

Brüel & Kjær

1623

Tracking Filter

Valid from serial no. 725659

037-0301



Service

1623

Tracking Filter

Valid from serial no. 725659

037—0301

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Spare Parts

Please state type and serial number of the instrument when ordering spare parts.

Trouble Shooting

If any fault should occur, check the instrument according to the checking procedure.

The Checking Procedure is divided up into sections, where each section will refer to a subsection in the Service Instruction corresponding to a specific part of the instrument.

The subsection in the Service Instruction will normally consist of a block diagram, a technical description, an adjustment procedure and a simplified diagram where the test points are identified.

Before correcting any apparent deviation make sure that the measuring instrument has tolerances small enough not to affect the measurement.

When a fault has been traced and corrected, the voltages and adjustment influenced by the correction must be rechecked. The complete instrument should then be tested to make sure that all basic functions are operative.

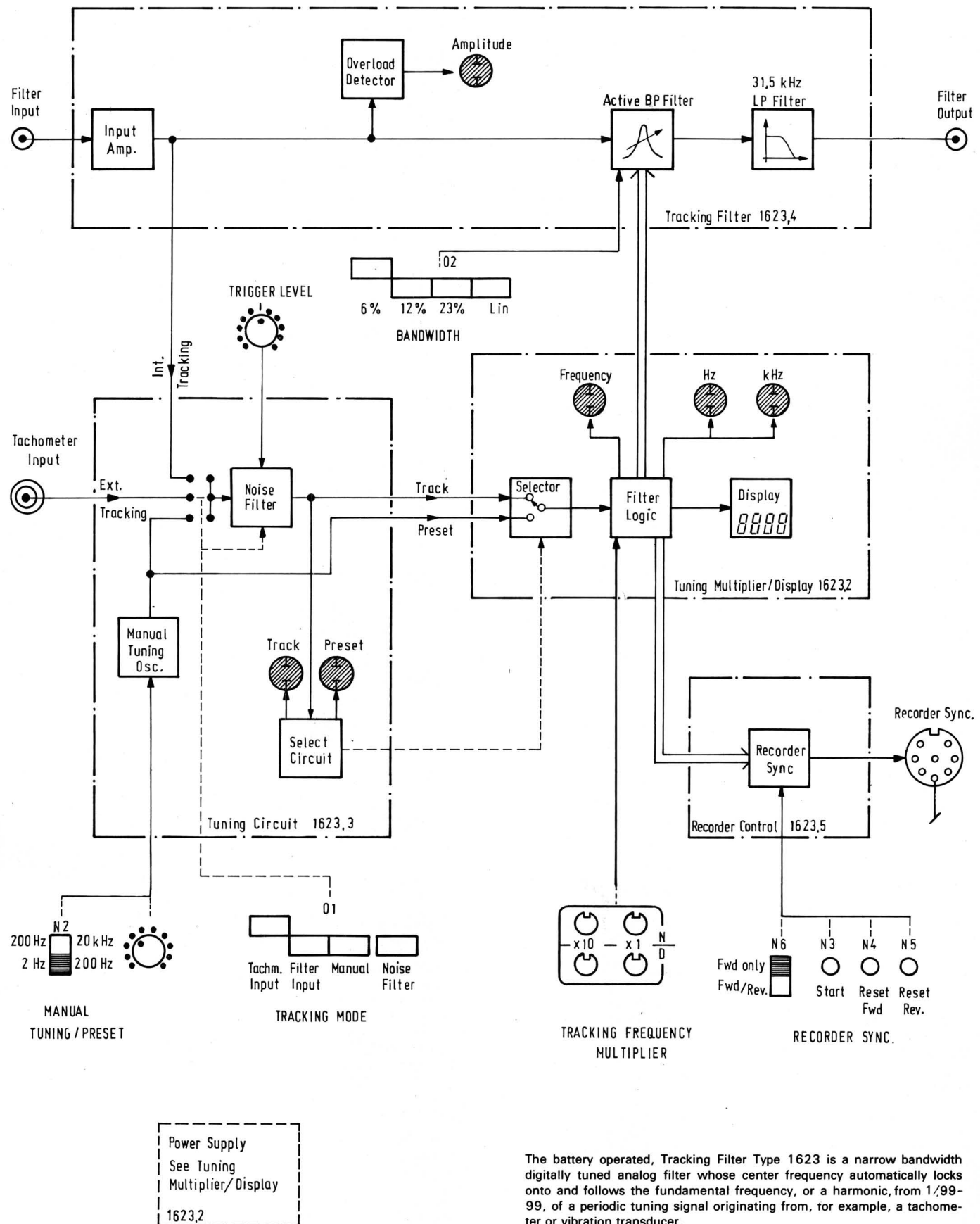
The tolerances given in these notes are intended for use as guide for adjustments.

Updating

Due to the constant progress in technology the instrument will from time to time be brought up to date in order to provide continuously improved performance.

For this reason there may be small variations between the instrument and the Service Instruction.

However, the local Service Representative is in possession of all informations regarding any change that has been made.



The battery operated, Tracking Filter Type 1623 is a narrow bandwidth digitally tuned analog filter whose center frequency automatically locks onto and follows the fundamental frequency, or a harmonic, from 1/99-99, of a periodic tuning signal originating from, for example, a tachometer or vibration transducer.

1.1 Manual Tuning

- a. BATTERY: "On"
MANUAL TUNING/PRESET: "2 Hz — 200 Hz"
TRACKING MODE: "Manual"
BANDWIDTH: "Lin"
TRACKING FREQ. MULTI.: $\frac{N}{D} = \frac{01}{01}$
MANUAL TUNING: "Fully counter clockwise"

No input connected.

Check the "Battery" indicator. The pointer should be in the green area.
Check indication: "Hz" and "Track"
"Filter Center Frequency": 2,05 Hz $\pm$ 0,02 Hz

- b. MANUAL TUNING to "Fully clockwise"

"Filter Center Frequency" indication: > 200 Hz

- c. MANUAL TUNING/PRESET to "200 Hz — 20 kHz"
MANUAL TUNING to "Fully counter clockwise"

"Filter Center Frequency" indication: < the frequency found under item 1.1b.

- d. MANUAL TUNING to "Fully clockwise"

"Filter Center Frequency" indication: > 20 kHz
Out of range indication "Frequency" flickers.

- e. MANUAL TUNING to approx. "20 kHz"

Out of range indication "Frequency" stop flickering.
In case of malfunction consult 1623.3

- f. MANUAL TUNING to approx. "2 kHz"

Check that indication "Hz" and "kHz" shift takes place at approx. 2 kHz.
In case of malfunction consult 1623.2

1.2. Filter Bandwidth

BATTERY: "On"
MANUAL TUNING/PRESET: "200 Hz — 20 kHz"
TRACKING MODE: "Manual"
BANDWIDTH: "6%"
TRACKING FREQ. MULTI.: $\frac{N}{D} = \frac{01}{01}$

Input signal to "Filter Input": approx. 1 V RMS 1 kHz.
Turn MANUAL TUNING to approx. 1 kHz.

Fineadjust input frequency for max. voltage on "Filter Output". Fineadjust input voltage to exactly 1 VRMS on "Filter Output", for each BANDWIDTH position.
Check the BW 3dB and insert the frequency values for fupper and flower into the formula below, and calculate the bandwidth percentage.

NOISE
BANDWIDTH

$$\left. \begin{array}{l} 6 \\ 12 \\ 23 \end{array} \right\} \Rightarrow \frac{(f_u - f_l) \times 100}{\sqrt{f_u \times f_l}} \% = \left\{ \begin{array}{l} 5,2 - 5,6 \\ 10,4 - 11,2 \\ 20,9 - 22,5 \end{array} \right.$$

In case of malfunction consult 1623.4

1.3. Octave Selectivity

BATTERY: "On"
MANUAL TUNING/PRESET: "200 Hz — 20 kHz"
TRACKING MODE: "Manual"
BANDWIDTH: "6%"
TRACKING FREQ. MULTI.: $\frac{N}{D} = \frac{01}{01}$

Input signal to "Filter Input": approx. 1 VRMS 1 kHz

Turn MANUAL TUNING to 1 kHz $\pm$ 10 Hz. Fineadjust input frequency for max. voltage on "Filter Output". Fineadjust input voltage to exactly 1 VRMS on "Filter Output", for each BANDWIDTH position

Check the attenuation on "Filter Output" according to the table below.

BANDWIDTH (%)	Signal frequency (Hz)	
	500	2000
6	—57,5 dB	—57,5 dB
12	—45,5 dB	—45,5 dB
23	—34,1 dB	—34,1 dB
Tolerance (dB)	± 1	± 1

In case of malfunction consult 1623.4

1623.1 Checking Procedure

1.4 Automatic Tracking and Filtergain

- a. BATTERY: "On"
TRACKING MODE: "Filter Input"
BANDWIDTH: "Lin"
TRACKING FREQ. MULTI.: $\frac{N}{D} = \frac{01}{01}$

Input signal to "Filter Input" and "Tachometer Input": 1 VRMS 1 kHz.

- b. BANDWIDTH to "6%"

Turn MANUAL TUNING slowly through the range 2 Hz — 20 kHz and check "Filter Output" according to the table below.

	2 Hz — 2 kHz	2 kHz — 20 kHz
	Filter Output: 1 VRMS Tolerance: (dB)	
BANDWIDTH (%)		
6	± 1	± 2
12	± 0,5	± 1
23	± 0,25	± 0,5

- c. TRACKING MODE to "Tachm. Input"

Check "Filter Output" as above.
In case of malfunction consult 1623.3.

1.5 Tracking Frequency Multiplier

- BATTERY: "On"
TRACKING MODE: "Filter Input"
BANDWIDTH: "6%"
TRACKING FREQ. MULTI.: $\frac{N}{D} = \frac{01}{01}$

Input signal to "Filter Input": 1 VRMS 1 kHz
Check "Filter Center Frequency": 1 kHz for all position of $\frac{N}{D} : \frac{1}{1}, \frac{2}{2}, \dots, \frac{9}{9}$
and $\frac{10}{10}, \frac{11}{11}, \frac{12}{12}, \frac{20}{20}, \dots, \frac{90}{90}$

In case of malfunction consult 1623.2.

1.6 Trigger Level

- BATTERY: "On"
TRACKING MODE: "Tachm. Input"
BANDWIDTH: "6%"
TRACKING FREQ. MULTI.: $\frac{N}{D} = \frac{01}{01}$

Input signal to "Tachometer Input": 14 mVRMS 1 kHz
Fineadjust "TRIGGER LEVEL" to obtain indication "Track"
Decrease input voltage 10 dB and check indication "Preset".
In case of malfunction consult 1623.3

1.7 Noise Filter

- a. BATTERY: "On"
TRIGGER LEVEL: "+ 1 V"
MANUAL TUNING/PRESET: "2 Hz — 200Hz"
TRACKING MODE: "Manual"
BANDWIDTH: "6%"
TRACKING FREQ. MULTI.: $\frac{N}{D} = \frac{01}{01}$

Input signal to "Filter Input": 1,1 VRMS 1 kHz ± 15 Hz
Turn MANUAL TUNING to 20 Hz.

- b. TRACKING MODE to "Filter Input"

Check indication: "Hz", "Track"
"Filter Center Frequency": 1000 Hz ± 20 Hz

- c. Noise Filter to "In"

Check indication: "Hz", "Preset" and "20 Hz"
Slowly sweep the frequency down (approx. 200 Hz) until "Track" is indicated
Slowly sweep the frequency up and check that "Track" is indicated in the entire range.
In case of malfunction consult 1623.3

1.8 Noise

- BATTERY: "On"
TRACKING MODE: "Filter Input"
BANDWIDTH: "23%"
TRACKING FREQ. MULTI.: $\frac{N}{D} = \frac{01}{01}$

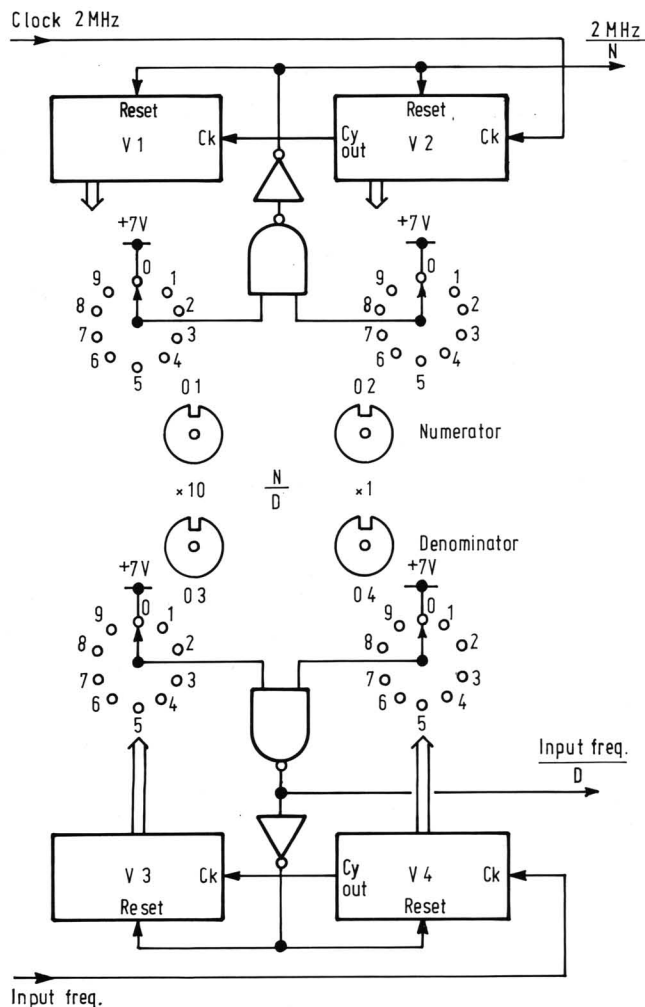
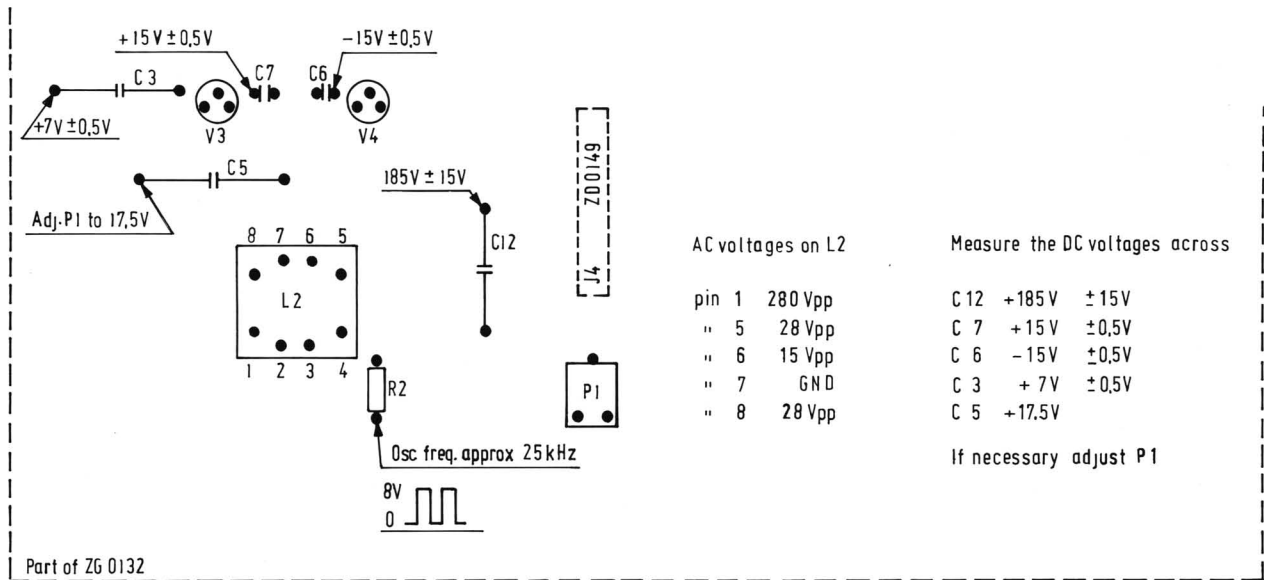
Short circuit "Filter Input"
Input signal to "Tachometer Input": 1 VRMS 1 kHz
Slowly turn MANUAL TUNING through the range 2 Hz — 20 kHz, and check noise level on "Filter Output": < 1 mVRMS with averaging time $T_{eff} = 1$ s or slow
In case of malfunction consult 1623.4.

1.9 Overload (Amplitude)

- BATTERY: "On"
TRACKING MODE: "Filter Input"
BANDWIDTH: "23%"
TRACKING FREQ. MULTI.: $\frac{N}{D} = \frac{01}{01}$

Input signal to "Filter Input" 3 VRMS 1 kHz.
Check overload indication: "Amplitude" flickers.
Decrease the voltage to 2,8 VRMS and check that "Amplitude" stops flickering.
In case of malfunction consult 1623.4

Power Supply: Current consumption approx. 340 mA.



