Instruction Manual
SD1012B Tracking Filter
Part Two

Legacy Manual

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SECTION IV

CALIBRATION AND MAINTENANCE

4.1 GENERAL

Before calibrating the instrument, the technician is advised to study carefully Section III of this manual. Refer also to the front-panel and rear-chassis descriptions given in Section I.

Most voltage checks and adjustments can be made with the circuit cards installed. Remove and extend cards only when directed, and then use caution when installing extender and circuit card; be sure to remove power. Figure 4-1 is a top view of the instrument with cover removed, showing all calibration controls.

Note that except for the extender card, each circuit card is individually keyed to its receptacle. Each card is slotted, and a "key" is located between two pins of each receptacle. Therefore, the "key" must be removed before the extender can be inserted.

NOTE

A layout drawing showing the location of the circuit cards is located on the inside surface of the top cover. On this drawing, the location of each circuit card "key" is denoted by its two adjacent pin numbers. For example, on circuit card A1, the "key" is located between pins 13 and 14.

CAUTION

To prevent possibility of plugging a circuit card in the wrong socket, be sure to replace "keys" after calibrating or servicing the instrument.

Throughout the calibration procedure, calibration controls and parts on a circuit card are referenced by their circuit card and part number alphanumeric designator. For example, on Power Supply circuit card A9, R15 is referred to as A9R15. Similarly, circuit card pin connections are referenced by the circuit card alphanumeric designator, a hyphen, pin number/letter; such as A2-F, or A4-16.

