Ver. 3 03/02

CLAMP-ON
GROUND RESISTANCE TESTER
MODEL 3711/3731

(CATALOG #2117.60/2117.61)

REPAIR AND CALIBRATION MANUAL

AEMC® INSTRUMENTS

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Revision	Description	Date	Approved
1	Created Document	12/5/00	JPM
2	Added Generator and Power Supply	11/7/01	JPM
3	Added Parts List	3/18/02	JPM

REPAIR AND CALIBRATION

NOTE: Any attempts to repair and/or maintain this instrument, other than replacement of fuses and batteries, voids the warranty of the instrument. The presence of high voltages at certain locations requires servicing of this instrument by qualified personnel. It is recommended that it be sent to an authorized service center.

To guarantee that your instrument complies with the factory specifications, we recommend that the unit be submitted to our factory service center at one-year intervals for recalibration, or as required by other standards.

For instrument repair and/or calibration, please call our factory at **(800) 945-AEMC**.

CHAUVIN ARNOUX, Inc.
d.b.a. AEMC® Instruments
15 Faraday Drive • Dover, NH 03820 USA
(800) 945-2362 • (603) 749-6434 • Fax: (603) 742-2346

(Or contact your authorized distributor.) Estimates for repairs, normal recalibration, and calibration traceable to N.I.S.T. are available.

All customers must call for a return authorization number before returning any instrument.

TECHNICAL AND SALES ASSISTANCE

If you are experiencing any technical problems, or require any assistance with the proper use or application of this instrument, please call our technical hotline:

CHAUVIN ARNOUX, Inc.
d.b.a. AEMC® Instruments
(800) 343-1391 • (508) 698-2115 • Fax: (508) 698-2118
www.aemc.com

ELECTRICAL SPECIFICATIONS

Ground Resistance			
Measurement Range	**Range**	**Resolution**	**Accuracy***
Autoranging .01Ω to 1200Ω	0.1 to 1.00Ω	0.01Ω	± (2% R ± 0.02Ω)
	1.0 to 50.0Ω	0.1Ω	± (1.5% R ± 0.1Ω)
	50.0 to 100.0Ω	0.5Ω	± (2.0% R ± 0.5Ω)
	100 to 200Ω	1Ω	± (3.0% R ± 1Ω)
	200 to 400Ω	5Ω	± (6.0% R ± 5Ω)
	400 to 600Ω	10Ω	± (10% R ± 10Ω)
	600 to 1200Ω	50Ω	Approx. 25% ± 50

Ground or Leakage Current			
Measurement Range	**Range**	**Resolution**	**Accuracy***
Autoranging 1mA to 30.00Arms	1 to 299mA	1mA	± (2.5% R + 2mA)
	0.300A to 2.999A	0.001A	± (2.5% R + 2mA)
	3.00A to 29.99A	0.01A	± (2.5% R + 20mA)

R = Reading

* Reference conditions: 23°C ± 3K, 50% RH ± 10%, battery at 8 V ± 0.2V, external magnetic field < 40 A/m, external electrical field < 1 V/m, conductor centered, loop resistance noninductive. Accuracy % of reading, Frequency: 50, 60 Hz.

Resistance Measurement Frequency: 2403Hz

Voltage generated into the loop: About 60mVrms

Alarm Range (Model 3731 Only): 0 to 199Ω

Resistance Overload: OL displayed above 1200Ω

Current Overload: OL displayed above 29.99Arms

Current Measurement Frequency: 47 to 800Hz

Influence of Frequency:
Add 7.5% to the reference specification

MECHANICAL SPECIFICATIONS

Dimensions: 9.25 x 3.94 x 2.17" (235 x 100 x 55 mm)

Weight: 2.2 lbs. (1 kg)

Case Material: Lexan® 920A (UL94V2) or equivalent

Jaw Cover Material:
Lexan® with 10% fiberglass charge (UL94V0) or equivalent

LCD Cover Material: Clear Lexan® (UL94V1) or equivalent

Color: Gray body, red jaws

Jaw Window Diameter: 1.25" (32 mm)

Jaw Opening: 1.38" (35 mm)

Operating Temperature: 14° to 131°F (-10° to 55°C)

Operating Humidity:
10 to 90% RH @ 14° to 104°F (-10° to 40°C),
75% RH @ 131°F (55°C)

Storage Temperature: -22° to 158°F (-30° to 70°C)

Altitude: Operational 2000m
Storage: 12000m

Power Supply: 9V alkaline (IEC 6LF22 or NEDA 1604A)

Battery Life:
Typical: 8 hrs or approx. 1000 measurements of 30 seconds

LCD: 3-3/4 digit, 1.73 x 1.10" (44 x 28 mm)

US Design Patent: No. 362,639

SAFETY SPECIFICATIONS

CE 

IEC 1010-2-032 (Class 2), Double Insulation

Working Voltage: 150V, Cat. III - Pollution Degree 2
300V, Cat. II - Pollution Degree 2

ELECTROMAGNETIC COMPATIBILITY:
Emission: EN 50081-1 Ed. 92
Immunity: EN 50082-1 Ed. 97

Vibration Test: IEC 68-2-6

Shock Test: IEC 68-2-27

Drop Test (1m): IEC 68-2-32

Max A Overload: 100A continuous, 200A (<5s) 50/60Hz
OL displayed above 29.99Arms

Environmental:
IP30 (Protection Index) EN 60529 Ed.92
IK04, EN 50102 Ed 95

3711 / 3731 Series Comparison

	Model 3731	Model 3711
Size	9.25 x 3.94 x 2.17”	
Weight	2.2 lbs	
Max Conductor Size	1.25” (32 mm)	
Ohm Function	1 to 1200 Ω	
Max Current for Ω Measurement	5 A, 50 V	
Ampere Function	1 mA to 30 A rms	
Display Hold	Yes	
Open Jaw Indicator	Yes	
Beeper	Yes	
Low Battery Indicator	Yes	
Battery Life Indicator	% Batt. life @ power up	
Alarm Function	Yes, from 1 to 199 Ω	No
Memory Function	Yes, 1 to 99 registers (Ω & A)	No
Noise Detection	Yes - LCD indicator	
Low Resistance Detection	Yes - LCD indicator < 1 Ω	
Auto Power Off	Yes, 5 minute delay	

More Functions & Features

	Model 3731	Model 3711
Self-Test	Yes, runs quick display test of all functions at power up	
Auto-Off	Yes, 5 min if not in use, may be disabled by user	
LCD Battery Life Indicator	Yes, 0 to 100 % @ power up	
LCD Noise Interference Indicator	Yes	
LCD Open Jaw Indicator	Yes	
LCD Closed Loop Indicator	Yes	
LCD Display Hold	Yes, Ω & A	
Multi-tone Beeper	Yes, may be disabled by user	
Programmable Alarm	Yes, from 1 to 199 Ω high or low	No
Programmable Memory	Yes, up to 99 readings (Ω & A)	No
Saved Programming @ Power Off	Yes	No
Construction	GE Lexan® and IEC Standards	
Safety Standards	Built to IEC 1010, UL, CSA, CS	

CALIBRATION EQUIPMENT

REQUIRED ITEMS:

For Field Calibration: (resistance values only)

Each ground resistance tester is supplied with a calibration loop to check and calibrate it. This loop does not allow calibration above 198Ω. The typical range of measurement of ground resistance is less than this value.

- One DC power supply adjustable from 5.6V to 10V (0.2A min.)
- Four resistors:
  20Ω, 120Ω, 150Ω, 500Ω (Accuracy 0.25%)
- One AC Current generator to supply 1.4A, 50 or 60Hz (Accuracy 0.25%)
- One small insulated flat screwdriver.

For Laboratory Calibration: (including amps range):

Add the following items:

- One decade resistance box, accuracy 0.25% (non-inductive) adjustable from 0.01Ω to 500Ω.
- One AC current generator capable of supplying 100mA to 20A into a two turn wire loop with a frequency of 50 to 400Hz. (Fluke 5500 or 5520).
- One DMM 20000 cts (Accuracy: < 0.1% in DC) and (< 0.5% in AC).

