SPARTA
ELECTRONIC CORPORATION

Model 682
Stereo Generator

5851 FLORIN-PERKINS ROAD / SACRAMENTO, CALIFORNIA / TELEX 377-488 CABLE SPARTA / (916) 383-5353
A Division of Computer Equipment Corporation

TECHNICAL MANUAL

Model 682
Stereo Generator

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A DIVISION OF COMPUTER EQUIPMENT CORPORATION

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SECTION I
GENERAL INFORMATION

1-1 INTRODUCTION

This manual contains information required to install, operate, and maintain the Sparta Model 682 Stereo Generator. Section I describes the stereo generator and lists its specifications, Section II provides installation instructions, Section III contains operating procedures and Section IV describes the principles of operation. Maintenance procedures and troubleshooting diagrams are contained in Section V and replaceable parts are identified and listed in Section VI.

1-2 GENERAL DESCRIPTION

The Model 682 Stereo Generator provides a composite stereophonic baseband signal for operation of the 680 Direct-FM Exciter. Because of its design, this stereo generator may be used with any Direct-FM Exciter Type-Accepted by the Federal Communications Commission for operation under part 73 of the rules.

Remote control of the stereo/mono function is accomplished with a simple contact closure. This function is available at terminals on the rear of the unit.

Internal circuitry uses operational amplifiers and other integrated circuits where they best perform the various functions. Bipolar transistors are used in other areas. All of the circuitry is short-circuit proof. The power supplies utilize fold-back current limiting to prevent failures due to misuse of the equipment.

Only one operating control is provided. This is a front-panel control that sets the overall gain of the system. This control is adjusted for 8, 9 or 10% pilot injection. There are no other user-adjustable controls.

1-2.1 PHYSICAL DESCRIPTION

The Model 682 consists of a single unit of standard rack panel construction. Physical characteristics of the Model 682 are listed in table 1-1.

Table 1-1 Physical Characteristics

Dimensions:	3-1/2" high, 6" deep, 19" wide
Weight:	
Construction Style:	1/8" alodined aluminum with painted front panel with mounting flanges notched to mate with standard 19" equipment rack
Maximum Altitude:	To 12,500 feet
Maximum Humidity:	95%
Connectors:	AC-audio input - Standard barrier strip Output - BNC Type (2)

Table 1-2 Electrical Characteristics

Power Requirements:	105-125 VAC, 50/60 Hz, 1 Ø, 15 Watts
Ambient Temperature Range:	0°F to 120°F
Altitude Range:	To 12,500 ft.
Pilot Frequency Stability:	± 1 Hz maximum
Audio Input Impedance:	600 Ohms, balanced
Audio Input Level:	+ 10 dbm ± 2 DB at 400 Hz for 90% modulation
Frequency Response:	+ 0.25 to - 0.5 db from 50 Hz to 15,000 Hz (referred to 75-usec preemphasis)
Distortion:	0.1% of composite waveform or less
Noise:	-75 db below 100% modulation
Stereo Separation:	-40 db from 50 Hz to 15,000 Hz or better (-60 db typical)
Carrier Suppression:	-65 db below 100% modulation
Crosstalk:	-50 db or better (-60 db typical)

SECTION II
INSTALLATION

2-1 INSTALLATION PLANNING

Dimensions essential for proper installation of the Model 682 Stereo Generator are shown in Figure 2-1.

2-1.1 ENVIRONMENTAL REQUIREMENTS

Location of the Model 682 must be within the following environmental limitations:

a. Maximum altitude: 12,500 ft.

b. Maximum temperature: 120° F

c. Minimum temperature: 0° F

d. Maximum himidity: 95%

2-1.2 POWER REQUIREMENTS

105-125 VAC, 50/60 Hz, 1 Ø is required to operate the Model 682. Since this unit uses very little power (15 watts) it can remain permanently connected to the AC line and left operational. Should you desire to turn it on and off with the transmitter you should allow at least 30 seconds for the device to stabilize before program operation begins. Should it be necessary to operate this equipment from a 230 volt source use a step-down transformer such as a Triad N-68X. It is important that an auto - transformer not be used.

2-1.3 COOLING REQUIREMENTS

When used with the companion 680 exciter the stereo generator should be mounted under the exciter. It is important that the stereo generator be mounted as close to the exciter as possible. When used to retrofit older transmitters it is wise to locate the stereo generator and the exciter in a rack adjacent to the transmitter. In this way you can be assured that the sensitive circuitry within this equipment is kept away from the fields of motors, transformers and high current carrying conductors that might exist within the transmitter.

2-2 INPUT AND OUTPUT CONNECTIONS

All input and output connections for the Model 682 are made at the rear of the unit and are noted on Figure 2-1.

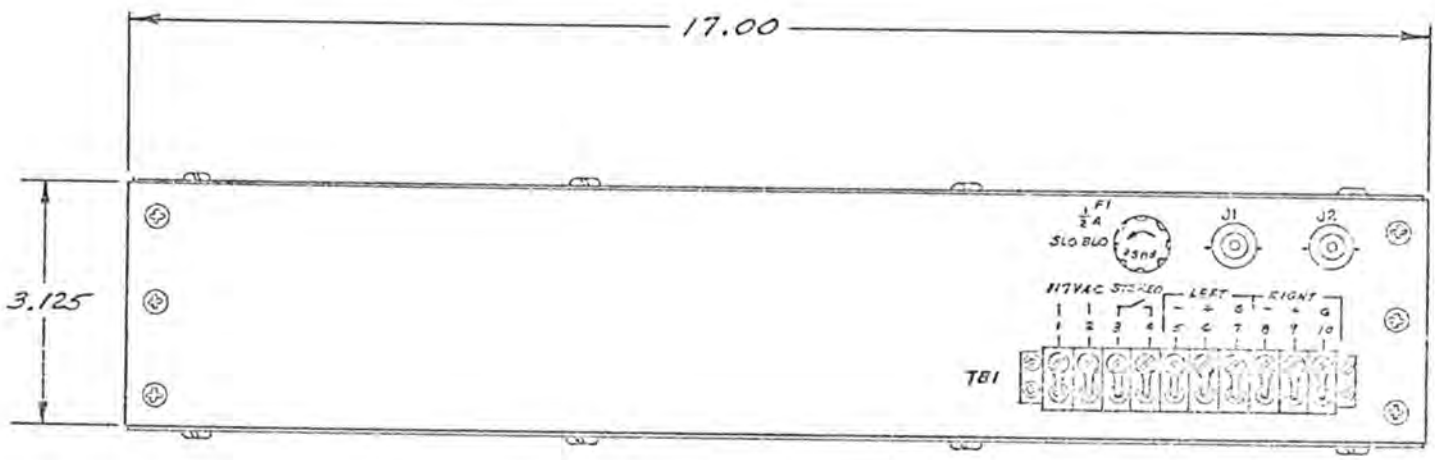
Primary power is connected to terminals 1 and 2 of TB-1.

Remote control of the stereo/mono function is accomplished by a contact closure across terminals 3 and 4 of TB-1. The front panel switch must be in the MONO position for this to operate. The stereo indicator lamp on the front panel will glow when the 682 is operating in the stereophonic mode.

