

## AVMS FACILITIES

ACV Function	4920M	4920
Voltage (8 ranges)	100mV - 1100V	90mV - 1100V
Frequency range	10Hz - 1MHz	1Hz - 1.25MHz
Input(s)	N Type	N (A) or 4mm posts (B)
Spot Calibration ?	NO	YES
Transfer Mode (AC-DC)	NO	YES
MilliVolt option	NO	0.9mV - 110mV
WBV Function	4920M	4920
Voltage	2 ranges 0.1 - 3.5V	One range 0.9 - 3.5V
Frequency range	10Hz - 20MHz	10Hz - 50MHz
Input	N Type	N type on remote unit

### ACV Input impedance :

3mV - 1V ranges = 404K $\Omega$  shunted by 90pF  
 3V - 100V ranges = 124K $\Omega$  shunted by 150pF  
 300V & 1KV ranges = 404K $\Omega$  shunted by 90pF

### WBV Input impedance :

all ranges = 50 $\Omega$

## AVMS SPECIAL CALIBRATION SEQUENCE

ACV Function

(N = Normal cal mode, S = Special Cal mode)

Cal type	AVMS Range	Input	Freq	Cal Menu
Frequency	1 or 10V	100%	1E6	N, Freq
Filter Cal	10V	6V	1E3	S, Filt
30% LF Cal [1]	10V	3V	1E3	N
100% LF Cal [1]	10V	10V	1E3	N
100% HF Cal [1,2]	10V	10V	1E6	N
Linearity High	10V	10V	1E6	S, ALin
Linearity Mid (4920)	10V	3V	1E6	S, ALin
Linearity Low (4920M)	10V	2V	1E6	S, ALin
Linearity Low (4920)	10V	1V	1E6	S, ALin
DC Cal High (4920)	10V	±10V	DC	S, AcDc
DC Cal Low (4920)	3V	±3V	DC	S, AcDc
Flatness Cals	10V	10V	A, B, C, D	S, Flat
<b>Then for all other ranges:</b>				
30% LF Cal [1]	Range	0.3R	1E3	N
100% LF Cal [1]	Range	1.0R	1E3	N
100% HF Cal [1,2]	Range	1.0R	1E6	N
Flatness Cals	Range	1.0R	A, B, C, D	S, Flat

**Notes:**

1. These are the points required for calibration during Routine Cal.
2. 100% HF Cal is not performed during Special cal (same as Flatness 'D').

# AVMS FLATNESS CALIBRATION FREQUENCIES

Range	Flatness Band			
	A	B	C	D
0.3V - 10 V	Range/50KHz	Range/200KHz	Range/500KHz	Range/1MHz
30V & 100V	Range/50KHz	Range/200KHz	19.9V/500KHz	19.9V/1MHz
300V	Range/10KHz	Range/20KHz	Range/50KHz	Range/100KHz
1000V	Range/10KHz	Range/20KHz	700V/500KHz	500V/100KHz

## AVMS SPECIAL CALIBRATION SEQUENCE

WBV Function

(N = Normal cal mode, S = Special Cal mod)

Cal type	AVMS Range	Input	Freq	Cal Menu
Linearity (4920M) [1]	3V	None	N/A	S, WLin
Linearity (4920) [1,2]	3V	None	N/A	S, ALin
30% LF Cal [3]	3V	3V	1E3	N
100% LF Cal [3]	3V	3V	1E3	N
Flatness Cal (4920M)	3V	3V	20MHz	S, Flat
Flatness Cal (4920)	3V	3V	5MHz	S, Flat
Flatness Cal (4920)	3V	3V	10MHz	S, Flat
Flatness Cal (4920)	3V	3V	30MHz	S, Flat
Flatness Cal (4920)	3V	1V [4]	50MHz	S, Flat
30% LF Cal (4920M)	1V [5]	0.3V	1E3	N
100% LF Cal (4920M)	1V [5]	1V	1E3	N
Flatness Cals (4920M)	1V [5]	1V	As ACV 1V	S, Flat

**Notes:**

1. Wide band linearity may be performed before frequency calibration.
2. On 4920, WLin is performed by selecting WBV, then special cal ALin.
3. Points required for Routine calibration.
4. 1V/50MHz as test system cannot drive 3V/50MHz.
5. Although the WBV connector is used for 4920M 1V Wide Band range, the input signal is routed from the WBV unit to the ACV pre-amp. Input impedance is 50Ω set in the WBV unit.

