Brüel & Kjær

Measuring Amplifier
Type 2636

Valid from serial no. 1232626

037-0389

Service

Measuring Amplifier
Type 2636

Valid from serial no. 1232626

037-0389

Spare Parts

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

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.

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.

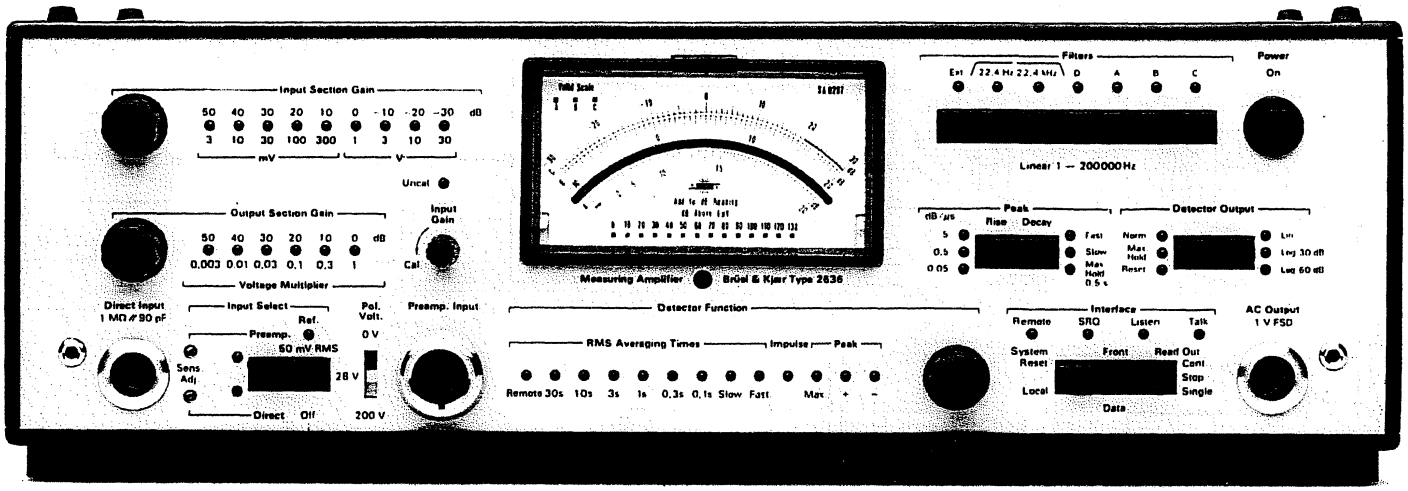
The subsection in the Service Instruction will normally consist of a Block Diagram, a Technical Description, an Adjustment Procedure and a Simplified Diagram where the test points are identified.

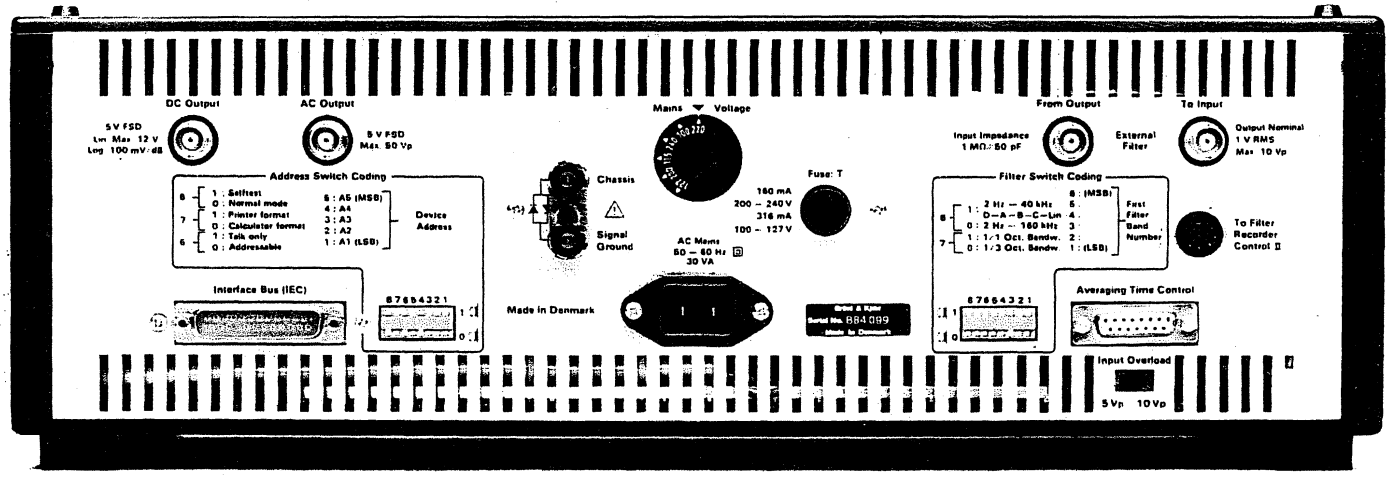
Before correcting any apparent deviation make sure that the measuring instrument has tolerances small enough not to affect the measurement.

When a fault has been traced and corrected, the voltages and adjustments 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.

Consisting of:


Input Section Gain
Output Section Gain
Voltage Multiplier
Input Select
Direct Input
Preamp. Input
Measuring Amplifier
Brüel & Kjær Type 2636
Detector Function
RMS Averaging Times
Filters
Power
On
Linear 1 — 200000 Hz
Peak
Detector Output
Interface
AC Output
1 V FSD
Data


DC Output
AC Output
Mains Voltage
From Output
To Input
Address Switch Coding
Chassis
Signal Ground
Fuse: T
AC Mains
Interface Bus (IEC)
Made in Denmark
Filter Switch Coding
To Filter Recorder Control
Averaging Time Control
Input Overload

1.1. Function Check

Sensitivity

INPUT SECTION GAIN: "100 mV"
OUTPUT SECTION GAIN: "x 1"
INPUT GAIN: "Cal"
INPUT SELECT: "Direct", "Off"
DETECTOR FUNCTION: "Fast"
DETECTOR OUTPUT: "Lin", "Norm"
FILTERS: "Linear 1—200000 Hz"
AC POWER: "On"
Meter Scale: "SA 0259"

ADDRESS SWITCH CODING 8:"0"
(located on the rear panel)

Input signal to "Direct Input": 50 mV, 1000 Hz
Check: Meter indicates 50 mV
If not, adjust "Direct Sens Adj."

INPUT SELECT to "Direct", "50 mV RMS"

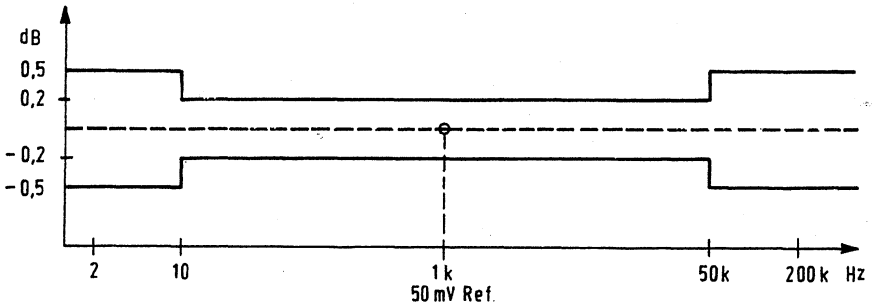
Check: Meter indicates 50 mV
"Input Select Ref" LED is on

In case of malfunction consult Section 2636-3.1

INPUT SELECT to "Direct" "Off"

Input signal to "Direct Input": 100 mV, 1000 Hz
Check as follows:

Meter reading is 100 mV ~ FSD
Output voltage on "AC Output 1 V FSD": 1000 mV ± 40 mV AC
- "AC Output 5 V FSD": 5000 mV ± 200 mV AC
- "DC Output 5 V FSD": 5000 mV ± 100 mV DC
(located on the rear panel)



Frequency Response

Change Input voltage to 50 mV
Check the frequency response according to above scheme

Self Test

Activate INTERFACE READ OUT "Single"

ADDRESS SWITCH CODING 8 to "1" and 6 to "1"
INPUT SELECT: "Direct", "50 mV RMS"

Check: "Interface Remote" LED is flashing, and after 10 sec it will light permanently, indicating the test is started

When test is completed after approx 3 min, the "Interface Remote" LED will go off

In case of malfunction consult the scheme below

1.2. Error Code Identification

LED and Meter indication	Fault Character	Delay Sec	Tolerances dB	If necessary consult item:
1 Front Panel Controls: Change REMOTE/LOCAL. If no knob change has been done the last 10 sec, the analog test will start				
2 Calibration: Ref: On, A Filter, RMS 0,1 s, Normal, Log 60 dB, 100 mV, 1 Level = 94,0 dB	UNCAL	10	0.2	Function Check 2636-1.1

continued

Function	Fault Character	Delay Sec	Tolerances dB	If necessary consult item:
3 Amplifier Liniarity:				
Ref: On, A Filter, RMS 0,1 s; Normal, Log 60 dB, Level = 94,0 dB				Input/Output Amplifier
300 mV × 0,3	0	1	0.4	
1 V × 0.1	1	1	0.4	Section 2636 3
3 V × 0.03	2	1	0.4	
10 V × 0.01	3	1	0.4	
30 V × 0.003	4	1	0.4	
4 Detector Liniarity:				
Ref: On, A Filter, RMS 0,1 s, Normal, Log 60 dB, Level = 94.0 dB				Detector and Meter Circuit
10 V × 1	5	10	1.0	
3 V × 1	6	1	1.0	Section 2636 5
1 V × 1	7	1	0.6	
300 mV × 1	8	1	0.6	
100 mV × 1	9	1	0.6	
30 mV × 1	:	1	0.6	
10 mV × 1	;	1	0.6	
Level 90.0 dB (Overload)				
3 mV × 1	<	1	3.0	
Lin Level = 50 mV				
100 mV × 1	=	1	1.0	
300 mV × 1	>	1	1.0	
1 V × 1	?	1	1.0	
5 Detector Function:				
Ref: On, A Filter, Normal, 30 mV × 1, Log 60 dB, Level = 97.0 dB				Detector and Meter Circuit
				Section 2636:5
Peak	@	1	0.5	
- Peak	A	1	0.5	
Max Peak	B	1	0.5	
Ref Off, Level = 71,0 dB				Detector and Meter Circuit
Fast Peak Decay	C	0.6	7.0	
Ref On/Off, Slow Peak Decay	D	6	7.0	Section 2636 5
Ref On, Level = 40,0 dB				Front Panel Control
Reset Detector Output	E	1	0.7	Section 2636:6
Ref Off, Normal, Level 97.0 dB				Front Panel Control
Max Hold 0.5 s (level)	F	0.3	0.7	
Level = 40,0 dB (reset)	G	0.75	0.7	Section 2636:6
Ref On/Off, Level 97,0 dB				Detector and Meter Control
Max Hold Detector Output	H	4	0.5	Section 2636 5

continued

Function	Fault Character	Delay Sec	Tolerances dB	If necessary consult item:
Ref On Level = 94.0 dB				
Impulse	I	4	0.5	Detector and Meter circuit
Ref Off, Level = 68,0 dB	J	9	7.0	
Ref On/Off, RMS Fast	K	0,75	7.0	Section 2636 5
Ref. On/Off, RMS Slow	L	6	7.0	
Ref On/Off, RMS 0,1 s	M	0,3	7.0	
Ref On/Off, RMS 0,3 s	N	0,9	7.0	
Ref On/Off, RMS 1 s	O	3	7.0	
Ref On/Off, RMS 3 s	P	9	7,0	
Ref On/Off, RMS 10 s, Level = 85,3 dB	Q	10	2.5	
Ref On/Off RMS 30 s	R	30	2.5	
6 Filters:				
Ref On, 30 mV × 1, RMS 0,1 s, Normal Log 60 dB, Level 94.0 dB				Filters
C-filter	S	1	0.5	
B-filter	T	0.5	0.5	Section 2636 4
D-filter	U	0.5	0.5	
LF-filter	V	0.5	0.5	
HP-filter	W	0.5	0.5	
All filters off	X	0.5	0.5	
7 Noise:				
Ref Off, 3 mV × 0,003, RMS 0.1 s, Normal, Log 60 dB, Level - 4.0 dB				
Input short circuit to ground (internal)				Filters
A-filter	Y	6	9.9	
C-filter	Z	2	9.9	Section 2636 4
B-filter		2	9.9	
D-filter, Level 2.0 dB		2	9.9	
HP- and LP-filter, Level —4.0 dB	]	9	9.9	
HP-filter, Level 6.5 dB	Λ	3	9.9	
All filters off	—	3	9.9	Input/Output Amplifier Section 2636:3

Self test Description

The Type 2636 contents a built-in self test program which make it possible to check the instrument functions automatically If a Type 2312 is connected to the 2636 the 2312 automatically write, if a fault should occur in the instrument

The self test is activated by setting the DEVICE ADDRESS switch bit 8 to "1" and 2636 is set to Talker function
The self test can be interrupted by pushing the INTERFACE switch to "Local

The self test program contents the following steps:

1. Front Panel Controls

Push INTERFACE "Single"
Now the "Remote" LED starts flashing As long as the "Remote" LED is flashing the knobs at the Front Panel can be checked to see if the function can be set and read by the CPU When none of the Front Panel controls have been touched for 10 s the self test continues to step 2.

2. Calibration

The analog test is carried out by using the internal Ref Generator as reference for all the measurements This means that the Direct "Sens Adj" and the "Input Gain" potentiometers influence the measurements Therefore the 2636 first checks if the calibration is correct If not the "Direct" and SRQ LED's are flashing The 2312 will write for inst.:

UNCAL
094 4 (measured value)
094 0 (correct value)

After this information the self test will be interrupted

The calibration can be done as follows:

REF : "50 mV RMS"
INPUT SECTION GAIN: "100 mV"
INPUT GAIN: "Calibrated"
OUTPUT SECTION GAIN: "x1"
INPUT: "Direct"
DETECTOR FUNCTION: "RMS 0.1 s
FILTERS: "A"
DETECTOR OUTPUT: "Normal", "Lin"

Adjust "Sens Adj" to 50 mV Meterdeflection (94 dB re 1 µV) Tolerances ± 0.2 dB

Notice, that "Preamp Sens Adj" is not used in the self test and that the test is carried out in the Log 60 dB Mode

3. Amplifier Linearity

Input and Output Section Gain is changed in —10 dB and + 10 dB steps respectively Therefore the Output Level will be constant and only the Amplifier Linearity will be checked

continued

4. Detector Linearity

Test of the Detector Linearity is done by changing the Input Section Gain in 10 dB steps over the hole Dynamic Range both in Logarithmic and Linear Mode

5 Detector Function

The Detector Function test starts with test of the Peak
First the test of the —Peak + Peak and Max Peak and then the test of the Fast and Slow Decay in Max Peak The Decay Time test is made by switching the Ref voltage on and off and measure the value after a certain time
Then a test of the Detector Reset With Reference on, the Detector is reset once
Then a test of the Max Hold 0.5 s This is done by switching the Reference on and off and see if the value is constant for 0.5 s Finally a test of the Max Hold

The Impulse is tested as follows:

First a measurement of the value and then a test of the Decay Time

The last Detector Function check is a check of the RMS Time Constants, which are checked in the same way as in Peak

6 Filters

By using the built in Reference Generator as reference all the Filters can be checked at 1 kHz The Filter Curves are not checked. but the following Noise Check will give a good indication if the curves are correct (If necessary consult Filter, 2636 4)

7. Noise

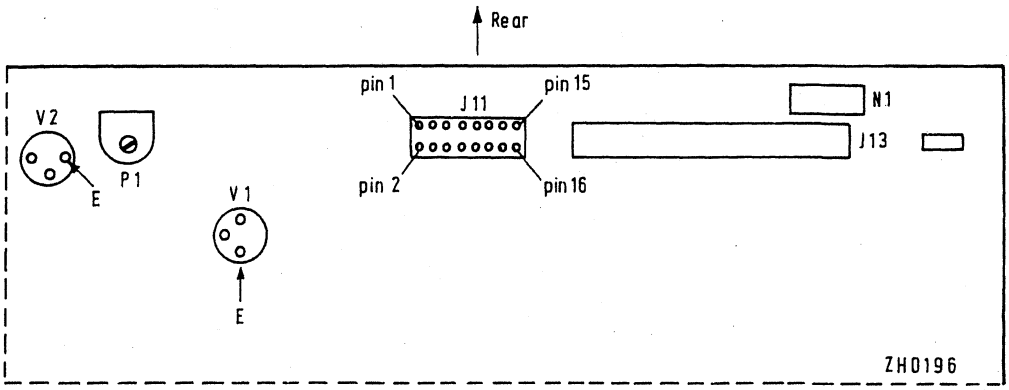
The Noise check is done in all the filters and without the filters The check is possible because both the Inputs can be connected to ground, at the same time. internally The noise value is checked within a certain range in order to find as many fault as possible

Notice If the top cover is removed from the 2636, an error message may be printed by the 2312 because of the increased noise level

After the Noise check the 2636 switches back to Local Mode or to that Remote position which where present before the self test

General

To ensure that fault is not produced by outside signals all connection to the instrument should be removed before a self test takes place (Except the Interface cable and the Mains cable)



Viewed from the printed side

Check the following voltages on the Mother Board ZH 0196:

Emitter V2: + 200 V ± 0.2 V DC (Pol voltage)
If necessary adjust P1

Emitter V1: + 146 V to + 154 V (Unloaded)

J11 pin 4: + 55 V to + 65 V (Unregulated)

J11 pin 6: —55 V to —65 V (Unregulated)

J11 pin 12: + 17.9 V to + 19.3 V

J11 pin 16: —17.9 V to + 19.3 V

J11 pin 14: + 5.75 V to + 6.25 V

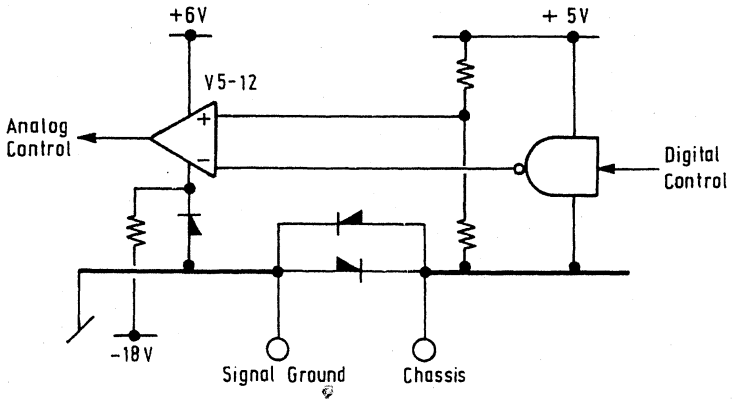
J11 pin 13: + 4.80 V to + 5.20 V

J11 pin 5: + 11.5 V to + 12.5 V (Unloaded)

Print ZL 0066 pin 22: + 14.25 V to + 1575 V

Print ZL 0066 pin 23: —14.25 V to —15.75 V

Notice! Circuit Diagram can be found at the Interconnection Diagram 2636 9



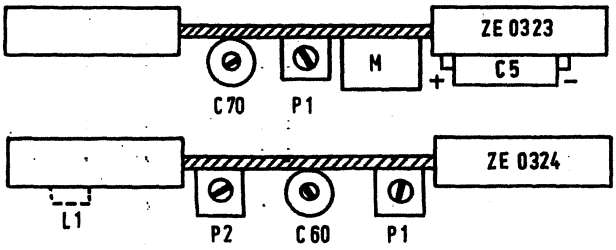
Remarks

Digital ground is always connected to chassis

The Analog Circuits are controlled via isolating components, which make the Analog ground floating corresponding to chassis.

This is done in order to avoid Hum in big installations. Notice that the Analog Circuits are al-

3.1. Adjustment



Off-set

Measure the voltage at the negative side of C5 on ZE 0323: ± 10 mV.
If necessary adjust P1.

INPUT SECTION GAIN: "30 mV"
OUTPUT SECTION GAIN: "x 0,1"
INPUT SELECT: "Direct, "Off"
INPUT GAIN: "Cal."
FILTERS: "Ext:"
DETECTOR FUNCTION: "Fast"
DETECTOR OUTPUT: "Norm.", "Lin"
Meter Scale: "SA 0259"
Rear: INPUT OVERLOAD: "10 Vp"

Measure the voltage at the negative side of C4 on ZE 0324: ± 10 mV.
If necessary adjust P2.

Frequency Response, Output Section

Input signal to "External Filter, From Output" 1 kHz.
Adjust the input voltage to 1000 mV on "AC Output 1 V FSD"

INPUT SECTION GAIN to "100 mV"
OUTPUT SECTION GAIN to "x 1"

Change the input frequency to 1 Hz.

Check the voltage on "AC Output 1 V FSD": 1000 mV ± 0,5 dB.

Change the input frequency to 200 kHz.

Check the voltage on "AC Output 1 V FSD": 1000 mV + 0,8—0 dB
If necessary adjust L1 on ZE 0324

OUTPUT SECTION GAIN to "x0.1"

Reduce the input voltage by 20 dB
Check 1000 mV + 0,8—0 dB
If necessary adjust C60.

Frequency Response, Input Section

Input signal to "Direct Input" 1 kHz.
Adjust the input voltage to 1000 mV on "AC Output 1 V FSD".

INPUT SECTION GAIN to "1 V"
FILTERS to 'Linear 1 Hz — 200000 Hz"

Change the input frequency to 50 kHz.

Check the voltage on "AC Output 1 V FSD": 1000 mV ± 0,5 dB.
If necessary adjust C70 on ZE 0323.

Overload

Input signal to "Direct Input" 1 kHz.
Adjust the input voltage to 7,42 V on "External Filter, To Input".

FILTERS to "Ext."

Check that the 1 V LED is flashing within ± 0,5 dB

Change the input frequency to 200 kHz.

Check that the 1 V LED is flashing within ± 1 dB.

FILTERS to "Linear 1 Hz — 200000 Hz"
OUTPUT GAIN to "x0.3"

Input signal to "Direct Input" 1 kHz.
Adjust the input voltage to 7,42 V on "AC Output 1 V FSD".

Check that the x0.3 LED is flashing within ± 0,5 dB.
Change input frequency to 200 kHz
Check that the x0.3 LED is flashing within ± 1 dB

Reference Oscillator

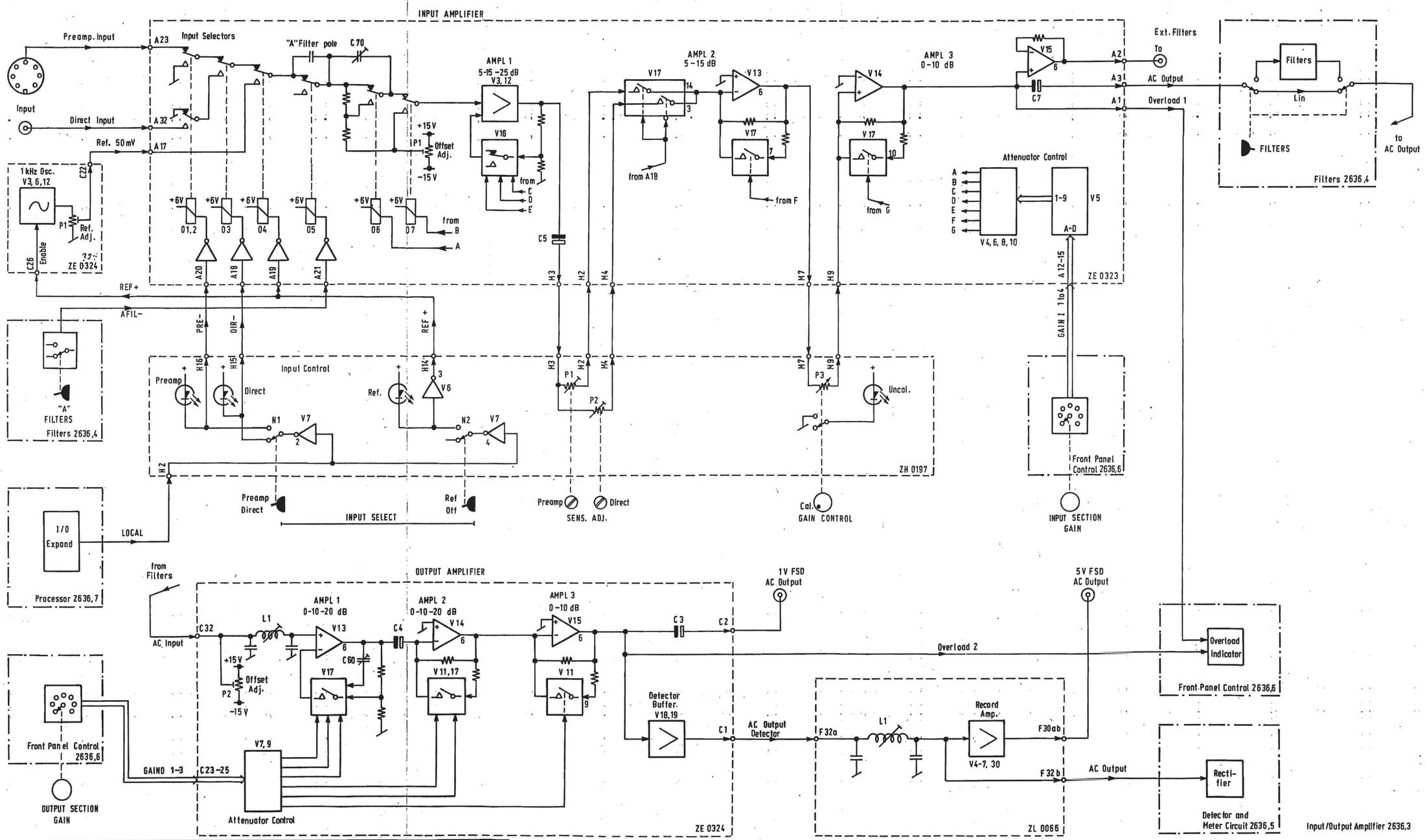
Input signal to "Direct Input" exactly: 100 mV. 1 kHz

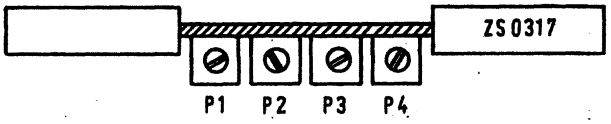
INPUT SECTION GAIN to "100 mV"

Check that the meter deflect to full scale.
If necessary adjust "Direct Sens. Adj.".

