

# NOTAT

Til: HN

Kopi: KS, KKr

Fra: KT

Dato: 91.01.15

Sak: RYGGFONN

---

## DETALJER OG FORANDRINGER I FORBINDELSE MED FELTINSTRUMENTERING I RYGGFONN SESONG 1990/91

Et stort skred vinteren 1990 tok med seg både Y-masta og masta på skredforbygningen. En modifisert rørmast i to seksjoner ble satt på toppen av den gjenværende seksjon fra den gamle y-masta. Sveisbare strekkklapper av typen Ailtech (vedlegg 1) ble montert i hver rørseksjon. Totalt er det nå 3 snitt med strekkklapper som måler moment og skjærspenninger, dvs totalt 6 fullbrokoblinger. Det er i tillegg montert 2 stk. geofoner innvendig i rørmasta. En av disse er koblet til en hendelsesdetektor som starter registrering av målersignaler. For monteringsdetaljer se vedlegg 2.

Koblings skjema for sensorer på rørmasta er gitt i fig. 1.

Masta på toppen av skredforbygningen ble satt på plass og eksisterende strekkklapper ble koblet til feltkabel. Koblings skjema gitt i fig. 2. Motstående strekkklapper (SL1/SL3, SL2/SL4) er koblet sammen til fullbroer for å opprettholde signalnivå med halvert eksiteringsspenning. 2 stk. geofoner er lagt ut på oversiden av skredforbygningen med kabel-lengder på 50 (RM-1V) meter og 100 (RM-2V) meter. Disse er terminert i koblingsboksen på masta.

Defekt lastselle på toppen av betongklossen må frakobles i lokal koblingsboks når denne blir tilgjengelig.

Sensordata med kalibreringsfaktorer er gitt i tabell 1.

Loggesystemet starter når signalet fra geofonen, etter forsterkning, overskrider 0.7 volt. Dette betyr, med en forsterkning på 50, og en kalibreringsfaktor på 15.3 mV/mm/s, at systemet lagrer data når svingehastigheten overskrider ca. 1 mm/s. Triggersystemet er vist på fig. 3.

Lagringsmediet er en digital kasett-spiller (DAT) som kan lagre data i ca. 2 timer. Med en opptaksperiode på 80 sekunder gir dette mulighet for 90 registreringer før kassetten er full. Se vedlegg 3.

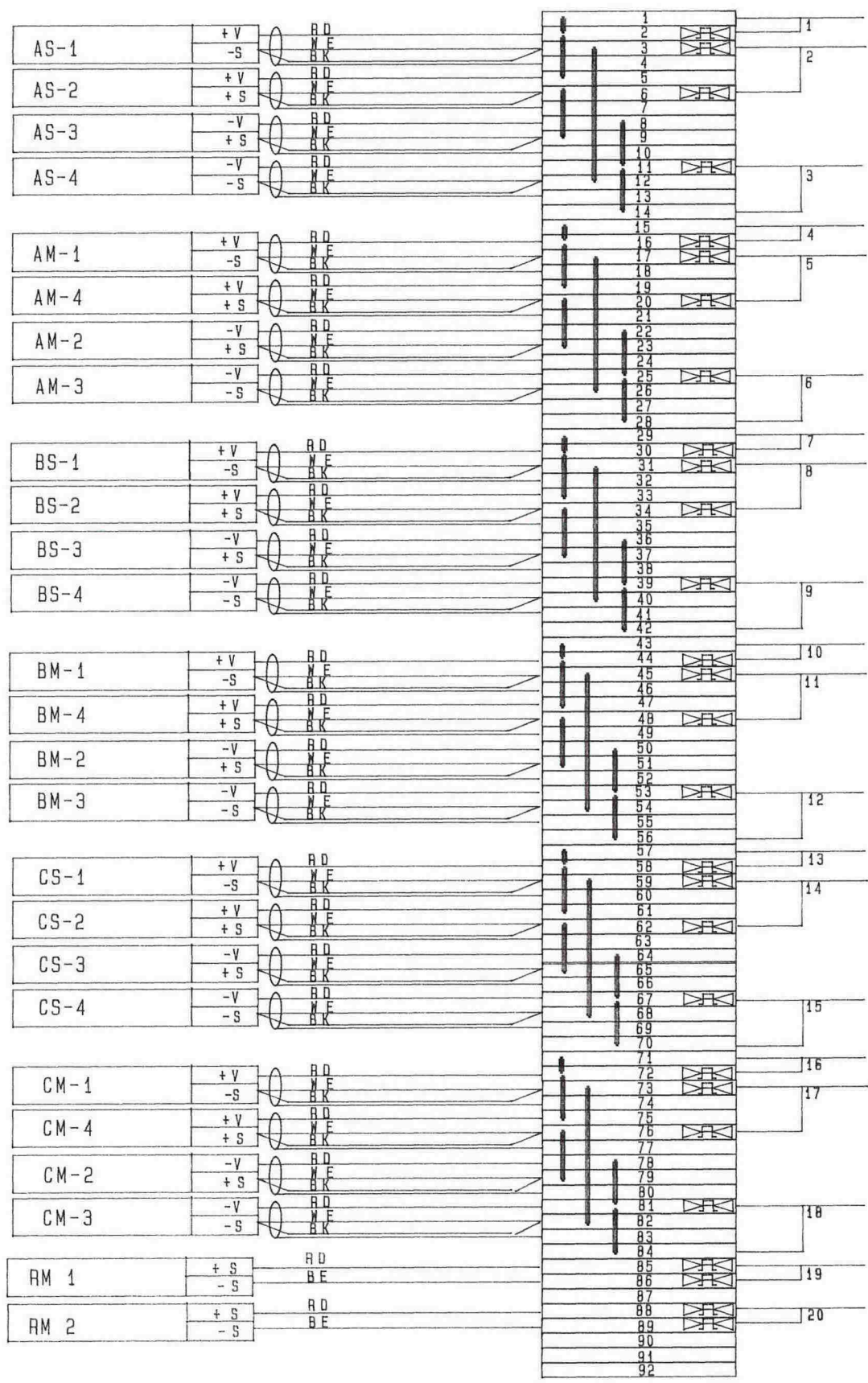
## Innstilling av PCM-system:

Filter: Knekkfrekvens = 75 Hz  
Multiplexer: Underkanaler = 24  
Modulator: Hovedkanaler = 2  
Bit-rate = 160kbit/s  
Tidkode: Sanntid programert  
Impulsrele: Tidsintervall = 80 s  
Punktprøvefrekvens:  $5333.3/24 = 222.2$  Hz

Alle registreringsinstrumentene er koblet til en 24V fordelingsboks. Denne er koblet til en batteribank på 8 stk. 24V batterier som kontinuerlig blir ladet fra en ELTEK batterilader. Ved strømbrydd vil batteriene kunne levere strøm til systemet i ca 100 timer. Fordelingsboksen består av en 24V til 5V dc/dc omformer, og en 24V til +/- 15V omformer, se vedlegg 4.


Figur 4 viser instrumenteringssystemet for Ryggfonn.

581200.2

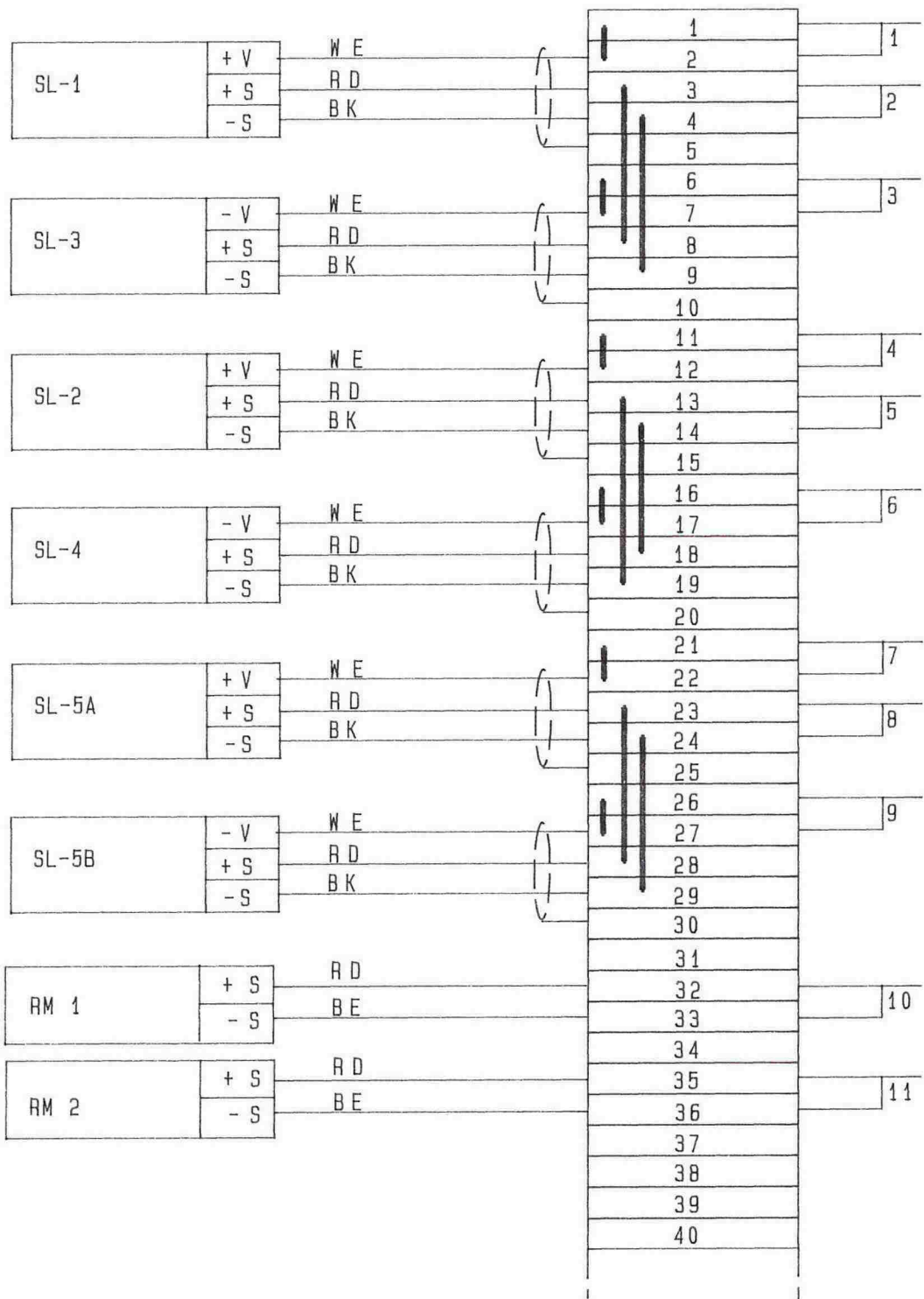



RYGGFONN

TUBE-MAST WIRING DETAILS  
LOCAL JUNCTION BOX

Report No.	Figure No. 1
Drawn by <i>UT</i>	Date 12-90
Checked	 <b>NGI</b>
Approved	

