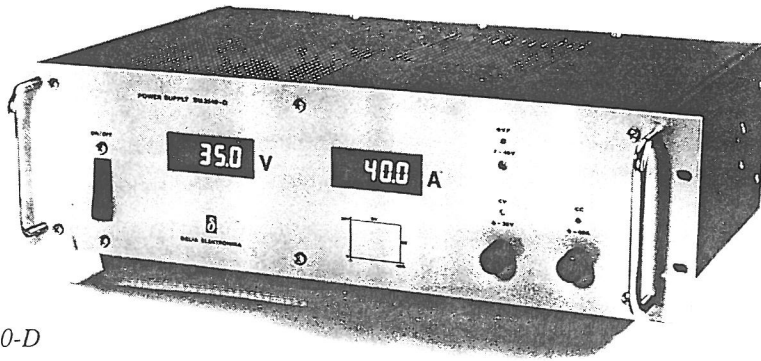


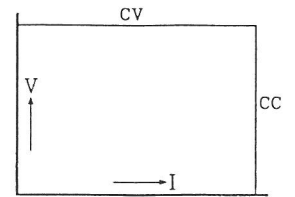
**SM 3540-D**

**SMX 7220-D**

# 1400 watt SM - SERIES



SM 3540-D



Output		SM 3540	SMX 7220
voltage		0 - 35 V	0 - 72 V
current		0 - 40 A	0 - 20 A
<b>Input</b>			
AC input, full load		198 - 265 V 50 - 60 Hz	198 - 265 V 50 - 60 Hz
DC input, full load		237 - 350 V	237 - 350 V
current (220 V AC)		9.3 A rms	9.3 A rms
fuses		16 AT	16 AT
<b>Efficiency</b>			
DC input, full load		91 %	91 %
AC input, full load		89 %	89 %
<b>Regulation</b>			
Load 0 - 100%	CV	5 mV	5 mV
Line 198 - 265 V AC	CV	5 mV	5 mV
Load 0 - 100%	CC	25 mA	15 mA
Line 198 - 265 V AC	CC	25 mA	15 mA
Ripple + noise, rms / p-p	CV	2 / 10 mV	4 / 20 mV
	CC	8 / 25 mA	4 / 12 mA
Programming speed	0 → Vmax	20 ms	25 ms
Output impedance	0-100 kHz CV	0.05 Ohm	0.05 Ohm
Temp. coeff., per °C	CV		5.10 <sup>-5</sup>
	CC		1.10 <sup>-4</sup>
Stability			
during 8 hrs after	CV		3.10 <sup>-4</sup>
1hr warmup	CC		1.10 <sup>-3</sup>

Analog Programming	CV	CC
<b>Programming inputs</b>		
input range	0 - 5 V	0 - 5 V
accuracy	± 0.2% +0 mV / +12.5 mV	± 0.5% +0 mV / +18 mV
input impedance	1 MOhm	1 MOhm
<b>Monitoring output</b>		
output range	0 - 5 V	0 - 5 V
accuracy	± 0.2% +0 mV / +12.5 mV	± 0.5% - 5 mV / +0 mV
output impedance	20 Ohm	20 Ohm
<i>Note: Lower offset programming inputs and monitoring outputs on request</i>		
<b>IEEE 488 Programming</b>		
With external interface PSC44M, see page 4 of this catalog. Programming and Read-back of both Voltage and Current with 12 bits DA and AD converters.		

<b>Standby input power</b>	: 10 W	<b>Hold-Up time</b>	: 25 ms (100 % load) 60 ms (50 % load)
<b>Remote shut-down</b>	: With 5 V or relay contact	<b>Series operation</b>	: Normal and Master / Slave Max. 600 V total voltage
<b>Recovery time</b>		<b>Parallel operation</b>	: Normal and Master / Slave
50 - 100% load step	: 100 $\mu$ s (SM3540) 150 $\mu$ s (SMX7220)	<b>Remote sensing</b>	: Max. 2 V per lead
<b>Insulation</b>		<b>OVP trip range</b>	: 17 - 115 % of Vmax.
Input/Output	: 3750 Vrms (1 min.) 8mm creepage/clearance	<b>Meters</b>	: Digital 3.5 digit. (SMX7220 also available with analog meters)
Input/case	: 2500 Vrms (1 min.)	<b>Mounting</b>	: Vertical airflow through the unit should not be ob- structed
Output/case	: 600 V DC	<b>Cooling</b>	: Natural convection cool- ing, no blower, no noise
<b>Safety</b>	: IEC 950 / IEC 348	<b>Enclosure</b>	: IP20
<b>EMC</b>			
RFI suppression	: VDE 0871 B		
Immunity	: IEC 801-4 level 4 IEC 801-3 level 3		
<b>Operating ambient temp.</b>	: -20 to +50 °C		
<b>Thermal protection</b>	: Output shuts down in case of insufficient cooling		

### Fixed or Variable output

- Standard : Variable output **Knobs** at front panel. Voltage and current control with 10 turn potentiometers, resolution 0.03%
- Option P001 : Fixed output **Screwdriver** adjustment of V, I, OVP at front panel

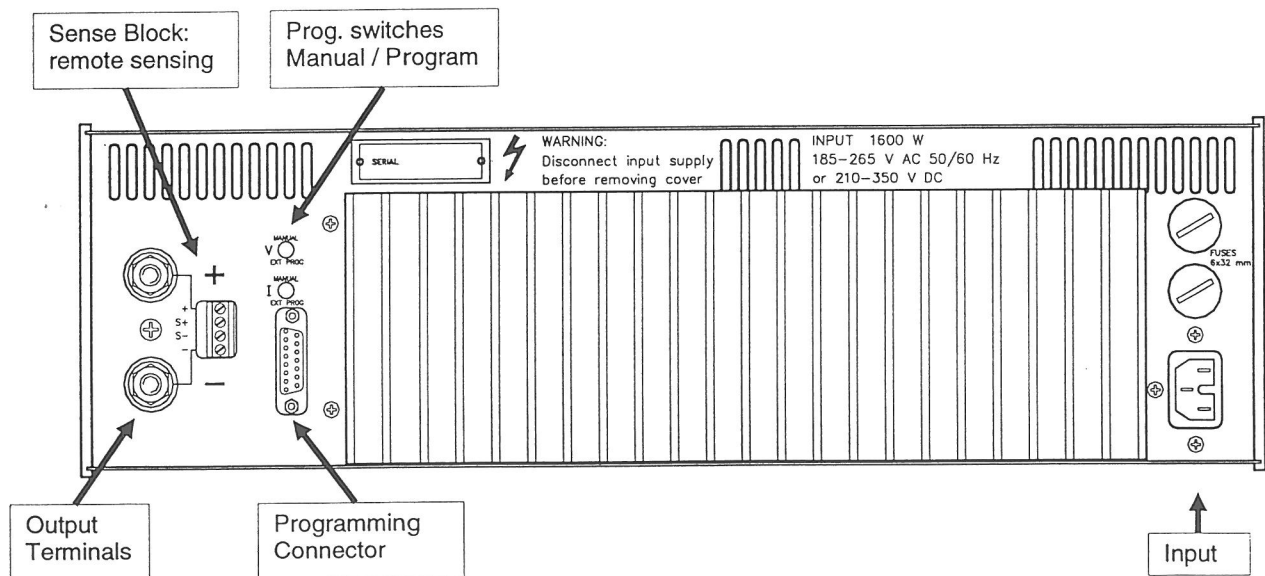
### Master / slave operation

- Parallel and Series operation with equal Current and Voltage sharing.
- In this way two or more SM-units can together be used as one high power unit.
- Voltage and current of the units is controlled by the master (by potentiometers or by programming).

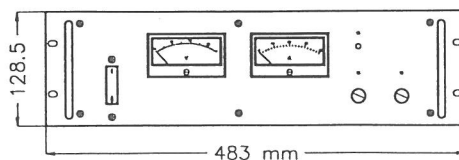
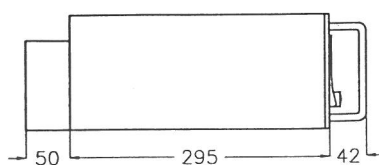
### Battery Charging

- The CV / CC regulated power supplies are very suitable for battery charging.
- Ask for the special datasheet "BATTERY CHARGING WITH SM-series POWER SUPPLIES". This datasheet contains information about protective measures against accidental battery reversing.

### Rear Connections



### Dimensions and Weight

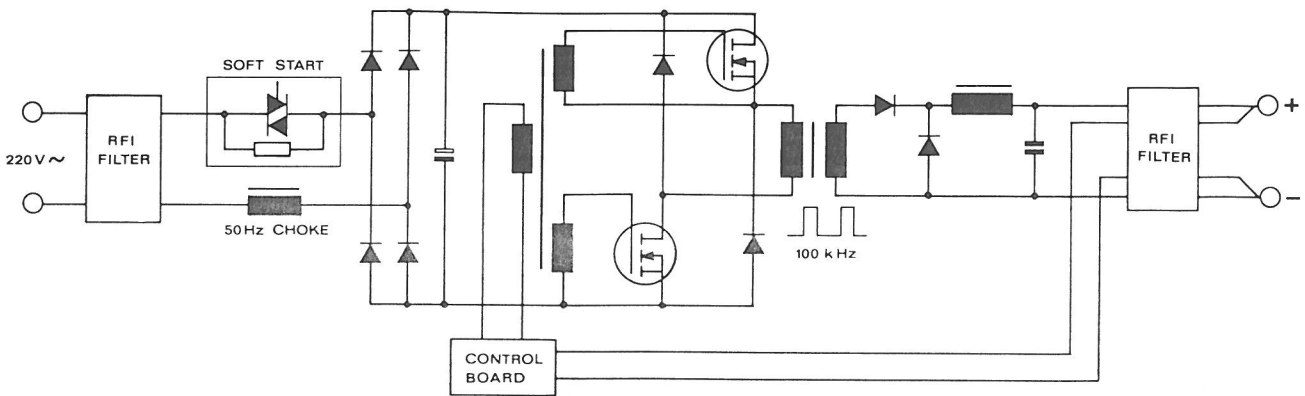


SM 3540  
SMX 7220

19" 3 U

14.5 kgs

## Circuit description



Simplified functional diagram of SM 3540

The 220V AC line voltage is rectified by a bridge rectifier and smoothed by a large electrolytic capacitor. The 50Hz choke in the input circuit improves the waveform of the input current so that no low frequency distortion is produced on the line voltage.

The high frequency interference produced inside the power supply is prevented to go to the line or the load by carefully designed RFI filters.

When the unit is switched on the large electrolytic capacitor is charged via the resistor of the SOFT START circuit so that no large inrush current will flow. As soon as the voltage is sufficiently high the power supply starts working and the series resistor is bypassed by a triac.

The use of powerfet's makes it possible to operate at 100kHz switching frequency with many advantages like small size, light weight, low ripple and fast regulation. The rectified 220V (300VDC) is chopped by the power mosfet and transformed to a lower voltage. This 100kHz power converter is of the feed forward type. The regulation is achieved by pulse width modulation.

Carefull design, overdimensioning of vital components, several built-in protections and cool operation (because of the very high efficiency) make the SM3540 a very reliable power supply which can continuously be used at maximum rating.

### Cooling and thermal protection

The SM3540 has natural convection cooling (no fans no noise). This means that it has to be used in horizontal position so that the air can pass freely vertically along and through the unit.

To protect the unit for overheating in case of wrong use (like covering it with something or building it in with insufficient cooling) two thermo-switches are built in which can shut down the output.

One is thermally coupled to the power fets. If it is activated all led lamps go out. The second is thermally coupled to the high frequency power diodes of the output circuit. If it is activated the led lamp of the OVP starts burning.

### Load ripple and peak currents

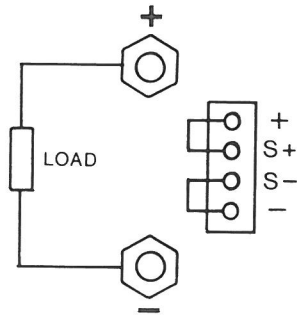
Ripple currents caused by the load at frequencies below 1 kHz are compensated by the voltage regulation.

However high load ripple currents which exceed the current limit or which have strong

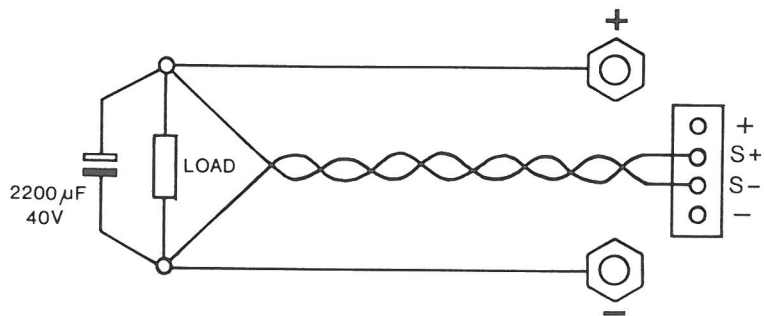
components above 1 kHz can overheat the output electrolytic capacitors. Also repetitive high peak currents, like taken by 50Hz DC-AC inverters can have this effect. If the current limit is exceeded periodically by such high ripple current the CC led lamp will start blinking. The rms value of the current should be kept below 15A

In above cases an electrolytic capacitor of 10.000 uF as buffer parallel to the load is recommended.

### Local or remote sensing



Local sensing



Remote sensing

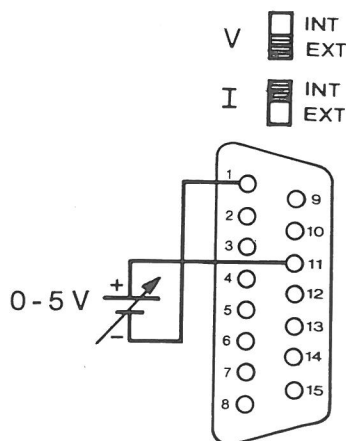
For most applications the SM3540 can be used with local sensing, which means that the output voltage is kept constant at the output terminals. Local sensing is recommended because it cannot cause problems like interference or oscillating.

However if it is desirable to compensate the voltage drop over the leads to the load the point of stabilisation can be displaced from the output terminals to the load terminals by using sense leads (thin measuring wires) from S+ and S- to the + and - of the load.

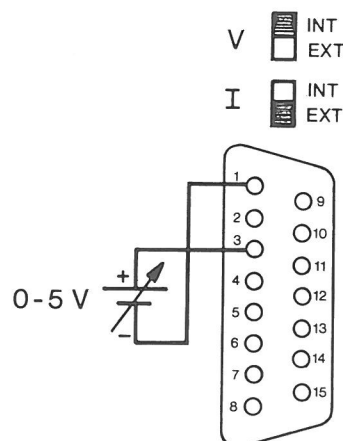
To prevent for interference and oscillations it is advisable to twist the sense leads and to connect an extra electrolytic capacitor of 2200 uF to the load terminals.

Maximum 2V can be compensated in each load lead. Of course in that case the 4V subtracts from the maximum voltage rating.

### Voltage and current programming



Voltage programming  
by 0 - 5V



Current programming  
by 0 - 5V

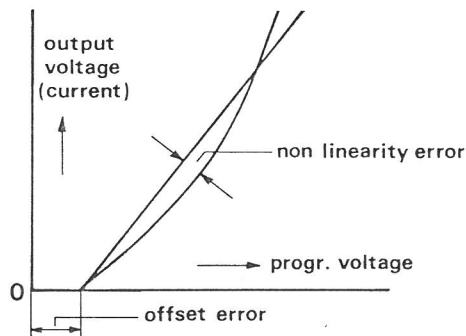
Both output voltage and current can be programmed by 0-5V.

To program connect as drawn above and put the switches V and I (through the holes above the connector) in the right position (at external for programming).

The programming inputs have a very high input impedance (opamp inputs). The zero of the programming inputs (pin 1 at the 15-pole D-connector at the rear of the power supply) is internally connected (through a picofuse of 250mA) to the negative power output terminal. So when connecting one has to take care that the load current will not flow through the programming zero connection and blow the picofuse.

Our IEC 625/IEEE 488 controllers PSC 625 and PSC 44M have isolated (1000V) analog outputs, so in that case there is no problem.

### Programming accuracy



For the full output voltage range (or current range) the required programming input voltage is 0-5V +/- 2%.

The linearity error (not including the offset error) is maximum 0.15%.

The zero offset error is always positive and maximum 30mV for voltage- and max. 40mV for current programming.

