# SERVICING 1 - 1

## PREAMPS AND AMPLIFIERS



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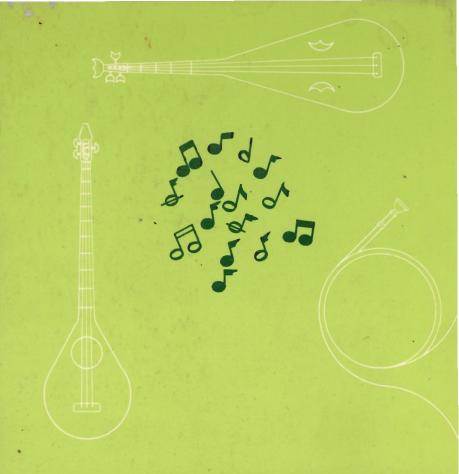
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- Using the Audio Signal Generator to Test Amplifier Response
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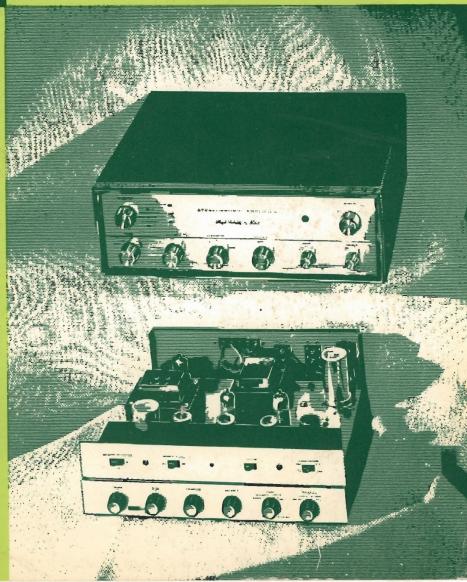
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A Havan M. Sams

PHOTOFACT PUBLICATION-HF-4





## SERVICING HI-FI PREAMPS AND AMPLIFIERS

VOLUME 4

(HF-4)



HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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### SERVICE FACTS ABOUT PREAMPS AND AMPLIFIERS

### **ANALYZING EQUALIZATION NETWORKS**

In a hi-fi system, it is generally desirable to have a flat frequency response over the entire audible range. This doesn't mean that every component (speaker, amplifiers, cartridge, etc.) will have a flat response, nor does it mean that corrective measures will be taken with every unit to produce this desired response. It does mean, however, that action should be taken to insure that the output will be as nearly like the original music or sound as possible.

What do we mean by flat? Simply stated, a flat response is realized when, after the volume control is adjusted to reproduce the original volume level at any one frequency, this same volume level will be reproduced at all frequencies on the recording. Now that we have established the need for a frequency response that is flat and covers the entire audible range, let's see how equalization and equalizers fit into the picture.

Those of you who are familiar with the specifications for playback power amplifiers know that a typical listing of these specs might be 30 watts of audio over the range of 20 cps to 50 kc ±1.5 db at less than 3% IM (intermodulation) distortion. You should also be familiar with the fact that a speaker enclosure is designed to load the speaker and, thus, match it to the output amplifier to produce an essentially flat frequency response. It is also readily accepted that voltage amplifier stages can be designed with a flat frequency response over the entire audio range. Why, then, is equalization (frequency compensation) needed?

There are two main reasons — the pickup device used in the playback system, and the recording itself. Let's examine the recording first. Most pickup cartridges utilize the velocity principle, where the output signal voltage is proportional to the excursion rate of the needle. It just so happens that when the record is cut to produce equal velocities for all frequencies of the same voltage amplitude, the excursion distance is inversely proportional to the frequency.

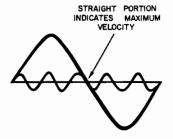


Fig. 1. A constant velocity at all frequencies results in higher amplitudes at low frequencies.

In Fig. 1, two signals are superimposed to illustrate this phenomenon. This would mean (using practical figures) that if an excursion of 1/10,000 of an inch produced maximum output voltage at 20,000 cps, then the excursion required to produce the same output at 20 cps would be 1/10 of an inch. Naturally, grooves 1/10 of an inch wide cannot possibly be packed 100 to the inch on a record. Some LP and extended play 45's even have more than 100 grooves to the inch. For this reason then, the amplitudes of low-frequency sig-

nals are attenuated before they are applied to the record.

On modern recordings, this attenuation is not done on a helter-skelter basis. Instead, most recordings are now based on the RIAA (Recording Industry Association of America) curve shown in Fig. 2.

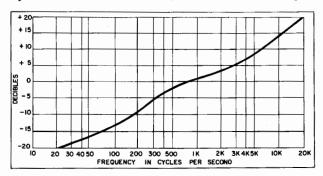


Fig. 2. RIAA recording curve ( $\pm$  2 db tolerance).

As you can readily see, all signals with a frequency below 1,000 cps will be attenuated, while those above 1,000 cps will be boosted. Applying this information to your knowledge of a playback system, you can see that if we are to hear music as it sounded before being put on the record, some frequency compensation must be employed in the playback system. The RIAA playback curve in Fig. 3 is the reverse of the record curve in Fig. 2, and equalization in the playback must boost the low frequencies and attenuate the high frequencies in accordance with this curve to produce a flat response.

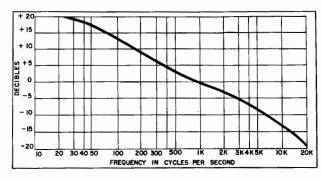


Fig. 3. RIAA playback curve (± 2 db tolerance).

This, of course, assumes a flat response characteristic for the pickup device — a condition not always found. To compensate for the frequency-characteristic differences between the various pickup devices, tone controls that can either boost or attenuate both low and high frequencies are included in playback systems, but the ranges of these controls are generally not sufficient to complement the record curve. Thus, a special circuit that accomplishes the required equalization is incorporated in the playback amplifier and is almost always made up of combinations of resistors and capacitors. Let's examine the basic circuit in Fig. 4 and see how this combination of resistance and capacitance can be used for frequency correction.

First of all, let's eliminate the components not primarily tied in with frequency correction — the plate-load resistor R1 for the first stage, the coupling capacitor and DC blocker C1, and the DC return R4 for the grid of the second stage. Actually, C1 does affect the low-frequency response since its impedance will be fairly high at low audio frequencies, but this is not the reason it is used. As a matter of fact, its effect is the opposite of what we are trying to obtain and must be considered in the design of the compensating network.

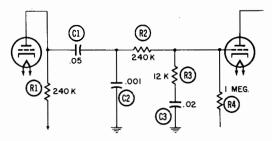


Fig. 4. Basic equalization circuit.

Getting into the network itself, we find that C2 and R2 form a low-pass filter network which attenuates the highs more than the lows. This happens because the higher the frequency, the lower the value of  $X_{\rm C}$  for any given capacitor. In the vernacular of the hi-fi fan, C2 provides high frequency roll-off.

Now we get to the series network of R3 and C3, and again we have a reactance  $(X_C)$  that varies with frequency. If you calculate the reactance of a .02-mfd capacitor, you will find that: at 60 cps,  $X_C$  equals 191K, at 1,000 cps,  $X_C$  equals 7,950 ohms; at 10,000 cps,  $X_C$  equals 795 ohms; and at 20,000 cps,  $X_C$  equals 397 ohms. Since  $X_C$  and R are in series, the net result is an impedance which varies from 12,397 ohms at 20 kc to 203,000 ohms at 60 cps.

If we further analyze this circuit, we see that any signal at the junction of C1, C2 and R2 will divide between R2 and the combination of R3 and C3. Since the total impedance of R3 and C3 is higher at low frequencies, more signal voltage will be applied to the output grid at low frequencies. This is the type of equalization circuitry employed for a common variable-reluctance style of pickup cartridge,

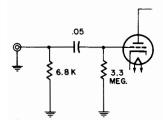


Fig. 5. Equalization in input circuit.

Equalization may not always be accomplished entirely between the halves of a dual triode, as shown in Fig. 4. In many cases, high frequency roll-off is accomplished through the use of a small resistor across the input, as shown in Fig. 5. Its purpose is to provide damping for the variable-reluctance cartridge and, thus, reduce the highs.

Other types of pickup devices usually require different equalization characteristics; furthermore, different circuit designs (such as pentode-to-triode or triode-to-pentode) will require different equalization network configurations. However, these circuits could also be analyzed for an understanding of how they are used to accomplish equalization.

### USING THE AUDIO SIGNAL GENERATOR TO TEST AMPLIFIER RESPONSE

Testing a high-quality amplifier without specialized equipment has always been a problem. However, an amplifier can be checked for power output and frequency response with an audio signal generator, AC voltmeter, and scope. If the scope has a wide bandpass response, flat from 0 to 1,000,000 cps or greater, a square-wave audio signal can be used to check both high- and low-frequency responses of the amplifier. If, however, the scope is the general-service type (response to 500 kc), then a sine-wave signal is more suitable. The limited response of a narrow-band scope will distort the square wave slightly and affect the accuracy of the test.

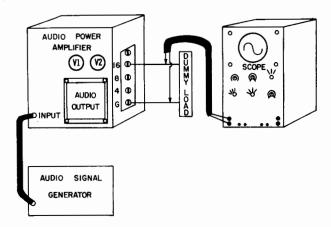
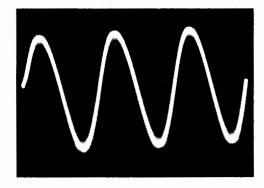
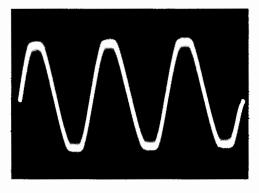


Fig. 6. Test setup for checking amplifier gain over the audio-frequency range.



(A) No clipping.



(B) Mild clipping.

Fig. 7. Comparison of scope patterns observed when setting generator gain level.

In making the test setup, the audio sine-wave signal is applied to the amplifier input, and the speaker output terminals are terminated with a suitable resistor (8 or 16 ohms of a wattage equal to or greater than the power rating of the amplifier). The scope is connected across this resistor, as shown in Fig. 6. A 25-ohm, 100-watt potentiometer makes a good universal dummy load.

After allowing about 15 minutes for warmup, set the signal generator frequency at 1,000 cps and adjust the signal level to the point just below clipping, as illustrated in Fig. 7. The AC output voltage can now be measured across the dummy resistor. A sensitive AC VTVM is best for this measurement; however, a conventional 5,000 ohm-per-volt VOM will give satisfactory performance. Compare your readings with those in Table I to obtain the power output capability of the amplifier under test. If you use a conventional VOM, your amplifier is producing a power output equal to or slightly higher (10 to 15%) than the figure in the table.

DUMMY -4 OH		DUMMY -8 OH		DUMMY -16 (	LOAD_ DHMS
VOLTAGE	WATTS	VOLTAGE	WATTS	VOLTAGE	WATTS
2 2.3 3 3.5 4 5 6 7 8	1 1.3 1.71 2.25 3 4 6.25 9 12.5	4 5 6 7 8 9 10 11 12 13 14 15	2.0 3.125 4.5 6.125 8 10.1 12.5 15 18 21 24.5 28 32	8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 30 35 40	4 5 6.25 7.5 8 10.6 12.25 14 16 18 20 22.5 27.5 30 33 36 39 56 75.6

Table I. Power Output in Terms of Voltage Across Fixed Resistor.

To check frequency response, adjust the signalgenerator frequency to the lowest frequency the amplifier can pass, and adjust the generator output to produce a signal level above which clipping will take place. Repeat this operation at 500- to 1,000-cps increments across the audio spectrum, noting the voltage reading obtained. Plotting the readings on a graph, as

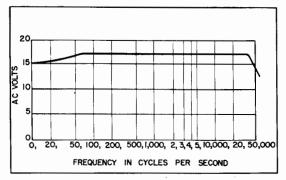


Fig. 8. Amplifier response graph obtained by plotting output voltage readings.

shown in Fig. 8, will provide a gain curve of the amplifier. Harmonic or intermodulation distortion will not be evident; but if the gain curve is fairly flat across the band (similar to Fig. 8), the amplifier is doing a reasonably good job. If you need a more accurate check, use a harmonic distortion analyzer and intermodulation analyzer in the prescribed manner.

### A GLIMPSE INTO STEREO PREAMP DESIGN

To say a preamp is a preamp and a stereo preamp is simply two preamps would be like saying any two babies are twins. Since we know a 6SN7 won't work as the final amplifier in a 100-kw transmitter stage, we can realize that a stereo preamp isn't just two of everything. While two of everything is required, several other considerations are of utmost importance to stereo operation. In the block diagram of Fig. 9,

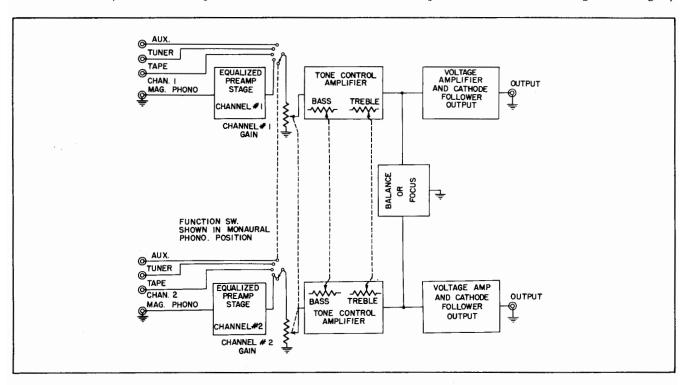


Fig. 9. Block diagram of basic stereo preamplifier, showing pair of identical sound channels, ganged controls, balance network, and functionswitch circuit.

for example, you will notice such things as balance control, ganged controls, monaural phono position, and two input jacks for each position on the function selector (except monaural phono). Ganged equalization switches that simultaneously provide the desired equalization to both preamplifier stages may also be provided.

Of particular interest is the fact that the function selector switches, gain, treble, and bass controls of the two channels are ganged — making this portion of the stereo preamplifier no more complicated to operate than a single-channel preamplifier.

The gain controls in Fig. 9 might be labeled volume or loudness in a commercial unit. The function would be the same, however — to vary the output signal of the two channels equally and simultaneously. The ganged bass and treble controls need no explanation other than that they provide simultaneous changes in bass or treble response for the two channels. The design of the circuit in each channel must consider this ganged operation, and the components selected must be of close tolerance to insure a balanced operating condition.

The balance or focus control is peculiar to stereo preamps — monaural units don't have one. This control provides precise balancing of the two output signal amplitudes. If, for any reason (such as unbalanced gain in the preceding stages), the output signals are not identical in amplitude, the balance control can be adjusted to achieve the desired degree of equality. While the balance control is shown connecting the two channels, it does so only from a DC bias standpoint. It does not link the signals in the two channels, nor does it in any way cause the two signals to be mixed.

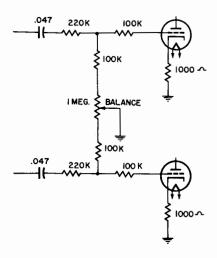


Fig. 10. Schematic of balance control network between stereo preamp channels.

The sample circuit in Fig. 10 shows how the balance control connects into the circuit to do its required job. As you can see, the control is in the common grid return and varies the ratio of DC resistance in each grid circuit. Because of this feature, a stage of gain is provided after the balance control and just ahead of the usual cathode-follower output stage. Thus, where some commercial preamp designs have employed only two dual-triode tubes (one tube as equalized preamp, one-half tube as tone-control amplifier, and one-half tube as a cathode follower), many stereo preamps will employ three dual triodes in each channel. When this is done, one tube will probably be used

for equalized preamp stages, one as a tone-control amplifier, and one as a voltage amplifier and cathode-follower output.

The major problem in stereo preamp design is to construct the unit so that it will provide identical performance on both channels without interaction between the two. This is achieved by the use of closetolerance components, matched tubes, adequate filtering and decoupling between the two channels and the power supply, and careful layout of components so that ground loops will not be created. While the foregoing are most important on the manufacturing level, they also enter the picture whenever service is required. The service technician should replace defective components with replacements having identical ratings and characteristics. Furthermore, replacements should be installed exactly like the originals; ground connections, etc., should not be moved, even though it may be easier to connect a part differently. Also, any tube to be used in a stereo preamp should be aged in the circuit for 24 hours before the unit undergoes a final check prior to its return.

### INTERESTING FACTS ABOUT FEEDBACK IN AMPLIFIERS

Feedback is a term often encountered by anyone active in audio work, especially by those who have a particular interest in amplifiers. Persons who work with public-address systems may connect the term with the howls and squeals that occur when sound from a loudspeaker is picked up by the microphone which picked up the original signal. The service technician, on the other hand, may be reminded of the whistles and squeals heard from a radio loudspeaker because unwanted feedback or coupling in some part of the receiver circuit caused the circuit to oscillate.

Feedback occurs when a portion of a signal in one part of an amplifier is reintroduced, or fed back, to a circuit nearer the amplifier input. The feedback is positive when the signal fed back is in phase with the input signal, in which case the gain of the circuit will increase and cause oscillation. The feedback is negative when the signal fed back is out of phase with the input signal. In this case, the gain of the circuit will be reduced.

We will concern ourselves here with the negative (or inverse) feedback applied to amplifiers to obtain certain desirable results. Almost everyone who works with amplifiers is acquainted with the basic principle of how an out-of-phase signal is fed back into an amplifier to reduce distortion, but this is only part of the story and is far from being enough to be of much assistance when an amplifier is being tested or serviced. The service technician should be familiar with the principles involved in negative feedback because some unusual and puzzling conditions can arise when a circuit included in a feedback loop is modified or disturbed. The term "feedback loop" refers to the circuit between the point where the feedback signal is taken from the circuit and the point where it is fed back into the circuit.

Negative feedback is largely responsible for the very low percentages of distortion featured by modern high-quality amplifiers. Only a few years ago, an amplifier with five per cent harmonic distortion was considered very good, but now the situation has changed. With the use of negative feedback, improved circuits, and high-grade output transformers in

present-day amplifiers, one-half per cent harmonic distortion at rated output is common, and much lower percentages are not at all unusual.

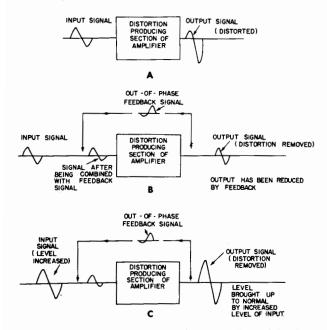


Fig. 11. The effect of negative feedback on a distorted signal.

The basic effect of negative feedback is illustrated in Fig. 11. The undistorted input signal and the distorted output signal are shown in Fig. 11A. The distortion of the output signal is evident because one peak of the signal waveform reaches a greater amplitude than the other. Such distortion, due to the nonlinear operation of tubes and other circuit components, is characteristic of amplifiers. A portion of the dis torted output signal is fed back out of phase to the input, where it combines with and modifies the input signal, as shown in Fig. 11B. The input signal is actually distorted by the out-of-phase feedback signal, so that the greater part of the distortion developed in the amplifying circuit is counteracted. Note that in Fig. 11B, the amplitude of the output signal has been reduced because of negative feedback. The output can be brought up to its normal level, as in Fig. 11C, if the

level of the input signal is increased. The powerhandling capabilities of amplifiers are not reduced by the application of negative feedback.

To be effective, the out-of-phase feedback signal must be taken from the amplifier at a point following the circuit in which the distortion is developed and must be fed into the amplifier at a point ahead of the circuit in which the distortion is developed.

The amount of negative feedback in an amplifier is rated in decibels and is the ratio of the output voltage obtained without feedback to the output voltage developed when feedback is applied. In other words, it is the gain reduction, in decibels, caused by the application of negative feedback.

The amount of negative feedback that can be used is limited, for several reasons. In the first place, we can realize that the full signal could not be fed back because the output would then drop to zero. This is never approached in actual practice because more than 20 decibels of feedback are seldom applied in a single feedback loop.

If 20 decibels of feedback were used in such a manner as to be fully effective, distortion and noise in the circuit would be reduced by a factor of 10. The gain of the circuit would also be reduced by a factor of 10; therefore, 10 times the amount of signal required before the feedback was applied would have to be used to obtain the same power output. For example, if 0.1 volt of input signal were required for a 20-wattoutput from an amplifier without feedback, then 1.0 volt of input signal would be needed to obtain the normal output of 20 watts after 20 decibels of feedback were applied.

An amplifier must be carefully designed and must use high-quality components if any large amount of negative feedback is to be utilized satisfactorily. Otherwise, the operation of the amplifier can become very unstable, even when only a moderate amount of feedback is applied.

Negative feedback is not a cure-all and must not be relied upon to make an excellent amplifier out of one that was poorly designed with undesirable characteristics. Negative feedback can make a very noticeable improvement in the operation of a mediocre amplifier, but it cannot work miracles.

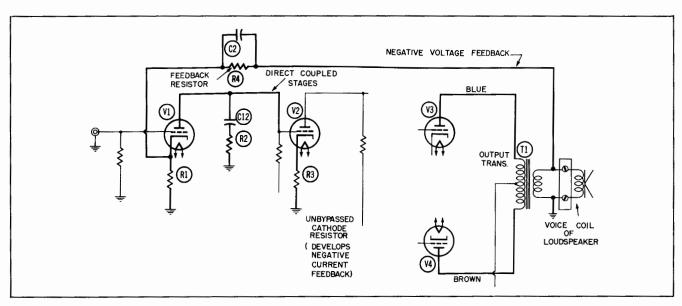


Fig. 12. Partial schematic diagram of a typical amplifier circuit using negative feedback.

Fig. 12 shows a partial schematic of a typical amplifier circuit in which the output transformer is included in the negative-feedback loop. A portion of the signal voltage developed across the load (the voice coil of the loudspeaker) is fed back to the cathode of tube V1 in the input stage. The amount of signal fed back depends upon the resistance value of feedback resistor R4. A large value of resistance reduces the amount of feedback, while a low value increases the feedback.

The feedback signal must be 180° out of phase with the input signal to produce the desired effects on the output signal. While the 180° out-of-phase relationship can be maintained readily at midfrequencies, the extreme low and high ends of the frequency range present some difficulties.

Circuit components, particularly the output transformer and the coupling capacitors, tend to shift the signal phase at the extreme high and low frequencies. The phase can be shifted so far that the feedback becomes positive at high and low frequencies. This situation can cause the amplifier to become very unstable at the frequency extremes because positive feedback produces oscillations. The feedback may become positive only on signal peaks, and therefore, the oscillations may occur in bursts and at certain frequencies only. This condition can give rise to many peculiar and disturbing forms of distortion. Loudspeakers have been blamed for a rattling or buzzing sound, when the amplifier was actually at fault.

Various precautions are taken to prevent or at least reduce the phase shift and thereby stabilize the operation of the amplifier. Output transformers with sufficiently low leakage reactances are a necessity. Very large coupling capacitors are employed where required, or capacitors are eliminated altogether by direct coupling. Phase- and frequency-correction networks, such as resistor R2 and capacitor C1 in the plate circuit of V1 or capacitor C2 across feedback resistor R4, aid in stabilizing the amplifier.

Since the feedback signal must be 180° out of phase, the output transformer must be correctly phased in the circuit. For instance, if the plate leads of the transformer were reversed so that the blue lead went to the plate of V4 and the brown lead went to the plate of V3, the phase of the feedback signal would be reversed and would become positive. The amplifier would oscillate and produce a terrific roar or howl.

The feedback in the circuit we have been discussing is voltage feedback because the feedback signal is a portion of the signal voltage developed across the voice coil of the loudspeaker. The results from the use of negative feedback in this circuit are typical of the desirable effects of voltage feedback when it is applied properly. We can list them as follows:

Distortion is reduced.

Certain types of hum and noise are reduced.

Output impedance is decreased.

Loudspeaker damping is increased.

The effects of the varying load presented to the amplifier by the loudspeaker are decreased.

Frequency response is increased.

Tone controls should not be located inside a feedback loop because much of their effectiveness will

be nullified by negative feedback. This is one reason tone controls and other compensating circuits are usually located in another section of the audio system.

An unbypassed cathode resistor is another method of obtaining negative feedback. As an example, R3 in Fig. 2 produces current feedback. Some of the effects of current feedback are the same as those obtained with voltage feedback, while others are the opposite. Some of the characteristic effects of current feedback are:

Distortion is reduced.

Gain is reduced.

Plate resistance of the stage in which the feedback is located is increased.

Effect of load impedance on the output voltage is increased.

Loudspeaker damping is decreased when current feedback is applied.

The damping applied to the loudspeaker can be controlled by varying the amount of feedback. The damping control circuit in Fig. 13 is a good example of this application of negative feedback. Two negative-feedback loops are used. One is voltage feedback, and the other is current feedback. The damping factor can be changed by varying the ratio of voltage feedback to current feedback.

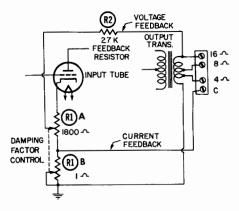


Fig. 13. Circuit using damping factor control.

Negative feedback is developed by the voltage-feedback loop connected from the top (or 16-ohm tap) of the output transformer through feedback resistor R2 to the moving contact of R1A in the cathode circuit of the input tube. When the moving contact is moved to the top or cathode end of R1A, negative voltage feedback will increase to maximum, and maximum damping action will be produced.

Negative feedback is developed in the current feedback circuit connected from the common (C) tap through R1B to ground. When the moving contact of R1B is moved toward the top or cathode end, current feedback will decrease because the resistance is reduced toward zero as R1B is progressively shorted to ground.

When R1B is moved in the opposite direction, current feedback is increased. Here we should recall that loudspeaker damping decreases as negative current feedback increases and that the damping increases when negative voltage feedback increases.

R1A and R1B are ganged and must turn together; therefore, when the damping-factor control tap is moved to maximum (upward on the schematic), the negative voltage feedback produces the desired maximum damping factor, and no current feedback is produced because R1B is shorted.

When the damping control is set to the minimum position, minimum negative voltage feedback is developed, and the damping factor is reduced. But, in this minimum position, maximum negative current feedback is produced; and this, in turn, also reduces the damping factor. Thus, a large range of damping can be obtained; however, since negative feedback is always applied, distortion will be held to a minimum at any setting of the damping-factor control.

Negative feedback can be utilized by tone controls, compensation circuits for magnetic cartridges, and record-playback compensation circuits in phono preamplifiers to modify the frequency response of an amplifier. This action is possible because the negative-feedback loop can be frequency selective. The feedback network is so modified that certain frequencies are fed back while other frequencies are not. The frequencies that are fed back are attenuated because negative feedback reduces gain, but those that are not fed back are not attenuated and are effectively boosted.

Fig. 14 shows a typical phono-preamplifier circuit in which compensation (bass boost) is obtained with a frequency-selective feedback circuit. C1 (shunted across feedback resistor R1) and C2 (shunted by R2) offer very little opposition to the feedback of high frequencies; consequently, these frequencies are fed back and attenuated. The reactances of C1 and C2 become progressively greater as frequency is lowered, and therefore, the low frequencies are not subjected to as much loss and are effectively boosted. The

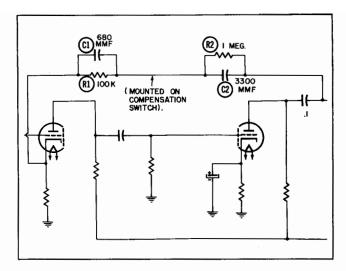
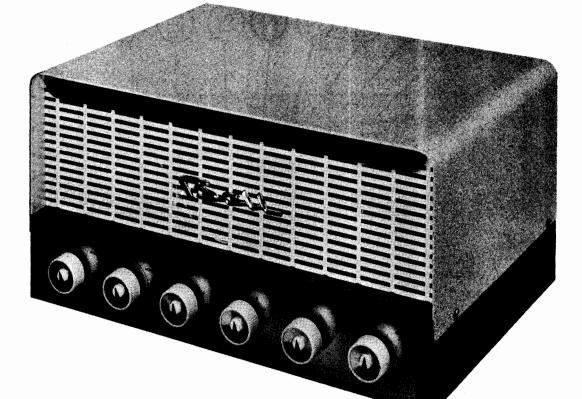


Fig. 14. Circuit using negative feedback for compensation.

compensation can be made to follow almost any desired curve if the appropriate network of resistors and capacitors is inserted in the feedback circuit. The values shown in Fig. 14 have been used for RIAA record compensation.

The same basic action is used with tone controls that employ negative feedback to control frequency response. A variety of such tone-control circuits are used, and some of them can appear to be very elaborate, but they alluse the frequency-selective feedback action.

The definite advantage of negative feedback in equalizing circuits is that, in addition to the compensation obtained, distortion and noise are reduced by the action of the feedback.



TRADE NAME

Bell Sound Model 3DT (G)

MANUFACTURER

Bell Sound Systems, Inc., 555 Marion Road, Columbus 7, Ohio.

TYPE SET

AC Operated 8 Channel Binaural Amplifier

TUBES

Eleven

POWER SUPPLY

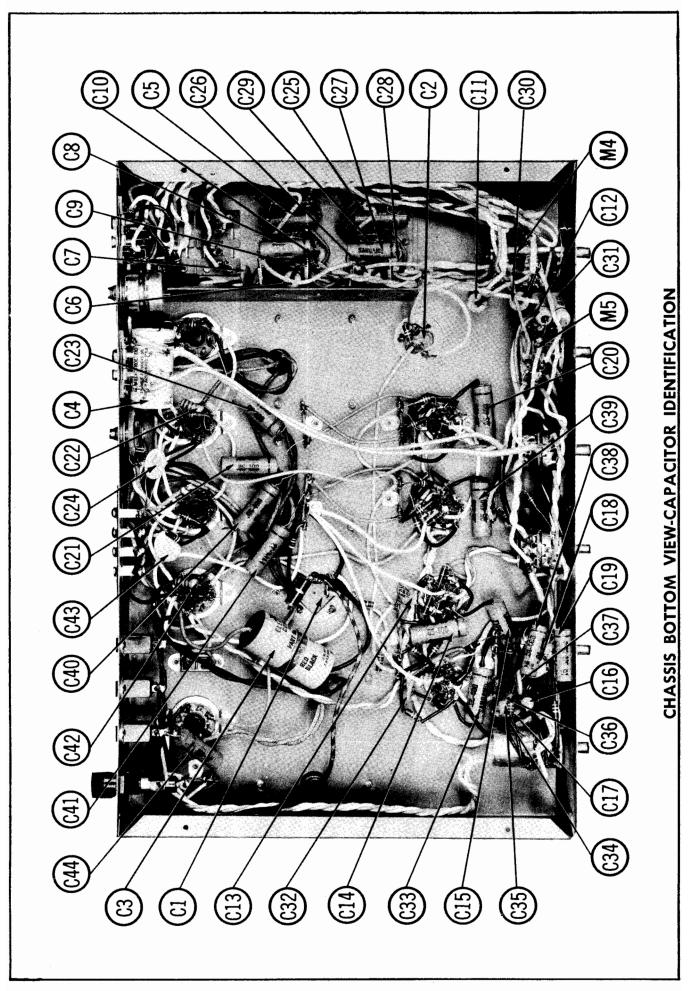
110-120 Volts AC-60 Cycles

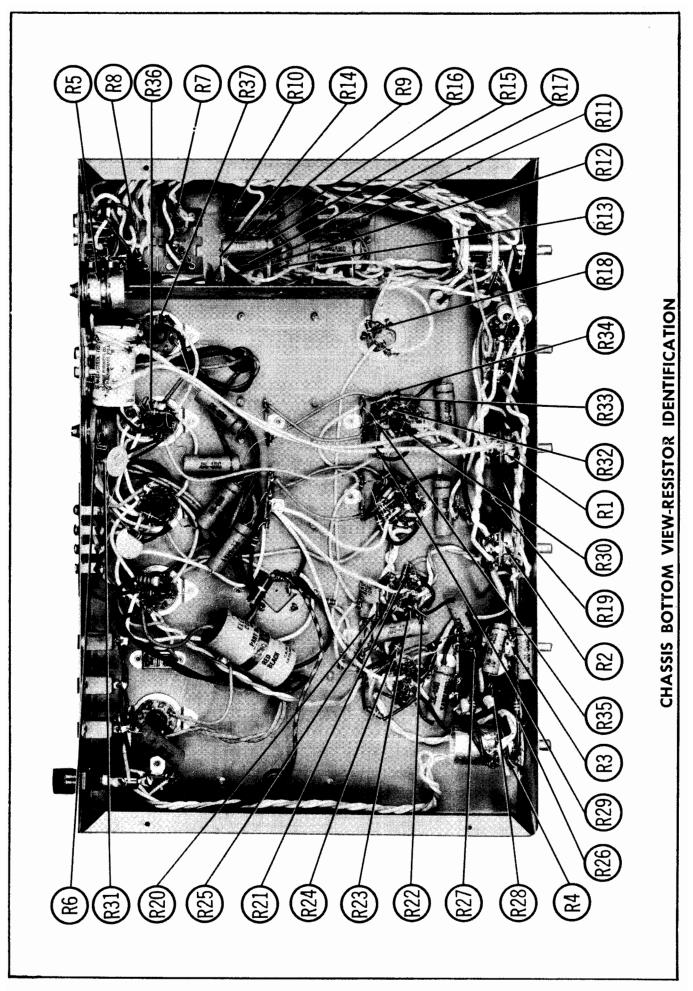
RATING 1.1 Amp@117 Volts AC (120 Watts)

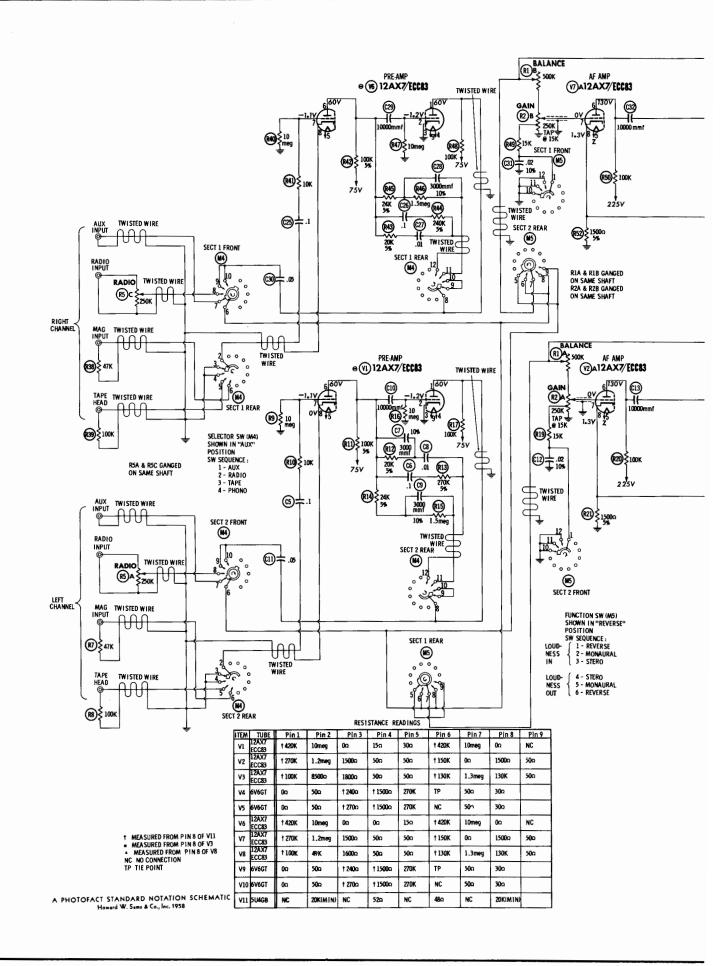
### HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

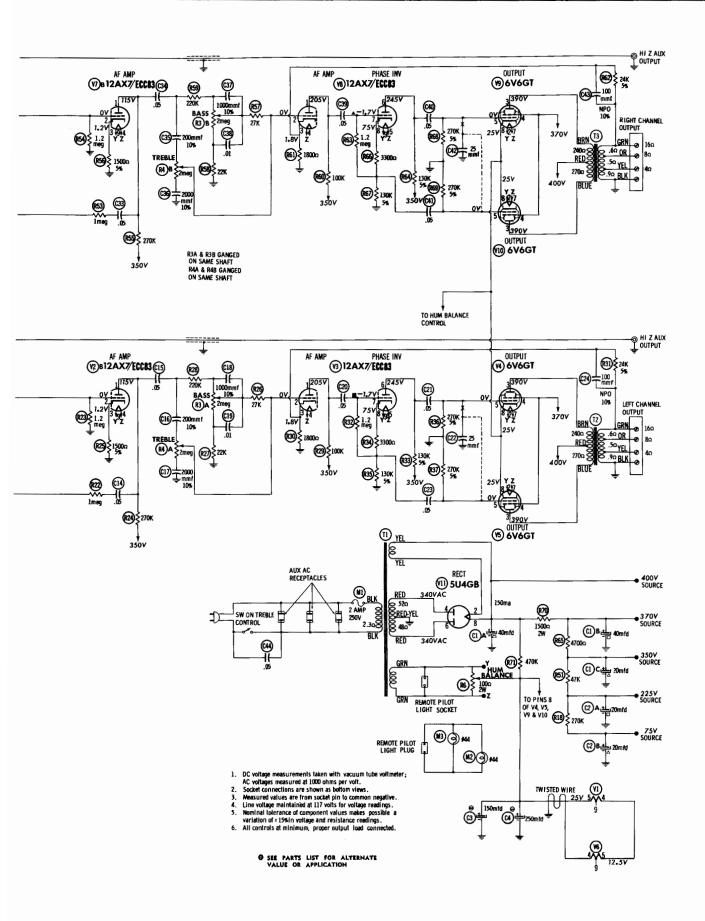
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of H342

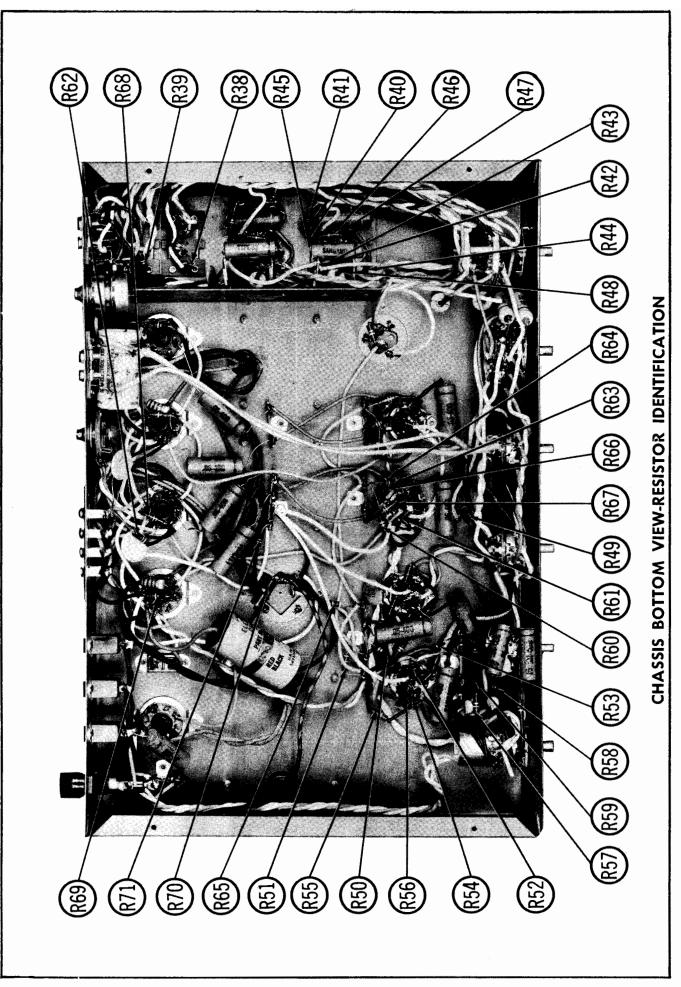
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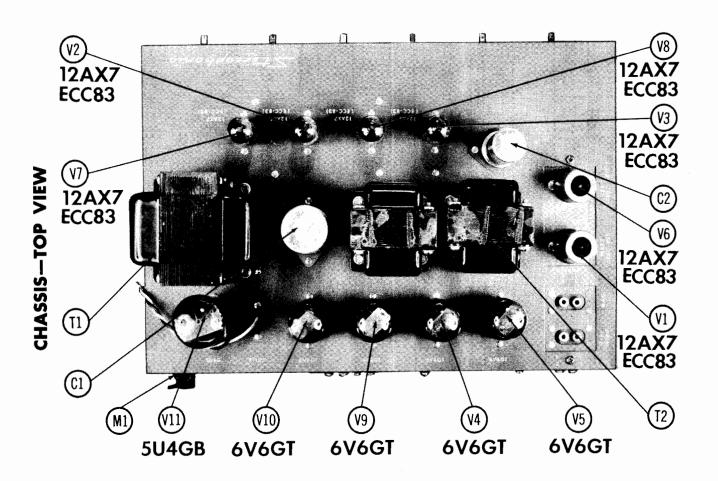












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	C83 ①	C83						SPRAGUE	PART No.	TVL-3786		1110	GC.Z-TAL		TVA-1311	IVA-1312
TYPE	12AX7/ECC83 ① 12AX7/ECC83	12AX7/ ECC83	6V6GT	6V6GT 5U4GB				SANGAMO	PART No.	r-165	-MT-4510		D-215		MT-15150	2-02.
	Right Channel Preamp. AF Amplifler	AF AmpPhase Inv.				s		PYRAMID		TMT-39		1	TMD-50		TD-150-50	TD-250-50 8-057
USE	Right Channe	AF Amp	_	Output	this application	ACITOR	REPLACEMENT DATA	MALLORY	PART No.	FP376.9			FP234		TC495	TC50025
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	<u> </u>				, use 12A)	YTIC	~	CORNELL	PART	C0344			B0400		BR1505	BR2505
TYPE	2AX7/ECC83 ①	2AX7/ ECC83	BV6GT	BV6GT	⊕8ome versions may use 12AY7 in this application	ELECTROLYTIC CAPACITORS		AEROVOX	PART No.	AFH3-43-50			AFH2-51		PRS50V150	PRS50V250
	12A	12A	676	6V6	D80m										Θ	Θ
	Left Channel Preamp.	AF AmpPhase Inv.						Bell Sound	PART No.							
USE	Left Channel	AmpP	Ħ	jt.			RATING	-	- 5	420	420	420	450	450	22	20
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¥ è	55	2.5	V4	V5			Γ	TEX:	ģ	₹ C	M	Ö	CZA	М	ဌ	2.

PARTS LIST AND DESCRIPTIONS TUBES (GENERAL ELECTRIC, SYLVANIA)

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Capacitors, and in mmfd. for Mica and Ceramic Capacitors.		MALLORY PART No.	GEM-201	MCB461	GEM-411	MCB461	DCSII	GEM-415	GE.M-1612	GEM-415	GEM-415	MCB237	MCB457	MCB255	GEM-411	GEM-415	GEM-415	UC-5425	GEM-415	ZT-531	GEM-201	GEM-201	GEM-411	MCB461	DC511	GEM-415	GEM-1612	DC511	GEM-415	GEM-415	MCB237	MCB457	MCB255	GEM-411	GEM-415	GEM-415	GEM-415	UC-5425	ZT-531	GEM-415
or Mica and	REPLACEMENT DATA	DUBILIER PART No.	CUB2P1	IR6D3	CUB481	IR5D3	BYA681	CUBABS	100 100	CUPASS	CUB485	LIOT2	IR5D2	IRSDI	CUB481	CUB4S6	CUB485	LT6Q25	CUB485	CIOTIC	CUB2P1	CUB2P1	CUB4S1	IR5D3	BYA681	CUB485		BYA681	CUB485	CUB485	LIOIZ	1R5D2	IRSDI	CUB481	CUB485	CUB485	CUB485	LT6Q25	CIOTIC	CUB485
n mmfd. fo	KEPLA	CENTRALAB PART No.	DF-104	51-10	D6-103		DD-103	DF-503	90. 44	DF-503	DF-503	TCZ-200			D6-103	DF-503	DF-503	D6-250	DF-503	TCZ-100	DF-104	DF-104	D6-103		DD-103	DF-503		DD-103	DF-503	DF-503	D6-201			D6-103	DF-503	DF-503	DF-503	D6-250	TCZ-100	DF-503
citors, and i		AEROVOX PART No.	P288N-1	1-N1007-1	P488N-01		BPD-01	P488N-05	0	D488N_05	P488N-05				P488N-01	P488N-05	P488N-05	8125	P488N-05	NP0-DI100	P288N-1	P288N-1	P488N-01		BPD-01	P488N-05		BPD-01	P488N-05	P488N-05				P488N-01	P488N-05	P488N-05	P488N-05	8125	NP0-DI100	P488N-05
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# PARTS LIST AND DESCRIPTIONS (Continued)

### CONTROLS

REGISTATION   PART No.   PART N		12.74	,		REP	REPLACEMENT DATA	ΙΨ		
RESIST. WATTS   PART NO.   PART	ĬĘ¥	\$	ş	Dail Sound	CENTRALAB	CLABOSTAT	Jal	VACITAM	SET ON MOTALIATEM
600K         ‡         20066P121         B-1041         Q13-133         UE1295         Balance           500K         ‡         20066P122         B-1041         Q13-139         UE1296         Balance           250K         ‡         20066P120         Caln, Tap@         Caln, Tap@         Caln, Tap@         Caln, Tap@           2meg         ‡         20066P120         Kall         Kall         Bass         Treble           2meg         ‡         20066P120         ADA7-250K-2         Treble         Treble         Treble           2meg         ‡         2meg         †         Treble         Treble         Treble           2meg         ‡         3min         ADA7-250K-2         Treble         Treble           2meg         †         3min         ADA7-250K-2         Min         Treble           2meg         †         3min         ADA7-250K-2         Min         Radio input           2meg         †         ADA7-250K-2         ADA7-250K-2         Min         Radio input           3min         kmin         Ad3-100         WPRGIO         Hum Balance           3min         kmin         Ad3-100         WPRGIO         Hum Balance	ģ	RESIST.	WATTS	PART No.	PART No.	PART No.	PART No.	PART No.	
500K         1         20066 P122         Balance         Balance           250K         1         20066 P122         Caln, Tap@         Caln	Z.	\$00K	-	20066P121	B-1041		Q13-133	UE1295	Balance
250K   20066P122   20066P122   20066P122   20066P120   250K   20066P120   250K   20066P120   250K   20066P120   250K   20066P120   250K   25	Д	500K					M13-133		Balance
250K   20066P120   Calh, Tap/g   Calh, Tap	<b>₹</b> 2	250K	-	20066P122				UE1299	Gain, Tap @15K
2meg   20066P120   Q13-139   UE1874   Bass   Bass   2meg   20066P120   Q13-139   UE1874   Bass   Bass   2meg   1   2meg   2	Ø	250K	-40						Gain, Tap(g)15K
2 meg         1         20066P119         Base         Base         Pase           2 meg         1         20066P119         Treble         M33-139         UE18736         Treble           Switch         250K         1         Red-1         Treble         Treble           250K         1         B20066P123         BB-103         AD47-250K-2         Q13-130         Treble           250K         1         Not Req.         Not Req.         M3-130         Radio input           8haft         Not Reg.         A43-100         WPE100         Rugot         Hum Balanc           100K         Rock Reg.         Not Reg.         Not Reg.         Not Reg.         Hum Balanc	R3A	2meg	-40	20066P120		_	Q13-139	UE1874	Bass
2 meg         1         20066PI19         Q13.159         UE18736         Treble           2 meg         1         20066PI19         ADA7-250K - 4         Fe-1         Treble           2 50K         1         BB-103         ADA7-250K - 4         Radio input         Radio input           2 50K         1         BB-103         ADA7-250K - 4         RA3-130         Radio input           8 haft         1         AK8-1/4         RQ         RA3-130         Radio input           1005         2 (WW]         B-20066PI13         AK8-1/4         RQ         Radio input           8 haft         PROFE Req.         NOT Req.         AK8-1/4         ROC Req.         Hum Balanc	Д	2meg	4				MI3-139		Bass
2 meg         4         B20066F123         BB-103         ADM7-250K-2         Q13-139         Treble           250K         4         B20066F123         BB-103         ADM7-250K-2         Q13-130         Radio input           250K         4         Not Req.         Not Req.         Not Req.         M3-130         Radio input           8baft         2(WW)         B-20066F141         WNIOI         WPRIOO         RIOOL         Hum Balanc           8haft         Not Req.         FKB-1/4         Not Req.         Not Req.         PKB-1/4         Hum Balanc	R4A	2meg	-	20066P119			Q13-139	UE18738	Treble
Savitch   250K   1   B20066P123   BB-103   AD47-250K-2 Q.13-130   Radio input 250K   1   1   1   1   1   1   1   1   1	Д	2meg					MD3-139		Treble
25.0K   1   10.066P123   10.05   10.	U	Switch					16-1		
250K   1	RSA	250K	-	B20066P123		AD47-250K-2	013-130		Radio input adjust.
Shaft   2(WW) B-20066Pi4  While   7852-j/4 R2   R100L   R100L   Bhaft   Not Req.   PEE-j/4 Not Req.   Not Re	Ф	250K				Not Req.	MG3-130		Radio input adjust.
Shaft 2(WW B-20086P141 WN101 A43-100 WPEX100 R100L Shaft Not Req. Not Req. Not Req. Not Req.	Ü	Shaft				FKB-1/4	92		
Shaft Not Req. FKB-1/4 Not Req.	R6A	1000	2(WW)	B-20066P141		A43-100	WPK100	RIOOL	Hum Balance
	Ø	Shaft			Not Req.	FKB-1/4	Not Req.	Not Req.	

### RESISTORS

listed.	
or less, unless otherwise listed.	
unless	
or less,	
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All wattages 1,	
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NOTES

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	Bell Sound	PART No.																								_									
		WAT	Ī																														84		
	RATING	OHMS		10K	100K 5%	20K 5%	240K 5%	24K 9%	1. 5meg	10meg	100K	15K	100K	47K	15000 5%	lmeg	1. 2meg	270K	15000 9%	27K	22K	220K	100K	18000	24K %	l. 2meg	130K 5%	47000	33000	130K 5%	270K 5%	270K 5%	15000	470K	
	TEM	ģ	R40	R41	R42	E43	R44	R46	R46	R47	R48	R49	R20	RSI	R52	R53	R54	R56	R56	R57	R58	R59	R60	<b>R</b> 61	R62	263	R64	R65	R66	R67	R68	R69	R70	R.71	
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	Bell Sound																																		
	·^	WATT																																	
	RATING	OHWS	1	100K	10meg	10K	100K 5%	20K 5%	270K 5%	24K 5%	1. 5meg	10meg	100K	270K	15K	100K	15000 5%	lmeg	l. 2meg	270K	15000 9%	27K	22K	220K	100K	18000	24K 5%	l. 2meg	130K 5%	33000	130K 5%	270K 5%	270K 5%	47K	100K
	ITEM	ģ	R7	22	8	2	₹	RIS	E	<b>E</b>	ES.	2	2	E 8	2	E20	22	<b>E22</b>	<b>K23</b>	£24	R25	R26	R27	<b>E28</b>	R29	R30	ES	R32	R33	<b>7</b> 3	R36	R36	<b>R37</b>	R38	R39
Ī													_																						

## TRANSFORMER (POWER)

,	_		_			_			
		Triad	PAKI NO.	R-16A					
		Stancor Thordarson Triad	FAKI NO.	22R33					
		Stancor	PAKI NO.	P-3173 PC8422 22R33 R-16A					
	REPLACEMENT DATA	Rom	PAKI NO.						
	REPLACE	Merit	PARI No.	P-3173					
		Halldorson Merit	PART No.						
		Bell Sound	LAKI NO.	B-20373					
			SEC. 2	20	®3A		SEC. 5		
		RATING	SEC. 1	BBOVCT	@.150A @3A		SEC. 4		
			PRI.	1177	® 1.1 <b>4</b>		SEC. 3	8. 3V	® 3.5A
		¥è		F			_		

# PARTS LIST AND DESCRIPTIONS (Continued)

# TRANSFORMER (AUDIO OUTPUT)

L					REPLAC	REPLACEMENT DATA	. 🔻			
Ž Š	I¥PEC	ANCE	IMPEDANCE Bell Sound	Halldorson	Merit	Ram	Stancor	Halldorson Merit Ram Stancor Thordarson Triad	Triad	NOTES
	PRI.	SEC.	LAKI NO.	LAKI NO.	LAKI NO.	LAKI NO.	LAKI NO.	LAKI NO.	LAKI NO.	
T2	65000	6500G160 Tap	B-20374				A-3304	22868 ①		⊕ Tape 2500 & 5000
	ಕ	(a) (b) (c) (d)								tape
13	65000	T3 65000 160 Tap	B20374				A-3304	22868 D		
	5_	CT ® 80 &								

### FUSES

TYPE	_	_				KELINCENE	ELECTRICAL PAIN		
2A 132002. 342001 AGC2 H 250v (3AG 2A 250v)	Ξž		RATING	Bell Sounk	Å.	LITTEL	FUSE No.	BU PART	SS No.
2A 312002 342001 AGC2 250V				FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
	3	1 3AG	2A 250V			312002. (3AG 2A 250V)	342001	AGC2	HKP

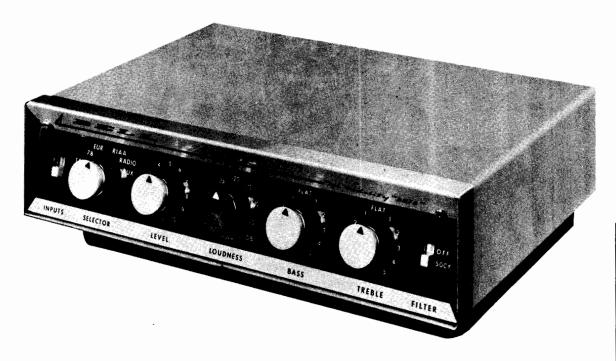
## MISCELLANEOUS

PART NAME   Bell Sound   NOTES
PART NAME Plot Lamp Plot Lamp Switch Switch
46.8
7 9 55 4 5

### **WIRING DATA**

General-use Unshielded Hook-up Wire Use BELDEN No. 8530 (Solid) Available in Ten Colors	8530 (Solid) Available in Ten Colors
Power Cord	gth)
Low-Loss Bhielded Lead (interconnecting)  Low-Loss Bhielded Lead (interconnecting)  Phono Pick-up Arm Cable  No. 8430 (Two Conductor - Twisted)	tor - Twisted)





TRADE NAME

Bell Sound Model 2315

MANUFACTURER

Bell Sound Systems, Inc., 555 Marion Road, Columbus 7, Ohio

TYPE SET

AC Operated 6 Channel 12 Watt Audio Amplifier

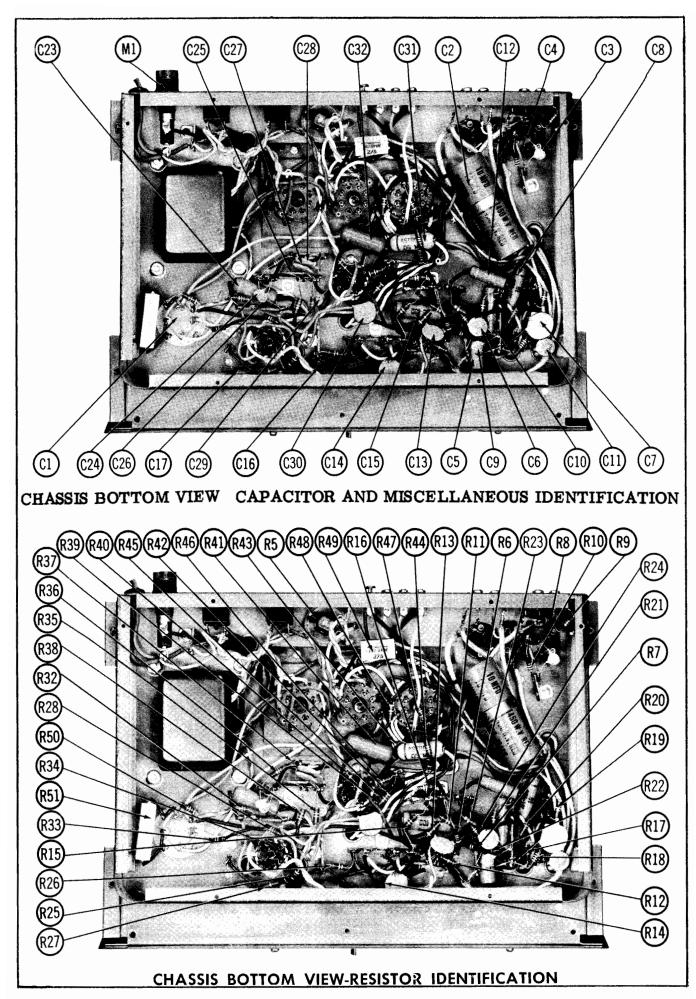
TUBES (Six)

Types 12AX7/ECC83 Phono Preamplifier, 12AX7/ECC83 AF Amplifier, 12AX7/EC

### HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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## CHASSIS-TOP VIEW

# PARTS LIST AND DESCRIPTIONS TUBES (GENERAL ELECTRIC, SYLVANIA)

Phono Preamplifler AF Amplifler AF Amp Phase Inv.

