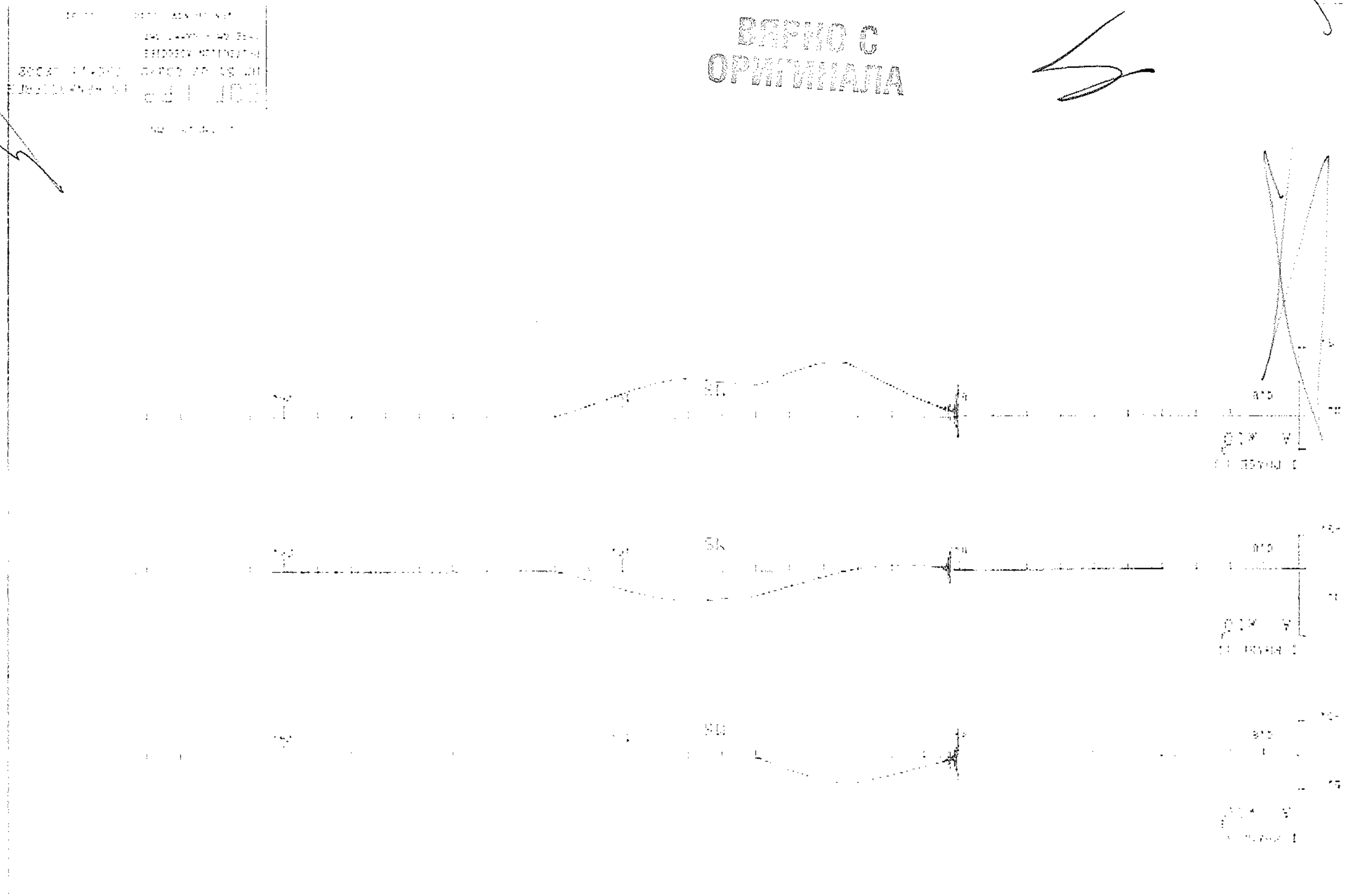
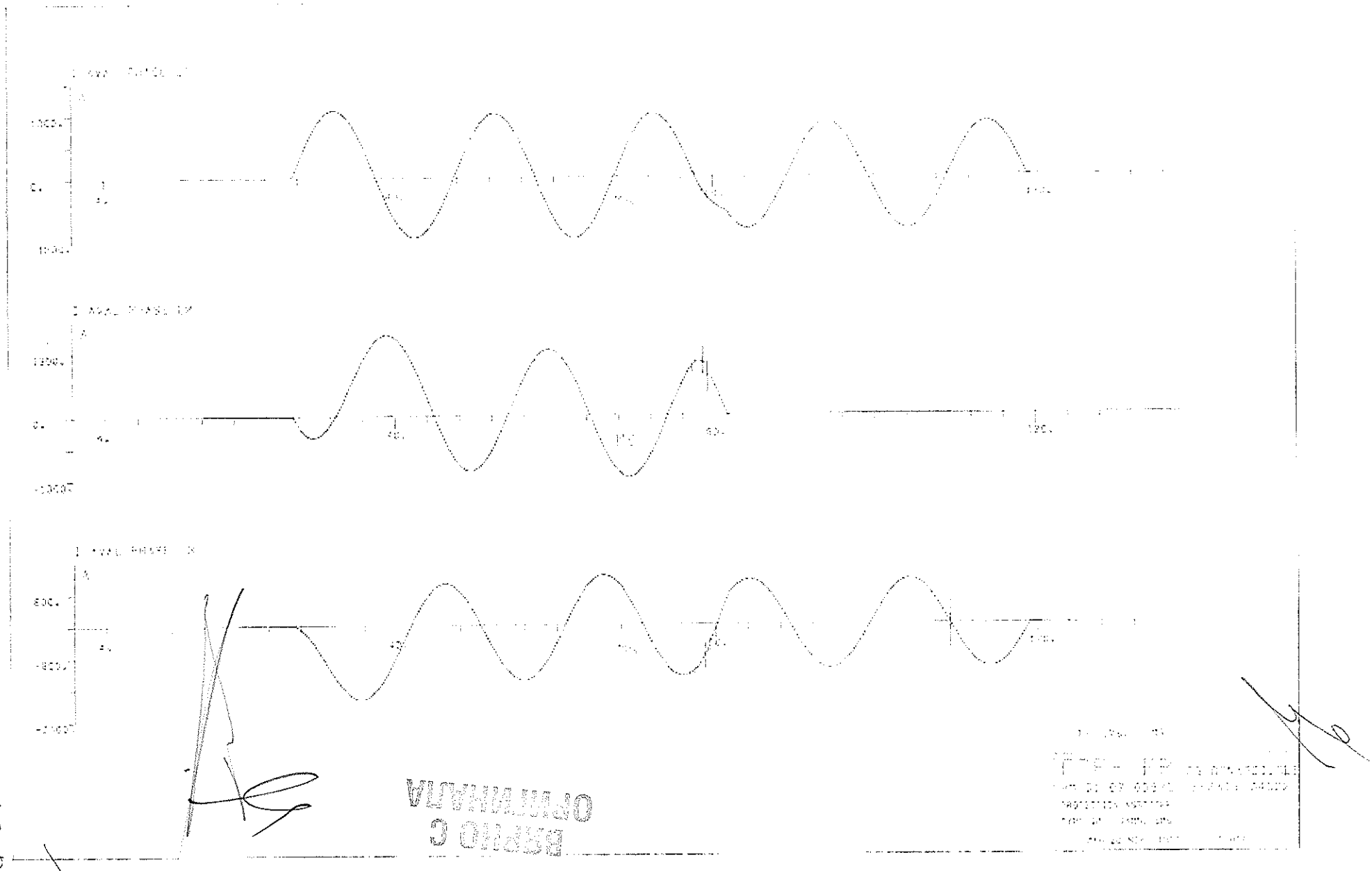
