

# TYPE TEST REPORT

Test document No.: 482.407.6.313

Client: SIMKO Tic. ve San. A.S.  
Enerji İletim ve Dağıtım Tesisleri  
Yakacik Yolu No.111  
TR-81430 Istanbul

Manufacturer: SIMKO Tic. ve San. A.S.

Equipment under test: Low-voltage switchgear assembly  
Capacitor unit

Type: C unit 8 PU.152

Manufacturing No.: 36045870

Rated characteristics:	Rated operational voltage	400	V
	Rated insulation voltage	1000	V
	Rated impulse withstand voltage	-	kV
	Rated operational current	577	A
	Rated power	400	kVAr
	Rated peak withstand current	50	kA
	Rated short-time withstand current (1 s)	24	kA
	Rated frequency	50	Hz
	Degree of protection	IP 40	

Normative document: IEC 439-1: 1992 + Corrigendum 1993  
DIN EN 60439 Teil 1 VDE 0660 Teil 500:1994-04

Test performed: Verification of temperature-rise limits

Date of test: 12 to 19 December 1996

Test result: The equipment under test has passed the test.



Berlin, 9 April 1997

*Hänisch*  
Prof. Dr.-Ing. H. Hänisch  
Managing director

*Fiebig*  
Dr.-Ing. R. Fiebig  
Test engineer in charge

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SIMKO Tic. ve San. A.S.

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Sheet 3

**1. Participants in the test**

Dr. Fiebig

IPH test engineer in charge

**2. Test performed**

Verification of temperature-rise limits

**3. Identity of the equipment under test (EUT)**

**3.1 Technical data and characteristics**

EUT: Low-voltage switchgear assembly, capacitor unit  
 Type: C unit 8 PU.152  
 Manufacturer: SIMKO - Siemens AG  
 Serial No.: 36045870  
 Year of manufacture: 1996

**Rated characteristics:**

Rated operational voltage		400 V
Rated insulation voltage		1000 V
Rated impulse withstand voltage		- kV
Rated operational current		577 A
Rated power		400 kVAr
Rated peak withstand current	distribution bars	50 kA
	PE and PN conductors	120kA
Rated short-time withstand current	distribution bars	24 kA
	PE and PN conductors	55 kA
Rated duration of short-circuit		1 s
Rated frequency		50 Hz
IP degree of protection		IP 40
Maximum ambient air temperature		35 °C

**Characteristics:**

Main dimensions		W/H/D	600 mm x 2200 mm x 600 mm
Switch cabinet	Manufacturer	SIMKO	Metal sheet, varnished
Internal enclosures			None
Air ventilation lattice on front side	side	below	Ventilation slots 385 cm <sup>2</sup>
		above	Roof opening 423 cm <sup>2</sup>
Type of mounting			In series, wall distance at least 10 cm
Kind of connection			Cable

Equipment:	pc	Type	Manufacturer	Rated values
Fuse	24	3NH30	SIMKO	160 A
Fuse link	24	3NA38	SIMKO	125 A
Capacitor	16	4RB525	SIEMENS	25 kVAr
Contactore	8	3TF48	SIMKO	
Discharge reactor	8	4AJ99	SIMKO	Up to 50kVAr
Controller	1	4RY83	SIEMENS	Up to 5 outputs
Distribution bar for both sides			-	20 mm x 10 mm each
N bar		E-Cu	-	40 mm x 10 mm
PE bar		E-Cu	-	40 mm x 10 mm

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**3.2 Identity documents**

The identity of the EUT is fixed by the following drawings and data submitted by the client:

Name of Drawing	Drawing No.	Date of drawing	Author	Note
Test panel 400 kVAr Capacitor Group	(4)G77552- S202	18.11.96	SIMKO	Sheet 15
Test Anlage C Feld Frontansicht	(3)G77552-IPH- A 2	27.11.96	SIMKO	Sheet 16
Test Anlage C Feld Frontansicht	(3)G77552-IPH- A 4	27.11.96	SIMKO	Sheet 17

EUT entry at IPH: 10 December 1996

**4. Verification of temperature-rise limits****4.1 Test laboratory**

Low-voltage high-power test laboratory, test room 3

**4.2 Normative document**

IEC 439-1: 1992 + Corrigendum 1993  
DIN EN 60439 Teil 1 VDE 0660 Teil 500: 1994-04