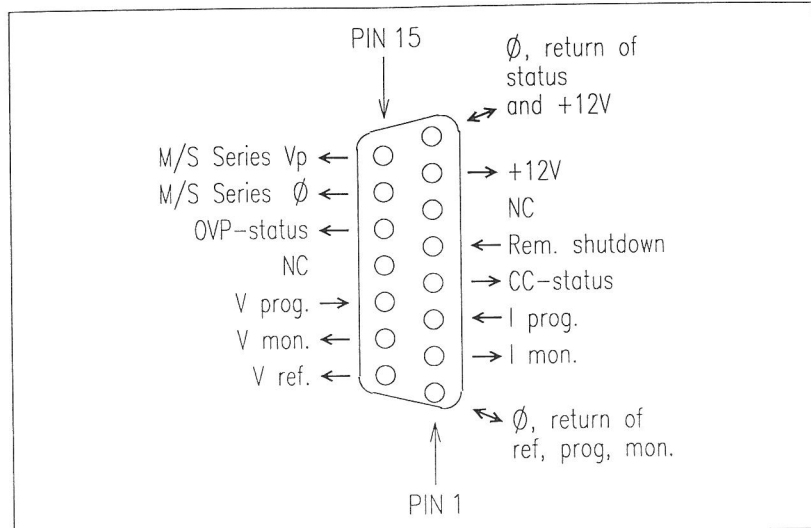
Our IEC 625/IEEE 488 power supply controllers PSC 625 and PSC 44M have trimpots at the rear to compensate for the range tolerance and zero shift of the power supply programming inputs.

### Programming speed

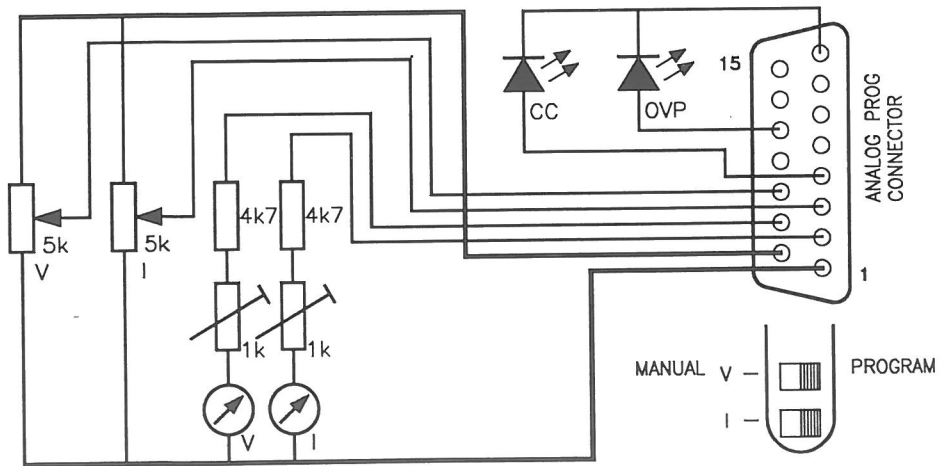
The maximum programming speed at full load (0,875 Ohm) is about 600V/sec.

With other loads higher speed is possible but to avoid overheating of the output capacitors do not exceed 1000V/sec.

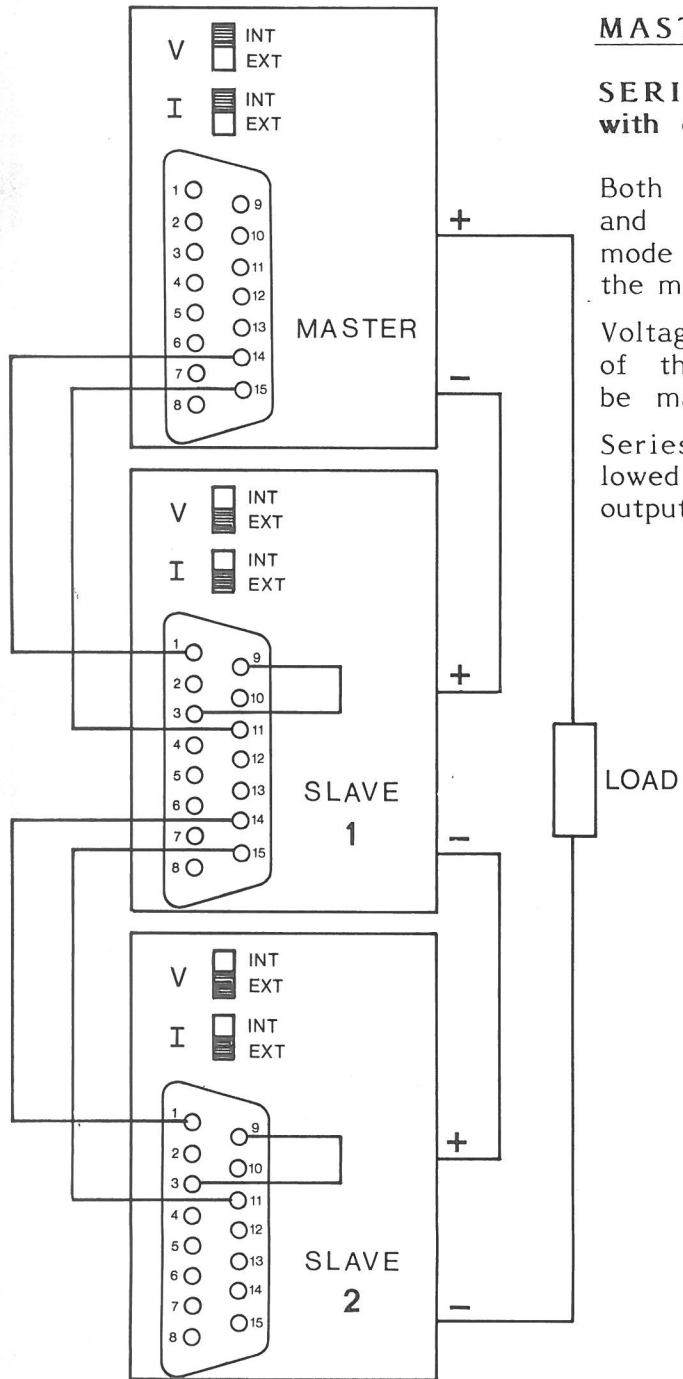
## Programming Connector



pin	description
1	Ø, return of reference, prog. inputs and monitor outputs.
2	current monitor output (0 - 5V)
3	current programming input (0 - 5V)
4	CC status output, logic 1 = CC mode (5 V / 10 mA)
5	Remote shutdown, +5V on the input = shutdown
6	NC
7	+12 V output (Ri = 500 Ohm)
8	Ø, return of status outputs and +12 V
9	reference voltage 5.1 V
10	voltage monitor output (0 - 5V)
11	voltage programming input (0 - 5V)
12	NC
13	OVP status output, logic 1 = OVP mode (5 V / 10 mA)
14	M/S series, output for slave (Ø)
15	M/S series, output for slave (prog.)



Remote Control



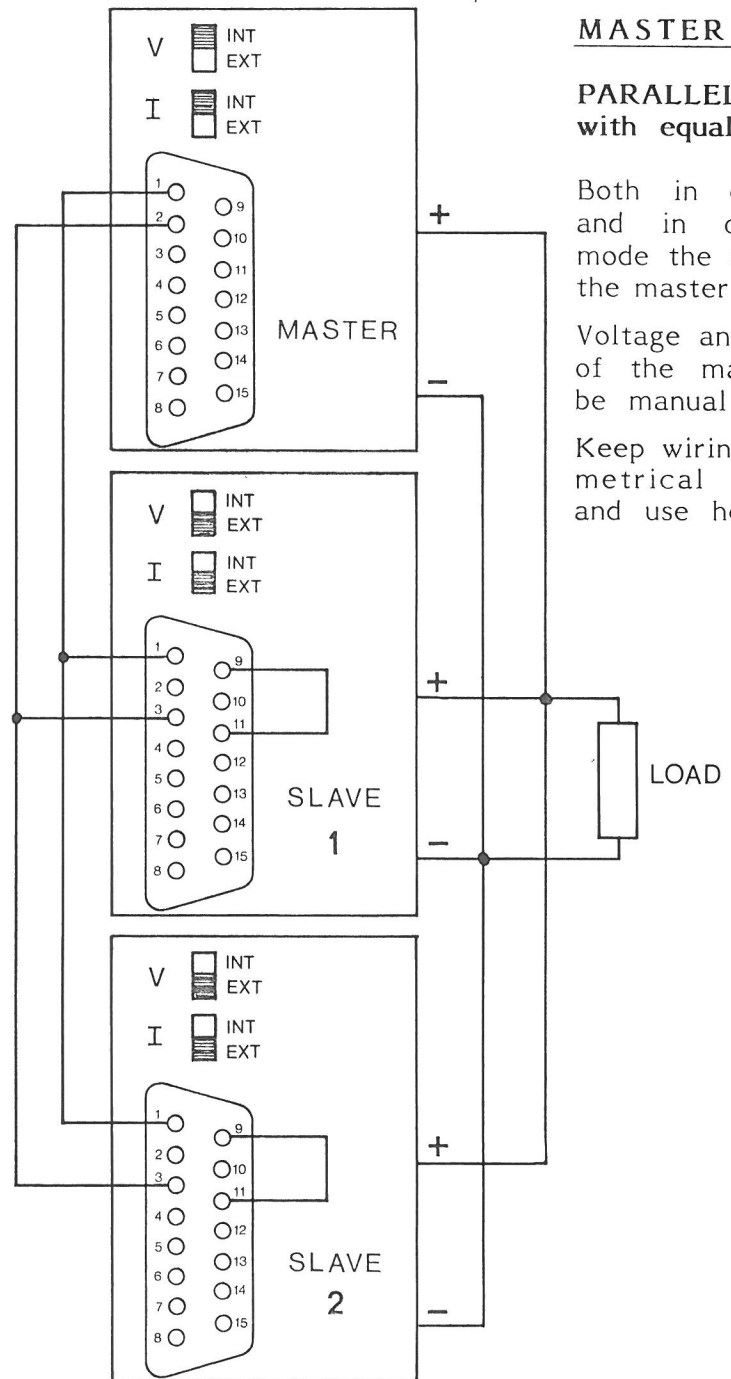
## MASTER AND SLAVE

### SERIES CONNECTION with equal voltage sharing

Both in constant voltage and in constant current mode the slaves will follow the master.

Voltage and current control of the master can either be manual or programmed.

Series connection is allowed up to 500V total output.



## MASTER AND SLAVE

### PARALLEL CONNECTION with equal current sharing

Both in constant voltage and in constant current mode the slaves will follow the master.

Voltage and current control of the master can either be manual or programmed.

Keep wiring short and symmetrical (equal lengths) and use heavy gauge wire.



## MASTER AND SLAVE

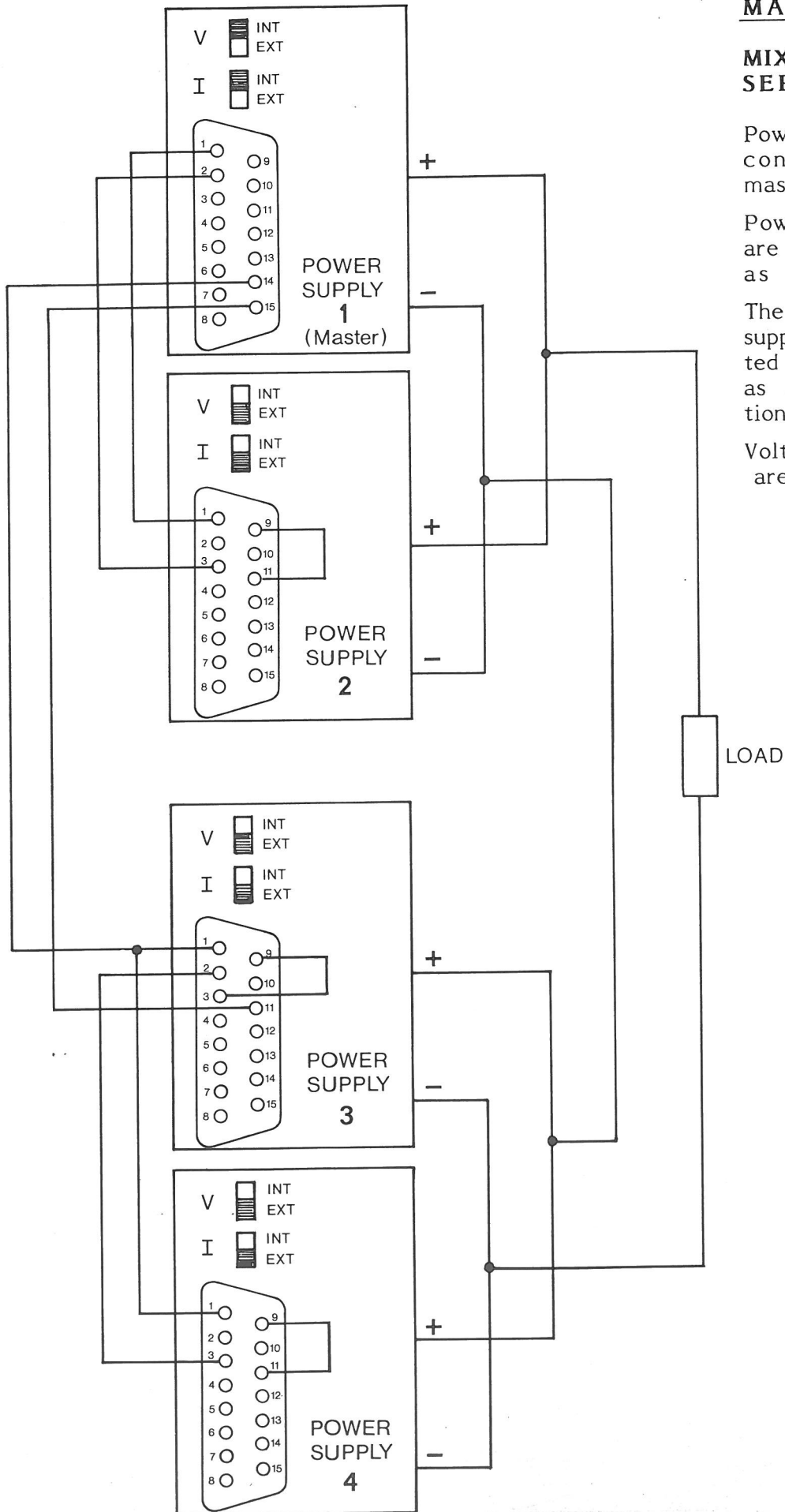
### **MIXED PARALLEL AND SERIES CONNECTION**

Power supply 1 and 2 are connected parallel as master and slave.

Power supply 3 and 4 are also connected parallel as master and slave.

The combination of power supply 3 and 4 is connected in series with and as slave of the combination 1 and 2.

Voltage and current control are now by power supply 1.