INPUT SELECTOR to "Direct", "50 mV Ref."

Check that the meter deflect to 50 mV.
If necessary adjust P1 on ZE 0324.


INPUT AMPLIFIER
Preamp. Input
Input
Direct Input
Ref. 50mV
Input Selectors
"A" Filter pole
AMPL 1
5-15-25 dB
V3, 12
V16
AMPL 2
5-15 dB
V17
V13
AMPL 3
0-10 dB
V14
V15
Ext. Filters
To
AC Output
Overload 1
Filters
Lin
FILTERS
to AC Output
Filters 2636,4
Offset Adj.
+15V
-15V
P1
1 kHz Osc.
V3, 6, 12
Ref. Adj.
ZE 0324
Enable
+6V
O1,2
O3
O4
O5
O6
O7
from A
from B
from C
D
E
from F
from G
from A18
Attenuator Control
V4, 6, 8, 10
V5
1-9
A-D
A12-15
GAIN I 1 to 4
ZE 0323
REF+
AFIL-
PRE-
DIR-
REF+
Input Control
Preamp
Direct
Ref.
V6
N1
N2
V7
ZH 0197
"A" FILTERS
Filters 2636,4
Front Panel Control 2636,6
INPUT SECTION GAIN
Preamp Direct
Ref Off
INPUT SELECT
Preamp
Direct
SENS. ADJ.
Cal.
GAIN CONTROL
Uncal.
I/O Expand
LOCAL
Processor 2636,7
OUTPUT AMPLIFIER
from Filters
AC Input
AMPL 1
0-10-20 dB
AMPL 2
0-10-20 dB
AMPL 3
0-10 dB
V11,17
V11
V7, 9
GAIN 0 1-3
C23-25
Attenuator Control
Front Panel Control 2636,6
OUTPUT SECTION GAIN
1V FSD AC Output
5V FSD AC Output
Overload 2
Overload Indicator
Front Panel Control 2636,6
Detector Buffer
V18,19
AC Output Detector
Record Amp.
V4-7, 30
F32a
F30ab
F32b
AC Output
Rectifier
Detector and Meter Circuit 2636,5
ZE 0324
ZL 0066
Input/Output Amplifier 2636,3



4.1. Adjustments

INPUT SECTION GAIN: "100 mV"
OUTPUT SECTION GAIN: "x1"
INPUT SELECT: "Direct", "Off"
INPUT GAIN: "Cal."
FILTERS: "Linear 1 Hz — 200000 Hz"
DETECTOR FUNCTION: "Fast"
DETECTOR OUTPUT: "Norm.", "Lin"
Meter Scale: "SA 0259"

Input signal to "Direct Input" 100 mV, 1 kHz.

Switch FILTERS to "D".
Deflection on the meter: 100 mV ± 0,05 dB
If necessary adjust P1 (ZS 0317) (A, B, C and D adj.)

Release "D" and switch "A" on.
Deflection: 100 mV ± 0,05 dB.
If necessary adjust P2 (ZS 0317).)

Release "A" and switch "B" on.
Deflection: 100 mV ± 0,05 dB.
If necessary adjust P3 (ZS 0317.)

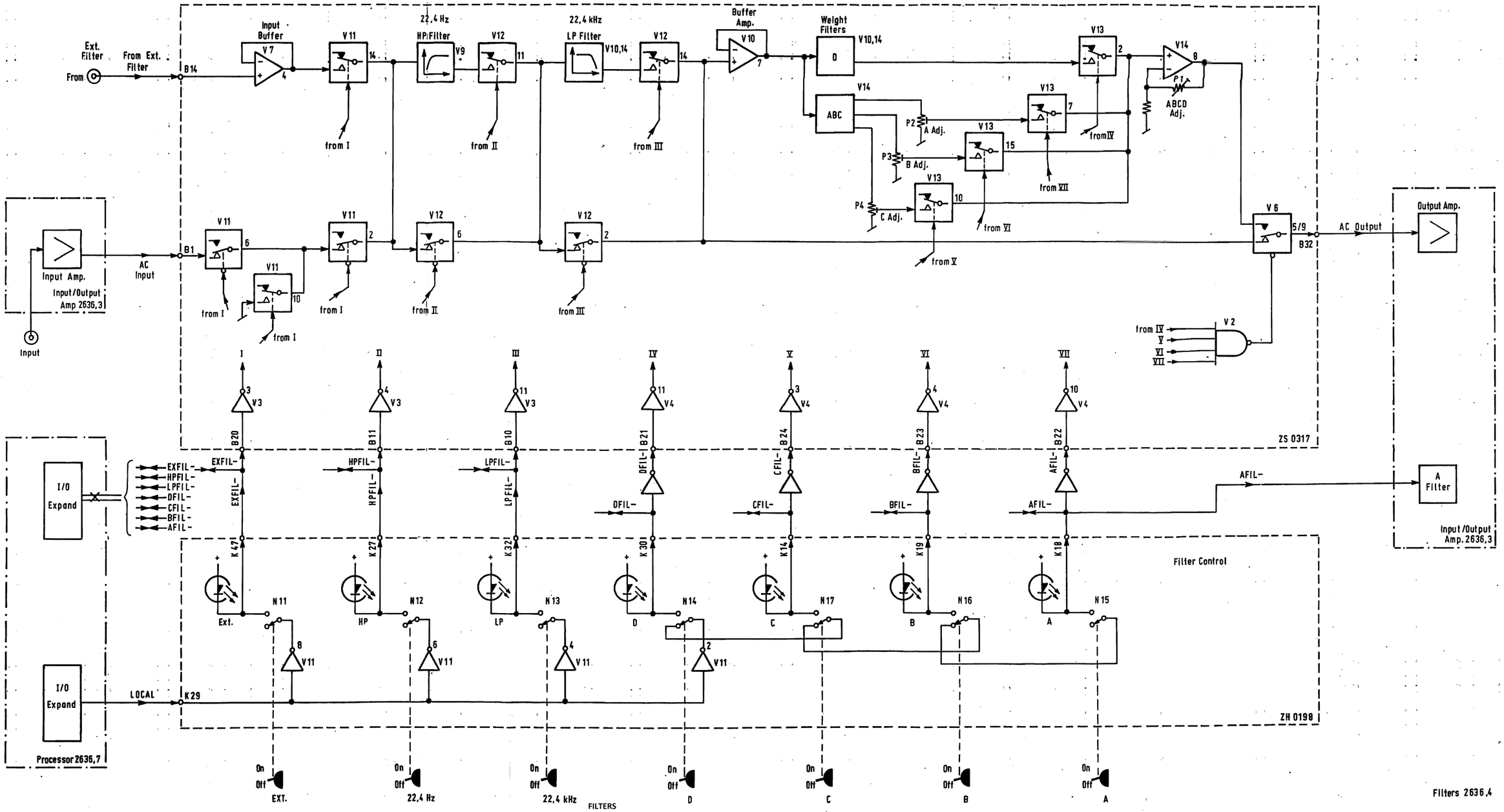
Release "B" and switch "C" on.
Deflection: 100 mV ± 0,05 dB.
If necessary adjust P4 (ZS 0317.)
Release "C".

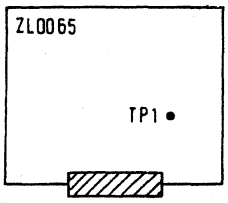
Check the Filter curves according to below scheme:

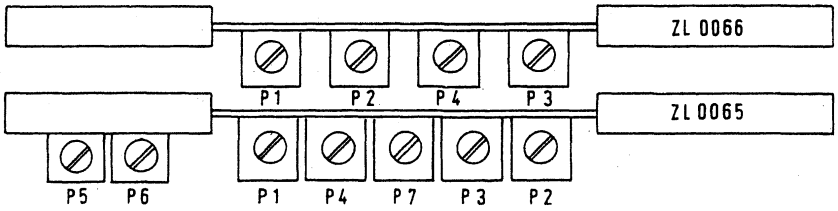
Input Frequency	FILTERS 22,4 Hz	22,4 kHz	D	A	B	C
10 Hz	—43,3 ± 5		—27,3 ± 1,5	—70,6 ± 1	—38,6 ± 1	—14,7 ± 1
20 Hz	—8,1 ± 2		—20,9 ± 1	—50,4 ± 1	—24,2 ± 1	—6,2 ± 1
200 Hz	0		—2,7 ± 0,5	—10,8 ± 0,3	—2,1 ± 0,3	0 ± 0,3
1 kHz	0	0	0	0	0	0
2 kHz	0		+ 7,9 ± 0,5	+ 1,2 ± 0,3	—0,1 ± 0,3	0,2 ± 0,3
10 kHz	0		+ 3,3 ± 0,5	—2,4 ± 1	—4,3 ± 1	—4,4 ± 1
20 kHz	0	—0,4 ± 0,2	—3,1 ± 1	9,4 ± 1	—11,3 ± 1	—11,4 ± 1
200 kHz	0	> 60	—26,6 ± 5	—56,8 ± 5	—64,8 ± 5	—68,0 ± 5

Ref.

dB attenuation


Ext. Filter
From
From Ext. Filter
B14
Input Buffer
V7
V11
22,4 Hz
HP Filter
V9
V12
22,4 kHz
LP Filter
V10,14
V12
Buffer Amp.
V10
Weight Filters
D
V10,14
ABC
V14
V13
V14
P1
ABCD Adj.
P2
A Adj.
P3
B Adj.
P4
C Adj.
from I
from II
from III
from IV
from V
from VI
from VII
Input Amp.
Input/Output Amp 2636,3
AC Input
Input
B1
V11
V12
V6
5/9
B32
AC Output
Output Amp.
V2
from IV
V
VI
VIII
I
II
III
IV
V
VI
VII
V3
V4
B20
B11
B10
B21
B24
B23
B22
ZS 0317
I/O Expand
EXFIL-
HPFIL-
LPFIL-
DFIL-
CFIL-
BFIL-
AFIL-
K 47
K 27
K 32
K 30
K 14
K 19
K 18
Filter Control
N11
N12
N13
N14
N17
N16
N15
Ext.
HP
LP
D
C
B
A
V11
LOCAL
K29
I/O Expand
Processor 2636,7
ZH 0198
A Filter
Input/Output Amp. 2636,3
On
Off
EXT.
22,4 Hz
22,4 kHz
D
C
B
A
FILTERS
Filters 2636,4





5.1. Adjustment Procedure

Rectifier

INPUT SECTION GAIN: "100 mV"
OUTPUT SECTION GAIN: "x1"
INPUT SELECT: "Direct", "Off"
INPUT GAIN: "Cal "
FILTERS: "Linear 1 Hz — 200000 Hz"
DETECTOR FUNCTION: "Fast"
DETECTOR OUTPUT: "Norm ", "Log 30 dB"
PEAK RISE: "5 μs/dB"
PEAK DECAY: "Fast"
Meter Scale: "SA 0259"

Input signal to "Direct Input" 1000 mV, 1 kHz

Decrease the input voltage by 30 dB
Note the "DC Output" voltage
Decrease the input voltage by 10 dB
Note the "DC Output" voltage
Note the difference between the two voltages = A

Decrease the input voltage by 20 dB
Note the "DC Output" voltage
Decrease the input voltage by 10 dB
Note the "DC Output" voltage
Note the difference between the two voltages = B

Adjust P7 on ZL 0065 to A = B ± 5 mV or less

Connect an oscilloscope to TP1 on ZL 0065 and check that the top of the curves are within ± 2 mV.
If necessary adjust P3 and repeat the above adjustment.

Input voltage to 1000 mV

Decrease the input voltage by 10 dB
Note the "DC Output" voltage
Decrease the input voltage by 10 dB
Note the "DC Output" voltage
Note the difference between the two voltages = C

Adjust P1 on ZL 0065 to A = C ± 5 mV or less

Input voltage to 1000 mV

Decrease the input voltage by 10 dB
Check the top of the curves to be within ± 1 mV on the oscilloscope
If necessary adjust P4 on ZL 0065
Repeat the adjustment of P1, P4 as they influence each others

Input voltage to 1000 mV

Check at "DC Output" that the steps from —10 to —70 dB of the input voltage are equal within ± 5 mV

DC Level (Log)

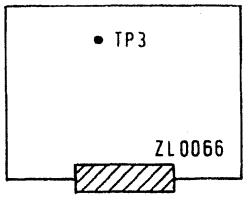
Input signal 1 kHz adjusted to exactly 1000 mV at "1 V AC Output" socket.

Decrease the input voltage by 50 dB
Check the voltage at "DC Output": 0 V ± 2 mV
If necessary adjust P2 (ZL 0065)

DC Gain (Log)

Input voltage 100 mV

Check the "DC Output" voltage: 5,000 mV ± 5 mV
If necessary adjust P3 (ZL 0066)



Meter Amplifier

Input signal to "Direct Input": 1 kHz
adjusted to 2000 mV ± 2 mV on "DC Output"

Check the voltage at TP3 (ZL 0066): 0 V ± 5 mV
If necessary adjust P2

Adjust the Meter to its mechanical zero

Input voltage to 100 mV RMS
Check FSD at the Meter
If necessary adjust P1 (ZL 0066)

Log/Lin Converter

Input voltage to 1000 mV ± 5 mV at "1 V AC Output"

DETECTOR OUTPUT to "Lin

Check the "DC Output" voltage: 5000 mV ± 5 mV
If necessary adjust P5 (ZL 0065)

Decrease the input voltage by 50 dB
"DC Output" voltage: 15.8 mV ± 0.1 mV
If necessary adjust P6 and repeat the adjustment of P5

Check the Linearity according to below scheme:

Input Voltage	DC Output Voltage	Tolerances
100 mV	5000 mV	± 10 mV
31.6 mV	1581 mV	± 10 mV
10 mV	500 mV	± 6 mV
3.16 mV	158 mV	± 2 mV
1 mV	50 mV	± 0,6 mV
0,31 mV	15.8 mV	± 0.2 mV

Peak Detector

Input voltage to 31,6 mV

DETECTOR FUNCTION to "Max Peak"
DETECTOR OUTPUT to "Log 30 dB"

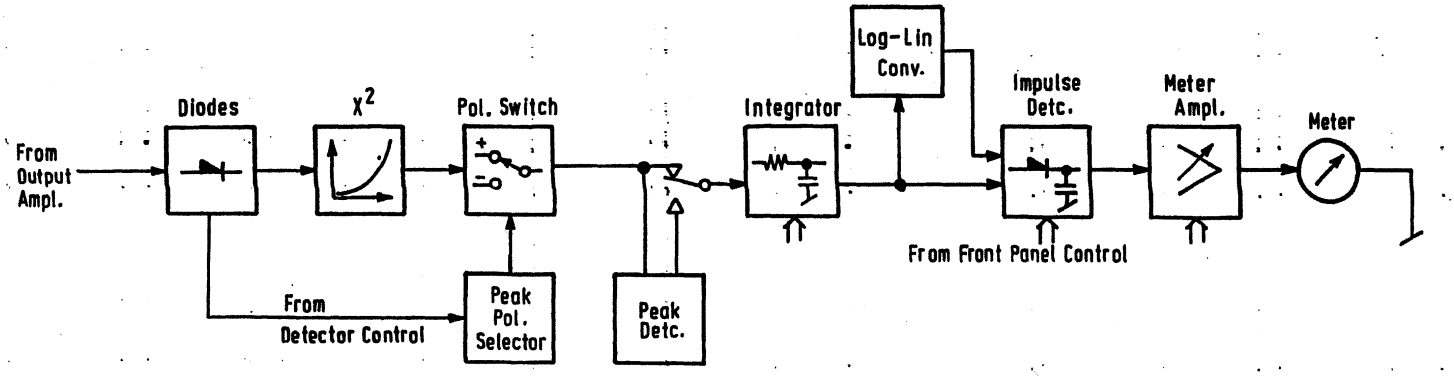
Check the "DC Output" voltage: 4301 mV ± 5 mV
If necessary adjust P4 on ZL 0066

DECTECTOR FUNCTION to "RMS Fast"

"DC Output" voltage: 4.000 mV ± 5 mV

Detector and Meter Circuit 2636.5

SIMPLIFIED DIAGRAM



		A	B
DETECTOR OUTPUT	Lin	high	low
	Log 30 dB	low	low
	Log 60 dB	low	high

		D	F	H	C
DETECTOR OUTPUT	Norm.	high	low	high	high/low
	Max. Hold	low	low	high	low
	Reset	(low) high	high	low	high/low

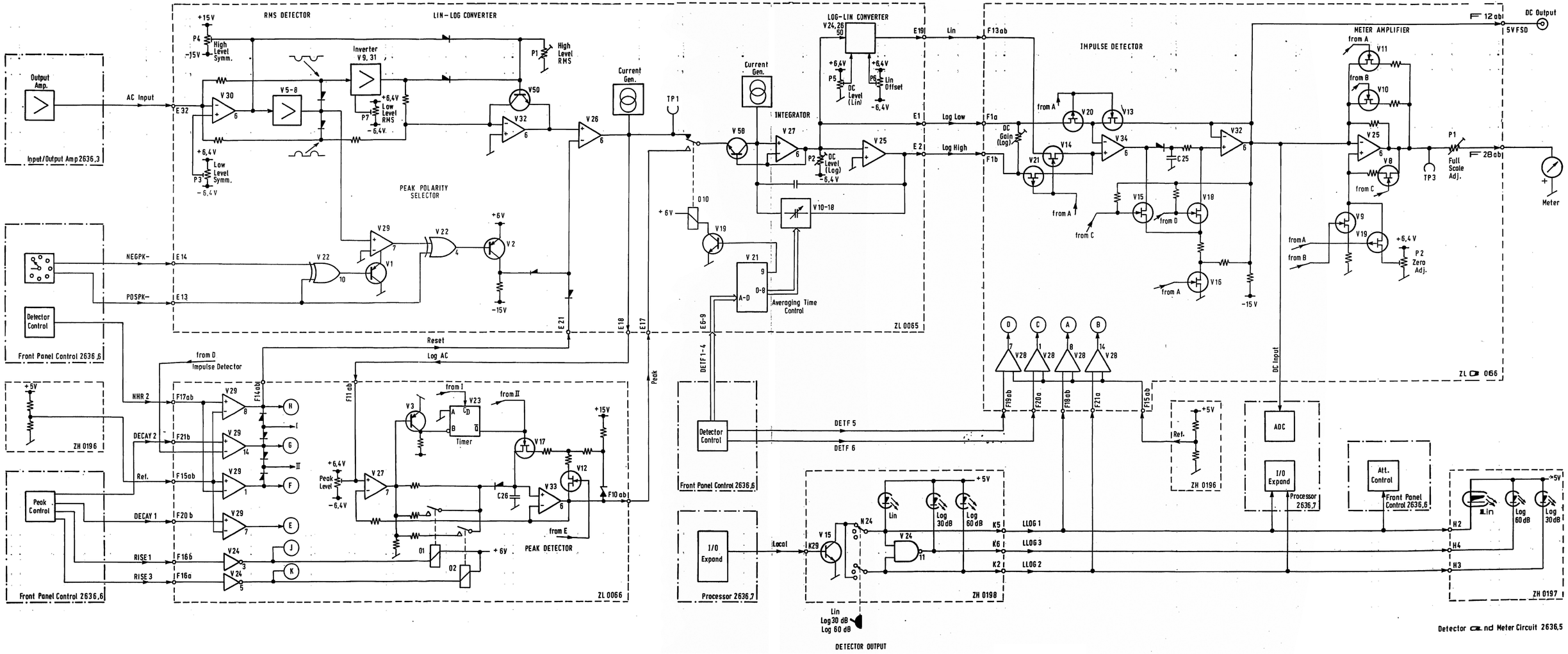
		E	G
PEAK DECAY	Fast	low	low
	Slow	high	low
	Max. Hold 0,5 s	high	high

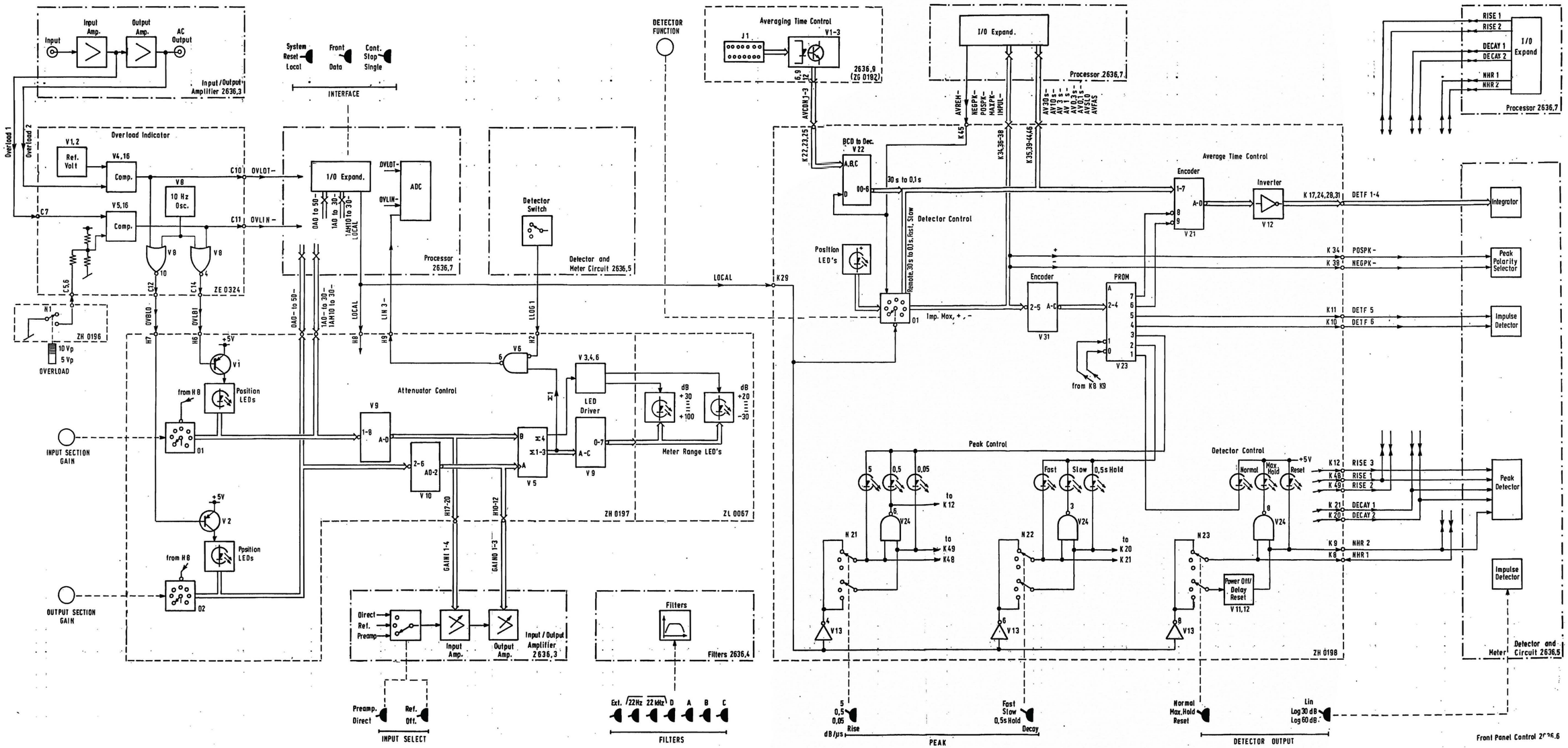
		J	K
PEAK RISE	5	0	1
	0,5	1	0
	0,05	1	1