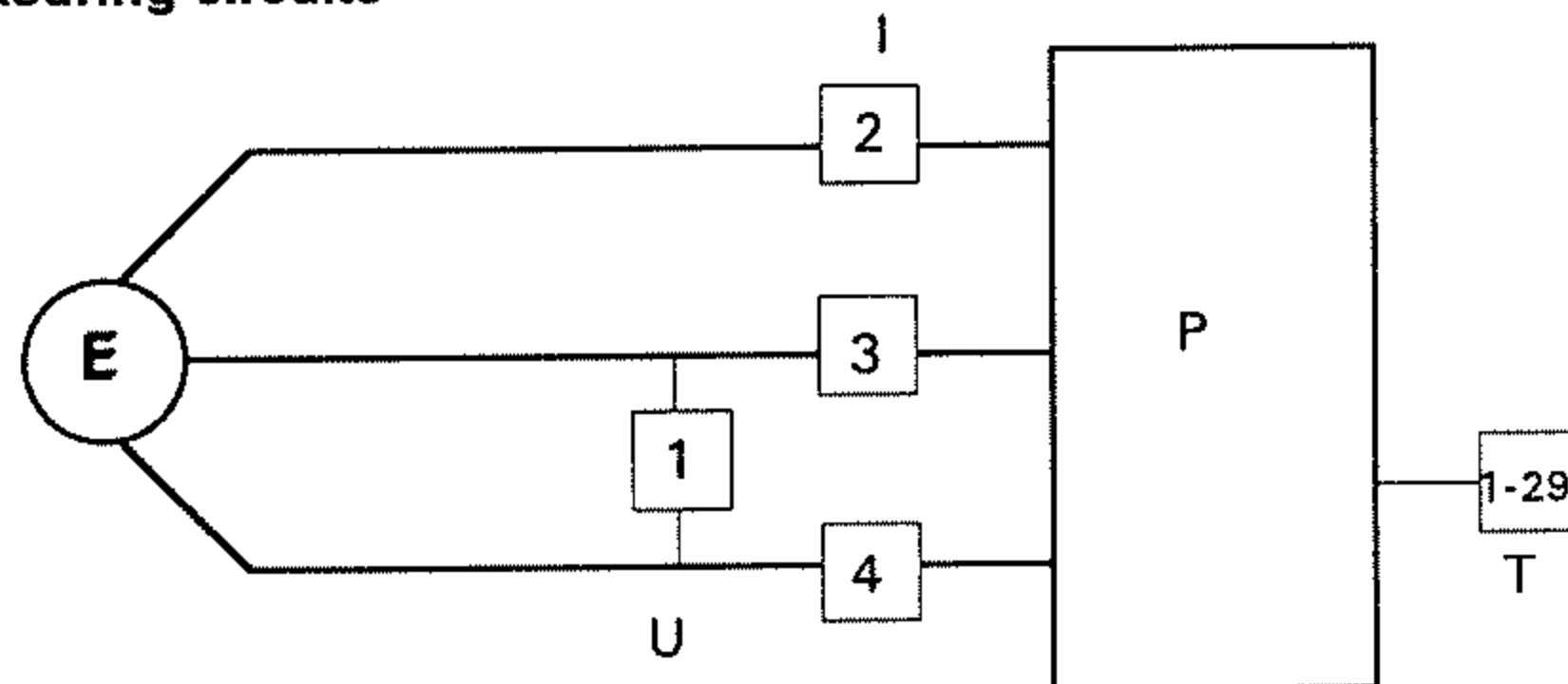
**4.3 Required test parameters,**

Test voltage	400 V , three-phase
Test frequency	50 Hz

**4.4 Test arrangement**

The low-voltage switchgear assembly was tested for series installation and for dead front installation at 10 cm distance to the rear wall. For this purpose, the capacitor unit was thermally insulated on both sides by a 50 mm styropor plate for simulating an adjacent unit warmed up by service. The rear side was also thermally insulated at a distance of 10 cm. Power was supplied via two rubber-insulated copper cables of 3 m length per phase with a cross-section of 240 mm<sup>2</sup> each.