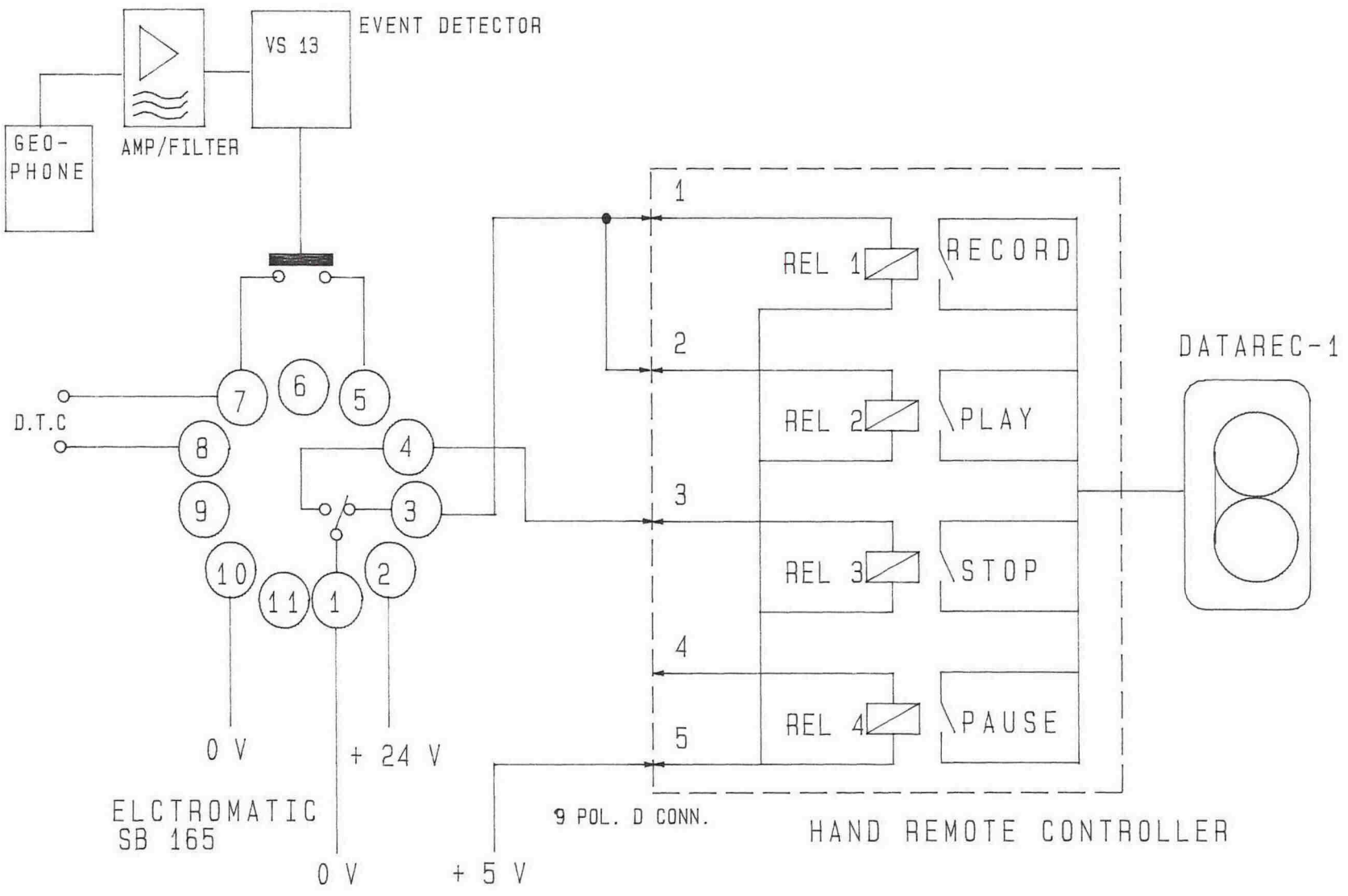
581200.2



<h1 style="margin: 0;">RYGGFONN</h1> <p style="margin: 0;">STEEL MAST AT TOP OF DAM WIRING DETAILS</p>	Report No.	Figure No. <b>2</b>
	Drawn by <i>MT</i>	Date 12-90
	Checked	 <b>NGI</b>
	Approved	

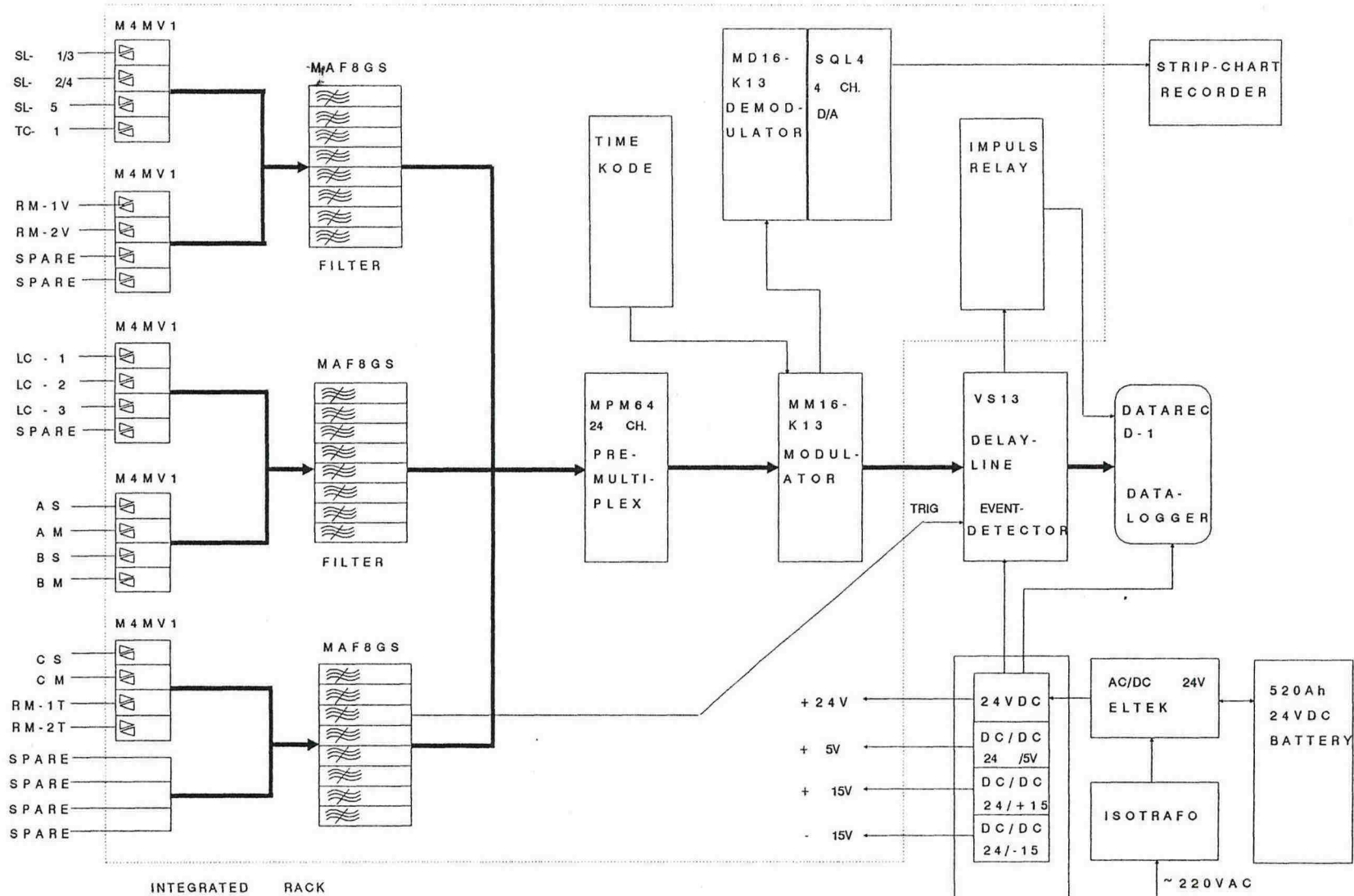
AUTOMATIC RECORDING SYSTEM


RYGGFONN



Report No.	Figure No.
Drawn by <i>[Signature]</i>	5
Checked	Date 1-91
Approved	





Figur nr.	4		
Dato	1-91		
Rapport nr.	Tegner	Kontrollert	Godkjent
			
RYGGETONN INSTRUMENTATION SYSTEM			

RYGGFONN – SENSOR CALIBRATION FACTORS 1990/91

Sensor	Ch. no. amplif/ filter	Ch. no. modem	Calibration factors		Excit. [V]	Gain	Conv. to eng. units	
SL-1/3	1	2.01	0.950	$\mu\text{V}/\text{V}(\mu\text{s})$	9.41	400	0.2797	$\mu\text{s}/\text{mV}$
SL-2/4	2	2.02	0.950	$\mu\text{V}/\text{V}(\mu\text{s})$	9.46	400	0.2782	$\mu\text{s}/\text{mV}$
SL-5AB	3	2.03	0.950	$\mu\text{V}/\text{V}(\mu\text{s})$	9.63	400	0.2733	$\mu\text{s}/\text{mV}$
TC-1	4	2.04	5.980	$\mu\text{V}/\text{V}(\text{kPa})$	9.46	400	0.0442	$\text{kPa}/\text{mV}$
LC-1	5	2.05	3.670	$\mu\text{V}/\text{V}(\text{kPa})$	8.00	200	0.1703	$\text{kPa}/\text{mV}$
LC-2	6	2.06	2.450	$\mu\text{V}/\text{V}(\text{kPa})$	8.00	200	0.2551	$\text{kPa}/\text{mV}$
LC-3	7	2.07	2.450	$\mu\text{V}/\text{V}(\text{kPa})$	8.00	200	0.2551	$\text{kPa}/\text{mV}$
SPARE	8	2.08			10.00	100		
RM-1V	9	2.09	20.000	$\text{mV}/\text{mm}/\text{s}$	10.00	50	0.0010	$\text{mm}/\text{s}/\text{mV}$
RM-2V	10	2.10	20.000	$\text{mV}/\text{mm}/\text{s}$	10.00	50	0.0010	$\text{mm}/\text{s}/\text{mV}$
SPARE	11	2.11			10.00	100		
SPARE	12	2.12			10.00	100		
AS	13	2.13	1.970	$\mu\text{V}/\text{V}(\mu\text{s})$	9.63	100	0.5271	$\mu\text{s}/\text{mV}$
AM	14	2.14	1.970	$\mu\text{V}/\text{V}(\mu\text{s})$	9.46	100	0.5366	$\mu\text{s}/\text{mV}$
BS	15	2.15	1.970	$\mu\text{V}/\text{V}(\mu\text{s})$	9.11	100	0.5572	$\mu\text{s}/\text{mV}$
BM	16	2.16	1.970	$\mu\text{V}/\text{V}(\mu\text{s})$	9.11	100	0.5572	$\mu\text{s}/\text{mV}$
CS	17	2.17	1.970	$\mu\text{V}/\text{V}(\mu\text{s})$	9.12	100	0.5566	$\mu\text{s}/\text{mV}$
CM	18	2.18	1.970	$\mu\text{V}/\text{V}(\mu\text{s})$	9.12	100	0.5566	$\mu\text{s}/\text{mV}$
RM-1M	19	2.19	15.300	$\text{mV}/\text{mm}/\text{s}$	10.00	50	0.0013	$\text{mm}/\text{s}/\text{mV}$
RM-2M	20	2.20	15.300	$\text{mV}/\text{mm}/\text{s}$	10.00	50	0.0013	$\text{mm}/\text{s}/\text{mV}$
SPARE	21	2.21			0.00	1		
SPARE	22	2.22			0.00	1		
SPARE	23	2.23			0.00	1		
SPARE	24	2.24			0.00	1		

SB1200.2

VEDLEGG 1

581200.7 RY66FONN

KS

12/90

NYE STRELAPPER RØRNAS

581200.2

SG159-11-38-65 AILTECH  
 Comp. Temp. Range: 0° to 180° F  
 Gage Factor (GFN) 1.90 ± 3%  
 Resistance: 358.3 OHM  
 I.R. > 100 Meg. OHM  
 Batch No.: 0649

**CS3**

SG159-11-38-65 AILTECH  
 Comp. Temp. Range: 0° to 180° F  
 Gage Factor (GFN) 1.90 ± 3%  
 Resistance: 355.9 OHM  
 I.R. > 100 Meg. OHM  
 Batch No.: 0649

**CM1**

SG159-11-38-65 AILTECH  
 Comp. Temp. Range: 0° to 180° F  
 Gage Factor (GFN) 1.90 ± 3%  
 Resistance: 357.8 OHM  
 I.R. > 100 Meg. OHM  
 Batch No.: 0649

**CS2**

SG159-11-38-65 AILTECH  
 Comp. Temp. Range: 0° to 180° F  
 Gage Factor (GFN) 1.90 ± 3%  
 Resistance: 356.8 OHM  
 I.R. > 100 Meg. OHM  
 Batch No.: 0649

**CM2**

SG159-11-38-65 AILTECH  
 Comp. Temp. Range: 0° to 180° F  
 Gage Factor (GFN) 1.90 ± 3%  
 Resistance: 357.6 OHM  
 I.R. > 100 Meg. OHM  
 Batch No.: 0649

**CS3**

SG159-11-38-65 AILTECH  
 Comp. Temp. Range: 0° to 180° F  
 Gage Factor (GFN) 1.90 ± 3%  
 Resistance: 357.3 OHM  
 I.R. > 100 Meg. OHM  
 Batch No.: 0649

