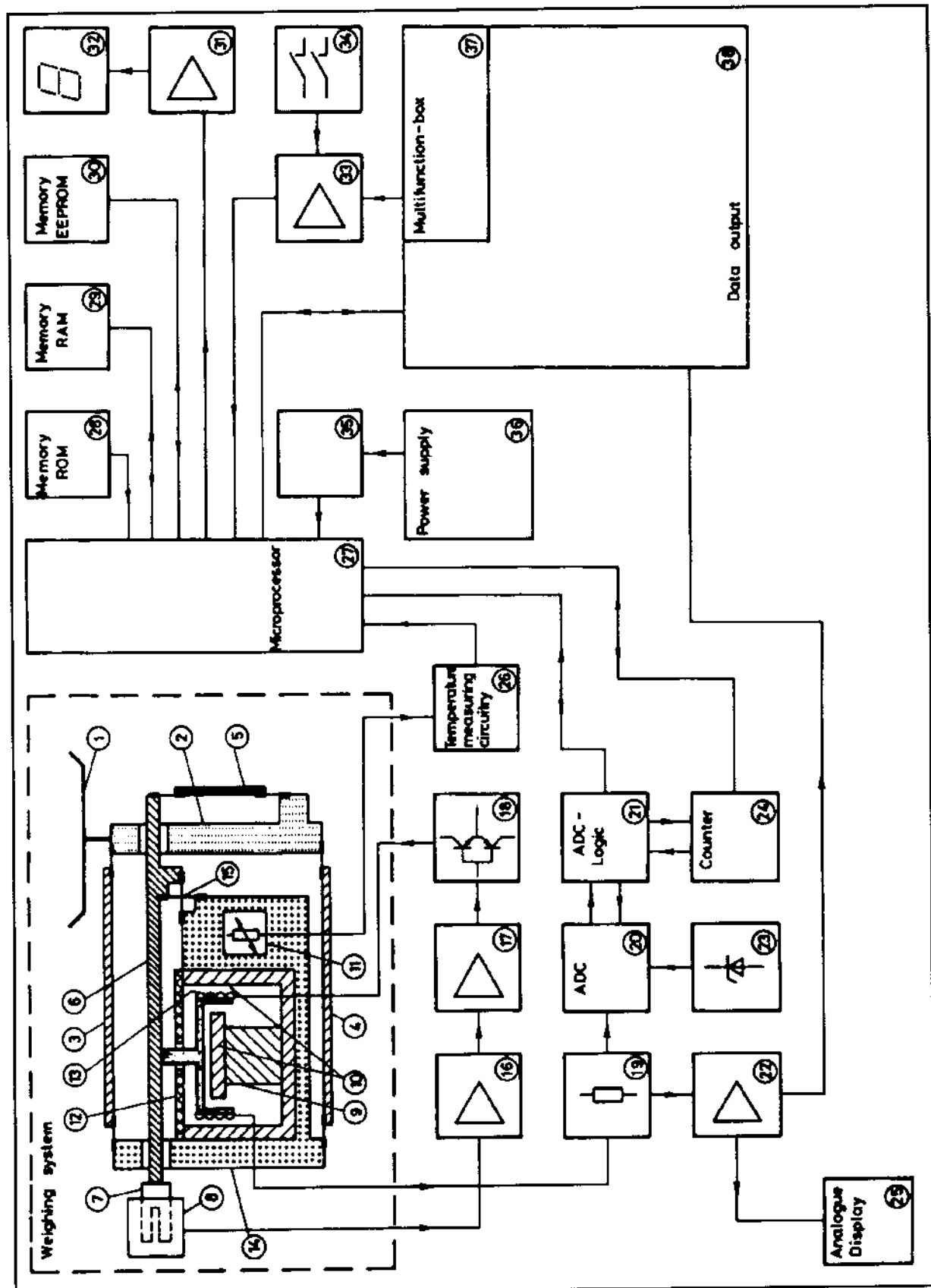


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- Justieranleitung		D 05.01
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## ELEMENTARY DIAGRAM



### **LEGEND OF ELEMENTARY DIAGRAM**

1. Weighing pan
2. Support
3. Top flexure arm
4. Bottom flexure arm
5. Flexure strap
6. Balance arm
7. Vane
8. Light detector
9. Permanent magnet
10. Pole piece
11. Temperature compensation (NTC-Resistor)
12. Magnetism screen
13. Compensation coil
14. Chassis
15. Balance arm's flexure
16. Input amplifier
17. PID-Regulator
18. Power amplifier
19. Measure resistor
20. Analogue-Digital Converter (ADC)
21. ADC-Logic
22. Buffer amplifier
23. Reference voltage source
24. Counter
25. Analogue display
26. Temperature measuring circuitry
27. Microprocessor
28. Programme memory (EPROM)
29. Data memory (RAM)
30. Non-Volatile data memory (EEPROM)
31. Display controller
32. Display
33. Key driver
34. ON/OFF, MODE and T-Key
35. "Power-ON-Reset" Logic
36. Power Supply
37. Multifunctionbox
38. Analogue output

### FUNCTIONAL DESCRIPTION

#### Weighing System Description

##### Mechanics

The force caused by any weight which is placed on the weighing pan [1] reaches the support [2] directly. The support [2] is sustained in a parallel configuration by the top [3] and bottom [4] flexure arms. The support [2] leads the force through the flexure strap [5] to the balance arm [6]. The arm [6] is connected to the flexures [15] on the chassis [14]. The balance arm [6] leads the force with a certain reduction ratio to the compensation coil [13] which is located in the center of the magnetic-system.

##### Magnetic-System

The magnetic system consists of a permanent magnet [9] and the pole piece [10]. They lead the magnetic field to the compensation coil [13]. The magnetic system, is covered by a screen [12], to inhibit the break-out of the stray-field.

##### Balance arm location

The position of the balance arm [6] is set by the light detector [8] which gets the light through the vane [7].

##### Measure principle and regulation

Any weight placed on the weighing pan [1] moves the balance arm [6] from its zero-position. The light detector [8] gives the deviation from the zero-position as an electric signal to the input amplifier [16] and to the PID-Regulator [17]. The PID-Regulator [17] changes its output voltage, which goes via the power amplifier [18] to the compensation coil [13], till the force change on the coil [13] is sufficient to put the balance arm [6] back to its initial zero-position. The position of the balance arm [6], is in the steady-state now, and the current through the coil [13] is proportional to the weight placed on the weighing pan [1].

##### Electronical Evaluation of the Measure Current

The coils' current is converted to a measure voltage by the measure resistor [19]. This measure voltage goes on the one side via the buffer-amplifier [22], to the analogue display [25], and the analogue output [38]; on the other side it feeds the analogue to digital converter [20] (AD-Converter). The AD-Converter [20] compares the signal with the reference voltage source [23]. The AD-Converter [20] works in the "Dual-Slope-Method" and is controlled by the microprocessor [27] by means of the AD-Logic [21]. The digital output signal reaches the microprocessor [27] through the counter [24]. The Reset-Logic [35] supervises the power supply [36] and enables the microprocessor [27] to run, if there is sufficient supply voltage. The microprocessor [27] sends the display-data to the display-controller [31], where the data is latched and displayed by the display [32].

The keys "ON/OFF", "MODE" and "T" [34] give information through the driver [33] to the microprocessor. If the balance is switched off by the "ON/OFF"-key, it remains in the "standby" mode, that means the balance is ready to work with no warm-up time after switching on again.

### Microprocessor System

The microprocessor system consists of the following parts:

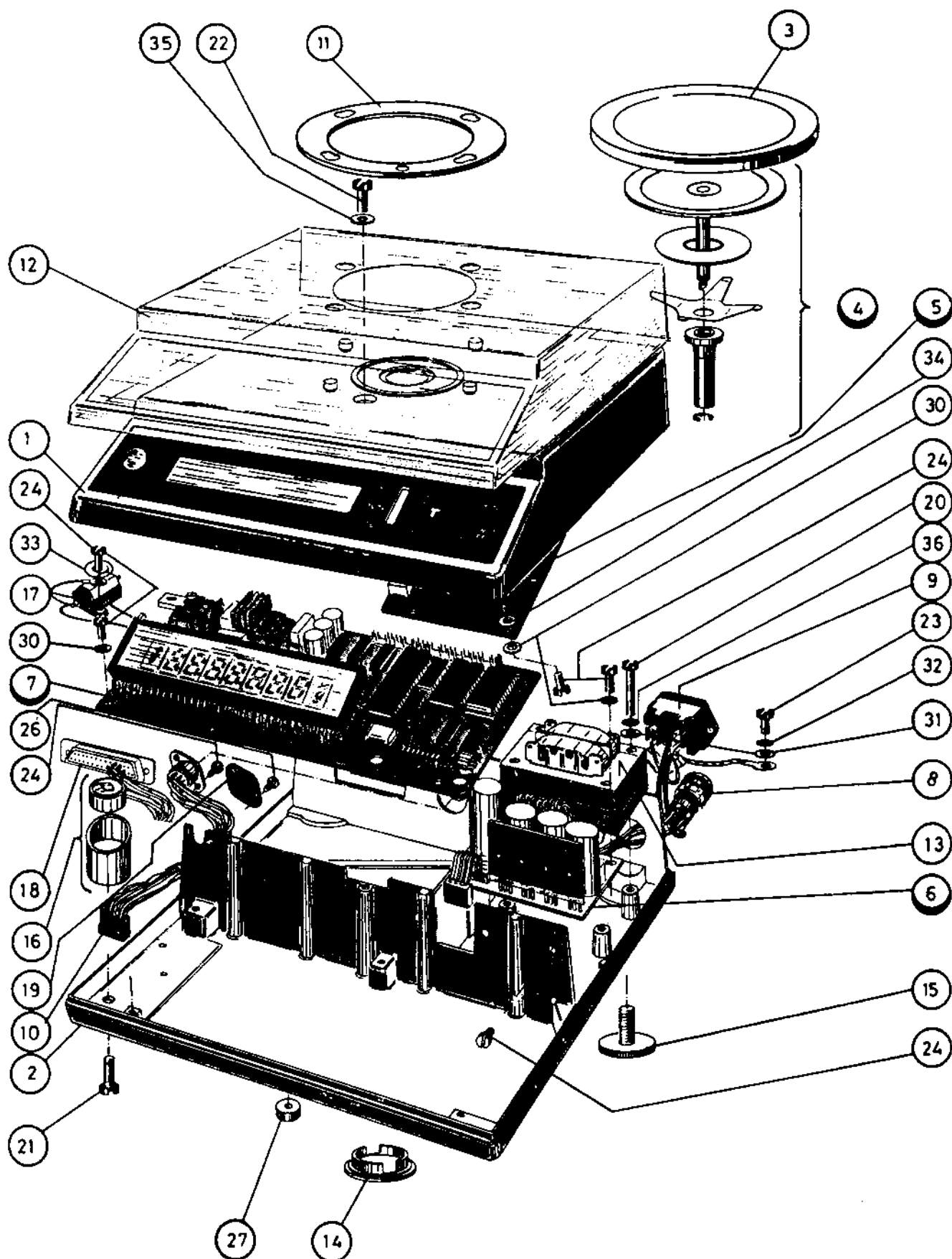
- |                                 |   |
|---------------------------------|---|
| Programme [28] :                | Command memory of the microprocessor [27] . It contains the programme instructions in a "Read Only Memory" (ROM).   |
| Data memory [29] :              | Data memory of the microprocessor . This memory is used to store and read the data. After a mains failure the data is not available anymore. It is a "Static Random Access Memory" (RAM).   |
| Non-Volatile data memory [30] : | This memory is used to store the important data that has to be available after a mains failure (e.g. Linearity data, calibration data, temperature adjustment data). It contains an "Electrically Erasable Programmable Read Only Memory" (EEPROM). |

The following tasks are done by the Microprocessor :

- Read and evaluated the data of the A-D Converter
- Optimize the integration time stability detection
- Measure the temperature of the weighing system
- Compensation of the temperature drift on the zero point
- Compensation of the temperature drift on the sensitivity
- Correction of non-linearity
- Calibration to a reference weight
- Drive the data-output
- Execute the multifunctionbox commands (e.g. piece-counting)
- Read the "T", "MODE" and "ON/OFF"-keys

# Precisa SERIES-300

BALANCE (without weighing cell)



# Precisa *SERIES-300*

*BALANCE (without weighing cell)*

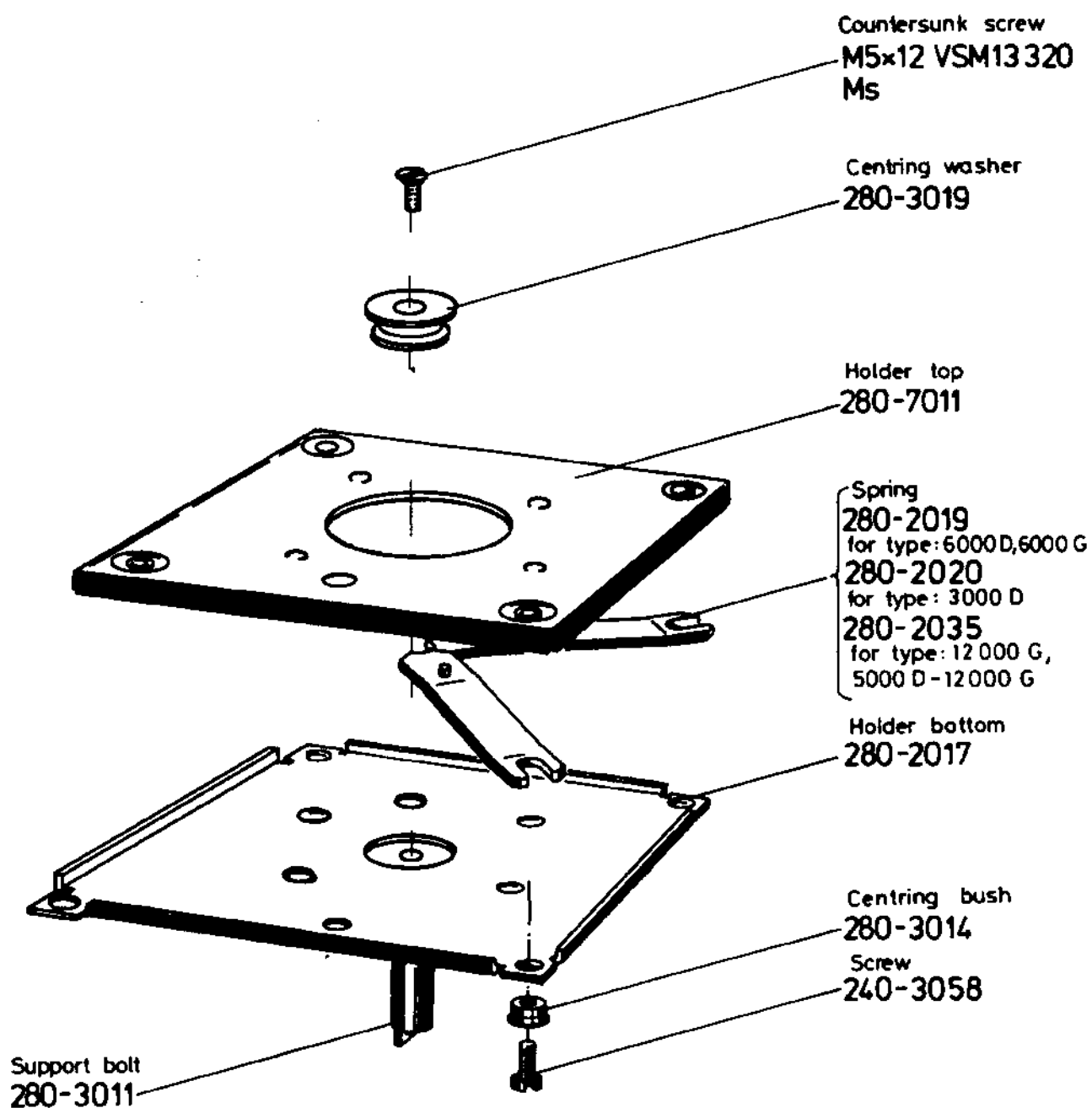
<u>Key No.</u>	<u>Part No.</u>	<u>Description</u>
1	300-9002	Housing's top with spirit level
2	300-9000	Housing's bottom (low-resolution)
(2)	300-9001	Housing's bottom (high-resolution)
3	270-2000	Weighing pan Ø 80mm for type: 125A, 80A-200M
(3)	280-7003	Weighing pan Ø 150mm for type: 160M, 220M, 100M-300C, 400M, 800M, 500M-2000C
(3)	280-7004	Weighing pan Ø 170mm for type: 300C, 600C, 1600C, 2200C, 1000C-3000D, 4000C, 3000C-6000D
(3)	280-7005	Weighing pan rectangle 190x223 for type: 3000D, 6000D, 6000G, 12000G, 5000D-12000G
4	280-8023	Pan holder for type: 125A, 80A-200M
(4)	280-8000	Pan holder for type: 300C, 160M, 220M, 100M-300C, 400M
(4)	280-8005	Pan holder for type: 600C, 800M
(4)	280-8019	Pan holder for type: 1000C-3000D
(4)	280-8024	Panholder for type: 4000C
(4)	280-8025	Panholder for type: 3000C-6000D
(4)	280-8028	Pan holder for type: 1600C, 2200C, 500M-2000C
(4)	280-8006	Panholder rectangle for type: 3000D
(4)	280-8016	Panholder rectangle for type: 12000G, 5000D-12000G
5	300-7202/10	Analogue board
(6)	280-7203/10	Power supply board (high-resolution)
6	300-7203/10	Power supply board (low-resolution)
7	300-7200/10	Main board (low-resolution)
(7)	300-7201/10	Main board (high-resolution)
8	280-8009	Voltage selector
9	300-8000	Socket with fuse compl.
10	300-7001	Plug compl. for multifunction box
11	280-2016	Retention ring
12	280-4003	Dust cover
13	280-7002	Transformer (high-resolution)
13	300-7000	Transformer (low-resolution)
14	240-4042	Cover
15	280-4015	Levelling Screw
16	280-7023	Levelling unit compl.
17	280-8010/2	Measure resistor 31 for type: 12000G, 5000D-12000G
(17)	280-8010/4	Measure resistor 51 for type: 4000C, 3000C-6000D