**MAIN SECTION**

C001	=	0.22UF 250V RMS	X2
C002	=	0.22UF 250V RMS	X2
C003	=	1UF 250V RMS	X2
C004	=	4700PF 400V RMS	SAFETY
C005	=	4700PF 400V RMS	SAFETY
C006	=	0.22UF 250V RMS	X2
C007	=	1.5UF 250V	MET POLYES
C008	=	0.22UF 250V RMS	X2
C009	=	2200UF 450V	SPRAGUE
C010	=	0.1UF 250V	MET POLYES
C011	=	0.22UF 63V	MET POLYES
C012	=	0.1UF 250V	MET POLYES
C013	=	0.22UF 63V	MET POLYES
C014	=	5100PF 1000V	POLYPROP
C015	=	1UF 400V	MET POLYES
C016	=	1UF 400V	MET POLYES
C017	=	1UF 400V	MET POLYES
C018	=	1UF 400V	MET POLYES
C019	=	22NF 630V	POLYPROP
C020	=	150PF 1000V	CERAMIC
C021	=	10PF 400V RMS	SAFETY
C022	=	10PF 400V RMS	SAFETY
C023	=	150PF 1000V	CERAMIC
C024	=	5100PF 1000V	POLYPROP
C025	=	22NF 630V	POLYPROP
C026	=	1UF 400V	MET POLYES
C027	=	1UF 400V	MET POLYES
C028	=	1UF 400V	MET POLYES
C029	=	1UF 400V	MET POLYES
C030	=	0.1UF 250V	MET POLYES
C031	=	0.1UF 250V	MET POLYES
C032	=	0.22UF 63V	MET POLYES
C033	=	0.22UF 63V	MET POLYES
C056	=	0.22UF 63V	MET POLYES
C057	=	15UF 16V	SOLID ALU
C058	=	0.22UF 63V	MET POLYES
C059	=	0.22UF 63V	MET POLYES
C060	=	47NF 250V	MET POLYES
C061	=	0.22UF 63V	MET POLYES
C062	=	10NF 1000V	MET POLYES
C063	=	1000PF 100V	POLYPROP
C064	=	10NF 250V	MET POLYES
C065	=	10NF 250V	MET POLYES
C066	=	100PF 400V	CERAMIC
C067	=	100PF 400V	CERAMIC
C068	=	15UF 16V	SOLID ALU
C069	=	15UF 16V	SOLID ALU
C070	=	100PF 400V	CERAMIC
C071	=	100PF 400V	CERAMIC
C072	=	100PF 400V	CERAMIC
C073	=	2200PF 100V	CERAMIC
C075	=	470PF 500V	CERAMIC
C076	=	22NF 250V	MET POLYES
C077	=	2.2UF 25V	SOLID ALU
C078	=	15UF 16V	SOLID ALU
C079	=	15UF 16V	SOLID ALU
C080	=	47PF 400V	CERAMIC
C081	=	1500PF 3000V	CERAMIC
C082	=	1500PF 3000V	CERAMIC
C083	=	470PF 500V	CERAMIC
C084	=	1000PF 100V	POLYPROP
C085	=	15UF 16V	SOLID ALU
C086	=	15UF 16V	SOLID ALU
C087	=	10NF 1000V	MET POLYES
C088	=	47PF 400V	CERAMIC
C089	=	15PF 500V	CERAMIC
C090	=	100PF 400V	CERAMIC
C091	=	2200PF 100V	CERAMIC
C092	=	2200PF 100V	CERAMIC
C093	=	470PF 500V	CERAMIC
C097	=	0.22UF 250V	RMS X2
C099	=	2.2UF 25V	SOLID ALU
C100	=	47UF 40V	ERO
C101	=	47UF 40V	ERO
C102	=	15PF 500V	CERAMIC
C108	=	15UF 16V	SOLID ALU
C109	=	10NF 250V	MET POLYES
C110	=	10NF 250V	MET POLYES
C111	=	10NF 250V	MET POLYES
C112	=	10NF 250V	MET POLYES
C113	=	10NF 250V	MET POLYES
C114	=	0.1UF 630V	MET POLYES
C115	=	0.1UF 630V	MET POLYES
C117	=	47NF 250V	MET POLYES
C118	=	47NF 250V	MET POLYES
C119	=	47NF 250V	MET POLYES
C120	=	47NF 250V	MET POLYES
C121	=	47NF 250V	MET POLYES
C122	=	47NF 250V	MET POLYES
C123	=	47NF 250V	MET POLYES
C124	=	47NF 250V	MET POLYES
C125	=	10NF 1000V	MET POLYES
C126	=	0.22UF 250V	RMS X2
C127	=	10NF 1000V	MET POLYES
C128	=	10NF 1000V	MET POLYES
C129	=	15UF 16V	SOLID ALU
C130	=	47NF 250V	MET POLYES
C131	=	10NF 1000V	MET POLYES
C132	=	10NF 1000V	MET POLYES
C133	=	2500PF 250V	CERAMIC
C200	=	22UF 250V	MARCON
C201	=	22UF 250V	MARCON
C202	=	22UF 250V	MARCON
C203	=	22UF 250V	MARCON
C204	=	0.1UF 400V	MET POLYES
C205	=	2200PF 100V	POLYPROP
C206	=	100PF 400V	CERAMIC
C207	=	10NF 500V	CERAMIC
C208	=	2200PF 100V	POLYPROP
C209	=	22UF 100V	PHILIPS
C210	=	2200PF 100V	POLYPROP
C211	=	150PF 1000V	CERAMIC
C212	=	1000PF 100V	POLYPROP
C213	=	220UF 35V	ERO
C214	=	220UF 35V	ERO
C215	=	220UF 35V	ERO
C900	=	47NF 250V	MET POLYES
C901	=	1000PF 100V	POLYPROP
C902	=	15UF 16V	SOLID ALU
C903	=	1000PF 100V	POLYPROP
C904	=	10NF 250V	MET POLYES
C905	=	0.22UF 63V	MET POLYES
C906	=	150PF 100V	POLYPROP
C907	=	220PF 100V	POLYPROP
C908	=	2200PF 100V	POLYPROP
C909	=	15UF 16V	SOLID ALU
C910	=	47UF 63V	ERO
C911	=	1000PF 100V	POLYPROP
C912	=	22NF 250V	MET POLYES
C913	=	0.1UF 100V	MULT LAYR
C914	=	2.2UF 25V	SOLID ALU
C915	=	47NF 250V	MET POLYES
C916	=	15UF 16V	SOLID ALU
C917	=	2200PF 100V	POLYPROP
D001	=	BTA 25-700B	ST
D002	=	GBPC35-08	GEN.INSTR.
D003	=	BYV26B	PHILIPS
D004	=	BYV26B	PHILIPS
D005	=	BYV26B	PHILIPS
D006	=	TZB15CB	SEMICON
D007	=	1N5818	MOTOROLA
D008	=	TZB15CB	SEMICON
D009	=	BYV26B	PHILIPS
D010	=	BYV26B	PHILIPS
D011	=	BYV26B	PHILIPS
D012	=	BYV26B	PHILIPS
D013	=	BYT08PI400	ST
D014	=	BYT08PI400	ST
D015	=	BYT08PI400	ST
D016	=	BYT08PI400	ST
D017	=	BYT08PI400	ST
D018	=	BYT08PI400	ST
D019	=	BYT08PI400	ST
D020	=	BYT08PI400	ST
D021	=	BYV26B	PHILIPS
D022	=	BYV26B	PHILIPS
D023	=	BYV26B	PHILIPS
D024	=	BYV26B	PHILIPS
D025	=	TZB15CB	SEMICON
D026	=	1N5818	MOTOROLA
D027	=	TZB15CB	SEMICON
D028	=	BYV26B	PHILIPS
D029	=	BYV26B	PHILIPS
D030	=	BYV26B	PHILIPS
D057	=	BZX55-C15	ITT
D058	=	1N5818	MOTOROLA
D059	=	BZX85-C20	ITT
D060	=	1N4148	PHILIPS
D061	=	BZX55-C15	ITT
D062	=	BZX85-C51	ITT
D063	=	1N4148	PHILIPS

D064	=	BZX85-C12	ITT
D065	=	1N4148	PHILIPS
D066	=	Z0104BA	TAG
D067	=	BZX85-C12	ITT
D068	=	1N4148	PHILIPS
D072	=	BZX55-C8V2	ITT
D073	=	1N4148	PHILIPS
D074	=	1N4148	PHILIPS
D075	=	1N4148	PHILIPS
D076	=	1N4148	PHILIPS
D077	=	1N4148	PHILIPS
D078	=	1N4148	PHILIPS
D079	=	BZX85-C15	ITT
D080	=	BZX85-C15	ITT
D081	=	BZX55-C12	ITT
D082	=	BZX55-C8V2	ITT
D083	=	BYW93-200U	PHILIPS
D084	=	BYW93-200U	PHILIPS
D085	=	BYW93-200U	PHILIPS
D086	=	BYW93-200U	PHILIPS
D087	=	1N4148	PHILIPS
D088	=	1N4148	PHILIPS
D089	=	1N4148	PHILIPS
D090	=	1N4148	PHILIPS
D091	=	BZX55-C12	ITT
D092	=	BZX55-C8V2	ITT
D093	=	BZX85-C12	ITT
D094	=	BZX85-C12	ITT
D095	=	BZX85-C12	ITT
D096	=	40HF10	IR
D097	=	40HF10	IR
D098	=	BZX85-C82	ITT
D200	=	SKB2-08L5A	SEMIKRON
D201	=	1N4148	PHILIPS
D202	=	1N4148	PHILIPS
D203	=	BYV26B	PHILIPS
D204	=	BYV26B	PHILIPS
D205	=	BYV26B	PHILIPS
D206	=	BYV28-200	PHILIPS
D900	=	1N4148	PHILIPS
D901	=	BZX55-C6V2	ITT
D902	=	BZX55-C10	ITT
D903	=	BZX55-C8V2	ITT
D904	=	1N4148	PHILIPS
D906	=	1N4148	PHILIPS
D907	=	1N4148	PHILIPS
D908	=	1N4148	PHILIPS
D909	=	1N4148	PHILIPS
D910	=	1N4148	PHILIPS
D911	=	1N4148	PHILIPS
D912	=	BYV26B	PHILIPS
D913	=	1N825A	ST
F001	=	FUSE 5X20 16T	
F002	=	FUSE 5X20 16T	
F003	=	FUSE 6X32 10FF	
F006	=	FUSE 5X20 .315F	
F200	=	FUSE PICO 0.25F	
F201	=	FUSE 5X20 1T	
IC05	=	TL431ILP	TEXAS
IC06	=	TL431ILP	TEXAS
IC07	=	TL084BCN	TEXAS
IC08	=	TL084BCN	TEXAS
IC09	=	OP177GP	AD
IC10	=	REF02HP	
IC011	=	TL081IP	TEXAS
IC200	=	UC3842	UNITRODE
IC900	=	HEF4046 BP	PHILIPS
IC901	=	HEF4011BD	PHILIPS
IC902	=	HEF4069UBD	PHILIPS
L001	=	L191	DELTA
L002	=	L191	DELTA
L003	=	L192	DELTA
L004	=	L193	DELTA
L005	=	L198	DELTA
L006	=	L197	DELTA
L007	=	L196	DELTA
L008	=	L195	DELTA
L009	=	L199	DELTA
L010	=	L195	DELTA
L011	=	L196	DELTA
L012	=	L198	DELTA
L013	=	L197	DELTA
L014	=	L194	DELTA
L015	=	L194	DELTA
L016	=	L208	DELTA
L017	=	15UH	SIEMENS
L018	=	L202	DELTA
L019	=	L201	DELTA
L020	=	2X TORO 14 BLUE	
Q001	=	BST100	PHILIPS
Q002	=	BST70	PHILIPS
Q003	=	IRF9520	IR
Q004	=	IRF512	IR
Q005	=	BUZ67	SIEMENS
Q006	=	BUZ67	SIEMENS
Q007	=	BUZ67	SIEMENS
Q008	=	BUZ67	SIEMENS
Q009	=	BUZ67	SIEMENS
Q010	=	BUZ67	SIEMENS
Q011	=	BUZ67	SIEMENS
Q012	=	BUZ67	SIEMENS
Q013	=	IRF9520	IR
Q014	=	IRF512	IR
Q015	=	BST100	PHILIPS
Q016	=	BST70	PHILIPS
Q028	=	BS250	ITT
Q029	=	BS170	ITT
Q030	=	BST100	PHILIPS
Q031	=	BST70	PHILIPS
Q032	=	IRF512	IR
Q033	=	2N2907A	ST
Q034	=	2N2222A	MOTO
Q035	=	2N2222A	MOTO
Q036	=	2N2222A	MOTO
Q037	=	BSS92	PHILIPS
Q038	=	BS170	ITT
Q039	=	BS170	ITT
Q200	=	BUK444-800B	PHILIPS
Q900	=	2N2222A	MOTO
Q901	=	BS170	ITT
Q902	=	BS170	ITT
Q903	=	2N2907A	ST
Q904	=	2N2222A	MOTO
Q905	=	2N2222A	MOTO
Q906	=	2N2907A	ST
Q907	=	BS250	ITT
Q908	=	2N2222A	MOTO
Q909	=	2N2222A	MOTO
Q910	=	2N2907A	ST
R001	=	2.2M MF/0.25W/1600V	
R002	=	TNR23G471K	MARCON
R003	=	100 WW/6.0W/200V	
R004	=	120 MF/2.0W/500V	
R005	=	8.2 WW/9.0W/500V	
R006	=	8.2 WW/9.0W/500V	
R007	=	8.2 WW/9.0W/500V	
R008	=	8.2 WW/9.0W/500V	
R009	=	8.2 WW/9.0W/500V	
R010	=	10K MF/2.0W/500V	
R011	=	10K MF/2.0W/500V	
R012	=	10K MF/2.0W/500V	
R013	=	10K MF/2.0W/500V	
R014	=	1K MF/0.6W/350V	
R015	=	1K MF/0.6W/350V	
R016	=	6.81 MF/0.6W/350V	
R017	=	6.81 MF/0.6W/350V	
R018	=	6.81 MF/0.6W/350V	
R019	=	6.81 MF/0.6W/350V	
R020	=	100 MF/2.0W/500V	
R021	=	100 MF/2.0W/500V	
R022	=	6.81 MF/0.6W/350V	
R023	=	6.81 MF/0.6W/350V	
R024	=	6.81 MF/0.6W/350V	
R025	=	6.81 MF/0.6W/350V	
R026	=	1K MF/0.6W/350V	
R027	=	1K MF/0.6W/350V	
R077	=	10K MF/0.6W/350V	
R078	=	4.75K MF/0.6W/350V	
R079	=	10 MF/0.6W/350V	
R080	=	22.1 MF/0.6W/350V	
R081	=	1K MF/0.6W/350V	
R082	=	1K MF/0.6W/350V	
R083	=	47.5 MF/0.6W/350V	
R084	=	22.1 MF/0.6W/350V	
R085	=	2.21K MF/0.6W/350V	
R086	=	22.1 MF/0.6W/350V	
R087	=	475 MF/0.6W/350V	
R088	=	1K MF/0.6W/350V	
R089	=	1K MF/0.6W/350V	
R090	=	10K MF/0.6W/350V	
R091	=	2.21K MF/0.6W/350V	
R092	=	150 MF/0.6W/350V	
R093	=	681 MF/0.6W/350V	
R094	=	475 MF/0.6W/350V	

R096	=	267	MF/0.6W/350V
R097	=	332	MF/0.6W/350V
R098	=	2.21K	MF/0.6W/350V
R099	=	2.21K	MF/0.6W/350V
R100	=	2.21K	MF/0.6W/350V
R101	=	18.2K	MF/0.6W/350V
R102	=	18.2K	MF/0.6W/350V
R103	=	82.5K	MF/0.6W/350V
R104	=	6.81K	MF/0.6W/350V
R105	=	6.81K	MF/0.6W/350V
R106	=	2.2M	MF/0.25W/1600V
R107	=	4.75K	MF/0.6W/350V
R108	=	4.75K	MF/0.6W/350V
R109	=	4.75K	MF/0.6W/350V
R110	=	4.75K	MF/0.6W/350V
R111	=	4.75K	MF/0.6W/350V
R112	=	4.75K	MF/0.6W/350V
R117	=	681	MF/0.6W/350V
R118	=	10K TRIMPOTM	20 TURNS
R119	=	3.32K	MF/0.6W/350V
R120	=	10K	MF/0.6W/350V
R121	=	100K	MF/0.6W/350V
R122	=	1K	MF/0.6W/350V
R123	=	68	MF/2.5W/500V
R124	=	68	MF/2.5W/500V
R125	=	68	MF/2.5W/500V
R126	=	68	MF/2.5W/500V
R127	=	10K TRIMPOTM	20 TURNS
R128	=	100K	MF/0.6W/350V
R129	=	100K	MF/0.6W/350V
R132	=	825	MF/0.6W/350V
R133	=	68.1	MF/0.6W/350V
R134	=	825	MF/0.6W/350V
R135	=	68.1	MF/0.6W/350V
R136	=	100K	MF/0.6W/350V
R137	=	4.75K	MF/0.6W/350V
R138	=	4.75K	MF/0.6W/350V
R142	=	2.2M	MF/0.25W/1600V
R143	=	10K	MF/0.6W/350V
R144	=	1.0	MF/0.6W/350V
R150	=	475	MF/0.6W/350V
R151	=	1K	MF/0.6W/350V
R152	=	TNR12G821K	MARCON
R155	=	26.7K	MF/0.6W/350V
R157	=	1K	MF/0.6W/350V
R164	=	22.1	MF/0.6W/350V
R165	=	22.1	MF/0.6W/350V
R166	=	22.1	MF/0.6W/350V
R171	=	1K	MF/0.6W/350V
R200	=	562K	MF/0.6W/350V
R201	=	562K	MF/0.6W/350V
R202	=	1K	MF/0.6W/350V
R203	=	68.1K	MF/0.6W/350V
R204	=	15K	MF/0.6W/350V
R205	=	392K	MF/0.6W/350V
R206	=	681K	MF/0.6W/350V
R207	=	CR	MF/0.6W/250V
R208	=	8.25K	MF/0.6W/350V
R209	=	33.2K	MF/0.6W/350V
R210	=	33.2K	MF/0.6W/350V
R211	=	33.2K	MF/0.6W/350V
R212	=	33.2K	MF/0.6W/350V
R213	=	6.81	MF/0.6W/350V
R214	=	475	MF/0.6W/350V
R215	=	3.92	MF/0.6W/350V
R216	=	10K	MF/0.6W/350V
R217	=	221	MF/0.6W/350V
R218	=	2.2K	MF/2.0W/500V
R219	=	2.2K	MF/2.0W/500V
R220	=	2.2K	MF/2.0W/500V
R900	=	100	MF/0.6W/350V
R901	=	332	MF/0.6W/350V
R902	=	332	MF/0.6W/350V
R903	=	56.2K	MF/0.6W/350V
R904	=	CR	MF/0.6W/250V
R905	=	10K	MF/0.6W/350V
R906	=	12.1K	MF/0.6W/350V
R907	=	12.1K	MF/0.6W/350V
R908	=	10K	MF/0.6W/350V
R909	=	10K	MF/0.6W/350V
R910	=	10K	MF/0.6W/350V
R911	=	10K	MF/0.6W/350V
R912	=	10K	MF/0.6W/350V
R913	=	825	MF/0.6W/350V
R914	=	1K	MF/0.6W/350V
R915	=	1.82K	MF/0.6W/350V
R916	=	3.32K	MF/0.6W/350V
R917	=	18.2	MF/0.6W/350V