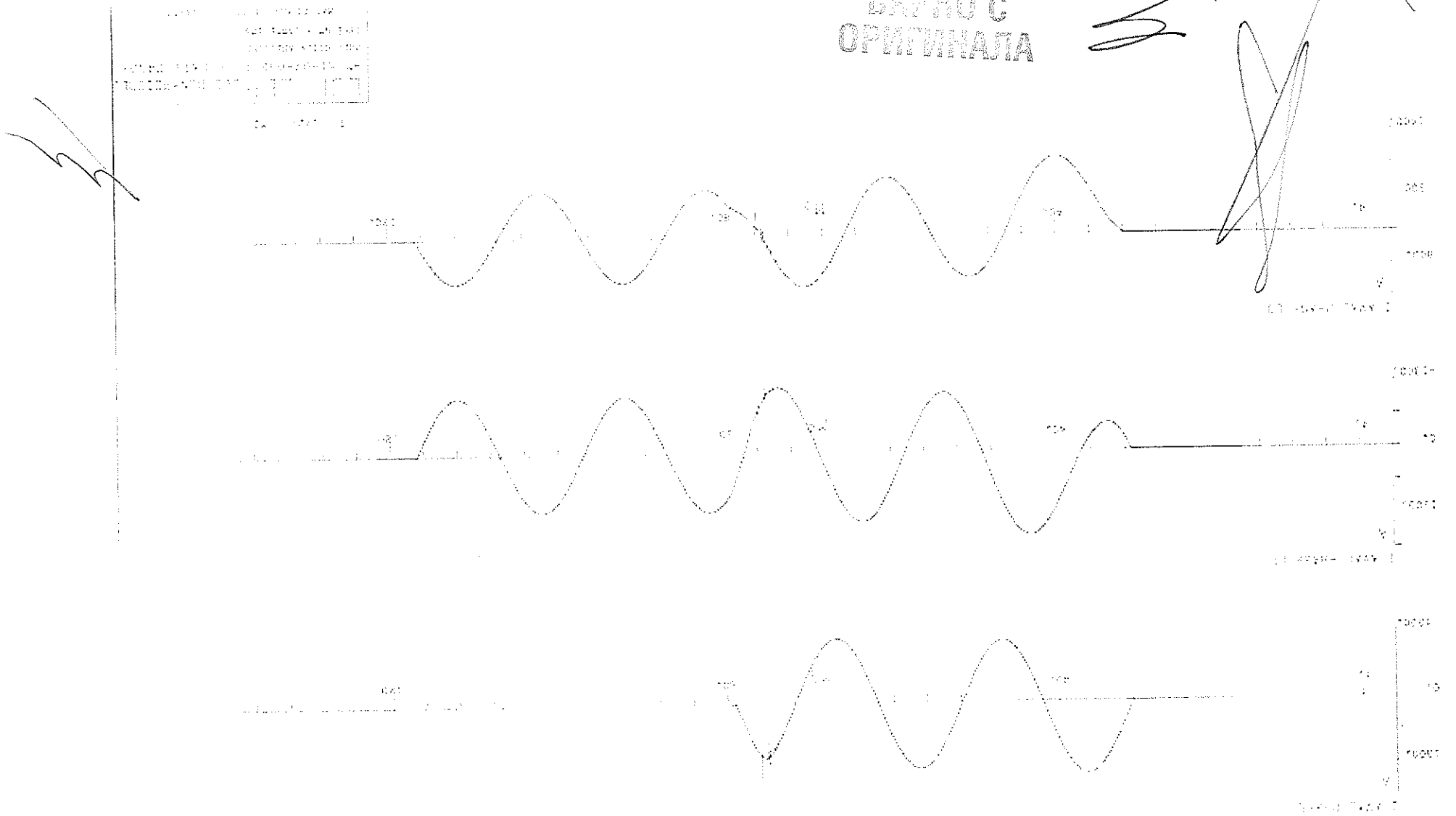
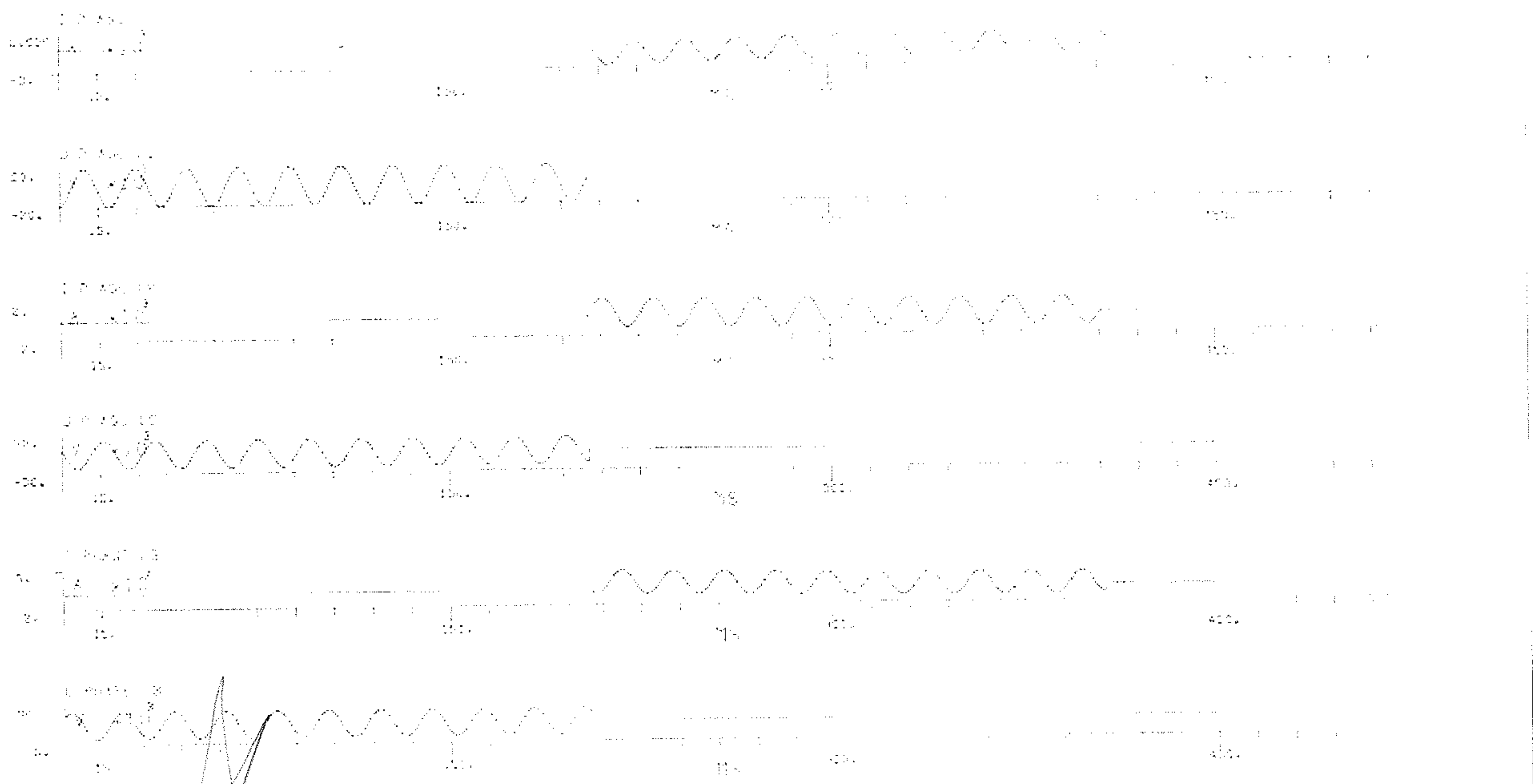