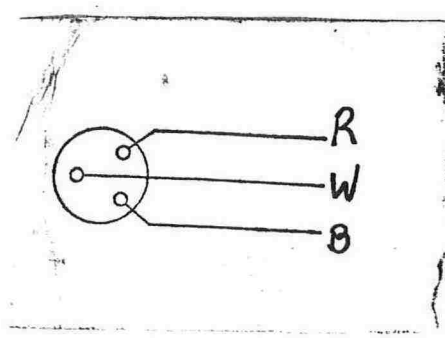
**CM3**

SG159-11-38-65 AILTECH  
 Comp. Temp. Range: 0° to 180° F  
 Gage Factor (GFN) 1.90 ± 3%  
 Resistance: 357.4 OHM  
 I.R. > 100 Meg. OHM  
 Batch No.: 0649

**CS4**

SG159-11-38-65 AILTECH  
 Comp. Temp. Range: 0° to 180° F  
 Gage Factor (GFN) 1.90 ± 3%  
 Resistance: 357.3 OHM  
 I.R. > 100 Meg. OHM  
 Batch No.: 0649

**CM4**





**B31**

SG159-11-38-65 AILTECH  
 Comp. Temp. Range: 0° to 180° F  
 Gage Factor (GFN) 1.90 ± 3%  
 Resistance: 355.8 OHM  
 I.R. > 100 Meg. OHM  
 Batch No.: 0649

SG159-11-38-65 AILTECH  
 Comp. Temp. Range: 0° to 180° F  
 Gage Factor (GFN) 1.90 ± 3%  
 Resistance: 352.2 OHM  
 I.R. > 100 Meg. OHM  
 Batch No.: 0649

**BM1**

SG159-11-38-65 AILTECH  
 Comp. Temp. Range: 0° to 180° F  
 Gage Factor (GFN) 1.90 ± 3%  
 Resistance: 355.0 OHM  
 I.R. > 100 Meg. OHM  
 Batch No.: 0649

**B32**

SG159-11-38-65 AILTECH  
 Comp. Temp. Range: 0° to 180° F  
 Gage Factor (GFN) 1.90 ± 3%  
 Resistance: 353.9 OHM  
 I.R. > 100 Meg. OHM  
 Batch No.: 0649

**BM2**

SG159-11-38-65 AILTECH  
 Comp. Temp. Range: 0° to 180° F  
 Gage Factor (GFN) 1.90 ± 3%  
 Resistance: 355.6 OHM  
 I.R. > 100 Meg. OHM  
 Batch No.: 0649

**B33**

SG159-11-38-65 AILTECH  
 Comp. Temp. Range: 0° to 180° F  
 Gage Factor (GFN) 1.90 ± 3%  
 Resistance: 353.3 OHM  
 I.R. > 100 Meg. OHM  
 Batch No.: 0649

**BM3**

**B34**

SG159-11-38-65 AILTECH  
 Comp. Temp. Range: 0° to 180° F  
 Gage Factor (GFN) 1.90 ± 3%  
 Resistance: 354.8 OHM  
 I.R. > 100 Meg. OHM  
 Batch No.: 0649

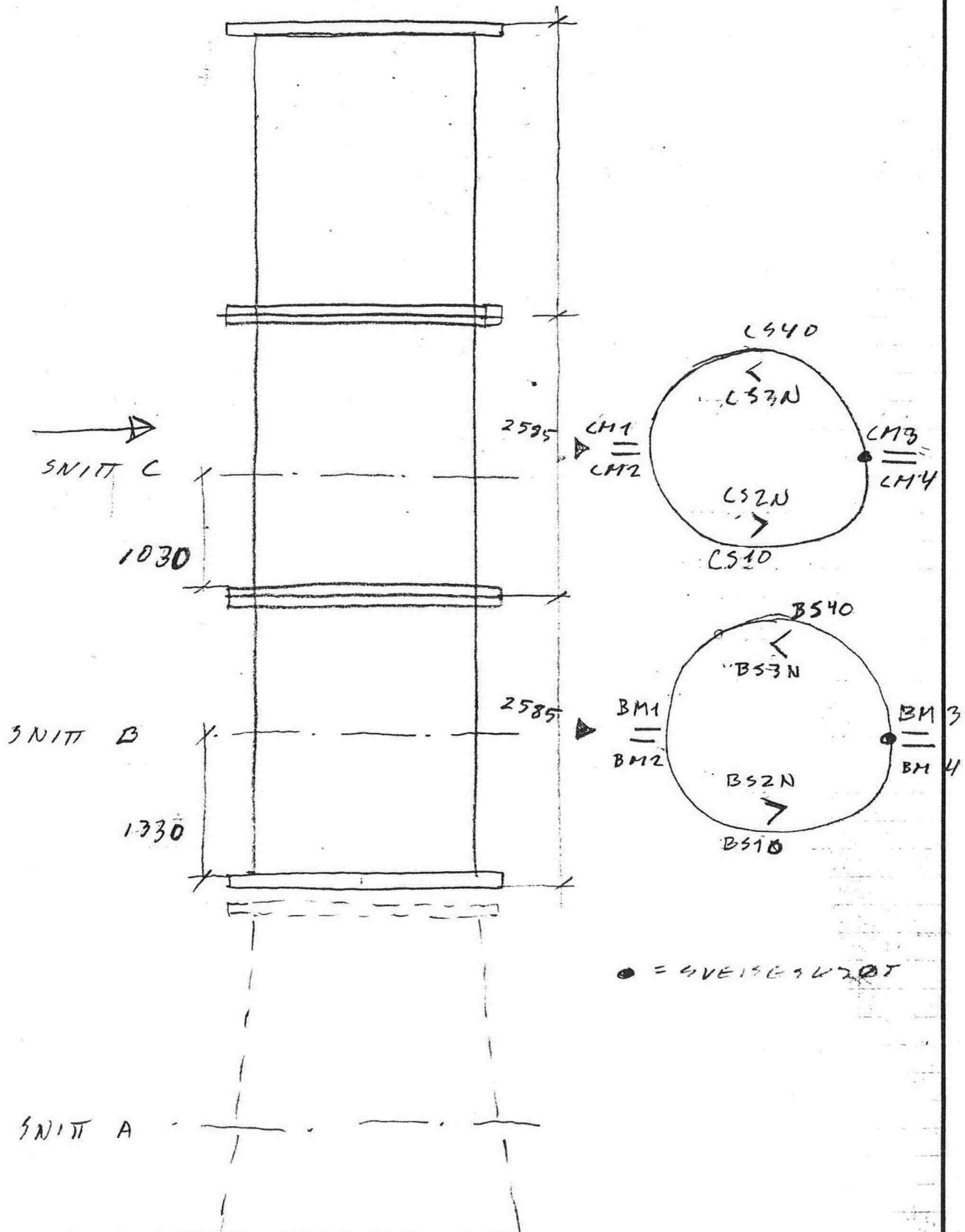
**BM4**

SG159-11-38-65 AILTECH  
 Comp. Temp. Range: 0° to 180° F  
 Gage Factor (GFN) 1.90 ± 3%  
 Resistance: 354.4 OHM  
 I.R. > 100 Meg. OHM  
 Batch No.: 0649

581200.2



OPPDRAG JOB TITLE	Rykkodan	OPPDRAGSNR. CONTRACT NO.	SIDE PAGE
FORSØK / BEREGNING SUBJECT		SIGN. <i>V. S.</i>	DATO DATE 12/11-90
		KONTR. CONTR.	DATO DATE



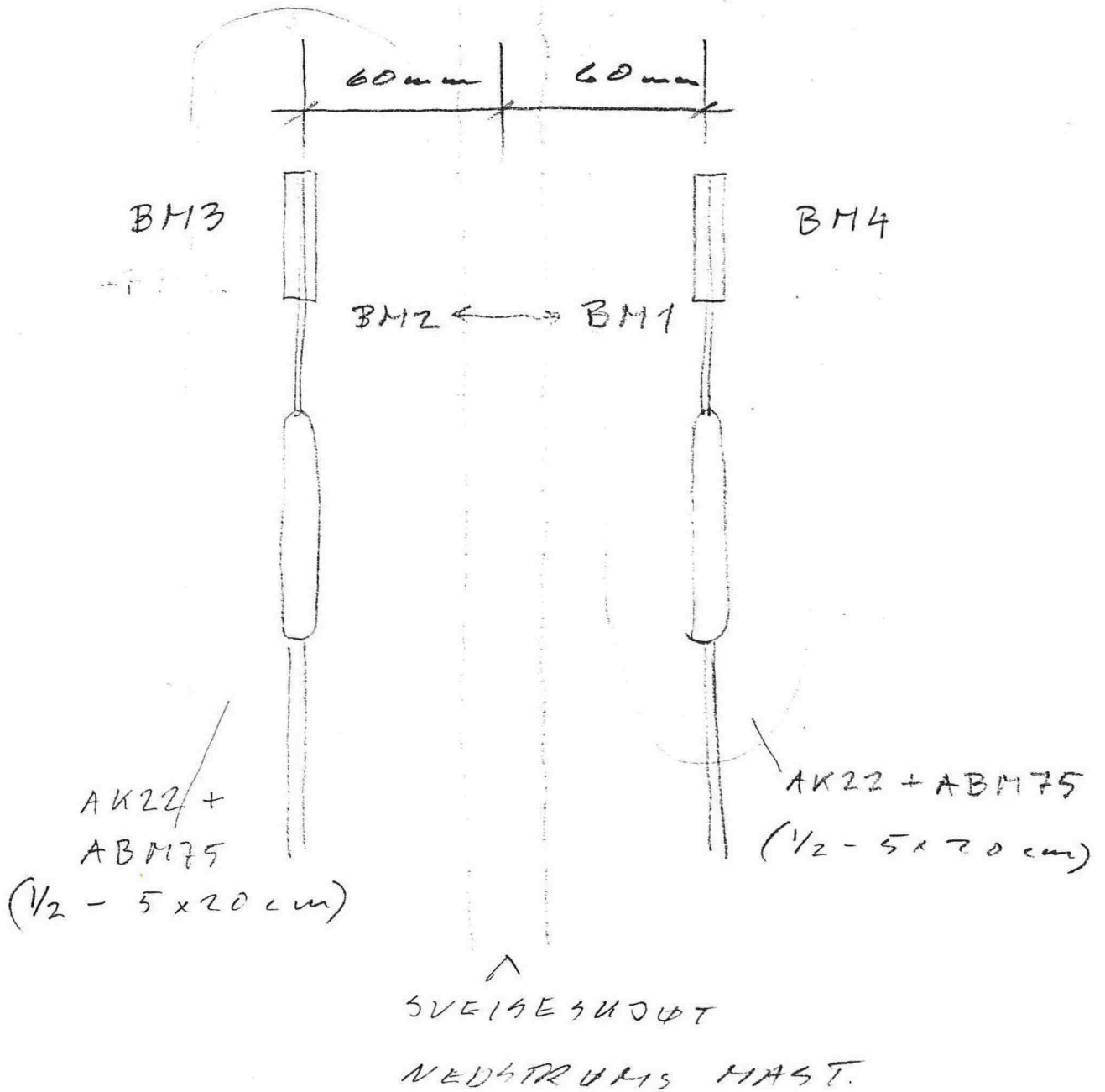
SB1200.2



OPDRAG JOB TITLE	Rulleform	OPDRAGSNR. CONTRACT NO.	SIDE PAGE
FORSØK / BEREGNING SUBJECT	N4 12 OKM 95	SIGN. <i>V. G.</i>	DATO DATE 11/90
		KONTR. CONTR.	DATO DATE

BM of LM-måler

TOPPMAST



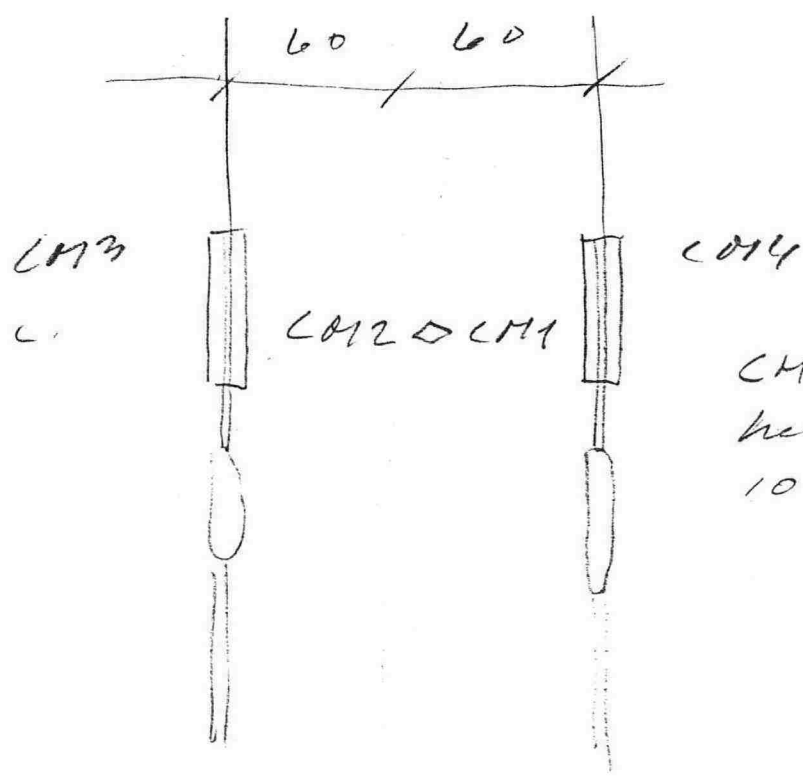
SETI INNENFRA MAST

21002185



OPDRAG JOB TITLE	RULLERUND	OPDRAGSNR. CONTRACT NO.	SIDE PAGE
FORSØK / BEREGNING SUBJECT	NY KONDUKT	SIGN. <i>UGO</i>	DATO DATE <i>11/90</i>
		KONTR. CONTR.	DATO DATE

TOPP



CM1-4 hver sin  
hull ABH75  
10 x 20 cm



OPPDRAG  
JOB TITLE

R466 FOUCC

OPPDRAGSNR.  
CONTRACT NO.