## AVMS CALIBRATION METHOD

Use characterised Calibrator?

Need super stable calibrator.

Characterisation to include load regulation.

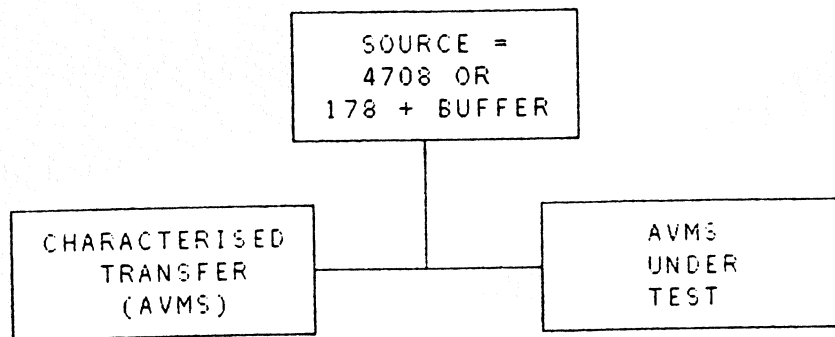
Still need Thermal Voltage Converter (TVC) system for wide band.

Use TVC systems for all calibrations/measurements?

Accurate - BUT:

Would take > 1 week per instrument.

So:



Transfer AVMS has been measured against TVC's.

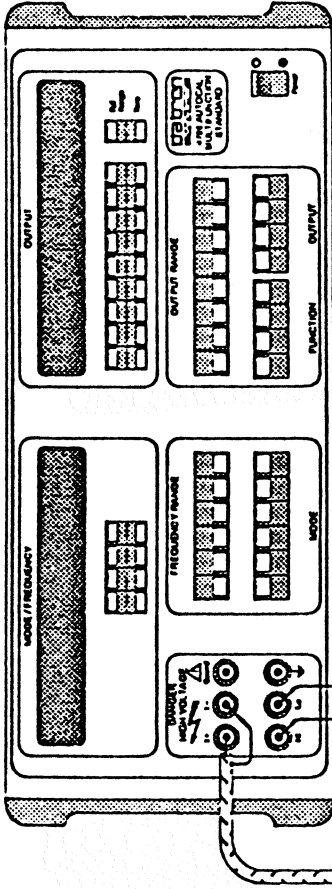
Error figures used to compute Absolute ACV from source.

Use Non nominal calibration.

Losses at HF - use precision connectors and ensure tightness constant.

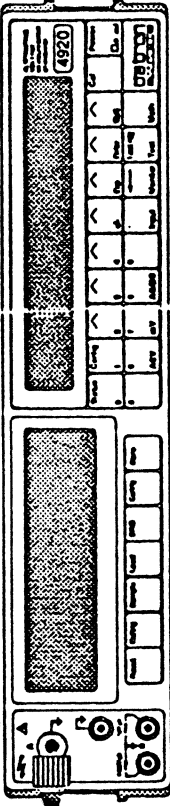
AC-DC Transfer - Use Accurate DC from calibrator.

DC 4 wire sense point? - approx 1uV loss in connection.

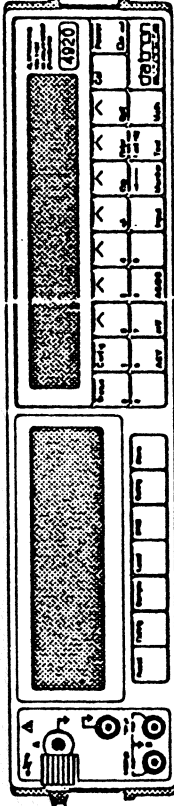


Alternating Voltage Source

'Master' 4920

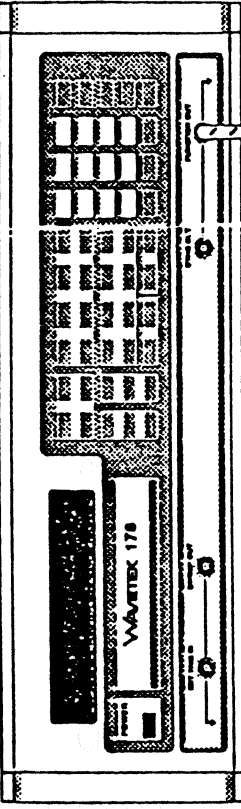


4920 'Unit under Calibration'