4.5 Test and measuring circuits



E - Supply  
 U - Voltage measurement  
 T - Temperature measurement  
 I - Current measurement  
 P - EUT

Figure 1: Test circuit for the verification of temperature-rise limits

Measuring point	Measuring quantity	Measuring sensor / device	Technical parameters
1	Voltage	Analogue voltmeter	600 V
2 - 4	Current	Current transformer with analogue ammeter	Ratio 1000/5 A cl. 0.5 3 A
1 - 29	Temperature	Therm 5500-3 Fe/constantan thermocouples	Measuring inaccuracy $\pm 1\%$ $\pm 0.3\text{ K}$

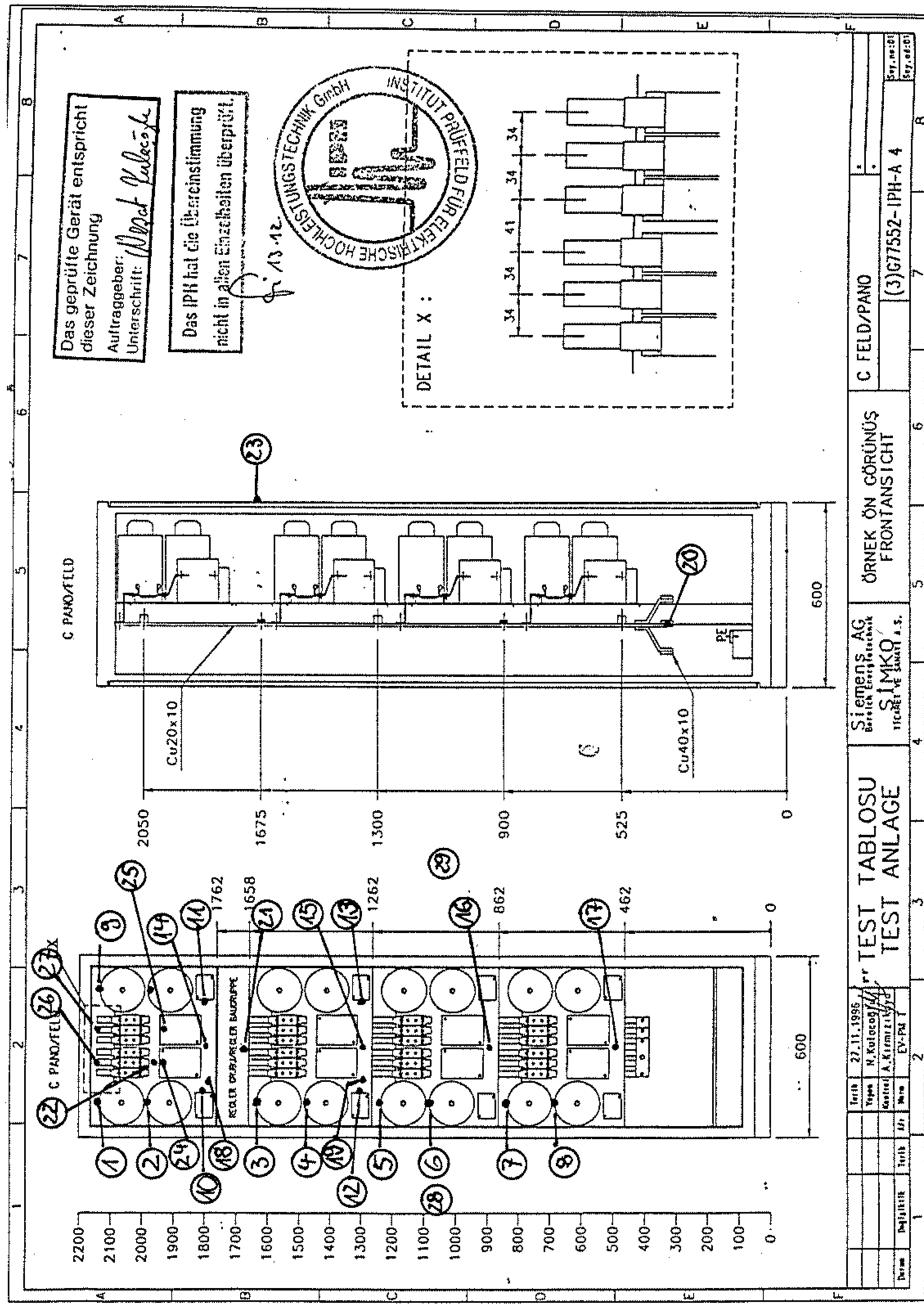


Figure 2: Temperature measuring points



**4.6 Test results**

EUT: Low-voltage switchgear assembly, capacitor unit 400 kVar

Test voltage: 420 V      Test frequency: f = 50 Hz  
 Test current: L1 510 A  
                   L2 516 A  
                   L3 516 A

Final temperatures:      Ambient air temperature 22.5 °C

Meas. point/ conductor	Designation of the part	Classification:  operating equipment/ terminal/ bar/ exposed surface	Material	Permissible temperature- rise limit acc. to standard or as stated by the manufacturer K	Measured final temperature at $\Delta T \leq 1 \text{ K/h}$ °C	Final temperature- rise (related to average ambient temperature) K	Temperature reserve K
1	Capacitor 1	Enclosure above	Metal	35 <sup>2)</sup>	52.4	29.9	5.1
2	Capacitor 3	Enclosure above	Metal	35	53.9	31.4	3.6
3	Capacitor 5	Enclosure above	Metal	35	51.1	28.6	6.4
4	Capacitor 7	Enclosure above	Metal	35	50.1	27.6	7.4
5	Capacitor 9	Enclosure above	Metal	35	46.7	24.2	10.8
6	Capacitor 11	Enclosure above	Metal	35	44.4	21.9	13.1
7	Capacitor 13	Enclosure above	Metal	35	39.3	16.8	18.2
8	Capacitor 15	Enclosure above	Metal	35	37.4	14.9	20.1
