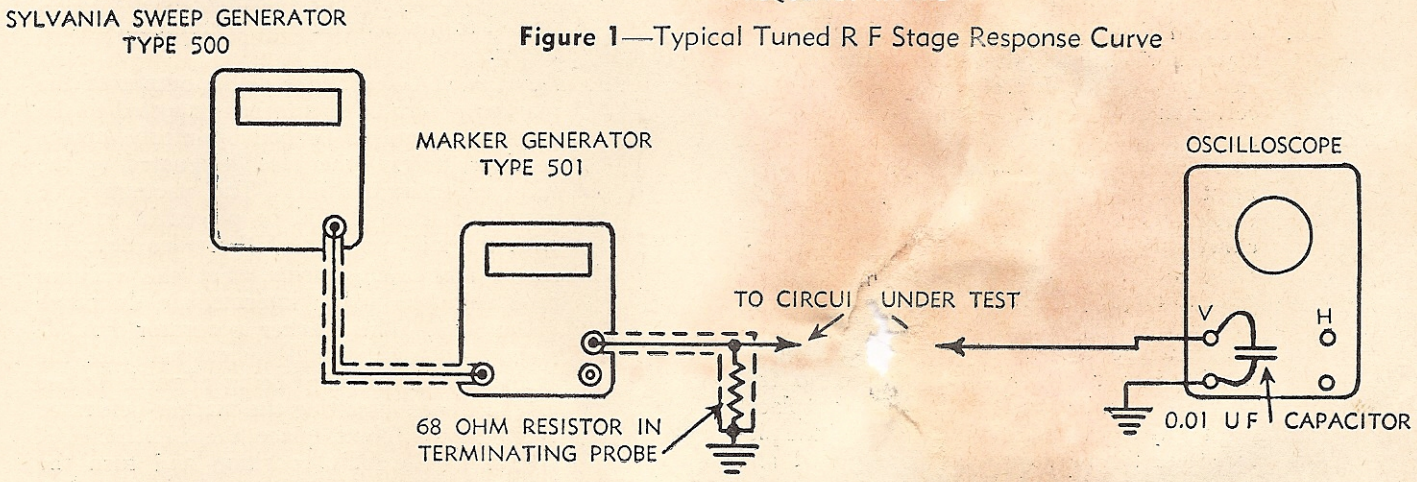

Figure 2—Connecting the Sylvania Sweep Generator to the Marker Generator

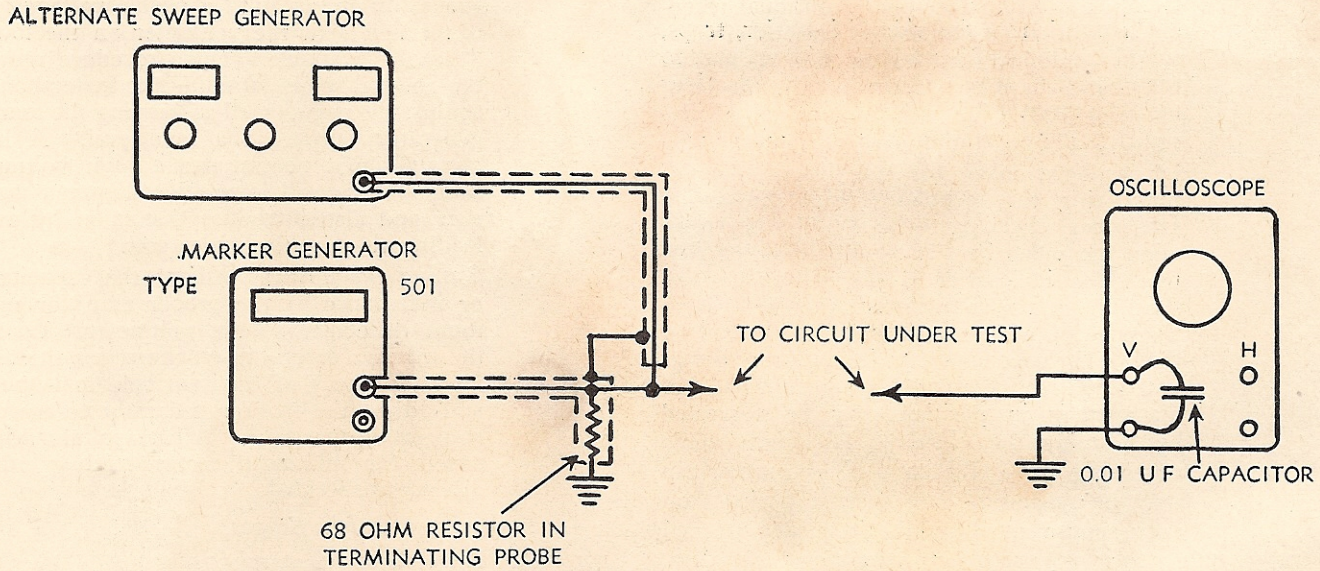

Figure 3—Connecting an Alternate Sweep Generator to the Marker Generator

C. *Refining the Marker Pip.* It should be noted that in Fig. 2 and 3 a 0.01 uf capacitor has been placed across the input of the oscilloscope. When using an oscilloscope capable of passing high frequency signals, the marker pip may appear fuzzy or drawn out horizontally. This fuzziness or "grass" is caused by the beating of the marker generator against the constantly changing frequency of the sweep generator. The frequency of the "grass" is progressively higher as the sweep generator frequency changes from center frequency to plus or minus the maximum sweep frequency. This "grass", if not eliminated, will make an accurate frequency check impossible. The purpose of the 0.01 uf capacitor is to bypass the unwanted signals to ground, and leave only a clear sharp marker pip.