CALIBRATION PROCEDURE

Note: The ground tester can be calibrated for resistance measurement values only if necessary. However, if the current calibration is required, it is imperative to readjust the ohms range**.**

LAB CALIBRATION:

Test Description	Conditions	Operation / Result
ON / OFF		Press the ON/OFF key pad
Current Measurement:		
Select Ampere		Press the A key pad
Zero check	No current through the jaws	Check the probe display 0A + 2 cts.
Adjustment	Supply 1.40A, 60Hz	Wait until the reading stabilizes and adjust R073 to read 1.400A on the display ± 3 ct
Resistance Measurement:		
Select the ohm range		Press the Ω key pad
Beginning of scale adjustment	Measure 20Ω	Adjust R019 to read 20.0Ω / -1 ct on the display
End of scale adjustment	Measure 500Ω	Adjust R040 to read 500Ω ± 20 ct on the display
Readjust the preceding steps 2 to 3 times or until both readings are within specification		
Middle of scale check	Measure 120Ω	Check the display is 120 ± 4 cts. Note the error value N1 (# of cts)
Middle of scale check	Measure 150Ω	Check the display is 150 ± 4 cts. Note the error value N2 (# of cts)
Control Gain Accuracy		To verify proper linearity of the two ranges, be sure the difference between the above error values (N1-N2) is less than 2 cts. If this condition is not met, readjust the end of scale to balance the error. Adjust R040 to read 500Ω ± 40 cts.

CALIBRATION VERIFICATION

After calibration adjustment procedure is complete, verify the following conditions:

Test Description	Conditions	Operation / Results
ON / OFF		Press the ON/OFF key pad
Current Measurement:		
Ampere range		Press the A key pad
Zero check	No current	Display 0A + 2 cts / - 0 cts
End of scale 3 - 30A	Measure 25A	Display 25.00A ± 60 cts
Beginning of scale 3 -30A	Measure 5A	Display 5.00A ± 12 cts
Range 300mA - 3A	Measure 1.4A	Display 1.400A ± 35 cts
Range 0 - 300mA	Measure 200mA	Display 200mA ± 5 cts

Resistance Measurement:		
Mode		Press the ohm key pad
Check R< 0.1Ω	Measure 0.08Ω	Display 0.08 ± 1 ct and symbol R< 0.1Ω
Beginning of the scale	Measure 1Ω	Display 1.0 ± 1 ct*
Beginning of the scale	Measure 20Ω	Display 20.0 ± 2 ct
Linearity check	Measure 40Ω	Display 40.0 ±- 6 cts
Linearity check	Measure 80Ω	Display 80.0 ± 15 cts
Gains check	Measure 120Ω	Display 120 ± 4 ct Note error N1 (# of ct)
Gains check	Measure 150Ω	Display 150 ± 4 ct Note error N2 (# of ct)
Gains check		To verify proper linearity of the two ranges, be sure the difference between the above error values (N1-N2) is less than 2 counts. If condition is not met, readjust the end of the scale to balance the error. Adjust R040 to read 500 Ω ± 40 cts.
End of scale	Measure 500Ω	Display 500 ± 40 cts
End of scale	Measure 1000Ω	Display 1000 ± 200 cts
Open jaw detection	Open the jaw	Display the symbol: "jaw open"

**including lead*

FIELD CALIBRATION WITH THE CALIBRATION LOOP:

NOTE: If necessary, adjust the Ampere range as shown above.

Cal Loop Accuracy: 0.3% typical (± 0.5% max.) This loop does not allow calibration above 198Ω.

Test description	Conditions	Operation / Result
ON / OFF		Press the ON/OFF key pad
Beginning of scale adjustment	Insert the probe around 22Ω loop	Adjust R019 to display 22.0Ω ± 0.2 cts
End of scale adjustment	Insert the probe around 198Ω loop	Adjust R040 to display 198Ω ± 7 cts or 198 - 4Ω
Readjust 2 or 3 times until both readings are within specification		

CALIBRATION VERIFICATION WITH THE CALIBRATION LOOP

Test description	Conditions	Operation / result
ON / OFF		Press the ON/OFF key pad
	Insert the probe to the 7.9Ω loop	Display 7.9 ± 0.3
	Insert the probe to the 12.5Ω loop	Display 12.5 ± 0.4
Beginning of scale	Insert the probe to the 22Ω loop	Display 22.0 ± 0.2
	Insert the probe to the 49.5Ω loop	Display 49.5 (+ 1.5 / -1.1)
End of scale	Insert the probe to the 198Ω loop	Display 198 (+ 7 / -4)

TAKING THE INSTRUMENT APART

- The set of jaws are a mated pair and must remain this way. Repair only one probe at a time to ensure that jaws are not mixed with another pair.
- Always disconnect the battery before any disassembly of the board is attempted.
- Be sure that the opening of the jaws are perfectly clean. A small amount of foreign matter on the surface of the jaws can bring the probe out of accuracy.

Necessary tools :

- Phillips screwdriver No. 1
- Standard flat screwdriver
- Jewelers screwdriver or pointed tweezers
- Torx screwdriver {No. 10}
- 25 W soldering iron

DISASSEMBLY PROCEDURE:

- Remove the two screws (V1 and V2) from the back cover and pull to remove it from the rest of the instrument.
- Disconnect and remove the battery.
- Remove the springs (R1 and R2) from the jaw assembly and trigger. The jaw assembly spring (R2) can be removed by wedging tweezers between the jaw and the holding pin and lifting it out of position.
- Remove the jaw screws (V3, V8, and V9) and the lower board screws (V4 and V5).
- Carefully lift the board and jaw assemblies out of the case.
- Carefully disconnect the two jaw connectors (J1 and J2) from the generator board using the tweezers or jewelers screwdriver to pry them out.
- Remove the jaws by sliding them over the shield. Keep the jaws as a pair.
- Desolder the solder joint attaching the shield to the board and the two wires from the beeper (use caution to avoid melting the case).
- Open the shield and remove the board mounting screws (V10) on the top of the generator board and the bottom of the main board and the screw near the battery holder (V6).
- Disconnect the connector (J3) from the power supply board and remove the generator board and the shield.
- Remove the screw (V7) on the power supply board and unplug from its socket (J6).
- Remove the remaining four screws (V11 to V14) from the battery holder and LCD display holder.

PROBE ASSEMBLY:

- To replace the display pull the LCD support from the main board (do not remove the Elastomere connectors mounted in the supports) and replace the display. The color mark on the display must be on the right side of the board when viewing the main board with the five (5) button contacts facing up and at the bottom.
- Replace the 4 screws (V11 to V14) that hold the battery compartment, the board, and the display mounts together.
- Screw in the bottom screw (V10 on display side of main board) into spacer (C). Wrap the shield around the main board, positioning the hole in the top of the shield over the spacer (C).
- Plug in the generator board. Be sure all of the pins of the connectors (J4 and J5 are inserted) and replace the mounting screws (V6 and top screw V10).
- Wrap the remainder of the solder shield around generator board. Solder the electrical shield to the solder pad of the generator board.
- Plug in the power supply board with the battery connector lead running under the board between the connector (J6) and the coil. Fasten with the screw (V7).
- Connect the supply connector (J3) from the generator board to the power supply.
- Connect the connector (J2) for the mobile jaw (jaw with trigger) to the generator board connector (J2) and route the wires between the main board and generator board.
- Slide the board assembly through the mobile jaw while making sure the shield is between the jaw plastics.
- Connect the connector (J1) for the fixed jaw (jaw without trigger) to the generator board connector (J1) and route the wires between the main board and generator board.
- Insert the screw (V8) through the mounting screw hole (V10) in order to line up the jaws and the board for proper insertion into the case.
- Insert the Elastomere keypad (green button for ON/OFF) and the HOLD knob with the spring into the front case.
- Insert the jaw and board assembly into the case while keeping the case horizontal to avoid losing the spring.

NOTE: The assembly should not have to be forced into position, but a slight manipulation may be required.