9	Capacitor 2	Enclosure above	Metal	35	53.0	30.5	4.5
10	Reactor 1	Enclosure inner side	Insulating material	35 <sup>2)</sup>	49.3	26.8	8.2
11	Reactor 2	Enclosure inner side	Insulating material	35	48.7	26.2	8.8
12	Reactor 3	Enclosure inner side	Insulating material	35	45.1	22.6	12.4
13	Reactor 4	Enclosure inner side	Insulating material	35	44.4	21.9	13.1
14	Contactors 1/2	Ambient air below	-	35 <sup>2)</sup>	47.6	25.1	9.9
15	Contactors 3/4	Ambient air below	-	35	-	-	-
16	Contactors 5/6	Ambient air below	-	35	37.0	14.5	20.5
17	Contactors 7/8	Ambient air below	-	35	26.3	3.8	31.2
18	Reactor 1	Ambient air right	-	-	47.8	25.3	-
19	Reactor 3	Ambient air right	-	-	40.6	18.1	-
20	L2 Cable connection	Connection	Cu bar	70	<70 <sup>1)</sup>	<47.5	>22.5
21	Controller	Ambient air	-	-	42.2	19.7	-
22	Fuses 1	Ambient air below	-	57 <sup>2)</sup>	51.4	28.9	28.1
23	Front door above at change-over switch	Exposed surface	Metal	30	34.2	11.7	18.3
24	L2 Contactor 1 upper connection bar	Bar	Cu bar	-	84 <sup>1)</sup>	-	-
25	L2 Contactor 2 upper connection bar	Bar	Cu bar	-	<70 <sup>1)</sup>	-	-
26	L2 Fuse 1 upper connection bar	Connection	Cu bar	-	<70 <sup>1)</sup>	-	-
27	L2 Fuse 2 upper connection bar	Connection	Cu bar	-	<70 <sup>1)</sup>	-	-
28	Ambient air	Outside right	-	-	22.3	-	-
29	Ambient air	Outside left	-	-	22.6	-	-

1) indication by thermal-change colours

2) defined by manufacturer



**4.7 Evaluation of test**

The EUT reached die final temperatures according to Sheet 9. The permissible temperature-rise values as layed down in IEC 439-1: 1992 + Corrigendum 1993 and EN 60439-1: 1994, DIN EN 60439 Teil 1 VDE 0660 Teil 500: 1994-04 and defined by the manufacturer for the built-in apparatus were observed.