The audio frequency input connections are marked on the rear panel adjacent to terminals 5-10 of TB-1. The polarity is indicated so that a positive going impulse applied to the positive (+) terminals will cause an instantaneous deviation in the positive (higher frequency) direction. The gain of the system is set up at the factory so that a left only or a right only signal applied during monophonic operation will result in the same degree of modulation as that obtained in the stereo mode. Contact the factory for information on how to set up the gain should you wish to use the stereo generator as a combiner for left and right program channels during monophonic operation.

The output connections are made with standard BNC type connectors labeled J1 and J2 on the rear panel. Both connectors are common and thus allow the user to connect up an oscilloscope to the output while modulating an exciter. The output impedance is essentially zero ohms and thus should be able to feed a long cable without high frequency degradation.

Do not short the output connections with the PILOT control at maximum. To do so will cause a disturbance that will take 10 to 20 seconds to clear.



INSTALLATION DRAWING - MODEL 682

FIGURE 2-1

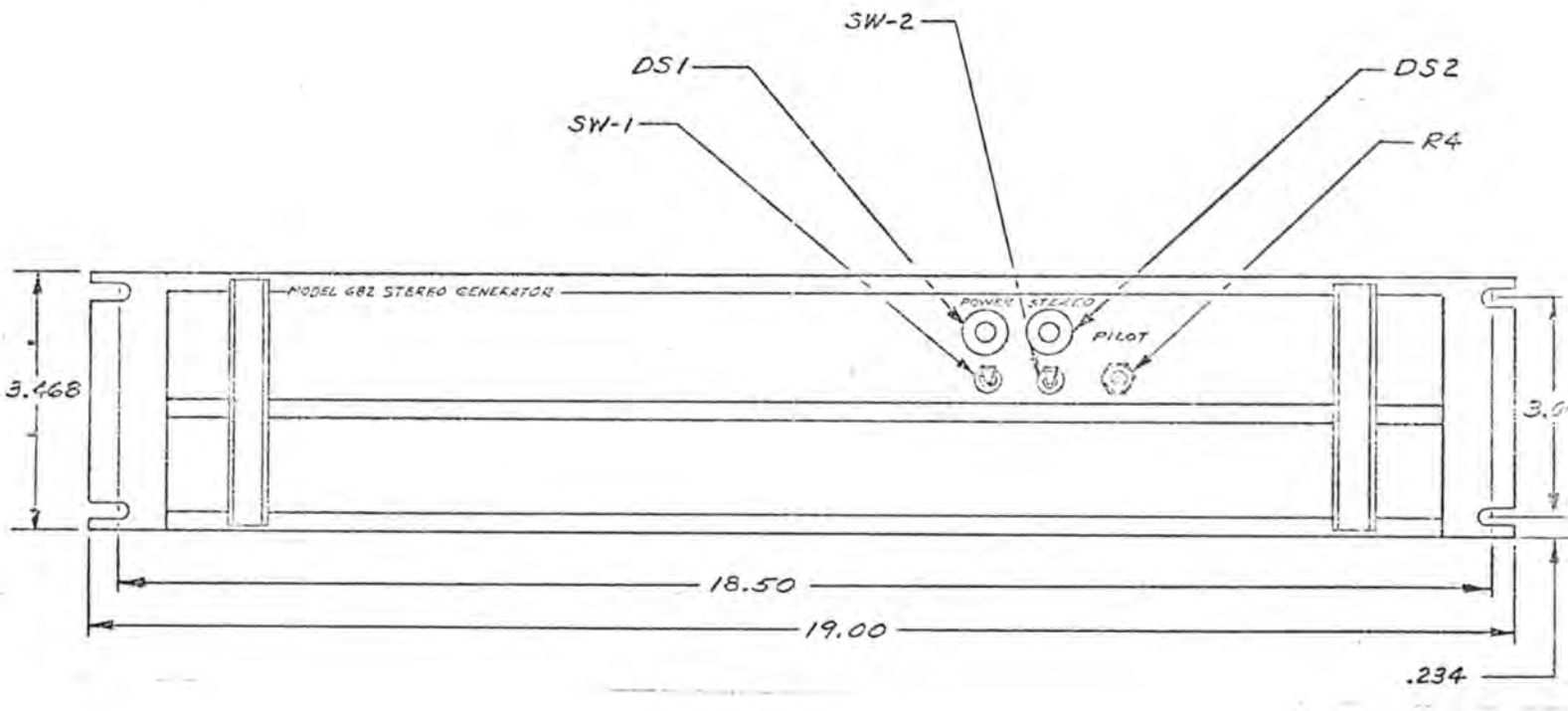
SECTION III
OPERATION

3-1 OPERATING CONTROLS AND INDICATORS

There are only three front panel controls on the Model 682 Stereo Generator - The on-off switch (S-1) the mono/stereo mode switch (1S-1) and the pilot amplitude adjustment (R-4).

As supplied from the factory the Model 682 is ready for operation and once the proper power and input connections are made it can be placed into service. There are no user-serviceable adjustments to be concerned with other than the pilot amplitude mentioned above. The pilot frequency is not adjustable and will run 1/2 to 1 Hz low during the beginning operation of the unit and will climb to a positive 1 Hz as the crystal ages over the first two year period. The oscillator is extremely stable. The total drift over a ten year period should not exceed 2 Hz.

A complete setup procedure is included in the maintenance section of this manual. It is included only to familiarize the user with the operation of the equipment and is not meant to be a guide to field adjustment. It is not possible to adjust the Model 682 for its best operation by using a stereo modulation monitor since this unit is more stable and capable of much better performance than even the most expensive FM monitoring equipment.



FRONT VIEW - MODEL 682

FIGURE 3-1

SECTION IV
PRINCIPLES OF OPERATION

4-1 INTRODUCTION

This section describes the principles of operation of the Model 682 Stereo Generator.

4-2 GENERATOR CIRCUIT DESCRIPTION

The Sparta Model 682 Stereo Generator uses the time-division multiples or filter method of generating the composite baseband signal.

The system basically consists of the alternate sampling of the left and right pre-emphasized channels at a 38 KHz rate. A special phase-linear filter is used to attenuate the third, and higher-order components of the resulting signal to make it correspond to the characteristics set forth by the Federal Communications Commission. The filtering action causes the resulting amplitude of the L-R sidebands to have a level about 1.4 times higher than that required for a proper baseband signal. This discrepancy is eliminated by the addition of a small amount of L+R to the signal. The result is a composite signal with the proper ratios of signal intensities to correspond to the Commission's Standards. A 19 KHz pilot is transmitted along with this signal to synchronize the demodulators in stereo receivers.

The 38 KHz sampling rate is generated by a 76 KHz "clock" consisting of 1Q5, 1Q6 and 1Q7. This oscillator operates from an on-the-board 5-volt regulator consisting of 1Q4 and its peripheral components. Transistors 1Q5 and 1Q6 operate as a gain-stage-pair with both negative and positive feedback. The negative feedback is via resistor 1R44 and the positive feedback is via crystal 1Y1. The stage will oscillate at frequencies at which there is more positive feedback than negative. This condition occurs at the series resonance frequency of the crystal. This type of oscillator is very stable. The crystal frequency is not adjustable but can be trimmed by changing the value of capacitor 1C24. A capacitor across resistor 1R44 decreases the gain of the circuit at higher frequencies and thus suppresses the crystal tendency to oscillate at its active overtones.