- Before pushing the board all the way down, insert the beeper wires through the case opening and solder to the board.
- Press down the board assembly and install the screws (V3, V8, and V9). Check the jaws to be sure they are lined up perfectly before locking the screws.
- Replace the screws to fasten the lower end of the board (V3 and V5).
- Route the three wires from the generator board to the power supply board between the case and the battery compartment.
- Insert the spring (R2) into the moving jaw and the other side into the fixed jaw.
- Place the plastic pin into the spring (R1) and insert the open end into the trigger. Slide the end with the pin into the holding slot of the case.
- Connect the battery and close the back case with the two cover screws (V1 and V2).

CAUTION: Do not pinch the power supply wires between the two covers.

MECHANICAL PARTS MODEL 3711/3731

PART N0.	DESCRIPTION	QTY	UNIT	LOC.
688241A96A	FACE PLATE MODEL 3711/3731	1	E	1
683403C96	BOTTOM CASE	1	E	2
688176A03	CLEAR COVER MODEL 3711	1	E	3
688176A07	CLEAR COVER MODEL 3731	1	E	3
688016B90A	JAW ASSEMBLY 3711/3731	1	E	4
525071-00	KEY PAD (5)	1	E	5
687850B93A	MAIN BOARD W / COMPONENT 3711/3731	1	E	6
687848B83A	GENERATOR BOARD W/COMPONENT 3711/3731	1	E	7
684724-93A	POWER SUPPLY BOARD W/COMPONENT	1	E	8
525249-00	LCD DISPLAY	1	E	9
525073-00	ELASTOMERE CONNECTOR (DISPLAY)	2	E	10
683414-96	DISPLAY HOLDER	2	E	11
683585A90	BATTERY COMPARTMENT	1	E	12
683416-96	HOLD BUTTON	1	E	13
683574-00	SPRING (HOLD BUTTON)	1	E	14
683573-00	SPRING (TRIGGER)	1	E	15
683415-96	SPRING GUIDE	1	E	16
683417-51	PIVOT SCREW	1	E	17
521061C00	DOWEL PIN 2 X 0.8 (JAW SPRING)	2	E	18
684714-00A	JAW SPRING	1	E	19
525113A00	SCREW (SELF TAPPING)	9	E	20
525122B00	SCREW CBL H M3-12/FE BK (BOTTOM CASE)	2	E	21
684727-54A	MOUNTING SCREW	2	E	22
684726-54A	INSERT	1	E	23
684005-74	FOAM	3	E	N/A
525113B00	SCREW (SELF TAPPING TORX #10)	1	E	25
524031-00	BATTERY CONNECTOR	1	E	26
525177-00	LOCK SCREW	1	E	27
683572-83	BEEPER ASSEMBLY	1	E	28
525274-00B	CONNECTOR 3 CTS	1	E	29
525275-00A	CONTACT F P/CONNECTOR	1	E	30
357647Z00	WIRE / MB 0,12/PVC/ BU	0.1	M	31
357651Y00	WIRE / MB 0,12/PVC/ WH	0.1	M	32
357647Y00	WIRE / MB 0,12/PVC/ RD	0.1	M	33
684904-96A	HOLDER (WRIST STRAP)	1	E	35
P03100824	WRIST STRAP	1	E	36
525291-00A	PUSH LOCK (WRIST STRAP)	1	E	38
684788-03A	SHIELD	1	E	39

MAIN BOARD

Descrip.	Type	Val	Specification			Ref #
C 1	CAP	10 nF	10 %	50 V	CERAMIC	01492310245003
C 2	CAP	1 nF	10 %	50 V	CERAMIC	01492310245000
C 3	CAP	1 nF	10 %	50 V	CERAMIC	01492310245000
C 4	CAP	1 nF	10 %	50 V	CERAMIC	01492310245000
C 5	CAP	22 nF	5 %	50 V	CERAMIC	525288K30A
C 6	CAP	22 nF	5 %	50 V	CERAMIC	525288K30A
C 7	CAP	3.3 nF	5 %	50 V	CERAMIC	525845C30A
C 8	CAP	22 nF	5 %	50 V	CERAMIC	525288K30A
C 9	CAP	3.3 nF	5 %	50 V	CERAMIC	525845C30A
C 10	CAP	2.2 nF	10 %	50 V	CERAMIC	01492322245000
C 11	CAP	1 nF	5 %	50 V	CERAMIC	525180U37A
C 12	CAP	22 nF	5 %	50 V	CERAMIC	525288K30A
C 13	CAP	22 nF	5 %	50 V	CERAMIC	525288K30A
C 14	CAP	22 nF	5 %	50 V	CERAMIC	525288K30A
C 15	CAP	22 nF	5 %	50 V	CERAMIC	525288K30A
C 16	CAP	22 nF	5 %	50 V	CERAMIC	525288K30A
C 17	CAP	22 nF	5 %	50 V	CERAMIC	525288K30A
C 18	CAP	100 nF	20 %	16 V	CERAMIC	525083E37A
C 19	CAP	10 nF	10 %	50 V	CERAMIC	524891L37A
C 20	CAP	1 nF	10 %	50 V	CERAMIC	01492210245000
C 21	CAP	470 nF	20 %	25 V	CERAMIC	525288Q30A
C 22	CAP	1 nF	10 %	50 V	CERAMIC	01492210245000
C 23	CAP	10 nF	10 %	50 V	CERAMIC	524891L37A
C 24	CAP	10 nF	10 %	50 V	CERAMIC	524891L37A
C 25	CAP	10 pF	10 %	50 V	CERAMIC	524891L37A
C 26	CAP	10 nF	10 %	50 V	CERAMIC	524891L37A
C 27	CAP	10 nF	10 %	50 V	CERAMIC	524891L37A
C 28	CAP	10 nF	10 %	50 V	CERAMIC	524891L37A
C 29	CAP	1 nF	5 %	50 V	CERAMIC	01492310235000
C 30	CAP	470 nF	20 %	50 V	CERAMIC	525288Q30A
C 31	CAP	470 nF	20 %	50 V	CERAMIC	525288Q30A
C 32	CAP	1 nF	10 %	50 V	CERAMIC	01492210245000
C 33	CAP	10 nF	10 %	50 V	CERAMIC	524891L37A
C 34	CAP	10 nF	10 %	50 V	CERAMIC	524891L37A
C 35	CAP	100 nF	10 %	50 V	CERAMIC	525083E37A
C 36	CAP	4.7 nF	10 %	50 V	CERAMIC	525327P30A
C 37	CAP	1 nF	10 %	50 V	CERAMIC	01492210245000
C 38	CAP	100 nF	10 %	50 V	CERAMIC	525083E37A
C 39	CAP	100 nF	10 %	50 V	CERAMIC	525083E37A
C 40	CAP	22 nF	5 %	50 V	CERAMIC	525288K30A
C 41	CAP	10 nF	10 %	50 V	CERAMIC	524891L37A

