MODEL 683

SCA GENERATOR

TECHNICAL MANUAL

SPARTA
Division of Cetec Corporation

5851 Florin-Perkins Road, Sacramento, Ca. 95828 • (916) 383-5353 • Telex 377-488 • Cable SPARTA

SPARTA
ELECTRONIC CORPORATION

OPERATING AND SERVICING MANUAL

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SECTION I
GENERAL INFORMATION

1-1 INTRODUCTION

This manual contains information required to install, operate, and maintain the Sparta Model 683 SCA Generator. Section I describes the 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 683 SCA Generator provides a signal meeting the requirements of a subsidiary communications authorization (SCA) mode of operation. Because of its design, this SCA generator may be used with any Direct-FM Exciter Type-Accepted by the Federal Communications Commission for operation under part 73 of the rules.

If the SCA generator is to be operated at a frequency of 67 KHz simultaneously with a standard stereo signal make certain the optional 5 KHz low pass filter has been installed.

External muting is accomplished with a simple contact closure. This function is available at terminals on the rear of the unit.

As supplied the Model 683 will accept program and telemetry signals.

Five front panel operating controls are provided - frequency adjust, output level, subcarrier on - auto - off, muting delay and power on-off.

1-2.1 PHYSICAL DESCRIPTION

The Model 683 consists of a single unit of standard rack panel construction. Physical characteristics of the Model 683 are listed in table 1-1.

Table 1-1 Physical Characteristics

Dimensions:	3-1/2" high, 10" deep, 19" wide
Weight:	12 Lbs.
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 Telemetry - 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:	± 500 Hz maximum
Audio Input Impedance:	600 Ohms, Balanced
Audio Input Level:	+ 10 dbm ± 2 DB at 400 Hz for 100 modulation
Frequency Response:	± 2 DB from 50 Hz to 7500 Hz (referred to 75-usec preemphasis)
Distortion:	< 1.5% at 10% deviation (50 Hz - 7.5 KHz)
Noise:	65 DB below 15% deviation
Subcarrier Frequencies:	41 KHz and 67 KHz
Modulation Method:	Direct FM
Modulation Capability:	± 15% of subcarrier frequency (10% deviation = 100% modulation)
Injection Range:	0 - 30%
Muting:	Selectable at front panel
Muting Sensitivity:	Subcarrier gate opens at - 10 dbm at 400 Hz
Muting Delay:	Adjustable from 0.6 to 4 seconds, nominal

SECTION II
INSTALLATION

2-1 INSTALLATION PLANNING

Dimensions essential for proper installation of the Model 683 SCA Generator are shown in Figure 2-1.

2-1.1 ENVIRONMENTAL REQUIREMENTS

Location of the Model 683 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 humidity: 95%

2-1.2 POWER REQUIREMENTS

105-125 VAC, 50/60 Hz, 1 Ø is required to operate the Model 683. 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 SCA generator should be mounted under the exciter. It is important that the SCA generator be mounted as close to the exciter as possible. When used to retrofit older transmitters it is wise to locate the SCA 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 683 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 SCA muting function is accomplished by a contact closure across terminals 7 and 8 of TB-1.

The audio frequency input connections are terminals 1 and 2 of TB-1.

The telemetry input connections are terminals 5 and 6 of TB-1.