		C
DETECTOR FUNCTION	Impulse	low
	all others	high

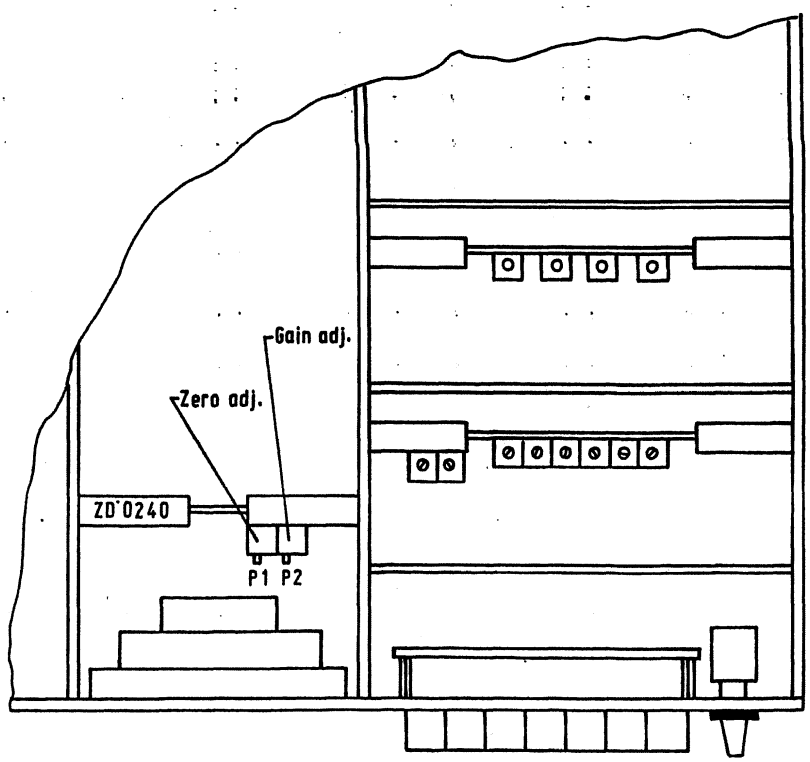
high = 15 V
low = —15 V
0 = 0 V
1 = 5 V

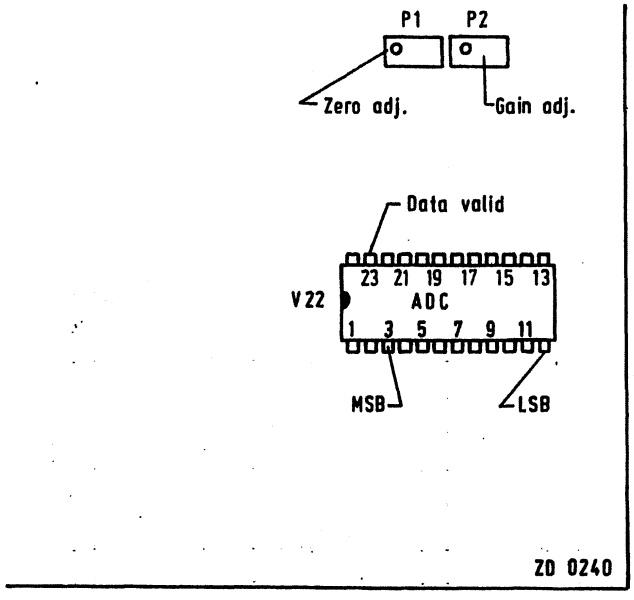
The letters above the tables refers to the incircled letters in the simplified diagram


RMS DETECTOR
LIN-LOG CONVERTER
LOG-LIN CONVERTER
IMPULSE DETECTOR
METER AMPLIFIER
INTEGRATOR
PEAK POLARITY SELECTOR
PEAK DETECTOR
Output Amp.
Input/Output Amp 2636,3
AC Input
High Level Symm.
Low Level Symm.
Inverter V 9, 31
High Level RMS
Low Level RMS
Current Gen.
DC Level (Lin)
Lin Offset
DC Level (Log)
DC Gain (Log)
Full Scale Adj.
Zero Adj.
Meter
DC Output
5 V FSD
Averaging Time Control
Reset
Log AC
Peak
Lin
Log Low
Log High
NEGPK-
POSPK-
NHR 2
DECAY 2
Ref.
DECAY 1
RISE 1
RISE 3
Timer
Peak Level
Detector Control
Front Panel Control 2636,6
Front Panel Control 2636,5
ZL 0065
ZL 0066
ZH 0196
ZH 0198
ZH 0197
Processor 2636,7
I/O Expand
ADC
Att. Control
Ref.
Local
DETF 5
DETF 6
DETF 1-4
DC Input
DETECTOR OUTPUT
Detector and Meter Circuit 2636,5


Input
Input Amp.
Output Amp.
AC Output
Input/Output Amplifier 2636,3
System Reset Local
Front Data
Cont. Stop Single
INTERFACE
DETECTOR FUNCTION
Averaging Time Control
J1
V1-3
2636,9 (ZG 0192)
I/O Expand.
Processor 2636,7
RISE 1
RISE 2
DECAY 1
DECAY 2
NHR 1
NHR 2
Overload 1
Overload 2
Overload Indicator
V1,2
Ref. Volt
V4,16
Comp.
V8
10 Hz Osc.
V5,16
C7
C10
OVLOT-
C11
OVLIN-
1/O Expand.
OVLOT-
OVLIN-
ADC
Processor 2636,7
Detector Switch
Detector and Meter Circuit 2636,5
C5,6
C12
C14
ZE 0324
N1
ZH 0196
10 Vp
5 Vp
OVERLOAD
OVBLO
OVBLI
OAD to 50-
1AD to 30-
1AH10 to 30-
LOCAL
LIN 3-
LLOG 1
H7
H6
H8
H9
H2
+5V
V1
V6
V 3,4,6
from H 8
Position LEDs
Attenuator Control
V9
LED Driver
dB +30 +100
dB +20 -30
Meter Range LED's
INPUT SECTION GAIN
D1
1-8
A-D
2-6
A0-2
V 10
B
A
Σ4
Σ1-3
V 5
0-7
A-C
V 9
ZH 0197
ZL 0067
+5V
V 2
Position LEDs
from H 8
OUTPUT SECTION GAIN
D2
H17-20
H10-12
GAINI 1-4
GAINO 1-3
Direct
Ref.
Preamp
Input Amp.
Output Amp.
Input / Output Amplifier 2636,3
Filters
Filters 2636,4
Preamp. Direct
Ref. Off.
INPUT SELECT
Ext.
22Hz
22 kHz
D
A
B
C
FILTERS
LOCAL
K29
AVCONJ-3
K22,23,25
BCD to Dec.
V 22
A,B,C
D
00-6
30 s to 0,1 s
Position LED's
Remote, 30s to 0,1s, Fast, Slow
Detector Control
D1
Imp. Max, +, -
AVREN-
NEGPK-
POSPK-
HALPK-
IMPOL-
K45
K34,36-38
K35,39-44,46
AV30s-
AV10s-
AV 3 s-
AV 1 s-
AV0,3 s-
AV0,1 s
AVSLO
AVFAS
Encoder
1-7
A-D
8
9
V 21
Inverter
V 12
K 17,24,28,31
DETF 1-4
Integrator
K 34
POSPK-
K 38
NEGPK-
Peak Polarity Selector
Encoder
2-5
A-D
V 31
PROM
A
2-4
V 23
from K8 K9
K11
DETF 5
K10
DETF 6
Impulse Detector
Peak Control
5
0,5
0,05
to K 12
V24
N 21
to K49
K48
V13
Fast
Slow
0,5s Hold
3
V24
N 22
to K 20
K 21
V13
Detector Control
Normal
Max. Hold
Reset
+5V
8
V24
N 23
Power Off/ Delay Reset
V 11,12
V13
K12
RISE 3
K 48
RISE 1
K 49
RISE 2
K 21
DECAY 1
K 20
DECAY 2
K9
NHR 2
K8
NHR 1
Peak Detector
Impulse Detector
ZH 0198
Detector and Meter Circuit 2636,5
5
0,5
0,05
dB/µs
Rise
Fast
Slow
0,5s Hold
Decay
PEAK
Normal
Max.Hold
Reset
Lin
Log 30 dB
Log 60 dB
DETECTOR OUTPUT
Front Panel Control 2636.6

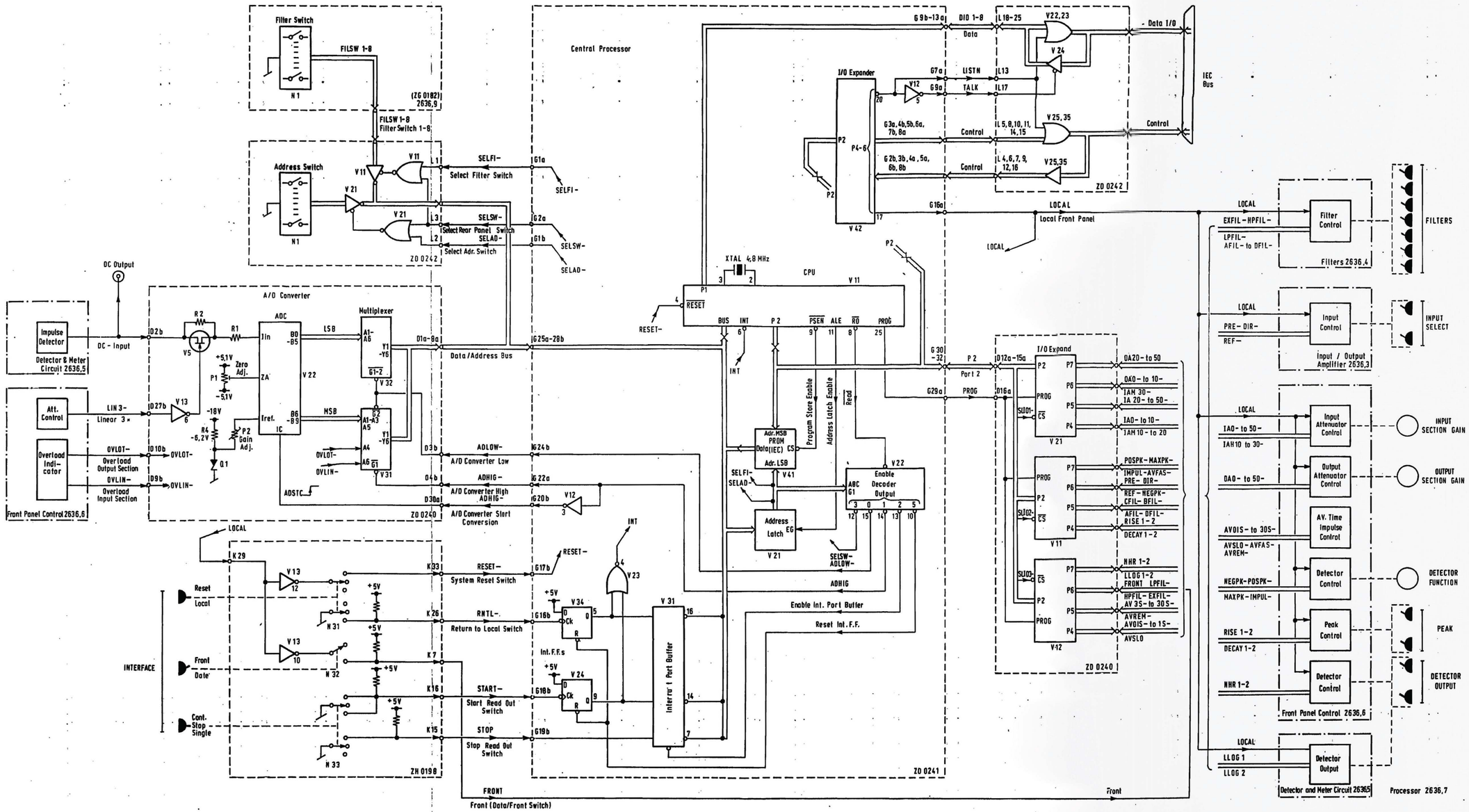
SIMPLIFIED DIAGRAM

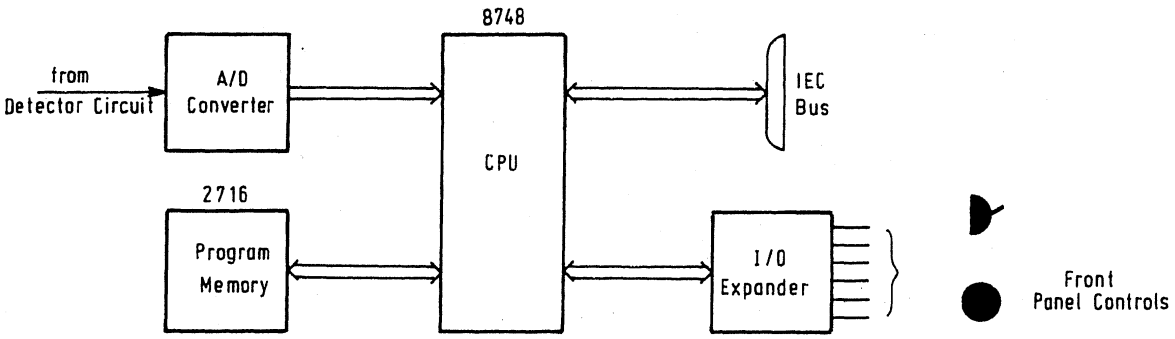




Processor 2636.7

SIMPLIFIED DIAGRAM





General

The digital section in 2636 is based on the Intel μProcessor 8748 and a PROM 2716 for program storage. The 8748 CPU acts as a main controller for the digital functions in 2636 These functions might be split-up in the following way

1 Test programs
2 Talk Listen-Remote Control-IEC functions

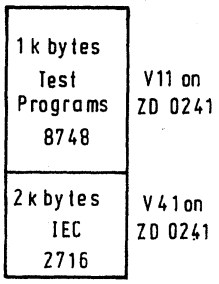
For further information about the IEC-function implemented; the Instruction Manual sec 5 should be consulted

CPU (ZD 0241)

All Mnemonics for signals on PC-Board connectors are explained in Mnemonics Listing See page 7-5 The following descriptions are referred to the Simplified Diagram

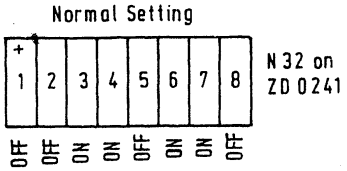
The 8748 is a single chip 8 bits computer with an 1K bytes internal PROM program memory Further more the 8748 has a 64 bytes data RAM The external X-Tal is 4.8 MHz

The 2716 is an EPROM with 2K bytes memory The program for 2636 is stored as follows:



The 8748 contains the testprogram for selftest of 2636 and Signature Analysis In 2716 the program for all IEC-Interface functions is stored Since the digital control functions for 2636 are contained in only 2 PC boards namely ZD 0241 and ZD 0240 these two PC boards may be removed and all the analog functions will still work Of cource, testprograms and IEC functions cannot be executed When trouble shooting the 2636 the 8748 (V11 on ZD 0241) might be removed and replaced by any other 8748 or 8035 When it is done it is important to set switch N32 7 in Off position

The Data/Address Bus in the 8748 is multiplexed and it is used for both Data In and Data Out to the CPU. The signal direction is dependent of the control signals. RD Read is used as a Read Strobe to the Decode V22 PSEN Program Store Enable is active during a fetch to the PROM V41. ALE Address Latch Enable is active once during each clock cycle and is used as an clock signal for the Address Latch V21
These signals make it possible to transfer signals to and from the CPU



Certain control signals is led through a switch N32 on ZD 0241 This switch is used to signature analysis and should not be touched unless noted The switch is not shown on the simplified diagram

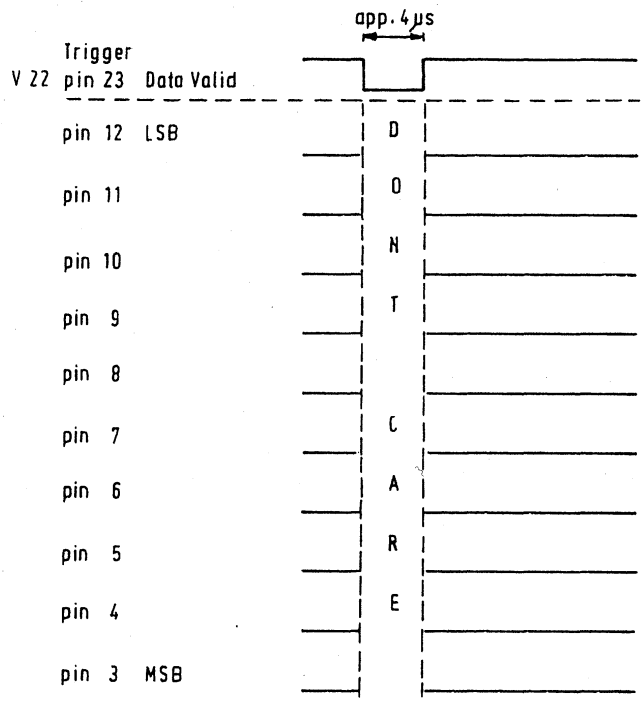
The address in the PROM V41 is selected with the LSB part through the Address Latch V21 and the MSB part from P2 (Port 2) on the CPU The selected address in the PROM contains a new instruction which is transferred to the CPU via the Data/Address Bus

The Bus is also used to transfer data from the A/D Converter on ZD 0240 Furthermore data from the Address Switch on ZD 0242 and Filter Switch on ZG 0182 are transferred via the bus

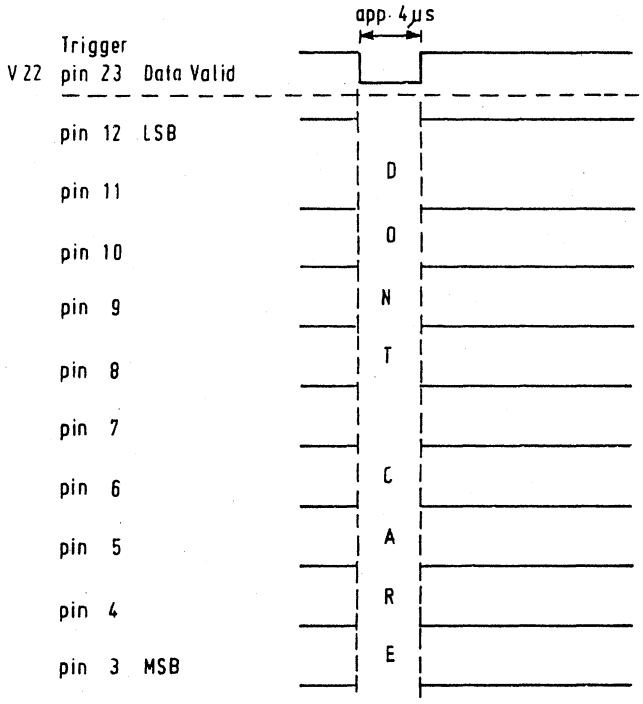
ADJUSTMENT PROCEDURE

INPUT SECTION GAIN to "30 mV"
FILTERS to "Linear 1 — 200000 Hz"
DETECTOR OUTPUT to "Norm ", "Lin"

Fineadjust the input voltage to 7578 mV on "DC Output"



Turn P2 (Gain Adj) slowly CCW so that all bits turns high



Turn P2 slowly CW until LSB (pin 12) just alternate. Make sure that all other bits still are high

Mnemonics for ZD 0241 (G-Connector)

Pin	Mnemonic	Signal Name
1a	SELFI—	Select Filter Switch
b	SELAD—	Select Adr Switch
2a	SELSW—	Select Rear Panel Switch
b	ATNI—	Attention (input IEC)
3a	SRQO—	Service Request (output IEC)
b	IFCI—	Interface Clear (input IEC)
4a	NDACI—	Not Data Accepted (input IEC)
b	NDACO—	Not Data Accepted (output IEC)
5a	NRFDI—	Not Ready For Data (input IEC)
b	INTH—	Interrupt of Handshake (IEC)
6a	NRFDO—	Not Ready For Data (output IEC)
b	DAVI—	Data Valid (input IEC)
7a	LISTN	Listen or Bus Idle (IEC)
b	DAVO—	Data Valid (output IEC)
8a	EOIO—	End or Identify (output IEC)
b	RENI—	Remote Enable (input IEC)
9a	TALK	Talker (IEC)
b	DIO8—	Data I/O bit 8 (IEC)
10a	DIO7—	Data I/O bit 7 (IEC)
b	DIO6—	Data I/O bit 6 (IEC)
11a	DIO5—	Data I/O bit 5 (IEC)
b	DIO4—	Data I/O bit 4 (IEC)
12a	DIO3—	Data I/O bit 3 (IEC)
b	DIO2—	Data I/O bit 2 (IEC)
13a	DIO1—	Data I/O bit 1 (IEC)
b	STAFI—	Start Filter (1617)
14a	PENR—	Pen Down recorder (1617)
b	TLED—	Talk Diode
15a	STIR—	Stop Recorder (1617)
b	LLED—	Listen Diode
16a	LOCAL	Local — Front Panel
b	RTNL—	Return to local switch (IEC)
17a	ALE	Address Latch Enable
b	RESET—	System Reset Switch
18a	RD—	Read
b	START—	Start Talk Switch
19a	INT—	Interrupt
b	STOP	Stop Talk Switch
20a	PSEN—	Program Store Enable
b	ADSTC—	A/D Converter Start Conversion
21a	DGND	Digital Gnd
b	DGND	Digital Gnd
22a	ADHIG—	A/D Converter High
b	VCCIO—	Vcc to I/O Ports
23a	+ 5V	+ 5V
b	+ 5V	+ 5V
24a	RAVR—	Filter Shift recorder (1617)
b	ADLOW	A/D Converter Low
25a	DBUSO	Data Bus bit 0
b	DBUS1	Data Bus bit 1
26a	DBUS2	Data Bus bit 2
b	DBUS3	Data Bus bit 3
27a	DBUS4	Data Bus bit 4
b	DBUS5	Data Bus bit 5
28a	DBUS6	Data Bus bit 6
b	DBUS7	Data Bus bit 7
29a	PROG	Program and Strobe for I/O Ports
b	SLIO1—	Select I/O Port 1
30a	PRT20	Port 2 bit 0
b	SLIO2—	Select I/O Port 2
31a	PRT22	Port 2 bit 2
b	SLIO3—	Select I/O Port 3
32a	PRT21	Port 2 bit 1
b	PRT23	Port 2 bit 3

Mnemonics for ZD 0240 (D-Connector)

Pin	Mnemonic	Signal Name
1a	DBUS0	Data Bus bit 0
b	DBUS2	Data Bus bit 2
2a	DBUS1	Data Bus bit 1
b	DC-Input	A/D Converter DC Input
3a	AGND	Analog Gnd
b	ADLOW—	A/D Converter Low
4a	DBUS3	Data Bus bit 3
b	ADHIG—	A/D Converter High
5a	DBUS4	Data Bus bit 4
b	NHR2	Normal, Hold, Reset Switch
6a	DBUS5	Data Bus bit 5
b	NHR1	Normal, Hold, Reset Switch
7a	DBUS6	Data Bus bit 6
b	LLOG2	Linear, Log Switch
8a	DBUS7	Data Bus bit 7
b	LLOG1	Linear, log switch
9a	SLIO1—	Select I/O Port 1
b	OVLIN—	Overload Input Section
10a	SLIO2—	Select I/O Port 2
b	OVLOT—	Overload Output Section
11a	SLIO3—	Select I/O Port 3
b	CFIL—	C Filter
12a	PRT23	Port 2 bit 3
b	AVFAS—	Averaging Time Fast
13a	PRT22	Port 2 bit 2
b	EXFIL—	External Filter
14a	PRT21	Port 2 bit 1
b	HPFIL—	High Pass Filter (22.4 Hz)
15a	PRT20	Port 2 bit 0
b	LPFIL—	Low Pass Filter (22.4 kHz)
16a	PROG	Program and Strobe for I/O Ports
b	DFIL—	D Filter
17a	RISE2	Rise Switch
b	AV1S—	Averaging Time 1S
18a	RISE1	Rise Switch
b	AV3S—	Averaging Time 3 S
19a	DECAY2	Decay Switch
b	AV10S—	Averaging Time 10 S
20a	DECAY1	Decay Switch
b	AVREM—	Averaging Time Remote
21a	BUSY	A/D Converter
b	AV30S—	Averaging Time 30 S
22a	REF—	Reference
b	AVSLO—	Averaging Time Slow
23a	PRE—	Preamplifier
b	AV01S—	Averaging Time 0.1 S
24a	DIR—	Direct
b	AVO3S—	Averaging Time 0.3 S
25a	MAXPK—	Maximum Peak
b	AFIL—	A Filter
26a	IMPUL—	Impulse
b	BFIL—	B Filter
27a	POSPK—	Positive Peak
b	LIN3—	Linear 3 x
28a	NEGPK—	Negative Peak
b	VCCIO—	Vcc to I/O Ports
29a	+ 18 V	+ 18 V
b	—18 V	—18 V
30a	ADSTC	A/D Converter Start Conversion
b	FRONT	Front (Data/Front Switch)
31a	+ 5 V	+ 5 V
b	+ 5 V	+ 5 V
32a	DGND	Digital Gnd
b	DGND	Digital Gnd