1386

1387



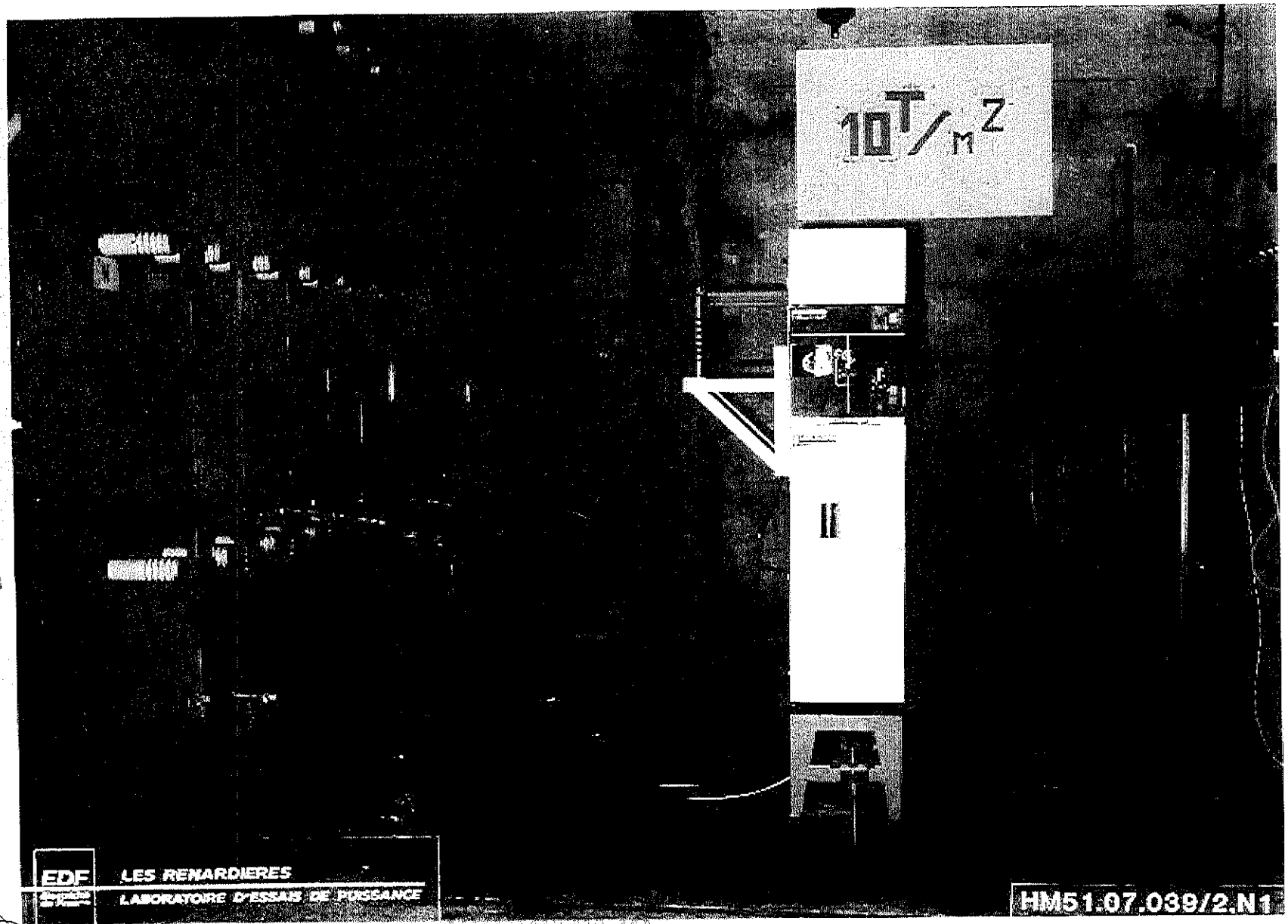


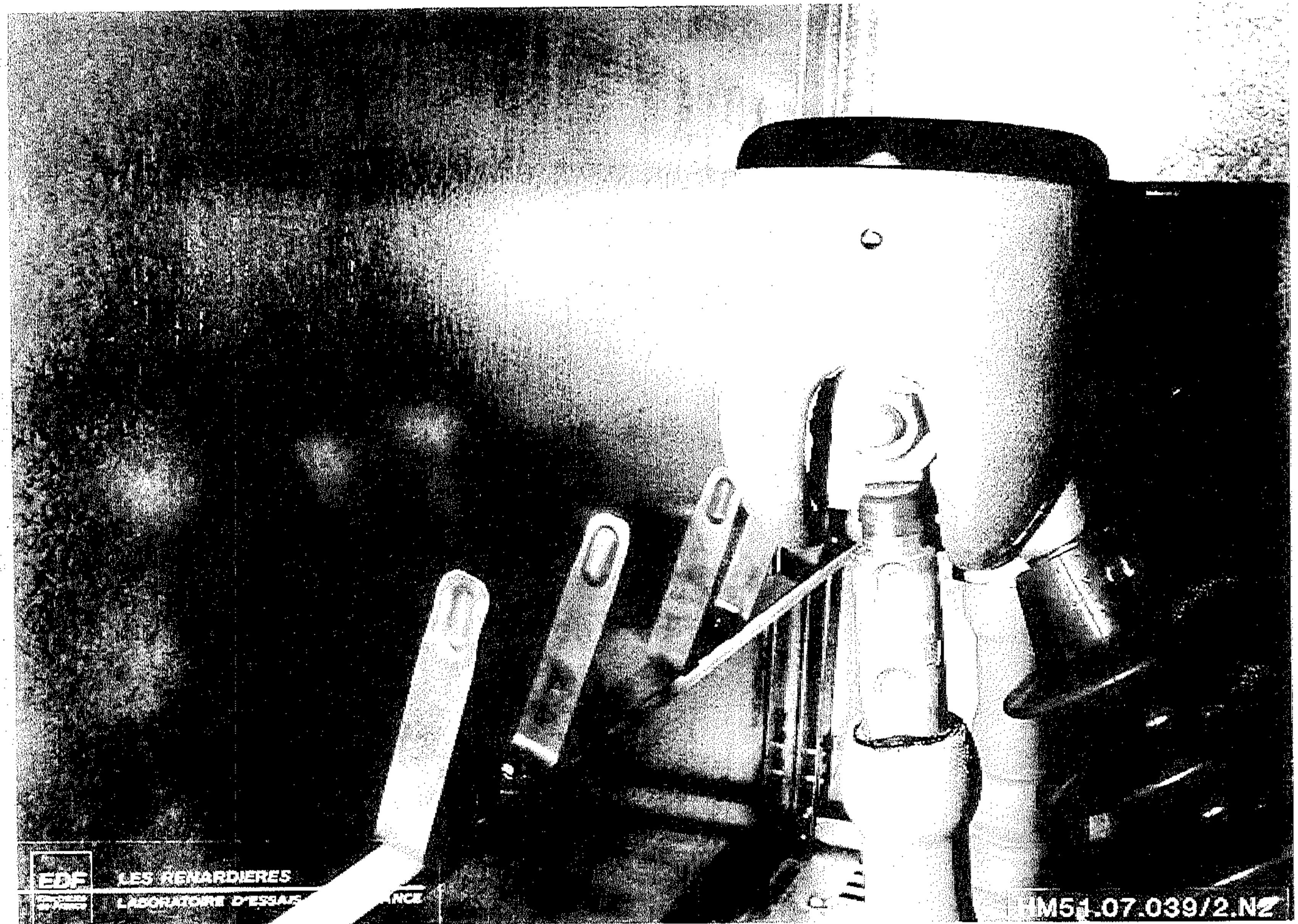


ВЕРНО С ОРИГИНАЛА

1390

1391


10 T/m²
EDF
LES RENARDIERES
LABORATOIRE D'ESSAIS DE PUISSANCE
HM51.07.039/2.N1


EDF
LES RENARDIERES
HM51.07.039/2.NZ

3

ALUMINUM
CHAIRS

1394

VOLTA
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station d'essais à grande puissance
F-38050 Grenoble cedex 9

51168340XB

AB3665b

ESEF
ensemble des stations d'essais Francaises
BP n 1
77250 Moret sur Loing

TEST REPORT No. AB 3665 b

Apparatus : *High-voltage switch*

Designation : *SM6 inside cubicle SM6 type QM*

Rated voltage 24 kV-Rated nomnal current 200 A-Rated frequency 50/60 Hz

Manufacturer : *MERLIN GERIN - Grenoble - FRANCE*

Object : *Single capacitor bank current switching tests rated at :*

135 A - 24 kV

Short-circuit making tests rated at :

31.5 kA peak - 24 kV

Tested for : *MERLIN GERIN*

Date(s) of tests : *13 - 14 - 15 - 18 / 04 / 1994*

These tests were carried out in accordance with : **Customer request based on NFC standard 64.130 (1992) § 6.101.12**

The performance of the apparatus tested and the results obtained are shown in the tables , oscillograms and photographs enclosed .

The responsability for conformity of any apparatus having the same designation with that tested rests with the Manufacturer.

The documents forming part of this report are :

The test report comprises 81 page(s)

Grenoble 22 / 02 / 1995

Technical Manager — Ph. MAUDUIT

Testing Station Manager — J.C. OKERMAN

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RATINGS OF THE METAL-ENCLOSED SWITCHGEAR ACCORDING TO IEC 298

Manufacturer	: MERLIN GERIN
Designation	: Cubicle SM6 type QM
Number of phases	: 3
Voltage	kV: 24
Power frequency withstand voltages (1 min)	
- to earth and between phases	kV: 50
- across the isolation distance	kV: 60