SIDE  
PAGE

FORSØK / BEREGNING  
SUBJECT

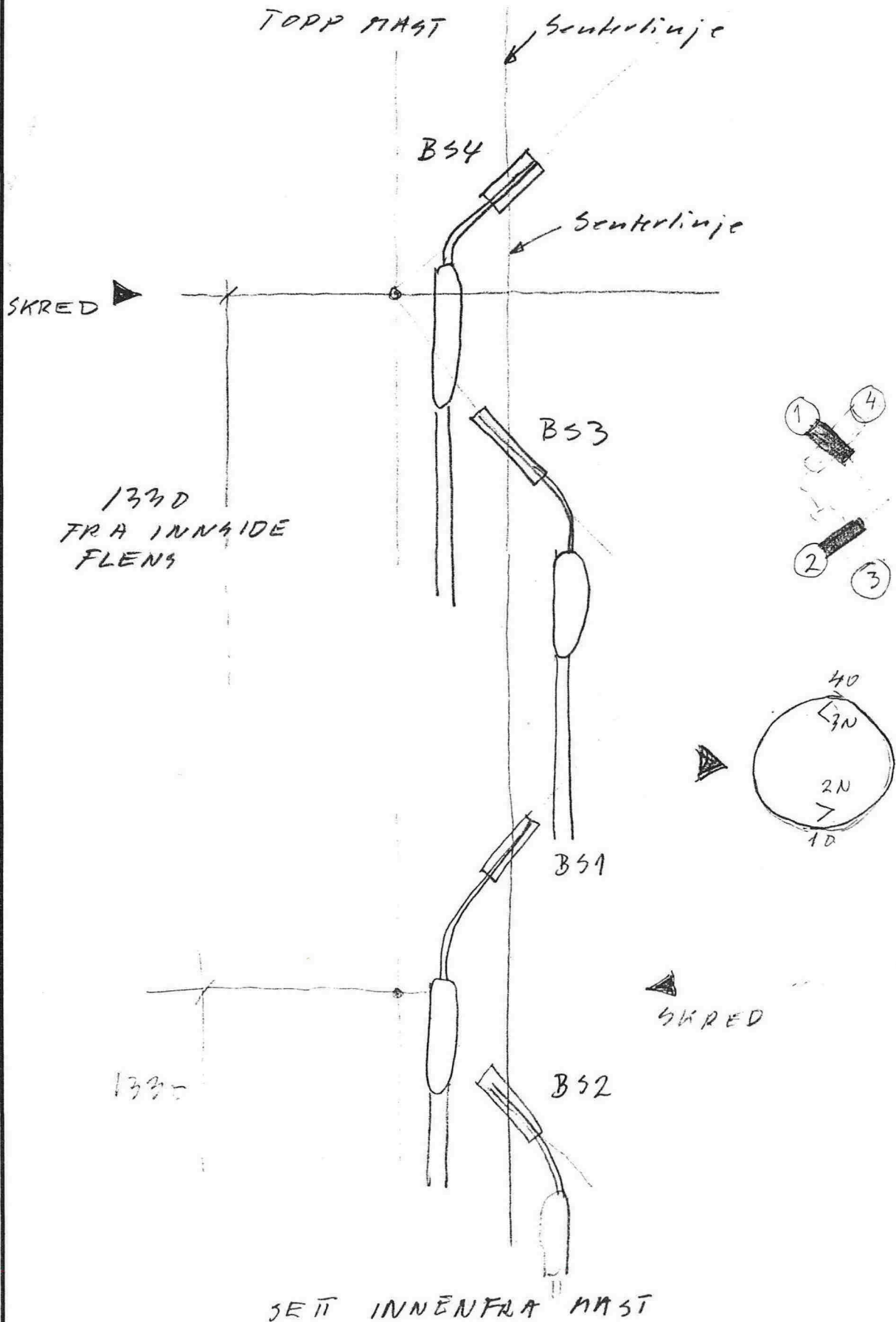
N4 ROLLMAST

SIGN. *liho*

DATO  
DATE 11/90

KONTR.  
CONTR.

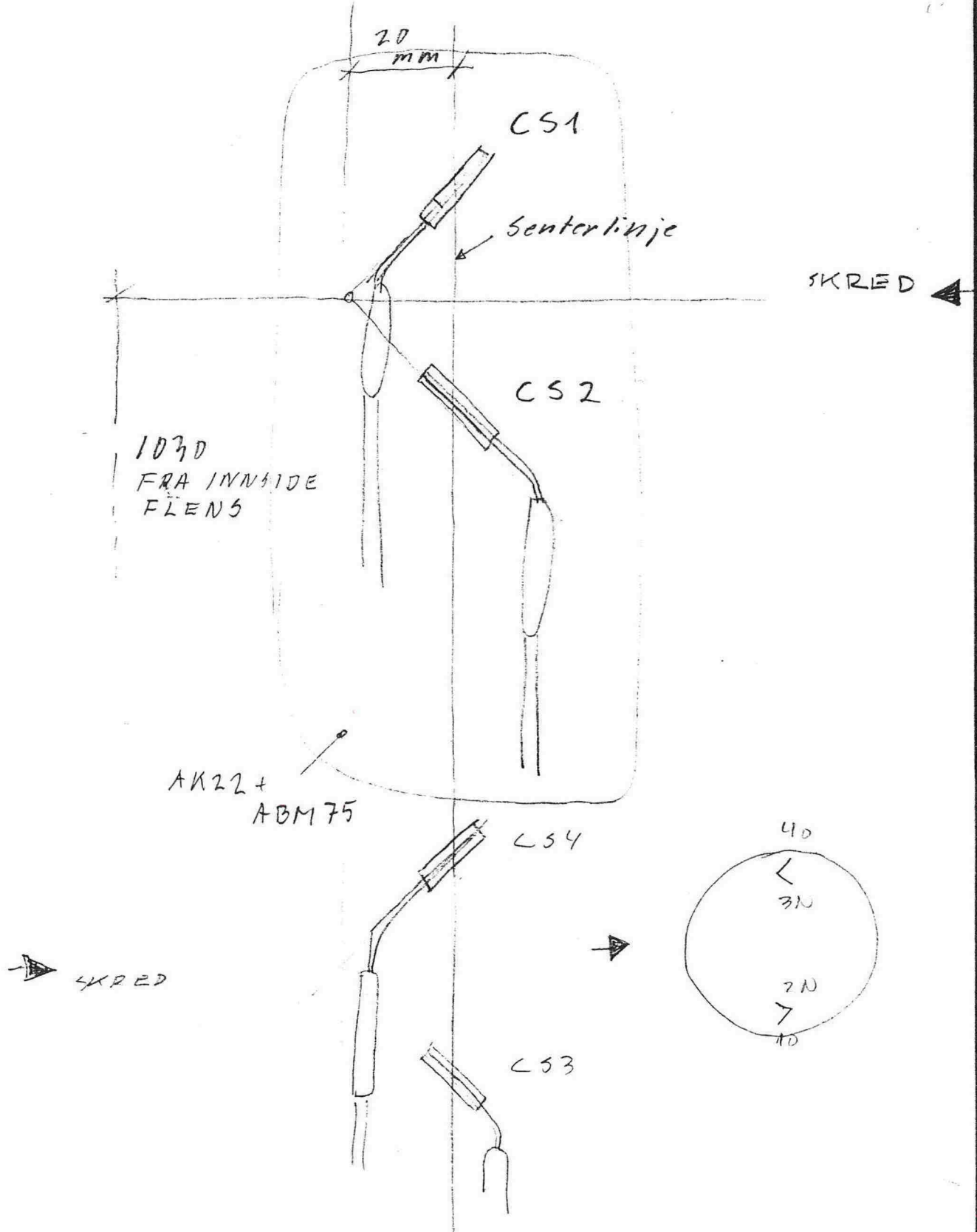
DATO  
DATE





OPDRAG JOB TITLE	DYLLIFØR	OPDRAGSNR. CONTRACT NO.	SIDE PAGE
FORSØK / BEREGNING SUBJECT	N4 RØRPIST	SIGN. <i>VSO</i>	DATO DATE <i>11/90</i>
		KONTR. CONTR.	DATO DATE

TOPP MAST



SETT INNENFRA MAST

2.002185

2.002185



OPPDRAG  
JOB TITLE

RULLE FØN

OPPDRAGSNR.  
CONTRACT NO.

SIDE  
PAGE

FORSØK / BEREGNING  
SUBJECT

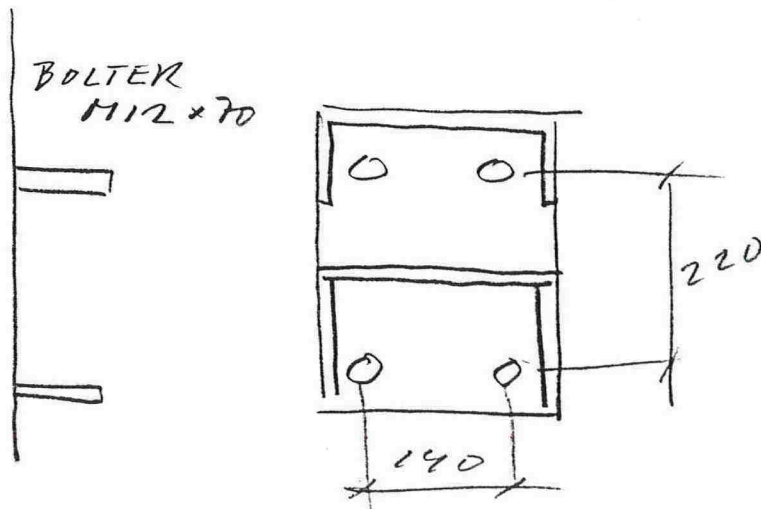
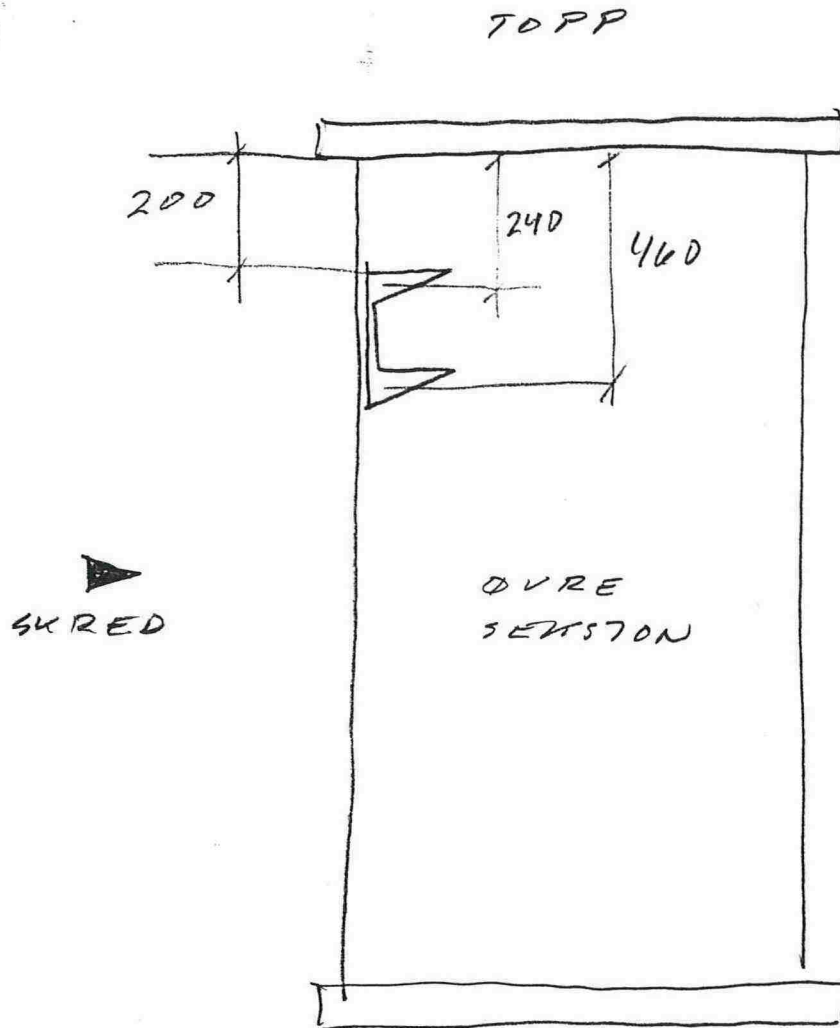
SIGN. *UGO*

DATO  
DATE *13/11-92*

KONTR.  
CONTR.