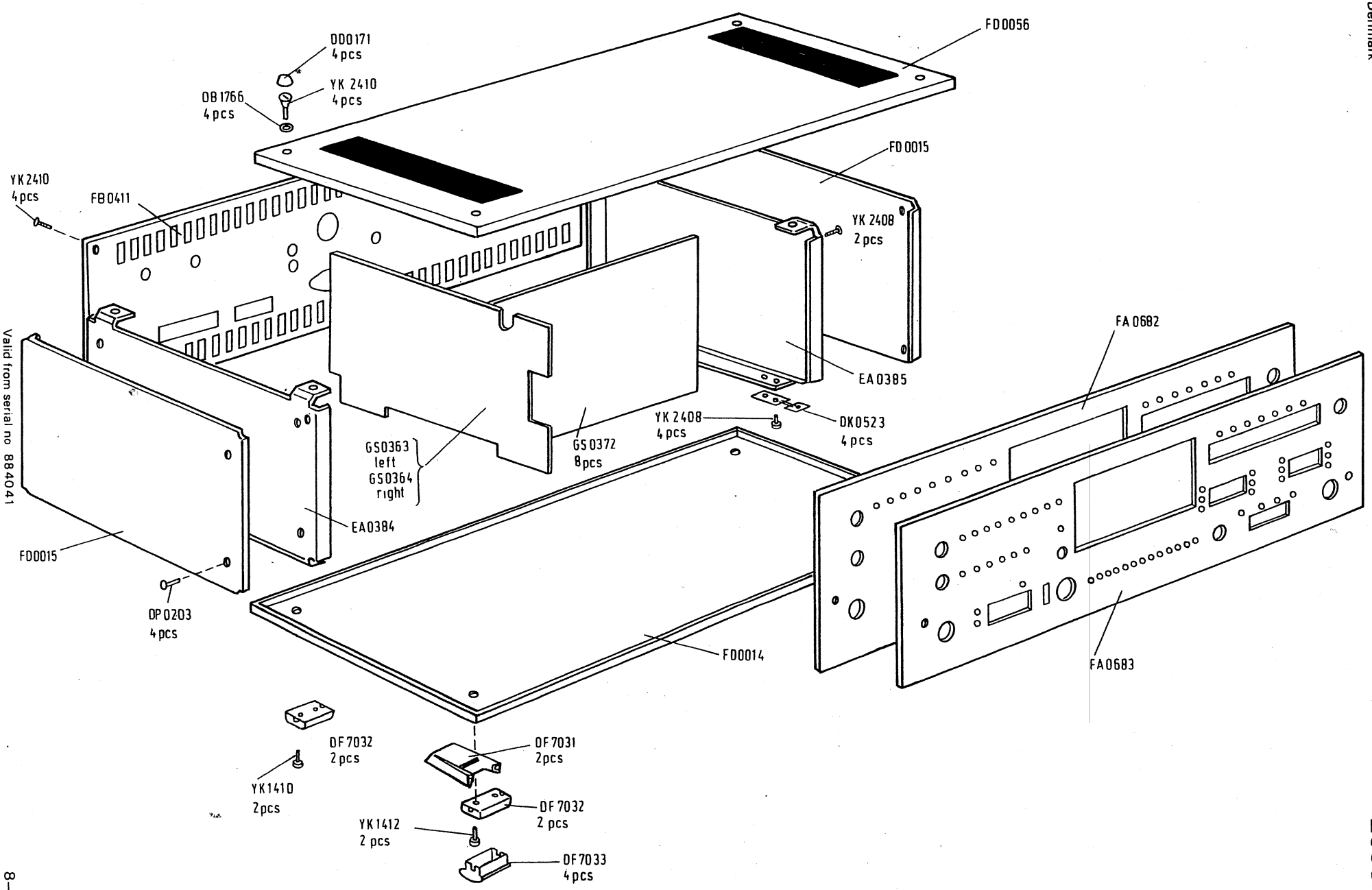
/NEMONICS LISTING

/nemonics for ZD 0240 (P-Connector)

Pin	Mnemonic	Signal Name
1	IA50—	Input Attenuator 50 dB
2	IAM30—	Input Attenuator —30 dB
3		
4	IAM20—	Input Attenuator —20 dB
5	OA0—	Output Attenuator 0 dB
6	IAM10—	Input Attenuator —10 dB
7	OA10—	Output Attenuator 10 dB
8	IA0—	Input Attenuator 0 dB
9	OA20—	Output Attenuator 20 dB
10	IA10—	Input Attenuator 10 dB
11	OA30—	Output Attenuator 30 dB
12	IA20—	Input Attenuator 20 dB
13	OA40—	Output Attenuator 40 dB
14	IA30—	Input Attenuator 30 dB
15	OA50—	Output Attenuator 50 dB
16	IA40—	Input Attenuator 40 dB

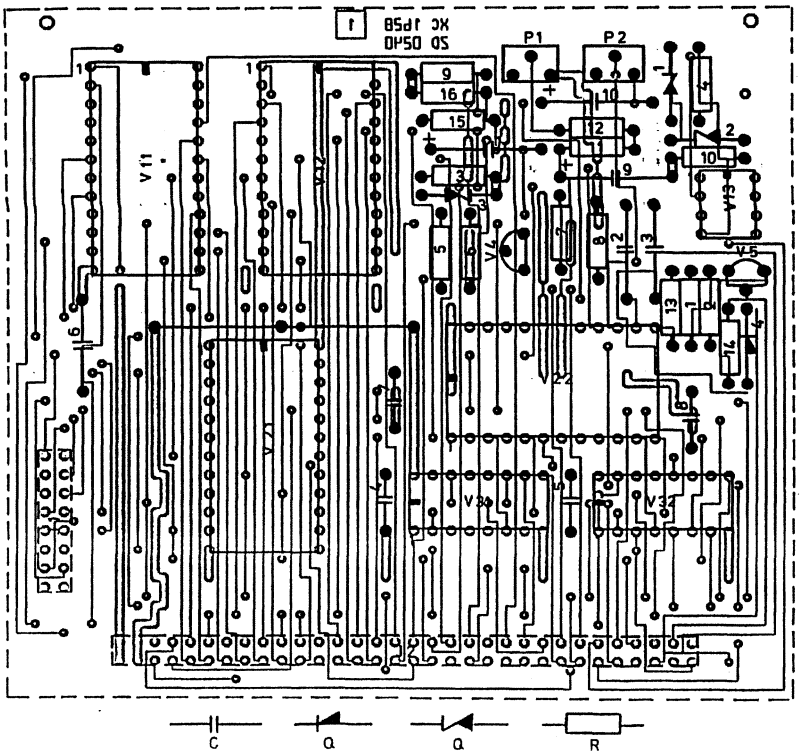
/nemonics for ZD 0242 (L-Connector)

Pin	Mnemonic	Signal Name
1	SELFI—	Select Filter Switch
2	SELAD—	Select Adr Switch
3	SELSW—	Select Rear Panel Switch
4	ATNI—	Attention (input IEC)
5	SRQO—	Service Request (output IEC)
6	IFCI—	Interface Clear (input IEC)
7	NDACI—	Not Data Accepted (input IEC)
8	NDACO—	Not Data Accepted (output IEC)
9	NRFDI—	Not ready For Data (input IEC)
10	INTH—	Interrupt of Handshake (IEC)
11	NRFDO—	Not Ready For Data (output IEC)
12	DAVI—	Data Valid (input IEC)
13	LISTN	Listen or Bus Idle (IEC)
14	DAVO—	Data Valid (output IEC)
15	EOI—	End of Identify (output IEC)
16	RENI—	Remote Enable (input IEC)
17	TALK	Talker (IEC)
18	DIO8	Data I/O bit 8 (IEC)
19	DIO7	Data I/O bit 7 (IEC)
20	DIO6	Data I/O bit 6 (IEC)
21	DIO5	Data I/O bit 5 (IEC)
22	DIO4	Data I/O bit 4 (IEC)
23	DIO3	Data I/O bit 3 (IEC)
24	DIO2	Data I/O bit 2 (IEC)
25	DIO1	Data I/O bit 1 (IEC)
26		
27	DGND	Digital Gnd
28	DGND	Digital Gnd
29		
30		
31	+ 5 V	+ 5 V
32	+ 5 V	+ 5 V
33		
34		
35	FILSW7	Filter Switch no 7
36	DBUS0	Data Bus bit 0
37	FILSW1	Filter Switch no 1
38	DBUS1	Data Bus bit 1
39	FILSW3	Filter Switch no 3
40	DBUS2	Data Bus bit 2
41	FILSW4	Filter Switch no 4
42	DBUS3	Data Bus bit 3
43	FILSW5	Filter Switch no 5
44	DBUS4	Data Bus bit 4
45	FILSW6	Filter Switch no 6
46	DBUS5	Data Bus bit 5
47	FILSW2	Filter Switch no 2
48	DBUS6	Data Bus bit 6
49	FILSW8	Filter Switch no 8
50	DBUS7	Data Bus bit 7


DD0171
4 pcs
YK 2410
4 pcs
DB1766
4 pcs
FD0056
FD0015
YK2410
4 pcs
FB0411
YK 2408
2 pcs
FA0682
EA0385
DK0523
4 pcs
YK 2408
4 pcs
GS0363
left
GS0364
right
GS0372
8 pcs
EA0384
FD0015
DP0203
4 pcs
FD0014
FA0683
DF7032
2 pcs
DF7031
2pcs
YK1410
2pcs
DF7032
2 pcs
YK1412
2 pcs
DF7033
4 pcs

A/D Converter

ZD 0240



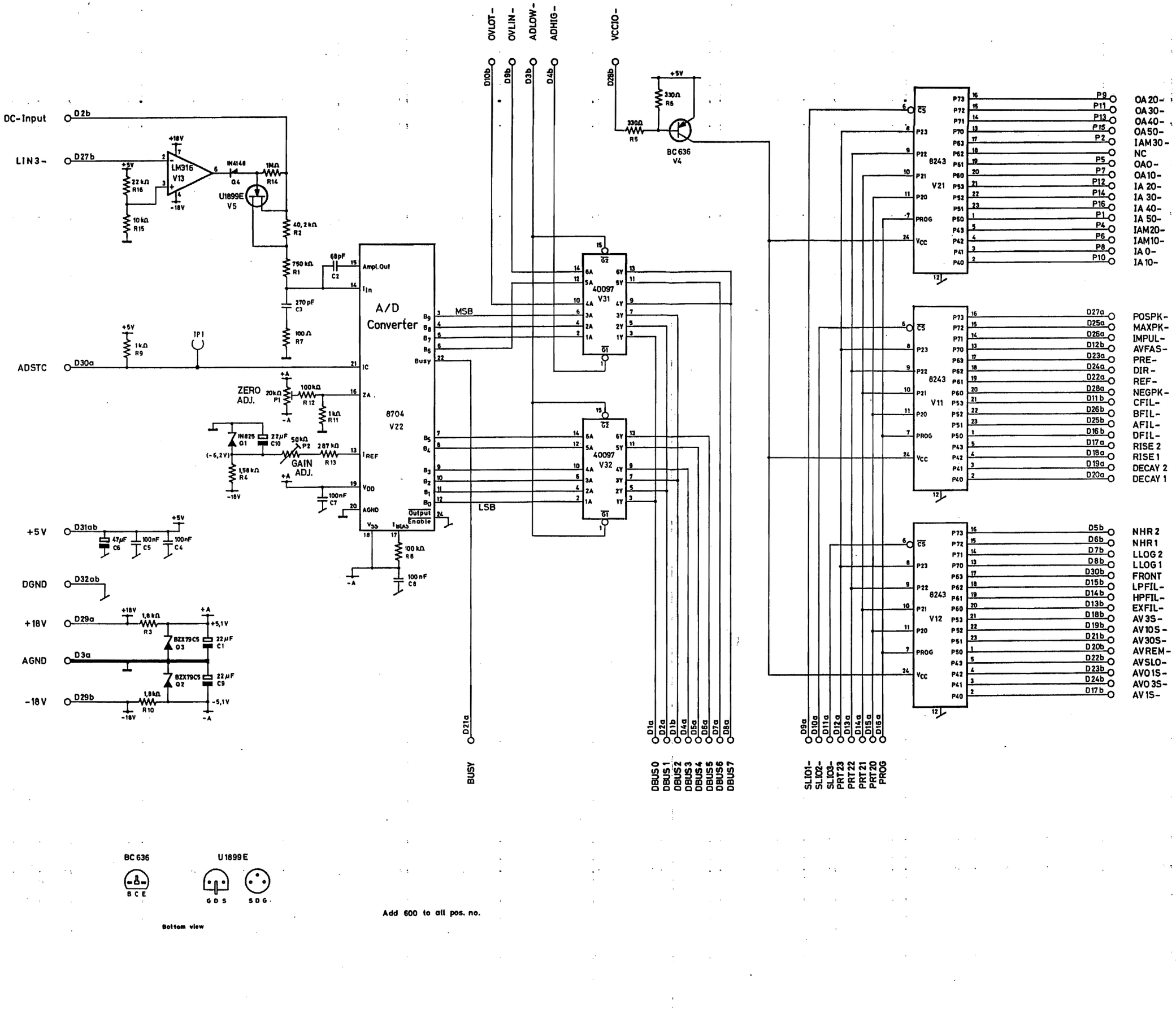
Viewed from the component side

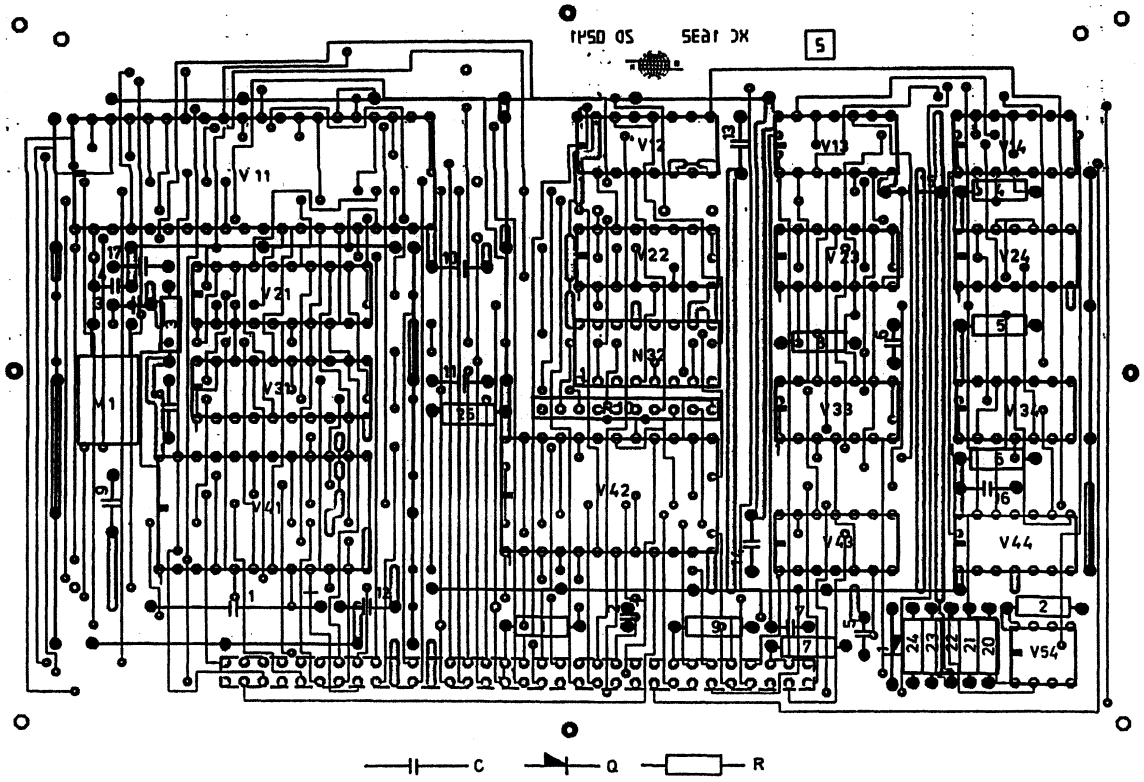
Note: Add 600 to all position numbers

C 1	Electrolytic		22 µF/ 10 V	CE 0203
C 2	Polystyrene	1%	68 pF/630 V	CT 1191
C 3	-	1%	270 pF/125 V	CT 1143
C 4,5	Ceramic		100 nF/ 16 V	CK 5103
C 6	Electrolytic		47 µF/ 10 V	CE 0204
C 7,8	Ceramic		100 nF/ 16 V	CK 5103
C 9, 10	Electrolytic		22 µF/ 10 V	CE 0203
J 1	16-pin Plug			JP 1604
J 2	64-pin Plug			JP 6400
P 1	Cermet		20 kΩ	PG 3211
P 2	-		50 kΩ	PG 3520
Q 1	Ze.	1N825	5,9-6,5 V/0,25 W	QV 1346
Q 2,3	-	BZX79C5	4,8-5,4 V/0,25 W	QV 1339
Q 4	Si.	1N4148	75 V/75 mA	QV 0216

R 1	Metal	1/4 W	1%	750 kΩ	RF 5750
R 2	-	-	-	40,2 kΩ	RF 4402
R 3	Carbon	-	5%	1,8 kΩ	RB 3180
R 4	Metal	-	1%	1,58 kΩ	RF 3158
R 5, 6	Carbon	-	5%	330 Ω	RB 2330
R 7	Carbon	1/4 W	5%	100 Ω	RB 2100
R 8	-	-	-	100 kΩ	RB 5100
R 9	-	-	-	1,0 kΩ	RB 3100
R 10	-	-	-	1,8 kΩ	RB 3180
R 11	-	-	-	1,0 kΩ	RB 3100
R 12	-	-	-	100 kΩ	RB 5100
R 13	Metal	1/4 W	1%	287 kΩ	RF 5287
R 14	Carbon	-	5%	1,0 MΩ	RB 6100
R 15	-	-	-	10 kΩ	RB 4100
R 16	-	-	-	22 kΩ	RB 4220

V 4	Silicon PNP	BC636	VB 0118
V 5	FET	U1899E	VB 1063
V 11,12	I/O Expander for 8748	8243	VD 5011
V 13	Op. Amp.	LM316	VE 9998
V 21	I/O Expander for 8748	8243	VD 5011
V 22	A/D Converter	8704	VD 3010
V 31,32	6 × Buffer 3/S	HEF40097	VD 2047
	24-pin Socket		JJ 2407
	Printed Circuit Board		XC 1628


DC-Input
D2b
LIN3-
D27b
+18V
LM316
V13
-18V
IN4148
Q4
1MΩ
R14
U1899E
V5
22 kΩ
R16
10 kΩ
R15
40,2 kΩ
R2
750 kΩ
R1
68pF
C2
270 pF
C3
100 Ω
R7
Ampl.Out
Iin
A/D
Converter
8704
V22
ADSTC
D30a
+5V
1 kΩ
R9
TP1
IC
ZERO
ADJ.
20kΩ
P1
100kΩ
R12
1kΩ
R11
ZA
IN825
Q1
22µF
C10
50kΩ
P2
287 kΩ
R13
IREF
(-6,2V)
1,58 kΩ
R4
GAIN
ADJ.
VDD
100nF
C7
AGND
Output
Enable
100 kΩ
R8
100nF
C8
MSB
LSB
Busy
B9
B8
B7
B6
B5
B4
B3
B2
B1
B0
OVLOT-
OVLIN-
ADLOW-
ADHIG-
VCCIO-
D10b
D9b
D3b
D4b
D28b
330Ω
R5
330Ω
R6
BC 636
V4
40097
V31
40097
V32
8243
V21
8243
V11
8243
V12
P9
P11
P13
P15
P2
P5
P7
P12
P14
P16
P1
P4
P6
P8
P10
OA 20-
OA 30-
OA 40-
OA 50-
IAM30-
NC
OAO-
OA10-
IA 20-
IA 30-
IA 40-
IA 50-
IAM20-
IAM10-
IA 0-
IA 10-
D27a
D25a
D26a
D12b
D23a
D24a
D22a
D28a
D11b
D26b
D25b
D16b
D17a
D18a
D19a
D20a
POSPK-
MAXPK-
IMPUL-
AVFAS-
PRE-
DIR-
REF-
NEGPK-
CFIL-
BFIL-
AFIL-
DFIL-
RISE 2
RISE 1
DECAY 2
DECAY 1
D5b
D6b
D7b
D8b
D30b
D15b
D14b
D13b
D18b
D19b
D21b
D20b
D22b
D23b
D24b
D17b
NHR 2
NHR 1
LLOG 2
LLOG 1
FRONT
LPFIL-
HPFIL-
EXFIL-
AV3S-
AV10S-
AV30S-
AVREM-
AVSLO-
AV01S-
AV03S-
AV1S-
+5V
D31ab
47µF
C6
100nF
C5
100nF
C4
DGND
D32ab
+18V
D29a
1,8 kΩ
R3
+5,1V
BZX79C5
Q3
22µF
C1
AGND
D3a
BZX79C5
Q2
22µF
C9
-18V
D29b
1,8kΩ
R10
-5,1V
D21a
BUSY
D1a
D2a
D1b
D4a
D5a
D6a
D7a
D8a
DBUS0
DBUS1
DBUS2
DBUS3
DBUS4
DBUS5
DBUS6
DBUS7
D9a
D10a
D11a
D12a
D13a
D14a
D15a
D16a
SLI01-
SLI02-
SLI03-
PRT23
PRT22
PRT21
PRT20
PROG
BC 636
B C E
U1899E
G D S
S D G
Bottom view
Add 600 to all pos. no.