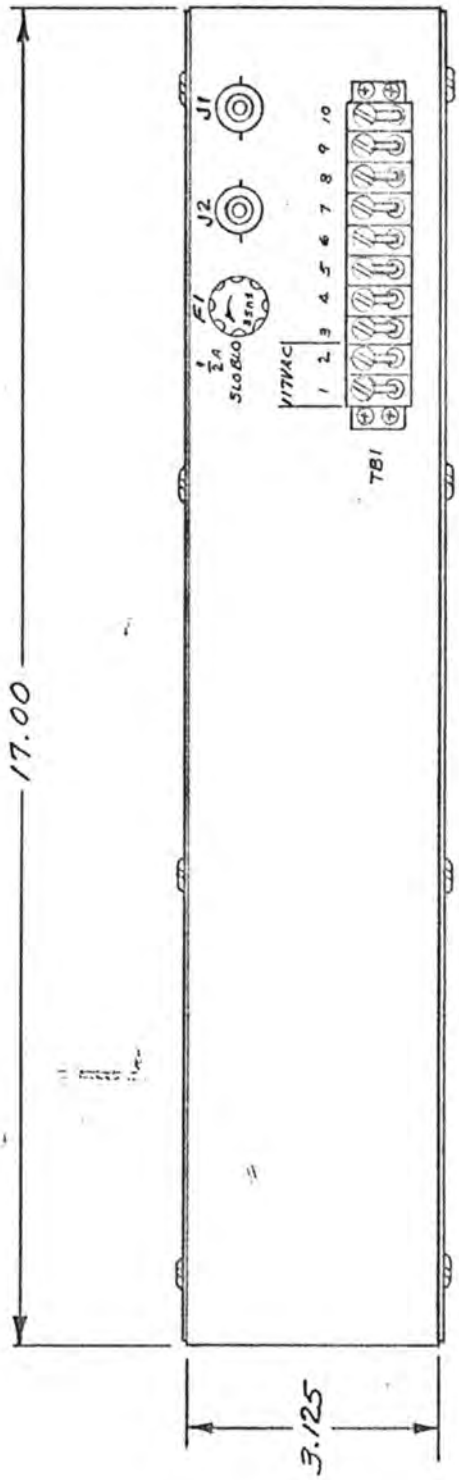


FIGURE 2-1
INSTALLATION DRAWING MODEL 683

SECTION III
OPERATION

3-1 OPERATING CONTROLS AND INDICATORS

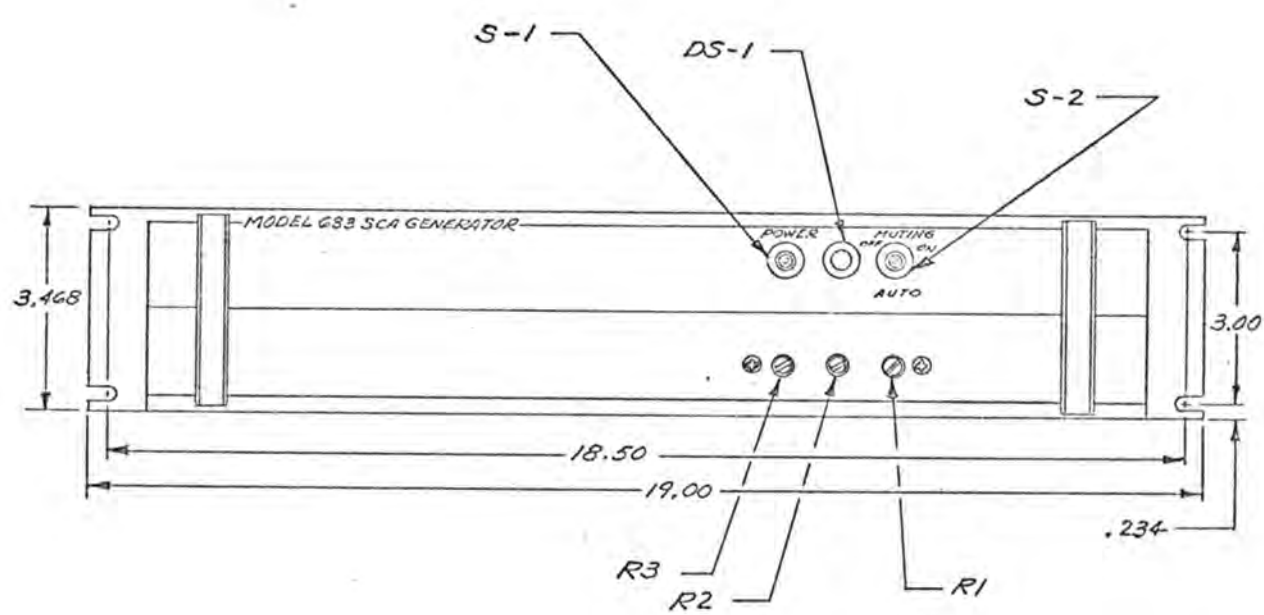
There are only five front panel controls on the Model 683 SCA Generator - illustrated on the drawing below.

As supplied from the factory the Model 683 is ready for operation and once the proper power and input connections are made it can be placed into service.

Output level control (R-3) should be set for the proper modulation level as indicated on an approved monitor. R-2 will set the frequency to the desired value. If automatic muting is desired the subcarrier control switch S2 should be set to auto. The SCA carrier will then turn on and off as audio is applied - the muting turn - off time determined by the setting of R-1 (muting delay).

> NOTE: Telemetry tones do not have sufficient level to provide the automatic control feature - if the SCA unit is used for telemetry only the unit should be turned on and off by a relay closure across the "enable" terminals - 7 and 8 on TB-1.

A complete setup procedure is included in the maintenance section of this manual.



FRONT VIEW - MODEL 683

FIGURE 3-1

SECTION IV
PRINCIPLES OF OPERATION

4-1 INTRODUCTION

This section describes the principles of operation of the Model 683 SCA Generator.

4-2 GENERATOR CIRCUIT DESCRIPTION

Inasmuch as the 41-KHz SCA module and the 67-KHz SCA module have similar circuitry, the following discussion applies equally to both units. The difference table on the schematic specifies those components used for operation at either frequency.

Incoming audio is fed to a 10 db resistive pad that is followed by transformer T1. The circuit board contains provision for an optional 5-KHz low-pass filter for use with the 67-KHz SCA module when the exciter is equipped with a stereo generator. The filter connects to terminals 20, 21, and 22, and the jumper should be removed from between terminals 20 and 21.

The emitter circuit of Q1 contains the preemphasis and rolloff networks. The 75-usec preemphasis network consists of R12 and C4, and high-frequency rolloff is provided by the network of L1 and R10. The preemphasis time constant may be changed to 150 usec by changing the value of C4 to 0.33 uF. Telemetry tones can be injected into the emitter of Q1 from terminals on the rear panel of the unit. Emitter-follower Q2 is used to drive the muting amplifier and the subcarrier modulated oscillator.

Modulated oscillator Q10-Q11 is a free-running multivibrator, the frequency of which is proportional to its bias voltage. Transistor Q9 regulates the bias to compensate for temperature drift.

The modulated oscillator is followed by diode gate CR5-CR6, buffer amplifier Q12, and a low-pass filter which removes harmonics of the oscillator waveform. The output of the filter is fed to emitter-follower Q13.