Tracking Freq. Multiplier

(ZD 0149)

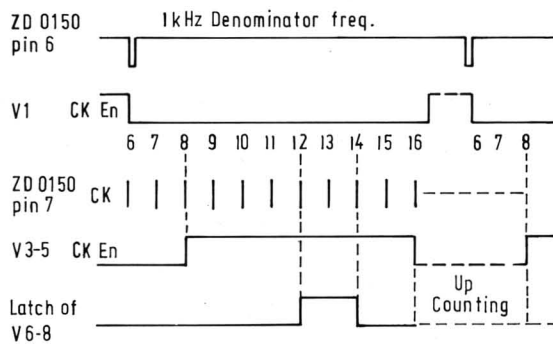
The Numerator divides the 2 MHz clock, and will give a higher "Filter Center Frequency", or equal, to the input frequency to 1623.

The Denominator divides the input freq. to the 1623 f. inst. 1 kHz. And will give a lower "Filter Center Frequency" or equal, to the input freq.

If "N" is set to zero the 2 MHz clock to the Periods Upcounter is inhibited, as V1 and V2 remains reset. This gives a stable binary information to the latch V6, 7, 8 and next to the "Tracking Filter" which will be locked to the last input frequency Independent of Osc. drift or knob settings.

1623.2 Tuning Multiplier/Display

Technical Description



Sequence Counter V1

The Sequence Counter controls the Period Upcounter and the Latch. The Sequence Counter, is preset to 6 from it's own carry out and, starts counting on the first Numerator pulse (ZD 0150 pin 7) followed after CK enable, caused by the Denominator pulse (ZD 0150 pin 6). Count no. 12, 13 latches the data from the Period Upcounter into V6, 7, 8 from where it is taken to the Display.

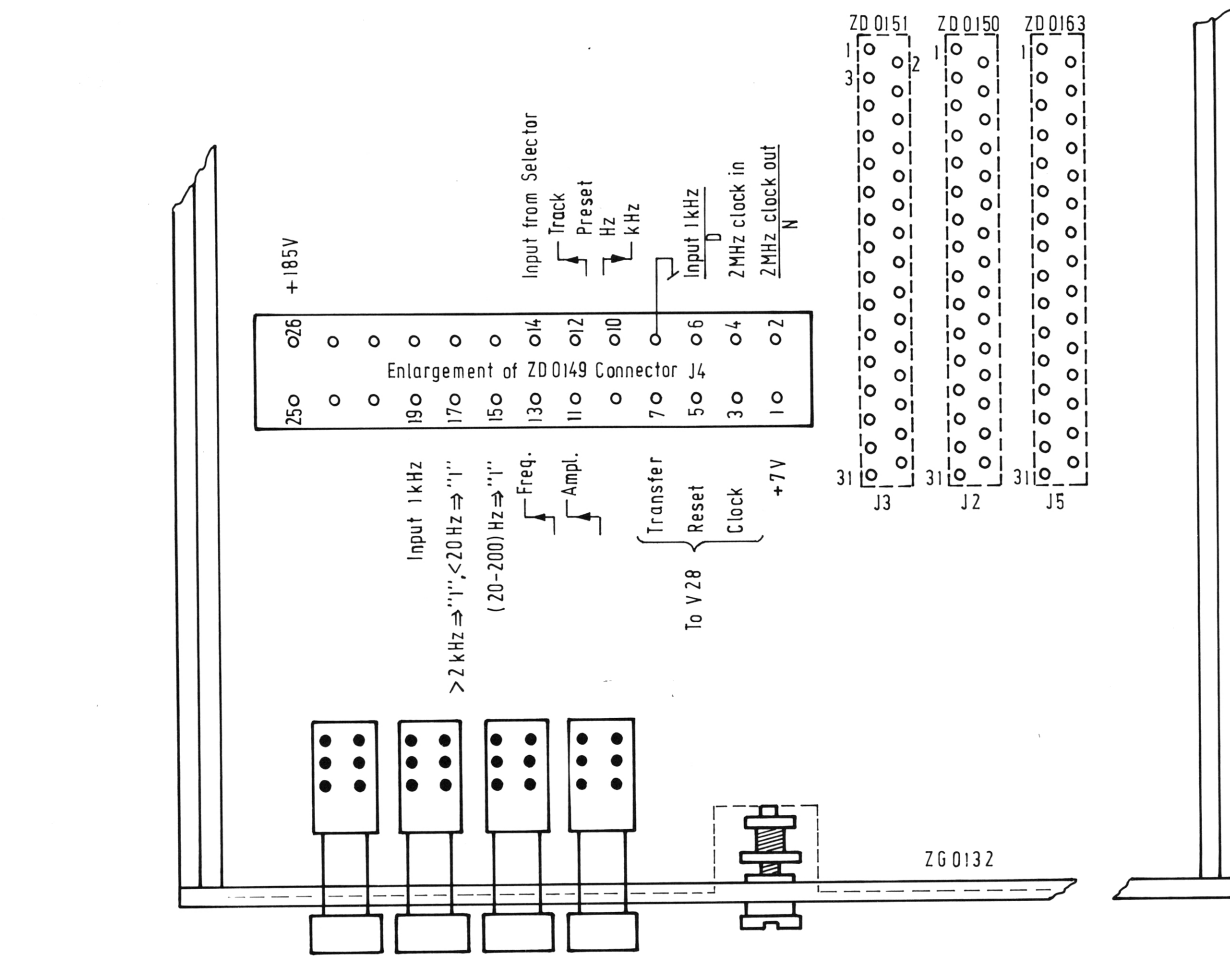
Display Counter

The Display Counter V9, 10, 11 is preset to the input value and counts down clocked by the 2 MHz osc. The carry out is fed to the Counter/Display Decoder V28 clock input. V28 counts up in the periods of 0,1 s given by the Timing osc., adjustable by P1 on ZD 0151.

V18D gives on output a delayed Reset for V28.

This Reset must be delayed at least one Count Input pulse to V28.

The Count Input negative edge must follow a Transfer command before a Reset is applied to prevent transfer of invalid data.



Adjustment

2 MHz Osc.

BATTERY: "On"
TRACKING MODE: "Tachm. Input"
TRACKING FREQ. MULTI: $\frac{1}{10}$
BANDWIDTH: "6"

Display

BATTERY: "On"
TRACKING MODE: "Filter Input"
TRACKING FREQ. MULTI: $\frac{1}{10}$

Check that the Clock Osc. frequency is exactly the frequency written on the shield of ZT 0052.
If necessary adjust L1 on ZD 0150.

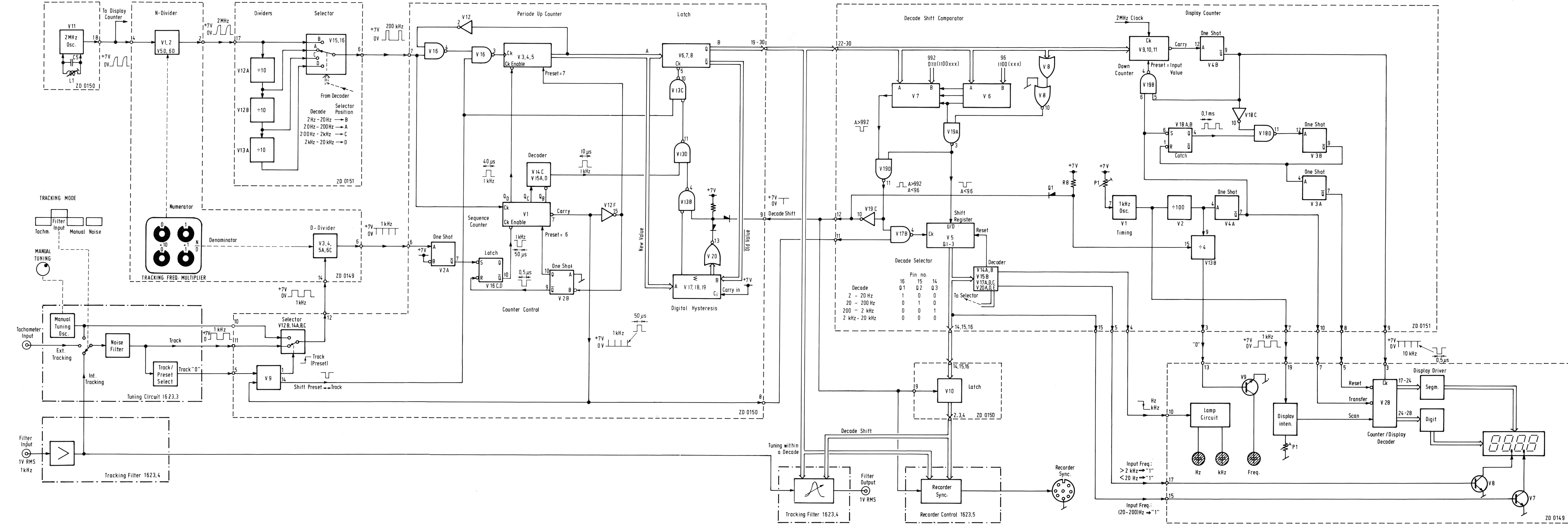
If a component in the filter circuit has been replaced, check the following:
Input signal to "Filter Input" 220.0 Hz 1 V rms.
Input signal to "Tachometer Input" 211.2 Hz to 229.1 Hz 1 V rms.
Check that the filter attenuation is the same at 211.2 Hz as at 229.1 Hz.
If necessary adjust L1 on ZD 0150, and mark the new Clock. Osc. frequency on the shield of ZT 0052. Check the upper and two lower decades of the frequency range.
Max. difference between the input freq. and the displayed freq. $\pm 1.5\%$.

Input signal to "Filter Input" 220.0 Hz 1 V rms.
Check that the "Filter Center Frequency" Display shows 220 Hz ± 2 Hz.
If necessary adjust P1 on ZD 0151.

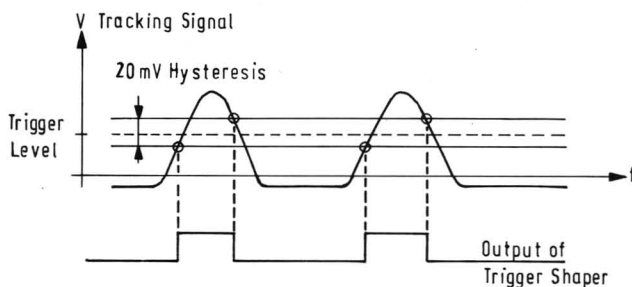
Change input frequency to 180 Hz.
Max. difference between "Filter Center Frequency" Display and input frequency, when the input frequency is changed is 1.5%.
If necessary readjust P1 on ZD 0151.

Change input frequency to 220.0 Hz.
Check that the "Filter Center Frequency" Display shows 220 Hz ± 2 Hz.

The display intensity must be the same as the intensity of the lamps.
If necessary adjust P1 on ZD 0149.



Technical Description



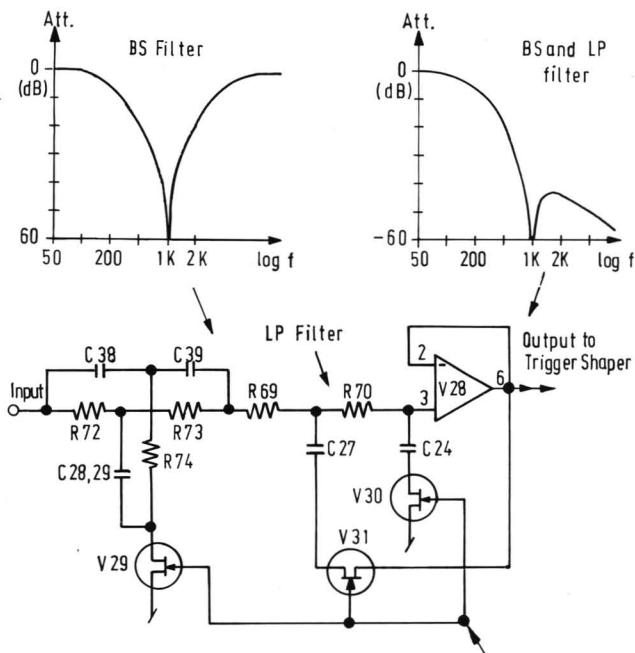
Practically any well defined periodic signal between 20 mVp and 120 Vp can be used to tune the Filter on "Tachometer Input". The tuning source for the filter is selected by the push buttons TRACKING MODE.

TACHM. INPUT: Selects the signal applied to "Tachometer Input".
FILTER INPUT: Selects the signal applied to "Filter Input".
MANUAL: The filter is tuned by the MANUAL TUNING knob.

TRACKING MODE	Track	Preset
"Filter < 20 mVp Input" > 20 mVp	NO	YES
"Tackm. < 20 mVp Input" > 20 mVp	NO	YES
"Manual"	YES	NO

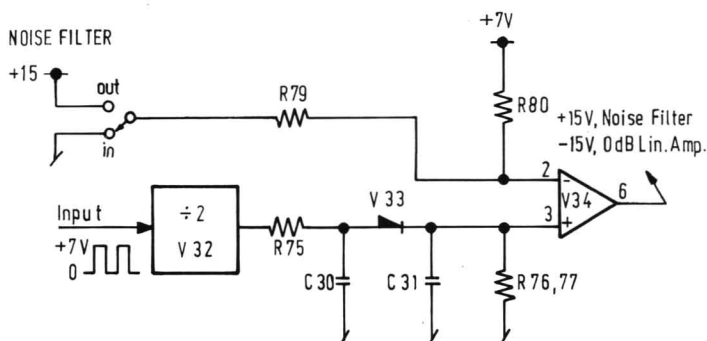
The tuning signal is fed via the Noise Filter to a Trigger Shaper. The frequency information is then fed to a Selector. The Selector is controlled by the Track/Preset Select Circuit to be in either "Preset" or "Track" pos. Output of the Selector is fed to Filter Logic and Display.

Noise Filter

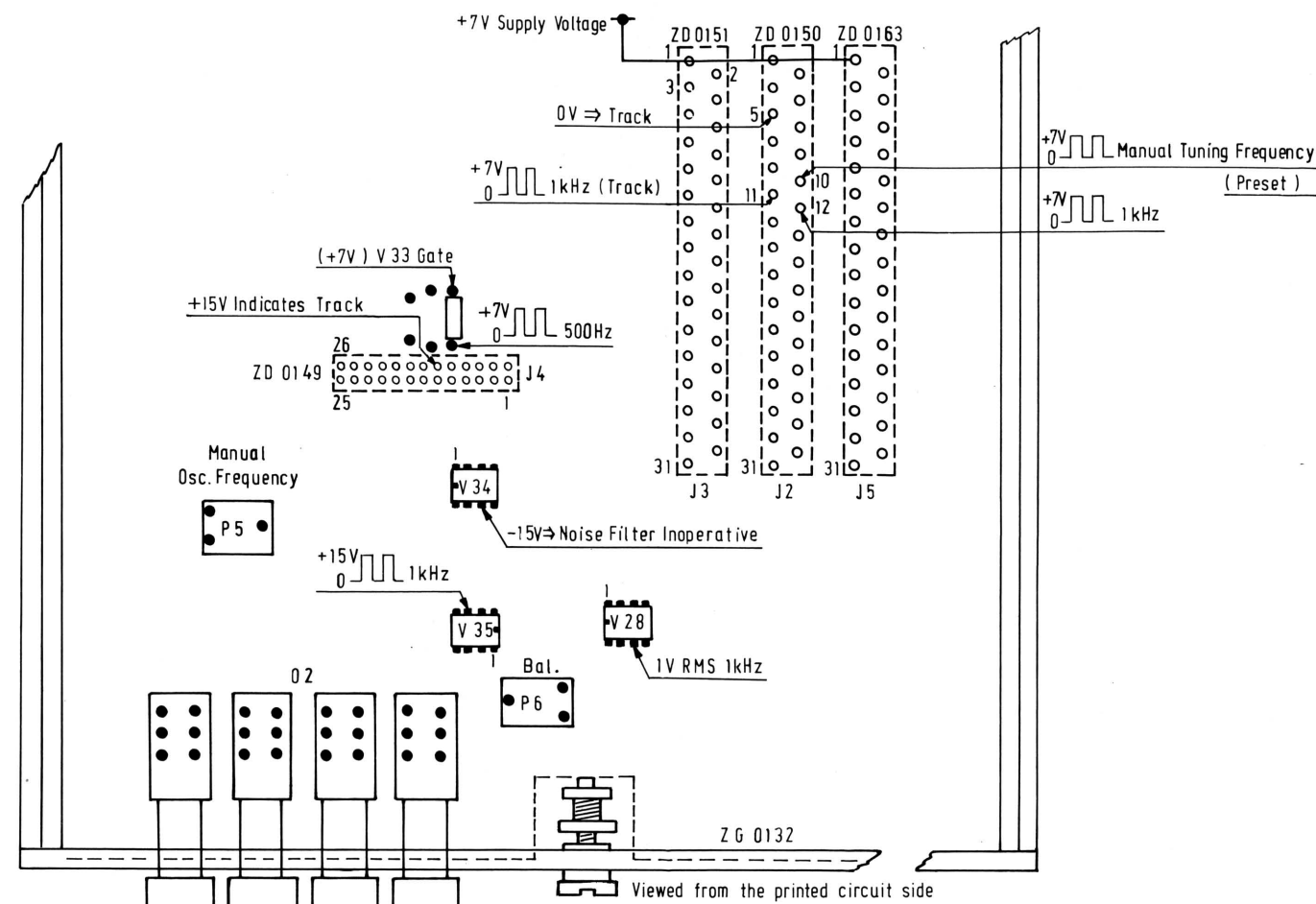


The Noise Filter consists of a BS Filter and a LP Filter. This is to ensure a max. rejection of higher frequency noise and especially the 1 kHz sync. tone on the B and K Test Records.