TYPE	6V6GT 6V6GT 5Y3GT
USE	Output Output Rectifler
ITEM No.	V4 V5 V6

_		_		_							_
					SPRAGUE PART No.	R2555 *				TVA-2722	
111	159 A9 6V 6GT	5Y3GT			SANGAMO PART No.					MTD-4510	
			S		PYRAMID PART No.					TDLD-26	
	Output Output	Rectiffer	ACITOR	REPLACEMENT DATA	MALLORY PART No.					TCD72	
ģ	V5 V5	2	S	REPLAC	3 E S					1145	
_		$\neg$	YTIC		CORNELL- DUBILIER PART No.					BBRTI	
1116	12AX7/ECC 83 12AX7/ECC 83	ZAX7/ECC83	ELECTROLYTIC CAPACITORS		AEROVOX PART No.					PRS450V1010   BERTI1145	
_	23	Ž	ш		Q.						
<b>u</b>	Phono Preamplifler AF Amplifler	АF Ашр Разве пу.			BELL SOUND PART No.						
Š	Phono Preami AF Ampliffer	Amp I		RATING	VOLT.	450	450	450	20	450	420
	Phon AF 4	AF 1		П	No. CAP. VOLT.	-40	51.	o[ <b>▼</b>	90	2	2
ģ	7 27	43			Ş. Ş.	CIA	Д	ပ	Α	CZA	Д

Non Catalog Item

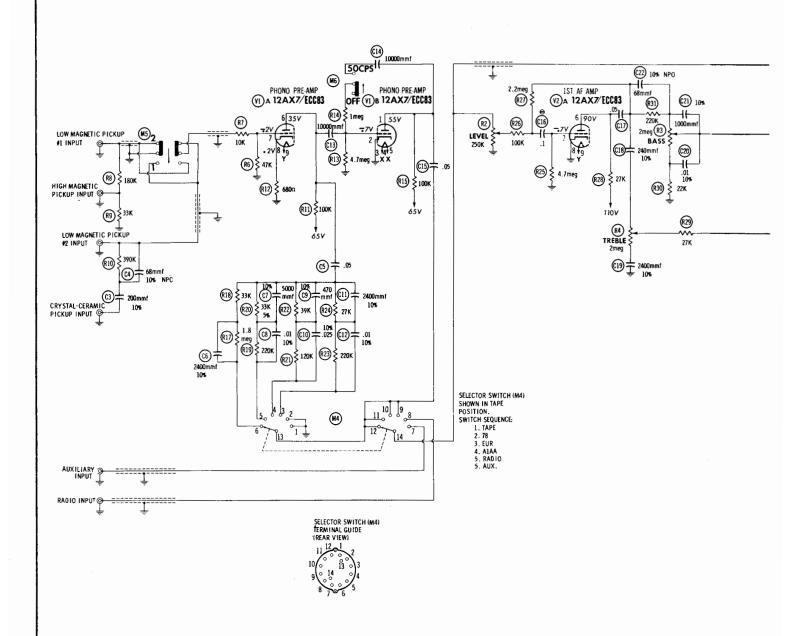
FIXED CAPACITORS
Capacity values given in the rating column are in mfd. for Paper
Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

Tight		_						REPLACEMENT DATA	REPLACEMENT DATA		
CAP.   VOIT   PART NO.   PART NO.   PART NO.   PART NO.   PART NO.   PART NO.     200	ITEM	_		BELL SOUND	AEBOVOX	CENTRALAB		ERIE	YACIIAM	SPDACIIE	NOTES
200         Horo-Di 68         TCZ-20         LIOT2         ED-200         MCB237           0.6         400         P488N-05         DF-803         LIGD24         TCO-68         CIO4685           0.0         400         F8N-05         DF-803         CUB465         DF-403         CUB465           0.0         400         BPD-01         DF-803         LR5D24         CY20C2421         GEM-415           0.0         400         BPD-01         DD-103         BYA851         ED-470         GEM-161           0.0         400         BPD-01         DD-103         BYA851         ED-01         DC511           0.0         400         BPD-01         DD-103         BYA851         ED-01         GEM-161           0.0         400         BPD-01         DD-103         BYA851         ED-01         GEM-161           0.0         400         BPBN-01         DF-803         CUB255         ED-201         GEM-161           0.0         400         BPBN-01         BP-241         BPD-30         GEM-161         GEM-161           0.0         400         BPD-01         BP-341         BPD-30         GEM-161         GEM-161           0.0         400	ź			PART No.	PART No.	PART No.		PART No.	PART No.	PART No.	
1909   1909   1909-D  68   TCZ-68   C10Q68C   TCO-68   TCD-68   TCD-68   TCD-68   TCD-68   TCD-68   TCD-68   TCD-68   TCD-68   TCD-69	ຮ	200				TCZ-200	L10T2	ED-200	MCB237	MS-32	10%
2400         P48BN-05         DF-503         UB485         CYD8455         GEM-415           2400         400         H8BN-05         DF-503         HRD24         CY20C2421         MCB465           470         400         DF-01         DF-01         DF-01         DF-01         DF-01         DF-01           10000         400         BPD-01         DD-103         BYA851         ED-01         DCB11           10000         BPD-01         DD-103         BYA851         ED-01         DCB11           10000         BPD-01         DD-103         BYA851         ED-01         DCB11           10000         BPD-01         DD-103         BYA851         ED-01         DCB11           240         FPR8R-15         DF-204         CUB255         CUB255         GEM-161           240         FPR8R-15         DF-204         CUB255         GEM-161         GEM-161           100         H98R-10         DF-204         CUB255         CUB255         GEM-161           100         H00         H98R-10         DF-104         CUB255         GEM-161           100         H00         H98R-01         DF-104         CUB255         GEM-161           100 <td>Ç</td> <td>89</td> <td></td> <td></td> <td>NPO-DI 68</td> <td>TCZ-68</td> <td>C10Q68C</td> <td>TCO-68</td> <td></td> <td>5TCC-088</td> <td>10% NPO</td>	Ç	89			NPO-DI 68	TCZ-68	C10Q68C	TCO-68		5TCC-088	10% NPO
2400         400         HBD24         CY20C2421         MCB465           .00         400         BPD-01         DB-471         SR5747         ED-470         GEM-101           .025         400         BPD-01         DD-103         BYA681         ED-01         DC511           .060         400         BPD-01         DD-103         BYA681         ED-01         DC511           .06         400         BPD-01         DD-103         BYA681         ED-01         DC511           .06         400         P48RN-05         D803         CUB285         ED-01         GEM-161           .06         400         P48RN-05         D803         CUB285         ED-03         GEM-16           .06         400         P48RN-05         DF-203         CUB285         ED-204         GEM-16           .1000         400         P48RN-05         DF-203         CUB285         ED-204         GEM-16           .100         400         P48RN-05         DF-204         RED-204         GEM-16           .100         PA6RN-1         BP-241         RR5D-2         CTC-68         GEM-16           .100         400         PA6RN-1         BP-341         REP-01	C2	8	400		P488N-05	DF-503	CUB4S5		GEM-415	4TM-85	
15000   1600	ပိ	2400					1R5D24	CY20C242J		MS-224	3601 106
400         400         BPD-01         DB-471         SRST47         ED-470         GEM-1611           1.025         400         400         BPD-01         DD-103         BYA681         ED-01         DC511           1.0000         BPD-01         DD-103         BYA681         ED-01         DC511         DC511           1.0000         BPD-01         DD-103         BYA681         ED-01         DC511         DC511           1.000         BPD-01         DD-103         BYA681         ED-01         DC511         DC511           2.40         400         PA68N-05         DF-204         CUB265         ED-20         GEM-415           1.000         400         PA68N-05         DF-204         IA0724         CY20C2427         GEM-415           1.000         400         PA68N-0         DF-241         IRSD2         CY20C2427         GEM-415           1.000         400         PA68N-0         DF-204         IRSD2         CY20C2427         GEM-415           1.000         400         PP-26N-1         DF-104         BP-201         DC511         BC511           4.00         PP-004         DF-103         BYA681         ED-01         DC511         BC511 </td <td>C</td> <td>2000</td> <td></td> <td></td> <td></td> <td></td> <td>LR5D5</td> <td></td> <td>MCB465</td> <td>MS-25</td> <td>10%</td>	C	2000					LR5D5		MCB465	MS-25	10%
470         DB-471         DB-477         ED-470           2400         400         BPD-01         DD-103         BYA6S1         ED-01         DCSII           10000         400         BPD-01         DD-103         BYA6S1         ED-01         DCSII           10000         400         BYA6SN-1         DT-103         GTM-185         ED-01         DCSII           240         400         PY46SN-0         DT-103         GTM-185         ED-201         GEM-185           240         100         PY46SN-0         DT-103         GTM-185         GEM-18         GEM-18           100         400         PY46SN-0         DF-241         GEM-18         GEM-18         GEM-18           100         400         PY46SN-0         DF-241         IRSD2         CEM-18         GEM-18           100         400         PY46SN-0         DF-241         IRSD2         CEM-18         GEM-18           100         400         PY46SN-0         DF-241         IRSD2         CF0-242         GEM-18           100         PY46SN-1         DF-104         CTC2-68         GEM-18         GEM-18           100         PY40SN-1         DF-104         DF-104         DCSII <td>ပိ</td> <td>5</td> <td>\$</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>GEM-161</td> <td></td> <td>10%</td>	ပိ	5	\$						GEM-161		10%
1850.24   24.00   24	တို့	470				D8-471	5R 5T 47	ED-470		MS-324	10%
01         400         BPD-01         DD-103         BYA6SI         ED-01         DCBII           10000         BPD-01         DD-103         BYA6SI         ED-01         DCBII           1000         BPD-01         DD-103         BYA6SI         ED-01         DCBII           1.0         200         PP48RN-05         DF-603         CUB4SS         GEM-201         GEM-201           240         400         P948RN-05         DF-603         CUB4SS         ED-240         GEM-201           1000         400         P948RN-05         DF-604         IA0724         CY20C2427         GEM-101           1 00         400         NPO-D1 68         TCZ-68         C10468C         TC2-08         GEM-101           4 00         P24RN-1         DF-104         LMTSD         TC-100         MCE255           66         NPO-D1 68         TCZ-68         C10468C         TC-108         GEM-201           1 000         BPD-01         DD-103         BYA681         ED-01         DC511           1 000         BPD-01         DD-103         BYA681         ED-01         DC511           2 00         BPD-01         DD-103         BYA681         ED-01         DC511 </td <td>3 5</td> <td>2400</td> <td><u></u></td> <td></td> <td></td> <td></td> <td>1R5D24</td> <td>CY20C2421</td> <td></td> <td>MS-224</td> <td>26 26 26 26 26 26 26 26 26 26 26 26 26 2</td>	3 5	2400	<u></u>				1R5D24	CY20C2421		MS-224	26 26 26 26 26 26 26 26 26 26 26 26 26 2
10000   BPD-01   DD-103   BYA651   ED-01   DC511	CIS	Б.	400						GEM-1611		10%
December   December	CI3	10000			BPD-01	DD-103	BYA6S1	ED-01	DCSII	5HK-SI	
100   P488N-05   P-503   CUB455   GEM-415	C14	10000			BPD-01	DD-103	BYA6S1	ED-01	DCSII	5HK-Si	
1   200   P286N-1   DF-104   CUB2P	C15	.05	40		P488N-05	D -503	CUB4S5		GEM-415	4TM-S5	
240         P468N-05         DF-503         CUB-455         CUB-455         CUB-455         CUB-455         CUB-456         CUB-456         CT2C-424         CT2C-424         GEM-415           240         400         NPO-D1 68         TCZ-68         C10Q465         TCO-68         GEM-401           1000         P288N-1         DF-104         CUB2P1         GEM-401         GEM-401           470         PP-04         CUB2P1         ED-100         GEM-201         GEM-201           110000         PP-05         PP-104         CUB2P1         ED-10         GEM-201           110000         BPD-01         DD-103         BYA681         ED-01         DC511           110000         BPD-01         DD-103         BYA681         ED-01         DC511           270         BPD-01         DP-627         ED-270 <td>C16</td> <td>=</td> <td>200</td> <td></td> <td>P288N-1</td> <td>Dr104</td> <td>CUB2P1</td> <td></td> <td>GEM-201</td> <td>2TM-P1</td> <td>9</td>	C16	=	200		P288N-1	Dr104	CUB2P1		GEM-201	2TM-P1	9
240         D6-24I         LJ0724         ED-240           240         400         BPD-24I         LJ0724         ED-240           1000         NPO-D1 68         TCZ-68         CIOQ66C         TCD-68         GEM-4BI           470         P268N-I         DF-104         CUB2P         GEM-4BI           470         BPD-0I         DG-47I         BP-07         DC5II           10000         BPD-0I         DD-103         BYA68I         ED-0I         DC5II           10000         BPD-0I         DD-103         BYA68I         ED-0I         DC5II           270         BPD-0I         DD-103         BYA68I         ED-0I         DC5II           26         400         P468I-0-5         DF-5	C17	.05	400		P488N-05	DF-503	CUB4S5		GEM-415	4TM-S5	
2400         400         HR5D24         CY20C2421         GEM-16II           1000         400         NPO-DI 68         TCZ-68         CU0466C         TCO-68           1.1         200         P26BN-I         DF-104         CUBEPI         ED-100         MCB255           1.0         200         BPD-0I         DF-104         CUBEPI         ED-470         GEM-20I           4.70         BPD-0I         DF-104         CUBEPI         ED-470         GEM-20I         GEM-20I           100000         BPD-0I         DD-103         BYA68I         ED-470         DC5II         DC5II           270         BPD-0I         DD-103         BYA68I         ED-0I         DC5II         DC5II           270         BPD-0I         DD-103         BYA68I         ED-0I         DC5II         DC5II           270         BPD-0I         DD-103         BYA68I         ED-0I         DC5II         DC5II           270         BPD-0I         DD-103         BYA68I         ED-270         DC5II         DC5II           280         400         P468R-05         DF-503         CUB465         GEM-415         GEM-415           290         400         P468R-05         DF-503 </td <td>C18</td> <td>240</td> <td></td> <td></td> <td></td> <td>D6-24L</td> <td>L10T24</td> <td>ED-240</td> <td></td> <td>MS-324</td> <td>10%</td>	C18	240				D6-24L	L10T24	ED-240		MS-324	10%
1000   1000	CIB	2400					1R5D24	CY20C242J		MS-224	10%
1800   NPO-D1 68   TCZ-68   G10646C   TCO-68   TCD-100   MCBZ55   TCD-104   TCD-100   MCBZ55   TCD-104   TCD-100   TCD-104   TCD-100   TCD-104	C20	<u>.</u>	400						GEM-1611		10%
10000   10000   1000000   100000   100000   100000   100000   100000   100000   1000000   100000   100000   100000   100000   100000   100000   1000000   100000   100000   100000   100000   100000   100000   1000000   100000   100000   100000   100000   100000   100000   1000000   100000   100000   100000   100000   100000   100000   1000000   100000   100000   100000   100000   100000   100000   1000000   100000   100000   100000   100000   100000   100000   1000000   100000   100000   1000000   1000000   1000000   1000000   1000000   1000000   1000000   1000000   1000000   1000000   10000000   10000000   10000000   100000000	C21	001					IRSDI	ED-1000	MCB255	MS-21	
1   200   P286N-1   DF-104   CUB2P   GEM-201     10000	C22	88			NPO-D1 68	TCZ-68	C10Q68C	TCO-68		5TCC-068	10% NPO
470   BPD-01   Db-471   SRFT47   ED-470   DC511	C23	Ξ.	28		P288N-1	DF-104	CUB2P1		GEM-201	2TM-PI	
10000   BPD-01   DD-103   BYA681   ED-01   DC511     10000   BPD-01   DD-103   BYA681   ED-270   DC511     10000   BPD-01   DD-103   BYA681   ED-01   DC511     10000   BPBN-05   DF-503   CUB465   GEM-415     10000   BPBN-05   DF-503   CUB465   GEM-	C24	470				D6-471	5R5T47	ED-470		MS-347	10%
470   BPD-01   Db-471   SRST47   ED-470   DCS11     10000   BPD-01   DD-103   BYA681   ED-01   DCS11     270   BPD-01   DD-103   BYA681   ED-01   DCS11     10000   BPD-01   DD-103   BYA681   ED-01   DCS11     10000   BPD-01   DD-103   BYA681   ED-01   DCS11     260   BPD-01   DD-103   CUB468   ED-01   DCS11     260   BPBR-05   DF-503   CUB468   GEM-415     260   GEM-415   GEM-415   GEM-415   GEM-415     260   GEM-415   GEM-415   GEM-415   GEM-415     260   GEM-415	C25	10000			BPD-01	DD-103	BYA6S1	ED-03	DCSII	5HK-SI	
100000   BPD-01   DD-103   BYA681   ED-01   DCS11     10000   BPD-01   DD-103   BYA681   ED-01   DCS11     270   BPD-01   DD-103   BYA681   ED-01   DCS11     10000   BPD-01   DD-103   BYA681   ED-01   DCS11     10000   BPD-01   DD-103   BYA681   ED-01   DCS11     10000   BPBN-05   DF-503   CUB465   GEM-415     1000   BPBN-05   DF-503   CUB465   GEM-415     10000   BPD-01   DF-503   CUB465   GEM-415     10000   BPD-01   DF-503   CUB465   GEM-415     10000   BPD-01   DC-103   DF-503   CUB465     10000   BPD-01   DC-103   DF-503   CUB465     10000   BPD-01   DC-103   DF-503   CUB465     10000   BPD-01   DC-103   DC-103   DF-503   CUB465     10000   BPD-01   DC-103   DC-103   DC-103     10000   DC-103   DC-103   DC-103   DC-103   DC-103     10000   DC-103   DC-103   DC-103   DC-103   DC-103     10000   DC-103   DC-103   DC-103   DC-103   DC-103   DC-103     10000   DC-103	C26	470				D6-471	5R5T47	ED-470		MS-347	10%
10000   BPD-01   DD-103   BYA681   ED-270   DG-811     10000   BPD-01   DD-103   BYA681   ED-270   DG-811     10000   BPD-01   DD-103   BYA681   ED-270   DG-811     10000   BPGRN-05   DF-803   CUB465   GEM-415     10000   GEM-415   GEM-415   GEM-415   GEM-415   GEM-415   GEM-415     10000   GEM-415   GEM-415   GEM-415   GEM-415   GEM-415     10000   GEM-415   GE	C27	10000			BPD-01	DD-103	BYA6SI	ED-01	DCSII	5HK-Sl	
270   BPD-01   D6-271   Li0T27   ED-270   DC511   Li0072   ED-01   DC511   D	C28	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-81	
100000   100000   100000   100000   100000   100000   100000000	C28	270				D6-271	L10T27	ED-270		MS-327	10%
.05 400 P488N-05 DF-503 CUB4S5 GEM-415 .05 400 P488N-05 DF-503 CUB4S5 GEM-415	C30	10000			BPD-0I	DD-103	BYA6S1	ED-01		5HK-SI	
.05   400   P488N-05   DF-503   CUB485   GEM-415	C31		400		P488N -05	DF-503	CUB4S5			4TM-S5	
	C32		400		P488N-05	DF-503	CUB485			4TM-S5	

Note 1. Some versions may use . Olmid in this application.

			INSTALLATION NOTES	Loudness, Tap 3 100K&	Level		Bass	
		20011414	PART No.		U46	Not Req.	055	Not Req.
SIC	TA	-	PART No.		011-130	Not Req.	013-139	Not Req.
CONTROLS	REPLACEMENT DATA	TATOCALO	PART No.		A47-250K-S QII-130	F8-3	A47-2meg-Z	F8-3
	RE	CENTRALAB	PART No.		3-E	Not Req.	B-76	Not Req.
		TATE OF LIVE	WATTS PART No. PART No.	B-20066164	B-20066P162		B-20066P159	
	9	Ç	WATTS	4	-49		444	_
	SINEEVO	Š	RESIST. ANCE	250K Switch	250K	Shaft	2meg	Shaft
		¥	ģ	RIA	R2A	Ø	R3A	<b>A</b>
							2	3

R3 (19) (18) (19) (18) (19) (10) (10) (10) (10) (10) (10) (10) (10	M5 M4 M3 R2 R1 V1 12AX7 ECC83
SEL. SOUND SYSTIMS, IN SECOND OUTPUT CERAMIC CONTROL SCORE OUTPUT CONTROL SCORE OUTPUT STAFF HD L	(V3) (T2)



- DC voltage measurements taken with vacuum tube voltmeter;
   AC voltages measured at 1000 ohms per volt.
   Socket connections are shown as bottom view.
   Measured values are from socket pin to common negative.
   Line voltage maintained at 117 volts for voltage readings.
   Nominal tolerance of component values makes possible a variation of =15% in voltage and resistance readings.
   All controls at minimum, proper output load connected.
- - 0 SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

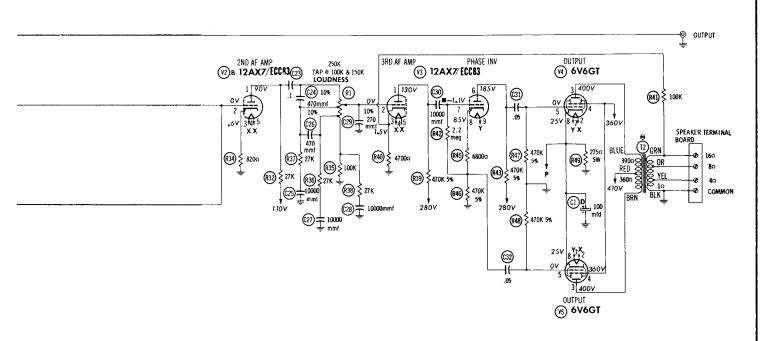
### RESISTANCE READINGS

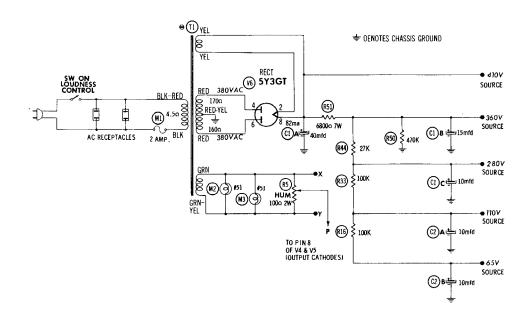
N3TI		Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
٧ì	12AX7 ECC83	† 330K	4.7meg	0Ω	300α	300∩	† 330K	47K	680ი	300Ω
V2	12AX7 ECC83	† 160K	22K	820n	300n	300ი	1160K	4.7meg	0Ω	300o
V3	12AX7 ECC83	† 500K	100K	<b>4200</b> 0	300α	300ი	† 500K	2.7meg	470K	300∩
V4	6V6GT	TP	300ი	† 390Ω	† 6800Ω	470K	TP	300∩	275ด	
V5	6V6GT	TP	300Ω	† 360Ω	1 6800Ω	470K	NC	300n	275n	
V6	5Y3GT	NC	20K(Min)	NC	170Ω	NC	160Ω	NC	20K(Min)	
+	MEASI	DEU EDUM	PIN 8 OF VA				•	•		

- MEASURED FROM PIN 8 OF V3 MEASURED FROM PIN 8 OF V3 NO CONNECTION TIE POINT

A PHOTOFACT STANDARD NOTATION SCHEMATIC Howard W. Sams & Co., Inc. 1958

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# PARTS LIST AND DESCRIPTIONS (Continued)

		١		REP	EPLACEMENT DATA	TA			
Ę	2	2	TREET, SOUND	CENTRALAB	TATOCIAIO	Jat	7901141	STECIA INCIDA INTESIA	Е
ģ	RESIST.	WATTS	WATTS PART No.	PART No.	PART No.	PART No.	PART No.	INSIALIATION NOTES	
R4A	2meg	-400	B-20066P159	B-76	A47-2meg-Z Q13-139	Q13-139	U55	Treble	L.
A	Shaft			Not Req.	FB-3	Not Req.	Not Req.		_
R5A	1000	~1	B-20066P141	WN-101	A43-100		C1001P *	Hum (Wire Wound)	
Ф	Shaft			Not Req.	FKS-1/4		Not Req.		
					04()101014				

**RESISTORS** \* Use #203 & #212 Fiber Insulating Washers.

¥ o

All wattages 1/2 watt, or less, unless otherwise listed.

BELL SOUND PART No. RATING 221K 222K 222K 221K 100K 820G 820G 100K 574 470K 6% 470K 6% 470K 6% 470K 6% 470K 6% 860G ₹ ° NOTES BELL SOUND PART No. RATING 100 K 680 f 680 f

R6
R8
R8
R9
R10
R11
R12
R11
R12
R13
R14
R14
R17
R18
R18
R18
R18
R18
R18
R18
R18

TRANSFORMER (POWER)

						REPLACI	REPLACEMENT DATA			
Žgè		RATING		BELL SOUND Halldorson Merit	Halldorsan	Merit	Ram	Ram Stancor Thordarson	Thordarson	Triod
	PRI.	SEC. 1   SEC. 2	SEC. 2	PAKI No.	PART NO. PART NO. PARI NO. PART NO. PART NO. PART NO.	PART No.	PARI No.	PART No.	PART No.	PART No.
Į	1177	117V 740VCT 5V	2Ω	B20368 ①	рязи @			PM8409	PM8409 24R04 2 R-11B 2	R-11B
	© .74A	3 .74A 3 .082A 3 2A	© 34							)
	SEC. 3	SEC. 3 SEC. 4 SEC. 5	SEC. 5							
	6.3V									
16	1									
9	U Part #B20369 used for 50% operation.	369 used fo	edo one to	ration,		Tape center	(2) Tape center tap on 6, 3V winding.	winding.		

# PARTS LIST AND DESCRIPTIONS (Continued) TRANSFORMER (AUDIO OUTPUT)

					REPLAC	REPLACEMENT DATA	<b>4</b>			
₹ .	IMPEC	IMPEDANCE	Ä	Halldorson Merit	Merit	Rom	Stancor	Stancor Thordarson	Triad	NOTES
	PRI.	PRI. SEC.	LAKI NO.	PAKI NO.	PAKI No.	PAK No.	PAKI No.	PAKI NO.   PAKI NO.   PAKI NO.   PAKI NO.   PAKI NO.	PAKI No.	
T2	76000	T2 76000 180	32B8 ①							① Alternate Part
	IJ	CT Tap								#B20370
		80, 40								

**FUSES** 

NOTES

SS No.	HOLDER	нкр
BU	FUSE	VGC2
FUSE No.	HOLDER	342001
LITTEL	FUSE	312002. (3AG 2A 250V)
SOUND No.	HOLDER	
BELL S	FUSE	
RATING		2A 250V
TYPE		3AG
¥°.		WI
	TYPE	TYPE RATING BELL SOUND LITTELFUSE BUSS PART No.

**MISCELLANEOUS** 

WIRING DATA

General-use Unshielded Hook-up Wire
8524 (Stranded) Available in Ten Colors Power Cord
Low-Loss Shielded Lead (Interconnecting)





TRADE NAME Challenger Models CHA33, CHA33Y

MANUFACTURER Challenger Amplifier Co., P.O. Box 500, Paramus, N.J.

TYPE SET AC Operated 3 Channel 33 Watt Audio Amplifier (Model CHA33Y has 3 Speed

Manual Record Player)

Types 12AX7/ECC83 Mic 1-Mic 2 Preamplifier, 6AV6 Mixer, 12AX7/ECC83 AF Amp.-Phase Inv., (2) 6L6GB Output, (2) 5Y3GT Rectifier TUBES (Seven)

RATING 1.1 Amp. @117 Volt AC (120Watts) POWER SUPPLY 110-120 Volt AC-60 Cycle

### HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of H329 the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information. tion contained herein. @ 1958 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana . Printed in U.S. of America

# PARTS LIST AND DESCRIPTIONS TUBES (GENERAL ELECTRIC, SYLVANIA)

Ş. Ş.	USE	TYPE	
<b>⋝</b> :	Mic 1-Mic 2 Preamplifler	12AX7/ECC83	
2 2	Mixer AF AmpPhase Inv.	12AX7/ ECC83	
٧4	Output	6L6GB	

ģ	USE	TYPE
V5 V7	Output 61.6GB Rectifier 573GT Rectifier 573GT	m is is

			_			_
				SPRAGUE PART No.	TVL-1980 TVL-4759.7	1 12-1000
TYPE	6L6GB 5Y3GT 5Y3GT			SANGAMO PART No.	D-270 Q-027 MT-0550	MA. 1 - 0000
USE		S		PYRAMID PART No.	TMC-61 TMQ-8	
	Output Rectifier Rectifier	ACITOR	REPLACEMENT DATA	MALLORY PART No.	WP433.6	2001
No.	V5 V6 V7	TIC CAI	REPLAC	CORNELL- DUBILIER PART No.	BR1850 D0080	- Trees
TYPE	12AX7/ECC83 6AV6 12AX7/ECC83 6L6GB	ELECTROLYTIC CAPACITORS		AEROVOX PART No.	AFHI-59 AFH4-09 PRSCOVEO	7
	ifter			CHALLENGER PART No.		
USE	Mic 1-Mic 2 Preampliffer Mixer AF AmpPhase Inv. Output		RATING	CAP. VOLT.	116 500 5 450 15 450 15 450	
ž Ž	7 2 2 X			Ž Š Š	A B C C C	

FIXED CAPACITORS
Capacity values given in the rating column are in mfd. for Paper
Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

					the same of the same of the same of		
			æ	REPLACEMENT DATA	r DATA		
GHALLENGED	APPONON	CENTRALAB	CORNELL-	FDIE	2001111	-	STON
PART No.	PART No.	PART No.		PART No.	PART No.	PART No.	S S
	P288N-033	DF-303	CUB6833		GEM-4133	6TM-S33	
	P488N-033	DF-303	CUB6S33		GEM-4133	6TM-833	
	P288N-033	DF-303	CUB6S33		GEM-4133	6TM-833	
	P488N-033	DF-303	CUB6S33		GEM-4133	6TM-833	
	P488N-1	DF-104	CUB41-1		GEM-401	4TM-P1	
			5R5T27	ED-270		MS-327	10%
			1R5D22	CY20C222K		MS-222	10%
			REDI	ED-1000	MCB255	MS-21	10%
		D6-562		GP-5600			!
	P288N-033	DF-303	CUB6S33		GEM-4133	6TM-S33	
	BPD-015	DD16-153	BYA10815	ED-015		5HK-S15	
	P488N-033	DF-303	CUB6S33		GEM-4133	6TM-S33	
	P488N-033	DF-303	CUB6833		GEM-4133	6TM-S33	
			IR5D22	CY20C222K		MS-222	10%
		P288N-033 BPD-015 P488N-033 P488N-033		D6-562 DF-303 DDI6-153 DF-303 DF-303	D6-562 DF-303 CUB6S33 DD16-153 BYA10S15 DF-303 CUB6S33 DF-303 R5D22	DF-560 GP-5600 DF-303 CUB6S33 DF-303 CUB6S33 DF-305 CUB6S33 DF-305 CUB6S33 DF-305 CY20C222K RRDD2 CY20C222K	DF-303 CUB6S33 GEM-4133 DP-303 CUB6S33 GEM-4133 DF-303 CUB6S33 GEM-4133 DF-303 CUB6S33 GEM-4133 GEM-4133 GEM-4133

### CONTROLS

	SEE CIVITATION OF THE PERSON O	INSTALLATION NOTES	Treble			Вавв		Phono		Microphone 2		Microphone 1	
	AGCIIVM	PART No.	<b>U55</b>	Not Req.	US-26	1055	Not Req.	048	Not Req.	048	Not Req.	1048	Not Req.
ITA			Q13-139	Not Req.	1-92	Q13-139	Not Req.	Q13-133	Not Req.	Q13-133	Not Req.	Q13-133	Not Req.
PLACEMENT DA	TATOCAL	PART No.	A47-2meg-Z	FS-3	SWE-12	A47-2meg-Z	FS-3	A47-500K-Z	-S5	A47-500K-Z	F8-3	A47-500K-Z	FS-3
RE	CENTRALAB	PART No.	B-76				Not Req.	B-60	Not Req.	B-60	Not Req.	B-60	Not Req.
	CHALLENGER	PART No.	7417			V413		V367		V367		V367	
١	2	WATTS	著,	ı		-400		-400		-40		-400	
FYG	5	RESIST.		Shaft	Switch	2meg	Shaft	200K	Shaft			500K	Shaft
	<b>₹</b>	ģ	RIA	Д	Ö	RZA	M	R3A	Д	R4A	В	R5A	Д
		REPLACEMENT DATA	RESIST- WATTS PART No. PART No.	REPIACEMENT DATA   RECENTANCE   CLAROSTAT   IRC   MALLORY   RESIST.   WATTS   PART No.   PART NO.	REPLACEMENT DATA	REPLACEMENT DATA   REPLACEMENT DATA   RC   MALILORY   RESIST.   WATTS   PART No.   PAR	RESIST- WATTS	REPLACEMENT DATA	RESIST	REPIACEMENT DATA	REBIST	REJIST	REPIACEMENT DATA

(C1)	(i) (i) (ii) (ii) (iii)	M2)	6L6GB 6L6	<b>GGB (5) (1)</b>
ove 6	O; Ö	3 XYZ		13672
(V2) 6AV6	V1 12AX7 ECC83	V3 12AX7 ECC83	V7 5Y3GT	₩6 5Y3GT

# PARTS LIST AND DESCRIPTIONS (Continued)

CHASSIS—BOTTOM VIEW

RESISTORS
All wattages 1/2 watt, or less, unless otherwise listed.

**C**7

R5

R13

R10

R37

R9

**C**5

**C4** 

R15

R8

R6

(R14)

(R30)

CI

(R26)

**R7** 

**(**66

(R11) (R20)

(R27)

(2)

(R23

(R22

**R34** 

(C17)

(C16)

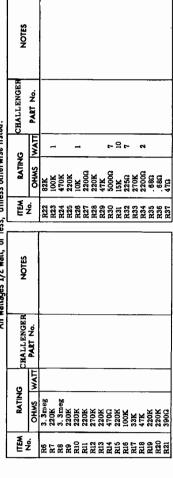
**R35** 

(R4)

(R12)

**(**213)

(R21)



## TRANSFORMER (POWER)

No.   PRI   SEC. 1   SEC. 2   SEC. 3   SEC. 3						/man and an and an an and an					
RATING   CHALLENGER   PRI   SEC. 2   SEC. 3   PART No.   IITV   800VCT   5V   6.3VCT   T365-2   PART No.   CHALLENGER   S.							REP	LACEMENT	DATA		
PRI. SEC. 1 SEC. 2 SEC. 3 PART No.   IITV 800VCT 5V 6.3VCT T385-2	ۇق		Z Z	2		CHALLENGER	Holldorson	Merit	Stoncor	Thordorson	Triod
800VCT 5V 6.3VCT T365-2 @.130A @4A @ 2.8A		PRI.	SEC. 1	SEC. 2	SEC. 3	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
(2).130A (2)4A (2) 2.8A	z	1170	BOOVCT	2Λ	6. 3VCT	T365-2					R-24B
		<b>®</b> I. <b>IA</b>	® 130A		® 2.8A						1

## TRANSFORMER (AUDIO OUTPUT)

		NOTES							
		Triod	PART No.						
		Stoncor Thordorson Triad	PART No.						
•	DATA	Stoncor	PARI No.						
	REPLACEMENT DATA	Merit	PAKI No.						
	R	Halldorson Merit	PAKI No.						
		CHALLENGER	LAK NO.	T279-1					
			SEC.1	70V		SEC. 2	16CTap	@	80 & 40
		IMPEDANCE	PRI.	20009	ដ				
	i	ź		T2					

### FUSES

(C14)

R31

**R33** 

**R28** 

**R29** 

(3)

	BUSS PART No.	HOLDER	HKP		
	BU	FUSE	MDL2		
REPLACEMENT DATA	LITTELFUSE PART No.	HOLDER	342001		
REPLACEM	LITTEI	FUSE	313002.	(3AG 2A 250V S/B)	
	NGER No.	HOLDER			
	CHALLENGER PART No.	FUSE			
	RATING		2A 250V	8/в	
	TYPE		3AG		
	Ş ĕ		W		

## MISCELLANEOUS

NOTES	<b>4</b> 51	
CHALLENGER PART No.		
PART NAME	Pilot Lamp	
景。	MZ	

### WIRING DATA

(C11) (R18)

(C10)

**R17** 

R1

**C9** 

R16 R19

C12

**R32** 

C15

**R36** 

M1

(B)

R2

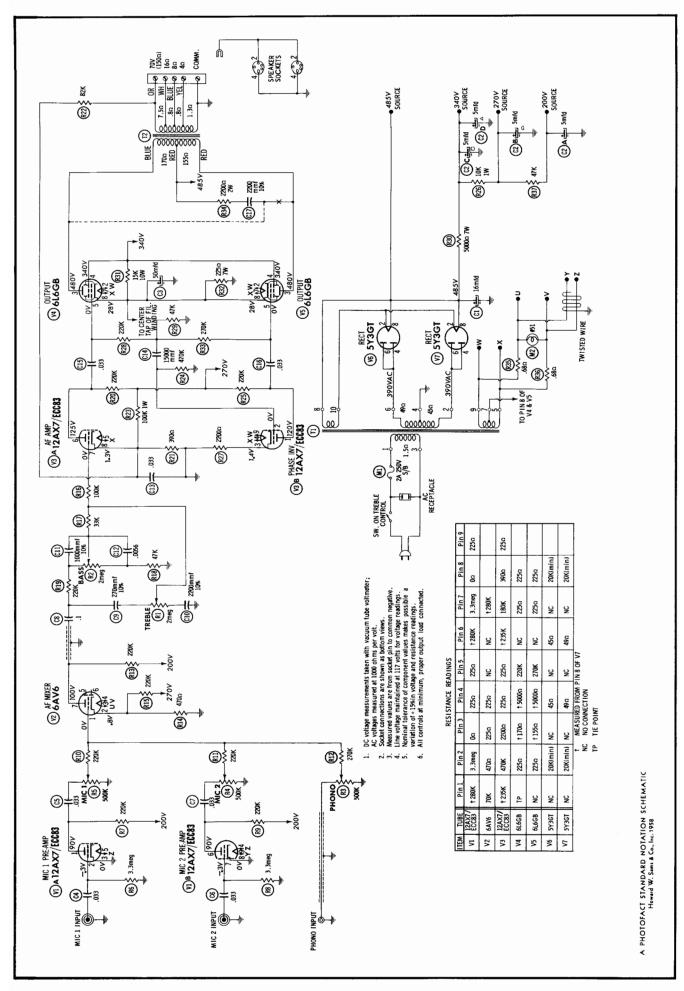
**R24** 

(R25)

R3

	_			_
TIMING DAIN	General-use Unshielded Hook-up Wire	Power Cord	Low-Loss Shielded Lead (Interconnecting) Use BELDEN No. 9401	Phono Pick-up Arm Cable

### 29





DAVID BOGEN **MODEL L60** 

TRADE NAME David Bogen Model L60

MANUFACTURER David Bogen Co., Inc. P.O. Box500, Paramus, N.J.

TYPE SET AC Operated 6 Channel 60 Watt Audio Amplifier

TUBES Twelve

POWER SUPPLY 110-120 Volts AC-60 Cycle RATING 1.1 Amp. @ 117 Volts &C (130 Watts)

### VOLTAGE REGULATOR ADJUSTMENT (R6)

The voltage regulator (R6) should be adjusted if V5, V6, V7, V8 or V9 tubes are replaced.

1. Set "Volt Reg. " Control (R6) and volume controls (R1, R2, R3) at minimum Allow the amplifier to warm up for four minutes.

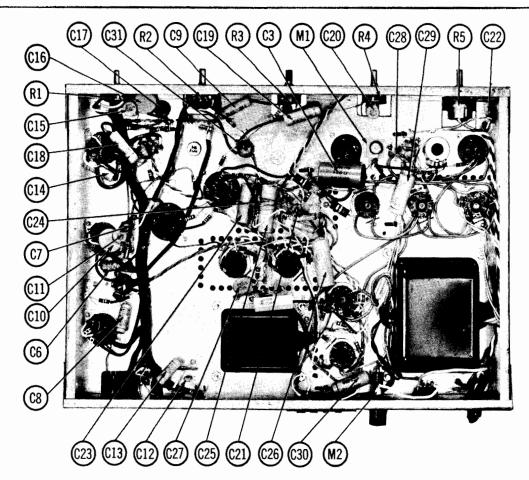
2. Using an accurate low range DC voltmeter, connect the positive lead to terminal 1 of the "CUR MON" test strip. Connect the negative lead to ground.

3. Turn the voltage regulator (R6) for a SLIGHT meter deflection. Measure the voltage at terminals 1, 2, 3, and 4 on the "CUR MON" strip. Keep the meter connected to that terminal which measures the highest voltage.

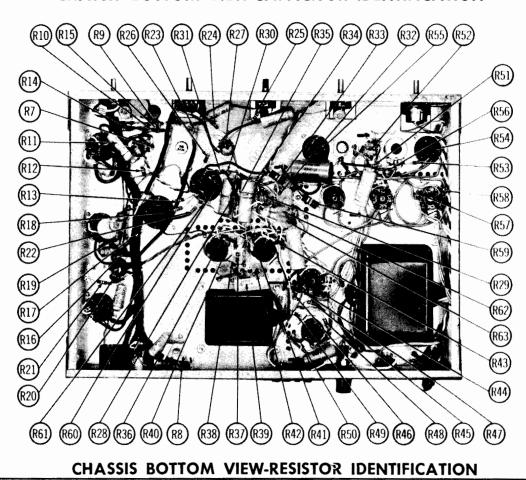
4. Turn the voltage regulator (R6) until the meter indicates . 25 volt.

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### CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



## CHASSIS-TOP VIEW

ECC83 12AX7 (V2)

(C4)

6AV5GA

(T2)

(V8

6AV5GA 6AV5GA6AV5GA

(V6)

(M4)

(V4) 6U8

(2)

(V5)

(I

√10) 5Y3GT

(11) 5Y3GT

√12) 5Y3GT

R6

√9 6CM7

(C1)

# PARTS LIST AND DESCRIPTIONS TUBES (GENERAL ELECTRIC, SYLVANIA)

TEA No.	USE	TYPE	ĘŠ
5	Mic 1-Tuner-Phono Preamp.	12AX7 / ECC83	V
V2	Mic 2-Mic3 Preamplifier	12AX7/ ECC83	Λ8
23	AF Amplifier	6AV6	6Λ
74	AF AmpPhase Inv.	608	Ν
25	Output	6AV5GA	ıı
V6	Output	6AV5GA	VIS

TYPE	6AV5GA	6AV5GA	6CM7	SY3GT	SY3GT	SY3GT
USE	Output	Output	Volt. RegReg. Cont.	Rectifier	Rectifier	Rectifier
Ž.	77	Λ8	6Λ	VIO	VII	V12

## **ELECTROLYTIC CAPACITORS**

) (VI) 12.AX7 ECC83

M6

**C**5

Г	RAT	RATING			REPLAC	REPLACEMENT DATA			
No E	A.	VOLT.	DAVID BOGEN PART No.	AEROVOX PART No.	CORNELL- DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
	30	400		AFH1-51	A0470	FP145	TMS-56	S-265	TVL-1720
	စ္တ	400		AFH1-51	A0470	FP145	TMS-56	S-265	TVL-1720
	20	001		PRS150V50	BR5015	TC49	TD-50-150	MT-1550	TVA-1414
_	<u>د</u>	200		AFH4-09	D0080	WP433.6	TMQ-9	Q-027	TVL-4759.7
щ	ı,	200							
	5	200							
$\overline{}$	€	200							
CSA	014	350		AFH4-19-10	D0179.3	FP474. 5	TMQ-113	Q-035	TVL-4826
_	01	350						MT-4510	
	20	450							
_	20	450							

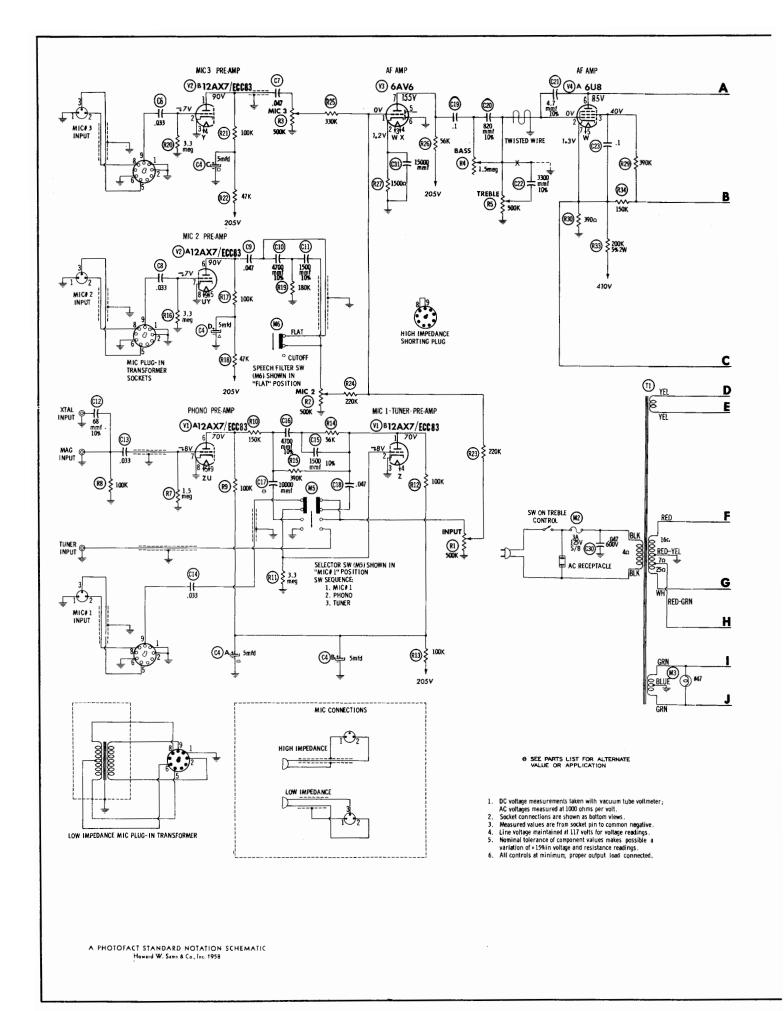
## FIXED CAPACITORS

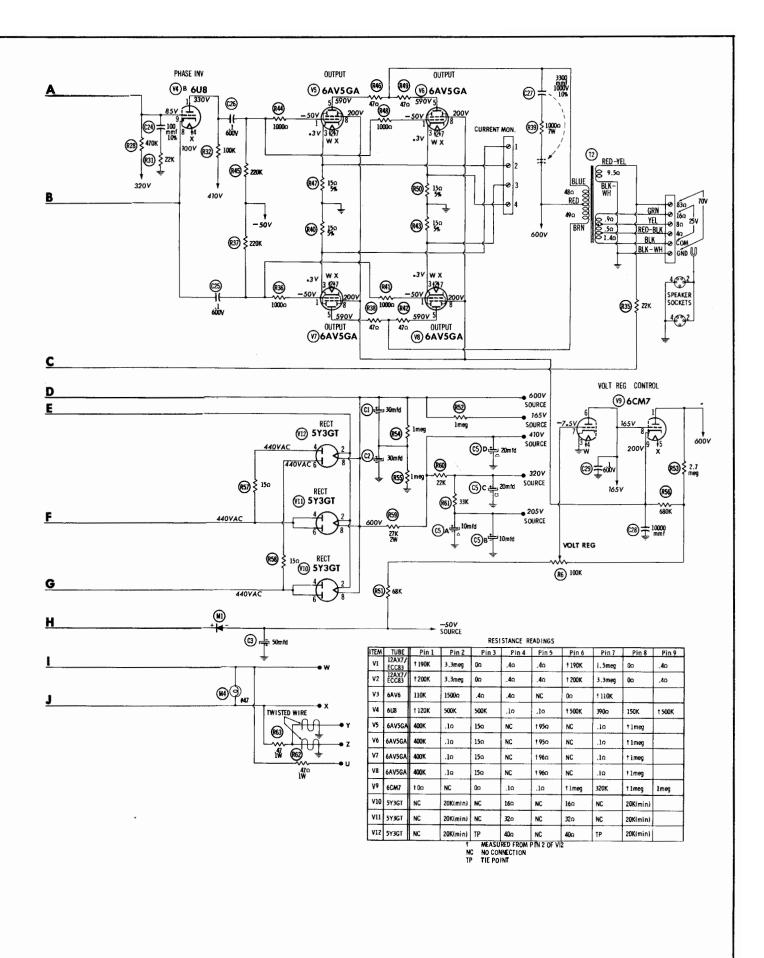
(3) 6AV6

**M**3

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd, for Mica and Ceramic Capacitors.

Moltan   M					,			EDI A CEASEN	ATAC FIRST OF THE PARTY OF THE		
CAP   VOIT   PART No.   PART No		-	1					CHIACEMEN	AIA		
CAP   VOIT   PART No.   PART NO	¥	Z	2	DAVID BOGEN	VCV Can	CENTRALAR		FPIF	>90	TI CARGO	NOTES
1047   200   P288N-033   DF-503   CUB2S47   GEM-4413   GTM-S33	ģ	3	VOL	PART No.	PART No.	PART No.		PART No.	PART No.	PART No.	2
.047         200         P288N-047         DF-503         CUBBS47         GEM-4147         2TM-537           .047         200         P288N-047         DF-503         CUBS43         GEM-4133         GTM-537           .047         200         P288N-047         DF-503         CUBS43         GEM-4133         GTM-537           1500         RD-60         DD-60         LDC66         ED-160         RB-215         RB-215           033         200         P288N-043         DF-303         CUB683         BC-460         GEM-4133         GTM-533           1500         P288N-047         DF-303         CUB683         BC-66         GEM-4133         GTM-533           1000         P288N-047         DF-303         CUB683         BC-66         GEM-4133         GTM-533           4700         P288N-047         DF-104         CY20C47X         GEM-4133         GTM-533           10000         P288N-047         DF-103         BYA81         ED-160         GEM-413         GTM-533           4.7         200         P288N-047         DF-103         BYA81         ED-160         GEM-413         GTM-51           1.         200         P288N-1         DF-104         CUB2P1         DC-1	ဗ	.033	200		P288N-033	DF-303	CUB6S33		GEM-4133	6TM-S33	
. 0.33         200         P288N-047         DF-503         CUBBS43         GEM-4147         ZTM-533           1500         RSP8N-047         DF-503         CUBBS47         CY20C472K         GEM-4147         ZTM-547           1500         RSP8N-047         DF-503         CUBBS43         CFE         RB-215           68         NP - D168         DD-680         LIQ68         ED-68         GEM-4133         GTM-533           .033         200         P288N-033         DF-303         CUBBS33         GEM-4133         GTM-533           1500         P288N-047         DF-503         CUBBS33         CEM-4133         GTM-533         GTM-533           10000         P288N-047         DF-503         CUBBS31         ED-60         GEM-4133         GTM-533           4.70         P288N-047         DF-104         CUBB21         ED-1800         GEM-413         GTM-513           4.71         A7         P288N-04         DF-104         CUB221         DC-511         GEM-413         FTM-21           4.77         A7         P288N-1         DF-104         CUB21         DC-511         GEM-213         GTM-21           1.1         600         P288N-1         DF-104         CUB2P1	C7	. 047	200	-	P288N-047	DF-503	CUB2847		GEM-4147	2TM-S47	
1500	80	.033	200		P288N-033	DF-303	CUB6S33		GEM-4133	6TM-S33	
1500   1500	60	. 047	200		P288N-047	DF-503	CUB2S47		GEM-4147	2TM-S47	
150   150	C10	4700					RED47	CY20C472K		MS-247	10%
0.33   2.00   2.288N-0.03   DF-3.03   CUBAS3   DF-3.04   DF-3.04   CUBAS3   DF-3.05   DF-3	ũ	1500					REDIS	ED-1500		MS-215	2601
.033         200         P288N-033         DF-303         CUBB6S3         GEM-4133         6TM-533           1500         1500         P288N-033         DF-303         CUB6S33         GEM-4133         6TM-533           1500         1500         1500         1500         1500         1500         1500           1 040         10         10         10         10         10         10         10           1 04         200         10 <td>CIS</td> <td>88</td> <td></td> <td></td> <td>NP0-D168</td> <td>DD-680</td> <td>L10068</td> <td>ED-68</td> <td></td> <td>MS-468</td> <td>10%</td>	CIS	88			NP0-D168	DD-680	L10068	ED-68		MS-468	10%
1500   1500   1500   1500   1600	C13	.033	200		P288N-033	DF-303	CUB6S33		GEM-4133	6TM-S33	!
1500   1500	C14	. 033	200		P288N-033	DF-303	CUB6S33		GEM-4133	6TM-S33	
10000   100000   100000   100000   100000   100000   100000   100000   10000	CIS	1500					RSD15	ED-1 500		MB-215	10%
10000   Papp-01   DD-103 PY-651   ED-01   DC-511   5HK-51     1	CIB	4100					R5D47	CY20C472K		MS-247	10%
. 047         200         P288N-047         DF-503         CUB2847         GEM-4147         2TM-547           8.0         P288N-1         DF-104         CUB2P1         GEM-200         TM-8-10           8.7         NPO-DIG-7         TCZ-4R7         TCZ-4R7         TCZ-4R7         TCZ-4R7           3300         NPO-DIG-7         TCZ-4R7         TCZ-6R7         TCZ-5R7         TCZ-5R7           100         NPO-DIG-1         TCZ-4R7         TCZ-6R7         TCZ-5R7         TCZ-5R7           100         NPO-DIG-10         DF-104         CUB2P1         TCZ-6R7         TCZ-5R7           1         600         NPO-DIG-10         DF-104         CUB2P1         CEM-601         TCM-P1           1         600         P688N-1         DF-104         CUB6P1         GEM-601         GTM-P1           1         600         BPD-01         DF-104         CUB6P1         GEM-601         GTM-P1           1         600         BPD-01         DF-104         CUB6P1         GEM-601         GTM-P1           1         600         BPD-01         DF-104         CUB6P1         GEM-601         GTM-P1           1         600         P688N-1         DF-104         CUB6P1 </td <td>C17</td> <td>10000</td> <td></td> <td></td> <td>BPD-01</td> <td>DD-103</td> <td>BYA6S1</td> <td>ED-01</td> <td>DC511</td> <td>5HK-SI</td> <td>8</td>	C17	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-SI	8
1   200   P268N-1   DF-104   CDB2P    ED-820   GEM-201   ZTM-P    ED-820   STM-P    STM-P	C18	. 047	200		P288N-047	DF-503	CUB2S47		GEM-4147	2TM-S47	
4.7   1.0	C19	٦.	200		P288N-1	DF-104	CUB2P1		GEM-201	2TM-P1	
4,7   NP0-DI4.7   TCZ-4R7 (RED33   TCO-4.7   TCC-4R7 (RED33   TCO-4.7   TCC-4R7 (RED33   TCC-4R7 (RED-10)   TCC-4R7 (R	C20	820					R5T82	ED-820		ME-382	10%
3300   P288N-1   DF-104   CUB2P1   ED-109   MCB235   MG-313   MG	ក្ដ	7.4			NP0-D14. 7	TCZ-4R7	C10V47C	TC0-4, 7	ZT-5547	5TCCB-V47	10%
1   200   P28BN-1   DF-104   CUB2P1   GEM-201   ZTM-P1	C22	3300					R5D33	CY20C332K		MS-233	10%
100   NPO-DITO   DP-101 LIDT1   ED-100 MCB235 MG-31   P688N-1   DP-104 LIDT1   ED-100 MCB235 MG-31   P688N-1   DP-104 CUB6P1   GEM-601 6TM-P1   GEM-601 6TM-P1   GEM-601 6TM-P1   GEM-601 6TM-P1   GEM-601 6TM-P1   GEM-601 GEM-601   GEM-	C23	-:	200		P288N-1	DF-104	CUB2P1		GEM-201	2TM-P1	
1   600   P688N-1   DF-104   CUB6P1   GEM-601   6TM-P1     1   600   P688N-1   DF-104   CUB6P1   GEM-601   6TM-P1     1   600   P688N-1   DF-104   CUB6P1   GEM-601   6TM-P1     1   600   BPD-01   DF-104   CUB6P1   GEM-601   6TM-P1     1   600   P688N-07   DF-105   CUB6P1   GEM-601   6TM-P1     1   600   P688N-07   DF-105   GEM-601   6TM-P1     1   600   P688N-07   DP-105   GEM-601   6TM-P1     1   600   P688N-07   DF-105   GEM-601   6TM-P1     1   600   P688N-07   DP-105   GEM-601   GEM-61     1   600   P68N-07   DP-105   GEM-601   GEM-61     1   600   P68N-07   DP-105   GEM-61   GEM-61     1   600   P68N-07   DP-105   DP-105   GEM-61   GEM-61     1   600   P68N-07   DP-105   DP-105   GEM-61	C24	901			NP0-DI100	DD-101	LIOTI	ED-100	MCB235	MS-31	10%
1   600   P688N-1   DF-104   CUB6P1   GEM-601   GTM-P1     10000   BPD-01   DD-103   BYA681   ED-01   DC511   5HK-S1     1   600   P688N-1   DF-104   CUB6P1   GEM-601   GTM-P1     1   600   P688N-47   DF-503   EUB684   GEM-614   GTM-P1     1   600   P688N-47   DF-503   EUB684   GEM-614   GTM-P1     1   600   P688N-47   DF-503   EUB684   GEM-614   GTM-P1     1   600   GEM-614   GTM-P1   GTM-P1     1   600   GEM-614   GTM-P1   GTM-P1     1   600   GTM-P1   GTM-P1   GTM-P1     1   600   GTM-P1   GTM-P1   GTM-P1   GTM-P1     1   600   GTM-P1   GTM-P1   GTM-P1   GTM-P1     1   600   GTM-P1   GTM-P1   GTM-P1   GTM-P1   GTM-P1     1   600   GTM-P1   GTM-P1   GTM-P1   GTM-P1   GTM-P1     1   600   GTM-P1   GTM-	C25		900		P688N-1	DF-104	CUBGPI		GEM-601	6TM-Pl	
10000   1000   1000   10000	C26	-:	900		P688N-1	DF-104	CUB6P1		GEM-601	6TM-PI	
10000   BPD-01   DD-103   BYA681   ED-01   DG511	C27	3300	1000								10%
.1 600 P68N-1 DF-1.04 CUB6P1 GEM-601 .047 600 P68N-047 DF-503 CUB6847 GEM-6147 15000 BPD-015 DDI6-133 FFAI0S15 ED-015	C28	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
. 047 600 P688N-047 DF-503 CUB6S47 GEM-6147 15000 BPD-015 DDI6-153 BYA10S15 ED-015	C29	٦.	900		P688N-1	DF-104	CUB6P1		GEM-601	6TM-Pl	
15000 BPD-015 DD16-153 BYA10S15 ED-015	C30	. 047			P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
	C3	15000			BPD-015	DD16-153	BYA10S15	ED-015		5HK-S15	





# PARTS LIST AND DESCRIPTIONS (Continued) CONTROLS

No.   RESIST   WATTS   PART No.   PART No.			9		REI	REPLACEMENT DATA	ITA			_
RESIST: WATTS	¥		2	DAVID BOGEN	1	L	-	200		
B=60	ģ	RESIST. ANCE	WATTS	PART No.			PART No.	PART No.	INSTALLATION NOTES	
Not Req.   Not Req.   Not Req.   Not Req.	RIA	-	-100	V367	B-60	A47-500K-Z	Q13-133	U48	Input	_
B-60	Д	Shaft			Not Req.	FS-3	Not Req.	Not Req.		_
Not Req.   FR-3   Not Req.   Not Req.     Not Req.   FS-3   Qi3-133   U48     Not Req.   FS-3   Qi3-133   U48     Not Req.   FS-3   Qi3-139   U68     Not Req.   FS-3   Not Req.   Not Req.     Not Req.   FS-3   Not Req.   U8-26     AB-40*   A47-100K-8*   Bii-128   TAI5L     AK-1   FKS-1/4   TM-Kit   Not Req.	R2A	u,	-44		B-60	A47-500K-Z	013-133	048	Mic 2	
B-60   A47-500K-Z   Q13-133   U48     Not Req.   FS-3   Not Req.   Not Req.     B-76   A47-Zmeg-Z   Q13-139   U55     Not Req.   FS-3   Not Req.   Not Req.     B-60   A47-500K-Z   Q13-139   U48     Not Req.   FS-3   Vel Req.   Vel Req.     KB-1   SWE-L2   76-1   U8-26     AB-40*   A47-100K-S*   BII-128   TA15L     AK-1   FKS-1/4   TM-Kit   Not Req.     PEGISTORS	Д	Shaft			Not Req.		Not Req.	Not Req.		
Not Req.   FS-3   Not Req.   No	5	ഹ	-46	V367	B-60		013-133	048	Mic 3	
B-76	Д	Shaft			Not Req.		Not Req.	Not Req.		_
Not Req.   FR-3   Not Req.   Not Req.	₹	1. 5meg	-40	V407	B-76	A47-2meg-Z	013-139	0.055	Вавв	_
B=60   A47-500K-Z   Q3-133   U48   Not Req.   A47-100K-S*   B11-128   TA15L   AK-1   FKS-1/4   TM-Kit   Not Req.   Not Req.	Д				Not Req.	•	Not Req.	Not Req.		_
Not Req. FS-3   Not Req.   Not Req.	R5A		2100	V377	B-60		013-133	U48	Treble	_
KB-1   SWE-12   76-1   UB-26   AB-40*   A47-100K-8* BII-128   TAISL   AK-1   KB-414   TAISL   Not Req.   BESISTORS	Д	ω.			Not Req.		Not Req.	Not Req.		_
AK-1 FKS-1/4 TMI-Kit Not Req.  PECISTORS	ပ				KB-1	SWE-12		US-26		_
AK-1 FKS-1/4 TMI-Kit RESISTORS	<b>R</b> 8	100K	-49	V392	AB-40*	A47-100K-S*	B11-128	TAISL	Volt Regulator	
	Д	Shaft			A.K-1	FKS-1/4	TM-Kit	Not Req.	•	_
	*	nlarge Mou	nting Ho	le to 3/8"		RESISTO	RS			_

therwise listed.
unless o
2 watt, or less,
ages 1/2
All watt

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		¥ ±	ģ	W				¥ ź	ė Ž		MZ						層	ź	Ş		M X	2	OIM		L	Ğ		ă —
1					,			_				_					_									_		
	NOTES																											
	DAVID BOGEN	PART No.																										
	ø	WATT			1																			~			-	_
	RATING	OHWS	1000G 220K	470	100001	150 98	10002	150 59	10000	220K	473	150 5%	100001	473	150 5%	68K	lmeg	2. 7meg	lmeg	lmeg	680K	155	150	27K	22K	33K	0.47	0.47
	ITEM	ģ	R36 R37	R38	R39	R40	R41	R43	R44	R45	R46	R47	R48	R49	R50	155	R52	R53	R54	R55	R56	R57	R58	R59	1860 1860	R61	R62	R63
	NOTES																											
	DAVID BOGEN	PART No.																										
		WATT												_													7	
	RATING	OHWS	1. 5meg 100K	100K	150K	3. 3meg	100K	56K	390K	3. 3meg	100K	47K	180K	3. 3meg	100K	47K	220K	220K	330K	26K	15000	470K	390K	3903	22K	100K	200K 5%	150K
	ITEM	ò	R7 R8	88	RIO	<b>E</b>	RIZ	<u>7</u>	RIS	RI6	FII7	R18	R19	R20	R21	R22	R23	R24	R25	R26	R27	R28	R29	R30	R31	R32	R33	R34

# PARTS LIST AND DESCRIPTIONS (Continued) TRANSFORMER (POWER)

						RE	REPLACEMENT DATA	DATA		
₹ S		K	RATING		DAVID BOGEN	Halldorson	Halldorson Merit	Stancor	Stancor Thordarson	Trind
	PRI.	SEC. 1	SEC. 2 SEC. 3	SEC. 3	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
TI	1170	870VCT	5V	6.3VCT	T3150					
	a 1. 1A	(a) . 052A (a) 6A		@ 7A						
		Tap ®								
		37V ®								
		. 001A								
			¥	ANSFC	TRANSFORMER (AUDIO OUTPUT	DIO OIL	JTPUT)			

	NOTES									
	Triod	PAKI NO.								
	Halldorson Merit Stancor Thardarson Triad	PAKI NO.								
DATA	Stancor	PAKI No.							RECTIFIER	
REPLACEMENT DATA	Merit	PAKI No.							REC	
2	Halldorson	PAKI No.								
	DAVID BOGEN	PAKI No.	T2124							
	No.	SEC. 1	70V	$\overline{}$	SECZ	160	Tap®	80, 40		
	¥	PRI.	33000	ပ်						
	Ž ģ		1.2					_		

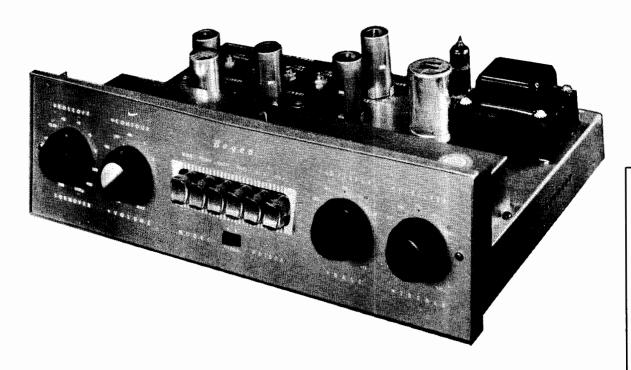
	NOTES				
	SARKES TARZIAN PART No.	10		NT DATA	
REPLACEMENT DATA	INTERNATIONAL PART No.	RS065	FUSE	REPLACEMENT DATA	
REPLACEM	FEDERAL PART No.	1263A	4		Na C
	DAVID BOGEN PART No.	H373			Marcoa Chry A.C.
MING	CURRENT Measured)	W100		_	
≱		٠.			
	¥ Š Š	MI			
_			,	_	

					REPLACEMI	REPLACEMENT DATA		
ŽĘ.	TYPE	RATING	DAVID BOGEN PART No.	OGEN No.	LITTEL	LITTELFUSE PART No.	BU PART	BUSS PART No.
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
MZ	3AG	34			313003.	342001	MDX3	HKP
		125V S/B			(3AG 3A 125V S/B)			
				NAICCEL I	AICCELL ANIECTIC			

夏克	PART NAME	DAVID BOGEN PART No.	NOTES
М3			#47
M4	Pilot Lamp		447
M5	Switch	S475	Selector (Slide Type DPDT)
M6	Switch	2361	Speech Filter (Slide Type SPDT)
			WIRING DATA

General-use Unshielded Hook-up Wire
Power Card
Low-Loss Shielded Lead (Interconnecting) Use BELDEN No. 8430 Phono Pick-up Arm Cable





TRADE NAME David Bogen Model PR100A

MANUFACTURER David Bogen Co., Inc., P.O. Box 500, Paramus, N. J.