Subcarrier control switch S-2 is mounted on the front panel. This switch provides a choice of three operating conditions: ON, OFF, and AUTO. These designations relate to muting the subcarrier. In the AUTO position, the subcarrier is automatically muted when there is no audio input into the SCA module. The muting amplifier composed of Q3 through Q8 gates the subcarrier on with normal audio inputs of 20 db or less below peak deviation capability. The subcarrier remains on for a short period (nominally between 0.6 and 4 seconds) after the audio input is removed; the duration of the period is adjustable by muting delay control R41.

4-3 POWER SUPPLY CIRCUIT DESCRIPTION

A regulated power supply serves the DC power needs of all stages. The operation is as follows - the positive (+) input of operation amplifier 4IC1 is maintained at some fixed voltage by the action of zener diode 4D5. Current flows out of this amplifier into the base of series-pass transistor, 4Q1. This causes its emitter voltage to rise. The voltage will rise until the negative (-) input of the operational amplifier receives a voltage from 4R3 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 4Q1 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 rectifier and filter capacitor.

SECTION V
MAINTENANCE

5-1 PERIODIC MAINTENANCE

No special maintenance procedures are necessary. The Model 683 SCA 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 cover 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 cover and all screws after cleaning.

5-2 ALIGNMENT AND ADJUSTMENT PROCEDURE

If the SCA generator requires adjustment it should be performed only by experienced personnel having an adequate understanding of the generator and who are thoroughly familiar with the test equipment required.

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)	SCA Monitor	
(5)	SHIELDED Audio leads for test connections	
(6)	G.C. 9302 Aligment tool	
(7)	1 foot length of RG-58U cable with BNC Connectors	

5-2.2 ALIGNMENT PROCEDURE

(1) Remove the SCA 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 J1 using a 1-foot length of coaxial cable

(4) Set FREQUENCY adjust potentiometer R2 on front panel of SCA module to mid-range position.

(5) Connect SCA monitor to J2. Set subcarrier control switch S2 to ON.

(6) Adjust coarse freuqency control R43 to produce 41-KHz or 67-KHz indication, as appropriate, on SCA monitor.

(7) Connect low-distortion audio oscillator to terminals 1 and 2 of SCA. Set audio oscillator for 400-Hz output and verify that an audio input level between +8 and +12 dbm yields a 10% frequency deviation.

(8) Set subcarrier control switch S2 to AUTO. Decrease oscillator output to approximately -10 dbm and verify muting function. Verify correct setting of MUTING DELAY control R1 to ensure muting turnoff time between 0.5 and 4 seconds.

(9) Connect oscilloscope to wiper terminal of OUTPUT LEVEL control R3. Set subcarrier control switch S2 to ON and verify that OUTPUT LEVEL control R-3 produces variation of from 0 to 2 volts peak-to-peak (0.7 volt rms).

SECTION VI
REPLACEABLE PARTS

6-1 ORDERING INFORMATION

When ordering parts for the Model 683 SCA 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 683 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
00207	Quality Transformer Co.	Chicago, IL
01295	Texas Instruments Inc.	Dallas, TX
02660	Amphenol Corp.	Broadview, IL
03508	General Electrical Semiconductor	Syracuse, N.J.
04713	Motorola Semiconductor	Phoenix, AZ
07263	Fairchild Semiconductor	Mountain View, CA
09353	C & K Components	Watertown, MA
11502	IRC Division of TRW	Boone, NC
12040	National Semiconductor	Plattsburgh, N.Y.
13934	Midwec Corporation	Oshkosh, NB
18722	RCA Corp. - Solid State Division	Mountaintop, PA
23265	Sparta Electronic Corporation	Sacramento, CA
24759	Lenox - Fugle Electronics, Inc.	Watchung, N.J.
29505	Temple Industries	Tecate, CA
37942	PR Mallory Inc.	Indianapolis, IN
44655	Ohmite Manufacturing Co.	Skokie, IL
56289	Sprague Electric Co.	North Adams, MA
71400	Bussman Div. of Mc Graw - Edison	St. Louis, MO
71590	Centralab - Division of Globe-Union Inc.	Milwaukee, WI
71785	Howard B. Jones - Chinch Division	Chicago, IL
72136	Electro Motive Manufacturing Co. Inc.	Willimantic, CT
72765	Drake Manufacturing Co.	Harwood Heights, IL
73445	Amperex Electronic Corporation	Hicksville, LI, N.Y.
80294	Bourns Inc.	Riverside, CA
81349	Military Specification	

Table 6-2. Replaceable Parts List

Desig	Description	Part No.	Mfr.	Mfr. Part No.	Total
	Chassis	022-4152	23265	022-4152	1
	Front panel	022-4153	23265	022-4153	1
	Dress strip	022-4154	23265	022-4154	1
	Handle	022-4086	23265	022-4086	2
	Cover, top	022-4155	23265	022-4155	1
	Cover, bottom	022-4156	23265	022-4156	1
	Wiring harness	022-4157	23265	022-4157	1
A6A1	Generator	022-1012	23265	022-1012	1
A2	Power supply	022-8050	23265	022-8050	1
DS-1	Lamp, 28V	244-0014	72765	11604	1
F-1	Fuse, 1/2A Slo-Blo	261-0007	71400	MD6 0.5	1
J-1	Connector, BNC	287-0034	02660	UG-1094A/U	2
J-2	Same as J-1				
R-1	Potentiometer, 100K	130-0064	44655	CLU-1041	1
R-2	Potentiometer, 1K	130-0052	44655	CLU-1021	2
R-3	Same as R-2				
R-4	Resistor, 5.6K, 1/2W, 5%	136-0049	11502		1
S-1	Switch, DPDT	299-0011	09353	7201PN	1
S-2	Switch, DPDT	299-0300	09353	7211H	1
T-1	Transformer, Power	326-0010	00207	23K19C	1
TB-1	Terminal board	477-0010	71785	10-164	1
XDS-1	Lampholder	244-0003	72765	4428-001	1
XF-1	Fuseholder	261-0043	71400	HKP	1