Viewed from the component side

Note: Add 1000 to all position numbers

C 1	Electrolytic	100 µF/ 6,3 V	CE 0207
C 2	-	1 µF/ 63 V	CE 0540
C 3,4	Ceramic	18 pF/400 V	CK 1180
C 5-7	-	22 nF/ 32 V	CK 4222
C 8-17	-	100 nF/ 16 V	CK 5103
J 1	64-pin Plug		JP 6400
M 1	X-tal 4,8 MHz		MB 0011
N 32	Signature Switch		NN 0068
Q 1	Si. 1N4148	75 V/75 mA	QV 0216

R 1	Carbon	1/4 W	5%	470 Ω	RB 2470
R 2	-	-	-	100 kΩ	RB 5100
R 3-6	-	-	-	470 Ω	RB 2470
R 7-9	-	-	-	330 Ω	RB 2330
R 10	Thickfilm			9 × 10 kΩ	RZ 6410
R 20	Carbon	1/4 W	5%	100 kΩ	RB 5100
R 21	-	-	-	820 kΩ	RB 5820
R 22	-	-	-	270 kΩ	RB 5270
R 23	-	-	-	680 kΩ	RB 5680
R 24	-	-	-	10 kΩ	RB 4100
R 25				4,7 kΩ	RB 3470

V 11	Single Chip Microcomputer	CPU8748	VP 0002
V 12	6 × Bus Driver	SN74LS368	VD 1073
V 13	6 × Schmitt-Trigger	SN74LS14	VD 1028
V 14	2 × D-Type Flip-Flop	SN74LS74	VD 1001
V 21	8 × Transparent Latch	SN74LS373	VD 1066
V 22	3-to-8-Line Decoder	SN74LS138	VD 1055
V 23	4 × 2 Inp. NOR Buffers/OC	SN74LS33	VD 1085
V 24	2 × D-Type Flip-Flop	SN74LS74	VD 1001
V 31	8 × Inverting Buffer	SN74LS240	VD 1060
V 33	4 × 2 Input OR Gate	SN74LS32	VD 1034
V 34	2 × D-Type Flip-Flop	SN74LS74	VD 1001
V 41	PROM	2716	VP 1153
V 42	I/O Expander for 8748	8243	VD 5011
V 43	4 × 2 Input NOR	SN74LS02	VD 1000
V 44	4 × 2 Input AND	SN74LS08	VD 1024
V 54	2 × Low Power Comparator	LM393	VE 0163

24-pin Socket	JJ 2407
40-pin Socket	JJ 4003
Printed Circuit Board	XC 1632

DIO8 G9b
DIO7 G10a
DIO6 G10b
DIO5 G11a
DIO4 G11b
DIO3 G12a
DIO2 G12b
DIO1 G13a
RESET- G17b
DBUS7 G28b
DBUS6 G28a
DBUS5 G27b
DBUS4 G27a
DBUS3 G26b
DBUS2 G26a
DBUS1 G25b
DBUS0 G25a
ALE G17a
RD- G18a
PRT23 G32b
PRT22 G31a
PRT21 G32a
PRT20 G30a
ATNI- G2b
IFCI- G3b
START- G18b
RTNL- G16b
RENI- G8b

TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10

+5V 470Ω R1 100kΩ R2 1N4148 D1 100kΩ R20 820kΩ R21 10kΩ R24 270kΩ R22 680kΩ R23 1µF C2 LM393 V54

4,8MHz M1 18pF C3 18pF C4

CPU 8748 V11 VP0002

PROM 2716 V41 VP 1153

LS 138 V22

LS373 V21 ADDRESS LATCH

LS240 V31

8243 V42 IEC I/O-PORT

5× 10kΩ R10

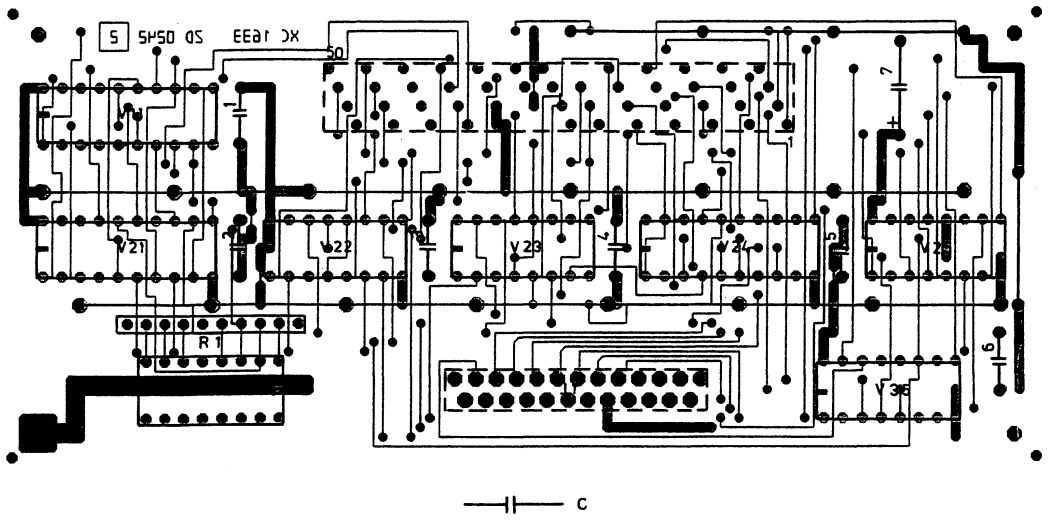
SIGNATURE SWITCH N32 Normal: OFF 1 OFF 2 ON 3 ON 4 OFF 5 ON 6 ON 7 OFF 8

3× 10kΩ R10

LS14 V13 LS74 V14 V24 V34 LS08 V44 LS368 V12 LS32 V33 LS02 V43 LS08 V44 LS368 V12 LM393 V54 LS368 V12 LS14 V13 LS533 V23 LS02 V43 LS368 V12 LS14 V13 LS368 V12

470Ω R3 R4 R5 R6 330Ω R7 R8 R9 22nF C5 C6 C7 100nF C8-C17 100µF C1 4,7kΩ R25

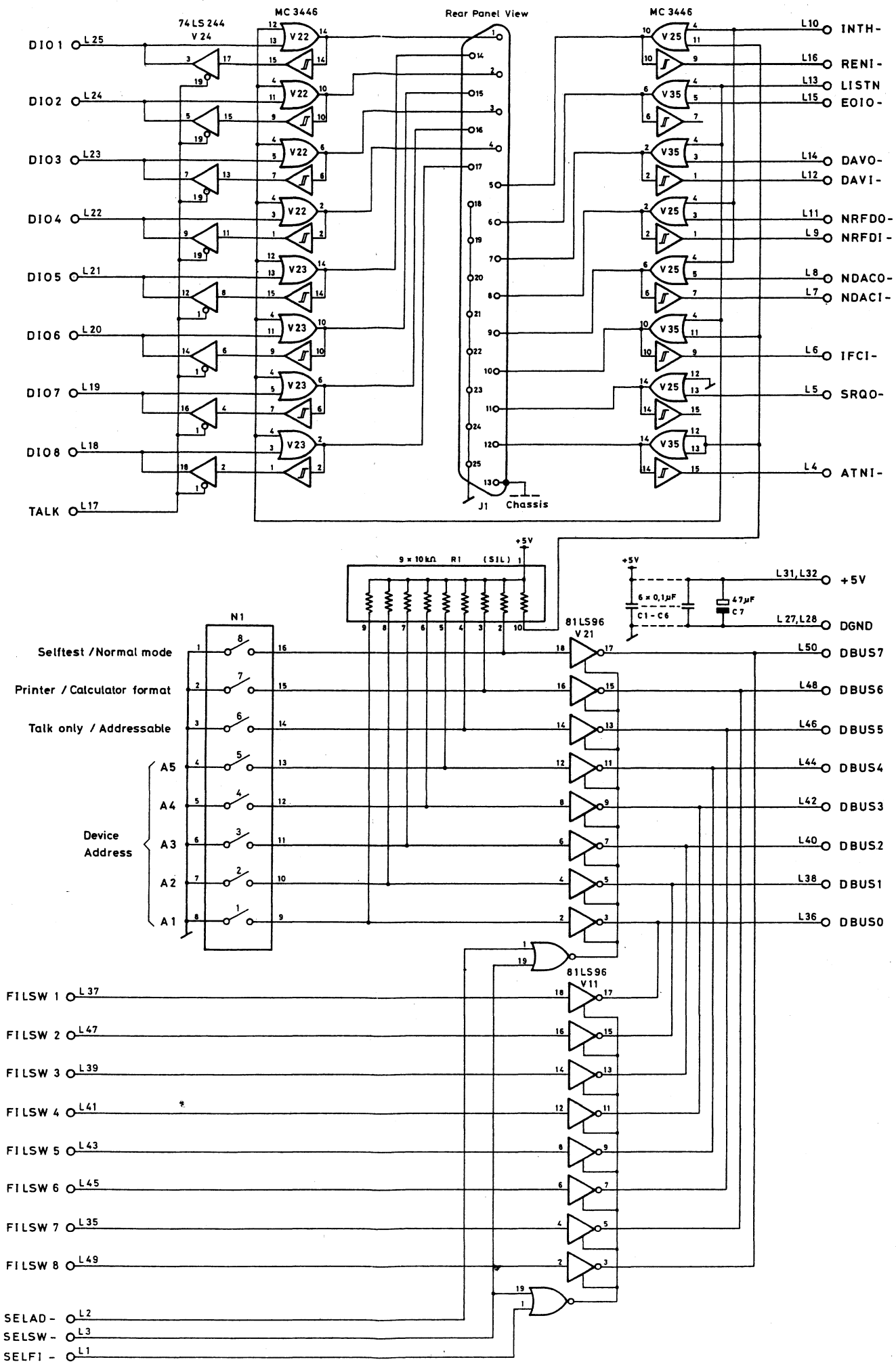
INT- G19a
PSEN- G20a
SLIO1- G29b
SLIO2- G30b
SLIO3- G31b
PROG G29a
NRFDI- G5a
NDACI- G4a
DAVI- G6b
RAVR- G24a
NRFDO- G6a
NDACO- G4b
DAVO- G7b
EOIO- G8a
TALK G9a
LISTN G7a
SRQO- G3a
LLED- G15b
TLED- G14b
STAFI- G13b
INTH- G5b
SELAD- G1b
SELFI- G1a
ADLOW- G24b
ADHIG- G22a
SELSW- G2a
ADSTC G20b
VCCIO- G22b
LOCAL G16a
+5V G23ab
DGND G21ab
STOP G19b
PENR- G14a
STIR- G15a



Viewed from the component side

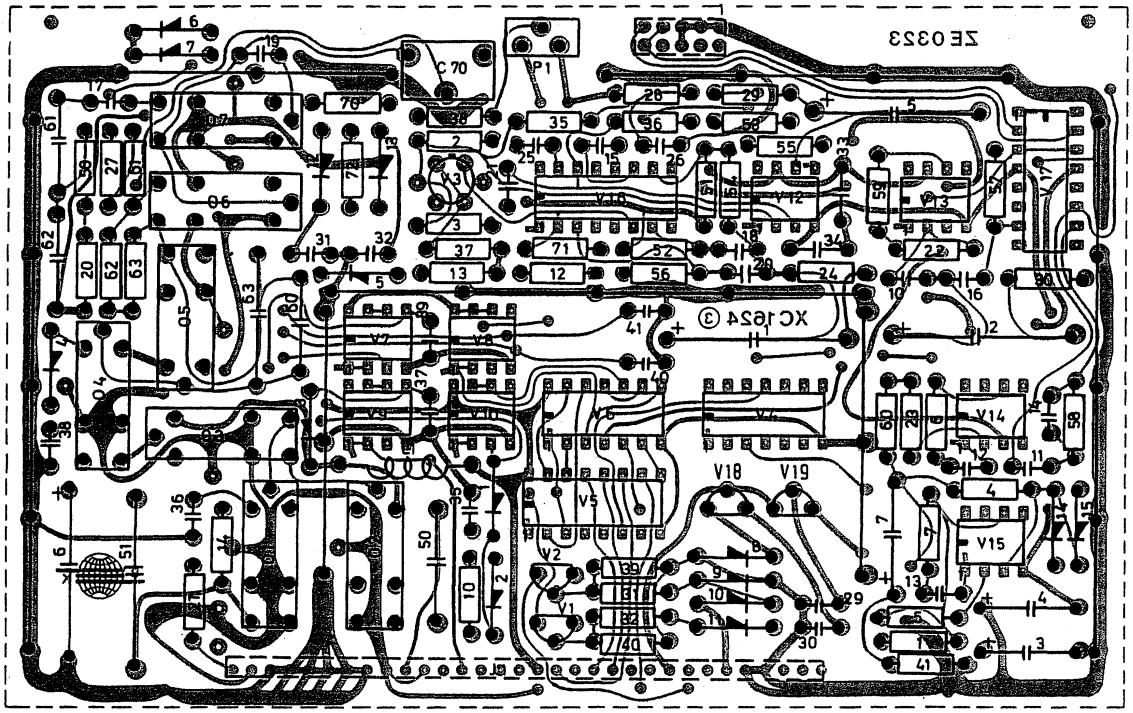
Note: Add 1100 to all position numbers

C 1-6	Ceramic	100 nF/ 16 V	CK 5103
C 7	Electrolytic	47 µF/ 10 V	CE 0204
J 1	25-pin Plug		JP 2505
N 1	Switch, 8-pin		NN 0085
R 1	Thickfilm	9 × 10 kΩ	RZ 6410
V 11,21	8 × Buffers, 3-State	SN81LS96	VD 1086
V 22,23	4 × Bus Transceiver	MC3446	VD 0095
V 24	8 × Inverting Buffer	SN74LS244	VD 1087
V 25,35	4 × Bus Transceiver	MC3446	VD 0095
	Flatcable with Plug		AY 5034
	16-pin Socket		JJ 1622
	Printed Circuit Board		XC 1633



Note: Add 1100 to all position numbers.

LAYOUT DIAGRAM



C Ω R

Viewed from the component side

ARTS LIST

te: Add 200 to all position numbers

1,2	Electrolytic		470 µF/ 6.3 V	CE 0101
3,4	-		47 µF/ 25 V	CE 0491
5,6	-		220 µF/ 6.3 V	CE 0208
7	Tantalum		47 µF/ 6V	CF 0017
10,11	Ceramic		2.2 pF/400 V	CK 0220
12,13	-		3.9 pF/400 V	CK 0390
14	-		8.2 pF/400 V	CK 0820
15,16	-	5%	10 pF/400 V	CK 1100
17,18	-	5%	12 pF/400 V	CK 1120
19	-	5%	18 pF/400 V	CK 1180
20	-		68 pF/400 V	CK 1683
21	-		120 pF/400 V	CK 2122
25	-		1.5 nF/400 V	CK 3151
26	-		2.2 nF/400 V	CK 3221
29-32	-		10 nF/ 30 V	CK 4101
33,34	-		47 nF/ 30 V	CK 4470
35-37	-		47 nF/ 16 V	CK 4471
38	Electrolytic		6.8 µF/ 10 V	CE 0355
39-41	Ceramic		47 nF/ 16 V	CK 4471
50	Polycarbonate		470 nF/100 V	CS 0383
51	Polyester		470 nF/400 V	CS 0440
60	Polystyrene	1%	240 pF/500 V	CT 1142
61	-	1%	270 pF/125 V	CT 1143
62	-	1%	2.7 nF/ 63 V	CT 1158
63	-	1%	1.2 nF/500 V	CT 1308
70	Variable		5-65 pF	CV 0057
1	32-pin Plug			JP 3200
1	Coil		30 µH	LJ 0008
1-7	Relay			OC 0058
1	Cermet		50 kΩ	PG 3515
1-11	Si.	1N4148	75 V/75 mA	QV 0216
12,13	-	FDH300	150 V/200 mA	QV 0242
14,15	-	1N4148	75 V/75 mA	QV 0216

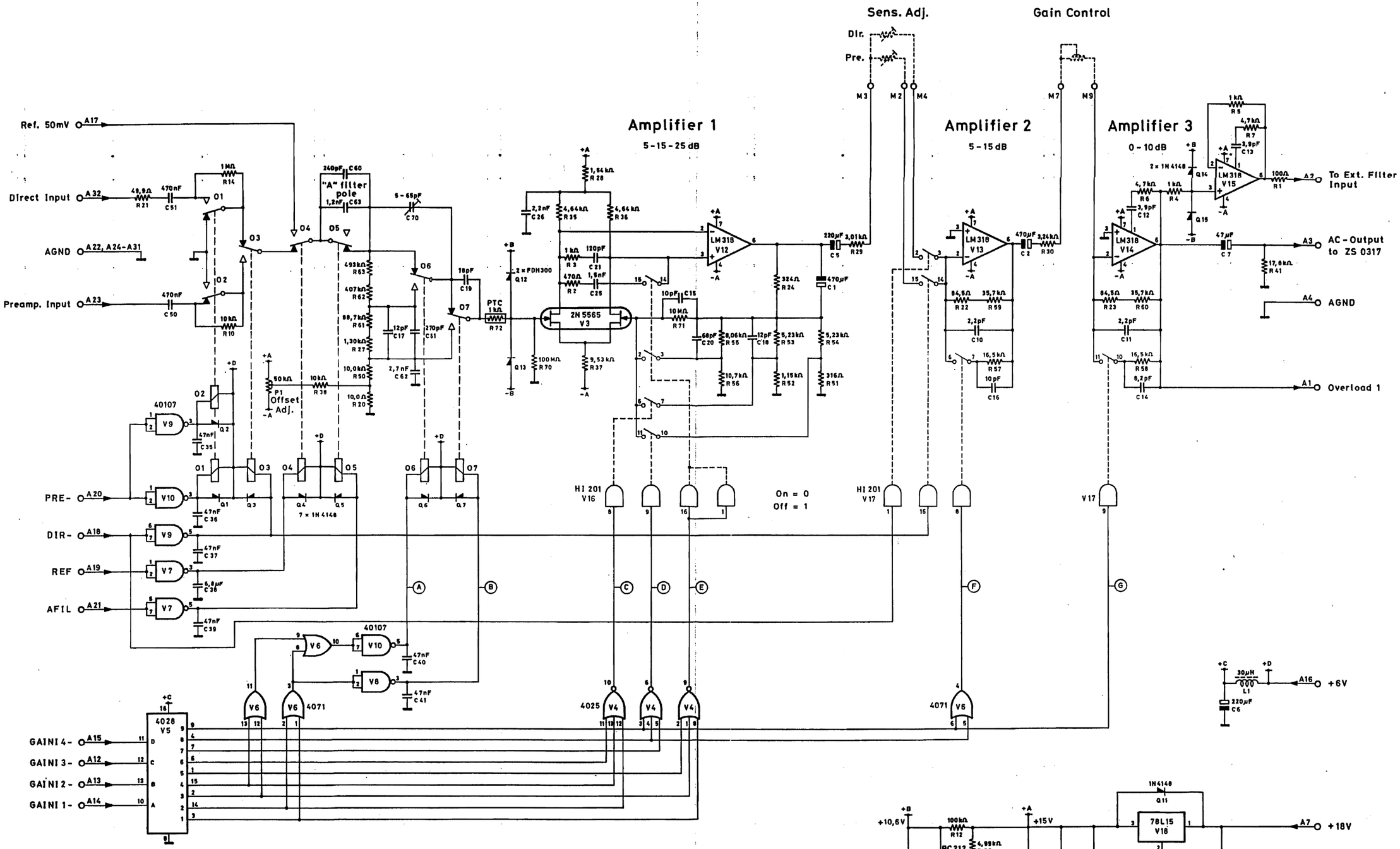
R 1	Carbon	1/4 W	5%	100 Ω	RB 2100
R 2	-	-	-	470 Ω	RB 2470
R 3-5	-	-	-	1.0 kΩ	RB 3100
R 6,7	-	-	-	4.7 kΩ	RB 3470
R 10	-	-	-	10 kΩ	RB 4100
R 12,13	-	-	-	100 kΩ	RB 5100
R 14	-	-	-	1.0 MΩ	RB 6100
R 20	Metal	-	1%	10.0 Ω	RF 1100
R 21	-	-	-	49.9 Ω	RF 1499
R 22,23	-	-	-	84.5 Ω	RF 1845
R 24	-	-	-	324 Ω	RF 2324
R 27	-	-	-	1.30 kΩ	RF 3130
R 28	-	-	-	1.54 kΩ	RF 3154
R 29	-	-	-	3.01 kΩ	RF 3301
R 30	-	-	-	3.24 kΩ	RF 3324
R 31,32	-	-	-	4.99 kΩ	RF 3499
R 35,36	-	-	-	4.64 kΩ	RF 3464
R 37	-	-	-	9.53 kΩ	RF 3953
R 38-40	-	-	-	10.0 kΩ	RF 4100
R 41	-	-	-	17.8 kΩ	RF 4178
R 50	-	-	0.1%	10.0 kΩ	RF 6042
R 51	-	-	-	316 Ω	RF 6046
R 52	-	-	-	1.15 kΩ	RF 6047
R 53,54	-	-	-	5.23 kΩ	RF 6049
R 55	-	-	-	8.06 kΩ	RF 6053
R 56	-	-	-	10.7 kΩ	RF 6054
R 57,58	-	-	-	16.5 kΩ	RF 6057
R 59,60	-	-	-	35.7 kΩ	RF 6060
R 61	-	-	-	88.7 kΩ	RF 6062
R 62	-	-	-	407 kΩ	RF 6063
R 63	-	-	-	493 kΩ	RF 6064
R 70	Carbon	1/8 W	20%	100 MΩ	RH 0901
R 71	-	-	10%	10 MΩ	RH 0902
R 72	PTC			1 kΩ	RN 0203

V 1	Silicon	PNP	BC212	VB 0049
V 2	-	NPN	BC182	VB 0055
V 3	FET		2N5565	VB 1084
V 4	3 x 3 Input NOR		CD4025	VD 2015
V 5	BCD-Dec./Bin. 8-Decoder		CD4028	VD 2017
V 6	4 x 2 Input OR Gate		CD4071	VD 2052
V 7-10	2 x 2 Input NAND Driver		CD40107	VD 2101
V 12-15	Op. Amp.		LM318N	VE 0083
V 16,17	4 x FET Switch		HI201	VE 0149
V 18	+15 V Voltage Regulator		78L15	VE 0188
V 19	–15 V Voltage Regulator		79L15	VE 0189

8-pin Socket	JJ 0817
10-pin Plug	JP 1012
Printed Circuit Board	XC 1624

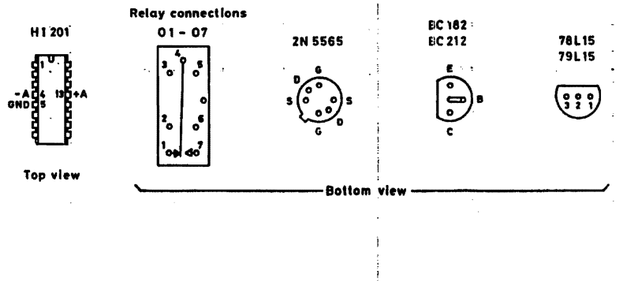
Input Amplifier ZE 0323

CIRCUIT DIAGRAM

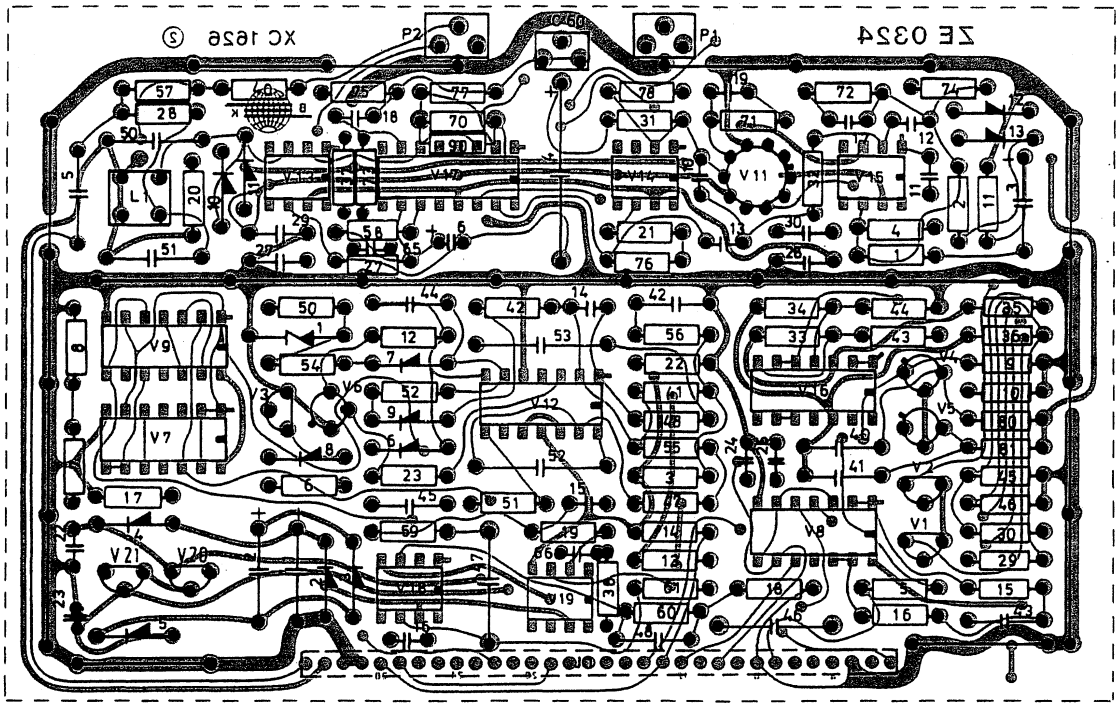


Input Amplifier

GAINI 4 3 2 1	Overall gain	Att. (A)(B)	Att. gain	Amp.1 (C)(D)(E)	Amp.1 gain	Amp.2 (F)	Amp.2 gain	Amp.3 (G)	Amp.3 gain
1 0 0 0	50dB	1 1	0dB	1 0 1	25dB	1	15dB	1	10dB
0 1 1 1	40dB	1 1	0dB	1 0 1	25dB	1	15dB	0	0dB
0 1 1 0	30dB	1 1	0dB	1 0 1	25dB	0	5dB	0	0dB
0 1 0 1	20dB	1 1	0dB	0 1 1	15dB	0	5dB	0	0dB
0 1 0 0	10dB	1 1	0dB	1 1 0	5dB	0	5dB	0	0dB
0 0 1 1	0dB	0 1	-20dB	0 1 1	15dB	0	5dB	0	0dB
0 0 1 0	-10dB	0 1	-20dB	1 1 0	5dB	0	5dB	0	0dB
0 0 0 1	-20dB	0 0	-40dB	0 1 1	15dB	0	5dB	0	0dB
0 0 0 0	-30dB	0 0	-40dB	1 1 0	5dB	0	5dB	0	0dB



Note: Add 200 to all position numbers.