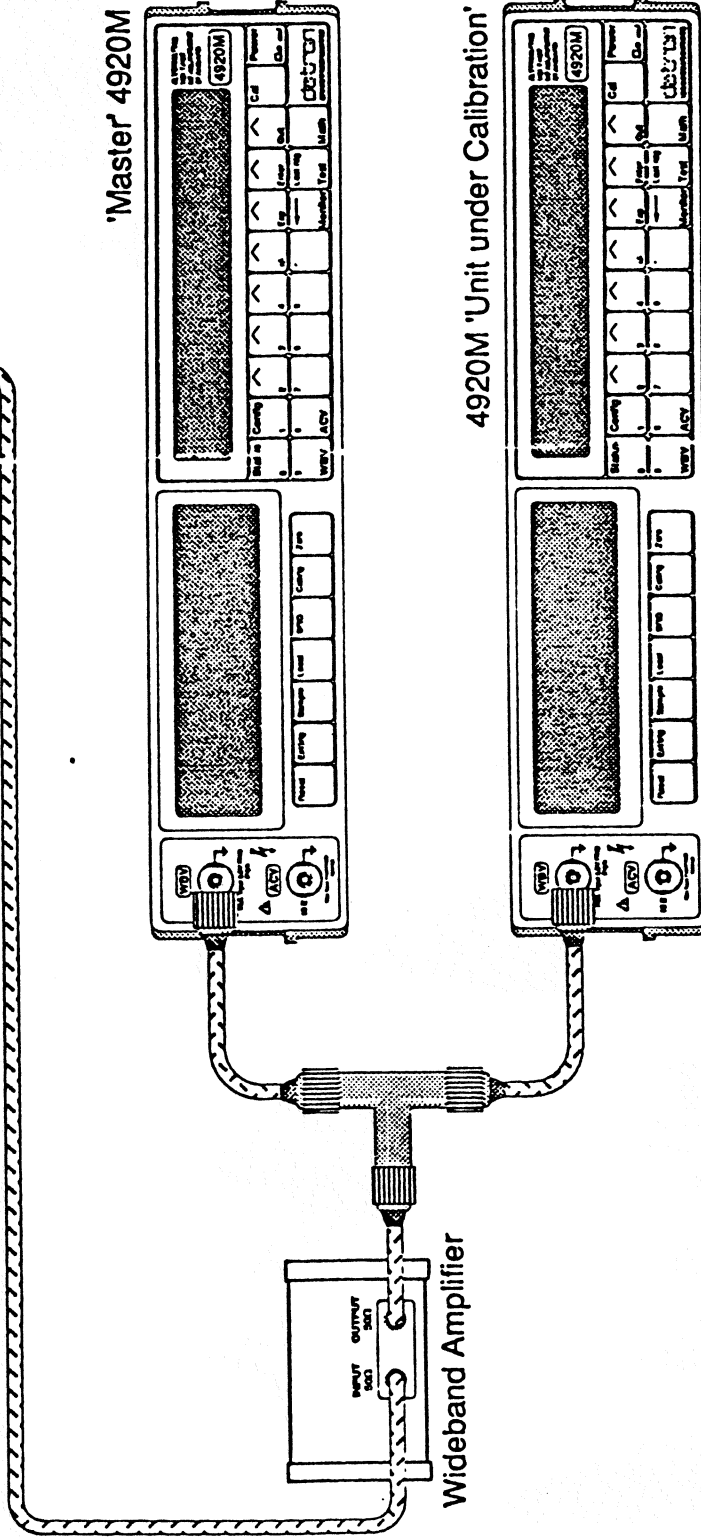


# Product Calibration System - High Accuracy Function





Wideband Alternating Voltage Source



'Master' 4920M

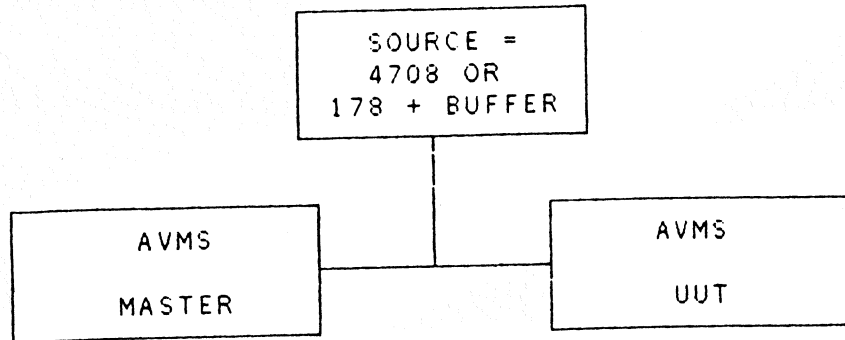
4920M 'Unit under Calibration'

Wideband Amplifier

# Product Calibration System - Wideband Function



## AVMS CALIBRATE/VERIFY SEQUENCE



### Determine absolute source voltage

Trigger and read Master.