Table 6-2. Replaceable Parts List

A6A1 Generator -41KHz (67 KHz)

Desig.	Description	Part No.	Mfr.	Mfr. Part No.	Total
C1	Capacitor, 2.2uf, 35v	104-0112-01	23265		3
C2	Capacitor, .005uf, 1kv	110-0076-01	56289	5HK-D50	4
C3	Capacitor, .001uf, 1kv	110-0204-01	23265		2
C4	Capacitor, .15uf, 100v	105-3226-11	13934	E3XFR, .15, 5%, 100v	1
C5	Capacitor, 47uf, 20v	104-0126-01	23265		2
C6	Capacitor, 15uf, 20v	104-0119-01	23265		5
C7	Capacitor, .22uf, 100v	105-3226-12	13934	E3XFR, .22, 5%, 100v	3
C8	Capacitor, .1uf, 100v	105-3226-10	13934	E3XFR, .1, 5%, 100v	2
C9	Capacitor, .01uf, 100v	110-0006-01	23265		1
C10	Same as C7				
C11	Same as C6				
C12	Same as C5				
C13	Same as C6				
C14	Same as C1				
C15-C16	Same as C6				
C17	Same as C8				
C18	Capacitor, 820pf	101-0039-01	72136	DM15E821J0300WV4CR	6
(C18)	Capacitor, 510pf	101-0034		DM15E511JO300WV4CR	
C19	Same as C18				
(C19)	Same as (C18)				
C20	Capacitor, .0022uf, 100v	105-3226-20	13934	E3FR, .0022, 1%, 100v	1
C21	Same as C2				
C22	Same as C3				
C23	Capacitor, 150 pf	101-0176-01	72136	DM15F151J0500WV4CR	1
(C23)	Capacitor 120 pf	101-0174-01	72136	DM15F121J0500WV4CR	2
C24	Same as C18				
(C24)	Capacitor, 430pf	101-0031-01	72136	DM15E431JO300WV4CR	1

Table 6-2. Replaceable Parts List (Cont'd)

Desig.	Description	Part No.	Mfr.	Mfr. Part No.	Total
C25	Capacitor, 750pf	101-0038-01	72136	DM15E751JO300WV4CR	1
(C25)	Capacitor, 470pf	101-0032-01	72136	DM15E821JO300WV4CR	1
C26-C27	Same as C18				
(C26-C27)	Capacitor, 820pf	101-0039	72136	DM15E821JO300WV4CR	2
C28	Same as C2				
C29	Same as C1				
C30	Same as C2				
C31	Same as C7				
C32-C36	N/A				
C37	Same as C18				
(C37)	Same as C23				
C38	Capacitor, 560pf	101-0035-01	72136	DM15E561JO300WV4CR	1
(C38)	Not used				
CR1-CR6	Diode, 1N914	161-0096-01	01295	1N914	6
L1	Inductor, 1mh	186-0094-02	24759	MR-1000	1
L2	Inductor, 10mh	186-0094-06	24759	MR-10,000	1
(L2)	Inductor, 4.7mh	186-0094-04	24759	MR-4700	1
L3	Inductor, 4.7mh	186-0094-04	24759	MR-4700	1
(L3)	Inductor, 3.9mh	186-0094-03	24759	MR-3900	1
PCB	PC Board	065-0935	23265	065-0935	1
Q1-Q9	Transistor, 2N2924	149-0180-01	03508	2N2924(TO-5)	11
Q10	Transistor, 2N3646	149-0303-01	07263	2N3646	2
Q11	Same as Q10				
Q12-Q13	Same as Q1				
R1-R2	Resistor, 150, 10%, 1/2w	136-1128-01	81349	RC20GF151K	5
R3	Resistor, 470, 10%, 1/2w	136-1140-01	81349	RC20GF471K	5

Table 6-2. Replaceable Parts List (Cont'd)

Desig.	Description	Part No.	Mfr.	Mfr. Part No.	Total
R4-R5	Same as R1				
R6	Same as R3				
R7	Resistor, 180, 10%, 1/2w	136-1130-01	81349	RC20GF181K	1
R8	Resistor, 33K, 10%, 1/2w	136-1184-01	81349	RC20GF333K	1
R9	Resistor, 4.7K, 10%, 1/2w	136-1164-01	81349	RC20GF472K	7
R10	Resistor, 68, 10%, 1/2w	136-1120-01	81349	RC20GF680K	1
R11	Resistor, 2.2K, 10%, 1/2w	136-1156-01	81349	RC20GF222K	5
R12	Same as R3				
R13	Resistor, 15K, 10%, 1/2w	136-1176-01	81349	RC20GF153K	1
R14	Same as R3				
R15	Resistor, 100, 10%, 1/2w	136-1124-01	81349	RC20GF101K	4
R16-R17	Resistor, 1K, 10%, 1/2w	136-1148-01	81349	RC20GF102K	8
R18	Resistor, 10K, 10%, 1/2w	136-1172-01	81349	RC20GF103K	16
R19	Resistor, 100K, 10%, 1/2w	136-1196-01	81349	RC20GF104K	6
R20-R21	Same as R18				
R22	Same as R16				
R23	Same as R19				
R24-R25	Same as R18				
R26	Same as R16				
R27	Resistor, 220, 10%, 1/2w	136-1132-01	81349	RC20GF221K	5
R28	Same as R18				
R29	Same as R19				
R30	Same as R27				
R31	Same as R18				
R32	Same as R27				
R33	Same as R18				