The test has been  **p a s s e d .**



# 10. Appendices





Figure 3: View of the capacitor unit



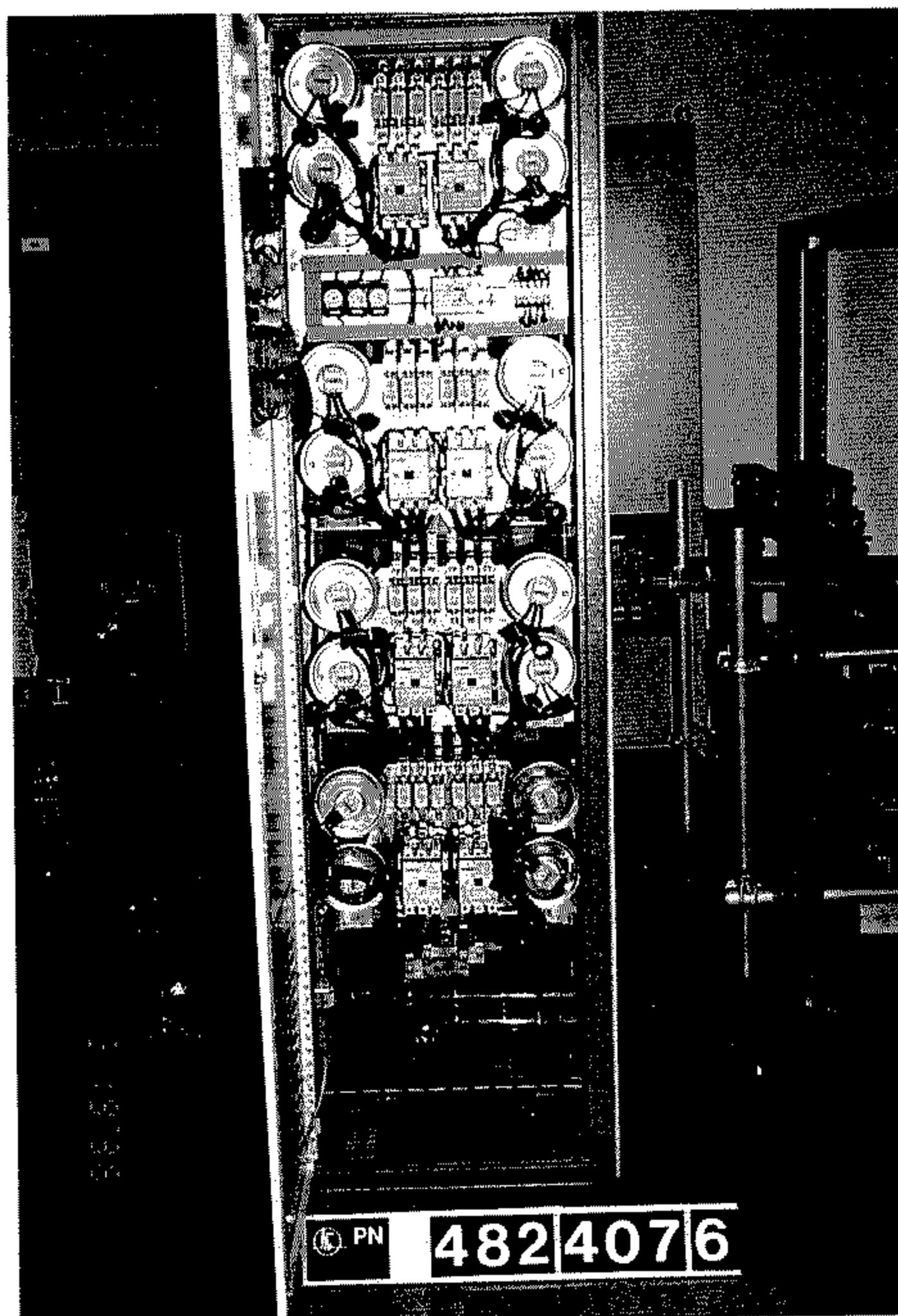


Figure 4: Capacitor unit opened - front view