DATO  
DATE

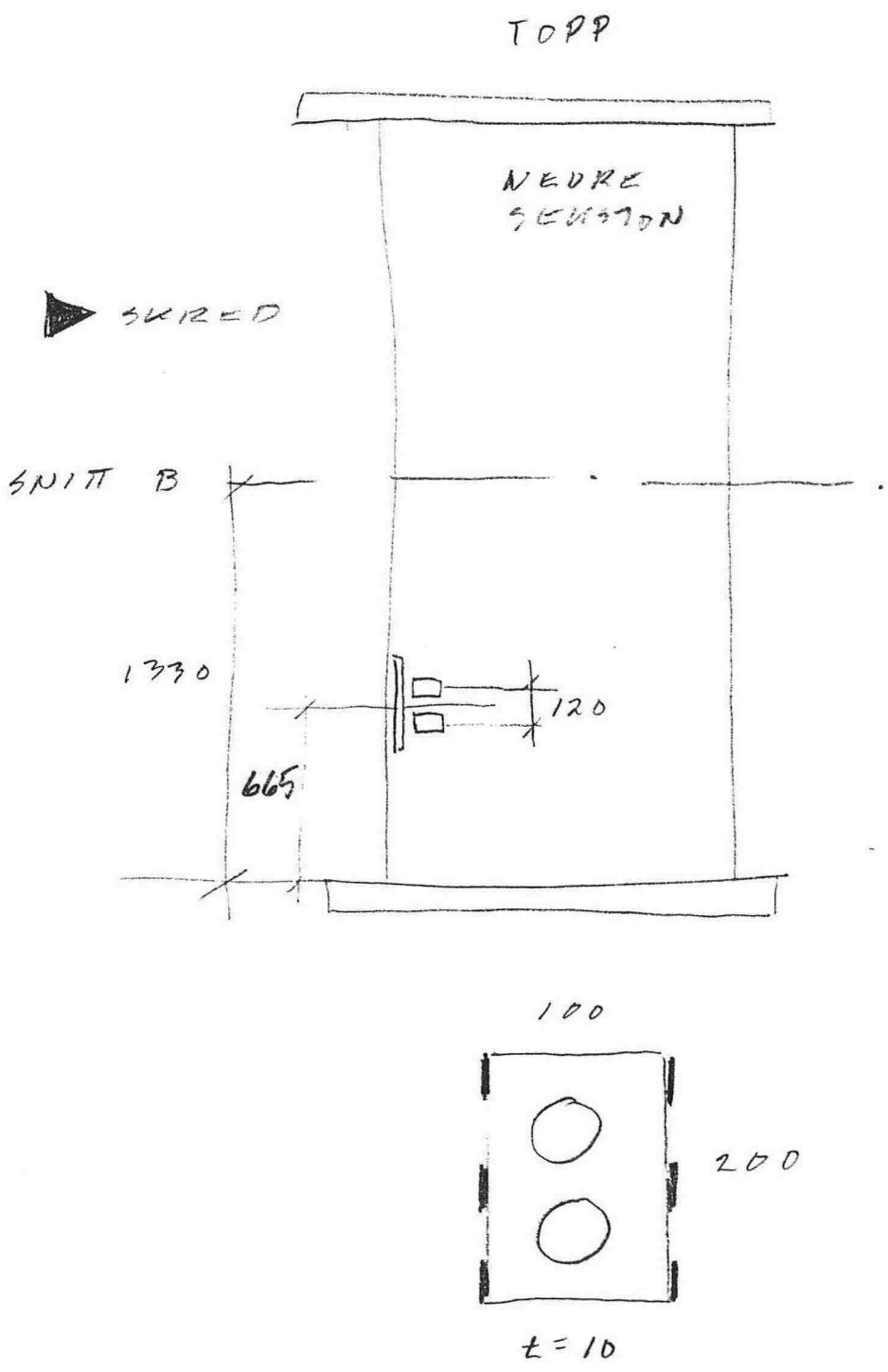
# MONTERING HOLDER FOR AKSELLERDMETRE





OPDRAG JOB TITLE	R466FONN	OPDRAGSNR. CONTRACT NO.	SIDE PAGE
FORSØK / BEREGNING SUBJECT		SIGN. <i>[Signature]</i>	DATO DATE 3/11-90
		KONTR. CONTR.	DATO DATE

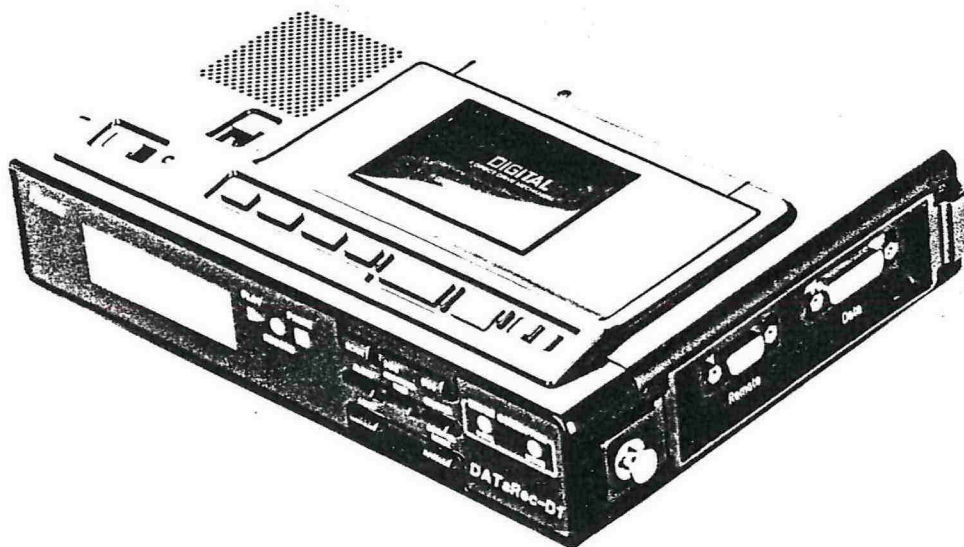
Montering 2 stk Geoforner.





# DATARec-D1

Digital Cassette Tape Recording System



*DATARec* tape recording systems were developed for recording large amounts of data in measurement technique applications. A new extremely small tape cassette permitted small instrument dimensions. The data are recorded on to a 3.8 mm magnetic tape in the helical scan technique. By means of a special channel coding during recording (8-10 Modulation) a very high packing density of 61 kBit/inch was achieved. A highly efficient error-correcting method (Double Encoded Reed Solomon Code) ensures an excellent data security of the *DATARec* magnetic tape system. As the maximum recording time of 2 hours is too short for measuring the bit error rate, it is less than  $1:10^{-10}$  and thus by several powers of ten smaller than the bit error rates of instrumentation recorders.

The maximum bit rate is 1.536 MBit/s, which is sufficient for most telemetric applications. With a weight of 1.5 kg and a power consumption of 6 W combined with its small dimensions the *DATARec* magnetic tape systems represent a new class and a new generation of recording instruments.

**JOR·AB**

JoR AB  
NAVAREN, AR  
S-741 00 Knivsta

Telefon  
(0)18-34 28 20  
Int +46 18 342 820

**Helm**

## General Information on DAT

The new Digital Audio Tape format was developed by a joint effort of more than 60 Japanese companies. The result is a new tape cassette with very small dimensions. The system employs rotating heads working in the helical scan recording technique. When developing the DAT instruments, the designers were able to capitalize on the large experience with video recorders. Thus a completely new drive mechanism with outstanding specifications emerged. The system features are so convincing that - given appropriate electronics - professional application of the DAT cassette is possible. The Digital Audio Tape again proves that consumer goods developments can be successfully employed for recording measured data. Our VIDEO-PCM magnetic tape systems have already been used for data storage purposes in measurement technique applications since 1980.

## Recording PCM Data

The DAT cassette served as the basis for the development of the new DATaRec magnetic tape system. The first model of this series is the DATaRec-D1. With this instrument, serial PCM data streams can be recorded at a maximum bit rate of 1.536 MBit/s depending on the mode of operation. A highly efficient error-correcting method eliminates practically all errors during playback. The error correction capacity is 6,336 data bits. Compared with longitudinal recording this correction capacity means that 6,336 successive data bits may be incorrect. They still are completely corrected on the digital level. By this even very large burst errors can be corrected. The user gets a magnetic tape system free from errors.

## Time Coding

The Digital Audio Tape format has a large so-called "subcode capacity". In addition to the PCM data, further information can be written on to the magnetic tape in the subcode area. With the DATaRec-D1 magnetic tape storage, time, date and an index number are recorded. This index number marks data areas during recording. During playback, the beginning of a specified area can be located at a speed 200 times faster than normal permitting very fast access to the numbered data areas.

## Mobile Application

Small instrument dimensions are especially appreciated in mobile applications. DATaRec magnetic tape systems are not only small, they also have a very low power consumption and work accurately even if exposed to vibrations. As a result of the small cassette dimensions the moving masses are very low and thus insensitive to vibration and acceleration. Where tape instrumentation recorders already fail - e. g. in tracklaying vehicles - DATaRec magnetic tape systems can still be used without any limits to data security.

## Extension Possibilities

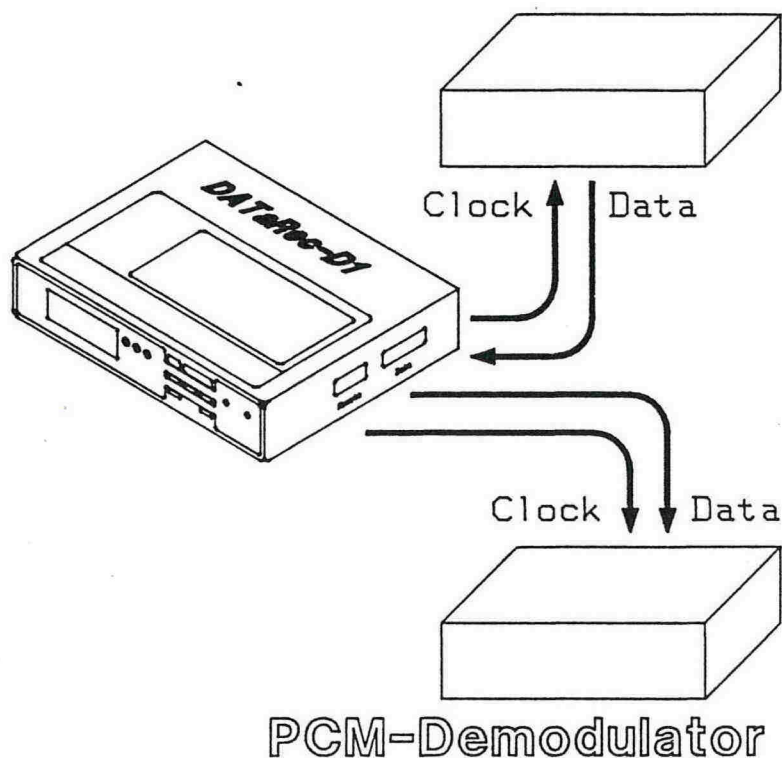
The cassette recording instrument DATaRec-D1 is the first member of a new instrument family. It is suitable for serial data recording only. Further extensions are being developed and interface cards for parallel input and output as well as Data + Clock mode will be available in the near future. Further instruments for recording analog signals will complete the DATaRec series. Our special attention is focussed on communication with a computer as this problem is getting more and more important for large amounts of data. We supply the user with magnetic tape systems for data recording with a very simple connection to most commercial computers. Data transmission software is available from us for HP computers of the 200 and 300 series as well as for the IBM AT.