R918	=	6.81K	MF/0.6W/350V
R919	=	1K	MF/0.6W/350V
R920	=	1K	MF/0.6W/350V
R921	=	3.32K	MF/0.6W/350V
R922	=	3.32K	MF/0.6W/350V
R923	=	100	MF/0.6W/350V
R924	=	10K	MF/0.6W/350V
R925	=	12.1K	MF/0.6W/350V
R926	=	100	MF/0.6W/350V
R927	=	10K	MF/0.6W/350V
R928	=	18.2	MF/0.6W/350V
R929	=	12.1K	MF/0.6W/350V
R930	=	2.21K	MF/0.6W/350V
R931	=	1K	MF/0.6W/350V
R932	=	1K	MF/0.6W/350V
R933	=	12.1	MF/0.6W/350V
R934	=	10K	MF/0.6W/350V
R935	=	56.2K	MF/0.6W/350V
R936	=	47.5	MF/0.6W/350V
T001	=	T204	DELTA
T002	=	T206	DELTA
T003	=	T205	DELTA
T004	=	PE 51687	P.ENG.
T200	=	XT239	DELTA

### ONLY FOR SM3540

C074	=	4700PF 63V	POLYPROP
C094	=	820UF 50V	SPRAGUE
C095	=	820UF 50V	SPRAGUE
C096	=	820UF 50V	SPRAGUE
C098	=	4700PF 63V	POLYPROP
C103	=	820UF 50V	SPRAGUE
C104	=	820UF 50V	SPRAGUE
C105	=	820UF 50V	SPRAGUE
C106	=	820UF 50V	SPRAGUE
C107	=	820UF 50V	SPRAGUE
C116	=	4.7UF 63V	MET POLYES
Q618	=	2N2907A	ST
Q619	=	2N2222A	MOTO
R113	=	475	MF/0.6W/350V
R114	=	22.1K	MF/0.6W/350V
R115	=	3.92K	MF/0.6W/350V
R116	=	82.5K	MF/0.6W/350V
R130	=	PTC 120	C883 SIEMENS
R131	=	PTC 120	C883 SIEMENS
R139	=	100K	MF/0.6W/350V
R140	=	2.74K	MF/0.6W/350V
R141	=	SHUNT 40A/50MV	
R145	=	3.32K	MF/0.6W/350V
R146	=	3.32K	MF/0.6W/350V
R147	=	3.32K	MF/0.6W/350V
R148	=	3.32K	MF/0.6W/350V
R149	=	2.74K	MF/0.6W/350V
R161	=	33.2K	MF/0.6W/350V
R162	=	4.75K	MF/0.6W/350V
R163	=	3.3M	MF/0.25W/1600V
R182	=	PTC 120	C883 SIEMENS
R661	=	4.75K	MF/0.6W/350V
R662	=	1K	MF/0.6W/350V
R663	=	4.75K	MF/0.6W/350V
R664	=	4.75K	MF/0.6W/350V

### P321 FOR SM3540

C134	=	2.2UF 25V	SOLID ALU
C135	=	2.2UF 25V	SOLID ALU
C136	=	2.2UF 25V	SOLID ALU
C137	=	2.2UF 25V	SOLID ALU
C138	=	10NF 1000V	MET POLYES
C139	=	0.33UF 100V	MULT LAYR
D069	=	LED 3MM RED	PHILIPS
D070	=	LED 3MM GREEN	AEG
D071	=	LED 3MM GREEN	AEG
IC102	=	L7905CV	ST
R095	=	5K POTM 10 TURNS	
R153	=	5K POTM 10 TURNS	
R154	=	5K POTM 10 TURNS	
R167	=	2K TRIMPOTM 20 TURNS	
R168	=	3.92K	MF/0.6W/350V
R169	=	2K TRIMPOTM 20 TURNS	

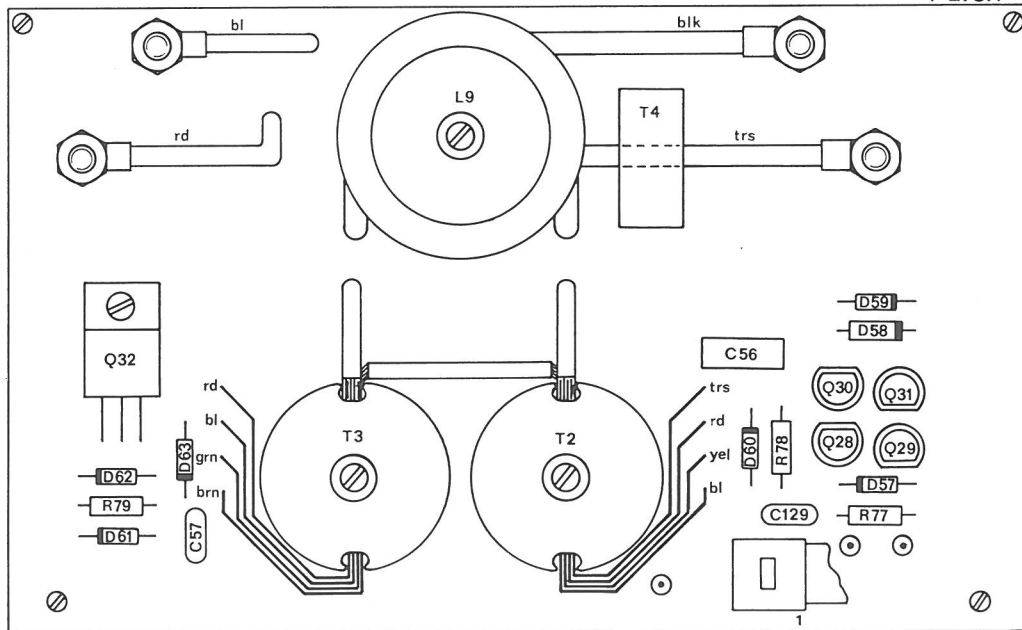
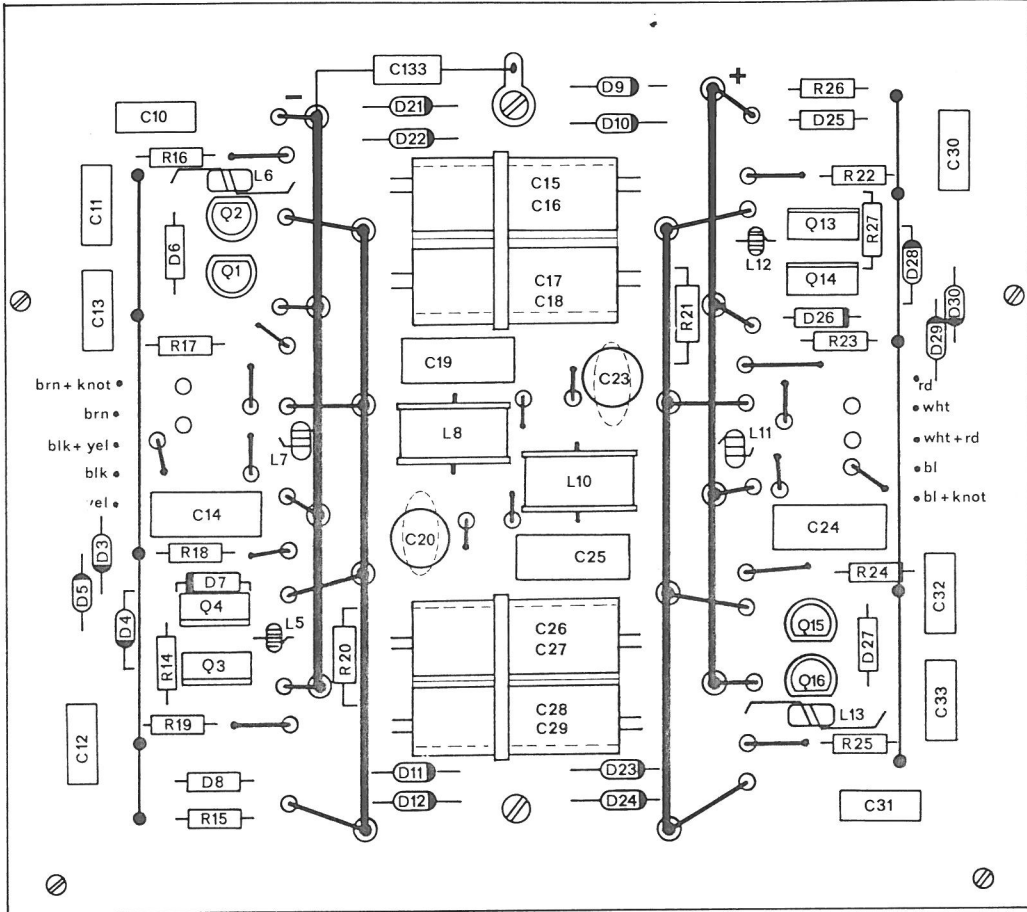
R170 = 3.92K MF/0.6W/350V  
 R172 = 1K MF/0.6W/350V  
 R173 = 1M MF/0.25W/1600V  
 R174 = 10K TRIMPOTM 20 TURNS  
 R175 = CR MF/0.6W/250V  
 R176 = 562 MF/0.6W/350V  
 R177 = 1K MF/0.6W/350V  
 R178 = 1M MF/0.25W/1600V  
 R179 = 10K TRIMPOTM 20 TURNS  
 R180 = CR MF/0.6W/250V  
 R181 = 562 MF/0.6W/350V

### ONLY FOR SMX7220

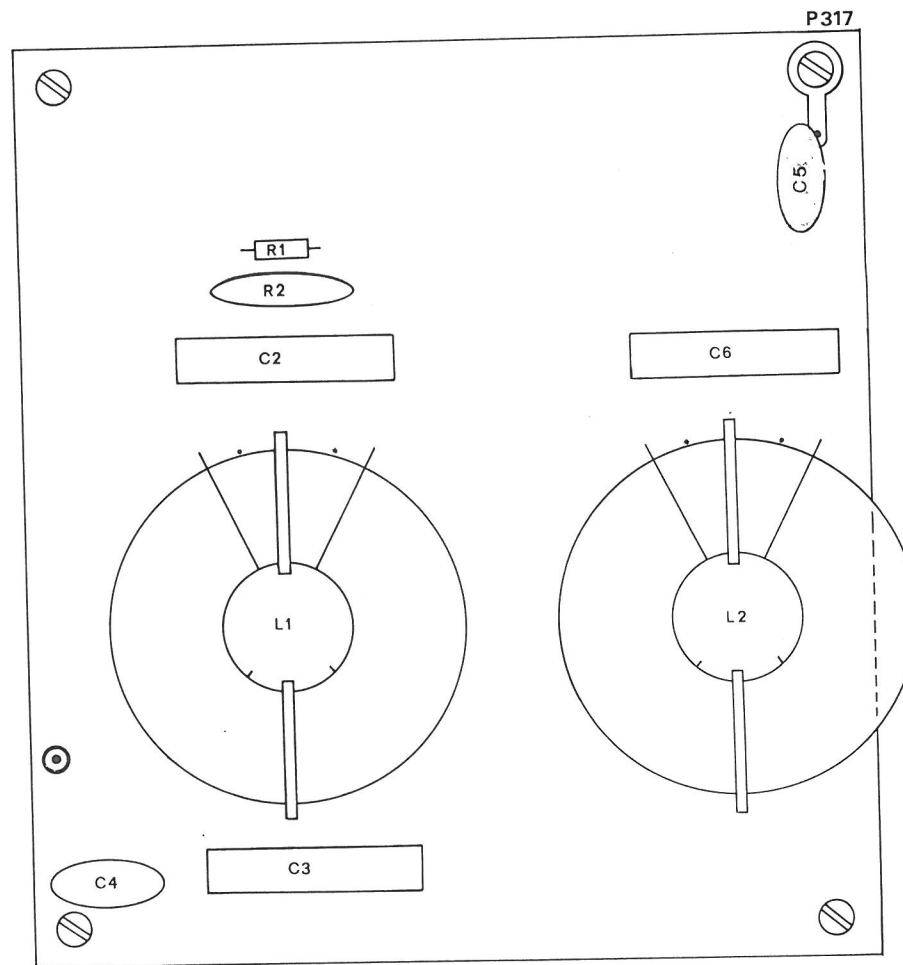
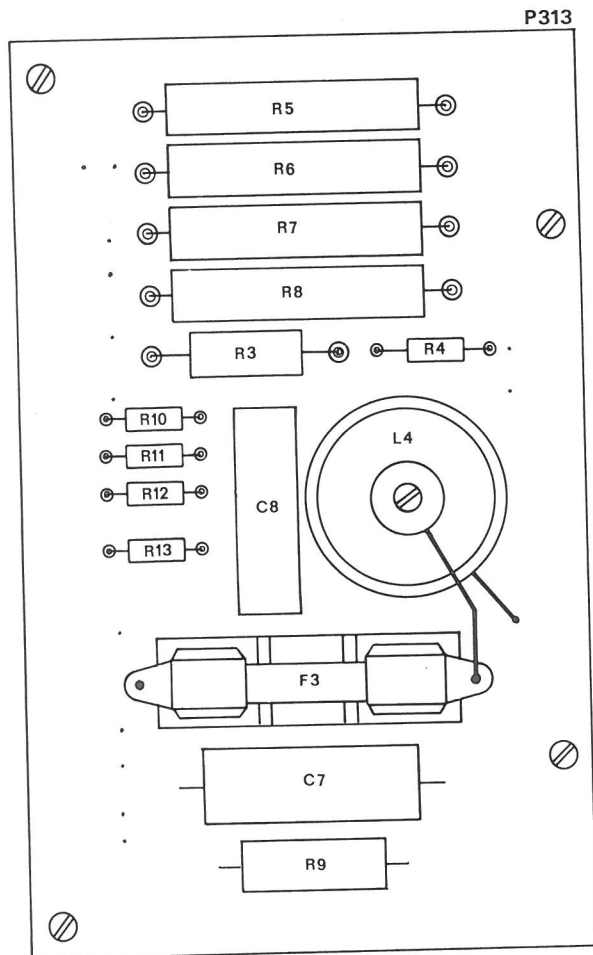
C074 = 2500PF 250V CERAMIC  
 C094 = 220UF 100V SPRAGUE  
 C095 = 220UF 100V SPRAGUE  
 C096 = 220UF 100V SPRAGUE  
 C098 = 2500PF 250V CERAMIC  
 C103 = 220UF 100V SPRAGUE  
 C104 = 220UF 100V SPRAGUE  
 C105 = 220UF 100V SPRAGUE  
 C106 = 220UF 100V SPRAGUE  
 C107 = 220UF 100V SPRAGUE  
 C116 = 3.3UF 100V MET POLYES  
 Q618 = 2N2907A ST  
 Q619 = 2N2222A MOTO  
 R113 = 475 MF/0.6W/350V  
 R114 = 68.1K MF/0.6W/350V  
 R115 = 5.62K MF/0.6W/350V  
 R116 = 56.2K MF/0.6W/350V  
 R130 = PTC 600 C884 SIEMENS  
 R131 = PTC 600 C884 SIEMENS  
 R139 = 100K MF/0.6W/350V  
 R140 = 2.74K MF/0.6W/350V  
 R141 = SHUNT 20A/50MV  
 R145 = 8.25K MF/0.6W/350V  
 R146 = 8.25K MF/0.6W/350V  
 R147 = 6.81K MF/0.6W/350V  
 R148 = 6.81K MF/0.6W/350V  
 R149 = 5.62K MF/0.6W/350V  
 R161 = 68.1K MF/0.6W/350V  
 R162 = 4.75K MF/0.6W/350V  
 R163 = 1M MF/0.25W/1600V  
 R182 = PTC 600 C884 SIEMENS  
 R661 = 4.75K MF/0.6W/350V  
 R662 = 1K MF/0.6W/350V  
 R663 = 4.75K MF/0.6W/350V  
 R664 = 4.75K MF/0.6W/350V