Apply Master error figure.

### Calibrate

Use absolute source value in "Set Cal"

### Verify Calibration

Trigger and read both AVMS.

Apply Master error figure to get absolute voltage.

Determine UUT error.



## 4920 TRANSFER

Advantage of Transfer mode

Remove Pre-Amp gain drifts.

Remove reference drifts negligible.

Can give indication of health of Cal system.

### DC Cal

AC-DC difference is assumed to be range independant,  
DC cal on 10V range only.

10V range AC gain and linearity cals must precede DC cal.

DC cal = input +ve & -ve DC, calculate DC RMS  
value calculate and store AC-DC difference.

### Transfer Measurement

Do DC+ and DC- measurement

Calculate DCRMS to get DC gain and hence AC gain using AC-DC difference

Do AC measurement

Calculate AC value from raw A-D output and calculated AC gain

## 4920 OR 4920M AS MASTER

Test system supports either 4920 or 4920M as Master.

### 4920M Master

We have some stability data on a 4920M.

4920M wide band is proven and works to 50MHz.

4920 UUT's - Lo and earth should NOT be connected.

### 4920 Master

ONLY 1 of 4920 UUT or 4920 Master to have Lo and earth connected.

4920 Master Lo and earth should NOT be connected for 4920M UUT.

4920 has DC capability.

User may chose to use DC accuracy from 4920 or 4708.

### Stability audit

4920 AC-DC difference is set on 10V range.

Gain shifts on the Master AVMS will show as 4920 UUT DC errors (ex 10V).  
(DC gain = AC gain + AC-DC difference)

Reference drift not detected as DC cal depends on 10V AC gain cal.

If Master is 4920, make manual DC measurements to check 10V gain shift.

4920 Master DC and 4708 DC difference is compared to a warning level.  
If warning level is exceeded, both results and difference  
are written to "DCERRORS.RES"

## 4920 MILLIVOLTS

4 Additional Ranges 0.9mV - 110mV.

No Calibration required - but need to functionally check x 30 amp.