76 KHz from the oscillator is supplied to isolation-stage 1Q7 and then to 1IC1 where its frequency is divided by 2. Some of 1IC1's output is applied to 1IC2 for further division to 19 KHz.

A 19 KHz square-wave from 1IC 2 is applied to a filter consisting of 1C21, 1L3, 1C22, 1L4, and 1C23. This is a simple pi-network with two 90 degree sections. The phase-shift is adjustable by tuning either 1L3 or 1L4. This adjusts the pilot phase. The output of this filter consists of a perfect sine-wave with less than 0.1% distortion (with harmonics over -60 db). This sine wave is applied to a combining amplifier consisting of transistor 1Q3 where it is mixed with the baseband signal.

The left pre-emphasis amplifier and the right pre-emphasis amplifier are identical except for the fact that the right one has adjustable circuit constants to make it exactly correspond to the response, amplitude and phase, of the left. A description of one circuit should suffice.

The audio-frequency signal from the left-channel input is applied to the balancing transformer, T1, from the terminals on TB-1. This transformer serves to unbalance the signal and couple it to the input of operational amplifier, 1IC3. This amplifier is connected as a unity-gain voltage follower with 75 uS de-emphasis in the negative feedback loop. This de-emphasis causes the circuit to operate as a differentiator with a 75 uS time-constant. This is the required condition for pre-emphasis. The outputs of both the left and the right pre-emphasis amplifiers are routed to a pair of shunt-choppers.

The choppers, consisting of 1Q1 and 1Q2 alternately short out part of the left and right signals before they are combined at the input of 1Q3 by resistors 1R18 and 1R38. The amount of signal being attenuated while the transistors are turned on is controlled by resistors 1R19 and 1R37. This allows independent control of the ratios of L+R and L-R amplitudes for both channels. The L-R signal being referred to is the pair of sidebands located around 38 KHz as a result of the modulation of a Left and Right audio input signal. The

standards allow that if both of the channels are fed identical signals, in phase, all of the modulation will be in the main channel (frequencies from 50 Hz to 15 KHz). Should both channels receive the same signal, but exactly 180 degrees out of phase, all of the modulation will be in the sub-channel (23 KHz to 53 KHz). For this reason the subchannel components are referred to as the L-R components and the main channel components are called the L+R components.

Combining-amplifier, 1Q3 is a simple emitter-follower. It is used in this case because the output impedance of an emitter-follower is essential zero, thus the input impedance of the phase-linear filter can be controlled by 1R22. The complete composite baseband signal appears at the input of the filter. This signal is not suitable for modulation of a transmitter, however, because of the large harmonic content of the square-wave modulation in the sub-channel. The filter attenuates these harmonics without distorting the phase between the main and subchannels. The output signal of the filter is a "cleaned up" version of the same signal.

1IC5 is a wide-band operational amplifier. It serves to increase the amplitude of the filter output to about 10 volts peak-to-peak. Relay 1K1 selects either a mono signal (from the combined outputs of the pre-emphasis amplifiers) or a stereo signal (from the filter) to be applied to the input of this amplifier.

4-3 POWER SUPPLY CIRCUIT DESCRIPTION

A regulated power supply serves the DC power needs of all stages. This supply utilizes a tracking regulator so that both the positive and the negative outputs will vary the same should there be any variation in output voltage. The operation of this circuit is not easy to comprehend by inspection. If 2IC1, 2Q3 and 2Q4 were removed from the circuit we have a 30 volt regulated power supply with neither the positive nor the negative outputs grounded. The operation is as follows - the positive (+) input of operational amplifier 2IC2 is maintained at some fixed voltage by the action of zener diode 2D2. Current flows out of this amplifier into the base of series-pass transistor, 2Q2. This causes its emitter voltage to rise. The voltage will rise until the negative (-) input of the operational amplifier receives a voltage from 2R7 that exceeds the zener voltage at the positive (+) input. At this point the levels will stabilize so that just enough current flows out of the operational amplifier into 2Q2 to maintain this condition. Since there is a great deal of gain enclosed within this negative-feedback loop, the output voltage will remain very stable for large changes in load current or supply voltages. The input voltage to this regulator is supplied by a conventional bridge rectifer and filter capacitor.

Clamp transistor, 2Q1 serves to current-limit the supply. Should enough current flow through resistor 2R6 to cause transistor 2Q1 to draw current it will clamp the zener-reference voltage to a very low level preventing the circuit from being damaged. During normal operation transistor 2Q1 is not active in the circuit.

Transistors 2Q3, 2Q4 and operational amplifier 2IC1 serve to center-tap this 30 volt regulated supply. The transistors 2Q3 and 2Q4 are similar in operation to a complimentary-symmetry output stage used in audio amplifiers. The only difference being that the output is grounded. Resistors 2R8 and 2R9, being equal in value, center-tap the supply. The voltage at the junction of these two resistors is exactly 1/2 the 30-volt supply potential or 15 volts. Operational amplifier 2IC1 and its complimentary-symmetry output act as a current amplifier to simulate a zero-impedance mid-point connection to ground. This is because the operational amplifier will attempt to maintain its positive and negative input terminals at the same potential. The negative input is grounded. Current will flow out of the operational amplifier into the complimentary-symmetry output. The output stage will amplify this current and adjust the loading on the negative or positive leg of the supply until the difference in potentials (obtained via resistors 2R8 and 2R9) exactly equals zero volts. This results in a "perfect" center-tap for the supply in that the positive and negative voltage will exactly track each other within the limitations of the operational amplifier and output stage.

SECTION V
MAINTENANCE

5-1 PERIODIC MAINTENANCE

No special maintenance procedures are necessary. The Model 682 stereo generator is designed with components that should not exhibit problems throughout the life of the equipment. None of the active devices are operating with parameters known to cause time-dependent failure modes.

The top and bottom covers should be removed and the dust blown out of the generator using a soft blast device such as a vacuum cleaner rather than an air compressor. Remember to re-install the covers (both top and bottom) and all screws after cleaning.

5-2 ALIGNMENT AND ADJUSTMENT PROCEDURE

CAUTION

Do not adjust the stereo generator without access to the proper test equipment listed below. A stereo monitor should not be used to adjust the 682 stereo generator - to do so will cause the introduction of improper phase and amplitude variations to the composite signal to make up for the imperfections of the stereo monitor. Your 682 stereo generator is a precision source of a near perfect stereo test signal and should not be tampered with. If measurements are suspect the correct operation of the stereo generator should be determined utilizing the procedure listed below- then - than the monitor should be adjusted to the generator.

5-2.1 TEST EQUIPMENT

(1) Low distortion Audio frequency Generator	Krohn-Hite 4200 or equivalent
(2) Wideband Oscilloscope	Tektronix 422 or equivalent
(3) Accurate VOM	Simpson 260
(4) SHIELDED Audio leads for test connections	
(5) G.C. 9302 Alignment tool	
(6) 1 foot length of RG-58U cable with BNC Connectors	

5-2.2 ALIGNMENT PROCEDURE

(1) Remove the Stereo Generator from the transmitter, remove the top cover, and place the unit on a test bench

(2) Connect 117 VAC to terminals to 1 and 2 of TB-1

(3) Connect wideband oscilloscope to either J1 or J2 using a 1-foot length of coaxial cable

(4) Feed a 400 Hz audio signal into the left input, TB1-5 and TB1-6. Connect the shield to TB1-7 and the chassis-ground connection on the audio generator. The balanced input can be fed unbalanced if desired. The level should be about +10 dbm.