C 42	CAP	4.7 nF	10 %	50 V	CERAMIC	525327P30A
C 80	CAP	47 uF	20 %	10 V	CERAMIC	525180M30
C 81	CAP	47 uF	20 %	10 V	TANTALUM	525180M30
C 82	CAP	10 uF	20 %	16 V	TANTALUM	525180A30
C 83	CAP	10 uF	20 %	16 V	TANTALUM	525180A30
C 84	CAP	10 uF	20 %	16 V	TANTALUM	525180A30
C 85	CAP	10 uF	20 %	16 V	TANTALUM	525180A30
C 86	CAP	10 uF	20 %	16 V	TANTALUM	525180A30
C 87	CAP	470 nF	20 %	50 V	CERAMIC	525288Q30A
C 88	CAP	470 nF	20 %	50 V	CERAMIC	525288Q30A
C 89	CAP	470 nF	20 %	50 V	CERAMIC	525288Q30A
C 90	CAP	1 nF	10 %	50 V	CERAMIC	01492210245000
C 91	CAP	10 nF	10 %	50 V	CERAMIC	01492310245003
C 92	CAP	470 nF	20 %	50 V	CERAMIC	525288Q30A
C 93	CAP	470 nF	20 %	50 V	CERAMIC	525288Q30A
C 94	CAP	470 nF	20 %	50 V	CERAMIC	525288Q30A
CR 1	DIODE	BZV55C6, 2 V	ZENER		SOD-80	524842W30
CR 2	DIODE	BZV55C6, 2 V	ZENER		SOD-80	524842W30
CR 3	DIODE	BZV55C6, 2 V	ZENER		SOD-80	524842W30
CR 4	DIODE	BZV55C6, 2 V	ZENER		SOD-80	524842W30
CR 5	DIODE	LL103A	SCHOTTKEY		SOD-80	524842P30
CR 6	DIODE	LL103A	SCHOTTKEY		SOD-80	524842P30
CR 7	DIODE	LL4148F	SIGNAL		SOD-80	524842N37A
CR 8	DIODE	LL4148F	SIGNAL		SOD-80	524842N37A
CR 9	DIODE	LL4148F	SIGNAL		SOD-80	524842N37A
L 1	COIL	BLM21A10			805	525435-30A
L 2	COIL	BLM21A10			805	525435-30A
L 3	COIL	BLM21A10			805	525435-30A
L 4	COIL	BLM21A10			805	525435-30A
L 5	COIL	BLM21A10			805	525435-30A
L 6	COIL	BLM21A10			805	525435-30A
J 1	CONN	53014-510	5 CONTACT MALE		J5-53014	525881A00A
J 2	CONN	53014-510	5 CONTACT MALE		J5-53014	525881A00A
J 3	CONN		6 CONTACT		J-F4945D00	524945D00
J 4	CONN		4 CONTACT		J-F4945G00	524945G00
J 5	CONN		4 CONTACT		J-F4945G00	524945G00
Q 1	TRAN	2N7002	N-channel FET		SOT-23	525112C37A

Q 2	TRAN	2N7002	N-channel FET			SOT-23	525112C37A
R0 1	RES	2.21 Kohm	1 %	50 ppm	0.25 W	CM204	525029R30A
R0 2	RES	1 Mohm	1 %	50 ppm	0.25 W	CM204	01298300100231
R0 3	RES	200 Ohm	1 %	50 ppm	0.25 W	CM204	01298320000031
R0 4	RES	121 Ohm	1 %	50 ppm	0.25 W	CM204	01298312100031
R0 5	RES	4.22 Kohm	1 %	50 ppm	0.25 W	CM204	01298300422131
R0 6	RES	3.43 Kohm	1 %	50 ppm	0.25 W	CM204	525140Z30
R0 7	RES	1.43 Kohm	1 %	50 ppm	0.25 W	CM204	525399Q30A
R0 8	RES	21.5 Kohm	5 %	50 ppm	0.25 W	CM204	01298302150131
R0 9	RES	33.2 Kohm	5 %	50 ppm	0.1 W	805	525838X30A
R0 10	RES	2.21 Kohm	1 %	50 ppm	0.1 W	805	525400Q30A
R0 11	RES	3.83 Kohm	1 %	50 ppm	0.25 W	CM204	5225479Y30A
R0 12	RES	24.9 Kohm	1 %	50 ppm	0.25 W	CM204	525544K30A
R0 13	RES	1.18 Kohm	0.1 %	25 ppm	0.25 W	CM204	01297300118101
R0 14	RES	11.3 Kohm	0.1 %	25 ppm	0.25 W	CM204	012973 1130101
R0 15	RES	6.04 Kohm	1 %	100 ppm	0.1 W	805	525479G30A
R0 16	RES	2.37 Kohm	1 %	50 ppm	0.25 W	CM204	01298300237131
R0 17	RES	820 ohm	1 %	50 ppm	0.25 W	CM204	525838M30A
R0 18	RES	1.5 Kohm	1 %	50 ppm	0.25 W	CM204	01298300150131
R0 19	POT	5 Kohm	20 %	50 ppm	0.5 W	T93XA	523862H00
R0 20	RES	16.9 Kohm	5 %	50 ppm	0.25 W	CM204	525544M30A
R0 21	RES	825 ohm	5 %	50 ppm	0.25 W	CM204	01298382500031
R0 22	RES	1 Kohm	0.1 %	50 ppm	0.25 W	CM204	525264H30
R0 23	RES	31 Kohm	0.1 %	50 ppm	0.25 W	CM204	525264J30
R0 24	RES	3.83 Kohm	1 %	50 ppm	0.25 W	CM204	525479Y30A
RO 25	RES	2.74 Kohm	1 %	100 ppm	0.1 W	805	525628N30A
R0 26	RES	100 Kohm	5 %	200 ppm	0.1 W	805	525400F30A
R0 27	RES	100 Kohm	5 %	200 ppm	0.1 W	805	525400F30A
R0 28	RES	1.21 Mohm	1 %	50 ppm	0.25 W	CM204	01298300121231
R0 29	RES	7.15 Kohm	1 %	50 ppm	0.25 W	CM204	525077K37
R0 30	RES	4.87 Kohm	1 %	50 ppm	0.25 W	CM204	525085G30

R0 31	RES	4.87 Kohm	1 %	50 ppm	0.25 W	CM204	525085G30
R0 32	RES	226 ohm	1 %	50 ppm	0.25 W	CM204	525189J30
R0 33	RES	24.9 Kohm	1 %	50 ppm	0.25 W	CM204	01297302490101
R0 35	RES	10 Kohm	1 %	50 ppm	0.25 W	CM204	525029J37
R0 36	RES	4.87 Kohm	1 %	50 ppm	0.25 W	CM204	525085G30
R0 37	RES	4.87 Kohm	1 %	50 ppm	0.25 W	CM204	525085G30
R0 38	RES	226 ohm	1 %	50 ppm	0.25 W	CM204	525189J30
R0 40	POT	50 Kohm	20 %	100 ppm	0.5 W	T93XA	523862K00
R0 41	RES	446 ohm	1 %	50 ppm	0.25 W	CM204	525189U30
R0 42	RES	36.5 Kohm	1 %	50 ppm	0.25 W	CM204	525243Z30
R0 43	RES	10 Kohm	1 %	50 ppm	0.25 W	CM204	525029J37
R0 44	RES	3.83 Kohm	1 %	50 ppm	0.25 W	CM204	525479Y30A
R0 45	RES	32.4 Kohm	1 %	50 ppm	0.25 W	CM204	525077T30
R0 46	RES	66.5 Kohm	1 %	50 ppm	0.25 W	CM204	525116L37A
R0 47	RES	133 Kohm	1 %	50 ppm	0.25 W	CM204	01298313300131
R0 48	RES	10 Kohm	1 %	50 ppm	0.25 W	CM204	525029J37
R0 49	RES	31 Kohm	1 %	50 ppm	0.25 W	CM204	525264J30
R0 50	RES	47 Kohm	5 %	200 ppm	0.1 W	805	525400A30A
R0 51	RES	47 Kohm	5 %	200 ppm	0.1 W	805	525400A30A
R0 52	RES	47 Kohm	5 %	200 ppm	0.1 W	805	525400A30A
R0 53	RES	47 Kohm	5 %	200 ppm	0.1 W	805	525400A30A
R0 54	RES	47 Kohm	5 %	200 ppm	0.1 W	805	525400A30A
R0 55	RES	47 Kohm	5 %	200 ppm	0.1 W	805	525400A30A
R0 57	RES	47 Kohm	5 %	200 ppm	0.1 W	805	525400A30A
R0 58	RES	47 Kohm	5 %	200 ppm	0.1 W	805	525400A30A
R0 59	RES	1 Mohm	5 %	200 ppm	0.1 W	805	525400B30A
R0 60	RES	47 Kohm	5 %	200 ppm	0.1 W	805	525400A30A
R0 61	RES	10 Kohm	5 %	200 ppm	0.1 W	805	525400E30A
R0 62	RES	10 Kohm	5 %	200 ppm	0.1 W	805	525400E30A
R0 63	RES	47 Kohm	5 %	200 ppm	0.1 W	805	525400A30A
R0 64	RES	47 Kohm	5 %	200 ppm	0.1 W	805	525400A30A
R0 65	RES	4.7 Kohm	5 %	200 ppm	0.1 W	805	525400C30A
R0 66	RES	1 Kohm	5 %	200 ppm	0.25 W	1206	525077N37
R0 67	RES	2 Mohm	1 %	200 ppm	0.1 W	805	525677R30A
R0 68	RES	47 Kohm	5 %	200 ppm	0.1 W	805	525400A30A
R0 69	RES	47 Kohm	5 %	200 ppm	0.1 W	805	525400A30A
R0 70	RES	100 ohm	5 %	200 ppm	0.1 W	805	525400M30A