Lightning impulse withstand voltages	
- to earth and between phases	kV: 125
- across the isolation distance	kV: 145
Frequency	Hz: 50/60
Normal current	A : 200
Peak withstand current	kA: 31.5
Short-time withstand currents	
- main circuit	kA: 12.5
- earthing switch	kA: 12.5
- earth bar	kA: 12.5
Duration of short-circuit	s: 1
Arcing withstand due to an internal fault	kA: /
- duration	s: /
- type of accessibility	: /
Degree of protection	: IP2XC
Dimensions	: /
Weight	: /
Drawing(s) No.	: 3729262 A

The metal-enclosed switchgear, is equipped with : 1 switch SM6

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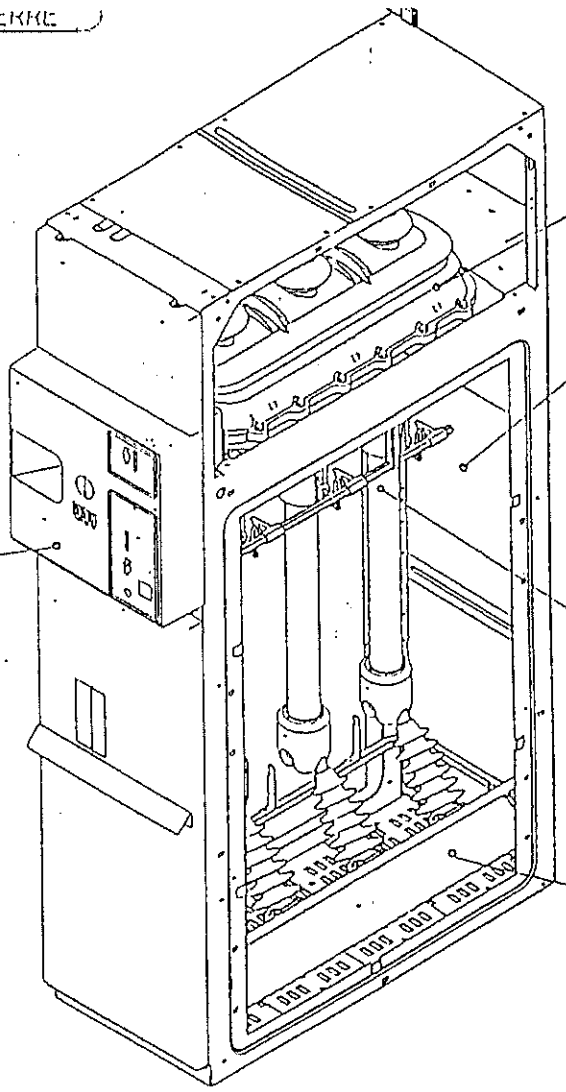
RATINGS OF THE HV SWITCH ACCORDING TO IEC 265

Manufacturer		: MERLIN GERIN
Designation		: SM6
Number of poles		: 3
Type of switch		: with increased operating frequency
Class		: indoor
Voltage		kV: 24
Power frequency withstand voltage (1 min)		kV: 50
Lighting impulse withstand voltage		kV: 125
Frequency		Hz: 50/60
Normal current		A : 200
Breaking capacities		
Mainly active load		A : 200
No-load transformer		A : /
Closed-loop		A : 200
Cable-charging		A : 25
Line-charging		A : /
Earth-fault		A : 75
Cable-charging under earth-fault conditions		A : 44
Making capacity		kA: 31.5
Peak withstand current	kA peak	: 31.5
Short-time withstand current	kA R.M.S.	: 12.5
- duration	s	: 1
Mechanical endurance	Operating cycles	: 1000
Interrupting medium		: gas SF6
Absolute pressure required at 20 °C	bar	: 1.4
Operating temperatures	minimum °C	: - 25
	maximum °C	: + 55
Degree of protection		: IP2XC
Drawing(s) No.		: /

1397

CIRCUIT TERRE



INTERRUPTEUR

INSTALLATION FUSIBLES
et RACCORDEMENT CABLES

COMMANDE

DECLENCHEMENT FUSION-FUSIBLE

SECTIONNEUR DE TERRE AVAL

Ind.	Date	Modification/Modification
A		Edition originale/First issue

SM6

CELLULE
INTERRUPTEUR
PROTECTION (QM)