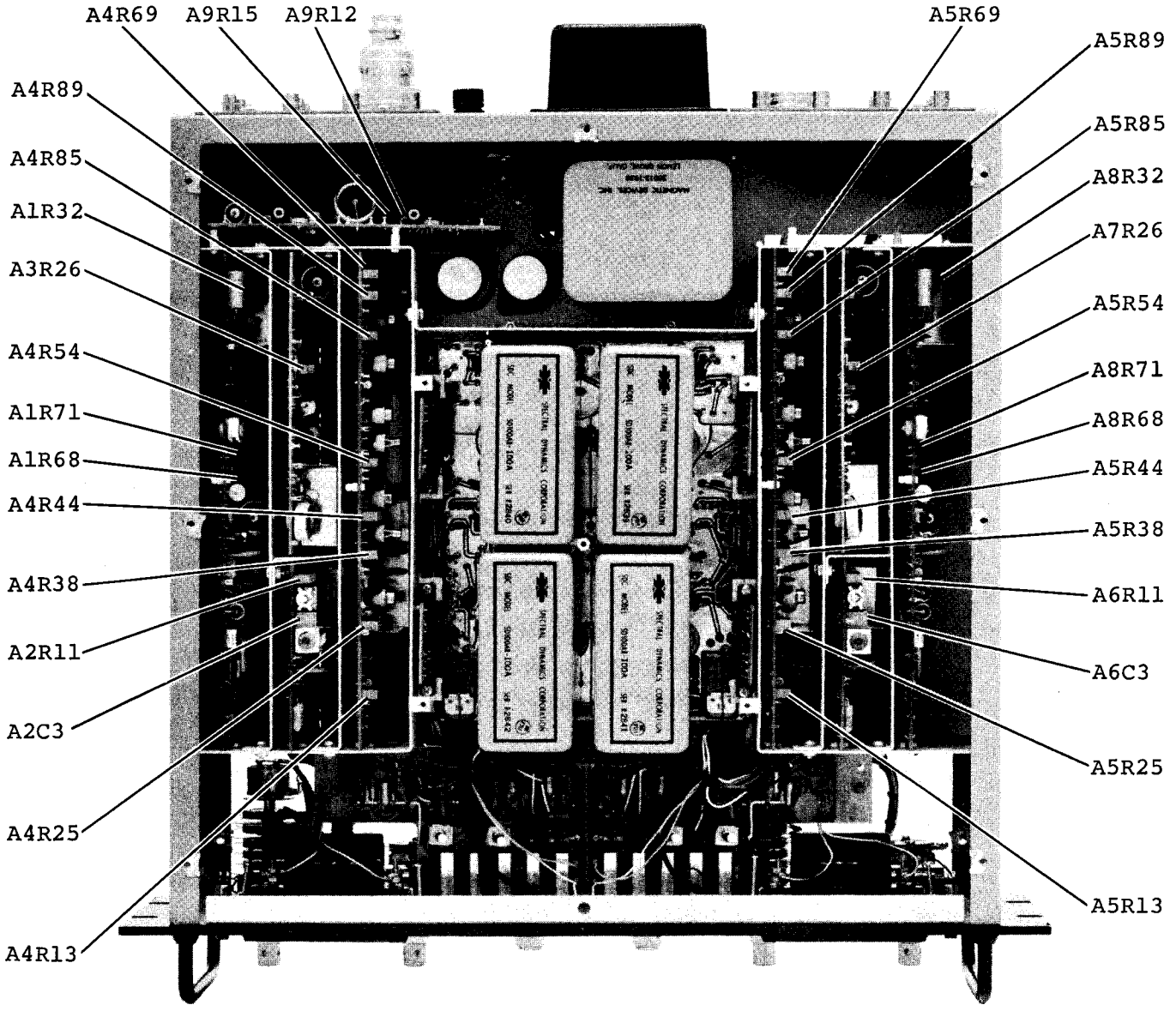


Figure 4-1. Top Chassis View

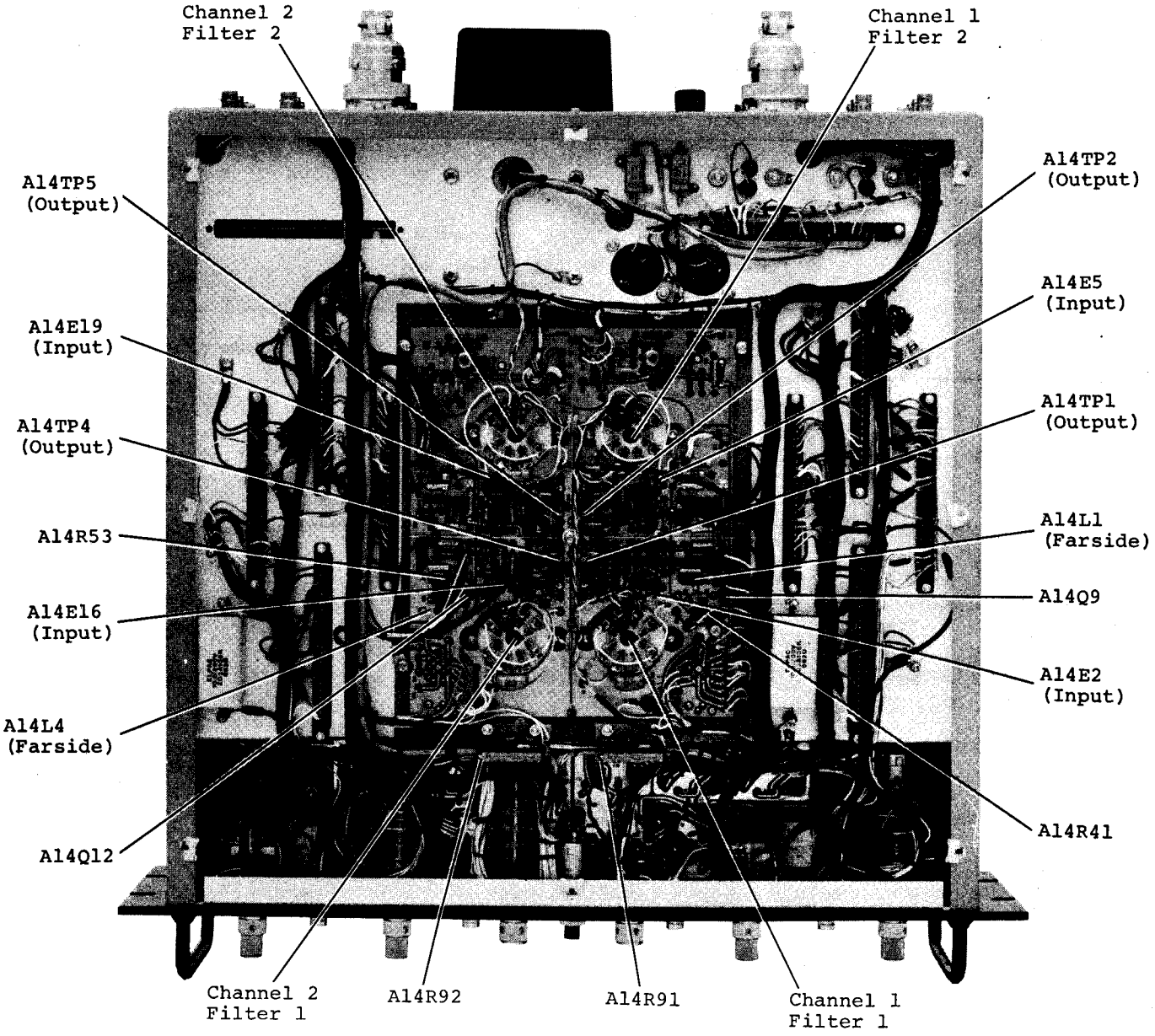


Figure 4-2. Bottom Chassis View

4.2 CALIBRATION PROCEDURE

CAUTIONS

1) To ensure proper calibration of the instrument, the following procedure must be performed in its entirety and in the sequence listed.

2) Be sure power is off before removing or replacing circuit cards.

Table 4-1 lists the test equipment required; test equipment having equal or better operational characteristics may be substituted.

Table 4-1. Test Equipment Required

Name	Model No.	Manufacturer
Attenuator	350D	Hewlett-Packard
Digital Voltmeter	3440A	Hewlett-Packard
Carrier Generator	SD1010B	Spectral Dynamics
Frequency Counter	5223L	Hewlett-Packard
RMS Voltmeter	3400A	Hewlett-Packard
Ratio Transformer	RT-60	Gertsch
Sweep Oscillator	SD104A	Spectral Dynamics
Oscilloscope	545	Tektronix
Probe	013-071	Tektronix
Wave Analyzer	310	Hewlett-Packard

4.2.1 Preliminary Setup

a. With the power off, check that the front-panel Signal Input meters read 0. Mechanically adjust if necessary.

b. Check that the 115/230 switch on the rear chassis is set properly and the correct value of fuse is installed.

c. Ensure that jumpered plugs P11 and P22 are installed. (See Figure 2-1 in Section II for plug details.)

d. Remove the instrument top cover and ensure installation of at least one crystal filter in each channel. (Refer to paragraph 2.2.1 NOTES in Section II.)

NOTE

If available, install 5-Hz and 50-Hz BW filters in positions 1 and 2 respectively of each channel. Other BW values can be used, such as 2 Hz, 10 Hz, etc. If only one filter is available, install it in position 1 and ensure that its PSD assembly is also installed in PSD No. 1 position.

e. Connect power cord to the primary power source, and press the front-panel POWER switch/indicator; it should glow red indicating power is on.

NOTE

A 5-minute warmup is sufficient before making the power supply adjustments. However, at least a 1-hour warmup should be allowed before calibrating the filter section.