### P321 FOR SMX7220

C134 = 10NF 1000V MET POLYES  
 C135 = 2.2UF 25V SOLID ALU  
 C136 = 2.2UF 25V SOLID ALU  
 C137 = 2.2UF 25V SOLID ALU  
 C138 = 10NF 1000V MET POLYES  
 C139 = 0.33UF 100V MULT LAYR  
 D069 = LED 3MM RED PHILIPS  
 D070 = LED 3MM GREEN AEG  
 D071 = LED 3MM GREEN AEG  
 IC102 = L7905CV ST  
 R095 = 10K POTM 10 TURNS  
 R153 = 5K POTM 10 TURNS  
 R154 = 5K POTM 10 TURNS  
 R167 = 22.1 MF/0.6W/350V  
 R168 = 4.75K MF/0.6W/350V  
 R169 = 1K TRIMPOTM 20 TURNS  
 R170 = 4.75K MF/0.6W/350V  
 R172 = 1K MF/0.6W/350V  
 R173 = 1M MF/0.25W/1600V  
 R174 = 10K TRIMPOTM 20 TURNS  
 R175 = CR MF/0.6W/250V  
 R176 = 562 MF/0.6W/350V  
 R177 = 1K MF/0.6W/350V  
 R178 = 1M MF/0.25W/1600V  
 R179 = 10K TRIMPOTM 20 TURNS  
 R180 = CR MF/0.6W/250V  
 R181 = 562 MF/0.6W/350V

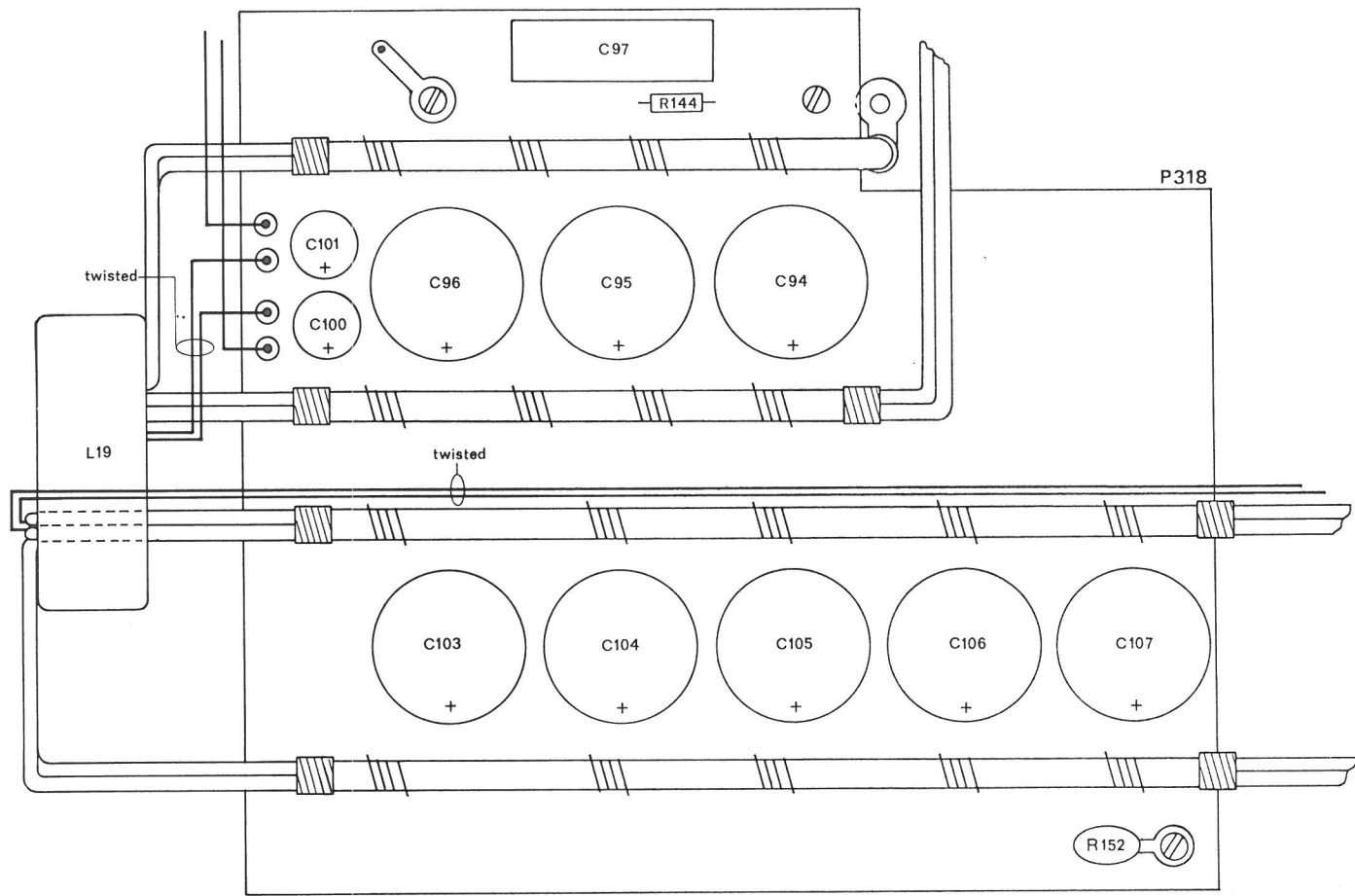


Title: SM 3540		δ
P284B (C20, C23)	8-88 Vr.	
Q1, 2, 15, 16, 30, 31.	5-87 Vr.	Date: 1-'85
Modifications	Date App.	delta elektronika bv



			Title: <b>SM 3540</b>
			Date: 1 - '85
Modifications	Date	App	<b>delta elektronika bv</b>



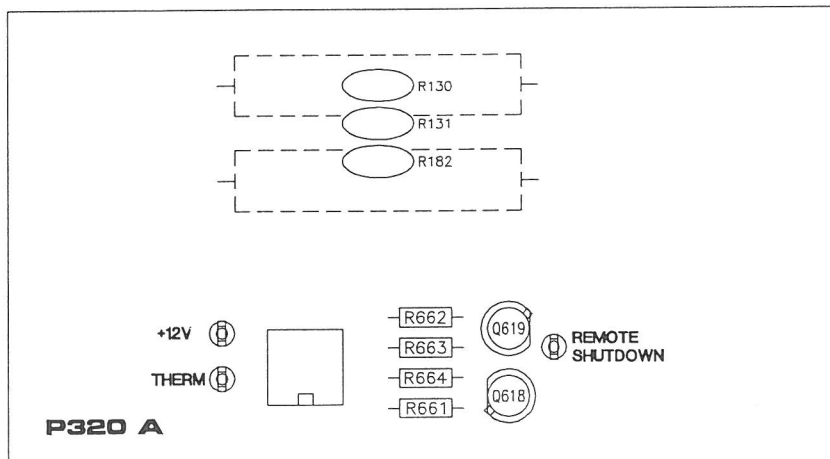
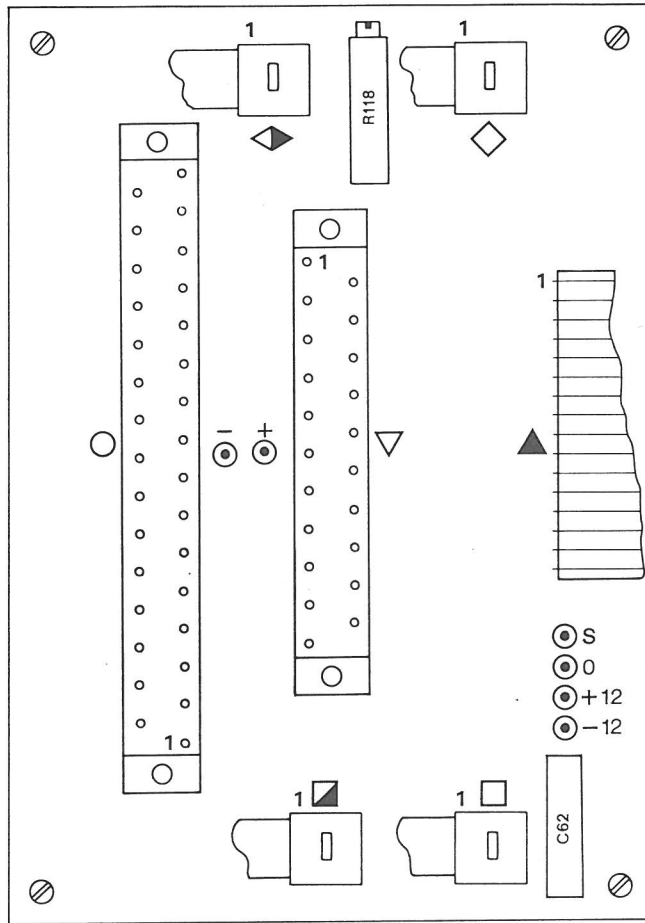



			Title: <b>SM 3540</b>
			Date: 1 - '85
Modifications	Date	App	<b>delta elektronika bv</b>

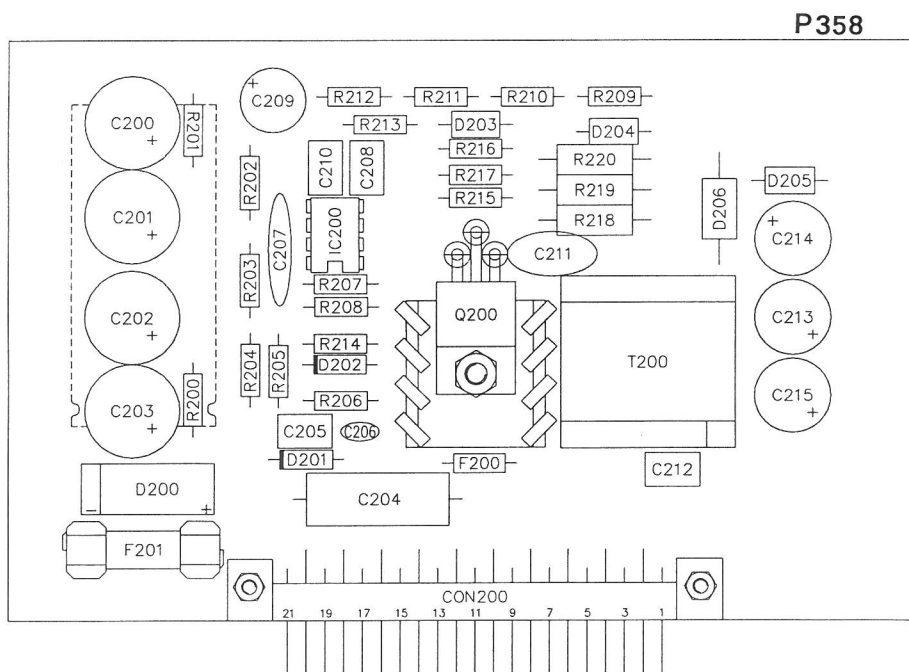
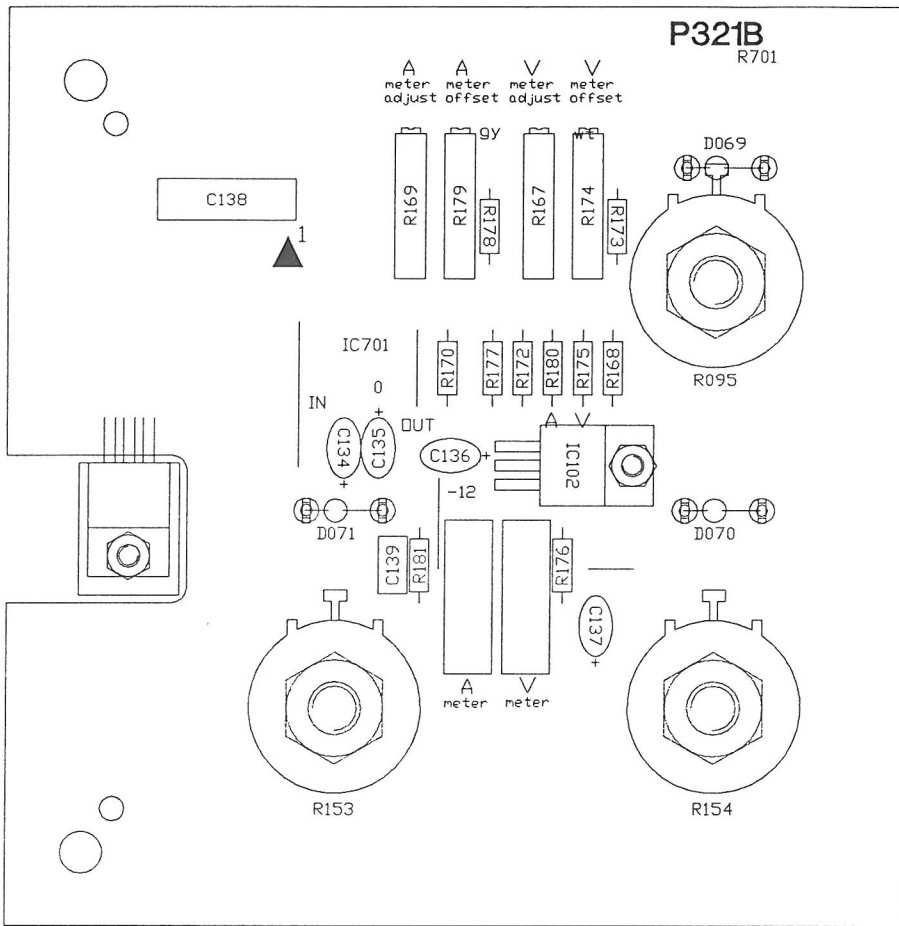