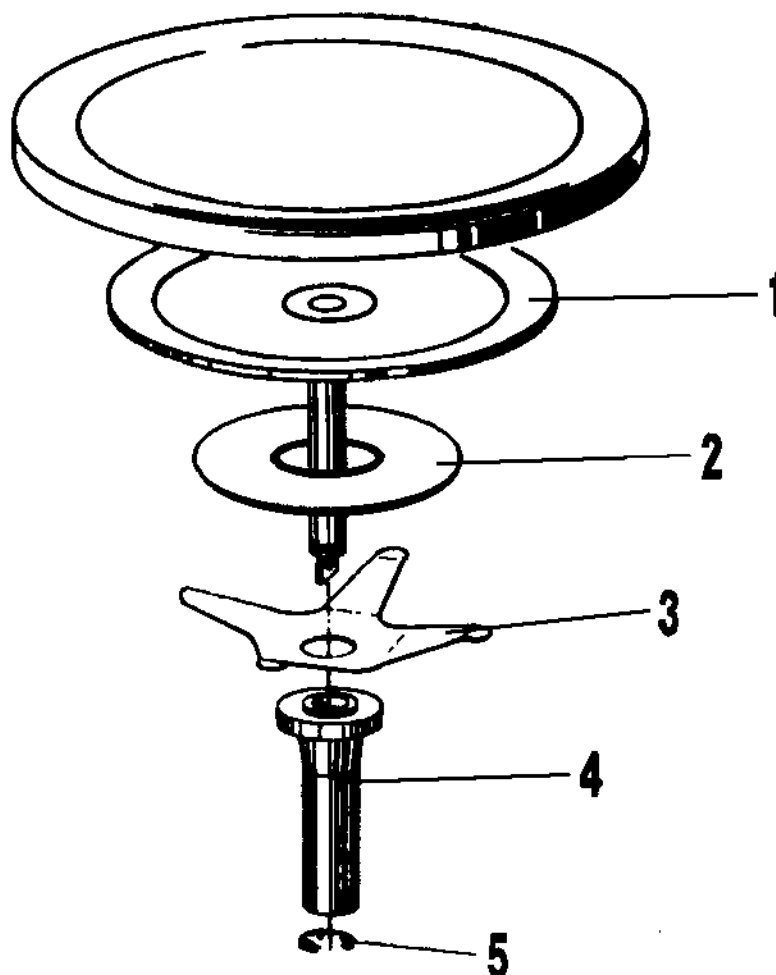
# **Precisa** *SERIES-300*

*BALANCE (without weighing cell)*

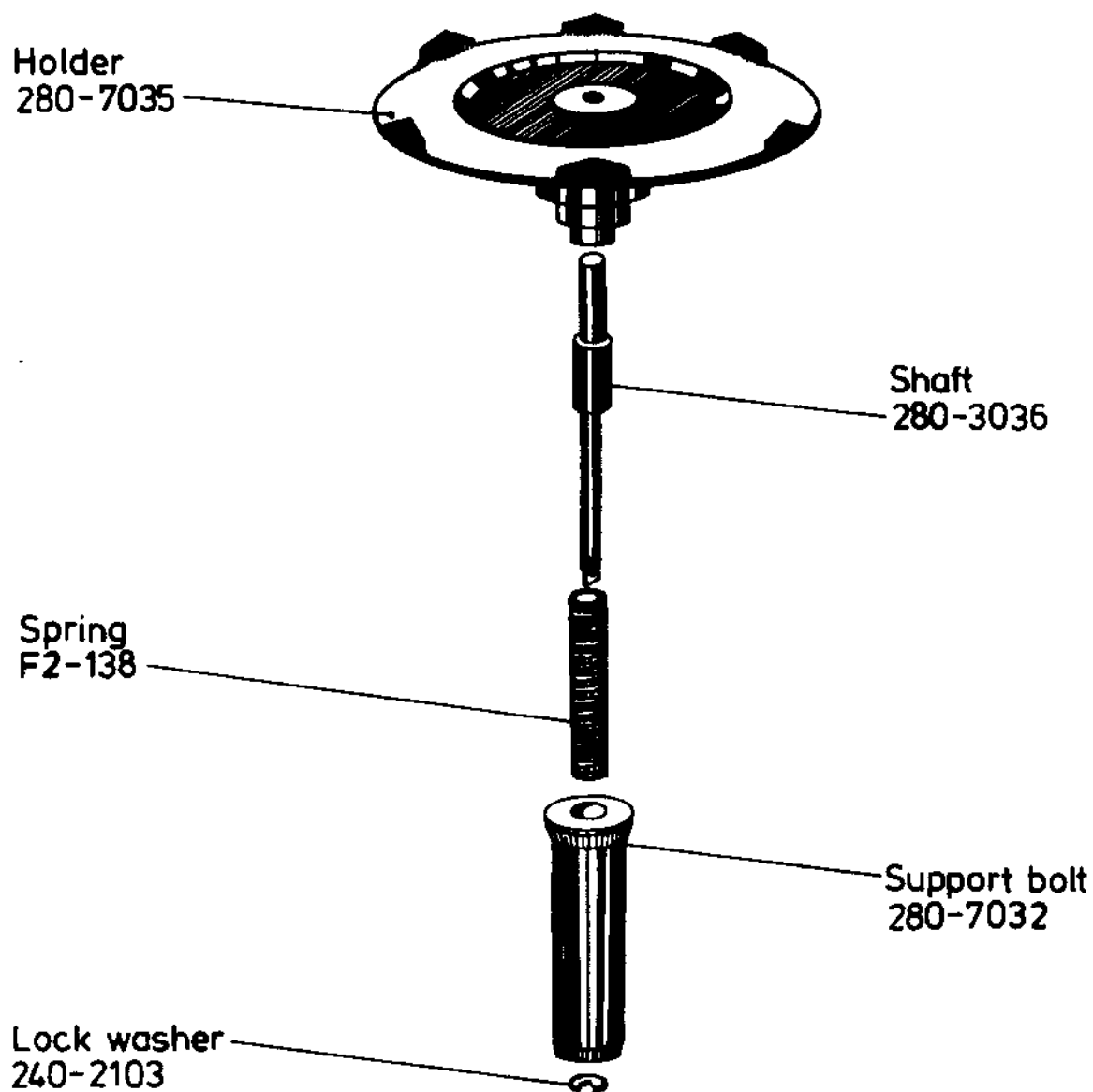
<b><u>Key No.</u></b>	<b><u>Part No.</u></b>	<b><u>Description</u></b>
(17)	280-8010/5	Measure resistor 75 for type: 1000C-3000D, 6000D
(17)	280-8010/6	Measure resistor 100 for type: 800M, 600C, 1600C, 2200C, 6000G, 500M-2000C
(17)	280-8010/8	Measure resistor 125 for type: 400M
(17)	280-8010/9	Measure resistor 190 for type: 300C
(17)	280-8010/10	Measure resistor 270 for type: 80A-200M, 100M-300C
(17)	280-8010/11	Measure resistor 360 for type: 160M, 220M
(17)	280-8010/12	Measure resistor 390 for type: 125A
18	350-7042	Interface-Cable V24/RS232 bi-directional
19	280-4000	Cover plate small
20	VSM 13300	Screw M4x30
21	VSM 13300	Screw M4x10
22	VSM 13300	Screw M4x8
23	VSM 13300	Screw M4x6
24	VSM 13304	Screw M3x6
26	VSM 13328	Screw M3x4
27	280-4010	Rubber foot
30	240-4052	Washer
31	VSM 13904	Washer Ø 4,3
32	VSM 12754 A	Spring washer Ø 4,3
33	VSM 12754 A	Spring washer Ø 3,2
34	280-2023	Spring disk
35	VSM 13904	Washer Ø 4,2
36	VSM 12740 B	Spring washer Ø 4,3





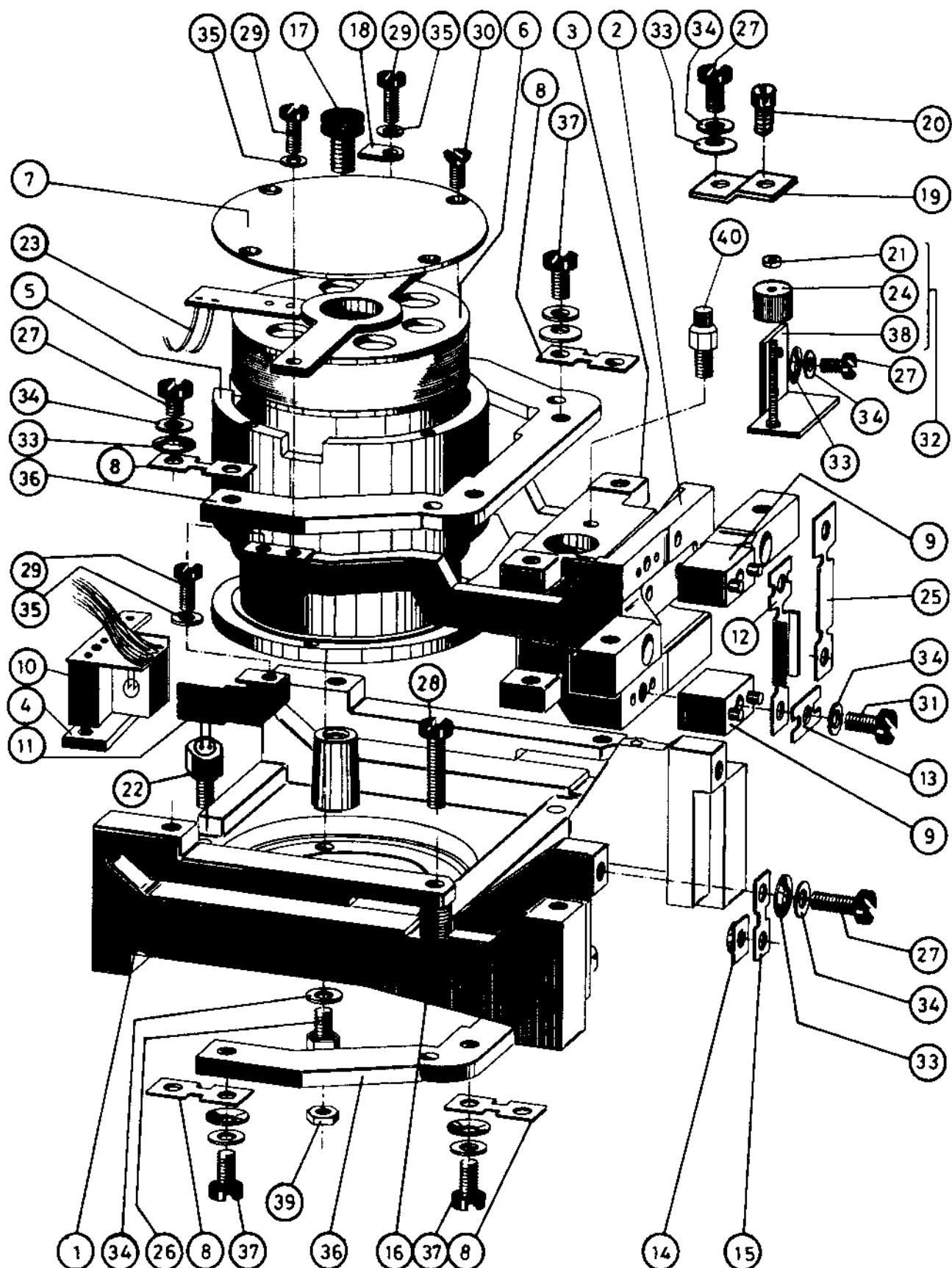


Key-No.	Part-No.	Description	Dimension
1	280-7006	Holder	
2	300-2003	Washer	0,4mm
	300-2004	Washer	0,6mm
3	280-2021	Spring for type: 160M, 220M, 400M, 100M-300C	
(3)	280-2022	Spring for type: 800M, 600C	
(3)	280-2041	Spring for type: 1600C, 2200C, 500M-2000C, 1000C-3000D	
4	280-3018	Support bolt	
5	PN 1024/6	Lock washer	



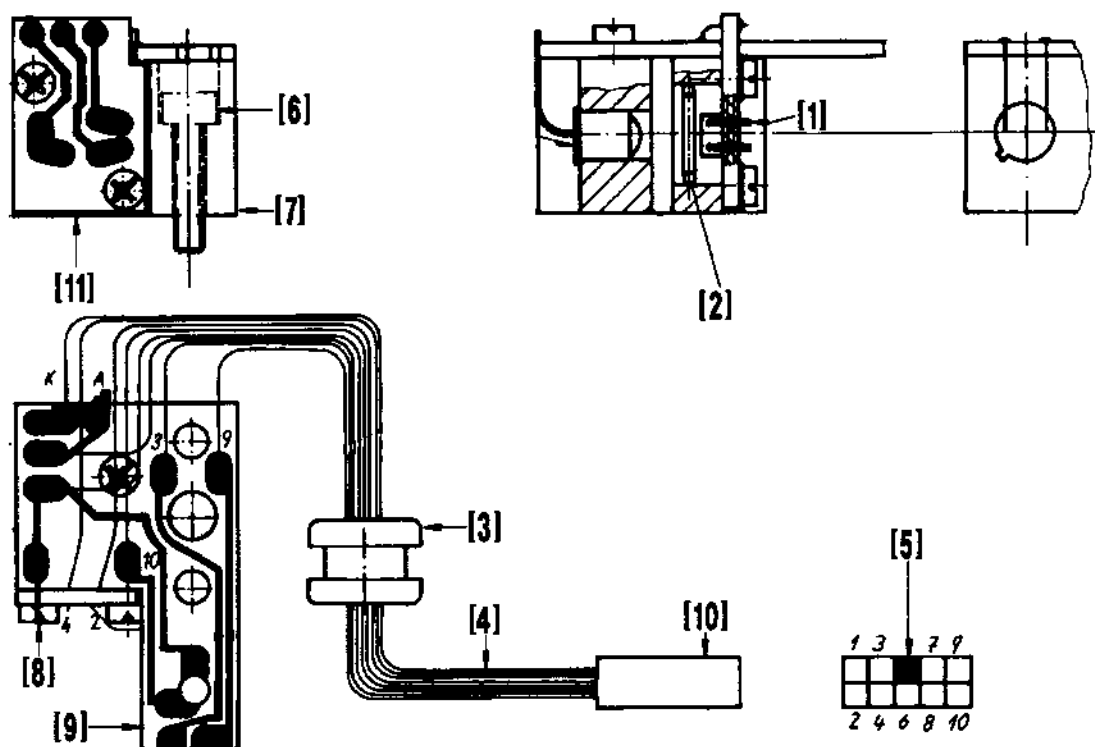
# Precisa SERIES-300

WEIGHING CELL

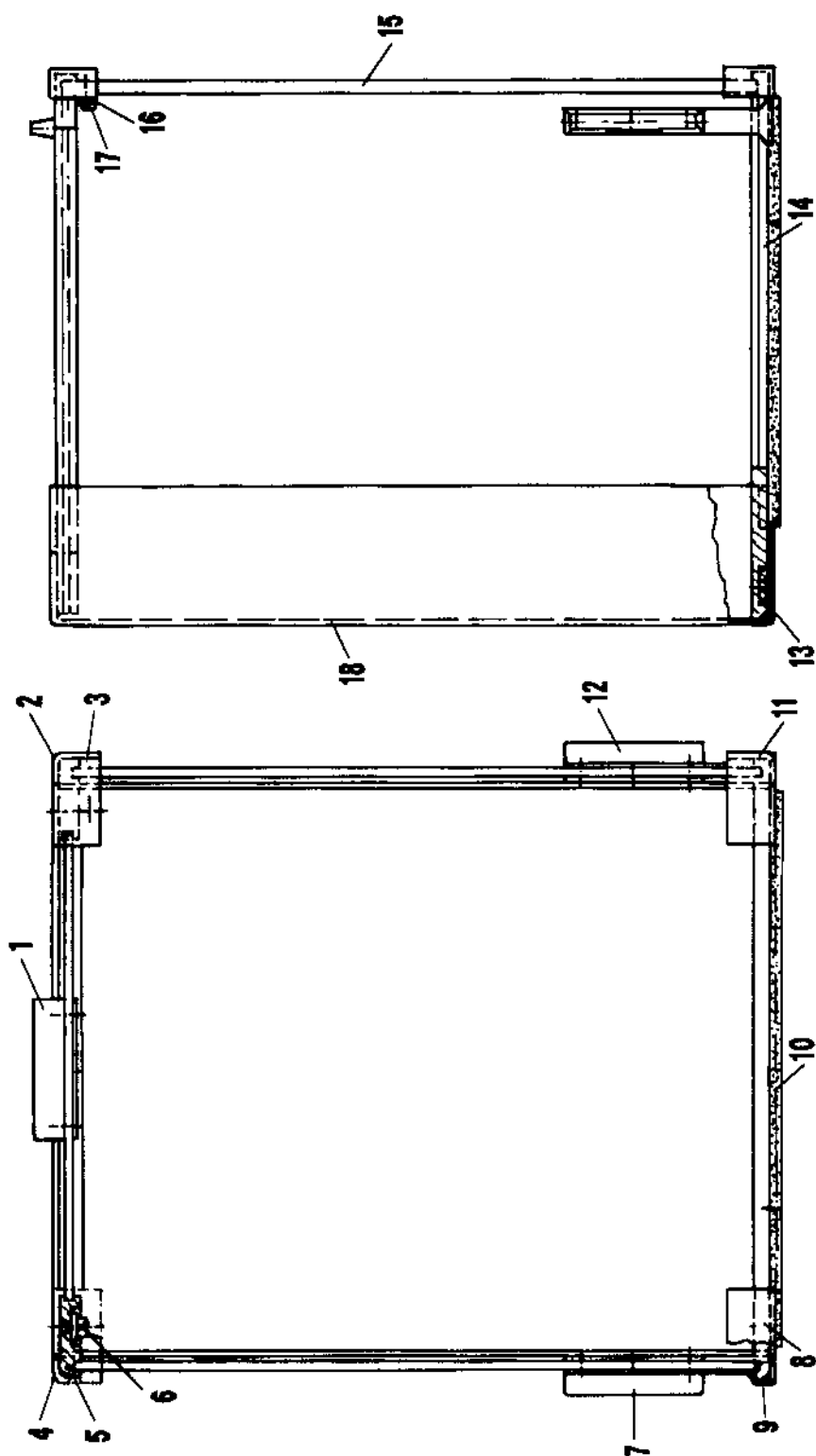


<u>Key No.</u>	<u>Part No.</u>	<u>Description</u>
1	280-5003 f1	Chassis
2	280-7008	Balance arm
3	280-7018	Support piece
4	300-2000	Distance piece for sensor mechanism
5	300-8006	Pot
6	280-7000	Plunger coil
7	280-2001	Cover disk
8	280-2039	Flexure for type: 300C, 600C, 1600C, 2200C, 4000C, 1000C-3000D, 3000C-6000D
(8)	280-2040	Flexure for type: 125A, 160M, 220M, 400M, 800M, 80A-200M, 100M-300C, 500M-2000C,
(8)	300-2002	Flexure for type: 3000D, 6000D, 6000G, 12000G, 5000D-12000G
9	280-7030	Space piece for type: 125A, 80A-200M
(9)	280-7017	Space piece for type: 400M
(9)	280-7031	Space piece for type: 160M, 220M, 300C, 600C, 100M-300C
(9)	280-2005	Space piece for type: 4000C
(9)	280-2036	Space piece for type: 800M, 500M-2000C
(9)	280-2058	Space piece for type: 1600C, 2200C, 1000C-3000D
10	300-8001	Sensor mechanism
11	280-2049	Vane
12	280-2034	Flexure strap for type: 125A, 160M, 220M, 400M, 800M, 300C, 600C, 1600C, 80A-200M, 100M-300C,
13	280-2005	Torsion protection
14	280-3008	Nut
15	280-2009	Flexure sheet for type: 6000D, 6000G, 12000G, 5000D-12000G
(15)	280-2028	Flexure sheet for type: 160M, 220M, 400M, 800M, 100M-300C, 500M-2000C
(15)	280-2038	Flexure sheet for type: 300C, 600C, 1600C, 2200C, 3000D 1000C-3000D
(15)	280-2050	Flexure sheet for type: 125A, 80A-200M
(15)	280-2053	Flexure sheet for type: 3000C-6000D, 4000C
16	F2-152	Pressure spring
17	240-4048	Stop screw
18	280-2003	Stop plate
19	280-2042	Safety device
20	280-3020	Screw
21	280-3046	Nut M3

<u>Key No.</u>	<u>Part No.</u>	<u>Description</u>
22	3350-005	NTC-resistor 330k
23	3719-000	Connection wire
24	280-3044	Knurled nut (for type: 125A, 80A-200M)
25	280-2056	Flexure strap for type: 2200C, 4000C, 3000D, 6000D, 6000G, 12000G, 500M-2000C, 1000C-3000D, 3000C-6000D, 5000D-12000G
26	280-3047	Bolt
27	VSM 13300	Screw M4x8
28	280-3048	Screw
29	240-3094	Screw M3x8
30	VSM 13328	Countersunk screw M3x6
31	VSM 13300	Screw M4x8 for type: 4000C, 3000D, 6000D, 6000G, 12000G, 3000C-6000D, 5000D-12000G
(31)	VSM 13300	Screw M4x10 for type: 800M, 1600C, 2200C, 500M-2000C, 1000C-3000D
(31)	VSM 13300	Screw M4x16 for type: 160M, 220M, 300C, 600C, 100M-300C
(31)	VSM 13300	Screw M4x20 for type: 125A, 400M, 80A-200M
32	280-8027	Counterweight compl. for type: 125A, 160M, 220M, 400M, 800M, 80A-200M, 100M-300C, 500M-2000C, 3000C-6000D
34	240-2070	Washer Ø 4,2
35	VSM13904	Washer Ø 3,2 brass
36	280-2000	Flexure holder
37	250-3031	Screw M4x6
38	280-3045	Threaded stud for type: 125A, 160M, 220M, 400M, 800M, 80A-200M, 100M-300C, 500M-2000C, 3000C-6000D
	280-5025	Support angle for type: 125A, 160M, 220M, 400M, 800M, 80A-200M, 100M-300C, 500M-2000C, 3000C-6000D
39	VSM 13753	Nut M4
40	300-3000	Special screw for type: 3000D, 6000D, 6000G, 12000G, 5000D-12000G



Key-No.	Part-No.	Decription
1	3251-015	LED
2	280-4034	O-ring seal
3	240-4088	Rubber
4	470-7028	Cable (8 pc.)
5	3504-398	Plug
6	DIN 912	Screw M3x20
7	280-5015	Body
8	BN381	Screw M2x5
9	280-7207	Board
10	3504-609	Plug
11	280-7208	Board