R0 71	RES	30 Kohm	5 %	200 ppm	0.1 W	805	525400M30A
R0 72	RES	23.7 Kohm	1 %	50 ppm	0.25 W	CM204	525540J30A
R0 73	POT	5 Kohm	20 %	100 ppm	0.5 W	T93XA	523862H00
R0 74	RES	16.2 Kohm	1 %	50 ppm	0.25 W	CM204	01298301620131
R0 75	RES	4.87 Kohm	1 %	50 ppm	0.25 W	CM204	525085G30
R0 76	RES	10 Kohm	1 %	50 ppm	0.25 W	CM204	525029J37
R0 77	RES	10 Kohm	1 %	50 ppm	0.25 W	CM204	525029J37
R0 78	RES	10 Kohm	1 %	50 ppm	0.25 W	CM204	525029J37
R0 79	RES	470 Kohm	5 %	200 ppm	0.1 W	805	525479P30A
R0 80	RES	12.1 ohm	5 %	200 ppm	0.125 W	805	525479P30A
R0 81	RES	12.1 ohm	5 %	200 ppm	0.125 W	805	525743P30A
R0 82	RES	40.2 ohm	1 %	50 ppm	0.25 W	CM204	525264V30
R0 83	RES	24.9 Kohm	1 %	50 ppm	0.25 W	CM204	01297302490101
R0 84	RES	3.4 Kohm	1 %	50 ppm	0.25 W	CM204	525140Z30
R0 85	RES	10 Kohm	5 %	200 ppm	0.1 W	805	525400E30A
R0 86	RES	475 ohm	1 %	50 ppm	0.1 W	805	525838Y30A
R0 87	RES	10 Kohm	5 %	200 ppm	0.1 W	805	525400E30A
R0 90	RES	10 Kohm	5 %	200 ppm	0.1 W	805	525400E30A
R0 91	RES	10 Kohm	5 %	200 ppm	0.1 W	805	525400E30A
R0 92	RES	10 Kohm	5 %	200 ppm	0.1 W	805	525400E30A
R0 94	RES	10 Kohm	5 %	200 ppm	0.1 W	805	525400E30A
R0 95	RES	10 Kohm	5 %	200 ppm	0.1 W	805	525400A30A
R0 96	RES	10 Kohm	5 %	200 ppm	0.1 W	805	525400E30A
R0 97	RES	10 Kohm	5 %	200 ppm	0.1 W	805	525400E30A
R0 98	RES	10 Kohm	5 %	200 ppm	0.1 W	805	525400E30A
R0 99	RES	10 Kohm	5 %	200 ppm	0.1 W	805	525400E30A
R0 100	RES	1.47 Kohm	1 %	50 ppm	0.25 W	CM204	01298300147131
R0 101	RES	2.32 Kohm	1 %	50 ppm	0.25 W	CM204	525077W30
R0 186	RES	10 Kohm	5 %	200 ppm	0.1 W	805	525400E30A
D 1	LCD					D-ZEB26/OHM	525249-00
RRO 1	RES NTWK						525079-00
SO 1	SWITCH		PUSHBUTTON				524974A00
Y 1	QUARTZ	8 MHz				Y-F5671	525841-40A

Z 1	IC	TLC271CD	SO8	525034A30
Z 2	IC	TLE2022AID	SO8	525639N30A
Z 3	IC	TLE2022AID	SO8	525639N30A
Z 4	IC	TLE2022AID	SO8	525639N30A
Z 5	IC	TLE2022AID	SO8	525639N30A
Z 6	IC	TLE2022AID	SO8	525639N30A
Z 7	IC	TLE2022AID	SO8	525639N30A
Z 8	IC	TLE2022AID	SO8	525639N30A
Z 9	IC	CD4053	SO16	525034F30
Z 10	IC	CD4053	SO16	525034F30
Z 11	IC	CD4051	SO16	525034R30
Z 12	IC	CD4053	SO16	525034F30
Z 13	IC	CD4053	SO16	525034F30
Z 14	IC	DG412 DY-T	SO16	525201R30
Z 15	IC	CD4093	SO14	525034D30
Z 16	IC	CD4093	SO14	525034D30
Z 17	IC	NM93C66M8	SO8	525289M30A
Z 18	IC	M37513 EFGP	100P6Q-A	525789U40A
Z 19	IC	TLE2022AID	SO8	525639N30A

GENERATOR BOARD

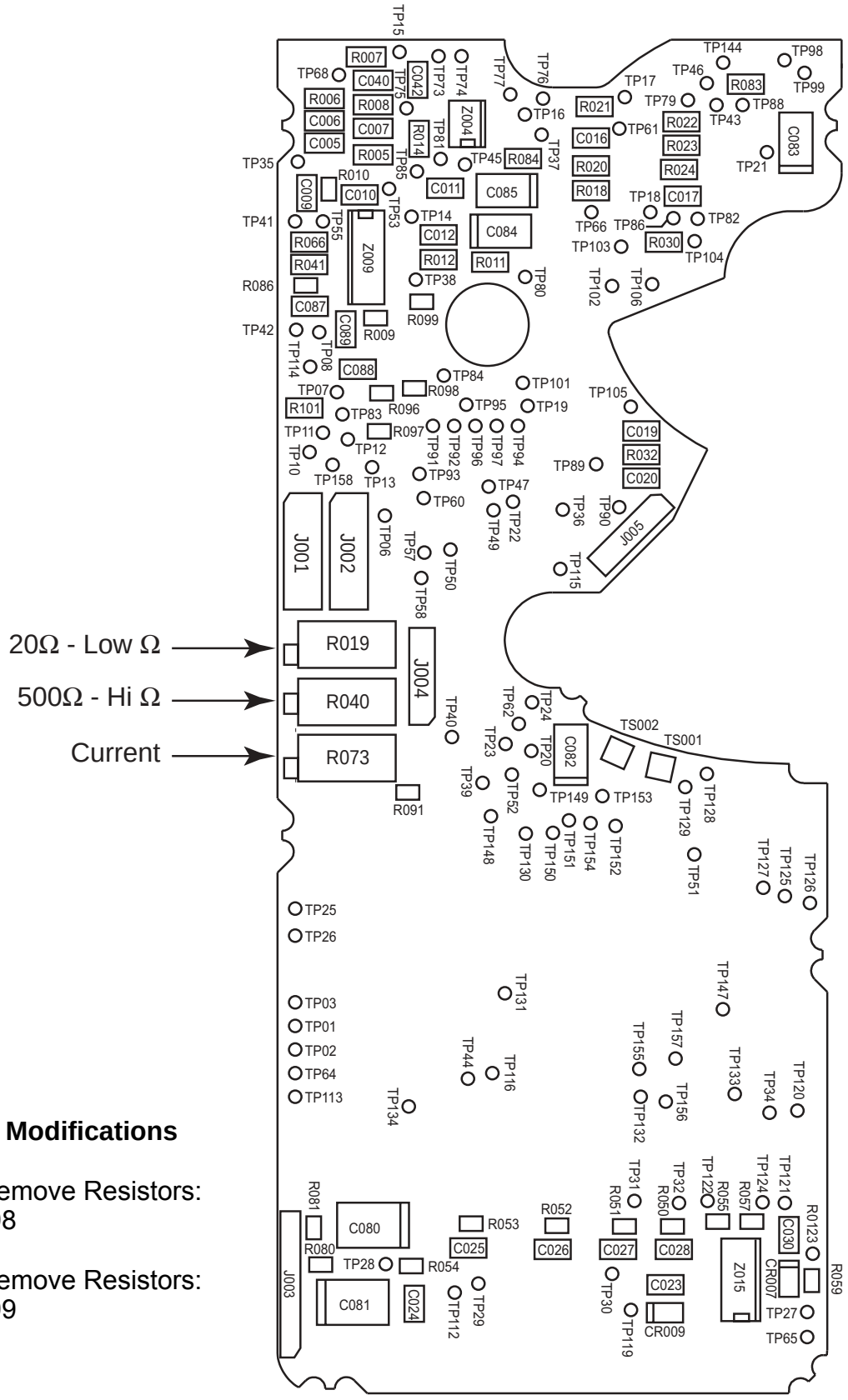
Descrip.	Type	Val	Specification			Ref #
C 101	CAP	1 nF	5 %	50 V	CERAMIC	525180U37A
C 102	CAP	220 pF	5 %	50 V	CERAMIC	525552U30A
C 103	CAP	470 nF	20 %	50 V	CERAMIC	525288Q30A
C 104	CAP	470 nF	20 %	50 V	CERAMIC	525288Q30A
C 105	CAP	22 nF	5 %	50 V	CERAMIC	525288K30A
C 106	CAP	22 nF	5 %	50 V	CERAMIC	525288K30A
C 107	CAP	47 uF	20 %	10 V	TANTALUM	525180M30
C 108	CAP	47 uF	20 %	10 V	TANTALUM	525180M30
C 109	CAP	47 uF	20 %	10 V	TANTALUM	525180M30
C 110	CAP	47 uF	20 %	10 V	TANTALUM	525180M30
C 111	CAP	1 nF	20 %	50 V	CERAMIC	01492310245000
C 112	CAP	1 nF	10 %	50 V	CERAMIC	01492310245000
C 113	CAP	1 nF	10 %	50 V	CERAMIC	01492310245000