(5) Synchronize the oscilloscope externally from the audio generator so that several complete cycles of the composite signal are observed. The oscilloscope must be DC coupled and the Stereo Generator operating in the STEREO MODE.

(6) Adjust 1R19, left separation control, for a flat baseline.

(7) Disconnect the audio generator from the left input and reconnect it to the right input, TB1-8 and TB1-9. The shield is connected to TB1-10. Leave the right input unterminated.

(8) Adjust 1R37, right separation control for a flat baseline.

(9) Connect a voltmeter between the positive (+) and negative (-) terminals of the regulator PC Board and adjust 2R7, regulator adjustment, for exactly 25 volts.

(10) Connect both the left and right inputs together so that the 400 Hz input is applied out of phase. A "bowtie" pattern should appear on the oscilloscope. Adjust 1L4, Pilot Phase for a symmetrical zero-axis crossing. It may be helpful to reduce the amount of audio into the generator while increasing the oscilloscope gain.

(11) Switch the stereo generator to the mono mode and increase the oscilloscope gain to where the interaction of the two inputs added out-of-phase can be observed. The level should be very low, the audio generator set at 2 KHz.

(12) Adjust 1R26 gain control and 1R36 phase control until the signal is observed to completely cancel out. There may be some noise and some audio-frequency harmonics but the signal should cancel quite perfectly.

(13) Reduce the audio input level 20 db and change the frequency to 15 KHz.

(14) Carefully readjust 1R26, 1R36, and 1R29 until the signal is observed to cancel completely.

(15) Go back to step #12. Remember to change the audio generator frequency to 400 Hz and increase the level to its original setting. Follow steps #12 through #14 until no further improvement is noted.

(16) With the Audio generator at 400 Hz and the level about +10 dbm, switch the stereo generator to the stereo mode. Adjust the oscilloscope sweep speed so that at least 8 complete cycles can be observed. Increase the gain of the oscilloscope and offset the vertical centering so that the positive tips of the waveform can be closely observed.

(17) Very carefully adjust ONLY 1R26, gain control, to eliminate any variation in the height of alternate envelope tips.

(18) Disconnect the left input signal from TB1-5 and TB1-6 while leaving the right input connected. Reduce the generator level about 10 or 15 db (i.e. -5 to 0 dbm input) and change the output frequency to 10 KHz. Synchronize the oscilloscope so that several cycles can be observed.

(19) Determine if there is any tilt in the baseline. The base line may be slightly rounded but it should not tilt one way or the other. If there is any tilt adjust 1R25 to remove it. Otherwise do not adjust 1R25.

(20) If you have adjusted 1R25, go back to setps #4 through #7.

(21) The stereo generator has now been completely adjusted. Replace the top cover.

SECTION VI
REPLACEABLE PARTS

6-1 ORDERING INFORMATION

When ordering parts for the Model 682 Stereo Generator, give the model number and the serial number of the equipment and the reference designation and Sparta part number. To order a part not listed in paragraph 6-3 of this section, give a complete description of the part including function and location.

All parts should be ordered from:

SPARTA ELECTRONIC CORPORATION
5851 Florin-Perkins Road
Sacramento, California 95828
Telephone: (916) 383-5353
Telex: 377-488
Cable Address: SPARTA

6-2 PARTS LOCATION

The location of parts listed in table 6-2 are shown in figures 6-1 through 6-3.

6-3 TABLES OF REPLACEMENT PARTS

A list of manufacturers of the component parts of the Model 682 is provided by table 6-1. Table 6-2 contains a listing of replaceable parts. The manufacturer of the particular part listed in table 6-2 is indicated by a code number, which is used to identify the manufacturer as listed in table 6-1.

Table 6-1. List of Manufacturers

Code No.	Manufacturer	Address
00815	Northern Engineering Laboratories	Burlington, Wisconsin
01295	Texas Instrument Inc.	Dallas, Texas
02660	Amphenol Corporation	Broadview, Illinois
02735	Radio Corporation of America	Somerville, New Jersey
04713	Motorola Semiconductor	Phoenix, Arizona
05397	Kemet-Lindy Division of Union Carbide	Cleveland, Ohio
09353	C & K Components	Watertown, Massachusetts
10582	CTS	Skyland, North Carolina
11502	IRC	Boone, North Carolina
12040	National Semiconductor	Plattsburgh, New York
13934	Midwec Corporation	Oshkosh, Nebraska
23265	Sparta Electronic Corporation	Sacramento. California
56289	Sprague Electronic Company	North Adams, Massachusetts
71400	Bussman - Division of Mc Graw - Edison	St. Louis, Missouri
71590	Centralab Division of Globe - Union Incorporated	Milwaukee, Wisconsin
71785	Howard B. Jones - Division of Cinch Manufacturing Co.	Chicago, Illinois
72136	Elmenco	Bronx, New York
72765	Drake Manufacturing Company	Harwood Heights, Illinois
73445	Amperex Electronic Corporation	Hickeville, New York
76493	J. W. Miller Company	Los Angeles, California
80223	United Transformer Company	New York, N.Y.
80294	Bourns Inc.	Riverside, California
91506	Augat Inc.	Attleboro, Massachusetts

Table 6-2. Replaceable Parts List

Chassis Mounted Components

Desig	Description	Part No.	Mfr.	Mfr. Part No.	Total
	Chassis front	022-4095	23265	065-4095	1
	Chassis back	022-4097	23265	065-4097	1
	Chassis, left side	022-4099	23265	065-4099	1
	Chassis , right side	022-4098	23265	065-4098	1
	Dress strip	022-4096	23265	065-4096	1
	Handle	022-4086	23265	065-4086	2
	Cover, top	022-4100	23265	065-4100	1
	Cover, bottom	022-4101	23265	065-4101	1
	Wiring harness	022-4103	23265	065-4103	1
A-1	Generator	022-8090	23265	065-8090	1
A-2	Power supply	022-8100	23265	065-8100	1
C-1	Capacitor, .005uF/1 KV	110-0076	71590	DD-501	2
C-2	Same as C-1				
C-3	Capacitor, 120pf/500V	101-0080	72136	DM15F-121	4
C-4	Same as C-3				
C-5	Same as C-3				
C-6	Same as C-3				
C-7	Same as C-1				
C-8	Same as C-1				
C-9	Capacitor, 250 uF/64V	112-0007	73445	C437 AR/4250	1
DS-1	Lamp, 28V, red	244-0014	72765	11604	2
DS-2	Lamp, 28V amber	244-0014-02	72765	11607	
F-1	Fuse, 1/2 A Slo-Blo	261-0007	71400	MDL 0.5	1
J-1	Connector, BNC	287-0034	02660	UG-1094A/U	2
J-2	Same as J-1				
R-1	Resistor, 620 ohms, 1/2W, 5%	136-0031	11502		2
R-4	Potentiometer, 5K, 1/2W, WW	130-0400	80294	271-1-502M	1