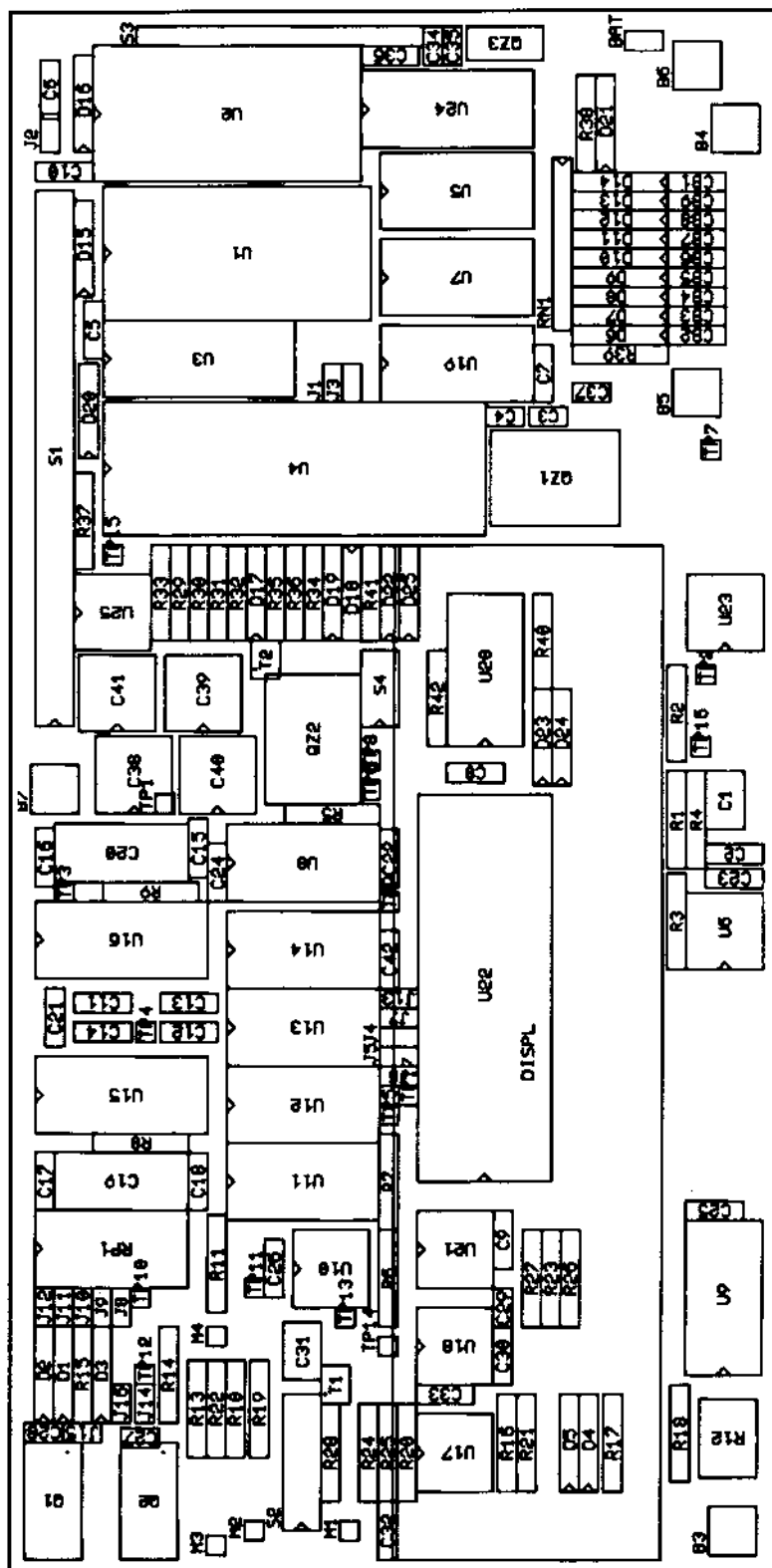




Key-No.	Part-No.	Description	Dimension
1	350-7064	Top Slide	
2	290-4008	Cover (right/top)	
3	350-7066	Sliding Rail (right)	
4	290-4009	Cover (left/top)	
5	350-7065	Sliding Rail (left)	
6	BN 712	Nut & Washer	M 3 / D 3,2
7	350-7062	Side Slide compl. (left)	
8	350-4029	Cover (left/bottom)	
9	350-4012	Adhesive Tape	
10	MW2070-003	Attenuation Tape	(2x135mm), (2x200mm)
11	350-4030	Cover (right/bottom)	
12	350-7063	Side Slide (right)	
13	350-4031	Connecting Piece	
14	350-7005	Under Plate	
15	350-4025	Front Pane	
16	240-4052	Washer	D 3,2 (carton)
17	BN 1016	Screw	D 2,9 x 6,5
18	350-7061	Backwall	

-> Please note, the optional windshield 350-8837 differs only in regards to Key-No. 14 which has here the Part-No. 350-7067 Under Plate.

## MAIN BOARD 300-7200/10 (low-resolution)



## ***DISTINCTIONS BETWEEN THE DIFFERENT TYPES OF MAIN BOARDS***

### ***Components***

<b>Board-No.</b>	<b>Type</b>	<b>TL500 (U15&amp;U16)</b>	<b>Jumper J16</b>	<b>Measuring Resistor</b>	<b>*Service-No.*</b>
300-7250	300C	1	yes	190 Ohm	100,"Version"
300-7251	600C	1	no	100 Ohm	101,"Version"
300-7252	3000D	1	no	125 Ohm	102,"Version"
300-7253	6000D	1	no	75 Ohm	103,"Version"
300-7254	160M	2	yes	360 Ohm	104,"Version"
300-7255	220M	2	yes	360 Ohm	105,"Version"
300-7256	1600C	2	no	100 Ohm	106,"Version"
300-7257	2200C	2	no	100 Ohm	107,"Version"
300-7258	100M-300C	2	yes	270 Ohm	108,"Version"
300-7259	1000C-3000D	2	no	75 Ohm	109,"Version"
300-7260	6000G	1	no	100 Ohm	110,"Version"
300-7261	12000G	1	no	31 Ohm	111,"Version"
300-7262	5000D-12000G	2	no	31 Ohm	112,"Version"

-> \* Service-No. \* is displayed short after switching-on the balance

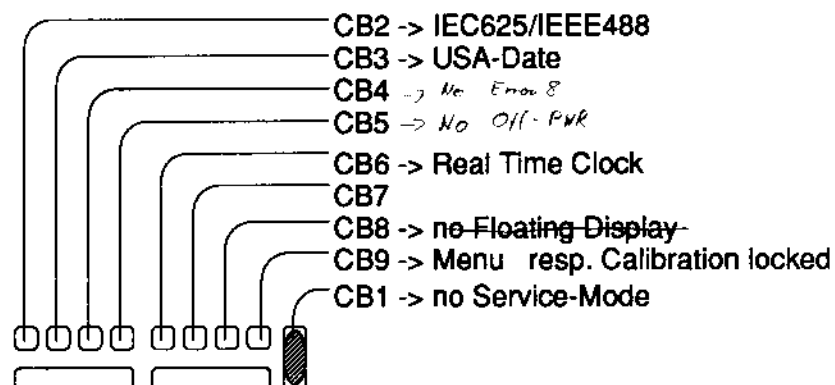
## EPROM-Labeling

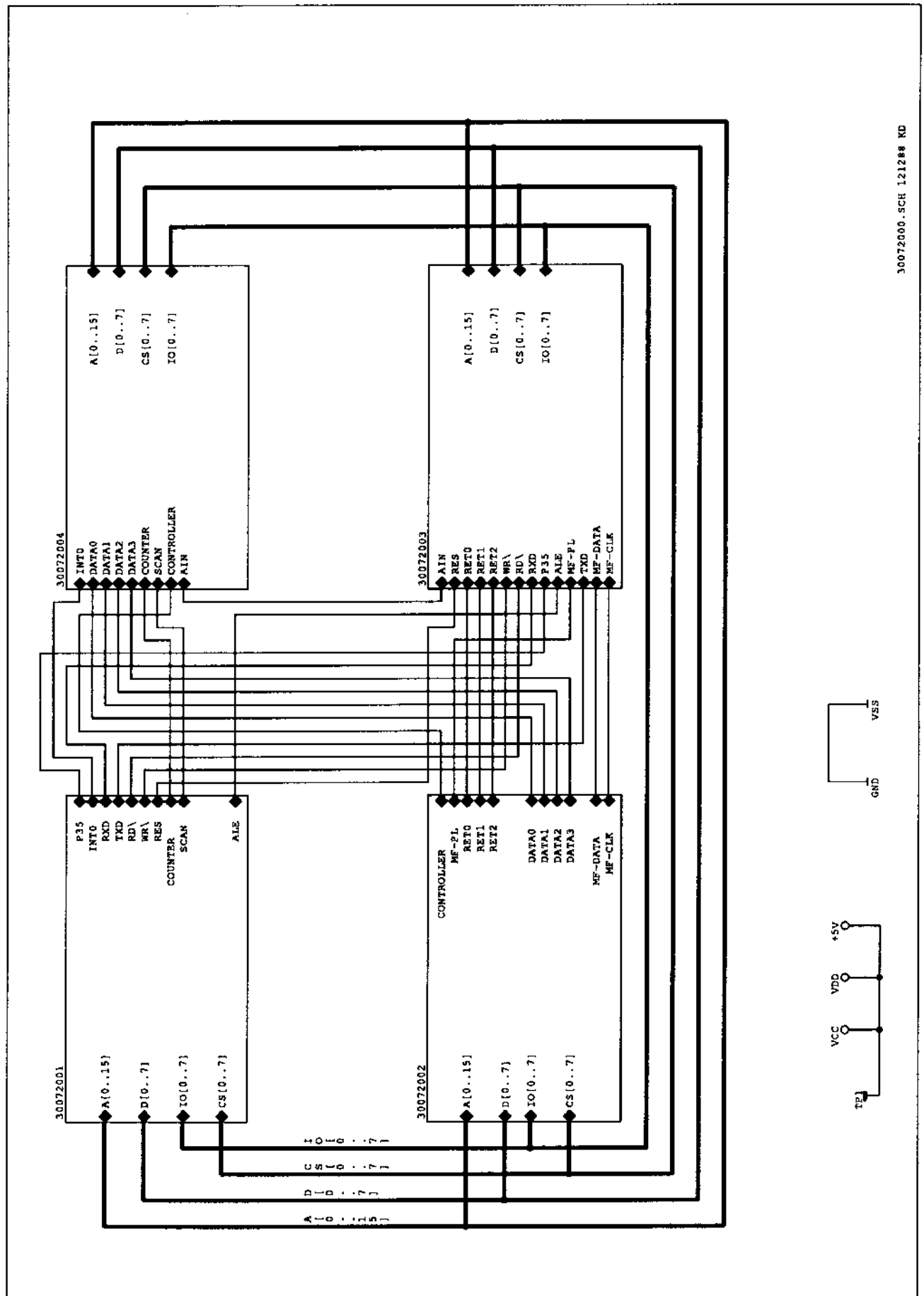
-> Please note, it is important that the Code on the label of the main board corresponds with the one on the label on the EPROM.

Example:

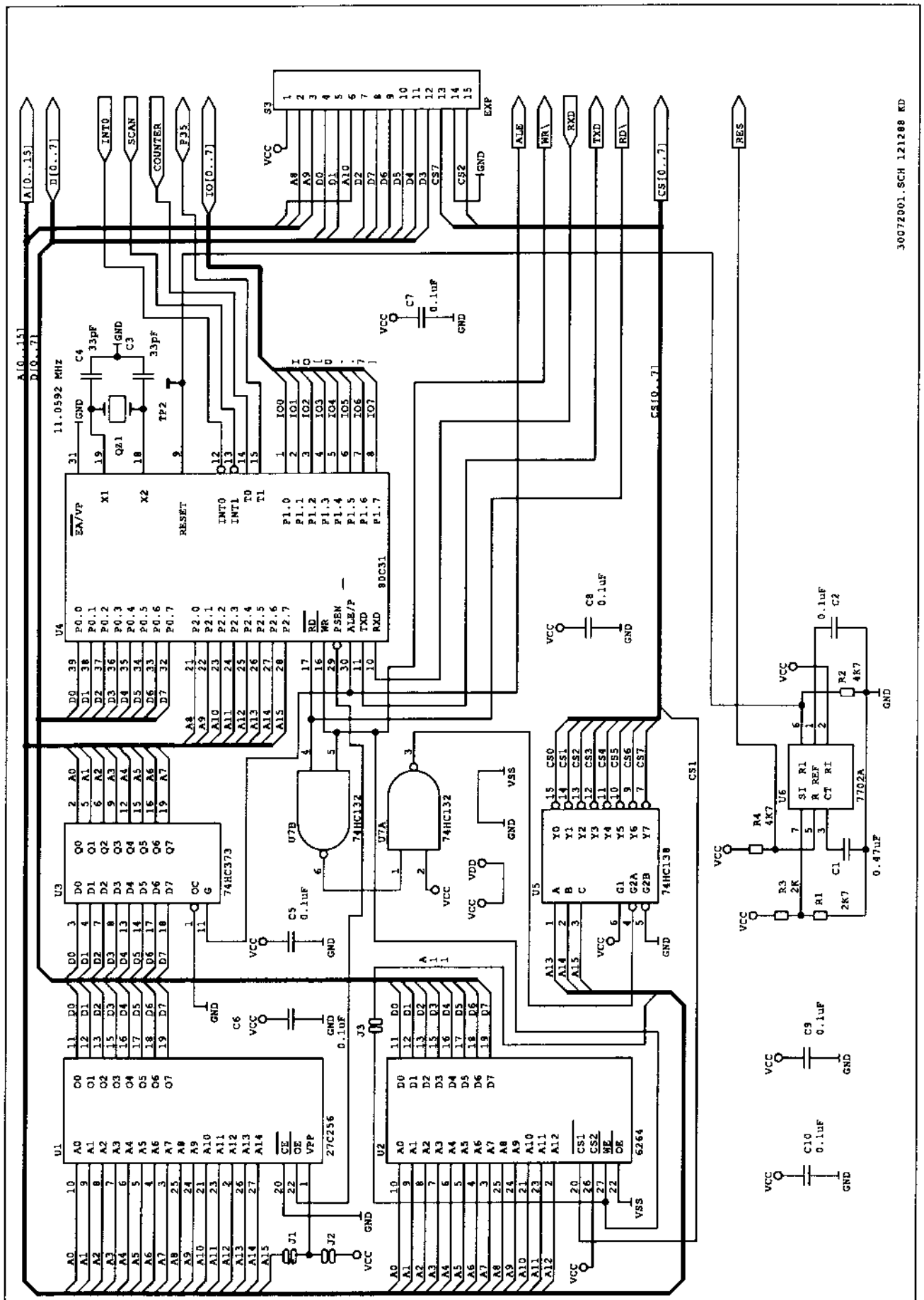


## Jumper-Settings



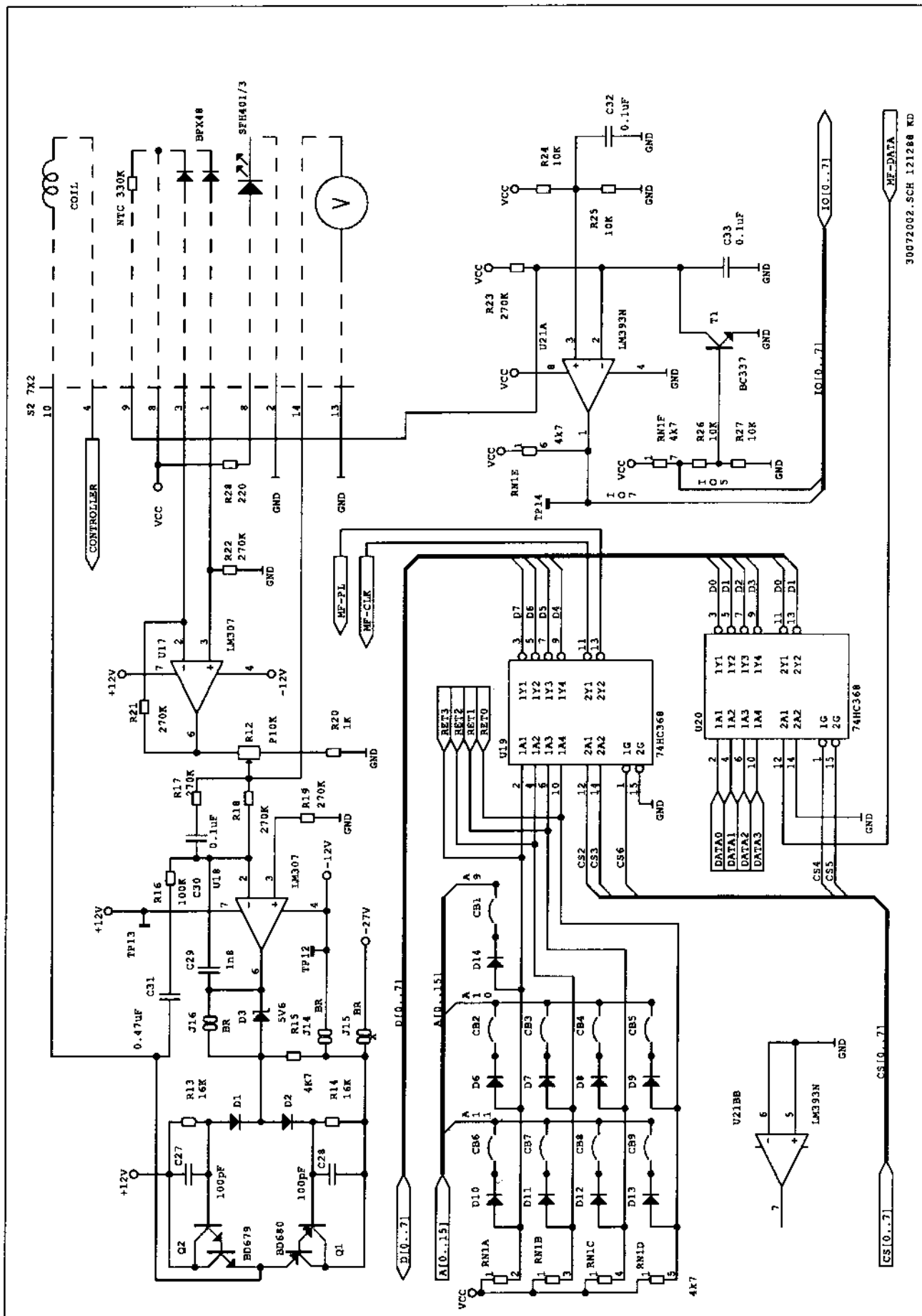


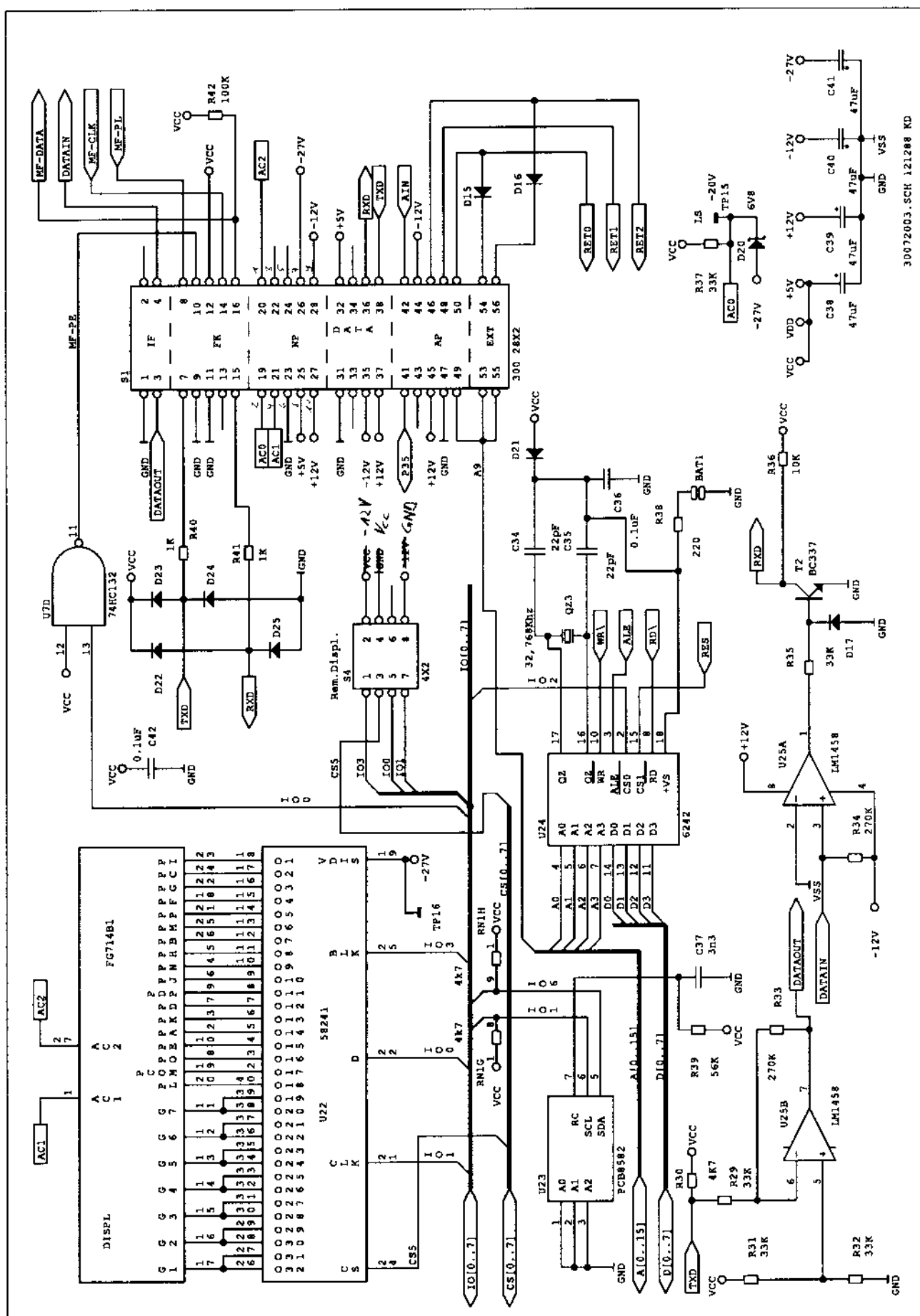
30072000.SCH 121288 KD



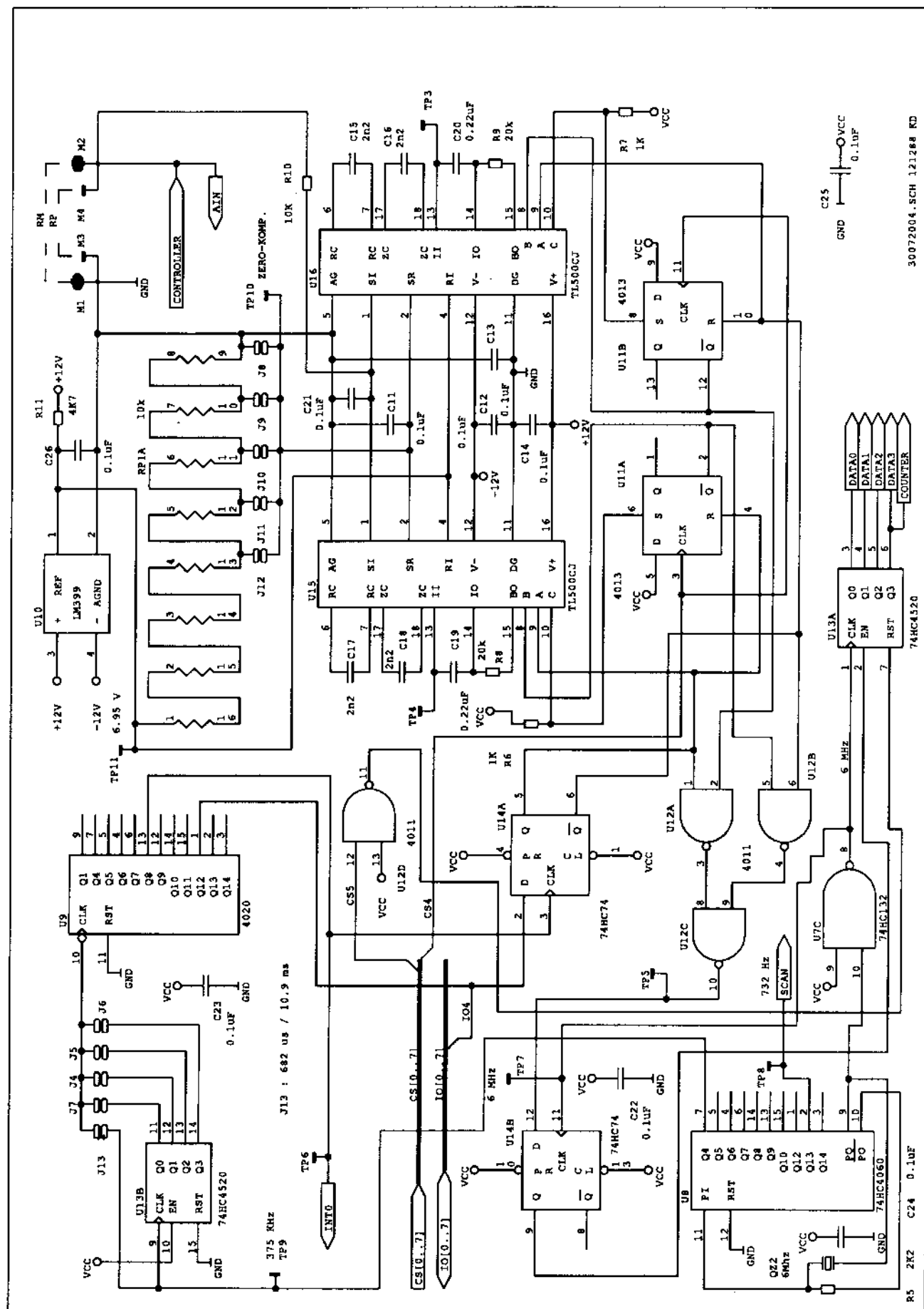
# Precisa *SERIES-300*

**MAIN BOARD 300-7200/10 (low-resolution)**









# Precisa *SERIES-300*

MAIN BOARD 300-7200/10 (low-resolution)

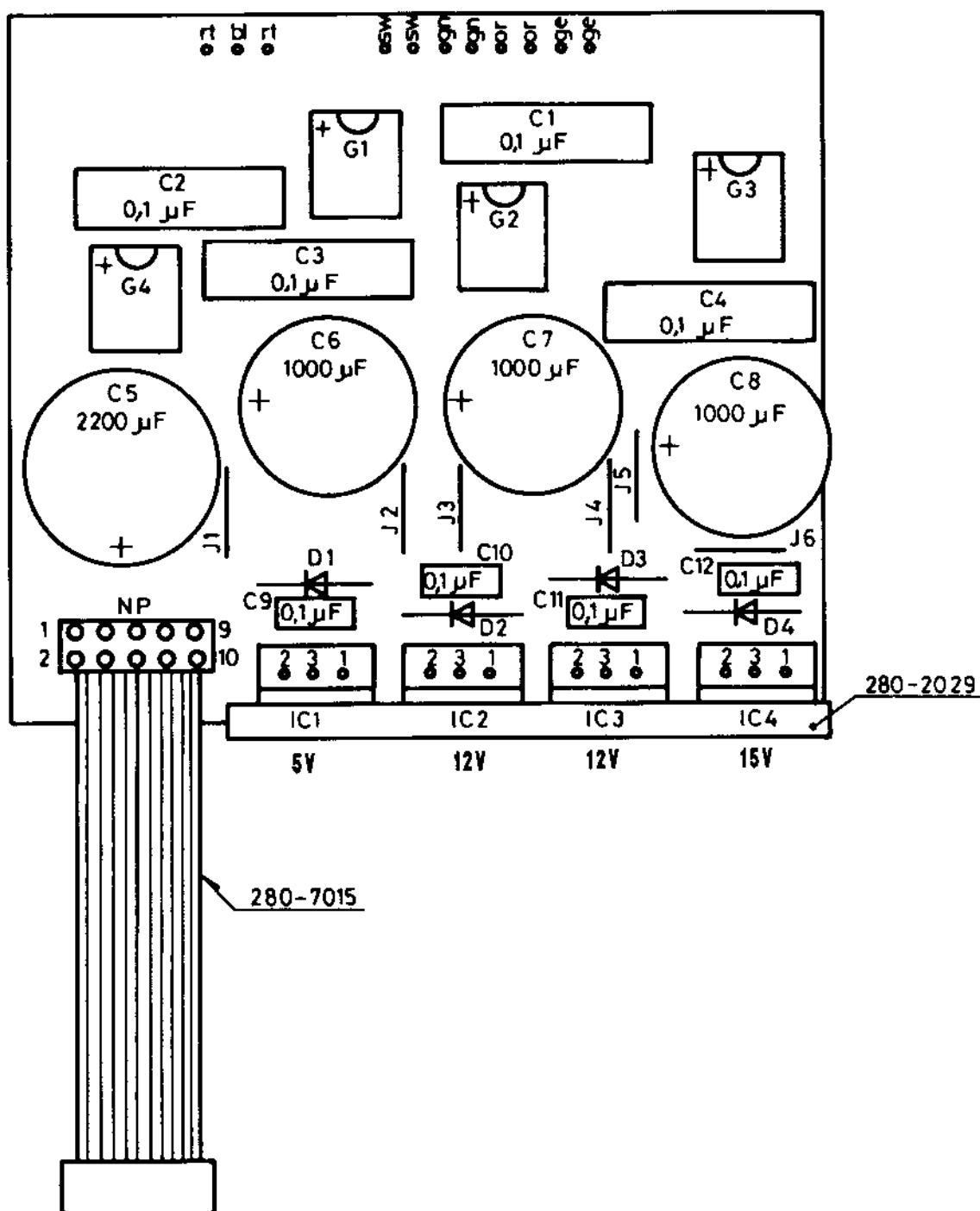
<u>Pos.</u>	<u>Pc.</u>	<u>Key-No.</u>	<u>Type</u>	<u>Part-No.</u>
1	16	TP1/TP2/TP3/TP4/TP5/TP6/ TP7/TP8/TP9/TP10/TP11/ TP12/TP13/TP14/TP15/TP16	LS	3500-004
2	1	U1	27C256	3022-028
3	1	U2	6264	3022-033
4	1	U3	74HC373	3019-404
5	1	U4	80C31	3022-029
6	1	U5	74HC138	3019-403
7	1	U6	7702A	3022-026
8	2	C1/C31	0.47uF	3401-447
9	1	R1	2K7	3304-227
10	22	C2/C5/C6/C7/C8/C9/C10/ C11/C12/C13/C14/C21/C22/ C23/C24/C25/C26/C30/C32/ C33/C36/C42	0.1uF	3401-410
11	2	C3/C4	33pF	3419-033
12	5	R2/R4/R11/R15/R30	4K7	3304-247
14	1	U7	74HC132	3019-409
15	1	QZ1	11.0592 MHz	3881-008
16	1	R3	2K	3304-220
17	1	U8	74HC4060	3019-410
18	1	R5	2K2	3304-222
19	1	U10	LM399	3220-101
20	5	R6/R7/R20/R40/R41	1K	3304-210
21	2	C19/C20	0.22uF	3420-222
22	6	R10/R24/R25/R26/R27/R36	10K	3304-310
23	1	U14	74HC74	3019-408
24	2	U15/U16	TL500CJ	3030-003
25	1	U13	74HC4520	3020-525
26	1	QZ2	6Mhz	3881-003
27	4	M1/M2/M3/M4	LSA	3500-001
28	4	C17/C15/C16/C18	2n2	3420-222
29	1	U11	4013	3020-084
30	1	U12	4011	3020-024
31	1	U9	4020	3020-574
32	1	RP1	10k	3329-100
33	2	R9/R8	20k	3304-320
34	1	Q1	BD680	3130-020

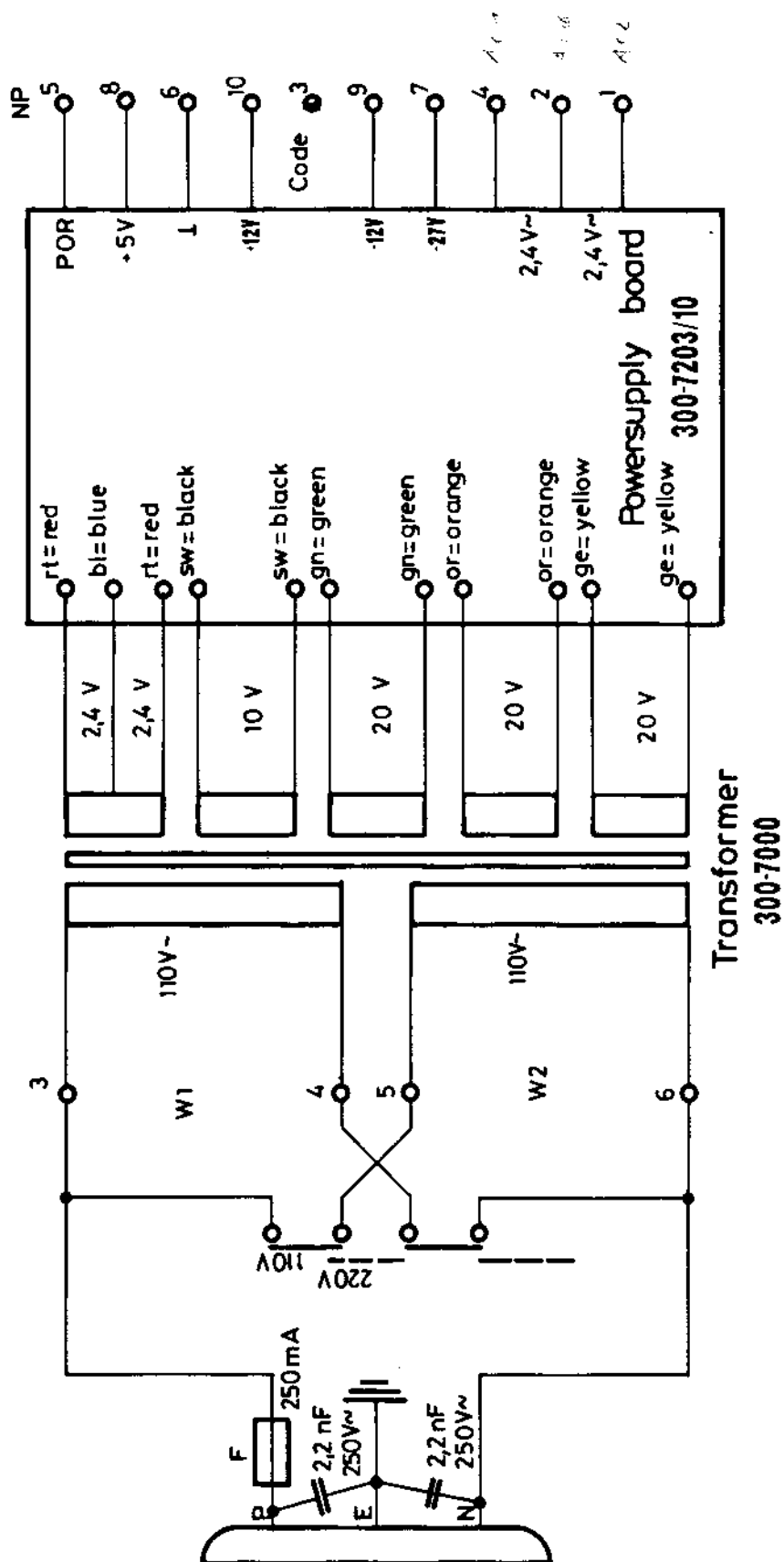
# Precisa *SERIES-300*

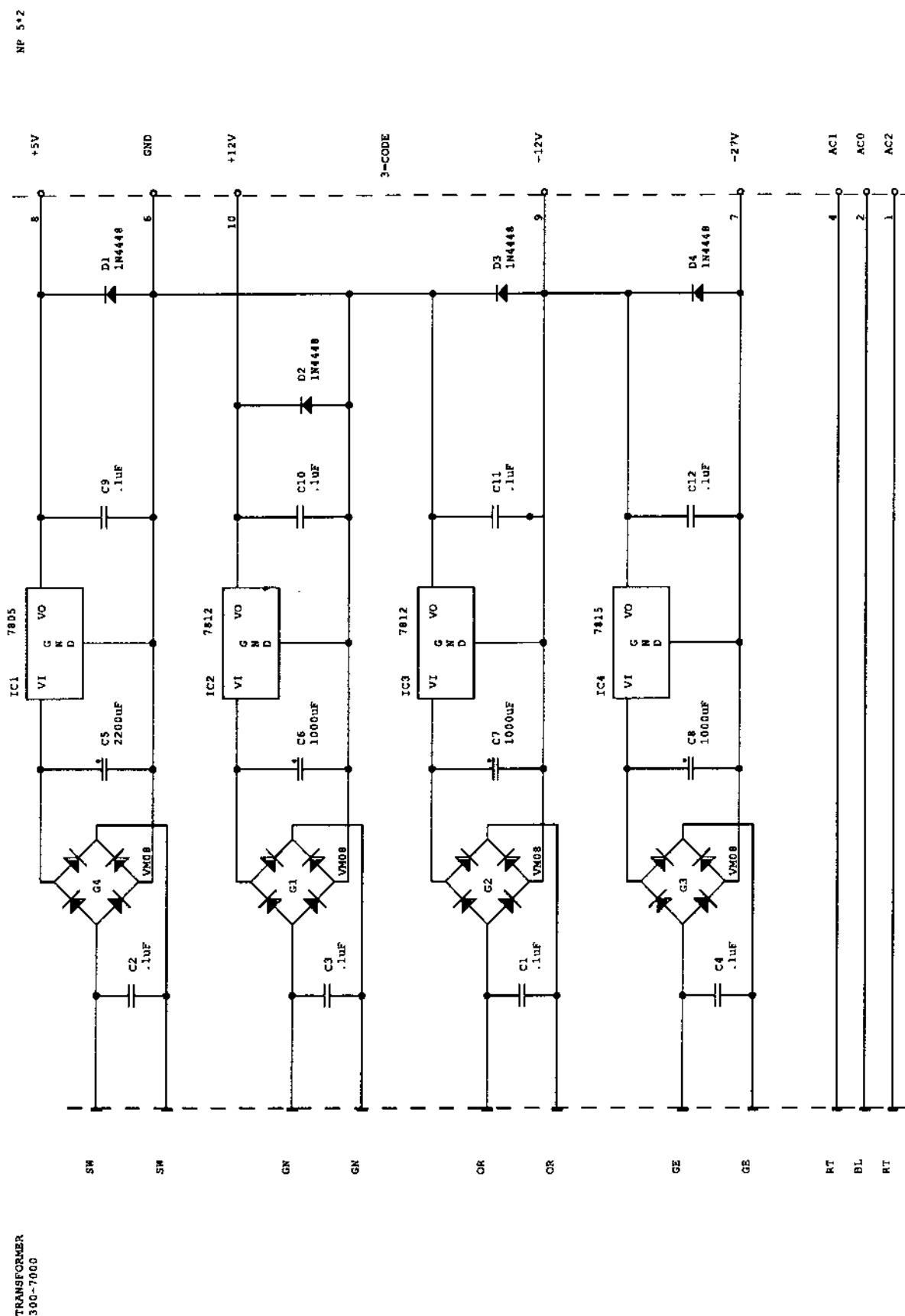
MAIN BOARD 300-7200/10 (low-resolution)

<u>Pos.</u>	<u>Pc.</u>	<u>Key-No.</u>	<u>Type</u>	<u>Part-No.</u>
35	1	Q2	BD679	3130-021
36	2	C27/C28	100pF	3416-110
37	2	R13/R14	16K	3304-316
38	1	C29	1n8	3419-218
39	2	R16/R42	100K	3304-410
40	8	R17/R18/R19/R21/R22/R23/ R33/R34	270K	3304-427
41	2	T1/T2	BC337	3100-004
42	2	U17/U18	LM307	3030-021
43	2	R28/R38	220	3304-122
44	21	D1/D2/D4/D5/D6/D7/D8/D9/ D10/D11/D12/D13/D14/D15 D16/D17/D21/D22/D23/D24/ D25	D	3230-901
45	1	D3	5V6	3241-956
46	1	S2	S2 7X2	3504-314
47	1	R12	P10K	3330-001
48	2	U19/U20	74HC368	3019-407
49	1	U21	LM393N	3030-025
50	1	RN1	4k7	3360-005
51	1	U22	58241	3022-031
52	1	U23	PCB8582	3022-034
53	5	R29/R31/R32/R35/R37	33K	3304-333
54	2	C34/C35	22pF	3419-022
55	1	C37	3n3	3419-233
56	1	R39	56K	3304-356
57	1	D20	6V8	3241-968
58	4	C38/C39/C40/C41	47uF	3428-647
59	1	U25	LM1458	3030-020
60	1	DISPL	FG714B1	3260-017
61	1	U24	6242	3022-035
62	1	QZ3	32/768Khz	3881-009
63	1	S1	300 28X2	3504-330
64	1	S4	4X2	3504-327