D. *Video I F Response Curve Calibration.* In appearance, the response curve may coincide exactly with the curve presented by the receiver manufacturer. However, the characteristics curve, viewed by the technician, could be completely misleading due to adjustment of the oscilloscope's horizontal and vertical gain controls. For example, if the curve should drop off along dotted line, (Fig. 4-A), the band pass w be insufficient to amplify all the frequ contained in the video signal, and the be poor picture detail. Also osition of the i f carrier, sound carrier trap frequencies must be considered oper placement may cause extreme dis the picture due to the sound being amplified and passed to the grid of the picture tube via the video i f stages. In the fringe areas, poor alignment may completely eliminate the sound and picture. The frequency as well as the exact position of the video i f carrier, traps, sound carrier and band pass, with respect to the response curve, are given by the receiver manufacturer.

Figures 4 A and B illustrate an ideal video i f response curve for the purpose of familiarizing the technician with the actual frequency checking necessary to correctly align the video i f. It should be noted that the video i f carrier is placed halfway up the slope of the characteristics curve. Check the position of the marker pip as viewed on the oscilloscope against the position designated in the receiver alignment data. A discrepancy in position may be corrected by retuning the video i f amplifiers while observing the oscilloscope. The marker pip may be moved to any desired position on the response curve, and the frequency checked against the receiver manufacturer's data. Fig. 4 B suggests several marker pip positions that may be used to insure proper alignment.

3. *Trap Alignment.*

A. *General Discussion.* The necessary signal source requirements for proper trap alignment are a continuous carrier possessing a high degree of frequency accuracy and stability. These demands are met by the Sylvania Marker Generator Type 501. Accurate peaking of the traps is also impossible if alignment is attempted by utilizing the video i f response curve. Consequently, the oscilloscope should be replaced with a dc vacuum tube voltmeter. The sweep generator, if connected to the marker generator or receiver from previous steps, need not be disconnected. However, it should be turned "OFF" or placed in "STANDBY" to prevent the possibility of extraneous signals being passed to the detector and vacuum tube voltmeter.

B. *Instrument Connections.* The output of the marker generator should be connected to the grid of the mixer or converter tube of the receiver, unless otherwise designated by the receiver manufacturer. The vacuum tube voltmeter leads should be placed in parallel with the load resistor of the video detector.

C. *Instrument Adjustments.* Set the vacuum tube voltmeter to an intermediate dc range (50 volts). The marker generator BAND switch and dial should correspond with the frequency of the trap being aligned. (Use extreme care in setting the marker generator frequency.) Next, place the SELECTOR switch in the VFO position and turn the VFO ATTENUATOR clockwise until a slight meter deflection is noted. Reduce the vacuum tube voltmeter range and marker generator output until a usable voltage level is reached with the voltmeter on the lowest dc range available. This procedure reduces the possibility of slamming the meter pointer against the peg as well as keeping the marker generator output at a low level. A high output signal necessitates a high voltmeter range. This will lower the alignment accuracy and also introduce distortion by overloading the circuits under test.

D. *Tuning the Traps.* Adjust the capacitance or inductance of the proper trap for minimum deflection of the voltmeter. Consult the manufacturer's instructions for the resonant frequency of the next trap to be tuned and adjust the marker generator to the corresponding position. All traps should be tuned for minimum meter reading unless otherwise specified.