Viewed from the component side

ZE 0324

PARTS LIST

Note: Add 400 to all position numbers

C 1,2	Electrolytic			47 µF/ 25 V	CE 0491
C 3	-			47 µF/ 10 V	CE 0204
C 4	-			220 µF/ 6.3 V	CE 0208
C 5	Tantalum			6.8 µF/ 6 V	CF 0006
C 6	-			100 µF/ 3 V	CF 0019
C 10	Ceramic			2.7 pF/400 V	CK 0270
C 11	-			3.9 pF/400 V	CK 0390
C 12	-			5.6 pF/400 V	CK 0560
C 13	-			8.2 pF/400 V	CK 0820
C 14,15	-		5%	10 pF/400 V	CK 1100
C 16	-			27 pF/400 V	CK 1271
C 17	-		5%	12 pF/400 V	CK 1120
C 18	-		5%	22 pF/400 V	CK 1220
C 19	-		5%	27 pF/400 V	CK 1271
C 22	-			10 nF/ 30 V	CK 4101
C 23	Electrolytic			22 µF/ 25 V	CE 0352
C 24,25	Ceramic			10 nF/ 30 V	CK 4101
C 27-30	-			47 nF/ 30 V	CK 4470
C 40,41	Polyester			47 nF/250 V	CS 0434
C 42	-			22 nF/400 V	CS 0432
C 43	-			100 nF/250 V	CS 0436
C 44	-			15 nF/100 V	CS 0431
C 45	-			100 nF/250 V	CS 0436
C 46	Polycarbonate			330 nF/100 V	CS 0350
C 47	-			1 µF/100 V	CS 0384
C 48	Polyester			0.1 µF/250 V	CS 0436
C 50	Polystyrene		1%	220 pF/125 V	CT 1118
C 51	-		1%	75 pF/150 V	CT 1128
C 52,53	-		1%	10 nF/ 63 V	CT 1545
C 60	Variable			2.5-6 pF	CV 0050
C 65,66	Ceramic		5%	10 pF/400 V	CK 1100
J 1	32-pin Plug				JP 3200
L 1	Coil			1.8 mH	LB 0940
P 1	Cermet			1 kΩ	PG 2114
P 2	-			50 kΩ	PG 3515
Q 1	Ze	1N4567		6.1-6.7 V/0.4 W	QV 0037
Q 2-9	Si	1N4148		75 V/75 mA	QV 0216
Q 10,11	-	FDH300		150 V/200 mA	QV 0242
Q 12,13	-	1N4148		75 V/75 mA	QV 0216
R 1	Carbon	1/4 W	5%	100 Ω	RB 2100
R 2	-	-	-	1.0 kΩ	RB 3100
R 3-5	-	-	-	4.7 kΩ	RB 3470
R 6-10	-	-	-	47 kΩ	RB 4470
R 11-14	-	-	-	100 kΩ	RB 5100
R 15	-	-	-	820 kΩ	RB 5820
R 16	-	-	-	1 MΩ	RB 6100
R 17	-	1/8 W	10%	10 MΩ	RH 0902
R 18	Carbon	1/4 W	5%	1.0 kΩ	RB 3100
R 19	-	-	-	4.7 kΩ	RB 3470
R 20	Metal	-	1%	68.1 Ω	RF 1681
R 21	-	-	-	301 Ω	RF 2301
R 22	-	-	-	1.10 kΩ	RF 3110
R 23	-	-	-	1.15 kΩ	RF 3115
R 27	-	-	-	2.05 kΩ	RF 3205
R 28	-	-	-	2.55 kΩ	RF 3255
R 29,30	-	-	-	3.01 kΩ	RF 3301
R 31	-	-	-	3.92 kΩ	RF 3392
R 32	-	-	-	4.02 kΩ	RF 3402
R 33-38	-	-	-	4.22 kΩ	RF 3422
R 40-46	-	-	-	10.0 kΩ	RF 4100
R 47,48	-	-	-	15.8 kΩ	RF 4158
R 50	-	-	-	17.8 kΩ	RF 4178
R 51	-	-	-	20.0 kΩ	RF 4200
R 52	-	-	-	30.1 kΩ	RF 4301
R 54	-	-	-	71.5 kΩ	RF 4715
R 55	-	-	-	82.5 kΩ	RF 4825
R 56	-	-	-	169 kΩ	RF 5169
R 57	-	-	-	127 kΩ	RF 5127
R 58	-	-	-	340 kΩ	RF 5340
R 59,60	-	-	-	523 kΩ	RF 5523
R 61	-	-	-	787 kΩ	RF 5787
R 70	-	-	0.1%	2.15 kΩ	RF 6048
R 71	-	-	-	5.69 kΩ	RF 6050
R 72	-	-	-	5.83 kΩ	RF 6051
R 73	-	-	-	6.98 kΩ	RF 6052
R 74	-	-	-	12.7 kΩ	RF 6055
R 75	-	-	-	15.8 kΩ	RF 6056
R 76	-	-	-	17.8 kΩ	RF 6058
R 77	-	-	-	20.5 kΩ	RF 6059
R 78	-	-	-	39.2 kΩ	RF 6061
R 80,81	Carbon	1/8 W	10%	10 MΩ	RH 0902
R 90	-	1/4 W	5%	1 MΩ	RB 6100

V 1	Silicon	BC212	VB 0049
V 2,3	-	BC182	VB 0055
V 4,5	FET	E102	VB 1053
V 6	FET	2N4391	VB 1060
V 7,8	4 × 2 Input NOR	CD4001	VD 2000
V 9	4 × 2 Input NAND	CD4011	VD 2004
V 11	2 × Analog Switch	HI-200	VE 0070
V 12	Op. Amp.	LM324	VE 0074
V 13-15	- -	LM318N	VE 0083
V 16	Comparator	LM339	VE 0110
V 17	4 × Analog Switch	HI-201	VE 0149
V 18	Op. Amp.	LM308AH	VE 0087
V 19	- -	LM318N	VE 0083
V 20	+15 V Voltage Regulator	78L15	VE 0188
V 21	-15 V Voltage Regulator	79L15	VE 0189
	8-pin Socket		JJ 0817
	14-pin Socket		JJ 1416
	Printed Circuit Board		XC 1626

Output Amplifier ZE 0324

CIRCUIT DIAGRAM

Amplifier 1
0-10-20dB

Amplifier 2
0-10-20dB

Amplifier 3
0-10dB

Detector Buffer

AC-Input C32

Offset Adj. 50kΩ P2

AGND C30, C31

GAIN0 3 C23

GAIN0 2 C24

GAIN0 1 C25

HI 201 V17

HI 200 V11

4011

4001

On = 0

Off = 1

1VAC-Output C2

AGND C3

AC-Output Detector C1

AGND Detector C15

Overload Indicator

+11,1V

10,5V DC

OVLOT- C10

OVLBO C12

OVLBI C14

OVLIN- C11

Overload 1 C7

Overload C5

5/10Vp N1 C6

Ref. Oscillator 1kHz

REF C26

Ref. 50mV C22

Ref. Voltage Adj.

10 Hz Osc.

+11,1VDC C27

-11,1VDC C28

+6V C16

+18V C21

-18V C18

Output Amplifier								
GAINO	Overall	Amp.1		Amp.2		Amp.3	
3 2 1	gain	ⒶⒷⒸ	gain	ⒹⒺ	gain	Ⓕ	gain
1 1 0	0dB	0 1 1	0dB	0 0	0dB	0	0dB
1 0 1	10dB	1 1 0	10dB	0 0	0dB	0	0dB
1 0 0	20dB	1 0 1	20dB	0 0	0dB	0	0dB
0 1 1	30dB	1 0 1	20dB	1 0	10dB	0	0dB
0 1 0	40dB	1 0 1	20dB	1 1	20dB	0	0dB
0 0 1	50dB	1 0 1	20dB	1 1	20dB	1	10dB

HI 201 — Top view

HI 200 — Bottom view

BC182 BC212

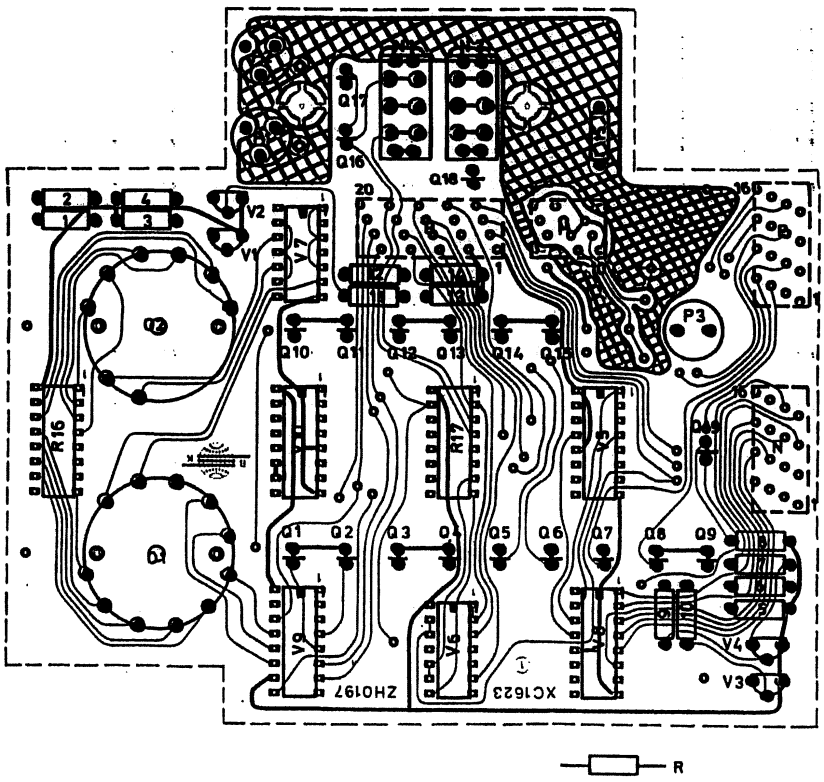
E 102 2N 4391

78L15 79L15

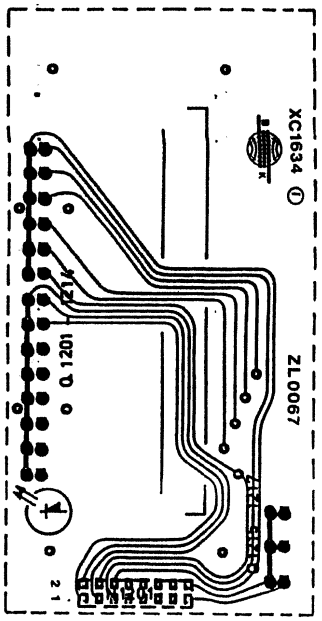
Note: Add 400 to all position numbers.

Amplifier Control

ZH 0197



Viewed from the printed circuit side



Viewed from the printed circuit side

Note: Add 100 to all position numbers

N 1	INPUT Switch			NN 0089
N 2	REF. Switch			NN 0089
O 1	Switch Mecanism			OD 1073
	Wafer for O1			OD 1074
O 2	Switch Mecanism			OD 1071
	Wafer for O2			OD 1072
P 1,2	"Sens. Adj."		10 kΩ	PD 3114
* P 3	"Input Gain"		8 kΩ	PS 2800
Q 1-19	LED			QV 4019
R 1-8	Carbon	1/4 W 5%	470 Ω	RB 2470
R 9,10	-	- -	10 kΩ	RB 4100
R 11-14	-	- -	15 kΩ	RB 4150
* R 15				
R 16,17	Thickfilm		15 × 10 kΩ	RZ 0048
V 1-4	Silicon PNP		BC212B	VB 0049
V 5	4 bit Binary Full Adder		SN74LS283	VD 1021
V 6	4 × 2 Input NAND Gate		SN74LS00	VD 1033
V 7	6 × Inverter O/C		SN74LS05	VD 1035
V 8	BCD-to Decimal Dec./Dr.		SN74LS145	VD 1037
V 9	10-4-line Encoder		SN74LS147	VD 1083
V 10	8-3-line Encoder		SN74LS148	VD 1041

10-pin Flatcable	AY 1054
16-pin Flatcable	AY 1609
16-pin Flatcable	AY 1649
20-pin Flatcable	AY 2035
Printed Circuit Board	XC 1623

Meter Circuit ZL 0067

Note: Add 1200 to all position numbers

N 1	16-pin Plug		JP 1604
Q 1-17	LED	OLR-102	QV 4003
	Cover for Lamp		DZ 9425
	Printed Circuit Board		XC 1634

* Matched set P3/R15 = 8 kΩ

ZH 0197

inted circuit side

AY 1054
AY 1609
AY 1649
AY 2035

XC 1623

JP 1604

R-102 QV 4003

DZ 9425
XC 1634

XC1634 ①

ZL0067

OVLBO H7 — BC 212 V2 — 15kΩ R11 — 15kΩ R13 — 470Ω R2
OVLBI H6 — BC 212 V1 — 15kΩ R12 — 15kΩ R14 — 470Ω R1
LOCAL H8 — 10kΩ R16

74LS05 V7

Input Section Gain: O1 — +50dB, +30dB, +10dB, -10dB, -30dB; +40dB, +20dB, 0dB, -20dB

Output Section Gain: O2 — 0dB, +20dB, +40dB; +10dB, +30dB, +50dB

-30dB Q9 Q8 Q7 Q6 Q5 Q4 Q3 Q2 Q1 +50dB
0dB Q15 Q14 Q13 Q12 Q11 Q10 +50dB

IA 50- P1, IA 40- P16, IA 30- P14, IA 20- P12, IA 10- P10, IA 0- P8, IAM10- P6, IAM20- P4, IAM30- P2, OA 50- P15, OA 40- P13, OA 30- P11, OA 20- P9, OA 10- P7, OA 0- P5, UNCAL- P3

74LS147 V9 — A B C D
15 x 10kΩ R17
74LS148 V10 — A0 A1 A2

H11 GAINO3
H12 GAINO2
H10 GAINO1
H19 GAINI4
H18 GAINI3
H17 GAINI2
H20 GAINI1

74LS00 V6
H9 LIN3-
H2 LLOG1
H3 LLOG2
H4 LLOG3

74LS283 V5
74LS145 V8

BC212 V4 — 10kΩ R16 — 10kΩ R9 — 470Ω R7 — N14
BC212 V3 — 10kΩ R16 — 10kΩ R10 — 470Ω R6 — N11

ZL 0067
N1 — 470Ω R5
N1 LIN
N2 LOG 30
N4 LOG 60
N3
N15 +30dB
N16 +40dB
N12 +50dB
N8 +60dB
N7 +70dB
N10 +80dB
N9 +90dB
N13 +100dB
N14
N11
-30dB, -20dB, -10dB, 0dB, +10dB, +20dB
Add 1200 to all position numbers.

Sens. Adjust
M3 — 10kΩ P1 — Preamp.
M2
10kΩ P2 — Direct
M4

Gain Control
M7 — Rε R15 — 10kΩ P3 — M9
Rtot. = 8kΩ

470Ω R8 — 10kΩ R16 — Q19

470Ω R4 — 10kΩ R16 — Q16 Q17
470Ω R3 — 10kΩ R16 — Q18

Input — Peamp. / Direct — N1
On / Off — N2
Reference

74LS05 V7
V6

+5V H1
DGND H5

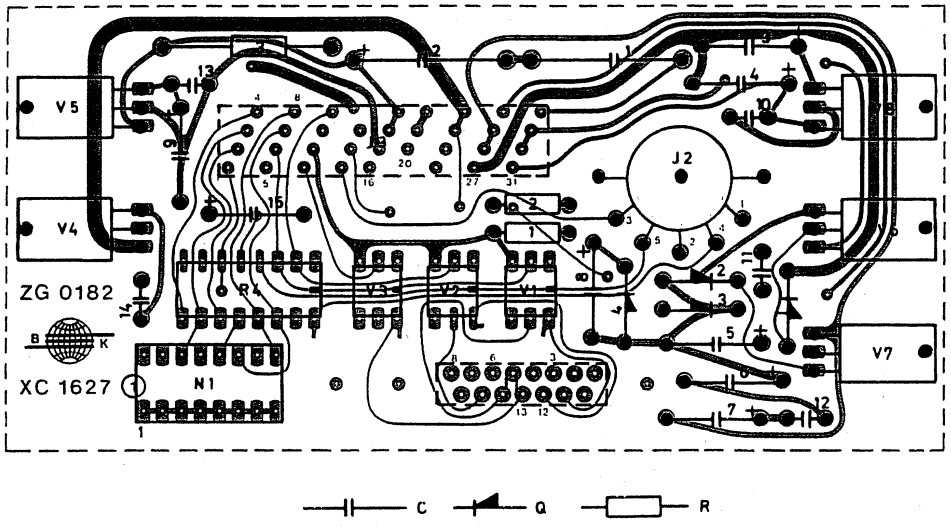
H15 H16 DIR- PRE-
H13 H14 REF- REF

Note: Add 100 to all position numbers.
* Open Collector

BC 212
E B C
Bottom view

LED
C A

LAYOUT DIAGRAM / PARTS LIST



Viewed from the printed circuit side

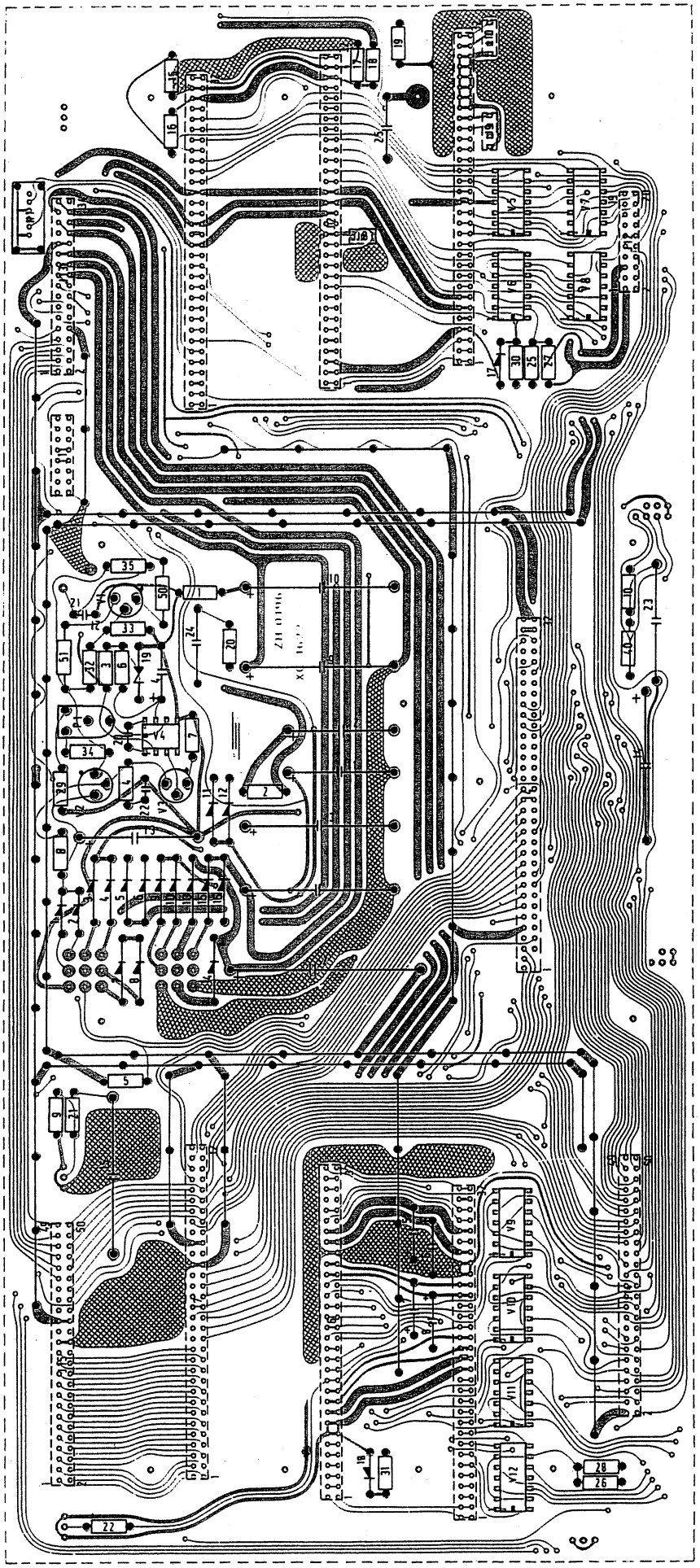
Note: Add 500 to all position numbers

C 1,2	Electrolytic		100 µF/ 16 V	CE 0310
C 3-9	-		4,7 µF/ 63 V	CE 0200
C 10-14	Ceramic		22 nF/ 32 V	CK 4222
C 15	Electrolytic		4,7 µF/ 63 V	CE 0200
J 1	15-pin Socket			JJ 1505
J 2	8-pin DIN Socket			JJ 0802
J 3	DIL Socket			JJ 1622
N 1	Filter Coding			NN 0085
Q 1-4	Si 1N4148		75 V/75 mA	QV 0216
R 1	Carbon	1/4 W 5%	100 Ω	RB 2100
R 2	-	- -	1,0 kΩ	RB 3100
R 3	Wire	4 W 10%	30 Ω	RX 0309
R 4	Thickfilm		8 × 47 kΩ	RZ 6447
V 1-3	Optically Coupled Isolator		TL114	VD 0093
V 4	Voltage Regulator		MC7805C	VE 0076
V 5	- -		MC7812C	VE 0123
V 6	- -		MC7818C	VE 0143
V 7	- -		MC7918C	VE 0144
V 8	- -		MC7806C	VE 0145
	Flatcable with Plug			AY 3424
	Printed Circuit Board			XC 1627

CIRCUIT DIAGRAM

See Interconnection Diagram 2636

Mother Board



Viewed from the printed circuit side

ZH 0196

PARTS LIST

C 1	Electrolytic	1000 µF/ 16 V	CE 0309
C 2	-	4700 µF/ 16 V	CE 0335
C 3	-	470 µF/ 25 V	CE 0468
C 4-8	-	10 µF/ 25 V	CE 0416
C 9,10	-	470 µF/ 40 V	CE 0417
C 11,12	-	22 µF/100 V	CE 0616
C 13	-	4,7 µF/350 V	CE 0708
C 14	-	22 µF/250 V	CE 0805
C 15	-	100 µF/ 63 V	CE 0537
C 20	Ceramic	68 pF/400 V	CK 1683
C 21,22	-	1 nF/400 V	CK 3101
C 23	Polycarbonate	220 nF/400 V	CS 0117
C 24	-	220 nF/100 V	CS 0339
C 25	-	2,2 µF/ 63 V	CS 0349

J 1-7	64-pin	Socket for Print	JJ 6400
J 8	3-pin	Angular Plug	JP 0323
J 9,10	4-pin	Angular Plug	JP 0413
J 11	16-pin	Plug	JP 1604
J 12	20-pin	Plug	JP 2012
J 13	34-pin	Plug	JP 3402
J 14,15	50-pin	Plug	JP 5005

N 1	Overload Switch	NN 0105

P 1	Cermet	2,2 kΩ	PG 2207

Q 1,2	Si	BYX10	1200 V/150 mA	QV 0025
Q 3-18	-	1N4004	400 V/1 A	QV 0237
Q 19	Ze	1N825	5,9-6,5 V/0,25 W	QV 1346

R 1,2	Carbon	1/4 W	5%	100 Ω	RB 2100
R 3	-	-	-	820 Ω	RB 2820
R 4,5	-	-	-	1,0 kΩ	RB 3100
R 6,7	-	-	-	5,6 kΩ	RB 3560
R 8,9	-	-	-	100 kΩ	RB 5100
R 10	-	-	-	1 MΩ	RB 6100
R 15-19	Metal	-	1%	4,99 Ω	RF 0499
R 20-22	-	-	-	49,9 Ω	RF 1499
R 25,26	-	-	-	1,62 kΩ	RF 3162
R 27,28	-	-	-	3,40 kΩ	RF 3340
R 29	-	-	-	5,23 kΩ	RF 3523
R 30, 31	-	-	-	2,49 kΩ	RF 3249
R 32	-	-	-	51,1 kΩ	RF 4511
R 33	-	-	-	154 kΩ	RF 5154
R 34	-	-	-	191 kΩ	RF 5191
R 35	-	-	-	649 kΩ	RF 5649
R 40	Carbon	0,15 W	10%	20 MΩ	RH 0002
R 50,51	-	1/3 W	5%	12,5 kΩ	

V 1-3	Silicon	BF258	VB 0552
V 4	Op. Amp	LM301	VE 0017
V 5-12	4 × Op. Amp.	LM324	VE 0074

