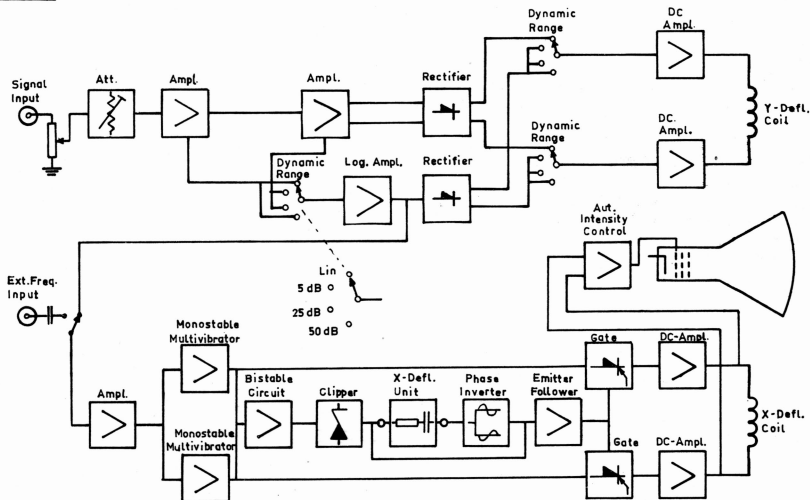


Consisting of:

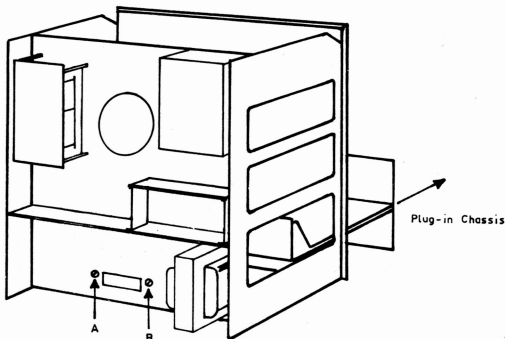
Y-Deflection	4712.1
X-Deflection	4712.2
Cathode Ray Circuit	4712.3
Motor Drive	4712.4
Position of Components	4712.5
Parts List	4712.6
Circuit Diagram	4712.7

Block Diagram:



Removal of the Metal Case

Place the instrument face downwards on a piece of soft material. After removing the four threaded retainers at the back of the instrument, it is possible to slide the case out of the chassis and the front panel.



Removal of Plug-in Chassis

To correct a fault in the Plug-in Chassis, the unit must be taken out. This can be done after the two screws A and B, which hold the plug-in chassis in its place, are removed.

Trouble Shooting

If the reason for a fault is not an obvious one such as a dead tube, broken down resistor, blown or disconnected fuse etc., then first test the voltages of all the tubes and compare them with the voltages shown in the circuit diagram in order to localize the defect. Should this method of finding the fault prove unsuccessful, then check the instrument by adopting the method described in the adjustment procedure. When the trouble has been found and remedied, the voltages and adjustments which are influenced by the remedy must be rechecked.

The tolerances stated in the instructions can only be used as a guide for adjustment and control, but any deviations must not be corrected without being sure that the tolerances of the instruments used for making the adjustment are so small as to have no influence on the measurements.

The instructions in this Manual are given purely as a guide to the service of equipment. Some faults, as f. inst. small deviations in tolerances require for their correction special control equipment and extensive experience, and in these cases it is necessary to send the instrument to the factory.

Spare Parts

Please state type and serial number of apparatus, when spare parts are ordered.

Instruments and Accessories Necessary for Service and Repair:

Multimeter (50 μ A)

Beat Frequency Oscillator type 1022 (+ Motor Drive UM 1014)

(Beat Frequency Oscillator type 1013)

Oscilloscope

Electronic DC-Voltmeter

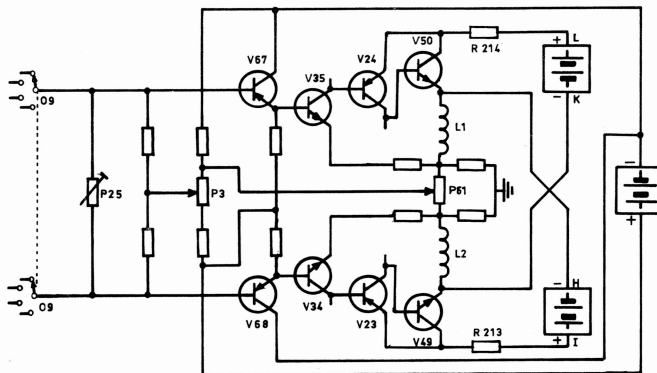
1.1. DC Voltages

Linear amplifier: V 8 a': 107 - 134 V V 1 a': 50 - 60 V
(XC 0319) k': 35 - 50 V k': 1.3 - 1.8 V
a: 60 - 80 V a: 200 - 250 V
k: 2 - 2.5 V k: 53 - 70 V

Logarithmic amplifier: V 13 collector measuring point D: -25.8 to -26.2 V.
(XC 0319) If necessary adjust P 27.

V 13 emitter: -24.5 to -25.5 V.
V 39 emitter, measuring point d: -14 to -18 V
V 41 collector, measuring point e: -12 to -14.5 V
V 41 emitter approx.: -2.8 V
V 42 collector, measuring point f: -12 to -14.5 V
V 42 emitter approx.: -2.8 V
V 43 collector, measuring point g: -12 to -14.5 V
V 43 emitter approx.: -2.8 V
V 44 collector, measuring point h: -12 to -14.5 V
V 44 emitter approx.: -2.8 V
V 45 collector, measuring point i: -13.5 to -16 V
V 45 emitter approx.: -2.6 V

DC amplifier: across C 10, measuring point K-L: 9-11 V
(4712.5 sheet 4, " C 9, " " H-L: 9-11 V
rear view) " C 20, " " B-C: 35-45 V unloaded
" C 31, " " A-ground: 310-335 V



1.2. Y-DC Amplifier

INPUT ATTENUATOR: "0 dB"
INPUT POTENTIOMETER: "10"
DYNAMIC RANGE: "50 dB"
VERTICAL SPEED: "Slow"

- a. Connect the input signal to INPUT SIGNAL socket on type 4712.

Adjust the input voltage until the spot is on the 25 dB line (approx. 180 mV) and the frequency to the 1 kHz line. Check the current in the output transistors V 49, V 50 by means of a multimeter connected across the collector resistors.

Voltage across R 213 and R 214: 300 mV.
If necessary adjust P 3 (situated on printed circuit XC 0318).

- b. Increase the input voltage until the spot is on the 50 dB line.

Voltage across resistor R 213: approx. 100 mV
R 214: approx. 425 mV.

- c. Decrease the input voltage until the spot is on the 0 dB line
Voltage across resistor R 213: approx. 425 mV
R 214: approx. 100 mV

The voltage across R 213 for 0 dB deflection and across R214 for 50 dB deflection should be within 5%.

If not adjust P 61 (situated on printed circuit XC 0318).

1.3. Vertical Speed

- a. INPUT ATTENUATOR: "0 dB"
INPUT POTENTIOMETER: "10"
DYNAMIC RANGE: "50 dB"
VERTICAL SPEED: "Fast"
FREQUENCY SCALE: "20-20000 Hz"

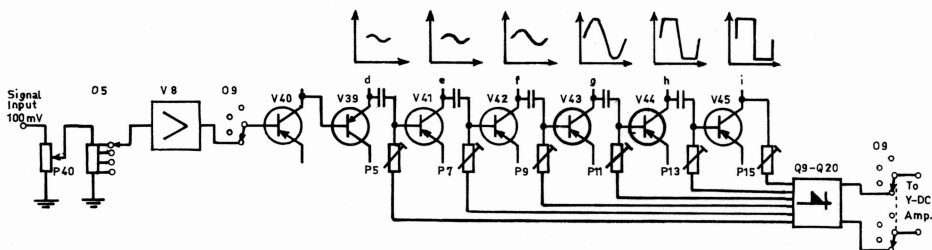
Input frequency: 200 Hz.
Adjust input signal to the 25 dB line.
Ripple: max. 1.2 dB.

- b. VERTICAL SPEED to "Slow"

Input frequency: 20 Hz.
Ripple: max. 1.2 dB.

- c. INTENSITY to "10"

Change the input voltage ± 10 dB.
Overshoot: max. 10%

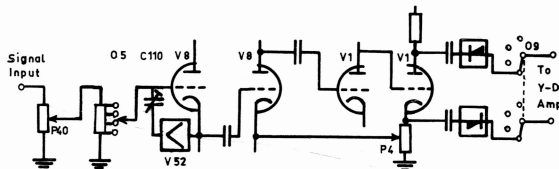


1.4. Logarithmic Amplifier 50 dB Range

INPUT ATTENUATOR: "0 dB"
INPUT POTENTIOMETER: "10"
DYNAMIC RANGE: "50 dB"
VERTICAL SPEED: "Slow"

- a. Input signal: 10 mV, 630 Hz.
Measure the RMS voltage at measuring point i: approx. 7.5 V.
The spot should be on the 0 dB line.
If necessary adjust P 30. (situated on printed circuit XC 0324)
- b. Increase the input voltage 50 dB.
The spot should be on the 50 dB line.
If necessary adjust P 25 (situated on printed circuit XC 0318).
- c. Depress OSCILLATOR STOP on type 1022. The spot should drop down below the frame followed by one jump, not reaching the zero line. If it does, check the DC voltages in the logarithmic amplifier (measuring point d-i).
The DC voltages must not change if the OSCILLATOR STOP is depressed.
If necessary adjust potentiometers P 19-24 (situated on printed circuit XC 0319).
- d. Increase the input voltages stepwise (10 dB steps) from 10 mV and check that the steps of the spot are correct.
If necessary adjust potentiometer: P 15 P 13 P 11 P 9 P 7 P 5
position: 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB
(situated on printed circuit XC 0319).
- e. Increase the input voltage stepwise (1 dB steps) and check that the steps from 0-5 dB are correct.
Tolerance: ± 1 mm.
If necessary adjust P 15 and P 25.

NB. Whenever one of the potentiometers is adjusted check item 1.4 again, and if P 25 is adjusted check also item 1.5, 1.6 and 1.7.



1.5. Linear Amplifier

INPUT ATTENUATOR: "0 dB"
INPUT POTENTIOMETER: "10"
DYNAMIC RANGE: "Lin."
VERTICAL SPEED: "Slow"

Input signal: 100 mV, 630 Hz.

The spot should be on the 5 dB line (50 dB scale).
If necessary adjust P 29.

Increase the input voltage to 1 V.

The spot should be on the 50 dB line (50 dB scale).

If necessary adjust P 4 (situated on printed circuit XC 0319).

Adjustment of P 4 and P 29 should be repeated until both positions are correct.

Check also position of the spot for Voltage: 200, 400, 600, 800 mV

Position: 10, 20, 30, 40 dB (50dB scale)

Tolerance: ± 1.5 mm.

1.6. Logarithmic Amplifier 25 dB Range

INPUT ATTENUATOR: "0 dB"
INPUT POTENTIOMETER: "10"
DYNAMIC RANGE: "25 dB"
VERTICAL SPEED: "Slow"

a. Input signal: 10 mV, 630 Hz.

The spot should be on the 0 dB line.

If necessary adjust first P18 for an output voltage on V45 collector (measuring point i): approx. 7.5 V RMS, then P 31 until the spot is on the 0 dB line. (situated on printed circuit XC 0319)

b. Increase the input voltage stepwise (5 dB) and check that the steps on the screen are correct.

Tolerance: ± 1 mm.

If necessary adjust potentiometer: P 16 P 14 P 12 P 10 P 8 P 6
position: 0 dB 5 dB 10 dB 15 dB 20 dB 25 dB
(situated on printed circuit XC 0319).

If adjustment range of P 6 - 16 is too narrow adjust P 25 and repeat item 1.4. (situated on printed circuit XC 0318).

c. Increase the voltage stepwise (1 dB steps) and check that the steps from 0 to 5 dB are correct.

Tolerance: ± 1 mm.

If necessary adjust P 16 and P 31.

d. Increase the voltage stepwise (1 dB steps) and check that the steps from 20 to 25 dB are correct.

Tolerance: ± 1 mm.

If necessary adjust P 6 and P 18.

NB. Whenever one of the potentiometers is adjusted check item 1.6 again.

1.7. Logarithmic Amplifier 5 dB Range

INPUT ATTENUATOR: "0 dB"
INPUT POTENTIOMETER: "10"
DYNAMIC RANGE: "5 dB"
VERTICAL SPEED: "Slow"

a. Input signal 100 mV, 630 Hz.

The spot should be on the 0 dB line.

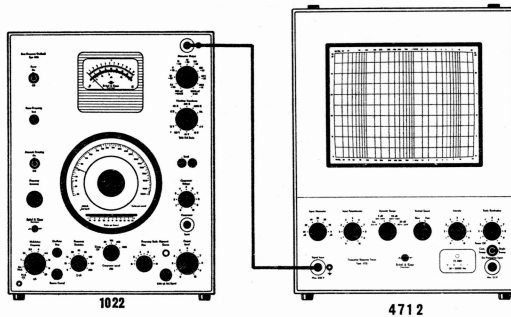
If necessary adjust first P 26 for an output voltage on V 45 collector (measuring point i) to 6.5 V RMS. Then adjust P 37 until the spot is on the 0 dB line. (situated on printed circuit XC 0319)

b. Increase the input voltage stepwise (1 dB) and check that the steps from 0 dB to 5 dB are correct.

Tolerance: ± 1 mm.

If necessary adjust P 37 and P 26.

- c. Increase the input voltage stepwise (0.1 dB) and check that the steps from 0 to 0.5 dB are correct.
Tolerance: ± 0.05 dB.
- NB. Whenever one of the potentiometers is adjusted check item 1.7 again.



1.8. Frequency Response

INPUT ATTENUATOR: "10"
INPUT POTENTIOMETER: "10"
DYNAMIC RANGE: "25 dB"
VERTICAL SPEED: "Slow"

- a. Input frequency: 1000 Hz.
Adjust input signal until the spot is on the 10 dB line.
Vary the frequency from 20 to 20000 Hz.
The spot shall still be at the 10 dB line.
Tolerance: ± 0.1 dB (+ tolerance of type 1022: 0.3 dB).
Ripple at 20 Hz: max. 1.2 dB.

- b. If the spot is not within the tolerances or if the input frequency is higher than 20 kHz it is necessary to connect an input signal 1 V, 1 kHz to EXT. FREQUENCY INPUT which will keep the spot fixed on the 1 kHz line during checking and adjustment.

Check the frequency response for all positions of DYNAMIC RANGE.