Desig	Description	Part No.	Mfr.	Mfr. Part No.	Total
R-48	Same as R-1				
S-1	Switch, SPST	299-0011	09353	7101D	2
S-2	Same as S-1				
T-1	Transformer, Audio	318-0116	80223	A20	2
T-2	Same as T-1				
T-3	Transformer, Power 30VAC/250MA	326-0010	326-0010	23K19C	1
TB-1	Terminal board	477-0019	71785	10-140Y	1
XDS-1	Lampholder	244-0003	72765	4428-001	2
XDS-2	Same as XDS-1				
XF-1	Fuseholder	261-0043	71400	HKP	1

Table 6-2. Replaceable Parts List

A-1 - Generator

Desig	Description	Part No.	Mfr.	Mfr. Part No.	Total
1C-1	Capacitor, 330PF/500V	101-0180	72136	CM05FD331J03	1
1C-2	Capacitor, 7500PF/500V	101-0052	72136	DM19-752	2
1C-3	Capacitor, 820PF/300V	101-0049	72136	DM19-821	2
1C-4	Capacitor, 220uF/10V	104-0132	05397	M39003/1-2025	3
1C-5	Same as 1C-4				
1C-6	Same as 1C-2				
1C-7	Same as 1C-3				
1C-8	Capacitor, 0.47uF/25V	110-0040	56289	5CO23474X0250B3	3
1C-9	Capacitor, 47PF/500V	101-0163	72136	CM05E0470J03	3
1C-10	Capacitor, 120PF/500V	101-0174	72136	CM05ED121J03	3
1C-11	Same as 1C-10				
1C-12	Same as 1C-10				
1C-13	Same as 1C-4				
1C-14	Capacitor, 150PF/500V	101-0176	72136	DM15F-151	2
1C-15	Capacitor, 1000PF/500V	101-0051	72136	DM15-102	3
1C-16	Same as 1C-15				
1C-17	Same as 1C-15				
1C-18	Capacitor, 470PF/500V	101-0047	72136	DM15-471	1
1C-19	Same as 1C-8				
1C-20	Same as 1C-8				
1C-21	Capacitor, 8200PF/500V	101-0053	72136	DM19-822	2
1C-22	Capacitor, 0.047uF/100V	105-3226-07	13934	E3XFR	1
1C-23	Same as 1C-21				
1C-24	Same as 1C-9				
1C-25	Capacitor, 4.7uF/35V	104-0115	05397	4R7UF35V	2
1C-26	Same as 1C-25				

Desig	Description	Part No.	Mfr.	Mfr. Part No.	Total
1C-27	Capacitor 620PF/300V	101-0036		DM1SE621J0300WV4GR	
1C-28	Capacitor, 10PF/500V	101-0150	72136	CM05CD100D03	1
1C-29	Selected at Checkout				
1C-30	Capacitor, 4.7 uf/35V	104-0115	05397	CSRBF475K	2
1C-31	Same as 1C-30				
1C-32	Same 1C-9	101-0007	01295		
1D-1	Diode, silicon	161-0007	01295	IN4005	1
1D-2	Diode, Zener, 6.2V/1W	161-0020	04713	IN3828	1
1IC-1	Integrated Circuit	425-0029	04713	MC850P	2
1IC-2	Same as 1IC-1				
1IC-3	Integrated Circuit	425-0020	04713	MC1439G	3
1IC-4	Same as 1IC-3				
1IC-5	Same as 1IC-3				
1K-1	Relay, SPDT, 30VDC	180-0013		AZ530-06-2	1
1L-1	Inductor, 3.3uH	186-0002	76493	70F336A1	2
1L-2	Same as 1L-1				
1L-3	Inductor, 7-10MH	186-0007	76493	23A823RPC	2
1L-4	Same as 1L-3				
PCB	Printed Circuit Board	065-8090	23265	065-8090	1
1Q-1	Transistor, NPN Silicon	149-0045	04713	2N709	2
1Q-2	Same as 1Q-1				
1Q-3	Transistor, NPN Silicon	149-0169	04713	2N3053	2
1Q-4	Same as 1Q-3				
1Q-5	Transistor, NPN Silicon	149-0032	04713	2N4124	3
1Q-6	Same as 1Q-5				
1Q-7	Same as 1Q-5				
1R-1	Resistor, 180K, 1/2W, 5%	136-0091	11502		1
1R-2	Resistor, 4.7K, 1/2W, 5%	136-0047	11502		9
1R-3	Resistor, 620 ohms, 1/2W, 5%	136-0031	11502		13
1R-4	Same as 1R-2				
1R-5	Same as 1R-3				

Desig	Description	Part No.	Mfr.	Mfr. Part No.	Total
1R-6	Resistor, 5.6K, 1/2W, 5%	136-0049	11502		1
1R-7	Potentiometer, 5K	130-0033	80294	3339P-1-502	2
1R-8	Resistor, 100 ohms, 1/2W, 5%	136-0016	11502		1
1R-9	Same as 1R-3				
1R-10	Same as 1R-3				
1R-11	Same as 1R-3				
1R-12	Same as 1R-3				
1R-13	Same as 1R-2				
1R-14	Same as 1R-2				
1R-15	Resistor, 22K, 1/2W, 5%	136-0067	11502		2
1R-16	Resistor, 1.5K, 1/2@, 5%	136-0036	11502		3
1R-17	Resistor, 10K, 1/2W, 5%	136-0057	11502		1
1R-18	Same as 1R-2				
1R-19	Potentiometer, 500 ohms	130-0035	80294	3339P-1-501	3
1R-20	Same as 1R-2				
1R-21	Resistor, 47K, 1/2W, 5%	136-0075	11502		4
1R-22	Resistor, 7.5K, 1/2W, 5%	136-0053	11502		1
1R-23	Same as 1R-3				
1R-24	Resistor, 2.2K, 1/2W, 5%	136-0038	11502		3
1R-25	Potentiometer, 10K	130-0039	80294	3339P-1-103	1
1R-26	Same as 1R-19				
1R-27	Same as 1R-3				
1R-28	Same as 1R-3				
1R-29	Potentiometer, 200 ohms	130-0037	80294	3339P-1-201	1
1R-30	Same as 1R-3				
1R-31	Same as 1R-15				
1R-32	Same as 1R-2				

Desig	Description	Part No.	Mfr.	Mfr. Part No.	Total
1R-33	Same as 1R-2				
1R-34	Same as 1R-16				
1R-35	Resistor, 8.2K, 1/2W, 5%	136-0055	11502		1
1R-36	Same as 1R-7				
1R-37	Same as 1R-19				
1R-38	Same as 1R-2				
1R-39	Same as 1R-21				
1R-40	Resistor, 1K, 1/2W, 5%	136-0034	11502		4
1R-41	Same as 1R-3				
1R-42	Same as 1R-3				
1R-43	Same as 1R-40				
1R-44	Resistor, 100K, 1/2W, 5%	136-0085	11502		1
1R-45	Same as 1R-3				
1R-46	Same as 1R-24				
1R-47	Same as 1R-21				
1R-48	Same as 1R-16				
1R-49	Same as 1R-21				
1R-50	Same as 1R-40				
1R-51	Same as 1R-40				
1R-52	Same as 1R-24				
1R-53	Resistor, 30K, 1/2W, 5%	136-0070	11502		1
1R-54	Resistor, 270 ohms, 1/2W, 5%	136-0023	11502		1
1T-1	Transformer, 1:1	022-4092	23265	022-4092	3
1T-2	Same as 1T-1				
1T-3	Same as 1T-1				
1Y-1	Crystal, 76 KHz	165-0019	00815	NE13	1
1XY-1	Crystal socket	396-0199	91506	8000A	1