## POWER SUPPLY BOARD 300-7203/10





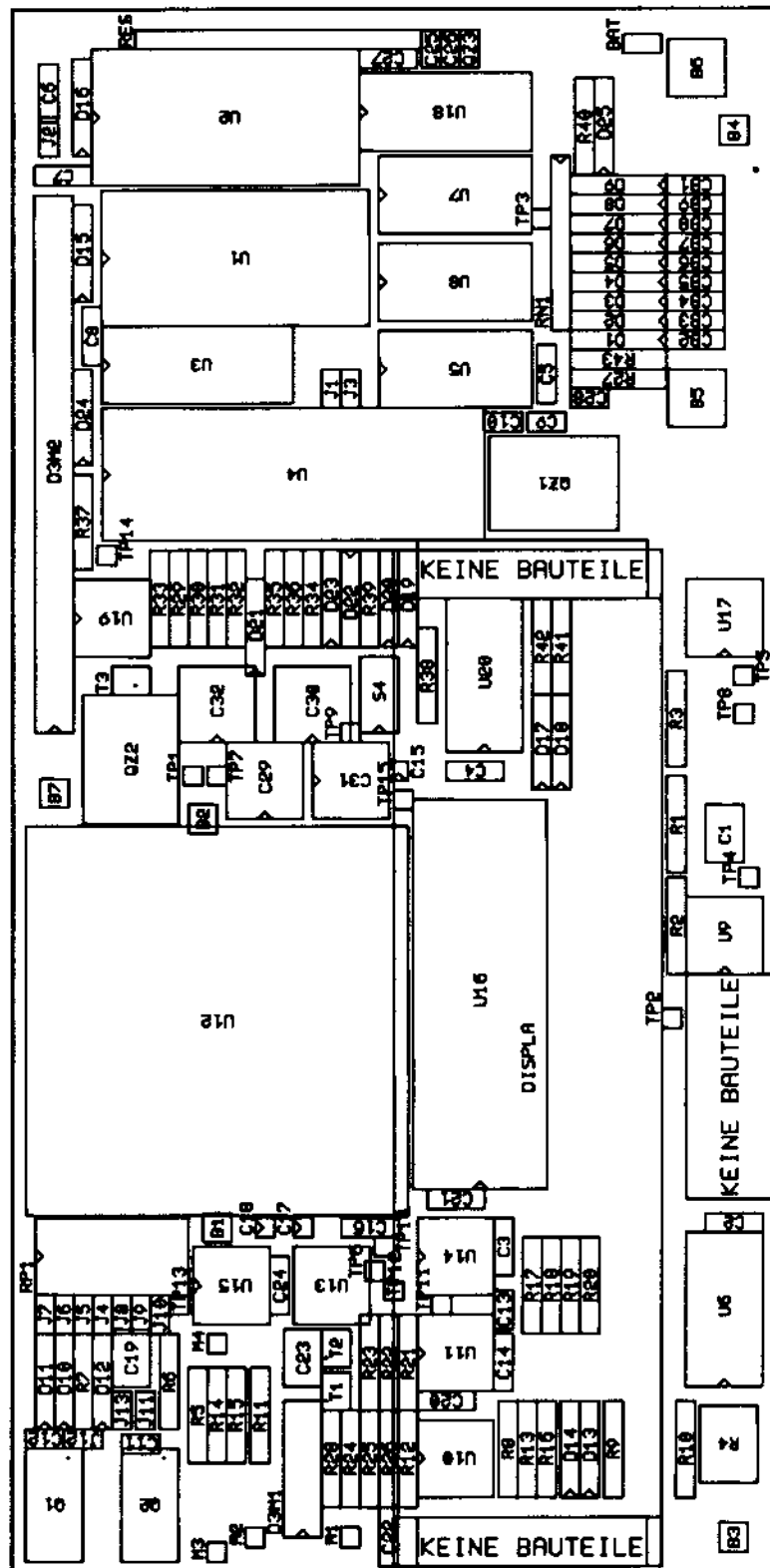


KEY NO.	ORDER-NO.	DESCRIPTION
C1....C4	3426-410	CAPACITOR 0,1 $\mu$ F
C5	3428-822	CAPACITOR 2200 $\mu$ F ELKO
C6....C8	3428-810	CAPACITOR 1100 $\mu$ F ELKO
C9....C12	3401-410	CAPACITOR 0,1 $\mu$ F
D1....D4	3210-004	UNIVERSAL DIODE
G1....G4	3220-008	RECTIFIER
IC1	3050-002	IC 7805 VOLTAGE REGULATOR
IC2....IC3	3050-006	IC 7812 VOLTAGE REGULATOR
IC4	3050-001	IC 7815 VOLTAGE REGULATOR
J1....J5	3714-003	JUMPER

# Precisa SERIES-300

MAIN BOARD 300-7201/10 (high-resolution)

MAIN BOARD 300-7201/10 (high-resolution)





## DISTINCTIONS BETWEEN THE DIFFERENT TYPES OF MAIN BOARDS

### Components

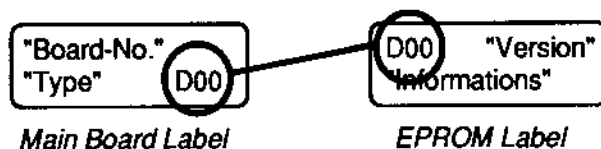
Board-No.	Type	Measuring Resistor	*Service-No.*
300-7270	400M	125 Ohm	120,"Version"
300-7271	4000C	51 Ohm	121,"Version"
300-7272	500M-2000C	75 Ohm	122,"Version"
300-7273	800M	100 Ohm	123,"Version"
300-7274	3000C-6000D	51 Ohm	124,"Version"
300-7275	125A	390 Ohm	125,"Version"
300-7276	80A-200M	270 Ohm	126,"Version"

-> \* Service-No. \* is displayed short after switching-on the balance

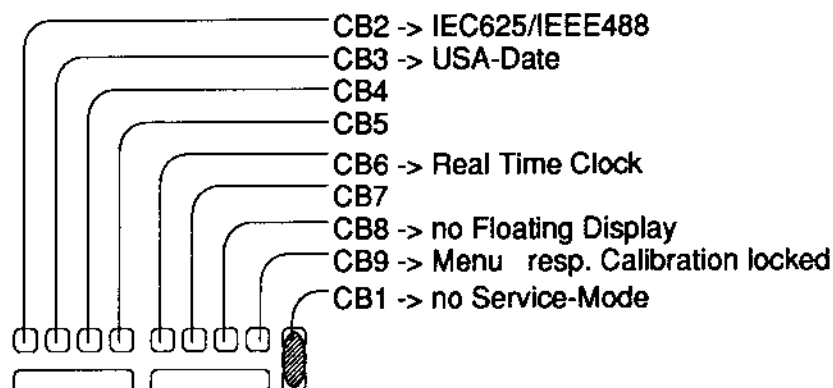
### EPROM-Labeling

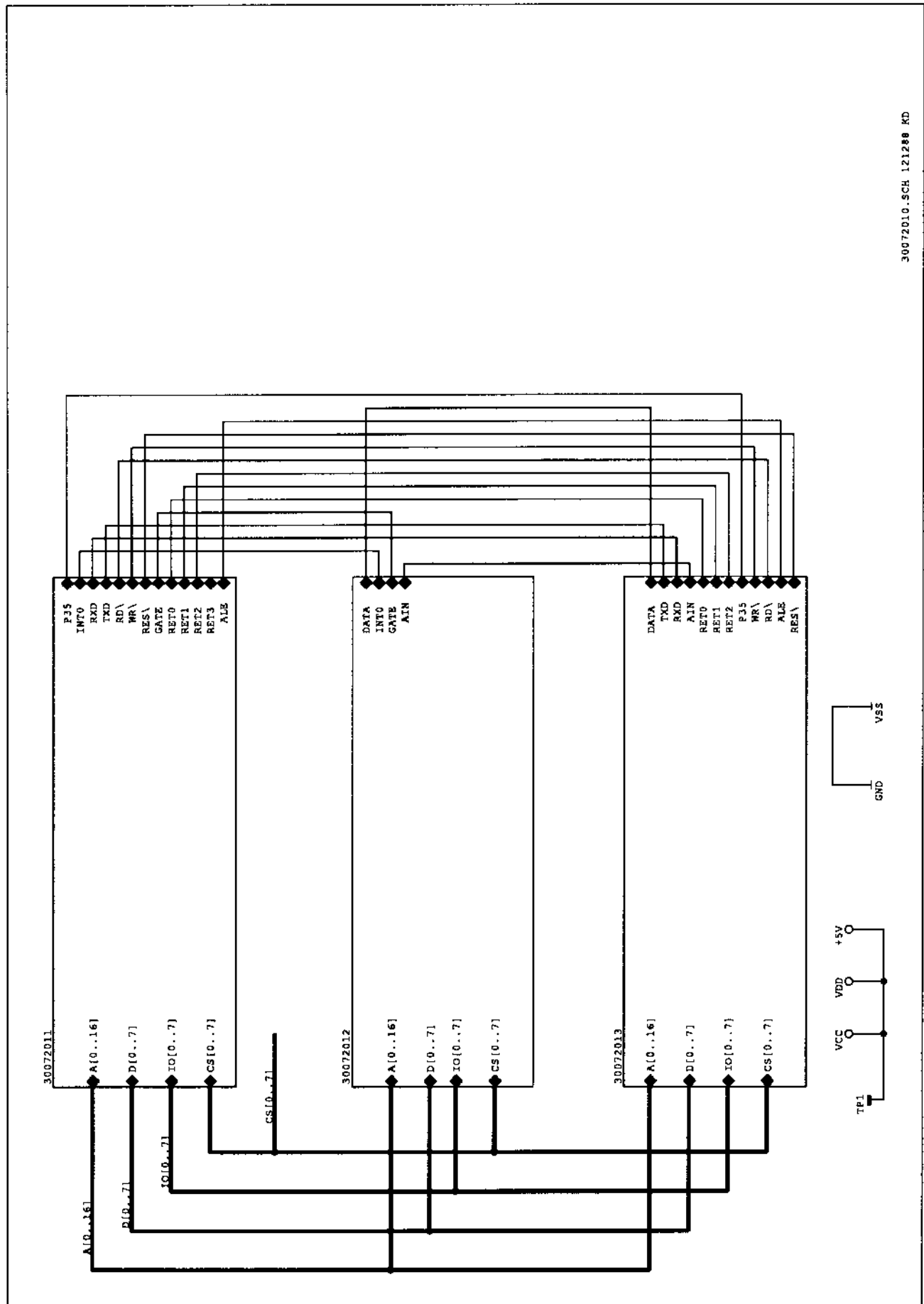
-> Please note, it is important that the Code on the label of the main board corresponds with the one on the label on the EPROM.

Example:



### Jumper-Settings

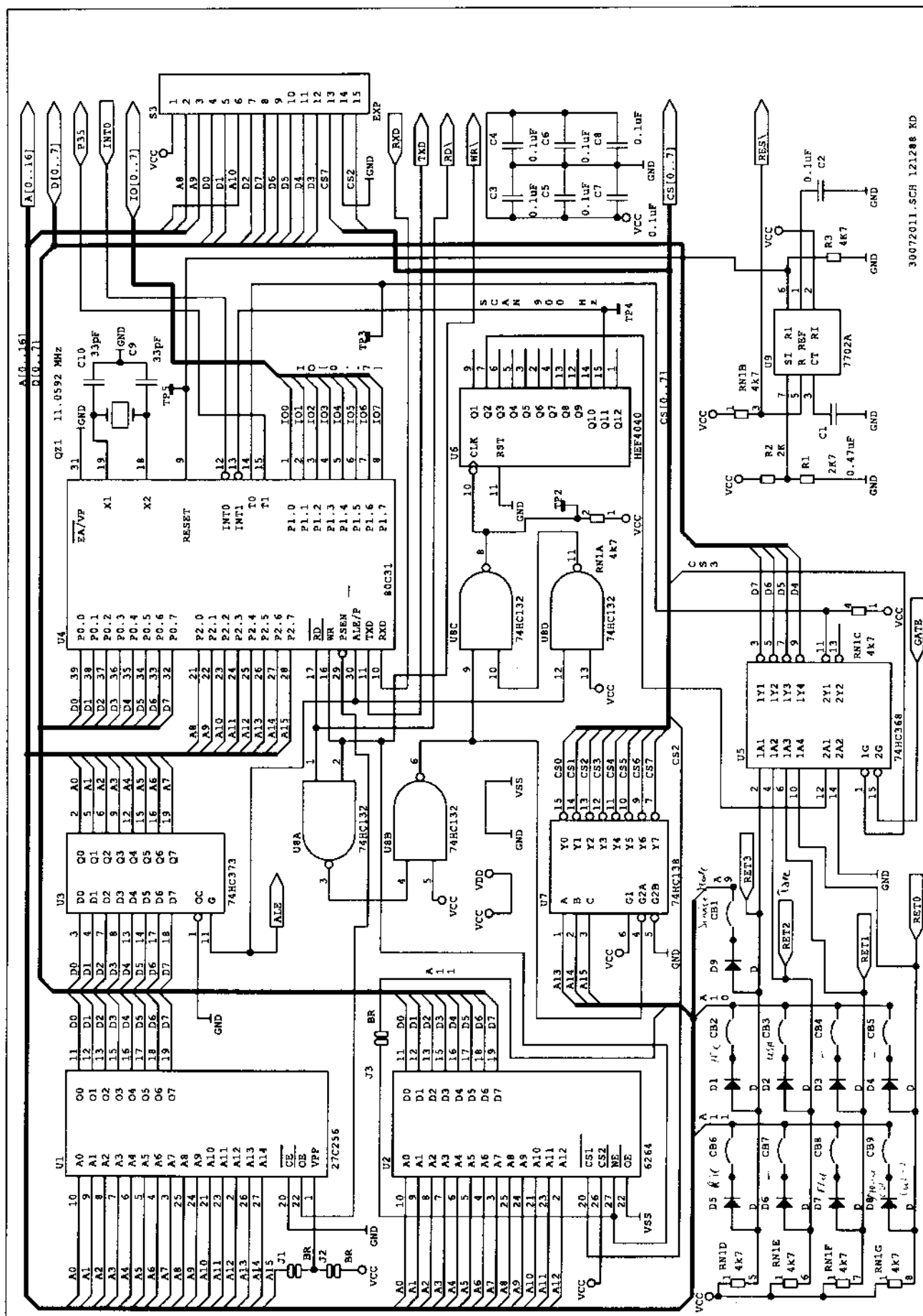




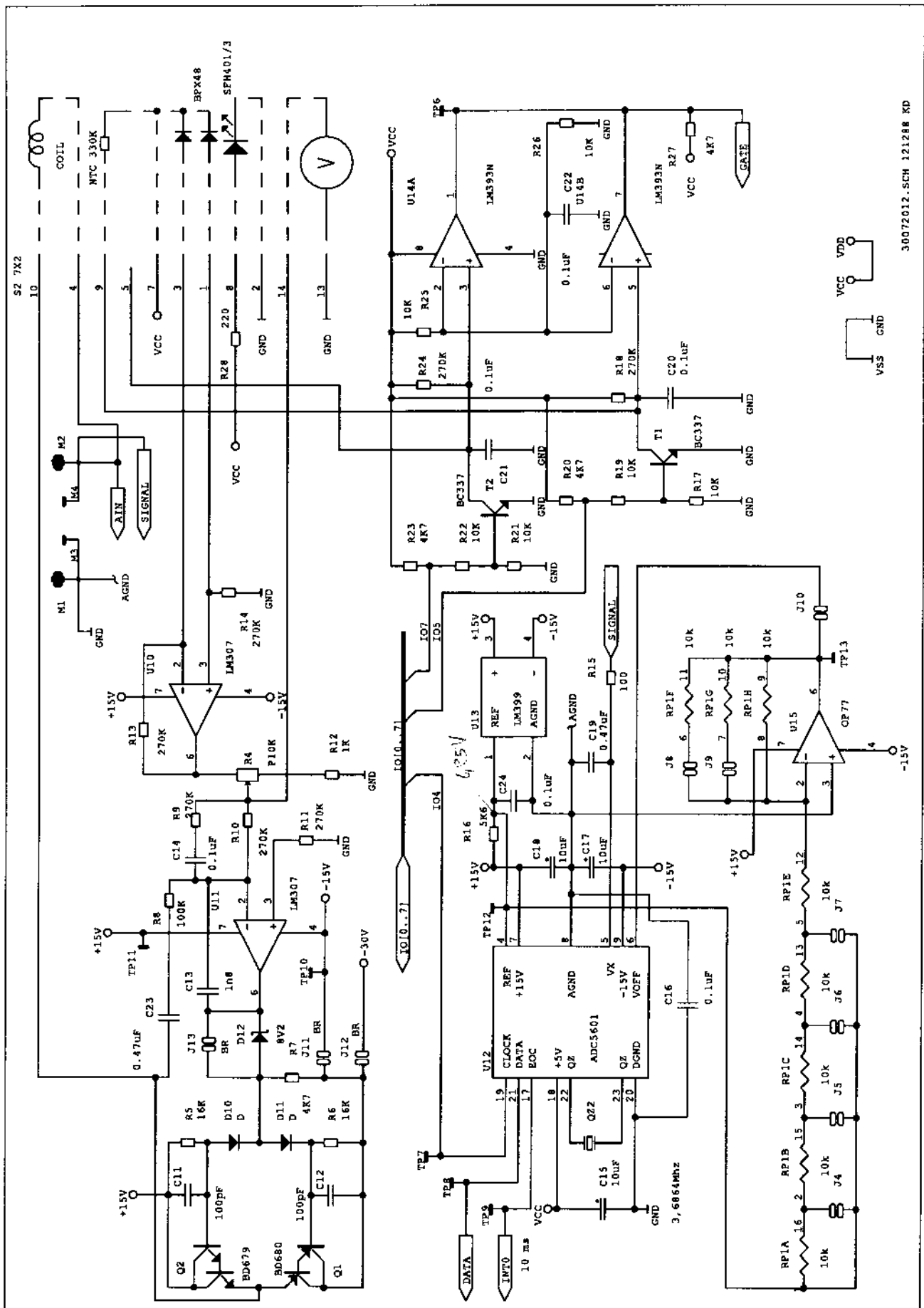
30072010.SCH 121288 KD

# Precisa *SERIES-300*

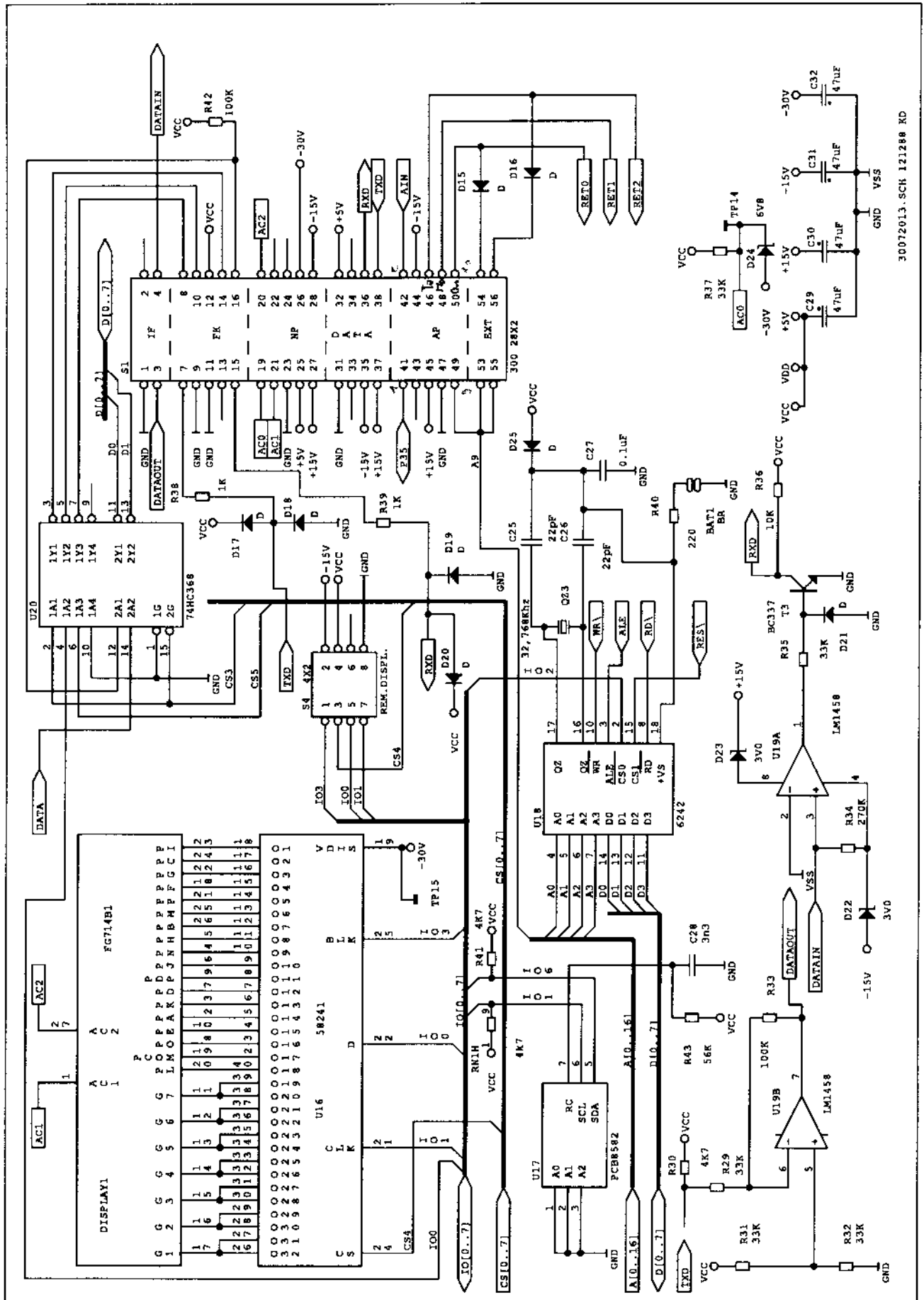
**MAIN BOARD 300-7201/10 (high-resolution)**