4. *Stagger-tuned I F Stages.*

A. *Analysis and General Discussion.* When the circuits of a receiver are stagger-tuned, each

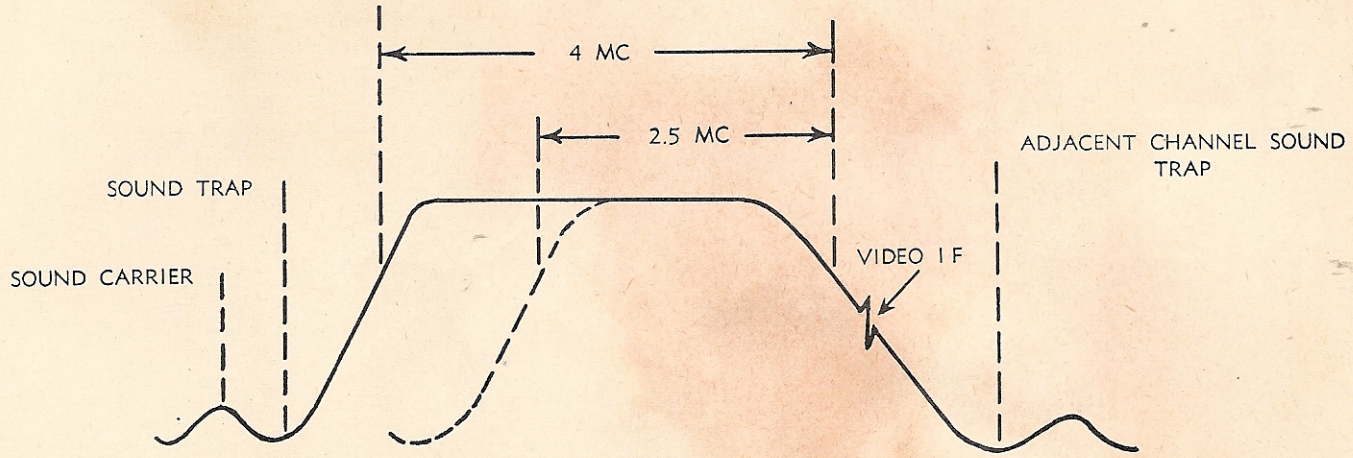

Figure 4A—Ideal Video I F Response Curve

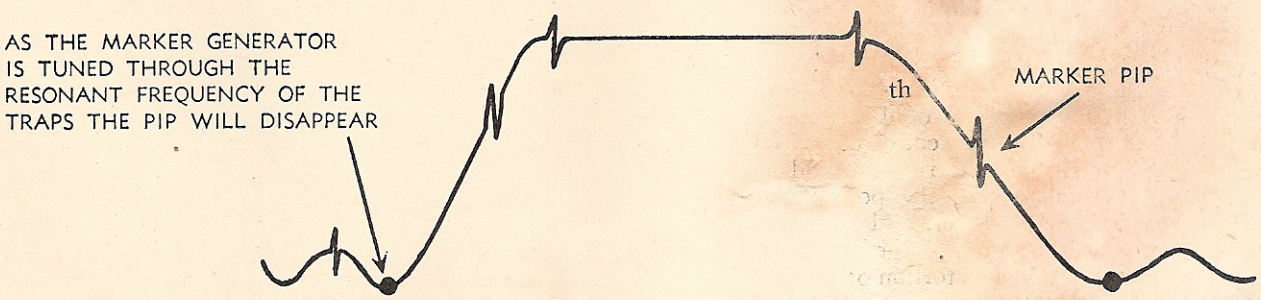

Figure 4B—Ideal Video I F Response Curve With Suggested Check Points

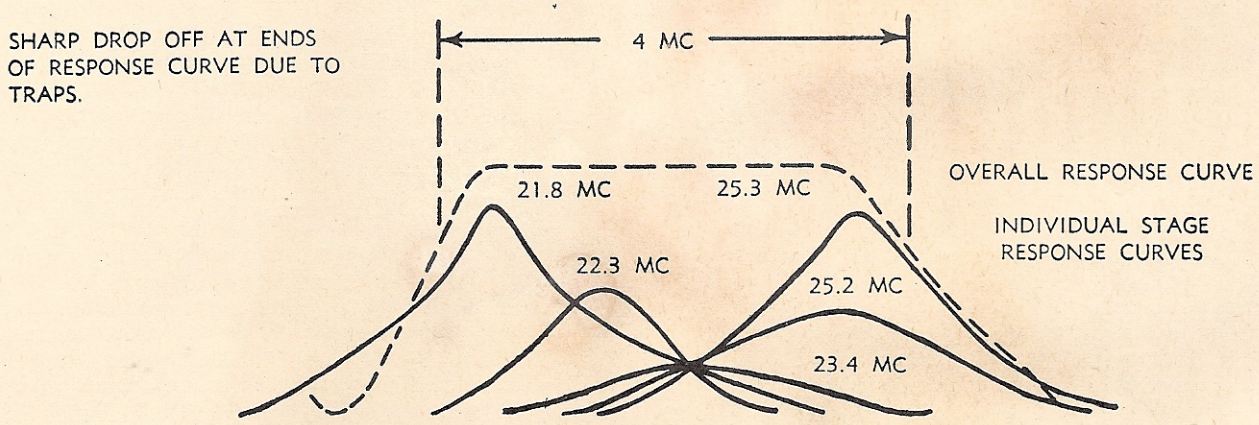

Figure 5—Stagger-tuned I F's Producing a 4 mc Band Pass

stage is peaked to a different frequency. Therefore, alignment may be accomplished by using the marker generator and vacuum tube voltmeter. In Fig. 5 the response curve of each stage is represented by the solid lines. (The frequencies indicated are representative of a receiver having an i f carrier frequency of 25.75 mc.) The addition of the individual stage response curves, with respect to frequency and amplitude, will result in the overall characteristics curve. (See dotted line.)

B. *Instrument Connections.* Connect the vacuum tube voltmeter across the video detector load resistor. Then clip the output of the marker generator between grid and ground of the last video i f stage, unless otherwise specified by the receiver manufacturer. The conventional method is to inject the signal in the last i f amplifier first, and then to the preceding stages until each has been peaked.

C. *Instrument Adjustm* vacuum tube voltmeter to range. Place the marker vitch and dial to position with the resonant frequency video i f stage. With the or SELECTOR switch set t the VFO ATTENUATOR c suitable vacuum tube voltm noted. (Refer to Section rker generator and voltmet

D. *Tuning the I F's.* Adj leo i f transformer for a maximu deflection. After the stage has been a urately peaked, reconnect the marker generator output to the grid of the preceding stage. Consult the alignment data for the exact resonant frequency. Then, retune the marker generator and peak the circuit. The same procedure should be followed until each i f stage has been aligned.