4.2.2 Power Supply (A9)

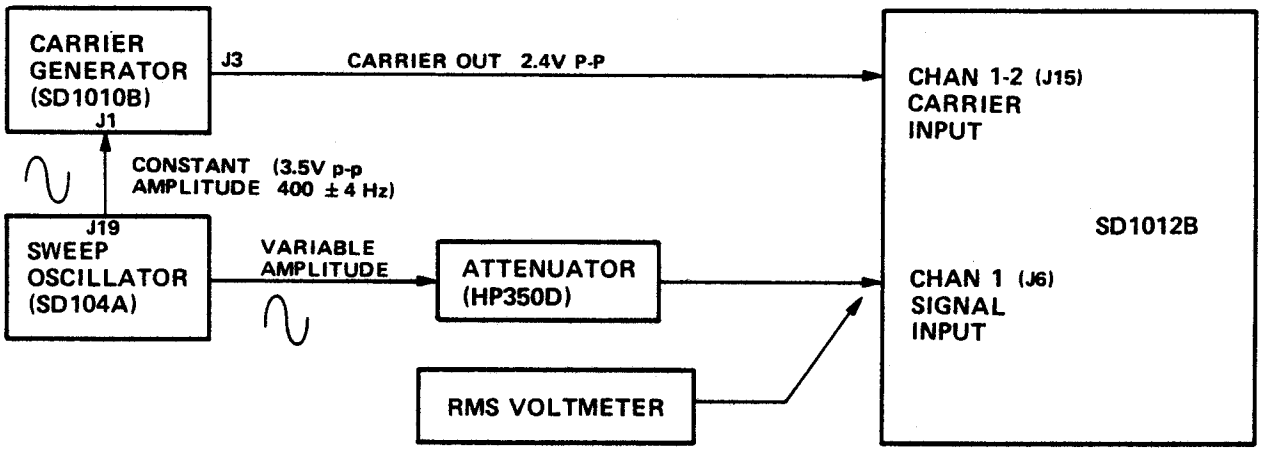
a. Connect DVM and oscilloscope to A9TP4. Adjust A9R15 for -15V (-14.98 to -15.02). Ripple should be less than 4 mV p-p.

b. Connect DVM and oscilloscope to A9TP3. Adjust A9R12 for +15V (+14.98 to +15.02). Ripple should be less than 4 mV p-p.

c. Connect DVM and oscilloscope to A9TP9. DVM should read approximately +45V; ripple should be less than 5 mV p-p.

4.2.3 AC INPUT/OUTPUT (A1), Input Section (Channel 1)

Connect the SD1012B and test equipment as follows:



a. On the SD1010B, set the OPER/CAL switch in the OPER position and adjust the TUNING AMPL control for a centerline indication (green area) on the TUNING AMPLITUDE meter.

b. On Channel 1 of the SD1012B, set the RANGE (Vrms) and METER MULTIPLIER controls in the 1 position and the RELATIVE gain control fully clockwise to the switch detent position; set the FILTER selector in the 1 position.

c. Remove power to extend circuit card A1 and re-apply power.

d. With the sweep oscillator for 400 Hz, ±4 Hz, adjust the Attenuator for 5 dB attenuation. Monitor the CHAN 1 SIGNAL INPUT with an rms voltmeter and adjust the sweep oscillator for 1 Vrms, ±10 mV.

e. On the SD1010B, adjust the FREQ control for maximum meter indication on the SD1012B. If the meter appears saturated (off scale), adjust the CHANNEL 1 FILTER 1-CAL control on the SD1012B for full scale.

f. Check rms voltage at A1TP1; should be 31.6 mV (30.97 to 32.23 mV).

g. At A1TP13, check for 0.234 Vrms (0.224 to 0.244 Vrms).

h. Switch CHANNEL 1 RANGE (Vrms) switch to the .3 position and adjust the Attenuator for 3 dB attenuation (this increases the input level by 12 dB). Adjust A1R23 until the OVERLOAD lamp glows dimly.

i. Adjust the Attenuator for 0 dB (increases level by 3 dB) and the OVERLOAD lamp should glow brightly.

Leave circuit card A1 extended and return RANGE switch to the 1 position.

4.2.4 Modulator (A2)

a. Remove attenuator, and adjust oscillator to provide SIGNAL INPUT of 1 Vrms at 2 kHz.

b. On AC Input/Output card A1, monitor A1TP3 with oscilloscope and adjust A1R32 for 8V p-p (±1V p-p).

c. Remove power, remove card A1 and extender (do not replace the "key" at this time), and return A1 to its socket.

Re-apply power.

d. Connect wave analyzer to A2TP2. Tune wave analyzer for 0 dB at 100 kHz.

e. Alternately adjust A2R11 and A2C3 to decrease the 102-kHz signal to -50 dB or more below the 100-kHz signal. (Some fluxuations on the analyzer meter below -50 dB is normal.)