C 114	CAP	1 nF	10 %	50 V		CERAMIC	01492310245000
C 115	CAP	1 nF	10 %	50 V		CERAMIC	01492310245000
C 116	CAP	1 nF	10 %	50 V		CERAMIC	01492310245000
C 118	CAP	47 pF	5 %	50 V		CERAMIC	01492347035000
C 119	CAP	47 pF	5 %	50 V		CERAMIC	01492347035000
C 140	CAP	100 nF	10 %	50 V		CERAMIC	525083E37A
C 141	CAP	470 nF	20 %	50 V		CERAMIC	525288Q30A
CR 103	DIODE	1N5335B	ZENER			CB417	525182J00A
CR 106	DIODE	1N5335B	ZENER			CB417	525182J00A
CR 107	DIODE	LL4148F	SIGNAL			SOD80	524842N37A
L 1	COIL	BLM21A10				805	525435-30A
L 2	COIL	BLM21A10				805	525435-30A
L 3	COIL	BLM21A10				805	525435-30A
L 4	COIL	BLM21A10				805	525435-30A
L 5	COIL	BLM21A10				805	525435-30A
J 101	CONN		MALE CONNECTOR 5 PIN			J-F5273-00D	525273-00D
J 102	CONN		MALE CONNECTOR 5 PIN			J-F5273-00D	525273-00D
J 103	CONN		BERG PIN X 4			J4F9405	529405E00
J 107	CONN		BERG PIN X 4			J4F9405	529405E00
Q 101	TRANS	MMBT2222	NPN			SOT-23	525112M30
Q 102	TRANS	MMBT2907	PNP			SOT-23	525112L30
Q 103	TRANS	MMBT2222	NPN			SOT-23	525112M30
Q 104	TRANS	MMBT2907	PNP			SOT-23	525112L30
Q 105	TRANS	2N7002T1	N-channel FET			SOT-23	525112C37A
Q 106	TRANS	2N7002T1	N-channel FET			SOT-23	525112C37A
R 101	RES	7.87 Kohm	1 %	50 ppm	0.25 W	CM204	525116Y30
R 102	RES	19.1 Kohm	1 %	50 ppm	0.25 W	CM204	525116K30
R 103	RES	19.1 Kohm	1 %	50 ppm	0.25 W	CM204	525116K30
R 104	RES	7.87 Kohm	1 %	50 ppm	0.25 W	CM204	525116Y30
R 105	RES	10 ohm	1 %	50 ppm	0.25 W	1206	01293000100001
R 106	RES	9.09 ohm	1 %	50 ppm	0.25 W	CM204	525628J30A
R 110	RES	3.01 Kohm	1 %	100 ppm	0.1 W	805	525399Z30A

R 111	RES	3.01 Kohm	1 %	100 ppm	0.1 W	805	525399Z30A
R 112	RES	10 Kohm	1 %	50 ppm	0.1 W	805	525281V30A
R 113	RES	100 Kohm	1 %	50 ppm	0.1 W	805	525281X30A
R 114	RES	12.1 Kohm	1 %	100 ppm	0.1 W	805	525780G30A
R 116	RES	10 Kohm	1 %	50 ppm	0.1 W	805	525281V30A
R 117	RES	100 Kohm	1 %	50 ppm	0.1 W	805	525281X30A
R 118	RES	12.1 Kohm	1 %	100 ppm	0.1 W	805	525780G30A
R 119	RES	100 ohm	5 %	200 ppm	0.25 W	1206	525077M37
R 121	RES	30.1 Kohm	1 %	50 ppm	0.25 W	CM204	01298303010131
R 122	RES	200 Kohm	1 %	50 ppm	0.25 W	CM204	01298320000131
R 123	RES	10.5 Kohm	1 %	50 ppm	0.25 W	CM204	525544L30A
R 124	RES	100 ohm	1 %	100 ppm	0.25 W	1206	01293000200001
R 125	RES	100 ohm	1 %	100 ppm	0.25 W	1206	01293000200001
R 127	RES	12.1 Kohm	5 %	200 ppm	0.125 W	805	525780G30A
R 128	RES	47.5 Kohm	1 %	100 ppm	0.1 W	805	525400V30A
R 129	RES	10 Kohm	1 %	50 ppm	0.1 W	805	525281V30A
R 130	RES	0 ohm	50 mohm			805	525544Z30A
R 131	RES	3.4 Kohm	1 %	50 ppm	0.1 W	805	525399J30A
R 132	RES	6.8 Kohm	1 %	50 ppm	0.25 W	CM204	525541B30A
R 139	RES	47.5 Kohm	1 %	100 ppm	0.1 W	805	525400V30A
R 141	RES	12.1 Kohm	5 %	200 ppm	0.125 W	805	525780G30A
R 142	RES	10 Kohm	1 %	50 ppm	0.1 W	805	525281V30A
R 150	RES	76.8 Kohm	1	50 ppm	0.25 W	CM204	525281C30A
R 151	RES	66.5 Kohm	1 %	50 ppm	0.25 W	CM204	525116L37A
R 180	RES	221 Kohm	1 %	50 ppm	0.25 W	CM204	525033G37
R 185	RES	1 Mohm	5 %	200 ppm	0.1 W	805	525400B30A
S 101	SWITCH					S-F5370	525885A00A
Z 101	IC	TLE2062ID				SO8	525329K30A
Z 102	IC	TLE2062ID				SO8	525329K30A
Z 103	IC	CD4053BCM				SO16	525034F30
Z 104	IC	TLC27M2CD				SO8	01959002200000
Z 105	IC	TLE2022				SO8	525639N30A
Z 107	IC	CD4040BCM				SO16	525145Z30
Z 108	IC	CD4051BCM				SO16	525034R30