E. *Checking the Final Response Curve.* The resulting overall video i f response, formed by the addition of the individual stage response curves may be viewed on the oscilloscope by connecting the combined output of the marker and sweep generator to the grid of the first video i f amplifier. Next, the oscilloscope leads should be clipped across the diode load resistor of the video detector. Now, set the sweep generator to the i f carrier frequency, and the sweep width control to give the desired frequency range. The resulting overall response curve should be similar in shape to the response curve illustrated in Fig. 5. (See dotted line.) Set the marker generator to the i f carrier frequency and compare the response curve viewed on the oscilloscope with the example provided by the receiver manufacturer. If the shape of the overall characteristics curve or the relative position of the i f carrier marker pip does not agree with the receiver specifications, each stage should be realigned while observing the oscilloscope.

5. *Inter-carrier Sound Systems.*

A. *General Discussion.* The band width specified by the FCC for narrow band frequency modulation is 50 kc. This means that the sound carrier frequency may be varied only plus and minus 25 kc with modulation. At 4.5 mc, a dial inaccuracy of 1% would cause a frequency error of 45 kc. Therefore, the signal used for alignment must be crystal controlled. The crystal should have a frequency of 4.5 mc and possess a zero drift characteristic.

B. *Instrument Connections.* Connect the output of the marker generator to the grid of the first video amplifier. Clip the vacuum tube voltmeter to the sound detector in the manner designated by the receiver manufacturer for measuring amplitude changes.

C. *Instrument Adjustments.* Insert a 4.5 mc crystal in the marker generator XTAL socket. Set the SELECTOR switch to the XTAL position and turn the XTAL ATTENUATOR clockwise until a suitable deflection is noted on the voltmeter. Refer to Section 3-C for proper adjustment of the voltmeter range and marker generator output.

D. *Sound Trap and I F Circuit Adjustments.* The inter-carrier sound trap, usually located in the plate circuit of the last video amplifier, should be tuned first, for a maximum voltmeter reading. Next, proceed to the sound i f stages and peak each circuit for optimum gain.

The receiver manufacturer may state that alignment be made by viewing the sound i f response curve. If this is the case, the combined output of the marker and sweep generator should be connected to the grid of the first inter-carrier sound i f amplifier. Substitute an oscilloscope for the vacuum tube voltmeter and proceed to display the sound i f response curve. Turn the marker generator XTAL ATTENUATOR clockwise until the marker pip appears. Use the marker pip as a reference guide to the exact sound i f center frequency. The curve should be approximately the same as Fig. 6.

E. *Sound Detector Alignment.* To view the characteristics curve of sound detector, rewire the oscilloscope in the manner designated in the receiver alignment data. The curve should be somewhat similar to Fig. 7, providing the oscilloscope sweep is a 60 cycle sawtooth wave.

IF 4.5 MC MARKER PIP APPEARS AT POINT B, I F'S ARE TUNED INCORRECTLY. RETUNE EACH STAGE UNTIL PIP APPEARS AT A.

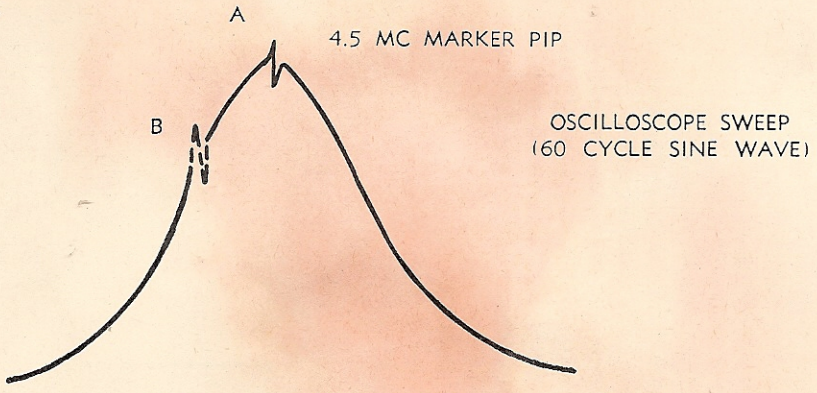

Figure 6—Intercarrier Sound I F Response Curve as Viewed on an Oscilloscope

IF 4.5 MC MARKER PIP APPEARS AT POINT B, RETUNE SECONDARY OF RATIO DETECTOR OR DISCRIMINATOR TRANSFORMER.

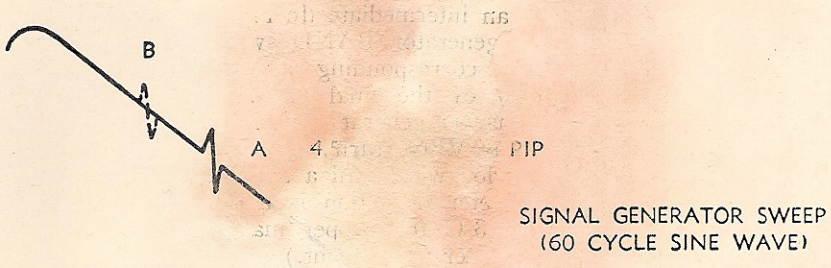

Figure 7—Intercarrier Sound Detector Response Curve as Viewed on an Oscilloscope Using a 60 Cycle Sawtooth Sweep Voltage