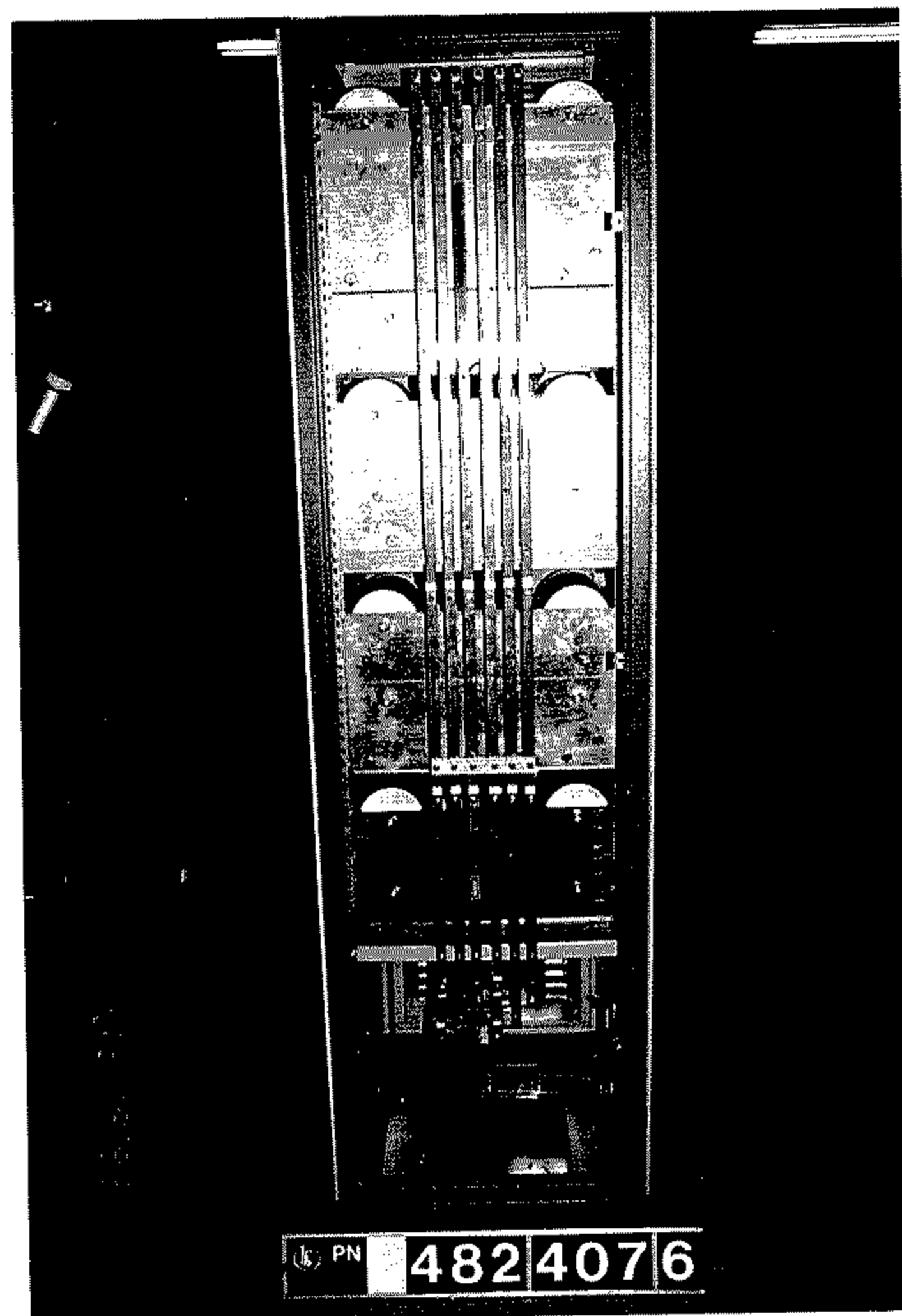
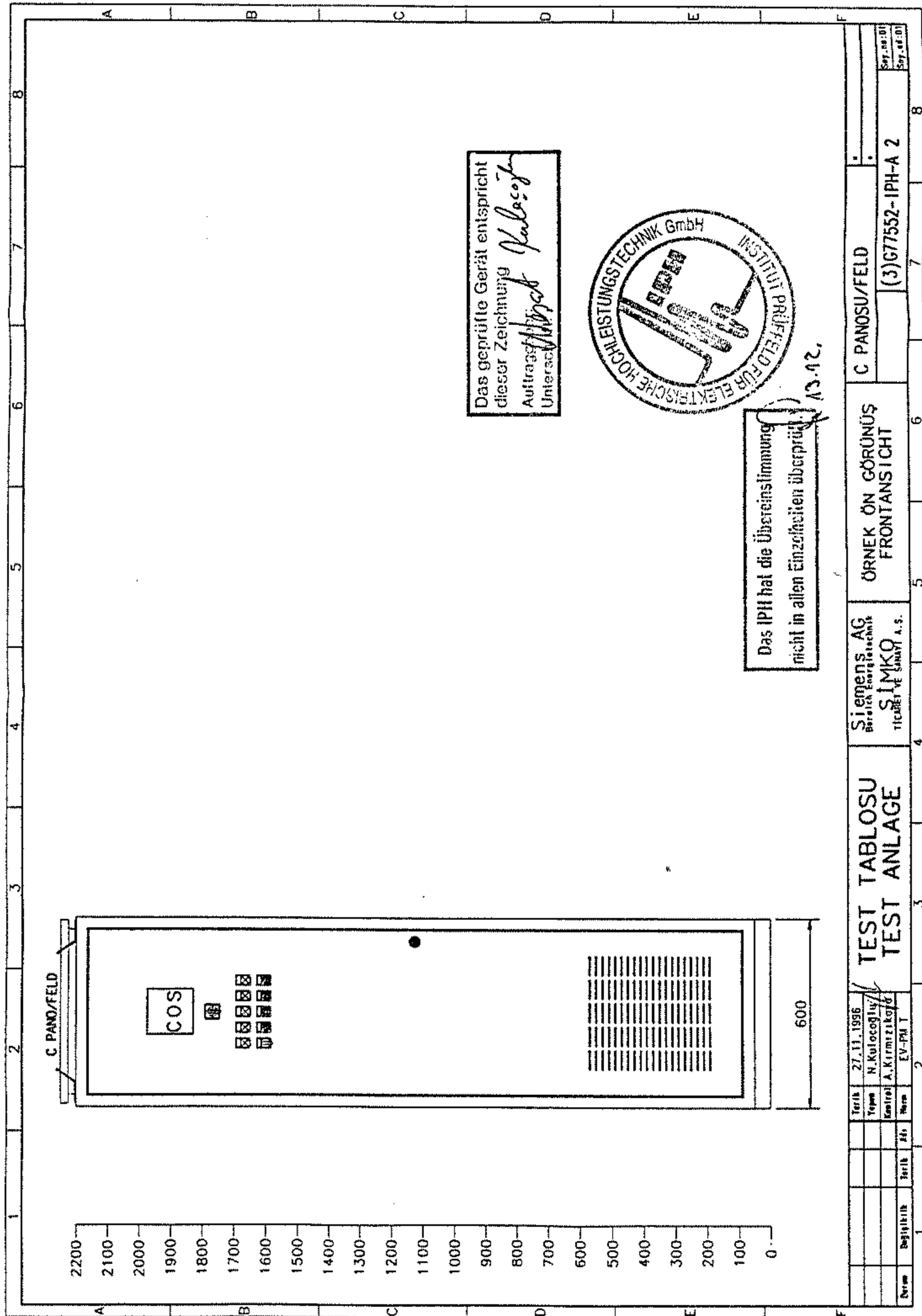