00072011.SCH 121208 KD



30072012.SCH 121288 KD



# Precisa *SERIES-300*

MAIN BOARD 300-7201/10 (high-resolution)

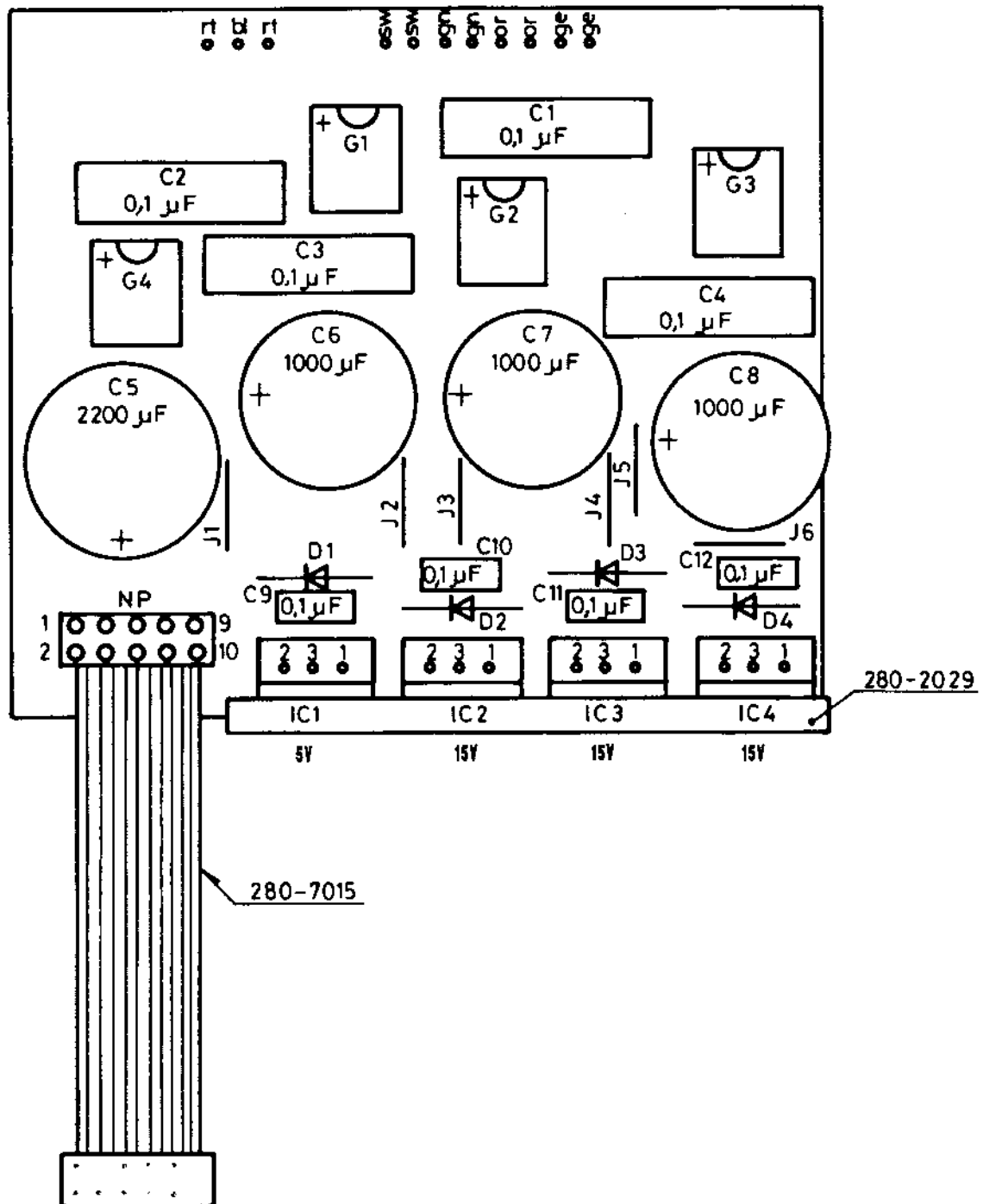
Pos.	Pc.	Key-No.	Type	Part-No.
1	15	TP1,TP2,TP3,TP4,TP5,TP6, TP7,TP8,TP9,TP10,TP11, TP12,TP13,TP14,TP15	LS	3500-004
2	1	U1	27C256	3022-028
3	1	U2	6264	3022-033
4	1	U3	74HC373	3019-404
5	1	U4	80C31	3022-029
6	21	D1,D2,D3,D4,D5,D6,D7,D8, D9,D10,D11,D13,D14,D15, D16,D17,D18,D19,D20,D21, D25	D	3230-901
7	1	U7	74HC138	3019-403
8	1	U9	7702A	3022-026
9	3	C1,C19,C23	0.47uF	3401-447
10	1	R1	2K7	3304-227
11	1	R2	2K	3304-220
12	14	C2,C3,C4,C5,C6,C7,C8,C14, C16,C20,C21,C22,C24,C27	0.1uF	3401-410
13	2	C9,C10	33pF	3419-033
15	7	R3,R7,R20,R23,R27,R30, R41	4K7	3304-247
16	1	S3	EXP	
17	1	U8	74HC132	3019-409
18	1	U6	HEF4040	
19	2	U5,U20	74HC368	3019-407
20	1	QZ1	11.0592MHz	3881-008
22	1	RN1	4k7	3360-005
23	1	U12	ADC5601	3030-009
24	1	U13	LM399	3220-101
25	1	RP1	10k	3304-310
26	1	U15	OP77	3030-026
27	1	Q1	BD680	3130-020
28	1	Q2	BD679	3130-021
29	2	C11,C12	100pF	3416-110
30	2	R5,R6	16K	3304-316
31	1	C13	1n8	3419-218
32	1	D12	8V2	3241-982

# Precisa **SERIES-300**

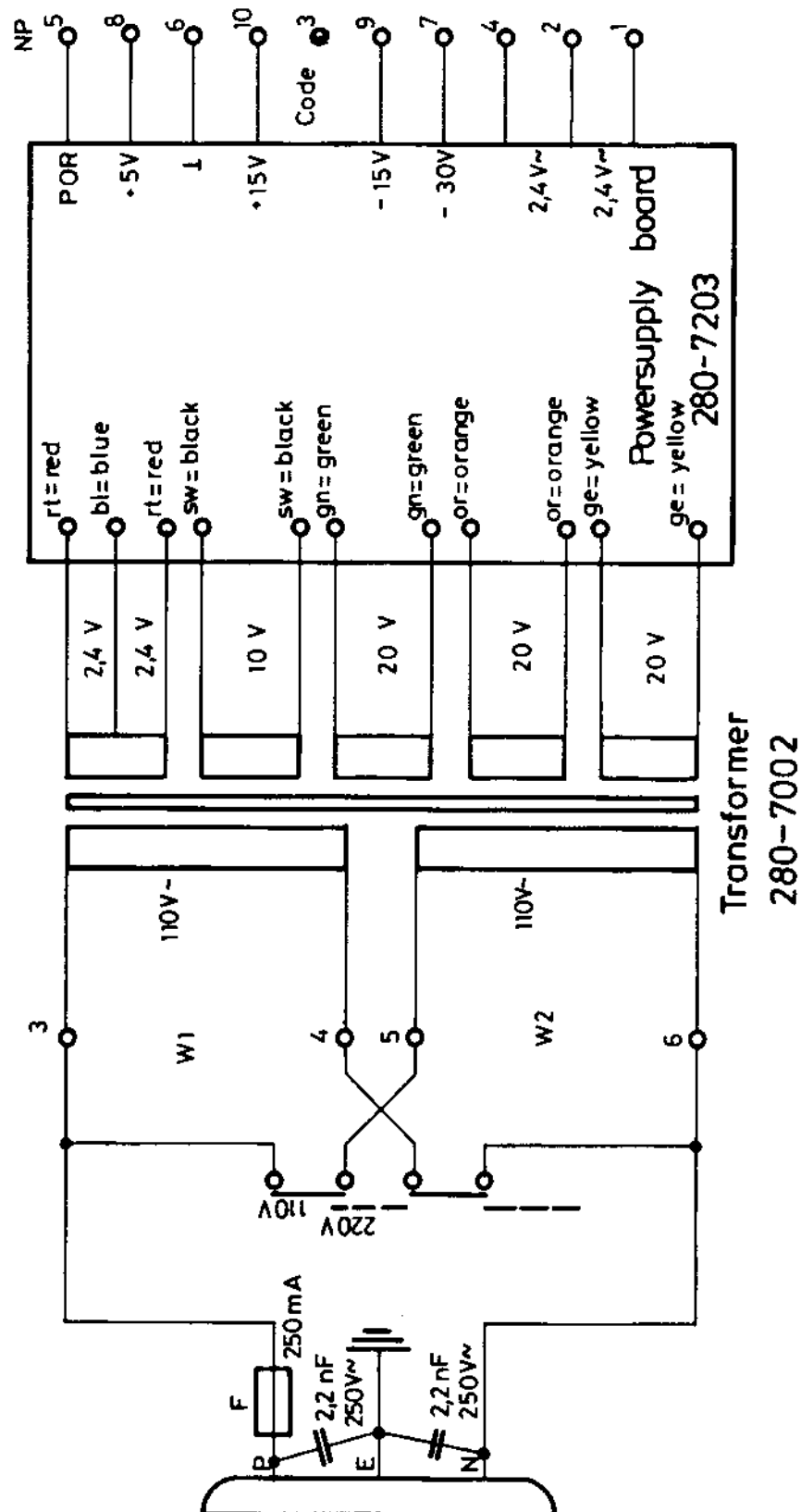
MAIN BOARD 300-7201/10 (high-resolution)

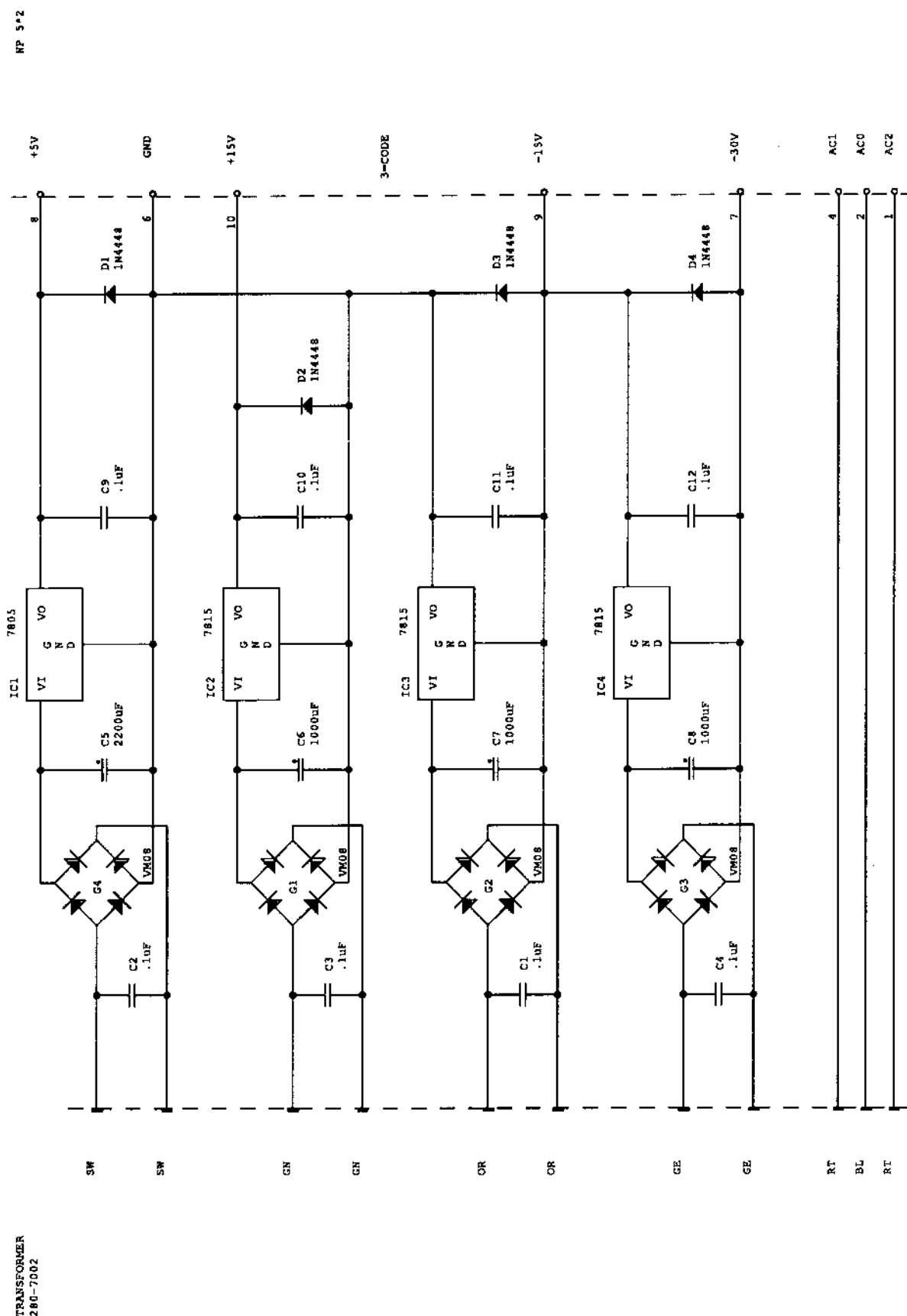
Pos.	Pc.	Key-No.	Type	Part-No.
33	3	R8,R33,R42	100K	3304-410
34	8	R9,R10,R11,R13,R14,R18, R24,R34	270K	3304-427
35	3	R12,R38,R39	1K	3304-210
36	1	QZ2	3,6864Mhz	3881-006
37	1	R15	100	3304-110
38	1	R16	5K6	3304-256
39	7	R17,R19,R21,R22,R25,R26, R36	10K	3304-310
40	3	T1,T2,T3	BC337	3100-004
41	3	C15,C17,C18	10uF	3428-610
42	1	R4	P10K	3330-001
43	2	U10,U11	LM307	3030-021
44	4	M1,M2,M3,M4	LSA	3500-001
50	1	S2	S27X2	3504-314
52	2	R28,R40	220	3304-122
53	1	U14	LM393N	
54	1	DISPLAY1	FG714B1	3260-017
55	1	U17	PCB8582	3022-034
56	1	U18	6242	3022-035
57	5	R29,R31,R32,R35,R37	33K	3304-333
58	2	C25,C26	22pF	3419-022
59	1	QZ3	32,768Khz	3381-009
60	1	C28	3n3	3419-233
61	2	D22,D23	3V0	3241-930
62	1	R43	56K	3304-356
63	1	D24	6V8	3241-968
64	4	C29,C30,C31,C32	47uF	3428-647
65	1	U19	LM1458	3030-020
67	1	S1	30028X2	
68	1	U16	58241	3022-031

## POWER SUPPLY BOARD 280-7203/10



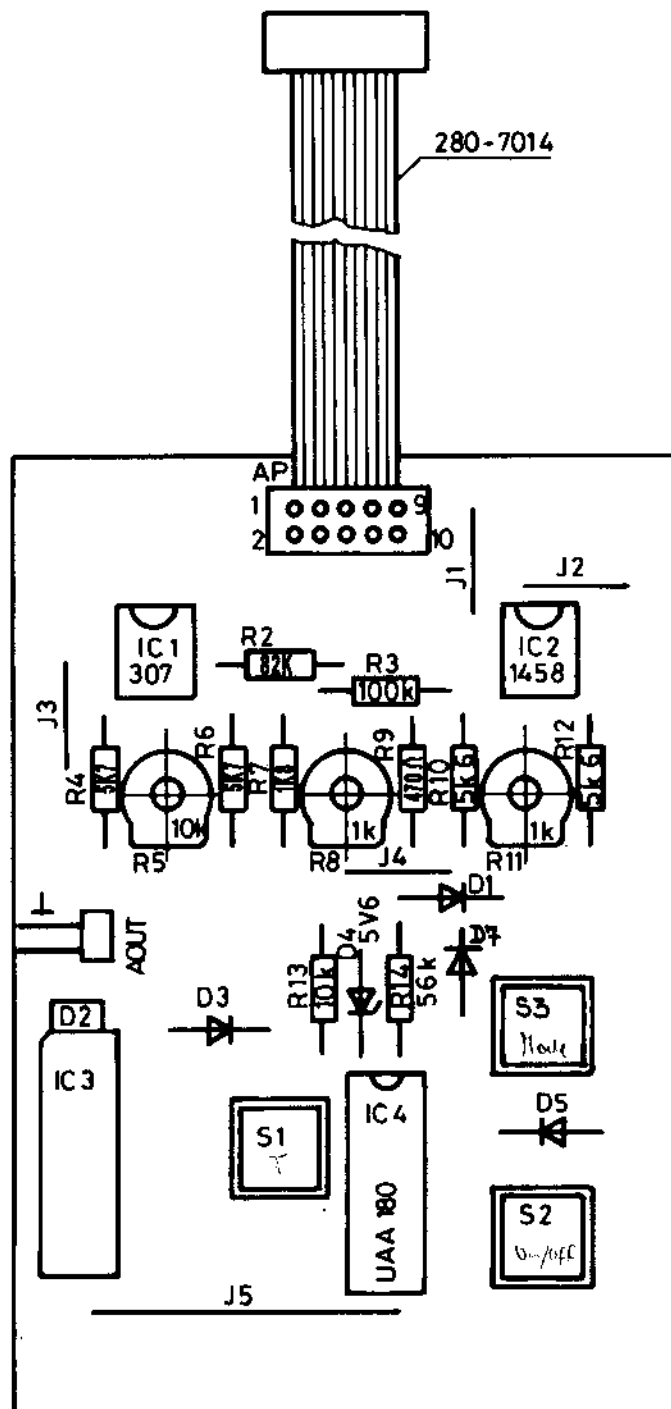


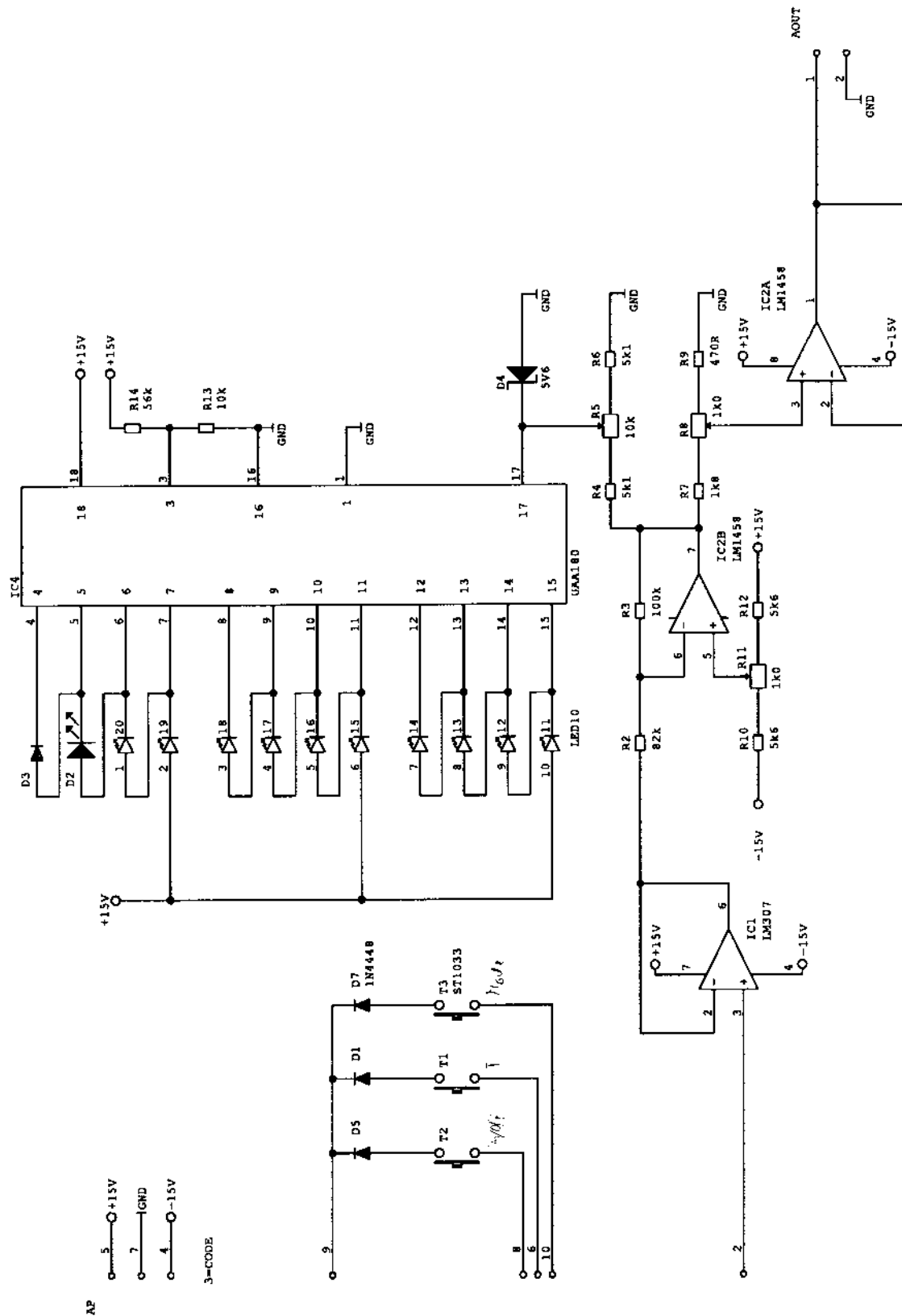




KEY NO.	ORDER-NO.	DESCRIPTION
C1....C4	3426-410	CAPACITOR 0,1 $\mu$ F
C5	3428-822	CAPACITOR 2200 $\mu$ F ELKO
C6....C8	3428-810	CAPACITOR 1100 $\mu$ F ELKO
C9....C12	3401-410	CAPACITOR 0,1 $\mu$ F
D1....D4	3210-004	UNIVERSAL DIODE
G1....G4	3220-008	RECTIFIER
IC1	3050-002	IC 7805 VOLTAGE REGULATOR
IC2....IC4	3050-001	IC 7815 VOLTAGE REGULATOR
J1....J5	3714-003	JUMPER