Table 6-2. Replaceable Parts List

A-2. Power Supply

Desig	Description	Part No.	Mfr.	Mfr. Part No.	Total
2C-1	Capacitor, 1000 uF/50V	112-0009	29505	301-1000/50	1
2C-2	Not used				
2C-3	Not used				
2C-4	Capacitor, 0.15uF/100V	105-0013	73445	C281 CH/A150K	1
2D-1	Diode, Silicon	161-0007	01295	IN4005	5
2D-2	Diode, Zener, 22V/1/2W	161-0008	04713	IN5251	1
2D-3	Same as 2D-1				
2D-4	Same as 2D-1				
2D-5	Same as 2D-1				
2D-6	Same as 2D-1				
2IC-1	Integrated Circuit	150-0003	12040	U5B-7741-393	2
2IC-2	Same as 2IC-1				
PCB	Printed Circuit Board	065-8100	23265	065-8100	1
2Q-1	Transistor, PNP Silicon	149-0021	02735	2N4036	1
2Q-2	Transistor, PNP Silicon	149-0179	02735	2N3740	2
2Q-3	Same as 2Q-2				
2Q-4	Transistor, NPN Silicon	149-0017	02735	2N3054	1
2R-1	Resistor, 6200 ohms, 1/2W,5%	136-0031	11502		4
2R-2	Resistor, 1.5K, 1/2W, 5%	136-0036	11502		1
2R-3	Same as 2R-1				
2R-4	Same as 2R-1	136-0047			
2R-5	Same as 2R-1	136-0038			
2R-6	Resistor, 100 ohms, 1/2W, 5%	136-0016	11502		1
2R-7	Potentiometer,10K, 1/4W	130-0016	CTS-1RC	U201R-103B	1
2R-8	Resistor, 4.7K, 1/2W, 5%	136-0047	11502		2
2R-9	Same as 2R-8				

Desig	Description	Part No.	Mfr.	Mfr. Part No.	Total
2R-10	Resistor, 2.2K,1/2W, 5%	136-0035	11502		2
2R-11	Resistor 1.2K, 1/2W, 5%	136-0035	11502		
2R-12	Resistor, 1.8 Ohms, 1/2W, 5%	136-0002	11502		1
2R-13	Resistor, 1K, 1/2W, 5%	136-0034	11502		2
2R-14	Same as 2R-13				
2R-15	Resistor, 3.9K, 1/2W, 5%	136-0045	11502		1