Noise Filter Switch Circuit



The Noise Filter Switch Circuit controls the Noise Filter conditions to either a 0dB linear amplifier or a 200 Hz LP filter. With NOISE FILTER pushed "In" the filter is active. Furthermore the input frequency to V32 is integrated in R75 and C30 and gives a positive rectified voltage on V3 + input. Which again, when the input frequency exceeds approx. 200 Hz, will switch the Noise Filter to be a 0dB linear amplifier. With "Manual" pushed in the Noise Filter is a 0dB lin. ampl. independent of NOISE FILTER button.



Adjustment

Manual Tuning

MANUAL TUNING/PRESET: "2 Hz—200 Hz"
 TRACKING MODE: "Manual"
 TRACKING FREQ. MULTI.: $\frac{N}{D} = \frac{01}{01}$
 MANUAL TUNING: "Fully counter clockwise"

MANUAL TUNING/PRESET to "200 Hz—20 kHz"
 MANUAL TUNING to "Fully clockwise"

Check that "Filter Center Frequency" shows 2.05 Hz $\pm$ 0.02 Hz.
 If necessary adjust P5.

Check that "Filter Center Frequency" shows > 20 kHz.
 If necessary change value of R60.
 The "Frequency" lamp should flicker.

Trigger Level

TRACKING MODE: "Tachm. Input"
 TRACKING FREQ. MULTI.: $\frac{N}{D} = \frac{01}{01}$
 TRIGGER LEVEL: "+ 1 V"

TRIGGER LEVEL to "+ 1 V"

TRIGGER LEVEL to exactly
 "Mechanical middle Position"

Check the DC output of V28 (pin 6) to be within -1 V to -1.2 V.

Check the DC output of V28 (pin 6) to be within + 1 V to + 1.2 V.

Input signal to "Tachometer Input": 14 mV RMS 1 kHz.
 Check with an oscilloscope the output of V35 (pin 6)
 If necessary adjust P6.

Noise Filter Check

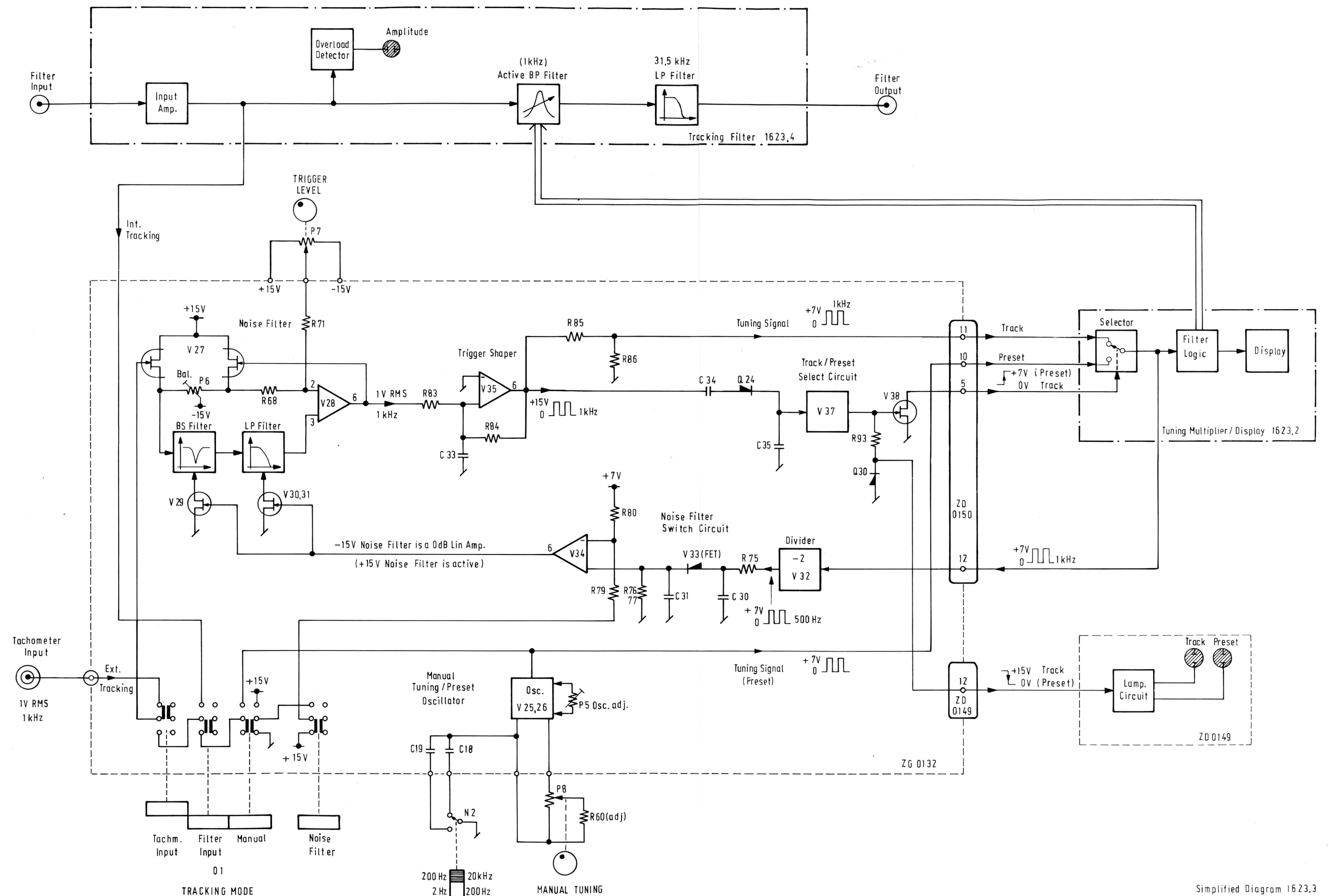
TRACKING MODE: "Tachm. Input"
 TRIGGER LEVEL: "Middle Position"
 TRACKING FREQ. MULTI.: $\frac{N}{D} = \frac{01}{01}$

NOISE FILTER to "In"

Input to "Tachometer Input": 1 V RMS 100 Hz.
 To check the Noise filter it is necessary to inhibit the Noise Filter Switch Circuit.
 This can be done by connecting the gate of V33 to + 7 V.
 In this way the Noise Filter is working in the entire frequency range.

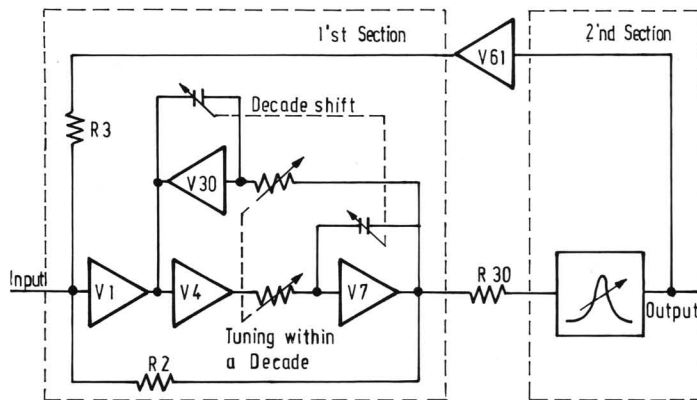
"Track" lamp should be on. By increasing the input frequency slowly the shift from "Track" to "Preset" should take place before 1 kHz is reached.
 If it is necessary to check the frequency response of the filter, this can be done by connecting a Level Recorder to V28 pin 6.

Remove the connection from + 7 V to gate of V33

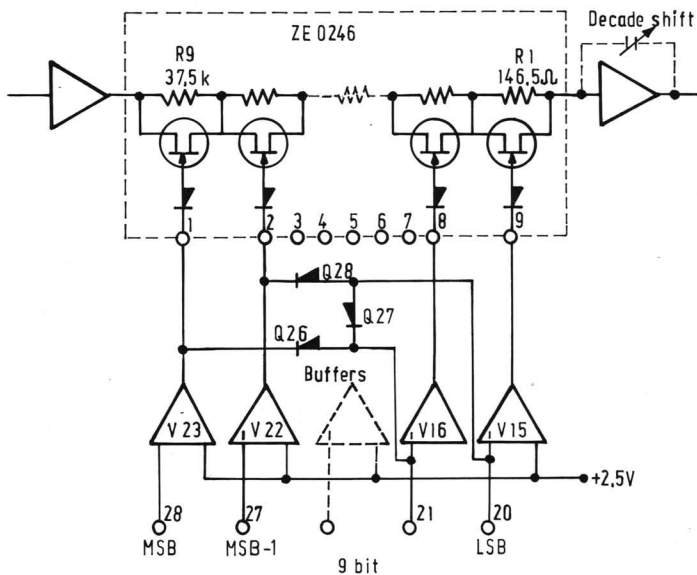


Simplified Diagram 1623.3

Technical Description



The filter is an active filter, tuned over a decade by a series of resistors which are switched in by a row of FET's. Both resistors and FET's are placed on four thick film circuits ZE 0246, mounted on ZT 0052. The filter consists of two sections each having two rows of tuning resistors $r_1 - r_9$. These resistors are digitally switched in from a 9 bit binary code. The resistor values follows the binary form, and "FET On" resistances are included.



One row of tuning resistors is shown. If faults appears in this circuit exchange ZE 0246. The three diodes Q26, 27, 28 cuts off the two LSB when MSB is "1", and cuts off the LSB when MSB-1 is "1" seen from the buffer inputs. This makes always 7 bits in use instead of 9 bits, seen from the filter, and reduces the noise in the filter.

9 bit									Resolution	
(0)	(0)	0	1	1	0	0	0	0	2%	96
(0)	(0)	1	1	1	1	1	1	1	0,8%	255
(0)	1	0	0	0	0	0	0	(0)	1,6%	256
(0)	1	1	1	1	1	1	1	(0)	0,8%	511
1	0	0	0	0	0	0	0	(0)	1,6%	512
1	1	1	1	1	0	0	(0)	(0)	0,8%	992

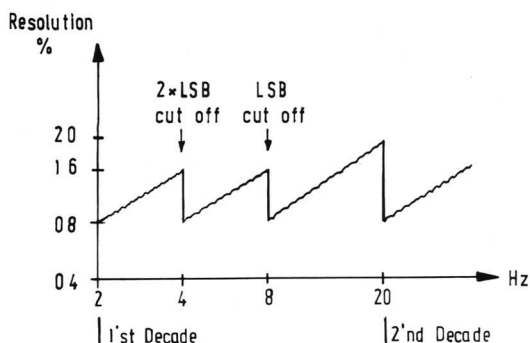
1 = -15V, on output of buffers
0 = +15V

At 96 the filter shifts to the next higher decade. The value is set by the Comparator. See 1623.2.

The LSB is cut off by Q28.

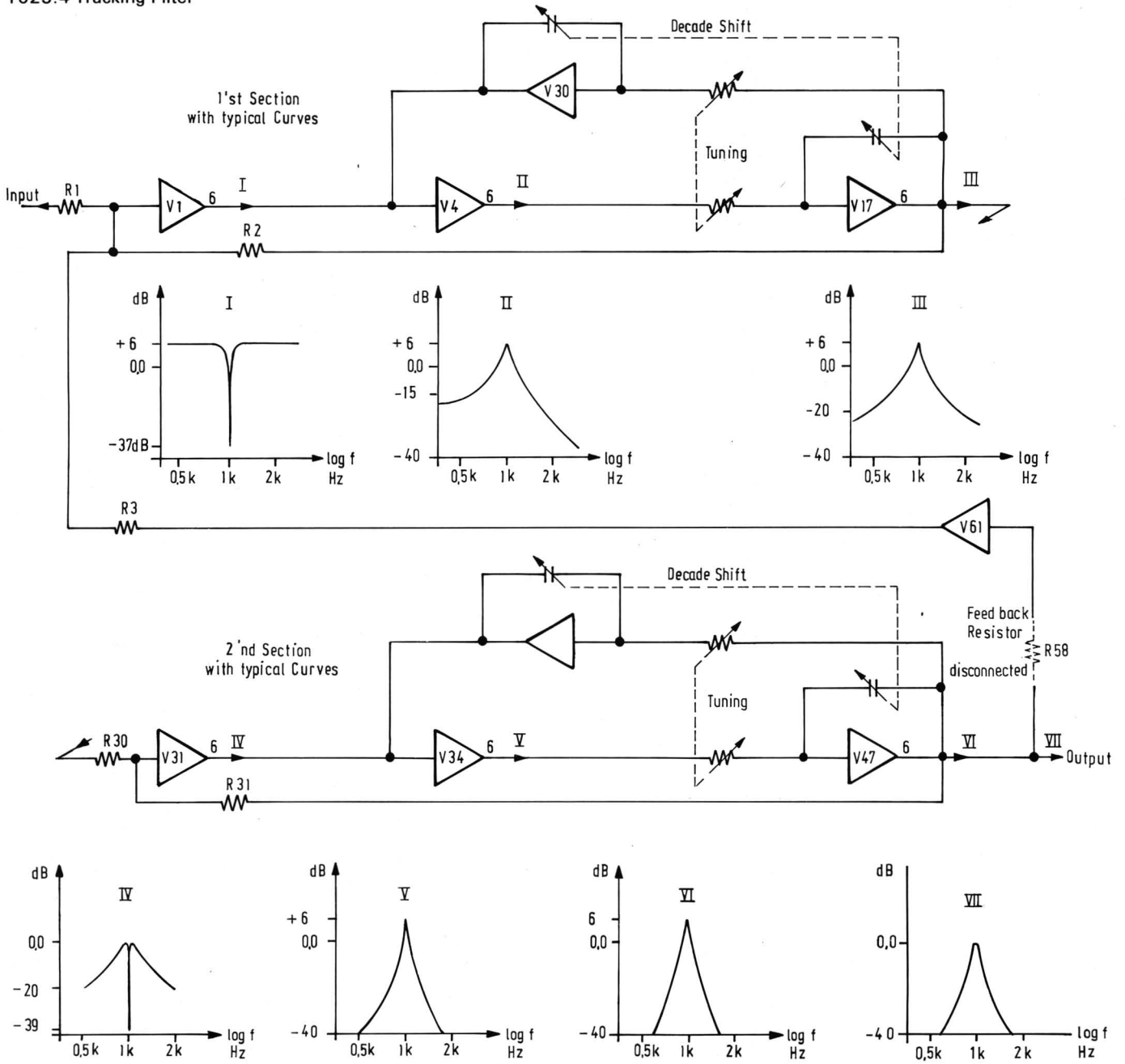
The two LSBs are cut off by Q26, 27.

At 992 the filter shifts to the next lower decade. The value is set by the Comparator. See 1623.2.



One decade consists of approx. 204 filter steps or filter center frequencies.

1623.4 Tracking Filter



Trouble Shooting

TRACKING MODE: "Filter Input"
 BANDWIDTH: "Lin"
 TRACKING FREQ. MULTI.: $\frac{N}{D} = \frac{01}{01}$

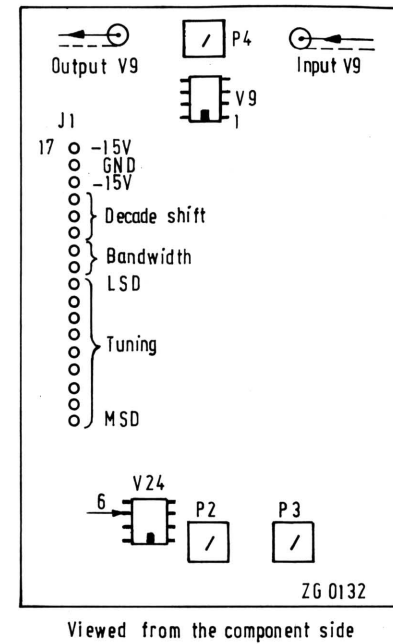
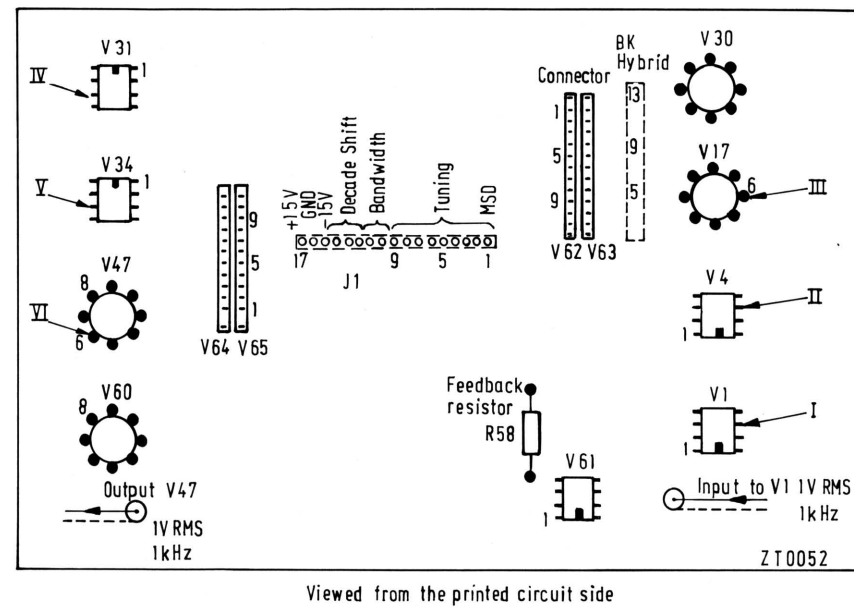
TRACKING FREQ. MULTI.: $\frac{N}{D} = \frac{00}{01}$
 BANDWIDTH to "12%"

Disconnect the feedback resistor R58.
 Check the DC offset voltage in the checkpoints I, II ... VI: $0V \pm 30 \text{ mV}$
 Input signal to "Filter Input" 1 V_{RMS} 1 kHz
 Output voltage on "Filter Output" 1 V_{RMS}.