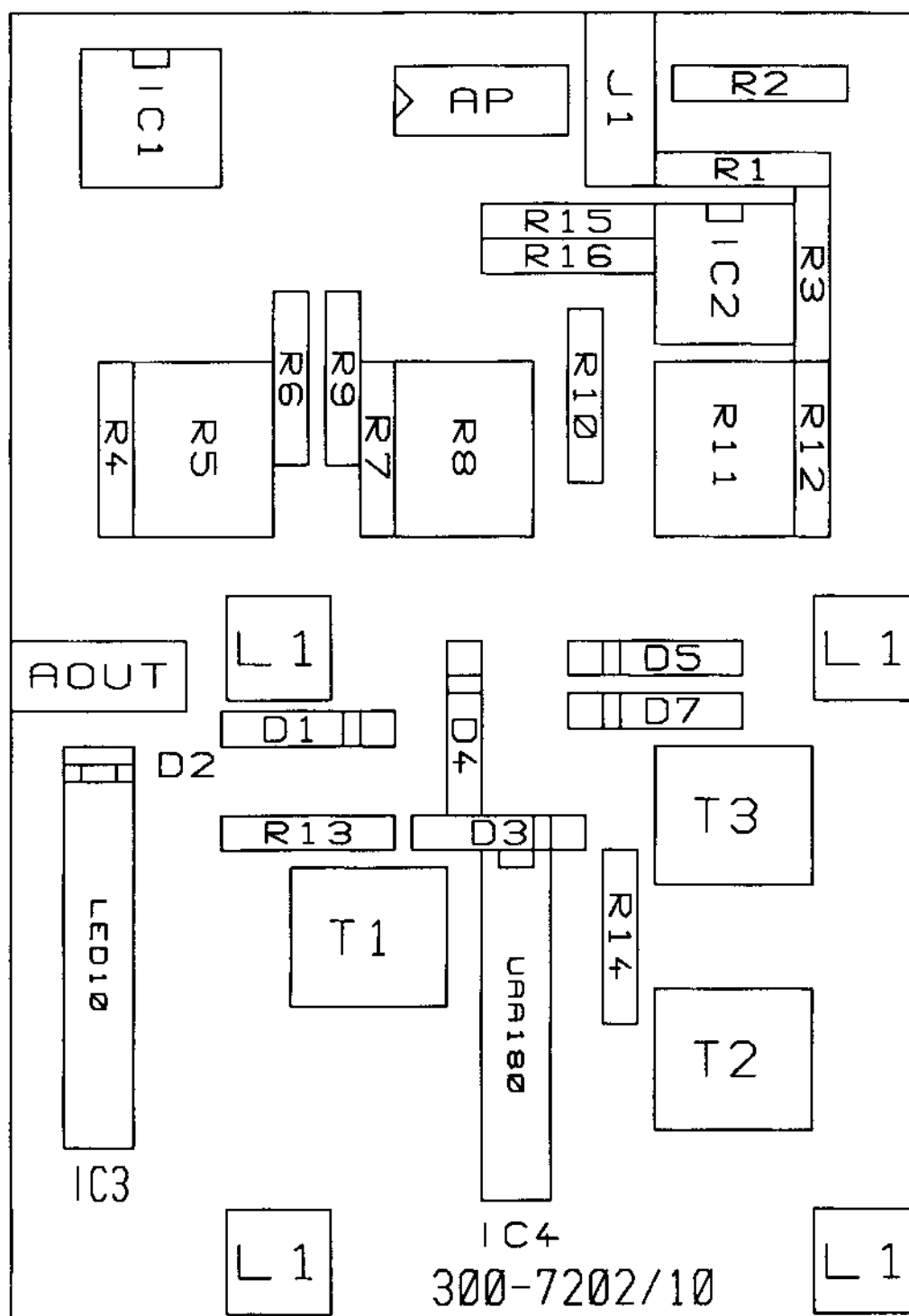
## ANALOGUE BOARD 300-7202/10

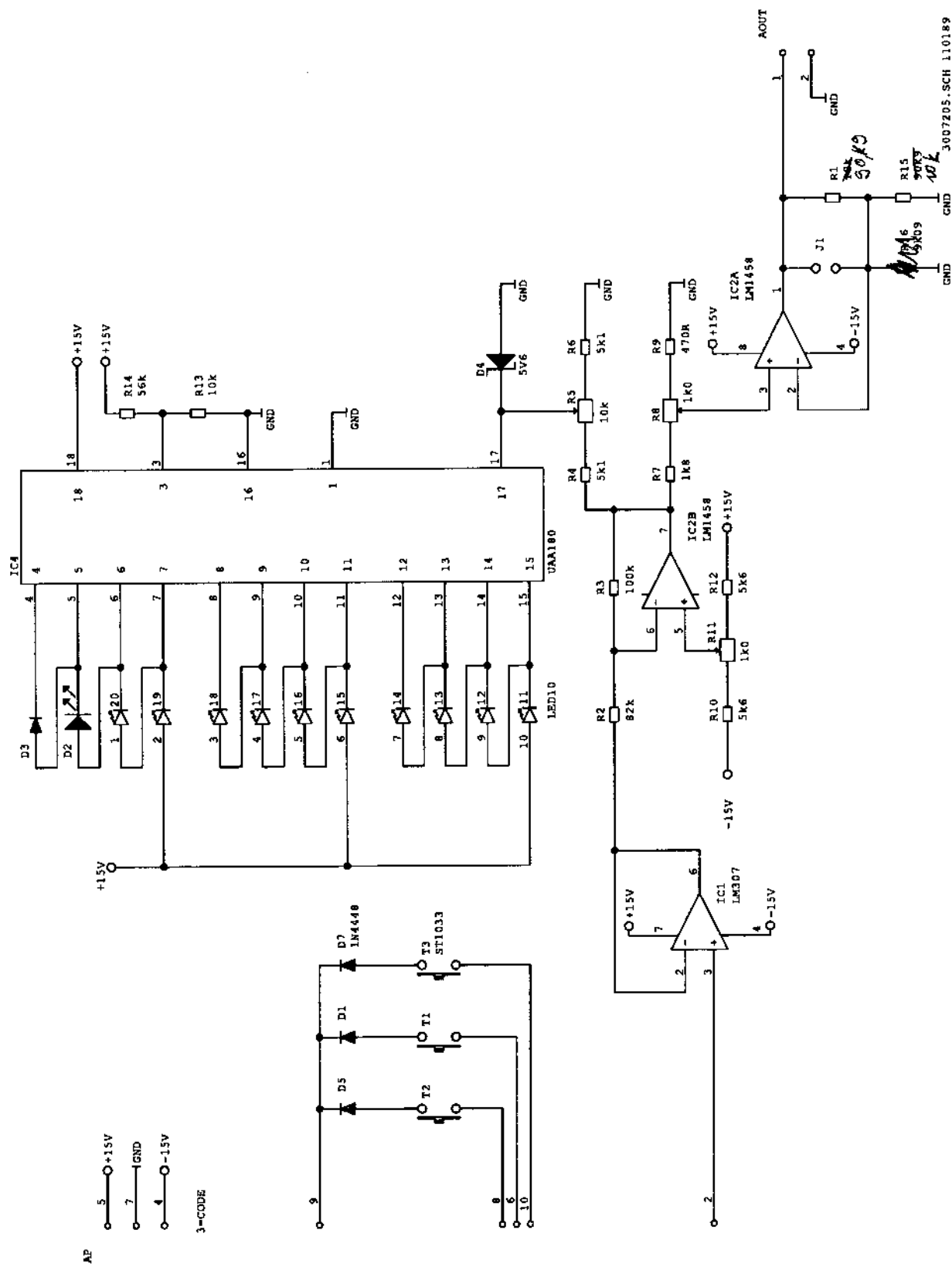




Pos.	Pc.	Key-No.	Type	Part-No.
1	3	T2,T1,T3	ST1033	3602-008
2	4	D5,D1,D3,D7	1N4448	3230-901
3	1	IC4	UAA180	3030-010
4	1	D4	5V6	3241-956
5	1	D2	LED	3251-004
6	1	AP	5X2V	280-7014
7	2	AOUT,J1	2X1H	3504-360
8	1	IC3	LED10	3251-012
9	1	R14	56k	3304-356
10	2	R13,R1	10k	3304-310
11	2	R4,R6	5k1	3304-251
12	1	R5	10k	3330-001
13	1	R7	1k8	3304-218
14	1	R9	470R	3304-147
15	2	R8,R11	1k0	3330-002
16	1	IC2	LM1458	3030-020
17	1	R3	100k	3304-410
18	1	R2	82k	3304-382
19	2	R10,R12	5k6	3304-256
20	1	IC1	LM307	3030-021
21	1	R15	90k	3304-390
22	1	R16	9k0	3304-290

## ANALOGUE BOARD 300-7205/10







Pos.	Pc.	Key-No.	Type	Part-No.
1	3	T2,T1,T3	ST1033	3602-008
2	4	D5,D1,D3,D7	1N4448	3230-901
3	1	IC4	UAA180	3030-010
4	1	D4	5V6	3241-956
5	1	D2	LED	3251-004
6	1	AP	5X2V	280-7014
7	2	AOUT,J1	2X1H	3504-360
8	1	IC3	LED10	3251-012
9	1	R14	56k	3304-356
10	2	R13,R1	10k	3304-310
11	2	R4,R6	5k1	3304-251
12	1	R5	10k	3330-001
13	1	R7	1k8	3304-218
14	1	R9	470R	3304-147
15	2	R8,R11	1k0	3330-002
16	1	IC2	LM1458	3030-020
17	1	R3	100k	3304-410
18	1	R2	82k	3304-382
19	2	R10,R12	5k6	3304-256
20	1	IC1	LM307	3030-021
21	1	R15	90k	3304-390
22	1	R16	9k0	3304-290

### SERVICE-TOOLS AND EQUIPMENT

Apparatus: Voltmeter, Soldering-iron

Tools:

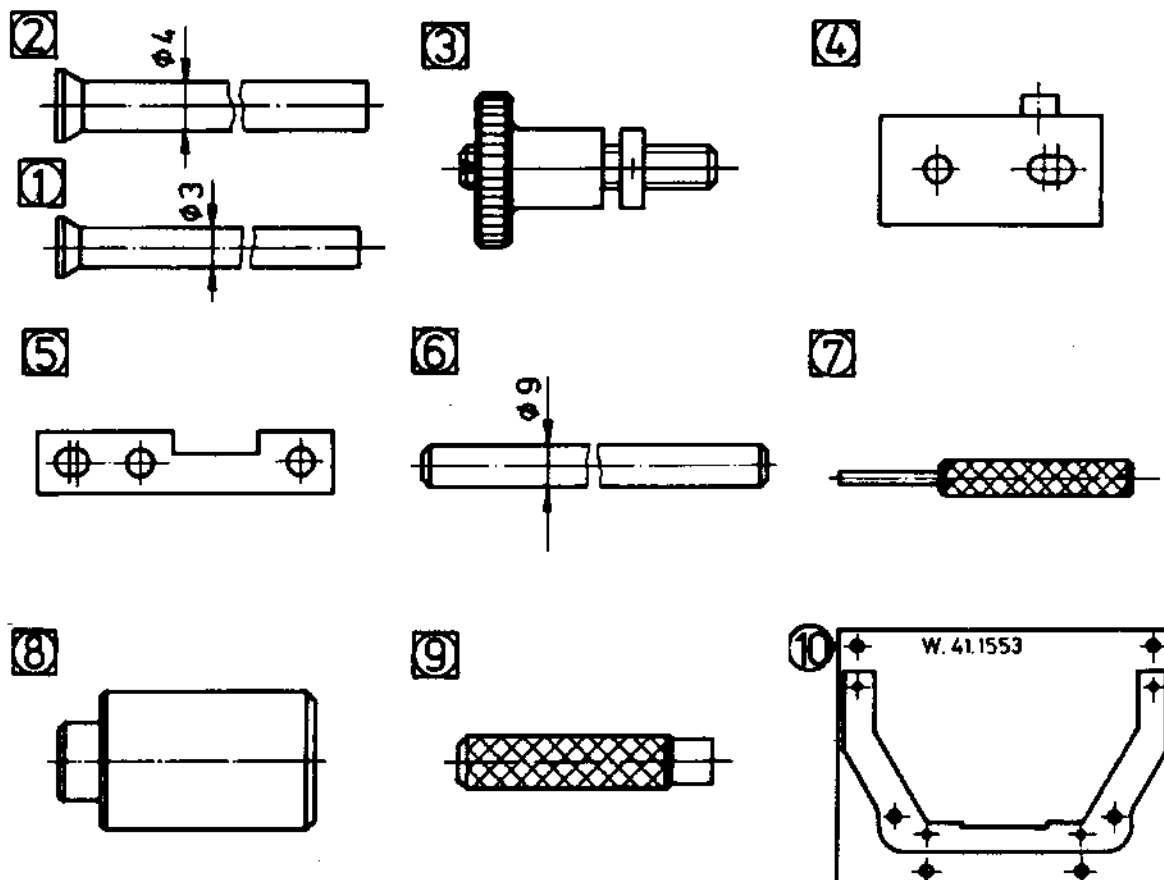
- Standard: Screwdriver-set No. 0, 1, 2, 3, 4, 5 (flat blade)
- Special: ① Pin  $\varnothing 3$  PW29.43.300, ② Pin  $\varnothing 4$  PW29.43.400,  
 ③ Stop W.41.1487, ④ Fixing-block W.41.1488,  
 ⑤ Alignment-piece W.41.1486, ⑥ Centring mandrel  
 W.41.1457/5, ⑦ Pin W.51.722, ⑧ Centring bolt W.41.1470,  
 ⑨ Centring bush W. 41.1480, ⑩ Assembly plate (flexure arm)  
 W.41.1553

### SERVICE-WERZEGE UND AUSRÜSTUNG

Geräte: Voltmeter, Lötkolben

Werkzeuge:

- Normal: Schraubenzieher-Satz Nr. 0, 1, 2, 3, 4 und 5
- Spezial: ① Hilfsstift  $\varnothing 3$  PW29.43.300, ② Hilfsstift  $\varnothing 4$  PW29.45.400,  
 ③ Hilfsanschlag W.41.1487, ④ Befestigungsklotz W.41.1488,  
 ⑤ Ausrichtsteg W.41.1486, ⑥ Zentrierdorn W.41.1457/5,  
 ⑦ Hilfsstift W.51.722, ⑧ Zentrierbolzen W.41.1470,  
 ⑨ Zentrierbüchse W.41.1480, ⑩ Montage-Platte f. Lenker  
 W.41.1553



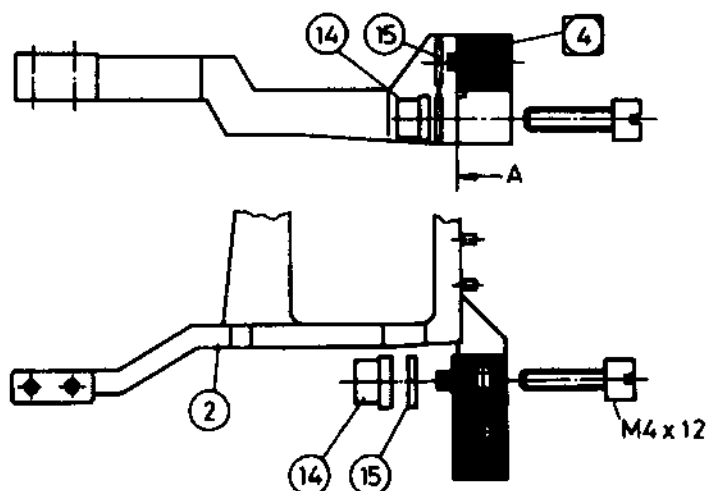
### ASSEMBLING INSTRUCTION FOR SERIES-300

The different signs which appear in these instructions are:

- ⑤ normal position
- ⑤ positions for tools

Instructions for exchange of flexure sheet pos. ①⑤ on balance arm:

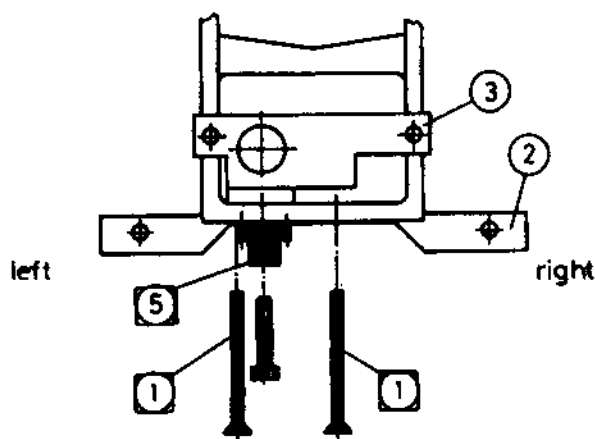
- Fit fixing-blocks ④ on right and left side of balance arm ② with the black screws M4x20 (surface "A" should be aligned).



- Assemble both flexure-sheets (right/left) with the nuts ⑭ and screws M4x12 to balance arm.
- Disassemble both fixing-blocks ④ from the balance arm.

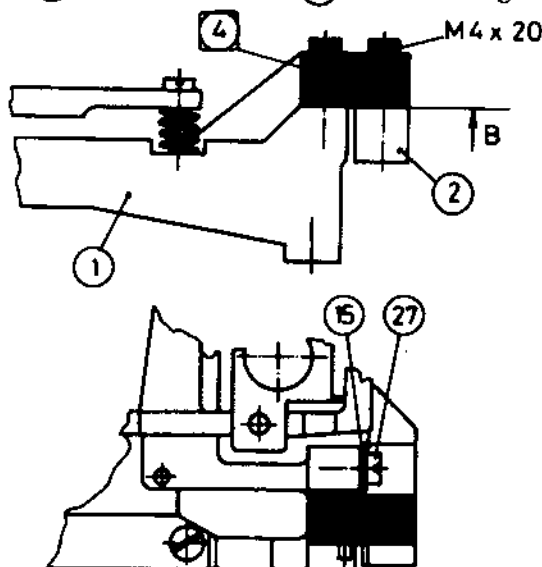
### Assembling

1. Introduce the support piece ③ (larger side to the right side) into the balance arm ②.



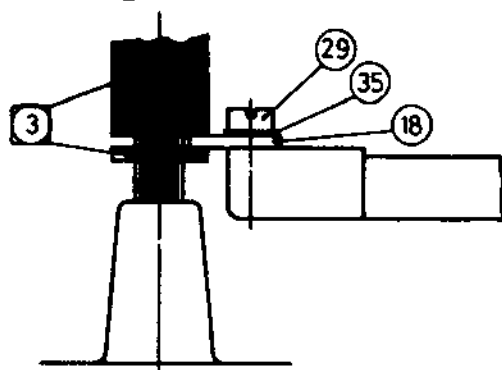
Support piece ③ should be aligned to the balance arm with 2 pins ① (∅ 3), then fix support ③ to the balance arm ② with the alignment-piece ⑤ and 2 spec. screws M4x15.