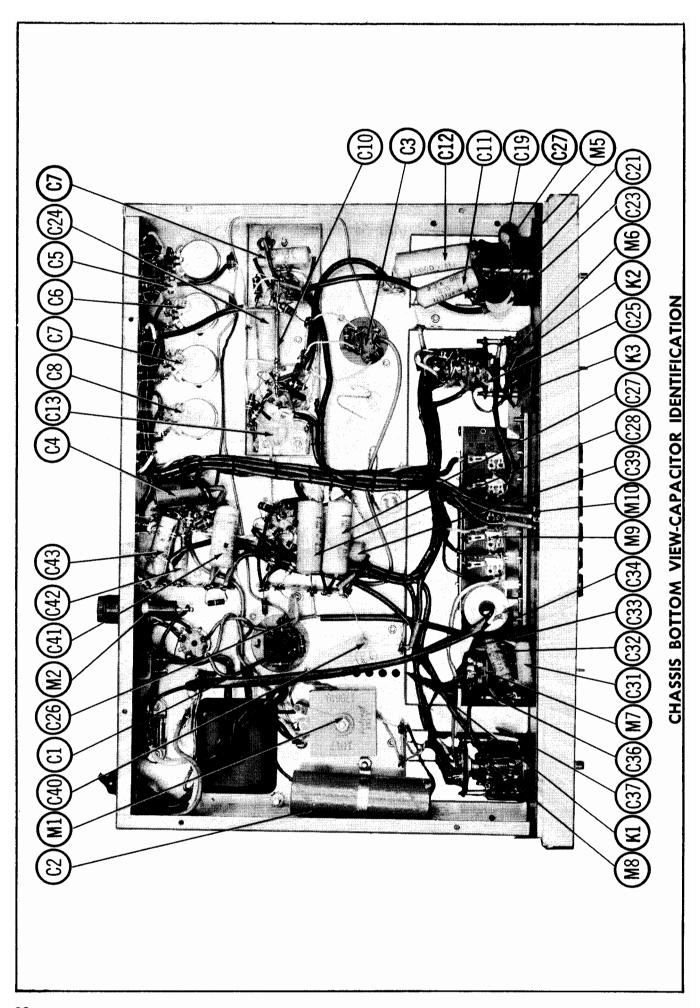
TYPE SET AC Operated 8 Channel Equalizer Preamplifier

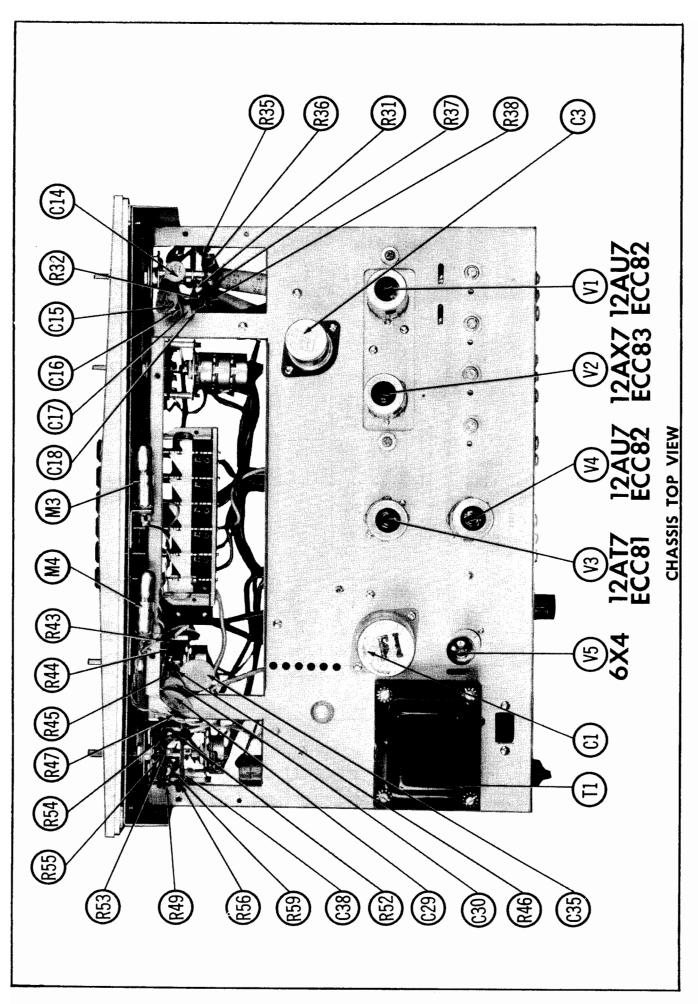
Types 12AU7/ECC82 Phono Preamplifier, 12AX7/ECC83 Phono AF Amplifier, 12AT7/ECC81 AF Amplifier, 12AU7/ECC82 AF Amp. - Cath. Follower, 6X4 Rectifier TUBES (Five)

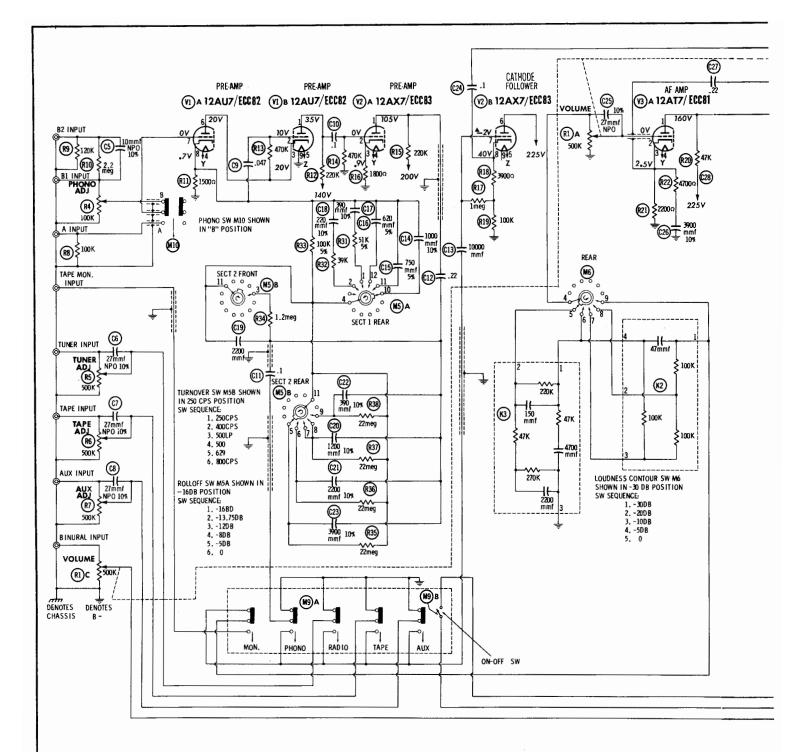
POWER SUPPLY 110-120 Volts AC-60 Cycles RATING . 23 Amp. @ 117 Volts AC (23 Watts)

### HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of H216 the particular type of replacement part listed. duction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1957 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana . Printed in U.S. of America







- 1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
- Socket connections are shown as bottom views.

  Measured values are from socket pin to common negative.
- Line voltage maintained at 117 volts for voltage readings. Nominal tolerance of component values makes possible a
- variation of ± 15% in voltage and resistance readings.

  6. All controls at minimum, proper output load connected.

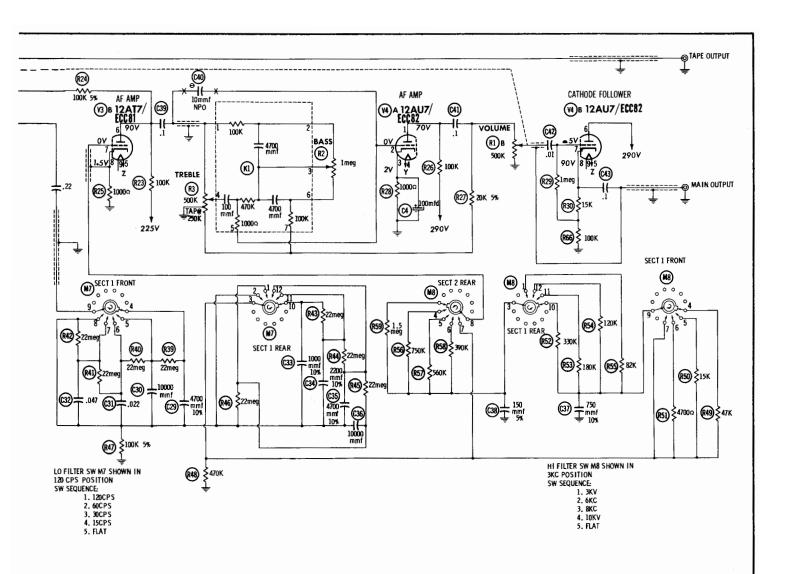
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

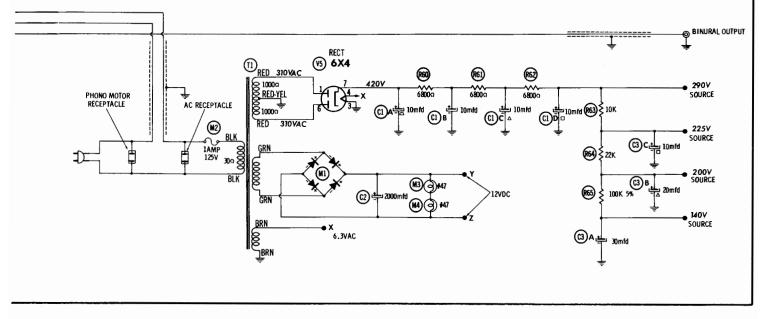
### RESISTANCE READINGS

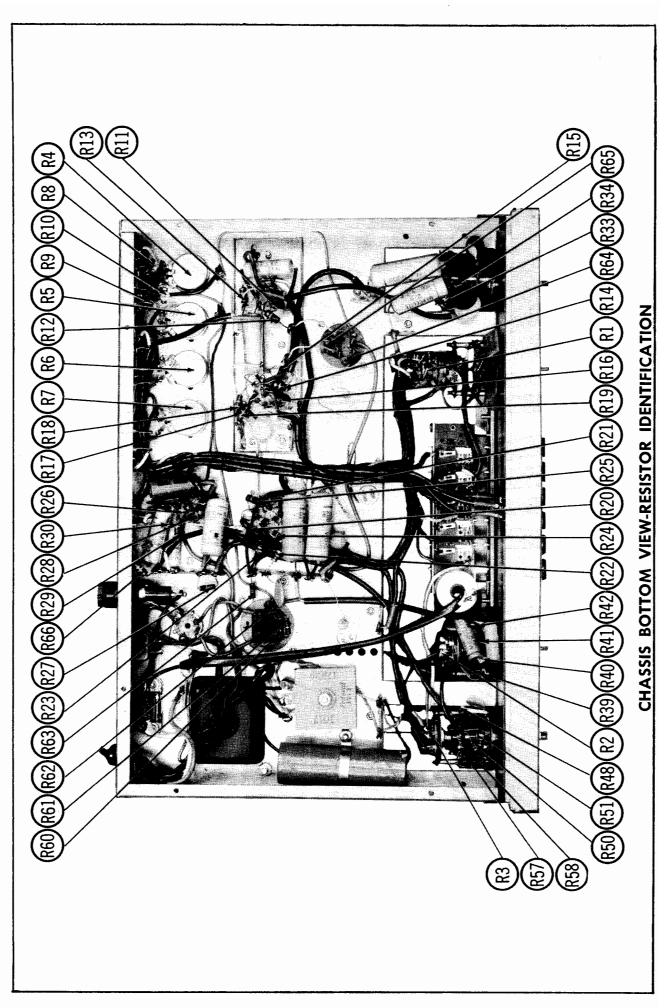
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
٧ı	12AU7/ ECC82	† 370K	INF	INF	6α	6Ω	INF	100K	1500Ω	0Ω
V2	12AX7/ ECC83	† 250K	470K	1800Ω	6Ω	6Ω	† 30K	1.1Meg	100K	9Ω
V3	12AT7/ ECC81	† 77K	0Ω	2200Ω	6Ω	6Ω	† 130K	2.2Meg	1000Ω	9Ω
V4	12AU7/ ECC82	† 120K	600K	1000ດ	6Ω	<b>6</b> 0	† 20K	1.1Meg	115K	9Ω
V5	6X4	1000Ω	NC	0Ω	.3α	NC	1000Ω	20K(Min)		
			ALL MEA	SURFMENTS	TAKEN IN	"AUX" POS	SITION			

- MEASURED FROM PIN 8 OF V4
- MEASURED FROM PIN 8 OF V2 MEASURED FROM PIN 7 OF V5

A PHOTOFACT STANDARD NOTATION SCHEMATIC Howard W. Sams & Co., Inc. 1957







# PARTS LIST AND DESCRIPTIONS TUBES (GENERAL ELECTRIC, SYLVANIA)

TYPE

NSE

Ž Š	USE	TYPE	 Ž Š	
Z Z Z	Phono Preamplifier Phono AF Amplifier AF Amplifier	12AU7/ECC82 12AX7/ECC83 12AT7/ECC81	 V4 V5	AF Rec

	12AU7/ECC82 6X4			SANGAMO SPRAGUE PART No. PART No.	TVL-4760		R2425 *	TVL-3537	0610 TVA-1101
	er 12A1				0.00		s -025	☐ D335 ☐ MT-1530	MTH-0610
	AF AmpCath. Follower Rectifler	S		PYRAMID PART No.	TMQ-10		TD-1000-15 8-025		TD-100-6
	AF Amp Rectifler	PACITOR	REPLACEMENT DATA	MALLORY PART No.	FP434		TC1501	FP330.3	TC2501
	V4 V5	YTIC CA	REPLA	CORNELL- DUBILIER PART No.	D0000		BR20001 [	_	BBR100-6
	12AV7/ECC82 12AX7/ECC83 12AT7/ECC81	ELECTROLYTIC CAPACITORS		AEROVOX PART No.	AFH4-10		AFE1-03	AFH3-17	PRS6V100
	plifler			David Bogen PART No.					
	Phono Preamplifler Phono AF Amplifler AF Amplifler		RATING	CAP. VOLT.	450	450	15	150	100 6
	Pho Pho AF		RAI	CAP.	99	01	2000	750	001 100
	7			Ž Š Š	CIA	υA	C2	C3A B	<b>در</b> د

### FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

24.0	E 18 18	RIS RI4 RI5	R17	R19	R22 R23	R24 R25	R27	R29	R31	R34 R35	R37				ž Ž	F			_
	NOTES	NPO 10% NPO 10% NPO 10%	NP0 10%		10% 5%	10% 10%	10%	588 889	NP0 10%	10%	10%		10%	801	10% 5%	Odn (	;	-	
	SPRAGUE PART No.	STCC -Q1	2TM-S47 2TM-Pl	2TM-Pl 2TM-P22 5HK-9	}		5GA-D22		2TM-Pl	2TM-P22	77 IN 17	5HK-SI 2TM-S22 2TM-S47		5HK-SI	STCC-T15	2TM-PI 5TCC-OI	4TM-PI	4TM-SI 2TM-PI	
T DATA	MALLORY PART No.	ZT-541	GEM-4147 GEM-201	GEM-201 CUB2P22 DC511			UC-5222		GEM-201	GEM-2022	7707-1170	DC511 GEM 4122 GEM 4147		рсеп	ZT-5315	GEM-201 ZT-541	GEM-401	GEM 411 GEM -201	
REPLACEMENT DATA	ERIE PART No.	TCO-10 TCO-27 TCO-27	TCO-27	10-0H	ED-1000	ED-390 ED-220	ED-0022 ED-1200	ED-390	TCO-27			ED-01 ED-02	ED-1000	ED-01	ED-750 TCO-150	TCO-10	}	GP-10000	
	CORNELL- DUBILIER PART No.	C10Q1C C10Q27C C10Q27C	CUB2S47 CUB2S47 CUB2P1	CUB2P1 CUB2P22 RYA6SI		L10T39 L10T22	BYA10D22	L10T39	CUB2P1 C10Q27C	CUB2P22	2000	BYA6SI CUB4S22		BYA6SI		CUB2PI	CUB4PI	CUB4SI CUB2PI	
	CENTRALAB PART No.	TCZ-10 TCZ-27 TCZ-27	TCZ-27 DF-503 DF-104	DF-104		D6-391 D6-221	DD-222	D6-391	DF-104 TCZ-27			DD-103 DD-203	1	DD-103	TCZ-150	DF-104	DF-104	DD-103 DF-104	
	AEROVOX PART No.	NP0-SI 10	P288N-047 P288N-1	P288N -1 P288N -22 BPD-01	<b>;</b>		BPD-0022		P288N-1	P288N-22		BPD-01 P288N-022 P288N-047		BPD-01	NP0-SI 150	P288N-1 NP0-SI 10	P488N-1	P288N-01 P288N-1	
	David Bogen PART No.					-								-					ersions.
	P. VOLT		200	200				_	200	200	2	200				200	400	200 200	Not used in some versions.
	<b>≦</b> 3	227	.047	1. 22 1. 22 1. 20 1. 20 20 20 20 20 20 20 20 20 20 20 20 20 2	1000 750	2382	1200	3800	27	22.8	4 700	. 022	2200	10000	750 150	7.⊆	: -:	ē:	used in
	₹ 9	C C C C C C C C C C C C C C C C C C C	8 8 9	1225	10 C	รีรีรีรี	610 CCC	022	C224 C25	022	C29	031	888	239	C37	C 39	C 42	C42 C43	O Not

# PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

Γ	!	٩		REF	REPLACEMENT DATA	Ι¥		
TEX.	KAIING	2	Dorrid Dogon	CENTRALAB	TATOORAY	Jal	Vac	
ģ	RESIST.	× T ×		PARTNA	PART	PART	PART	INSTALLATION NOTES
	ANCE							
A I	500K	ri(C	8452B			013-133		Volume
Ф	500K	(- 5				M13-133		Volume
Ü	500K	1-10				M13-133		Volume
R2A	1Meg	i= 01		B-69	A47-1Meg-S	Q11-137	U54	Bass
ø	Shaft			Not Req.	FKS 3	Not Req.	Not Req.	
R3A	500K	-10		BT-65	A47F5-500K	_	UT-431	Treble, Tap @ 250K
Д	Shaft			Not Req.	FKS 3	_	Not Req.	
R4A	100K	-(5)	V391	AB -40	A47-100K-S	•	U41	Phono Adjust.
Ø	Shaft			AK-1	FKS-1/4	_	Not Req.	•
RSA	500K	=4eq	V275B	AB-60	A47-500K-Z	Q13-133	048	Tuner Adjust.
Ø	Shaft	ı		AK-1	FKS-1/4		Not Req.	
RGA	500K	-(a)	V275B	AB-60	A47-500K-Z	Q13-133	048	Tape Adjust.
Д	Shaft			AK-1	FKS-1/4		Not Req.	
A7A	500K	-in	V275B	AB-60	A47-500K-Z	Q13-133	U48	Aux Adjust.
щ	Shaft			AK-1	FKS-1/4		Not Req.	

### RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

										_				_											_					
NOTES																														
David Bogen	PART No.																													
<b>(</b> )	WATT																													
RATING	OHWS	22Meg	22Meg	ZZMeg	22Meg	22Meg	22Meg	22Meg	22Meg	22Meg	100K 5%	470K	47K	15K	4700R	330K	180K	120K	82K	750K	260K	390K	1. 5Meg	6800n	6800n	00089	10K	22K	100K 5%	100K
TEA	Z	R38	R39	1440	¥	R42	R43	R44	R45	R46	R47	R48	R49	R50	R51	R52	R53	R54	R55	R56	R57	R58	R59	R60	R61	R62	R63	R64	R65	R66
NOTES																														
David Bogen	PART No.																													
O	WATT	L																												
RATING	SWHC	30K	20K	. zMeg	2002	20K	70K	70K	20K	3008	Meg	300g	)0K	7.	2002	2002	X00	00K 59	0000	)0K	0K 5%	8000	Med	<u>×</u>	1K 59	) X6	30K 5%	2Meg	2Meg	2Meg

## TRANSFORMER (POWER)

					REP	EPLACEMENT DAT	DATA		
	RAT	RATING		David Bogen	Halldorson	Merit	Stancor	Thordorson	Triod
PRI.	SEC. 1	SEC. 1   SEC. 2   SEC. 3	SEC, 3	PART No.	PART No.	PART No.	PART No.	PART NO. PART NO. PART NO. PART NO.	PART No.
117VAC	640VCT	HTVAC 640VCT 6.3VAC 12VAC	12VAC	T3133-1					

# PARTS LIST AND DESCRIPTIONS (Continued) COMPONENT COMBINATIONS

TEA No.	USE	DESCRIPTION	David Bogen PART No.	REPLACEMENT DATA
¥	Tone Compensation	4700MMF, 4700MMF, 100MMF 100K, 470K, 10000, 100K	C392	Centralab PC190
K2	Tone Compensation	47MMF, 100K, 100K, 100K	C419	Sprague 104C-11
K3	Tone Compensation	150MMF, 4700MMF, 2200MMF 47K, 47K, 270K, 220K	C420	Sprague 102C-22

### SELENIUM RECTIFIER

	NOTES	
	SARKES TARZIAN PART No.	604B
THE PROPERTY OF THE PARTY OF TH	INTERNATIONAL PART No.	CIB
NEL POST	FEDERAL PART No.	1017
	David Bogen PART No.	H-432
2	CURRENT (Measured)	. 720A
	ž ė	M

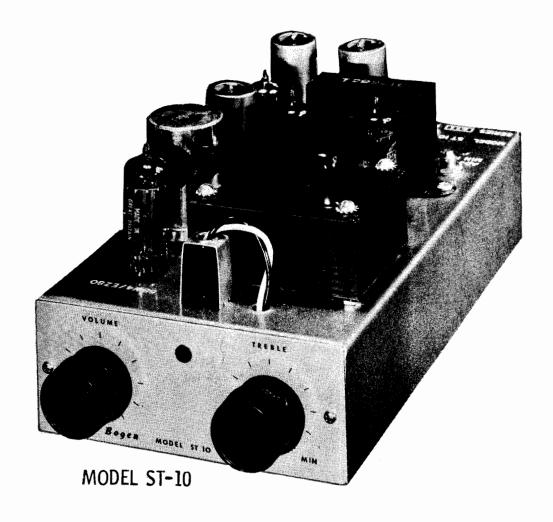
### FUSES

David Bog PART No FUSE	7 6 6	RATING David Bogen PART No.	FUSE HOLDER	IA 125V SIO-BIO
------------------------------	-------	-----------------------------	-------------	--------------------

### MISCELLANEOUS

ξŝ	PART NAME	David Bogen PART No.	NOTES
М3	Pilot Lamp		#47
M4	_		<b>#</b> 47
M5A		S422A	Rolloff (Rotary Wafer Type)
Д	Switch		Turnover (Rotary Wafer Type)
У		S452A	Contour (Rotary Wafer Type)
M		S424C	Lo Filter (Rotary Wafer Type)
M8	Switch	S425C	Hi Filter (Rotary Wafer Type)
M9A	_	S426E	Input Selector Assy (Pushbutton Slide Type)
Д			On-Off (Pushbutton Slide Type)
MIO	Switch	5476	Phono (A & B) (Slide Type SPST)





TRADE NAME

David Bogen Models ST-10, ST-10G

MANUFACTURER

David Bogen Co., Inc., P. O. Box 500, Paramus, N. J.

TYPE SET

AC Operated Audio Amplifier

TUBES (Seven)

Types ECC83/12AX7 (or) 12AD7 Ch. 2 Preamplifier, 6C4 Ch. 2 Cathode Follower, ECC83/12AX7 (or) 12AD7 Ch. 1 Preamplifier, 6U8 Ch. 1 AF Amp. - Phase Inv., (2) 6AQ5 Ch. 1 Output, EZ80/6V4 (or) EZ81/6BW4 Rectifier

POWER SUPPLY

110-120 Volts AC-60 Cycles

RATING .52 Amp. (2) 117 Volts AC (52 Watts)

### HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., lnc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., lnc., by the manufacturers of H196

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# PARTS LIST AND DESCRIPTIONS

# TUBES (GENERAL ELECTRIC, SYLVANIA)

NOTES

TYPE

Note 2

6U8 6AQ5 6AQ5 EZ80/ 6V4

		_
asn	Ch. 1AF Amp Phase Inv. Ch. 1 Output Ch. 1 Output	Rectifier
ITEM No.	V5 V6 V6	V7
NOTES	Note 1	Note 1
TYPE	ECC 63/ 12AX7 6C4	ECC63/ 12AX7
USE	Ch. 2 Preampiffler Ch. 2 Cathode Follower	Ch. 1 Preamplifler
ŽĘ Še	γ 41 42	ς Λ

Note I. Type 12AD7 may be used in some versions. Note 2. Type EZ81/8BW4 may be used in some versions.

	SPRAGUE PART No.		TVA-1503
	SANGAMO PART No.		MT-2508
	PYRAMID PART No.		TD-8-250 MT-2508
EMENT DATA	MALLORY PART No.		TC51
REPLAC	CORNELL- DUBILIER PART No.	CD0080 CBR3035	BBR8-250
	AEROVOX PART No.	AFH4-49	PRS250V6 BBR8-250
	David Bogen PART No.		Θ
9	VOLT.	350	250
	3	\$ a a b	9 €
	¥ ġ	A CIA	ខឹ
	REPLACEMENT DATA	TEPLACEMENT DATA  CORNELL— MALIORY PYRAMID SANGAMO DUBILIER PART No. PART No. PART No.	RATING

# D Some versions may use 20MFD in this application.

FIXED CAPACITORS
Capacity values given in the rating column are in mfd. for Paper
Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

_				_														
	NOTES												Θ	<b>®</b>	<b>@</b>	,		<b>9</b>
	SPRAGUE PART No.	2TM-822	2TM-822	5GA-T27	6TM-S33	2TM-P1	2TM-822	2TM-822	5GA-T27	6TM-S33	6TM-D22	6TM-S33	4TM-S22	5GA-T68	5GA-088	5HK-815	SHK-SIS	5HK-Di
DATA	MALLORY PART No.	GEM-4122	GEM-4122	UC-5327	GEM-4133	GEM-201	GEM-4122	GEM-4122	UC-5327	GEM-4133	GEM-6222	GEM-4133	GEM-4122	UC-5368	UC-5468			DC 521
REPLACEMENT DATA	ERIE PART No.	ED-02	ED-02	ED-270			ED-02	ED-02	ED-270		GP-2200		ED-02	ED-680	ED-68	ED-015	ED-015	ED-1000
	CORNELL- DUBILIER	CUB4822	CUB4S22	L10T27	CUB6833	CUB2PI	CUB4822	CUB4822	L10T27	CUB6S33	CUB6D22	CUB6S33	CUB4S22	BYA10T68	1100,68	BYA10S15	BYA10S15	BYA6D1
	CENTRALAB PART No.	DD-203	DD-203	DD-271	DF-303	DF-104	DD-203	DD-203	DD-271	DF-303	D6-222	DF-303	DD-203	DD-681	DD-680	DD16-153	DD16-153	DD-102
	AEROVOX PART No.	P288N-022	P288N-022	BPD-00027	P288N-033	P288N-1	P288N-022	P288N-022	BPD-00027	P2B8N-033	P288N-0022	BPD-033	P488N-022	BPD-00068	BPD-000088	BPD-015	BPD-015	BPD-001
	David Bogen PART No.																	
	P. VOLT	200	200		200	200	200	200		200	200	200	400					
;	₹ 3	. 022	. 022	22	. 033	-:	. 022	. 022	2	. 033	. 0022	. 033	. 022	88	88	15000	15000	000
	¥ è	ິວ	2	S	80	c C	ဗီ	රී	CIO	<del>5</del>	C12	CI3	5	CIS	50	C17	C18	e U

Some versions may use . 033MFD in this application.
 Some versions may use 270MMF in this application.
 Not used in some versions.

### CONTROLS

L	1			E	REPLACEMENT DATA	TA		
	KATING	ڻ ح	David Bogs	4000	1110001	٥	200	
	RESIST. ANCE	WATTS		PART No.	PART No.	PART No.	PART No.	INSTALLATION NOTES
_	\$00K	-40	VIIFA	BB-104	AD47-500K-Z	Q13-133	UE1402	Volume
_	200K	49		Not Req.	Not Req.	M13-133	Not Req.	Volume
	Shaft			Not Req.	F8-3	Not Reg.	Not Red.	
R2A	200K	-44	V323A	B-80	A47-500K-8	013-133	U48	Treble
_	Shaft			Not Req.	F8-3	Not Red.	Not Red.	
	Switch			E	8WE-12	76-1	US-26	
_	Cover			KG 19				
R3A	202	~	VILSA	WN-500	A43-50	WPK50	R50L	Hum Balance (Wire Wound)
_	Shaft			Not Req.	FKB-1/4		Not Req.	

EZ80 6BW4 (V7)	6U8 (1) (4)	6C4 (V2)	ECC83 12AX7 (VI)	
The second secon			A STATE OF THE STA	5
		1728	O 0	
<b>M</b> 1 (1)	V5 6AQ5	(V6) (T2) 6AQ5	HUM (V3) ADJ 12AX ECC8	. <i>7</i> i3

# **PARTS LIST AND DESCRIPTIONS (Continued)**

RESISTORS
All wattages 1/2 watt, or less, unless otherwise listed.

i	214		REPLACEMENT DATA	ENT DATA					REPLACEM	REPLACEMENT DATA	
£ 2	YAIIN	,	David Bogen	IRC	NOTES	E E	&ATING	o o	David Bogen	EC.	NOTES
į	OHWS	WATT	PART No.	PART No.		ġ	OHWS	WATT	PART No.	PART No.	
P.4	100K			BTS-100K		R20	390K			BTS-390K	
E C	3. 3Meg			BTS-3. 3Med		R21	3900			BTS-390	
88	220K			BTS-220K		R22	100K			BTS-100K	
R.7	180K			BTS-180K		R23	68000			BTS-6800	Note 2
88	3. 3Meg			BTS-3.3Meg		R24	150K			BTS-150K	Note 3
88	220K			BTS-220K		R25	22K			BTS-22K	Note 4
RIO	4 TK			BTS-47K		R26	110K 5%			BTS-110K 5%	
E	100K			BTS-100K		R27	22K			BTS-22K	
RIZ	3. 3Meg			BTS-3. 3Meg		R28	680 K			BTS-680K	
RI3	220K			BTS-220K		R29	120021	-		BTA-1200	Note 6
R14	180K			BTS-180K		<b>R</b> 30	3002	-		PW7-300	
RIS	3. 3Meg			BTS-3. 3Meg		R31	680K			BTS-680K	
RIB	220K			BTS-220K		R32	22000	~		BTB-2200	
R17	150 K			BTS-150K	Note 1	R33	. 470	_		BTA 47	
RIB	47K			BTS-47K		R34	. 470	_		BTA 47	
B18	470K			BTS-470K		R35	. 270 5%			BTA 27 5%	
						R36	. 270 5%	_			

Note 1. Some versions may use 100K in this application. Note 3. Some versions may use 22K in this application. Note 3. Some versions may use 110K in this application. Note 4. Some versions may use 33K in this application. Note 5. Some versions may use 82K in this application. Note 6. Not used in some versions.

## TRANSFORMER (POWER)

						REI	PLACEMENT	DATA		
¥ o		Z.	RATING		David Bogen	Halldorson	Merit			Triad
	PRI.	SEC. 1	SEC, 2	SEC. 3	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
F	11TVAC	117VAC 580VCT 6. 3VAC	6. 3VAC		T3174 (D				22R02 @	R-5B
				•						

Tape 5V@ 2A winding and center tap on 6.3V winding. ① Alternate Part #T3159

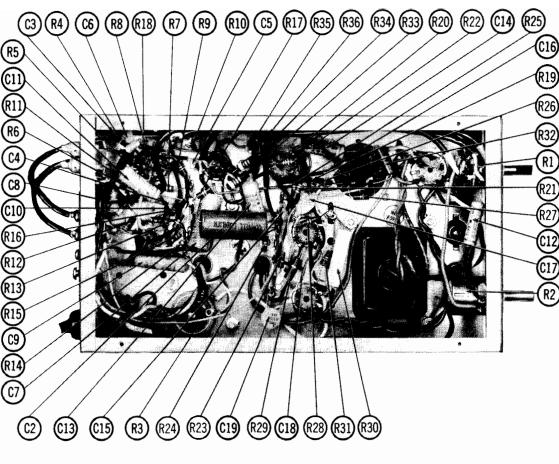
## TRANSFORMER (AUDIO OUTPUT)

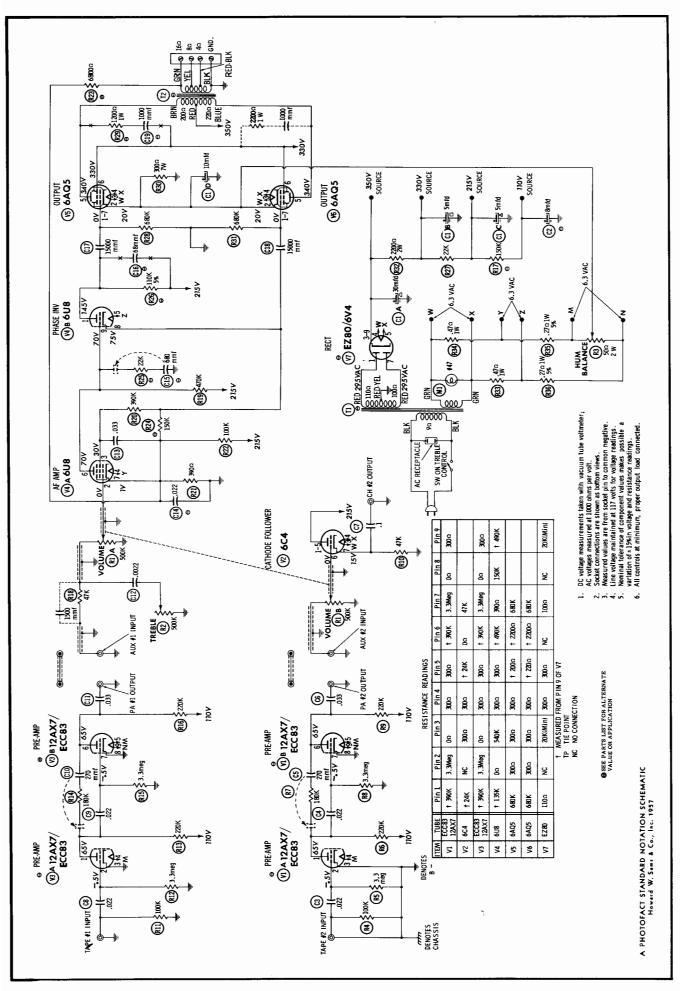
	Stancor Thordarson Triad NOTES	PART No.	S-28X ① Alternate Part Number	Drill new mounting hole		
	Thordors	PART NO			26S59	:
T DATA	Stancor	PART No.			A-3870	
REPLACEMENT DATA	Merit	PAKI No.	A-3027			
2	Holldorson	PAKI No.	zınz		Z1404 ②	
	David Bogen Holldorson Merit	LAKI NO.	T292-1		T292-3 ①	
	ANCE	SEC.	780087	Tap	36000 160	CT Tap®
	No.	PRf.	78002	CI	36002	CI
	ž		T2			

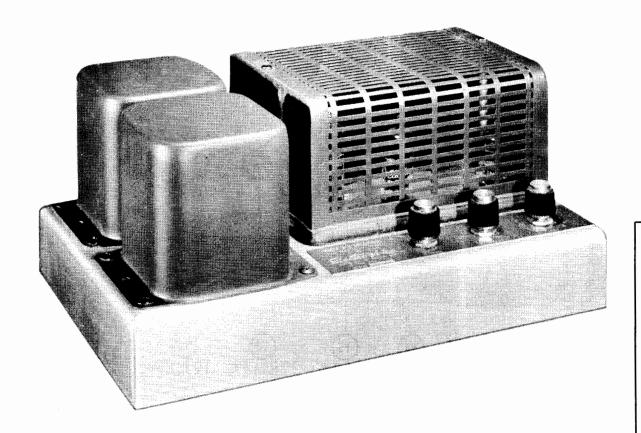
### **MISCELLANEOUS**

82		
NOTES	<b>#</b> 47	
David Bogen		
PART NAME	Pilot Light	
Ş EX	¥	

# CHASSIS—BOTTOM VIEW







TRADE NAME Electro-Voice Model Al5

MANUFACTURER Electro-Voice, Inc., Buchanan, Mich.

TYPE SET AC Operated Amplifier

TUBES (Six) Types 12AX7 AF Amp.-Phase Inv., 12BH7A Driver , (2) EL84 Output, (2) 6X4 Rectifier

POWER SUPPLY 105-125 Volts AC-60 Cycles RATING .48 Amp. @ 117 Volts AC

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# PARTS LIST AND DESCRIPTIONS

# TUBES (GENERAL ELECTRIC, SYLVANIA)

No.	USE	TYPE	NOTES
V1	AF AmpPhase Inv.	12AX7	
V2	Driver	12BH7A	
V3	Output	EL84	

NOTES	
TYPE	EL84 6X4 6X4
USE	Output Rectifier Rectifier
TEA No.	V4 V5 V6

					_			_
res				SPRAGUE PART No.	TVL-2764	TVL-2764	TVL-1660	TVA-1414
TYPE NOTES	4			SANGAMO PART No.	D-185	D-185	8-260	0661-M
	EL84 6X4 6X4				Н			
		S		PYRAMID PART No.	TMD-43	TMD-43	TMS-50	TD-50-150
USE	Output Rectifier Rectifier	ELECTROLYTIC CAPACITORS	REPLACEMENT DATA	MALLORY PART No.	FP238	FP238	FP144	TC49
Š	V4 V5 V6	₹ 5	REPLA(	CORNELL- DUBILIER PART No.				2
		, XIC		CORP	B0450	B0450	A0460	BR 501
NOTES		CTROL		AEROVOX PART No.	AFH2-57	AFH2-57	AFH1-45	PRS150V50
TYPE	12AX7 12BH7A EL84	EE			AF	AF	AF	PR
				Electro-Voice PART No.	4208	4208	4207	4242
USE	AF AmpPhase Inv. Driver Output		RATING	CAP. VOLT.	400	400 400	8 <b>4</b>	90
	AF Am Driver Output				₽40	<del>1</del> 4	20 40	22
Š Š	V1 V2 V3			No Me	CIA	CZA B	а 3	Š

**T**2

FIXED CAPACITORS
Capacity values given in the rating column are in mfd. for Paper
Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

		221014	S										
			PART No.	2TM-Pl	5GA-T1	4TM-S22	4TM-847	4TM-S47	5HK-81	6TM-Pl	6TM-Pl	4TM-847	4TM-S47
	DAIA	2000	PART No.	PT401	UC-531	PT4122	PT4147	PT4147	DC-511	PT601	PT601	PT4147	PT4147
	CEPLACEMENI L	202	PART No.		831-101	817-02			611-01				
	-	CORNELL	PART No.	CUB2PI	G042	CUB4822	CUB4847	CUB4S47	K082	CUB6P1	CUB6P1	CUB4847	CUB4847
		CENTRAL AB	PART No.	DF-104	DD-101	DD-203	DF-503	DF-503	DD-103	DF-104	DF-104	DF-503	DF-503
		2010	PART No.	P288N-1	BPD-0001	BPD-02	BPD-05	BPD-05	BPD-01	P688N-1	P688N-1	BPD-05	BPD-05
		Though Wedge	PART No.	4265	4281	4260	4243	4243	4257	4241	4241	4243	4243
-		Š	VOLT	200		904	400	8		009	90	400	400
		Z	₹	-:	8	. 022	2.	2.	10000	7	7	2	.047
		¥	ģ	Ç	8	2	జ	ස	8	3	ខ្ល	ខ្លួ	C14

EL84

6X4 (V6)

(C2)

(C3)

(c1)

6X4 (V5)

**(11** 

### CONTROLS

ITEM   RESIST: WATTS   Electro-Voice   CENTRALIAB   CLAROSTAT   IRC   MALIORY   INSTALLAI   INSTALLA	INSTALLATION NOTES D. Level Attach to RIA Damping Eactor-wire wound
	Damping Factor- wire woun

12BH7A

### RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

NOTES

Note 2

-	_	$\neg$	-	_					_		_	_	
REPLACEMENT DATA	IRC	PART No.	BT8-1200	BTS-120	BTS-470K	BTS-470K	BTS-120	BTS-47K	BTS-1800	BTS-56K	BTS-56K	BTB-100	BTB-100
REPLACEM		PART No.	4658	4607	4650	4650	4607	4668		4652	4652	4655	4655
	S	WATT										8	8
	RATING	OHWS	12002	1200	470K	470K	1200	47K	18000	56K	56K	1000	0001
	IEW Z		R14	RIS	RIG	RI7	R18	R19	R20	R21	R22	R23	R24
	NOTES					_					Note 1		
DATA	Ē	PART No.	TS-270K	BTS-22K	TS-1.2Meg	TS-27K	TS-470	BTS-27K	TS-470K	TS-470K	_	BTB-12K	TS-12K
REPLACEMEN	Electro-Voice	PART No.			•••	_				-		4679	
r	c)	WATT										7	~
	<b>SATING</b>	OHWS	270K	22K	1.2Meg	27K	4700	27K	470K	470K	470K	12K	12K
	¥ .	ġ	2	2	22	92	2	. 8	62	2	Ħ	2	213

Note 1. Not used in some versions. Note 2.80me versions use 38000 in this application (Part 446017).

# PARTS LIST AND DESCRIPTIONS (Continued)

## TRANSFORMER (POWER)

							REF	LACEMENT	DATA		
	ž		Z	RATING		Electro-Voice	Holldorson		Stancor	Thordarson	Triod
		PRI.	SEC. 1	SEC. 2	SEC. 3	PART No.	PART No.	PART No.	PART No.	PART No.	
_	F	LTVAC	550VCT	550VCT	6.3VAC	1591					
		(g) . 48A	@ . 024A	@ . 025A	@3.6A						
					SEC. 4						
_					20V *						

												,	
		S	EC. 1	PRI.   SEC. 1   SEC. 2   SEC. 3	SEC. 3	PART No.	_	PART No. PA	ART No.	PART No. PART No.	PART No.	PART No.	
ī	117VA(	E G	OVCT .024A	117VAC 550VCT 550VCT 6.3VAC (2.48A (2.024A (2.025A (2.8.6A)	6.3VAC (2)3.6A	1691		<u> </u>					
				,	SEC. 4								
	* Blas	· Bias Supply.	ķ										_
				Ŧ	ANSFC	TRANSFORMER (AUDIO OUTPUT)	(AUDIC	D OUT	PUT)				
L					~	REPLACEMENT DATA	DATA			_			_
Z Z	ITEM IMPEDANCE	ANCE	Elect	tro-Voice	Electro-Voice Holldorson	Merit	Stoncor		Triod	_	NOTES		
	PRI.	SEC.	<b>A</b>	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.	<u>ه</u>			
E	T2 20000 160	160	1590						L				
		er G											

### FUSES

(C13)

(R20)

(R18)

(R24)

(C10)

(R22)

(R10)

(R14)

(R21)

(C14)

(M1

R4

(R19)

(M2)

(R15)

M3

(R16)

(R13)

R2

R9

**(**22)

R1

<u>C5</u>

R8

R7

R5

R3

(3) (3) (7)

R6 C6

R11

(C11)

(R12)

	BUSS PART No.	HOLDER	нкр
	PART	FUSE	MDX 14
REPLACEMENT DATA	LITTELFUSE PART No.	HOLDER	342001
REPLACEM	LITTE	FUSE	31301. 5 (3AG S/B 14A)
	llectro-Voice PART No.	HOLDER	
	Electr PART	FUSE	20171
	RATING		14A 125V
	TYPE		3AG 8/B
	Ze.		DW.

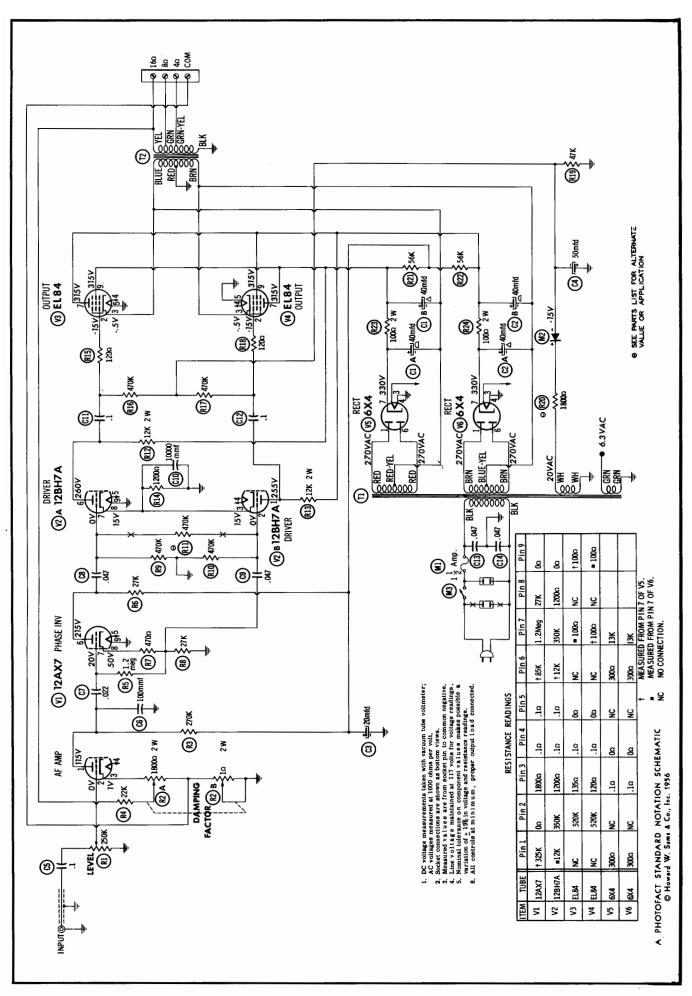
### SELENIUM RECTIFIER

		NOTES	
		SARKES TARZIAN PART No.	10
		RECEPTOR PART No.	
	DATA	MALLORY PART No.	8520
SCEEDING MECHICIEN	REPLACEMENT	INTERNATIONAL PART No.	CR10
SELEI		FEDERAL PART No.	1159
		Electro-Voice PART No.	5914
	RATING	CURRENT	
		ž ó Ž	W

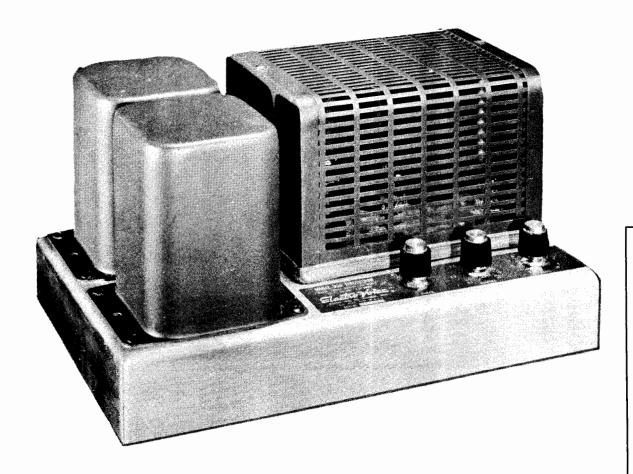
### **MISCELL ANEOUS**

	NOTES	On-off (Power) SPST
2	Electro-Voice PART No.	B5641
	PART NAME	M3 Switch
	夏泉	MS

# CHASSIS—BOTTOM VIEW







TRADE NAME Electro-Voice Model A20

MANUFACTURER Electro-Voice, Inc., Buchanan, Mich.

TYPE SET AC Operated 20 Watt Amplifier

TUBES (Six) Types 12AX7 AF Amplifier-Phase Inverter, 12BH7A Driver, (2) 6V6GT Output, (2) 6X4 Rectifier

POWER SUPPLY 105-125 Volts AC - 60 Cycles FATING .59 Amp. 2 117 Volts AC

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# PARTS LIST AND DESCRIPTIONS

# TUBES (GENERAL ELECTRIC, SYLVANIA)

NOTES	
TYPE	12AX7 12BH7A 6V6GT
USE	AF AmpPhase Inv. Driver Output
ITEM No.	V1 V2 V3

	NOTES	Ž.	USE	Ξ
ı –		V4	Output	9A9
		V5	Rectifier	6X4
		Α6	Rectifier	6X4

Š		USE		I YE	NOTES		ż	USE		TYPE	NOTES	
75 A 4	Ar Am Driver	AF AmpPhase Inv. Driver		ZAX?			V 4 V 5	Output Rectifier		6X4		
V3	Output		9	6V6GT			$\dashv$	Rectifier		6X4		
				ELECI	ROLY	JC 0	AP	ELECTROLYTIC CAPACITORS				
		RATING				REI	LACE	REPLACEMENT DATA				
Ž Š	S.	VOLT.	Electro-Voice PART No.	PART	AEROVOX PART No.	CORNELL- DUBILIER PART No.		MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	O .	SPRAGUE PART No.
CIA	₽40	200	4247	AFH2-72	-72	B053		FP288	TMD-62	D-275	_	R1495 *
C2A B	40	200	4247	AFH2-72		B053		FP288	TMD-62	D-275		R1495 *
ິຮ	2 P	420	4246	AFH1-50	_	A046		FP144	TMS-55	8-260	_	TVL-1714
C4	20	100	4242	PRS150V50	$\exists$	BR5015	_	TC49	TD-50-150	FM-15	┪	TVA-1414
*	Non-catalog item	alog iten	n.									

6V6GT

 $\overline{11}$ 

6X4 (V5)

6X4 (V6)

6V6GT 12BH7A (V4) (C2) (V2) (C

12AX7 ) (VI)

 $\bigcirc$ C1

C3

### FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

						~	EPLACEMENT D	ATA		
TEM	RAT	S	Flectro-Voice	201047	CENTRALAB	CORNELL	cbir	2001111		324014
Š	₹	VOLT	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.	
CS	-:	200	4265	P288N-1	DF-104	CUB2P1		PT401	2TM-Pl	
8	8		4281	BPD-0001	DD-101	G042 ·	831-101	UC-531	5GA-TI	
Ç	.022	400	4260	BPD-02	DD-203	CUB4822	817-02	PT4122	4TM-822	
8	.64	400	4243	BPD-05	DF-503	CUB4847	_	PT4147	4TM-847	
8	.84	400	4243	BPD-05	DF-503	CUB4847		PT4147	4TM-847	
CIO	10000		4257	BPD-01	DD-103	K082	811-01	DC-511	5HK-81	
ij	-:	99	4241	P688N-1	DF-104	CUB6P1		PT601	6TM-Pl	
CIS	-:	900	4241	P688N-1	DF-104	CUB6P1		PT601	6TM-Pl	
CIS	7	90	4243	BPD-05	DF-503	CUB4847		PT4147	4TM-847	
C14	74	400	4243	BPD-05	DF-503	CUB4847		PT4147	4TM-847	

### CONTROLS

	STECK NOTES IN THE	INSTALLATION NOTES	Level	Attach to RIA	Damping factor-wire wound	Damping factor- wire wound
	Yaciiva	PART No.	U44	Not Red.	-	
TA	J. GI	PART No.		_		
PLACEMENT DA		PART No.	A47-250K-Z Q13-130	F8-3		
RE		PART No.	B-51	Not Red.	ı	
		WATTS PART No.	14686			
9	٥	WATTS	-40		~1	7
	5	RESIST-	250K	Shaft	10	18001
	¥	ź	RIA	ф	R2A	ф

RESISTORS All wattages 1/2 watt, or less, unless otherwise listed.

NOTES

			-	NEI POCK	בועם יויים					NET CASE	ALTECACEMENT DATA
	TEX	RATING	ی	Electro-Voice	IRC	NOTES	TEN TEN	RATING	ď	Electro-Voice	IRC
	ò	OHMS	WATT	PART No.	PART No.		ò	OHWS	WAT	PART No.	PART N
	R3	270K		4889	BTS-270K		R14	1202		4607	BTS-120
	R4	27K		4651	BTS-27K		RIS	470K		4650	BTS-4701
	R5	1.2Meg		4656	BTS-1.2Meg		RI6	470K		4650	BTS-4701
	R6	27K		4651	BTS-27K		R17	1200		4607	BTS-120
	R7	4700		4654	BTS-470		R18	47K		4668	BTS-47K
	R8	27K		4651	B/TS-27K		RIB	10001		4693	BTS-1000
	R9	470K		4650	BTS-470K		R20	26K		4652	BTS-56K
	RIO	470K		4650	BTS-470K		R21	26K		4652	BTS-56K
	RII	12K	7	4679	BTB-12K		R22	100c	~	4655	BTB-100
	FIZ	12K	~	4679	BTB-12K		R23	1001 1001	~	4655	BTB-100
	RIS	12002		4658	BTS-1200						
,											

# CHASSIS—BOTTOM VIEW PARTS LIST AND DESCRIPTIONS (Continued)

## TRANSFORMER (POWER)

### Thordarson PART No. Stancor PART No. Merit PART No. Halldorson PART No. Electro-Voice PART Na. SEC. 1 SEC. 2 SEC. 3 RATING Ř Š

### \* Blas supply.

# TRANSFORMER (AUDIO OUTPUT)

	"				
	NOTES				
	Triad	PAKI NO.			
	Thordarson	PAKI NO.   PAKI NO.   PAKI NO.   PAKI NO.			
I DATA	Stancor	FAKI NO.			
 REPLACEMENT DATA	Merit	PAKI NO.			
	Halldorson	PAKI No.			
	Electro-Voice Halldorson	LAKI NO.	1579		
	ANG	PRI.   SEC.	180	ta p	80,40
	ITEM IMPEDANCE	PRI.	20002		
	Ž Š		T2		

		_		
	BUSS PART No.	HOLDER	нкр	
	PAR	FUSE	MDL 13	
REPLACEMENT DATA	LITTELFUSE PART No.	HOLDER	342001	
REPLACEM	LITTEI	FUSE	31301.5	(974 5/ E
	Electro-Voice PART No.	HOLDER		
	Electro PART	FUSE		
	RATING	12A		
	TYPE		3AG 8/B	-/-
	ŠĘ.		M	

		(ES IAN No.		
		R TARZIAN	10	
		RECEPTOR PART No.		
í	DATA	MALLORY PART No.	8820	
	REPLACEMENT DATA	INTERNATIONAL PART No.	CRIO	
		FEDERAL PART No.	1159	
		Electro-Voice PART No.	5914	
	RATING	CURRENT		
		Š į	M2	

### **MISCELLANEOUS**

NOTES	On-off (power) SPST	
Electro-Voice PARI No.	B5641	
PART NAME	Switch	
Ze Ze	K	

(R21)

(R16)

M2

R4

(R19)

(R18)

(R14)

(R15)

(M3)

(R11)

(R9)

(C11)

(R2)

(C10)

**R13** 

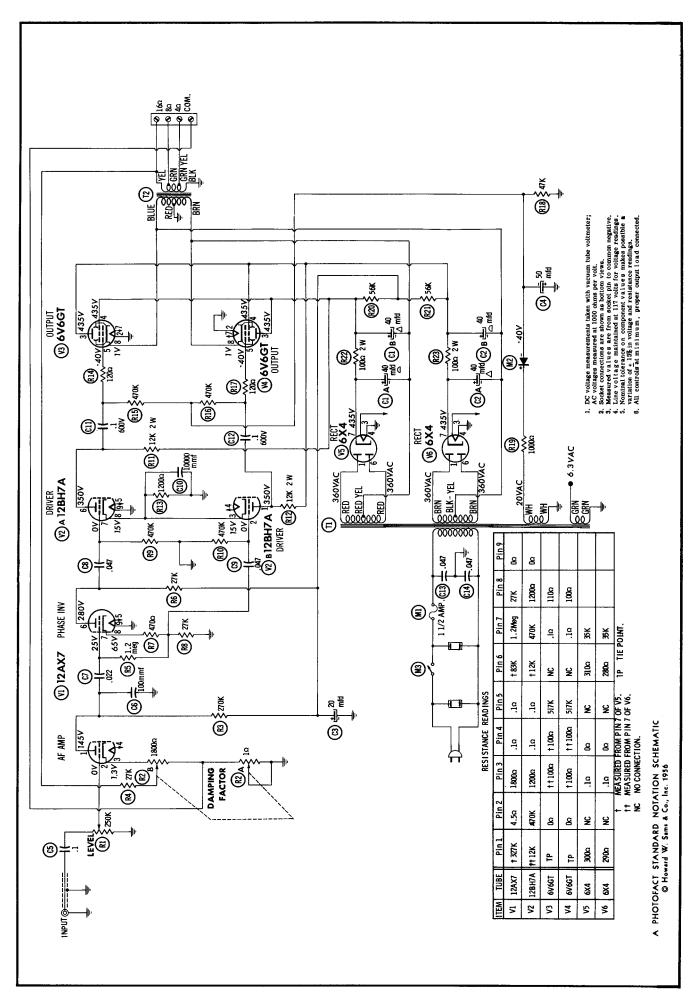
R10

R1

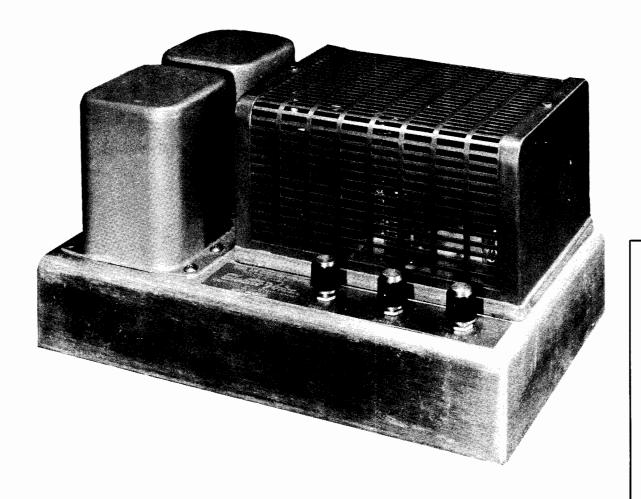
**C**5

R12

R8







TRADE NAME Electro-Voice Model A30

MANUFACTURER Electro-Voice, Inc., Buchanan, Michigan

TYPE SET AC Operated 30 Watt Audio Amplifier

TUBES (Six) Types 12AX7 AF Amp. -Phase Inv., 12BH7A Driver, (2) 1614 Output, (2) 5Y3GT Rectifier

POWER SUPPLY 105-125 Volts AC - 60 Cycles RATING 1 Amp. (2) 117 Volts AC (110 Watts)

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# PARTS LIST AND DESCRIPTIONS TUBES (GENERAL ELECTRIC, SYLVANIA)

TYPE	1614 5X3GT 5X3GT	
USE	Output Rectifier Rectifier	CIECTOCIVATO CABACITORS
ITEM No.	V4 V5 V6	3
, <u>.</u> ,		1
 NOTES		Y Car
 TYPE	12AX7 12BH7A 1614	212
usE	AF AmpPhase Inverter Driver Output	
TEM No.	V1 V2 V3	

C2

NOTES

	Ш	RATING			REPLAC	REPLACEMENT DATA			
¥ Š Š		CAP. VOLT.	Electro-Voice	AEROVOX PART No.	CORNELL- DUBILIER	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
CIA	₽40	200	4247	AFH2-72	B0530	FP288	TMD-62	D-275	TVL-2940
щ	40	200			9	9	60	1	0,00
CZA	40	200	474.	AFR2-72	BCSS	F P 288	IMD-02	D-413	1 V L-2850
ខ	20	450	4246	AFH1-50	AO460	FP144	TMS-55	S-260	TVL-1714
7	20	001		PRS150 V5	BR5015	TC49	TD-50-150	FM-1550	TVA-1414

C3

12**A**X7

### FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

[C1]

**5Y3GT** 

12BH7A

	STOIL	2											Note 1	Note 1
	11000	PART No.	2TM-Pl	5GA-T1	4TM-S22	4TM-S22	6TM-Pl	5HK-SI	4TM-S22	6TM-Pl	4TM-S47	4TM-S47	16TM-S5	16TM -S5
ATA	20011	PART No.	GEM-401	UC-531	GEM-4122	GEM-4122	GEM-601	DCSII	GEM-4122	GEM-601	GEM-4147	GEM-4147	GEM-1615	GEM-1615
REPLACEMENT DATA	200	PART No.		ED-100	ED-02	ED-02		GP-10000	ED-02					
~	CORNELL-	DUBILIER PART No.	CUB2PI	LIOTI	CUB4S22	CUB4S22	CUB6P1	BYA6SI	CUB4S22	CUBBPI	CUB4S47	CUB4847	CUBI6S5	CUB1685
	CENTRALAB	PART No.	DF-104	DD-101	DD-203	DD-203	DF-104	DD-103	DD-203	DF-104	DF-503	DF-503		
	20,000	PART No.	P288N-1	BPD-0001	BPD-02	BPD-02	P688N-1	BPD-01	BPD-02	P688N-1	BPD-05	BPD-05	P1688N-05	P1688N-05
	Electro-Voice	PART No.							4260					
	RATING	VOLT	200		400	400	900		400	900	400	400	1600	1600
	Z	3 3	-:	100	. 022	. 022	-:	10000	. 022	-:	. 047	. 047	.05	. 05
	TEM	Š	CS	8	c	8	CB	CIO	CII	CIS	Cl3	C14	C15	C16

Note I: Not used in some versions.