## Connecting PCM Systems

### PCM-Modulator

#### Synchronous Operation

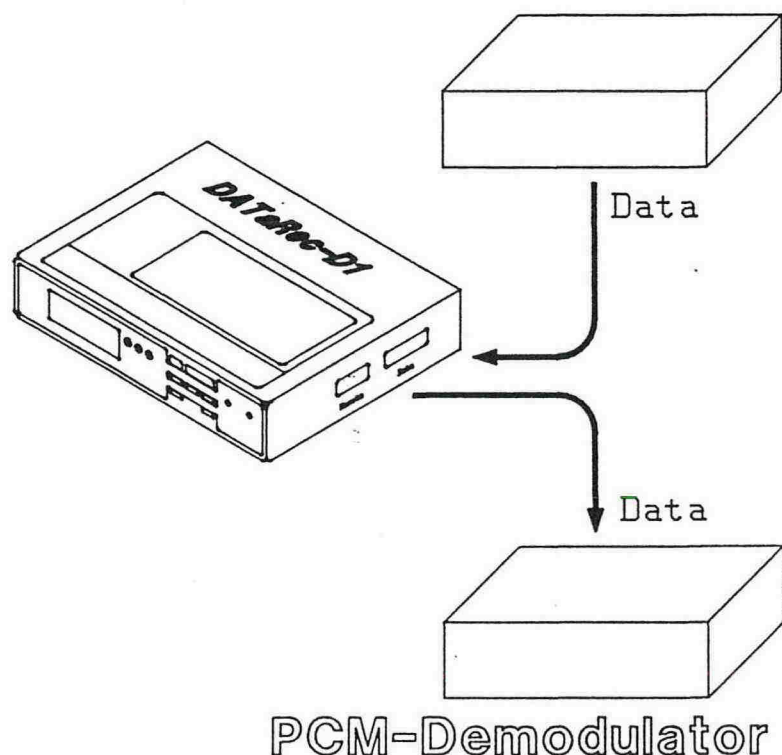
In this mode, the maximum bit rate of 1.536 MBit/s can be used for recording. The PCM modulator has to be synchronized with the DATaRec-D1 by external clocking from the magnetic tape system. The application is restricted by this single fixed bit rate. Synchronization is not always possible. On the other hand synchronous operation offers essential advantages and cost reductions. The bit synchronizer in the PCM demodulator is not required during playback. The serial data stream and the bit clock are available to the user.



### PCM-Modulator

#### Asynchronous Operation

Data can be recorded at any bit rate without any switching or re-adjusting. The maximum values vary with the type of encoding. They are listed under "Technical Data" on the next page. The applied serial data stream is sampled in the DATaRec-D1 at a frequency of 1.536 MHz and recorded on to the magnetic tape. During playback, this produces a constant residual jitter of the edges which is 650 ns max. For an accurate bit synchronization the demodulator needs a sufficiently large capture range, especially at higher bit rates.



## Technical Data

### Drive, Tape

Cassette	DAT format, Digital Audio Tape
Recording time	2 hours, DT-120 cassette
Recording capacity	1.38 GByte
Width of the magnetic tape	3.81 mm
Tape speed	8.15 mm/s
Relative speed	3.133 m/s
Track width	13.591 $\mu\text{m}$
Head azimuth	20°
Angle of tape contact	90°
Wavelength on the tape	0.67 $\mu\text{m}$
Packing density on the tape	61 kBit/inch
Bit rate incl. error correction	2.46 MBit/s
Available data capacity	1.536 MBit/s
Subcode capacity	273 kBit/s
Recording format	8-10 Modulation

### PCM Electronics

Data input and output	serial, TTL compatible
Bit rate	1.536 MBit/s (synchronous operation) 720 kBit/s, NRZ code (asynchronous operation) 360 kBit/s, Miller code
Error correction	Double Encoded Reed Solomon
Bit error rate	$<1:10^{-10}$ (not measurable)

### Environmental Conditions

Vibration	5 g, MIL-STD-810C, graph C
Acceleration	10 g, in all directions
Operating temperature	-10 °C to +45 °C, incl. tape
Storage temperature	-20 °C to +60 °C

### General Data

Power supply	6 V DC, battery 10 - 32 V, DC adaptor 100 - 240 V, power supply adaptor
Power consumption	approx. 6 W
Battery operating time	2 hours recording, battery NP-22H
Weight	approx. 1.8 kg incl. battery approx. 1.5 kg without battery
Dimensions	240 x 54 x 175 mm (WxHxD)

# DELTA ELEKTRONIKA BV



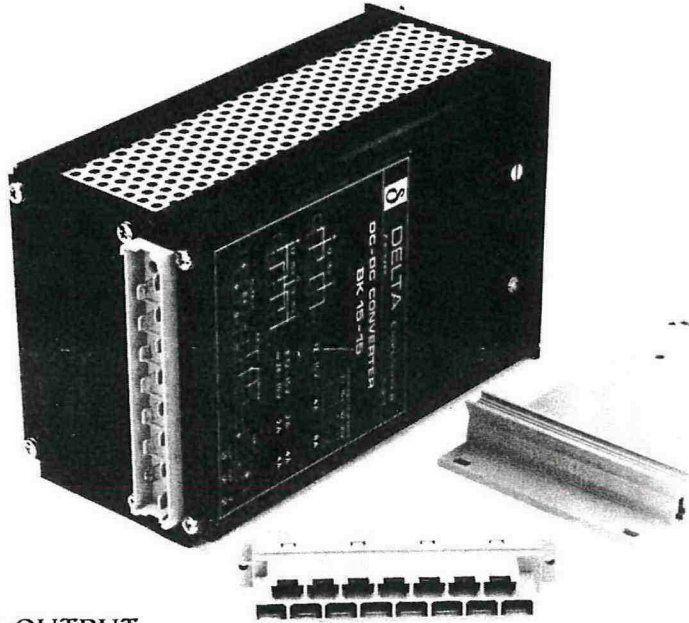
P.O. BOX 27  
 4300 AA ZIERIKZEE  
 NETHERLANDS  
 TEL. (01110) 13656 TLX 55349  
 FAX 31 1110 16919

## DC-DC CONVERTER BK 15-15

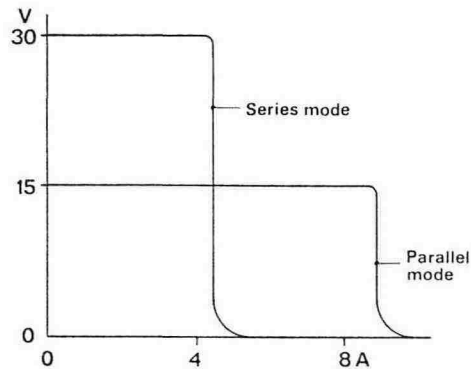
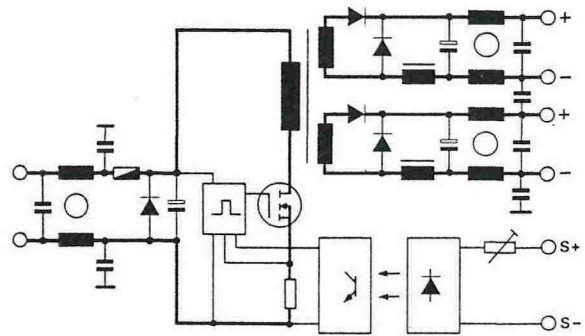
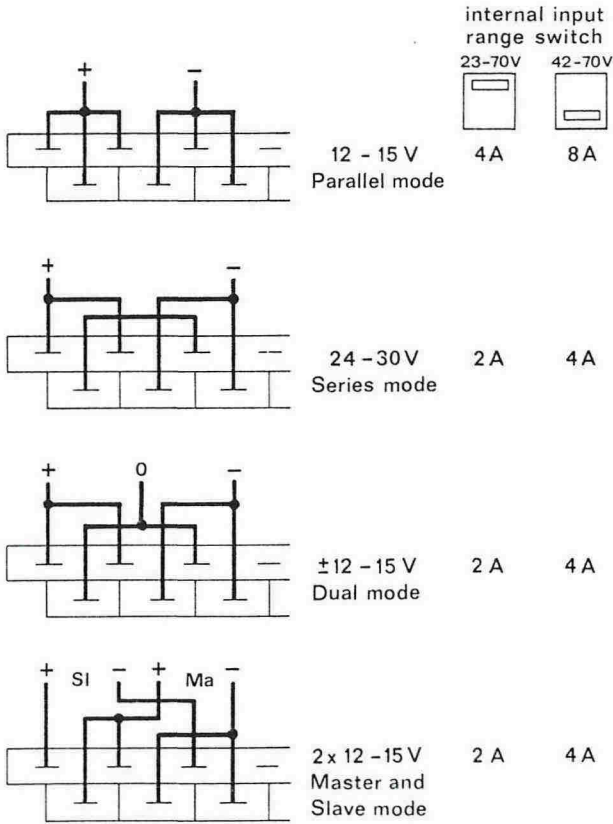
Eurocassette according to DIN 41494 with connector H 15, acc. to DIN 41612. Front panel width 16 TE.

The BK 15-15 uses power-FET's at a switching frequency of 100 kHz.

Efficiency is 83% at 120 W output.



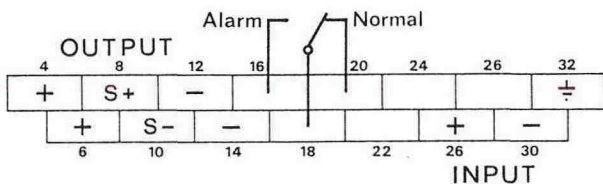
### TWO INPUT RANGES + FOUR OUTPUT MODES



### Two input ranges

42-70VDC at 120W output  
 23-70VDC at 60W output  
 Maximum 75VDC + 50V 0.3 μS

Protected against polarity reversal by means of a parallel diode and a fuse.

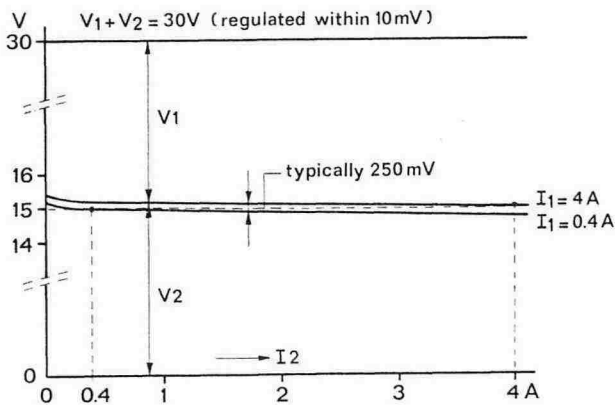


## Voltage regulation

10mV for 23-70V input variation  
10mV for 0-100% load variation

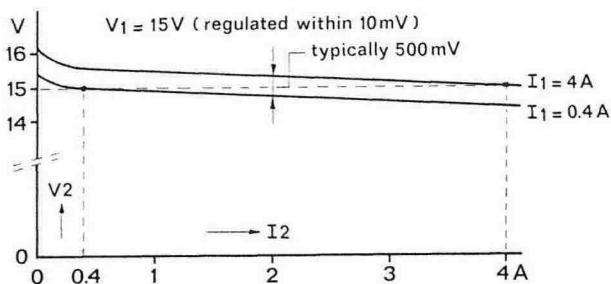
Above load regulation applies for a single output in parallel or series mode.