Table 6-2. Replaceable Parts List (Cont'd)

Desig.	Description	Part No.	Mfr.	Mfr. Part No.	Total
R34-R35	Same as R11				
R36	Same as R15				
R37	Same as R18				
R38	Same as R9				
R39	Same as R11				
R40	Same as R18				
R41-R42	N/A				
R43	Resistor, var., 10K	137-0837-01	80294	3067P1-103	1
R44-R45	Same as R9				
R46	Resistor, 27K, 10%, 1/2w	136-1182-01	81349	RC20GF273K	1
R47	Resistor, 22K, 10%, 1/2w	136-1180-01	81349	RC20GF223K	3
R48	Same as R27				
R49	Same as R16				
R50	Same as R47				
R51	Same as R16				
R52	Same as R15				
R53	Same as R16				
R54	Same as R1				
R55-R56	Same as R19				
R57	Same as R16				
R58	Same as R9				
R59-R60	Same as R18				
R61	Same as R9				
R62	Same as R47				
R63-R64	Same as R18				
R65	Same as R19				

Table 6-2. Replaceable Parts List (Cont'd)

Desig.	Description	Part No.	Mfr.	Mfr. Part No.	Total
R66	Resistor, 47K, 10%, 1/2w	136-1188-01	81349	RC20GF473K	2
R67	Resistor, 220K, 10%, 1/2w	136-1204-01	81349	RC20GF224K	1
R68	Same as R66				
R69	Resistor, 3.3K, 10%, 1/2w	136-1160-01	81349	RC20GF332K	1
R70	Same as R3				
R71	Same as R27				
R72	Same as R9				
R73	Same as R18				
R74	Same as R15				
R75	Same as R11				
R76	N/A				
R77	Same as R18				
T1	Transformer, audio	318-0115-02	00207		1

A-2 Power Supply

Desig.	Description	Part No.	Mfr.	Mfr. Part No.	Total
4C1	Capacitor, 1000uf/50v	112-0009	29505	301-1000/50	1
4C2	Capacitor, .001/1kv	110-0013	71590	DD-102	
4C3	Capacitor, 250uf/64v	112-0007	73445	C437AR/4250	1
4D1	Diode, Silicon	161-0007	01295	1N4005	4
4D2	Same as 4D1				
4D3	Same as 4D1				
4D4	Same as 4D1				
4D5	Diode, Zener, 5.1v/1v	161-0022	04713	1N4733	1
4IC-1	Integrated circuit	150-0003	12040	UA741C	1
PCB	Printed Circuit Board	065-8050	23265	065-8050	1
4Q-1	Transistor, 2N5497	149-0023	18722	2N5497	1
4R-1	Resistor, 620 ohms, 1/2w, 5%	136-0031	11502		3
4R-2	Same as 4R-1				
4R-3	Potentiometer, 10K, 1/4w	130-0044-02	37942	MTL14L4	1
4R-4	Same as 4R-1				
4R-5	Resistor, 4.7K, 1/2w, 5%	136-0047	11502		2
4R6	Same as 4R-5				
	OPTIONAL ITEM				
LPF	Low Pass Filter (5KHz)	001-7567	23265	001-7567	1