2. Assemble balance arm with support piece together to the chassis (1) with 2 disk springs (33), 2 washers (34) and 2 screws (27) (do not tight the screws).



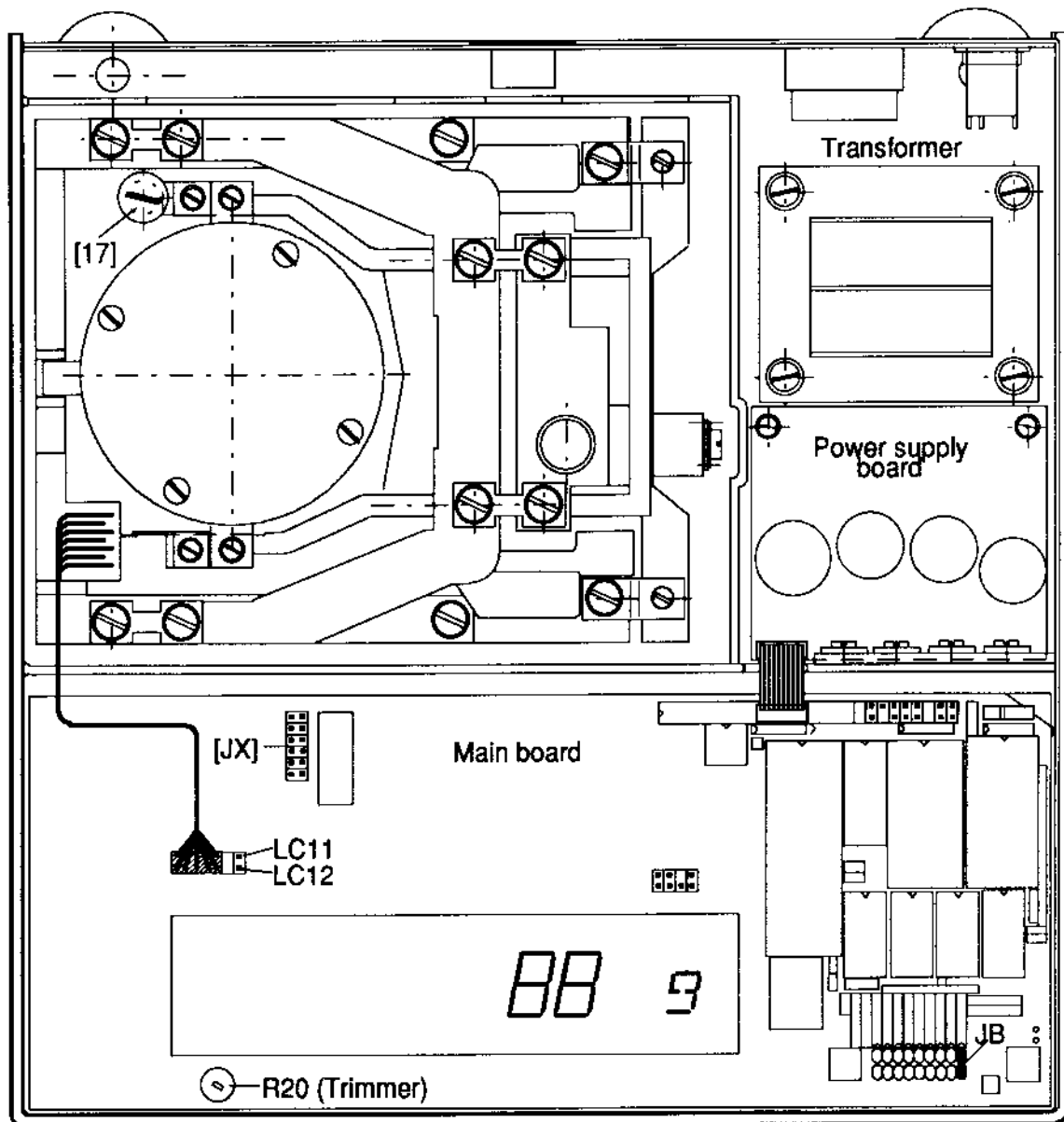
Aline balance arm to the chassis with 2 fixing-blocks (4) and 4 black screws M4x20 (alignement line B). Then fix both screws (27) on the flexure sheets (right/left).

3. Assemble stop (3) (screw part) on chassis.  
Assemble stop plate (18) to the balance arm with the washer (35) and screw (29).  
Clamp the stop plate (18) with the bottom and upper-part of the stop (3).



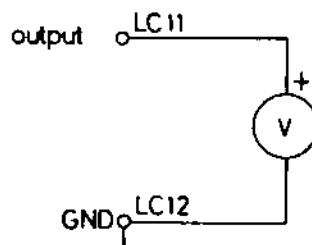
4. Assemble pot compl. (4), (5).  
Check pot with the pin (7) (aline). Place chassis sideways, push centring mandrel (6) through pot and chassis. Assemble 3 screws (26) M4x16 and 3 washers (34) (attn. to the position of the pot's hollows). Place weighing system to the normal position. Remove centring mandrel (6) and assemble plunger coil (6) with the centring bolt (8). Fix coil with two screws (29) M3x8. Check coil's movement to the pot space. Place weighing system sideways and tight the 3 screws (26).
5. Place weighing system to the normal position.  
Disassemble plunger coil (6). Check the space inside the pot with the pin (7) and clean the pot.
6. Assemble plunger coil (6).  
Clean plunger coil and assemble it with the centring bolt (8). Fix the coil with 2 screws (29) M3x8 and 2 washers (35) Ø 3,2 brass. Remove centring bolt (8) and assemble cover disk (7) with 4 screws (30) countersunk head M4x22,6.

7. Assemble NTC-resistor (22) .
8. Assemble sensor mechanism (10) .  
Lead the NTC's wires through the sensor's board hole. Fix sensor mechanism with 2 screws (25) M4x25 (M3x20) and 2 washers (34) . Align sensor support to the chassis.
9. Assemble vane (11) .  
Assemble vane (11) with the screw (29) M3x8 and the washer (35). Check if vane is in the middle of sensors-housing's slit.
10. Assemble  
Flexure arm compl. on top. Check the flexures: reflection of embossing, parallelism, straightness ca. 0,1 mm. Push two pins (2) (Ø 4) through flexure arm and chassis. Assemble 4 screws (27) M4x8, 4 washers (34) and 4 disk spring (33) .
11. Assemble  
Place weighing system on back wall. Flexure arm compl. on bottom. Check the flexures: reflection of embossing, parallelism, straightness ca. 0,1mm. Assemble 4 screws (27) M4x8, 4 washers (34) and 4 disk spring (33) . Fix all 8 screws (27) , the two pins (2) should move without detention.  
Attention: Do not try to bring tension to the flexures by tighten them.
12. Assemble flexure strap (12) .  
Disassemble pin (1) on left and the alignment piece (5) . Assemble two space pieces (9) (if there are some), flexure strap (12) with two torsion-protections (13) , two washers (34) and two screws (31) (take notice of position).
13. Place weighing system back to the normal position.
14. Assemble safety-device (19)  
Disassemble fixing-block (4) on left. Assemble screw (20) to the balance arm (2) , assemble safety-device (19) with screw (27) M4x8, washer (34) and disk spring (33) . Check/adjust the space from screw (20) to safety-device (19) with the centring bush (9) . Do the same for the right side.
15. Disassemble the stop (3) and assemble stop screw (17) .
16. Solder  
NTC-resistor and coil connecting wires to the sensor's board.
17. Remove  
the two pins (2) Ø 4, one pin (1) Ø 3 from the weighing system. Check all the flexures and the cleanness of the system.
18. Assemble  
Put weighing system into housing's bottom. Fix it with 3 screws (27) and connect the sensor's plug to the main board.



### ADJUSTMENT INSTRUCTION FOR WEIGHING CELL

1. Unsolder jumper **(JB)** on main board.
2. Level the balance with the levelling screws. Plug on the balance
3. Adjust symmetry
  - At both end-positions of the balance arm, the capacity indicator should have a certain voltage, a positive and a negative one. The symmetrical voltage value can be adjusted with the stop-screw **(17)**.
  - This voltage can be measured on pins LC11 and LC12 (load cell-plug on main board), and its range can be regulated with the trimmer (R20) on main board.



Set symmetry voltage to  $\pm 1,5$  V.

4. Check initial load

The initial load deviations, Error 60 (falling below the minimum conversion range), and Error 61 (exceeding the maximum conversion range), can be adjusted with the jumper **(IX)** (if available) on main board.

  - Unloaded weighing pan, Error 60 should not appear.
  - Full capacity on weighing pan, Error 61 should not appear.
5. Corner load adjustment

Adjust corner load with a testweight with the value of  $1/3$  of the balance's capacity. The adjustment is done by turning the screws **(1)** and **(2)**. Set corner load to  $\pm 1$  digit.
6. Adjust linearisation (with multifunctionbox and cover plate linearisation)

#### Balances with one range

- a) Press button 1, zero point (unloaded weighing pan), display blinks for about 8 times.
- b) Place  $1/2$  capacity on pan, press button 2. Display blinks for about 8 times.
- c) Place full capacity on pan, press button 3. Display blinks for about 8 times.
- d) Press button 4, linearisation will be evaluated.

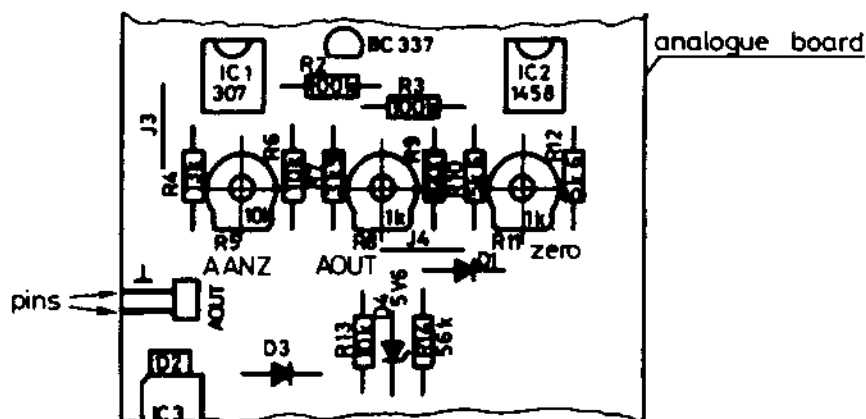
#### Dual range balances

##### Linearity of the first range (small)

- a) Press button 1, zero point (unloaded weighing pan), display blinks for about 8 times.
- b) Place  $1/2$  capacity (of small range) on pan, press button 2, display blinks for about 8 times.
- c) Place full capacity (small range) on pan, press button 3, display blinks for about 8 times.
- d) Press button 4, linearisation will be evaluated (of small range). A round sign will appear on display's left side.

### Linearity of the second range (high)

- e) Press button 1, zero point (unloaded weighing pan), display blinks for about 8 times.
  - f) Place 1/2 capacity (of high range) on pan, press button 2, display blinks for about 8 times.
  - g) Place full capacity (of high range) on pan, press button 3, display blinks for about 8 times.
  - h) Press button 4, linearisation will be evaluated.
7. Check instability  
Insert the "Testprogramme I"-plate into multifunctionbox. Place the full capacity of the balance on the weighing pan. Press button 2 (instability). By pressing button 2, an instability reference number starts to be measured over 50 short integration periods. Two successively measured values are subtracted and the absolute value of the difference is accumulated and displayed (red diode lights up when measuring is finished). The instability reference number should be measured 5 times. In doing so, the two worst of the five measured reference numbers should not be taken into account. Each of the three remaining values should be smaller than 100 counts. Choose a suitable place for the balance, e.g. a stable table with vibration damper. The balance should be equipped with a draft shield (if available). The place should be free from vibrations and drafts.
  8. Check hysteresis  
Place first test weight (1/2 capacity) on weighing pan, press taring button. Place second test weight (1/2 capacity) on weighing pan, remove second test weight and read out display. Repeat this procedure three times. Allowed deviation should be +/- 1 digit.
  9. Disconnect balance from the mains  
Solder jumper **JB** on main board. See page KD280-4.2./1. Connect balance on the mains.
  10. Analogue output adjustment to zero.  
Adjust output voltage with the trimmer (R11) "zero" on analogue board. The voltage should be 0,00 V +/- 0,01 V. It can be measured on pin 1 and pin OUT on the analogue board.  
This procedure should have been done with an unloaded weighing pan.





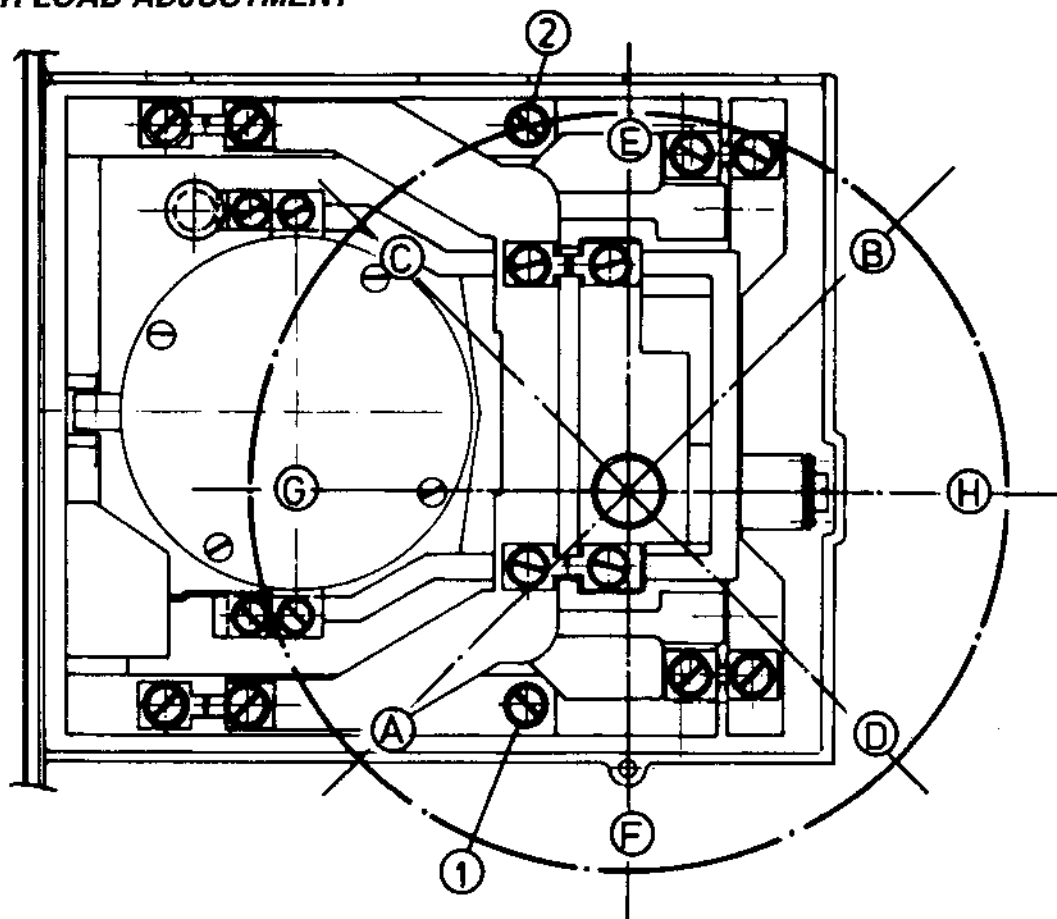
11. Analogue output adjustment by full capacity.  
Place a testweight (full capacity) on weighing pan, adjust output voltage with the trimmer (R8) "AOUT" on analogue board. The voltage should be 1,00 V +/- 0,01 V. It can be measured on pin 1 and pin OUT like item 10.
12. Capacity indicator adjustment  
Place a testweight (full capacity) on weighing pan, adjust capacity indicator with the trimmer (R5) "AANZ" on analogue board to a 100 % capacity. That means the last yellow LED should light up and the red LED should not.
13. Reassemble housing's top with screw (22) M4x8 and washer (35) .
14. General check
  - Instability (full capacity) 100 digits
  - Linearity +/- 1 digit
  - Hysteresis +/- 1 digit
  - Corner load deviation +/- 1 digit
  - Overflow (OL), underflow (UL) and "switch over" change of range
  - Stability detector "g"

### Important

When contacting PAG for technical assistance, the following points are being required for a prompt service:

- Balance type, e.g. 300C
  - Order-number, e.g. No.280-9431
  - Selling-number, e.g. No. T70820
  - Serial-number, e.g. No. 5009-202
  - EPROM-number, e.g. No. 28:06-00
  - Program-number, e.g. No. 5007-00
  - Accurate description of the defect
  - Weighing results
- (label on the rear)  
(label on chassis)  
(label on EPROM)  
(testprogram I, button 4)

### CORNER LOAD ADJUSTMENT



#### Procedure

1. Check corner load deviations between corners A-B and C-D. The corner which shows most deviation should be adjusted first.
2. Corner load adjustment is done by turning the screws ① and ②.  
Screw ① is for the adjustment of the corners A and B.  
Screw ② is for the adjustment of the corners C and D.
3. Examples:
  - 1) Between corners A and B there is a difference of 17 digits.  $A = 0$  and  $B = -17$ . Turning screw ① in clockwise direction, corner B will increase its value on display, that means the error of -17 digits will become smaller. It will go to -10, -5 and reach 0 and then go to +5, +10, etc. Depends on how far the screw 1 will be turned.
  - 2) Between corners C and D there is a difference of 17 digits.  $C = 0$  and  $D = -17$ . Turning screw ② in clockwise direction, corner D will increase its value on display, that means the error of -17 digits will become smaller. It will go to -10, -5 and reach 0 and then go to +5, +10, etc. Depends on how far the screw 2 will be turned.Reaching 0 on all corners A-B, C-D, then corners E-F, G-H should be checked too.  
The tolerance on the corner deviation should be  $\pm 1$  digit. It should be checked with a test weight of which the value corresponds to  $1/3$  of the balance's capacity.

### **ERROR-DISPLAY SERIES-300**

#### **1. Operating Error**

##### **1.1 Disappears by correct handling**

- Error 1 - no programme plate on the multifunction box
- Error 2 - no display in these units possible (GN, ct, C.M.)
  - reference value too small or negative (percentage programme)
  - measure value deviation bigger than +/- 50% of the reference value (statistic programme)
  - reference value smaller than + 100 digits (statistic programme)
  - density of the solid bigger than 25 g/ccm (density programme)
  - at least one measured value is on overload, respectively on underload range (animal weighing programme)
- Error 3 - reference weight too small or negative (counting programme)
  - less than two measure values stored (statistic programme)
  - density of the liquid smaller than 0.5 g/ccm or bigger than 2.0 g/ccm (density programme)

##### **1.2 Correctable with suitable precaution**

- Error 7 - inadmissible extensions connected (disconnect from MF-box socket)
- Error 8 - zero point is not in between the tolerance limits (unload weighing pan)
- Error 9 - calibration constant smaller than 0.99 or higher than 0.01 (display frozen - switch off and repeat calibration procedure)

#### **2. Error in the normal working mode**

##### **2.1 Fatal Error (displayed on cold start - disappears by pressing tare button)**

- Error 10 - linearisation factor destroyed (repeat linearisation procedure)
- Error 11 - calibration constants destroyed (recalibrate balance)

##### **2.2 Fatal Error (displayed on cold start - display frozen)**

- Error 13 - balance model code during usage destroyed (switch balance off and on again)
- Error 14 - invalid balance model code (store new code)
- Error 16 - internal RAM defective (replace micro processor)
- Error 17 - external RAM defective (replace RAM)
- Error 18 - EPROM defective (replace EPROM)
- Error 19 - wrong EPROM (insert correct EPROM)

##### **2.3 Servicing Diagnostic Error**

###### **2.3.1 Tolerable Error (display on use of testprogramme 1 - disappears by pressing tare button)**

- Error 21 - temperature factor destroyed (fine temperature compensation inactivated)

### **3. Error in the adjust working mode**

#### **3.1 Temperature Calibration Error (corrected by doing new temperature calibration)**

- Error 50 - temperature difference smaller than 100 digits or temperature values stored in wrong sequence
- Error 51 - limit value for the zero point correction or scale correction exceeded
- Error 52 - not all values needed for the evaluation of the temperature curve are available
- Error 53 - ascent of zero point or scale too big

#### **3.2 Initial Load Error (corrected by changing the load)**

- Error 60 - falling below the maximum conversion range
- Error 61 - exceeding the maximum conversion range