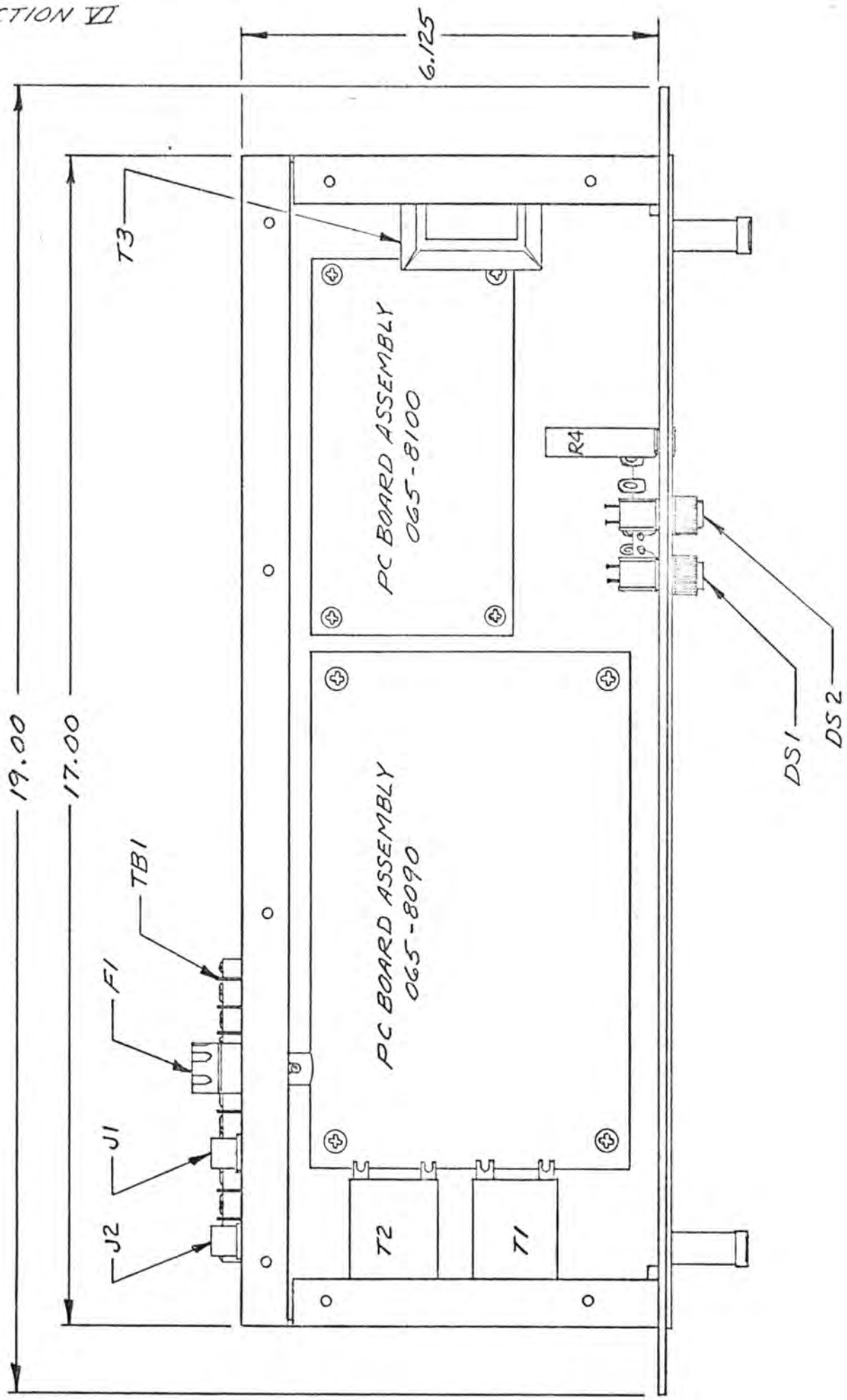


FIGURE 6-1
MODEL 682 STEREO GENERATOR
TOP VIEW

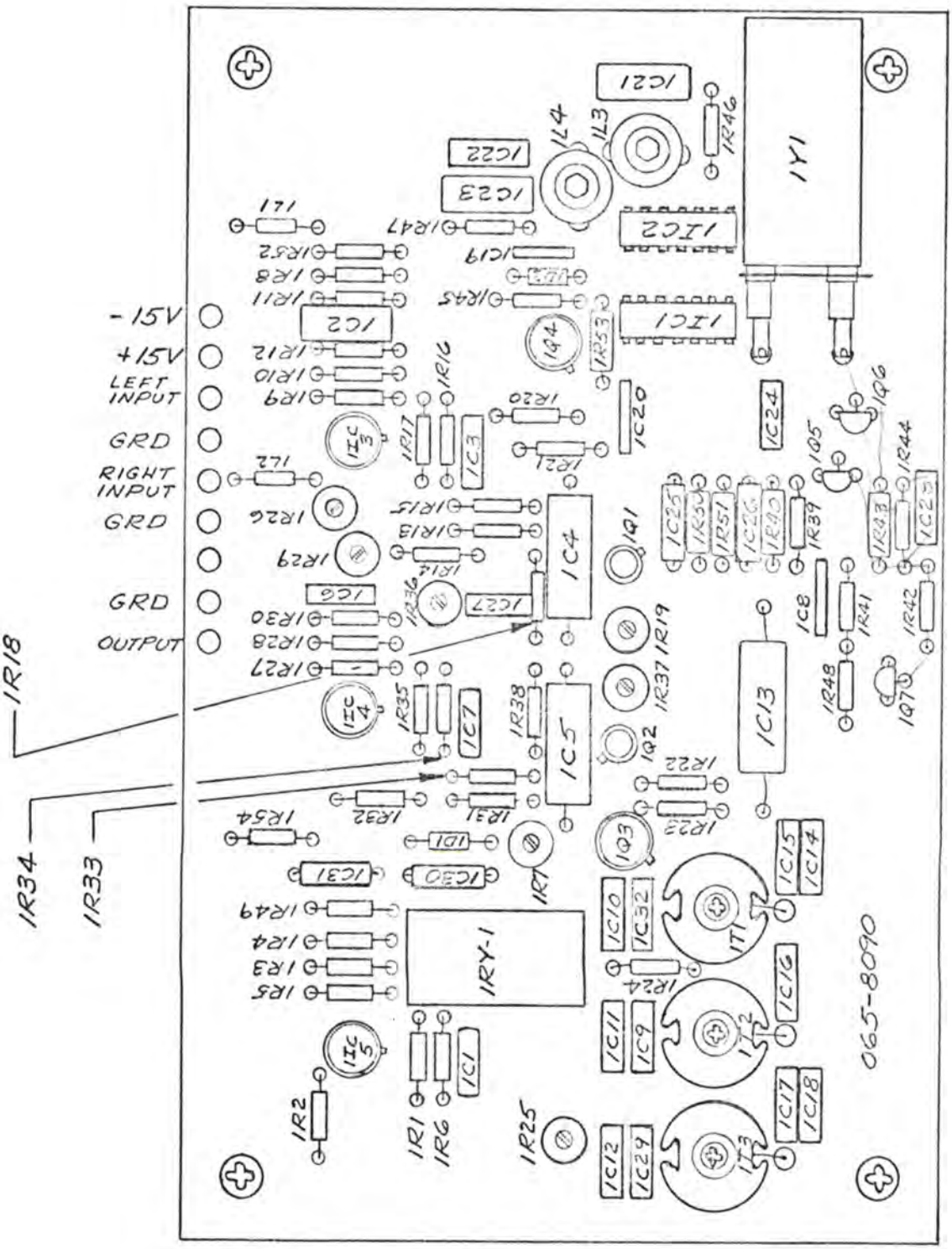


FIGURE 6-2
MODEL 682 STEREO GENERATOR
PC BOARD ASSEMBLY

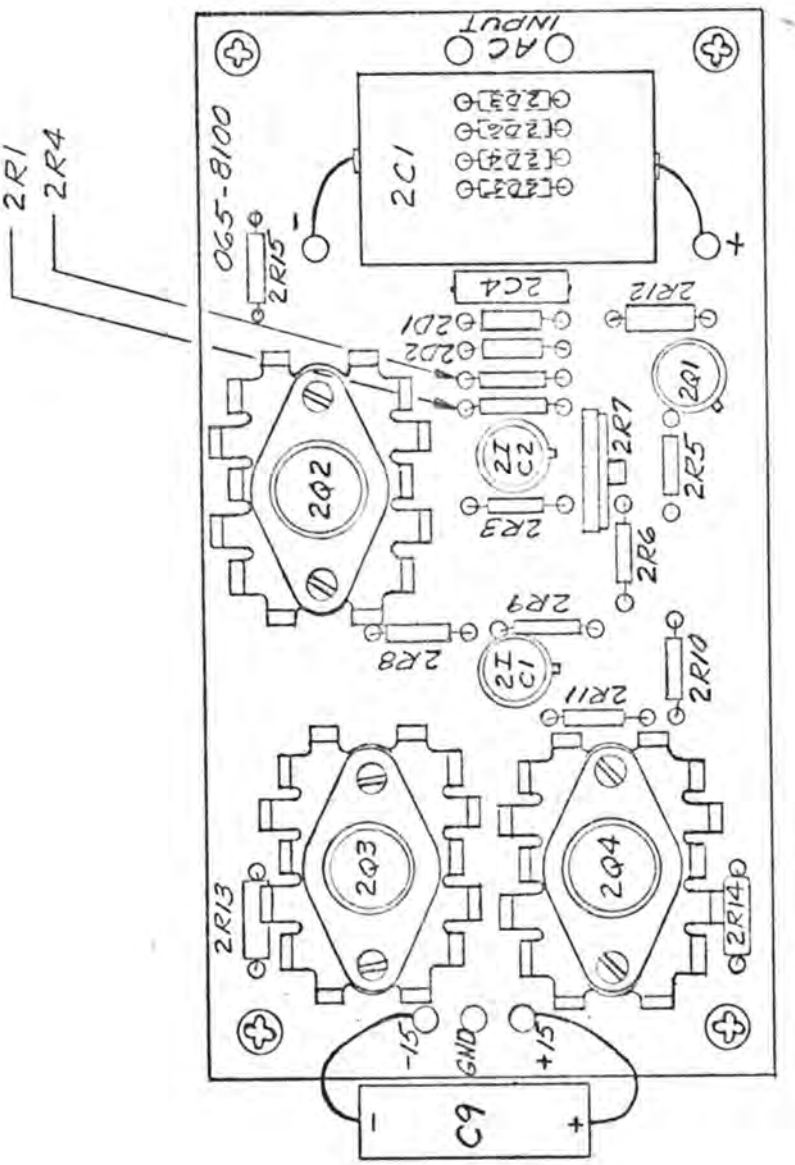


FIGURE 6-3
MODEL 682 STEREO GENERATOR
PC BOARD ASSEMBLY

CHANGE	DESCRIPTION	APP'D
A	SEE ECR 489	
B	SEE ECR 528	
C	SEE ECR 533	
D	SEE ECR 545	

TB1 T3 C1 .005µF 1KV F1 ½A SLO-BLO SW-1 C2 .005µF 1KV OUTPUT J2 J1 R4 5K

2D3 2D4 2D6 2D5 IN4005 2C1 2D1 IN4005 2D2 2Q1 2N4036 CLAMP

SERIES PASS 2R15 3.9K 2Q2 2N3740 2R2 1.5K 2C4 .15µF 100V 2IC2 741 2R3 620Ω 2R6 100Ω 2R4 620Ω 2R5 620Ω 2R7 10K 2R1 620Ω REG ADJ 2R12 1.8Ω