Tolerance:	Frequency			
	20 Hz	50 kHz	100 kHz	200 kHz
Linear	± 0.1 dB	± 0.1 dB	± 0.1 dB	± 0.2 dB
Logarithmic	± 0.1 dB	± 0.1 dB	± 0.2 dB	± 0.3 dB

If necessary adjust C 110 (tolerance of type 1022: 0.3 dB
type 1013: 0.5 dB).

1.9. Input Attenuator

INPUT ATTENUATOR: "60 dB"
INPUT POTENTIOMETER: "10"
DYNAMIC RANGE: "50 dB"
VERTICAL SPEED: "Slow"

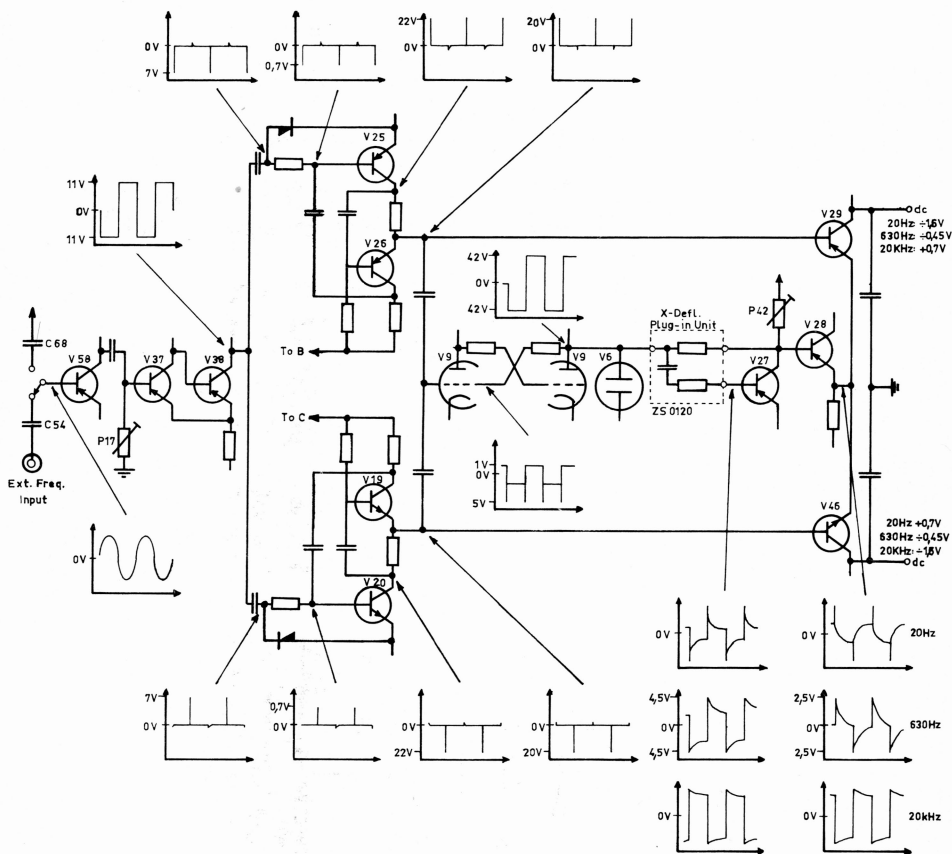
Input frequency: 1000 Hz. Adjust the input voltage until the spot is on the 0 dB line.

Check all positions of INPUT ATTENUATOR by comparison with type 1022.
Tolerance: ± 0.1 dB (+ tolerance type 1022: 0.2 dB).

1.10. Hum in Linear and Log. Ampl.

INPUT ATTENUATOR: "0 dB"
INPUT POTENTIOMETER: "10"
DYNAMIC RANGE: "25 dB"
VERTICAL SPEED: "Slow"

Input voltage: 10 mV.
Set the frequency a little above the main frequency.
Max. vertical movement: ± 1 mm.



2.1. DC Voltages

Bistable circuit:

V 9 a': 3-7 V a': 70-90 V
a : 106-116 V or a : 23-27 V

Emitter follower: across

C 42 measuring point a: -19 to -22 V
V 27 " " b: - 4 to - 5 V
V 28 " " c: -14 to -16 V

should be measured without x-deflection plug-in unit inserted.

DC-Amplifier: across

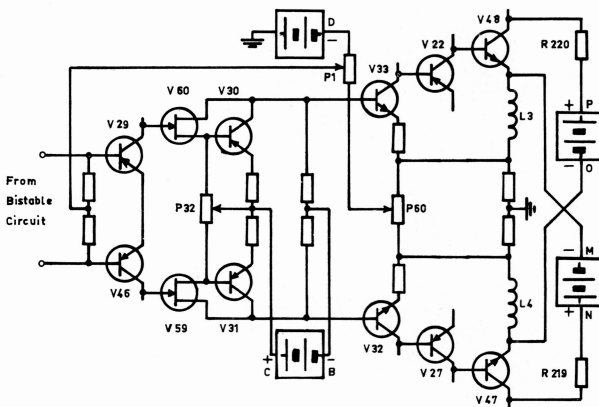
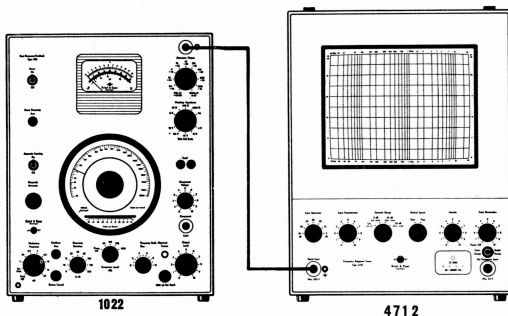
C 8 measuring point O-P: Approx. 15-17 V
C 7 " " M-N: Approx. 15-17 V
Q 67-68 " " B-C: 22-26 V
between midpoint Q 67-68 and ground: -2 to -2.5 V.

If the voltage from the stabilized power supply is incorrect, check item 1.1.

2.2. Frequency Sensing

DYNAMIC RANGE: "Lin."

- a. Input signal to EXT. FREQ. INPUT socket: 1 V, 1000 Hz.
Connect an oscilloscope to V 38 collector and check the square-wave signal.
If unsymmetrical adjust P 17 (situated on printed circuit XC 0320).
Increase the input voltage to 5 V-50 V and check that the wave form is still symmetric.
Possible reasons for fault: Defective diodes Q 30, 31.
- b. Input signal: 5 V, 20000 Hz.
Check the negative pulses on V 19 emitter and the positive pulses on V 26 emitter.
Pulse height: approx. 20 V.
Pulse width : approx. 15 μ sec. and equal within 10%.
- c. Input signal: 5 V, 1000 Hz.
Connect an oscilloscope to V 9 plate (pin 6) and check the square-wave signal.
It should be symmetric and the voltage should be 82-87 V p-p.
Change frequency to 20000 Hz. The waveform should still be symmetric.
Tolerance: $\pm 10\%$.



2.3. X-DC Amplifier

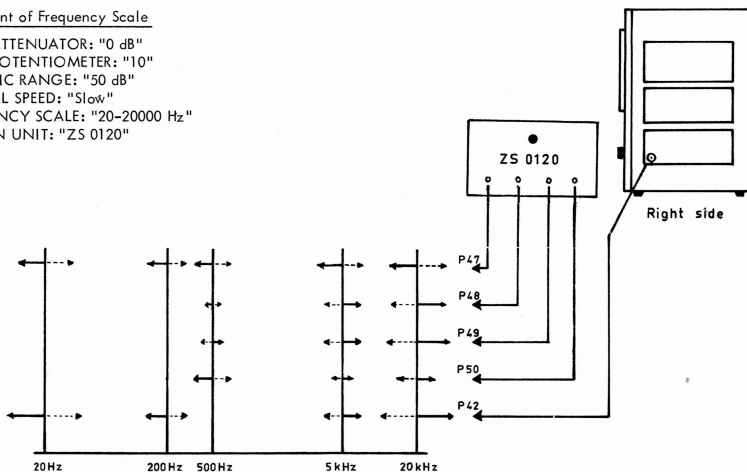
INPUT ATTENUATOR: "0 dB"
INPUT POTENTIOMETER: "10"
DYNAMIC RANGE: "50 dB"

- a. Input signal 180 mV, 1000 Hz.
Remove the x-deflection plug-in unit.
The spot should be at the 630 Hz (20-20000 Hz scale).
If necessary adjust P 32 (situated on printed circuit XC 0320).

- b. Replace the x-deflection plug-in unit (ZS 0120).
Adjust input frequency to the spot on the 630 line.
Check the current in the output transistors V 47-48 by means of a multimeter connected across the collector resistors.
Voltage across R 219, R 220: 900 mV.
Tolerance: $\pm 5\%$.
If necessary adjust P 1 (situated on printed circuit XC 0320).
 - c. Change the frequency until the spot is on the 20 Hz line.
Check the voltage across collector resistor: R 220: approx. 200 mV
R 219: approx. 1200 mV
 - d. Change the frequency until the spot is on the 20000 Hz line.
Check the voltage across collector resistor R 220: approx. 1200 mV
R 219: approx. 200 mV
- The voltage across R 220 at 20000 Hz and R 219 at 20 Hz should be within 5%.
If not adjust P 60 (situated on printed circuit XC 0318).

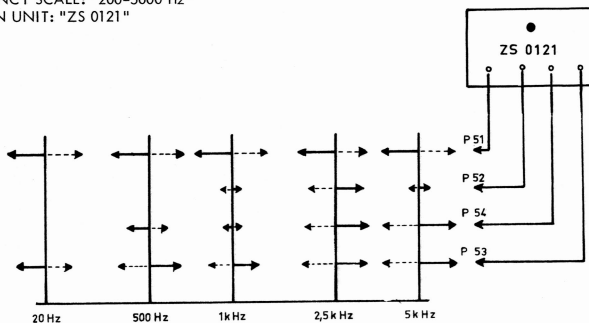
2.4. Adjustment of Frequency Scale

- a. INPUT ATTENUATOR: "0 dB"
INPUT POTENTIOMETER: "10"
DYNAMIC RANGE: "50 dB"
VERTICAL SPEED: "Slow"
FREQUENCY SCALE: "20-20000 Hz"
PLUG-IN UNIT: "ZS 0120"



Movement of the spot for clockwise adjustment: \longrightarrow
counter clockwise adjustment: \dashrightarrow

- b. FREQUENCY SCALE: "200-5000 Hz"
PLUG-IN UNIT: "ZS 0121"



Movement of the spot for clockwise adjustment: \longrightarrow
counter clockwise adjustment: \dashrightarrow

3.1. DC Voltages

E.H.T. Supply: V_2 a₁: 280-320 V
(XC 0365) g_2 : 110-125 V

V_3 a: 280-320 V
 g_2 : 90-140 V

Across R 228: 20-30 V, when the oscillator is working,
otherwise the voltage is approx. 60 V.

Aut. Brightness Regulator:

(XC 0363) V_{16} collector: -9 to -11

" V_{17} " : -9 to -11

(XC 0362) V_{63} " : 100 V, X-deflection Plug-in Unit removed

" V_{64} " : 100 V, " " " "

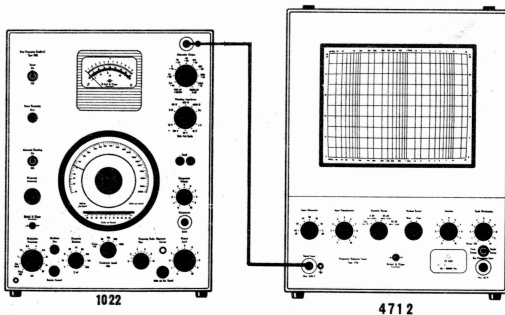
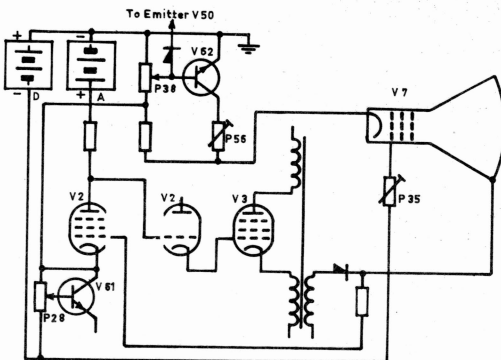
Cathode Ray Tube: V_7 g: -10.5 to -13^x

k: 22 to 33^x depending on setting of P 56

(Intensity) a₁: 250 to 290 " " P 39

(Fokus) a₂: 0 to 320 " " P 36

E.H.T.: 9.9 to 10.1 kV adjusted by P 28



3.2. Blanking Level

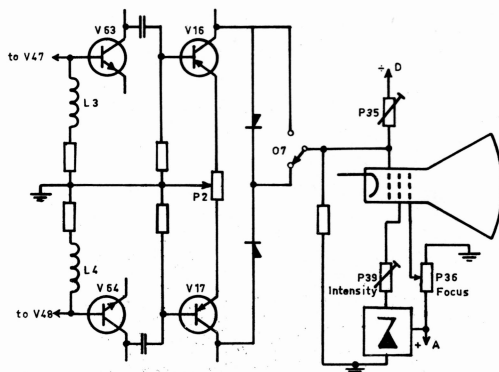
INPUT ATTENUATOR: "0 dB"
INPUT POTENTIOMETER: "10"
DYNAMIC RANGE: "50 dB"
BLANKING LEVEL: "Low"

Input signal: 40 mV, 10000 Hz.
Measure the cathode voltage on V_7 , pin 7^x): approx. 20 V.

Check the regulation range of P 38.

Turn slowly P 38 from LOW to HIGH until the spot disappears. The setting of P 38 should now be within the upper 2/3rd and the cathode voltage should rise approx. 14 V.

^x) Measured by means of an electronic DC voltmeter.



3.3. Automatic Brightness Control

- a. INPUT ATTENUATOR: "0 dB"
INPUT POTENTIOMETER: "10"
DYNAMIC RANGE: "50 dB"
VERTICAL SPEED: "Slow"
BLANKING LEVEL: "Low"
RETURN TRACE: "On"

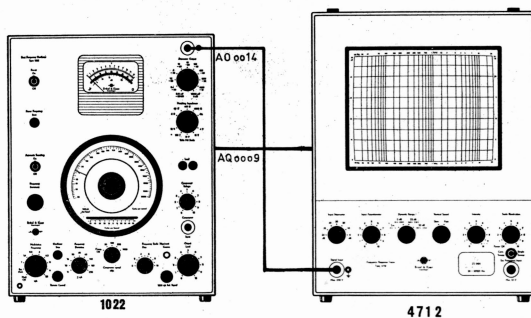
Connect a multimeter across the collectors of V 16, V 17 and adjust P 2 for 0 V.