The positions of $\frac{N}{D} = \frac{00}{01}$ locks the Filter Center Frequency onto the latest input frequency 1 kHz, independent of the Clock Osc. drift and knob settings.
 Sweep the extern generator and check the curves I, II ... VI. For curve I and IV it may be necessary to fine tune the input freq. to obtain the max. rejection.
 All curves are typical.

Note, that the gain increases 6 dB in the 1'st Filter Section with R58 in open circuit.
 Curve IV is attenuated by Curve III and will therefore not show the increase of 6 dB.

Curve VII is shown with the feedback resistor R58 replaced.



Adjustment

Off-Set

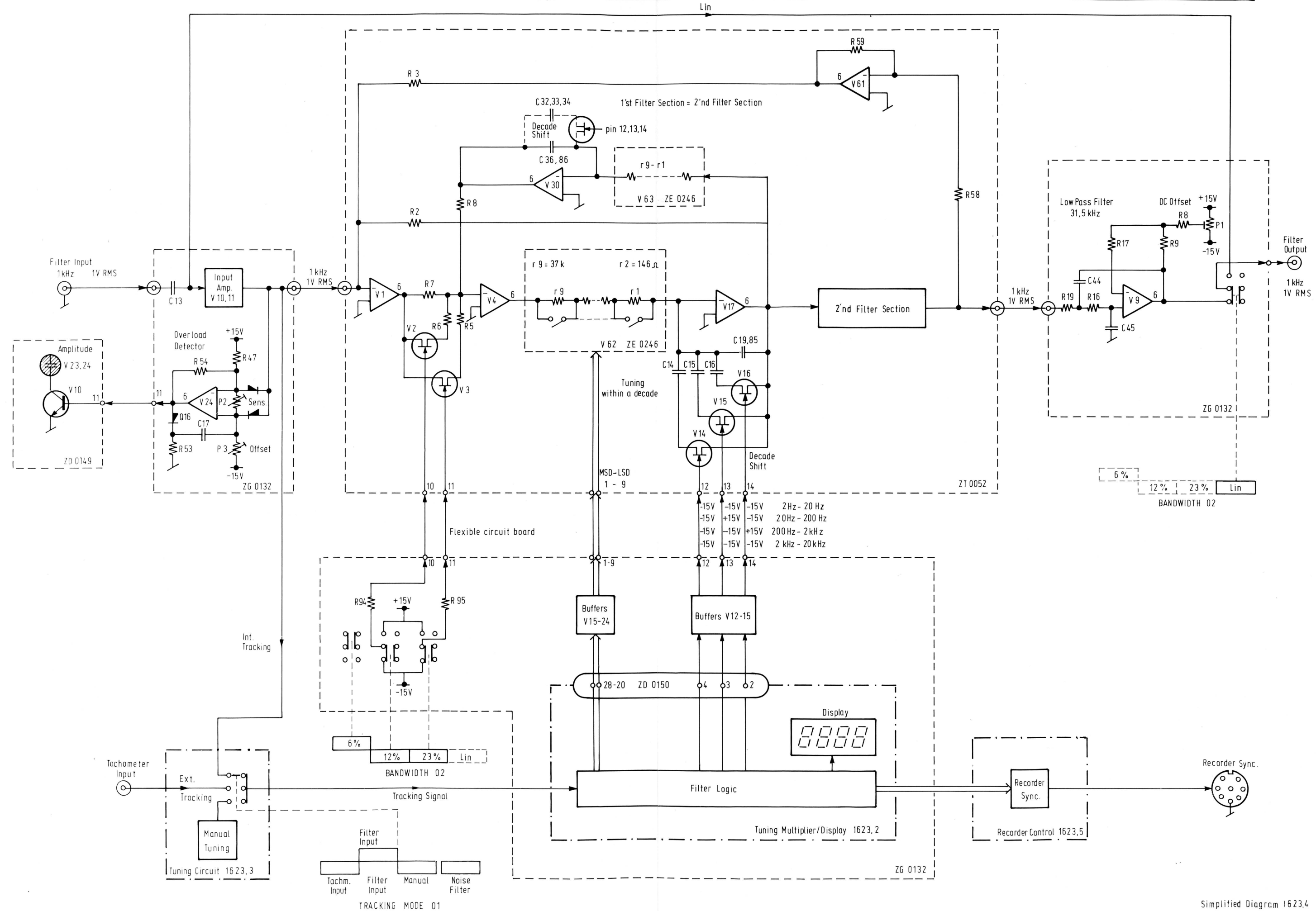
MANUAL TUNING/PRESET: "2 Hz — 200 Hz"
 TRACKING MODE: "Manual"
 BANDWIDTH: "23%"
 TRACKING FREQ. MULTI.: $\frac{N}{D} = \frac{01}{01}$
 MANUAL TUNING: "Fully counter clockwise"

Short circuit "Filter Input".
 Measure the DC off-set voltage on "Filter Output": $0V \pm 2 \text{ mV}$.
 If necessary adjust P4 on ZG 0132.
 If not possible check all the off-set voltages on the op-amp's pin 6 on ZT 0052 to be $0V \pm 30 \text{ mV}$.
 Slowly turn MANUAL TUNING through the range. The off-set voltage on "Filter Output" should be $0V \pm 2 \text{ mV}$.

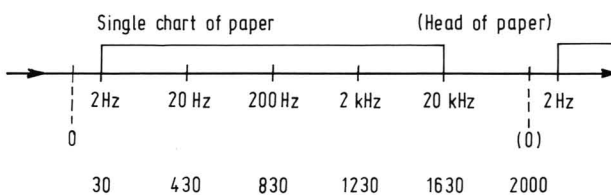
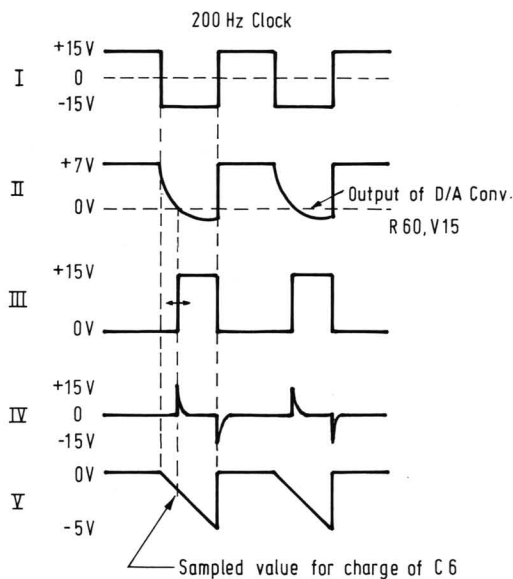
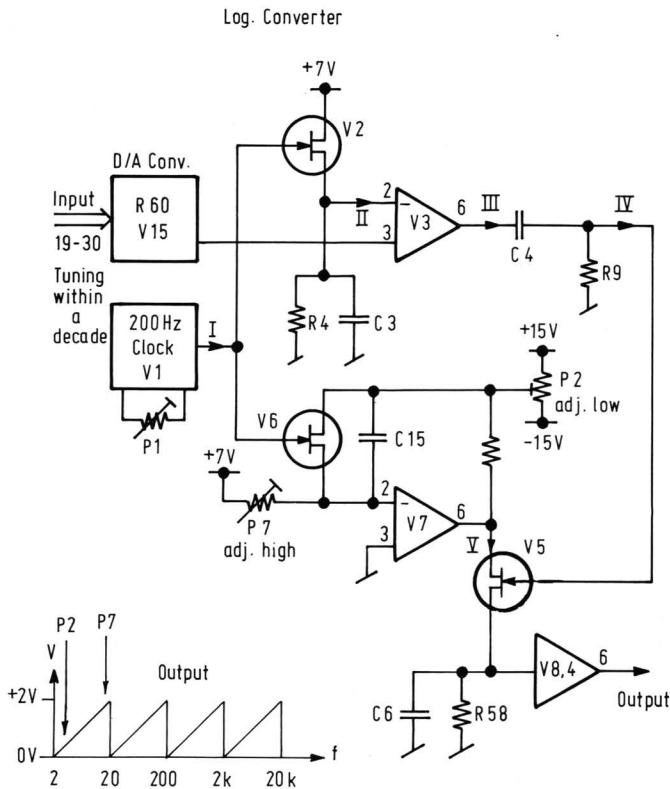
Overload (Amplitude)

TRACKING MODE: "Filter Input"
 BANDWIDTH: "23%"
 TRACKING FREQ. MULTI.: $\frac{N}{D} = \frac{01}{01}$

Measure the DC voltage on V24 pin 6 on ZG 0132 and adj. P3 for min. voltage: approx. $-0.5V$.
 Input signal to "Filter Input": $3V \text{ RMS } 1 \text{ kHz}$.
 The "Amplitude" lamp should flicker.
 By decreasing the input voltage to $2.8V \text{ RMS}$ the "Amplitude" lamp should stop flickering.
 If necessary adjust P2 on ZG 0132.



Technical Description



The 1623 Tracking Filter is provided with a Synchronization signal for the Level Recorder Type 2306. Also a DC Ramp voltage for controlling one of the axes of an X-Y recorder is provided.

For single chart length of paper (250 mm) the 1623 will deliver 2000 pulses. 400 pulses/decade. With a switch on the rear panel of the 1623 the paper movement may be selected to either "Forward Only" or "Forward and Reverse". The position "Forward and Reverse" can only be used together with the 2306, if this has a higher serial no. than 718058 or is modified with kit WB 0250.

Frequency information consisting of "Tuning within a Decade" is fed to the Recorder Sync. Board ZD 0163.

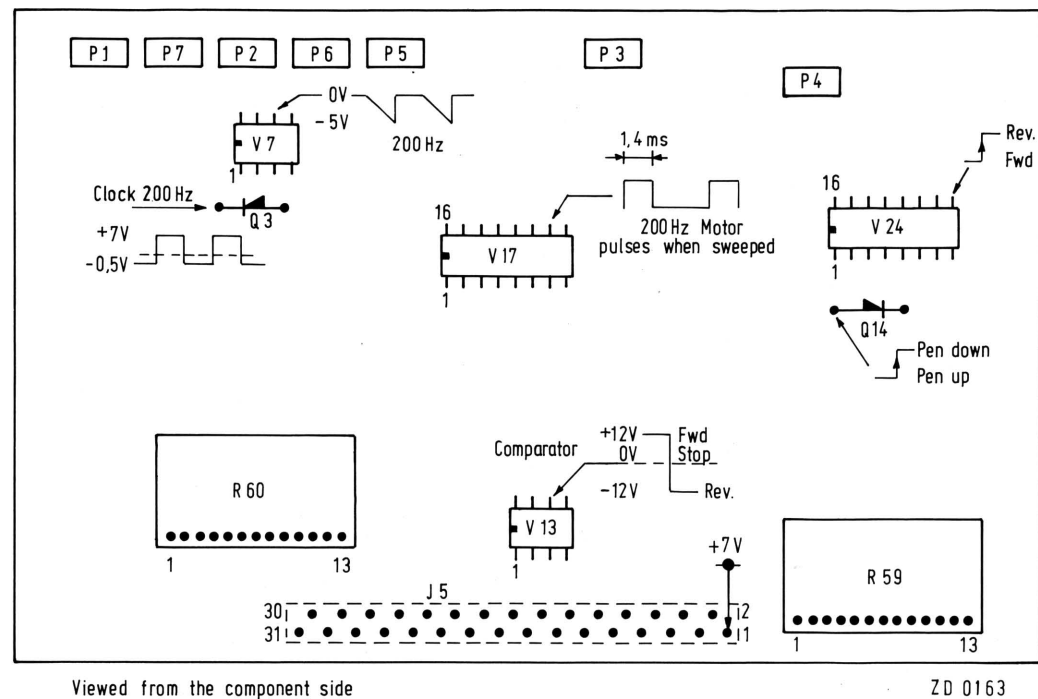
The tuning information (pin 19-30) is D/A converted (R60) and fed to the Log Converter. A Decade weighting is added to the log conversion on the input of V9. See the Simplified Diagram.

The Log function is taken from C3//R4. The max paper speed is set by the 200 Hz clock, which is adjusted to 200 Hz $\pm$ 10 Hz.

At 2000 pulses the Counter V18-20 is reset by V21. 2000 pulses correspond to a single chart of paper. The 200 Hz clock giving the Motor Sync. pulses for the 2306, gives a paper speed of 25 mm/s if the paper is continuously running.

The number of pulses n to the Recorder Sync.

$$n = 400 \log \frac{f_1}{f_0}$$
 between two frequencies.



Adjustment

Connect a Counter to "Recorder Sync." pin 7, and connect 2306 via cable AQ 0182 to 1623 "Recorder Sync.".

If no 2306 is available it is necessary to place a pull up resistor of approx. 1 k Ω between pin 7 and +7V, to obtain correct counting of the sync. pulses for the Motor.

Measure the clock freq. with a Counter, 200 Hz $\pm$ 10 Hz on V1 pin 6. If necessary adjust P1 on ZD 0163.

Knob settings

BATTERY: "On"
TRACKING MODE: "Tachm. Input"
TRACKING FREQ.MULTI: N = "01"
RECORDER SYNC.: "Fwd Only" (on rear)

a RECORDER SYNC., press "Reset Fwd"

RECORDER SYNC., press "Start"

b REORDER SYNC., press "Reset Fwd"

RECORDER SYNC., press "Start"

c REORDER SYNC., press "Reset Fwd"

RECORDER SYNC., press "Start"

d REORDER SYNC., press "Reset Fwd"

RECORDER SYNC., press "Start"

e RECORDER SYNC., press "Reset Fwd"

RECORDER SYNC., press "Start"

f RECORDER SYNC., press "Reset Fwd"

Reset the Counter

The Counter should show 30 ± 2 pulses.
If necessary adjust P2. And repeat item a.
If not possible to obtain 30 ± 2 pulses by adjustment of P2 then set P6 to middle position, and repeat item a.