POWER SUPPLY BOARD 684724-93A							
Descrip.	Type	Val	Specification				Ref #
C 201	CAP	10 uF	20 %		16 V	TANTALUM	525180A30
C 202	NONE						
C 203	CAP	10 uF	20 %		16 V	TANTALUM	525180A30
C 204	CAP	470 uF	20 %		10 V	POL. ALUM.	525180S00
C 205	CAP	47 uF	20 %		6.3 V	TANTALUM	525180B30
C 206	CAP	47 uF	20 %		10 V	TANTALUM	525180M30
C 207	CAP	0.1 uF	10 %		50 V	CERAMIC 1206	525083E37A
C 208	CAP	47 uF	20 %		6.3 V	TANTALUM	525180B30
C 209	CAP	47 uF	20 %		6.3 V	TANTALUM	525180B30
C 210	CAP	47 uF	20 %		6.3 V	TANTALUM	525180B30
CR 201	DIODE	TMBYV 10-20A SCHOTTKY 1A 20V				MELF	525182D30
CR 202	DIODE	TMBYV 10-20A SCHOTTKY 1A 20V				MELF	525182D30
CR 203	DIODE	RM 4004-G REDRESS. 1A 400V				MELF	524842Z30
J 201	CONN	MALE CONNECTOR 6 PIN					
J 202	CONN	MALE CONNECTOR 3 PIN					525273-00B
L 201	Induct	220 uH	0.5A r< OU = 0.6 ohm				525148B00
L 202	Induct	470 uH	0.34A r< OU = 1.2 ohm				525148C00
Q 201	TRAN	SI 9953 DY	MOS (X) P			SO-08	525112N30
R 201	RES	1.8 ohm		5 %	500 ppm	FILM.Ep 1206	525264S30
R 202	RES	1.8 ohm		5 %	500 ppm	FILM.Ep 1206	525264S30
R 203	RES	470 Kohm		5 %	200 ppm	FILM.Ep 1206	525085Y37
Z 202	IC	LM 2936M	REGULATOR +5V			SO-08	525201Z30
Z 203	IC	MAX 639 CSA	(+5V)			SO-08	525201V30
Z 204	IC	MAX 635 ACSA	(-5V)			SO-08	525201W30

MAIN BOARD BOTTOM

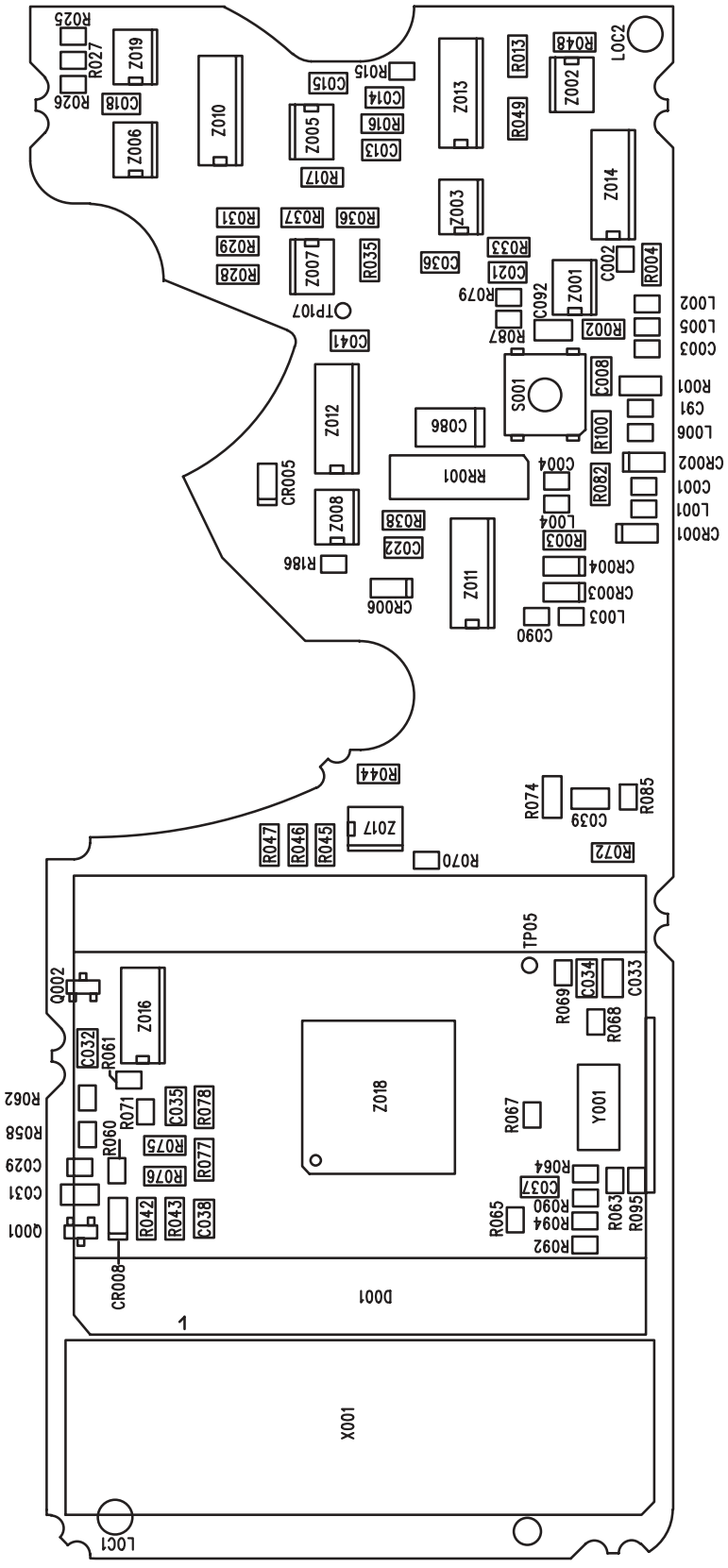


Standard Modifications

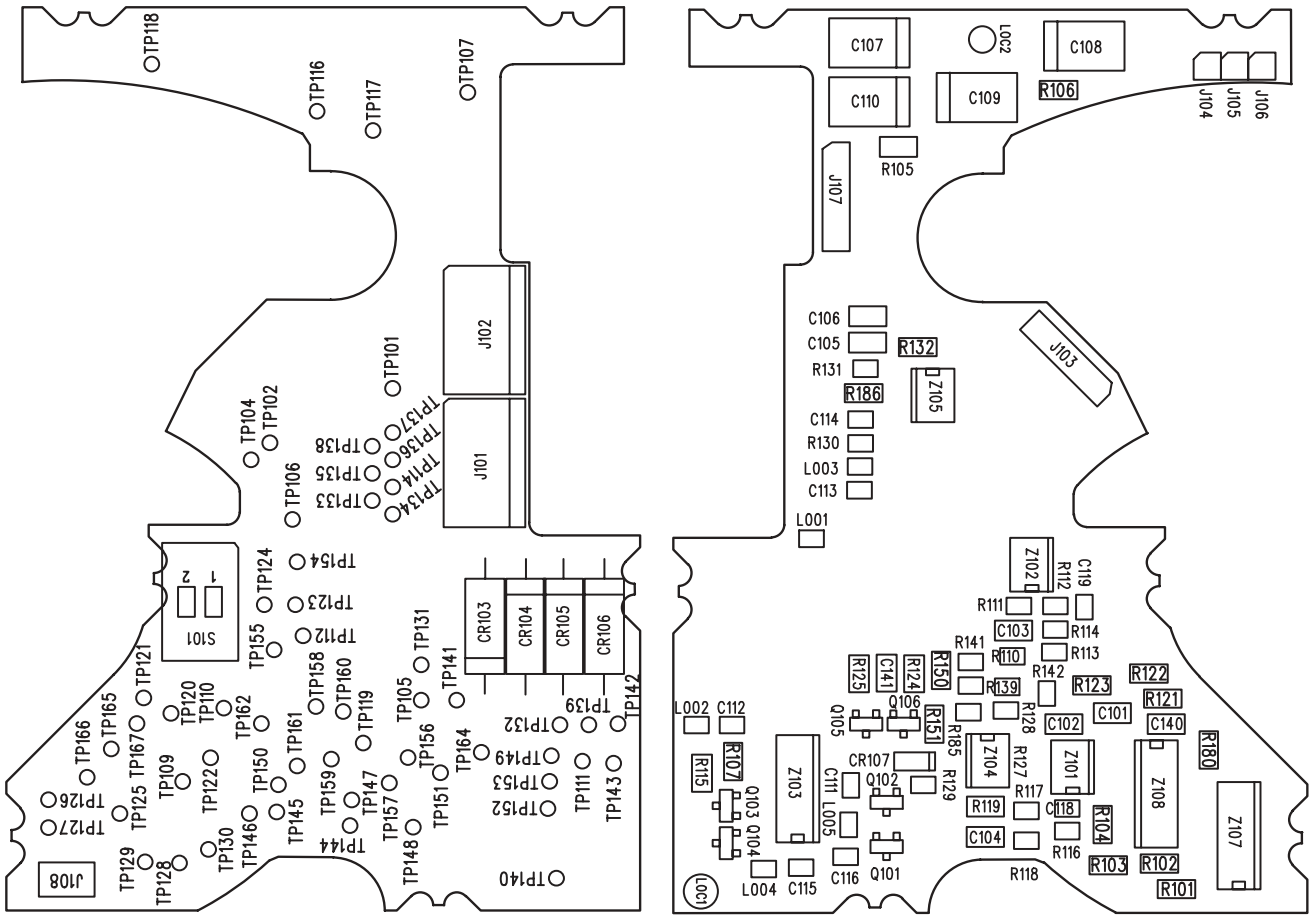
Model 3731 Remove Resistors:
R097 and R098