### CONTROLS

1614

INSTALLATION NOTES Damping (Wire-wound) Damping (Wire-wound) Level MALLORY PART No. U44 Not Req. PART No. Q13-130 Not Req. REPLACEMENT DATA
AB CLAROSTAT
PART No. A47-250K-Z FS-3 CENTRALAB PART No. B-51 Not Req. Slectro-Voice PART No. K4686 14686 WATTS RATING 250K Shaft 10 1800Ω Ž Š

### RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

**T**1

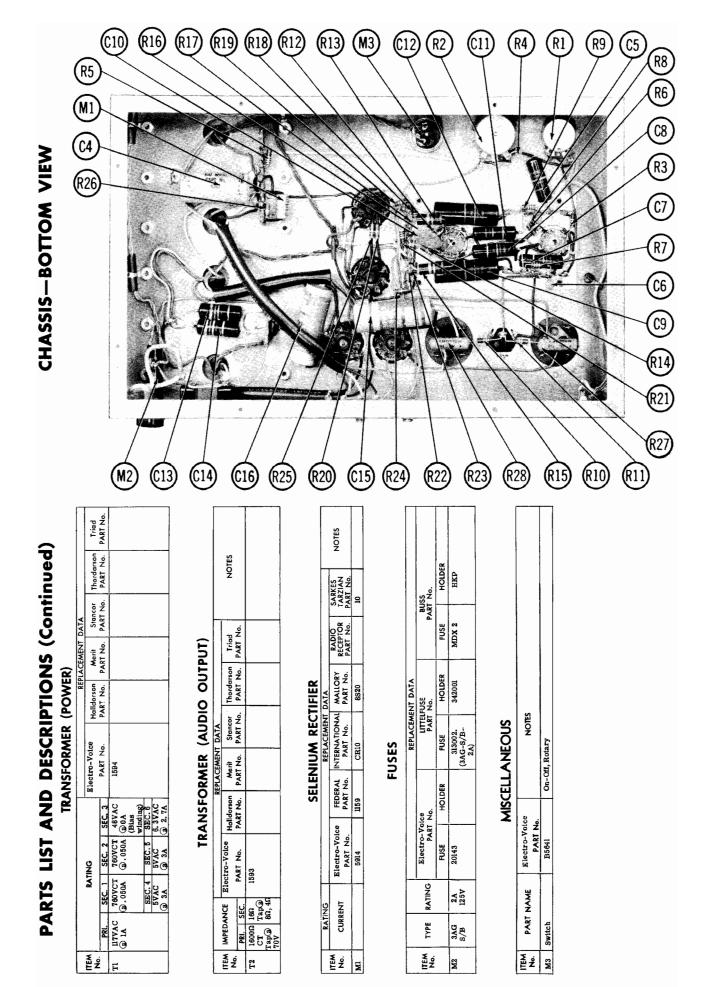
5Y3GT

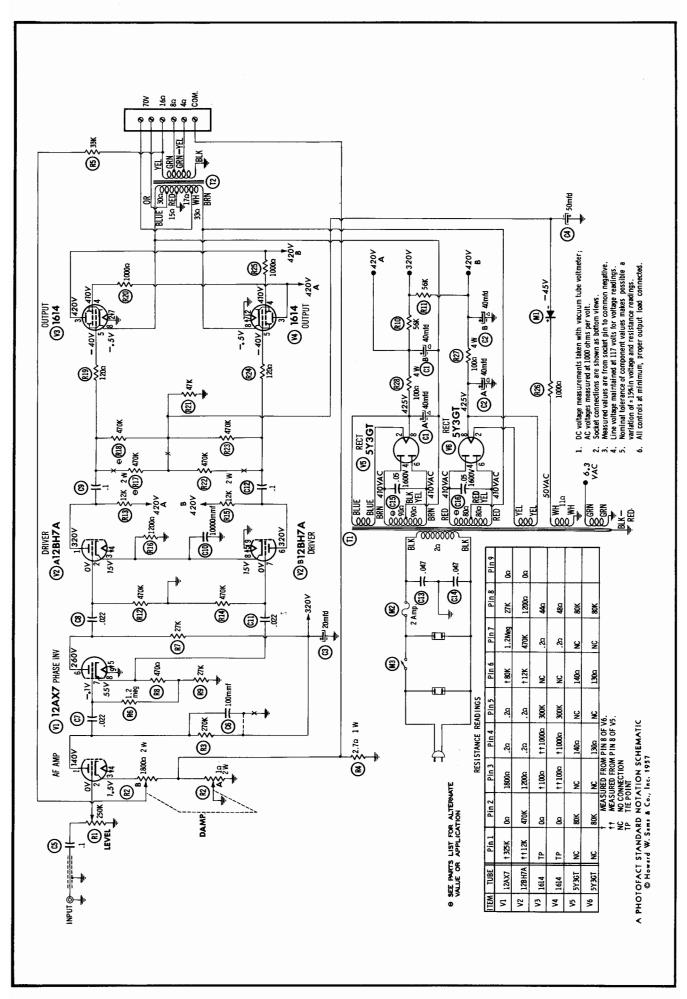
	NOTES			Note 1					Note 1						
CEPLACEMENT DATA	IRC	PART No.	BTS-1200	BTS-470K	BTS-470K	BTS-120	BTS-1000	BTS-47K	BTS-470K	BTS-470K	BTS-120	BTS-1000	BTS-1000	PW4-100	PW4-100
KELLACEM	Electro-	PART No.	4658	4650	4650	4607	4693	4668	4650	4650	4607	4693	4693	4684	4684
	o.	WATT												4	4
	RATING	OHMS	120021	470K	470K	1202	10001	47K	470K	470K	1200	10001	10001	1000	1000
	TEX Z	9	RIG	RI7	RI8	<b>R</b> 19	R20	R21	R22	R23	R24	R25	R26	R27	R28
	NOTES														
KEPLACEMENI DAIA	IRC	PART No.	BTS-270K		BTS-33K	BTS-l. 2Meg	BTS-27K	BTS-470	BTS-27K	BTS-56K	BTS-56K	BTS-470K	BTB-12K	BTS-470K	BTB-12K
KELACEM	Electro-	PART No.	4669	4680	4665	4656	4651	4654	4651	4652	4652	4650	4679	4650	4679
	5	WATT		1									~		7
	RATING	OHWS	270K	2. 70. 5%	33K	l. 2Meg	27K	4702	27K	56K	56K	470K	12K	4 70K	12K
	ME W		R3	R4	32	R6				EE0			뛾		RIS

Note 1: Not used in some versions.

(12)

1614







TRADE NAME Electro-Voice Model PC2

MANU FACTURER Electro-Voice Inc., Buchanan, Mich.

TYPE SET AC Operated Equalizer Preamplifier

TUBES (Three) Types 12AX7 Phono Preamplifier, 12AX7 AF Amplifier, 6X4 Rectifier

POWER SUPPLY 105-125 Volts AC - 60 Cycles RATING . 22 Amp. @ 117 Volts AC

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## CHASSIS-TOP VIEW

# PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

IEM No.	USE	TYPE	NOTES
V2	Phono Preamplifier	12AX7	
V2	AF Amplifier	12AX7	

72	AF A	V2 AF Amplifler		12AX7				_	
			_	ELECTROI	YTIC CA	ELECTROLYTIC CAPACITORS	S		
		RATING			REPLA	REPLACEMENT DATA			
¥ . Se ∰	Ą.	CAP. VOLT.	Electro-Voice PART No.	AEROVOX PART No.	CORNELL- DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
CIA	20	350	42045		_	F FP434. 5		T-Q-030	
m	₹20	320			_	TC62	•	-MT-4520	
U	<b>=</b> 20	320							
2	12	220	(Note I)	PRS250V12	BBR12-250	TC53	TD-12-250	FM-2512	TVA-1505
င္ပ	20	25	42046	PRS50V20	BBR20-25	TC26	TD-25-25	FM-0225	TVA-1205
			The late of the late of the same of the late of the la						

FIXED CAPACITORS
Capacity values given in the rating column are in mfd. for Paper
Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

						~	REPLACEMENT DATA	ATA		
TEA	¥	RATING	Electro-Voice		4	CORNELL				
ģ	3. 3	VOLT	PART No.	PART No.	PART No.	PART No.	PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C4	10000		4252	BPD-01	DD-103	BYA6S1	GP-10000	DC511	5HK-SI	
CS	2000		42002	BPD-005	DD-502	BYA10D5	GP-5000	DC525	5HK-D5	
ဗ	10000		4252	BPD-01	DD-103	BY A 6S1	GP-10000	DCSII	5HK-SI	
C1	2000	_	4259	BPD-002	DD-202	BY A10D2	GP-2000	DC522	5HK-D2	
C8	10000		4252	BPD-01	DD-103	BYA6S1	GP-10000	DC511	5HK-SI	
ဗ	٦.	9	4245	P488N-1	DF-104	CUB4P1		GEM-401	4TM-Pl	
C10	200		42003	BPD-0005	DD-50	BY A10T5	ED-500	UC-535	5GA-T5	
C.	200		42003	BPD-0005	DD-501	BY A10T5	ED-500	UC-535	5GA-T5	
C12	-:	400	4245	P488N-1	DF-104	CUB4PI		GEM-401	4TM-Pl	
CI3	200		4256	BPD-0002	DD-201	LIOT2	ED-200	UC-532	5GA-T2	
C14	2000		4259	BPD-002	DD-202	BY A10D2	GP-2000	DC522	5HK-D2	
C15	10000		4257	BPD-01	DD-103	BY A 6S1	GP-10000	DCSII	5HK-SI	
C16	1000		4258	BPD-001	DD-102	BYA6D2	ED-1000	DC521	5HK-DI	
C12	.1	904	4245	P488N-1	DF-104	CUB4P1		GEM-401	4TM-Pl	

### CONTROLS

		INSTALLATION NOTES	Volume		Treble		Вавя			Hum Balance (Ceramic)		Hum Balance (Magnetic)	
	24011411	PART No.	U33	Not Req.	U53	Not Req.	U53	Not Req.	US-26	UZ	Not Req.		Not Req.
ATA	_	PART No.	Q13-123	Not Req.	Q13-137	Not Req.	Q13-137	Not Req.	76-1	Q11-103	RO.	011-103	RQ
REPLACEMENT DATA	_	PART No.	A47-50K-Z	FB-3	A47-IMeg-Z	FS-3	A47-IMeg-Z	F8-3	SWE-12	A47-500-S	FKS-1/4	A47-500-S	FKS-1/4
REPI		PART No.	B-32	Not Req.	B-70	Not Req.	B-70	Not Req.	KB-1	AB-4	AK-1	AB-4	AK-1
	Electro-Voice PART No.		A46086		A4686		Z4686			R4686		R4686	
٥		WATTS	-tru		<b>⊸</b> [79		-404			-		-	
SIMITAR		RESIST- ANCE	50K	Shaft	IMeg	Shaft	IMeg	Shaft	Switch	5000	Shaft	2000	Shaft
	¥ E	Š	RIA	Д	R2A	щ	R3A	щ	ပ	R4A	В	R5A	Ø

3 743			
•			
	and the second s		
/ / /			
$(v_1)$ $(M_4)$ $(M_3)$	(R6) (V2) (R1) (R4)	R2 M2 V3 R22 C1	(R3) (T1) (M1)
12AX7	12AX7	6X4	

# **PARTS LIST AND DESCRIPTIONS (Continued)**

RESISTORS
All wattages 1/2 wat, or less, unless otherwise listed.

-											
			REPLACEMENT DATA	NI DATA					REPLACEMENT DATA	ENT DATA	
¥ ;	RATING	U	Electro-Voice	IRC	NOTES	¥ 2	RATING		Electro-Voice	IRC	NOTES
ė	OHMS	WATT	PART No.	PART No.		j Ž	OHMS	WATT	PART No.	PART No.	
	22Med		4606	BTS-22Med		R20	47000		4675	BTS-4700	
2.5	47K		4668	BTS-47K		R21	120K		4670	BTS-120K	
α.	120K		4670	BTS-120K		R22	12K		4649	BTS-12K	
	22002		4676	RTS-2200		R23	120K		4670	BTS-120K	
2 5	12Mag		4672	BTS-12Med		R24	18K		46029	BTS-18K	
3 =	120K		4670	BTS-120K		R25	8900		46045	BTS-680	
15	2 Meg		4656	BTS-1 2Meg		R26	390K		46028	BTS-390K	•
1 6	120K		4670	BTS-190K		R27	330K		4685	BTS-330K	
7	2Med		4656	BTS-1 2Meg		R28	1. 2Meg		4656	BTS-l. 2Meg	
2	2.70K		4669	BTS-270K		R29	47K		4668	BTS-47K	
9	2.70K		4669	BTS-270K		R30	47K		4668	BTS-47K	Note 1
4.5	1 8 Mag		4673	BTS-1 8Med		R31	2.7K		4651	BTS-27K	
ă	F. GER		4652	RTS-54K		R32	l. 2Meg		4656	BTS-l. 2Meg	Note 1
RIB	12008	_	4658	BTS-1200		R33	120K		4670	BTS-120K	Note 1

Note 1: Not used In some versions.

## TRANSFORMER (POWER)

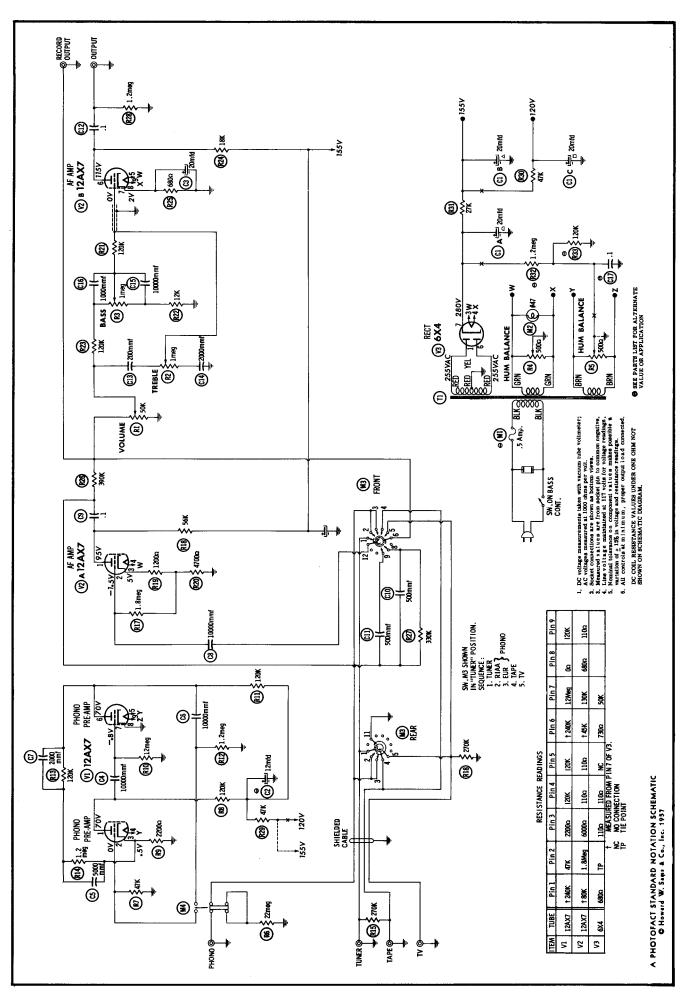
						REP	EPLACEMENT DATA	DATA		
Z Z		<b>R</b> AT	RATING			Halldarson	Merit	Stancor	Thordarson	Triad
	PRI.	SEC. 1	SEC. 2	SEC. 3	PART No.	PART No.	PART No.	PART No.	PART No. PART No. PART No. PART No.	PART No.
ī	117VAC		6. 3VAC	6. 3VAC	15021					
	9.22A	@ 0224	D.055A   D.3A   D 1A							

### FUSES

					REPLACEM	REPLACEMENT DATA		
ZEN O	TYPE	RATING	Electro-Voice PART No.	-Voice No.	LITTEL	LITTELFUSE PART No.	BUSS PART No.	SS No.
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
MI	3AG	3 1/2A	(Note I)		312, 500	356001	AGC 1/2	4405
		250 V			(3AG-2A- 250V)			
Ž	te 1: Some	e verelons	a may use 3AG.	\$A. 250V. S/B	Note I: Some versions may use 3AG 4 A 250V S/B (Part #Z-20066) in this amplication	in this applicat	lon.	

MISCELLANEOUS

### #47 Function (Rotary, Wafer Type) Ceramic-Magnetic Changeover NOTES Electro-Volce PART No. PART NAME Pilot Light Switch Switch ₹ Ş M2 M3







TRADE NAME Fisher Model PR-6

MANUFACTURER Fisher Radio Corp., 21-21 44th Drive, Long Island City 1, N. Y.

TYPE SET

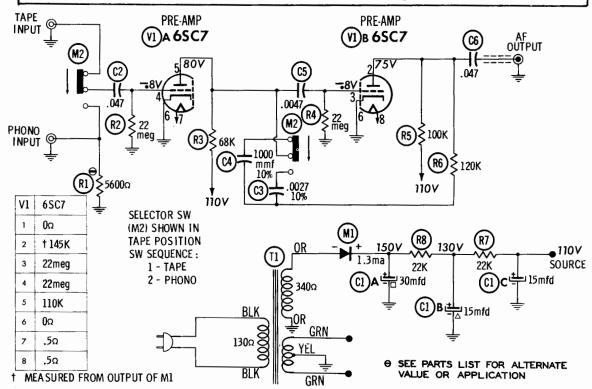
AC Operated Preamplifier

TUBES (One)

Type 6SC7 Preamplifier

POWER SUPPLY 105-125 Volts AC-50/60 Cycle

RATING .04 Amp. @117 Volts AC (4 Watts)



### A PHOTOFACT STANDARD NOTATION SCHEMATIC

Howard W. Sams & Co., Inc. 1958

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# CHASSIS—BOTTOM VIEW

# PARTS LIST AND DESCRIPTIONS

# TUBES (GENERAL ELECTRIC, SYLVANIA)

USE		
¥ è L		
	_	
NOTES		
TYPE	68C7	
USE	Preamplifier	
No.	V]	

NOTES				SPRAGUE PART No.	TVL-3437
TYPE				SANGAMO PART No.	T-035
USE		S		PYRAMID PART No.	TMT-7
		ELECTROLYTIC CAPACITORS	REPLACEMENT DATA	MALLORY PART No.	FP311. 4
ž Ž		S	REPLAC	를 교 양	
		ZIC		CORNELL- DUBILIER PART No.	C0070
NOTES		ROL		Š. Š.	7-50
TYPE	68C7	LECT		AEROVOX PART No.	AFH3-17-50
USE				FISHER PART No.	C515-122
ວັ	eamplifier		TING	VOLT.	150 150 150

■ 30 ▲ 15 Ą.

O BB

No.

					O.L.	SOLES			10%	10%	!	
		er				SPRAGUE	PART No.	2TM-S47		15-21	5TM-D47	2TM-S47
		nfd. for Pap	Capacitors	DATA		MALLORY	PARI No.	GEM-4147		MCB255	GEM-6247	GEM-4147
	FIXED CAPACITORS	ımı are in r	nd Ceramic	REPLACEMENT DATA	102	2 2 2	YAKI No.			ED-1000	CUB6D47 GP-4700	
	CAPA	rating colu	or Mica a	•	CORNELL	DUBILIER	PART No.	CUB2S47		IR5DI .	CUB6D47	CUB2S47
	FIXED	en in the	n mmfd. fe		Cr. ITO	CENTRALAB	LAKI NO.	DF-503			D6-472	DF-503
		Capacity values given in the rating column are in mfd. for Paper	Capacitors, and in mmfd. for Mica and Ceramic Capacitors.		201000	AEROVOX	PAKI NO. PAKI NO. PART No.	P288N-047 DF-503			P288N-0047 D6-472	P288N-047 DF-503
		Capaci	Сара		FISHER	17 1010	PAKI NO.	C68P473M2	C68P272K2	CC26GP102K5	C68P472F2	C68P473M2
150 150					RATING	CAP.   VOLT		200	200		200	200
▲ 15 150 15 150					Z	3		. 047	0027	1000	.0047	. 047
mrs					_		- 1					- 1

Ž.

22222

### RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

NOTES					_
FISHER	PART No.	RC20BF104K	RC20BF124K	RC20BF223K	RC20BF223K
9	WATT				_
RATING	OHMS	100 <b>K</b>	120K	22K	22K
ITEM	į	RS	R6	R7	R8
NOTES		Note 1			
FISHER	FISHER PART No.			RC20BF683K	RC20BF226K
ຽ	WATT				
RATING	OHWS	56003	22meg	68K	22meg
ITEM	į	RI	R2	R3	R4

Note 1 Chassis with pickering cartridge use 39000 in this application

## TRANSFORMER (POWER)

	Triod	PART No.							
	Stoncor Thordorson	PART No.							
4	Stoncor	PART NO. PART NO. PART NO. PART NO. PART NO. PART NO.					NOTES		1159 ① CR-20 ① 10 ① ①Pig Tail Leads
- NA -	Ram	No.					_		⊕Pig
KEPLACEMENI DAIA	Merit	T No. PAR			IFIER		SARKES	PART No.	10 O
	*	PAR			ECT		¥	•	9
	Halldorson	PART No.			SELENIUM RECTIFIER	REPLACEMENT DATA	INTERNATION	PART No.	CR-20
	FISHER	PART No.	15-118		SELEN	REPLACEM	FEDERAL	PART No. PART No.	1159 Œ
		_	T-5				_	ó	
		SEC. 1 SEC. 2	6.3VCT T-515-118	a 300A			FISHER	PART No.	SR3180
	RATING	SEC. 1	115V	(a) 04A (a) .0013A (a) .300A		RATING	CURRENT	(Measured)	
		PRI.	T1 117V	a. 04A				(Meas	. 0013Å
	¥ g		Ţ				TEX	2	۶

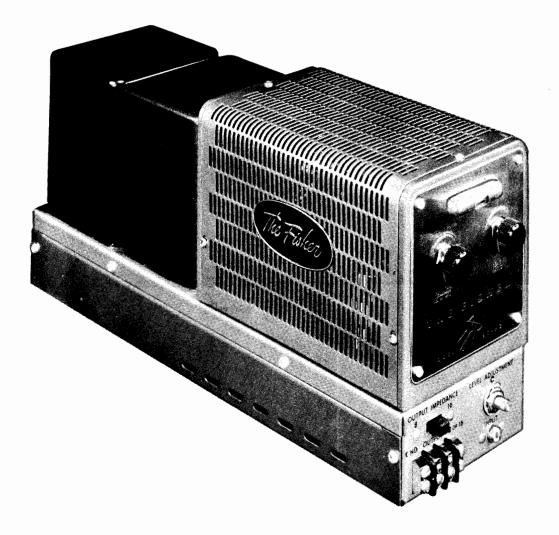
### MISCELLANEOUS

	(.	
NOTES	Phono-Tape (Slide Type DPDT)	
FISHER PART No.	S-505-117	
PART NAME	Switch	
캶	M2	

M2	M2 Switch	S-505-117	Phono-Tape (Slide Type DPDT)
			WIRING DATA
G	neral-use Unshielded	Hook-up Wire	General-use Unshielded Hook-up Wire
Ъ	wer Cord		8524 (Stranded) Available in Ten Colors Power Cord
រុំ	w-Loss Shielded Lea	d (Interconnecting).	1725-K (淳 Ft. Length) Low-Loss Shielded Lead (Interconnecting).
균	ono Pick-up Arm Cal	ble	Phono Pick-up Arm Cable Use BELDEN No. 8430 (Two Conductor - Twisted)

### **R7** R8 C2 R3 **M**2 C3 R6 C4 **C5 C6**





TRADE NAME	Fisher Model 80-AZ
MANUFACTURER	Fisher Radio Corp., 21-21 44th. Drive, Long Island City 1, N.Y.
TYPE SET	AC Operated 30 Watt Audio Amplifier
TUBES (Five)	Types 12AT7 AF AmpPhase Inv., 12AU7A Driver, (2) EL-37 Output, 5V4G Rectifier
POWER SUPPLY	105-125 Volts AC-50/60 Cycles RATING 1 Amp. Q 117 Volts AC

### PHASE INVERTER BALANCE ADJUSTMENT

	1.	Disconnect the speaker and connect a 16 ohm, 20 watt resistor to "GND" and "8 or 16".	6.	Set the audio generator to 1000 cycles and adjust the attenuator so that the amplifier produces 20 watts (17.85 yolts RMS) across the 16 ohm resistor.
ı	2.	Connect the audio generator to the amplifier input.		Total result in the second and the second se
ı			7.	Tune the wave analyzer to the second harmonic of 1000
I	3.	Switch IMPEDANCE SELECTOR to "16".		cycles or, if a distortion analyzer is used, tune it for minimum reading at 1000 cycles.
ı	4.	Turn Z-Matic control fully counter clockwise.		minute round in 1000 of 01000
ı			8.	Adjust the phase inverter balance control (R4) for mini-
ı	5.	Connect the wave analyzer or distortion analyzer across		mum distortion.
ı		the 16 ohm resistor.		

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# PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

NOTES	
TYPE	12AT7 12AU7A EL-37
USE	AF AmpPhase Inv. Driver Output
Ş. No.	V2 V1

NOTES	Z S Z		
	V2	Rectifler	<b>6V4</b>

-7			П	ша	_		
NOTES				SPRAGUE PART No.	TVL-2940	TV1-2764	TVA-1308
_				SANGAMO PART No.	D-275	D-235	FM-0550
TYPE	EL-37 5V4G			\$≥	À	<u> </u>	F
E		į,		PYRAMID PART No.	TMD-62	TMD-54	TD-50-50
USE	Output Rectifler	ELECTROLYTIC CAPACITORS	REPLACEMENT DATA	MALLORY PART No.	FP288	FP238	TC39
TE≱ No.	V4 V5	CAF	REPLAC	<b>∄</b> ₩9			
		1		CORNELL- DUBILIER PART No.	B0530	B0450	BR505
NOTES		TROLY		AEROVOX PART No.			$\neg$
TYPE	12AT7 12AU7A EL-37	ELEC		PAR	AFH2-72	AFH2-57	PRS50V50
				FISHER PART No.	C-522-114	C-1798	C-508-115
USE	AF AmpPhase Inv. Driver Output		RATING	VOLT.	200	25	20 2
	AF Am Driver Output		RAT	S S	40		203
TEM No.	V1 V2 V3			Ž .	GIA R	C2A	ខ

### FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

		SPRAGUE PART No.	PRAGUE ART No.	ART No. M-P22 CC-T22	PRAGUE ART No. M-P22 CC-T22 M-S22	MRT No. M-P22 CC-T22 M-S22 M-S22	PRAGUE ART No. 164-P22 M-P22 M-S22 M-S22 M-S22 M-S22 M-S22 M-S22 M-S22 M-S23	PRAGUE ART No.  M-P22  CC-T22  CC-T22  M-S22  M-P1	PRAGUE 1  ART No.  MA-P22  CC-T22  CC-T22  MA-S22  MA-P1  MA-P1  A-D6	PRAGUE 1 M-P22 M-P22 M-S22 M-S22 M-P1 A-D5 M-94	-	PRAGUE TWO TO THE PRAGUE TWO TO THE PRAGUE TWO THE
1	_		+				-				9 9 4 4 4 9 9 3	
	MALLORY PART No.		PT4022	PT4022	PT4022 PT4122	PT4022 PT4122 PT4122	PT4022 PT4122 PT4122 PT401	PT4022 PT4122 PT4122 PT401 PT401	PT4022 PT4122 PT4122 PT401 PT401 OC-526	PT4022 PT4122 PT4122 PT401 PT401 PT6147	PT4022 PT4122 PT4122 PT401 PT401 DC-526 PT8147	PT4022 PT4122 PT4122 PT401 DC-525 PT8147
	ERIE PART No.					811-221 817-02 817-02						
	DUBILIER PAPT NO	-	UB2P22	<u> </u>		00-	00-	00-				
-	8 6	5	88									
	CENTRALA PART No.			D6-221	D6-221	D6-221	D6-221	D6-221 DF-104 DF-104	D6-221 DF-104 DF-104 DF-502	D6-221 DF-104 DF-104 DD-502	D6-221 DF-104 DF-104 DD-502 DF-503 DF-503 DF-820	D6-221 DF-104 DF-104 DD-502 DF-503 DF-503
	AEROVOX PART No.		P288N-22	P288N-22 NP0-81220	P288N-22 NP0-81220 P488N-022	P288N-22 NP0-81220 P488N-022 P488N-022	P288N-22 NP0-81220 P488N-022 P488N-022 P488N-1	P288N-22 NP0-81220 P488N-022 P488N-1 P488N-1	P288N-22 NP0-8I220 P488N-022 P488N-1 P488N-1 D1-005	P288N-22 NP0-81220 P488N-022 P488N-1 P488N-1 D1-005 BPD-05	P266N-22 NPO-51220 P468N-022 P468N-1 P468N-1 D1-005 BPD-06	P288N-22 NP0-81220 P488N-022 P488N-02 P488N-1 P488N-1 D1-005 BPD-05 I469-000082
	FISHER PART No.		C69P224V2	C69P224V2 CC-21GP221K5	C69P224V2 CC-21GP221K5 68P223M4	C69P224V2 CC-21GP221K6 68P223M4 68P223M4	C69P224V2 CC-2IGP22IK5 68P223M4 68P223M4 68P104M4	C69P224V2 CC-21GP221K5 68P223M4 68P223M4 68P104M4 68P104M4	C69P224V2 CC-21GP221K5 68P223M4 68P223M4 68P104M4 68P104M4 C-508-122	C699224V2 CC-2IGP22IK5 68P223M4 68P233M4 68P104M4 68P104M4 C-508-123 C-68P473M6	C699224V2 CC-21GP22IK6 68P223M4 68P223M4 68P104M4 68P104M4 C-508-122 C-68P473M6	C697224V2 CC-21GP221K6 68P233M4 68P233M4 68P104M4 C-506-123 C-68P473M6
9	VOLT		200	200	400	700 400 400	0 000	0 0000	0 0000	00 000 00 00 00 00	00 000 00 00 00 00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00 00 00 00 00 00
-		33		220	220	.022	. 022 . 022 . 022	.022 .022 .1	. 1 . 1 . 1 . 1 . 1 . 1 . 1 . 1 . 5000			220 .022 .022 .1 .1 5000 82 420
-	_ 돌양	2		S	88	385	8858	58588	55555			5555555555

5V4G (V5)

**T**2

T1

**EL37** (V4)

12AT7 (V1) (

(R21)

R2

M3

### CONTROLS

	L	9		RE	REPLACEMENT DATA	ITA			
Ŧ	2	2	4	CENTRALAB	CLABOSTAT		V40:1444	SETON MOTALIATEM	,
ģ	RESIST-	WATTS	PART No.	PART No.	PART No.	PART No.	PART No.	TON MOTORIENT	3
RIA	1000B	-414		AB-5	A47-1000-8	QII-108	U4	Z-Matic	
щ	Shaft	,	Not Req.	AK-8	RB-3/16	NO.	DS-37	Attach to RIA	
U	Switch			KB-1	SWE-12	78-1	US-26	Attach to RIA	
R2A		-46	R557-121				040	Peak Power	
4	- 0,		Not Reg.				D8-37	Attach to R2A	
R3A		-4K	R-2815-9	AB-59	A47-500K-8	Q11-133	SU-50	Level	
4	Shaft	_	Not Reg.	AK-1	FKS-1/4	Not Req.	Not Req.	Attach to R3A	
R4A	50K	-40	R-50000-5		A47-50K-S	Q11-128	SU-35	Balance	
æ			Not Req.	AK-1	FKB-1/4	RQ	Not Req.	Attach to R4A	
R5	35K	44	•					Peak Power Indicator	Note 1.
1	andleren emen of bonn told I atom	d to acom	o vereione						

### NOTES Note 1 Note 1

# PARTS LIST AND DESCRIPTIONS (Continued) RESISTORS All wattages 1/2 watt, or less, unless otherwise listed.

	NOTES									Note 1	Note 1					
INT DATA	IRC	PART No.	BTS-100K	BTB-6800					BTB-820K	BTS-2.2Meg	BT8-18K	BTB-2200	BT8-330	BTS-2200	BTB-10K	BT8-10K
REPLACEMENT DATA	FISHER	PART No.	RC-20BF104K	RC~20BF682K		10 JR-557-128			RC-20BF824K		RC-20BF183K	RC-20BF222K	RC-20BF331K	RC-20BF222K	RC-20BF103K	RC-20BF103K
١,	o	X			_	<u>^</u>	_	2								
	RATING	OHWS	100K	6800n	3500	CI.	g	1000 2001	820K	2.2Meg	18K	22002	3300	22002	10K	10K
	₹ ;	ġ Z	R20	R21	R22A	M	ပ	Ω	R23	R24	R25	R26	R27	R28	R29	R30
_			_						_		_	_		_	_	
	NOTES														Note 1	Note 1
INT DATA	_	PART No.	BTS-1500	BT8-220K	BT8-10K	BTS-100K	BTS-68K	BTS-470K	BTS-470K	BTS-150K	BTS-150K	BTS-4700	BT8-470K	BT8-470K	BTS-68 Note 1	
REPLACEMENT DATA	_		RC-20BF152K BTS-1500	RC-20BF224K BTB-220K	RC-20BF103K BTS-10K	Ä	RC-20BF683K BTS-68K	RC-20BF474K BTS-470K	RC-20BF474K BTS-470K	RC-20BF154K BTS-150K	X	-	<b>4</b>	4 K		
لـ	FIBHER			24 K	SK	S	=	RC-20BF474K BTB-470K	RC-20BF474M BTS-470K	¥	7	-	<b>4</b>	4 K		
لـ	IRC	PART No.	RC-20BF152K	RC-20BF224K	RC-20BF103K	S	RC-20BF683K			RC-20BF154K	RC-20BF154K	RC-20BF472K	RC-20RF474K	RC-20BF474K	B13-68	BTS-68

Note 1. Not used in some versions.

## TRANSFORMER (POWER)

						REF	<b>EPLACEMENT</b>	DATA		
割ら		RATING	ğ		FISHER	Halldorson	Merit	Stoncor	Thordorson	Triod
	PRI.	SEC. 1	SEC. 2	SEC. 3	PART No.	PART No.	PART No.	PART No.   PART No.   PART No.	PART No.	PART No.
Ħ	11TVAC	800VCT	6.3VCT		T-557-123					
	<b>≸</b> (@	@.110ADC @3.2A	93.2A				_			

# TRANSFORMER (AUDIO OUTPUT)

	NOTES							
	Triad	LAKI NO.						
	Thordarson	FAKI NO.						
r DATA	Merit Stancor Thordarson Triad	PARI NO.						
EPLACEMENT DATA	Merit	FAKI NO.						
~	Halldorson	PARI NO.						
	FISHER	YAKI NO.	T-557-122					
	ITEM IMPEDANCE No.	PRI.1 SEC.	43000 160	CT tap ®	PRI. 2 . 940	2802	Į.	
	Ž ģ		12					

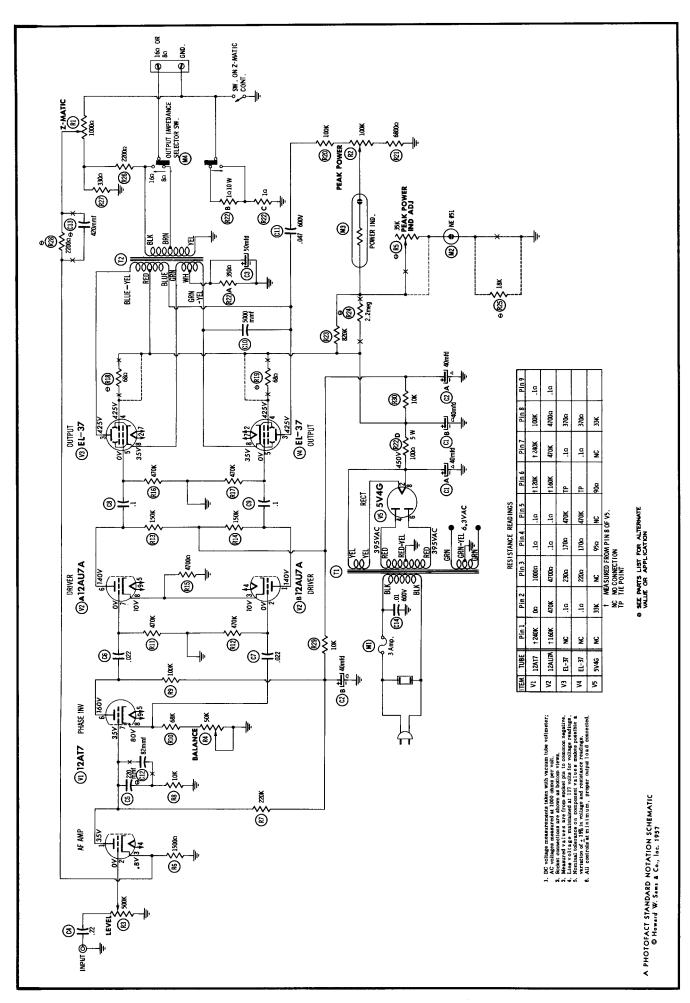
### FUSES

	S No.	HOLDER	нкр
	BUSS PART No.	FUSE	8 DDV
ENT DATA	LITTELFUSE PART No.	HOLDER	342001
REPLACEMENT DATA	LITTEL	FUSE	\$12003. (3AG 3A)
	R No.	HOLDER	
	FISHER PART No.	FUSE	
	RATING		3A 250V
	TYPE		3AG
	Z S		¥

### MISCELLANEOUS

	Туре)
NOTES	<ul> <li>NESI. Voltage Regulator</li> <li>Power Indicator</li> <li>Output Impedance Selector (DPDT-Slide T</li> </ul>
FISHER PART No.	V-NE-51 1-557-120 8-505-117
PART NAME	Neon Bulb Neon Bulb Switch
Ž Š	W W

# CHASSIS—BOTTOM VIEW





TRADE NAME Grommes Model 212

MANUFACTURER Precision Electronics, Inc., 9101 King Ave., Franklin Park, Ill.

TYPE SET AC Operated 8 Channel Preamplifier

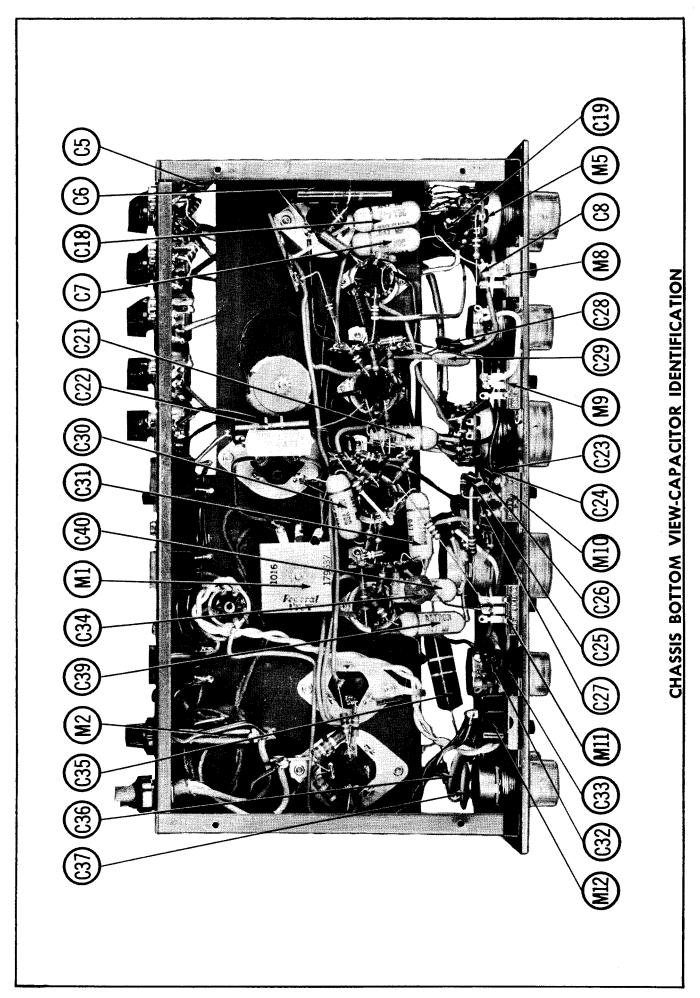
Types 12AX7 Phono Preamplifier, 12AX7 AF Amp. -Cath. Follower, 12AX7 AF Amplifier, 12AX7 AF Amp. -Cath. Follower, 6X4 Rectifier TUBES (Five)

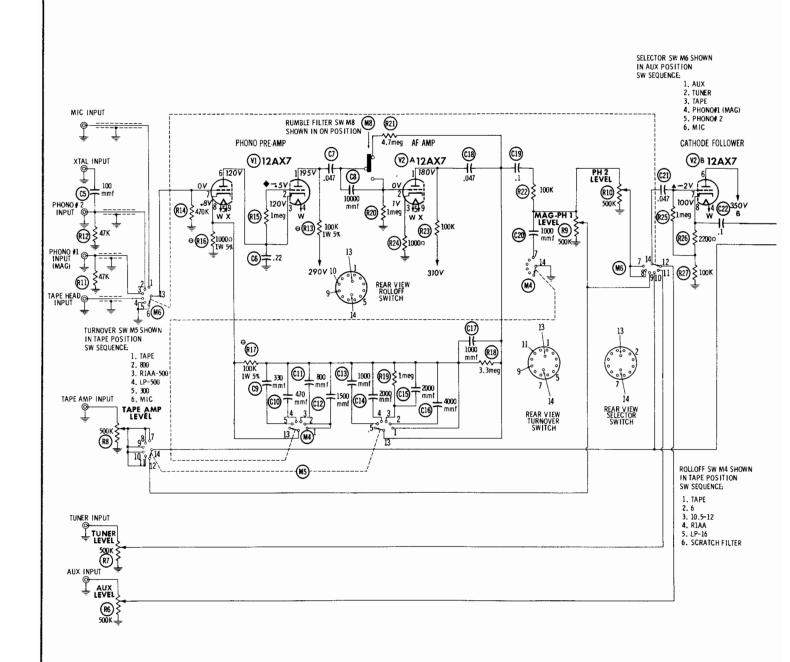
POWER SUPPLY 110-120 Volts AC-60 Cycles RATING . 25 Amp. (2) 117 Volts AC (22 Watts)

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#### RESISTANCE READINGS

				WEST	JIMIGE K	LADINOS				
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	† 147K	INF	INF	3Ω	30	INF	0α	1000a	0Ω
V2	12AX7	† 127K	1Meg	1000Ω	3Ω	3Ω	† 15K	1Meg	100K	6Ω
٧3	12AX7	† 115K	1Meg	1000Ω	6Ω	6Ω	† 115K	0Ω	3200Ω	9Ω
V4	12AX7	† 15K	1.1Meg	100K	9Ω	9Ω	† 115K	480K	1000Ω	120
V5	6X4	1100Ω	NC	INF	INF	NC	1200Ω	20K(Min)		

- ALL MEASUREMENTS TAKEN IN "TAPE" POSITION

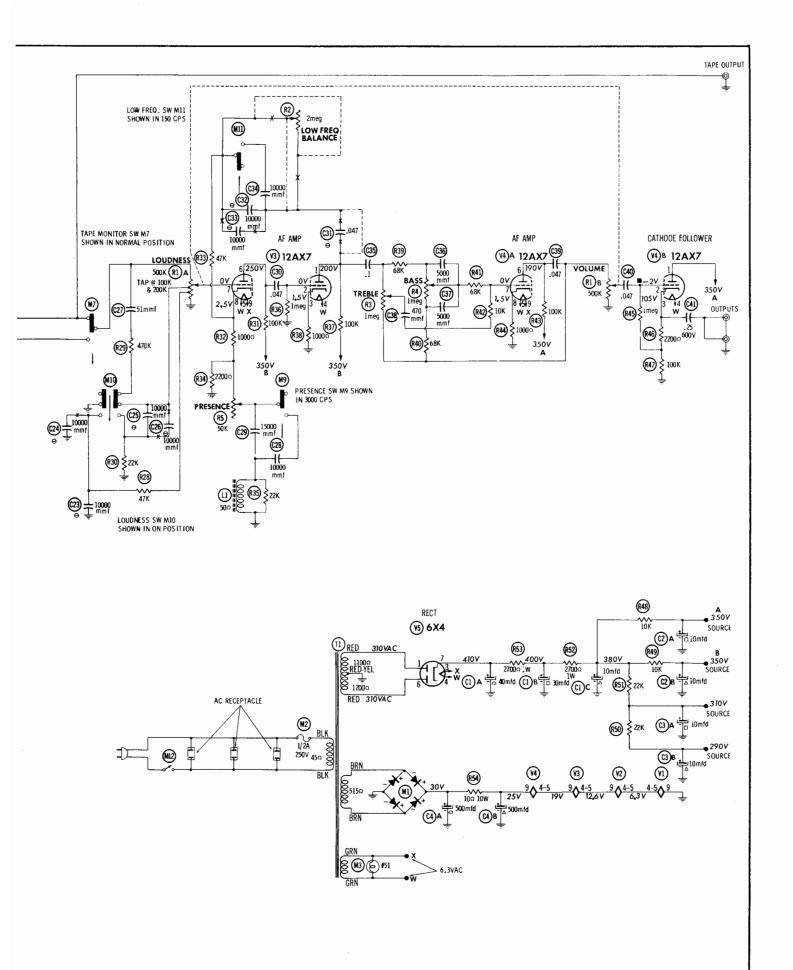
   MEASURED FROM PIN 3 OF V1
- MEASURED FROM PIN 3 OF V4
- MEASURED FROM PIN 7 OF V5
- ▲ MEASURED FROM PIN 8 OF V2 NC NO CONNECTION

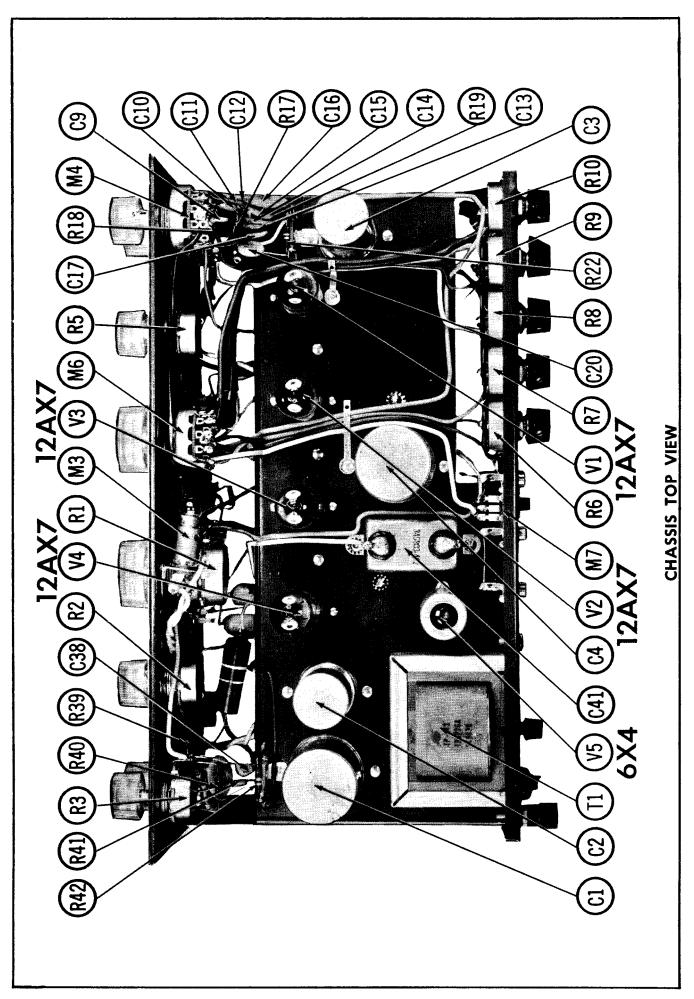
- DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.

- 2. Socket connections are shown as bottom views.
  3. Measured values are from socket pin to common negative.
  4. Line voltage maintained at 117 volts for voltage readings.
  5. Nominal tolerance of component values makes possible a variation of ± 15% in voltage and resistance readings.
  6. All controls at minimum, proper output load connected.

SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

A PHOTOFACT STANDARD NOTATION SCHEMATIC Howard W. Sams & Co., Inc. 1957





# PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL

TEM No.	JSN	TYPE	NOTES
V1	Phono Preamplifler	12AX7	
V2	AF Amp Cath. Follower	12AX7	
V3	AF Amplifler	12AX7	

	NOTES	
0	TYPE	12AX7 6X4
ELECTRIC, SYLVANIA)	asn	AF Amp Cath. Follower Rectifier
F. C.	ITEM No.	V4 V5
3 = .		

# PARTS LIST AND DESCRIPTIONS (Continued) REPLACEMENT DATA

CONTROLS

1:	~!									_														_
-	REPL	CENTRALAB	PART No.				B-76	Not Req.	B-69	Not Req.	B-69	Not Req.	B-34	Not Req.	B-60	Not Req.	B-60	Not Req.	B-60	Not Req.	B-60	Not Req.	B-60	Not Req.
		GROMMES	PART No.		LC2X500K		LFBC2M		GTC-IM		GTC-IM		PC 50K		VC500K		VC500K		VC500K		VC500K		VC500K	
Ī		ş	WATTS		~1 <b>10</b>	- 12	H		(eq		-(0)		14		-la		٦'n		-401		~\@		eq	
		S	RESIST.	ANCE	500K	200K	2Meg	Shaft	lMeg	Shaft	lMeg	Shaft	50K	Shaft	500K	Shaft	500K	Shaft	500K	Shaft	500K	Shaft	500K	Shaft
		IEM	ģ		RIA	Д	R2A	Д	R3A	Д	R4A	Д	R5A	М	R6A	М	R7A	м	R8A	m	R9A	Д	RIOA	Д
		NOTES												SPRAGOE	PAKI NO.				TVI2750		TVL-2750		TVL-2233	
	-	TVDE	-	L	LZAX?	140								SANCAMO	PAKI NO.	D-400	MT-4530		200	2	D-200	:	MTH-2550	MTH-2550
				11 11	Ar Amp - Cath, rollower Becelfier						•			PYRAMID	PAKI No.				TMD-47		TMD-47		TD-500-25	TD-500-25
		3511	5		Ar Amp - C	TOTAL				VIIV CABACITOBS		REPLACEMENT DATA		MALLORY	PARI No.				FD231		FD231		WDO65	TC2505
		ITEM	Š		44	-				TIC CAE	֡֝֝֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֡֓֓֓֓֓֡֓֓֓֡֓֡	REPLAC	COPNELL	DUBILIER	PART No.	B0490	BB1045		B0370		B0370	2	BR5002	BR5002
	ı	v	,							2	3		-		_		_		_			_	_	_

Loudness, Tap 3 100K & 200K Volume Low Freq. Bal.

Treble Вавв

INSTALLATION NOTES

MALLORY PART No.

IRC PART No.

CLAROSTAT PART No.

# FLECTROLYTIC

			_	_			_		_
	SPRAGUE PART No.			TVL-2750		TVL-2750		TVL-2233	
	SANGAMO PART No.	D-400	200	D-200		D-200			
	PYRAMID PART No.		_	TMD-47		TMD-47		TD-500-25	TD-500-25
EMENT DATA	MALLORY PART No.			FP231		FP231		WD065	TC2505
REPLAC	CORNELL- DUBILIER PART No.		crowd	B0370		B0370		BR5002	BR5002
	AEROVOX PART No.	AFH4-117-48		AFH2 47		AFH2-47			
	GROMMES PART No.								
S Z	VOLT.	400	900	320	320	350	320	22	22
RAT	8	0.5	2 O	9	014	9	014	₽200	₹200
	No.	CIA	ن ه	C2A	Ø	C3A	ф	C4A	Д
	REPLACEMENT DATA	CAP. VOLT. GROMMES AEROVOX CORNELL MALLORY PYRAMID SANGAMO PART No. PART No. PART No. PART No.	RATING         REPLACEMENT DATA           CAP.         VOLT.         GROMMES         AEROVOX         CORNELL- DART No.         MALLORY PART No.         PART NO.	RATING         REPLACEMENT DATA           CAP.         VOIT.         GROMMES         AEROVOX CORNELL ALITAGE         AALIORY PRAMID SANGAMO           A40         400         AFH4-117-48         B0420         D-400           A10         350         AFH4-117-48         BR1045         MT-4530	RATING   ARROYOX   CORNEIL   MALLORY   PYRAMID SANGAMO   PART No.   PART NO	RATING   REPLACEMENT DATA   REPLACEMENT DATA   REPLACEMENT DATA   REPLACEMENT DATA   RATIORY   PYRAMID SANGAMO   SANGAMO   PART No.   PART NO	RATING   ARROYOX   CORNELL   MALLORY   PART NO.   PAR	REPLACEMENT DATA   REPLACEMENT DATA   REPLACEMENT DATA   REPLACEMENT DATA   ARBOYOX   CORNELL   MALLORY   PYRAMID   SANIGAMO   SAN	RATING   REPLACEMENT DATA   REPLACEMENT DATA   REPLACEMENT DATA   ALIO   PART No.   PA

### RESISTORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

FIXED CAPACITORS

MC235 GEM-2022 GEM-4147 DC511

UC-5333 UC-5347 DC5215

ED-01 ED-330 ED-470

L10T8 BYA10D15

5W5T1 CUB2P22 CUB4S47 BYA6S1 L10T33 BYA10T47

MALLORY PART No.

ERIE PART No.

CENTRALAB CORNELL-PART No. PART No.

AEROVOX PART No.

GROMMES PART No.

CAP. VOLT

200 400 400

ED-100

D6-101

REPLACEMENT DATA

DC521 DC522 DC522 UC-524 UC-524 DC521 GEM-4147 GEM-401 GEM-401 GEM-401 DC521 GEM-401

BYA6DI BYA10D2 BYA10D2 BYA10D4 BYA6DI CUB4S47 CUB4S47 CUB4S47 CUB4S47 CUB4S47

DF-503 DD-103 DD-103 DD-4731 DD-601 DD-102 DD-102 DD-102 DD-102 DD-103 DF-104 DD-103 DF-104 DD-103 DF-104 DD-103 DF-103 DF-104 DD-103 DF-104 DD-103 DF-103 D

ED-1000

ED-0015 ED-1000 ED-002 ED-004 ED-1000

Input Level Mag. Phono #1

Input Level Phono #2

Input Level Tape Amp.

Input Level Tuner Input Level AUX. Presence

Q18-133XX M11-133 Q13-139 Q13-139 Q11-137 Q11-137 NOT Req. Q13-123 Q13-123 Q13-133 NOT Req. Q13-133 NOT Req. Q13-133 NOT Req. Q13-133 NOT Req. Q13-133 NOT Req.

All wattages 1/2 watt, or less, unless otherwise listed.

NOTES

REPLACEMENT DATA	IRC C	PART No.	BTS-47K	BTS-2200	BTS-22K	BTS-IMeg	B18-100K	DOE-2100	B12-086	B15-085	B1S-68K	B18-10K	B18-100A	0001-81g	BIS-IMeg	BTS-2200	BTS-100K	BTS-10K	BTS-10K	BTS-22K	BT8-22K	DT 4 -2700	0014-410	DIA-AIG	PW10-10
REPLACEM	GROMMES	PART No.																							
Γ		WATT																				-	٠.	- :	07
	RATING	OHWS	47K	22002	22K	IMeg	100K	70007	68K	68K	68K	10K	100K	100012	IMeg	22000	100K	10K	10K	22K	22K	0002	2002	2000	100
	¥ Z	j	R33	R34	R35	R36	R37	K38	H39	R40	R41	R42	H43	R44	R45	R46	R47	R48	R49	R50	1 2		200	2	R54
	NOTES				Note 1			Note 1	Note 1		_	_				_									
INT DATA	E C	PART No.	BTS-47K	BIS47K		BTS-470K	BTS-lMeg	,		BTS-3. 3Meg	BTS-lMeg	BTS-lMeg	BTS-4. 7Meg	BTS-100K	BTS-100K	BTS-1000	BTS-IMeg	DTE-2200	010-010 010-010	VON-SIG	BTS-47K	BTS-470K	BTS-22K	BTS-100K	BTS-1000
REPLACEMENT DATA	GROMMES	PART No.																							
Γ		WAT			-			_	-																
	RATING	OHWS	47K	47X	100K 59		Meg	10000 5%	100K 5%		Meg	lMeg	4. 7Meg	100K	1001	00001	Med	South	220022	1004	47K	470K	22K	100K	10001
	TEM	ġ	EIN	RIS	RIS	F14	RIS	RIB	R17	E B	RIS	R20	R21	B22	E233	12.4	200		924	KZ.	R28	R29	R30	B31	R32
	NOTES														_					_	-	∋∈	9	9	<u>•</u>
	SPRAGUE	PART No.	1FM-31	2TM-P22	4TM-S47	5HK-SI	5GA-T33	5GA-T47	5GA-T8	5HK-DI5	SHK-DI	5HK-D2	5HK-D2	5HK-D4	5HK-DI	4TM-S47	4TM-PI	SHK-DI	4TM-847	100	4.1 M-P1	5HK-SI	5HK-81	5HK-SI	5HK-SI

# Note 1. Low noise deposited carbon resistor.

## TRANSFORMER (POWER)

**@@@** 

5HK-81 5HK-815 4TM-847 4TM-847 5HK-81 5HK-81

GEM-4147 GEM-4147

ED-01 ED-01 ED-01

DD-103 DD-16-153 DF-503 DF-503 DD-103 DD-103 DP-104 DD-502 DD-502 DD-503 DF-603 DF-603

DC511

BYA6SI BYA10S15

CUB4847 CUB4847 BYA681

8 6 8 8

15000 15000 10000 10000

400

ED-01 ED-01 ED-01 ED-01 ED-01 ED-01

BYA6SI

1468-0001 1280-05 1890-003 1890-003 1890-003 1890-003 1890-003 1890-003 1890-003 1890-003 1890-013 1890-0

6 4 6 6 6 6

10000 10000 10000

400 400

-							5	LACEMENT	DATA		
	TEX No.		RA	PATING		GROMMES	Holldorson	Merit	Stancor	Thordarson	Triad
		PRI.	SEC. 1	SEC, 2	SEC. 3	PARI No.	PAKI No.	AKI NO. PAKI NO.	PAKI NO.	PAKI NO. PAKI NO.	PAKI NO.
	F	11TVAC	640VCT	640 VCT 6. 3VAC 23VAC	23VAC	TP-212					
		© .25A	O10.	W . 00 A 010. 0	© 300A						

_	_
used	used
10E	ğ
18	7
C24	C28
☐ When C23 is 20000MMF C24 is not used.	20000MMF
18	9
C23	255
When	W
9	0

558

GEM-401 DC525 DC525 UC-5347 GEM-4147

BYA6SI CUB4PI BYA6D5 BYA6D5 BYA10T47 CUB4847

When C32 is 20000MMF C33 is not used. Not used In some versions.