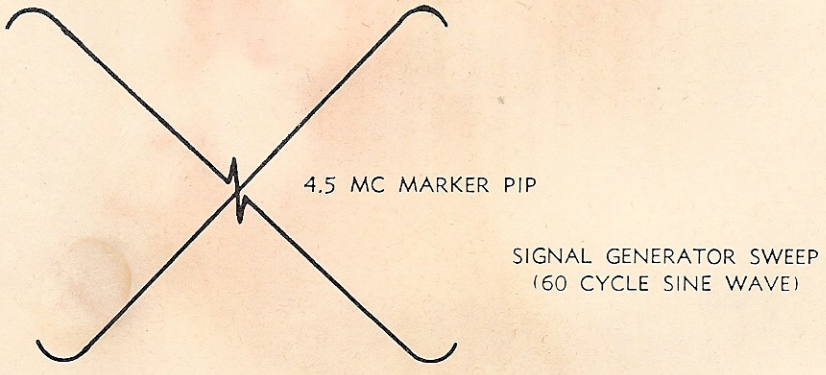

Figure 8—Intercarrier Sound Detector Response Curve as Viewed on an Oscilloscope Using a 120 Cycle Sawtooth Sweep Voltage

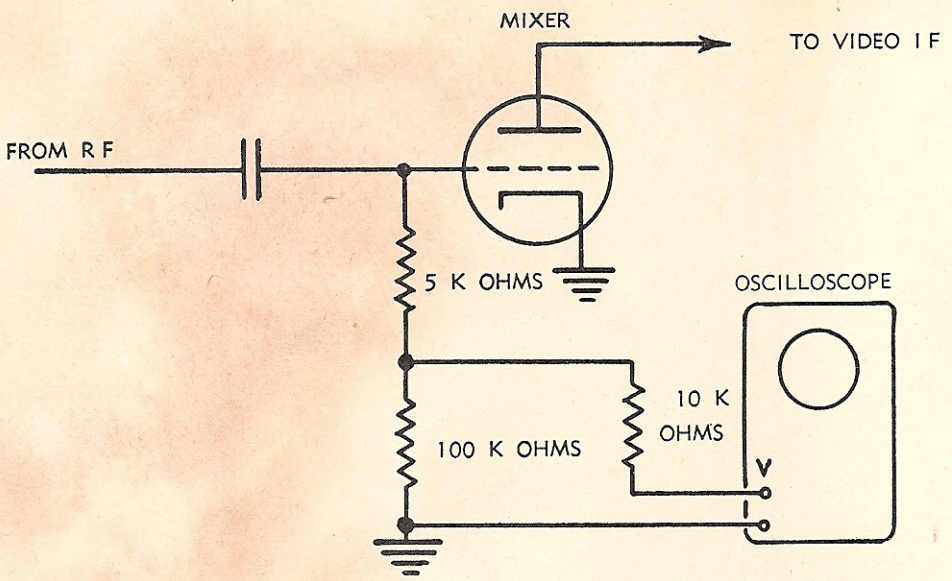

Figure 9—Method of Connecting Oscilloscope to Mixer

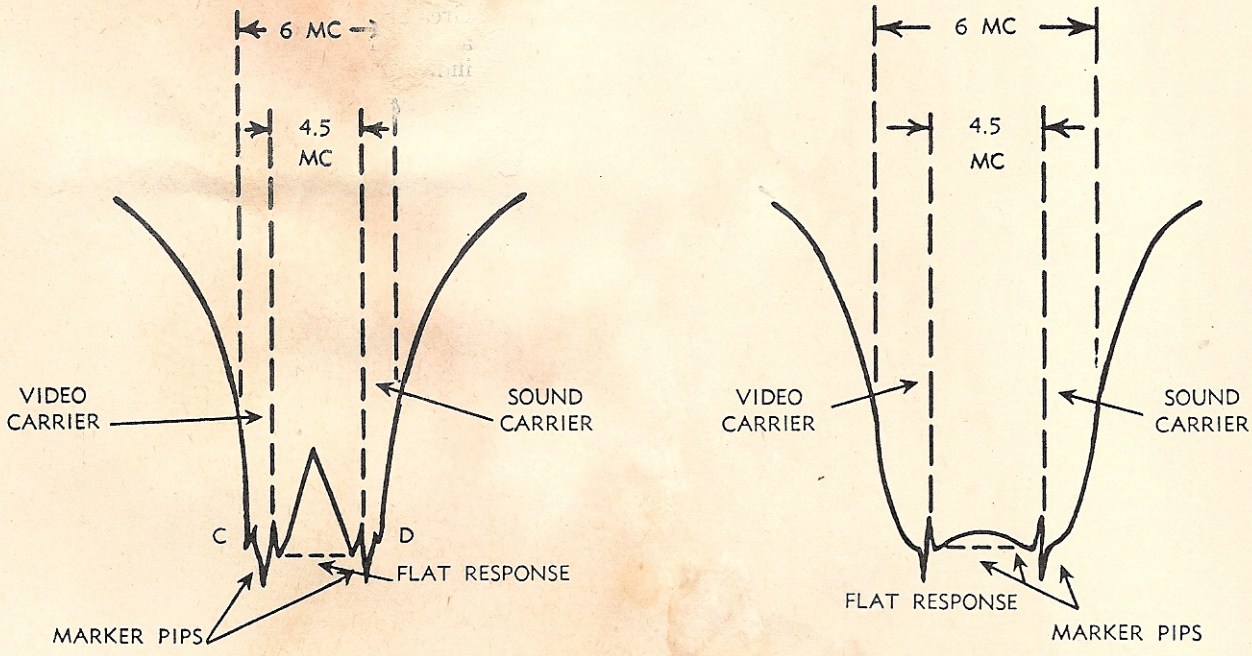

Figure 10A-B—Typical TV R F Response Curves With Markers

The 4.5 mc marker pip should fall exactly in the center of the pattern as illustrated in Fig. 7. Adjust the primary of the discriminator or ratio detector transformer for maximum pattern amplitude. The secondary should be tuned until the curve is symmetrical. The receiver manufacturer may designate a horizontal oscilloscope sweep frequency of 120 cycles instead of 60 cycles. In this case, the curve will be similar to Fig. 8, commonly known as a "crossover".