MERLIN GERIN

3729262

Indice modif. → A

AB 3665 b page 4

VOLTA
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RECORD OF PROVING TESTS

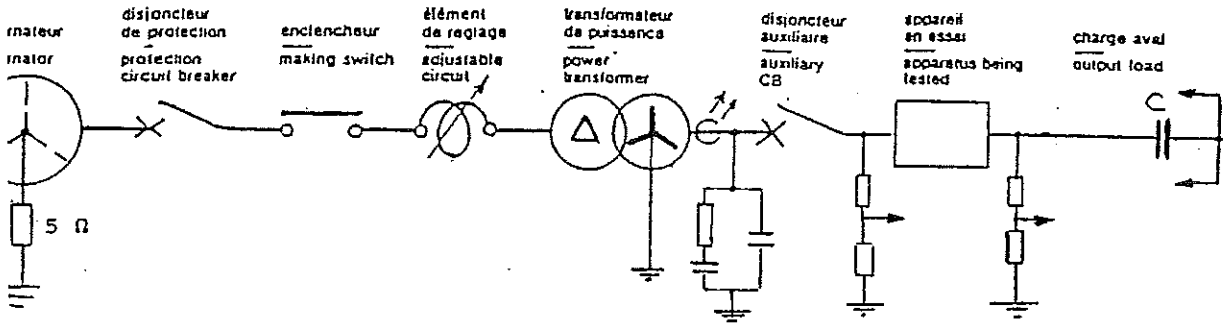
Apparatus No. :

Manufacturer Representative(s) : Mr MESTRALLET MERLIN GERIN/DMT

Test Manager : M.PALLOT SEGP VOLTA

1399

TEST CIRCUIT FOR SINGLE CAPACITOR BANK CURRENT SWITCHING TESTS



Note : - The measuring devices of the voltage on load side were note suited:
- The voltage drop does not exceed 10 % 100 ms after arc extinction.

CONDITIONS OF PROVING TESTS

- Supply by the upper switch connections
- The fuses are replaced by rigid connections
- Pressure of the interrupting medium : 0.4 bar gauge
- Control devices supply : 85 % of the rated voltage : 187 Vac
- The time of supply of the opening coil is changed by 1 ms after each test
- The duration between two successive operations is 3 to 5 minutes
- The metallic enclosure is connected to earth point by cable 50 mm2. The fault current is recorded on the oscillograms

Test-duties No.1 and 2

The short-circuit current reaches 10 % of the rated short-time withstand current of the switch

Test-duties No.3 and 4

The short-circuit current reaches 56 % of the rated short-time withstand current of the switch

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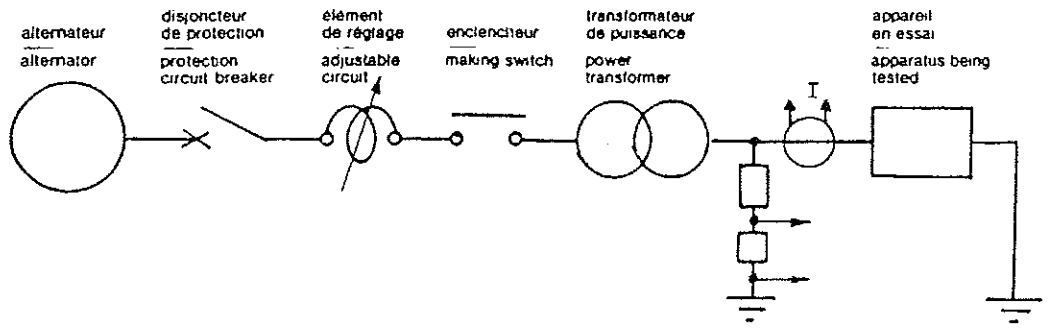
TEST CIRCUIT FOR THE SHORT-CIRCUIT MAKING TESTS



CONDITIONS OF PROVING TESTS

- Supply by the upper switch connections
- The short-circuit is on lower switch connections
- Pressure of the interrupting medium : 0.4 bar gauge
- Control devices supply : 85 % of the rated voltage : 187 Vac

1401

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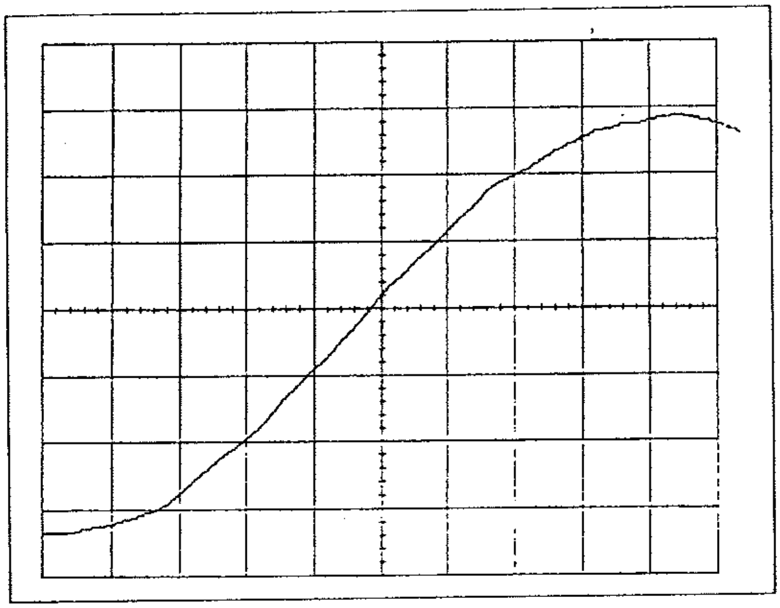
F-38050 Grenoble cedex 9

CALIBRATION OF THE SUPPLY CIRCUIT A

Oscillogram		No.	B 3665.94.04.13.014		
Circuit : 100 %			phase 1	phase 2	phase 3
Frequency		Hz	50		
Measure of the R.M.S. current	Time	ms	20	20	20
	Value	kA	1.29	1.30	1.27
	Average	kA	1.29		
Aperiodic component	Value	%	75	70	6
Peak current		kA	3.45	3.50	2.00
Power factor			0.05		