#### COILS

			REPLACEMEN	T DATA			
<b>3</b>	USE	GROMMES PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES	
_	Tone Choke					220 Millhenrie s	

## SELENIUM RECTIFIER REPLACEMENT DATA

	NOTES	
	SARKES TARZIAN PART No.	604B
ACEMENT DATA	INTERNATIONAL PART No.	CIB
REPLACEA	FEDERAL PART No.	1017
	GROMMES PART No.	
RATING	CURRENT (Measured)	. 3A
	No H	M

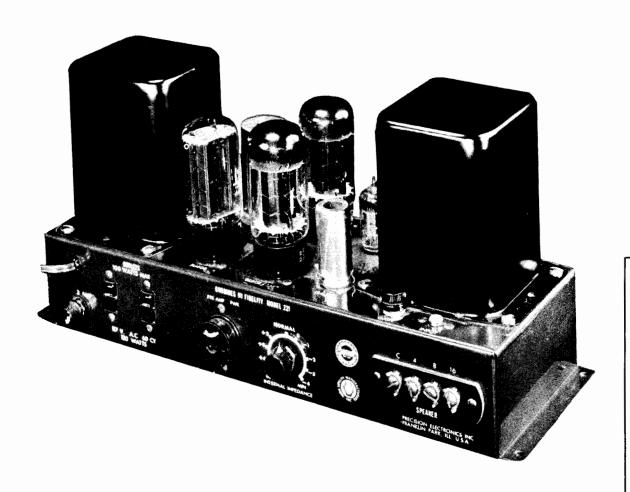
#### FUSES

		HOLDER	
	BUSS PART No.	FUSE HO	AGC½ HKP
REPLACEMENT DATA	LITTELFUSE PART No.	HOLDER	342001 A
KEPLACEME	LITTEL	FUSE	312. 500 (3AG ½A 250V)
	GROMMES PART No.	HOLDER	
		FUSE	
	RATING		±A 250V
	TYPE		3AG
	Ž. Š.		M2

### MISCELLANEOUS

₹ %	PART NAME	GROMMES PAPT NO	NOTES
		TAKI NO.	
M3	Pilot Lamp		<b>#21</b>
M4	Switch		Rolloff DB (Rotary Wafer Type)
W2	Switch		Turnover CPS (Rotary Wafer Type)
M6	Switch		Input Selector (Rotary Wafer Type)
M7			Tape Monitor (Slide Type SPDT)
M.8			Rumble Filter (Slide Type SPDT)
M.9	Switch		Presence (Slide Type SPDT)
M10			Loudness (Slide Type DPST)
M			Low Freq. (Slide Type SPDT)
MI2			Power On-Off (811de Type SPDT)





TRADE NAME Grommes Model 221

MANUFACTURER Precision Electronics, Inc. 9101 King Ave., Franklin Park, Ill.

TYPE SET AC Operated Audio Amplifier

TUBES (Five) Types 12AU7 AF Amplifier, 12AU7 AF Amp. - Phase Inv., (2) 6L6GB (or) 5881 Output,

U4GB Rectifier

POWER SUPPLY 110-120 Volts AC - 60 Cycles RATING . 9 Amp. 3 117 Volts AC (9 Watts)

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T2

# PARTS LIST AND DESCRIPTIONS

# TUBES (GENERAL ELECTRIC, SYLVANIA)

TYPE NOTES	12AU7 12AU7	
USE	AF Ampililer AF Amp Phase Inv. 12	
TEM No.	V2 V2	

NOTES	Note 1				SPRAGUE PART No.	TVL-3842	TVA-1504	TVA-1308
TYPE	6L.6GB 5U4GB				SANGAMO PART No.	Q-040	MT-4510	MT-0550
			S		PYRAMID PART No.	TMQ-12	TD-10-250	TD-50-50
USE	Output Rectifier		ELECTROLYTIC CAPACITORS	REPLACEMENT DATA	MALLORY PART No.	FP396.1	TC52	TC39
ŞE¥	V4 V5		S	EPLAC	in≪o			
			JIC	~	CORNELL- DUBILIER PART No.	C0372	BR1045	BR505
NOTES	Note 1		TROL		AEROVOX PART No.	AFH3-50-05	0IA09	V 50
TYPE	12AU7 12AU7 6L.6GB	1881	ELEC		PAR	AFH3	PRS350V10	PRS50V50
	ase Inv.	1. Some versions may use type 5881			GROMMES PART No.			
USE	AF Amplifler AF Amp Ph Output	version		RATING	CAP. VOLT.	450 450	450 250	20
	AF Au AF Au Output	1. Some		RAT	Ą.	40	<b>4</b> 20	20

501

12AU7

12**AU**7

SS CB

ITE. No.

## FIXED CAPACITORS

Copacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

	NOTES							10%
	110	PART No.	2TM-P22	5GA-T25	2TM-P22	4TM-Pl	4TM-PI	
DATA	200	PART No.	GEM-2022	UC-5325	GEM-2022	GEM-401	GEM-401	
REPLACEMENT DATA	colc	PART No.		ED-250				ED-20
~	CORNELL-	PART No.	CUB2P22	L10T25	CUB2P22	CUB4PI	CUB4PI	L1002
	CENTRALAB	PART No.		DD-251		DF-104	DF-104	D6-200
	201042	PART No.	P268N-22	BPD-00025	P288N-22	P488N-1	P488N-1	NP0-SI 20
	000101000	PART No.						
	MING	VOLT	200		200	400	400	
	Z	3	. 22	250	. 22	-:	٦.	20
	TEM	ģ	C4	S	80	C	83	င်

**V**3

6L6GB 6L6GB

#### CONTROLS

	STON NOITY INTER		Gain		Damping (Wire Wound)	Damping (Wire Wound)
	MALLORY	PART No.	U48	Not Req.		
TA	٩	A	Q13-133	Not Req.		
PLACEMENT DATA	CLABOSTAT	PART No.	A47-500K-Z	RS-2		
REF	CENTRALAB	PART No.	B-60	Not Req.		
	SECURITES	PART No.	VC500K			
5	Ş	WATTS	40		4	4
	KAING	RESIST- ANCE	500K	Shaft	n	II.
	TEX	ģ	RLA	В	R2A	В

 $\bigcirc$ 

#### RESISTORS

All Wattages 1/2 Watt, of less, unless offlet wise fisten.		MES IRC NOTES ITEM RATING GRON	PART No. OHMS WATT		BTS-22K 2	R14	RIS		R17 100K		R19	_	160
ć,	_								_				
11, 01 15		NOTES											
/* cofenie	ENT DATA	IRC	PART No.	BTS-IMeg	BTS-22K	BTA-100K	BTS-100K	BTS-1000	BTS-22K	BTS-2200	BTS-IMeg	BTA-47K	
7	REPLACEM	GROMMES	PART No.										
		ن ن	WATT			-	_					-	•
		RATING	OHWS	Meg	22K	100K	100K	10000	22K	22000	Med	47K	1
		¥ 1	ģ	В3	H4	RS	Be	B.7	RB	B. B.	E	1	

NT DATA					REPLACEMENT DATA	ENT DATA	
IRC	NOTES	¥ Z	RATING	9	GROMMES	IRC	NOTES
PART No.		9	OHWS	WATT	PART No.	PART No.	
RTS-IMeg		R12	26K	1		BTA-56K	
ATS-22K		R13	22K	~		BTB-22K	
TA-100K		R14	10001			BTS-1000	
TOUL STE		RIS	100K			BTSI00K	
BTS-1000		RI6	10001			BTS-1000	
766 976		R17	100K			BTS-100K	
3TS-220		R18	400B	2		1 3/4A-400	
TC-1Meg		RIB	22K			BTS-22K	
DTA-47K		R20	22K	2		BTB-22K	
WILL WILL		5	100	-		DTA 10V	

(V5) **5U4GB** 

(II

# CHASSIS—BOTTOM VIEW

# PARTS LIST AND DESCRIPTIONS (Continued)

## TRANSFORMER (POWER)

						RE	PLACEMENT	DATA		
Ž Š		<b>Z</b>	KATING		GROMMES	Halldorson	Merit	Stancor	Thordarson	Triad
	PRI.	SEC. 1	SEC. 2 SEC. 3	SEC. 3	PART No.	PART No.	PART No.	PART No.	PART No.   PART No.   PART No.   PART No.	PART No.
Ę	UTVAC © . 9A	117VAC 760VCT 5VAC (2) . 9A (2) .110A (2) 3A	5VAC © 3A	6. 3VCT	TP5UA				25R06	<b>HSM-207</b> ⊕

						_				
בופם	PART No.	HSM-207 ⊕							ing holes.	
Merit Stancor Thordarson	PART No. PART No. PART No.	25R06					NOTES		HSM-186 Drill new mounting holes.	
STORCOL	ART No.						г—		O Dru	_
Jer	No.				PUT)		Triad	PAKI No.	HSM-186	•
	PART No. PA				OUT		Stancor Thordarson	PAKI NG.	22839	
	PAR				NDIC	\TA	ancor	PAKI No.		
	ė Ž				2	칠	L.			_
	PART No.	TP5UA			<b>SRMEI</b>	REPLACEMENT DATA		PAKI No.	A-3102	
_	SEC. 1   SEC. 2   SEC. 3	6. 3VCT	4		TRANSFORMER (AUDIO OUTPUT)	R	Halldorson	PAKI NO.	H4111	
	SEC. 2	117VAC 760VCT 5VAC (9.8A   (9.110A (9.3A	(1) Drill new mounting holes.		_		GROMMES	FAKI NO.	T022	
		OVCT JIOA	ew mo				L_	•		
		903	Ortil n				ANCE	SEC.	160	3
	ZE.	DTVAC	Θ				IMPEDANCE	PRI.	•	CI IND
ź		Ţ					¥ ġ		T2	

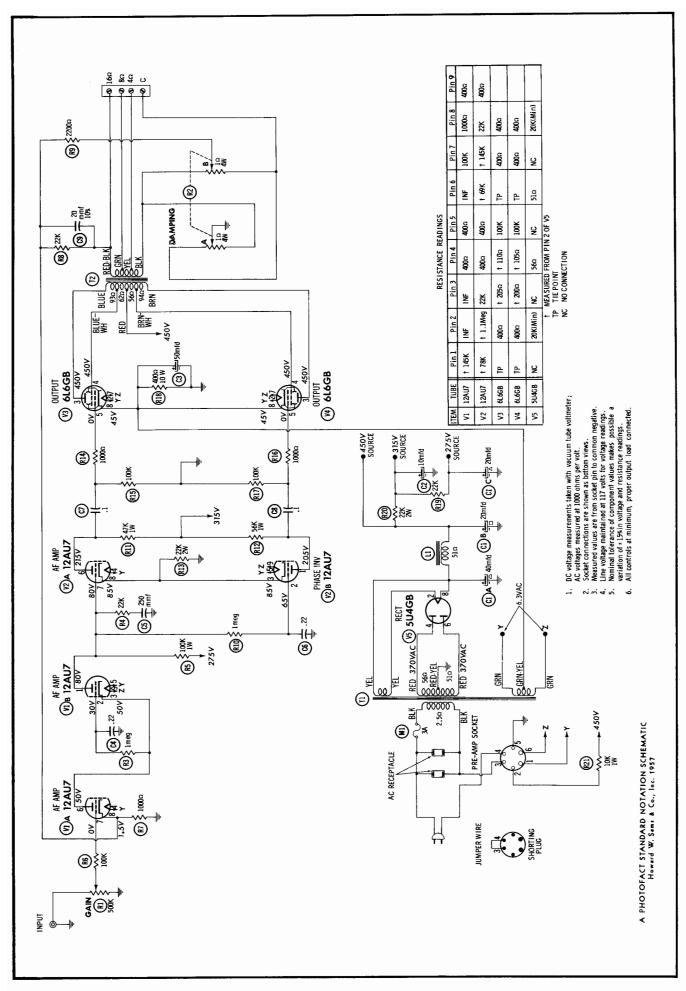
### FILTER CHOKE

	Triod PART No.	C-23X	
	Thordarson PART No.	28C43	
DATA	Stoncor PART No.	C-2304	
LACEMENT	Merit PART No.	C-2974	
REF	Halldorson PART No.	C5026	
	GROMMES PART No.	CH2	
	INDUCTANCE (0 CURRENT 1000 (L)	2Hy	
RATINGS	D. C. RESISTANCE	51.0	
	TOTAL DIRECT CURRENT	. 110A	
	N. S.	3	

#### FUŠES

	SS No.	HOLDER	нсм
	BUSS PART No.	FUSE	AGC3
REPLACEMENT DATA	LITTELFUSE PART No.	HOLDER	342001
REPLACEM	LITTE	FUSE	312003. (3AG-3A)
	MES No.	HOLDER	
	GROMMES PART No.	FUSE	
	RATING		3А
	TYPE		3 <b>A</b> G
	Zew No.		M1

M1 R21 C7 R17 R16 R13 R2 R3 R6 R9 R4 R7 C5 R1 R8 C9
(1) (3) (R20) (R18) (R15) (R14) (R5) (R10) (C8) (R11) (R12) (R19) (C6) (C2) (C4)







TRADE NAME	Hamilton Model PMX-6
MANUFACTURER	Hamilton Electronics Corp., 2726 W. Pratt Ave., Chicago 45, Iil.
TYPE SET	AC Operated 6 Channel Preamplifier Mixer
TUBES (Three)	Types 12AX7 Channels 1-2 Preamplifier, 12AX7 Channels 3-4 Preamplifier, 12AX7 Channels 5-6 Preamplifier
POWER SUPPLY	110-120 Volts AC - 60 Cycles RATING .04 Amp. (2) 117 Volts AC (5 Watts)

#### HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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# PARTS LIST AND DESCRIPTIONS

# TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V2 V2	Channel 1-2 Preamp. Channel 3-4 Preamp.	12AX7 12AX7	

NOTES	
TYPE	12AX7
USE	Chamel 5-6 Preamp.
ITEM No.	N3

## ELECTROLYTIC CAPACITORS

					2	ELCINOLI IIC CAI ACII CHO			
RATING		Ş			REPLAC	REPLACEMENT DATA			
A.	_	No. CAP. VOLT.	HAMILTON PART No.	AEROVOX PART No.	CORNELL- DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
40		150	(Note 1)	AFH3-09	08000	FP31L 4	TMT-8 T-040	T-040	TVL-3438
30		120					_		
20		150							

Note 1: Some versions may use 20-20-20MFD unit in this application.

FIXED CAPACITORS
Capacity values given in the rating column are in mfd. for Paper
Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

						~	EPLACEMEN	T DATA		
TEA	R	ATING	THE STATE OF STATE	20,00	CENTRALAB	CORNELL-	Loie	_		MOTES
Š	₹.	VOLT	PART No.	PART No.	PART No.	DUBILIER PART No.	PART No.	PART No.	PART No.	NOES
C3	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
ຬ	10000			BPD-01	DD-103	BYA6S1	ED-01	DCSII	5HK-S1	
C4	10000			BPD-01	DD-103	BYA6SI	ED-01	DC511	5HK-Sl	
S	10000			BPD-01	DD-103	BYA6S1	ED-01	DCSII	5HK-81	
క	10000			BPD-01	DD-103	BYA6SI	ED-01	DCSII	SHK-S1	
C1	10000			BPD-01	DD-103	BYA6S1	ED-01	DCSII	5HK-SI	

#### CONTROLS

						2		
	CIVILITA	4		REF	REPLACEMENT DATA	ITA		
¥	\$	2	HAMILTON	CCNITOALAB	CIABOCTAT	اهر	Vacilian	SELOIA NOLE IN LENA
ģ	RESIST. ANCE	WATTS		PART No.		PART No.	PART No.	INSTALLATION NOTES
RIA	500K	-40		B-60	A47-500K-Z Q13-133	Q13-133	U48	Channel 1 Volume
Д	Shaft			Not Req.	K88-3	Not Req.	Not Req.	
RZA	200K	-40			A47-500K-Z Q13-133	Q13-133	048	Channel 2 Volume
В	Shaft			Not Req.	KS8-3	Not Req.	Not Req.	
R3A	500K	<b>→ </b> ≈		B-60	A47-500K-Z Q13-133	Q13-133	U48	Channel 3 Volume
М	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R4A	200K			B-60	A47-500K-Z Q13-133	Q13-133	U48	Channel 4 Volume
ф	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R5A	500K	-40		B-60	A47-500K-Z Q13-133	Q13-133	U48	Channel 5 Volume
Д	Shaft			Not Req.	KSS-3 Not Req.	Not Req.	Not Req.	
R6A	500K	jee		B-60	A47-500K-Z	013-133	048	Channel 6 Volume
Ø	Shaft			Not Req.	K88-3	Not Req.	Not Req.	
O	Switch			KB-1	SWE-12	78-1	US-26	

47
7

RESISTORS
All wattages 1/2 watt, or less, unless otherwise listed.

			REPLACEMENT	ENT DATA			L		REPLACEM	ENT DATA	
TEX Z	RATING	<u>ა</u>	HAMILTON	IRC	NOTES	¥ Z	RATING	<u>ა</u>	HAMILTON	IRC	NOTES
ġ Z	OHWS	WATT	PART No.	PART No.		9	OHWS	WATT	PART No.	PART No.	
R7	470K			BTS-470K		RIB	150K			BTS-150K	
88	100K			BTS-100K		R19	470K			BIS-470K	
8	150K			BTS-150K		R20	100K			BTS-100K	
RIO	470K			BTS-470K		R21	150K	_		BTS-150K	
12	100K			BTS-100K		<b>E22</b>	470K	_		BTS-470K	
R12	150K			BTS-150K		R23	100K	_		BTS-100K	
R13	470K			BTS-470K		<b>R24</b>	150K			BTS-150K	
RI4	100K			BTS-100K		22	33K			BTS-33K	
<b>E</b>	150K			BTS-150K		R26	33K			BTS-33K	
RIB	470K			BTS-470K		R27	10K			BTS-10K	
R17	100K	_		BTS-100K							

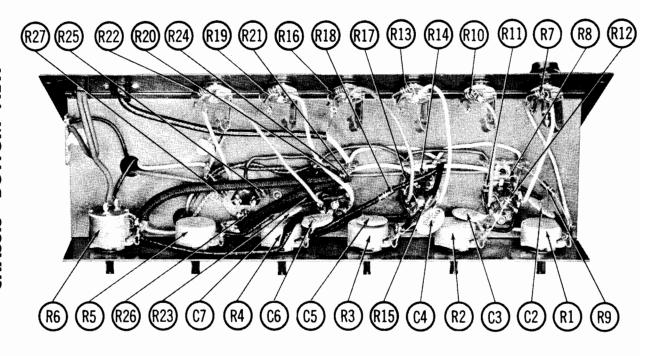
## TRANSFORMER (POWER)

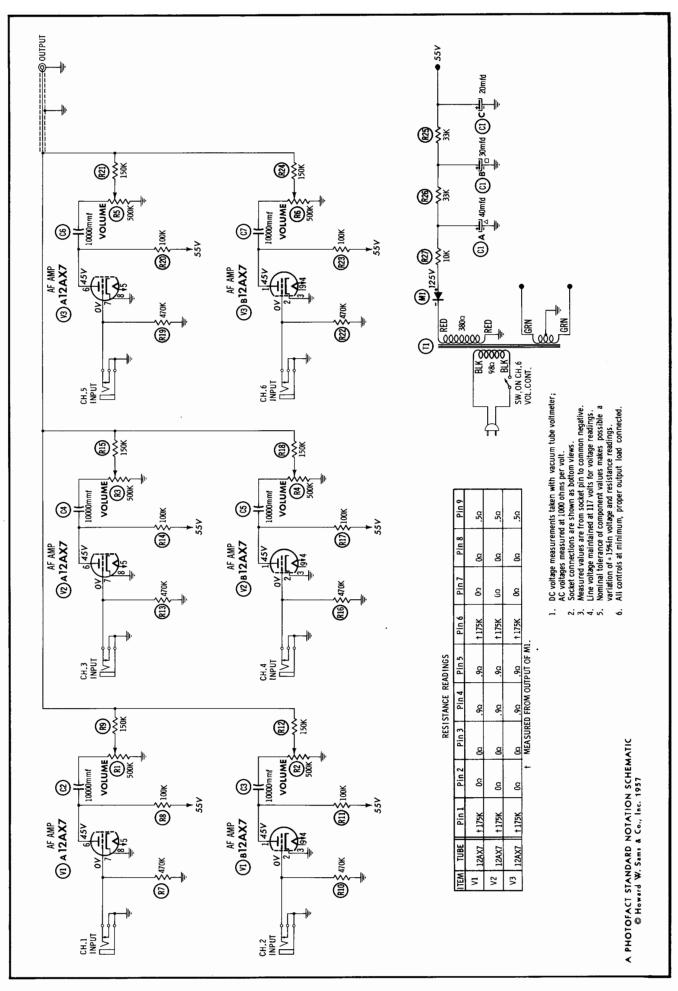
						REF	LACEMENT	DATA		
Ž Š		Z	RATING		HAMILTON	Holldorson	Merit		Thordorson	Triod
	PRI.	SEC, 1	SEC. 2	SEC. 3	PART No.	PART No.	PART No.		PART No. PART No.	PART No.
F	U7VAC	150VAC 8VCT	BVCT		33GA07		P-3046		26R32	
	@.04A	3.0012A	@ .34A							

## SELENIUM RECTIFIER

		NOTES		
		SARKES TARZIAN PART No.	20	
		RADIO RECEPTOR PART No.	831	
1157	DATA	MALLORY PART No.	8875	
SELECTION RECTIFIER	REPLACEMENT DATA	INTERNATIONAL PART No.	RS050	
JELLI		FEDERAL PART No.	1386	
		HAMILTON PART No.		
	RATING	CURRENT (Measured)	. 0012A	
		ŽĘ Š	MI	

# CHASSIS—BOTTOM VIEW







TRADE NAME Harman-Kardon Model A-1040 "Trend II"

 $\mbox{MANUFACTURER} \quad \mbox{Harman-Kardon, Inc., 520 Main St.}, \mbox{ Westbury, L.I., N.Y.}$ 

TYPE SET

AC Operated 6 Channel 40 Watt Audio Amplifier

TUBES (Ten)

Types 12AX7 Phono Preamplifier, 12AX7 Cath. Follower-AF Amp., 12AV6 AF Amplifier, 12AT7 AF Amp-

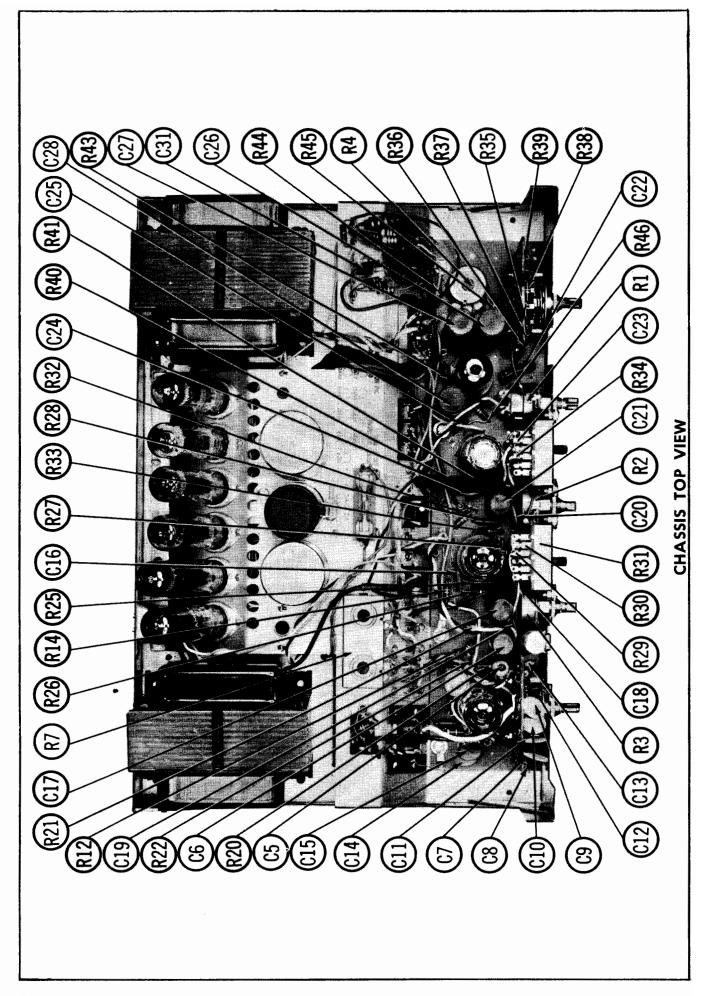
Phase Inv., (4) 12AB5 Output, (2) EZ81 Rectifier

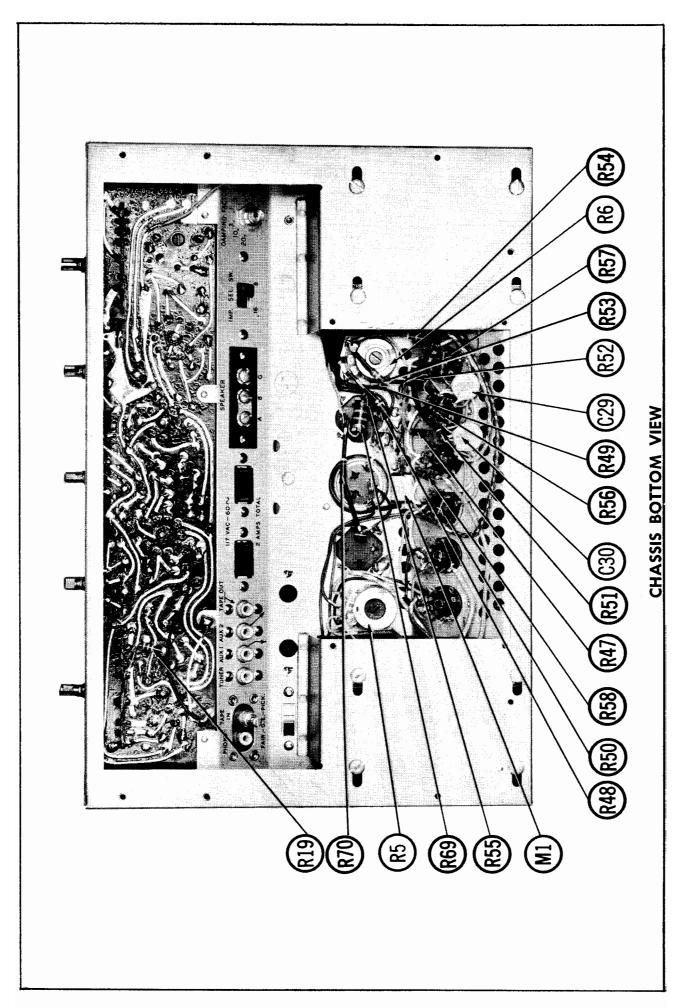
POWER SUPPLY 105-125 Volts AC-60 Cycles RATING . 83 Amp. @117 Volts AC (84 Watts)

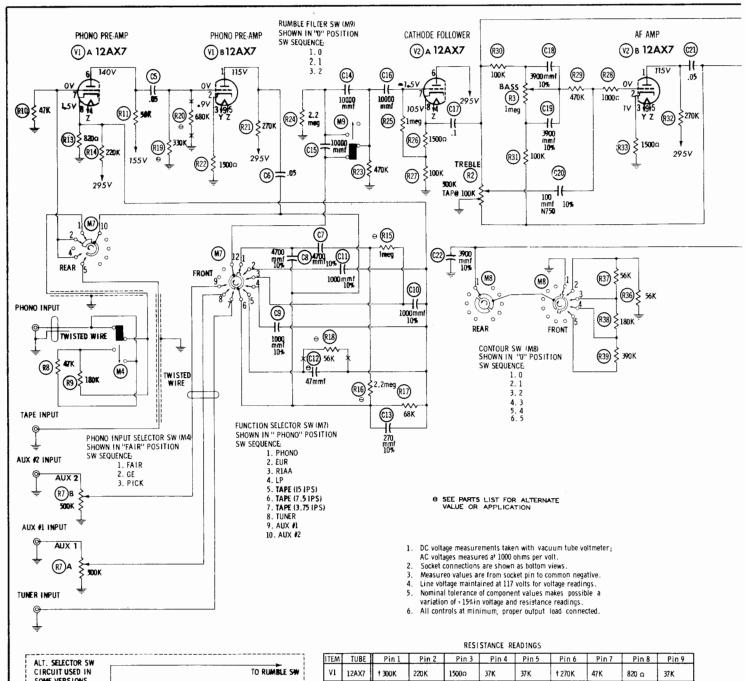
#### HOWARD W. SAMS & CO., INC. . Indianapolis 5, Indiano

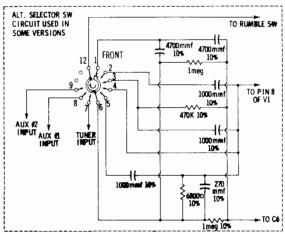
.The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of H268

the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1958 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana. Printed in U.S. of America









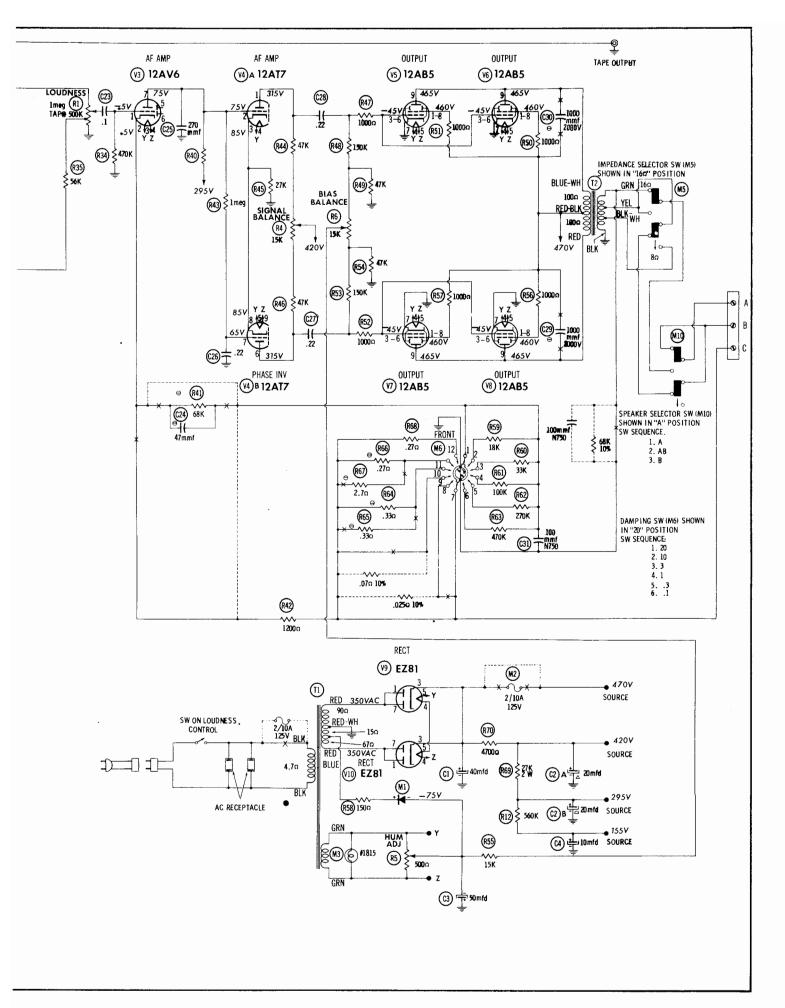
TEM	TUBE	Pinl	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
۷۱	12AX7	† 300K	220K	1500ດ	37K	37 K	† 270K	47K	820 Ω	37K
V2	12AX7	† 300K	600K	1500ດ	37K	37 K	† 32K	1.1meg	100K	37K
٧3	12 <b>A</b> V6	470K	1100Ω	37K	37K	NC	NC	† 500K		
V4	12AT7	160K	† 500K	27K	37K	37K	† 60K	†1.5meg	27K	37K
V5	12AB5	† 1 <b>090</b> 0	TP	165K	37K	37K	165K	0Ω	† 1000Ω	† 100Ω
۷6	12AB5	† 1 <b>000</b> Ω	TP	165K	37K	37K	165K	0Ω	† 1000Ω	† 10 <b>0</b> Ω
V7	12AB5	† 1000Ω	TP	165K	37K	37K	165K	0Ω	† 1000Ω	†100Ω
V8	12AB5	t 1000a	TP	165K	37K	37K	165K	0Ω	†1000Ω	†100ດ
V9	EZ81	90Ω	NC	20K(min)	37K	37K	NC	90Ω	NC	NC
V10	EZ81	8ln	NC	20K(min)	37K	37K	NC	81n	NC	NC

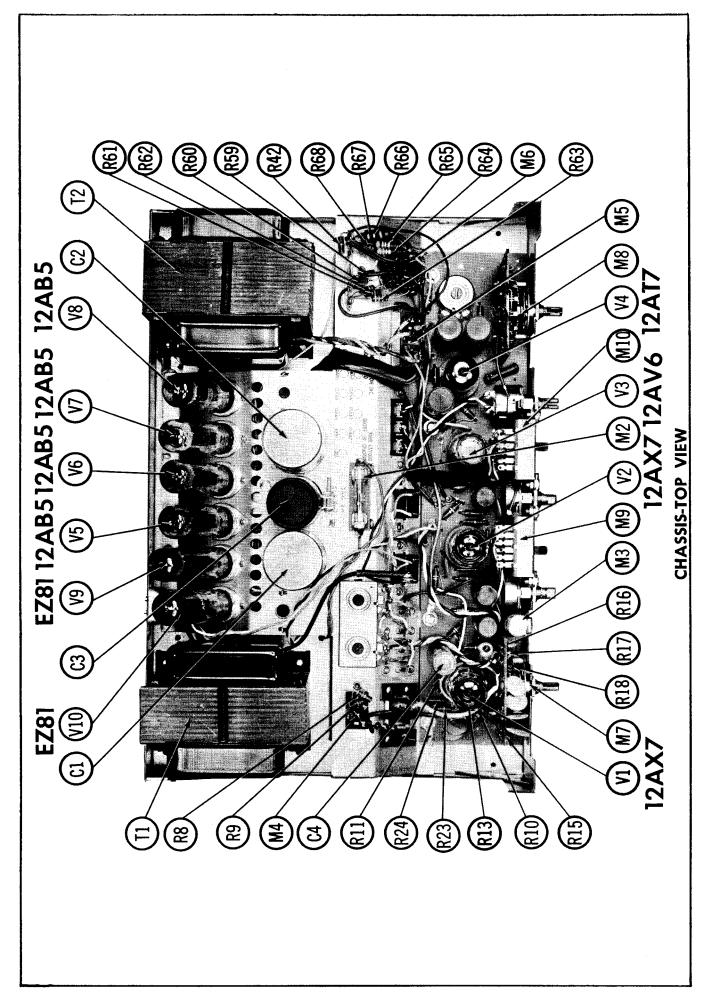
MEASURED FROM PIN 8 OF V 2

A PHOTOFACT STANDARD NOTATION SCHEMATIC

Howard W. Sams & Co., Inc. 1958

NC NO CONNECTION TP TIE POINT





# PARTS LIST AND DESCRIPTIONS TUBES (GENERAL ELECTRIC, SYLVANIA)

TEA No.	W USE	TYPE	NOTES	Ne.	5
5	Phono Preamplifier	12AX7		9Λ	Output
72	Cath. Follower-AF Amp.	12AX7		V7	Output
V3	AF Amplifler	12AV6		Α8	Output
V4	AF Amplifier-Phase Inv.	12AT7		60	Rectifier
A5	Output \	12AB5		V10	Rectifier

₹ Š		ž	USE	TYPE	NOTES	ITE#	A USE		TYPE	NOTES
<b>5</b> \$	Phon	Phono Preamplifier		12AX7		V6	Output		12AB5	
V 4	AF A	AF Amplifler	dmv sv- i	2AV6		N8			12AB5	
V4	AF A	mpliffer	-Phase Inv.	2AT7		60			EZ81	
Λ2	Output	, ,	12,	12AB5		VI0	Rectifier		E.Z81	
				ELECT	ROLY	TIC CA	ELECTROLYTIC CAPACITORS	٠,		
	RAT	RATING				REPLA	REPLACEMENT DATA			
Š Š	3 3	VOLT.	Harman-Kardon PART No.	AEROVOX PART No.	× Š.	CORNELL- DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
ວັ	40	475	JE1071739	AFH1-	AFH1-58-10	A0518	FP284	TMD-61	S-300	TVL-1820
C2A		475	JE1071740	AFH2-69	_	B0500		TMD-61	D-270	TVL-2935
m	202	475								
ខ	သ	120	JE1021711	AFH1-18	_	A0200	FP115	T.MB-20	S-080	TVL-1415
C4	10	120		PRS150V10	_	BBR10-150	TC42	TD-10-150	MT-1510	TVA-1406

## FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

						~	REPLACEMENT DATA	DATA		
Ę	Ž	RATING	Harman-Kardon	г	CENTRALAB		202	200	31,0	ST CIA
Ż	3ं	VOLT	PART No.	PART No.	PART No.		PART No.	PART No.	PART No.	2
CS	.05	200		P288N-05	DF-503	CUB285		GEM-415	2TM-S5	
ర	8	400				BC6S47J		ACE615	4SE-S47	
C	4100					1R5D47			MS-247	10%
8	4100					1R5D47			7	10%
ප	00 1					IRSDI	ED-1000	MCB255		10%
CIO	001					IRSDI	ED-1000	MCB255		10%
CII	000					IRSDI	ED-1000	MCB255	-	10%
C18	47			BPD-000047	DD-470	L10047	ED-47	UC-5447		9
CI3	270			NPO-S1270	D6-271	5R5T27	ED-270			201
C14	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511		
CIS	1000			BPD-01	DD-103	BYA8S1	ED-01	DC511	5HK-81	
C16	00001			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-SI	
CI1	٦.	200				BC2P1J		ACE401	2SE-P10	
CIB	3900				_	1R5D39			MS-239	108
CIB	3900				_	1R5D39			MS-239	
02 02 02	8			N750-D1100	TCN-100	CIOTIU	TC7-100	NT-531	5TCU-TI	N750 10%
ឌ	8	400				BC6847J	•	ACE615	48E-847	
C23	3900	_				IR5D39			MB-239	10%
C23	-:	200				BC2P1J		ACE401	28E-P10	
C24	47			BPD-000047	DD-470	L10047	ED-47	UC-5447	5GA-Q47 (	_ ല
C25	220			S1270	D6-271	LT6T27	GP-270	UC-5327	5GA-T27	
C28	. 22	400				BC6P22J		ACE6022	4SE-P22	
C27	. 22	40				BC6P22J		ACE6022	4SE-P22	
C28	. 22	400			_	BC6P22J		ACE6022	4SE-P22	
C29	<u>00</u>	2000		HVD-30-1000	DD30-102	HVB20D1	HD3-1000	DC3021	20HKB-DI	Θ
C30	<u>001</u>	2000		HVD-30-1000	DD30-102	HVB20D1	HD3-1000	DC3021	20HKB-Di(	Θ
င္မ	100			N750-DI100	TCN-100	CIOTIU	TC7-100	NT-531	5TCU-T1 N750	N750

## ① Not Used in Some Versions

## CONTROLS

		9		REI	REPLACEMENT DATA	ITA		
EX.	S	2	Harman-	CENTRALAB	TATACAM	اور	Vaccinate	SETOIA MOIT A LIATEIA
ż	RESIST.	WATTS	PART No.	PART No.	PART No.	2	PART No.	INSTALLATION NOTES
RIA	Imeg	400	RV1021636					Loudness, Tap @ 500K
Ø	Switch							Power On-Off
R2	50 <b>0K</b>	-44	RV1021634					Treble, Tap® 100K
23	lmeg	4	RV1021635					Bass
R4	15K	-40	RV1021725					Signal Balance
RSA	5000	-40	RV1021709	AB-4	A47-500-S	BI1-103	TA52L	Hum Adjustment
Д	Shaft			AK-1	FKS-1/4	TMI-Kit	Not Req.	
R6A	15K	*	RV1021708	AB-22	A47-15K-8	B11-118	TA153L	Bias Balance
Д	Shaft			AK-1	FKS-1/4	TMI-Kit	Not Req.	
RTA	500K	-40	RV1071756	BX-59	A47-500K-B	BII-133	TASSL	Aux. 1
Д	500K	-40		BX-59	A47-500K-B	BII-133	TASSL	Aux. 2
Ö	Shaft	,		Not Req.	FKS-1/4 •	TM-Kit	Not Req.	* Two Required

# PARTS LIST AND DESCRIPTIONS (Continued) RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

		_			_														_						_	_		_				
NOTES			Note 3																							Note 5		Note 6				
Harman- Kardon	PART No.																															
U	WATT	L			_																										~	
RATING	OHWS	470K	68K	120021	lmeg	47K	27K	47K	10000	150K	47K	10000	1000	10001	150K	47K	15K	10000	100001	1502	18K	33K	100K	270K	410K	0.33Ω	0. 33വ	0.272	2, 70	0.270	27K	47002
ITEM	ģ	R40	R41	R42	R43	R44	R45	R46	R47	R48	R49	R50	RSI	R52	R53	R54	R55	R56	R57	R58	R59	R60	R61	R62	R63	R64	R65	R66	R67	R68	R69	R70
NOTES									Note 1	Note 2		Note 3	Note 4	Note 3	•																	
Harman- Kardon	PART No.																															
6	WATT																															
RATING	OHWS		180K	47K	26K	580K	8200	220K	lmeg	2. 2meg	68K	26K	330K	680K	270K	15000	410K	2.2meg	lmeg	15002	100K	100001	470K	100K	100K	270K	15002	470K	56K	26K	26K	180K
ITEM	ģ	R8	83	R10	RII	RI2	R13	R14	RIS	R16	R17	R18	RI9	R20	R2I	R22	R23	R24	R25	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38

- Note 1. Some versions may use 470K in this application Note 2. Some versions may use Imeg in this application Note 3. Not used in some versions Note 4. Some versions may use 220K in this application Note 5. Some versions may use 0.180 in this application Note 6. Some versions may use 0.240 in this application Note 6.

TRANSFORMER (POWER)

						REF	REPLACEMENT DATA	DATA		
Z E		Z	MING		Harman-Kardon	Halldorson	Merit	Stancor	Stancor Thordorson Triad	Triad
	PRI.	SEC. 1	SEC. 2	SEC. 3	PART No.	PART No.	PART No.   PART NO.	PAKI NO.	PAKI NO.	PAKI No.
T	117V	720VCT	12V		FT1071729					
	3.83A	3 .074A 8 2.6A	® 2.6A							
		Tap (9)								
		. UUZA								

# TRANSFORMER (AUDIO OUTPUT)

				2	REPLACEMENT DATA	DATA			
Z Š	MPED	ANCE	No. IMPEDANCE Harman-	Halldorson	Merit	Stancor	Thordarson	Triad	NOTES
	PRI.	SEC.	LAKI NO.	LAKI NO.	LAKI NO.	ON INC.	.00	. Out	
LZ	4400B	1400R 16Ω	FT1071730				22S78 ①		(1) Use Orig. Shields
	CI	CT Tap®							Do Not Use 250%, 500% Taps
		80.40							

#### RECTIFIERS

	NOTES	
	SARKES TARZIAN PART No.	10
ENT DATA	INTERNATIONAL PART No.	CR20
REPLACEN	FEDERAL PART No.	1159
	Harman-Kardon PART No.	21021726
RATING	CURRENT (Measured)	. 002A
	¥ ¿	W

#### FUSES

					REPLACEM	REPLACEMENT DATA		
Ž.	TYPE	RATING	Harman-Kardon PART No.	-Kardon No.	LITTEL	LITTELFUSE PART No.	BUSS PART No.	SS No.
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	3AG	2/10A			313, 200	357001	MDL 2/10	4405
		125V S/B			(3AG 2/10A 125V S/B)			

### MISCELLANEOUS

五克	PART NAME	Harman-Kardon PART No.	NOTES
M3	Pilot Lamp	KB1071741	41815
M4	Switch		FairGE-Pick (Silde Type SPDT)
MS	Switch		Impedance Selector (Slide Type SPST)
<b>8</b>	Switch	ER371057	Damping Factor (Rotary Wafer Type)
M7	Switch	ER1021633	Function (Rotary Wafer Type)
M8	Switch	ER1021632	Contour (Rotary Wafer Type)
M <sub>3</sub>	Switch		Rumble Filter (Slide Type DPST)
MIO	Switch	ES1021717	Speaker (Silde Type DPST)

#### WIRING DATA

8530 (Solid) Available in Ten Colors	8524 (Stranded) Available in Ten Colors 1765-B (6 Ft. Length)	1.60-18. (12 Ft. Length) io. 9430 (Two Conductor - Twisted)
General-use Unshielded Hook-up Wire Use BELDEN No. 8530 (Solid) Available in Ten Colors	8524 (Stranded) Availa Power Cord	Low-Loss Shielded Lead (interconnecting)

# CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

## **ADJUSTMENTS**

## BIAS BALANCE ADJUSTMENT (R6)

This control should be adjusted if an output tube (V5, V6, V7, or V8) is replaced, Connect a suitable load (speaker or resistor) across the speaker terminals and allow the amplifier to warm-up. Connect no scilloscope across the speaker terminals. Afth volume control at minimum, adjust R6 for a straight line on the screen of the scope. If an oscilloscope is not available, an AC VTVM may be connected across the speaker terminals and R6 adjusted for a minimum reading on the meter.

(This should be approximately 1-5 millivolt).

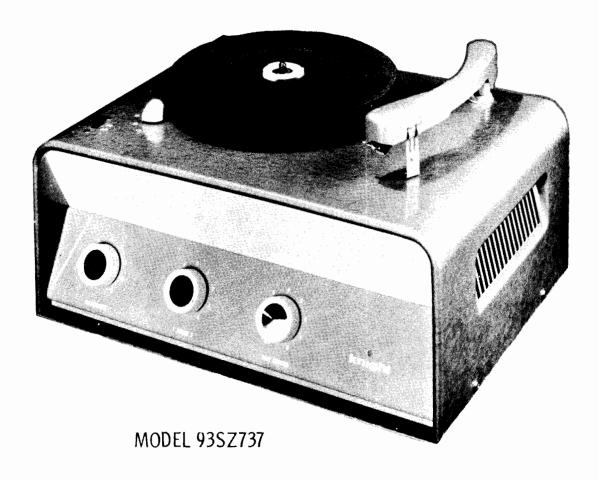
## SIGNAL BALANCE ADJUSTMENT (R4)

This control should be adjusted if new tubes are installed in the amplifier.

The "Bias Balance" control (R6) should be adjusted prior to adjusting R4.
Connect an IM analizer, with a signal ratio of 4:1, to the amplifier. Set volume control for maximum output.

Adjust the "Signal Balance" control (R4) for minimum IM.





POWER SUPPLY	110-120 Volts AC - 60 Cycles	RATING	. 6 Amp. (2) 117 Volts AC, 62 Watts
TUBES (Five)	Types 6AV6 Mic. Preamplifier, ECOutput, 5Y3GT Rectifier	C83 (or) 12AD7 (	or) l2AX7 AF Amplifier, (2) 6V6GT
TYPE SET	AC Operated 16 Watt 3 Channel Audi	o Amplifier (Mo	del 938Z737 Has 4 Speed Manual Record Player)
SUPPLIER	Allied Radio Corp., 100 N. Western	Ave., Chicago	80, Illinois
TRADE NAME	Knight Models 93SZ505, 93SZ737		

#### HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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# PARTS LIST AND DESCRIPTIONS TUBES (GENERAL ELECTRIC, SYLVANIA)

USE	Output Output Rectifier
TEM No.	V3 V4 V5
NOTES	Note 1
TYPE	6AV6 ECC83/ 12AX7
USE	Mic. Preamplifler AF Amplifler
No.	72 73

NOTES				SPRAGUE PART No.	TVL-3783	TVA-1704 TVA-1308
TYPE	6V6GT 6V6GT 5Y3GT			SANGAMO PART No.	Q-055	MT -4508 MT -1540
3		S		PYRAMID PART No.	TMT-36	TD-8-450 TD-40-150
3SU	Output Output Rectifler	relons use a 12AD7 in this application.  ELECTROLYTIC CAPACITORS	REPLACEMENT DATA	MALLORY PART No.	FP396.2	TC71 TC48
Š.	V3 V4 V5	appll CAF	EPLAC	<u> -</u> સ છ		
		7 In this	~	CORNELL- DUBILIER PART No.	C0320	BR845 BR505
NOTES	Note 1	se a 12AE		AEROVOX PART No.	AFH3-41	PRS450V8 PRS150V40
TYPE	6AV6 ECC83/ 12AX7	ELEC		PAR	AFB	PRS
ı.	Mer	Note 1. Some versions use a 12AD7 in this application.  ELECTROLYTIC CAPACI		KNIGHT PART No.		
USE	Mic. Preamplifier AF Amplifier		RATING	CAP. VOLT.	450 450 450	450 50
	M1c AF		RA	A.	40 10 10	32
No.	V1 V2			No No	CIA	ខខ
			-			

## FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

	STOIL	200			10%	10%	10%					
		PART No.	5HK-SI	5HK-S1				6TM-S47	6TM-S47	6TM-S47	6TM-S47	6TM-S2
F DATA		PART No.	DC511	DC5II				GEM-6147	GEM-6147	GEM-6147	GEM-6147	GEM-812
REPLACEMENT DATA	-	PART No.	ED-01	ED-01	ED-500	ED-150						
~	CORNELL	DUBILIER PART No.	BYA6SI	BYA6S1		L10T15		CUB6S47	CUB6S47	CUB6S47	CUB6S57	CUB6S2
	CT. 170 1 1 0	PART No.	DD-103	DD-103	DD-501	DD-151		DF-503	DF-503	DF-503	DF-503	DD-203
		PART No.	BPD-01	BPD-01				P686N-047	P686N-047	P688N-047	P688N-047	P688N-02
	Hitches	PART No.										
	RATING	VOLT						909	909	909	90	009
	Z	3	10000	10000	200	150	2200	8	8.	8.	. 047	05
_	¥E.	ģ	_			C2	_	_		-		_

#### CONTROLS

	SECIA NOIS INSERT	INSTALLATION NOTES	Tone			Phono #1 & #2, Tap ② 2Meg	Mic. Input	
	Vacilian	PART No.	U53	Not Req.	US-26		U53	Not Req.
TA		PART No.	Q13-137	Not Req.	76-1		Q13-137	- }
REPLACEMENT DATA	CLABOSTAT	PART No. PART No.	A47-IMeg-Z	K88-3	SWE-12		A47-IMeg-Z	KSS-3
RE	CENITOALAB	PART No.	RP-105AC-C B-70 A47-11	Not Req.	<u>-</u>		B-70	Not Req.
	THE CHANGE	PART No.	RP-105AC-C			RP-405A		
١	2	WATTS	-10			-100	-101	
1240	MAIN	RESIST-	lMeg	Shaft	Switch	4Meg	IMeg	Shaft
	TEX	ģ	RIA	Д	υ	R2	R3A	Ø

# RESISTORS All wathares 1/2 wath or less, unless otherwise listed.

TEM					1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		•					
March   Marting   March   Marting   Marting				REPLACEME	ENT DATA					REPLACEM	ENT DATA	
OHMS   WATT   PART No.   PART No.   OHMS   WATT   PART No.	EX.	RATIN	ن ق	KNIGHT	IRC	NOTES	EA .		(2)		IRC	
100 k   100	9	OHMS	WATT	PART No.	PART No.		ġ	ď	WATT		PART No.	
470K 470K 470K 470K 470K BTS-470K R16 470K BTS-470K R16 470K BTS-470K R17 2700 2700 2700 2700 2700 BTS-230K R18 3300 1 470K BTS-230K R18 3300 1 470K BTS-470K R18 820 1 820 820 820 820 820 820 820 820 820 820	R4	10Meg			BTS-10Meg		R13	100K			BTS-100K	
220K         BTS-220K         R15         100K           470K         BTS-470K         R16         470K           470K         BTS-470K         R17         550D         470K           270G         BTS-270K         R18         470K         1           470K         BTS-370K         R19         330G         1           470K         BTS-470K         R20         1           470K         BTS-470K         R21         22K	2	470K			BTS-470K		R14	10001			BTS-1000	
470K         BTS-470K         R16         470K           470K         BTS-470K         R17         2500         4           2700G         BTS-270G         R18         470K         4           330K         BTS-330K         R19         3300G         1           470K         BTS-370K         R20         1           470K         BTS-470K         R21         22K	94	220K			BTS-220K		RIS	100K			BTS-100K	
470K         BTS-470K         R17         250D         4           2700A         BTS-2700         R18         470K           330K         BTS-330K         R19         330G         1           470K         BTS-370K         R20         10K           470K         BTS-470K         R21         22K	4	470K			BTS-470K		RIB	470K			BTS-470K	
27000 BTS-2700 R18 470K 330K BTS-330K R20 10K 470K BTS-370K R20 10K 470K BTS-470K R21 22K	88	470K			BTS-470K		R17	2500	4		PW4-250	
330K BTS-330K R19 3300Ω 1 470K BTS-470K R20 10K 470K BTS-470K R21 22K	2	2,000			BTR-2700		RIB	470K			BTS-470K	
470K 470K H70K BT8-470K R21 22K	RIO	330K			BTS-330K		RIB	33000	-		BTA-3300	
470K BTS-470K R21 22K	RII	470K			BT8-470K		R20	10K			BTS-10K	
	RI2	470K			BT8-470K		R21	22K			BTS-22K	

NOTES

6AV6 (VI) (T2)	6V6GT V3	6V6GT	5Y3GT V5
V2) 12AX ECC8	(3) (3) (3)	11)	

## TRANSFORMER (POWER)

						REP	LACEMENT	DATA		
Z Z		ZY.	RATING		KNIGHT	Holldorson	Merit	Stoncor	Thordorson	Triod
	PRI.	SEC. 1	SEC. 2	SEC. 3	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
F	117VAC	640VCT	5VAC	6.3VCT	LP-0258	P9315	P-2953	PM8410	22R05	R-148
	Ø. 6A	@ .076A	© 24	© 1.5A						

-		·	7								
2	PART No.	R-148									
1001001001	PART No.	22R05				NOTES					
	PART No.	PM8410			L		<u>.</u>				
	PART No.	P-2953	1	PUT)			PAKI No.				
		<u>                                       </u>		00		Thordorson	PAKI No.				
	PART No.	P9315		OIG	4	Stancor	Ö				
	ó			₹	IT DAT	Sta	A A	L			
	PART No.	LP-0258		ORMER	REPLACEMENT DATA	Merit	PAKI No.				
	SEC. 3			TRANSFORMER (AUDIO OUTPUT)	~	Halldorson	PAKI NO.				
	SEC. 1   SEC. 2   SEC. 3	11TVAC 640VCT 5VAC 8.3VCT 3.6A 3.076A 3.2A 3.15A		_		KNIGHT	FAKI NO.	LO-0150			
	SEC. 1	840VCT				L,	SEC.	00	<u>چ</u>	2500,	.,
	PRI.	T1 117VAC 640VCT (2) .6A (2) .076A				ITEM IMPEDANCE No.	PRI. S		CT Ta	2 KG	16
ż		F				Š Š		T2			

## PHONO CARTRIDGE

	SHARKS			PT-2 * Tone Arm Complete With Cartridge.	
	VOICE	Š	MOUNT	PT-2	
,	ELECTRO-VOICE	PART No.	CARTRIDGE		-
ENT DAT	IC	70.	NEEDLE	GĐ	
REPLACEMENT DATA	ASTATIC	PART No.	CARTRIDGE	25T	
	KNIGHT	PART No.			
	ITEM	ģ		W	

ASTATIC NEEDLE LISTING SHOWN ABOVE IS SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLACEMENTS SEE BELOW.

## PHONO NEEDLE

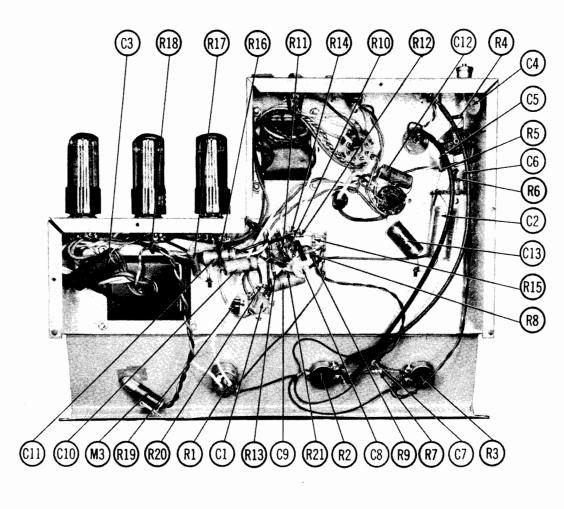
(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

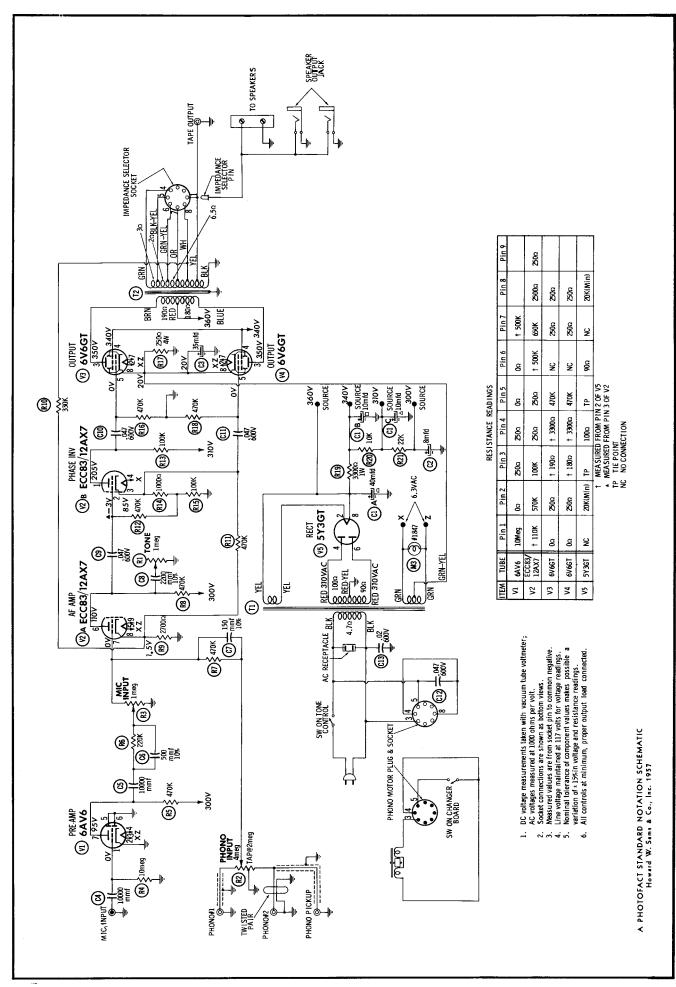
	REMARKS	• Metal † Jewel • Diamond
	WALCO PART No.	* W-8TPA or † W-8TPS or † W-8DS or • W-8TPD
REPLACEMENT DATA	JENSEN PART No.	† A-71 or † • A-7150 or • A-71D
	KNIGHT PART No.	
	Z S	M2

### **MISCELLANEOUS**

NOTES	#1847
KNIGHT PART No.	
PART NAME	Panel Lamp
Z è	М3

# CHASSIS—BOTTOM VIEW







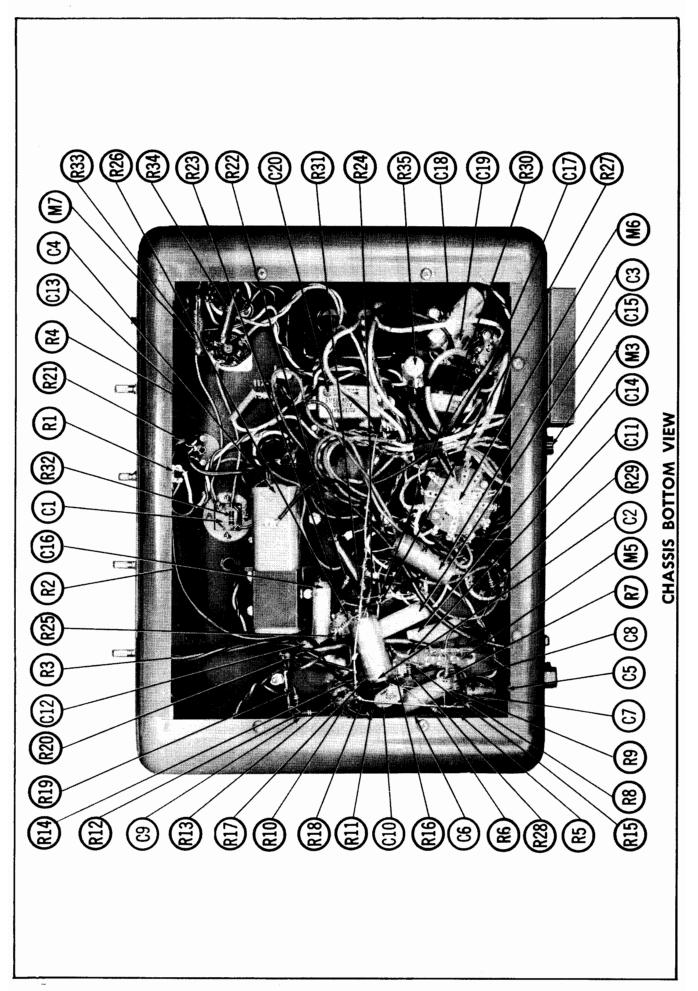


TRADE NAME	Knight Model 93SZ645
SUPPLIER	Allied Radio Corp., 100 N. Western Ave., Chicago 80, Ill.
TYPE SET	AC (or) Battery Operated 4 Channel 25 Watt Mobile Audio Amplifier
TUBES (Seven)	Types 12AX7 Mic. 1-Mic. 2-Mag. Preamp., 12AX7 Mic. 1-Mic. 2-Mag. Preamp. 12AX7 AF AmpPhase Inv., (2) 6L6G Output, (2) 6X5GT Rectifier
POWER SUPPLY	110-130 Volts AC - 60 Cycles (or)   RATING   . 92 Amp.

