
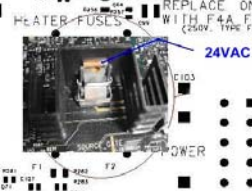
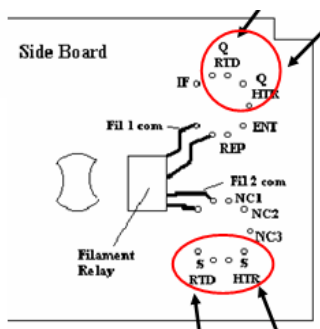


5973/5 MSD - Typical Test Points

Supply voltages: All test points are at the Mainboard. Measure from the test point to ground. Use the chassis or a screw as the ground point.	Voltage	Range
	ACOM	-.05 to .05
	+5 VDC	4.8 to 5.2
	+/- 10 VDC	-9.99 to -10.01
	+/-15 VDC	14.45 to 15.55
	+24 VDC	22.6 to 26.7
	+/- 280 VDC	237 to 297

Heating		Voltage	Location
	Fuses F3/F4	110 VAC	at AC board
	24 VAC	0 - 50 typical 24	 Fuses, F1 and F2 at Mainboard
	24 V squared	0 – 25 Typical 6,8	 Heat sink at Mainboard

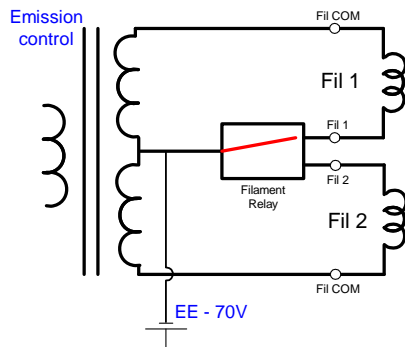
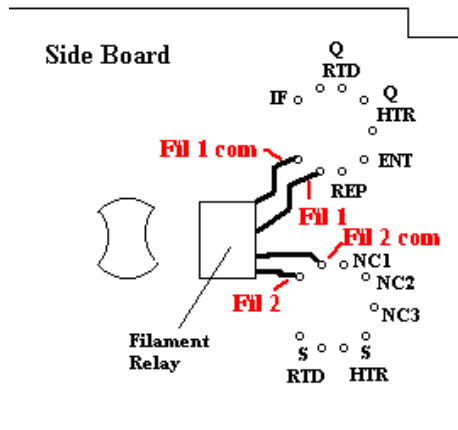
	Testpoint	Ohm/Volt	Location
	Source Heater	19 Ohm 15 Ohm*	Sideboard Q HTR and S HTR * Japanese high temp heater only
	Quad Heater	9.6 Ohm	Sideboard Q RTD and S RTD
	Source sensor	179 Ohm ¹⁾	1) @ 230°C/150°C, $R = 100 + (.35 * t)$
	Quad sensor	153 Ohm ¹⁾	
	Source Temp	2.24 V ²⁾	2) @ 230°C/150°C (10 mV/°C) Mainboard
	Quad Temp	1.46 V ²⁾	

HI-VAC Signal and HI-VAC Signal Power Cable:

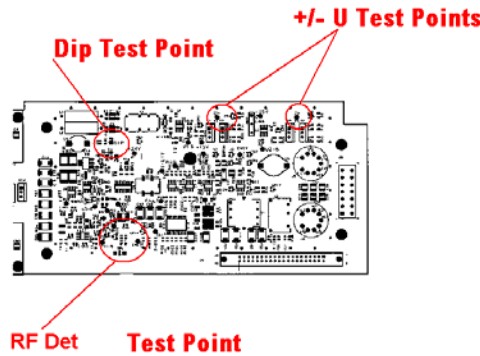
Fan	Pin 5,6,7 on the High Vacuum Signal Cable					
Cal Valve	pin 8,9 on the High Vacuum Signal Cable or measure on Cal Valve					
Too Cold	Pin 1,2 on the High Vacuum Signal Cable					
Too Hot	Pin 3,4 on the High Vacuum Signal Cable					
DP Heater	pin 2,7 on the High Vacuum Power Cable					
	Fan	Cal Valve	Too Cold	Too Hot	DP heater (110V)	DP heater (200V-240V)
Ohm	OPEN 5-6, 6-7, 5-7	89.5 ohms			30	100
Cold system			Open	Closed		
Hot system			Closed	Closed		
TOO Hot system			Closed	Open		