4.2.5 Filter Driver (A14)

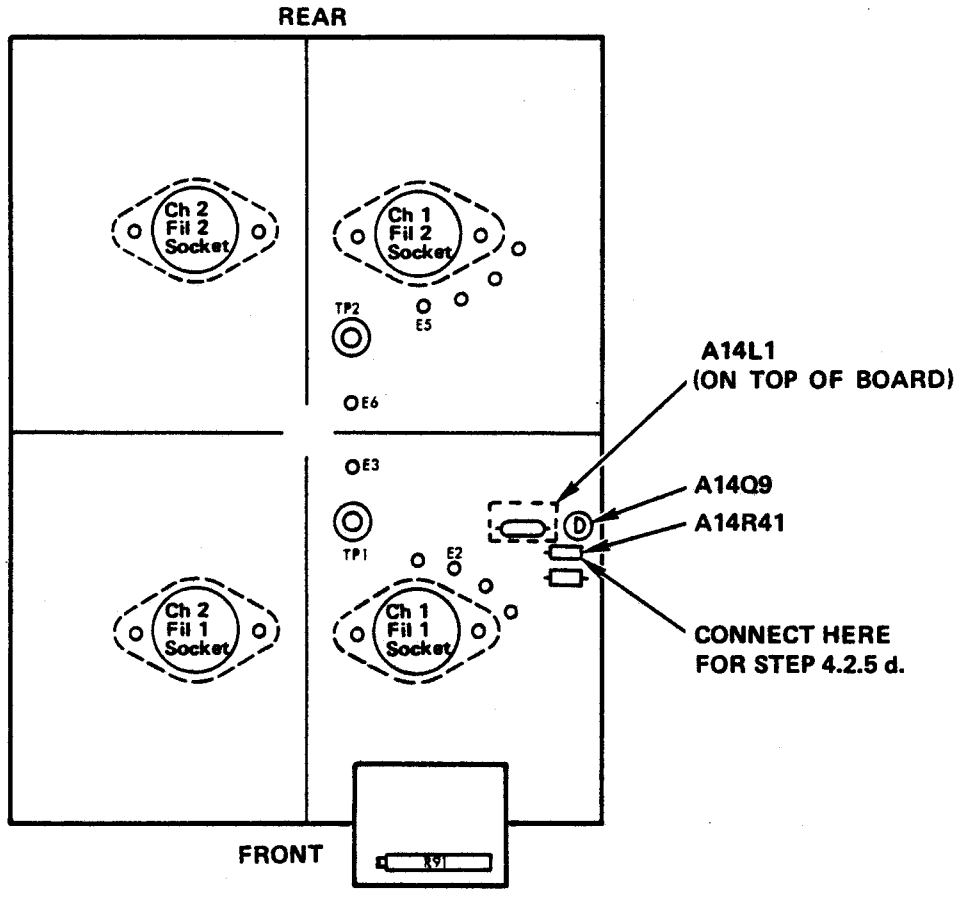
CAUTION

To ensure stability of the crystal filters, be sure that at least 1 hour has elapsed since the power was initially applied to the instrument.

a. Place instrument on right side (viewing instrument from the front) and remove the bottom cover to expose component side of card A14.

b. Connect oscilloscope to J7, 100-kHz FIL I.F. On SD1010B, adjust front-panel FREQ control for maximum output at J7.

c. Use oscilloscope and check that the gain is 5.6 or more between the following points: A14E2 (input) and A14TP1 (output), A14E5 (input) and A14TP2 (output). See drawing below for the relative location of these input and output points.



A14, Bottom View, Channel 1 Check Points

d. Connect rms voltmeter to junction of A14Q9 base and A14R41. (See drawing above.)

e. Sequentially set the FILTER switch to 1 and 2, and adjust the associated front-panel CAL control for approximately 360 mV at the base of A14Q9.

f. Set FILTER switch to 1. Use non-metallic screwdriver and adjust A14L1 for maximum output at J7; recheck, on SD1010B, adjustment of front-panel FREQ control for maximum output.

Do not replace instrument bottom cover at this time.

4.2.6 AC Input/Output (A1), Output Section

a. Remove power, extend card A1, and re-apply power.

b. Use oscilloscope and check at A1TP3 for 8V p-p ±1V p-p.

c. Check at pin U of A1 card for 6V p-p (5.8V to 6.2V p-p).

d. Check at A1TP6 for a single-sideband envelope, ≈360 mV p-p.

e. Disconnect sweep oscillator from SIGNAL INPUT; connect a DVM to A1TP9.

f. Adjust A1R71 for +15V (14V to 16V) at A1TP9.

g. Reconnect sweep oscillator to SIGNAL INPUT and adjust for 400-Hz, 1 Vrms input.

h. Connect rms voltmeter to A1TP9 and adjust A1R68 for 10 Vrms.

i. Remove power, remove card A1 and extender, replace "key" between pins 13 and 14, and return A1 to its socket.

NOTE

If a 50-Hz BW filter is in position 2, set FILTER switch to 2 and adjust the FILTER 2 CAL adjust in the following procedure. Otherwise, select the FILTER that is available and adjust its associated CAL adjust.

j. Insert a ratio transformer (RT) between the sweep oscillator output and the SIGNAL INPUT connector.

k. Set RT to X0000 (0 dB) and adjust sweep oscillator for 400-Hz, 1 Vrms at the SIGNAL INPUT. Then set RT to 10000 (-20 dB).

l. Connect rms voltmeter to J4, UNITY GAIN FIL SIG OUTPUT. Adjust applicable front-panel FILTER CAL adjust for 100 mV rms at J4.

m. Set RT to X0000 (0 dB) and adjust A14R91 for 1 Vrms at J4. (R91 is a compensating potentiometer located on a small subassembly of card A14, accessible from the bottom of the instrument.)

n. Repeat steps k. through m. as required for proper outputs at 0 dB and -20 dB input levels.

o. Place instrument on bottom, but do not replace bottom cover at this time.

4.2.7 PSD (A4)

a. Remove power, extend card A4 (save "key"), and re-apply power.

b. Set RT to X0000 (0 dB) and ensure that the SIGNAL INPUT is 400-Hz, 1 Vrms.

c. Check that the RANGE and METER MULTIPLIER switches are both set to 1, and set MODE switch to .01, SINE AVG (SEC).

d. Adjust A4R13 for full-scale reading on front-panel Signal Amplitude meter.

e. Set RT to 00300, connect DVM to A4TP6, and adjust A4R38 for 29.5 mV (29.3 to 29.7 mV). (Record reading for comparison in the next step.)

f. Connect DVM to A4TP8 and adjust A4R54 for same reading as A4TP6 (±0.1 mV).

g. Set RT to X0000 (0 dB). Connect DVM to A4TP6 and adjust A4R44 for 10V (9.9V to 10.1V).

h. Set RT to 00000. Set front-panel LOG DC ATTEN (dB) switch to -10.

Adjust A4R89 and A4R85 to mid-range of travel.

Connect jumper from A4TP8 to ground.

i. Connect DVM to A4TP13 and adjust A4R69 for 0V ±0.1 mV.

Remove jumper and return LOG DC ATTEN switch to (OPER) 0.

j. Connect DVM to A4TP8 and adjust RT for 10V (9.9V to 10.1V) at A4TP8.

k. Connect DVM to A4TP12 and adjust A4R89 for 400 mV (0 dB point).

l. Connect DVM to A4TP8 and adjust RT for 100 mV at A4TP8.

m. Connect DVM to A4TP12 and adjust A4R85 for 0V ±1 mV (-40 dB point).

n. Repeat steps j. through m. as necessary until the 0 dB and -40 dB points are correct.

o. Connect DVM to A4TP8 and adjust RT for 10 mV at A4TP8 (approximately -60 dB).

p. Recheck 0 dB and -40 dB points (steps j. through m.).

q. Remove power, remove A4 and extender, replace the "key" between pins 17 and 18, and return A4 to its socket.

r. If instrument is Model SD1012B-1, -2 (With Sine Reject), proceed to paragraph 4.2.8. If Model SD1012B, proceed to paragraph 4.2.9 and calibrate Channel 2.