PROSPECTIVE TRV OF THE SUPPLY CIRCUIT A

Circuit : 1.29 kA - 24 kV

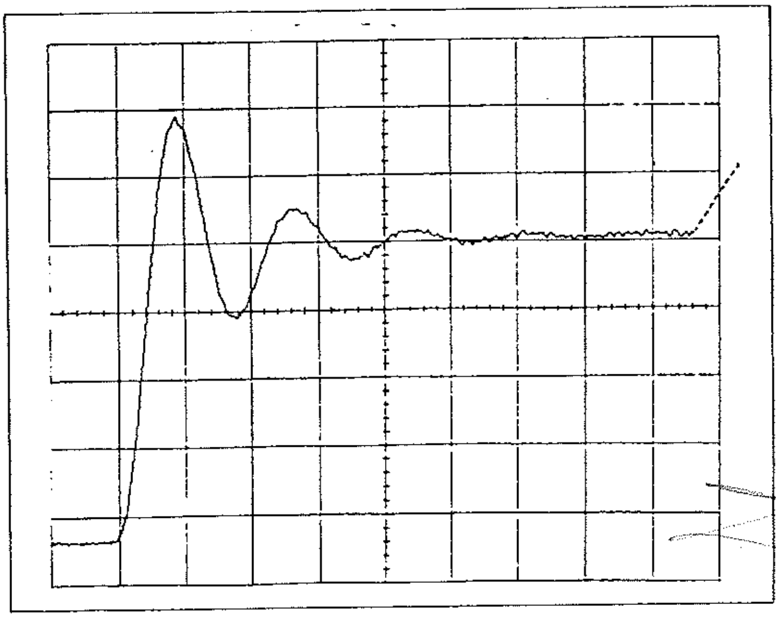


t_3 = 78 μs

t_d = 9 μs

k = 1.42

Time base : 10 μs /unit



k = 1.42

Time base : 0.1 ms /unit

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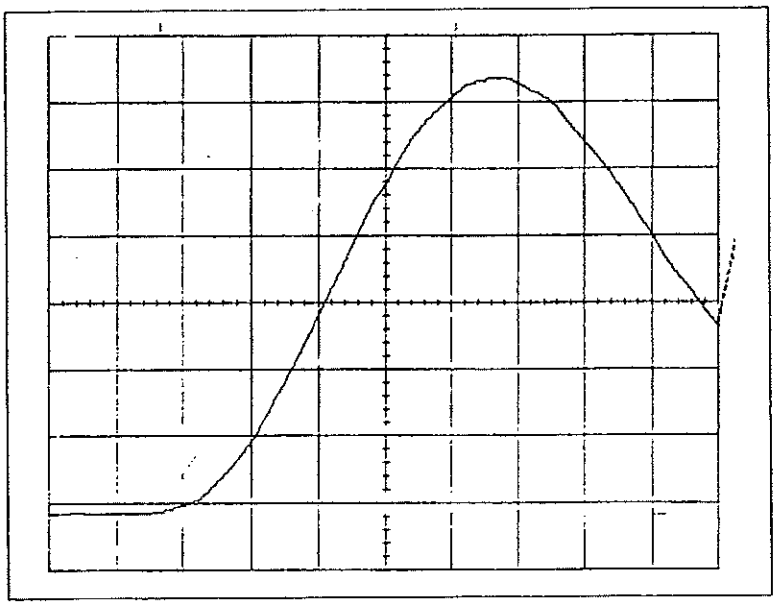
F-38050 Grenoble cedex 9

CALIBRATION OF THE SUPPLY CIRCUIT B

Oscillogram		No.	B 3665.94.04.13.015		
Circuit : 50 %			phase 1	phase 2	phase 3
Frequency		Hz	50		
Measure of the R.M.S. value	Time	ms	10	10	10
	Value	kA	3.59	3.48	3.40
	Average	kA	3.49		
Aperiodic component	Value	%	93	66	32
Peak current		kA	9.78	8.50	6.15
Power factor			0.03		

Circuit : 100 %			phase 1	phase 2	phase 3
Frequency		Hz	50		
Measure of the R.M.S. value	Time	ms	10	10	10
	Value	kA	7.18	6.96	6.80
	Average	kA	6.98		
Aperiodic component	Value	%	93	66	32
Peak current		kA	19.6	17.2	12.3
Power factor			0.03		

PROSPECTIVE TRV OF THE SUPPLY CIRCUIT B



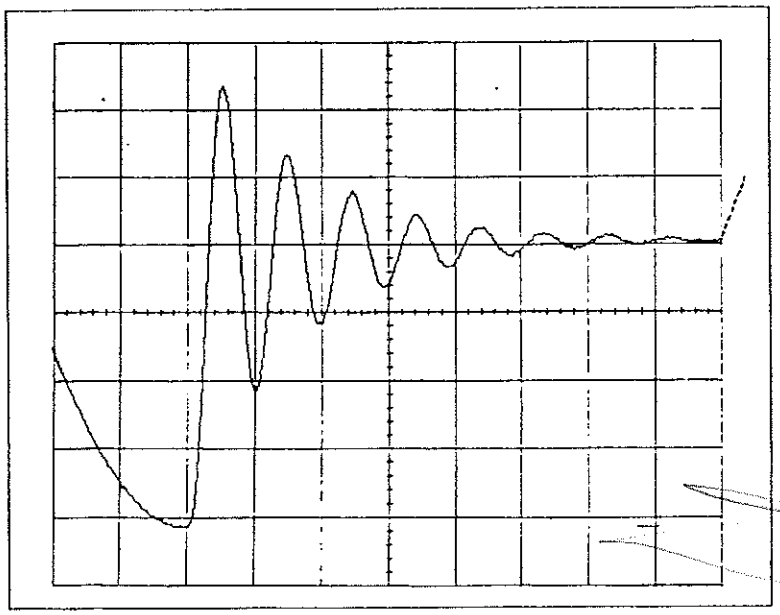
Circuit : 6.98 kA - 24 kV

t_3 = 88 μs

t_d = 15 μs

k = 1.55

Time base : 20 μs /unit



k = 1.55

Time base : 0.2 ms /unit

1405

RESULTS OF THE NO-LOAD OPERATIONS BEFORE TESTS

RATINGS

Motor supply voltage : 220 Vac

Pressure of the interrupting medium : 0.4 bar gauge

Supply voltage of the opening coil : 220 Vac

Supply voltage of the closing coil : 220 Vac

Oscillogram No. B 3665.94.04.13			011	012	013	
Operating sequence			C - O	C - O	C - O	
Motor supply voltage		Vac	242	220	187	
Pressure of the interrupting medium	gauge	bar	0.4	0.4	0.4	
	absolute	bar	1.4	1.4	1.4	
Supply voltage of the coil	opening	Vac	242	220	187	
	closing	Vac	242	220	187	
Time	opening	ms	20.5	19	25	
	closing	ms	60	59	67.5	

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F-38050 Grenoble cedex 9

RESULTS OF THE MAKING AND BREAKING TESTS

Test-duty : Test-duty No. 4

Operating conditions of the apparatus : See page 6

Test conditions : See pages 6 - 10 - 11

Apparatus condition before tests : Having performed the single capacitor bank tests of test repport No. AB 3665 a

Oscillogram No. B 3665.94.04.14			062	t	063	t	064
Operating sequence			C-O		C-O		C-O
Applied voltage		kV	23.9		24.2		24.1
Peak current		A	410 740 880		800 450 930		920 720 460
Closing time		ms	45.0		48.0		54.0
Broken current	per phase	A	131 131 138		131 138 138		134 138 134
	average	A	133		136		135
Aperiodic component		%	< 20		< 20		< 20
Recovery voltage	per phase	kV	14.5 14.1 14.3		14.3 14.5 14.7		14.3 14.3 14.5
	average	kV	14.3		14.5		14.4
	phase to phase	kV	24.8		25.1		24.9
Time	opening	ms	25		25		25
	arcing	ms	7		10		11
	break	ms	32.0		35.0		36.0
Remarks							