5973/5 MSD - Typical Test Points

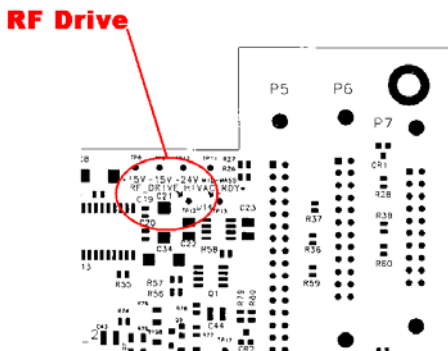
Ion Source:



Sideboard:



Mainboard:



Lens	Testpoint	Display in volt
Repeller	REP	(EI/PCI: +, NCI : -)
Ion Focus	IF	(EI/PCI: -, NCI : +)
Entrance Lens	ENT	Offset 0 to 64V Lens(gain) 0 to 128mV/AMU (EI/PCI: -, NCI : +)

If voltages are NOT OK, check the resistance of REP/IF, REP/ENT, REP to GND, IF/ENT. All should be > 10 MOhm

Filaments:

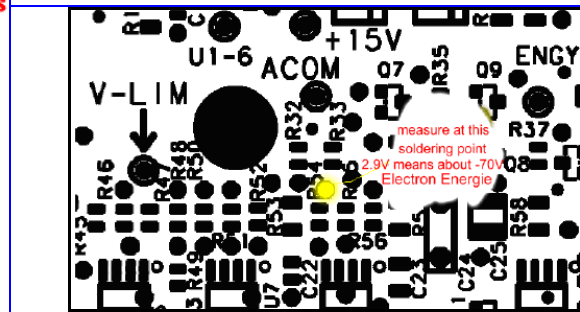
Voltage of FIL to GND - 70VDC (**negative!**) **Note 1**

Resistance of "HOT" FIL1 to FIL1 COM while selecting filament 2 < 2 Ohm.

Resistance of "HOT" FIL2 to FIL2 COM while selecting filament 1 < 2 Ohm

Note 1: If -70V are not present:

- Resistance FIL to GND > 10 MOhm
- Electron Energy – measure at soldering point (sideboard) R54: 2.9VDC means the drive signal from the mainboard is present, so should measure – 70V at the Sideboard (except if filament is on ground!)



Quadupole: ^{1) 5973 only}				
Test Point	100 AMU	800 AMU	1050 AMU	Location
Dip	0.1	0.4	0.6	Sideboard
RF Det	1.1	7.7 9.5 ¹⁾	9.5	Sideboard
U+	23.7	202 191 ¹⁾	252	Sideboard
U-	-23.7	- 202 -191 ¹⁾	-252	Sideboard
RF Drive	-1.2	-7.9 -9.8 ¹⁾	-9.8	Mainboard

5973/5 MSD - Typical Test Points

Electron Multiplier:						
EMV Set Point	0	200	400	1000	1500	3000
EMV Monitor VDC	0.006	.666	1.326	3.31	4.98	9.92

HED and DIF:

Detector/Ion Focus	HED Monitor	HED Set Point	ION POLARITY
~ - 95 VDC ¹⁾	+ 2 V	ON	POS
0 VDC	+ 5 V	OFF	POS/NEG
~ + 95 VDC ¹⁾	+ 8 V	ON	NEG
	0 VDC	No response from HED supply/defective	

To turn the HED ON execute the command: `MSPARM HED,,1`

To turn the HED OFF execute the command: `MSPARM HED,,0`

SPACE

¹⁾ The output voltage from the power supply is set to +/- 350/650VDC!