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# CHASSIS-TOP VIEW

# PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

NOTES	
TYPE	12AX7 12AX7 12AX7 6L.6G
USE	Mic. 1-Mic. 2-Mag. Preamp. Mic. 1-Mic. 2-Mag. Preamp. AF AmpPhase Inverter Output
¥.	2222

ITEM No.	USE	TYPE	NOTES
V5	Output	6L6G	
V6	Rectifier	6X5GT	
V7	Rectifier	6X5GT	

## ELECTROLYTIC CAPACITORS

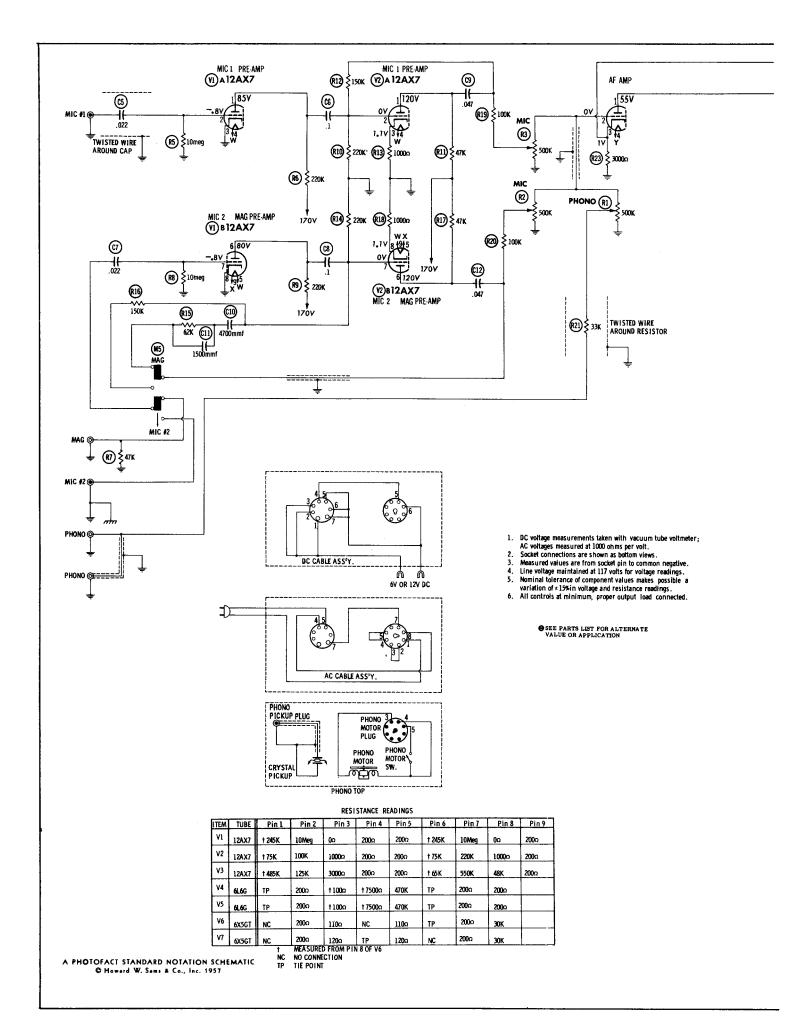
	RAT	NG			REPLA	EMENT DATA			
Z H	Q.	VOLT.	KNIGHT PART No.	AEROVOX PART No.	CORNELL- DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGU PART N
CIA	-40	450		AFH3-41	CO320	FP396.2	TMT-36	9-055	TVL-378
Mι	9 5	<b>3</b> 5							
, ន	9	35				TC71	TD-8-450	FM-4508	TVA-170
ខ	35	22		PRS150V40	BR 505	TC39	TD-50-50	FM-0550	TVA-130
<u>2</u>	4.0	8		ž		TX803	PLM6-4	7108-4	CR46

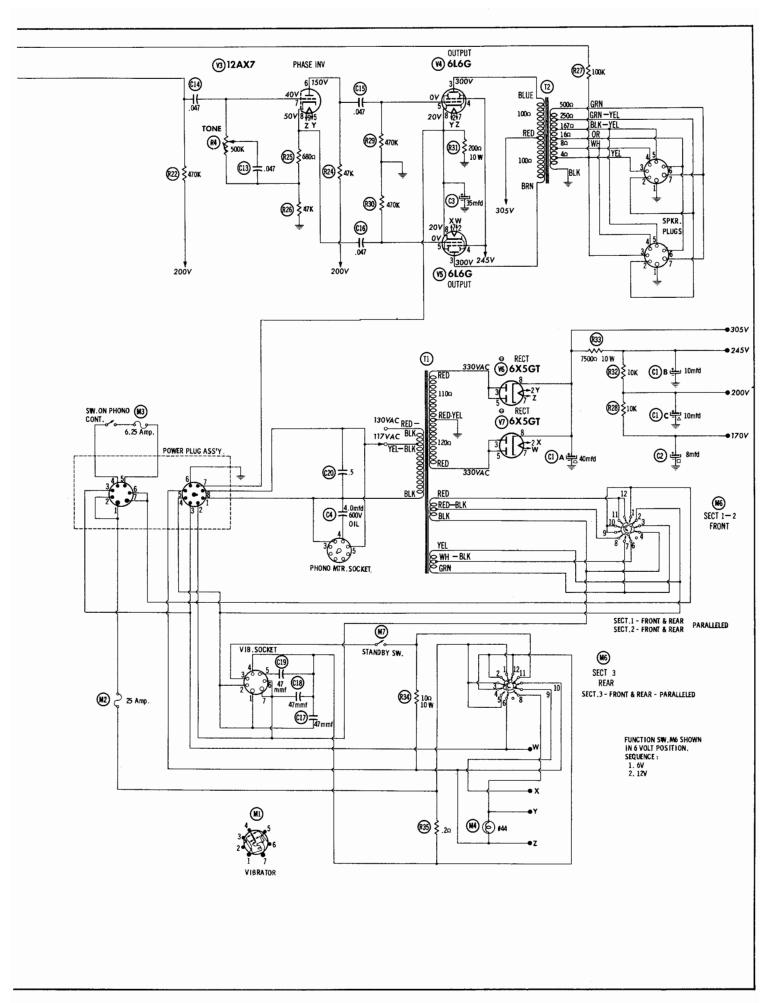
FIXED CAPACITORS
Capacity values given in the rating column are in mfd. for Paper
Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

	_						DEDI ACEMENT DATA	ATA		
TEM	₹	RATING	THE CALL			COPNELL	1			
ģ	3	VOLT	PART No.	MALLORY PART No.	SPRAGUE PART No.	Ž				
ဗ္	. 022	200		BPD-02	DD-203	CU B4822	ED-02	GEM-4122	4TM-S22	
క	Ξ:	900		P668N-1	DF-104	CUB8P1		GEM-601	6TM-P1	
2	. 022	200		BPD-02	DD-203	CU B4822	ED-02	GEM-4122	4TM-822	
8	-:	900		P666N-1	DF-104	CUBBPI		GEM-801	6TM-P1	
පී	. 047	009		BPD-05	DF-503	CUB6847		GEM-6147	6TM-S47	
ខ្ល	4700			BPD-0047	DD-472	K079	ED-0047	UC-5247	5HK-D47	
៊ី	1500			BPD-0015	DD-152	K071	ED-0015	UC-5215	5GA-D15	
C12	. 047	900		BPD-05	DF-503	CU B6S47		GEM-6147	6TM-847	
ដ	. 047	8		BPD-05	DF-503	CUB6847		GEM-6147	6TM-S47	
C14	. 047	900		BPD-05	DF-503	CUB6S47		GEM-6147	6TM-S47	
CIS	. 047	900		BPD-05	DF-503	CUB6847		GEM-6147	8TM-S47	
C16	. 047	900		BPD-05	DF-503	CUB6S47		GEM-6147	6TM-547	
C12	. 47	200		P268N-47		CUB2P47		GEM-4047	2TM-P47	
8 []	. 47	200		P268N-47		CUB2P47		GEM-4047	2TM-P47	
G G	. 47	800		P288N-47		CUB2P47		GEM-4047	2TM-P47	
65	ď	2								

TEN S	~	Ş	KNIGET	CENTRALAB	REPLACEMENT DATA	IRC	MALLORY	INSTALLATION NOTE
AIN B	+	2 -44	TAKE NO.	AB-59 AK-4		Q11-133 Not Req.	U50 Not Req.	Phono Volume
Ω <b>33</b> α	Switch 500K	-44		KB-1 AB-60	SWE-12 A47-500K-Z K88-3	76-1 Q13-133 Not Bee	US-26 U46 Not Reg	Mic. 2-Mag. Volume
R3A		- <b>4</b> n		AB-60	A47-500K-Z	O13-133	U46 Not Reg	Mic. 1 Volume
R4A B		- <b>4</b> n		AB-60 AK-4	A47-500K-Z KSS-3	Q13-133 Not Req.	U48 Not Req.	Tone

6X5	GT	6X5GT	<b>M</b> 4	(I)	12A (V3	X7 1:	2AX7 (v2)
		окъстьс	HONO MOTOR				
		Manager .	\$15°		· CO	· (O)	
			27 AMP	(a) 124 64			The state of the s
	M1	11)	M2)	12 6	V4 5L6G 6	V5 bL6G 1:	(VI) 2AX7





PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

REPLACEMENT DATA

NOTES

Halldorson Merit Stancor Thordorson Triad PART No. PART No. PART No. PART No.

KNIGHT PART No. LO-0093-D

IMPEDANCE

8KCT 5000 12500, 2500, 1670, (700), 160, 80,

12

RESISTORS
All wattages 1/2 watt, or less, unless otherwise listed.

			Ц.				_	_		J				L	_	_		15	٩
	_	_					_												
		NOTES																	
	ENT DATA	IRC	PART No.	BTS-33K	BTS-470K	BTS-3000 5%	BTS-47K	BTS-680	BTS-47K	BTS-100K	BTS-10K	BTS-470K	BTS-470K	PW10-200	BTS-10K	PW10-7500	PW10-10		
.cu.	REPLACEMENT DATA	KNIGHT	PART No.																
20		o	WATT			_								2		2	2	20	
CSS OLITER		RATING	OHWS	33K	470K	30000 5%	47K	6800	47K	100K	10K	470K	470K	2002	10K	7500ນ	100	. 20	
5		TEM	ė Ž	R21	R22	R23	R24	R25	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	
31, 01 153		NOTES					_												
All Wallayes 1/2 Wall, Of less, Utiless Utilet Wise fister.	REPLACEMENT DATA	IRC	PART No.	BTS-10Meg	BTS-220K	BTS-47K	BTS-10 Meg	BTS-220K	BTS-220K	BTS-47K	BTS-150K	BTS-1000	BTS-220K	BTS-62K 5%	BTS-150K	BTS-47K	BTS-1000	BTS-100K	BTS-100K
2	REPLACEM	KNIGHT	PART No.																
		3	WATT																
		KAIING	OHWS	10 Meg	220K	47K	10 Meg	220K	220K	47K	150K	10001	220K	62K 5%	150K	47K	10000	100K	100K
	į	¥ 2	2	#25	R6	R7	R8	R9	RIO	RII	R12	RI3	R14	RIS	R16	RI7	R18	R19	R20

	NOTES	
	RADIART PART No.	6VB6UL
NT DATA	MALLORY PART No.	
REPLACEME	CORNELL- DUBILIER PART No.	6VB6UL
	KNIGHT PART No.	JV-0021
	NPUT FRE.	90v
	VOLTS	8 or 12
	TYPE	Interrupter
	Рƥ	MI

**VIBRATOR** 

# TRANSFORMER (POWER)

		1	ģ		Α2		M3					7/2	1	2	 M2 SM
		Triad	PART No.												
		Stancor Thordarson	PART No.								-				
	DATA	Stancor	PART No.												
2	REPLACEMENT DATA	Merit	PART No.												
	REF	Halldorson	PART No.												
INAINSPORMER (FOWER)		KNIGHT	PART No.	LP-0239A											
2		<b></b>	SEC. 2 SEC. 3	NOI	880VCT 83VCT @ 83VCT @	63VCT 63VCT	22A 3 22A 3	LION							
		RATING	SEC. 1   SEC. 2	AC OPERATION	680VCT 63	E.8	<u> </u>	DC OPERATION	LOA099	© . 120A					
			PRI.		130VAC	1 ap a	© 92A		PRI. 1	63VCT	63VCT	3 3A	PRL 2	Bayer (3)	9
		ž ź			Ţ									_	

### **MISCELLANEOUS**

HOLDER

HOLDER 456001

FUSE

HOLDER

FUSE

KNIGHT PART No.

RATING

TYPE

BUSS PART No.

REPLACEMENT DATA
LITTELFUSE
PART No.

FUSES

HKP 4512

MDL 6 1/4 FUSE MDM 25

341001

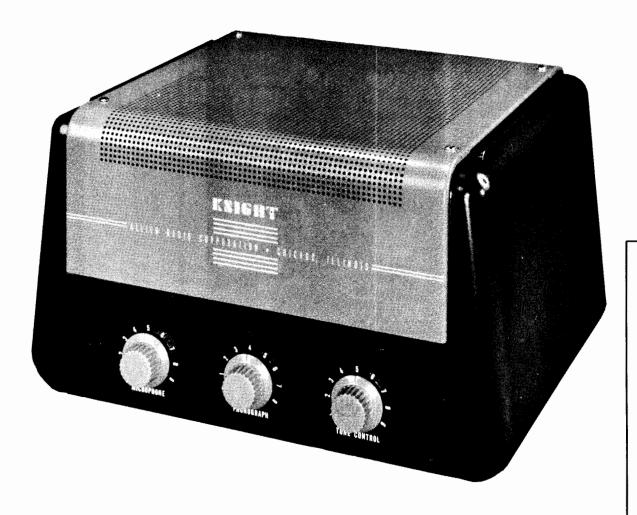
411025. (4AG 25A) 3136. 25 (3AG 6 1/4A)

25A 32V 6 1/4A 32V

411 4AG 313 3AG

ž ż	PART NAME	KNIGHT PART No.	NOTES
M4	Pilot Light		ት <sup>‡</sup>
M	Switch		Mag-Mic. 2, Slide Type (DPDT)
M6	Switch		Power Changeover (Rotary, Wafer Type) 3 Gang.
M7	Switch		DC On-Stand By, Slide Type (SPST)





TRADE NAME Knight Model 93SZ655

SUPPLIER Allied Radio Corp., 100 N. Western Ave., Chicago 80, 11.

TYPE SET AC Operated 3 Channel 15 Watt Audio Amplifier

TUBES (Five) Types 6SJ7 Mic Preamplifier, 6SC7 AF Amp. -Phase Inv., (2) 6V6GT Output, 5Y3GT Rectifier

RATING .8 Amp. @ 117 Volts AC (75 Watts) POWER SUPPLY 105-130 Volts AC 50/60 Cycles

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# PARTS LIST AND DESCRIPTIONS

# TUBES (GENERAL ELECTRIC, SYLVANIA)

ξġ.	USE	TYPE	NOTES
Z 2 2	Mic Preamplifter AF AmpPhase Inv. Output	6SJ7 6SC7 6V6GT	

NOTES	
TYPE	6V6GT 5Y3GT
USE	Output Rectifier
₹ Š Š	2 V

		_		_			_
			SPRAGUE PART No.	TVL-3783		TVA-1704	TVA-1308
6V6GT 5Y3GT			SANGAMO PART No.	Q-055		FM-4508	FM-0550
	S		PYRAMID PART No.	TMT-36		TD-8-450	TD-50-50
Output Rectifier	PACITOR	REPLACEMENT DATA	MALLORY PART No.	FP396.2		TC71	TC39
¥ &	3	REPLAC	- <u>1</u> 28.8				
	YTIC		CORNELL- DUBILIER PART No.	CO3 20		BR845	BR505
Ħ	ELECTROLYTIC CAPACITORS		AEROVOX PART No.	AFH3-41			PRS150V40
68J7 6SC7 6V6GT	ш			Ì		.,	-
tler se Inv.			KNIGHT PART No.				
Mic Preampliffer AF AmpPhase Inv. Output		S	VOLT.	450	450	450	20
Mic Pr AF Am Output		RATING	CAP. VOLT.	94	39		32
222			¥ o Se ¥	CIA	nυ	C7	3

FIXED CAPACITORS
Capacity values given in the rating column are in mfd. for Paper
Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

		NOTES										
		SPRAGUE PART No.	ATM CAT	STM SA7	RTM-S47	000	0711 -344	01M-D22	OTW-S4	15G-W TO	6TM-S5	E TO
L DATA		MALLORY PART No.	GEM_6147	NEW ALA	CEM-6147	2000	00-00-00-00-00-00-00-00-00-00-00-00-00-	2220-M2D	4 6 147	4EW-01#1	GEM-615	CENE 0147
REPLACEMENT DATA		PART No.				020-020	2000	2200-02				
	COPNE	PART	CUB6847	CUB6847	CUB6847	SUKT99	CTIBATO	CTIBRA47	CID 6947		CUBESS	CIDROA7
		CENTRALAB PART No.	DF-503	DF-503	DF-503	128-221	D6-222	DE-503	DE-508		25-10	509
		PART No.	BPD-05	BPD-05	BPD-05	1468-00022	BPD-0022	BPD-05	BPD-05		60-G48	ה-חקב
	THOUSE	PART No.										
	RATING	VOLT	L	8				009				
	2	3	.047	.047	.047	220	. 0022	. 047	. 047	80	3	. 047
	TEM	ż	Ş	ဗ	ဗ	C C	පී	පී	Cio	3	3	2

#### CONTROLS

S 48 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	RESIST- W. ANCE SOOK SWItch SWItch SWItch SWItch SWItch SWItch SWItch SWItch SWItch SOOK Shaft S	WATTA u u	KNIGHT PART No.	REP CENTRALAB PART No. AB-59 AK-4 KB-1 AB-60 AK-4 AB-60 AK-4 AK-4 AK-4 AK-4 AK-4 AK-4 AK-4 AK-4	CLAROSTAT IRC CLAROSTAT IRC PART No. A47-500K-9 Q11-133 SWE-12 A47-500K-2 Q3-133 KSS-3 Not Req. A47-500K-2 Q3-133 KSS-3 Not Req. A47-500K-2 Q3-133 KSS-3 Not Req.	RC RC PART No. Call-133 POR Req. 78-1 Call-133 POR Req. 78-1 Call-133 POR Req. Call-133 POR Req. POR POR Req. POR POR Req. POR POR Req. POR	MALLORY PART No. U50 Not Req. U9-26 U48 U48 U48 Not Req.	INSTALLATION NOTES Phono Mic.	
--	--	-----------	--------------------	---	---	---	--	-------------------------------	--

#### RESISTORS

NOTES

			All	All Wattages 1/2 Watt, or less, unless otherwise listed	art, or les	s, unies	s ornerwis	e IISTE	j	
			REPLACEMENT	ENT DATA				Г	REPLACEMENT	ENT DATA
¥ 2	KATING	2	KNIGHT	RC	NOTES	<u>1</u> €	RATING		KNIGHT	1
2	OHWS	WATT	PART No.	PART No.		ģ	OHWS	WATT	PART No.	PART
R4	100K			BTS-100K		RIZ	470K			BTS-470F
22	10Meg			BTS-10Meg		E13	15000			BTS-1500
88	470K			BTS-470K		R14	10K			BTS-10K
R7	2. 2Meg			BTS-2. 2Meg		RIS	10K			BTS-10K
88	470K			BTS-470K		RI6	470K	_		BTS-470K
R9	470K			BTS-470K		RI7	2500	9		DW10-250
뎚	10K			BTS-10K		P.I.6	33000	-		BTA-3300
교	470K			BTS-470K						

6SJ7 (VI)	6SC7 (V2)	6V6GT (V3)	6V6GT	5Y3GT (V5)	12
	us °os				
			Society of the second of the s		
			ance one		
		(0		11)	

CHASSIS—BOTTOM VIEW

## TRANSFORMER (POWER)

Tick   RATING   SEC. 2   SEC. 2   SEC. 3   SEC. 2   SEC. 3   SEC. 2   SEC. 3   SEC							REP	REPLACEMENT DATA	DATA		
EC. 3 PART No. 3VCT LP-0168 1.85A	₹ Ž		RAT.	Ö		KNIGHT	Halldorson	Merit	Stancor	Thordorson	Triod
1.85A LP-0188		PRI.	SEC. 1	SEC. 2	SEC. 3	PART No.	PART No.	PART No.	PART No.	PART No.	PART
1.85▲	F	130VAC	650VCT	5VAC	6.3VCT	LP-0168				22808 ⊕	
UTVAC ② .8A		tap a	a .085A	@ 34	a 1.85A						
(B) . 8A		117VAC			1						
		a. 8A									

This transformer does not provide a tap on primary winding for 130VAC input.

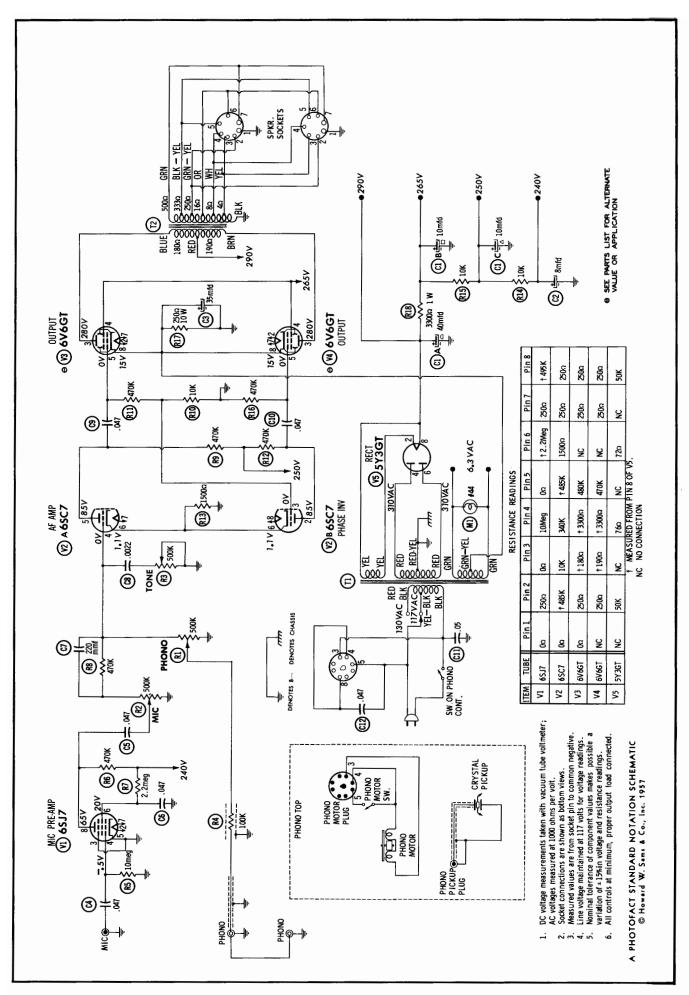
# TRANSFORMER (AUDIO OUTPUT)

		NOTES							
5		Triad	PART No.						
		Stancor Thordarson	PART NG. PART NO.						
	r DATA	Stancor	PART No.						
NAME A	REPLACEMENT DATA	Merit	PAKI NG.						
TOTION CHIEF (ACCIO) COLLOI)	RE	Halldarson Merit	PAKI No.						
		KNIGHT PART No.		5000 ГО-0092-В					
		No.	SEC.	5000	tap 0	(70V),	2502,	162,82	452
		Ž.	PRI.	T2 10K	Ç				
	i	Š		TZ					

### **MISCELLANEOUS**

	NOTES		
200711	KNIGHT PART No.	*444	
	PART NAME	Pilot Light	
	ž ė	M	

R2 R18 C1 R15 R1 R4 C12 R3	
R8 C7 R14	(0
R14) (5)	
R6 R7	
(2) (8)	
R9 R5	
(4) (6) (R13) (R12) (C9) (R10) (R11) (C10) (R16) (R17) (C3) (C11)	





KNIGHT MODEL 93SZ682



TRADE NAME	Knight Model 93SZ682
SUPPLIER	Allied Radio Corp., 100 N. Western Ave., Chicago 80, Illinois
TYPE SET	AC Operated 5 Channel 30 Watt Audio Amplifier
TUBES (Six)	Types 6SC7 Preamplifier, 6SC7 Mixer, 6SC7 AF Amp Phase Inv., (2) 6L6G Output, 5U4G Rectifier
POWER SUPPLY	105-130 Volts AC-50/60 Cycles RATING 1.18 Amp. @ 117 Volts AC (125 Watts)

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# PARTS LIST AND DESCRIPTIONS

# TUBES (GENERAL ELECTRIC, SYLVANIA)

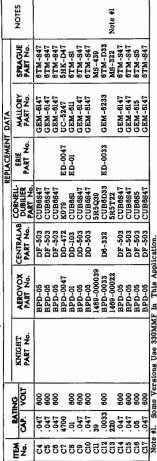
No.	asn	TYPE	NOTES
ĭ	Pre	2000	
	MIC 2 - Mag Preamplifier	6SC7	
V2	Mixer	6SC7	
Z A	AF Amp Phase Inv.	88C7	

NOTES	
TYPE	61.6G 61.6G 50.4G
USE	Output Output Rectifier
₹ Š Š	V4 V6 V8

NOTES				SPRAGUE PART No.	TVL-3783	TVA-1704	TVA-1308
TYPE	6L6G 6L6G 5U4G			SANGAMO PART No.	Q-055	FM-4508	FM-0550
		Į <b>A</b>		PYRAMID PART No.	TMT-36	TD-8-450 FM-4508	TD-20-20
USE	Output Output Rectiffer	ELECTROLYTIC CAPACITORS	REPLACEMENT DATA	MALLORY PART No.	FP396-2	TCI	TC39
ģ	V4 V5 V8	CAR	EPLAC	그음호			
		JE C	~	CORNELL- DUBILIER PART No.	C0320	BR 845	BR505
NOTES		TROLY		AEROVOX PART No.		PRS450V8	PRS150V40
TYPE	68C7 68C7 68C7	ELECI		PAR	AFH3-41	PR84	PRSI
	MIC 1 Preampilifer — MIC 2 — Mag Preampilifer 69 Mixer			KNIGHT PART No.			
USE	Pream 2 - May r mp E		S	VOLT.	450	450 450	20
	MIC 1 MIC 2 Mixer AF An		RATING	<u>ਤ</u> ੰ ਤੋਂ	89	8 <u>1</u> 0	32
źż	V1 V3 V3			ž ė	G B	-	ខ

### FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.



### CONTROLS

	STON MOITH INTER	INSTALLATION NOTES	Phono			MIC 2-Mag			MIC 1		Tone	
	_	PART No.	U50	Not Req.	US-28	020	Not Req.	US-26	048	Not Req.	048	Not Red.
Ϋ́	2	PART No.	Q11-133									
EPLACEMENT DATA	TABOUTAT	PART No.	A47-500K-S	KSS-3	SWE-12	A47-500K-S	KSS-3	SWE-12	A47-500K-Z	KSS-3	A47-500K-Z	K98-3
REI	CENTRALAB	PART No.	AB-59	AK-4	KB-1	AB-59	AK-4	KB-1	AB-60	AK-4	AB-60	AK-4
	KNIGHT	PART No.										
١	Ş	WATTS	-400			-400			- 1		- 17	
	5	RESIST- ANCE		Shaft	Switch	500K	Shaft	Switch	500K	Shaft		gho ft
	¥ E	ģ	EA	Д	U	R2A	m	O	R3A	Щ	R4A	a

6SC 7	6SC7	6L6G (V4)	6SC7 (V3)	6L6G (V5)	5U4G (V6) (1)
					The state of the s
	<b>5</b> 59	E59			
			apa ono.		
		(	M1) (	<u>C1</u> (	12)

# PARTS LIST AND DESCRIPTIONS (Continued) RESISTORS All wattages 1/2 wett, or less, unless otherwise listed.

	NOTES												
INT DATA	IRC	PART No.	BTS-470K	BTS-10K	BTS-470K	BTS-470K	BTS-1500	BTS-10K	BTS-10K	BTS-470K	PW10-200	PW10-7500	
REPLACEMENT DATA	KNIGHT	PART No.											
	c c	WATT									2	2	
	RATING	OHWS	470K	10K	470K	470K	1500Ω	10K	10K	470K	2002	75000	
	¥ ;	ġ Ž	RIG	F17	RI8	R19	R20	R21	R22	R23	R24	R25	
	NOTES			_					_		_		
Z.	Г	ģ	0Meg	TS-220K	0Meg	00K	20K	7K	00K	2K	80K	800	3TS-1.5Meg
ENT DAT	IRC	PART No.	BTS-10Meg	BTS-	BTS-1	BTS-1	BTS-2	BTS-4	BTS-100K	BTS-2	BTS-1	BTS-1	BTS.
REPLACEMENT DATA	KNIGHT IRC	PART No. PART	BTS-1	-BTS-	BTS-1	BTS-1	BTS-2	BTS-4	BTS-1	BTS-2	BTS-1	BTS-1	BTS-
		_	BTS-1	-BTS-	-BTS-I	BTS-1	BTS-2	BTS-4	BTS-1	BTS-2	BTS-1	1-ST8	BTS-
	RATING KNIGHT IRC	PART No.								_	180K BTS-1	_	1.5Meg

### TRANSFORMER (POWER)

						REF	LACEMENT	DATA		
Z Z		₽¥.	RATING		KNIGHT	Halldorson	Merit	Stoncor	Halldorson Merit Stoncor Thordorson	Triad
•	PRI.	SEC. 1	SEC. 2	SEC. 3	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
I	130VAC	725VCT	5VAC	6.3VCT	LP-0198-B				24R05 ①	
	Tap @		(a) .135A (a) 3A	2.9A					)	
	117VAC									
	20 1.18A									

# This Transformer Does Not Provide A Tap On Primary Winding For 130VAC Input.

TRANSFORMER (AUDIO OUTPUT)   REPLACEMENT DATA   REPLACEMENT DATA   REPLACEMENT DATA   REPLACEMENT DATA   SEC.   PART No.   Taps   Signal Signal   Signal Signa
IMPEDA!
T2 No.

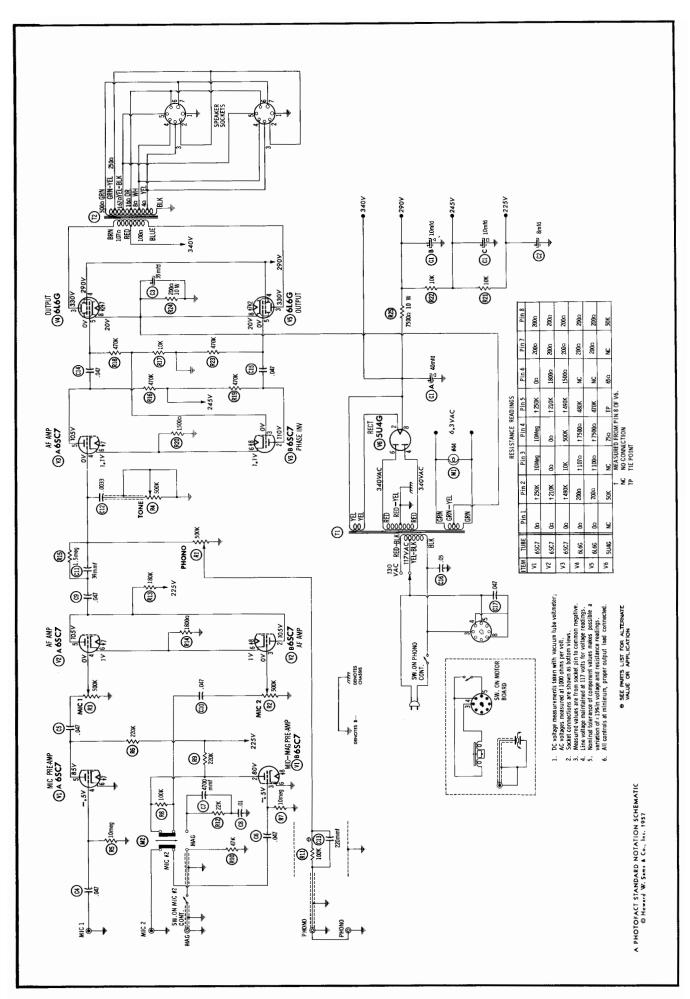
NOTES

### MISCELLANEOUS

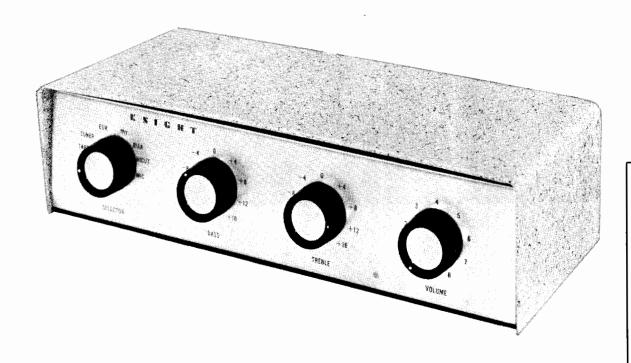
SHC 7		#44	Mag MIC 2, Silde Type (D. P. D. T.)	
KNIGHT	PART No.			
PART NAME		Pilot Light	Switch	
TEM	ģ	M	M2	

# CHASSIS—BOTTOM VIEW

(2) (2) (3) (3) (3) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4	R16 R15 R3 C11 R19 R2 R21 C1 C13 R1 R11 R4 C17
(8) (7) (	C14 R12 R10 M2 R8 R17 R23 R24 C15 C12 R25 C3 C16



### KNIGHT MODEL 945X706



TRADE NAME Knight Model 94SX706

SUPPLIER Allied Radio Corp., 100 N. Western Ave., Chicago 80, Ill.

TYPE SET AC Operated Equalizer Preamplifier

TUBES (Three) Types 12AX7 Preamplifier, 12AX7 Cath. Follower - 1st AF Amp., 6C4 2nd AF Amplifier

POWER SUPPLY 110-120 Volts AC-50/60 Cycles RATING .15 Amp. @ 117 Volts AC (7 Watts)

### HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Ca., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial con-G785

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# PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

	USE	TYPE	NOTES
# O 4	Phono — Mic Preampliffer Cathode Follower-ist AF Ampliffer	12AX7 12AX7	

NOTES	
TYPE	6C4
USE	2nd AF Amplifier
TEA No.	V3

			SPRAGUE PART No.	TVL-3535	TVL-3432.	TVA-1308
			SANGAMO PART No.	T-025	T-095	FM-0550
	so		PYRAMID PART No.	TMD-7 TD-16-150	TMT-22	TD-50-50
	ELECTROLYTIC CAPACITORS	REPLACEMENT DATA	MALLORY PART No.	[ FP225 [	ın	TC39
]	YTIC CAI	REPLAC	CORNELL- DUBILIER PART No.	0,000	C0210	BR505
	LECTROL		AEROVOX PART No.	AFH3-08	AFH3-22	PRS150V40
1444	ш		KNIGHT PART No.			
Tier		RATING	VOLT.	150 150	150	150
Amplifier			CAP. VOLT.	■30 A15	225	2 8
			No.	CIA	C2A	ບ

FIXED CAPACITORS
Capacity values given in the rating column are in mfd. for Paper
Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

		2	2		Note																				
		21101100	PART No.	6TM-Pi		6TM-D68	5GA-D22	5HK-81	5GA-T58	6HK-D47	5GA-T27	6TM-SI	4TM-822	4TM-822	6TM-Pl			1FM-415	5GA-T33	6TM-D33	6TM-Pl	6TM-Pl	6TM-Pl	6TM-82	
	ATA	200	PART No.	GEM-601		GEM-6268	UC-5222	DC-521	·UC-5356	UC-5247	UC-5327	GEM-611	GEM-4122	GEM-4122	GEM-801			UC-5415	UC-5333	GEM-6233	GEM-801	GEM-601	GEM-601	GEM-612	
	REPLACEMENT DATA	EBIE	PART No.			GP-6800	ED-0022	ED-001	ED-560	ED-0047	ED-270	ED-01	ED-02	ED-02				ED-15	ED-330	ED-0033				ED-02	
	~	CORNELL		CUB6PI		CUB6D68	K073	K069	G063	K079	G054	CUB681	CUB4822	CUB4822	CUB6P1				G056	CUB6D33	CUB6P1	CUB6P1	CUB6Pl	CUB682	
		CENTRALAB	PART No.	DF-104		D6-682	D6-222	DD-102	DD-561	DD-472	DD-271	DD-103	DD-203	DD-203	DF-104			DD-150	DD-331	D6-332	DF-104	DF-104	DF-104	DD-203	
(2.12.12.12.12.12.12.12.12.12.12.12.12.12		201000	PART No.	P688N-1		BPD-0068	BPD-0022	BPD-001	81560	BPD-0047	BPD-00027	BPD-01	BPD-02	BPD-02	P688N-1			1468-000015	BPD-00033	BPD-0033	P688N-1	P688N-1	P688N-1	BPD-02	
410		KNIGHT	PART No.																						Not used in some versions
		RATING	VOLT	900	1000	900						900	200	200	900	009	900	200	_	900	009	900	900	900	Not used i
		Z	S	-:	39	.0068	2200	800	260	202	270	5	.022	. 022	-:	.0056	. 056	15	330	. 0033	-:	٦.	-:	.02	Note #1.
		Ŧ	ģ	C4	S	ဗ	C C	8	ŝ	ខ្ល	3	<b>2</b>	ដ	<u>7</u>	CIS	C18	CI	23 23	C19	္က	ಷ ೮	C22	C233	C24	ž

### CONTROLS

	CHAPE	ب		RE	REPLACEMENT DATA	TA		
Ę	\$	٥	THOUSE	CENTRALAB	CABOSTAT	Jal	Vacilian	STACIA INCIANTINATION
ģ	RESIST- ANCE	WATTS	PART No.	PART No.	PART No.	PART No.	PART No.	INSTALLATION NOTES
RIA	500K	-100			A47-500K-S	Q11-133	U50	Volume
Ø	Shaft				KS8-3	Not Req.	Not Req.	
ပ	Switch				SWE-12	76-1	US-28	
R2A	500K	ca		AB-60	A47-500K-Z	Q13-133	U48	Treble
Д	Shaft				KS8-3	Not Req.	Not Req.	
R3A	500K	00			A47-500K-Z	013-133	U48	Вавв
Ð	Shaft				KBS-3	Not Req.	Not Req.	
R4A	200K	ce			A47-500K-Z	Q13-133	U48	Tuner Level
Ð	Shaft				KSS-3	Not Req.	Not Req.	

R1 (	M2) @	20) R2	(18)	R27 C1	7) (16)	R3 (M	13)	
	WER	APE OUT	12AX7		PASS TOTAL STREET, AND THE STR		30	PICK MIC
	10000000000000000000000000000000000000	OUTPUT			( ) ( )	O	TUNER TAP	E AUX
(11)	V3 6C4	©1)	(V2) 12A)	) <b>X7</b>	(2)	(VI 12A	/	

# PARTS LIST AND DESCRIPTIONS (Continued) RESISTORS All wattages 1/2 watt, or less, unless otherwise listed.

	Ö	•																
REPLACEMENT DATA	IRC	PART No.	BTS-3. 3Meg	BTS-4700	BTS-22K	BTS-4700	BTS-47K	BTS-4700	BT8-47K	BTS-68K	BTS-3000 5%	BTS-22K	BTS-33000	BTS-4700	BTS-4700	BT8-4700	BTS-2200	BW 3-4.7
REPLACEM	KNIGHT	PART No.							_									
	ر ق	WAT																
	RATING	OHWS	3. 3Meg	47000	22K	47000	47K	47000	47K	68K	30000 5%	22K	33000	47000	47000	47000	22000	4.70
	¥ .	ġ	R2	R22	R23	R24	R25	R26	R27	R28	R29	R30	R3	R32	R33	R34	R35	R36
	NOTES					_		_		_			_		-		_	
INT DATA	IRC	PART No.	BTS-27K	BTS-22K	BTS-470K	BTS-68K	BTS-68K	BTS-68K	BTS-68K	BTS-100K	BTS-150K	BTS-100K	DCC-220K1%	BTS-4700 5%	BTS-4700	BTS-470K	BTS-47K 5%	BTS-1500 5%
REPLACEMENT DATA	KNIGHT	PART No.				_												
T,		WATT												_				
	KATING	OHWS	27K	22K	470K	68K	68K	68K	68K	100K	150K	100K	220K 1%	47000 59	47000	470K	47K 5%	15000 5%
	<u> </u>	į	R5	R6	R7	88	R9	E 0	Z	R12	RIS	RI4	몺	R16	RI7	R18	EB B	R20

### TRANSFORMER (POWER)

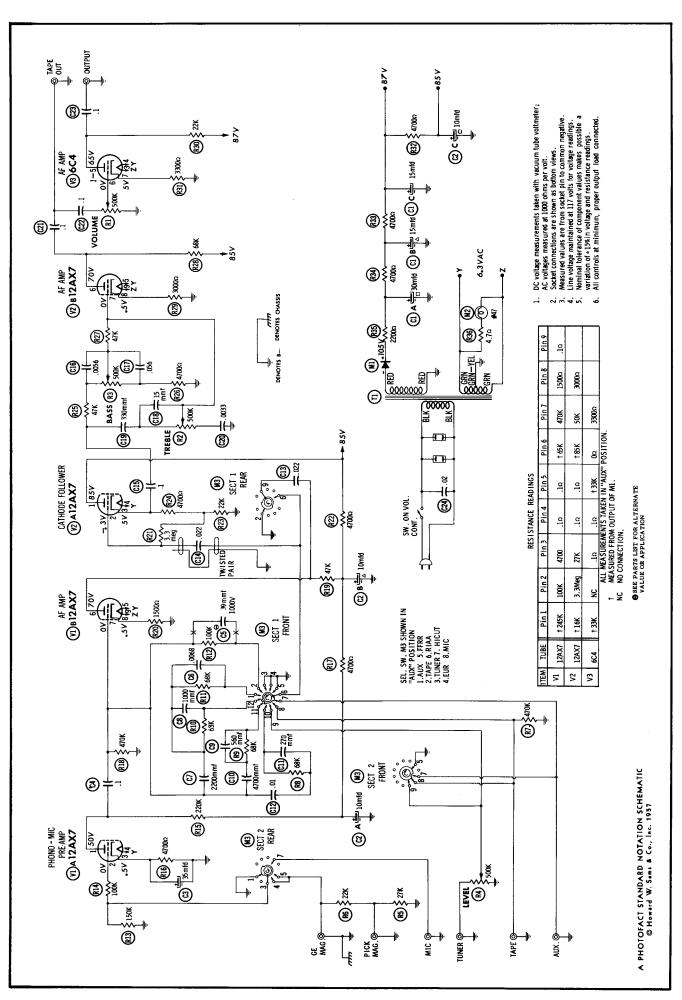
	5	÷		1
	Thordarson	PART N	26R32 ①	
DATA	Stancor	PART No.		
REPLACEMENT DATA	Merit	PART No. PART No. PART No. PART No.	P-3046①	
RE	Halldarson	PART No.		
	KNIGHT	PART Na.	LP-0243	
			·ат	
		SEC. 3	-T-P	
	NG.	SEC. 2   SEC. 3	6. 3VCT @ . 72A	
	RATING	SEC. 1 SEC. 2 SEC. 3	120VAC 6.3VCT LP. (B) .002A (B) .72A	tg. Hole.
		PRI. SEC. 1 SEC. 2 SEC. 3	117VAC 120VAC 6.3VCT LP- (@ .15A (@ .002A (@ .72A	rill New Mtg. Hole.
	Me. RATING	PRI. SEC. 1 SEC. 2 SEC. 3	120VAC 6.3VCT 6.002A @ .72A	(1) Drill New Mtv. Hole.

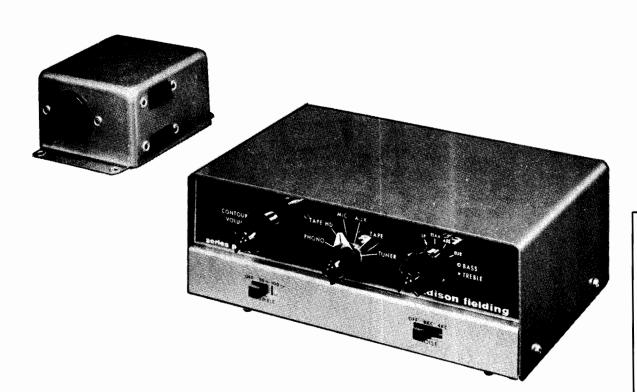
### SELENIUM RECTIFIER

	NOTES		
	SARKES TARZIAN PART No.	20	
	RADIO RECEPTOR PART No.	IA8	
DATA	MALLORY PART No.	8820	
REPLACEMENT	INTERNATIONAL PART No.	RS-050	
	FEDERAL PART No.	1386	
	KNIGHT PART No.	JR-0022	
RATING	CURRENT	.002A	
	Ž.	M	

### MISCELLANEOUS

- 55	PART NAME Dial Lamp Switch	KMIGHT PARI No.	NOTES #47 Function Selector, 2 Gang, Wafer Type
------	----------------------------	--------------------	---





TRADE NAME Madison Fielding Model PR-45 "Transamp"

MANUFACTURER Madison Fielding Corp., 863 Madison St., Brooklyn 21, N. Y.

TYPE SET AC Operated 6 Channel Preamplifier With Transistorized Input

TUBES (One) Type 12AX7/ECC83 AF Amplifier

POWER SUPPLY 105-125 Volts AC-50/60 Cycles RATING .10 Amp. @ 117 Volts AC (6 Watts)

### HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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# PARTS LIST AND DESCRIPTIONS TUBES (GENERAL ELECTRIC, SYLVANIA)

TYPE				NOTES	
USE			ITA	SYLVANIA PART No.	2N35 2N35
No.		TRANSISTORS	REPLACEMENT DATA	RAYTHEON PART No.	
	C83	TRAN	RE	C8S PART No.	2N439 2N439
TYPE	12AX7/ECC83				
USE	olifler			USE	AF Amplifier AF Amplifier
	AF Amplifter			ORIG. TYPE.	2N35 2N35
¥ o	7			₹ġ	≅××

TYPE				NOTES		
				<b>∡</b> o		
nse			TA.	SYLVANIA PART No.	2N35 2N35	ITORS
ė		TRANSISTORS	REPLACEMENT DATA	RAYTHEON PART No.		CAPAC
		SIS	EPLAC	2"		ပ
	C83	TRA	~	CBS PART No.	2N439 2N439	<b>ELECTROLYTIC CAPACITORS</b>
TYPE	12AX7/ECC83					ELEC
USE	lifter			USE	AF Amplifler AF Amplifler	
	AF Amplifier			ORIG. TYPE	2N35 2N35	
٠.		l .		_		1

SANGAMO PART No. MT-0502 MMT-325 MMT-325 PYRAMID PART No. TD-2-25 ML25-3 ML25-3 ML2-15 ML2-15 MALLORY PART No. TC302 TT3X25 TT3X25 BR2502 BBR2-50 BBR25-3 BBR25-3 PRS50V150 PRS50V2 SRE3V25 SRE3V25 PWE25002 PWE25002 PWE3200 AEROVOX PART No. Madison Fielding PART No. CE202010

VOLT.

3

No.

(R1)

(R22)

SPRAGUE PART No. R2472 \* (R26)

R2473 \* R2474 \* R2475 \* R2476 \* R2476 \* TE-1055 TE-1055

(07)

(R20)

(M6)

R3

(R16)

R4

(C15)

(R12)

(C13

FIXED CAPACITORS

\* Non Catalog Item

22000

 Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

REPLACEMENT DATA						2	REPLACEMENT DATA	L DATA		
RATING Madison	Madison	Madison	0,000	ł	CENTRALAB	CORNELL-	FDIE		2000	NOTES
CAP. VOLT PART No. PART No.	PART No.	PART No. PART No.	PART No.		PART No.	DUBILIER PART No.	PART No.	PART No.	PART No.	
3500						IR5D36			MS-235	10%
3500						1R5D36			MS-235	10%
	BPD-02	BPD-02	BPD-02		DD-203	BYB6S2	ED-02		5HK-S2	!
	BPD-02	BPD-02	BPD-02		DD-203	BYB6S2			5HK-S2	
200		P288N-1	P288N-1		DF-104	CUB2P1		GEM-201	2TM-PI	
	_	BPD-002	BPD-002	87	DD-222	BYA10D22	ED-0022	UC-5222	5GA-D22	
4700 BPD-0047	BPD-00	BPD-004	BPD-00	1.	DD-472	BYA10D47		UC-5247	5GA-D47	, and
						CIOVEC				ON
18 SI 18	SI 18	SI 18	SI 18		D6-180	LT6Q18	_	UC-5418	5GA-018	
	0-Qda	BPD-0	BPD-0	_	DD-103	BYA6S1		DC2II	5GA-81	
10000 BPD-0	)-QAB	BPD-0	BPD-(	=	DD-103	BYA6S1	ED-01	DC2II	5GA-81	
<b>S</b>	SI 47	SI 47	SI 47		D6-470	LT6047	_	UC-5447	5GA-Q47	
.22   200   P288N-22		P288N	P288N.	-22		CUB2P22		GEM-2022	2TM-P22	

12AX7 ECC83

(R31

(8)

C9

K1

R2

(C12)

(VI

(R25

CONTROLS

		•		2	REPLACEMENT DATA	TA		
TEX.	KATING	ي	Madison	SENTEN			WALLORY	SETON MOLENIATION
ģ	RESIST.	WATTS	PART No.	PART No.	PART No.	PART No.	PART No.	
RIA	500K	-106	RV10502					Volume
m c	100K	- rt					⟨► UE37618	Contour, Tap 3 Z5K & 50k
2 4	Switch	4	RV1002	F1-52			, 110,000 a	Вавв
Œ	500K	-10		R4-42		•	701070	Treble, Tap @ 250K
R3A	470K	•	RV5043	B-59	A47-500K-S	Q11-133	U50	Tuner Adjust
Д	Shaft			Not Req.	KS8-3	Not Req.	Not Req.	
R4A	25K	-44	RV2530	B-26	A47-25K-S	011-120	U29	Phono & Low Level Adjust
Д	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
RS	5000	~	RW5001					Hum Adjust (Wirewound)

Concentrikit Equivalent; K-2 Kit, Base Elements and Shafts: Bil-137, Pl-200 (Panel)
 STA-LOC Equivalent PB55A, OS500, RUISDT54, ISI25, US-41
 STA-LOC Equivalent FB16L, OS500, RU557254, ISI25
 STA-LOC Equivalent FB16L, OS500, RU557254, ISI25

# PARTS LIST AND DESCRIPTIONS (Continued) RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed

		NOTES																
		Madison Fielding	PART No.															
1		<sub>o</sub>	WATT															
122 OU I CU		RATING	OHWS	33K	10K	10K	100K	27002	470K	820K	220K	l. 8meg	220K	15002	150K	22K	10K	
		TEM	ģ	R21	R22	R23	R24	R25	R26	R27	R28	R29	R30	R31	R32	R33	R34	
ŝ	_																	
All Wallayes 1/2 Wall, of less, unless offici wise listen.		NOTES							_									
7	Madison	Fielding	PART No.															
		()	WATT															
		RATING	OHWS	270K	150K	68002	100K	120K	2600	390K	18K	100K	18K	100K	18K	18K	22K	22K
		TEM	ò	R6	R.	88	89	E S	RII	RI2	RI3	R14	RIS	R16	RI7	RIB	RIB	R20

### TRANSFORMER (POWER)

No.   PRI   SEC 1   SEC 2   SEC 3   SEC 3							REP	LACEMENT	DATA		
	Š Š		RAT	S		Madison Fleiding	Halldorson	Merit	Stancor	Thordarson	Triad
T1 117V 155V 6.3V TP1003		PRI.	SEC. 1	SEC. 2	SEC, 3	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
	ដ	117V (2) . 100A	155V ② .002A	6. 3V © . 300A		TP1003					

## COMPONENT COMBINATION

			COMPONENI COMBINATIONS	BINATIONS		
ΕZ	TE.¥ No.	USE	DESCRIPTION	Madison Fielding PART No.	REPLACEMENT DATA	
×	2	Tone Comp.	4700mmf, 4700mmf, 100mmf, 100K, 470K, 1000Ω			
						1

### REPLACEMENT DATA

	NOTES			
	SARKES TARZIAN PART No.			
 REPLACEMENT DATA	INTERNATIONAL PART No.	CR28	MISCELLANEOUS	NOTES
REPLACEM	FEDERAL PART No.		(ISCELL,	
	Madison Fielding FEDERAL INTERNATIONAL PART No. PART No.	SR1001	2	Madison Fielding PART No.
RATING	CURRENT M (Measured)	. 0018A		PART NAME
	No.	MI		Z S

### WIRING DATA

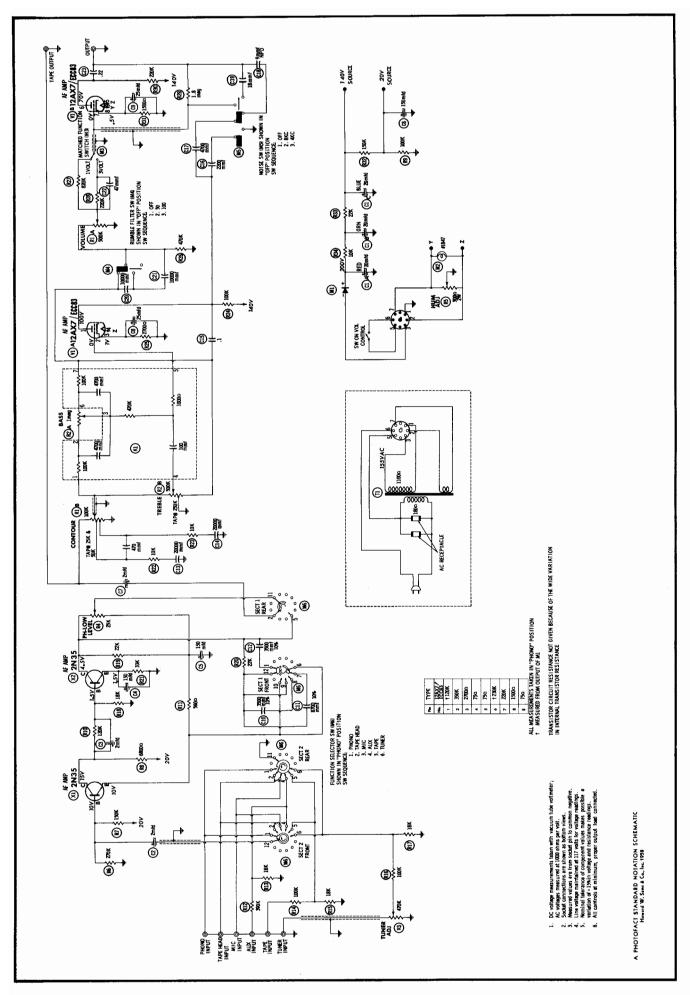
#1847
Matched Function (Silde Type SPDT)
Rumble Filter (Silde Type DPDT)
Noise Filter (Silde Type DPDT)
Selector (Rotary Water Type)

SS1007 SS1002 SS1006 SF1002

Pilot Lamp Switch Switch Switch Switch

M2 M3 M5 M6

			_
8530 (Solid) Available in Ten Colors	8524 (Stranded) Available in Ten Colors 1765-B (6 Ft. Length)	1725-K (7½ Ft. Lengtn) 8401	8430 (Two Conductor - Twisted)
General-use Unshielded Hook-up Wire	Power Cord	LV25- Low-Loss Shielded Lead (Interconnecting)	Phono Pick-up Arm Cable







TRADE NAME

Newcomb Model CO-1010

MANUFACTURER

Newcomb Audio Products Co., 6824 Lexington Ave., Hollywood 38, Calif.