Model 3711 Remove Resistors:
R096 and R099

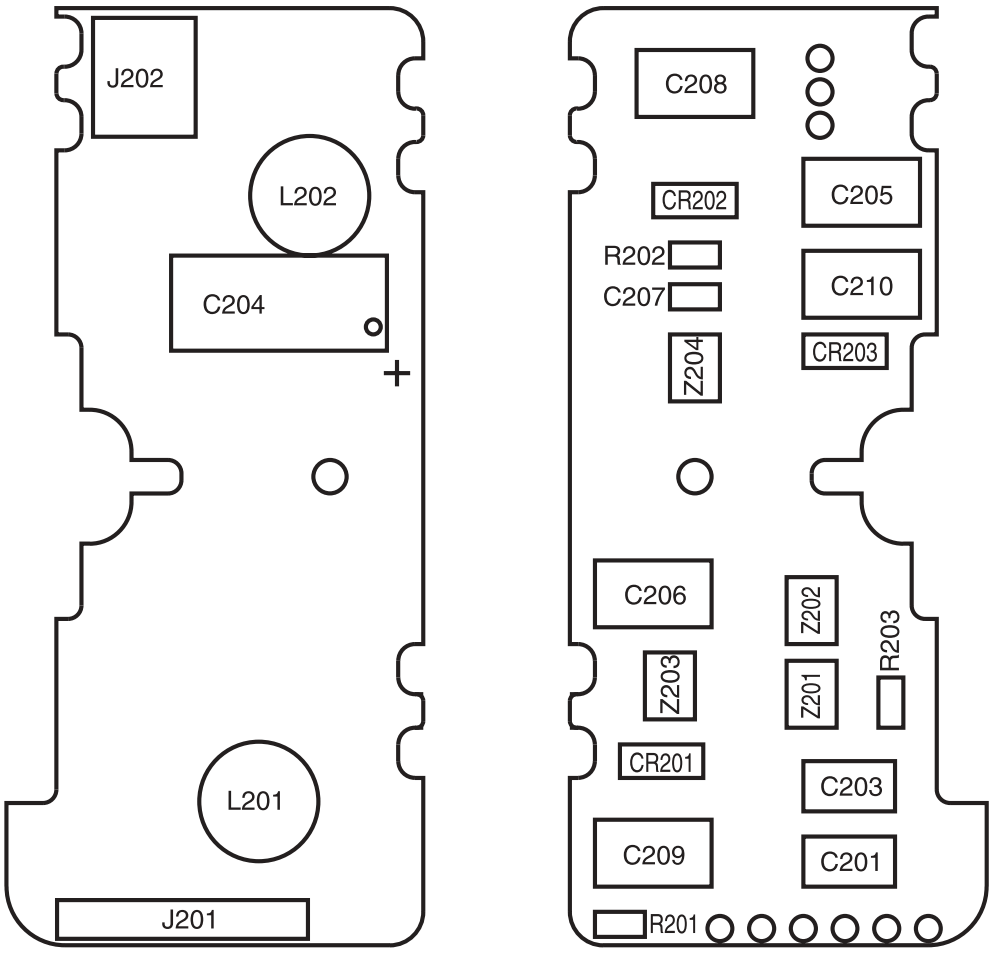
MAIN BOARD TOP



GENERATOR BOARD

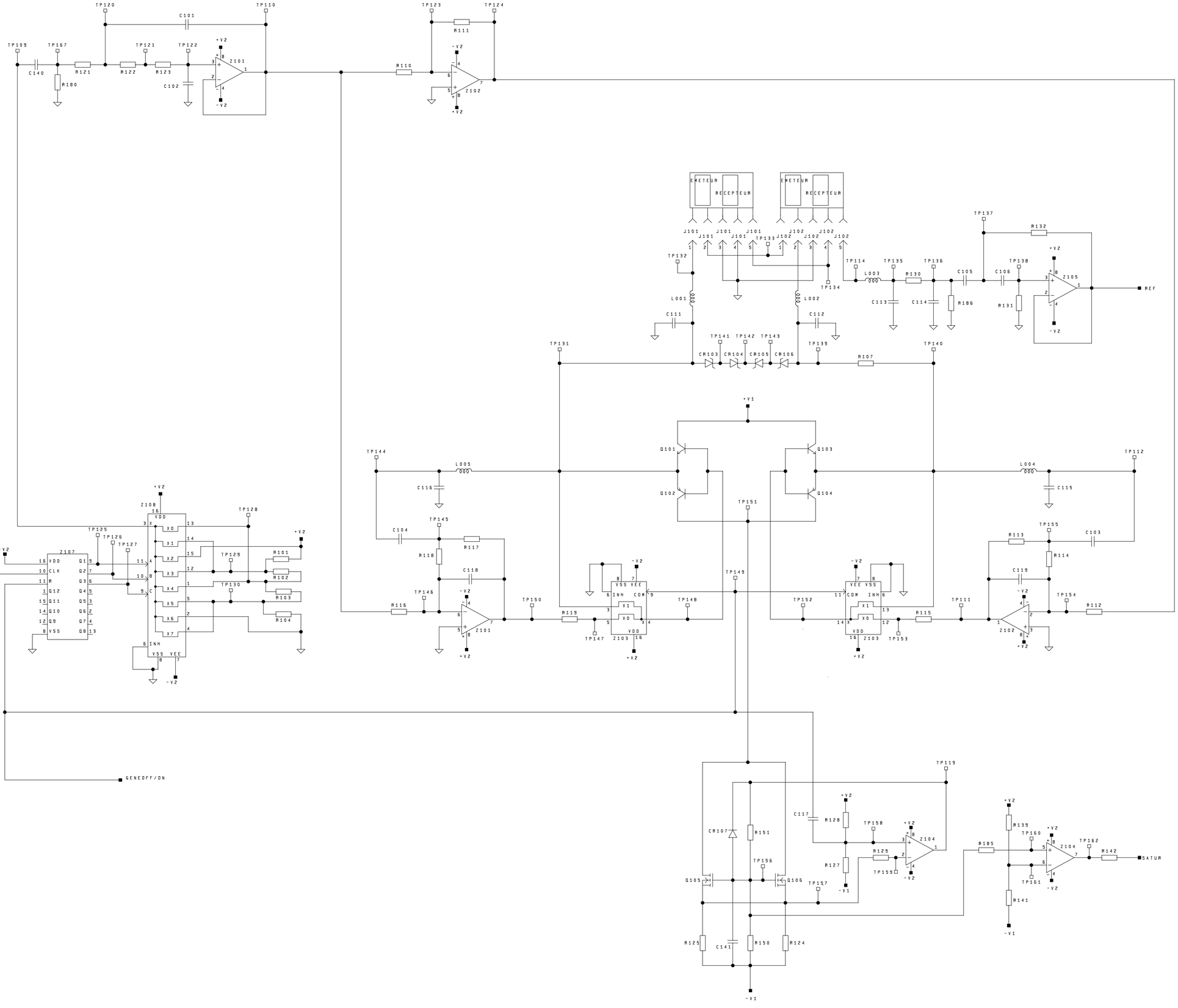


POWER SUPPLY BOARD



MODEL 3711/3731
MAIN BOARD SCHEMATIC

MODEL 3711/3731 - GENERATOR BOARD SCHEMATIC



MODEL 3711/3731 - POWER SUPPLY SCHEMATIC