1407

RESULTS OF THE MAKING AND BREAKING TESTS

Test-duty : Test-duty No. 4

Operating conditions of the apparatus : See page 6

Test conditions : See pages 6 - 10 - 11

Apparatus condition before tests : Having performed the previous tests

Oscillogram No. B 3665.94.04.14				065	t		066	t		067	
Operating sequence				C-O			C-O			C-O	
Applied voltage		kV		24.2			24.1			24.2	
Peak current		A	580	860	820	860	400	870	740	930	760
Closing time		ms		51.0			48.0			42.0	
Broken current	per phase	A	134	138	134	134	138	138	134	134	138
	average	A		135			137			135	
Aperiodic component		%		< 20			< 20			< 20	
Recovery voltage	per phase	kV	14.5	14.7	14.3	14.3	14.5	14.5	14.3	14.5	14.5
	average	kV		14.5			14.4			14.4	
	phase to phase	kV		25.1			24.9			24.9	
Time	opening	ms		25			25			25	
	arcing	ms		10.5			10			7.5	
	break	ms		35.5			35.0			32.5	
Remarks											

1408

VOLTA
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station d'essais à grande puissance
F-38050 Grenoble cedex 9

RESULTS OF THE MAKING AND BREAKING TESTS

Test-duty : Test-duty No. 4

Operating conditions of the apparatus : See page 6

Test conditions : See pages 6 - 10 - 11

Apparatus condition before tests : Having performed the previous tests

Oscillogram No. B 3665.94.04.14			068			t	069			t	070		
Operating sequence			C-O				C-O				C-O		
Applied voltage		kV	24.2				24.2				23.9		
Peak current		A	560	880	880		950	880	740		680	870	810
Closing time		ms	40.0				44.0				42.5		
Broken current	per phase	A	134	138	138		134	134	138		138	138	138
	average	A	137				135				138		
Aperiodic component		%	< 20				< 20				< 20		
Recovery voltage	per phase	kV	14.7	14.5	14.3		14.5	14.5	14.5		14.5	14.7	14.3
	average	kV	14.5				14.5				14.5		
	phase to phase	kV	25.1				25.1				25.1		
Time	opening	ms	25				25				25		
	arcing	ms	6.5				8.5				8		
	break	ms	31.5				33.5				33.0		
Remarks													

1409

VOLTA
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F-38050 Grenoble cedex 9

RESULTS OF THE MAKING AND BREAKING TESTS

Test-duty : Test-duty No. 4

Operating conditions of the apparatus : See page 6

Test conditions : See pages 6 - 10 - 11

Apparatus condition before tests : Having performed the previous tests

Oscillogram No. B 3665.94.04.14			071			t		t	
Operating sequence			C-O				C-O		C-O
Applied voltage		kV	24.0						
Peak current		A	500	860	910				
Closing time		ms	45.0						
Broken current	per phase	A	134	134	138				
	average	A	135						
Aperiodic component		%	< 20						
Recovery voltage	per phase	kV	14.7	14.5	14.3				
	average	kV	14.6						
	phase to phase	kV	25.3						
Time	opening	ms	25						
	arcing	ms	7						
	break	ms	32.0						
Remarks									

Apparatus condition after tests : No deterioration was noted

1490

RESULTS OF THE MAKING AND BREAKING TESTS

Test-duty : Test-duty No. 2

Operating conditions of the apparatus : See page 6

Test conditions : See pages 6 - 8 - 9

Apparatus condition before tests : Having performed the previous tests

Oscillogram No. B 3665.94.04.15			078			t	079			t	080		
Operating sequence			C-O				C-O				C-O		
Applied voltage		kV	23.7				23.9				24.1		
Peak current		A	530	730	530		600	660	320		430	730	540
Closing time		ms	42.0				43.5				46.5		
Broken current	per phase	A	148	145	145		148	145	148		148	148	148
	average	A	146				147				148		
Aperiodic component		%	< 20				< 20				< 20		
Recovery voltage	per phase	kV	15.2	15.2	15.6		15.2	15.6	15.6		15.6	15.6	15.6
	average	kV	15.3				15.5				15.6		
	phase to phase	kV	26.5				26.8				27.0		
Time	opening	ms	25				25				25		
	arcing	ms	6.5				9				8.5		
	break	ms	31.5				34.0				33.5		
Remarks													

ANNEXE N° 3

VOLTA
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station d'essais à grande puissance
F-38050 Grenoble cedex 9

RESULTS OF THE MAKING AND BREAKING TESTS

Test-duty : Test-duty No. 2

Operating conditions of the apparatus : See page 6

Test conditions : See pages 6 - 8 - 9

Apparatus condition before tests : Having performed the previous tests

Oscillogram No. B 3665.94.04.15			081			t	082			t	083		
Operating sequence			C-O				C-O				C-O		
Applied voltage		kV	23.9				24.1				23.8		
Peak current		A	480	440	730		300	550	720		560	730	410
Closing time		ms	41.5				41.0				48.0		
Broken current	per phase	A	148	148	148		148	145	141		152	145	145
	average	A	148				145				147		
Aperiodic component		%	< 20				< 20				< 20		
Recovery voltage	per phase	kV	15.6	15.6	15.0		15.2	15.6	15.2		15.6	15.6	15.6
	average	kV	15.4				15.3				15.6		
	phase to phase	kV	26.7				26.5				27.0		
Time	opening	ms	25				25				25		
	arcing	ms	13.5				9				6		
	break	ms	38.5				34.0				31.0		
Remarks													

1412

VOLTA
centre d'essais
station d'essais à grande puissance
F-38050 Grenoble cedex 9

RESULTS OF THE MAKING AND BREAKING TESTS

Test-duty : Test-duty No. 2

Operating conditions of the apparatus : See page 6

Test conditions : See pages 6 - 8 - 9

Apparatus condition before tests : Having performed the previous tests

Oscillogram No. B 3665.94.04.15			084			t	085			t	086		
Operating sequence			C-O				C-O				C-O		
Applied voltage		kV	23.9				23.9				23.9		
Peak current		A	440	720	570		750	330	570		620	410	720
Closing time		ms	45.0				52.0				53.5		
Broken current	per phase	A	152	148	148		145	145	145		148	141	148
	average	A	149				145				146		
Aperiodic component		%	< 20				< 20				< 20		
Recovery voltage	per phase	kV	15.6	15.6	15.6		15.2	15.6	15.6		15.6	15.6	15.6
	average	kV	15.6				15.5				15.6		
	phase to phase	kV	27.0				26.8				27.0		
Time	opening	ms	25				25				25		
	arcing	ms	13				9				11		
	break	ms	38.0				34.0				36.0		
Remarks													

1413

RESULTS OF THE MAKING AND BREAKING TESTS

Test-duty : Test-duty No. 2

Operating conditions of the apparatus : See page 6

Test conditions : See pages 6 - 8 - 9

Apparatus condition before tests : Having performed the previous tests

Oscillogram No. B 3665.94.04.15			087			t			t	
Operating sequence			C-O				C-O			C-O
Applied voltage		kV	24.0							
Peak current		A	160	320	540					
Closing time		ms	52.0							
Broken current	per phase	A	148	148	148					
	average	A	148							
Aperiodic component		%	< 20							
Recovery voltage	per phase	kV	15.2	15.6	15.2					
	average	kV	15.3							
	phase to phase	kV	26.5							
Time	opening	ms	25							
	arcing	ms	9.5							
	break	ms	34.5							
Remarks										

Apparatus condition after tests : No deterioration was noted

1414

VOLTA
centre d'essais
station d'essais à grande puissance
F-38050 Grenoble cedex 9