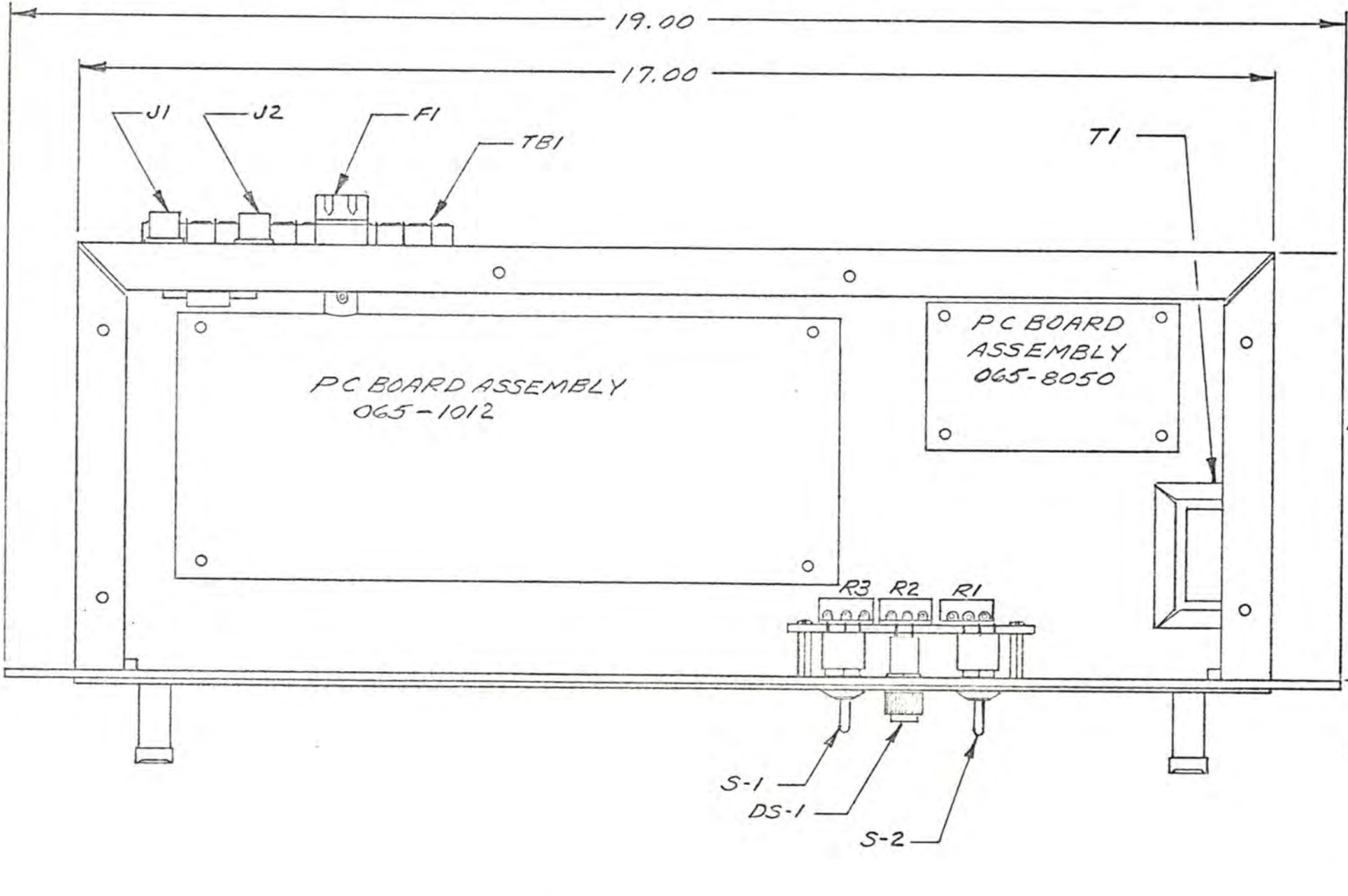


FIGURE 6-1
MODEL 683 SCA GENERATOR
TOP VIEW

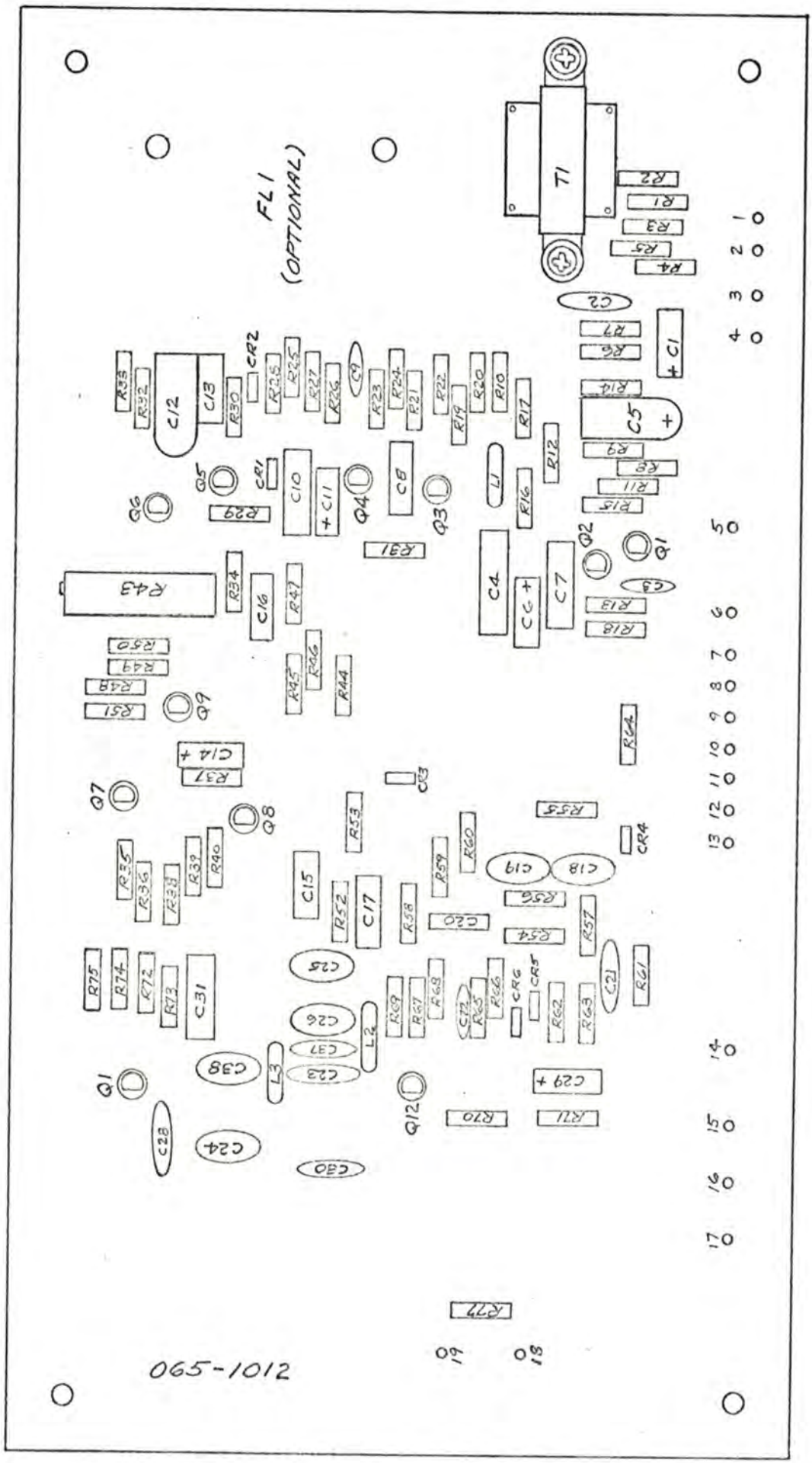


FIGURE 6-2