Adjust P 35 to a point where the spot has the same intensity for RETURN TRACE in position ON-OFF.

- b. DYNAMIC RANGE to "25 dB"
INTENSITY to "5"
RETURN TRACE to "On"

Input signal: 50 mV, 1000 Hz.

Adjust P 56 until the spot just can be seen on the screen.



3.4. Intensity Control

- a. INPUT ATTENUATOR: "0 dB"
INPUT POTENTIOMETER: "10"
DYNAMIC RANGE: "50 dB"
VERTICAL SPEED: "Slow"
BLANKING LEVEL: "Low"
RETURN TRACE: "On"

Input signal: 300 mV, 1000 Hz.

The spot should just be seen on the screen.

If not check item 3.3.b.

Measure the voltage on V 7 g₁ x) pin 2: approx. -10 V.

- b. SWEEP START to "Cont. Sweep"

Connect Motor Drive UM1014 on type 1022 to MOTOR DRIVE socket on type 4712 (cable AQ 0009).

Adjust by scanning forward SWEEP SPEED (P 45) until the voltage on V 7 g₁ x) pin 2 is -5 V.

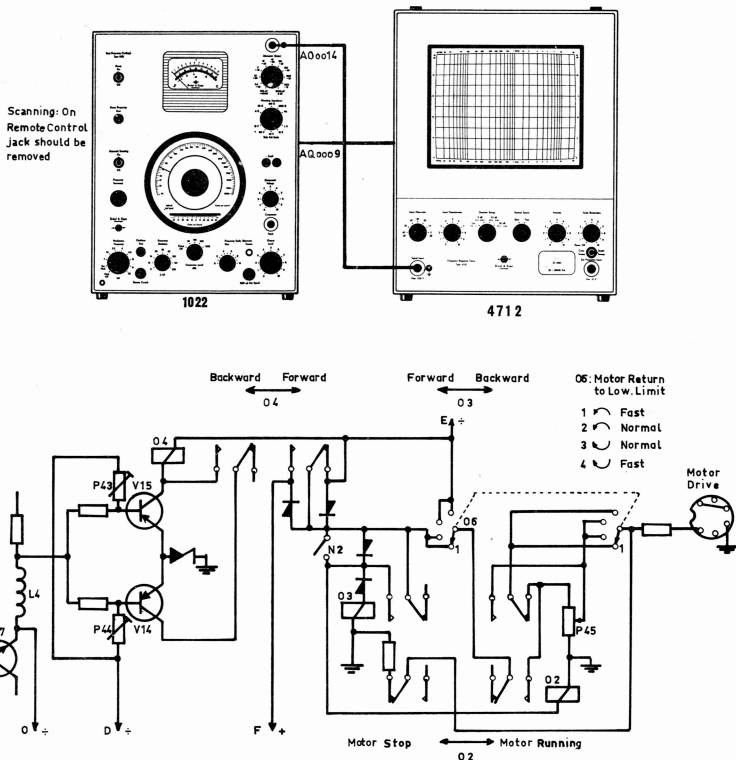
(Sweep time for one sweep only: Min. 12 sec.)

Check the voltage on V 7 g₁ x) pin 2: Scanning forward -5 V
" backwards -15 V.

x) Measured by means of an electronic DC voltmeter.

4.1. DC Voltage

Across C 21, measuring point F: 30 to 35 V
C 23 " " E: -30 to -36 V



4.2. Sweep Limits

SWEEP SPEED: "Mid. position"
UPPER: "1/3rd from High"
LOWER: "1/3rd from Low"
RETURN MODE: "Normal, left side"
PLUG-IN UNIT: "ZS 0120"
FREQ. SCALE: "20-20000 Hz"

- Connect Motor Drive UM 1014 on type 1022 to MOTOR DRIVE socket on type 4712 (cable AQ 0009).
Set Sweep in position CONT. SWEEP and check adjustment range for sweep limit potentiometers.
- Adjust sweep limit potentiometer LOWER to 20 Hz.
Turn potentiometer UPPER to LOW and check sweep limit: 70 Hz or lower.
Turn potentiometer UPPER clockwise and check that sweep limit 20000 Hz is obtained a little before stop (HIGH).
- Adjust sweep limit potentiometer UPPER to 20000 Hz.
Turn potentiometer LOWER to HIGH and check sweep limit: 10 kHz or higher.
Turn potentiometer LOWER anticlockwise and check that sweep limit 20 Hz is obtained a little before stop (LOW).

4.3. Return Mode

- a. SWEEP SPEED: "Mid. position"
RETURN MODE: "Normal, left side"

Set Sweep Start in position CONT. SWEEP and adjust sweep limit to approx. 200-2000 Hz.

- b. RETURN MODE to "Fast, left side"

The Motor Drive should go slowly from 200 to 2000 Hz and return fast (anti-clockwise).

- c. RETURN MODE to "Normal, right side"

The Motor Drive should go slowly clockwise independent of the sweep limits.

- d. RETURN MODE to "Fast, right side"

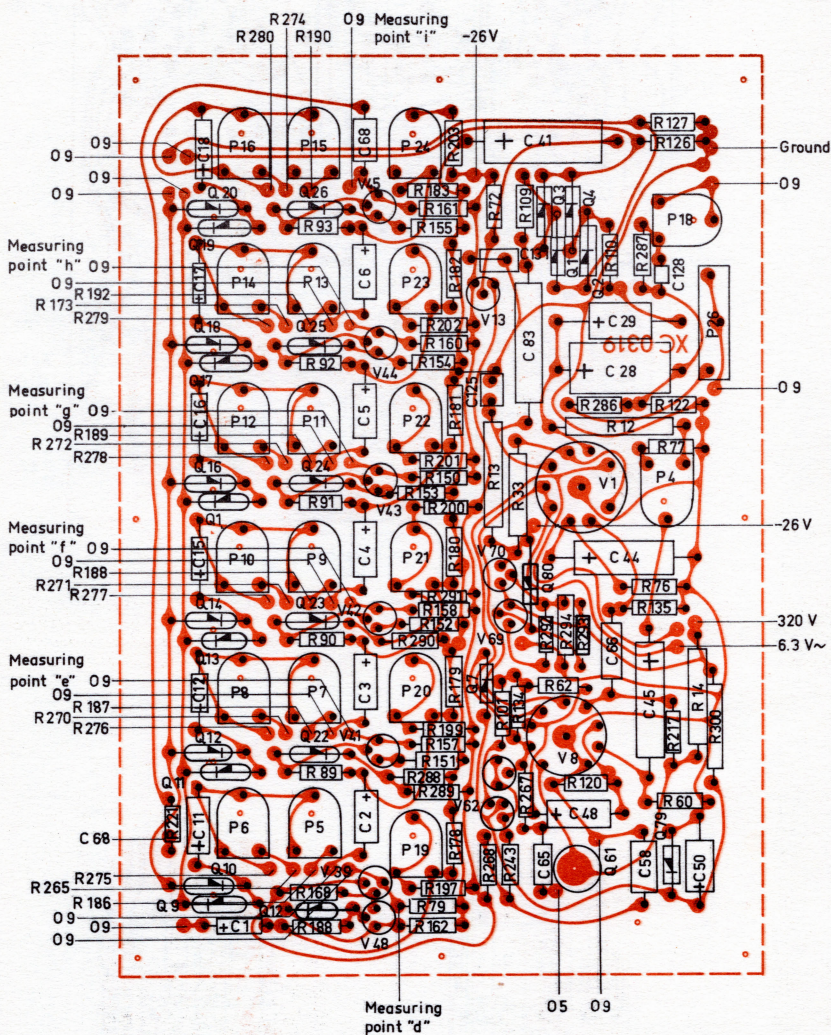
The Motor Drive should go slowly from all little before 20 Hz to sweep limit adjusted by UPPER and return fast (clockwise).

4.4. Sweep Speed

- SWEEP SPEED: "Low"
RETURN MODE: "Normal, right side"

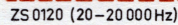
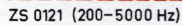
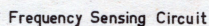
- a. Set Sweep Start in position CONT. SWEEP and check the time for sweep limits 20-20000 Hz: approx. 40 sec.

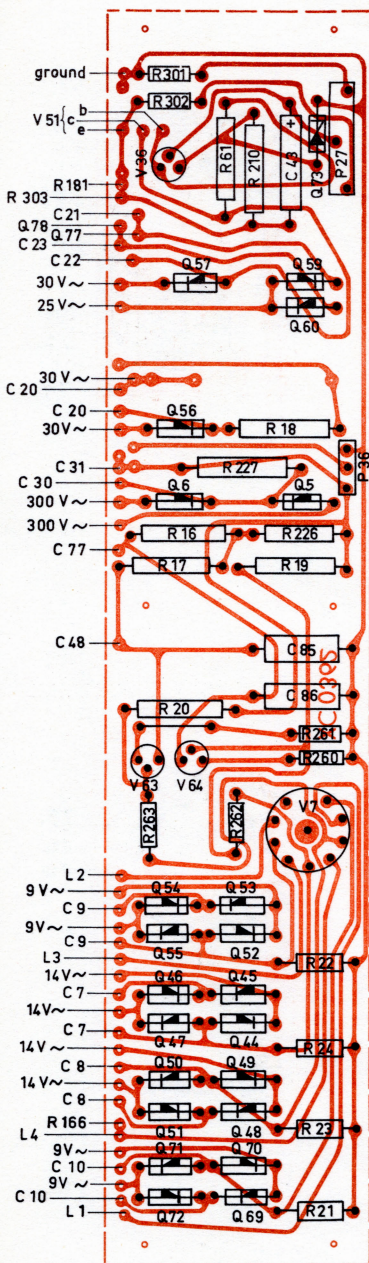
- b. Turn SWEEP SPEED to HIGH and check the time again: approx. 6 sec.



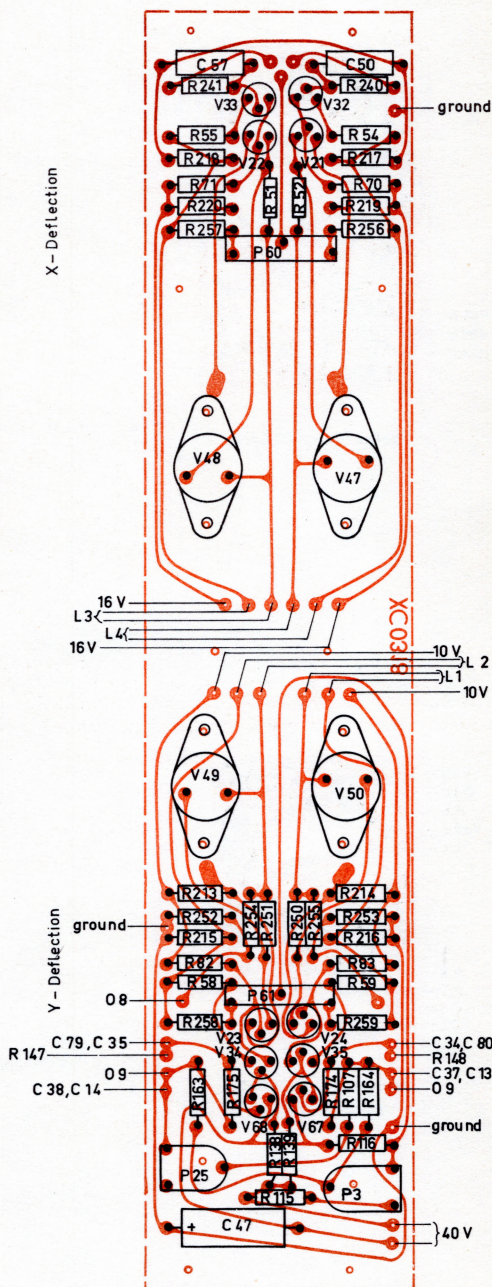
Printed Circuit XC 0319

Logarithmic Amplifier Linear Amplifier

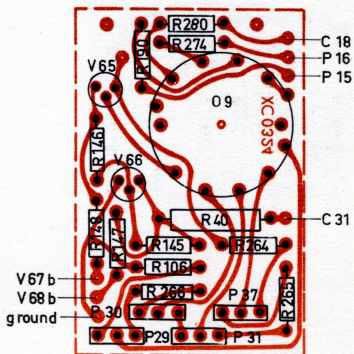




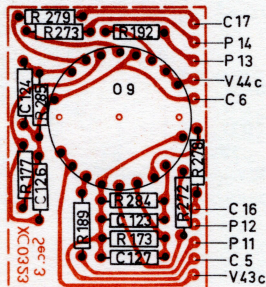
Printed Circuit XC 0362
Power Supply



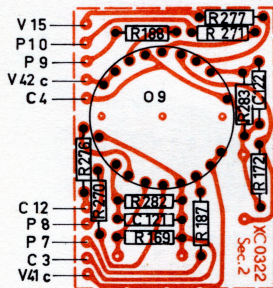
Printed Circuit XC 0318
DC Amplifier



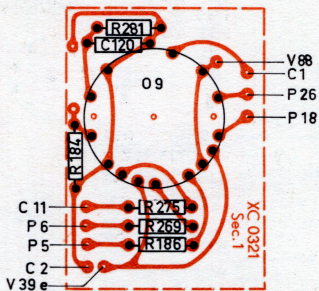
Printed Circuit XC0324



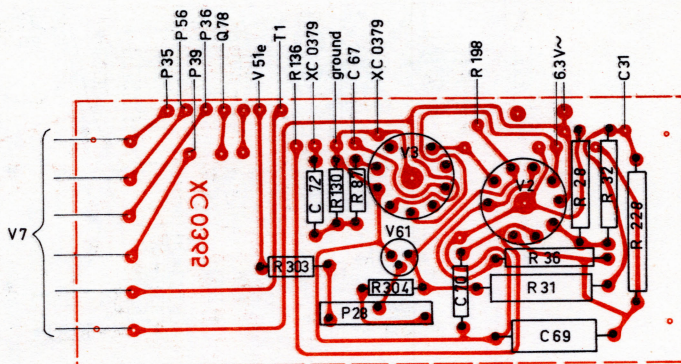
Printed Circuit XC0323
Dynamic Range



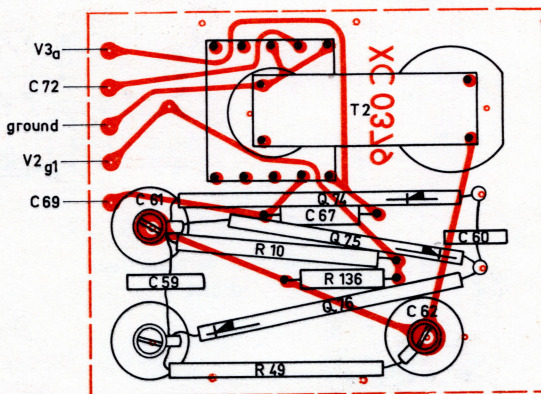
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Dynamic Range



