10A1 Calibration Outline

Presets	
V/CM	20mv
1MC BW	Pulled Out
Inputs (Both)	Ground
Step Atten. Bal	Centered

1. Coarse Adj (R275) — Cathodes of V113 & V313 at same Voltage. (About 1.2v at cathode end of diodes.)

2. + Bal Adj (R130) — Same Absolute voltage between (C152/R152 & Q123A collector) & (L123/R117 & Q123A Collector). (About 3 volts.)

3. - Bal Adj (R330) — Same absolute voltage between (C352/R352 & Q123B collector) & (L323/R317 & Q123B collector).

4. Step Atten Bal (R389) — Min shift between 20, 10, & 5mv. R200 may have to be adj to keep trace on screen.

5. Int. DC Bal (R200) — Min trace shift between 5, 2, & 1mv/cm.

NOTE: Steps 4 & 5 interact. Repeat until no further adj is necessary.

6. Var. Atten. Bal (R215) — 20mv/cm. Min trace shift as Var. is rotated.

7. I_b Bal (R510) — Adj for min fold OVER of trace as Var. is rotated.

NOTE: Steps 6 & 7 interact.

Presets	
V_c Polarity	+
Comparison Voltage	5-10-0
- Input	Ground
MV/CM	1mv

8. Common Mode Bal (R183) — Switch the + input to V_c & then back to Grnd. Trace must return quickly to within +.5cm of original position. Check with V_c Polarity at -. Readj R183 if necessary.

9. Gain (R513) — Adj at 5mv/cm.

10A1 Calibration Outline (cont.)

10. Check Attenuators (Both + & - Inputs) Accuracy

1mv	:	±2.5%
2mv-2v	:	±1.5%
5v -10v	:	± 3 %

11. Microphonics — 1cm max at 1mv/cm

12. + Grid Current Bal (R136)
    - Grid Current Bal (R336)
    (S/N 101-179 only) — Adj at 1mv/cm.

13. Grid Current Check S/N 180 & up — 1cm max at 1mv/cm. Check both + & - inputs.

14. Trig Bal (R659) — Trig at center line with very small calibrator signal & with time base in DC.

15. Check Minimum V_c Voltage — Comparison voltage at min & mv/cm at 1. ±.5cm shift from grnd to V_c. Reset helidial to agree with V_c residual voltage if more than ±.5cm.

16. 6V Cal (R583) — Comparison at 5-10-0. 6V ±1mv at V_c Out jack.

17. 1V Cal (R590) — Comparison at 0-10-0. 1V ±.5mv at V_c Out jack.

NOTE: Steps 16 & 17 Interact.

18. Check Comparison Voltage Outer Knob

2V (1-10-0)	±2.5mv
3V (2-10-0)	± 3mv
4V (3-10-0)	±3.5mv
5V (4-10-0)	±3.5mv

19. Check Comparison Voltage Helidial

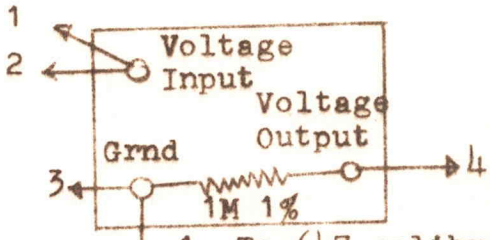
.1V (0-1-0)	thru
.9V (0-9-0)	± 4mv

Remove Q945 (Power-off)

Presets

V_c Range	60V
V/CM	10mv
Calibrator	50v
DC Divider	10:1
Inputs (Both)	V_c
Comparison Voltage	Outer knob between 0&1.

10A1 ON EXTENDER



1. To 647 calibrator
2. 10A1 input
3. 10A1 grnd
4. 10A1 V_c Out

20. Adj R106E (+ Input X10 Atten) — No shift when moving + input from V_c to DC.

10A1 Calibration outline (cont.)

Presets	
V Range	600V
V/CM	.1V
DC Divider	100:1

21. Adj R108D (+ Input X100 Atten) — No trace shift from V_c to DC.

22. Adj R306E (- Input X10 Atten) — Same as step 20.

23. Adj R308D (- Input X100 Atten) — Same as step 21.

Replace Q945 (Power-off)

Presets	
1M 1% from V_c Out to + input. Remove all other connections.	
V Range	60V
V/CM	50mv
Comparison Voltage	5-10-0
- Input	Ground
+ Input	DC
Fluke from + input to grnd	

24. Adj R105B (+ Input) — Adj R105B so voltage at + input is same when V_c Range is moved to 6V & V/CM to 20mv.

25. Adj R305B (- Input) — Same as step 24.

Remove all connections to 10A1 & reinstall in 647.

Presets	
V/CM	1mv
Comparison Voltage	5-10-0
Inputs (Both)	Ground

26. Check Common Mode Rejection — Switch both inputs to V_c. Observe max shift of ±.3cm. Disregard slow drift.

Presets	
Inputs (Both)	Ground
1MC BW	Pushed in
Connect short jumper from grid of V113 to grid of V313. Anode of diodes.	

27. Adj Common Mode Rejection (C723, C365, C125, C325) — Apply 10MC, 1V sinewave to both inputs. Adj in order given. Interact. 1 MV OR LESS.

28. Adj Common Mode Rejection (C115) — Use 1MC, 10V sinewave. CMR is typically 1.5mv.

10A1 Calibration Outline (cont.)

29. Adj Common Mode Rejection (C111)

Remove short. Use 10MC, 1V sine-wave. If CMR doesn't make 1mv repeat steps 28, 28, 29.

Applied Freq.	Applied Volts	Required CMR	Display Amplitude
20 MC	1V	100:1	10mv
5 MC	2V	2,000:1	1mv
2 MC	5V	5,000:1	1mv
500KC	10V	10,000:1	1mv
100KC	10V	10,000:1	1mv
10 KC	10V	20,000:1	0.5mv
1KC	10V	20,000:1	0.5mv
60cps DC coupled	10V	20,000:1	0.5mv
60cps AC coupled	10V	2,000:1	5mv

30. Attenuator Compensations

10A1 ON EXTENDER

Use 20pf standardizer & 1KC from 106. Measure output from 106 on test scope for required amplitude given in chart.

106	V_c Range	V/CM	+ Input Corner	+ Input Top	- Input Corner	- Input Top
200mv	6V	1mv	-	C105A	-	C305A
2 V	60V	10mv	C106C	C106A	C306C	C306A
20 V	600V	.1 V	C108C	C108A	C308C	C308A
Max.	600V	5 V	C109C	C109A	C309C	C309A

31. 5mv + Input High Freq Compensations (R540, C540, R213, C213)

4CM of 450 KC from 106. Aberrations not to exceed 3%.

32. 10mv High Freq Compensations (C715)

33. 20mv High Freq Compensations (C713A)

34. 1mv High Freq Compensations (R410)

Check 2mv comensations at same time.

35. Check - Input Compensations

Aberrations not to exceed 6%.

36. Band Pass (In a 647)

1&2mv : 35MC
5,10,20mv:45MC

37. Check 1MC BW Switch (20mv/cm)

3db down between 900KC & 1.1MC.

38. Check Recovery Time & Error

A 6V, 10kc squarewave, displayed at 1mv/cm should recover to within ±2mv of original level in .3us. At 500cps it should recover to within ±.5mv in 1msec. Both inputs.