4.2.8 Sine Reject (A3) (Model SD1012B-1 only)

If available, a 5-Hz crystal filter is used for this adjustment; otherwise use lowest BW filter. Also, if two crystal filters were previously installed in Channel 1, remove the crystal filter from position No. 2. The following procedure assumes a 5-Hz BW filter in position No. 1, and the filter removed from position No. 2.

a. Set FILTER switch to 1, RANGE switch to 1, and METER MULTIPLIER switch to 1. Adjust CHANNEL 1 SINE REJECT NULL to mid-range of travel.

b. Apply 400-Hz, 1 Vrms (full-scale) signal to SIGNAL INPUT of SD1012B and TUNING INPUT of SD1010B. On SD1010B adjust front-panel TUNING INPUT AMPL adjust for center-line (green area) reading on TUNING AMPLITUDE meter.

c. Calibrate FILTER 1 using the front-panel CONTROLS.

d. Set FILTER switch to 2 (no filter installed).

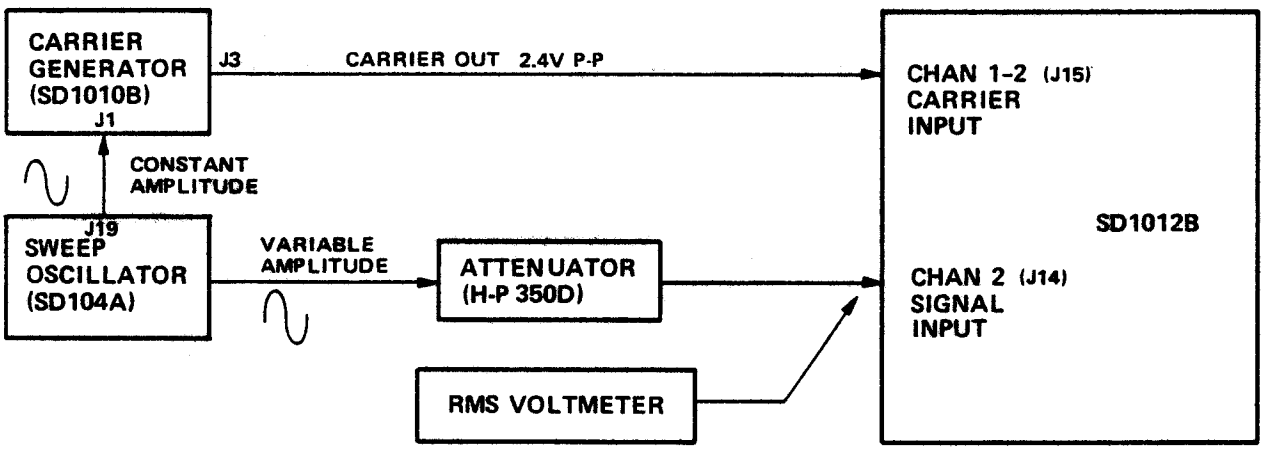
e. Connect rms voltmeter to J9, SINE REJECT OUTPUT, and adjust A3R26 for 1 Vrms ±0.1 dB.

f. Set FILTER switch to 1, and adjust front-panel Channel 1 Ø control and A3R1 for minimum output at J9; should be at least -32 dB below 1 Vrms.

g. Replace filter No. 2 (if applicable).

4.2.9 AC INPUT/OUTPUT (A8), Input Section (Channel 2)

Connect the SD1012B and test equipment as follows:



a. On the SD1010B, set the OPER/CAL switch in the OPER position and adjust the TUNING AMPL control for a centerline indication (green area) on the TUNING AMPLITUDE meter.

b. On Channel 2 of the SD1012B, set the RANGE (Vrms) and METER MULTIPLIER controls in the 1 position and the RELATIVE gain control fully clockwise to the switch detent position; set the FILTER selector in the 1 position.

c. Remove power to extend circuit card A8 and re-apply power.

d. With the sweep oscillator set for 400 Hz, ±4 Hz, adjust the Attenuator for 5 dB attenuation. Monitor the CHAN 2 SIGNAL INPUT with an rms voltmeter and adjust the sweep oscillator for 1 Vrms, ±10 mV.

e. On the SD1010B, adjust the FREQ control for maximum meter indication on the SD1012B. If the meter appears saturated (off scale), adjust the CHANNEL 2 FILTER 1-CAL control on the SD1012B for full scale.

f. Check rms voltage at A8TP1; should be 31.6 mV (30.97 to 32.23 mV).

g. At A8TP13, check for 0.234 Vrms (0.224 to 0.244 Vrms).

h. Switch CHANNEL 2 RANGE (Vrms) switch to the .3 position and adjust the Attenuator for 3 dB attenuation (this increases the input level by 12 dB). Adjust A8R23 until the OVERLOAD lamp glows dimly.

i. Adjust the Attenuator for 0 dB (increases level by 3 dB) and the OVERLOAD lamp should glow brightly.

Leave circuit card A8 extended and return RANGE switch to the 1 position.

4.2.10 Modulator (A6)

a. Remove attenuator, and adjust oscillator to provide SIGNAL INPUT of 1 Vrms at 2 kHz.

b. On AC Input/Output card A1, monitor A1TP3 with oscilloscope and adjust A1R32 for 8V p-p.

c. Remove power, remove card A1 and extender (do not replace the "key" at this time), and return A1 to its socket.

Re-apply power.

d. Connect wave analyzer to A6TP2. Tune wave analyzer for 0 dB at 100 kHz.

e. Alternately adjust A6R11 and A6C3 to decrease the 102-kHz signal to −50 dB or more below the 100-kHz signal.