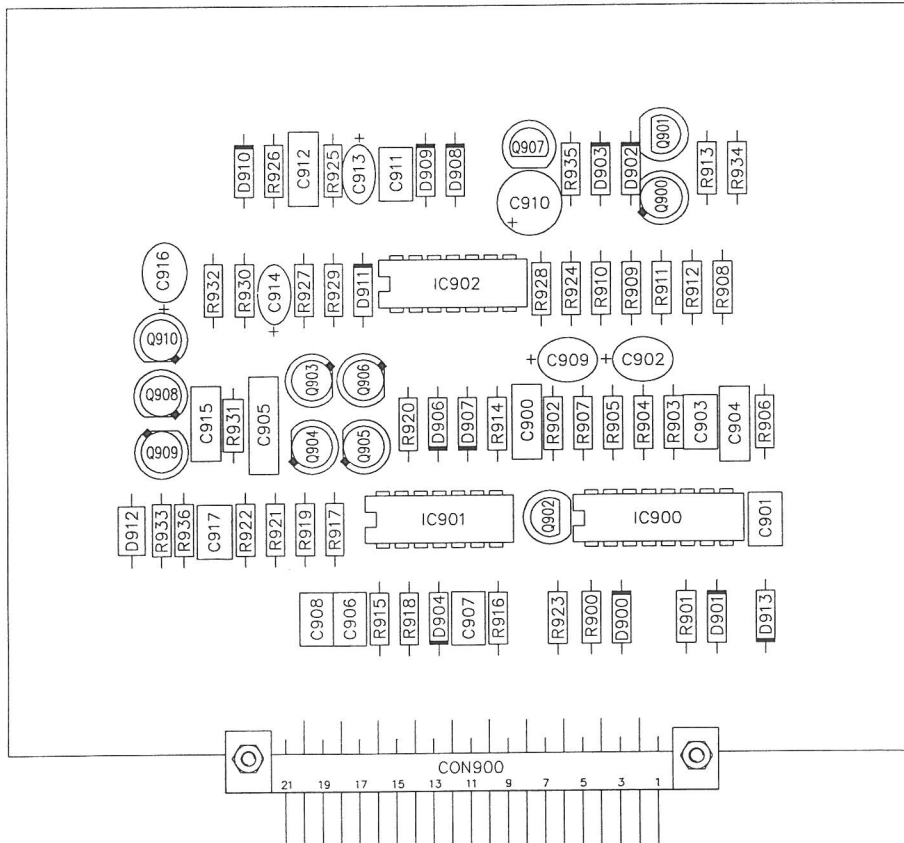
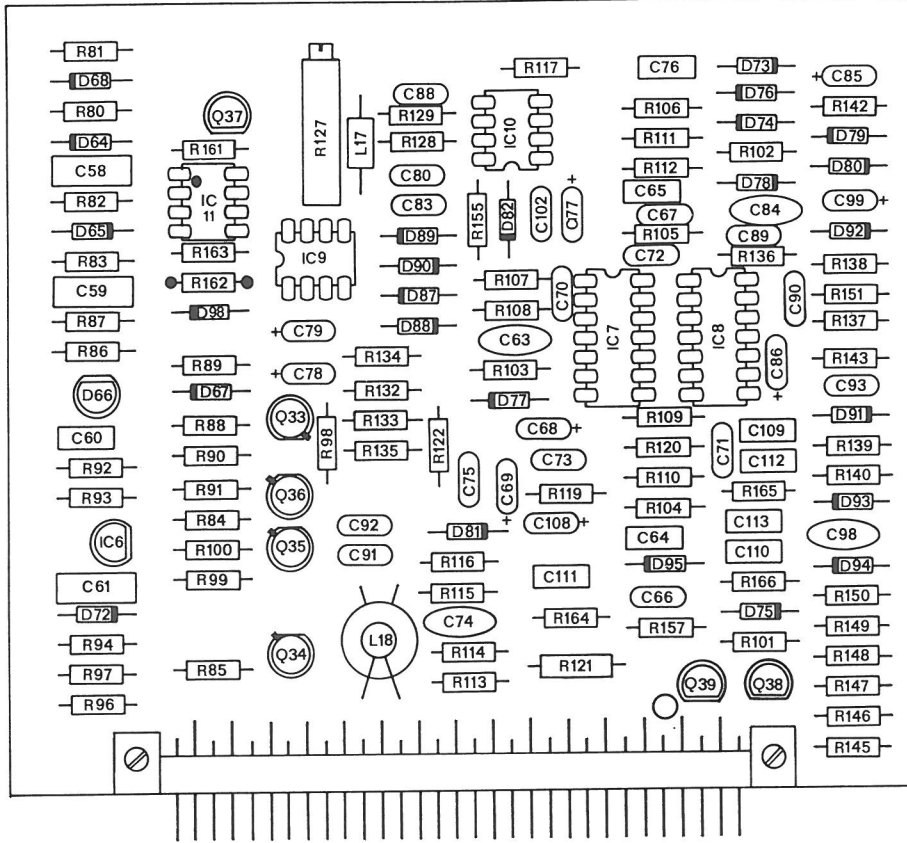
P319



		Title: SM 3540		
<i>Remote shutdown</i> <i>+ R172 (P320)</i>		<i>11/93</i> Ps <i>5/94</i> Ur.	Date: 1-'85	
Modifications	Date	App.	delta elektronika bv	

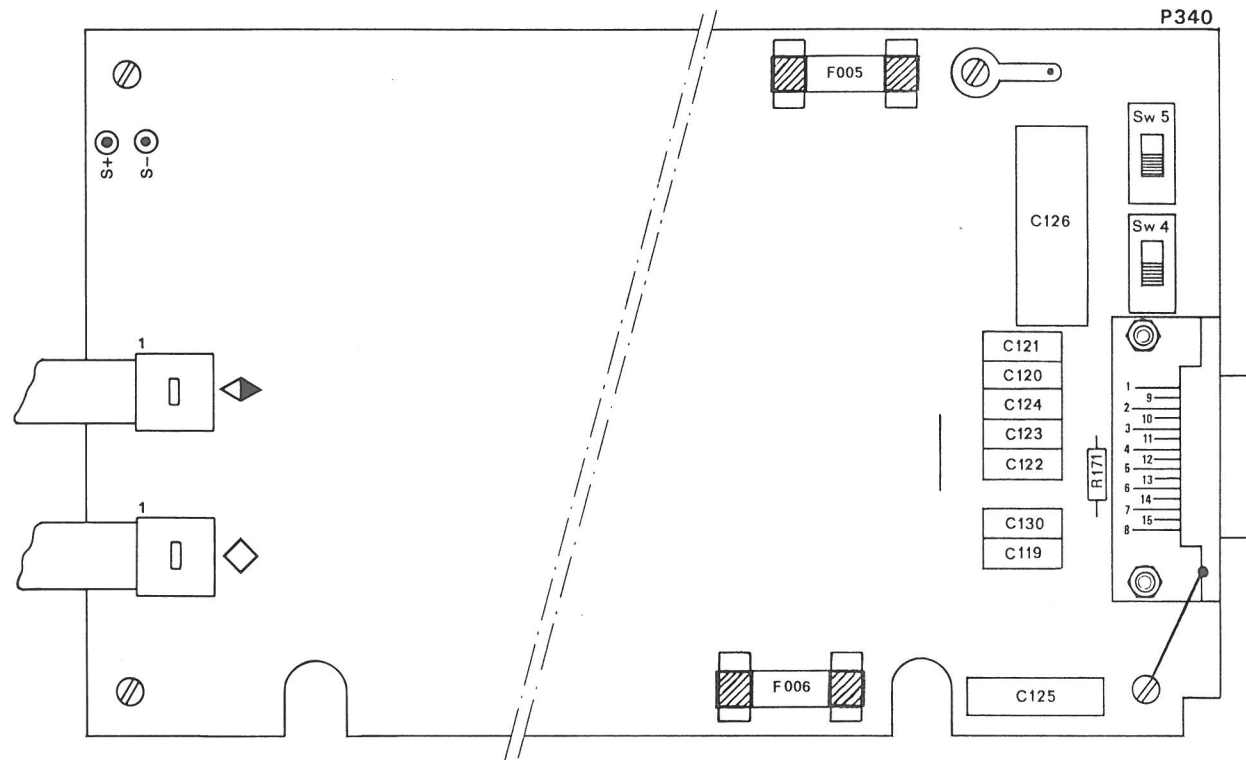


			Title: <b>SM 3540</b>	
<b>P321 = P358</b>	<b>8-'88</b>	<b>U.</b>	Date: <b>1-'85</b>	
Modifications	Date	App.	<b>delta elektronika bv</b>	



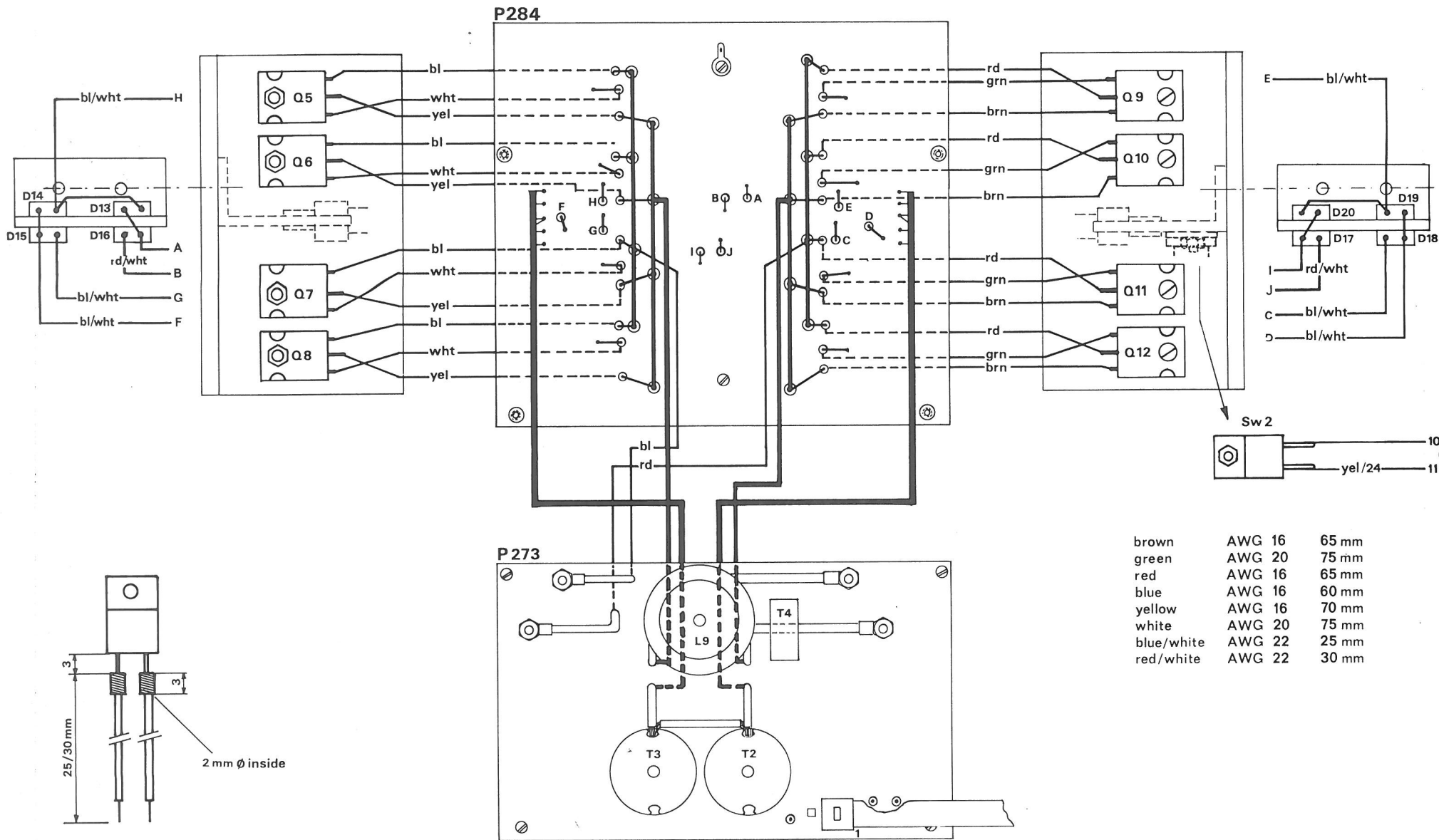
P324 = c type	2/92	Vr	Title: SM 3540
P324 = b type	11/88	Vr	
P323 = P357	8/88	Vr	
Modifications	Date	App.	Date: 1-'85
			delta elektronika bv





			Title: <b>SM 3540</b>
<i>P340B (v.DPM)</i>	<i>g-gi</i>	<i>Ur</i>	Date: 1-'85
Modifications	Date	App	<b>delta elektronika bv</b>

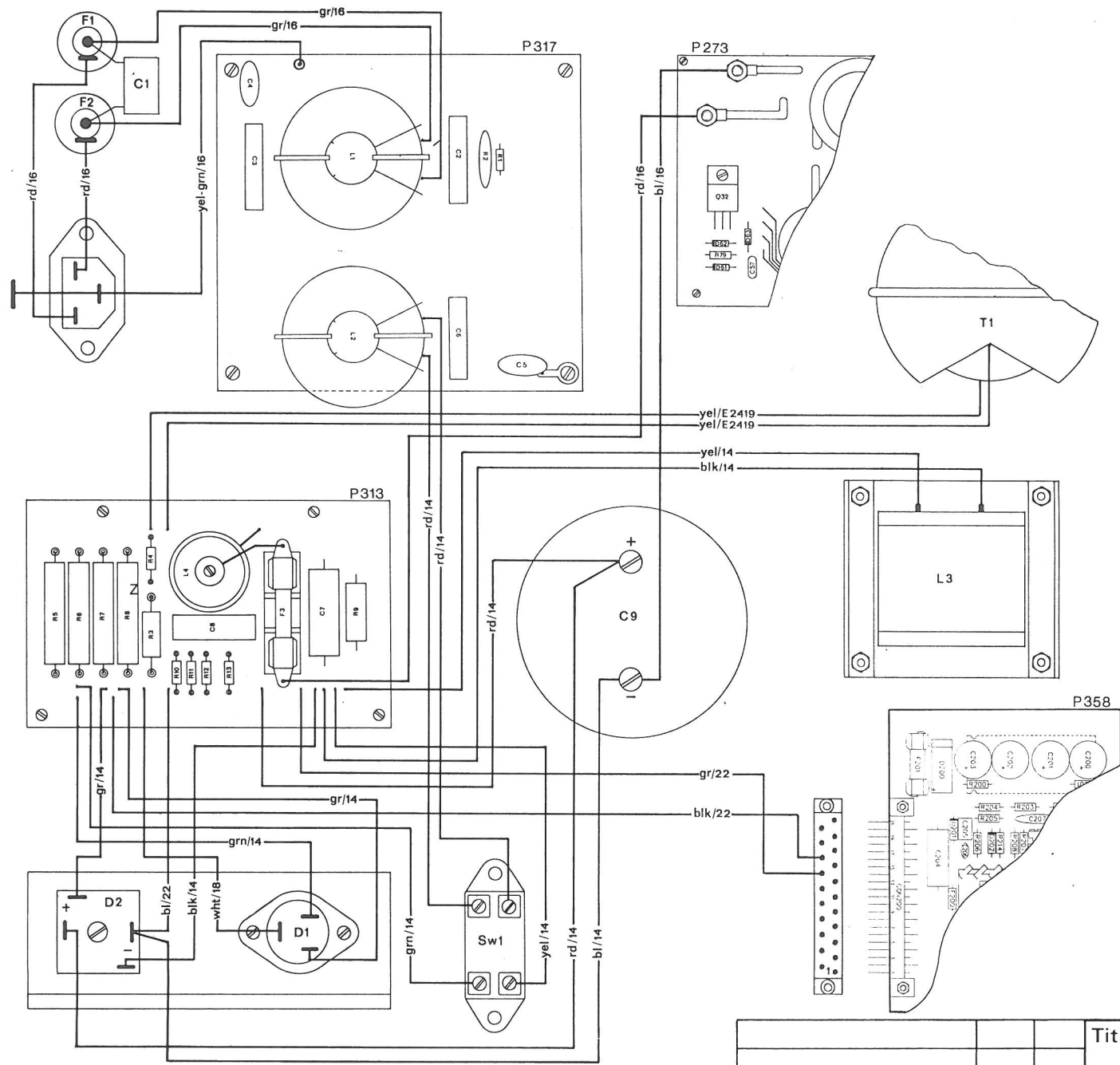




brown	AWG 16	65 mm
green	AWG 20	75 mm
red	AWG 16	65 mm
blue	AWG 16	60 mm
yellow	AWG 16	70 mm
white	AWG 20	75 mm
blue/white	AWG 22	25 mm
red/white	AWG 22	30 mm