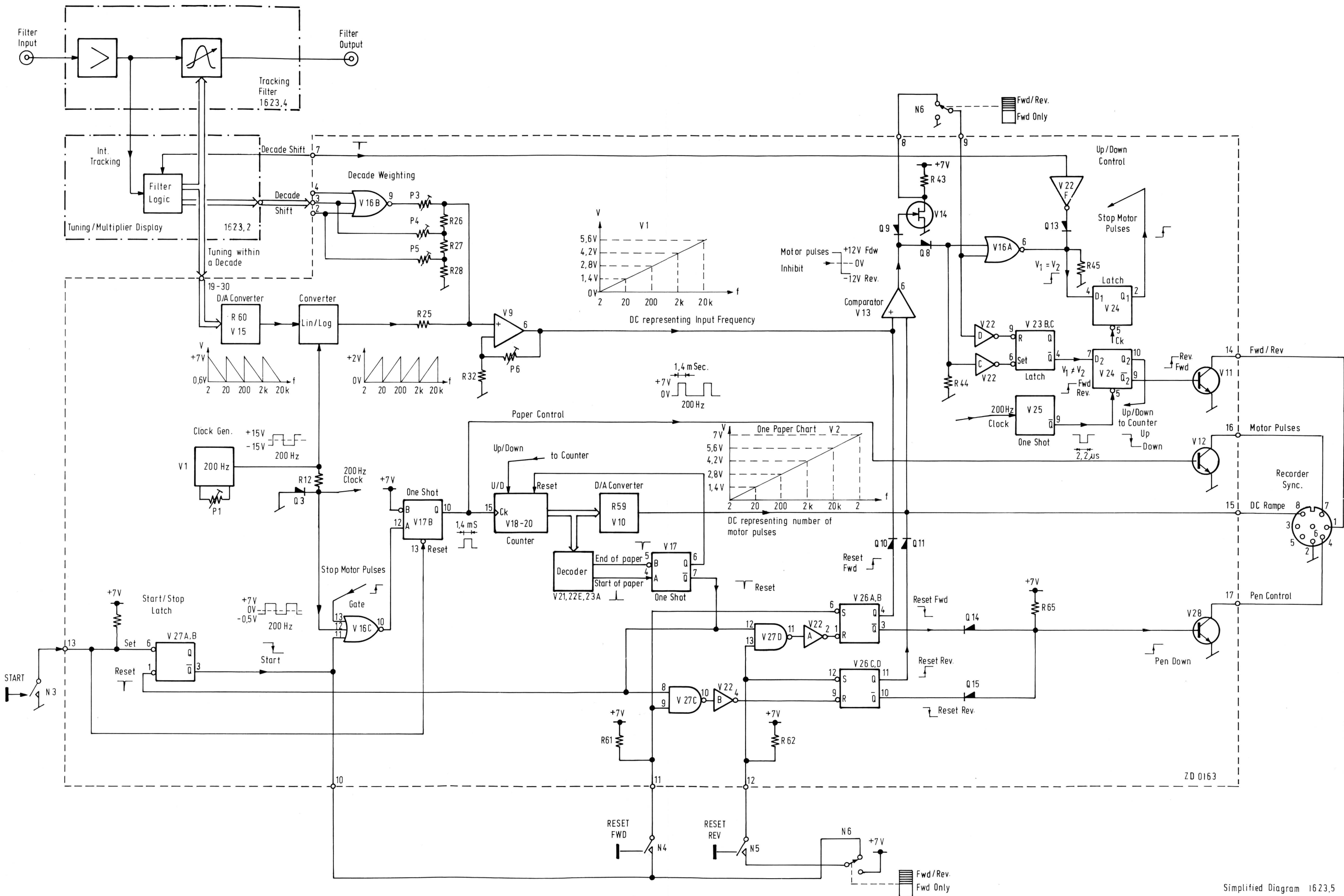
Change input freq. to 18 Hz.
Reset the Counter
The Counter should show 412 ± 2 pulses.
If necessary adjust P7, and repeat item b.

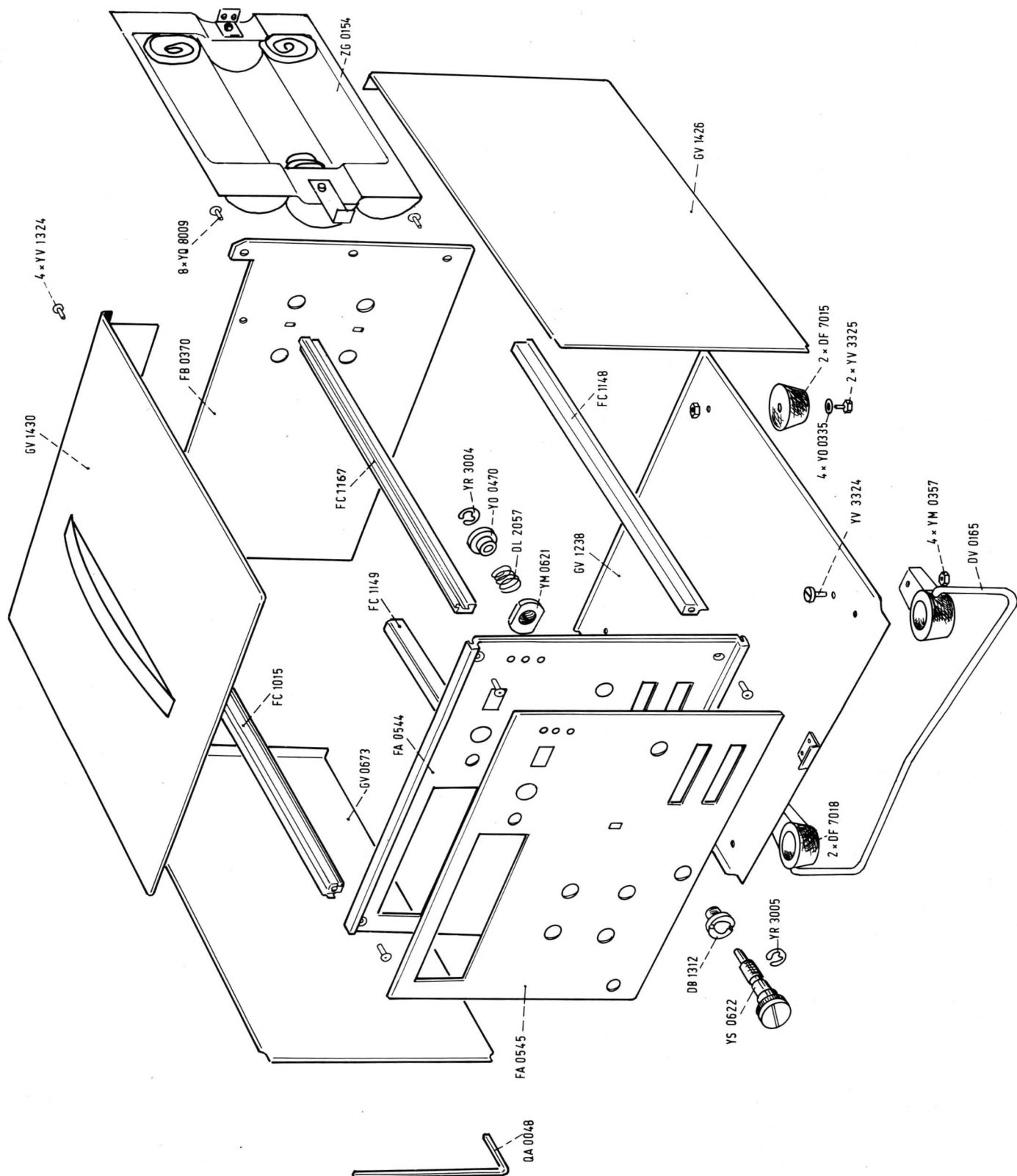
Change input freq. to 180Hz.
Reset the Counter
The Counter should show 812 ± 2 pulses.
If necessary adjust P5, and repeat item c.

Change input freq. to 1,80 kHz.
Reset the Counter
The Counter should show 1212 ± 2 pulses.
If necessary adjust P4, and repeat item d.

Change input freq. to 18,0 kHz.
Reset the Counter
The Counter should show 1612 ± 2 pulses.
If necessary adjust P3, and repeat item e.

The Counter should now show 2000 ± 1 pulses.





1623.6 Parts List

CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.
C 40,41	Tantalum	2,2 μ F/	35 V		CF 0022
C 46	-	2,2 μ F/	35 V		CF 0022
C 47	-	1 nF/	63 V		CT 1132
N 1,2	Selector				NN 0031
N 3-5	"Recorder Sync."				NT 0040
N 6	Selector				NN 0031
N 7	Switch, "Battery"				NN 0049
O 1	"Tracking Mode"				OZ 0015
P 7	"Trigger Level"	500 k Ω			PP 4505
P 8	"Manual Tuning"	1 M Ω			PP 5104
Q 29	Si. 1N4004	400 V/1 A			QV 0237
Q 33	Si. 1N4004	400 V/1 A			QV 0237
R 60	Metal 1/4 W	1%	5,49 k Ω		RF 3549
R 67	-	-	9,09 k Ω		RF 3909
R 87	Carbon	-	5% 1 M Ω		RB 6100
R 100	Wire	5 W	10% 12 Ω		RO 1208
	Set of screen cables				AO 1105
	Flat cable				AQ 0181
	Flexible circuit board				AR 1012
	Frame				DZ 9141
	Glass				SG 0053
	BNC Socket, "Filter Input"				JJ 0121
	BNC Socket, "Filter Output"				JJ 0130
	BNC Socket, "Tachomet Input"				JJ 0315
	7-pole DIN Socket				JJ 0709
	8-pole DIN Socket				JJ 0802
	Battery Indicator				IM 0011
	Locking Ring for above				YR 1011
	Battery				QB 0008
	Knob for "Tracking Freq. Multiplier"				SN 0076
	Scale for above				SD 0019
	Knob for "Trigger Level"				SN 2022
	Cover for above				DD 0089
	Knob for "Recorder Sync."				SN 0084
	Knob for "Manual Tuning"				SN 1025
	Fuse, slow 630 mA				VF 0032
	Fuse, slow 1,25 A				VF 0027
	Fuseholder				JS 0007
	Stand-off				XL 0063

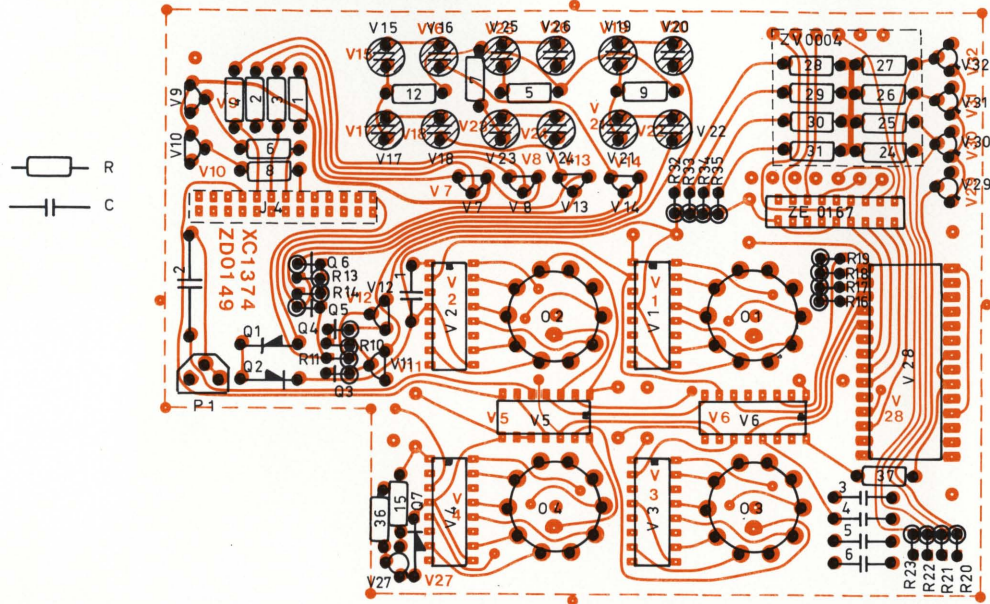
Furthermore 1623 contains the following Sub-assemblies the details of which can be found under their respective numbers.

Digital Circuit	ZD 0149
Digital Circuit	ZD 0150
Digital Circuit	ZD 0151
Frequency Converter	ZD 0163
Mother Board	ZG 0132
Active Filter	ZT 0052

Circuit and Layout Diagram with Parts List

ZD 0149

Digital Circuit

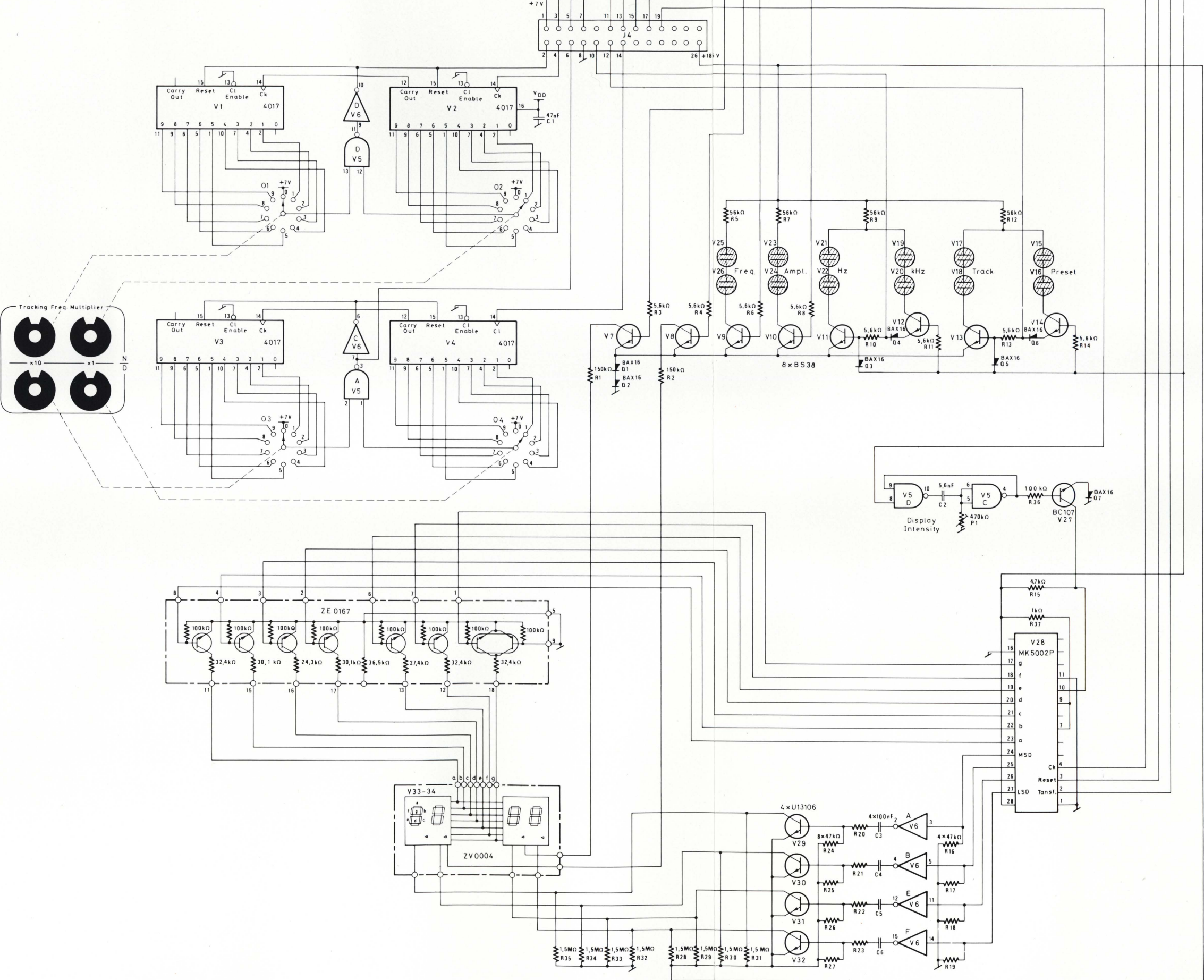


Viewed from the printed circuit side

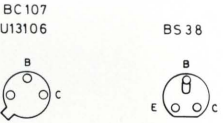
CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.	CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.
C 1	Ceramic	47 nF/	30 V		CK 4470	R 10,11	Carbon	1/4 W	5%	5,6 kΩ	RB 3560
C 2	Polystyrene	5,6 nF/	63 V		CT 1509	R 12	-	-	-	56 kΩ	RB 4560
C 3-6	Polyester	100 nF/250 V			CS 0402	R 13,14	-	-	-	5,6 kΩ	RB 3560
J 4	26-pin Plug for flat cable				JP 2603	R 15	-	-	-	4,7 kΩ	RB 3470
O 1-4	Tracking Frequency Multiplier				OI 0022	R 16-27	-	-	-	47 kΩ	RB 4470
P 1	Cermet	1/2 W	lin	470 kΩ	PG 4470	R 28-35	-	-	-	1,5 MΩ	RB 6150
Q 1-7	Si.	BAX16	150 V/300 mA		QV 0217	R 36	-	-	-	100 kΩ	RB 5100
R 1,2	Carbon	1/4 W	5%	150 kΩ	RB 5150	R 37	-	-	-	1 kΩ	RB 3100
R 3,4	-	-	-	5,6 kΩ	RB 3560	V 1-4	Decade Counter/ Divider			4017	VD 2063
R 5	-	-	-	56 kΩ	RB 4560	V 5	Quad 2-input NAND			4011	VD 2004
R 6	-	-	-	5,6 kΩ	RB 3560	V 6	Hex Buffer Inv.			4049	VD 2024
R 7	-	-	-	56 kΩ	RB 4560	V 7-14	Silicon	NPN		BSS38	VB 0549
R 8	-	-	-	5,6 kΩ	RB 3560	V 15-26	Neon Lamp				VS 0015
R 9	-	-	-	56 kΩ	RB 4560	V 27	Silicon	NPN		BC107	VB 0032
						V 28	Counter/Display Decoder			MK5002P	VD 0065
						V 29-32	Silicon	PNP		U13106	VB 0058
							Printed Circuit Board				XC 1374
							Thick Film Circuit				ZE 0167
							14-pin Socket				JJ 1408
							16-pin Socket				JJ 1622
							28-pin Socket				JJ 2800
							Reflector				DZ 9299

Display Unit

V 33,34	Sperry Display	VA 0097
	Socket for display	JV 0011
	PC Board without components	XC 1378
	PC Board with components	ZV 0004