	Printed Circuit Board	XC 1622

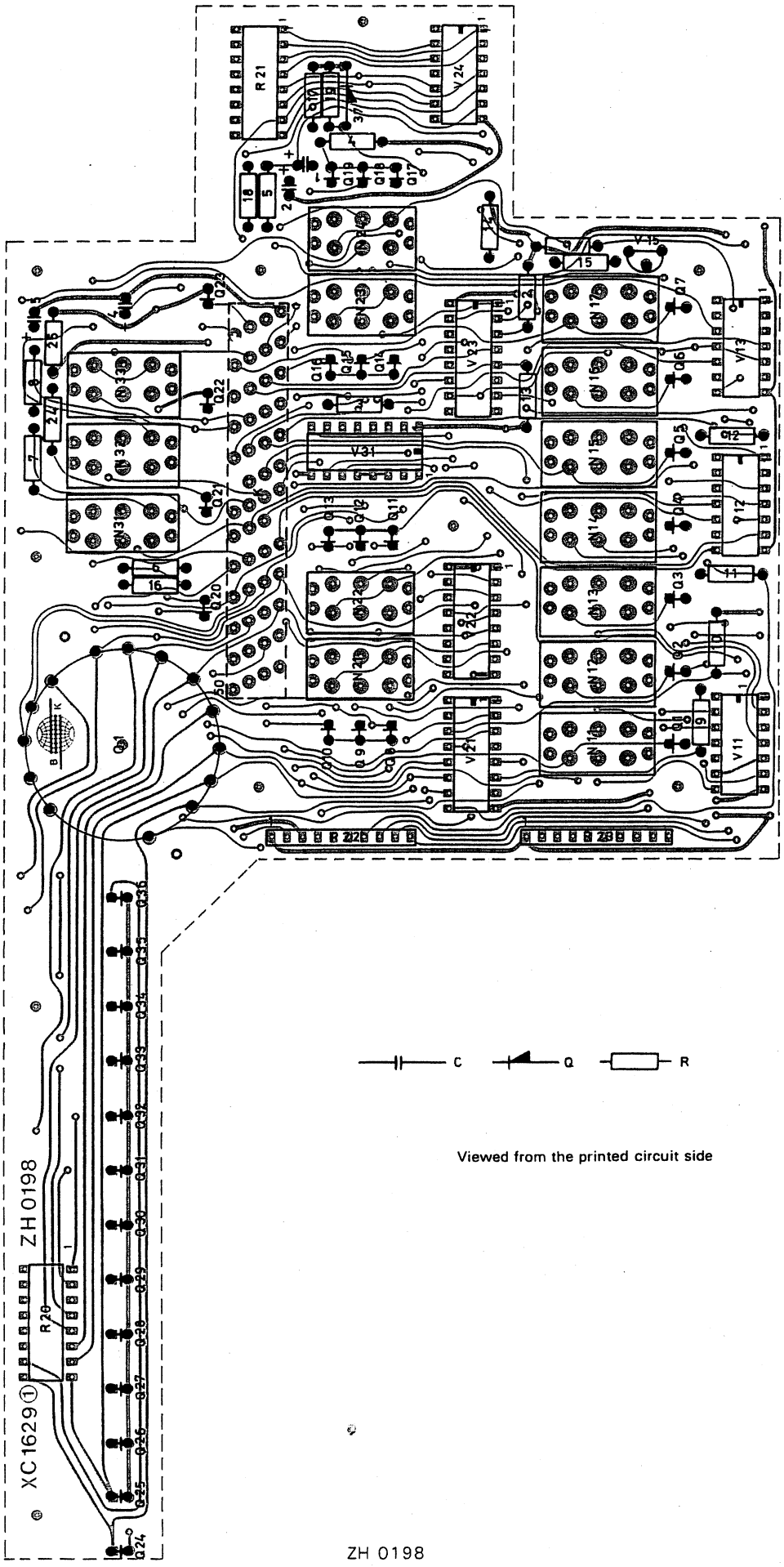
CIRCUIT DIAGRAM

See Interconnection Diagram 2636

Detector and Filter Control

ZH 0198

LAYOUT DIAGRAM



Viewed from the printed circuit side

ZH 0198

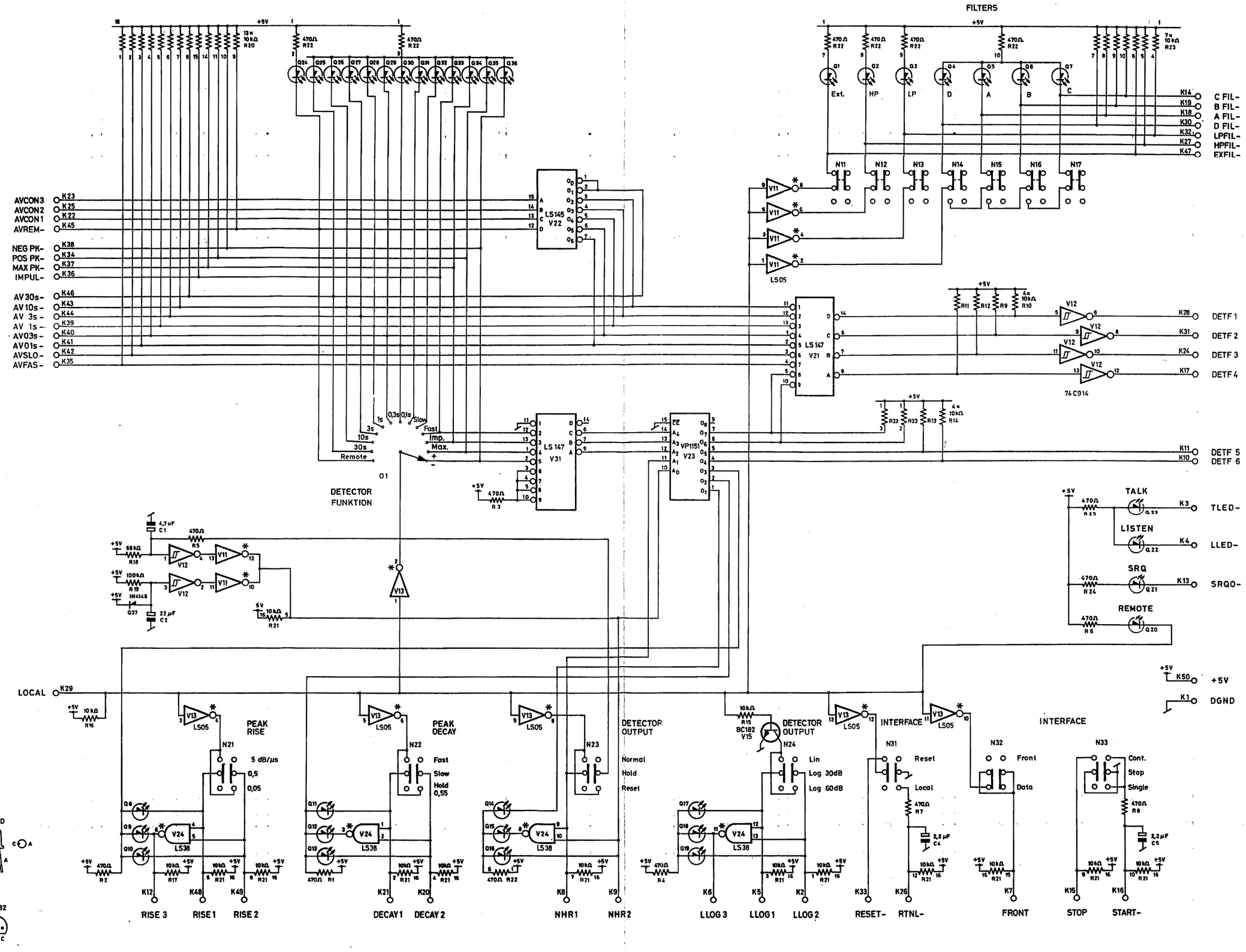
PARTS LIST

Note: Add 700 to all position numbers

C 1	Tantalum			4,7 µF/ 35 V	CF 0051
C 2	-			22 µF/ 16 V	CF 0031
C 4,5	-			2,2 µF/ 20 V	CF 0022
N 11-17	FILTERS				NN 0089
N 21,22	PEAK				NN 0090
N 23	DETECTOR OUTPUT				NN 0092
N 24	DETECTOR OUTPUT				NN 0090
N 31	SYSTEM RESET, LOCAL				NN 0091
N 32	FRONT, DATA				NN 0089
N 33	READ OUT, CONT STOP, SINGLE				NN 0092
O 1	DETECTOR FUNCTION				OG 3006
Q 1-36	LED CQY85NB				QV 4019
Q 37	Si 1N4148			75 V/75 mA	QV 0216
R 1-8	Carbon	1/4 W	5%	470 Ω	RB 2470
R 9-17	-	-	-	10 kΩ	RB 4100
R 18	-	-	-	68 kΩ	RB 4680
R 19	-	-	-	100 kΩ	RB 5100
R 20,21	Thickfilm			10 kΩ	RZ 0048
R 22	-			470 Ω	RZ 6247
R 23	-			10 kΩ	RZ 6410
R 24,25	Carbon	1/4 W	5%	470 Ω	RB 2470
V 11	6 × Inverter O/C			SN74LS05	VD 1035
V 12	6 × Schmitt Trigger			SN74C14	VD 2033
V 13	6 × Inverter O/C			SN74LS05	VD 1035
V 15	Silicon NPN			BC182	VB 0055
V 21	10 to 4 line Encoder			SN74LS147	VD 1083
V 22	BCD-to Decimal Dec./Dr.			SN74LS145	VD 1037
V 23	PROM 32 × 8 O/C			5600	VP 1151
V 24	4 × 2 NAND Buffer O/C			SN74LS38	VD 1084
V 31	10 to 4-line Encoder			SN74LS147	VD 1083
	Flatcable with Plug				AY 5034
	Printed Circuit Board				XC 1629

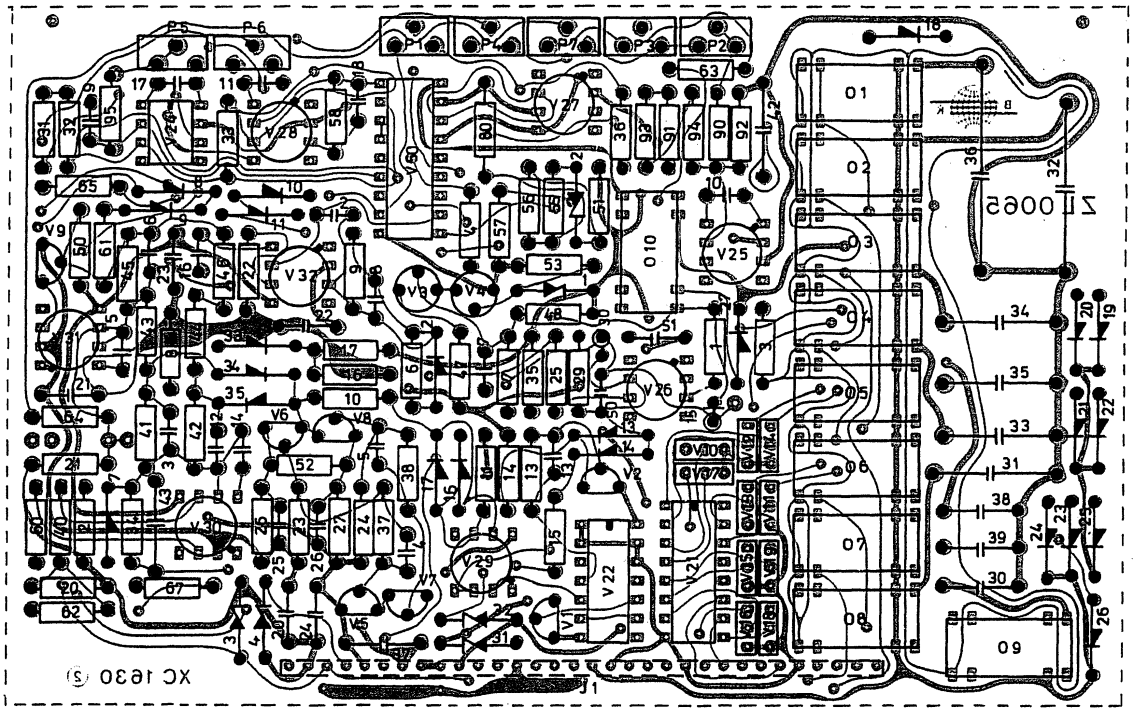
tector and Filter Control ZH 0198

CIRCUIT DIAGRAM



Note: Add 700 to all pos. no.

LAYOUT DIAGRAM



C Q Q R R Q

Viewed from the component side

PARTS LIST

Note: Add 800 to all position numbers

C 2	Ceramic		4,7 pF/400 V	CK 0470
C 3-7	-		10 pF/400 V	CK 1100
C 8	-		18 pF/400 V	CK 1180
C 9-11	-		27 pF/400 V	CK 1271
C 12	-		33 pF/400 V	CK 1330
C 13	-		47 pF/400 V	CK 1471
C 14-16	-		150 pF/400 V	CK 2151
C 17	-		220 pF/400 V	CK 2222
C 18	-		2,2 nF/400 V	CK 3221
C 20-24	-		47 nF/ 32 V	CK 4470
C 25,26	-		47 nF/ 16 V	CK 4471
C 30	Polycarbonate		22 nF/400 V	CS 0132
C 31	-		82 nF/100 V	CS 0236
C 32	-		3,3 µF/100 V	CS 0347
C 33	-		330 nF/100 V	CS 0350
C 34	-		1 µF/100 V	CS 0384
C 35	-		680 nF/100 V	CS 0388
C 36	-		10 µF/ 63 V	CS 0399
C 37	Polyester		47 nF/250 V	CS 0434
C 38	Polycarbonate		100 nF/100 V	CS 0409
C 39	-		33 nF/250 V	CS 0419
C 42	Polystyrene	1%	1 nF/ 63 V	CT 1132
C 43	-	-	68 pF/630 V	CT 1191
C 50	Ceramic		27 pF/400 V	CK 1271
C 51	-		47 nF/ 32 V	CK 4470
J 1	32-pin Plug			JP 3200
P 1	Cermet		50 Ω	PG 0504
P 2	-		20 kΩ	PG 3209
P 3	-		50 kΩ	PG 3515
P 4	-		100 kΩ	PG 4112
P 5	-		50 kΩ	PG 3515
P 6	-		500 kΩ	PG 4511
P 7	-		1 MΩ	PG 5111
Q 1-4	Ze.	1N4567	6,1-6,7 V/0,4 W	QV 0037
Q 7-27	Si.	1N4148	75 V/75 mA	QV 0216
Q 31,32	Ze.	BZX79C3V3	3,1-3,5 V/0,25 W	QV 1361
Q 33	Si.		HP 5082-2835	QV 5001
Q 34,35	-		HP 5082-2302	QV 5008

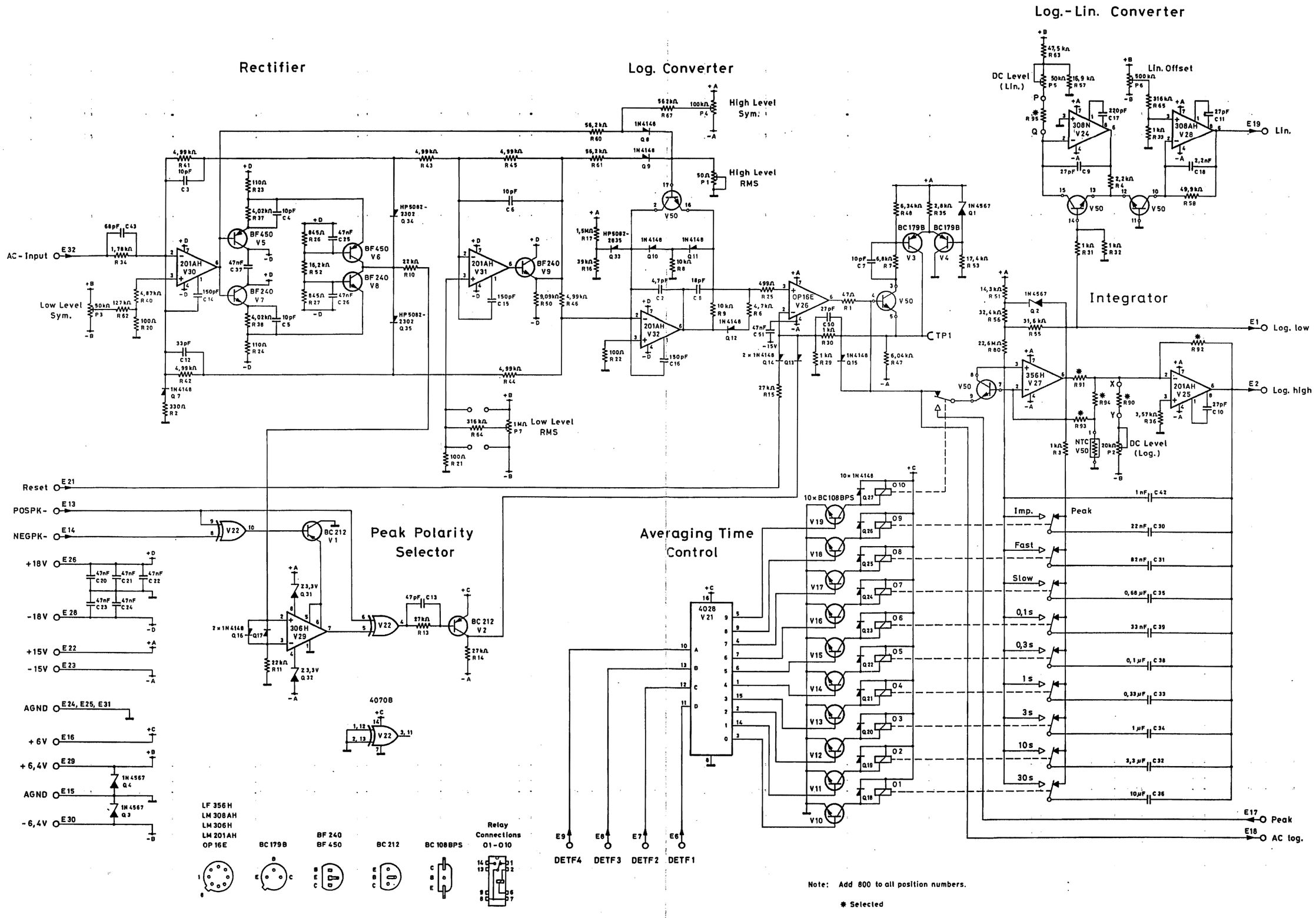
R 1	Carbon	1/4 W	5%	47 Ω	RB 1470
R 2	-	-	-	330 Ω	RB 2330
R 3	-	-	-	1,0 kΩ	RB 3100
R 4	-	-	-	2,2 kΩ	RB 3220
R 6	-	-	-	4,7 kΩ	RB 3470
R 7	-	-	-	6,8 kΩ	RB 3680
R 8.9	-	-	-	10 kΩ	RB 4100
R 10.11	-	-	-	22 kΩ	RB 4220
R 13-15	-	-	-	27 kΩ	RB 4270
R 16	-	-	-	39 kΩ	RB 4390
R 17	-	-	-	1,5 MΩ	RB 6150
R 20-22	Metal	-	1%	100 Ω	RF 2100
R 23,24	-	-	-	110 Ω	RF 2110
R 25	-	-	-	499 Ω	RF 2499
R 26.27	-	-	-	845 Ω	RF 2845
R 29-32	-	1,8 W	0,1 %	1,00 kΩ	RF 0296
R 33	-	1/4 W	1%	1,00 kΩ	RF 3100
R 34	-	-	-	1,78 kΩ	RF 3178
R 35	-	-	-	2,80 kΩ	RF 3280
R 36	-	-	-	3,57 kΩ	RF 3357
R 37,38	-	-	-	4,01 kΩ	RF 3401
R 40	-	-	-	4,87 kΩ	RF 3487
R 41-46	-	-	-	4,99 kΩ	RF 6066
R 47	-	-	-	6,04 kΩ	RF 3604
R 48	-	-	-	6,34 kΩ	RF 3634
R 50	-	-	-	9,09 kΩ	RF 3909
R 51	-	-	-	14,3 kΩ	RF 4143
R 52	-	-	-	16,2 kΩ	RF 4162
R 53	-	-	-	17,4 kΩ	RF 4174
R 55	-	-	-	31,6 kΩ	RF 4316
R 56	-	-	-	32,4 kΩ	RF 4324
R 57	-	-	-	16,9 kΩ	RF 4169
R 58	-	-	-	49,9 kΩ	RF 4499
R 60,61	-	-	-	56,2 kΩ	RF 4562
R 62	-	-	-	127 kΩ	RF 5127
R 63	-	-	-	47,5 kΩ	RF 4475
R 64,65	-	-	-	316 kΩ	RF 5316
R 67	-	-	-	562 kΩ	RF 5562
R 80	-	-	-	22,6 MΩ	RH 0040
R 90-95	Selected with V50				

V 1,2	Silicon	PNP	BC212	VB 0049
V 3,4	-	-	BC179B	VB 0100
V 5,6	-	-	BF450	VB 0131
V 7-9	-	-	BF240	VB 0599
V 10-19	-	-	BC108BPS	VB 0592
V 21	BCD to Decm./Bin to 8-Dec.		CD4028	VD 2017
V 22	4 Exclusive OR		CD4070B	VD 2019
V 24	Op. Amp.		LM308N	VE 0046
V 25	- -		LM201A	VE 0084
V 26	- -		OP16E	VE 0177
V 27	- -		LF356H	VE 0147
V 28	- -		LM308AH	VE 0087
V 29	Voltage Comparator		LM308AH	VE 0171
V 30-32	Op. Amp.		LM201AH	VE 0160
V 50	Thickfilm			ZE 0256

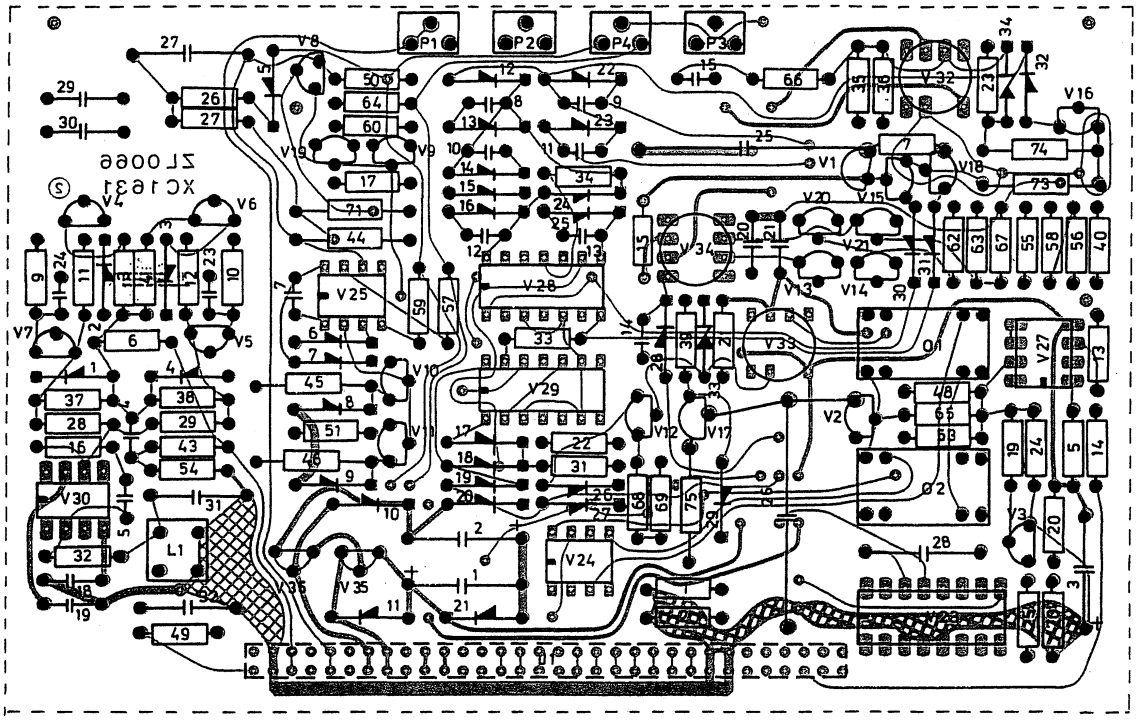
9-pin Socket	JJ 0910
Printed Circuit Board	XC 1630

Detector I ZL 0065

CIRCUIT DIAGRAM



LAYOUT DIAGRAM



Viewed from the component side

PARTS LIST

Note: Add 900 to all position numbers

C 1,2	Electrolytic		47 pF/ 25 V	CE 0491
C 3	-		22 µF/ 25 V	CE 2002
C 4	Ceramic		4.7 pF/400 V	CK 0470
C 5	-	5%	33 pF/400 V	CK 1330
C 7-14	-	5%	27 pF/400 V	CK 1271
C 15	-		2.2 nF/400 V	CK 3221
C 18-21	-		47 nF/ 32 V	CK 4470
C 23,24	-		47 nF/ 16 V	CK 4471
C 25,26	Polycarbonate		1 µF/100 V	CS 0336
C 27,28	-		0.47 µF/100 V	CS 0383
C 29,30	Polyester		0.1 µF/100 V	CS 0436
C 31	Polysterene	1%	200 pF/125 V	CT 1118
C 32	-	1%	270 pF/125 V	CT 1143
J 1	64-pin Plug			JP 6400
L 1	Coil		1,3 mH	LB 0925
O 1,2	Relay			OC 0072
P 1	Cermet		1 kΩ	PG 2114
P 2	-		2 kΩ	PG 2212
P 3	-		5 kΩ	PG 2520
P 4	-		200 kΩ	PG 4207
Q 1-32	Si 1N4148		75 V/75 mA	QV 0216
Q 33,34	Ze BZX79C6V2		6,1-6,3 V/0,25 W	QV 1372
R 1,2	Carbon	1/4 W 5%	1,0 Ω	RB 0100
R 3,4	-	- -	33 Ω	RB 1330
R 5	-	- -	47 Ω	RB 1470
R 6	-	- -	100 Ω	RB 2100
R 7	-	- -	220 Ω	RB 2220
R 9,10	-	- -	120 Ω	RB 2120
R 11,12			470 Ω	RB 2470
R 13,14			1,0 kΩ	RB 3100
R 15	-	- -	2,2 kΩ	RB 3220
R 16	-	- -	4,7 kΩ	RB 3470
R 17	-	- -	6,8 kΩ	RB 3680
R 19,20	-	- -	10 kΩ	RB 4100
R 21	-	- -	18 kΩ	RB 4180
R 22-24	-	- -	22 kΩ	RB 4220
R 25	-	- -	47 kΩ	RB 4470
R 26,27	-	- -	56 kΩ	RB 4560
R 28,29	-	- -	33 kΩ	RB 4330
R 31	-	- -	100 kΩ	RB 5100
R 32			1,0 kΩ	RB 3100
R 33	-	- -	120 kΩ	RB 5120
R 34-36	-	- -	220 kΩ	RB 5220
R 37,38	-	- -	330 kΩ	RB 5330
R 39,40	-	- -	1 MΩ	RB 6100