Figure 5: Capacitor unit opened - rear view









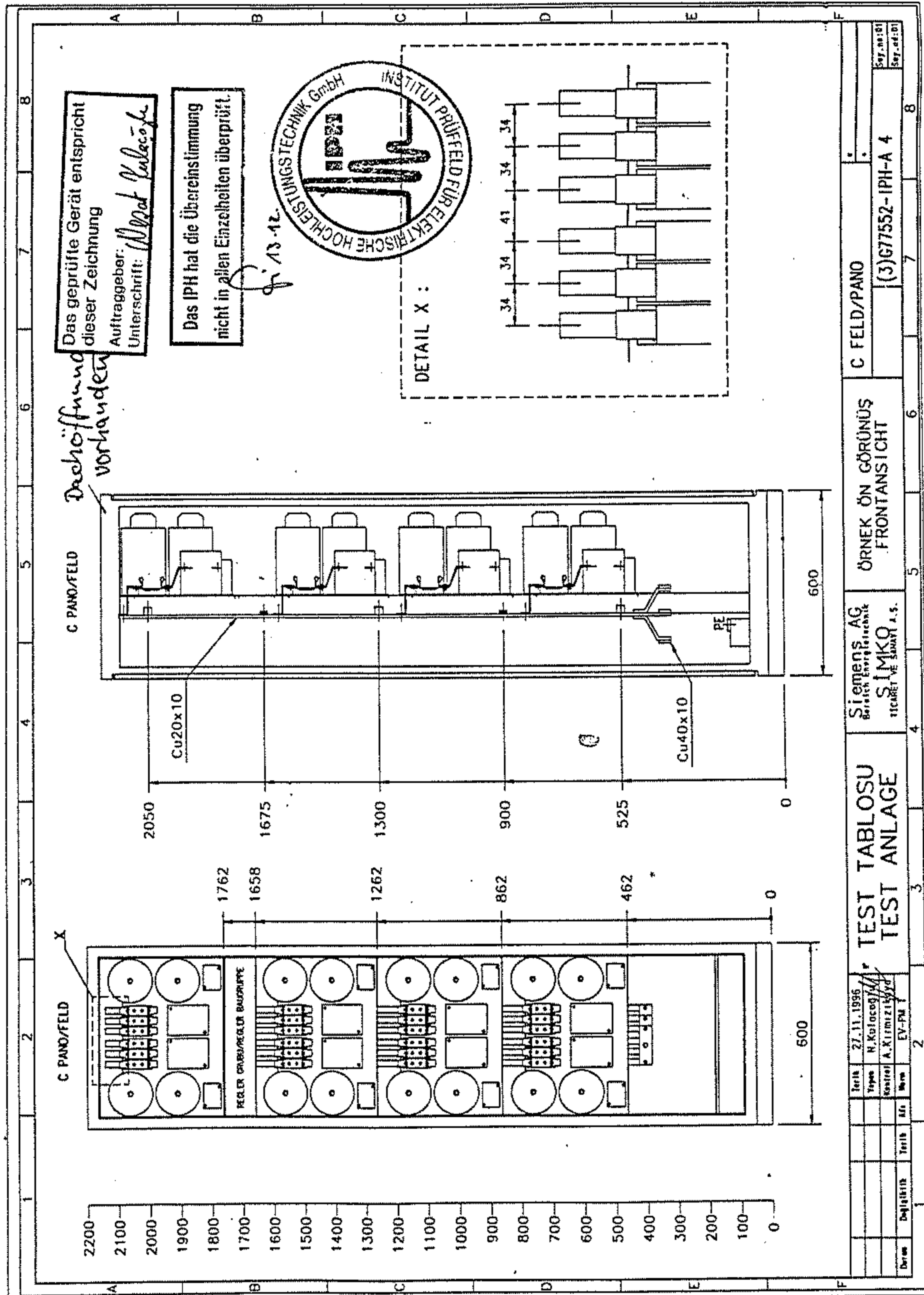
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Yapın	N. Kulocoglu	TEST ANLAGE		Bereich Elektrotechnik		ÖRNEK ÖN GÖRÜNÜŞ	
Kontrol	A. Kirmizikoglu			SİMKO		FRONTANSICHT	
Denetim	EV-PM T			TICARET VE SANAYİ A.Ş.		(3)G77552-IPH-A 2	
Denetim						Sayı: 011	
						Sayı: 011	





Siemens AG Bereich Energietechnik		C FELD/PANO	
SİMKO TICARET VE SANAYİ A.Ş.		ÖRNEK ÖN GÖRÜNÜŞ FRONTANSICHT	
TEST TABLOSU TEST ANLAGE		(3)G77552-IPH-A 4	
Terik: 27.11.1996		Ser.no:181	
Tipe: N. Kılıçoglu		Ser.no:201	
Savunul: A. Kirmizilıyız			
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