4.2.11 Filter Driver (A14)

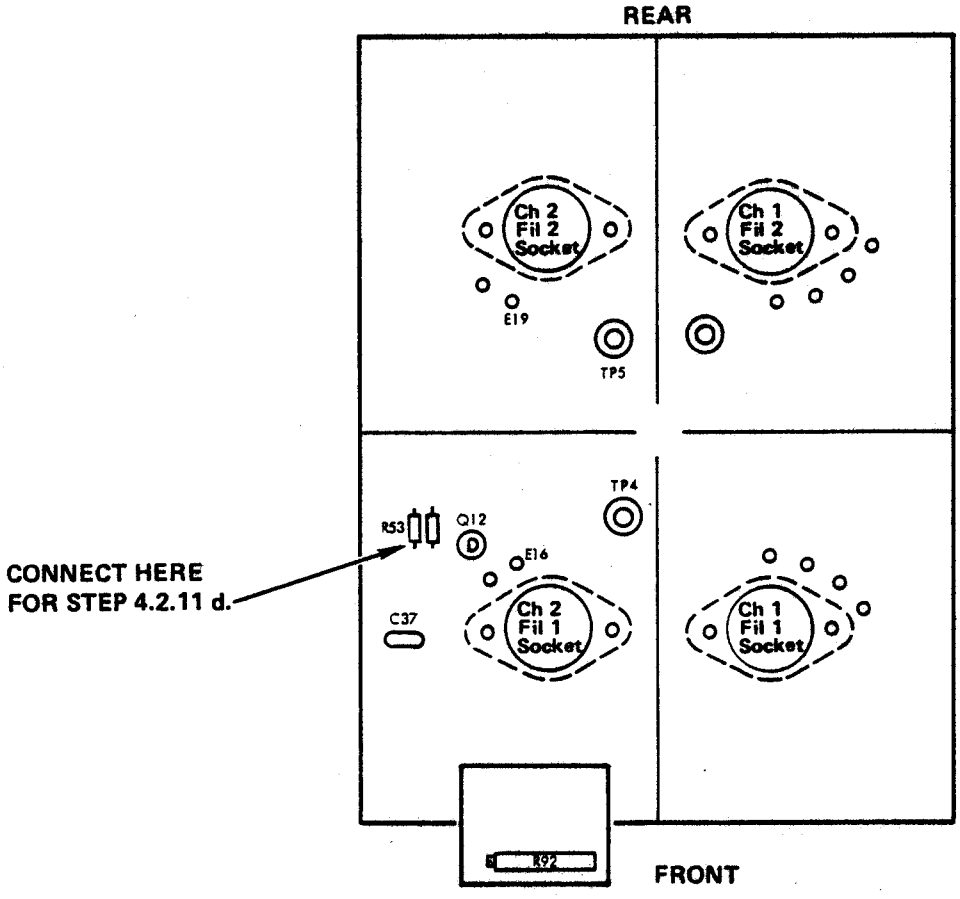
CAUTION

To ensure stability of the crystal filters, be sure that at least 1 hour has elapsed since the power was initially applied to the instrument.

a. Place instrument on right side (viewing instrument from the front).

b. Connect oscilloscope to J19, 100-kHz FIL I.F. On SD1010B, adjust front-panel FREQ control for maximum output.

c. Use oscilloscope and check that the gain is 5.6 or more between the following points: A14E16 (input) and A14TP4 (output), A14E19 (input) and A14TP5 (output). See drawing below for the relative location of these input and output points.



A14, Bottom View, Channel 2 Check Points

d. Connect rms voltmeter to base of A14Q12, junction of A14R53 and A14C37. (See drawing above.)

e. Sequentially set the FILTER switch to 1 and 2, and adjust the associated front-panel CAL control for approximately 360 mV at base of A14Q12.

f. Set FILTER switch to 1. Use non-metallic screwdriver and adjust A14L4 for maximum output at J19; recheck, on SD1010B, adjustment of front-panel FREQ control for maximum output.

g. Replace cover over crystal filters. (Do not replace instrument bottom cover at this time.)

4.2.12 AC Input/Output (A8), Output Section

a. Remove power, extend card A8, and re-apply power.

b. Use oscilloscope and check at A8TP3 for 8V p-p (7V to 9V p-p).

c. Check at pin U of A8 card for 6V p-p (5.8V to 6.2V p-p).

d. Check at A8TP6 for a single-sideband envelope, approximately 360 mV p-p.

e. Disconnect sweep oscillator from SIGNAL INPUT; connect a DVM to A8TP9.

f. Adjust A8R71 for +15V (+14V to +16V) at A8TP9.

g. Reconnect sweep oscillator to SIGNAL INPUT and adjust for 400-Hz, 1 Vrms input.

h. Connect rms voltmeter to A8TP9 and adjust A8R68 for 10 Vrms.

i. Remove power, remove card A8 and extender, replace "key" between pins 13 and 14, and return A8 to its socket.

NOTE

If a 50-Hz BW filter is in position 2, set FILTER switch to 2 and adjust the FILTER 2 CAL adjust in the following procedure. Otherwise, select the FILTER that is available and adjust its associated CAL adjust.

j. Insert a ratio transformer (RT) between the sweep oscillator output and the SIGNAL INPUT connector.

k. Set RT to X0000 (0 dB) and adjust sweep oscillator for 400-Hz, 1 Vrms at the SIGNAL INPUT. Then set RT to 10000 (-20 dB).

l. Connect rms voltmeter to J16, UNITY GAIN FIL SIG OUTPUT. Adjust applicable front-panel FILTER CAL adjust for 100 mV rms at J16.

m. Set RT to X0000 (0 dB) and adjust A14R92 for 1 Vrms at J12. (R92 is a compensating potentiometer located on a small subassembly of card A14, accessible from the bottom of the instrument.)

n. Repeat steps k. through m. as required for proper outputs at 0 dB and -20 dB input levels.

o. Replace bottom cover and place instrument on bottom.