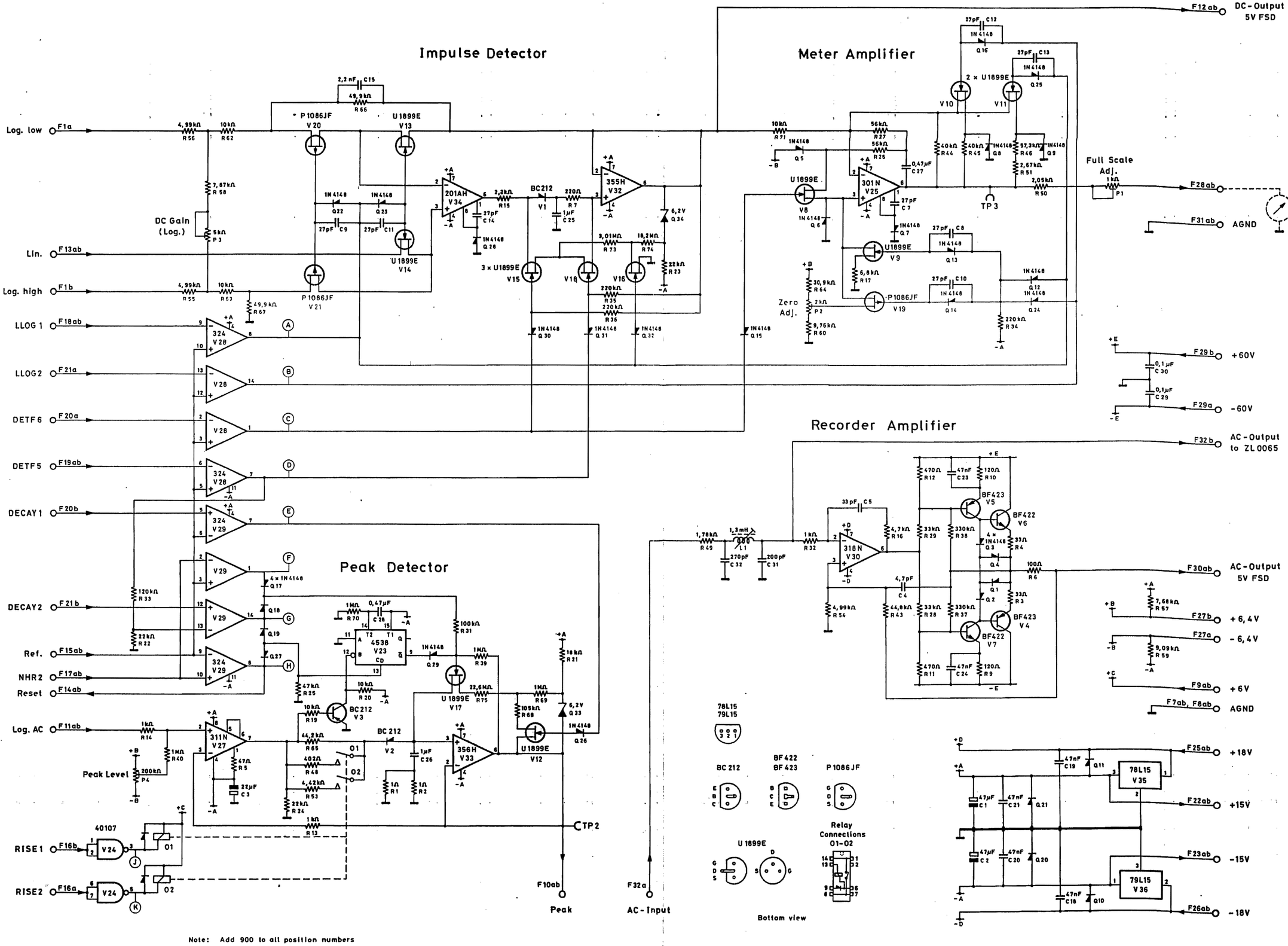
R 43	Metal	1/4 W	1%	44,8 kΩ RF 0029
R 44.45	-	-	0,1%	40,0 kΩ RF 0279
R 46	-	-	-	57,3 kΩ RF 0280
R 48	-	-	1%	402 Ω RF 2402
R 49	-	-	-	1,78 kΩ RF 3178
R 50	-	-	-	2,05 kΩ RF 3205
R 51	-	-	-	2,67 kΩ RF 3267
R 53	-	-	-	4,42 kΩ RF 3442
R 54-56	-	-	-	4,99 kΩ RF 3499
R 57	-	-	-	7,68 kΩ RF 3768
R 58	-	-	-	7,87 kΩ RF 3787
R 59	-	-	-	9,09 kΩ RF 3909
R 60	-	-	-	9,76 kΩ RF 3976
R 62.63	-	-	-	10,0 kΩ RF 4100
R 64	-	-	-	30,9 kΩ RF 4309
R 65	-	-	-	44,2 kΩ RF 4442
R 66,67	-	-	-	49,9 kΩ RF 4499
R 68	-	-	-	105 kΩ RF 5105
R 69.70	-	-	-	1,00 MΩ RF 6100
R 71	-	-	0,1%	10,0 kΩ RF 6229
R 73	Carbon	-	5%	3,01 MΩ RH 0038
R 74	-	-	-	18,2 MΩ RH 0039
R 75	-	-	-	22,6 MΩ RH 0040

V 1-3	Silicon	BC212	VB 0049
V 4.5	-	BF423	VB 0132
V 6.7	-	BF422	VB 0600
V 8-16	FET	U1899	VB 1063
V 17,18	- Selected	U1899	VB 1065
V 19-21	-	P1086	VB 1506
V 23	2 × Precision Monost. Multiv	CD4538	VD 2097
V 24	2 × 2 Input NAND Driver	CD40107	VD 2101
V 25	Op. Amp	LM301AN	VE 0017
V 27	Comparator	LM311N	VE 0054
V 28,29	Op. Amp.	LM324N	VE 0074
V 30	-	LM318	VE 0083
V 32	-	LF355H	VE 0107
V 33	-	LF356H	VE 0147
V 34	-	LM201AH	VE 0160
V 35	+ 15 V Voltage Regulator	78L15	VE 0188
V 36	−15 V Voltage Regulator	79L15	VE 0189

Heatsink	DT 0075
14-pin Socket	JJ 1416
Printed Circuit Board	XC 1631

Detector II ZL 0066

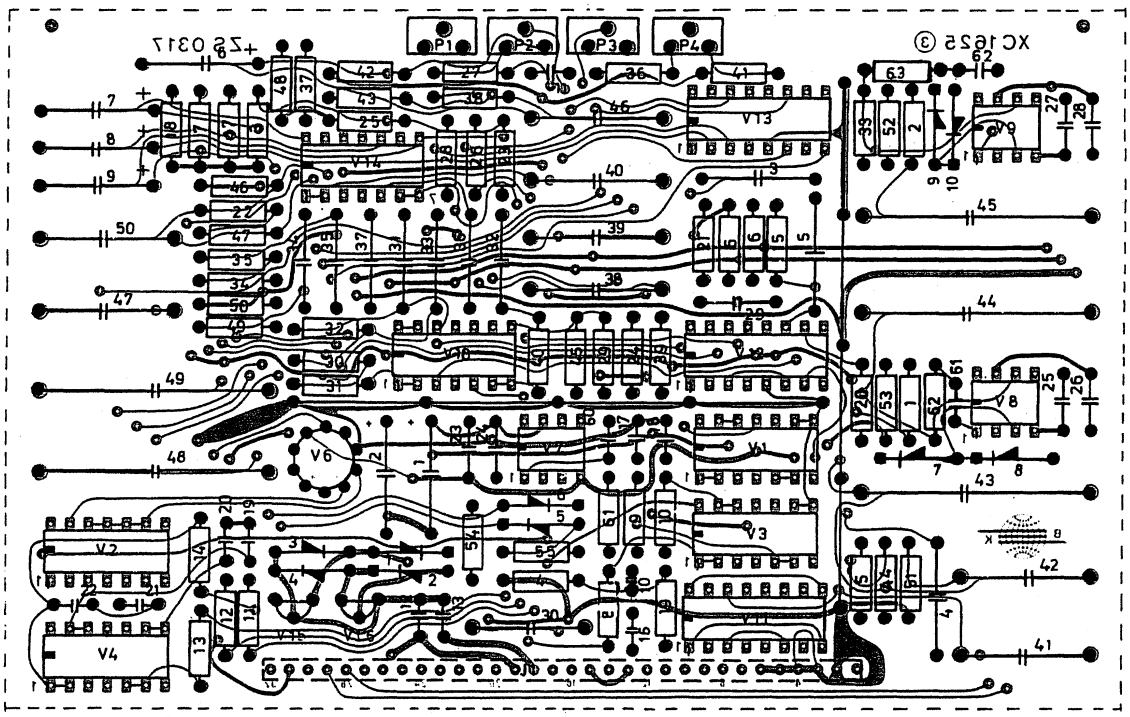
CIRCUIT DIAGRAM



Filter Circuit

ZS 0317

LAYOUT DIAGRAM



Viewed from the component side

PARTS LIST

Note: Add 300 to all position numbers

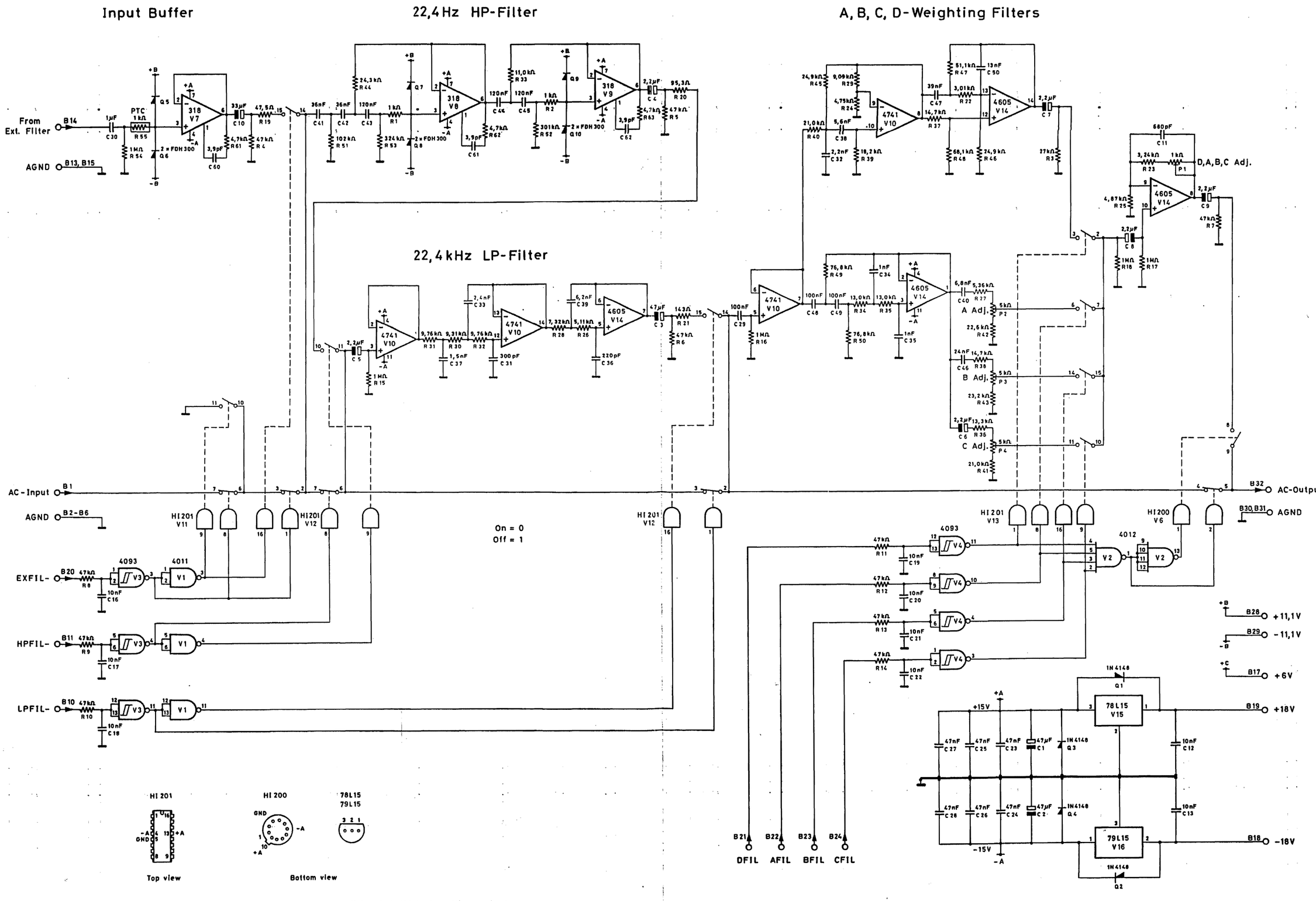
C 1,2	Electrolytic		47 µF/25 V	CE 0491
C 3	-		47 µF/ 10 V	CE 0204
C 4-9	-		2,2 µF/ 63 V	CE 0401
C 10	Tantalum		33 µF/ 10 V	CF 0034
C 11	Ceramic		680 pF/400 V	CK 2682
C 12,13	-		10 nF/ 30 V	CK 4101
C 16-21	-		10 nF/ 30 V	CK 4101
C 23-28	-		47 nF/ 30 V	CK 4470
C 29	Polycarbonate		100 nF/100 V	CS 0409
C 30	-		1 µF/100 V	CS 0384
C 31	Polysterene 1%		300 pF/125 V	CT 1112
C 32	-	1%	2,2 nF/ 63 V	CT 1126
C 33	-	1%	2,4 nF/ 63 V	CT 1129
C 34,35	-	1%	1,0 nF/ 63 V	CT 1132
C 36	-	1%	220 pF/125 V	CT 1141
C 37	-	1%	1,5 nF/ 63 V	CT 1151
C 38	-	1%	5,6 nF/ 63 V	CT 1509
C 39	-	1%	6,2 nF/ 63 V	CT 1510
C 40	-	1%	6,8 nF/ 63 V	CT 1511
C 41,42	-	1%	36 nF/ 63 V	CT 1520
C 43-45	-	1%	120 nF/ 63 V	CT 1525
C 46	-	1%	24 nF/ 63 V	CT 1540
C 47	-	1%	39 nF/ 63 V	CT 1541
C 48,49	-	1%	100 nF/ 63 V	CT 1543
C 50	-	1%	13 nF/ 63 V	CT 1560
C 60-62	Ceramic		3,9 pF/400 V	CK 0390
J 1	32-pin Plug			JP 3200
P 1	Cermet		1 kΩ	PG 2114
P 2-4	-		5 kΩ	PG 2520
Q 1-4	Si.	1N4148	75 V/75 mA	QV 0216
Q 5-10	-	FDH300	150 V/200 mA	QV 0242

R 1,2	Carbon	1/4 W	5%	1,0 kΩ RB 3100
R 3	-	-	-	27 kΩ RB 4270
R 4-14	-	-	-	47 kΩ RB 4470
R 15-18	-	-	-	1 MΩ RB 6100
R 19	Metal	-	1%	47,5 Ω RF 1475
R 20	-	-	-	95,3 Ω RF 1953
R 21	-	-	-	143 Ω RF 2143
R 22	-	-	-	3,01 kΩ RF 3301
R 23	-	-	-	3,24 kΩ RF 3324
R 24	-	-	-	4,75 kΩ RF 3475
R 25	-	-	-	4,87 kΩ RF 3487
R 26	-	-	-	5,11 kΩ RF 3511
R 27	-	-	-	5,36 kΩ RF 3536
R 28	-	-	-	7,32 kΩ RF 3732
R 29	-	-	-	9,09 kΩ RF 3909
R 30	-	-	-	9,31 kΩ RF 3931
R 31,32	-	-	-	9,76 kΩ RF 3976
R 33	-	-	-	11,0 kΩ RF 4110
R 34,35	-	-	-	13,0 kΩ RF 4130
R 36	-	-	-	13,3 kΩ RF 4133
R 37,38	-	-	-	14,7 kΩ RF 4147
R 39	-	-	-	18,2 kΩ RF 4182
R 40,41	-	-	-	21,0 kΩ RF 4210
R 42	-	-	-	22,6 kΩ RF 4226
R 43	-	-	-	23,2 kΩ RF 4232
R 44	-	-	-	24,3 kΩ RF 4243
R 45,46	-	-	-	24,9 kΩ RF 4249
R 47	-	-	-	51,1 kΩ RF 4511
R 48	-	-	-	68,1 kΩ RF 4681
R 49,50	-	-	-	76,8 kΩ RF 4768
R 51	-	-	-	102 kΩ RF 5102
R 52	-	-	-	301 kΩ RF 5301
R 53	-	-	-	324 kΩ RF 5324
R 54	-	-	-	1 MΩ RF 6100
R 55	PTC			1 kΩ RN 0203
R 61-63	Carbon	1/4 W	5%	4,7 kΩ RB 3470

V 1	4 x 2 Input NAND	CD4011B	VD 2004
V 2	2 x 4 Input NAND	CD4012B	VD 2005
V 3,4	4 x 2 Input NAND Sch.trig.	CD4093B	VD 2081
V 6	2 x Analog Switch	HI200	VE 0070
V 7-9	Op. Amp.	LM318	VE 0083
V 10	Op. Amp.	HA4741-5	VE 0112
V 11-13	4 x Analog Switch	HI201	VE 0149
V 14	4 x Op. Amp.	HA4605-5	VE 0172
V 15	+ 15 V Voltage Regulator	78L15	VE 0188
V 16	−15 V Voltage Regulator	79L15	VE 0189
	14-pin Socket		JJ 1416
	Printed Circuit Board		XC 1625

Filter Circuit ZS 0317

CIRCUIT DIAGRAM



Note: Add 300 to all position numbers.

BRÜEL & KJÆR
Nærum - Denmark

Interconnection Diagram/Parts List **2636.9**

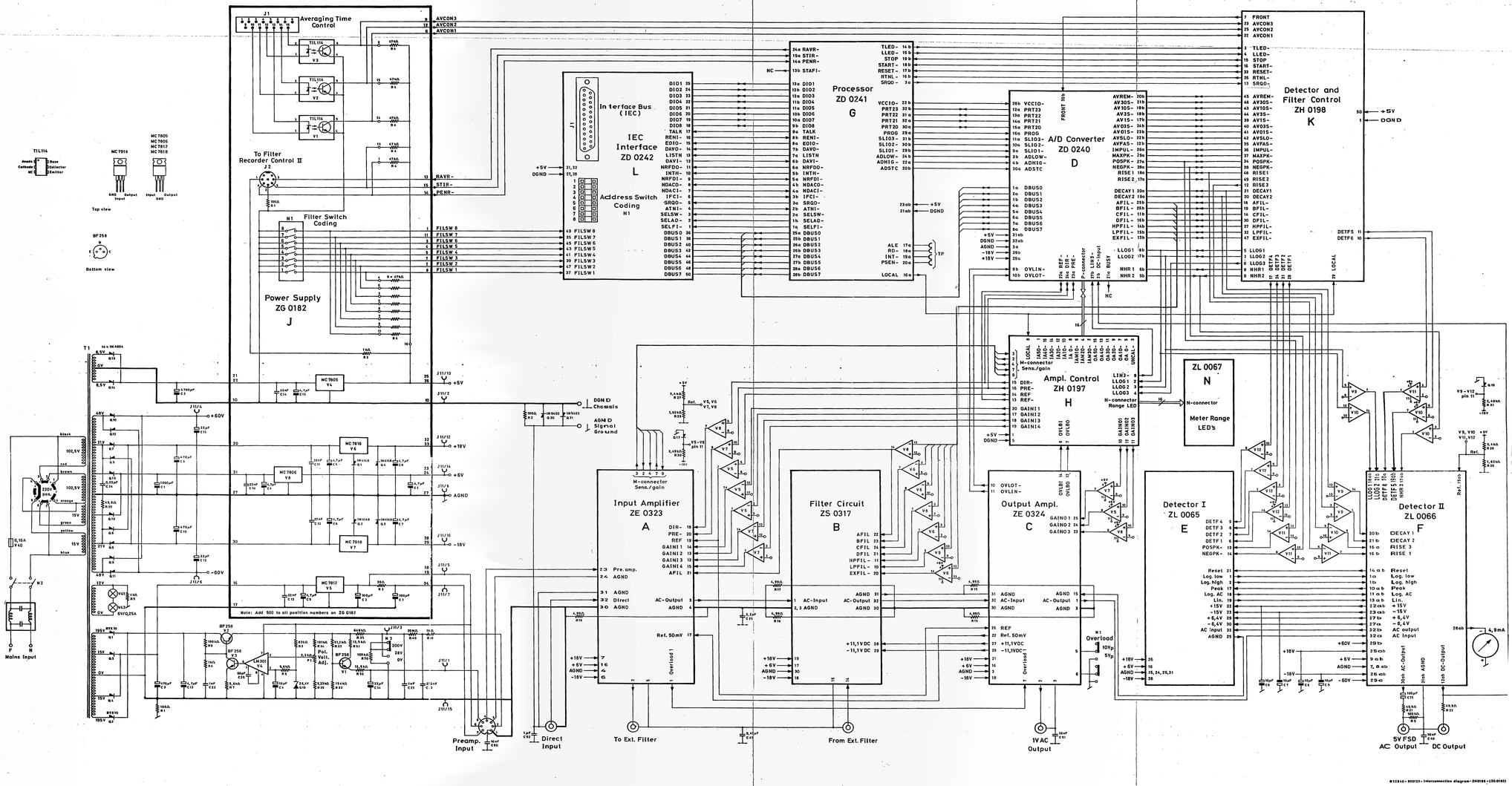
Miscellaneous

C 40	Polycarbonate	10 nF/250 V	CS 0101
C 41	-	470 nF/100 V	CS 0335
C 50,51	-	10 nF/250 V	CS 0101
C 52	-	1 µF/100 V	CS 0336
N 2	Power On/Off	-	NN 0114
N 3	Pot. Volt.	-	NN 0101
Q 30,31	Si. 1N5402	200 V/3 A	QV 0212
R 70	Metal 1/4 W	1% 105 kΩ	RF 5105
T 1	Mains Transformer		TN 1015
V 40	Fuse	0,16 A	VF 0051
V 41,42	Lamp	7 V/0,25 A	VS 1273

Metal Link Chassis - Signal Ground	DK 0182
Moving Coil Instrument	IM 0077
"1 V AC Output"	JJ 0108
"Direct Input"	JJ 0108
"To Ext. Filter"	JJ 0130
"5 V FDS AC Output"	JJ 0130
"DC Output"	JJ 0130
"From Ext. Filter"	JJ 0130
"Preamp. Input"	JJ 0705
Lamp Clamp	JO 0028
Fuse Socket	JS 0037
Banana Socket	JT 6204
Voltage Selector	OA 0050
Knob 10 mm	SN 1022
Cover for above	DD 0089
Knob 20 mm	SN 2011
Hinge for Moving Coil Instr.	UC 0074/75
Fuse 0,315 A	VF 0042
Fuse 0,160 A	VF 0051
Input Probe 10:1	ZC 0016
"Mains Input"	ZS 0310

Furthermore 2636 includes following subassemblies the desails of which will be found under the respective numbers

A/D Converter	ZD 0240
Processor	ZD 0241
IEC-Interface	ZD 0242
Input Amplifier	ZE 0323
Output Amplifier	ZE 0324
Power Supply	ZG 0182
Mother Board	ZH 0196
Amplifier Control	ZL 0067, ZH 0197
Detector and Filter Control	ZH 0198
Detector I	ZL 0065
Detector II	ZL 0066
Filter Circuit	ZS 0317



612646-800122- Interconnection diagram - ZH0198 + ZS0317