6. *R F Alignment.*

A. *General Discussion.* Accurate alignment of the r f stages is achieved by using a sweep generator, oscilloscope and the Sylvania Marker Generator Type 501. The latter two instruments, when operated in conjunction with the receiver, provide a visual representation of the r f characteristics curve. Band pass at the video and sound carrier frequencies does not present a problem. However, the response curve must be symmetrical with respect to the position of the sound and video carriers. Poorly aligned r f stages will naturally impair the receiver's sound and video reproduction.

B. *Instrument Connections.* Clip the combined output of the marker and sweep generator to the television receiver's antenna terminal lugs via the required dummy load. The oscilloscope, if the circuit permits, may be connected across the lower portion of the mixer grid leak resistor, as indicated by Fig. 9. If this is impossible, a demodulator probe must be used in series with the oscilloscope leads.

C. *Preliminary Marker Generator Tuning.* Turn the SELECTOR switch to STANDBY and proceed to display the r f response curve on the oscilloscope in the manner suggested by the receiver alignment data. The curve obtained should be somewhat similar to Fig. 10-A or B. Set the BAND switch and dial to the video carrier frequency of the channel being checked. Set the SELECTOR switch to VFO, and turn the VFO ATTENUATOR to the right until the marker pip appears on the response curve.

D. *Checking the Response Curve With the Marker Generator.* The oscillator frequency of most tv receivers is higher than the carrier frequency input to the mixer. Therefore, if the r f response curve is viewed directly (before the mixer), the video carrier will be on the low frequency side of the display. The video carrier appears on the high frequency side of the video i f response curve due to inversion in the mixer or converter. The marker pip should fall in the center of the low frequency resonance peak, as illustrated in Fig. 10-A, point C. The receiver manufacturer, in some cases, overcouples the r f tuned circuits to obtain the double resonance peaks as well as adequate band pass characteristics. Reset the marker generator VFO to the sound carrier frequency. The marker pip should now be in the center of the high frequency response curve resonance peak, (point D, Fig. 10-A.) If the video and sound carrier are found to be incorrectly positioned, retune the r f stages. A flat response (dotted lines in Fig. 10-A, B) between the video and sound carrier may be indicated by the alignment data. In this case the r f stages should be tuned until the video and sound marker pips are symmetrically placed on the response curve.

7. *Calibrating and Aligning High Frequency FM or AM Receivers.*

A. *General Discussion.* The marker generator, when operated in conjunction with a vacuum tube voltmeter, serves as an accurate signal source for aligning high frequency tuned circuits. The human ear, being a nonlinear device, is not capable of recording small amplitude variations. Consequently, the ... ll changes, not generally noticed in th... ce shop when aligning receivers ... e methods, may be extremely detri... the actual reception of weak signals. ... accuracy may be achieved by using ...n tube voltmeter as the alignment ...g device.

B. *Connecting the Marker Generator and Voltmeter.* The output of the marker generator should be connected to the antenna of the receiver via the dummy load prescribed by the receiver manufacturer. If the receiver is in the am class, the vacuum tube voltmeter may be placed directly across the second detector load resistor. When aligning fm receivers, connect the vacuum tube voltmeter in the manner designated for recording discriminator or ratio detector amplitude variations.

C. *Tuning the Oscillator.* Set the receiver and marker generator to the designated calibration frequency. Adjust the vacuum tube voltmeter to read negative dc voltage when aligning am receivers. For fm receivers the voltage polarity will depend on the voltmeter connections as designated by the receiver manufacturer. Set the marker generator SELECTOR switch to VFO and turn the VFO ATTENUATOR clockwise until a suitable meter deflection is noted. Tune the oscillator circuit (high frequency adjustment) for maximum meter deflection. If the receiver is very far out of alignment

the meter may not indicate the presence of the marker generator signal. In this case, tune the receiver until the vacuum tube voltmeter registers. Then, keeping in step, adjust the oscillator circuit and receiver tuning knob until the receiver dial pointer is correctly positioned. Set the receiver dial pointer very carefully to the dial scale calibration marker and tune the oscillator circuit for optimum vacuum tube voltmeter deflection.

D. *Tuning the R F Stages.* Readjust the marker generator and receiver dial to the correct frequency for peaking the r f circuits. Tune each r f stage for maximum voltmeter deflection in the order designated by the receiver manufacturer. If the receiver is provided with an adjustment for tracking the r f and oscillator circuits at the low frequency end of the dial, refer to the alignment data for the correct procedure.

SERVICE

For service, carefully pack the COMPLETE equipment with coaxial test leads and ship it to your nearest Sylvania Service Station by PREPAID EXPRESS. Accompany it with a letter describing the trouble and giving the PURCHASE DATE.