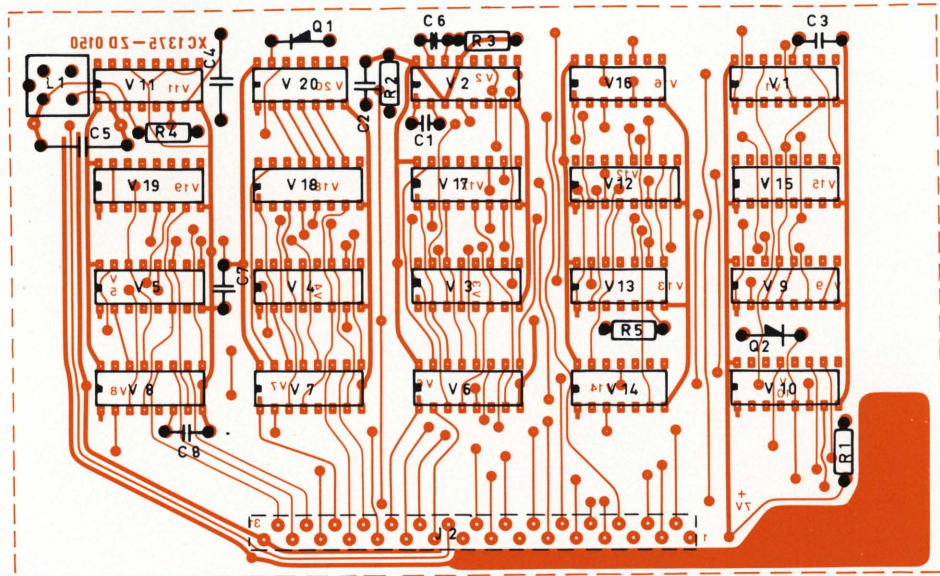
Pos no	Type	No of pins	GND	V _{DD}
V1	4017	16	8	16
V2	"	"	"	"
V3	"	"	"	"
V4	"	"	"	"
V5	4011	14	7	14
V6	4049	16	8	16
V28	MK5002P	28	1	28



Circuit and Layout Diagram with Parts List

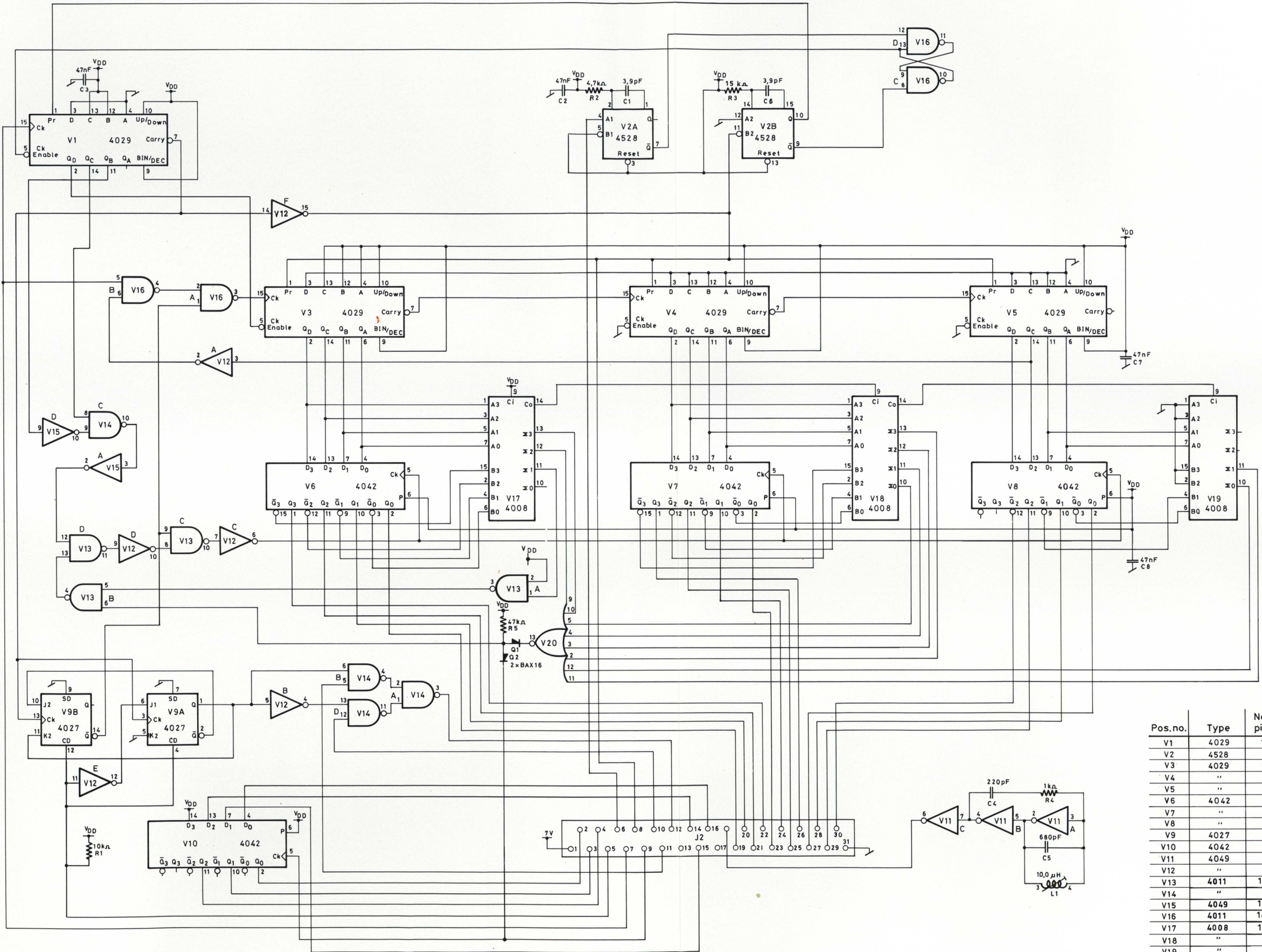
ZD 0150

Digital Circuit

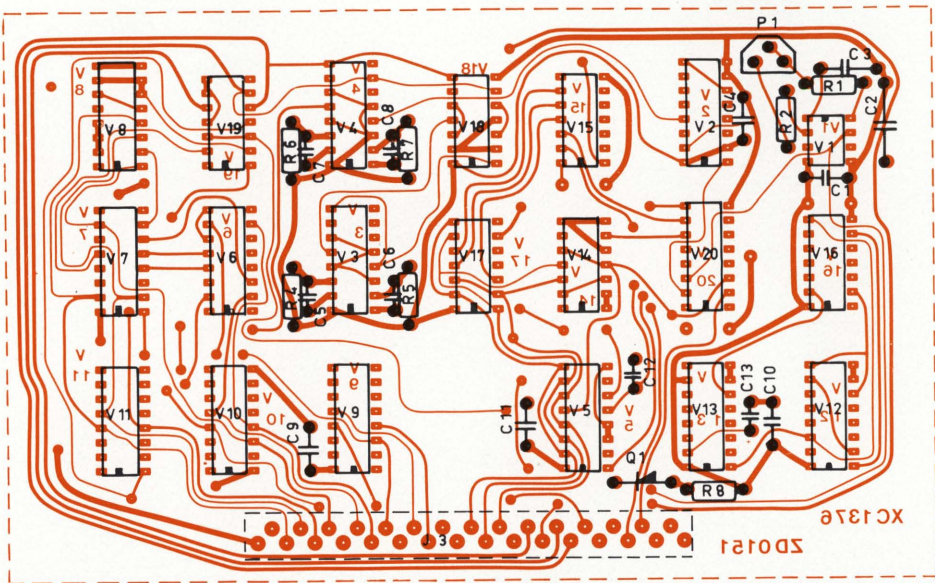


Viewed from the component side

CIRCUIT DIAGRAM REF.	COMPONENT TYPE		STOCK REF.	CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.
C 1	Ceramic	3,9 pF/250 V	CK 0390	V 1	Preset U/D Counter	4029
C 2,3	-	47 nF/ 30 V	CK 4470	V 2	Dual Monostable Multivibr.	4528
C 4	Polystyrene	220 pF/125 V	CT 0501	V 3-5	Preset U/D Counter	4029
C 5	-	680 pF/125 V	CT 1134	V 6-8	Quad Clocked "D" Latch	4042
C 6	Ceramic	3,9 pF/250 V	CK 0390	V 9	Dual JK Flip-Flop	4027
C 7,8	-	47 nF/ 30 V	CK 4470	V 10	Quad Clocked "D" Latch	4042
J 2	31-pin Plug for circuit board		JP 3103	V 11,12	Hex Buffer INV	4049
L 1	Coil	10 µH	LB 0903	V 13,14	Quad 2-input NAND	4011
Q 1,2	Si. BAX16	150 V/300 mA	QV 0217	V 15	Hex Buffer Inverter	4049
R 1	Carbon	1/4 W		V 16	Quad 2-input NAND	4011
R 2	-	-		V 17-19	4-Bit Full Adder	4008
R 3	-	-		V 20	Single 8-input NOR	4078
R 4	-	-				
R 5	-	-				
					Printed Circuit Board	XC 1375
					14-pin Socket for dual-in-line	JJ 1408
					16-pin Socket for dual-in-line	JJ 1622

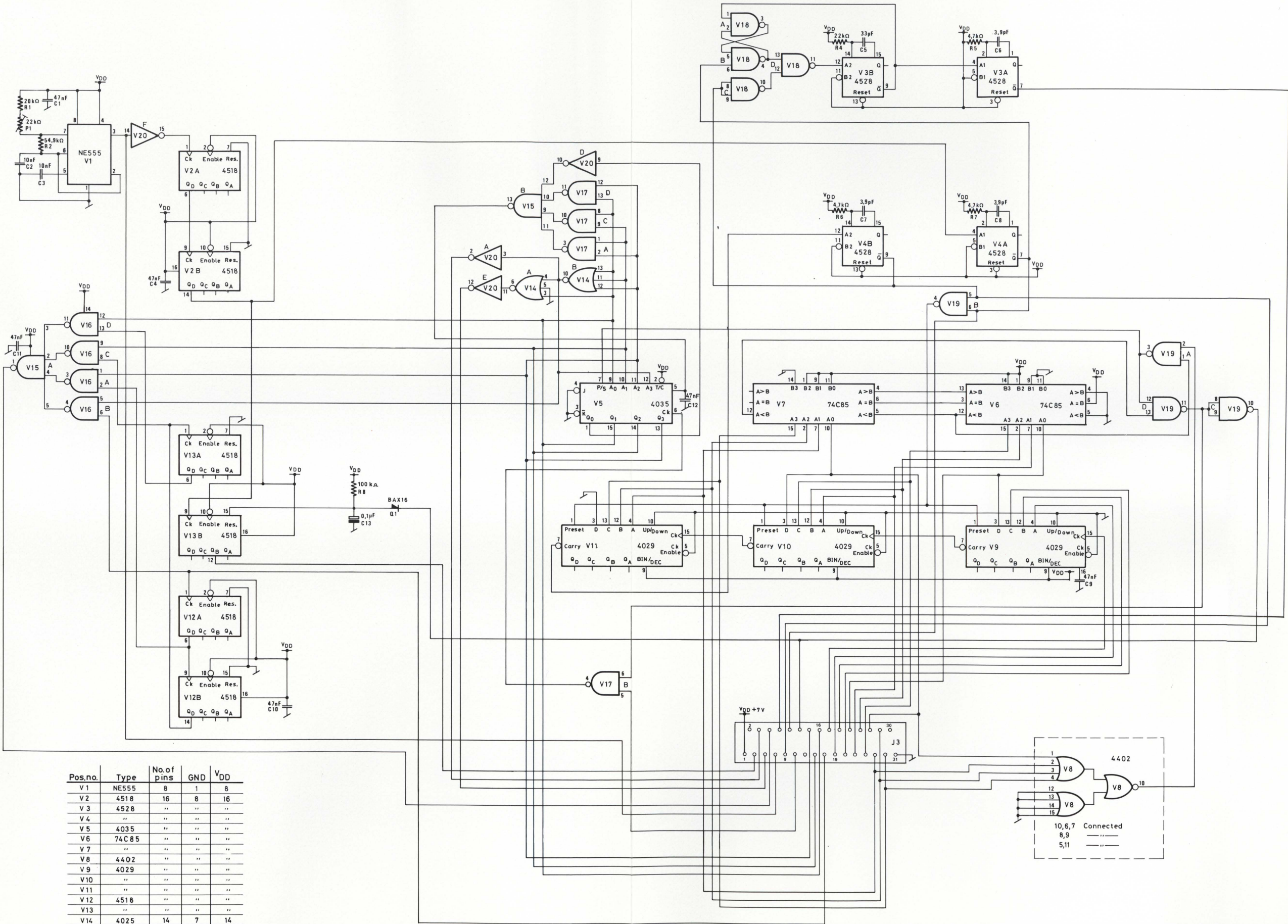


Pos.no.	Type	No.of pins	GND	VDD
V1	4029	16	8	16
V2	4528	"	"	"
V3	4029	"	"	"
V4	"	"	"	"
V5	"	"	"	"
V6	4042	"	"	"
V7	"	"	"	"
V8	"	"	"	"
V9	4027	"	"	"
V10	4042	"	"	"
V11	4049	"	"	"
V12	"	"	"	"
V13	4011	14	7	14
V14	"	"	"	"
V15	4049	16	8	16
V16	4011	14	7	14
V17	4008	16	8	16
V18	"	"	"	"
V19	"	"	"	"
V20	4078	14	7	14