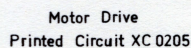
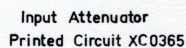
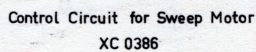
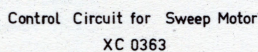
Printed Circuit XC0321
Dynamic Range

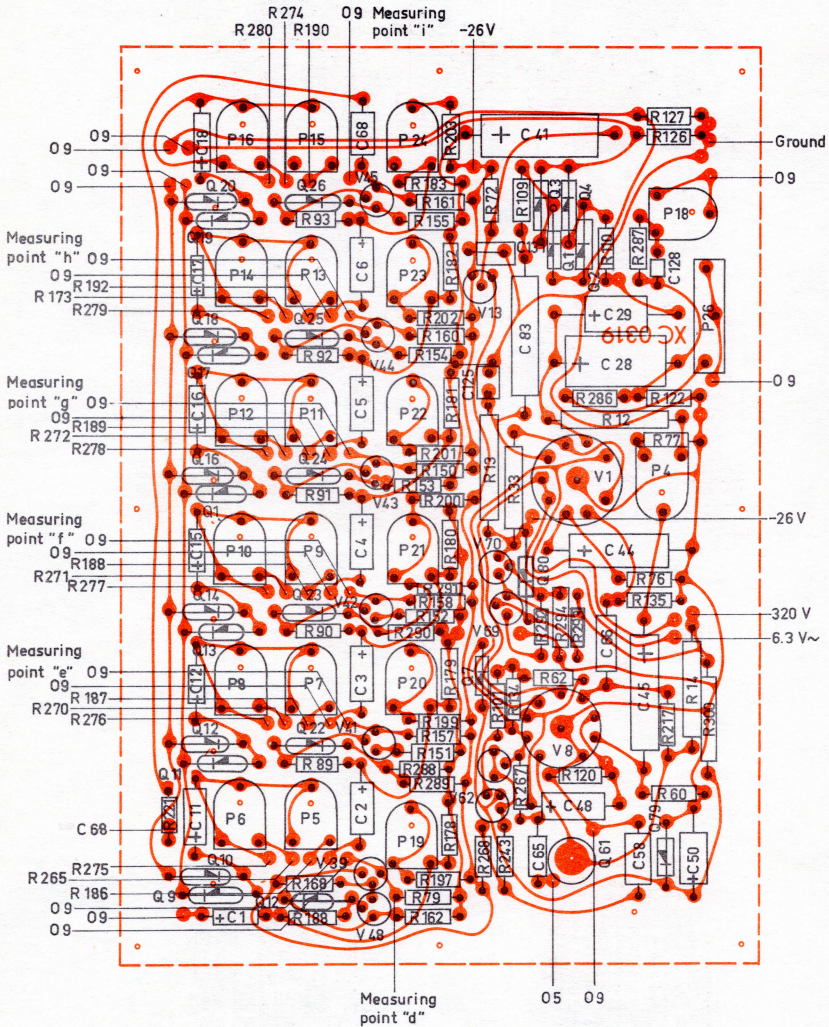


Printed Circuit XC 0365
EHT Power Supply



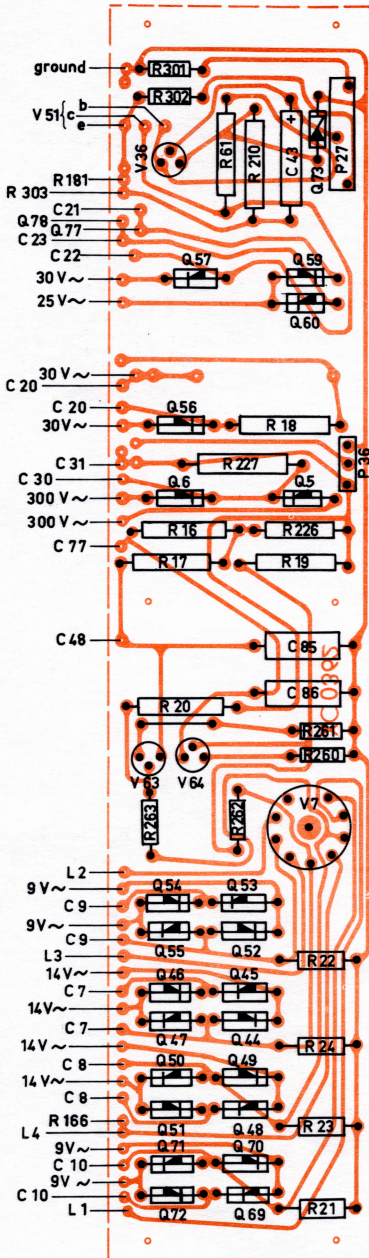
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EHT Circuit



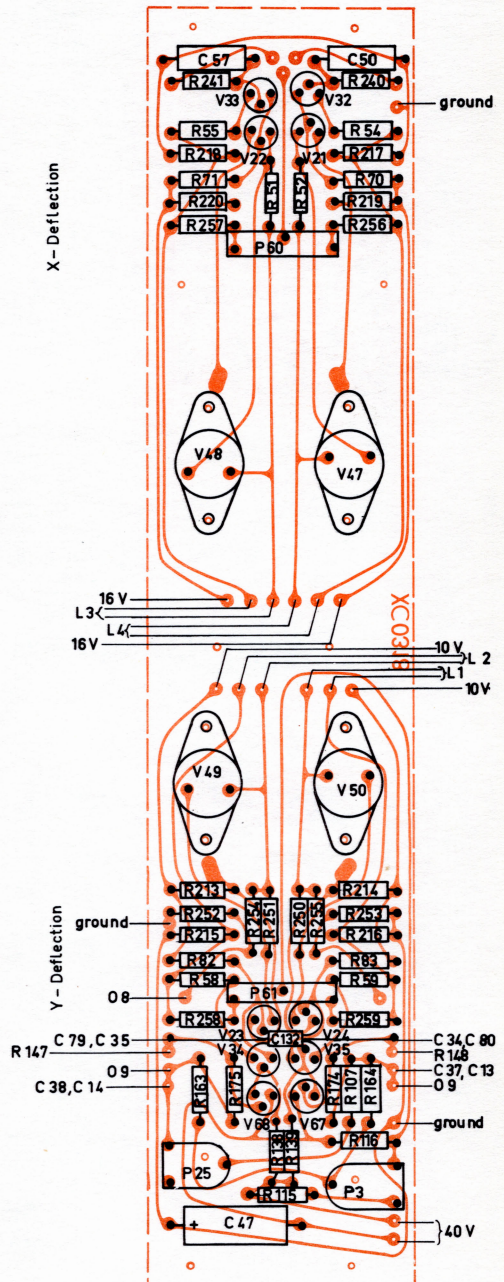


Printed Circuit XC 0319

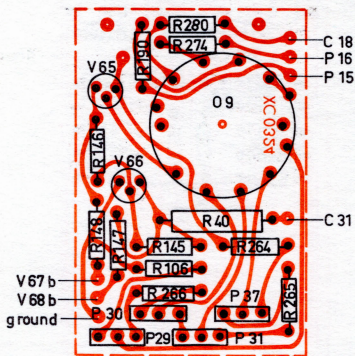
Logarithmic Amplifier Linear Amplifier



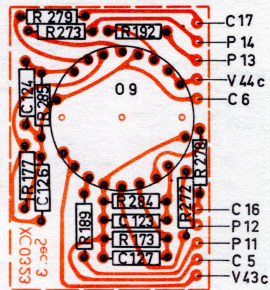
Printed Circuit XC 0362
Power Supply



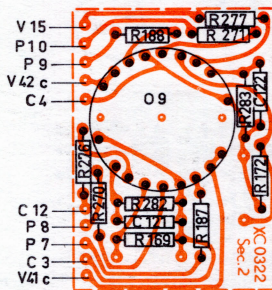
Printed Circuit XC 0318
DC Amplifier



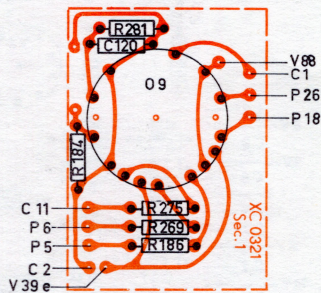
Printed Circuit XC0324



Printed Circuit XC0323
Dynamic Range



Printed Circuit XC0322
Dynamic Range



Printed Circuit XC0321
Dynamic Range

CIRCUIT DIAGRAM	COMPONENT TYPE		STOCK REF.	CIRCUIT DIAGRAM	COMPONENT TYPE		STOCK REF.
CAPACITORS:				SWITCHES:			
C 1	Electrolytic	50 µF/6.4 V	CE 0204	N 2	Sweep Start		-NN 0007
C 2-6	"	25 µF/ 25 V	CE 0202	N	Ext. Freq. Input		NT 0011
C 7-10	"	5000 µF/ 15 V	CE 0301	O 2-4	Relay		OC 0011
C 11, 12	"	12.5 µF/ 25 V	CE 0416	O 5	Attenuator		OR 4712
C 13, 14	"	4 µF/ 50 V	CE 0404	O 6	Sweep Mode		OS 4709
C 15-18	"	12.5 µF/ 25 V	CE 0416	O 7	Return trace		OT 4709
C 20-23	"	800 µF/ 64 V	CE 0516	O 8	Vertical speed		OU 4709
C 26	"	8 µF/350 V	CE 0802	O 9	Dynamic Range		OV 4712
C 28	"	20 µF/100 V	CE 0602				
C 29	"	4 µF/250 V	CE 2034				
C 30, 31	"	2 x 50 µF/450 V	CE 0909	POTENTIOMETERS:			
C 34, 35	"	4 µF/ 50 V	CE 0404	P 1	Trimmer	carbon lin.	PG 1500
C 37, 38	"	32 µF/ 25 V	CE 0407	P 2	"	"	PG 1201
C 41, 42	"	250 µF/ 25 V	CE 0413	P 3	"	"	PG 1100
C 43	"	64 µF/ 64 V	CE 0513	P 4	"	"	PG 2100
C 44	"	250 µF/ 6 V	CE 8944	P 5-17	"	"	PG 2201
C 45	"	100 µF/ 25 V	CE 0415	P 18	"	"	PG 2500
C 46	"	20 µF/ 64 V	CE 8949	P 19-24	"	"	PG 3102
C 47	"	250 µF/ 25 V	CE 0413	P 25	"	"	PG 3201
C 48	"	32 µF/ 64 V	CE 0509	P 26	"	wire	PG 3107
C 49	"	5 µF/ 35 V	CE 0406	P 27	"	"	PG 2203
C 50	Polyester	32 µF/ 64 V	CE 0509	P 28	"	"	PG 2505
C 51	Ceramic	10 nF	CK 4100	P 29, 31	"	carbon	PG 2104
C 52	"	± 5% 25 pF	CK 0091	P 32	"	"	PG 3501
C 53	"	27 pF/400 V	CK 1270	P 35	"	"	PG 5102
C 54	Electrolytic	10 µF/ 15 V	CE 0001	P 36	"	"	PG 4204
C 55	Metal	2.2 µF/100 V	CP 0014	P 37	"	"	PG 2104
C 56, 57	Polyester	0.47 µF/125 V	CS 0021	P 38	Blanking level	wire	PH 3250
C 58	"	0.22 µF/250 V	CS 0017	P 39	Intensity	carbon	PP 4105
C 59, 60	Ceramic	180 pF/ 8 kV	CK 2181	P 40	Input	"	PP 4105
C 61, 62	"	500 pF/20 kV	CK 2500	P 42	Trimmer	wire	PQ 2100
C 65	Polyester	0.1 µF/250 V	CS 0013	P 43, 44	"	"	PQ 1509
C 66	"	22 nF/250 V	CS 0005	P 45	"	"	PR 1109
C 67	Polystyrene	12.5 nF/	CT 3235	P 46	Scale ill.	"	PS 0109
C 68	Polyester	0.22 µF/250 V	CS 0017	P 47-53	Trimmer	carbon	PG 3250
C 69	"	0.47 µF/400 V	CS 0121	P 54	"	"	PG 3504
C 70	"	1.8 nF/400 V	CS 0125	P 56	"	"	PG 4103
C 72	"	4.7 nF/400 V	CS 0122	P 60, 61	"	"	PG 0100
C 73-76	"	100 nF/250 V	CS 0402				
C 77, 78	"	0.22 µF/250 V	CS 0017				
C 79, 80	"	0.47 µF/125 V	CS 0021				
C 82	"	1 µF/250 V	CS 0025	Q 1-4	Silicon	200 V/ 40 mA	QV 0022
C 83	"	2 µF/250 V	CS 0028	Q 5, 6	"	1200 V/0.15 A	QV 0025
C 84	"	0.22 µF/250 V	CS 0017	Q 7	"	200 V/ 40 mA	QV 0022
C 85, 86	"	0.47 µF/125 V	CS 0021	Q 9-20	Germanium	45 V/ 0.1 A	QV 0078
C 90, 91	Polystyrene	50 pF/500 V	CT 0101	Q 21-28	"	115 V/0.15 A	QV 0085
C 92, 93	"	100 pF/500 V	CT 0103	Q 30, 31	Silicon	275 V/ 30 mA	QV 0209
C 94, 95	"	2% 4 nF	CT 3225	Q 32, 33	"	200 V/ 40 mA	QV 0022
C 96	"	1% 344 pF	CT 3038	Q 36-40	"	275 V/ 30 mA	QV 0209
C 97	"	2.5% 675 pF	CT 3242	Q 41-55	"	50 V/ 0.6 A	QV 0501
C 98	"	1% 1.98 nF	CT 1303	Q 56, 57, 59, 60	"	200 V/ 0.6 A	QV 0502
C 99	"	1% 3.09 nF	CT 1200	Q 61	Zener	120 V/ 5 mA	QV 1004
C 100	"	+0%, -2% 10 nF	CT 3331	Q 62, 63	"	12 V/ 5 mA	QV 1112
C 101	"	1% 63 nF	CT 3364	Q 66	"	6.7 V/ 10 mA	QV 1324
C 102	"	1% 16.4 nF	CT 3528	Q 67, 68	"	12 V/ 75 mA	QV 1313
C 110	Trimmer	4.5-20 pF	CV 0020	Q 69-72	"	50 V/ 0.6 A	QV 0501
C 120-124	Ceramic	27 pF	CK 1270	Q 73	Zener	6.8 V/ 30 mA	QV 1106
C 125	"	60 pF/400 V	CK 1600	Q 74-76	Selenium	6750 V/ 0.3 mA	QV 0024
C 126	"	100 pF	CK 2100	Q 77, 78	Silicon	1200 V/0.15 mA	QV 0025
C 127	"	82 pF	CK 1820	Q 79	Zener	24 V	QV 1005
C 128	"	100 pF	CK 2100	Q 80	"	7 V/ 10 mA	QV 1007
C 129	Polyester	10 nF/250 V	CS 0403				
C 130	Ceramic	2.2 pF	CK 0220	RESISTORS:			
C 130	"	6.8 pF	CK 0680	R 1, 2	Metal	14 W	± 1% 6.2 kΩ RF 0201
				R 3	"	"	± 1% 4 kΩ RF 0202