AUTHORIZED SYLVANIA SERVICE STATIONS

EAST COAST STATES

Hoffman Electronics Corp.
253 East 72nd Street
NEW YORK 21, NEW YORK
Att: Mr. J. Hoffman

Radio Television Company
723 Ponce de Leon Ave., N. E.
ATLANTA, GEORGIA
Att: Mr. G. F. Johnson

CENTRAL STATES

Master Electric Service Co.
835 West Washington Blvd.
CHICAGO 7, ILLINOIS
Att: Mr. Richard Lomastro

WEST COAST STATES

Service Radio Wholesale
1357 Post Street
SAN FRANCISCO 9, CALIFORNIA
Jerry Shirek

CANADA

Bayly Engineering Ltd.
5 First Street
AJAX, ONTARIO, CANADA
Att: Mr. B. DeF. Bayly

FACTORY SERVICE STATION

Sylvania Electric Products Inc.
1221 West Third Street
WILLIAMSPORT, PENNSYLVANIA
Att: Mr. J. H. Mintzer

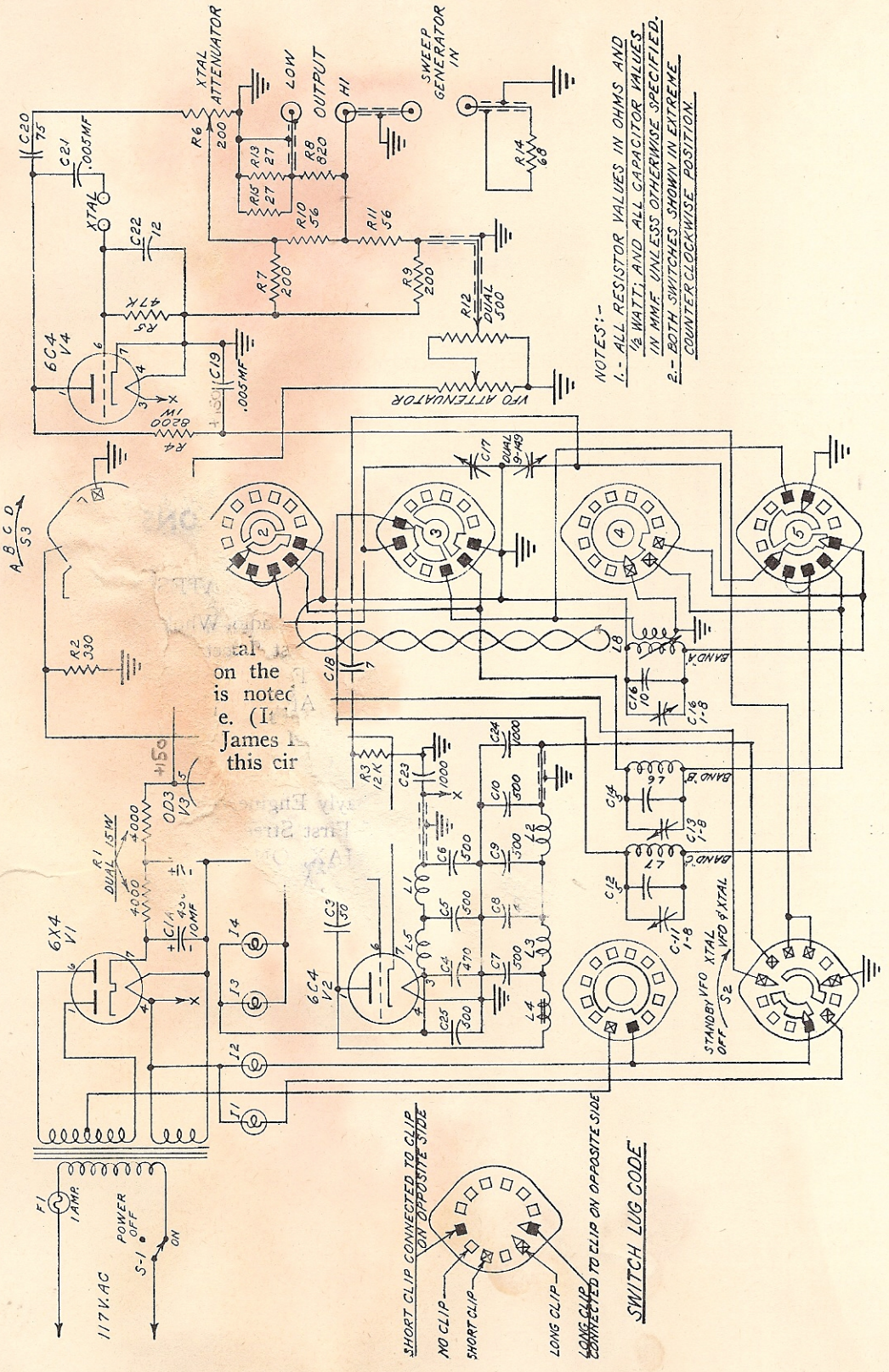

Figure II — Circuit Diagram of the Sylvania Marker Generator Type 501

PARTS LIST

Symbol	Description	Rating	Tolerance	Sylvania Part No.
	Bearing—Pulley			18691
	Board—Terminal: 2 lugs			12689
	Board—Terminal: 3 lugs			101
	Bracket—Coil Mounting			18697
	Bracket—Fuse Holder			18692
	Box—R.F.			18702
	Cable Assembly—Power			13501
	Cable—Drive			18611
	Cable—Coaxial Shielded RG-59/U			8996
	Cabinet			18659
C1	Capacitor—Fixed: Electrolytic	10-10 uf. 450 V		2787
C3	: Miniature ceramic	5000 uuf min., 500 V		18827
C4, 8	: Ceramic	470 uuf	±20%	18389
C5, 6, 7, 9, 10, 25	: Button mica	500 uuf	±10%	4948
C12, 14	: Ceramic	5 uuf, 500 V	±0.5 uuf	18392
C16	: Ceramic	10 uuf, 500 V	[illegible]	599
C18	: Ceramic	27 uuf		18386
C19, 21	: Mica	.005 uf. 400 V		7589
C20	: Ceramic	75 uuf		18828
C22	: Ceramic	12 uuf, 500 V		18770
C23, 24	: Ceramic	1000 uuf		7607
C11, 13, 15	Capacitor-Variable:	1 to 8 uuf		18705
C17	: 9 plate dual			18760
	Carriage—Pointer			18683
	Chassis—Oscillator			18698
	Chassis—Power Supply			18701
	Clamp—Cable			16278
	Collar: for 1/8" panel			18594
	Connector—Adapter			20719
	Contact—Connector			20603
	Contact—Cable Ground			20600
L1, 2, 3	Coil—Choke: 80—200 mc.			18383
	Cover—R. F. Box			18699
	Cover—R. F. Alignment			21191
	Disc—Drive			20155
	Fuse: Cartridge, 1 amp, 3AG			2422
	Handle: Finished brushed chrome			16940
	Hub—Pulley			18693
	Knob—Pointer			16252
	Knob—Round: Small			18458
	Knob—Round: Large			18457
	Lamp—Incandescent	6V, .15 amp.		2828
	Light—Indicator: Red			16974
	Light—Indicator: Green			18710
	Panel			18700
	Plate—Scale			18687
	Post—Spacing: 1—1/2"			18688
	Post—Spacing: 2—3/16"			18689
	Pulley: 5/8"			18469
	Pulley: 1/4"			18694
R1	Resistor—Fixed:	8000 ohms, tapped at 4000 ohms, 15 W	±10%	18766
R2	:	330 ohms 1/2 W	±10%	19364
R3	:	12000 ohms 1/2 W	±10%	985
R4	:	8200 ohms 1 W	±10%	1233
R5	:	47000 ohms 1/2 W	±10%	1010