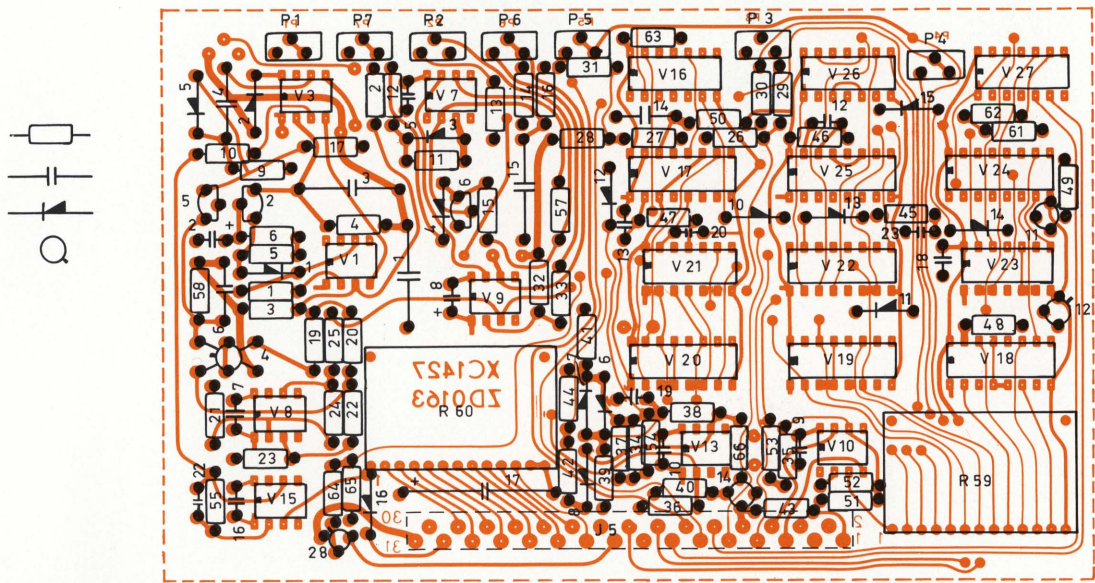


Viewed from the component side

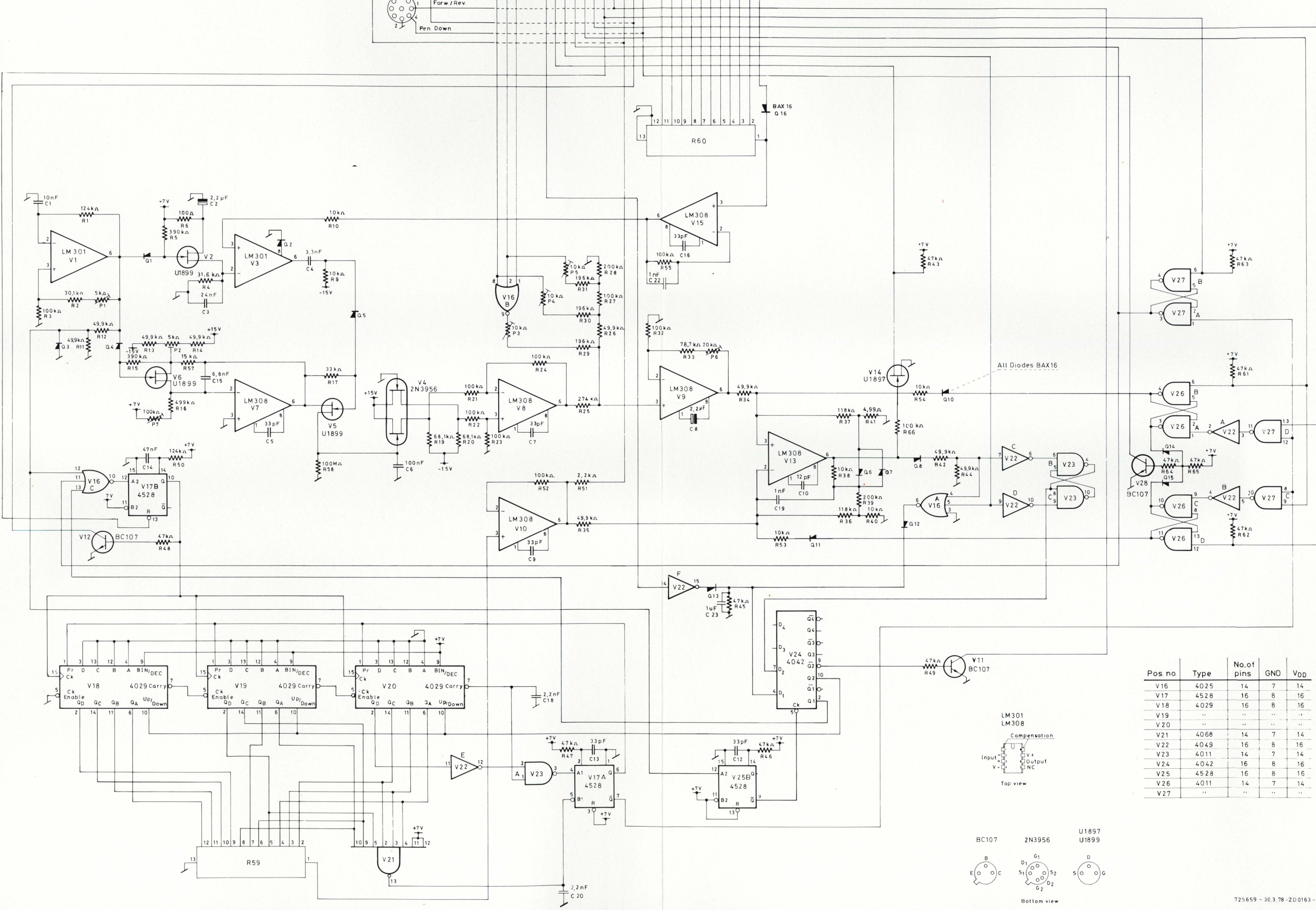
CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.	CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.
C 1	Ceramic	47 nF/ 30 V			CK 4470	V 1	Timer	NE555			VD 0062
C 2	Polystyrene	10 nF/ 63 V			CT 1545	V 2	Dual BCD Up Counter	4518			VD 2036
C 3	Polyester	10 nF/250 V			CS 0403	V 3,4	Dual Monostable Multivibr.	4528			VD 2032
C 4	Ceramic	47 nF/ 30 V			CK 4470	V 5	4-Bit Parallel In/Out	4035			VD 2030
C 5	-	33 pF/400 V			CK 1330	V 6,7	4-Bit Comparator	74C85			VD 2034
C 6-8	-	3,9 pF/400 V			CK 0390	V 8	2 x 4 Exp. OR	4402			VD 2031
C 9-12	-	47 nF/ 30 V			CK 4470	V 9-11	Preset U/D Counter	4029			VD 2018
C 13	Tantalum	0,1 µF/ 35 V			CF 0049	V 12,13	Dual BCD Up Counter	4518			VD 2036
J 3	31-pin Plug for circuit board				JP 3103	V 14	Tripple 3-input NOR	4025			VD 2015
P 1	Cermet	1/2 W		22 kΩ	PG 3220	V 15	Dual 4-input NAND	4012			VD 2005
Q 1	Si.	BAX16	150 V/300 mA		QV 0217	V 16-19	Quad 2 input NAND	4011			VD 2004
R 1	Metal	1/4 W	1%	20 kΩ	RF 4200	V 20	Hex Buffer INV	4049			VD 2024
R 2	-	-	-	54,9 kΩ	RF 4549	Printed Circuit Board					XC 1376
R 4	Carbon	-	5%	22 kΩ	RB 4220	8-pin Socket for dual-in-line					JJ 0804
R 5-7	-	-	-	4,7 kΩ	RB 3470	14-pin Socket for dual-in-line					JJ 1408
R 8	-	-	-	100 kΩ	RB 5100	16-pin Socket for dual-in-line					JJ 1622



Pos.no.	Type	No. of pins	GND	VDD
V 1	NE555	8	1	8
V 2	4518	16	8	16
V 3	4528	"	"	"
V 4	"	"	"	"
V 5	4035	"	"	"
V 6	74C85	"	"	"
V 7	"	"	"	"
V 8	4402	"	"	"
V 9	4029	"	"	"
V 10	"	"	"	"
V 11	"	"	"	"
V 12	4518	"	"	"
V 13	"	"	"	"
V 14	4025	14	7	14
V 15	4012	"	"	"
V 16	4011	"	"	"
V 17	"	"	"	"
V 18	"	"	"	"
V 19	"	"	"	"
V 20	4049	16	8	16



Viewed from the component side

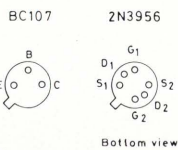
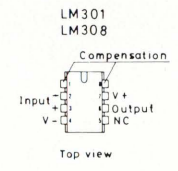


CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.	CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.
C 1	Polystyrene	10 nF/ 63 V	CT 1545	R 5	Carbon 1/4 W 5% 390 kΩ RB 5390
C 2	Tantalum	2,2 μF/ 35 V	CF 0022	R 6	- - - 100 Ω RB 2100
C 3	Polystyrene	24 nF/ 63 V	CT 1540	R 9	- - - 10 kΩ RB 4100
C 4	-	3,3 nF/ 30 V	CT 1544	R 10	Metal - 1% 10 kΩ RF 4100
C 5	Ceramic	33 pF/400 V	CK 1330	R 11-14	- - - 49,9 kΩ RF 4499
C 6	Polyester	100 nF/250 V	CS 0402	R 15	Carbon - 5% 390 kΩ RB 5390
C 7	Ceramic	33 pF/400 V	CK 1330	R 16	Metal - 1% 499 kΩ RF 5499
C 8	-	2,2 nF/400 V	CK 3221	R 17	Carbon - 5% 33 kΩ RB 4330
C 9	-	33 pF/400 V	CK 1330	R 19,20	Metal - 1% 68,1 kΩ RF 4681
C 10	-	12 pF/400 V	CK 1120	R 21-24	- - - 100 kΩ RF 5100
C 12,13	-	33 pF/400 V	CK 1330	R 25	- - - 274 kΩ RF 5274
C 14	Polyester	47 nF/250 V	CS 0401	R 26	- - - 49,9 kΩ RF 4499
C 15	Ceramic	6,8 nF/ 63 V	CT 1511	R 27	- - - 100 kΩ RF 5100
C 16	-	33 pF/400 V	CK 1330	R 28	- - - 200 kΩ RF 5200
C 17	Electrolytic	100 μF/ 16 V	CE 0310	R 29-31	- - - 196 kΩ RF 5196
C 18	Ceramic	2,2 nF/400 V	CK 3221	R 32	- - - 100 kΩ RF 5100
C 19	-	1 nF/400 V	CK 3101	R 33	- - - 78,7 kΩ RF 4787
C 20	-	2,2 nF/400 V	CK 3221	R 34,35	- - - 49,9 kΩ RF 4499
C 22	Ceramic	1 nF/400 V	CK 3101	R 36,37	- - - 118 kΩ RF 5118
C 23	Tantalum	1 μF/ 35 V	CF 0062	R 38	- - - 10 kΩ RF 4100
J 5	31-pin Plug for circuit board	JP 3103		R 39	- - - 200 kΩ RF 5200
P 1,2	Cermet	1/2 W 5 kΩ	PG 2520	R 40	- - - 10 kΩ RF 4100
P 3-5	-	- 10 kΩ	PG 3121	R 41	- - - 4,99 Ω RF 0499
P 6	-	3/4 W 20 kΩ	PG 3209	R 42	- - - 49,9 kΩ RF 4499
P 7	-	1/2 W 100 kΩ	PG 4112	R 43	Carbon - 5% 47 kΩ RB 4470
Q 1-8	Si. BAX16	150 V/300 mA	QV 0217	R 44	Metal - 1% 49,9 kΩ RF 4499
Q 10-16	-	150 V/300 mA	QV 0217	R 45-49	Carbon - 5% 47 kΩ RB 4470
R 1	Metal	1/4 W 1% 124 kΩ	RF 5124	R 50	Metal - 1% 124 kΩ RF 5124
R 2	-	- 30,1 kΩ	RF 4301	R 51	Carbon - 5% 2,2 kΩ RB 3220
R 3	-	- 100 kΩ	RF 5100	R 52	Metal - 1% 100 kΩ RF 5100
R 4	-	- 31,6 kΩ	RF 4316	R 53,54	Carbon - 5% 10 kΩ RB 4100
				R 55	Metal - 1% 100 kΩ RF 5100
				R 57	- - - 15 kΩ RF 4150
				R 58	Carbon 1/8 W 20% 100 MΩ RH 0901
				R 59,60	Thick Film Circuit - - - RZ 0040
				R 61-65	Carbon 1/4 W 5% 47 kΩ RB 4470
				R 66	- - - 100 kΩ RB 5100

ZD 0163

valid from serial no. 725659

Pos no	Type	No. of pins	GND	V _{DD}
V16	4025	14	7	14
V17	4528	16	8	16
V18	4029	16	8	16
V19	..	..	..	..
V20	..	..	..	..
V21	4068	14	7	14
V22	4049	16	8	16
V23	4011	14	7	14
V24	4042	16	8	16
V25	4528	16	8	16
V26	4011	14	7	14
V27	..	..	..	..



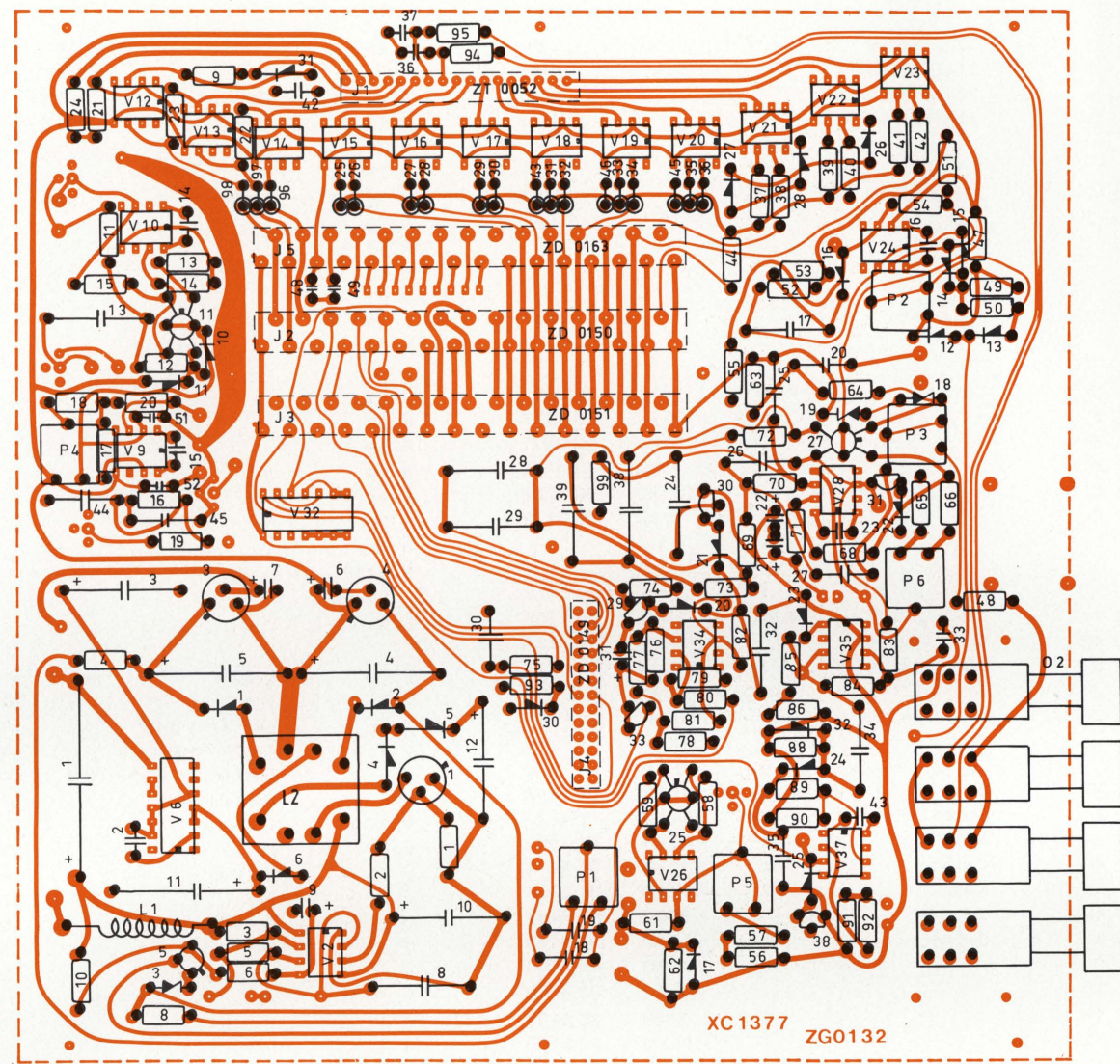
ZD 0163 Frequency Converter

CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.
V 1	Op. Amp.	LM301 VE 0017
V 2	FET N	U1899 VB 1064
V 3	Op. Amp.	LM301 VE 0017
V 4	FET N	2N3956 VB 1054
V 5,6	FET N	U1899 VB 1064
V 7-10	Op. Amp.	LM308 VE 0046
V 11,12	Silicon NPN	BC107 VB 1032
V 13	Op. Amp.	LM308 VE 0046
V 14	FET N Sel.	U1897 VB 1080
V 15	Op. Amp.	UM308 VE 0046
V 16	Tripple 3-input NOR	4025 VD 2015
V 17	Dual Monostable Multivibr.	4528 VD 2032
V 18-20	Preset U/D Counter	4029 VD 2018
V 21	Single 8-input NAND	4068 VD 2028
V 22	Hex Buffer Inverter	4049 VD 2024
V 23	Quad 2-input NAND	4011 VD 2004
V 24	Quad Clocked "D" Latch	4042 VD 2023
V 25	Dual Monostable Multivibr.	4528 VD 2032
V 26,27	Quad 2-input NAND	4011 VD 2004
V 28	Silicon NPN	BC107 VB 1032
	Printed Circuit Board	XC 1427
	14-pin Socket for dual-in-line	JJ 1408
	16-pin Socket for dual-in-line	JJ 1622

Circuit and Layout Diagram with Parts List

ZG 0132

Mother Board



Viewed from the printed circuit side.

CIRCUIT
DIAGRAM
REF.

COMPONENT TYPE

STOCK REF.

CIRCUIT
DIAGRAM
REF.

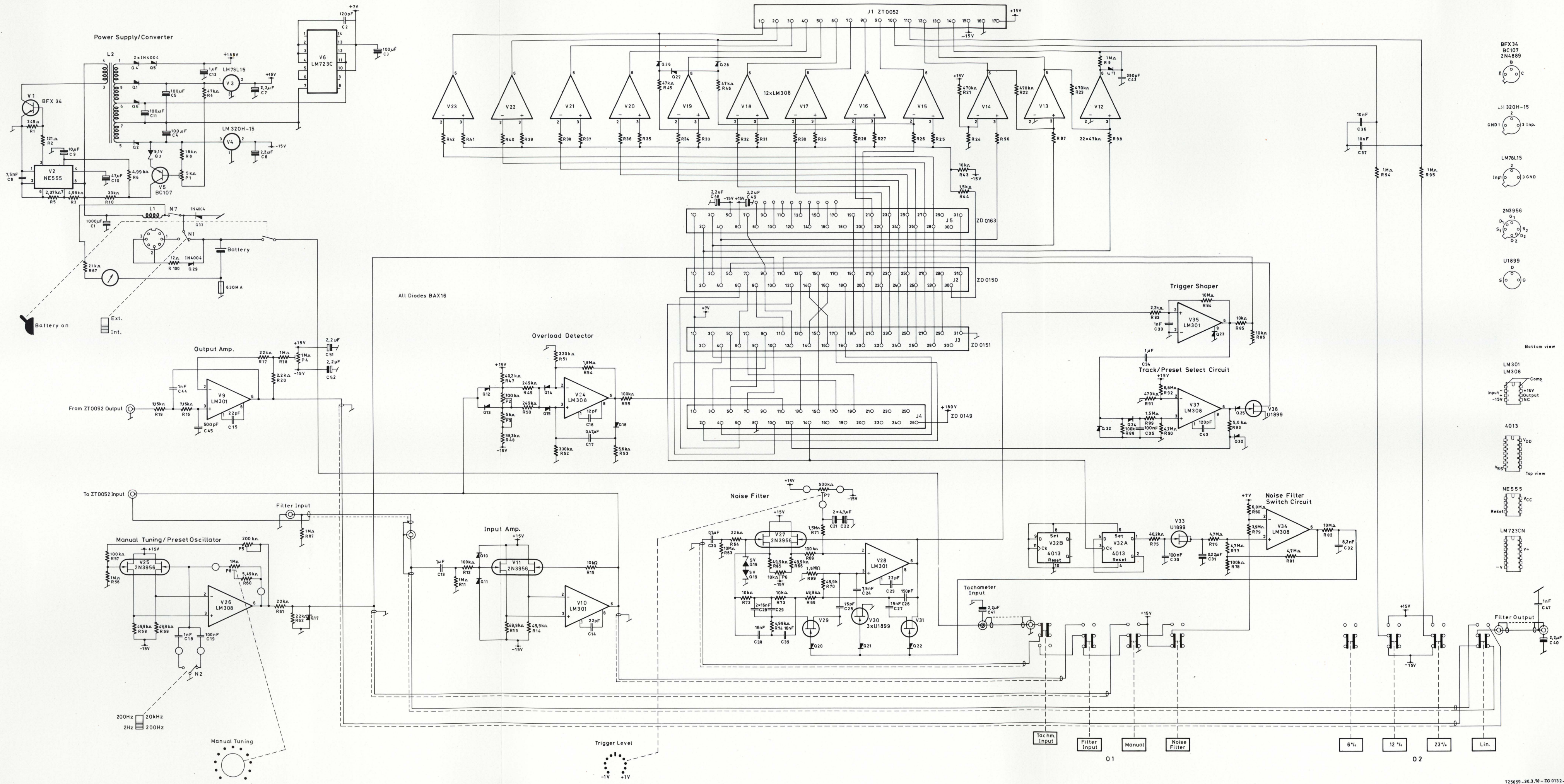
COMPONENT TYPE

STOCK REF.