## Dual mode



Shift of the zero point in the dual mode.  
Total voltage  $V_1 + V_2$  is regulated.

## Master and slave mode



Voltage variation of the slave output.  
The master  $V_1$  is regulated.

## Ripple

5mV RMS, 50mV p-p (incl. spikes).  
Measured with 0.22  $\mu F$  on the mating connector.

## Transient response

0.7 mS at 10-100% load change  
0.3 mS at 10- 90% load change  
Maximum deviation 0.5 V

## Temp. coeff. of output voltage

0.02% per  $^{\circ}C$

## Current limit

Constant current limit at about 110%

## Efficiency

83% at 120W output, 76% at 60W output.

## Alarm

Undervoltage alarm by means of a reed relay and a LED-lamp.  
Adjustable 10-15V.

## Overvoltage protection

SCR crowbar type OVP at the master output, which protects both outputs. Adjustment range 12-17V. When the OVP trips, the alarm contact also changes over.

## Temperature range

-10 to +50 $^{\circ}C$  at 100% output current.  
Derate current linearly to 20% at 75 $^{\circ}C$ .

## Parallel and series operation

Up to 250V combined output.  
In parallel operation the internal OVP's can be protected by an external one.

## Insulation

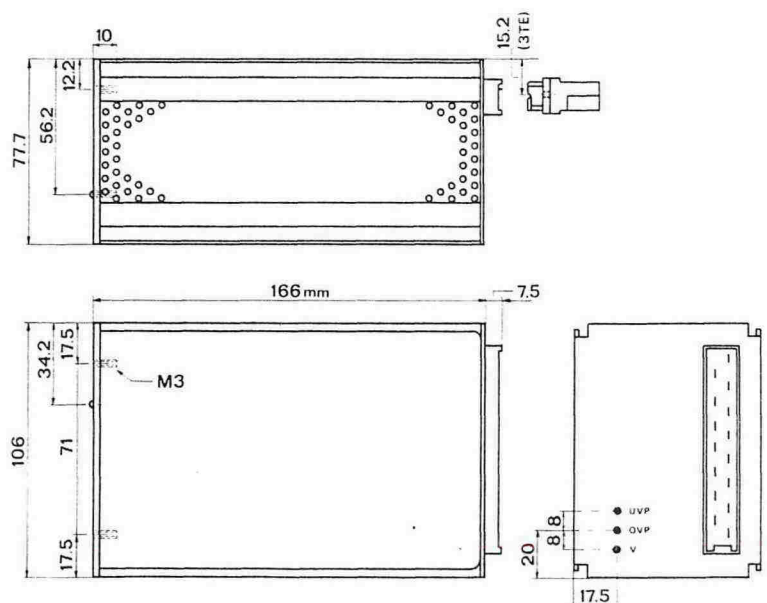
500VDC input to output and input to case.  
250VDC output to case.  
Higher insulation on request.

## RFI suppression

VDE 0875 N, input and output.

## Weight 1.25 kgs

Optional: On-off switch on front panel.  
16 TE front panel.



## INSTALLATION

When building in the BK 15-15 take care that there is sufficient space below and above the unit to permit the air to flow freely vertically through it for adequate cooling (natural convection cooling).

## PUTTING INTO OPERATION

The BK 15-15 is adjusted in the factory as follows:

### 1) Input voltage range switch.

The input range switch is put on 42-70 V.

If it has to be used on 24 V input the unit has to be opened to put the internal switch in the position 23-70 V. In this range the maximum output current is automatically reduced to 50 %.

### 2) Output voltage range

The 20-turn voltage adjustment potentiometer (marked V) is factory adjusted at 15 V for use in the parallel mode (12-15 V).

To use it in the series mode (24-30 V) or in the dual mode (+/- 12-15 V) turn up the voltage adjustment potentiometer (V) about 15 turns.

If previously used in the series mode it is necessary to turn down the voltage adjustment potmeter about 15 turns before putting on the unit in the parallel mode. If this is forgotten the overvoltage protector will short the output. In that case about 1 V is measured at the output.

### 3) Undervoltage protection (UVP)

The UVP is factory adjusted at about 10.5 V.

This means that the ledlamp and the reed relay alarm contact will switch over when the output falls below 10.5 V (or 21 V in the series mode).

The UVP level is adjustable from 10 to 15 V.

To adjust disconnect the unit from input and load and connect an external variable voltage source in series with a resistor of 100 Ohms (to protect the unit for damage) with pin 6 (+) and 14 (-). Also put a voltmeter across pin 6 and 14. Turn up the external voltage till the desired UVP level. Now turn up or down the UVP potentiometer till the ledlamp switches at this point.

### 4) Overvoltage protector (OVP)

The OVP is factory adjusted at 17 V (= 34 V in series mode).

To change the adjustment disconnect the unit from input and load and connect an external variable voltage source in series with a resistor of 100 Ohms (to protect the unit for damage) to pin 6 (+) and pin 14 (-). Also put a voltmeter across pin 6 and 14.

Turn up the external voltage till the desired OVP level. Now slowly turn down the OVP potentiometer till the OVP shorts the output (ledlamp out).

R = Ohm

1 =	120		PR37
2 =	15	k	MR30
3 =	100		
4 =	6,8	k	PR37
5 =	10	k	
6 =	33	k	
7 =	CR		
8 =	220	k	
9 =	470		
10 =	2,7	k	
11 =	470		
12 =	10	k	
13 =	1	M	
14 =	15	k	
15 =	CR		
16 =	4,7	k	
17 =	1	k	
18 =	18		
19 =	100		
20 =	47		
21 =	47		
22 =	10		
23 =	5,6		
24 =	15	k	
25 =	1	k	
26 =	27		PR37
27 =	27		PR37
28 =	100		PR37
29 =	100		PR37
30 =	1	k	
31 =	100		
32 =	1	k	
33 =	330		
34 =	680		
35 =	3,3	k	
36 =	1	k	
37 =	10	k	
38 =	10	k	trim
39 =	1,5	k	
40 =	220		
41 =	1	k	
42 =	470		
43 =	1	k	trim
44 =	680		
45 =	1	k	
46 =	1	k	
47 =	47		
48 =	470		
49 =	1	k	
50 =	680		
51 =	1	k	trim
52 =	3,3	k	
53 =	6,8	k	PR37
54 =	10	k	
55 =	10	k	

D

1 =	BYW 72	AEG/Tel
2 =	ZPD 12	TI
3 =	1N4148	TI
4 =	1N4148	TI
5 =	1N4148	TI
6 =	BYW 32	AEG
7 =	BYW 72	AEG/Tel
8 =	BYW 72	AEG/Tel
9 =	BYW 72	AEG/Tel
10 =	ZX 160	ITT
11 =	BYW 77/200	Sescosem
12 =	BYW 77/200	Sescosem
13 =	BYW 77/200	Sescosem
14 =	BYW 77/200	Sescosem
15 =	1N4148	TI
16 =	ZPD 5,1	TI
17 =	TL 431	TI
18 =	TIL 209B	TI
19 =	1N825	TI
20 =	1N4148	TI
21 =	BTW 38 600R	Philips
22 =	ZPD 8,2	TI

## Q

1 =	2N3020	Motorola
2 =	2N2907	Thomson
3 =	2N2907	Thomson
4 =	2N2222	Thomson
5 =	2N2222	Thomson
6 =	BS 250	ITT
7 =	BS 170	ITT
8 =	IRF 230	IR
9 =	IRF 230	IR
10 =	2N4037	RCA
11 =	2N2907	Thomson
12 =	2N2907	Thomson
13 =	2N2222	Thomson
14 =	2N2222	Thomson
15 =	BS 170	ITT


R) CR = calibration resistor

MR25 = metal film 0,4W 1%

MR30 = metal film 0,5W 1%

PR37 = metal film 1,6W 5%

all non specified resistors are  
of type MR25

			Title: Part list	
			BK 15 - 15	
R55 (P275a)	11.82	✓	Date: 9-'81	
Modifications	Date	App.	delta elektronika bv	



58/200.2

- C
- 1 = 3,3  $\mu$ F 100 V
- 2 = 0,1  $\mu$ F 250 V~
- 3 = 0,1  $\mu$ F 250 V~
- 4 = 330  $\mu$ F 100 V
- 5 = 150 pF 630 V
- 6 = 0,22  $\mu$ F 63 V
- 7 = 1 nF 630 V
- 8 = 47 nF 250 V
- 9 = 10 nF 250 V
- 10 = 0,22  $\mu$ F 63 V
- 11 = 1 nF 630 V
- 12 = 0,22  $\mu$ F 63 V
- 13 = 15  $\mu$ F 16 V
- 14 = 3,3  $\mu$ F 100 V
- 15 = 3,9 nF 1000 V
- 16 = 470 pF
- 17 = 470 pF
- 18 = 330  $\mu$ F 25 V
- 19 = 330  $\mu$ F 25 V
- 20 = 330  $\mu$ F 25 V
- 21 = 330  $\mu$ F 25 V
- 22 = 0,1  $\mu$ F 250 V~
- 23 = 10 nF 250 V
- 24 = 0,22  $\mu$ F 100 V
- 25 = 0,1  $\mu$ F 250 V~
- 26 = 0,22  $\mu$ F 100 V
- 27 = 0,22  $\mu$ F 100 V
- 28 = 0,22  $\mu$ F 63 V
- 29 = 0,47  $\mu$ F 40 V
- 30 = 2,2 nF 63 V
- 31 = 1  $\mu$ F 40 V
- 32 = 0,22  $\mu$ F 63 V
- 33 = 10 nF 250 V
- 34 = 0,22  $\mu$ F 63 V