R7, 9	:	200 ohms 1/2 W	±5%	910

PARTS LIST — Continued

Symbol	Description	Rating	Tolerance	Sylvania Part No.
R8	:	820 ohms 1/2 W	±10%	936
R10, 11	:	56 ohms 1/2 W	±10%	887
R13, 15	:	27 ohms 1/2 W	±10%	873
R14	:	68 ohms 1/2 W	±10%	891
R6	Resistor—Variable: Dual	200 ohms 2 W Linear taper	±20%	15344
R12	:	500 ohms 2 W Linear taper		18868
	Shaft—Drive			20161
	Shield—Tube: T-5 1/2, 1—3/4" long			18177
	: T-5 1/2, 2—1/4" long			18832
	Socket—Crystal			18684
	Socket—Tube: Miniature 7 pin			15053
	Socket—Tube: Octal			390
	Socket—Miniature: Bayonet base			18612
	Spring—Tensio			18488
	Switch- nd			18638
	lector			18637
	r			18407
	T ylvania Type 6C4			
	Tu ylvania Type 6X4			
	Tub lvania Type 0D3			
	Wi			18514

WARRANTY

Sylvania Electric Products Inc., warrants each new Marker Generator manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use, and service discloses such defect, provided the unit is delivered by the owner to a Sylvania Authorized Service Station or to our authorized wholesaler from whom purchased, intact, for our examination, with all transportation prepaid, within 90 days from the date of sale to original purchaser and provided such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any Marker Generato which has been subjected to misuse, neglect, accident, incorrect not our own, improper installation or to use in violation furnished by us, nor to units which have been repai outside of our factory, nor to cases where the serial nu has been removed, defaced or changed, nor to accessori with not of our own manufacture.

This warranty is in lieu of all other warran implied, and no representative or person is autho us any other warranty liability.

This warranty is void unless warr ided with instrument is filled out completely and maile sale of the instrument by the distributor.

This warranty applies only in the United States sessions and the Dominion of Canada where Sylvania maintain establishments. In other es, write to the Internatio es Division, Sylvania Electric Pro icts Inc., 1740 Broadway, N k 19, New York, or the local Sylvania Representative in your y.

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SYLVANIA ELECTRIC

Sylvania 500 and 501 Sweep Generator and Crystal Marker Dial Corrections

Crystal Frequency in MC.	Marker Frequency in MC.	Sweep Frequency in MC.
2.145 MC.		
3.290		
6.435		
8.580		
10.725		
12.870		
15.015	14.90	15.5
17.160	17.0	17.75
19.305	19.3	19.75
21.450	21.45	21.80
27.255	27.2	27.9
36.34	36.34	38.0
45.425	45.7	48.0
54.510	54.5	58.25
63.595	64.0	66.0
72.680		
81.765	82.3	86.0
90.850	91.9	96.0