VOLTAGE FOLLOWER 2IC1 741 2R8 4.7K 2R9 4.7K 2R10 1.2K 2Q3 2N3740 2Q4 2N3054 2R11 1.2K 2R13 1K 2R14 1K

-15V +15V GND R1 620Ω DS1 POWER ON C9 250µF 50VDC

WIDE BAND AMPLIFIER 1IC5 MC1439G 1R1 180K 1R2 4.7K 1R3 620Ω 1R4 4.7K 1R5 620Ω 1R49 47K 1R6 5.6K 1C1 330µF

1D1 IN4005 K1 1RY-1 1R54 270Ω IC30 4.7µF IC31 4.7µF R48 620Ω STEREO ON DS2 C7 .006µF 1KV C8 .005µF 1KV TB1-3 4 SW2 MONO STEREO

LEFT PRE-EMPHASIS AMPLIFIER 1L1 3.3µh C3 120pF 500V 1R52 2.2K 1R8 100Ω 1R9 620Ω 1R10 620Ω 1IC3 MC1439G 1R11 620 1R14 4.7K 1R13 4.7K 1R15 22K 1R12 620 C4 120pF 500V IC2 7,500pF IC3 820 pF 1R16 1.5K 1R17 10K

1R7 MONO GAIN 5K IC27 620pF 1R18 4.7K 1R19 500Ω LEFT SEP IC4 220µF 1Q1 2N709 SHUNT CHOPPER 1Q2 2N709 IC5 220µF 1R37 500Ω RIGHT SEP 1R38 4.7K

1R20 4.7K 1Q3 2N3053 IC13 220µF 1R22 7.5K 1R23 620Ω 1R21 47K 1R53 30K

IC10 120 pF 1:1 30mh 1T1 IC14 150pF IC15 1,000 pF 1R24 2.2K IC9 47pF IC11 120 pF 1:1 30mh 1T2 IC16 1,000 pF IC29 IC12 120 pF 1:1 30mh 1T3 IC17 1000pF IC18 470 pF 1R25 10K FILTER TERM

Ø LINEAR FILTER

RIGHT INPUT T2 C5 120pF 500V C6 120pF 500V 1L2 3.3µh RIGHT PRE-EMPHASIS AMPLIFIER 1R26 500Ω GAIN 1R27 620Ω 1IC4 MC1439G 1R28 620 1R29 500 TERM 1R31 22K 1R32 4.7K 1R33 4.7K 1R30 620Ω IC7 820 pF 1R34 1.5K IC6 7.500 pF 1R35 6.2K 1R36 5K PHASE

IC8 .47µF 25V 1R39 47K 1R40 1K 1Y1 IC24 47 pF 1Q5 1Q6 2N4124 IC28 10PF 1R44 100K 1R43 1K 1R42 620Ω 1Q7 2N4124 1R41 620Ω 1R48 1.5K

1IC1 MC 850P 1IC2 MC 850P IC25 4.7µF 1R50 1K 1R51 1K IC26 4.7µF

1Q4 2N3053 1R45 620Ω 1D3 1D2 6.1V IC19 .47µF IC20 .47µF 25V 1R46 2.2K IC21 8200pF 1L3 8-10mh 1L4 8-10mh PILOT IC22 .047µF IC23 8200pF 1R47 47K

76KHZ CLOCK DRIVER 38KHZ DIVIDER 19KHZ DIVIDER 19KHZ FILTER

SPARTA ELECTRONIC CORPORATION SACRAMENTO, CALIFORNIA 95828

TITLE: SCHEMATIC DIAG. GENERATOR, STEREO MODEL 682

DWN R.A.G. DATE 1-2-73 SCALE NONE APPD DATE SHT 1 OF 1 DWG NO. 02240840 D

SPARTA
Division of Cetec Corporation

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The obligation of SPARTA under the foregoing express warranty is limited to repairing any warranted product which upon SPARTA's examination proves to be subject to defective material and/or factory workmanship, when such product is returned to our factory, transportation prepaid by the purchaser, within one year from the date of original purchase from SPARTA. Under no circumstances shall a breach of any warranty by SPARTA subject SPARTA to any claim for consequential damages, the purchaser expressly assuming all risk of such consequential damages. In the case of any breach of any warranty, the liability of SPARTA shall not under any circumstances exceed the cost of repair or replacement of the defective product.

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August 1, 1973

SPARTA ELECTRONIC CORPORATION

FINAL TEST DATA

MODEL 682 STEREO BASEBAND GENERATOR
SERIAL # 213
USED IN MODEL _____ SER.# _____
CUSTOMER KTIM

POWER SUPPLY	-12.5	volts, +	+12.5 volts.
CURRENT LIMIT	340	MA +	340 MA
MAX PILOT OUTPUT LEVEL	1.5	volts P/P	
FM NOISE	75	db below 100% Modulation	
PILOT FREQUENCY	X	OK	
CHANNEL IDENT	X	OK	
PILOT PHASE	X	OK	
LEFT INPUT BAL	X	OK	
RIGHT INPUT BAL	X	OK	
LEFT SEP. ADJ.	X	OK	
RIGHT SEP. ADJ.	X	OK	
PHASE/GAIN MATCH	X	OK	
MONO GAIN ADJ.	X	OK	
FILTER TERM	X	OK	
FILTER ZERO SELECT CAP.	330	pf.	
STEREO/MONO REMOTE CHECK	X	OK	
MECH. INSPECTION	X	OK	
HEAT RUN	X	OK	
FUSE	0.5	AMPS.	

	LEFT SEP.	RIGHT SEP.	L=R	X-TALK L=R
50 Hz	60 db	60 db	56 db	51 db
500 Hz	52 db	52 db	58 db	53 db
5 KHz	52 db	53 db	55 db	51 db
10 KH.	55 db	55 db	54 db	52 db
15 KHz	56 db	56 db	51 db	53 db

	INPUT LEVEL	DISTORTION
50 Hz	+13.0 dbm	.1 %
500 Hz	+12.9 dbm	.1 %
5 KHz	-0.4 dbm	.1 %
10 KHz	-3.7 dbm	.1 %
15 KHz	dbm	.1 %

TEST TECHNICIAN _____

DATE 02-18-76

BILL MCKAY KFOI

TECHNIQUES 692 SPARTA

4/15/77 JCL

KFOX

Early 692's

Before S/N 189-190

The preset pilot level in the stereo gen is set for too high a level. The result is an inability to modulate to 100%. When attempting to attain full modulation the power supply runs out of reserves and the positive half of the audio clips about 1 db & 10-15% before the negative portion of the composite audio.

At the same point the MC1459 pre-emphasis Amp is driven nearly to its limits and its "power supply noise rejection" goes all to hell resulting in 1) Loss of separation 2) 76kHz and 38kHz noise increases 3) Distortion products and should it be necessary to operate in mono - at the audio levels necessary to modulate fully a 76kHz will be observed on Pos + Neg peaks of the audio waveforms.

The Correction is made by Changing the value of 1R53. 1R53 is Located (electrically) between the output of the 19KHz filter and an emitter follower ~~and~~ that feeds the Pilot into the Composite.

1R53 was about 30K
Should be Changed 10% to 20%
to Between 33K and 36K.

The S/Noise of the units should be ≤ 72db before the Change and ≤ 68db after the Change. ~~that~~ A Check of the unit is to Verify that it will modulate ≥ 120% without Positive Peak Clipping. (the above SN and mods are ref to 9% Pilot level)

I also Suggest Changing the Power Transformer to a ~~T~~ 91X or T92X triad Set for 30V ~~out~~ TAP. To bring the ~~unpe~~ V to the Reg Board from +33V to +44V and then Reset the Supply Reg to +15V