CIRCUIT DIAGRAM REF.	COMPONENT TYPE			STOCK REF.
RESISTORS:				
R 5-8	Metal	1/4 W	1%	180 kΩ RF 0203
R 9	"	"	"	400 kΩ RF 0205
R 10	"	"	"	100MΩ/10 kV RF 0218
R 11	"	"	"	250MΩ/18 kV RH 0603
R 12,13	Carbon	1 W	5%	10 kΩ
R 14	Wire	5.5 W	"	24 kΩ RX 0404
R 15	Carbon	1/3 W	10%	40 kΩ
R 16,17	"	1 W	5%	16 kΩ
R 18	"	1/2 W	10%	630 Ω
R 19,20	"	"	5%	315 kΩ
R 21-24	"	1/3 W	10%	1 kΩ
R 26	"	1/2 W	"	3.15 kΩ
R 27	"	1/3 W	2%	45 kΩ
R 28	"	1/2 W	"	800 kΩ
R 29	"	"	"	100 kΩ
R 30	"	1 W	10%	20 kΩ
R 31	"	"	"	63 kΩ
R 32	"	1/2 W	5%	350 kΩ
R 33	"	"	10%	125 kΩ
R 34	"	"	2%	125 kΩ
R 35	"	"	10%	250 kΩ
R 36	"	"	"	315 kΩ
R 38,39	Metal	1/2 W	± 1%	1.54 kΩ RF 0215
R 40	Carbon	"	10%	100 kΩ
R 41	"	1/3 W	0.5%	462 Ω
R 42	"	"	"	1 kΩ
R 43	"	"	"	3.16 kΩ
R 44	"	"	"	10 kΩ
R 45	"	"	"	31.6 kΩ
R 46	"	"	"	100 kΩ
R 47	"	"	"	316 kΩ
R 48	"	"	10%	250 kΩ
R 49	"	1/2 W	"	1MΩ
R 50	"	1/3 W	"	10 Ω
R 51,52	"	"	"	315 Ω
R 53	"	"	2%	100 Ω
R 54,55	"	"	10%	250 Ω
R 56	"	"	2%	570 Ω
R 57	"	"	"	500 Ω
R 58,59	"	"	10%	400 Ω
R 60	"	"	5%	2 kΩ
R 61	"	1/2 W	10%	3.15 kΩ
R 62	"	1/3 W	"	500 Ω
R 63	"	"	2%	4 kΩ
R 64-67	"	"	10%	1 kΩ
R 68	"	"	2%	4 kΩ
R 69-72	"	"	10%	1 kΩ
R 73	"	"	2%	2.5 kΩ
R 74,75	"	"	10%	1.25 kΩ
R 76	"	"	5%	800 Ω
R 77	"	"	10%	630 Ω
R 78,79	"	"	"	1.6 kΩ
R 80,81	"	"	2%	2 kΩ
R 82,83	"	"	"	1.6 kΩ
R 84	"	"	10%	800 Ω
R 85	"	"	"	5 kΩ
R 86	"	"	"	4 kΩ
R 87-93	"	"	"	2 kΩ
R 94,95	"	"	2%	3.15 kΩ
R 96	"	"	10%	3.15 kΩ
R 97	"	"	"	4 kΩ
R 99	"	"	2%	10 kΩ
R 100	"	"	"	5 kΩ
R 101	"	"	10%	3.15 kΩ
R 102-105	"	"	"	8 kΩ

CIRCUIT DIAGRAM REF.	COMPONENT TYPE			STOCK REF.
R 106	Carbon	1/3 W	2%	3.15 kΩ
R 107	"	"	10%	8 kΩ
R 108	"	"	2%	16 kΩ
R 109	"	"	10%	14 kΩ
R 110	"	"	"	20 kΩ
R 111,112	"	"	"	10 kΩ
R 113	"	"	2%	12.5 kΩ
R 114	"	"	"	10 kΩ
R 115,116	"	"	10%	8 kΩ
R 117	"	"	"	40 kΩ
R 118,119	"	"	"	12.5 kΩ
R 120	"	"	"	50 kΩ
R 121	"	"	"	63 kΩ
R 122	"	"	"	80 kΩ
R 123	"	"	"	50 kΩ
R 124,125	"	"	"	3.15 kΩ
R 126,127	"	"	"	100 kΩ
R 128	"	"	2%	135 kΩ
R 129	"	"	"	80 kΩ
R 130	"	"	10%	250 kΩ
R 131,132	"	"	"	400 kΩ
R 133	"	"	"	125 kΩ
R 134,135	"	"	"	3.15MΩ
R 136	Metal	1/4 W	± 5%	1.8MΩ RF 0219
R 137-139	Carbon	"	10%	5 kΩ
R 140	Metal	"	1%	62 kΩ RF 0206
R 141,142	"	"	"	82 kΩ RF 0207
R 143	"	"	"	154 kΩ RF 0208
R 145,146	Carbon	1/3 W	2%	16 kΩ
R 147,148	"	"	"	40 kΩ
R 151-154	"	"	1%	275 Ω
R 155	"	"	"	290 Ω
R 156	"	"	10%	400 Ω
R 157-161	"	"	2%	1.25 kΩ
R 162	"	"	"	1.4 kΩ
R 163,164	"	"	"	1.25 kΩ
R 165	Metal	1/4 W	± 1%	715 Ω RF 0214
R 166	"	"	"	680 Ω RF 0213
R 167	Carbon	1/3 W	10%	2.5 kΩ
R 168,169	"	"	2%	3.15 kΩ
R 170,171	"	"	10%	40 kΩ
R 172-175	"	"	2%	4 kΩ
R 177	"	"	"	5 kΩ
R 178	"	"	"	16 kΩ
R 179-185	"	"	"	6.3 kΩ
R 186	"	"	"	9 kΩ
R 187,188	"	"	"	9.5 kΩ
R 189	"	"	"	10.5 kΩ
R 190	"	"	"	12 kΩ
R 191	"	"	"	12.5 kΩ
R 192	"	"	"	13 kΩ
R 193,194	"	"	10%	250 kΩ
R 195,196	"	"	2%	25 kΩ
R 197	"	"	10%	63 kΩ
R 198	"	"	"	40 kΩ
R 199	"	"	2%	28 kΩ
R 200-202	"	"	"	31.6 kΩ
R 203	"	"	"	35 kΩ
R 204,205	"	"	"	63 kΩ
R 206	"	"	2%	160 Ω
R 210	"	1/2 W	10%	1 kΩ
R 211	Wire	5.5 W	"	30 Ω RX 0309
R 212	"	2 W	"	5 kΩ RO 0700
R 213,214	"	1 W	"	2 Ω RR 0002
R 215,216	"	"	"	3 Ω RR 0003
R 217,218	"	"	"	4 Ω RR 0004

CIRCUIT
DIAGRAM
REF.

COMPONENT
TYPE

STOCK
REF.

CIRCUIT
DIAGRAM
REF.

COMPONENT
TYPE

STOCK
REF.

CAPACITORS:

C1	Electrolytic	50 μ F/6.4 V	CE 0204
C 2-6	"	25 μ F/ 25 V	CE 2002
C 7,8	"	5000 μ F/ 25 V	CE 0420
C 9,10	"	5000 μ F/ 15 V	CE 0301
C 11,12	"	12.5 μ F/ 25 V	CE 0416
C 13,14	"	4 μ F/ 50 V	CE 0404
C 15-18	"	12.5 μ F/ 25 V	CE 0416
C 20-23	"	800 μ F/ 64 V	CE 0516
C 26	"	8 μ F/350 V	CE 0802
C 28	"	20 μ F/100 V	CE 0602
C 29	"	4 μ F/250 V	CE 2034
C 30,31	"	2 x 50 μ F/450 V	CE 0909
C 34,35	"	4 μ F/ 50 V	CE 0404
C 37,38	"	32 μ F/ 25 V	CE 0407
C 41,42	"	250 μ F/ 25 V	CE 0413
C 43	"	64 μ F/ 64 V	CE 0513
C 44	"	250 μ F/ 6 V	CE 8944
C 45	"	100 μ F/ 25 V	CE 0415
C 46	"	20 μ F/ 64 V	CE 8949
C 47	"	250 μ F/ 25 V	CE 0413
C 48	"	32 μ F/ 64 V	CE 0509
C 49	"	5 μ F/ 35 V	CE 0406
C 50	Polyester	32 μ F/ 64 V	CE 0509
C 51	Ceramic	10 nF	CK 4100
C 52	"	\pm 5% 25 pF	CK 0091
C 53	"	27 pF/400 V	CK 1270
C 54	Electrolytic	10 μ F/ 15 V	CE 0001
C 55	Metal	2.2 μ F/100 V	CP 0014
C 56,57	Polyester	0.47 μ F/125 V	CS 0021
C 58	"	0.22 μ F/250 V	CS 0017
C 59,60	Ceramic	180 pF/ 8 kV	CK 2181
C 61,62	"	500 pF/20 kV	CK 2500
C 65	Polyester	0.1 μ F/250 V	CS 0013
C 66	"	22 nF/250 V	CS 0005
C 67	Polystyrene	12.5 nF	CT 3235
C 68	Polyester	0.22 μ F/250 V	CS 0017
C 69	"	0.47 μ F/400 V	CS 0121
C 70	"	1.8 nF/400 V	CS 0125
C 72	"	4.7 nF/400 V	CS 0122
C 73-76	"	100 nF/250 V	CS 0402
C 77,78	"	0.22 μ F/250 V	CS 0017
C 79,80	"	0.47 μ F/125 V	CS 0021
C 82	"	1 μ F/250 V	CS 0025
C 83	"	2 μ F/250 V	CS 0028
C 84	"	0.22 μ F/250 V	CS 0017
C 85,86	"	0.47 μ F/125 V	CS 0021
C 90,91	Polystyrene	50 pF/500 V	CT 0101
C 92,93	"	100 pF/500 V	CT 0103
C 94,95	"	\pm 2% 4 nF	CT 3225
C 96	"	\pm 1% 344 pF	CT 3038
C 97	"	\pm 2.5% 675 pF	CT 3242
C 98	"	\pm 1% 1.98 nF	CT 1303
C 99	"	\pm 1% 3.09 nF	CT 1200
C 100	"	+0%, -2% 10 nF	CT 3331
C 101	"	\pm 1% 63 nF	CT 3364
C 102	"	\pm 1% 16.4 nF	CT 3528
C 110	Trimmer	4.5-20 pF	CV 0020
C 120-124	Ceramic	27 pF	CK 1270
C 125	"	60 pF/400 V	CK 1600
C 126	"	100 pF	CK 2100
C 127	"	82 pF	CK 1820
C 128	"	100 pF	CK 2100
C 129	Polyester	10 nF/250 V	CS 0403
C 130	Ceramic	2.2 pF	CK 0220
C 130	"	6.8 pF	CK 0680

SWITCHES:

N 2	Sweep Start	NN 0007
N	Ext. Freq. Input	NT 0011
O 2-4	Relay	OC 0011
O 5	Attenuator	OR 4712
O 6	Sweep Mode	OS 4709
O 7	Return trace	OT 4709
O 8	Vertical speed	OU 4709
O 9	Dynamic Range	OV 4712

POTENTIOMETERS:

P 1	Trimmer	carbon lin.	470 Ω	PG 1500
P 2	"	"	470 Ω	PG 1500
P 3	"	"	100 Ω	PG 1100
P 4	"	"	1 k Ω	PG 2100
P 5-17	"	"	2 k Ω	PG 2201
P 18	"	"	5 k Ω	PG 2500
P 19-24	"	"	10 k Ω	PG 3102
P 25	"	"	20 k Ω	PG 3201
P 26	"	wire	10 k Ω	PG 3107
P 27	"	"	2 k Ω	PG 2203
P 28	"	"	5 k Ω	PG 2505
P 29,31	"	carbon	1 k Ω	PG 2104
P 32	"	"	50 k Ω	PG 3501
P 35	"	"	200 k Ω	PG 4202
P 36	"	"	1 M Ω	PG 5104
P 37	"	"	1 k Ω	PG 2104
P 38	Blanking level	wire	25 k Ω	PH 3250
P 39	Intensity	carbon	100 k Ω	PP 4105
P 40	Input	"	100 k Ω	PP 4105
P 42	Trimmer	wire	1 k Ω	PQ 2100
P 43,44	"	"	500 Ω	PQ 1509
P 45	"	"	100 Ω	PR 1109
P 46	Scale ill.	"	10 Ω	PS 0109
P 47-53	Trimmer	carbon	25 k Ω	PG 3250
P 54	"	"	50 k Ω	PG 3504
P 56	"	"	100 k Ω	PG 4103
P 60,61	"	"	10 Ω	PG 0100

RECTIFIERS:

Q 1-4	Silicon	200 ∇ /	40 mA	QV 0022
Q 5,6	"	1200 ∇ /0.15 A		QV 0025
Q 7	"	200 ∇ /	40 mA	QV 0022
Q 9-20	Germanium	45 ∇ /	0.1 A	QV 0078
Q 21-28	"	115 ∇ /0.15 A		QV 0085
Q 30,31	Silicon	275 ∇ /	30 mA	QV 0209
Q 32,33	"	200 ∇ /	40 mA	QV 0022
Q 36-40	"	275 ∇ /	30 mA	QV 0209
Q 41-55	"	50 ∇ /	0.6 A	QV 0501
Q 56,57,59,60	"	200 ∇ /	0.6 A	QV 0502
Q 61	Zener	120 ∇ /	5 mA	QV 1004
Q 62,63	"	12 ∇ /	5 mA	QV 1112
Q 66	"	6.7 ∇ /	10 mA	QV 1324
Q 67,68	"	12 ∇ /	75 mA	QV 1313
Q 69-72	"	50 ∇ /	0.6 A	QV 0501
Q 73	Zener	618 ∇ /	30 mA	QV 1106
Q 74-76	Selenium	6750 ∇ /	0.3 mA	QV 0024
Q 77,78	Silicon	1200 ∇ /0.15 mA		QV 0025
Q 79	Zener	24 ∇		QV 1005
Q 80	"	7 ∇ /	10 mA	QV 1007