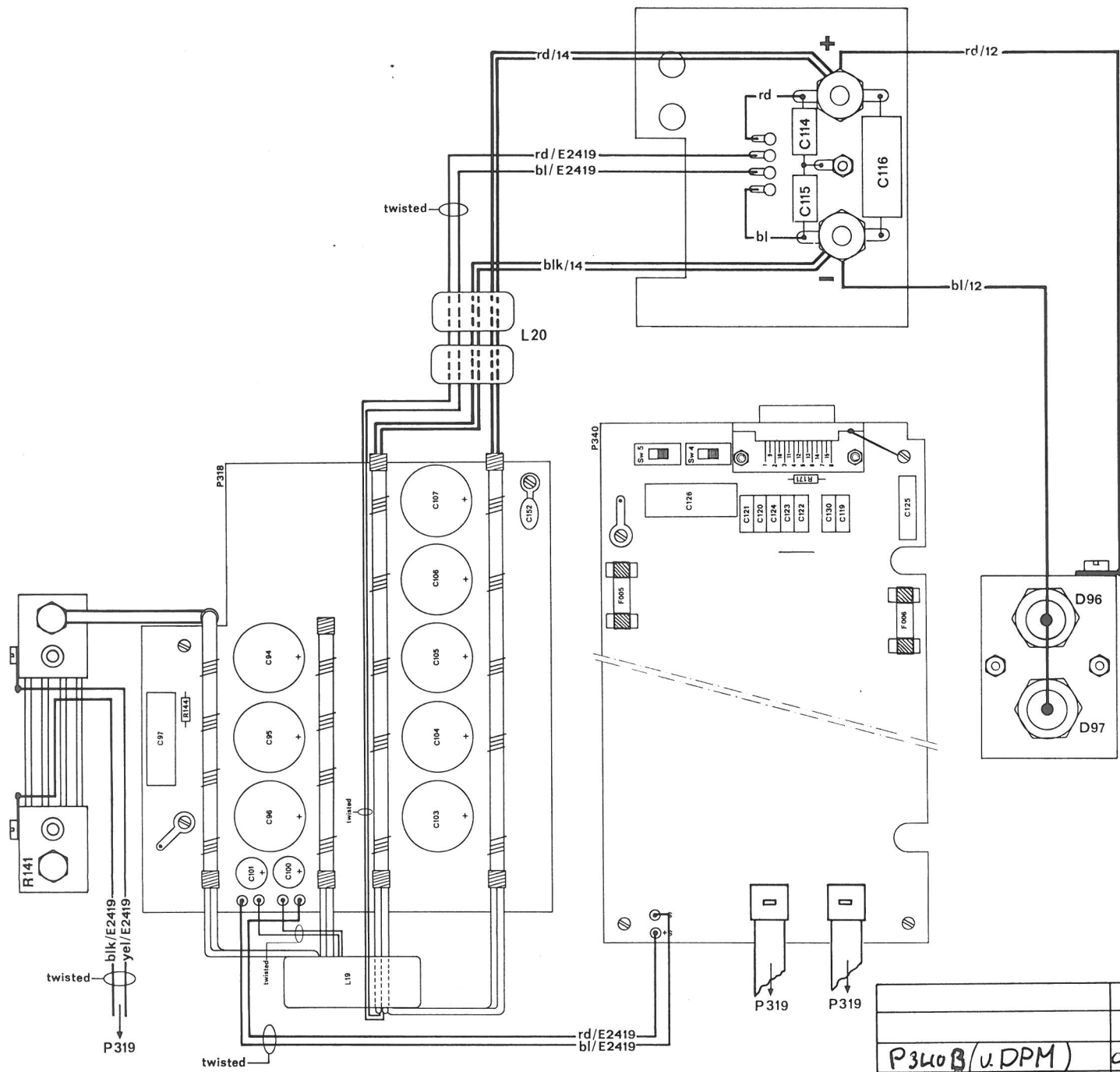
Q5-Q12	6-8g	Vr.	Title: SM3540 SMX 7220
Sw 2	5-g	Vr.	
			Date: 2-'85
Modifications	Date	App	delta elektronika bv





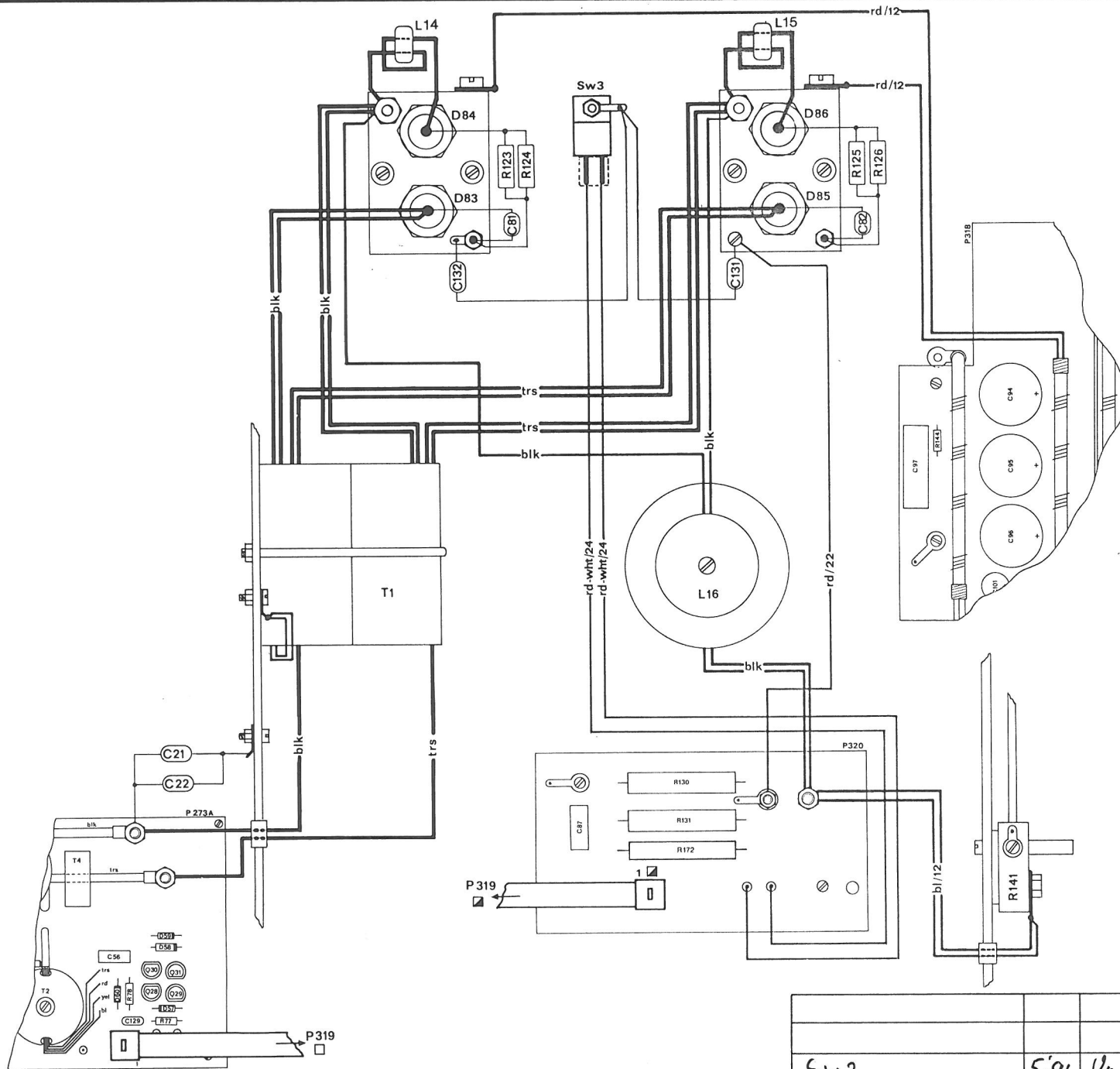
			Title: <b>SM 3540</b>
			Date: 1 - 85
Modifications	Date	App	<b>delta elektronika bv</b>





			Title: <b>SM 3540</b>
			Date: 1-'85
<b>P340B (u.DPM)</b>	g/gi	hr.	delta elektronika bv
Modifications	Date	App	

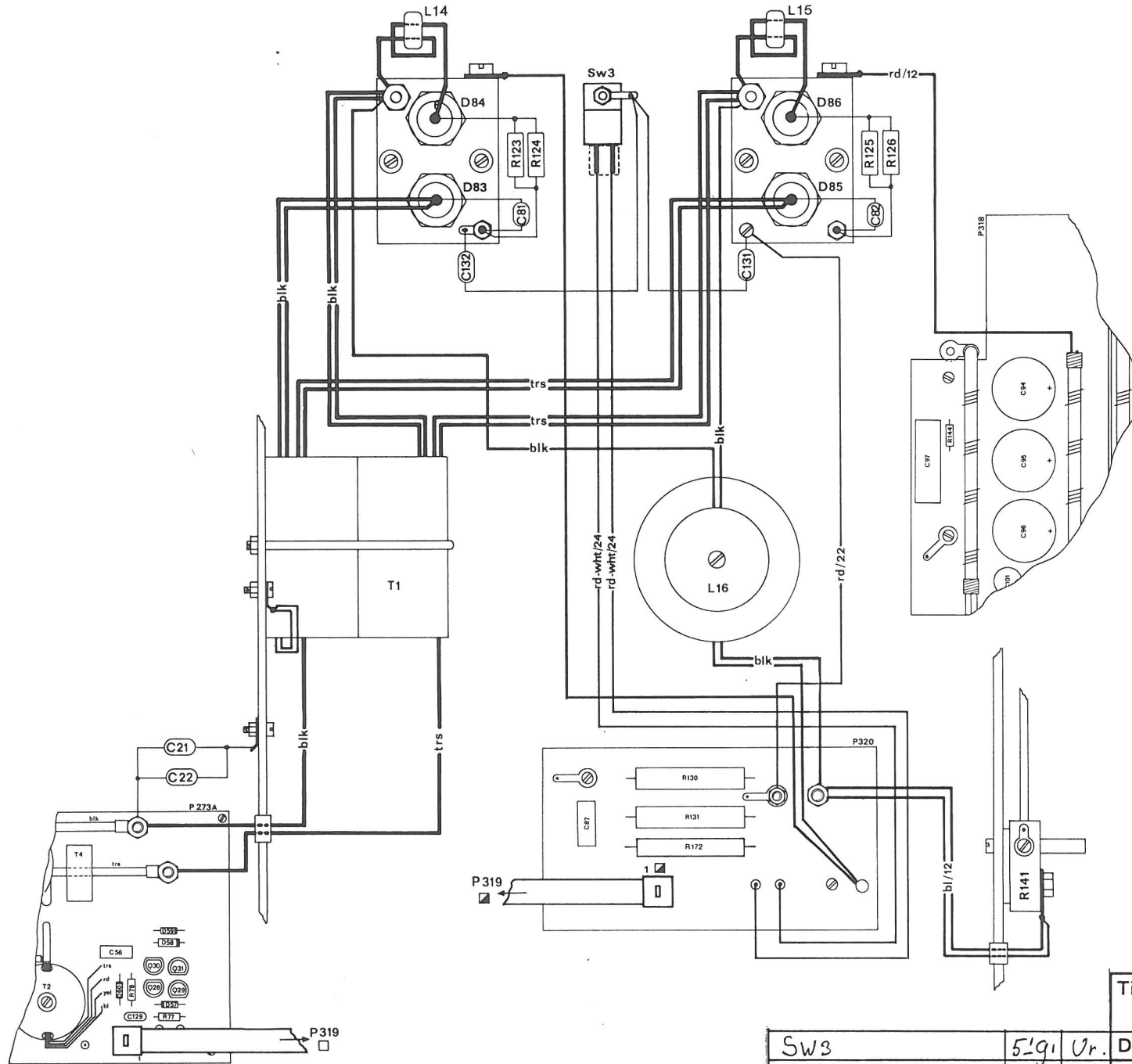




			Title: SM 3540
Sw 3	5-91	Ur	Date: 1-'85
Modifications	Date	App	delta elektronika bv







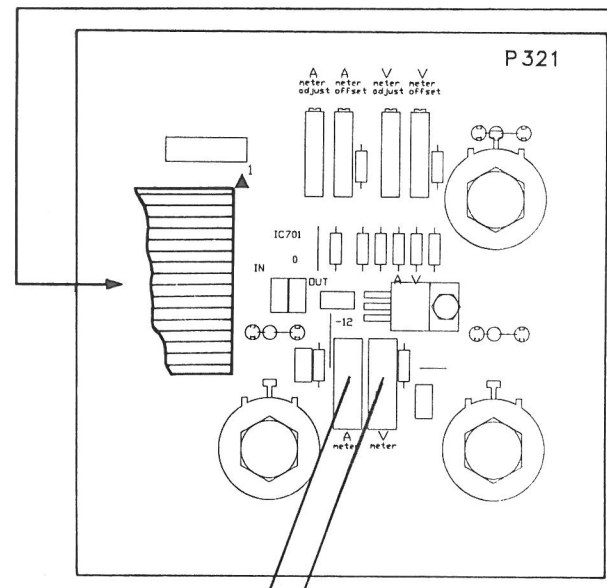
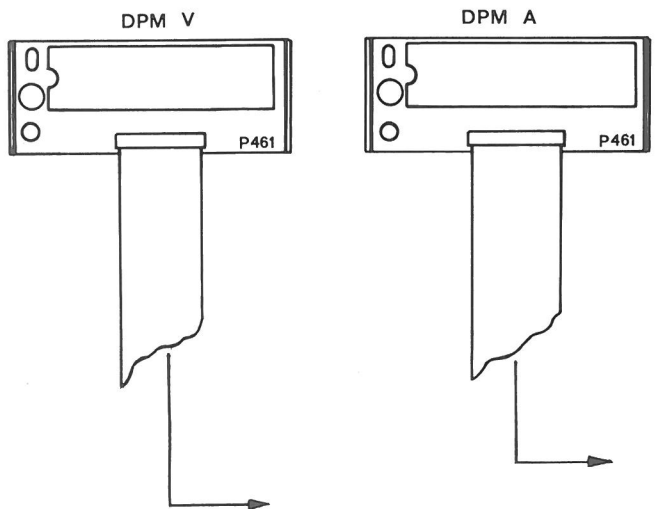
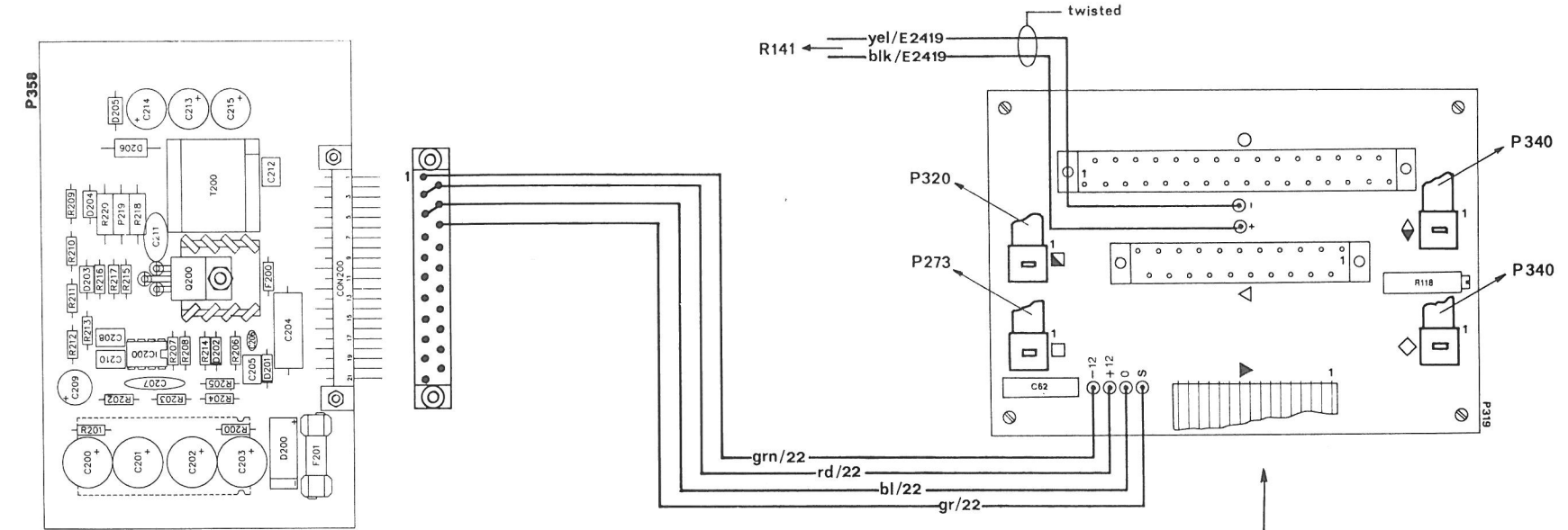
Title: **SMX7220**

Date: 1-'85

delta elektronika bv.