TYPE SET

AC Operated 6 Channel 10 Watt Audio Amplifier

TUBES (Five)

Types 12AX7 Preamp. - AF Amp., 12AX7 AF Amp. - Phase Inv. (2) 6V6GT Output 6AX5GT Rectifier

POWER SUPPLY

110-120 Volts AC-60 Cycles

RATING .55 Amp. @ 117 Volts AC (60 Watts)

### HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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## CHASSIS—TOP VIEW

# PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

NOTES	
TYPE	6V6GT 6AX5GT
USE	Output Rectifier
No H	V4 V5

SQ ES				SPRAGUE PART No.	R2410*				TVA-1702
¥	6V6GT 6AX5GT			SANGAMO PART No.					FM-4504
		S		PYRAMID PART No.					TD-4-450
50	Output Rectifier	ELECTROLYTIC CAPACITORS	REPLACEMENT DATA	MALLORY PART No.					TC70
ģ	V4 V5	S S	REPLAC	프 <b>로</b> S					
	 I	XIC 1		CORNELL- DUBILIER PART No.					BR445
2		TROL		AEROVOX PART No.					PRS450V4   BR445
	12AX7 12AX7 6V6GT	ELEC	!	PAR				_	PRS
	Preamplifier-AF Amplifier 1 AF Amplifier-Phase Inv. 1 Output 6			NEWCOMB PART No.	CE-36				CE-1
S	nplifier mplifier t		RATING	CAP. VOLT.	475	475	475	20	450
	Pream AF An Output		RA	3	40	01	10	22	_

Z E

FIXED CAPACITORS
Capacity values given in the rating column are in mfd. for Paper
Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

	_											_						_			_						
		NOTES																									
		110100	PART No.	5HK-S2	5GA-T35	5GA-TI	5GA-T3	5HK-DI5	6TM-S22	5HK-SI	6TM-PI	5HK-S2	5HK-S2	5GA-T47	5HK-D15	5HK-S2	5GA - T47	5HK-SI	5HK-S2	5GA-T25	5HK-S1	5HK-S1	5HK-S2	5HK-S2	5HK-S2	5GA-T1	CO PRODU
capacitors.	r data	Vaccination	PART No.		UC-5335	UC-531	UC-533	UC-5215	GEM-6122	DC511	GEM-601			UC-5347	UC-5215		UC-5347	DC511		UC-5325	DC511	DC511				UC-531	C010 MID
	REPLACEMENT DATA	SIGS	PART No.	ED-02	GP-350	GP-100	GP-300	ED-0015	ED-02	ED-01		ED-02	ED-02	GP-470	GP-1500	ED-02	GP-470	ED-01	ED-02	ED-250	ED-01	ED-01	ED-02	ED-02	ED-02	GP-100	60.03
or mica a		CORNELL-	PART No.	BYB6S2	LT6T35	LT6T1	LT6T3	BYA10D15	CUB6S22	BYA6S1	CUB6P1	BYB6S2	BYB6S2	LT6T47	LT6D15	BY B6S2	LT6T47	BYA6S1	BYB6S2	L10T25	BYA6S1	BYA6S1	BYB6S2	BYB6S2	BYB6S2	LT6TI	OTTDECTO
n mmra. r		CENITDALAB	PART No.	DD-203	D6-351	D6-101	D6-301	DD-152	DD-203	DD-103	DF-104	DD-203	DD-203	D6-471	D6-152	DD-203	D6-471	DD-103	DD-203	DD-251	DD-103	DD-103	DD-203	DD-203	DD-203	D6-101	606 00
Capacitors, and in mimia, for mica and ceramic capacitors.			PART No.	BPD-02	SI350	SI100	SI300	BPD-0015	BPD:02	BPD-01	P688N-1	BPD-02	BPD-02	S1470	SI1500	BPD-02	S1470	BPD-01	BPD-02	BPD-00025	BPD-01	BPD-01	BPD-02	BPD-02	BPD-02	00118	פט המם
Cap		NEWCOMB	PART No.	CM-35	CM-26	CM-14	CM-15	CM-52	CP-47	CM-32	CP-51	CM-35	CM-35	CM-25	CM-27	CM-35	CM-25	CM-32	CM-35	CM-22	CM-32	CM-32	CM-35	CM-35	CM-35	CM-14	
		RATING	VOLT			_			009	-	009																900
		RAT	<u>.</u> ਤੋਂ	20000	320	001	300	1600	. 022	10000	<b>-</b>	20000	20000	470	1200	20000	410	10000	20000	250	10000	10000	20000	20000	20000	00	660
		TEX	ģ	ຮ	2	S	95	C2	8	ల	CIO	CII	C12	CI3	CI4	CIS	CI6	CI1	C18	613	C20	ر <b>2</b> 2	C22	C23	C54	C25	365
	_																										_

### CONTROLS

		014014	INSTALLATION NOTES	Loudness, Tap @ 100K			Treble, Tap @ 1.2Meg		Bass	Bass	Hum Balance (Wire Wound)
		70011444	PART No.				UT-451	Not Req.			
	¥.	9	PART No.	X081-810	Not Req.	16-1	Q18-139X	Not Req.			
	REPLACEMENT DATA	TATOCIAL	PART No.	A47F1-250K Q13-130X	KSS-3	SWE-12	A47F3-2Meg   Q18-139X	KSS-3			
144	KE	CENTRALAB	PART No.	BT-53	Not Req.	KB-1					
		NEWCONB	WATTS PART No.	RV-87-K			RV-59-K		RV-57-K		RV-75
	<u></u>	2	WATTS	-12			-10		-10	-100	2
	CIAITAG	=	RESIST- ANCE	250K	Shaft	Switch	2Meg	Shaft	5Meg	5 Meg	1000
		¥	ģ	RIA	М	U	R2A	В	R3A	В	R4

R7 (17) R2 (R15) (16) (7) (R12) (25) (M4) (R24) (26) (29) (24) (13) (R23) (R3) (15) (R22)
(R1)
(M5)
M2 (C12)
C11)
R25 C14
RI6) (C10)
The same and the s
(R20)
(20) (R21)
R5 C3
R6) P10
M3 R9
R14) / R11)
R13////////////////////////////////////
R17 (C18 (C2) (V4) (V2) (V3) (C1) (V5) (R27) (R41) (T1) (R19) (R18 (C8)
6V6GT 12AX7 6V6GT 6AX5GT

# CHASSIS—BOTTOM VIEW

# PARTS LIST AND DESCRIPTIONS (Continued) RESISTORS All wattages 1/2 watt, or less, unless otherwise listed.

RATING NEWCOMB	REPLACEMENT DATA	NT DATA		1	IE		RATING	REPLACEM	REPLACEMENT DATA	
NEWCOME	_		2	NOTES	2			NEWCOMB	2	NOTES
WATT PART No. PA		₹	PART No.		2	OHWS	WATT	PART No.	PART No.	
_	_	BIS	BTS-560K		R25	5 470K		RR-33	BTS-470K	
_	_	BIS	BTS-560K		R26			RR-140	BTS-18Meg	
_	_	BI	3TS-100K		R27	7 270K		RR-31	BTS-270K	
RR-25 BT		BI	3TS-56K		R28			RR-18	BTS-10K	
_	_	BI	3TS-68K		R29	9 56K		RR-25	BTS-56K	
_	_	Ä	3TS-100K		R30		-	RR-140	BTS-18Meg	
_	_	Ä	3TS-22K		R31			RR-31	BTS-270K	Note
RR-32 BTS		BIS	BTS-330K		R3			RR-1	BTS-100	
		BIS	BTS-1, 5Meg		R33		_	RR-34	BTS-560K	
		BIS	BTS-270K		R34	100K	26	RR-50	BTS-100K 5%	
		BIS	-260K		R35		_	RR-18	BTS-10K	
RR-33   BTS	_	BIS	BTS-470K	-	R36	100K	38	RR-50	BTS-100K 5%	
		BIS	3TS-820K		R37	7 560K		RR-34	BTS-560K	
_	_	BI	3TS-18Meg		R38	٠,		RR-34	BTS-560K	
_	_	H	BTS-270K		R39	120002	73	RR-146	BTB-1200	
RR-34 BT	-	BT	3TS-560K		R40	0 3000 5%	2	RR-130	BTB-300 5%	
		BŢ	3TS-560K		R4I	1 56K		RR-25	BTS-56K	
RR-133 BT		BI	3TS-82K		R42			RR-22	BTS-27K	
_	_	BT	3TS-560K		R43			RR-13	BTS-39002	
RR-34 BI	_	BI	3TS-560K		R44	6.80	5% 1	RR-149		

Note 1. Some Versions May Use 580K In This Application (Part #RR-34).

### TRANSFORMER (POWER)

SEC. 3 TR-1		RE	REPLACEMENT DATA	DATA		
SEC. 1   SEC. 2   SEC. 3   S	NEWCOMB	Halldorson	Merit	Stancor	Stancor Thordarson	Triad
LITVAC 660VCT 6.3VAC	2 SEC. 3 PART No.	PART No.	PART No.	PART No.	PART No. PART No. PART No. PART No.	PART No.
S 55 A S 073 A S 74 A	TR-175		P-2951 (I)		22R02 (1)	
(4):004 (4):0154 (4)			ł		)	

(I) Tape 5V Winding & Center Tap On 6.3V Winding.

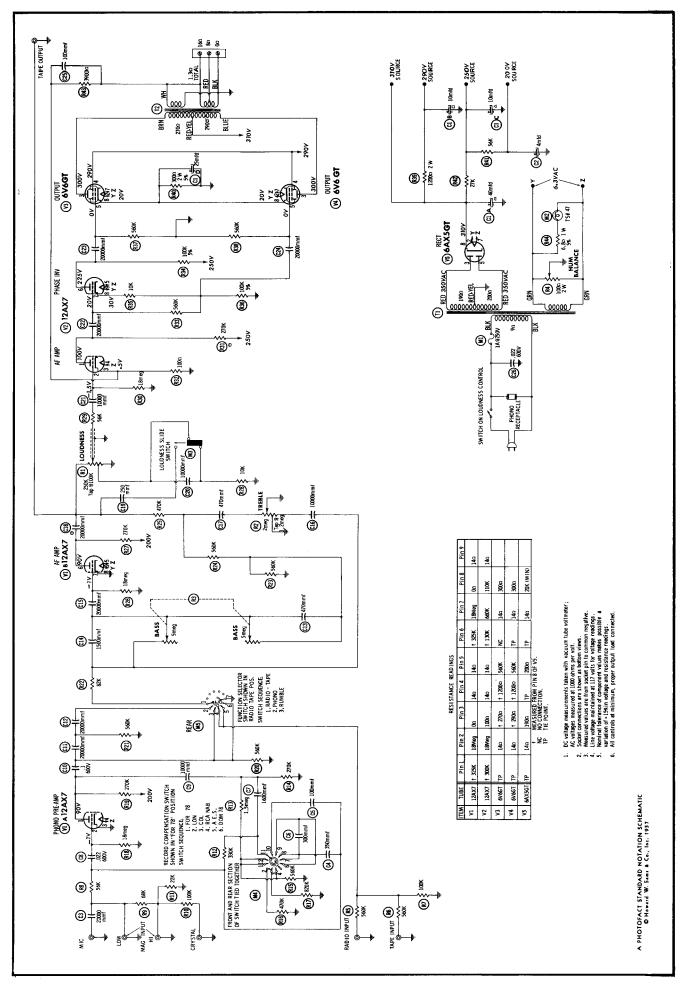
## TRANSFORMER (AUDIO OUTPUT)

	NOTES				
	Triad	PAKI NO.			
	Halldorson Merit Stancor Thordarson Triad	PAKI No.		,	
T DATA	Stancor	PAKI No.			
REPLACEMENT DATA	Merit	PAKI No.			
R	Halldorson	PARI No.	Z1404		
	NEWCOMB	FAKI NO.	TR-185		
	NANGE NANGE	SEC.	8000 160 TR-185	Tap® 80	
	IMPEDANCE	PRI.	2008	CT	
	ĕ ģ		T2		

### FUSES

	٠	HOLDER	4405
	BUSS PART No.	FUSE	MDL:1 4
REPLACEMENT DATA	LITTELFUSE PART No.	HOLDER	357001
REPLACEMI	LITTEL	FUSE	313001. (3AG1A) S/B
	MB No.	HOLDER	
	NEWCOMB PART No.	FUSE	FA-18
	RATING		1A 250V S/B
	TYPE		3AG
	ŠĘ.		Mi

		2	MISCELLANEOUS
N.	PART NAME	NEWCOMB PART No.	NOTES
M2	Pilot Light		447
X3	Switch	SY-5	Loudness Slide Tone (SDDT)
M4	Switch	SY-88	Record Compensation Rotary Wafer Tyme
M2	Switch	8X-90	Function Selector, Rotary Wafer Tyne

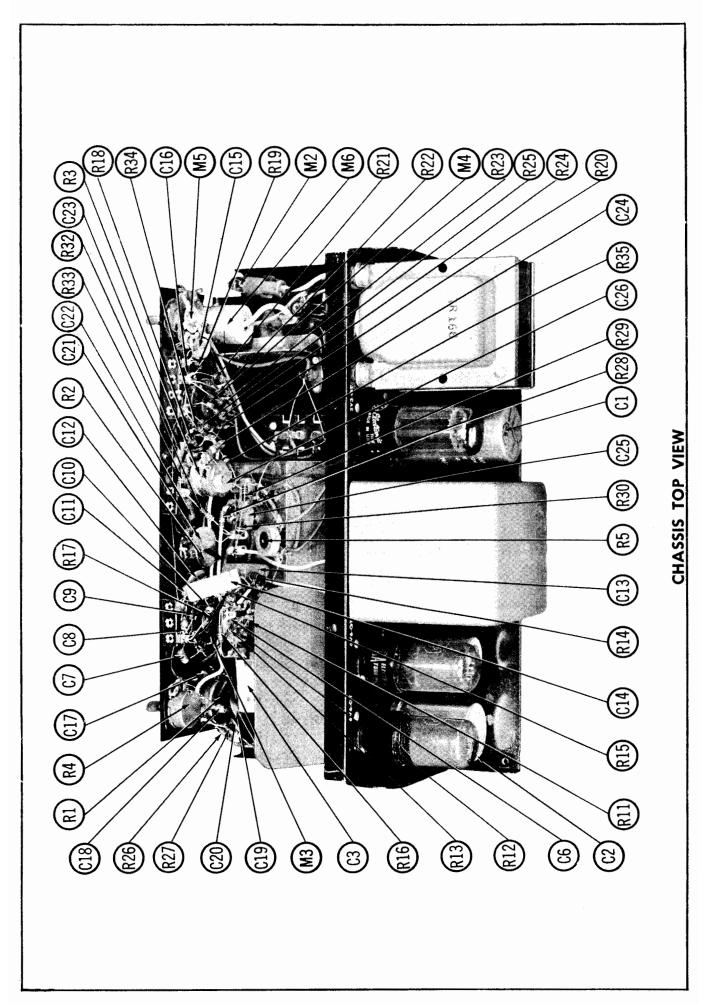




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# PARTS LIST AND DESCRIPTIONS TUBES (GENERAL ELECTRIC, SYLVANIA)

CHASSIS—TOP VIEW

**R48** 

(R49)

Ml

R45

(V2) 6AV6

(R42)

C28

ITEM No.	USE	TYPE	NOTES	ĽŽ
V2 V3	Mic-Phono Preamplifier AF Amplifier AF Amplifier-Phase Inv.	12AX7 6AV6 12AX7		V5 V5 V6

ITEM No.	USE	TYPE	NOTES
٧4	Output	6V6GT	
Λ2	Output	6V6GT	
9.0	Rectifier	5Y3GT	

## **ELECTROLYTIC CAPACITORS**

_		Z	RATING			REPLA	REPLACEMENT DATA			
	Ž. Vo	٦ ٩.	VOLT.	NEWCOMB PART No.	× .	CORNELL- DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
_	CIA		200	CE-33	AFH3-49	rBO520	FP284	LTMD-92	Q-075	TVL-3839
	Œ		475			LBR3050	LTC82	LTD-20-500		
_	CZA	20	475	CE-30			FP474	FTMQ-19	0.0-0.1	R2405 *
	В	01	475				LTC36	LTD-25-50	LFM-0525	
_	Ö	01	475							
	Ω	25	20							
_	င္ပ	4	420	CE-1	PRS450V4	BR445	TC70	TD-4-450	FM-4504	TVA-1702
*	Non C	Non Catalog Item.	Item.							

### FIXED CAPACITORS

(VI) (12AX7

(C27)

(R36)

5Y3GT (V6)

(11

6V6GT 12AX7

6V6GT

**(V5)** 

(R10)

(R8

(C5

(R9

(C4)

(R43)

C29

(R38

(30)

(R46)

R44

(R40)

(R31) R47

(R41)

(R39)

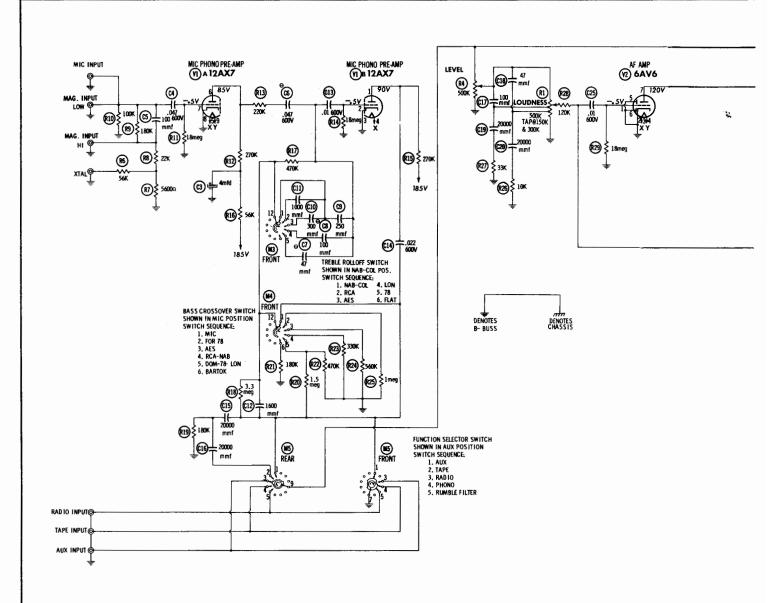
**R**7

R6

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

	NOTES	2			Note 1	Note 2	Note 3																						
	CDDACIE	PART No.	6TM-S47	5GA-T1	6TM-S47	5GA-Q47	5GA-TI	5GA-T25	5GA-T3	5HK-DI	5HK-DI5	6TM-SI	6TM-S22	5HK-S2	5HK-S2	5GA-TI	5GA-Q47	5HK-S2	5HK-S2	5HK-SI	5HK-DI	5GA-T47	5GA-T47	6TM-S	5HK-S2	6TM-S47	5GA-Q3	5HK-S2	5HK-S2
T DATA	Vaccinati	PART No.	GEM-6147	UC-531	GEM-6147	UC-5447	UC-531	UC-5325	UC-533	DC521	UC-5215	GEM-611	GEM-6122			UC-531	UC-5447			DC511	DC521	UC-5347	UC-5347	GEM-611		GEM-6147			
REPLACEMENT DATA	FRIF	PART No.		GP-100		GP-47	GP-100	ED-250	GP-300	GP-1000	GP-1500	GP-10000	ED-02	ED-02	ED-02	GP-100	GP-47	ED-02	ED-02	ED-01	GP-1000	GP-470	GP-470	GP-10000	ED-02		ED-30	ED-02	ED-02
~	CORNELL-	PART No.	CUB6S47	LT6TI	CUB6S47					LT6D1	_	_			BYB6S2	_	_			_				CUB6SI	BYB6S2	CUB6S47	L1003	BYB6S2	BYB6S2
	OFNTDAI AB	PART No.	DF-503		_	_		_						_		_		DD-203				_	D6-471	DD-103	DD-203			DD-203	
	ł.	PART No.	BPD-05	SI-100	BPD-05	SI-47	SI-100	BPD-00025	SI-300	SI-1000	BPD-0015	BPD-01	BPD-02	BPD-02	BPD-02	SI-100	SI-47	BPD-02	BPD-02	BPD-01	SI-1000	SI-470	SI-470	BPD-01	BPD-02	BPD-05	SI-30	BPD-02	BPD-02
	NEWCOMB	PART No.	CP-49	CM-14	CP-49	CM-3	CM-14	CM-22	CM-15	CM-38	CM-52	CP-45	CP-47	CM-35	CM-35	CM-14	CM-3	CM-35	CM-35	CM-32	CM-38	CM-25	CM-25	CP-45	CM-35	CP-49	CM-16	CM-35	CM-35
	2	VOLT	009	_	009						_	_					_	_					_	009		900		_	_
	Z	CAP. VOLT	. 047	001	.047	47	001	250	300	1000	1600	6.	. 022	20000	20000	100	47	20000	20000	10000	1000	410	410	10.	20000	. 047	30	20000	20000
	TEM.	ż	C4	CS	90	C2	83	C3	C10	CII	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	C29	C30
	_							_	_		_		_																_

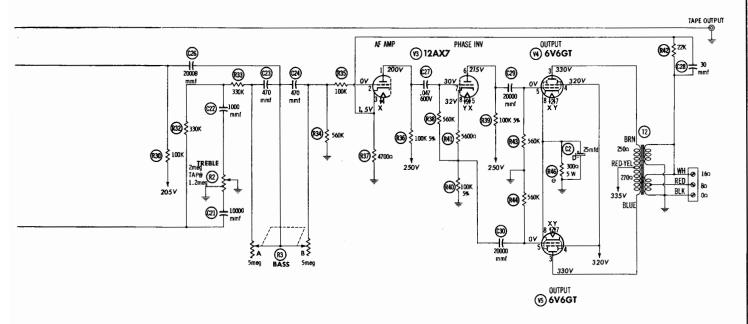
C30 20000 | CM-35 | EBD-02 | DD-203 | BYI
Note 1. Some versions may use .1 MFD 03 400V in this application.
Note 2. Some versions may use 100 MMF in this application.
Note 3. Some versions may use 150 MMF in this application.

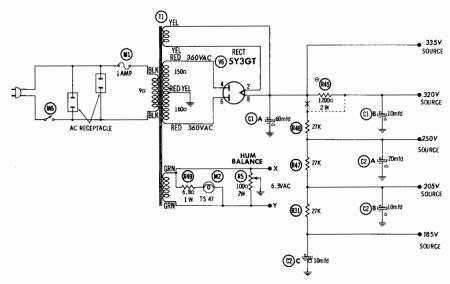


SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

A PHOTOFACT STANDARD NOTATION SCHEMATIC

O Howard W. Sam: & Co., Inc. 1957





- DC voltage measurements taken with vacuum tube voltmeter;
   AC voltages measured at 1,000 ohms per volt.
   Socket connections are shown as bottom views.
   Measured values are from socket pin to common negative.
   Line voltage maintained at 117 volts for voltage readings.
   Nominal tolerance of component values makes possible a variation of a 1,7% in voltage and resistance readings.
   All controls at minimum, proper output load connected.

### RESISTANCE READINGS

					3174602 10					
TEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
٧ı	12AX7	† 340K	18Meg	0α	26n	26Ω	† 405K	18Meg	0n	26a
V2	6AV6	18Meg	<b>0</b> Ω	26Ω	26a	0n	0Ω	† 155K		
V3	12AX7	† 127K	660K	4700Ω	26∩	26Ω	† 127K	650K	100K	26Ω
V4	6V6GT	TP	26Ω	† 250n	† 1 <b>200</b> Ω	560K	TP	<b>26</b> Ω	300Ω	
V5	6V6GT	TP	26a	t 270a	†1200a	560K	TP	260	300Ω	
<b>V</b> 6	5Y3GT	NC	20K (Min)	NC	150n	TP	1 <b>60</b> 0	NC	20K (Min)	
		NC NO	MEASUREA ASURED FRO CONNECTIO POINT.	M PIN 8 O		" POSITIO	N.			

# PARTS LIST AND DESCRIPTIONS (Continued)

### CONTROLS

	0 4 71	<u>.</u>		REP	REPLACEMENT DATA	ΤĀ		
TEX		•	NEWCOWR	CENTRALAB	TATACAMIO	2		
ģ	RESIST.	WATTS	PART No.	PART No.	PART No.	PART No.	PART No.	INSTALLATION NOTES
RIA	500K	-102	RV-71-K	ABT-160			UDT-285	Loudness, Tap a 150K & 300K
Œ	Shaft			AK-4			Not Req.	
R2A	2Meg	<b> </b> 00	RV-59-K		A47F3-2Meg Q18-139X		UT-451	Treble, Tap (a) 1. 2 Meg
М	Shaft	,			KSS-3	Not Req.	Not Req.	
R3A	5Meg	<b>→(%</b>	RV-57-K					Bass
æ	5Meg	-4N						Bass
R4A	500K	1-16	RV-86-K	B-59	A47-500K-S Q11-133		020	Level
В	Shaft	,		Not Req.	KSS-3		Not Req.	
RS	1000	2	RV-75					Hum Balance (Wire Wound)

RESISTORS
All wattages 1/2 watt, or less, unless otherwise listed.

				_	_	_					_	-	_					_	_				
NOTES																				Note 1			
IRC	PART No.	BTS-120K	BTS-18Meg	BTS-100K	BTS-27K	BTS-330K	BTS-330K	BTS-560K	BTS-100K	BTS-100K 5%	BTS-4700	BTS-560K	BTS-100K 5%	BTS-100K 5%	BTS-56002	BTS-22K	BTS-560K	BTS-560K	BTB-1200	PW7-300	BTS-27K	BTS-27K	
NEWCOMB	PART No.	RR-28	RR-140	RR-27	RR-22	RR-32	RR-32	RR-34	RR-27	RR-50	RR-14	RR-34	RR-50	RR-50	RR-15	RR-21	RR-34	RR-34	RR-146		RR-22	RR-22	RR-149
c)	WATT		_																8	2	·	_	-
Z Z Z	OHWS	120K	18 Meg	100K	27K	330K	330K	260K	100K	100K 5%	47000	260K	100K 59	100K 5%	56002	22K	560K	560K	12008	3000	27K	27K	6.82
¥ 4	ġ	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40	R41	R42	R43	R44	R45	R46	R47	R48	R49
NOTES						_				_										_			
IRC	PART No.	BTS-56K	BTS-5600	BTS-22K	BTS-180K	BTS-100K	BTS-18Meg	BTS-270K	BTS-220K	BTS-18Meg	BTS-270K	BTS-56K	BTS-470K	BTS-3, 3Meg	BTS-180K	BTS-1, 5Meg	BTS-180K	BTS-470K	BTS-330K	BTS-560K	BTS-1Meg	BTS-10K	BTS-33K
NEWCOMB	PART No.	RR-25	RR-15	RR-21	RR-29	RR-27	RR-140	RR-31	RR-30	RR-140	RR-31	RR-25	RR-33	RR-42	RR-29	RR-39	RR-29	RR-33	RR-32	RR-34	RR-37	RR-18	RR-23
,	WATT																				_		
KATIN	OHMS	26K	20003	22K	180 <b>K</b>	100K	18Meg	270K	220K	18 Meg	270K	56K	470K	3.3Meg	180K	1. 5Meg	180K	470K	330K	260K	1Meg	10K	33K
¥ 2	ė	92	22	8	62	92	E .	RI2			RIS		RI7	R18	RI9	R20	R21	R22	R23		R25		R27
	KALING NEWCOMB IRC NOTES LIEM RATING NEWCOMB IRC	NEWCOMB IRC NOTES IIEM RATING NEWCOMB OHMS WATT PART No.	NEWCOMB   IRC   NOTES   NEWCOMB   IRC   NOTES   NEWCOMB   IRC   OHMS   WATT   PART No.   PART No.   S6K   RR-25   BTS-56K   RR-8   BTS-120K   BTS-120K   RR-28   BTS-120K	NewCOMB   RC   NOTES   IFM   RATING   NEWCOMB   RC   NOTES   NOTES	NewCOMB   IRC   NOTES   IEM   RATING   NEWCOMB   IRC   No.   OHMS   WATT   PART No.   PART No.   Sek   RR-28   BTS-5600   RTS   BTS-5600   RTS   BTS-5800   RTS   BTS-100K   B	NEWCOMB   REATING   NEWCOMB   RC   NOTES   NEW   NEWCOMB   RC   NOTES   NEWCOMB   NE	NewCOMB   RC   NOTES   New COMB   RC   New COMB   RC   New COMB   New COMB   RC   New COMB   New COMB   RC   New COMB   New COMB	No.   NewCOMB   RC   NOTES   New COMB   RC   New COMB   RC	NewCOMB   NewC	New Comb   Red   New Comb   RC   Notes   New Comb   Notes   New Comb   Notes   New Comb   Notes   No	NewCOMB   NEWC	NewCOMB   NewC	Name	NEWCOMB   NEWCOMB   NEW   NE	NewCOMB   NewC	Name	CHMS         NEWCOMB         IRC         NOTES         IIEM         RATING         NEWCOMB         IRC           OHMS         WATI         PART         No.         No.         PART         No.	CHAMS         NEWCOMB         IRC         NOTES         II-M         COHMS         WATING         REWCOMB         IRC           56K         RR-15         BTS-56K         RR-15         BTS-180K         RR-16         BTS-18Meg         BTS-18Meg         BTS-18Meg         BTS-18Meg         BTS-18Meg         BTS-18Meg         BTS-10KK         BTS-18Meg         BTS-10KK         BTS-10KK <th>CHAMS         NEWCOMB         IRC         NOTES         II-M         CHAMS         NEWCOMB         IRC         NOTES         II-M         CHAMS         NATION         PART No.         PART</th> <th>CHAMS         NEWCOMB         IRC         NOTES         II-M         COHMS         WATING         REWCOMB         IRC           56002         RR-15         BTS-56K         RR-15         BTS-180K         RR-19         BTS-18Me         BTS-18Me           56002         RR-15         BTS-56K         RR-1         130K         RR-14         BTS-180K           1800K         RR-21         BTS-210K         RR-1         BTS-180K         BTS-180K           1800K         RR-21         BTS-210K         RR-3         BTS-180K         BTS-100K           2700K         RR-30         BTS-220K         RR-3         330K         RR-32         BTS-100K           2200K         RR-30         BTS-220K         RR-3         BTS-30K         BTS-50K         BTS-50K           2200K         RR-30         BTS-220K         RR-3         BTS-30K         BTS-50K         BTS-60K           4.00K         RR-30         BTS-220K         RR-3         BTS-40K         RR-3         BTS-60K           56K         RR-30         BTS-30K         RR-5         BTS-40K         RR-5         BTS-60K           4.00K         RR-3         BTS-30K         RR-3         BTS-50K         RR-3         BTS-</th> <th>CHAMS         NEWCOMB         IRC         NOTES         II-M         COHMS         WATT         REWCOMB         IRC         NOTES         II-M         COHMS         WATT         PART No.         PART No.<th>CHAMS         NEWCOMB         IRC         NOTES         IIEM         RATING         NEWCOMB         IRC           66K         RR-25         BTS-56K         RR-21         120K         RR-28         BTS-130K         BTS-130K           56002         RR-21         BTS-56K         RR-31         120K         RR-28         BTS-130K         BTS-130K           22K         RR-21         BTS-160K         RR-31         100K         RR-21         BTS-10Meg         BTS-10Meg</th><th>CHMAS         NEWCOMB         IRC         NOTES         II-M         COHMS         WATT         REWCOMB         IRC           56K         600.02         RR-25         BTS-56K         R29         18Me         RR-10         BTS-18Me           22K         RR-21         BTS-56K         R30         10K         RR-14         BTS-18Me           180K         RR-21         BTS-180K         RR31         27K         RR-14         BTS-10K           180K         RR-24         BTS-180K         RR31         27K         RR-28         BTS-10K           180K         RR-34         BTS-20K         RR-31         BTS-20K         RR-32         BTS-10K           18Me         RR-30         BTS-20K         RR-31         BTS-20K         RR-32         BTS-10K           18Me         RR-30         BTS-20K         RR-31         BTS-20K         RR-32         BTS-10K           18Me         RR-30         BTS-20K         RR-31         BTS-20K         RR-34         BTS-10K           270K         RR-31         BTS-20K         RR-34         BTS-10K         RR-34         BTS-10K           280K         RR-31         BTS-10K         RR-34         BTS-10K         RR-34</th></th>	CHAMS         NEWCOMB         IRC         NOTES         II-M         CHAMS         NEWCOMB         IRC         NOTES         II-M         CHAMS         NATION         PART No.         PART	CHAMS         NEWCOMB         IRC         NOTES         II-M         COHMS         WATING         REWCOMB         IRC           56002         RR-15         BTS-56K         RR-15         BTS-180K         RR-19         BTS-18Me         BTS-18Me           56002         RR-15         BTS-56K         RR-1         130K         RR-14         BTS-180K           1800K         RR-21         BTS-210K         RR-1         BTS-180K         BTS-180K           1800K         RR-21         BTS-210K         RR-3         BTS-180K         BTS-100K           2700K         RR-30         BTS-220K         RR-3         330K         RR-32         BTS-100K           2200K         RR-30         BTS-220K         RR-3         BTS-30K         BTS-50K         BTS-50K           2200K         RR-30         BTS-220K         RR-3         BTS-30K         BTS-50K         BTS-60K           4.00K         RR-30         BTS-220K         RR-3         BTS-40K         RR-3         BTS-60K           56K         RR-30         BTS-30K         RR-5         BTS-40K         RR-5         BTS-60K           4.00K         RR-3         BTS-30K         RR-3         BTS-50K         RR-3         BTS-	CHAMS         NEWCOMB         IRC         NOTES         II-M         COHMS         WATT         REWCOMB         IRC         NOTES         II-M         COHMS         WATT         PART No.         PART No. <th>CHAMS         NEWCOMB         IRC         NOTES         IIEM         RATING         NEWCOMB         IRC           66K         RR-25         BTS-56K         RR-21         120K         RR-28         BTS-130K         BTS-130K           56002         RR-21         BTS-56K         RR-31         120K         RR-28         BTS-130K         BTS-130K           22K         RR-21         BTS-160K         RR-31         100K         RR-21         BTS-10Meg         BTS-10Meg</th> <th>CHMAS         NEWCOMB         IRC         NOTES         II-M         COHMS         WATT         REWCOMB         IRC           56K         600.02         RR-25         BTS-56K         R29         18Me         RR-10         BTS-18Me           22K         RR-21         BTS-56K         R30         10K         RR-14         BTS-18Me           180K         RR-21         BTS-180K         RR31         27K         RR-14         BTS-10K           180K         RR-24         BTS-180K         RR31         27K         RR-28         BTS-10K           180K         RR-34         BTS-20K         RR-31         BTS-20K         RR-32         BTS-10K           18Me         RR-30         BTS-20K         RR-31         BTS-20K         RR-32         BTS-10K           18Me         RR-30         BTS-20K         RR-31         BTS-20K         RR-32         BTS-10K           18Me         RR-30         BTS-20K         RR-31         BTS-20K         RR-34         BTS-10K           270K         RR-31         BTS-20K         RR-34         BTS-10K         RR-34         BTS-10K           280K         RR-31         BTS-10K         RR-34         BTS-10K         RR-34</th>	CHAMS         NEWCOMB         IRC         NOTES         IIEM         RATING         NEWCOMB         IRC           66K         RR-25         BTS-56K         RR-21         120K         RR-28         BTS-130K         BTS-130K           56002         RR-21         BTS-56K         RR-31         120K         RR-28         BTS-130K         BTS-130K           22K         RR-21         BTS-160K         RR-31         100K         RR-21         BTS-10Meg         BTS-10Meg	CHMAS         NEWCOMB         IRC         NOTES         II-M         COHMS         WATT         REWCOMB         IRC           56K         600.02         RR-25         BTS-56K         R29         18Me         RR-10         BTS-18Me           22K         RR-21         BTS-56K         R30         10K         RR-14         BTS-18Me           180K         RR-21         BTS-180K         RR31         27K         RR-14         BTS-10K           180K         RR-24         BTS-180K         RR31         27K         RR-28         BTS-10K           180K         RR-34         BTS-20K         RR-31         BTS-20K         RR-32         BTS-10K           18Me         RR-30         BTS-20K         RR-31         BTS-20K         RR-32         BTS-10K           18Me         RR-30         BTS-20K         RR-31         BTS-20K         RR-32         BTS-10K           18Me         RR-30         BTS-20K         RR-31         BTS-20K         RR-34         BTS-10K           270K         RR-31         BTS-20K         RR-34         BTS-10K         RR-34         BTS-10K           280K         RR-31         BTS-10K         RR-34         BTS-10K         RR-34

# Note #1. 25025 W Used in Some Versions (Part #RR-94),

# PARTS LIST AND DESCRIPTIONS (Continued)

### TRANSFORMER (POWER)

L							REP	LACEMENT	DATA		
= -	Ž Š		RAI	RATING		NEWCOMB	Halldorson	Merit	Stancor	Thordarson	Triad
		PRI.	SEC, 1	SEC. 2	SEC. 3	PART No.	PART No.	PART No.	PART No.	PART NO. PART NO. PART NO. PART NO.	PART No.
	ΙŢ	117VAC	690VCT 5VA	5VAC	6.3VAC	. 3VAC TR-166	P9310 (1)		PC8409	24R02U	
		3.64A	3.64A (3.078A (3.2A	@2A	®1.7A						
								Tone C	Janton Ton	Tono Contor Ton On & 91 Wilnding	ding

## TRANSFORMER (AUDIO OUTPUT)

	NOTES				
	Triad	LAKI NO.			
	Thordarson	TAKI NO. PAKI NO. PAKI NO. PAKI NO.			
2	Stancor	PAKI NO.			
REFLACEMENT DATA	Merit	TAKI NO.			
Y.	Halldorson	LAKI NO.			
	NEWCOMB	Z ZZ	TR-178		
	ITEM IMPEDANCE No.	PRI. SEC.	3000 160	CT Tap ®	<b>3</b>
	Ę Ž	_	T2		

TYPE   RATING   NEWCOMB   LITTELFUSE   PART No.   PAR
--

### **MISCELLANEOUS**

	₹ ¥	PART NAME	NEWCOMB	NOTES
	M2	Pilot Light		TS47
	M3	Switch	SX-89	Treble Roll-Off, (Rotary Wafer Type)
_	M4	Switch	SX-89	Bass Cross-Over. (Rotary Wafer Type)
	M2	Switch	SY-91	Function Selector (Rotary Wafer Type)
	M6	Switch		Power On-Off



Newcomb Model CO-1020 TRADE NAME

MANUFACTURER Newcomb Audio Products Co., 6824 Lexington Ave., Hollywood 38, Calif.

TYPE SET AC Operated 7 Channel 20 Watt Audio Amplifier

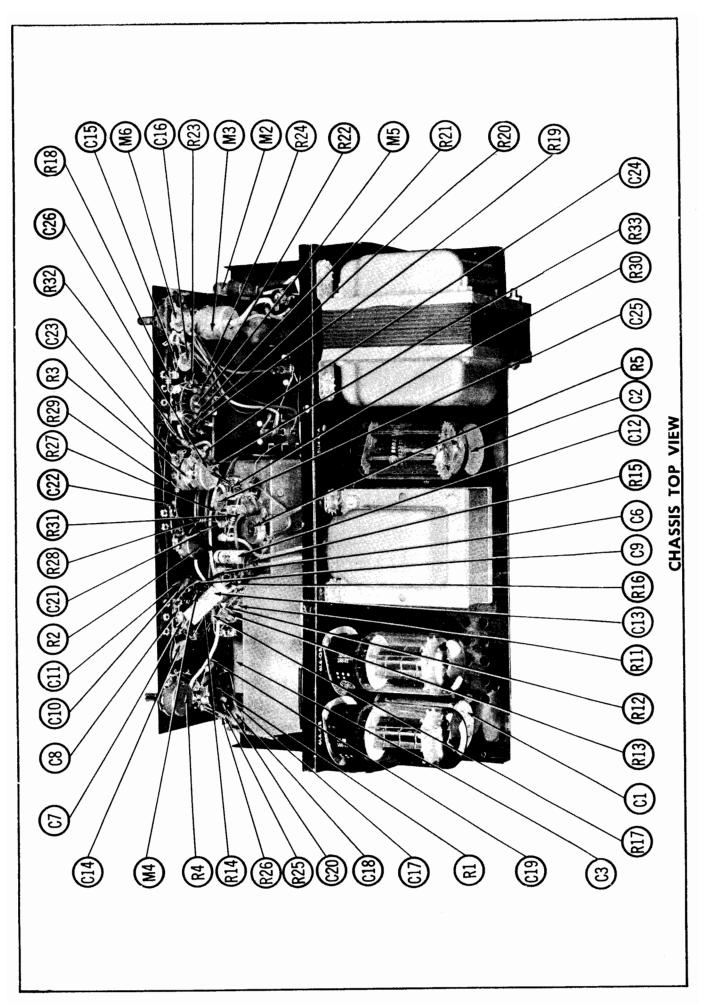
Types 12AX7 Preamplifier, 6AV6 AF Amplifier, 12AX7 AF Amp. -Phase Inv., (2) 6L6GB Output, 5U4GA Rectifier TUBES (Six)

POWER SUPPLY 110-120 Volts AC-60 Cycles RATING . 96 Amp. 2 117 Volts AC (105 Watts)

### HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitobility of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial con-G984

tent, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1957 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of Americo. Copyright under international Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America



# PARTS LIST AND DESCRIPTIONS TUBES (GENERAL ELECTRIC, SYLVANIA)

Ď	Output Output Rectifler
Ş. No.	V4 V5 V6
NOTES	
TYPE	12AX7 6AV6 12AX7
USE	Preamplifler AF Amplifler AF AmpPhase Inv.
ITEM No.	V1 V2 V3

PYRAMID S PART No. TMT-46 TD-4-450 F	USE	<u>"</u>		TYPE 12AX7	NOTES	=Z   Þ	₹ Š ¥	USE		TYPE 6L6GB	NOTES
PYRAMID SANGAMO TMT-46  TD-4-450 FM-4504	ase Inv.		3AV6 2AX7			. > >	, to 80	Output Rectifler		6L6GB 5U4GA	
CORPELL   MALIORY   PYRAMID   SANCAMO   DUBILIER   PART No.   PART No.   PART No.   D0880   FP474.5   TMT-46   FM-4504   ER445   TC70   TD-4-450   FM-4504		₩	<b>□</b>	2	<b>TROLY</b>	TIC C	AP,	<b>ACITOR</b>			
CORNELL- PART No.         MALIORY PART No.         PPRAMID PART No.         PART No.           D0880         FP474.5         TMT-46         FM-4504           BR445         TC70         TD-4-450         FM-4504	RATING					REP	<u>⊕</u>	WENT DATA			
D0680 TMT-46 FP474.5 BR445 TC70 TD-4-450 FM-4504	CAP. YOLT. NEWCOMB PART No.			PAR	Nox No.	CORNELL- DUBILIER PART No.		MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
FP474.5  BR445 TC70 TD-4-450 FM-4504	500 CE-33 A		<	<b>FH3</b>	-53	D0680			TMT-46		R2409 *
BR445 TC70 TD-4-450 FM-4504	CE-30		_	FH4	-19-10		_	FP474.5			R2405 *
BR445 TC70 TD-4-450 FM-4504	475										
BR445 TC70 TD-4-450 FM-4504						:	_			•	
	450 CE-1 PF		PI	34		BR445	_	C 70	TD-4-450	FM-4504	TVA-1702

### FIXED CAPACITORS

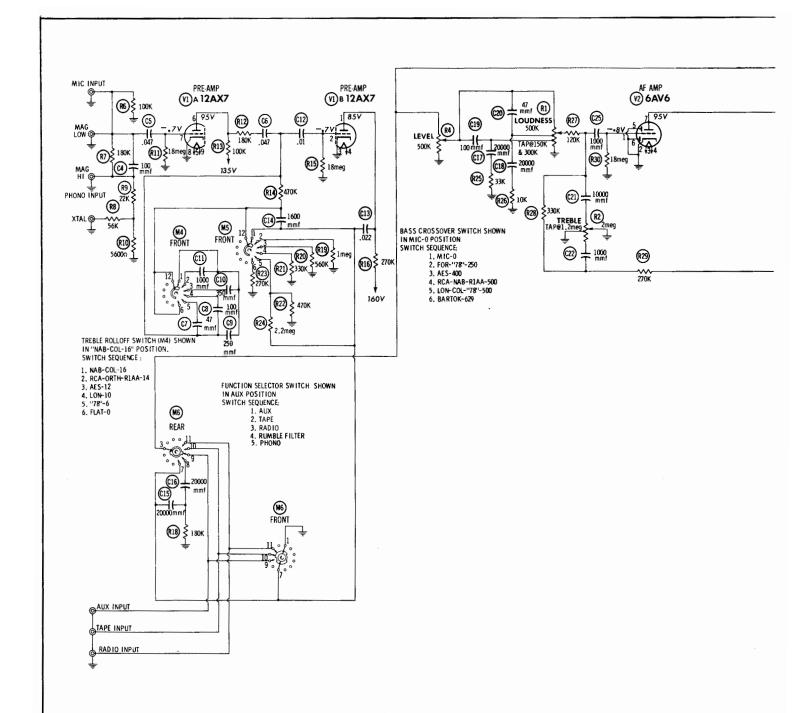
Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

					- 1	REPLACEMENT DATA	DATA		
₹ <u>3</u>	P. VOLT	NEWCOMB PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL- DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
100		CM-14	SI 100	D6-101	LT6T1	GP-100	UC-531	5GA-T1	
. 047	909	CP-49	BPD-05	DF-503	CUB6S47		GEM-6147	6TM-S47	
. 647	900	CP-49	BPD-05	DF-503	CUB6847		GEM-6147	6TM-S47	Note 1
47		CM-3	SI 47	D6-470	LT6Q47	GP-47	UC-5447	5GA-047	
100		CM-14	SI 100	D6-101	LT6Ti	GP-100	UC-531	5GA-T1	
250		CM-22	SI 250	D6-251	LT6T25	GP-250	UC-5325	5GA-T25	
350		CM-26	SI 350	D6-351	LT6T35	GP-350	UC-5335	5GA-T35	Note 2
1000		CM-38	SI 1000	D6-102	LT6DI	GP-1000	DC521	5HK-DI	
6.	009	CP-45	BPD-01	DD-103	CUB6SI	GP-10000	GEM-611	6TM-SI	
. 022	9	CP-47	BPD-02	DD-203	CUB6S22	ED-, 02	GEM-6122	6TM-S22	
1600		CM-52	BPD-0015	DD-152	L10DI5	ED-1500	UC-5215	5HK-DI5	
20000		CM-35	BPD-02	DD-203	BYB6S2	ED 02		5HK-S2	
20000		CM-35	BPD-02	DD-203	BYB6S2	ED. 02		5HK-S2	
20000		CM-35	BPD-02	DD-203	BY B6S2	ED 02		5HK-S2	
20000		CM-35	BPD-02	DD-203	BYB6S2	ED 02		5HK-S2	
8		CM-14	SI 100	D6-101	LT6T1	GP-100	UC-531	5GA-TI	
47		CM-3	SI 47	D8-470	LT6Q47	GP-47	UC-5447	5GA-047	
10000		CM-32	BPD-01	DD-103	BYA6SI	ED 01	DC511	5HK-SI	
1000		CM-38	BPD-001	DD-102	BYA6DI	ED-1000	DC521	5HK-DI	
4 70		CM-25	SI 470	D6-471	LT6T47	GP-470	UC-5347	5GA-T47	
470		CM-25	S1 470	D6-471	LT6T47	GP-470	UC-5347	5GA-T47	
10000		CM-32	BPD-01	DD-103	BYA6S1	ED-, 01	DC511	5HK-SI	
20000		CM-35	BPD-02	DD-203	BYB6S2	ED-, 02		5HK-S2	
. 047	900	CP-49	BPD-05	DF-503	CUB6S47		GEM -6147	6TM-S47	
100		CM-14	SI 100	D6-101	LT6TI	GP-100	UC-531	5GA-TI	
٦,	900	CP-52	P688N-1	DF-104	CUB6Pl		GEM-601	6TM-PI	
٦.	900	CP-52	P688N-1	DF-104	CUB6Pl		GEM-601	6TM-Pl	
250		00 MU	ממממ תיחם		TOTOW A	200	1001		

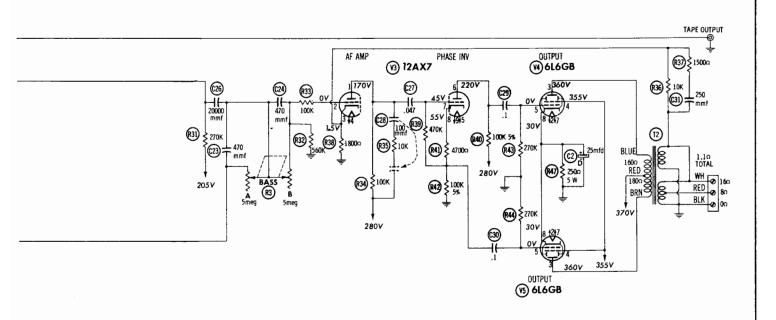
Note 1. Some versions may use . IMFD in this application (Part #CP-52) Note 2. Some versions may use 300MMF in this application

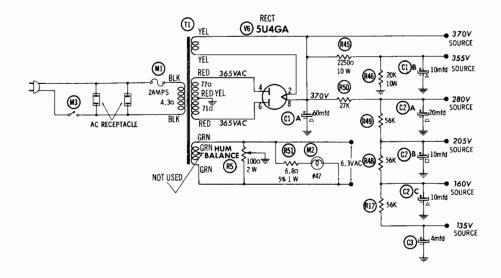
		4		RE	REPLACEMENT DATA	TA		
至	SAINS	ş	MEWCOMB		CIABOSTAT		VaC   A44	SECON MORE INTERIOR
ģ	RESIST.	WATTS	WATTS PART No.		PART No. PART No.	PART No.	PART No.	INSTALLATION NOTES
RI	500K	48	RV-71-K				UDT-285	Loudness, Tap 3 150K & 300K
R2A		- 100	RV-59-K		A47F3-2Meg Q18-139X	Q18-139X	UT-451	Treble, Tap a L 2Meg
B	Shaft				KSS-3	Not req.	Not req.	
R3A B	5Meg 5Meg	178	RV-57-K					Bass
R4A		-400	RV-86-K	B-59	A47-500K-S Q11-133	Q11-133	U50	Level
Д	Shaft				KSS-3	Not req.	Not req.	
R5		8	RV-75					Hum Balance

5U4GA	12AX7 6L6GB 6L6GB
$\sim$	R41) R39 V3 R42 V5 R44) V4 R35
(R51) (11) (V6) (R38) (C27) (12) (C30) (	
	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
	(29)
	(R43)
	(R47)
inner .	(R40)
TO THE PARTY OF	RAB
AL SECTION	
	R49
	R10
66 66	
	R8
10000	(R6)
	R
/ 70/////	
	(4)
(M1) (R50) (R45) (R46) (V2) (R36)	(3) (VI) (R37) (28) (C5) (C5)
6AV6	12AX7 R7
OA VO	



A PHOTOFACT STANDARD NOTATION SCHEMATIC © Howard W. Sams & Co., Inc. 1957





### RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V١	12AX7	† 410K	18Meg	0Ω	26Ω	260	† <b>2</b> 95K	18Meg	0Ω	26 <sub>0</sub>
V2	6AV6	18Meg	0Ω	26Ω	26Ω	0Ω	0Ω	† 355K		
٧3	12AX7	† 127K	660K	180 <b>0</b> Ω	26Ω	26Ω	† 127K	570K	100K	26∩
٧4	6L6GB	TP	26Ω	† 160a	† 2250Ω	270K	NC	26Ω	250n	
<b>V</b> 5	6L6GB	TP	26Ω	†180ດ	† 2250Ω	270K	TP	26Ω	250₁0	
V6	5U4GB	TP	20K(Min)	TP	77Ω	TP	710	TP	20K(Min)	

- † MEASURED FROM PIN 8 OF V6 NC NO CONNECTION TP TIE POINT

- DC voltage measurements taken with vacuum tube voltmeter;
   AC voltages measured at 1000 ohms per volt.
   Socket connections are shown as bottom views.
   Measured values are from socket pin to common negative.
   Line voltage maintained at 117 volts for voltage readings.
   Nominal tolerance of component values makes possible a variation of a 15% in voltage and resistance readings.
   All controls at microprometry and the local connected.

- 6. All controls at minimum, proper output load connected.

# PARTS LIST AND DESCRIPTIONS (Continued) RESISTORS All wattages 1/2 watt, or less, unless otherwise listed.

	REPLACEMENT DATA				Γ	REPLACEM	REPLACEMENT DATA	
<u> </u>	١,,	NOTES	E E	RATING	,,	NEWCOMB	2	NOTES
WATT PART NO. PART NO.	Z	ó	į	OHMS	WATT	PART No.	PART No.	
RR-27 BTS-100K	2	*	R29	270K		RR-31	BTS-270K	
RR-29 BTS-180K	~	0K	R30	18Meg		RR-140	BTS-18Meg	
RR-25 BTS-56K		3К	R31	270K		RR-31	BTS-270K	
_	ç.	×	R32	560K	_	RR-34	BTS-560K	
RR-15 BTS-5600	Ф	00	R33	100K		RR-27	BTS-100K	
_	~	Meg	R34	100K		RR-27	BTS-100K	
RR-29 BTS-180K	×	)K	R35	10K		RR-18	BTS-10K	
_	×	_	R36			RR-18	BTS-10K	
RR-33 BTS-470K	2	0K	R37	15002		RR-8	BTS-1500	
RR-140 BTS-18Meg	=	Meg	R38	18002	_	RR-9	BTS-1800	
_	≈	JK.	R39	4 70K		RR-33	BTS-470K	
_	8		R40	100K 5%		RR-50	BTS-100K 5%	
RR-29 BTS-180K	~	NO.	R41	47002	_	RR-14	BTS-4700	
_	~	leg	R42	100K 5%		RR-50	BTS-100K 5%	
_		10K	R43	270K		RR-31	BTS-270K	
_		0К	R44	270K		RR-31	BTS-270K	
_	_	, MO	R45	_	2	RR-126	1 3/4A-2250	
RR-31	Ē	0K	R46		2	RR-104	PW10-20K	
2.2Meg   RR-40 BTS-2.2Meg	•	Meg	R47	~	D.	RR-94	PW7-250	
RR-23	~	<u></u>	R48	26K		RR-25	BTS-56K	
RR-18	=		R49	56K		RR-25	BTS-56K	
		0K	R50	27K		RR-22	BTS-27K	
RR-32 BTS-330K		30K	R51	6.80.5%	_	RR-149		

### TRANSFORMER (POWER)

						RE	REPLACEMENT DATA	DATA		
Ž Ž		Z	RATING		_	Holldorson	Merit	Stancor	Stancor Thordarson	Triad
	PRI.	SEC. 1	1 SEC. 2 SEC. 3	SEC. 3	PART No.	PART No. PART No. PART No. PART No.	PART No.	PART No.	PART No.	PART No.
Ţ	T1 117VAC 720VCT	720VCT	5V 8.3VCT TR-118	8.3VCT		D9316 ①	P-3173 ②	PC8411 ①	P9316 ① P-3173 ② PC8411 ① 24B084 ① R-14A ①	R-14A
	Ø . 96A	3 . I22A	3.96A 3.122A 3 3A 3.8A	© 2.8A					}	0
-	Tane Center Ten On & 3V Winding	Ton On &	2V Windin							

Tape Center Tap On β. 3V Winding.
 Drill New Mounting Holes.

# CHASSIS—BOTTOM VIEW

## TRANSFORMER (AUDIO OUTPUT)

į				R	REPLACEMENT DATA	DATA .			
Š.	TEM IMPEDANCE No.	ANCE	NEWCOMB Halldorson Merit	Halldorson	Merit	Stancor	Stancor Thordarson	Triad	NOTES
	PRI.	PRI. SEC.	PARI NO.	PAKI NO. PAKI NO. PAKI NO. PAKI NO.	PAKI NO.	PAKI NO.	PAKI NG.	PAKI NO.	
T2	T2 6300Ω 16Ω	160	TR-161	Z1403 ①	A-3130 ①	A-3307 ①	22S68 D	S-60A (D	21403 ① A-3130 ① A-3307 ① 22S68 ① S-60A ① ① Drill new mounting holes.
	CI	CT Tap							

### FUSES

		HOLDER	нкр	
	BUSS PART No.	FUSE	AGC2 H	
REPLACEMENT DATA	LITTELFUSE PART No.	HOLDER	341001	
REPLACEM	LITTEL PART	FUSE	312002. (3AG2A)	
	VEWCOMB PART No.	HOLDER		
	NEWC	FUSE	FA-5	
	RATING		2A	
	TYPE		34G	
	¥.º		IWI	

### **MISCELL ANEOUS**

 ź	PART NAME	NEWCOMB PART No.	NOTES
M2	Pilot Light		*47
M3	Switch		ON-OFF
M4	Switch	SX -89	Treble Rolloff
M	Switch	8X-89	Вавв Стоввочет
N	Switch	16-AS	Selector



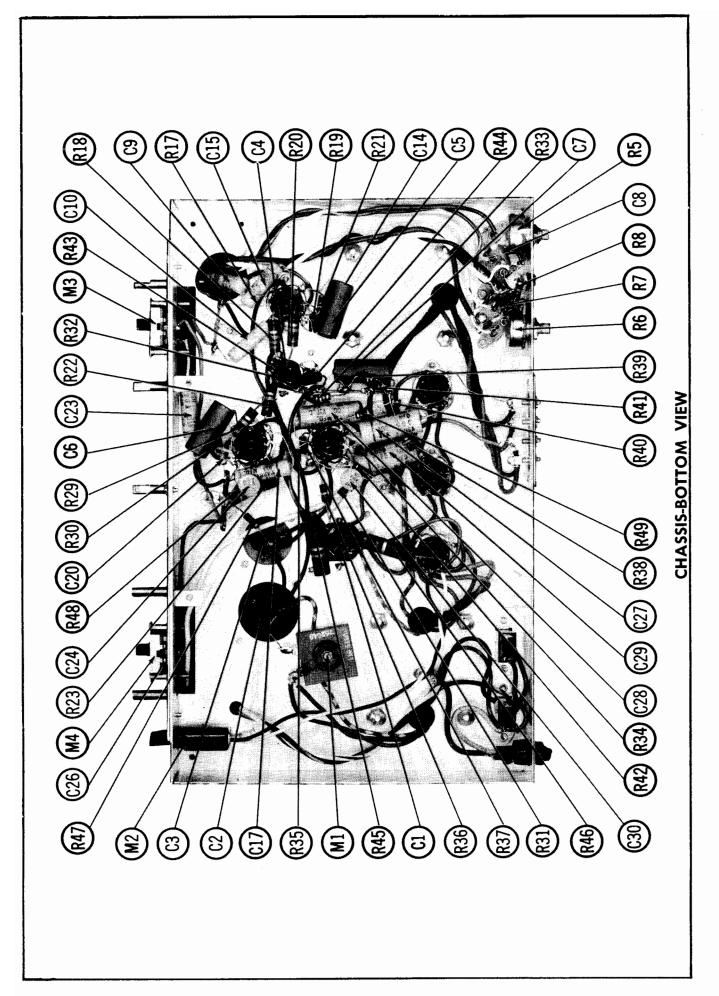


TRADE NAME	Pilot Model AA-903B	_
MANUFACTURER	Pilot Radio Corp., 37-06 36th St., Long Island City l, N. Y.	
TYPE SET	AC Operated 5 Channel Audio Amplifier	
TUBES (Six)	Types 12AX7 Phono Preamplifier, 12AX7 AF Amplifier, 12AX7 AF Amp Phase Inv., (2) EL84 (or) 6BQ5 Output, EZ81 (or) 6CA4 Rectifier	
POWER SUPPLY	105-120 Volts AC-60 Cycles RATING . 72 Amp. ② 117 Volts AC (71 Watts)	

### HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of H63

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## CHASSIS—TOP VIEW

# PARTS LIST AND DESCRIPTIONS TUBES (GENERAL ELECTRIC, SYLVANIA)

 TEM No.	USE	TYPE	NOTES	LΖ
V1 V2 V3	Phono Preamplifler AF Amplifler AF Amp Phase Inv.	12AX7 12AX7 12AX7		

ITEM No.		USE		TYPE	NOTES	N SE	w use	35	TYPE	NOTES
Z Z	Phon AF A	Phono Pream AF Amplifler	Phono Preamplifler AF Amplifler	12AX7 12AX7		V5 V5			EL84 EL84	Note 1 Note 1
V3	AF A	mp P	AF Amp Phase Inv.	12AX7		9.0	Rectifler		EZ81	Note 2
		No	Note 1. Alternate Type 6BQ5	Type 6BQ5		i R	Note 2. Alternate Type 6CA4	Type 6CA4		
				ELEC	TROL	TIC C	<b>ELECTROLYTIC CAPACITORS</b>	S		
	RAT	RATING				REPL.	REPLACEMENT DATA			
Ze. No.	CAP.	VOLT.	PILOT PART No.	AER	AEROVOX PART No.	CORNELL- DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
CIA	₹50	350	24-153	AFI	AFH4-14	D0130	FP444	TMQ-12	Q-040	TVL-4763
Д	■20	320								
U	₹20	320		_	_		_			
Ω	20	320			_					
CZ	200	22	24-152	AF		A0120	WP057	TMS-10	S-040	TVL-1220
င္ပ	8	25	24-154	AFI	AFH1-21	XA0241	WP055	TMS-9	S-035	TVL-1423
C4A	o1 <b>▼</b>	350	24-151	AF	AFH3-28	C0220	FP259	TMT-28	FS-215	TVL-3639.7
Д	₽40	350		_					LMT-4510	
CS	22	52	24-50	PRS		BBR25-25	TC26	TD-25-25	MT-0225	TVA-1205
0 C	22	25	24-50 ⊕	PRS	_	BBR25-25	TC26	TD-25-25	MT-0225	TVA-1205
22	25	25	24-50	PRS	PRS25V25	BBR25-25	TC26	TD-25-25	MT-0225	TVA-1205
oN ⊖	t used i	in some	(1) Not used in some versions.		ш	IXED C	FIXED CAPACITORS	DC		

FIXED CAPACITORS

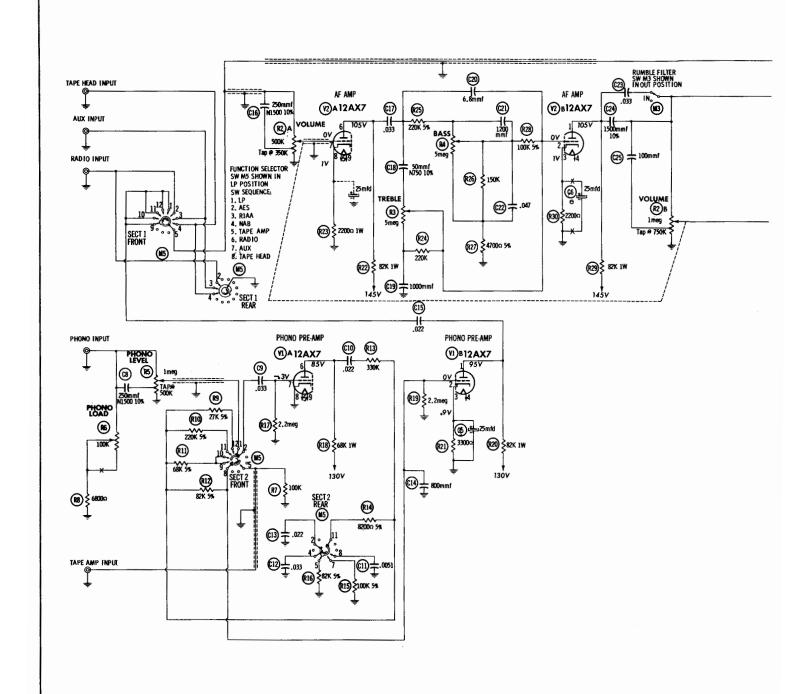
Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

10% 10% N1500 10% 10% NOTES N1500 N750 N750 10% 10% 5HK-D1 5TCCB-V68 6GA-D12 4TM-S33 4TM-S33 5GA-T1 MS-215 5GA-T1 MS-215 4TM-P1 4TM-P1 5TM-P1 5TM-P1 SPRAGUE Part No. 6TM-S33 4TM-S22 6TM-D5 6TM-S33 4TM-S22 5GA-T8 6TM-S33 MALLORY PART No. GEM -4133 GEM -4122 GEM -625 GEM -4133 GEM -4122 DC521 ZT-5568 UC-5212 GEM-4147 GEM-4133 GEM-4133 GEM-4122 GEM -401 GEM -201 GEM -401 UC-531 REPLACEMENT DATA ERIE PART No. TC7-50 ED-1000 TCO-6.8 ED-0012 ED-02 GP-5000 TC7-150 ED-02 ED-02 ED-100 CUB6S33 CUB4S22 CUB6D5 CUB6S33 CUB4S22 LIOT8 CUB4S22 CUB6S33 C10Q5U BYA6DI C10V68C L10DI2 CUB4S47 CUB6S33 IR5D15 CENTRALAB CORNELL-PART No. PART No. DF-303 TCN-50 DD-102 TCZ-6R8 D6-122 DF-503 DF-104 DF-104 DF-104 TCN-150 DF-303 DD-203 D6-502 DF-303 DD-203 DD-801 DD-203 DD-101 AEROVOX PART No. BPD-001 NP0-SI 6.8 BPD-05 BPD-03 1464-0015 BPD-0001 1464-0015 P488N-1 P488N-1 P488N-1 N750-SI 150 BPD-03 BPD-02 BPD-005 BPD-03 BPD-03 BPD-02 BPD-0008 BPD-03 PILOT PART No. RATING CAP. VOLT 40 40 40 88588 84 84 80 84 \$ 2 <del>2</del> 250 . 023 . 022 . 022 . 032 800 . 022 . 022 . 022 . 023 . 033 . 047 . 047 . 033 . 1500 

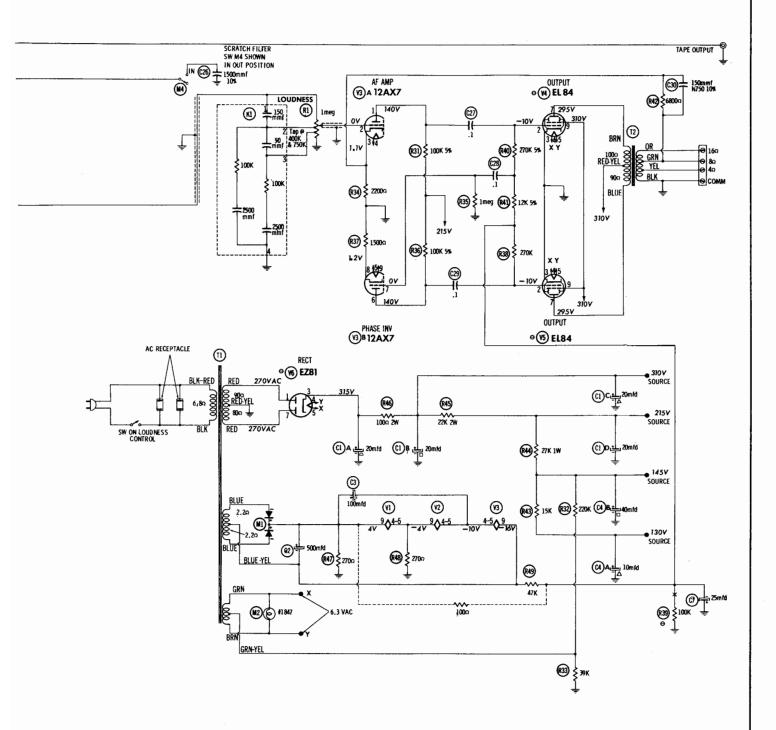
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					CONTROLS	SIS		
	L	CIVILIA		RE	REPLACEMENT DATA	ΤA		
¥		2	DII.OT	CENTRALAG	TATOCALO	9	700	
ģ	RESIST.	WATTS	Δ.	PART No.	PART No.	PART No.	PART No.	INSTALLATION NOTES
RIA	_	-401	36-66	C170S				Loudness, Tap 3 400K & 750K
-4	••							
R2A	A 500K	-400	36-65					Volume, Tap @ 350K
_	B IMeg	-47						Volume, Tap @ 750K
R3A			37-35		A47-5Meg-S	Q11-141	190	Treble
_	B Shaft				FS-3	Not Req.	Not Req.	
R4A		ru	37~35		A47-5Meg-S	011-141	190	Вавя
_	B Shaft				FS-3	Not Req.	Not Req.	
R5A	_	144	39-41	ABT-74	A47F5-1Meg Q19-137X U7	Q19-137X	UT-443	Phono Level, Tap @ 500K
_	B Shaft				FKS-1/4	Not Req.	Not Req.	
R6A		-414	39-32		A47-100K-S	011-128	041	Phono Load
_	B Shaft			Not Req.	FK8-1/4	Not Req.	Not Req.	