C 1	Electrolytic	1000 µF/ 25 V	CE 0419	C 23	Ceramic	22 pF/400 V	CK 1220
C 2	Ceramic	120 pF/400 V	CK 2122	C 24	Polystyrene	7.5 nF/ 63 V	CT 1512
C 3	Electrolytic	100 µF/ 16 V	CE 0310	C 25	-	75 pF/125 V	CT 1128
C 4,5	-	100 µF/ 40 V	CE 0443	C 26	-	150 pF/400 V	CT 1139
C 6,7	Tantalum	2.2 µF/ 35 V	CF 0022	C 27	Polyester	15 nF/250 V	CS 0045
C 8	Polystyrene	7.5 nF/ 63 V	CT 1512	C 28,29	Polystyrene	16 nF/ 63 V	CT 1539
C 9	Tantalum	10 µF/ 35 V	CF 0064	C 30	Polyster	100 nF/250 V	CS 0402
C 10	Electrolytic	47 µF/ 40 V	CE 8965	C 31	Tantalum	0.22 µF/ 35 V	CF 0063
C 11	-	100 µF/ 40 V	CE 0443	C 32	Polystyrene	8.2 nF/ 63 V	CT 1556
C 12	-	1 µF/350 V	CE 0512	C 33	Ceramic	1 nF/400 V	CK 3101
C 13	Polycarbonate	1 µF/ 63 V	CS 0803	C 34	Polycarbonate	1 µF/100 V	CS 0384
C 14,15	Ceramic	22 pF/400 V	CK 1220	C 35	Polyester	100 nF/250 V	CS 0402
C 16	-	12 pF/400 V	CK 1120	C 36,37	Ceramic	10 nF/ 30 V	CT 4101
C 17	Polycarbonate	0.47 µF/100 V	CS 0383	C 38,39	Polystyrene	16 nF/ 63 V	CT 1539
C 18	Polystyrene	1 nF/ 63 V	CT 1132	C 42	Ceramic	390 nF/400 V	CK 2391
C 19	Polyester	100 nF/250 V	CS 0044	C 43	-	120 pF/400 V	CT 2122
C 20	-	0.1 µF/250 V	CS 0402	C 44	Polystyrene	1 nF/ 63 V	CT 1132
C 21,22	Tantalum	4.7 µF/ 35 V	CF 0051	C 45	-	500 pF/630 V	CT 0213
				C 48-52	Tantalum	2.2 µF/ 35 V	CF 0022

ZG 0132

valid from serial no. 725659



ZG 0132 Mother Board

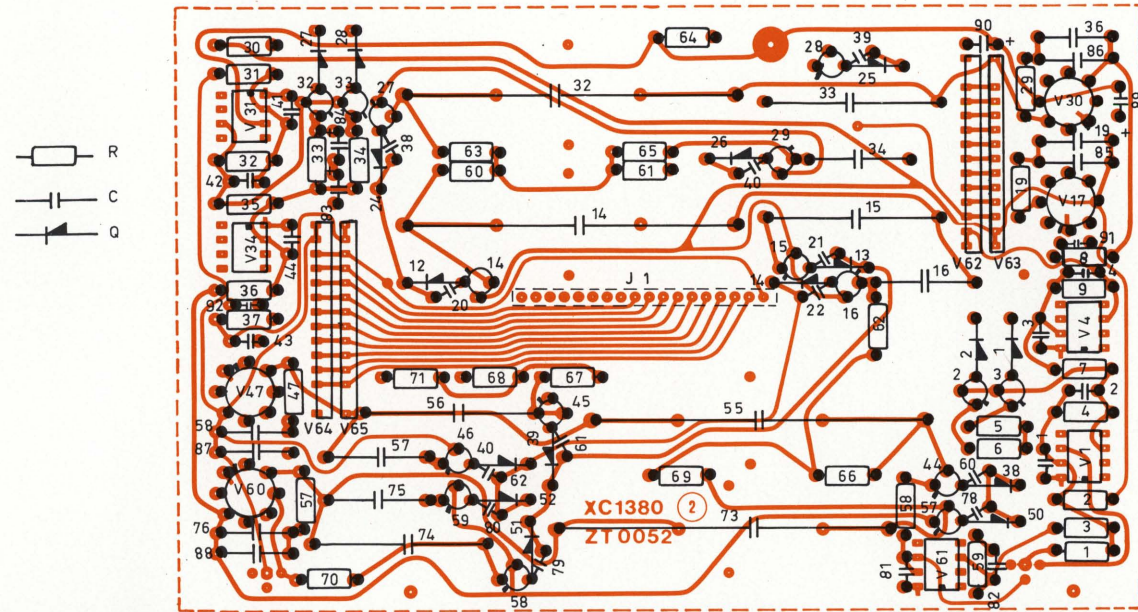
CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.	CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.
J 1	17-pin Socket				JJ 1701	R 68	Carbon	1/4 W	5%	100 kΩ	RB 5100
J 2,3	31-pin Socket				JJ 3105	R 69,70	Metal	-	1%	49,9 kΩ	RF 4499
J 4	26-pin Plug				JP 2603	R 71	Carbon	-	5%	1,5 MΩ	RB 6150
J 5	31-pin Socket				JJ 3105	R 72,73	Metal	-	1%	10 kΩ	RF 4100
						R 74	-	-	-	4,99 kΩ	RF 3499
						R 75	-	-	-	40,2 kΩ	RF 4402
L 1	Converter Coil				LJ 0015	R 76,77	Carbon	-	5%	4,7 MΩ	RB 6470
L 2	Coil				LB 0897	R 78	-	-	-	100 kΩ	RB 5100
						R 79	-	-	-	3,9 MΩ	RB 6390
						R 80	-	-	-	6,8 MΩ	RB 6680
						R 81	-	-	-	4,7 MΩ	RB 6470
O 2	"Bandwidth"				OJ 0058	R 82	-	-	-	10 MΩ	RB 7100
						R 83	-	-	-	2,2 kΩ	RB 3220
						R 84	-	-	-	10 MΩ	RB 7100
P 1	Cermet	1/2 W	5 kΩ	PG 2521		R 85,86	-	-	-	10 kΩ	RB 4100
P 2	-	-	100 kΩ	PG 4113		R 88	-	-	-	100 kΩ	RB 5100
P 3	-	-	5 kΩ	PG 2521		R 89	-	-	-	1,5 MΩ	RB 6150
P 4	-	-	1 MΩ	PG 5112		R 90	-	-	-	4,7 MΩ	RB 6470
P 5	-	-	200 kΩ	PG 4208		R 91	-	-	-	470 kΩ	RB 5470
P 6	-	-	10 kΩ	PG 3122		R 92	-	-	-	6,8 MΩ	RB 6680
						R 93	-	-	-	5,6 kΩ	RB 3560
Q 1,2	Si.	BAX16	150 V/300 mA	QV 0217		R 94,95	-	-	-	1 MΩ	RB 6100
Q 3	Ze.	ZF9,1	8,5-9,6 V/0,25 W	QV 1109		R 96-98	-	-	-	47 kΩ	RB 4470
Q 4,5	Si.	1N4001	400 V/1 A	QV 0237		R 99	-	-	-	1,5 MΩ	RB 6150
Q 6-17	Si.	BAX16	150 V/300 mA	QV 0217		V 1	Silicon		NPN	BFX34	VB 0559
Q 18,19	Ze.	BZX83	5,3-5,9 V/0,25 W	QV 1105		V 2	Timer			NE555	VD 0062
Q 20-32	Si.	BAX16	150 V/300 mA	QV 0217		V 3	+ 15 V Regulator			LM78L15	VE 0078
						V 4	—40 V Regulator			LM320-15	VE 0066
						V 5	Silicon		NPN	BC107	VB 0032
R 1	Metal	1/4 W	1%	249 Ω	RF 2249	V 6	Pos. Volt. Reg.			LJ23	VE 0052
R 2	Carbon	-	5%	121 Ω	RF 2121	V 9,10	Op. Amp.			LM301	VE 0017
R 3	Metal	-	1%	4,99 kΩ	RF 3499	V 11	FET		N	2N3956	VB 1054
R 4	Carbon	-	5%	47 kΩ	RB 4470	V 12-24	Op. Amp.			LM308	VE 0046
R 5	Metal	-	1%	2,37 kΩ	RF 3237	V 25	FET		N	2N3956	VB 1054
R 6	-	-	-	4,99 kΩ	RF 3499	V 26	Op. Amp.			LM308	VE 0046
R 8	Carbon	-	5%	18 kΩ	RB 4180	V 27	FET		N	2N3956	VB 1054
R 9	-	-	-	1 MΩ	RB 6100	V 28	Op. Amp.			LM301	VE 0017
R 10	-	-	-	33 kΩ	RB 4330	V 29-31	FET		N	U1899	VB 1064
R 11	-	-	-	1 MΩ	RB 6100	V 32	Dual D Flip-Flop			4013	VD 2006
R 12	-	-	-	100 kΩ	RB 5100	V 33	FET		N	U1899	VB 1065
R 13,14	Metal	-	1%	49,9 kΩ	RF 4499	V 34	Op. Amp.			LM308	VE 0046
R 15	Carbon	-	5%	10 kΩ	RB 4100	V 35	Op. Amp.			LM301	VE 0017
R 16	Metal	-	1%	7,15 kΩ	RF 3715	V 37	Op. Amp.			LM308	VE 0046
R 17	Carbon	-	5%	22 kΩ	RB 4220	V 38	FET		N	U1899	VB 1064
R 18	-	-	-	1 MΩ	RB 6100						
R 19	Metal	-	1%	7,15 kΩ	RF 3715						
R 20	Carbon	-	5%	2,2 kΩ	RB 3220						
R 21-23	-	-	-	470 kΩ	RB 5470		Printed Circuit Board				XC 1377
R 24-42	-	-	-	47 kΩ	RB 4470		One-pole Plug				JJ 0060
R 43	-	-	-	10 kΩ	RB 4100		8-pin Socket				JJ 0804
R 44	-	-	-	1,5 kΩ	RB 3150		14-pin Socket				JJ 1408
R 45,46	-	-	-	47 kΩ	RB 4470		One-pole Sokcet				JJ 0059
R 47	Metal	-	1%	40,2 kΩ	RF 4402						
R 48	-	-	-	38,3 kΩ	RF 4383						
R 49,50	-	-	-	249 kΩ	RF 5249						
R 51	Carbon	-	5%	220 kΩ	RB 5220						
R 52	-	-	-	330 kΩ	RB 5330						
R 53	-	-	-	5,6 kΩ	RB 3560						
R 54	-	-	-	1,8 MΩ	RB 6180						
R 55	-	-	-	100 kΩ	RB 5100						
R 56	Metal	-	1%	1 MΩ	RF 6100						
R 57	-	-	-	100 kΩ	RF 5100						
R 58,59	-	-	-	49,9 kΩ	RF 4499						
R 61,62	Carbon	-	5%	22 kΩ	RB 4220						
R 63	-	-	-	10 MΩ	RB 7100						
R 64	-	-	-	22 kΩ	RB 4220						
R 65,66	Metal	-	1%	49,9 kΩ	RF 4499						

Components which are not included in ZG 0132 can be found on page 6—2

Circuit and Layout Diagram with Parts List

ZT 0052

Active Filter



Viewed from the printed circuit side

CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.	CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.
C 1	Ceramic	120 pF/400 V CK 2122	R 1	Metal	1/4 W 1% 4,99 kΩ RF 3499
C 2	-	3,9 pF/400 V CK 0390	R 2-4	-	10 kΩ RF 4100
C 3	-	120 pF/400 V CK 2122	R 5	-	86,6 kΩ RF 4866
C 4	-	3,9 pF/400 V CK 0390	R 6,7	-	261 kΩ RF 5261
C 14	Polystyrene	1% 1 μF/ 30 V CT 1606	R 8,9	-	10 kΩ RF 4100
C 15	-	100 nF/ 63 V CT 1543	R 19	-	40,2 Ω RF 1402
C 16	-	10 nF/ 63 V CT 1545	R 29	-	40,2 Ω RF 1402
C 19	-	620 pF/125 V CT 1109	R 30-32	-	10 kΩ RF 4100
C 20-22	Ceramic	12 pF/400 V CK 1120	R 33	-	86,6 kΩ RF 4866
C 32	Polystyrene	1% 1 μF/ 30 V CT 1606	R 34,35	-	261 kΩ RF 5261
C 33	-	100 nF/ 63 V CT 1543	R 36,37	-	10 kΩ RF 4100
C 34	-	10 nF/ 63 V CT 1545	R 47	-	40,2 Ω RF 1402
C 36	-	620 pF/125 V CT 1109	R 57	-	40,2 Ω RF 1402
C 38-40	Ceramic	12 pF/400 V CK 1120	R 58,59	-	10 kΩ RF 4100
C 41	-	120 pF/400 V CK 2122	R 60-71	Carbon	5% 10 MΩ RB 7100
C 42,43	-	3,9 pF/400 V CK 0390			
C 44	-	120 pF/400 V CK 2122			
C 55	Polystyrene	1% 1 μF/ 30 V CT 1606	V 1	Op. Amp.	LM301AN VE 0017
C 56	-	100 nF/ 63 V CT 1543	V 2,3	FET N	sel. U1897 VB 1080
C 57	-	10 nF/ 63 V CT 1545	V 4	Op. Amp.	LM301AN VE 0017
C 58	-	620 pF/125 V CT 1109	V 14-16	FET N	2N5433 VB 1075
C 60-62	Ceramic	12 pF/400 V CK 1120	V 17	Amp.	LF355 VE 0107
C 73	Polystyrene	1% 1 μF/ 30 V CT 1606	V 27-29	FET N	2N5433 VB 1075
C 74	-	100 nF/ 63 V CT 1543	V 30	Amp.	LF355 VE 0107
C 75	-	10 nF/ 63 V CT 1545	V 31	Op. Amp.	LM301AN VE 0017
C 76	-	620 pF/ 12 V CT 1109	V 32,33	FET N	sel. U1897 VB 1080
C 78-80	Ceramic	12 pF/400 V CK 1120	V 34	Op. Amp.	LM301AN VE 0017
C 81	-	120 pF/400 V CK 2122	V 44-46	FET N	2N5433 VB 1075
C 82	-	3,9 pF/400 V CK 0390	V 47	Amp.	LF355 VE 0107
C 83,84	Tantalum	4,7 μF/ 35 V CF 0009	V 57-59	FET N	2N5433 VB 1075
C 85-88	Polystyrene	1% 470 pF/125 V CT 1111	V 60	Amp.	LF355 VE 0107
C 89,90	Tantalum	4,7 μF/ 35 V CF 0009	V 61	Op. Amp.	LM301AN VE 0017
C 91,92	Ceramic	1,5 pF/400 V CK 0150	V 62-65	Thick film circuit	ZE 0246
J 1	17-pin socket	JJ 1701		Printed Circuit Board	XC 1380
Q 1,2	Si.	BAX16	QV 0217	One-pole Plug	JJ 0060
Q 12-14	-	-	QV 0217	One-pole Socket	JJ 0059
Q 24-28	-	-	QV 0217	8-pin Socket for dual-in-line	JJ 0804
Q 38-40	-	-	QV 0217	8-pin Socket	JJ 0805
Q 50-52	-	-	QV 0217	Metal Screen	GV 1477