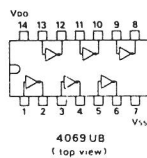
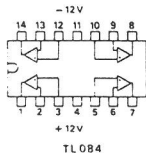
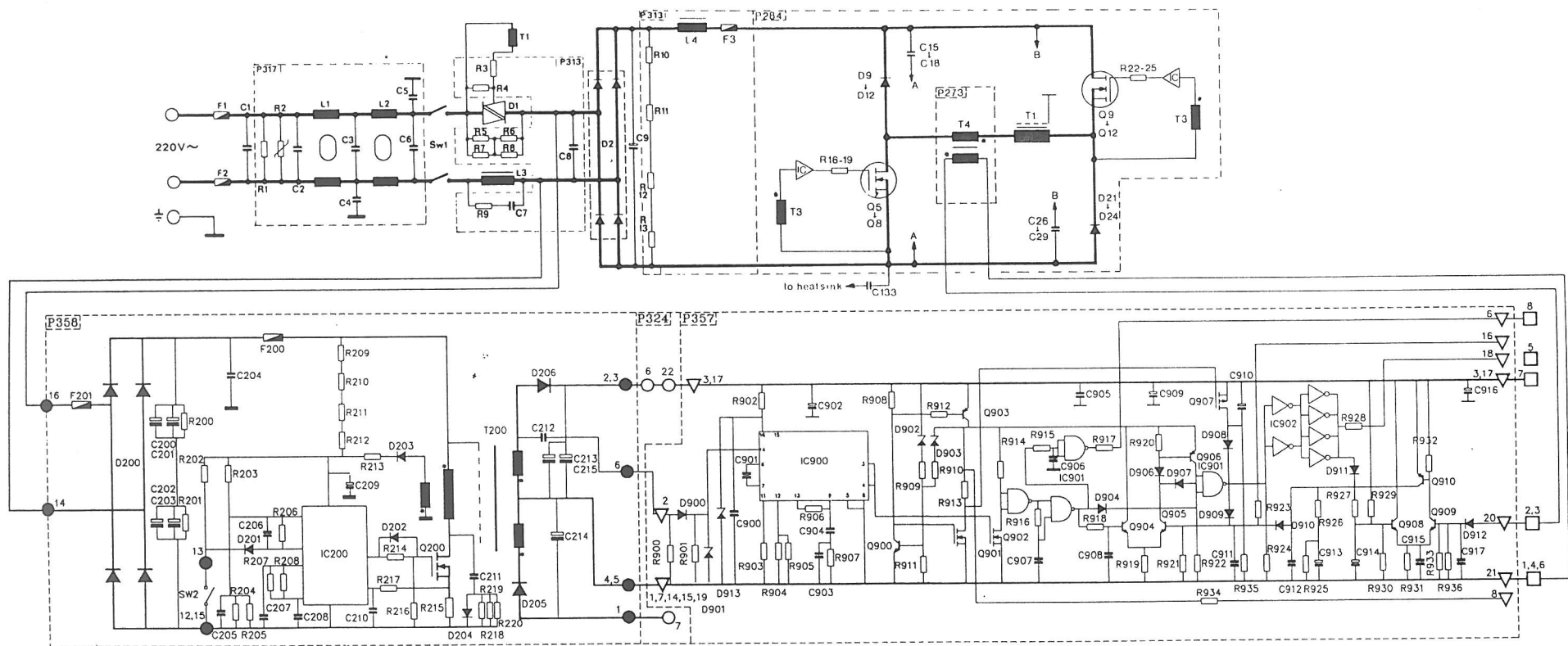
Sw3	5-91	Vr.
Modifications	Date	App





DPM A  
DPM V

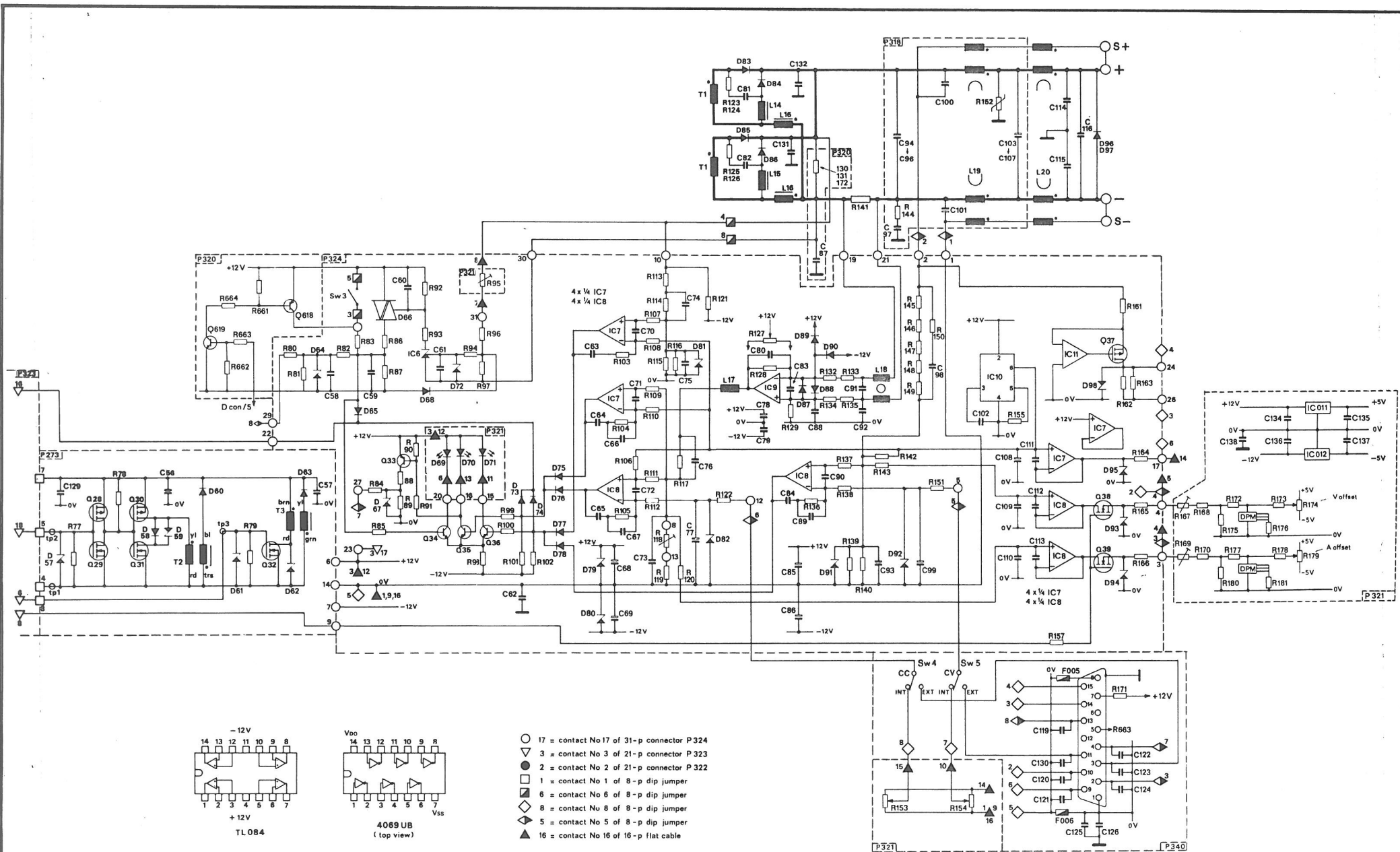
		Title: <b>SM 3540</b>		
<b>P321A (v. DPM)</b>		g/g, Ur.	Date: 1-'85	
Modifications	Date	App	<b>delta elektronik bv</b>	



- 17 = contact No 17 of 31-p connector P324
- ▽ 3 = contact No 3 of 21-p connector P323
- 2 = contact No 2 of 21-p connector P322
- 1 = contact No 1 of 8-p dip jumper
- ◇ 6 = contact No 6 of 8-p dip jumper
- ◆ 8 = contact No 8 of 8-p dip jumper
- ◊ 5 = contact No 5 of 8-p dip jumper
- ▲ 16 = contact No 16 of 16-p flat cable

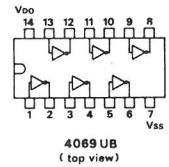
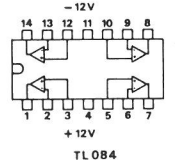
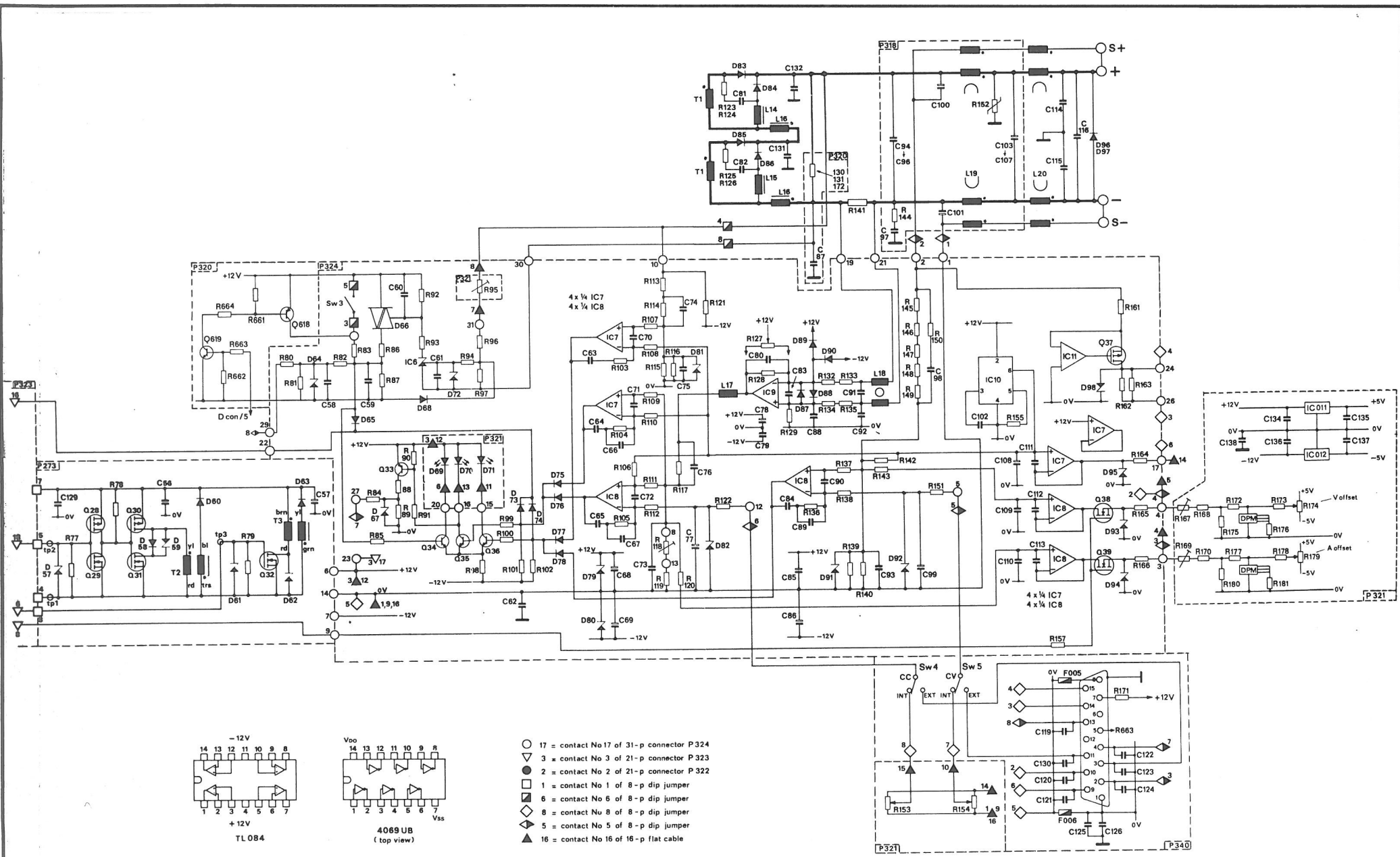
		Title: SM 3540	
P357, P358	8-88	Ur.	Date: 1-'85
Modifications	Date	App	delta elektronika bv





Remote shutdown	11/93	Vr.	Title:	SM 3540
IC11, Q37, R158, R159	2/92	Vr.	Date:	1 - '85
v. D.P.M.	9/91	Vr.		
Modifications	Date	App	delta elektronika bv	

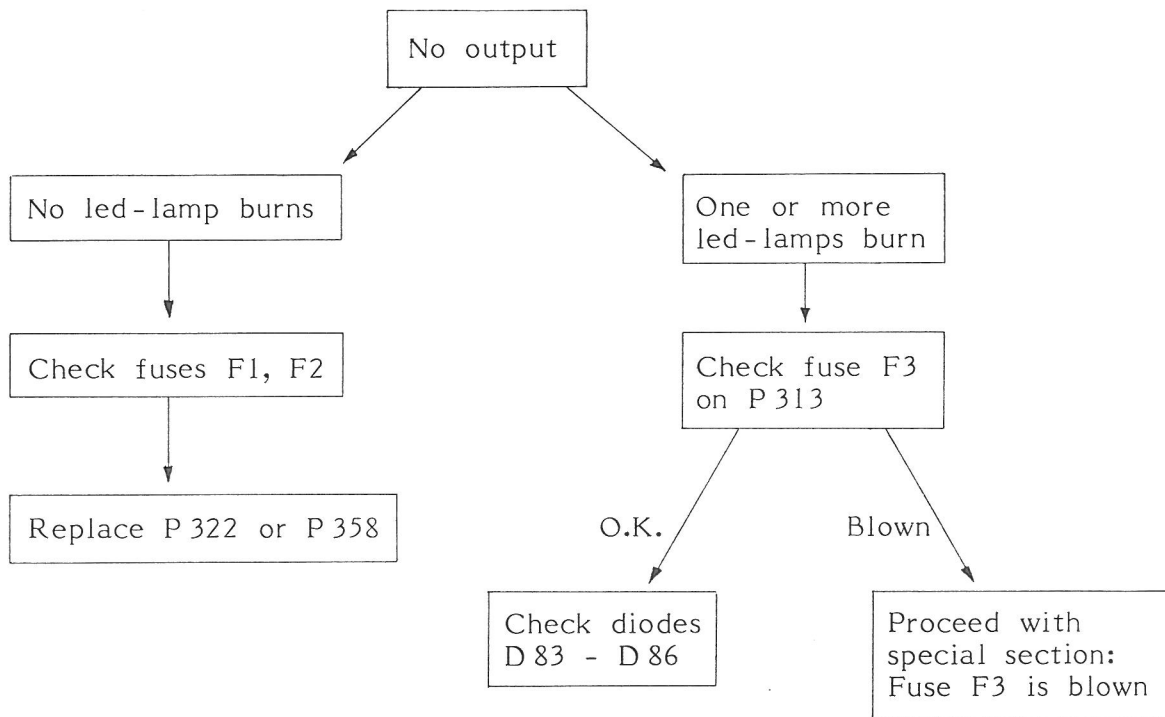




- 17 = contact No 17 of 31-p connector P 324
- 3 = contact No 3 of 21-p connector P 323
- 2 = contact No 2 of 21-p connector P 322
- 1 = contact No 1 of 8-p dip jumper
- 6 = contact No 6 of 8-p dip jumper
- ◇ 8 = contact No 8 of 8-p dip jumper
- ◇ 5 = contact No 5 of 8-p dip jumper
- ▲ 16 = contact No 16 of 16-p flat cable

Remote shutdown	11/93	Vr	Title: <b>SMX 7220</b>
IC11, Q37, R158, R159	2/92	Vr	
v.D.P.M.	9/91	Vr	
Modifications	Date	App	Date: 1-85
			delta elektronika bv





#### Fuse F3 is blown

1. Check diodes D 83, 84, 85, 86. (BYW 93-200, on heatsink).
2. Check all diodes on P 284, defective diodes will give a short. You don't have to desolder to measure them.
3. When one of the transistors Q 5 - Q 12 (BUZ 67) is blown, also one or more resistors R 16 - R 19, R 22 - R 25 (6,8 Ohm) will be blown (open circuit).
4. Replace defective components.
5. Switch on power supply.

If fuse F3 on P 313 is blown again, replace the whole switching unit containing P 273, P 284 and Q 5 - Q 12, also replace P 323.  
Send defective units for repair.

The SM3540 is a very reliable design and we expect a very low failure rate. To check this we want to keep record of every repair and therefore ask your cooperation.

In case you repair an SM3540 please report to us:

- Serial no
- Description of defect
- Presumable cause of defect
- Replaced parts

Delta elektronika BV  
P.O. Box 27  
4300 AA Zierikzee, Netherlands  
Tel. 31 1110 13656  
Telefax 31 1110 16919



## EC Declaration of Conformity

We

Delta Elektronika  
P.O. BOX 27  
4300 AA Zierikzee  
The Netherlands

declare under sole responsibility that the following Power Supplies:

**SM 3540-D**  
**SMX 7220-D**

meet the intent of Directives 89/336/EEC; 92/31/EEC; 93/68/EEC for Electromagnetic Compatibility and Directives 73/23/EEC; 93/68/EEC regarding Electrical Safety. Compliance was demonstrated to the following specification as listed in the official Journal of the European Communities:

**EN 50081-1 Generic Emissions:** (residential, light industrial)

EN 55022                Radiated, Class B  
EN 55022                Conducted, Class B

**EN 50082-1 Generic Immunity:** (residential, light industrial)

**EN 50082-2 Generic Immunity:** (industrial environment)

EN 61000-4-2	Electrostatic Discharge	Level 3.
EN 61000-4-4	Electrical Fast Transients / Bursts	Level 4.
ENV 50140	Radiated electromagnetic fields	Level 3.
ENV 50141	Conducted electromagnetic fields	Level 3.
EN 61000-4-5	Surge on DC output	Level 3, differential mode.
EN 61000-4-5	Surge on DC output	Level 2, common mode.
EN 61000-4-5	Surge on line input	Level 4.
EN 61000-4-11	Voltage variations and dips	

**EN 60950 Safety of IT equipment**

Managing director