RESISTORS:

R 1,2	Metal	1/4 W	\pm 1%	6.2 k Ω	RF 0201
R 3	"	"	"	4 k Ω	RF 0209
R 4	"	"	"	169 k Ω	RF 0202

CIRCUIT DIAGRAM REF.	COMPONENT TYPE			STOCK REF.
RESISTORS:				
R 5-8	Metal	1/4 W	1%	180 kΩ RF 0203
R 9	"	"	"	400 kΩ RF 0205
R 10	"	"	"	100MΩ/10 kV RF 0218
R 11	"	"	"	250MΩ/18 kV RH 0603
R 12,13	Carbon	1 W	5%	10 kΩ
R 14	Wire	5.5 W	"	24 kΩ RX 0404
R 15	Carbon	1/3 W	10%	40 kΩ
R 16,17	"	5.5 W	5%	15 kΩ RX 0304
R 18	"	1/2 W	10%	630 Ω
R 19,20	"	"	5%	315 kΩ
R 21-24	"	1/3 W	10%	1 kΩ
R 26	"	1/2 W	"	3.15 kΩ
R 27	"	1/3 W	2%	45 kΩ
R 28	"	1/2 W	"	800 kΩ
R 29	"	"	"	100 kΩ
R 30	"	1 W	10%	20 kΩ
R 31	"	"	"	63 kΩ
R 32	"	1/2 W	5%	350 kΩ
R 33	"	"	10%	125 kΩ
R 34	"	"	2%	125 kΩ
R 35	"	"	10%	250 kΩ
R 36	"	"	"	315 kΩ
R 38,39	Metal	1/2 W	± 1%	1.54 kΩ RF 0215
R 40	Carbon	"	10%	100 kΩ
R 41	"	1/3 W	0.5%	462 Ω
R 42	"	"	"	1 kΩ
R 43	"	"	"	3.16 kΩ
R 44	"	"	"	10 kΩ
R 45	"	"	"	31.6 kΩ
R 46	"	"	"	100 kΩ
R 47	"	"	"	316 kΩ
R 48	"	"	10%	250 kΩ
R 49	"	1/2 W	"	1MΩ
R 50	"	1/3 W	"	10 Ω
R 51,52	"	"	"	315 Ω
R 53	"	"	2%	100 Ω
R 54,55	"	"	10%	250 Ω
R 56	"	"	2%	570 Ω
R 57	"	"	"	500 Ω
R 58,59	"	"	10%	400 Ω
R 60	"	"	5%	2 kΩ
R 61	"	1/2 W	"	3.15 kΩ
R 62	"	1/3 W	"	500 Ω
R 63	"	"	2%	4 kΩ
R 64-67	"	"	10%	1 kΩ
R 68	"	"	2%	4 kΩ
R 69-72	"	"	10%	1 kΩ
R 73	"	"	2%	2.5 kΩ
R 74,75	"	"	10%	1.25 kΩ
R 76	"	"	5%	800 Ω
R 77	"	"	10%	630 Ω
R 78,79	"	"	"	1.6 kΩ
R 80,81	"	"	2%	2 kΩ
R 82,83	"	"	"	1.6 kΩ
R 84	"	"	10%	800 Ω
R 85	"	"	"	5 kΩ
R 86	"	"	"	4 kΩ
R 87-93	"	"	"	2 kΩ
R 94,95	"	"	2%	3.15 kΩ
R 96	"	"	10%	3.15 kΩ
R 97	"	"	"	4 kΩ
R 99	"	"	2%	10 kΩ
R 100	"	"	"	5 kΩ
R 101	"	"	10%	3.15 kΩ
R 102-105	"	"	"	8 kΩ

CIRCUIT DIAGRAM REF.	COMPONENT TYPE			STOCK REF.
R 106	Carbon	1/3 W	2%	3.15 kΩ
R 107	"	"	10%	8 kΩ
R 108	"	"	2%	16 kΩ
R 109	"	"	10%	14 kΩ
R 110	"	"	"	20 kΩ
R 111,112	"	"	"	10 kΩ
R 113	"	"	2%	12.5 kΩ
R 114	"	"	"	10 kΩ
R 115,116	"	"	10%	8 kΩ
R 117	"	"	"	40 kΩ
R 118,119	"	"	"	12.5 kΩ
R 120	"	"	"	50 kΩ
R 121	"	"	"	63 kΩ
R 122	"	"	"	80 kΩ
R 123	"	"	"	50 kΩ
R 124,125	"	"	"	3.15 kΩ
R 126,127	"	"	"	100 kΩ
R 128	"	"	2%	135 kΩ
R 129	"	"	"	80 kΩ
R 130	"	"	10%	250 kΩ
R 131,132	"	"	"	400 kΩ
R 133	"	"	"	125 kΩ
R 134,135	"	"	"	3.15MΩ
R 136	Metal	1/4 W	± 5%	1.8MΩ RF 0219
R 137-139	Carbon	"	10%	5 kΩ
R 140	Metal	"	1%	62 kΩ RF 0206
R 141,142	"	"	"	82 kΩ RF 0207
R 143	"	"	"	154 kΩ RF 0208
R 145,146	Carbon	1/3 W	2%	16 kΩ
R 147,148	"	"	"	40 kΩ
R 151-154	"	"	1%	275 Ω
R 155	"	"	"	290 Ω
R 156	"	"	10%	400 Ω
R 157-161	"	"	2%	1.25 kΩ
R 162	"	"	"	1.4 kΩ
R 163,164	"	"	"	1.25 kΩ
R 165	Metal	1/4 W	± 1%	715 Ω RF 0214
R 166	"	"	"	680 Ω RF 0213
R 167	Carbon	1/3 W	10%	2.5 kΩ
R 168,169	"	"	2%	3.15 kΩ
R 170,171	"	"	10%	40 kΩ
R 172-175	"	"	2%	4 kΩ
R 177	"	"	"	5 kΩ
R 178	"	"	"	16 kΩ
R 179-185	"	"	"	6.3 kΩ
R 186	"	"	"	9 kΩ
R 187	"	"	"	8.5 kΩ
R 188	"	"	"	9.5 kΩ
R 189	"	"	"	10.5 kΩ
R 190	"	"	"	12 kΩ
R 191	"	"	"	12.5 kΩ
R 192	"	"	"	14 kΩ
R 193,194	"	"	1%	250 kΩ
R 195,196	"	"	2%	25 kΩ
R 197	"	"	10%	63 kΩ
R 198	"	"	1%	40 kΩ
R 199	"	"	2%	28 kΩ
R 200-202	"	"	"	31.6 kΩ
R 203	"	"	"	35 kΩ
R 204,205	"	"	"	63 kΩ
R 206	"	"	2%	160 Ω
R 210	"	1/2 W	10%	1 kΩ
R 211	Wire	5.5 W	"	30 Ω RX 0309
R 212	"	2 W	"	5 kΩ RO 0700
R 213,214	"	1 W	"	2 Ω RR 0002
R 215,216	"	"	"	3 Ω RR 0003
R 217,218	"	"	"	4 Ω RR 0004

CIRCUIT
DIAGRAM
REF.COMPONENT
TYPESTOCK
REF.CIRCUIT
DIAGRAM
REF.COMPONENT
TYPESTOCK
REF.

CAPACITORS:

C 1	Electrolytic	50 μ F/6.4 V	CE 0204
C 2-6	"	25 μ F/ 25 V	CE 2002
C 7, 8	"	5000 μ F/ 25 V	CE 0420
C 9, 10	"	5000 μ F/ 15 V	CE 0301
C 11, 12	"	12.5 μ F/ 25 V	CE 0416
C 13, 14	"	4 μ F/ 50 V	CE 0404
C 15-18	"	12.5 μ F/ 25 V	CE 0416
C 20-23	"	800 μ F/ 64 V	CE 0516
C 26	"	8 μ F/350 V	CE 0802
C 28	"	20 μ F/100 V	CE 0602
C 29	"	4 μ F/250 V	CE 2034
C 30, 31	"	2 x 50 μ F/450 V	CE 0909
C 34, 35	"	4 μ F/ 50 V	CE 0404
C 37, 38	"	32 μ F/ 25 V	CE 0407
C 41, 42	"	250 μ F/ 25 V	CE 0413
C 43	"	64 μ F/ 64 V	CE 0513
C 44	"	250 μ F/ 6 V	CE 8944
C 45	"	100 μ F/ 25 V	CE 0415
C 46	"	20 μ F/ 64 V	CE 8949
C 47	"	250 μ F/ 25 V	CE 0413
C 48	"	32 μ F/ 64 V	CE 0509
C 49	"	5 μ F/ 35 V	CE 0406
C 50	"	32 μ F/ 64 V	CE 0509
C 51	Ceramic	10 nF	CK 4100
C 52	"	\pm 5% 25 pF	CK 0091
C 53	"	27 pF/400 V	CK 1270
C 54	Electrolytic	10 μ F/ 15 V	CE 0001
C 55	Polycarbonate	2.2 μ F/100 V	CS 0805
C 56, 57	Polyester	0.47 μ F/125 V	CS 0021
C 58	"	0.22 μ F/250 V	CS 0017
C 59, 60	Ceramic	180 pF/ 8 kV	CK 2181
C 61, 62	"	500 pF/20 kV	CK 2500
C 65	Polyester	0.1 μ F/250 V	CS 0013
C 66	Polycarbonate	22 nF/250 V	CS 0005
C 67	Polystyrene	12.5 nF/	CT 3235
C 68	Polyester	0.22 μ F/250 V	CS 0017
C 69	Polycarbonate	0.47 μ F/400 V	CS 0121
C 70	Polyester	1.8 nF/400 V	CS 0125
C 72	"	4.7 nF/400 V	CS 0122
C 73-76	"	100 nF/250 V	CS 0402
C 77, 78	"	0.22 μ F/250 V	CS 0017
C 79, 80	"	0.47 μ F/125 V	CS 0021
C 82	"	1 μ F/250 V	CS 0025
C 83	"	2 μ F/250 V	CS 0028
C 84	"	0.22 μ F/250 V	CS 0017
C 85, 86	"	0.47 μ F/125 V	CS 0021
C 90, 91	Polystyrene	50 pF/500 V	CT 0101
C 92, 93	"	100 pF/500 V	CT 0103
C 94, 95	"	2% 4 nF	CT 3225
C 96	"	1% 344 pF	CT 3038
C 97	"	2.5% 675 pF	CT 3242
C 98	"	1% 1.98 nF	CT 1303
C 99	"	1% 3.09 nF	CT 1200
C 100	"	+0%, -2% 10 nF	CT 3331
C 101	"	1% 63 nF	CT 3364
C 102	"	1% 16.4 nF	CT 3528
C 110	Trimmer	4.5-20 pF	CV 0020
C 120-124	Ceramic	27 pF	CK 1270
C 125	"	60 pF/400 V	CK 1600
C 126	"	100 pF	CK 2100
C 127	"	82 pF	CK 1820
C 128	"	100 pF	CK 2100
C 129	Polyester	10 nF/250 V	CS 0403
C 130	Ceramic	2.2 pF	CK 0220
C 130	"	6.8 pF	CK 0680
C 132	"	10 nF/400 V	CK 4100

SWITCHES:

N 2	Sweep Start	NN 0007
N	Ext. Freq. Input	NT 0011
O 2-4	Relay	OC 0011
O 5	Attenuator	OR 4712
O 6	Sweep Mode	OS 4709
O 7	Return trace	OT 4709
O 8	Vertical speed	OU 4709
O 9	Dynamic Range	OV 4712

POTENTIOMETERS:

P 1	Trimmer	carbon lin.	470 Ω	PG 1500
P 2	"	"	470 Ω	PG 1500
P 3	"	"	100 Ω	PG 1100
P 4	"	"	1 k Ω	PG 2100
P 5-17	"	"	2 k Ω	PG 2201
P 18	"	"	5 k Ω	PG 2500
P 19-24	"	"	10 k Ω	PG 3102
P 25	"	"	20 k Ω	PG 3201
P 26	"	wire	10 k Ω	PG 3107
P 27	"	"	2 k Ω	PG 2203
P 28	"	"	5 k Ω	PG 2505
P 29, 31	"	carbon	1 k Ω	PG 2104
P 32	"	"	50 k Ω	PG 3501
P 35	"	"	200 k Ω	PG 4202
P 36	"	"	1M Ω	PG 5104
P 37	"	"	1 k Ω	PG 2104
P 38	Blanking level	wire	25 k Ω	PH 3250
P 39	Intensity	carbon	100 k Ω	PP 4105
P 40	Input	"	100 k Ω	PP 4105
P 42	Trimmer	wire	1 k Ω	PQ 2100
P 43, 44	"	"	500 Ω	PQ 1509
P 45	"	"	100 Ω	PR 1109
P 46	Scale ill.	"	10 Ω	PS 0109
P 47-53	Trimmer	carbon	25 k Ω	PG 3250
P 54	"	"	50 k Ω	PG 3504
P 56	"	"	100 k Ω	PG 4103
P 60, 61	"	"	10 Ω	PG 0100

RECTIFIERS:

Q 1-4	Silicon	200 V/	40 mA	QV 0022
Q 5, 6	"	1200 V/0.15 A		QV 0025
Q 7	"	200 V/	40 mA	QV 0022
Q 9-20	Germanium	45 V/	0.1 A	QV 0078
Q 21-28	"	115 V/0.15 A		QV 0085
Q 30, 31	Silicon	275 V/	30 mA	QV 0209
Q 32, 33	"	200 V/	40 mA	QV 0022
Q 36	"	6 V/	150 mA	QV 1400
Q 37-40	"	275 V/	30 mA	QV 0209
Q 41-55	"	50 V/	0.6 A	QV 0501
Q 56, 57, 59, 60	"	200 V/	0.6 A	QV 0502
Q 61	Zener	120 V/	5 mA	QV 1004
Q 62, 63	"	12 V/	5 mA	QV 1112
Q 66	"	6.7 V/	10 mA	QV 1324
Q 67, 68	"	12 V/	75 mA	QV 1313
Q 69-72	Silicon	50 V/	0.6 A	QV 0501
Q 73	Zener	6.8 V/	30 mA	QV 1106
Q 74-76	Selenium	6750 V/	0.3 mA	QV 0024
Q 77, 78	Silicon	1200 V/0.15 mA		QV 0025
Q 79	Zener	24 V		QV 1005
Q 80	"	7 V/	10 mA	QV 1007

RESISTORS:

R 1, 2	Metal	1/4 W	\pm 1%	6.2 k Ω	RF 0201
R 3	"	"	"	4 k Ω	RF 0209
R 4	"	"	"	169 k Ω	RF 0202