4.2.13 PSD (A5)

a. Remove power, extend card A5 (save "key"), and re-apply power.

b. Set RT to X0000 (0 dB) and ensure that the SIGNAL INPUT is 400-Hz, 1 Vrms.

c. Check that the RANGE and METER MULTIPLIER switches are both set to 1, and set MODE switch to .01, SINE AVG (SEC).

d. Adjust A5R13 for full-scale reading on front-panel Signal Amplitude meter.

e. Set RT to 00300, connect DVM to A5TP6, and adjust A5R38 for 29.5 mV (29.3 to 29.7 mV). (Record reading for comparison in the next step.)

f. Connect DVM to A5TP8 and adjust A5R54 for same reading as A5TP6 (±0.1 mV).

g. Set RT to X0000 (0 dB). Connect DVM to A5TP6 and adjust A5R44 for 10V (9.9 to 10.1V).

h. Set RT to 00000. Set front-panel LOG DC ATTEN (dB) switch to -10.

Adjust A5R89 and A5R85 to mid-range of travel.

Connect jumper from A5TP8 to ground.

i. Connect DVM to A5TP13 and adjust A5R69 for 0V ±0.1 mV.

Remove jumper and return LOG DC ATTEN switch to (OPER) 0.

j. Connect DVM to A5TP8 and adjust RT for 10V at A5TP8.

k. Connect DVM to A5TP12 and adjust A5R89 for 400 mV (0 dB point).

l. Connect DVM to A5TP8 and adjust RT for 100 mV at A5TP8.

m. Connect DVM to A5TP12 and adjust A5R85 for 0V ±1 mV (-40 dB point).

n. Repeat steps j. through m. as necessary until the 0 dB and -40 dB points are correct.

o. Connect DVM to A5TP8 and adjust RT for 10 mV at A5TP8 (approximately -60 dB).

p. Recheck 0 dB and -40 dB points (steps j. through m.).

q. Remove power, remove A5 and extender, replace the "key" between pins 17 and 18, and return A5 to its socket.

r. If instrument is Model SD1012B-2 (With Sine Reject in Channels 1 and 2), proceed to paragraph 4.2.14. If Model SD1012B(-1), disconnect all test equipment, replace instrument top cover, and place instrument in service. To ensure overall operation, perform the operational checkout procedure of paragraph 2.2 in Section II in this manual.

4.2.14 Sine Reject (A7) (Model SD1012B-2 only)

If available, a 5-Hz crystal filter is used for this adjustment; otherwise use lowest BW filter. Also, if two crystal filters were previously installed in Channel 2, remove the crystal filter from position No. 2. The following procedure assumes a 5-Hz BW filter in position No. 1, and the filter removed from position No. 2.

a. Set FILTER switch to 1, RANGE switch to 1, and METER MULTIPLIER switch to 1. Adjust CHANNEL 2 SINE REJECT NULL to mid-range of travel.

b. Apply 400-Hz, 1 Vrms (full-scale) signal to SIGNAL INPUT of SD1012B and TUNING INPUT of SD1010B. On SD1010B, adjust front-panel TUNING INPUT AMPL adjust for center-line (green area) reading on TUNING AMPLITUDE meter.

c. Calibrate FILTER 1 using the front-panel controls.

d. Set FILTER switch to 2 (no filter installed).

e. Connect rms voltmeter to J21, SINE REJECT OUTPUT, and adjust A7R26 for 1 Vrms.

f. Set FILTER switch to 1, and adjust front-panel Channel 2 ϕ control and A7R1 for minimum output at J21; should be at least -32 dB below 1 Vrms.

Disconnect power cord from primary power source, replace filter No. 2, replace filter compartment cover and instrument top cover, and place instrument in service. To ensure overall operation, perform the operational checkout procedure of paragraph 2.2 in Section II of this manual.

4.3 PARTS REPLACEMENT

Except for some special SDC specification-controlled parts listed in Table 4-2, which must be ordered from Spectral Dynamics Corporation, standard electronic parts have been used throughout the instrument. Spectral Dynamics Corporation maintains a complete stock of all parts and complete printed circuit card assemblies used in the instrument.

When ordering a replacement part or assembly, be sure to include the reference designation, the part number or manufacturer's designation, and a complete description; include also the instrument name, model number, and serial number.

Table 4-2. Special Replaceable Parts List

Reference Designator	Description	Part Number Mfr. Designation
A1, A8	AC Input/Output Assembly	10942-1
A2, A6	Modulator Assembly	11204-1
A3, A7	Sine Reject Assembly	10954-1
A4, A5	PSD Output Assembly	10948-1
A9	Power Supply Assembly	10958-1
A10, A11, A12, A13	PSD Plug-In Assembly	11312-*
A14	Filter Driver Assembly	11188-1
------	Printed-Circuit Board Extender	23060-1
A15	Filter Phase Assembly	11210-1
	(Cont'd)	

*See DWG. NO. 11386, Sheet 2 of 4, for Assembly Dash Number Details.

Table 4-2. Special Replaceable Parts List
(Cont'd)

Reference Designator	Description	Part Number Mfr. Designation
A4A1, A5A1	709C (Factory Selected)	20013-244
DS1, DS4	OVERLOAD Indicator Lamps	CF03-ACS-2102
DS2, DS3	FILTER Indicator Lamps	CF03-WTS-2102
M1, M2	Meter, Signal Amplitude	20013-198
P11	AUX FUNCTIONS, Jumpered Plug	SDC 11514
P22	AUX FUNCTIONS, Jumpered Plug	SDC 11515
S1/S4/R18, S7/S9/R19	RANGE (Vrms) Switch/CAL Switch/ RELATIVE Control	20013-165
S2/S6, S8/S10	METER MULTIPLIER/LOG DC ATTEN (dB)	20013-164 20013-164
S3	FILTER Switch	20013-207
S5	MODE Switch	20013-209
S11/DS5	POWER Switch/Indicator	10529000
T1	Transformer, Power	20013-195
	Power Cord	Belden 17258-S