Noise from HED or EM or electronic:

- **Troubleshooting:**

- Put emission = 0, PFTBA closed, HED=ON and EMV=3000 and *REPEAT PROFILE* if counts are higher than around 10 THERE is NOISE
- HED = OFF and EMV = 3000 – no more noise -> HED noise
- HED = OFF, EMV = 0 -> no more noise -> EM horn
- HED=OFF and EMV=0 -> still noise -> remove signal cable -> still noise -> log amp

- **Fix HED noise:**

- Run over night at 800 AMU profile, emission=0, PFTBA closed while Quad and Ion Source are at maximum temperature.
- Clean HED assembly, Acetone and Ultrasonic bath (not EM horn)

- **EM horn noise:**

- Exchange horn

- **Electronic noise:**

- Log amplifier, signal cable

- **Order:**

need EM horn – order for onsite

not needed HED assembly (comes with EM horn installed)



To turn the HED ON execute the command: `MSPARM HED,,1`



To turn the HED OFF execute the command: `MSPARM HED,,0`

^
SPACE

5973/5 MSD - Typical Test Points

Vacuum Status - Diffusion Pump System (5973/5):	
LED at the AC board	Foreline Pump Status
Off: Means power is off to the diffusion pump, could be fault or in transition state. Blinking: Means that the power is being applied to the pump. It is a power demand circuitry. Solid Red: In less than 8 seconds it will be turned off, you will initially see it on as a line check and then it turns off during the transition period.	< 300 mTorr

Vacuum Status - Turbo pump:				
Status	LED at the AC board	Turbo Power Supply and Controller	Turbo Pump Power Supply	Turbo Pump Controller
5973 MSD With combined turbo controller and turbo power supply	RED LED at the AC board ON -> power send to the Turbo Pump	TP NORMAL LED: _ON_ 2) if TP speed > 80%		
5973 MSD With separate turbo controller and turbo power supply	RED LED at the AC board ON -> power send to the Turbo Pump		YELLOW LED: _ON_ Supply voltage present	NORMAL LED: _ON_ 1) 3 RED LED's: 1: _ON_ 2: _ON_ 3: _ON_
5975 MSD (turbo version)	RED LED at the AC board ON -> power send to the Turbo Pump			 _ON_ 3)  _OFF_

1) GREEN LED means Turbo pump controller get supply voltage.		
2) For the combined turbo controller and turbo power supply a GREEN LED means that the Turbo pump is above 80% speed.		
3) Normal one LED is ON, glowing green:		
		Cause
Glows green		<ul style="list-style-type: none"> Power unit OK Function "pumping station ON" carried out
Flashes green		<ul style="list-style-type: none"> Power unit OK Pumping station OFF
Blinks green		<ul style="list-style-type: none"> Mains power supply failure
	Glows red	<ul style="list-style-type: none"> Collective malfunction (e.g. run-up time error, over-temperature, turbo pump or TC100)
	Blinks red	<ul style="list-style-type: none"> Warning, e.g. mains power supply failure

5973/5 MSD - Typical Test Points

5975 MSD Ion Gauge Controller:



Command: do_gauge

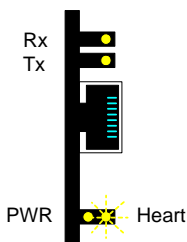
If OFF, just turn ON with command. If RED/Error power cycle the MSD. Or use the IonGaugeMonitor utility to troubleshoot ev. turn on the filament.

See DVD1 x:\I_Reference Material\IonGaugeMonitor

Main Board – 3 LEDs:

Normal State	Power On	This Green LED is normally solid green after the turn on cycle.
	MS ON	This Yellow LED is normally on when power is applied to the electronics
	Cal Valve On	The Yellow LED is on only when the cal valve is open
During turn on conditions	<ol style="list-style-type: none"> 1. Turn on the MSD 2. All three LEDs are flashing at the same rate and same time, this is an indication that the firmware has not been downloaded to the smartcard 3. When firmware is in the download phase you will see just the power on led flash 4. When download is complete then only the Power On LED is left on. <p>Turn on faults: The initial MSD error messages can not be read by the ChemStation; they can be read as binary from the flashing LEDs.</p>	

SmartCard - 4 LEDs:



Rx + Tx:	Send and Receive Transmission from LAN. Normal both ON. Rx OFF – no MSD Chemstation active
PWR	Power On LED
Heart	Health LED – normal blinking