CIRCUIT DIAGRAM REF.	COMPONENT TYPE			STOCK REF.
RESISTORS:				
R 5-8	Metal	1/4 W	1%	180 kΩ RF 0203
R 9	"	"	"	400 kΩ RF 0205
R 10	"	"	"	100MΩ/10 kV RF 0218
R 11	"	"	"	250MΩ/18 kV RH 0603
R 12,13	Carbon	1 W	5%	10 kΩ
R 14	Wire	5.5 W	"	24 kΩ RX 0404
R 15	Carbon	1/3 W	10%	40 kΩ
R 16,17	"	5.5 W	5%	15 kΩ RX 0304
R 18	"	1/2 W	10%	630 Ω
R 19,20	"	"	5%	315 kΩ
R 21-24	"	1/3 W	10%	1 kΩ
R 26	"	1/2 W	"	3.15 kΩ
R 27	"	1/3 W	2%	45 kΩ
R 28	"	1/2 W	"	800 kΩ
R 29	"	"	"	100 kΩ
R 30	"	1 W	10%	20 kΩ
R 31	"	"	"	63 kΩ
R 32	"	1/2 W	5%	350 kΩ
R 33	"	"	10%	125 kΩ
R 34	"	"	2%	125 kΩ
R 35	"	"	10%	250 kΩ
R 36	"	"	"	315 kΩ
R 38,39	Metal	1/2 W	± 1%	1.54 kΩ RF 0215
R 40	Carbon	"	10%	100 kΩ
R 41	"	1/3 W	0.5%	462 Ω
R 42	"	"	"	1 kΩ
R 43	"	"	"	3.16 kΩ
R 44	"	"	"	10 kΩ
R 45	"	"	"	31.6 kΩ
R 46	"	"	"	100 kΩ
R 47	"	"	"	316 kΩ
R 48	"	"	10%	250 kΩ
R 49	"	1/2 W	"	1MΩ
R 50	"	1/3 W	"	10 Ω
R 51,52	"	"	"	315 Ω
R 53	"	"	2%	100 Ω
R 54,55	"	"	10%	250 Ω
R 56	"	"	2%	570 Ω
R 57	"	"	"	500 Ω
R 58,59	"	"	10%	400 Ω
R 60	"	"	5%	2 kΩ
R 61	"	1/2 W	10%	3.15 kΩ
R 62	"	1/3 W	"	500 Ω
R 63	"	"	2%	4 kΩ
R 64-67	"	"	10%	1 kΩ
R 68	"	"	2%	4 kΩ
R 69-72	"	"	10%	1 kΩ
R 73	"	"	2%	2.5 kΩ
R 74,75	"	"	10%	1.25 kΩ
R 76	"	"	5%	800 Ω
R 77	"	"	10%	630 Ω
R 78,79	"	"	"	1.6 kΩ
R 80,81	"	"	2%	2 kΩ
R 82,83	"	"	"	1.6 kΩ
R 84	"	"	10%	800 Ω
R 85	"	"	"	5 kΩ
R 86	"	"	"	4 kΩ
R 87-93	"	"	"	2 kΩ
R 94,95	"	"	2%	3.15 kΩ
R 96	"	"	10%	3.15 kΩ
R 97	"	"	"	4 kΩ
R 99	"	"	2%	10 kΩ
R 100	"	"	"	5 kΩ
R 101	"	"	10%	3.15 kΩ
R 102-105	"	"	"	8 kΩ

CIRCUIT DIAGRAM REF.	COMPONENT TYPE			STOCK REF.
R 106	Carbon	1/3 W	2%	3.15 kΩ
R 107	"	"	10%	8 kΩ
R 108	"	"	2%	16 kΩ
R 109	"	"	10%	14 kΩ
R 110	"	"	"	20 kΩ
R 111,112	"	"	"	10 kΩ
R 113	"	"	2%	12.5 kΩ
R 114	"	"	"	10 kΩ
R 115,116	"	"	10%	8 kΩ
R 117	"	"	"	40 kΩ
R 118,119	"	"	"	12.5 kΩ
R 120	"	"	"	50 kΩ
R 121	"	"	"	63 kΩ
R 122	"	"	"	80 kΩ
R 123	"	"	"	50 kΩ
R 124,125	"	"	"	3.15 kΩ
R 126,127	"	"	"	100 kΩ
R 128	"	"	2%	135 kΩ
R 129	"	"	"	80 kΩ
R 130	"	"	10%	250 kΩ
R 131,132	"	"	"	400 kΩ
R 133	"	"	"	125 kΩ
R 134,135	"	"	"	3.15MΩ
R 136	Metal	1/4 W	± 5%	1.8MΩ RF 0219
R 137-139	Carbon	"	10%	5 kΩ
R 140	Metal	"	1%	62 kΩ RF 0206
R 141,142	"	"	"	82 kΩ RF 0207
R 143	"	"	"	154 kΩ RF 0208
R 145,146	Carbon	1/3 W	2%	16 kΩ
R 147,148	"	"	"	40 kΩ
R 151-154	"	"	1%	275 Ω
R 155	"	"	"	290 Ω
R 156	"	"	10%	400 Ω
R 157-161	"	"	2%	1.25 kΩ
R 162	"	"	"	1.4 kΩ
R 163,164	"	"	"	1.25 kΩ
R 165	Metal	1/4 W	± 1%	715 Ω RF 0214
R 166	"	"	"	680 Ω RF 0213
R 167	Carbon	1/3 W	10%	2.5 kΩ
R 168,169	"	"	2%	3.15 kΩ
R 170,171	"	"	10%	40 kΩ
R 172-175	"	"	2%	4 kΩ
R 177	"	"	"	5 kΩ
R 178	"	"	"	16 kΩ
R 179-185	"	"	"	6.3 kΩ
R 186	"	"	"	9 kΩ
R 187	"	"	"	8.5 kΩ
R 188	"	"	"	9.5 kΩ
R 189	"	"	"	10.5 kΩ
R 190	"	"	"	12 kΩ
R 191	"	"	"	12.5 kΩ
R 192	"	"	"	14 kΩ
R 193,194	"	"	1%	250 kΩ
R 195,196	"	"	2%	25 kΩ
R 197	"	"	10%	63 kΩ
R 198	"	"	1%	40 kΩ
R 199	"	"	2%	28 kΩ
R 200-202	"	"	"	31.6 kΩ
R 203	"	"	"	35 kΩ
R 204,205	"	"	"	63 kΩ
R 206	"	"	2%	160 Ω
R 210	"	1/2 W	10%	1 kΩ
R 211	Wire	5.5 W	"	30 Ω RX 0309
R 212	"	2 W	"	5 kΩ RO 0700
R 213,214	"	1 W	"	2 Ω RR 0002
R 215,216	"	"	"	3 Ω RR 0003
R 217,218	"	"	"	4 Ω RR 0004

CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.	CIRCUIT DIAGRAM REF.	COMPONENT TYPE			STOCK REF.
RESISTORS:						V 21-24	Silicon Trans.	PNP	2N4289	VB 0049
R 219, 220	Wire	5.5 W	10%	4.7 Ω	RX 0318	V 25	"	PNP	2N3702	VB 0038
R 223, 224	"	1 W	"	4 Ω	RR 0004	V 26-28	"	PNP	2N4289	VB 0049
R 225	"	5.5 W	"	6.2 kΩ	RX 0303	V 29	"	PNP	BCY90	VB 0051
R 226	"	"	"	12 kΩ	RX 0316	V 30, 31	"	PNP	2N4289	VB 0049
R 227	"	"	"	680 Ω	RX 0317	V 32-35	"	NPN	2N3704	VB 0028
R 228	"	8 W	"	1.5 kΩ	RX 0405	V 36-45	"	PNP	2N4289	VB 0049
R 229	"	"	"	27 kΩ	RX 0407	V 46	"	NPN	2N1613	VB 0026
R 230	"	5.5 W	"	30 Ω	RX 0309	V 47-50	"	NPN	40363	VB 0255
R 240, 241	Carbon	1/3 W	"	2 kΩ		V 51	Germanium Trans.	ASZ16(TI 3028)	VB 0029	
R 242	"	"	"	25 kΩ		V 52	Silicon Trans.	PNP	2N4289	VB 0049
R 243	"	"	"	6.3 kΩ		V 53	Fuse	1 Amp.	VF 0008	
R 250, 251	"	"	"	315 Ω		V 54-57	Scale Lamp	6 V/0.25 Amp.	VS 1273	
R 252, 253	"	"	5%	31.5 Ω		V 58	Silicon Trans.	PNP	2N4289	VB 0049
R 254, 255	"	"	"	125 Ω		V 59, 60	Field-effect Transistor	N-channel	VB 1045	
R 256, 257	"	"	10%	10 Ω		V 61-64	Silicon Trans.	NPN	2N3440	VB 0250
R 258, 259	"	"	"	10 Ω		V 65	"	PNP	2N4289	VB 0049
R 260, 261	"	"	5%	800 Ω		V 66	"	NPN	2N3704	VB 0028
R 262, 263	"	"	2%	5 kΩ		V 67, 68	"	PNP	2N4289	VB 0049
R 264	"	"	"	3.5 kΩ		V 69, 70	"	NPN	BF109	VB 0039
R 265	"	"	"	12 kΩ						
R 266	"	"	"	1.6 kΩ		PRINTED CIRCUIT:				
R 267	"	"	10%	5 kΩ		Plug-in Unit	ZS 0120			XC 0108
R 268	"	"	"	200 Ω		"	" ZS 0121			XC 0109
R 269	"	"	2%	9 kΩ		UM 1014	Motor Drive			XC 0205
R 270, 271	"	"	"	9.5 kΩ		DC Amplifier				XC 0318
R 272	"	"	"	10.5 kΩ		Lin., Log. and Y-Amplifier				XC 0319
R 273	"	"	"	13 kΩ		Frequency Sensing Circuit				XC 0320
R 274	"	"	"	12 kΩ		Dynamic Range sec. 1				XC 0321
R 275	"	"	1%	3.3 kΩ		"	sec. 2			XC 0322
R 276	"	"	"	3.28 kΩ		"	sec. 3			XC 0323
R 277	"	"	"	2.18 kΩ		"	"			XC 0324
R 278	"	"	"	2.63 kΩ		Power Supply				XC 0362
R 279	"	"	"	3.43 kΩ		Control Circuit Sweep Motor				XC 0363
R 280	"	"	"	2.69 kΩ		Attenuator O 5				XC 0364
R 281	"	"	"	8.7 kΩ		E.H.T. Generator				XC 0365
R 282	"	"	"	10.2 kΩ		E.H.T. Power Supply				XC 0379
R 283	"	"	"	9.1 kΩ		Control Circuit Sweep Motor				XC 0386
R 284	"	"	"	8.9 kΩ		XC 0318 with components				802 4712
R 285	"	"	"	5.9 kΩ		XC 0319	"			801 4712
R 286	Metal	1/4 W	±1%	6.2 kΩ	RF 0201	XC 0320	"			803 4712
R 287	Carbon	1/3 W	2%	8 kΩ		XC 0321	"			815 4712
R 288	"	"	"	300 Ω		XC 0322	"			816 4712
R 289	"	"	"	8 kΩ		XC 0323	"			819 4712
R 290	"	"	"	300 Ω		XC 0324	"			825 4712
R 291	"	"	"	10 kΩ		XC 0362	"			809 4712
R 292	"	"	"	1.9 kΩ		XC 0363	"			810 4712
R 293	"	"	10%	50 kΩ		XC 0364	"			806 4712
R 294	"	1 W	"	100 kΩ		XC 0365	"			808 4712
R 295, 296	Metal	1/4 W	"	200MΩ	RH 0005	XC 0379	"			814 4712
R 297, 298	Carbon	1/3 W	"	25 Ω		XC 0386	"			811 4712
R 299	"	"	"	1.25 kΩ						
R 300	"	1/2 W	"	250 kΩ						
R 301	Metal	"	±1%	1.54 kΩ	RF 0215	MISCELLANEOUS:				
R 302	"	1/4 W	"	4 kΩ	RF 0209	Back Plate				FB 0101
R 303	"	1/2 W	±2%	12 kΩ	RF 0304	Bakelite knob				SN 0814
R 304	"	"	"	33 kΩ	RF 0305	Deflection Coil				LB 1019
R 305	Carbon	1/8 W	"	4.7 Ω	RA 0203	Drive Belt for UM 1014				DX 0023
TUBES and TRANSISTORS:						T 1	E.H.T. Transformer			TH 0002
V 1	Twin Triode	ECC82/12AU7		VA 0011		"	E.H.T. Cable			AP 3002
V 2	Triode Pentode	ECF82/6U8		VA 0014		"	E.H.T. Plug			JP 0100
V 3	Pentode	EL84/6BQ8		VA 0023		"	Front Plate			FA 0089
V 6	Stabilizer	85A2		VA 0056		"	Handle			DH 0052
V 7	Cathode Ray Tube	M 36-11 GM		VA 0076		M 1	Motor			UM 0009
V 8, 9	Twin Triode	ECC88/6DJ8		VA 0073			Plastic Cover			KF 0034
V 13-17	Silicon Trans.	PNP 2N4289		VB 0049			Plug 3-pole			JP 4701
V 19, 20	"	NPN 2N3704		VB 0028			Plug 30-pole			JP 3000
							Plug Screened			JP 0018

CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.
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MISCELLANEOUS:

	Power Cord, EUR	AN 0005
	Power Cord, USA	AN 0006
T 2	Power Transformer	TN 0019
	Power Voltage Selector	JS 0005
	Relay-Socket for O 4	JJ 0008
	Relay-Socket for O 2, O 3	JJ 0012
	Rubber Feet	DF 7010
	Scale, blank	SA 0512
	Scale, 20-20000 Hz	SA 0510
	Scale, 200-5000 Hz	SA 0509
	Socket, screened (Signal Input)	JJ 0115
	Socket, screened (Ext. Freq. Input)	JJ 0119
	Socket, mounted on XC 0363	JJ 1200
	Socket 30-pole	JJ 3000
	Socket 6-pole	JJ 4704
	Socket 3-pole	JJ 4700
	Steel Ball for UM 1014	DQ 0014
	Spring for frame	DL 0156
	Spring for frame	DL 0157

CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.
RESISTORS:					
R 219, 220	Wire	5.5 W	5%	4.7 Ω	RX 0318
R 223, 224	"	1 W	10%	4 Ω	RR 0004
R 225	"	5.5 W	"	6.2 kΩ	RX 0303
R 226	"	"	"	12 kΩ	RX 0316
R 227	"	"	"	680 Ω	RX 0317
R 228	"	8 W	"	1.5 kΩ	RX 0405
R 229	"	"	"	27 kΩ	RX 0407
R 230	"	5.5 W	"	30 Ω	RX 0309
R 240, 241	Carbon	1/3 W	"	2 kΩ	
R 242	"	"	"	25 kΩ	
R 243	"	"	"	6.3 kΩ	
R 250, 251	"	"	"	315 Ω	
R 252, 253	"	"	5%	31.5 Ω	
R 254, 255	"	"	"	125 Ω	
R 256, 257	"	"	10%	10 Ω	
R 258, 259	"	"	"	10 Ω	
R 260, 261	"	"	5%	750 Ω	
R 262, 263	"	"	2%	5 kΩ	
R 264	"	"	"	3.5 kΩ	
R 265	"	"	"	12 kΩ	
R 266	"	"	"	1.6 kΩ	
R 267	"	"	10%	5 kΩ	
R 268	"	"	"	200 Ω	
R 269	"	"	2%	9 kΩ	
R 270	"	"	"	8.5 kΩ	
R 271	"	"	"	9.5 kΩ	
R 272	"	"	"	10.5 kΩ	
R 273	"	"	"	14 kΩ	
R 274	"	"	"	12 kΩ	
R 275	"	"	"	2.5 kΩ	
R 276	"	"	1%	3.28 kΩ	
R 277	"	"	"	2.18 kΩ	
R 278	"	"	"	2.63 kΩ	
R 279	"	"	"	3.43 kΩ	
R 280	"	"	"	2.69 kΩ	
R 281	"	"	2%	8.7 kΩ	
R 282	"	"	"	10.2 kΩ	
R 283	"	"	"	9.1 kΩ	
R 284	"	"	"	8.9 kΩ	
R 285	"	"	"	5.9 kΩ	
R 286	Metal	1/4 W	± 1%	6.2 kΩ	RF 0201
R 287	Carbon	1/3 W	2%	8 kΩ	
R 288	"	"	"	300 Ω	
R 289	"	"	"	8 kΩ	
R 290	"	"	"	300 Ω	
R 291	"	"	"	10 kΩ	
R 292	"	"	"	1.9 kΩ	
R 293	"	"	10%	50 kΩ	
R 294	"	1 W	"	100 kΩ	
R 295, 296	Metal	1/4 W	"	200MΩ	RH 0005
R 297, 298	Carbon	1/3 W	"	25 Ω	
R 299	"	"	"	1.25 kΩ	
R 300	"	1/2 W	"	250 kΩ	
R 301	Metal	"	± 1%	1.54 kΩ	RF 0215
R 302	"	1/4 W	"	4 kΩ	RF 0209
R 303	"	1/2 W	± 2%	12 kΩ	RF 0304
R 304	"	"	"	33 kΩ	RF 0305
R 305	Carbon	1/8 W	"	4.7 Ω	RA 0203

TUBES and TRANSISTORS:

V 1	Twin Triode	ECC82/12AU7	VA 0011
V 2	Triode Pentode	ECC82/6U8	VA 0014
V 3	Pentode	EL84/6BQ8	VA 0023
V 6	Stabilizer	85A2	VA 0056
V 7	Cathode Ray Tube	M.36-11 GM	VA 0076
V 8,9	Twin Triode	ECC88/6DJ8	VA 0073
V 13-17	Silicon Trans.	PNP 2N4289	VB 0049
V 19,20	"	NPN2N3704	VB 0028

CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.
V 21-24	Silicon Trans. PNP	2N4289 VB 0049
V 25	" PNP	2N3702 VB 0038
V 26-28	" PNP	2N4289 VB 0049
V 29	" PNP	BCY90 VB 0051
V 30,31	" PNP	2N4289 VB 0049
V 32-35	" NPN	2N3704 VB 0028
V 36-45	" PNP	2N4289 VB 0049
V 46	" NPN	2N1613 VB 0026
V 47-50	" NPN	40363 VB 0255
V 51	Germanium Trans.	AS216(TI 3028) VB 0029
V 52	Silicon Trans. PNP	2N4289 VB 0049
V 53	Fuse	1 Amp. VF 0008
V 54-57	Scale Lamp	6 V/0.25 Amp. VS 1273
V 58	Silicon Trans. PNP	2N4289 VB 0049
V 59,60	Field-effect Transistor	matched pair VB 1045
V 61-64	Silicon Trans. NPN	2N3440 VB 0250
V 65	" PNP	2N4289 VB 0049
V 66	" NPN	2N3704 VB 0028
V 67,68	" PNP	2N4289 VB 0049
V 69,70	" NPN	BF178 VB 0052

PRINTED CIRCUIT:

Plug-in Unit ZS 0120	XC 0108
" " ZS 0121	XC 0109
UM 1014 Motor Drive	XC 0205
DC Amplifier	XC 0318
Lin., Log. and Y-Amplifier	XC 0319
Frequency Sensing Circuit	XC 0320
Dynamic Range sec. 1	XC 0321
" " sec. 2	XC 0322
" " sec. 3	XC 0323
" " " "	XC 0324
Power Supply	XC 0362
Control Circuit Sweep Motor	XC 0363
Attenuator O 5	XC 0364
E.H.T. Generator	XC 0365
E.H.T. Power Supply	XC 0379
Control Circuit Sweep Motor	XC 0386
XC 0318 with components	802 4712
XC 0319 " "	801 4712
XC 0320 " "	803 4712
XC 0321 " "	815 4712
XC 0322 " "	816 4712
XC 0323 " "	819 4712
XC 0324 " "	825 4712
XC 0362 " "	809 4712
XC 0363 " "	810 4712
XC 0364 " "	806 4712
XC 0365 " "	808 4712
XC 0379 " "	814 4712
XC 0386 " "	811 4712

MISCELLANEOUS:

	Back Plate	FB	0101
	Bakelite Knob	SN	3222
	Knob Retaining-ring	DB	0674
L 1-4	Umbraco Screw	YQ	2083
	Deflection Coil	LB	1019
	Drive Belt for UM 1014	DX	0023
T 2	E. H. T. Transformer	TH	0002
	E. H. T. Cable	AP	3002
	E. H. T. Plug	JP	0100
	Front Plate	FA	0089
	Handle	DH	0052
M 1	Motor	UM	0009
	Plastic Cover	KF	0034
	Plug 3-pole	JP	4701
	Plug 30-pole	JP	3000
	Plug Screened	JP	0018

CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.
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MISCELLANEOUS:

	Power Cord, EUR	AN 0005
	Power Cord, USA	AN 0006
T 1	Power Transformer	TN 0019
	Power Voltage Selector	JS 0005
	Relay-Socket for O 4	JJ 0008
	Relay-Socket for O 2, O 3	JJ 0012
	Rubber Feet	DF 7010
	Scale, blank	SA 0512
	Scale, 20-20000 Hz	SA 0510
	Scale, 200-5000 Hz	SA 0509
	Socket, screened (Signal Input)	JJ 0115
	Socket, screened (Ext.Freq.Input)	JJ 0119
	Socket, mounted on XC 0363	JJ 1200
	Socket 30-pole	JJ 3000
	Socket 6-pole	JJ 4704
	Socket 3-pole	JJ 4700
	Steel Ball for UM 1014	DQ 0014
	Spring for frame	DL 0156
	Spring for frame	DL 0157

CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.	CIRCUIT DIAGRAM REF.	COMPONENT TYPE		STOCK REF.
RESISTORS:						V 21-24	Silicon Trans. PNP	2N4289	VB 0049
R 219,220	Wire	5.5 W	5%	4.7 Ω	RX 0318	V 25	"	PNP 2N3702	VB 0038
R 223,224	"	1 W	10%	4 Ω	RR 0004	V 26-28	"	PNP 2N4289	VB 0049
R 225	"	5.5 W	"	6.2 kΩ	RX 0303	V 29	"	PNP BCY90	VB 0051
R 226	"	"	"	12 kΩ	RX 0316	V 30,31	"	PNP 2N4289	VB 0049
R 227	"	"	"	680 Ω	RX 0317	V 32-35	"	NPN 2N3704	VB 0028
R 228	"	8 W	"	1.5 kΩ	RX 0405	V 36-45	"	PNP 2N4289	VB 0049
R 229	"	"	"	27 kΩ	RX 0407	V 46	"	NPN 2N1613	VB 0026
R 230	"	5.5 W	"	30 Ω	RX 0309	V 47-50	"	NPN 40363	VB 0255
R 240,241	Carbon	1/3 W	"	2 kΩ		V 51	Germanium Trans.	ASZ16(TI 3028)	VB 0029
R 242	"	"	"	10 kΩ		V 52	Silicon Trans. PNP	2N4289	VB 0049
R 243	"	"	"	6.3 kΩ		V 53	Fuse	1 Amp.	VF 0008
R 250,251	"	"	"	315 Ω		V 54-57	Scale Lamp	6 V/0,25 Amp.	VS 1273
R 252,253	"	"	5%	31.5 Ω		V 58	Silicon Trans. PNP	2N4289	VB 0049
R 254,255	"	"	"	125 Ω		V 59,60	Field-effect Transistor matched pair		VB 1045
R 256,257	"	"	10%	10 Ω		V 61-64	Silicon Trans. NPN	2N3440	VB 0250
R 258,259	"	"	"	10 Ω		V 65	"	PNP 2N4289	VB 0049
R 260,261	"	"	5%	750 Ω		V 66	"	NPN 2N3704	VB 0028
R 262,263	"	"	2%	5 kΩ		V 67,68	"	PNP 2N4289	VB 0049
R 264	"	"	"	3.5 kΩ		V 69,70	"	NPN BF178	VB 0052
R 265	"	"	"	12 kΩ		PRINTED CIRCUIT:			
R 266	"	"	"	1.6 kΩ		Plug-in Unit ZS 0120			XC 0108
R 267	"	"	10%	5 kΩ		" " ZS 0121			XC 0109
R 268	"	"	"	200 Ω		UM 1014 Motor Drive			XC 0205
R 269	"	"	2%	9 kΩ		DC Amplifier			XC 0318
R 270	"	"	"	8.5 kΩ		Lin., Log. and Y-Amplifier			XC 0319
R 271	"	"	"	9.5 kΩ		Frequency Sensing Circuit			XC 0320
R 272	"	"	"	10.5 kΩ		Dynamic Range sec. 1			XC 0321
R 273	"	"	"	14 kΩ		" " sec. 2			XC 0322
R 274	"	"	"	12 kΩ		" " sec. 3			XC 0323
R 275	"	"	"	2.5 kΩ		Power Supply			XC 0324
R 276	"	"	1%	3.28 kΩ		Control Circuit Sweep Motor			XC 0362
R 277	"	"	"	2.18 kΩ		Attenuator O 5			XC 0363
R 278	"	"	"	2.63 kΩ		E.H.T. Generator			XC 0364
R 279	"	"	"	3.43 kΩ		E.H.T. Power Supply			XC 0379
R 280	"	"	"	2.69 kΩ		Control Circuit Sweep Motor			XC 0386
R 281	"	"	2%	8.7 kΩ		XC 0318 with components			802 4712
R 282	"	"	"	10.2 kΩ		XC 0319	"		801 4712
R 283	"	"	"	9.1 kΩ		XC 0320	"		803 4712
R 284	"	"	"	8.9 kΩ		XC 0321	"		815 4712
R 285	"	"	"	5.9 kΩ		XC 0322	"		816 4712
R 286	Metal	1/4 W	± 1%	6.2 kΩ	RF 0201	XC 0323	"		819 4712
R 287	Carbon	1/3 W	2%	8 kΩ		XC 0324	"		825 4712
R 288	"	"	"	300 Ω		XC 0362	"		809 4712
R 289	"	"	"	8 kΩ		XC 0363	"		810 4712
R 290	"	"	"	300 Ω		XC 0364	"		806 4712
R 291	"	"	"	10 kΩ		XC 0365	"		808 4712
R 292	"	"	"	1.9 kΩ		XC 0379	"		814 4712
R 293	"	"	10%	50 kΩ		XC 0386	"		811 4712
R 294	"	1 W	"	100 kΩ		MISCELLANEOUS:			
R 295,296	Metal	1/4 W	"	200MΩ	RH 0005	Back Plate			FB 0101
R 297,298	Carbon	1/3 W	"	25 Ω		Bakelite Knob			SN 3222
R 299	"	"	"	1.25 kΩ		Knob Retaining-ring			DB 0674
R 300	"	1/2 W	"	250 kΩ		Umbraco Screw			YQ 2083
R 301	Metal	"	± 1%	1.54 kΩ	RF 0215	L 1-4	Deflection Coil		LB 1019
R 302	"	1/4 W	"	4 kΩ	RF 0209		Drive Belt for UM 1014		DX 0023
R 303	"	1/2 W	± 2%	12 kΩ	RF 0304	T 2	E.H.T. Transformer		TH 0002
R 304	"	"	"	33 kΩ	RF 0305		E.H.T. Cable		AP 3002
R 305	Carbon	1/8 W	"	4.7 Ω	RA 0203		E.H.T. Plug		JP 0100
TUBES and TRANSISTORS:							Front Plate		FA 0089
V 1	Twin Triode	ECC82/12AU7	VA 0011				Handle		DH 0052
V 2	Triode Pentode	ECF82/6U8	VA 0014			M 1	Motor		UM 0009
V 3	Pentode	EL84/6BQ8	VA 0023				Plastic Cover		KF 0034
V 6	Stabilizer	85A2	VA 0056				Plug,3-pole		JP 4701
V 7	Cathode Ray Tube	M 36-11 GM	VA 0076				Plug,30-pole		JP 3000
V 8,9	Twin Triode	ECC88/6DJ8	VA 0073				Plug,Coaxial		JP 0101
V 13-17	Silicon Trans.	PNP 2N4289	VB 0049						
V 19,20	"	NPN2N3704	VB 0028						

CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.
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MISCELLANEOUS:

	Power Cord, EUR	AN 0005
	Power Cord, USA	AN 0006
T 1	Power Transformer	TN 0019
	Power Voltage Selector	JS 0005
	Relay-Socket for O 4	JJ 0008
	Relay-Socket for O 2, O 3	JJ 0012
	Rubber Feet	DF 7010
	Scale, blank	SA 0512
	Scale, 20-20000 Hz	SA 0510
	Scale, 200-5000 Hz	SA 0509
	Socket, screened (Signal Input)	JJ 0115
	Socket, screened (Ext.Freq.Input)	JJ 0119
	Socket, mounted on XC 0363	JJ 1200
	Socket 30-pole	JJ 3000
	Socket 6-pole	JJ 4704
	Socket 3-pole	JJ 4700
	Steel Ball for UM 1014	DQ 0014
	Spring for frame	DL 0156
	Spring for frame	DL 0157

Circuit Diagram
Valid from serial no. 192797