APPENDIX A

CALCULATING VALUES OF SWEEP RATE CONTROL & AVERAGING TIME RESISTORS USED IN PSD PLUG-IN ASSEMBLIES (11312)

The standard PSD Plug-in Assemblies (11312) for the SD1012B are designed for use over the frequency range of 5 Hz to 5 kHz; for example, a Model SD104A-5 Sweep Oscillator with its MULTIPLIER (A) switch set to 1, or a Model SD114 Sweep Oscillator Servo. (Refer to Table A-1.) In these cases, the oscillators have a maximum sweep rate of 100 Hz/s and a sweep rate sensitivity of 0.1 V/Hz/s. (Sweep rate sensitivity equals 10 volts divided by the maximum sweep rate.) For proper sweep rate control when operating in other than the 5 Hz to 5 kHz frequency range, the particular resistor (R5, R6, R7, or R8) on assembly 11312 that is associated with the desired PSD CONFIDENCE (MODE switch) setting, must be replaced. The correct resistor value is calculated as follows:

a. Determine the filter bandwidth (BW) to be used and the "number of degrees of freedom" (N) desired. Refer to Table 2-3 in the basic SD1012B manual and determine which PSD CONFIDENCE switch position should be used. The associated resistors on assembly 11312 for each switch position are as follows:

PSD Confidence Switch Position	Resistor on Assembly 11312
1	R4 & R5
2	R3 & R6
3	R2 & R7
4	R1 & R8

b. Compute the analysis sweep rate (SR):

$$\text{Analysis SR}_{\text{(Hz/s)}} = \frac{BW^2}{N}$$

(The analysis sweep rate for all SDC standard filter bandwidths, 1.5 Hz through 200 Hz, is given in Table 2-3 of the SD1012B manual.)

c. Using the computed analysis sweep rate, SR, calculate the sweep rate control voltage (V_C) to be supplied by the PSD Plug-in Assembly:

$$V_C = \frac{SR \times 10V}{SR_{max}}$$

Since $\frac{10V}{SR_{max}}$ = SR sensitivity,

$$V_C = SR \times \text{SR sensitivity}$$

TABLE A-1

MODEL NUMBER	FREQUENCY RANGE	MULTIPLIER(A) SETTING	SR Max (Hz/s) w/10 Vdc Input	SR Sensitivity (V/Hz/s)
SD104A-5	50 Hz - 50 kHz	10	1000	0.01
	* 5 Hz - 5 kHz	* 1	100	0.1
	0.5 Hz - 500 Hz	.1	10	1
	0.05 Hz - 50 Hz	.01	1	10
	0.005 Hz - 5 Hz	.001	0.1	100
SD104A-2	20 Hz - 20 kHz	10	1000	0.01
	* 2 Hz - 2 kHz	* 1	100	0.1
	0.2 Hz - 200 Hz	.1	10	1
	0.02 Hz - 20 Hz	.01	1	10
SD104A-1	10 Hz - 10 kHz	10	200	0.05
	1 Hz - 1 kHz	1	20	0.5
	0.1 Hz - 100 Hz	.1	2	5
	0.01 Hz - 10 Hz	.01	0.2	50
SD104-10	20 Hz - 20 kHz	20	400	0.025
	10 Hz - 10 kHz	10	200	0.05
	* 5 Hz - 5 kHz	* 5	100	0.1
	2 Hz - 2 kHz	2	40	0.25
	1 Hz - 1 kHz	1	20	0.5
	0.5 Hz - 500 Hz	.5	10	1
	0.2 Hz - 200 Hz	.2	4	2.5
	0.1 Hz - 100 Hz	.1	2	5
	0.05 Hz - 50 Hz	.05	1	10
	0.02 Hz - 20 Hz	.02	0.4	25
SD114	* 5 Hz - 5 kHz	*-------	100	0.1

*No changes are required to standard PSD Plug-In Assemblies 11312 when operating in this range.

d. Determine value of associated sweep rate resistor (R5, R6, R7 or R8):

$$R = \frac{V_C \times 15{,}000}{15 \text{ volts} - V_C}$$

In the above equation, 15,000 is the approximate total resistance of the series divider network (assuming that the Sweep Rate Adjust, 2k ohm potentiometer is centered); and 15 volts is the supply voltage across the resistor divider network.

e. Determine value of associated averaging time resistor (R1, R2, R3 or R4):

$$R = \frac{N}{4\,BW} \times 100\,k\Omega$$

The following is a typical example:

Given:

Frequency range of operation is 50 Hz to 50 kHz (Source is an SD104A-5 Sweep Oscillator with its MULTIPLIER (A) switch set to 10.)

FILTER BW = 10 Hz; desired N = 200.

From Table 2-3 in SD1012B manual, with BW = 10 and N = 200, PSD CONFIDENCE switch position 4 is selected. Therefore, associated resistor R8 must be calculated and replaced with the closest value of 1% 1/4W resistor.

Proceed as follows:

1) Calculate required analysis sweep rate, SR:

$$SR = \frac{BW^2}{N} = \frac{10^2}{200} = 0.5 \text{ Hz/s}$$

2) Calculate sweep rate control voltage, V_C:

From Table A-1, the SR sensitivity is 0.01 for MULTIPLIER (A) switch setting 10 on the SD104A-5. Therefore,

$$V_C = SR \times SR\ sens = 0.5 \text{ Hz/s} \times 0.01 \text{ V/Hz/s} = 0.005 \text{ Volts}$$

3) Calculate R8:

$$R8 = \frac{V_C \times 15{,}000}{15 \text{ volts} - V_C} = \frac{0.005 \times 15{,}000}{15 - 0.005} = \approx 5 \text{ ohms}$$

Replace R8 with a 4.99 ohm 1% 1/4W resistor.

4) Calculate R1: $R1 = \frac{N}{4\,BW} \times 100k = 500k$

Replace R1 with a 499k 1% ¼W resistor.