	EZ81 (V6)  101 511VM 005-04V  C 11 C C  SL37100 20N3M2A	V2	12AX7 (V3)	V4)	<sub>3</sub> 0.60	12AX7	(12) (11)
3 2 5				TXASI C. (O)C. (XASI			(E) (E) (E) (E) (E)
R2 R1 K1							R16 
©19 ©16 R24	(13) (3) (13) (13) (13) (13) (13) (13) (	R27 R28 (	22 (23 (	25) R4) C	4) (21) (R)	3 R11 R12	M5 R10



A PHOTOFACT STANDARD NOTATION SCHEMATIC Howard W. Soms & Co., Inc. 1957



### RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
٧ı	12AX7	†, 1 <b>4</b> 5K	2.2Meg	3300∩	135Ω	135Ω	† 130K	2.2Meg	0Ω	135Ω
V2	12AX7	† 130K	100K	2200n	135ດ	135Ω	† 130K	0Ω	2200a	135ດ
٧3	12AX7	† 120K	00	2200n	135Ω	135Ω	† 120K	1 <b>Me</b> g	1500a	135ດ
V4	EL84	NC	380K	<b>0</b> Ω	35K	35K	NC	† 200Ω	NC	† 100Ω
V5	EL84	NC	370K	ŪΩ	35K	35K	NC	† 1900	NC	† 100Ω
<b>V</b> 6	EZ81	900	NC	20K(Min)	35K	35K	NC	80a	NC	NC

ALL MEASUREMENTS TAKEN IN "LP" POSITION

† MEASURED FROM PIN 3 OF V6

NC NO CONNECTION

- DC voltage measurements taken with vacuum tube voltmet AC voltages measured at 1000 ohms per volt.
   Socket connections are shown as bottom views.
   Measured values are from socket pin to common negative.
   Line voltage maintained at 117 volts for voltage readings.
   Nominal tolerance of componer values makes possible a variation of ±195 in voltage and resistance readings.
   Atl controls at minimum, proper output load connected.

SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

# PARTS LIST AND DESCRIPTIONS (Continued) RESISTORS All wattages 1/2 watt, or less, unless otherwise listed.

			REPLACEMENT DATA	ENT DATA					REPLACEM	REPLACEMENT DATA	
ITEM	RATING	v	PILOT	iRC	NOTES	ITEM	RATING	Ş	PILOT	J <b>a</b>	NOTES
į	OHWS	WATI	PART No.	PART No.		Š	OHWS	WATT	PART No.	PART No.	2
R.7	100K			BTS-100K		R28	100K 5%			BTS-100K 5%	
88	68002			BTS-6800		R29	82K	-		BTA-82K	
83				BTS-27K 5%		R30				BTS-2200	
RIO	220K 5%			BTS-220K 5%		R31	100K 5%			BTS-100K 5%	
E				BTS-68K 5%	_	R32	220K			BTS-220K	
R12				BTS-82K 5%		R33	39K			BTS-39K	
R13	330K			BTS-330K		R34	22002	_		BTS-2200	
R14	~			BTS-8200 5%		R35	lMeg			BTS-IMeg	
R15	100K 5%			BTS-100K 5%		R36	100K 5%	-		BTS-100K 5%	
RI6	82K 5%			BTS-82K 5%		R37	15002			BTS-1500	
R17	ē			BTS-2. 2Meg		R38	270K			BTS-270K	
R18	68K	-		BTA-68K		R39	100K			BTS-100K	Note 1
R19	2. 2Meg			BTS-2. 2Meg		R40	270K 5%	_		BTS-270K 5%	
R20	82K	-		BTA-82K		R41		_		BTS-12K 5%	
R21	33002			BTS-3300		R42	88002			BTS-6800	
R22	82K	-		BTA-82K		R43	15K	_		BTS-15K	
R23	22002	-		BTA-2200		R44	27K	-		BTA-27K	
R24	220K			BTS-220K		R45	22K	~		BTB-22K	
R25	220K 5%			BTS-220K5%		R46	1000	81		BTB-100	
R26				BTS-150K		R47	2700			BTS-270	
R27	47002 5%			BTS-4700 5%		R48	2700	_		BTS-270	
i				2		R49	47K			BTS-47K	

### Note 1, Not used in some versions.

### TRANSFORMER (POWER)

L							REP	LACEMENT	DATA		
	Ž ė		Z	RATING		PILOT	Halldorson		Stoncor	Thordorson	Triad
		PR:	SEC. 1	SEC. 2	SEC. 3	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
	F	11 TVAC	540VCT	6. 3VCT 3	32VCT © 320A	55-58					

## TRANSFORMER (AUDIO OUTPUT)

	NOTES		22866 T S-24A D T Fabricate mounting		
	Triad	PART No.	S-24A ①		
	Holldorson Merit Stancor Thordarson	PART No.	22866 D	,	
r DATA	Stancor	PAKI No.			
REPLACEMENT DATA	Merit	PAKI No.			
RE	Holldorson	PAKI No.	Z1405 ①		
	PILOT	PAKI NO.	56-51		
	ANCE	SEC.	73002 160	Tap	812, 412
	No.	PRI.	73008	CT	
	₹ ġ		T2		

# PARTS LIST AND DESCRIPTIONS (Continued)

## COMPONENT COMBINATIONS

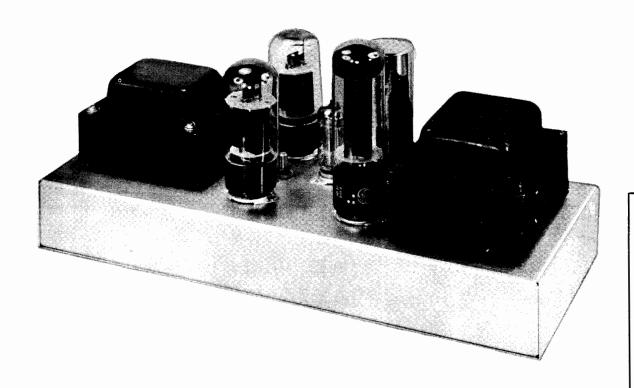
REPLACEMENT DATA	Centralab PC-325
PILOT PART No.	
DESCRIPTION	150MMF, 50MMF, 2500MMF, 2500MMF, 100K
USE	Tone Compensation
ÎTEM No.	꾜

### SELENIUM RECTIFIER REPLACEMENT DATA

NOTES		
SARKES TARZIAN PART No.	604B	
 INTERNATIONAL PART No.	СІВ	
FEDERAL PART No.	1017	
PILOT PART No.	110-519	
CURRENT (Measured)	. 320A	
No.	MI	

### **MISCELLANEOUS**

	ž ė	PART NAME	PILOT PART No.	NOTES
_	250	Diller I fate	01.00	17017
_	MZ	Pilot Light	01-89	F164.7
_	M3	Switch	101-41	Rumble Filter (Slide Type SPST)
	M4	Switch	101	Scratch Filter (Slide Type SPST)
_	M5	Switch	100-115	Selector (Rotary Wafer Type)



TRADE NAME H. H. Scott Model 223

MANUFACTURER Hermon Hosmer Scott, Inc., 385 Putnam Ave., Cambridge 39, Mass.

TYPE SET AC Operated Audio Amplifier

TUBES (Four) Types 12AX7 AF Amp. - Phase Inv., (2) 6L6GB Output, 5U4GA Rectifier

POWER SUPPLY RATING . 97 Amp. @ 117 Volts AC 110-120 Volts AC-60 Cycles

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## CHASSIS—TOP VIEW

# PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

NOTES	
TYPE	12AX7 6L9GB
USE	AF AmpPhase Inv. Output
JEA So.	V2 V2

NOTES	
TYPE	6L6GB 5U4GA
USE	Output Rectifier
No.	V3 V4

ε.		USE	<u> </u>	TYPE	NOTES		ģ	nSE.		TYPE	NOTES	S3	
	AF Am Output	opPh	AF AmpPhase Inv. Output	12AX7 6L9GB			V3 V4	Output Rectifier		6L6GB 5U4GA			
				ELEC	TROL	YTIC	\ Y	ELECTROLYTIC CAPACITORS					
1	RATING	S N				2	PLAC	REPLACEMENT DATA					
<b>s</b>	CAP. VOLT.	VOLT.	H. H. Scott PART No.		AEROVOX PART No.	CORNELL- DUBILIER PART No.	ن محرة	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	No.	SPRAGUE PART No.	
	88	475		AFB	AFH4-19-20 BO500	L BO500		FP475	TMQ-123	C-075 MT-4720	0	TVL-4834	
	02₹	475											
	ន្តន	100		PRS	PRS150V50 BR5015	BR5015		TC49	TD-50-150	FM-1550		TVA-1414	

5U4GA

### FIXED CAPACITORS

C1

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

						ox.	REPLACEMENT DATA	ATA		
TEM		RATING	H H Scott	70,000	CENTRALAB	_	2000	740	310.00	STATE
ġ Z	<u> </u>	VOLT	PART No.	PART No.	PART No. PART No.		PART No.	PART No.	PART No.	2
ဒ္	.0068	400		BPD-0068	D6-682	CUB6D68		GEM-6268	6TM-D68	
2	. 0027	9		BPD-0025	D6-272					
පි	9			BPD-0001	DD-101	G042	ED-100	UC-531	5GA-TI	
ŝ	2000			BPD-02	DD-203	K085	ED-02	_	5HK-S2	
ວີ	.047	\$		BPD-05	DF-503	CUB4S47		GEM-4147	4TM-847	
8	330			BPD-00033	DD-331	G056	ED-330	UC-5333	5GA-T33	
පී	.047	ş		BPD-05	DD-503	CUB4847		GEM-4147	4TM-S47	

12**A**X7

### CONTROLS

	Can City of City and City	INSTALLATION NOTES	Level		Balance	
	Yacilan	PART No.	U48	Not Req.	SU-35	Not Req.
ATA	٩	₹	Q13-133	Not Req.	QII-123	RQ
REPLACEMENT DATA		PART No.	A47-500K-Z Q13-133	RS-2	A47-50K-S	FKS-1/4
RE	CENTRALAB PART No.		B-60	Not Req.	AB-31	AK-1
	H. H. Scott PART No.					
١	2	WATTS	01		~ e	
CALT	\$	RESIST- ANCE	RIA 500K	Shaft	50K	Shaft
	¥ E	ģ	RIA	Φ	R2A	В

-			REPLACEMI	REPLACEMENT DATA		į
<u> </u>	KATING	9	H. H. Scott	IRC	NOTES	 <u>₹</u> 4
ė	OHWS	WATT	PART No.	PART No.		 į
R3	2. 2Meg			BTS-2. 2Meg		R14
R4	100K	_		BTA-100K		2 2
52	220K			BTS-220K		1 2
R6	18008			BTS-1800		1 0
7.	12K			BTS-12K		1 2
R8	2. ZMeg			BTS-2. 2Meg		200
<b>R</b> 3	100K	-		BTA-100K		3 6
2	270K			BTS-270K		יי
2	15000			BTS-1500		•
R12	12K			BTS-12K		,
<b>E</b> 33	330K			BTS-330K		

6	V L &	_	) (-	SB	}		6	j S	L	\(\frac{1}{3}\)	)	}	E	3	(		2	)
ES								NOTES	3									
INSTALLATION NOTES							REPLACEMENT DATA	SC BC	PART No.	BTS-6800	BTS-330K	BTS-1000	PW7-150	1 3/4A-25K	BTB-3300			
SK	Level	Balance					REPLACEM	H. H. Scott	PART No.									
MALLORY PART No.	U48 Not Reg.	SU-35	Not Req.			listed.			WATT PA				ω	9	7	4° u	. e	
IRC PART No.			z			otherwise		RATING	OHWS	68000 10000	330K	10000	1602	25K	33000	K21A 33%	15002	
	Q13-133	7	RQ		SS	ınless		<u> </u>	ģ	E 2	E.	RI7	R18	RI9	R20	K2LA	40	
CLAROSTAT PART No.	A47-500K-Z Q3-133 RS-2 Not Reo	A47-50K-S QII-123	FKS-1/4		RESISTORS	tt, or less, u		NOTES							_			
CENTRALAB PART No.	B-60 Not Red.	AB-31	AK-1			All wattages 1/2 watt, or less, unless otherwise listed	NT DATA	2	PART No.	BTS-2. 2Meg	BTA-100K	BTS-220K	B18-1800	D13-14h	BTA-100K	BTS-270K	BTS-1500	BTS-12K
H. Scott						All x	REPLACEMENT DATA	. Scott	RT No.									

# CHASSIS—BOTTOM VIEW

# PARTS LIST AND DESCRIPTIONS (Continued)

## TRANSFORMER (POWER)

						REF	REPLACEMENT DATA	DATA		
₹ s		RA	RATING		H. H. Scott	Halldorson	Merit	Stancor	Thordarson	Triad
	PRI.	SEC. 1	SEC. 1   SEC. 2   SEC. 3	SEC, 3	PART No.	PART No.	PART No.	PART No.	PART NO. PART NO. PART NO. PART NO.	PART No.
F	117VAC	700VCT 5VAC 6.3VCT	5VAC	6.3VCT	TR-10-3	P9315	P-2853(1)	P-2953(1) PM8411 (1) 22R07		R-168 ①
	@ .97A	@.97A @.130A @ 3A	<b>®</b> 34	(2) 2.1A				ı		

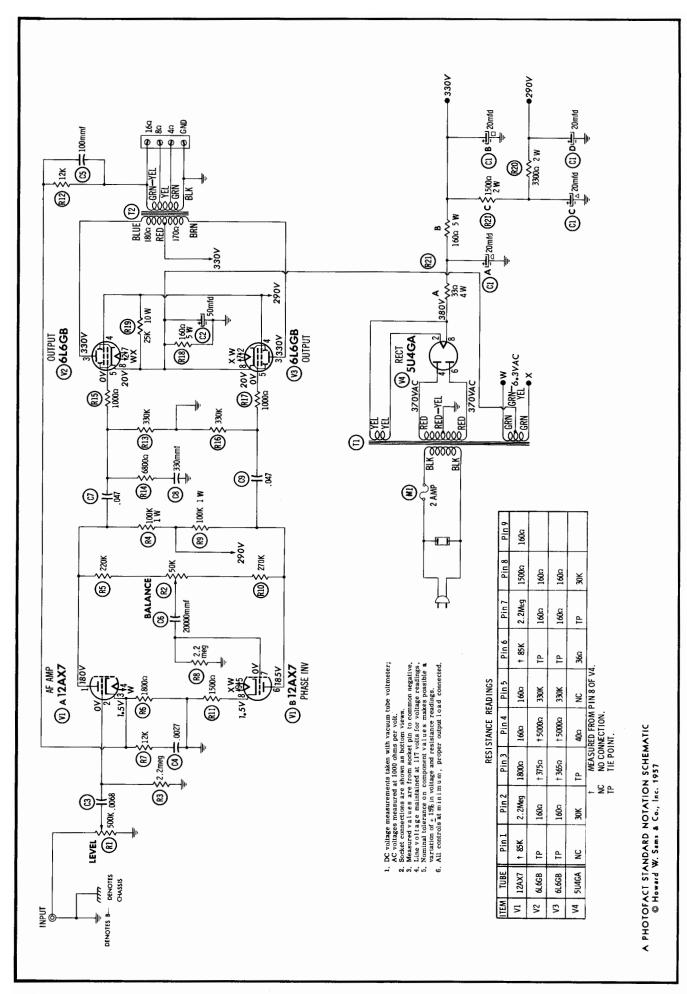
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:	2	۲	SEC. 1	SEC. 2	SEC. 3	PART No.		- o N E	PART No.	PART No.	PART NO.   PART NO.   PART NO.   PART NO.   PART NO.	PART No.	
F	117VAC (2). 97.4		VCT 130A	5VAC ® 3A	6.3VCT @2.1A	TR-10-3	P9315		P-2953⊕	P-2953① PM8411 ① 2ZR07	22R07	R-168 ①	
ļ	(1) Fabricate mounting.	te mou	nting.					•					
				÷			) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) (	7	(+1111111111111111111111111111111111111				
				<b>=</b>	ANST	IKANSFORMEK (AUDIO OUIPUI)	(AUDIC	5	5				
L					_	REPLACEMENT DATA	DATA						
¥ ź	A IMPEDANCE	ANCE	H.H	H.H. Scott	Halldorson	Merit	Stancar Thordarson Triad	Thordan	on Trio		NOTES		
<u> </u>	쮼	SEC.	۲ ۲	RT No.	PART No.	PART No. PART No. PART No.	PART No.	PART N	O. PART NO.	No.			
<b>T</b> 2	-	U91	TRA-10-14	(0-14									
_	CI	CT tap®											
	_	9			_				_				

### FUSES

	SS No.	HOLDER	нкъ	
	BUSS PART No.	FUSE	MDL2	
REPLACEMENT DATA	LITTELFUSE PART No.	HOLDER	342003.	
REPLACEM	LITTEI	FUSE	313002. (3AG S/B 2A)	
	cott No.	HOLDER		
	H. H. Scott PART No.	FUSE		
	RATING		ZA	
	TYPE		3AG	
	¥ ó E2		¥	

### (R12) (8) **R**7 **C5** R6 R3 **C3** R4 **C7** (R15) (R14) (R13) **C4 R5** R1 (R18) (C2)(R19) (R16) **R2**) (R10) (R17) R9 (R21) (R20) R8 **C6 C9**



### SHERWOOD MODEL S-1000-II





TRADE NAME Sherwood Model S-1000-II

MANUFACTURER Sherwood Electronic Laboratories, Inc., 2802 W. Cullom Ave., Chicago 18, Illinois

TYPE SET AC Operated 20 Watt Audio Amplifier

TUBES (Seven) Types EF86/6267 (or) Z729 Preamplifier, 12AX7/ECC83 Preamp. - Cath. Follower, 12AX7/ECC83

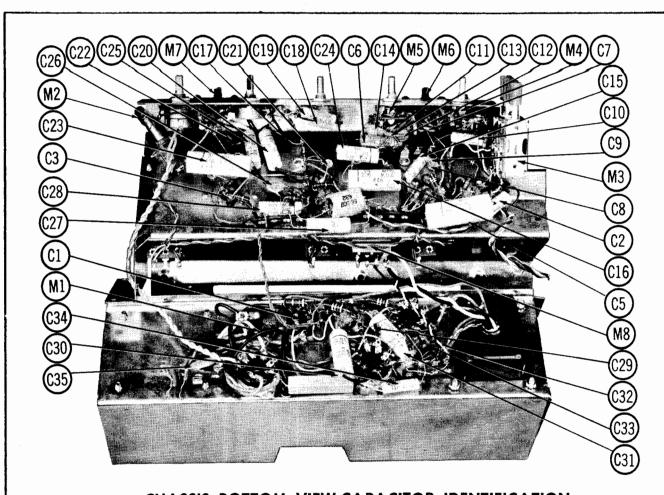
AF Amplifler, 6BA8A AF Amp. - Phase Inv., (2) 6L6GB Output, 5Y3GT Rectifler

POWER SUPPLY 110-120 Volts AC-60 Cycles RATING . 96 Amp. @ 117 Volts AC (100 Watts)

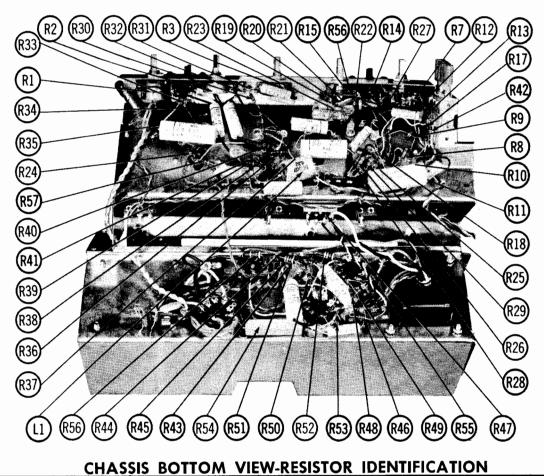
### HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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### CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



## CHASSIS—TOP VIEW

# PARTS LIST AND DESCRIPTIONS TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	ITEM No.	
V1 V2 V3 V4	Preamplitier Preamp Cath. Follower AF Amplitier AF Amp Phase inv.	EF88/6267 Note 1 12AX7/ECC83 12AX7/ECC83 6BA8A	V5 V6 V7	

Note 1. Alternate Type Z729

TYPE	6L6GB 6L6GB 5Y3GT
USE	Output Output Rectifier
ITEM No.	V5 V6 V7

				ELECTROLYTIC CAPACITORS	YTIC CA	<b>PACITOR</b>	40		
L		RATING			REPLAC	REPLACEMENT DATA			
No.		CAP. VOLT.	SHERWOOD PART No.	AEROVOX PART No.	CORNELL- DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
CIA	_	400		AFH4-85-25	D0 655	FP431-3		9-310	R2528 *
Ф	- 40	400							
о —	_	320							
_	_	20							
C	_	ß		SRE6V50	BBR50-6	TT6X50	TD-50-6	MMT-650	TE-1100
C3A	_	90		AFH2-47	B0370	FP231	TMD-41	D-200	R2322 *
щ	_	400							

ECC83 12AX7

5Y3GT (V7) (

 $\bigcirc$ 

**C**3

(C1)

Non Catalog Item

ECC83 12AX7

FIXED CAPACITORS
Capacity values given in the rating column are in mfd. for Paper

						REPLACEMENT DATA	r DATA		
KATING VO	VOLT	SHERWOOD PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL: DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
6	9		1468-0001	D6-101	5W5T1	ED-100	MC235	1FM-31	
44	38		P288N-33	DD16-153	CUB6815	ED-015	GEM-2033 GEM-4115	4TM-SIS	
				D6-681	IR5T68	ED-680		MS-368	10%
					IR5T82	ED-820		MS-382	10%
				D6-271	5R5T27	ED-270		MS-327	10%
4	9		P488N-0047	D6-472	CUB6D47	GP-4700	GEM-6247	6TM-D47	901
					IRSD12	ED-1200		MS-212	801
				D6-331	5R5T33	ED-330		MS-333	10%
₹	400		P488N-047	DF-503	CUB4S47		GEM-4147	4TM-S47	2
4	8		P488N-01	D6-103	CUB4SI	GP-10000	GEM-411	4TM-SI	
Ñ	8		P288N-15		CUB2P15		_	2TM-P15	
,	-		1469-0001	D6-101	22R5T1	CY10C101K	-	MS-31	10%
∢,	3 5		P488N-0033	D6-332	CUBED33	GP-3300	GEM-6233	6TM-D33	
* 4	38		D488N-0033	DE-332	CUBBLISS	GF-3300	GEM-0233	STM-D33	
	3		COLUMN TO THE PARTY OF THE PART	D6-681	IR5T68	ED-680		MS-368	1092
			1469-0001	D6-101	22R5T1	CY10C101K	MCB235	MS-31	10%
2	8		P288N-22		CUB2P22		GEM-2022	2TM-P22	!
4	90		P488N-033	DF-303	CUB6S33		GEM-4133	6TM-833	
4	90		P488N-022	DD-203	CUB4822	ED-02	GEM-4122	4TM-822	
					IR5D22			MS-222	10%
4	8		P488N-025		CUB6S3		GEM-413	4TM-S3	
	8		P488N-033	DF-303	CUB6833		GEM-4133	6TM-S33	
			1469-000047	D6-470	22R5Q47	CY10C470K		MS-447	10%
4	8		P488N-1	DF-104	CUB4P1		GEM-401	4TM-Pl	!
4	8		P488N-1	DF-104	CUB4P1		GEM-401	4TM-Pl	
	_		1469-000047	D6-470	22R5Q47	CY10C470K	ZT-5447	MS-447	3601
			1469-00012	D6-121	22R5T12	ED-120		MS-312	10%
	8		P488N-01	D6-103	CUB481	GP-10000		4TM-81	
	9		DAC-9	DD30-502 HVE16D5	HVE16D5	HD15-4700	GEM-1625	BL-D50	

6L6GB

**T**2

**R**5

<u>C4</u>

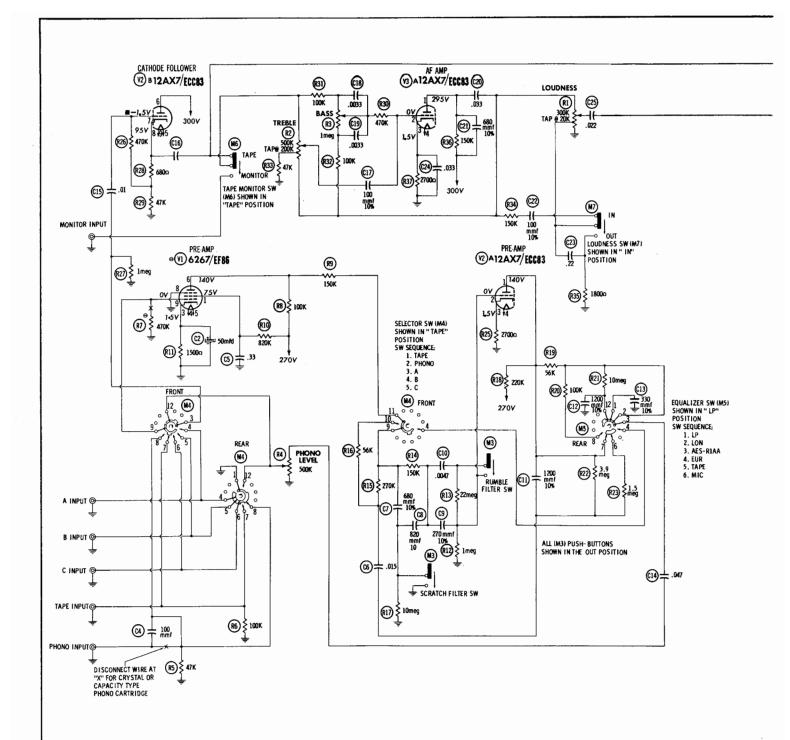
R6

R4

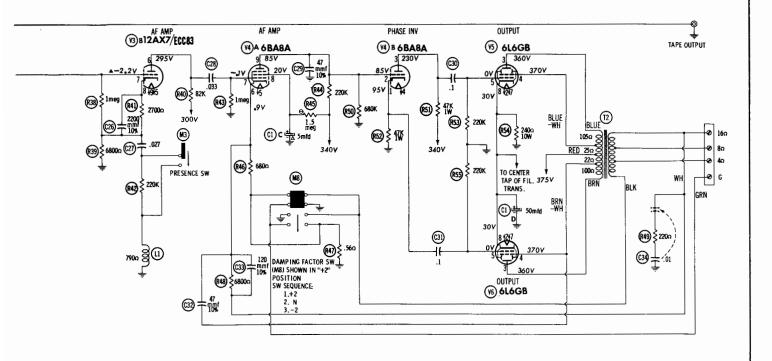
6L6GB V5

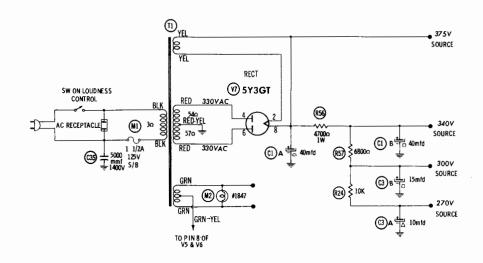
(VI) EF86 6267

6BA8A



A PHOTOFACT STANDARD NOTATION SCHEMATIC Howard W. Sams & Co., Inc. 1958





### RESISTANCE READINGS

ITEM		Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V١	EF86 / 6267	† 840K	0Ω	1500ດ	240Ω	2 <b>40</b> Ω	† 120K	0Ω	0Ω	85K
V2	12AX7/ ECC83	† 240K	lmeg	2700റ	2 <b>40</b> n	2 <b>40</b> n	†11K	520K	47 K	2 <b>40</b> 0
V3	12AX7/ ECC83	† 160K	670K	2700ი	2 <b>40</b> 0	2 <b>40</b> n	† 93K	lmeg	9500a	240n
V4	68A8A	47K	† 160K	† 52K	240a -	2 <b>40</b> Ω	680K	1meg	† 2.2meg	† 160K
V5	6L6GB	0α	2 <b>40</b> n	† 130Ω	† 25Ω	220K	2 <b>40</b> Ω	2 <b>40</b> 0	2 <b>40</b> n	
V6	6L6GB	0Ω	2 <b>40</b> Ω	† 122n	† 22n	220K	0Ω	2 <b>40</b> 0	240n	
V7	5Y3GT	NC	20K(Min)	NC	54Ω	NC	57Ω	TP	20K(Min)	

- MEASURED FROM PIN 8 OF V7
  MEASURED FROM PIN 8 OF V2
  MEASURED FROM PIN 8 OF V3
  NO CONNECTION
  TIE POINT

- DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
   Socket connections are shown as bottom views.
   Measured values are from socket pln to common negative.
   Line voltage maintained at 117 volts for voltage readings.
   Nominal tolerance of component values makes possible a variation of ±154in voltage and resistance readings.
   All controls at minimum, proper output load connected.

<sup>0</sup> SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

# PARTS LIST AND DESCRIPTIONS (Continued) CONTROLS

	_	INSIALISIN NOIES	30 © da		© 200K	_				
	-	INSIALLA	Loudness, Tap 3 20K		Treble, Tap 3 200K		Ваяв		Phono Level	
	_	PART No.			UT-431	Not Red.	U54	Not Req.	'	
ITA	_	PART No.			Q19-133X	Not Req.	-13.	Not Req.		
PLACEMENT DA	CIABOCTAT	PART No. PART No.			A47F6-500K Q19-133X	FS-3	A47-lmeg-S	FB.		
RE	CENTRALAS	PART No.			BT-65	Not Req.	B-69	Not Req.		
	GOOMGARS	WATTS PART No.	671AB3		670AB1		670AB2		670AB7	
٤	2		-100		-4-5		-479		-400	
1	S	RESIST. ANCE	300K	Switch	200K	Shaft	lmeg	Shaft	200K	
	₹ 1	ģ	RIA	Ø	R2A	æ	R3A	Д	R4	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

NOTES															Note 2													
SHERWOOD	PART No.			-																								
ڻ	WATT		_																		_	_		2		-		
RATING	OHWS	100K 100K	47K	150K	18000	150K	27007	lmeg	6800n	82K	2,000	220K	lmeg	220K	<ol> <li>5meg</li> </ol>	6800	0. 56Ω	88000	2200	680K	47K	47K	220K	2400	220K	4700G	6800C	
ITEM	ģ	R31	R33	R34	R35	R36	R37	R38	R39	R40	R41	R42	R43	R44	R45	R46	R47	R48	R49	R50	R51	R52	R53	R54	R55	R56	R57	
NOTES			Note 1																									
SHERWOOD	PART No.																											
	WATT																		_									]
RATING	OHWS	47K	4.70K	100K	150K	820K	15000	lmeg	22meg	150K	270K	26K	10meg	220K	56K	100K	Domed	9 Omeo	5meo	1014	27000	470K	Imed	GOOD	47K	470K		
TEX.									_	_	_	_	_		_		_				_	_	200	_		_		١.

Note L Not used in some versions.

Note 2. Some versions may use 2. 2meg.

_						REF	REPLACEMENT DATA	DATA		
₹ º		Z.	RATING		SHERWOOD	Halldorson	Merit	Stoncor	Thordarson	Triad
	PRI.	SEC. 1	SEC. 2	SEC. 3	PART No.	PART No.				PART No.
F	11.77	700VCT	2Λ	6.3V	922ABI					
	@.86A	@ .125A	© 34	© 2.9A						

# PARTS LIST AND DESCRIPTIONS (Continued) TRANSFORMER (AUDIO OUTPUT) PERFORMENT DATA

	ES				
	NOTES				
	Triod	TARE NO.			
	Stancor Thordarson Triod	LAKI NO.			
DAIA	Stancor	LAKI NO.			
KEPLACEMENI DAIA	Halldorson Merit	FARI NO.			
2		LAKI NO.			
	SHERWOOD	LAKI NO.	920ABI		
	WPEDANCE	SEC.	160	CT Tap @	82, 40
	_	PRI.	T2 55000 160	CI	
_	Š Š		T2		

COILS

REPLACEMENT DATA

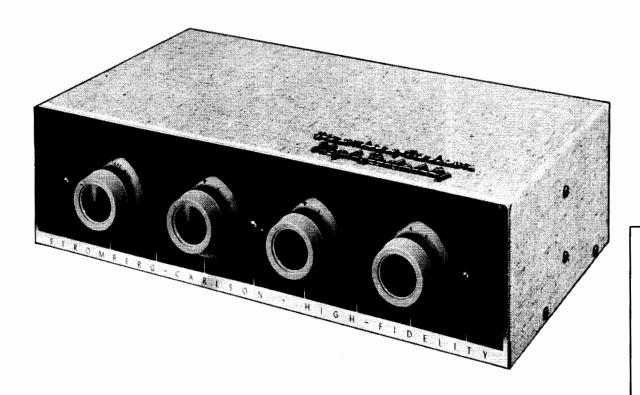
TEA				-				
ģ		is Si	PARI	SHERWOOD PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
E	Tone Choke	hoke						140 Millibenries
					FUSES			
					REPLAC	REPLACEMENT DATA		
N TEN	TYPE	RATING	SHERWOOD PART No.	0 8° 9°		LITTELFUSE PART No.		BUSS PART No.
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
Ē	3AG	15A			31301. 5	342003	MDLI	нкр
		125V S/B			(3AG 1\$A 125V S/B)	20		

MISCELLANEOUS

系	PART NAME	SHERWOOD PART No.	NOTES
M2	Pilot Lamp		#1847
M3	Switch Ass'y		Presence, Scratch Filter, Rumble Filter, Phono Level (Silde Type)
M4	Switch		Selector (Rotary Wafer Type)
MS	Switch		Equalization (Rotary Wafer Type)
M6	Switch		Tape Monitor (Slide Type SPDT)
M.	Switch		Loudness (Slide Type SPDT)
M8	Switch		Damping Factor (Slide Type DPDT)

WIRING DATA

General-use Unshielded Hook-up Wire
Power Cord Use BELDEN No. 1765 BG (7) Ft. Length)
Low-Loss Shielded Lead (Interconnecting)



POWER SUPPLY	105-125 Volts AC-50/60 Cycles RATING . 68 Amp. (2) 117 Volts AC (68 Watts)
TUBES (Six)	Types 12AT7 Phono Preamplifier, 12AX7 AF Amplifier, 6AV6 Phase Inverter, (2) 6CM6 Output, 5Y3GT Rectifier
TYPE SET	AC Operated 4 Channel Audio Amplifier
MANUFACTURER	Stromberg-Carlson Co., Service Dept., 1700 University Ave., Rochester 10, N. Y.
TRADE NAME	Stromberg-Carlson Model AR-411

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## CHASSIS-TOP VIEW

# PARTS LIST AND DESCRIPTIONS

# TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Phono Preamplifler	12AT7	
V2	AF Amplifler	12AX7	
V3	Phase Inverter	6AV6	

NOTES	
TYPE	6CM6 6CM6 5Y3GT
use	Output Output Rectifier
ITEM No.	V4 V5 V6

## **ELECTROLYTIC CAPACITORS**

	SPRAGUE PART No.	TVL-4705.	TVL-2935	TVA-1100
	SANGAMO PART No.	C.Q-060 C.MT-0550	D-225	MMT-650 TVA-1100
	PYRAMID PART No.		TMD-61	TD-50-6
REPLACEMENT DATA	MALLORY PART No.	CFP447	FP234	TC29
REPLA	CORNELL- DUBILIER PART No.		B0500	BBR50-6
	AEROVOX PART No.		AFH2-69	PRS25V50
	Stromberg- Carlson PART No.	35590	111619	111615-000
RATING	VOLT.	450 350 300	450	6
RAT	CAP. VOLT.	•40 •30 •15	202	50
	N. S.	CIA	C2A	ငဒ

FIXED CAPACITORS
Capacity values given in the rating column are in mfd. for Paper
Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

	NOTE															
	SPACIE	PART No.	6TM-SI	5GA-T47	5GA-T22	4TM-S22	5GA-T47	5GA-T47	6TM-D47	4TM-S22	5GA-Q27	4TM-S47	5GA-T22	4TM-S47	4TM-S47	4TM-P22
P DATA	VACILAM	PART No.	GEM-611	UC-5347	UC-5322	GEM-4122	UC-5347	UC-5347	GEM-6247	GEM-4122	UC-5427	GEM-4147	UC-5322	GEM-4147	GEM-4147	GEM-4022
REPLACEMENT DATA	FPIF	PART No.	GP-10000	GP-470	GP-220	ED-02	GP-470	GP-470	GP-4700	ED-02	GP-27		GP-220			
~	Ι-	PART No.	CUB6SI	LT6T47	LT6T22	CUB4822	LT6T47	LT6T47	CUB6D47	CUB4S22	LT6Q27	CUB4S47	LT6T22	CUB4S47	CUB4S47	CUB4P22
	CENTRALAB	PART No.	D6-103	D6-471	D6-221	DD-203	D6-471	D6-471	D6-472	DD-203	D6-270	DF-503	D6-221	DF-503	DF-503	
	2010414	PART No.	P688N-01	SI 470	SI 220	P488N-022	S1 470	SI 470	P688N-0047	P488N-022	SI 27	P488N-047	SI 220	P488N-047	P488N-047	P488N-22
	Stromberg-	PART No.														
	RATING	VOLT	009			400			909	400		400		400	400	400
	Æ	3	. 01	470	220	. 022	470	470	. 0047	. 022	27	047	220	.047	. 047	. 22
	TEM	ģ	C4	5	90	C C	8	3 8	000	CII	C12	2	C14	C15	CIB	C12

### CONTROLS

	INSTALLATION NOTES		Volume			Treble		88		Hum Adj. (Wire Wound)	
	_	PART No.	U48 Vol	t Req.	_	_	t Req.	5 Bass	_		t Req.
_		PART No. PA	_	_	_	_	-	Q13-141 U6		-	
REPLACEMENT DATA	CLABOSTAT	PART No.						A47-5Meg-Z			
REP	CENTRALAR	PART No.	B-60-S	Not Req.	Not Req.	B-69	Not Req.	B-87	Not Req.	101-NM	Not Req.
	Stromperg-	PARI No.	145638			145639		145630		145632	
9	٤	WATTS	-10			-40		-100		2	
	KAIING	RESIST- ANCE		Shaft	Switch	lMeg				_	Shaft
	ŢĘ¥	ģ	RIA	В	0	R2A	В	R3A	В	R4A	В

	5Y3GT (V6)	(C1)	6AV6	12AT7	6CM6	6CM6 (V5)	<b>©</b> 2
12AX7				err	V.		©18
(1)_							12
(11)					All Marriage And Marriage		R17
R1							(8)
R2					er sha		M1
	R15	R3	©10	<u>(9</u>	R16	<b>©</b> 7	

# PARTS LIST AND DESCRIPTIONS (Continued) RESISTORS

listed.
otherwise li
unless
watt, or less, u
1/2 watt,
All wattages 1/2 watt,
₹

	NOTES																
	Stromberg- Carlson	PART No.															
	<sub>o</sub>	WATT						_					ഹ	D.			
	RATING	OHWS	470K	೮0089	56K	680K	3. 3Meg	22K	47K	47K	100K	100K	2500	20002	22K	10K	100K
	¥ <u>₹</u>	j Ž	R20	R21	R22	R23	R24	R25	R26	R27	R28	R29	R30	R31	R32	R33	R34
יוו הפיניקסט ד/ ב חמיי, טו וכיט, מוווכיט פיווכו ווויס	NOTES			-													
	Stromberg- Carlson	PART No.															
	v	WATT							_								
	RATING	OHWS	lMeg	IMeg	Meg	47K	220K	56000	390K	470K	220K	56000	47K	100K	470K	220K	680012
	ITEM	į	RS	R6	R7	88	R9	R10	RII	R12	R13	R14	R15	R16	R17	RIB	R19

_	Γ						RE	PLACEMENT	DATA		1
	Ž Š		RAT	RATING		Stromberg- Carlson	Halldorson	ı	Stancor	Thordarson	l
_		PRI.	SEC. 1	SEC. 2	SEC. 3	PART No.	PART No.	PART No.	PART No.	PART No.	•
	ī	117VAC	IITVAC 620VCT	SVAC	6. 3VAC	161798 ①					
_		@ . 68A	Ø .170A	<b>©</b>	(a) L 8A						

# ○ Used in series 105A and later. Part #161789 used in series 105 and earlier.

### A-3304

161345

PRI. SEC. 65000 160 CT Tap@ 80,40

IMPEDANCE

ŠĘ. T2

(R13)(R14)

(R8)

(R10)

R5

R7

R28)(R12)

R9

R6

(R11)

C5

(R24)

(C6)

### **MISCELL ANEOUS**

NOTES	Selector (Rotary Wafer Type)	
Stromberg- Carlson PART No.	158682	
PART NAME	Switch	
Ž Š	Mî	

# CHASSIS—BOTTOM VIEW

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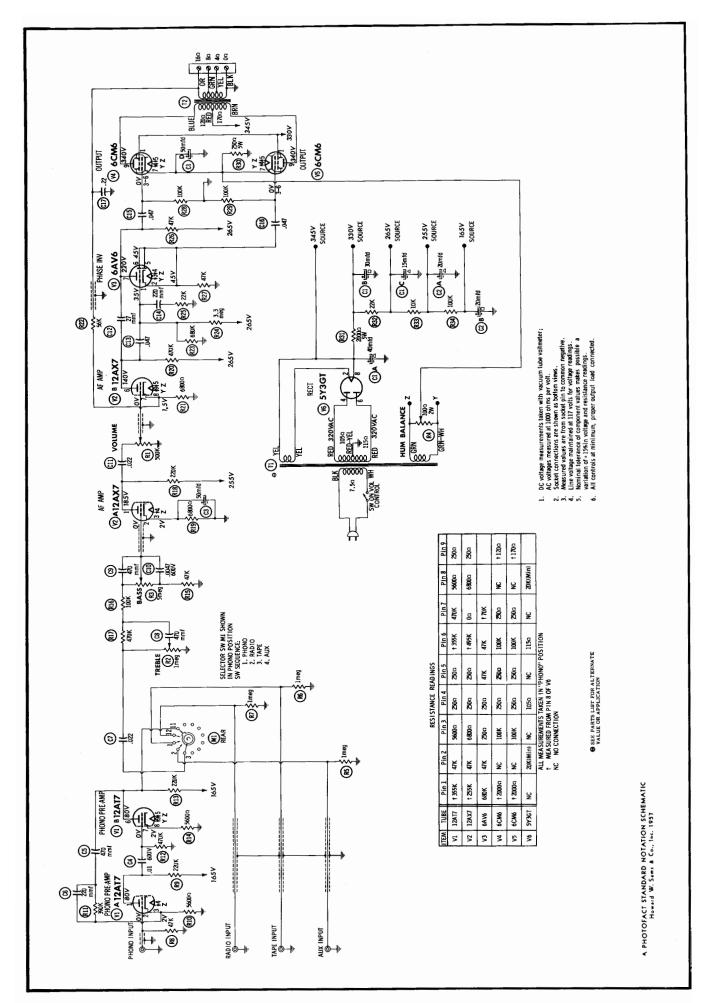
(R19

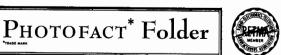
(R18)

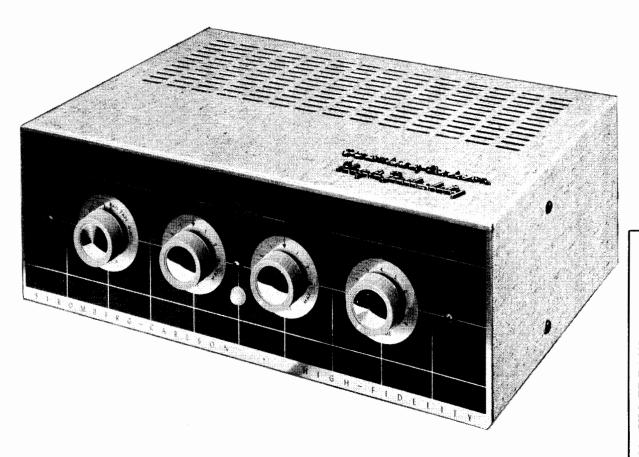
(R32)

(R31)

### **(**C15) (R30) (R29) R4 (R20) (R33 (C14) (R27 (C16) (R23) (C4) Triad PART No. NOTES Thordarson Triad PART No. PART No. TRANSFORMER (AUDIO OUTPUT) TRANSFORMER (POWER) 22568 Halldorson Merit Stoncor PART No. PART No. REPLACEMENT DATA







TRADE NAME Stromberg-Carlson Model AR-419 MANUFACTURER Stromberg-Carlson Co., Service Dept., 1700 University Ave., Rochester 10, N. Y. TYPE SET AC Operated Audio Amplifier Types 6SJ 7 AF Amplifier, 12AT7 AF Amplifier, 12AT7 AF Amp. - Phase Inv., (2) 6L6GB Output, 5U4GB Rectifier TUBES (Six) 1.1 Amp. @ 117 Volts AC (110 Watts) POWER SUPPLY 110-120 Volts AC-60 Cycles RATING

### HOWARD W. SAMS & CO., INC. . Indianapolis 5, Indiana

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the particular type of replacement part listed. duction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. @ 1957 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana . Printed in U.S. of America

# PARTS LIST AND DESCRIPTIONS TUBES (GENERAL ELECTRIC, SYLVANIA)

No.	USE	TYPE	NOTES
	AF Amplitler AF Amplitler AF Amp Phase Inv.	6SJ7 12AT7 12AT7	

No.	USE	TYPE	NOTES	
V4 V5 V6	Output Output Rectifier	6L6GB 6L6GB 5U4GB		

	•	2	OSE	1	2	_	ģ	iso	_	- I	NO ES
AF Ampilfler AF Ampilfler AF Amp - Ph	And And And	99.	аве Іпу.	6SJ7 12AT7 12AT7			V4 V5 V6	Output Output Rectifier		6L6GB 6L6GB 5U4GB	
				ELEC	TROL	YTIC	CAP	ELECTROLYTIC CAPACITORS			
RATING	Š	П				2	EPLACE	REPLACEMENT DATA			
CAP. VOLT.	>	ĽŢ.	Stromberg- Carlson PART No.		AEROVOX PART No.	CORNELL- DUBILIER PART No.	38.0	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
■30 500	2 2	0.5	46320-000	AFH	AFH2-72	B0530		FP284	TMD-62	D-275	TVL-2937
	3		35590-000	AFH	AFH4-85-25	D0650		FP431. 3		9-310	TVL-4705.8
▲15 300 ■30 350	3 8										
20 20	20						_				
9 09	9			XPP	XPP6V50	BBR 50-6	_	TT6X50	TD-50-6	MMT-650	TVA-1100

FIXED CAPACITORS
Capacity values given in the rating column are in mfd. for Paper
Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

	_	NOTES										_								
	_	SPRAGUE PART No.	5GA-T1	5GA-T1	5GA-T1	5GA-047	5GA-T33	4TM-P22	5GA-D47	6TM-833	5GA-033	5GA-D47	5GA T 47	5GA-T47	5GA-D47	6TM-S33	5GA -T47	4TM-DI	4TM-PI	ATM DI
T DATA		MALLORY PART No.	UC-531	UC-531	UC-531	UC-5447	UC-5333	GEM 4022	UC-5247	GEM-4133	UC-5433	UC-5247	UC-5347	UC-5347	UC-5247	GEM-4133	UC-5347	GEM-401	GEM-401	GEW-401
REPLACEMENT DATA		PART No.	ED-100	ED-100	ED-100	GP-47	ED-330		ED-0047		GP-33	ED-0047	ED-470	ED-470	ED-0047		ED-470			
	CORNEL	_	LIOTI	LIOTI	LIOTI	LT6047	L10T33	CUB4P22	BYA10D47	CUB6S33	LT6Q33	BY A10D47	BYAI0T47	BYA10T47	BY AJOD47	CUB6S33	BYA10T47	CUB4P1	CUB4Pi	CUB4 PI
		PART No.	DD-101	DD-101	DD-101	D6470	DD-331		DD-472	DF-303	D6-330	DD-472	DD-471	DD-471	DD-472	DF-303	DD-47	DF-104	DF-104	DF-104
		PART No.	BPD-0001	BPD-0001	BPD-0001	SI 47	BPD-00033	P488N-22	BPD-0047	P488N-033	SI 33	BPD-0047	BPD-00047	BPD-00047	BPD-0047	P488N-033	BPD-00047	P488N-1	P488N-1	P488N-1
	Stromberg-	PART No.																		
1	RATING	VOLT						408		8						400		40	400	400
	\$	3	100	8	00	47	330	. 22	4 700	. 033	33	4 700	470	420	4 700	. 033	4 70	-:	-:	7:
	¥	ģ	C4	င်	ဗ	C2	8	င်	C10	::	CIS	C13	C14	CIS	C16	C17	C18	C18	C20	C21

### CONTROLS

		INSTALLATION NOTES	Volume			Treble		Bass		Hum Adjust (Wire Wound)
		PART No.	U46	Not Req.	US-26	1085	Not Reg.	165	Not Req.	•
TA	3	PART No.				013-141				
EPLACEMENT DATA		PART No.	A47-500K-Z	F8-3	SWE-12	A47-5Meg-Z	FS-3	A47-5Meg-Z	FS-3	
REP	CENTRALAB PART No.		B-60-8	Not Req.	Not Req.	AB-88	AK-7	AB-88	AK-7	
	Stromberg- Carlson PART No.		145622-000			145661-000		145661-000		173853-000
		WATTS	Ť			-411		44		2
CIVITAG	2	RESIST- ANCE	500K	Shaft	Switch	5Meg	Shaft	5Meg	Shaft	1000
į	¥	Š	RIA	Д	ပ	R2A	Д	R3A	ß	R4

R15 T2 C1 R19 V2 R21 V4 R16 V5 C13 V6 T1 V3 C2 C1 R19 C15 C16 C12 R20 R3 C14 R26 R2 R1
(R13) (R8) (C5) (M2) (R14) (C15) (C16) (C12) (R20) (R3) (C14) (R26) (R2) (R1)

# **PARTS LIST AND DESCRIPTIONS (Continued)**

**RESISTORS**All wattages 1/2 watt, or less, unless otherwise listed.

1				,							
			REPLACEMENT DATA	ENT DATA					REPLACEM	REPLACEMENT DATA	
RATING	ر ق	_	Stromberg-	IRC	NOTES	¥ Z	RATING	ტ	Stromberg-	IRC	NOTES
OHMS WATT	٨×	E	PART No.	PART No.		Š	OHWS	WATT	PART No.	PART No.	
100K	L			BTS-100K		R21	470K			BTS-470K	
Meg				BTS-IMeg		R22	47K			BTS-47K	
100K				BTS-100K		R23	15000			BTS-1500	
8. 2Meg	_			BTS-8. 2Meg		R24	47002			BTS 4700	
470K				BTS 470K		R25	33002			BTS-3300	
1. 8Meg	_			BTS-1. 8Med		R26	1000			BTS-100	
100K	_			BTA-100K		R27	10000			BTS-1000	
33000	_			BTS-3300		R28	470K			BTS-470K	
470K	_			BTS-470K		R29	47K			BTS-47K	
470K				BTS-470K		R30	47K			BTS 47K	
33K				BTS-33K		23	220K			BTS-220K	
l. 8Meg				BTS-1. 8Meg		R32	220K			BTS-220K	
33K				RT8-33K		R33	2002	ß			
10000	_			BTS-1000		R34	15K			BTS-15K	
47K	_			RTS-47K		R35	47K			BTS-47K	
470K	_			BTS-470K		R36	47K			BTS-47K	
	_					R37	20003	2		PW7-5000	

### TRANSFORMER (POWER)

ľ										
						REF	LACEMENT	DATA		
₹.9		RAT	RATING		Stromberg- Carlson		Merit	Stoncor	Thordorson	Triod
	PRI.	SEC. 1	SEC. 2   SEC. 3	SEC. 3	PART No.	PART No.	PART No.	PART No.   PART No.   PART No.   PART No.	PART No.	PART No.
	117VAC	20	ш.,	6. 3VAC	161795-000	P9314 ①	P-3173 ①	P9314 (1) P-3173 (1) PC8410 (1) 24R05U (1) R-14A (1)	24R05U ①	R-14A (1)
	Ø 1.1A	0 140A	¥ ⊚	© 2.8A						

① Drill new mounting holes.

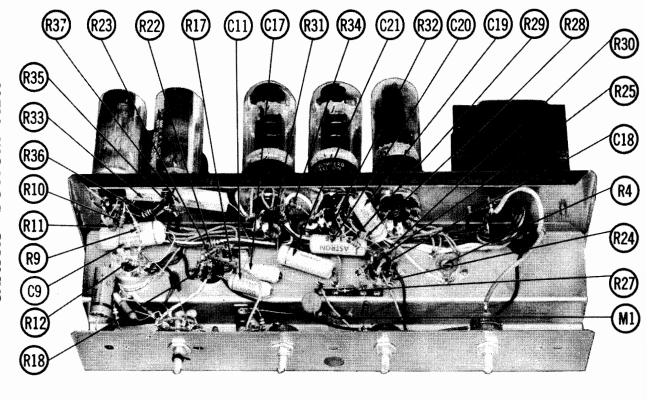
# TRANSFORMER (AUDIO OUTPUT)

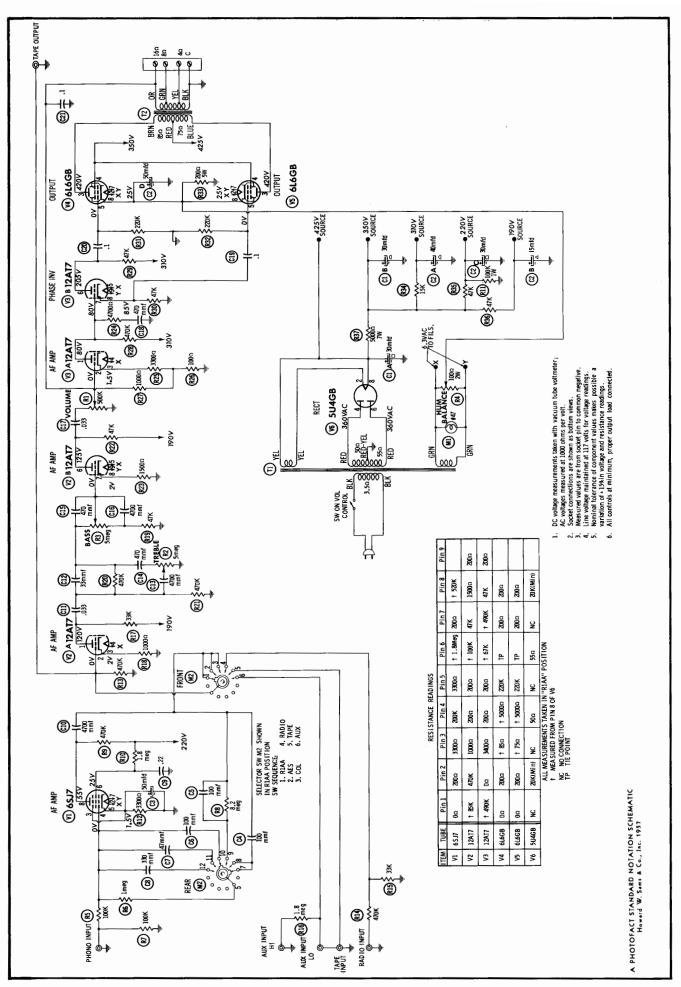
	NOTES		Drill new mounting holes.		
	Triod	PAKI NO.	Y09-S		
	Merit Stancor Thordorson Triod	PAKI No.	22S97 ① S-60A		
T DATA	Stancor	PAKI NO.	A-3131 A-3307		
REPLACEMENT DATA	Merit	PAKI No.	A-3131		
R	Halldorson	PAKI NO.	21401		
	Stromberg-	FAKI NO.	161355-000		
	MPEDANCE	SEC.	160	CT Tap®	
	_	PRI.	57003	CI	
	Š Ę		T2		

### MISCELLANEOUS

NOTES	#47 Selector (Rotary Wafer Type)
Stromberg- Carlson PART No.	158692-000
PART NAME	Pilot Lamp Switch
Ž Š	M2 M2

# CHASSIS—BOTTOM VIEW







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### PREAMPS AND AMPLIFIERS

### SERVICING HI-FI PREAMPS AND AMPLIFIERS

Contains complete information on the circuitry, specifications and replacement parts for 1957-58 Preamps and Amplifiers. Data on the following brand names appears in this volume:

BELL SOUND

HARMON-KARDON

CHALLENGER

**KNIGHT** 

DAVID BOGEN

MADISON FIELDING

**ELECTRO-VOICE** 

**NEWCOMB** 

**FISHER** 

**PILOT** 

**GROMMES** 

SCOTT (H. H.)

HAMILTON

SHERWOOD

STROMBERG-CARLSON