MODEL 683 SCA GENERATOR
PC BOARD ASSEMBLY 065-1012

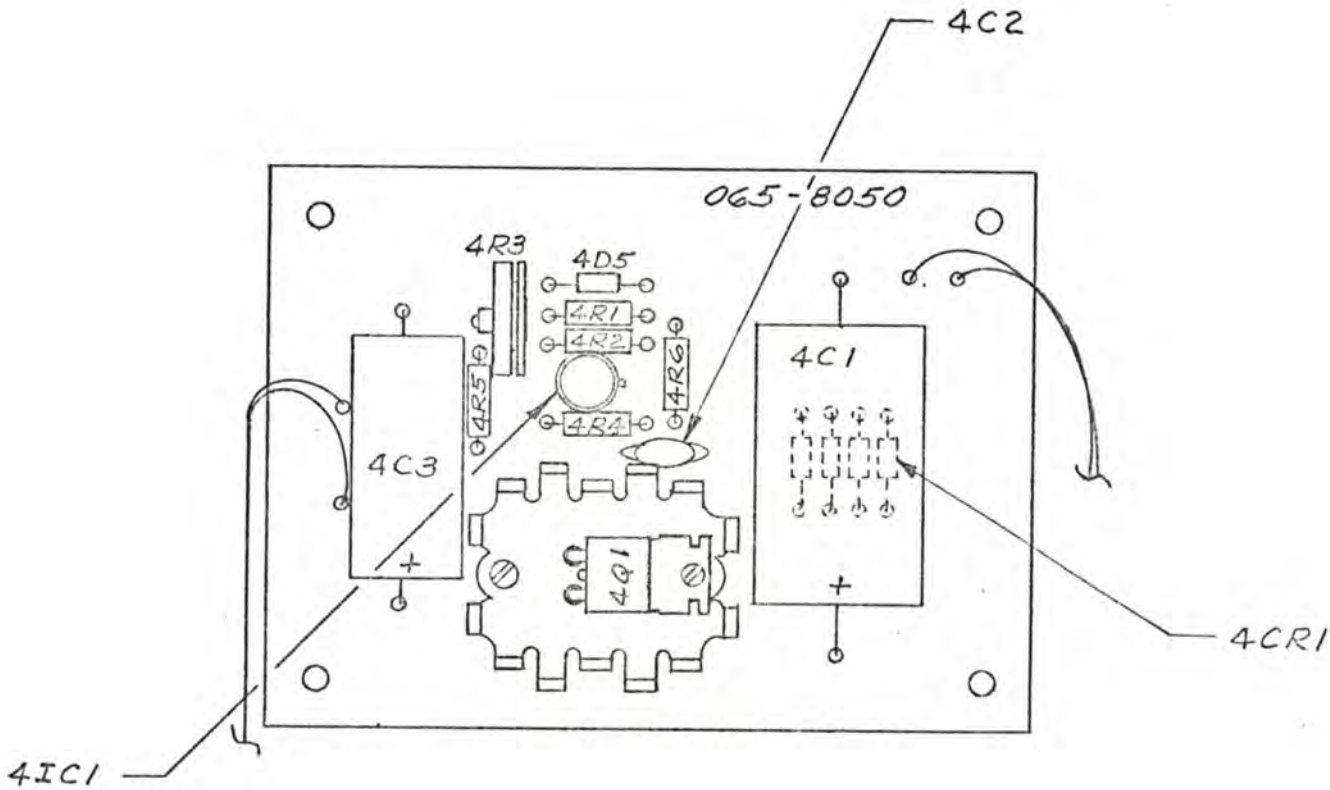
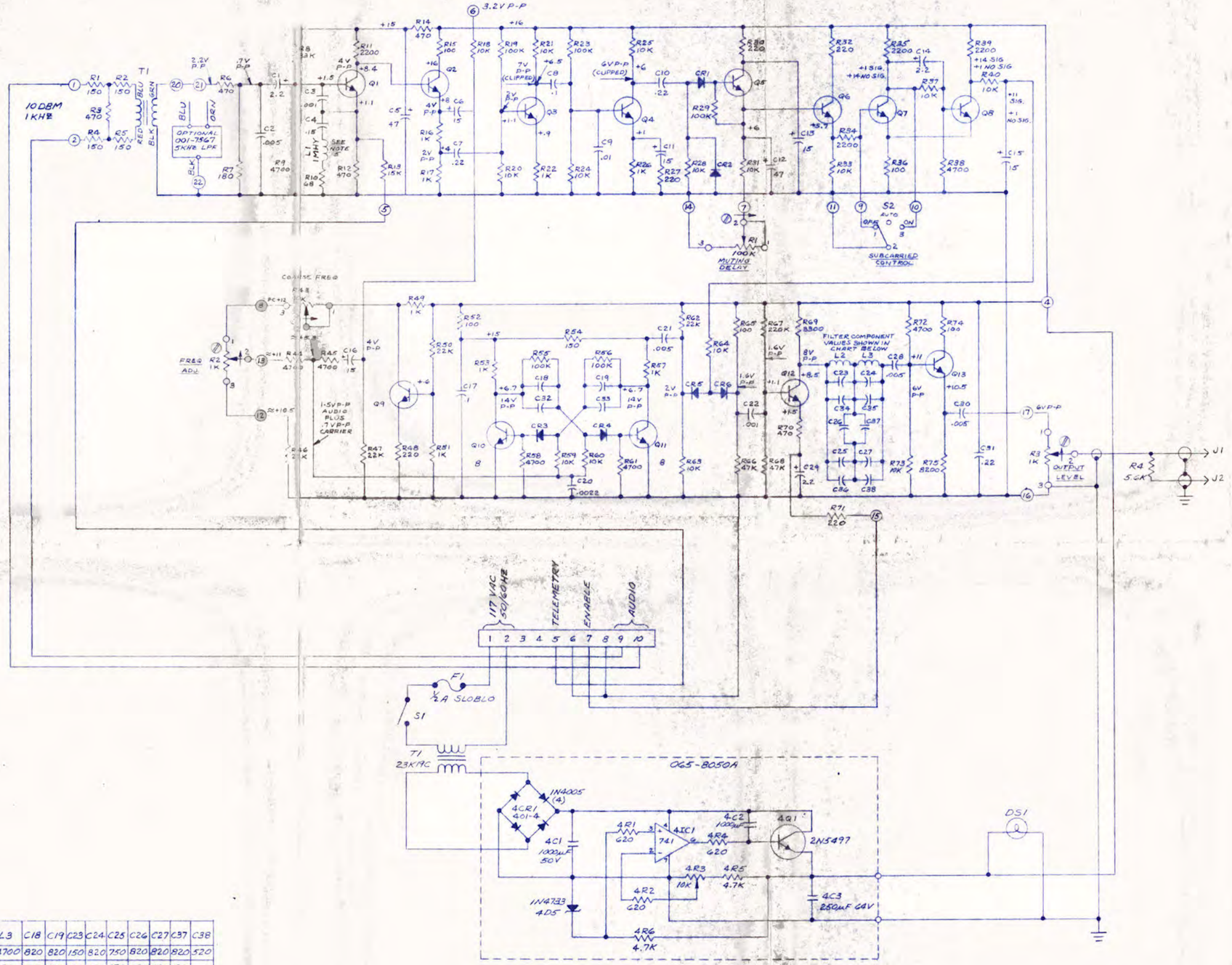