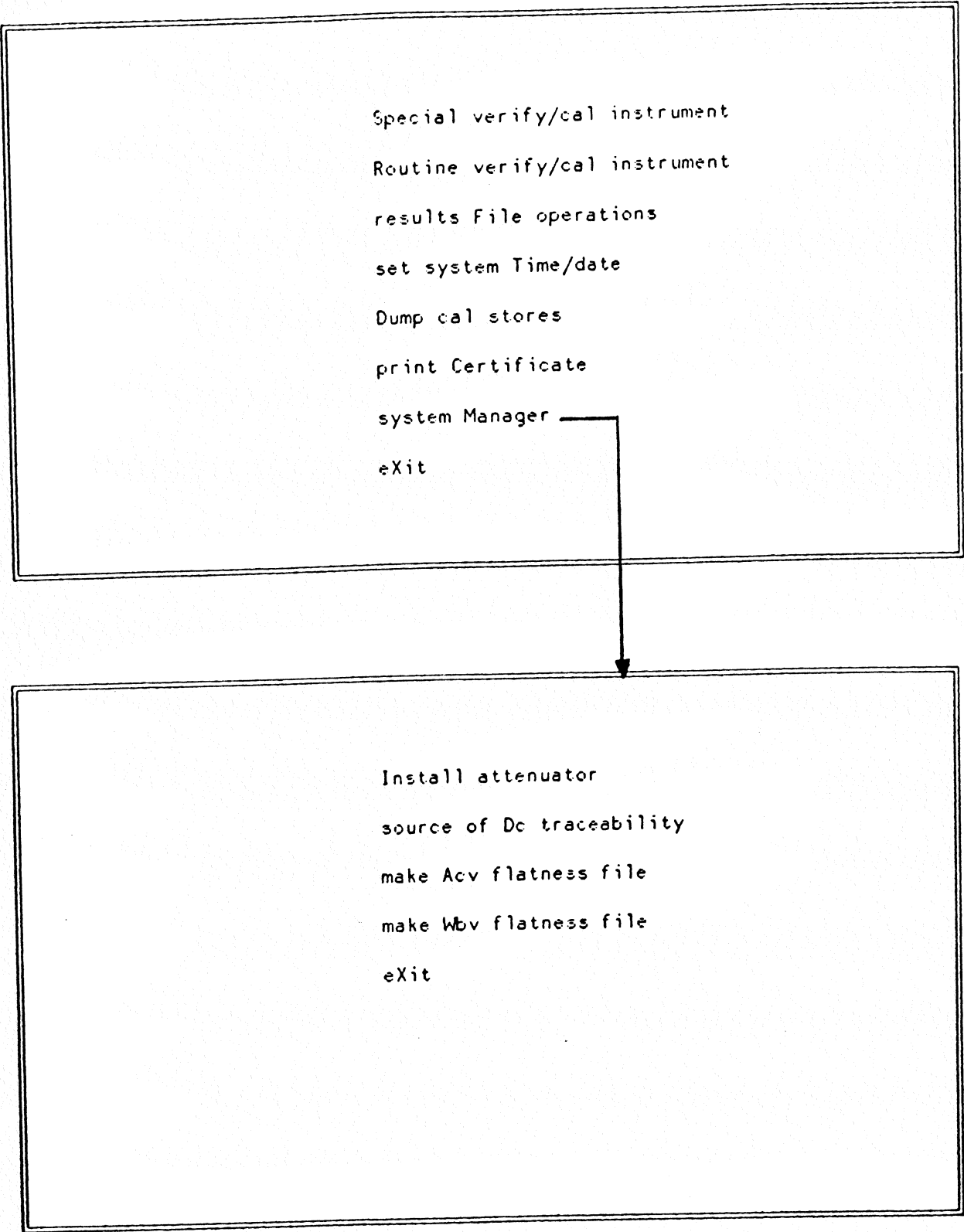
Do not make Transfer mV measurements as master may be 4920M.

Check LF and HF gains  $> 26$  &  $< 32$  and within 5 of each other.

Do manual accuracy checks using IVD.

# INSTALLATIONS (MANAGER)

Special verify/cal instrument  
Routine verify/cal instrument  
results File operations  
set system Time/date  
Dump cal stores  
print Certificate  
system Manager  
eXit



Install attenuator  
source of Dc traceability  
make Acv flatness file  
make Wbv flatness file  
eXit

DATRON WAVETEK

		Esc to Abort REPEAT F7 Procedure F9 Range F10 to Pause

**DATRON WAVETEK 4.0**  
**Verify 4920 WBV**

Version 1.2 dated 3 Apr 92

Start at: 10:15 on: 7th Apr 1992      Results in: FILE0128.RES

Page 1  
by: SRS

Comment: SYSTEM VERIFY AGAINST HOWARDS 4920

Transfer AMB: 22439-3 - Due Calibration 18th May 92

Instrument under test - FIRMWARE ISSUE: 01.19

SERIAL NUMBER: 23456

Instrument under test -

Wide Band Option Serial Number : 23456

Test Value	Freq Hz	Fk - Fk ppm	Result	Spec ppm	Error ppm	% Error of Spec
<b>3V RANGE, WBV FILTER Off</b>						
1.0000000V	1.00K	15	1.0001445V	1000	+145	+14%
3.0000000V	10	32	3.0002235V	1000	+75	+7%
3.0000000V	1.00K	2	3.0000130V	1000	+4	+0%
3.0000000V	100K	5	3.0000215V	1250	+7	+1%
3.0000000V	1.00M	2	2.9999658V	1250	-12	-1%
3.0000000V	5.00M	1	2.9983400V	1500	-553	-37%
3.0000000V	10.0M	3	2.9971810V	1500	-940	-63%
3.0000000V	20.0M	6	2.9909635V	2000	-3012	-151% F
3.0000000V	30.0M	2	2.9849695V	10000	-5010	-50%
1.0000000V	50.0M	23	0.9810385V	20000	-18962	-95% S

End at: 10:25 on: 7th Apr 1992

Readings without Corrections = 0

Suspect Source Output (S) = 1

Number of Fails (F) = 1