- L1 = L 171 Delta
- L2 = L 172 Delta
- L3 = L 173 Delta
- L4 = L 174 Delta

- T1 = T 175 Delta
- T2 = T 176 Delta

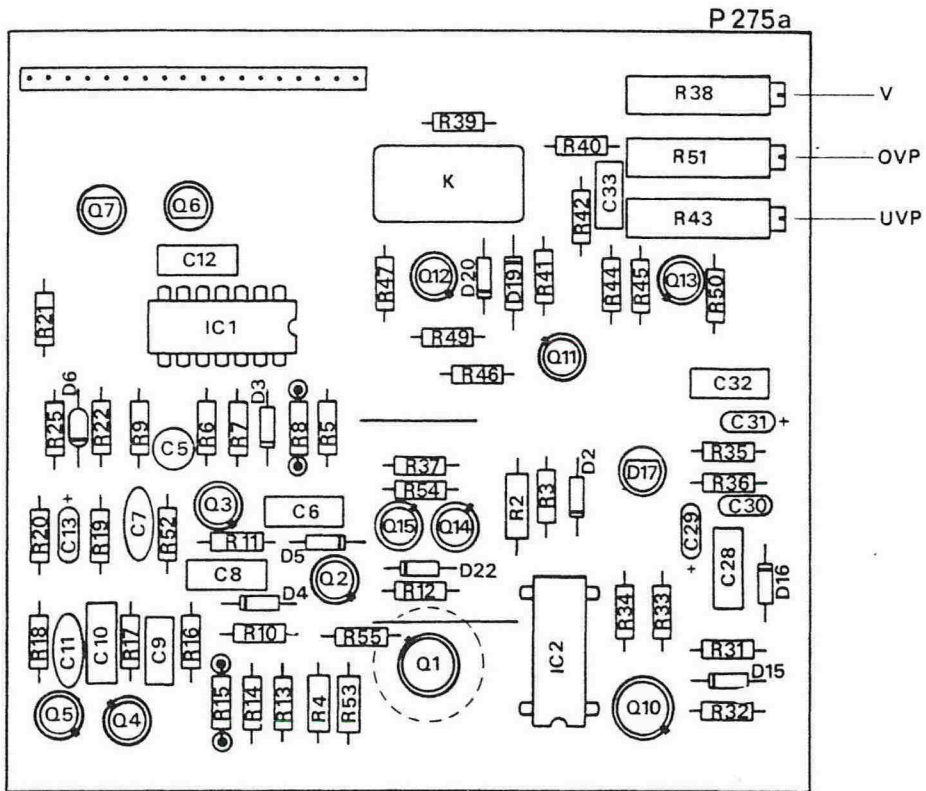
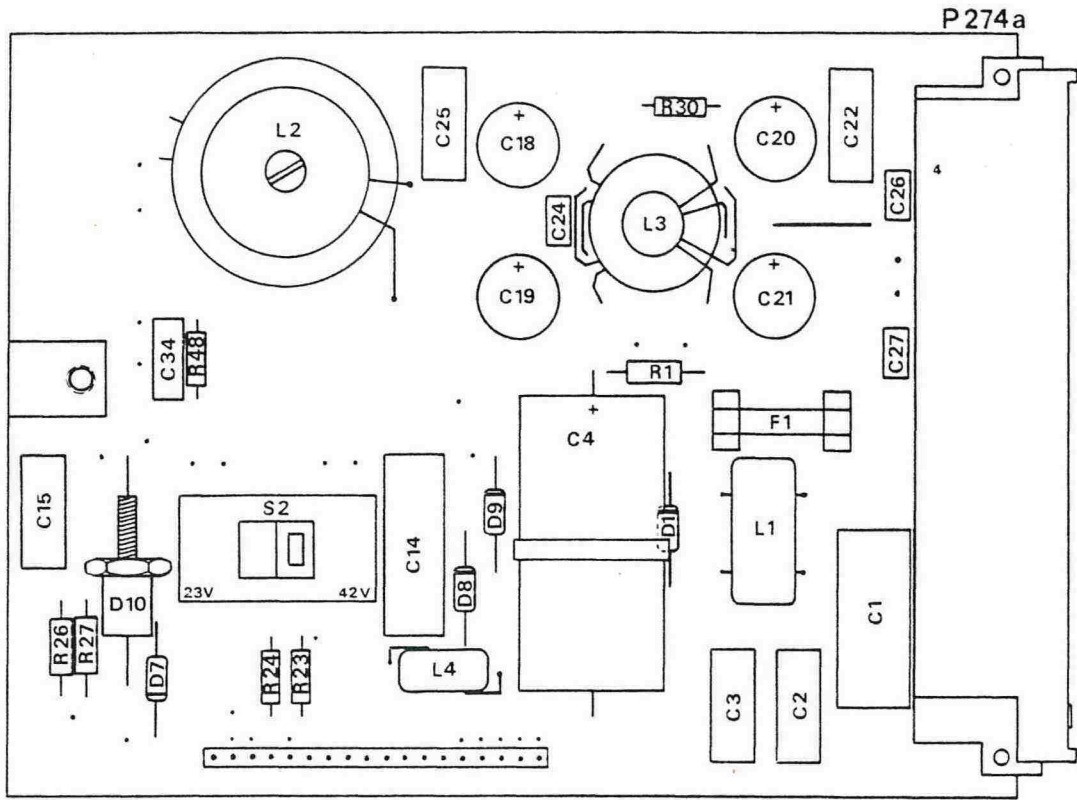
- IC1 = 4069 UB Philips
- IC2 = CNY 21 AEG

F1 = 6,3A 5x20 mm

K = relay RS 5 National

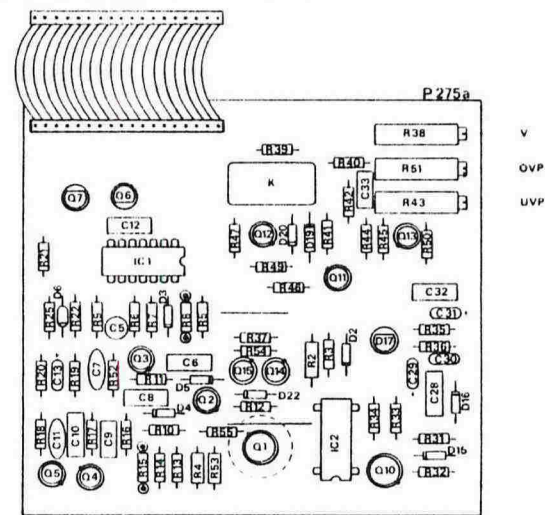
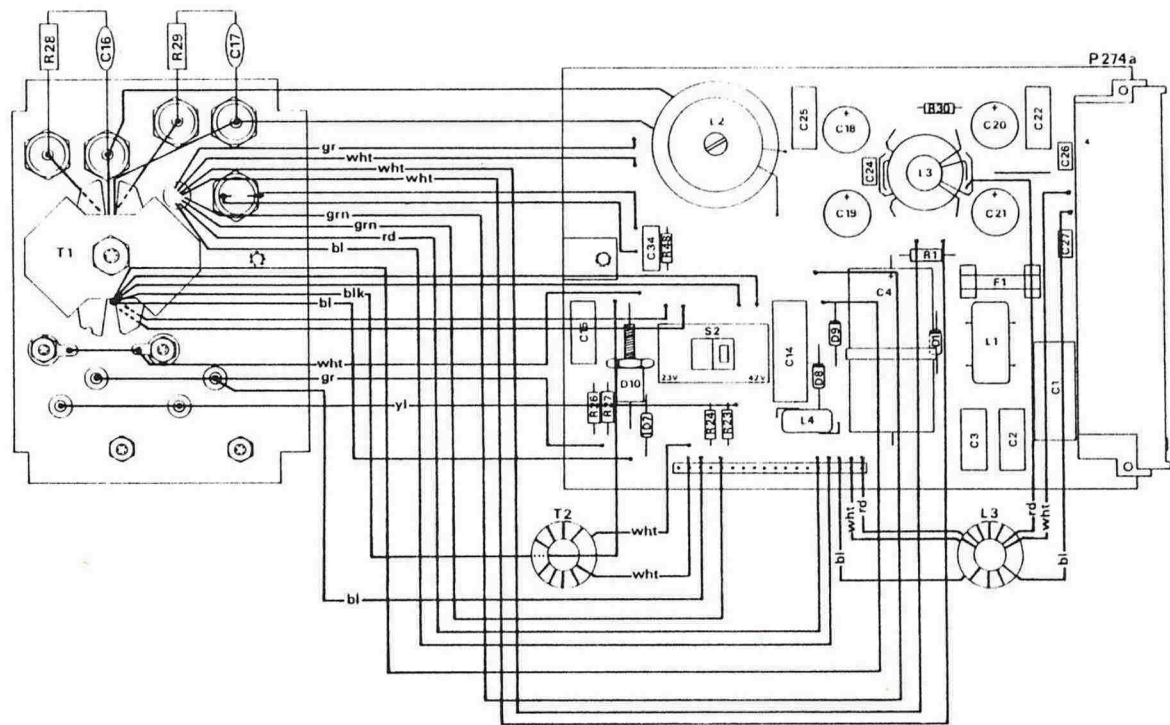
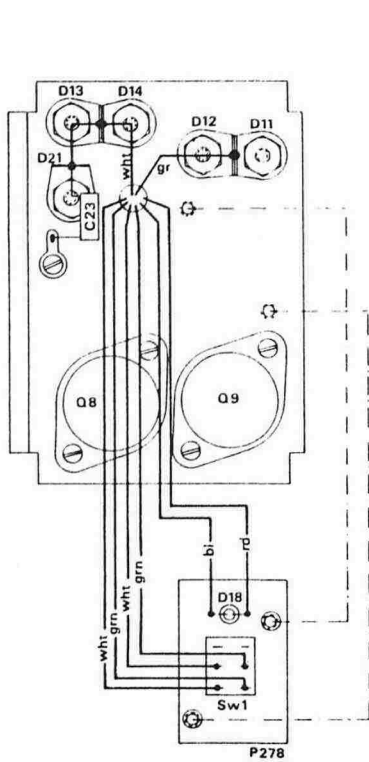
			Title: Part list	
			BK 15 - 15	
			Date: 9-'81	
Modifications	Date	App.	delta elektronika bv	

581200.2



			Title: PC boards BK 15 - 15
P274a, P275a (R55)	11-82	V.	Date: 9-'81
Modifications	Date	App.	delta elektronika bv

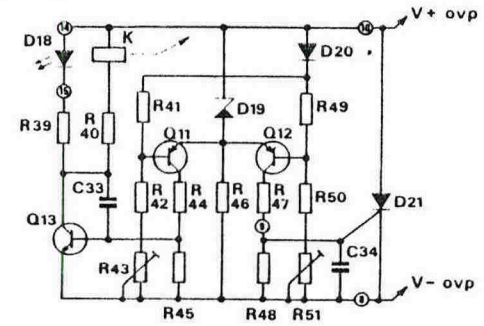
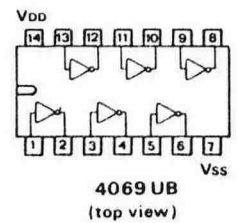
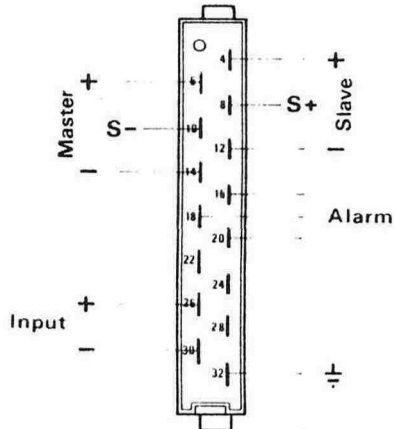
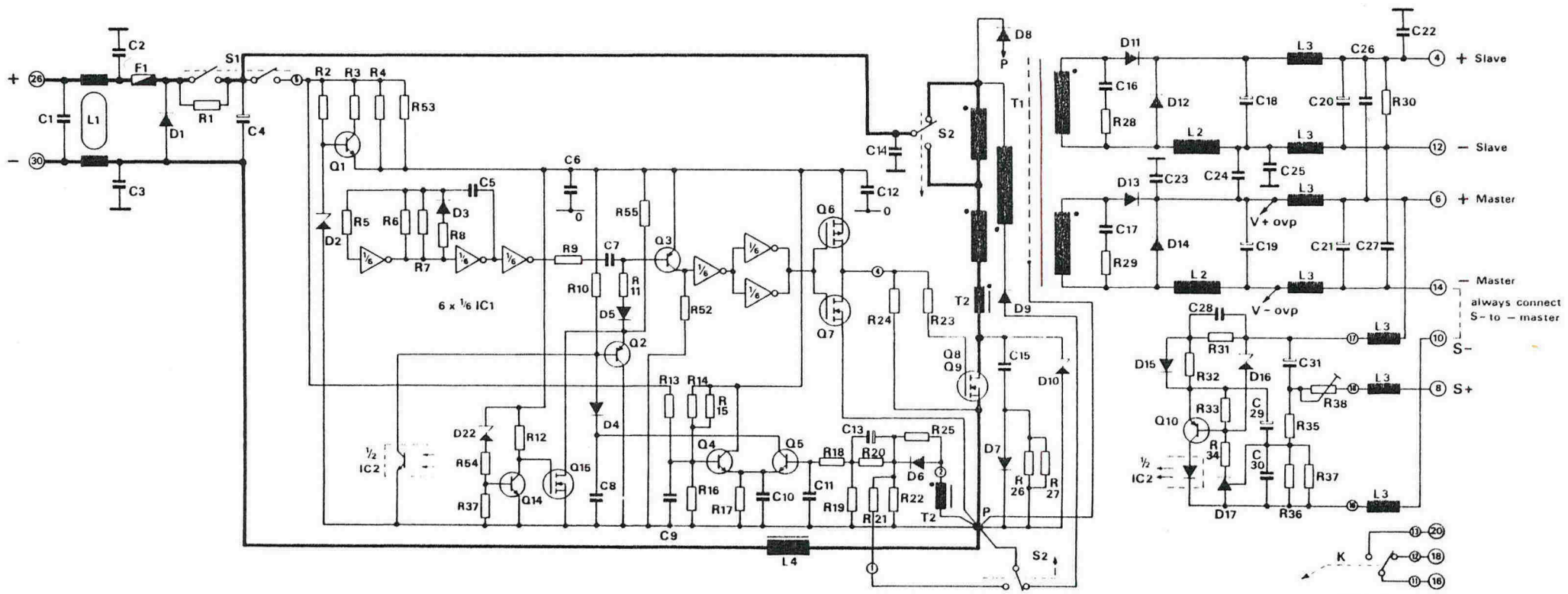




V  
OVP  
UVP

			Title: Wiring diagram BK 15 - 15	<b>δ</b>
P274a, P275a (R55)	11.82	U	Date: 9-'81	
Modifications	Date	App	delta elektronika bv	

2.002185



			Title: Circuit diagram
			BK 15 - 15
R55 (P275a)	11-'82	Vr	Date: 9-'81
Modifications	Date	App	delta elektronika bv

2002185