FIGURE 6-3
MODEL 683 SCA GENERATOR
PC BOARD ASSEMBLY 065-8050

CHANGE	DESCRIPTION	APPROVED
A	SEE ECR NO. 603	RAG 3/14



DASH NO.	SCA MODULE	L2	L3	C18	C19	C23	C24	C25	C26	C27	C37	C38
-01	41 KHZ	10,000	4700	820	820	150	820	750	820	820	820	520
-02	67KHZ	4700	3900	510	510	120	430	470	820	820	120	—

NOTES:
1. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS, ½W, 10%. CAPACITOR VALUES ARE IN MICROFARADS. TRANSISTORS ARE 2N2924, DIODES IN914.
2. UNDERLINED WORDING INDICATES FRONT PANEL CONTROL.
3. Ⓓ INDICATES SCREWDRIVER ADJUSTMENT.
4. ENCIRCLED NUMBERS ARE PRINTED CIRCUIT BOARD CONNECTIONS.
5. R10 CONTROLS RESPONSE AT 12 KHZ. C4 CONTROLS RESPONSE AT 2 KHZ.
6. CAPACITORS IN CHART IN PICOFARADS. INDUCTORS IN CHART IN MICROHENRYS.
7. TRANSISTORS Q1 THRU Q13 ARE TYPE 2N4124.

SPARTA ELECTRONIC CORPORATION
SACRAMENTO, CALIFORNIA 95828

TITLE: SCHEMATIC DIAG. SCA GENERATOR MODEL 683

DRAWN	R.A.G	11-25-75	SCALE	SHT 1	DWG NO.
APPD		DATE	ABOVE	OF 1	S-198-A

SPARTA
Division of Cetec Corporation

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High voltage transformers, modulation transformers, reactors and filter chokes carry an extended warranty of 50% of the replacement cost being allowed should failure occur during the second year.

The foregoing express warranty does not apply to any products manufactured by SPARTA that have been repaired, worked upon or altered by persons not authorized by SPARTA, or that have been subject to misuse, negligence or accident, or the serial number of which has been altered, effaced or removed; neither does the foregoing express warranty apply to any products of SPARTA that have been connected, installed, used or adjusted otherwise than in accordance with the instructions furnished by SPARTA. Accessories, allied equipment, and components supplied, but not manufactured by SPARTA are not warranted, either expressly or impliedly, by SPARTA, and shall carry only such warranty, if any, as is made by the manufacturer of such product.

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August 1, 1973