RESULTS OF THE MAKING AND BREAKING TESTS

Test-duty : Test-duty No. 1

Operating conditions of the apparatus : See page 6

Test conditions : See pages 6 - 8 - 9

Apparatus condition before tests : Having performed the previous tests

Oscillogram No. B 3665.94.04.18			091			t	092			t	093		
Operating sequence			C-O				C-O				C-O		
Applied voltage		kV	24.0				24.1				24.1		
Peak current		A	320	380	250		150	300	350		200	340	330
Closing time		ms	48.5				40.5				40.0		
Broken current	per phase	A	47.7	46.0	46.0		46.0	46.0	46.0		49.5	49.5	49.5
	average	A	46.6				46.0				49.0		
Aperiodic component		%	< 20				< 20				< 20		
Recovery voltage	per phase	kV	14.1	14.5	13.8		14.3	14.3	14.3		14.5	14.5	14.1
	average	kV	14.1				14.3				14.4		
	phase to phase	kV	24.4				24.8				24.9		
Time	opening	ms	25				25				25		
	arcing	ms	12.5				7.5				7		
	break	ms	37.5				32.5				32.0		
Remarks													

1415

VOLTA
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station d'essais à grande puissance
F-38050 Grenoble cedex 9

RESULTS OF THE MAKING AND BREAKING TESTS

Test-duty : Test-duty No. 1

Operating conditions of the apparatus : See page 6

Test conditions : See pages 6 - 8 - 9

Apparatus condition before tests : Having performed the previous tests

Oscillogram No. B 3665.94.04.18			094			t	095			t	096		
Operating sequence			C-O				C-O				C-O		
Applied voltage		kV	23.9				23.9				23.9		
Peak current		A	350	190	260		290	190	330		330	340	160
Closing time		ms	48.0				49.5				43.5		
Broken current	per phase	A	47.7	49.5	46.0		49.5	46.0	47.7		49.5	46.0	47.7
	average	A	47.7				47.7				47.7		
Aperiodic component		%	< 20				< 20				< 20		
Recovery voltage	per phase	kV	14.3	14.1	14.1		14.3	14.5	14.1		14.3	14.3	14.1
	average	kV	14.2				14.3				14.2		
	phase to phase	kV	24.6				24.8				24.6		
Time	opening	ms	25				25				25		
	arcing	ms	13				6.5				7.5		
	break	ms	38.0				31.5				32.5		
Remarks													

1416

VOLTA
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F-38050 Grenoble cedex 9

RESULTS OF THE MAKING AND BREAKING TESTS

Test-duty : Test-duty No. 1

Operating conditions of the apparatus : See page 6

Test conditions : See pages 6 - 8 - 9

Apparatus condition before tests : Having performed the previous tests

Oscillogram No. B 3665.94.04.18			097			t	098			t	099		
Operating sequence			C-O				C-O				C-O		
Applied voltage		kV	23.8				23.9				24.2		
Peak current		A	170	310	350		310	350	210		280	210	340
Closing time		ms	41.5				46.0				50.5		
Broken current	per phase	A	49.5	47.5	47.7		49.5	47.7	47.7		49.5	49.5	47.7
	average	A	48.3				48.3				48.9		
Aperiodic component		%	< 20				< 20				< 20		
Recovery voltage	per phase	kV	14.1	14.1	14.1		14.1	14.3	14.1		14.3	14.5	14.1
	average	kV	14.1				14.1				14.3		
	phase to phase	kV	24.4				24.4				24.8		
Time	opening	ms	25				25				25		
	arcing	ms	9.5				11				9.0		
	break	ms	34.5				36.0				34.0		
Remarks													

RESULTS OF THE MAKING AND BREAKING TESTS

Test-duty : Test-duty No. 1

Operating conditions of the apparatus : See page 6

Test conditions : See pages 6 - 8 - 9

Apparatus condition before tests : Having performed the previous tests

Oscillogram No. B 3665.94.04.18			100			t		t	
Operating sequence			C-O				C-O		C-O
Applied voltage		kV	23.9						
Peak current		A	340	150	280				
Closing time		ms	49.0						
Broken current	per phase	A	49.5	47.7	47.7				
	average	A	48.3						
Aperiodic component		%	< 20						
Recovery voltage	per phase	kV	14.3	14.5	14.1				
	average	kV	14.3						
	phase to phase	kV	24.8						
Time	opening	ms	25						
	arcing	ms	14.5						
	break	ms	39.5						
Remarks									

Apparatus condition after tests : No deterioration was noted

1418

RESULTS OF THE MAKING AND BREAKING TESTS

Test-duty : Test-duty No. 3

Operating conditions of the apparatus : See page 6

Test conditions : See pages 6 - 10 - 11

Apparatus condition before tests : Having performed the previous tests

Oscillogram No. B 3665.94.04.18			101			t	102			t	103		
Operating sequence			C-O				C-O				C-O		
Applied voltage		kV	24.1				24.1				24.0		
Peak current		A	220	500	500		540	360	500		460	540	310
Closing time		ms	43.5				49.0				49.0		
Broken current	per phase	A	47.7	46.0	47.7		47.7	47.7	47.7		46.0	47.7	47.7
	average	A	47.1				47.7				47.1		
Aperiodic component		%	< 20				< 20				< 20		
Recovery voltage	per phase	kV	14.3	14.1	14.0		14.1	14.1	13.8		14.1	14.1	13.8
	average	kV	14.1				14.0				14.0		
	phase to phase	kV	24.4				24.2				24.2		
Time	opening	ms	25				25				25		
	arcing	ms	6				12				5		
	break	ms	31.0				37.0				30.0		
Remarks													

1419

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RESULTS OF THE MAKING AND BREAKING TESTS

Test-duty : Test-duty No. 3

Operating conditions of the apparatus : See page 6

Test conditions : See pages 6 - 10 - 11

Apparatus condition before tests : Having performed the previous tests

Oscillogram No. B 3665.94.04.18			104			t	105			t	106		
Operating sequence			C-O				C-O				C-O		
Applied voltage		kV	24.0				24.1				23.9		
Peak current		A	240	490	520		300	470	520		150	500	520
Closing time		ms	39.5				43.5				41.0		
Broken current	per phase	A	46.0	46.0	46.0		47.7	46.0	46.0		46.0	47.7	47.7
	average	A	46.0				46.6				47.1		
Aperiodic component		%	< 20				< 20				< 20		
Recovery voltage	per phase	kV	14.1	14.1	13.8		14.1	14.1	13.8		14.3	14.1	13.8
	average	kV	14.0				14.0				14.1		
	phase to phase	kV	24.2				24.2				24.4		
Time	opening	ms	25				25				25		
	arcing	ms	7				6				9.5		
	break	ms	32.0				31.0				34.5		
Remarks													

1420

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RESULTS OF THE MAKING AND BREAKING TESTS

Test-duty : Test-duty No. 3

Operating conditions of the apparatus : See page 6

Test conditions : See pages 6 - 10 - 11

Apparatus condition before tests : Having performed the previous tests

Oscillogram No. B 3665.94.04.18			107			t	108			t	109		
Operating sequence			C-O				C-O				C-O		
Applied voltage		kV	23.8				24.1				24.2		
Peak current		A	240	400	200		400	520	390		300	520	480
Closing time		ms	46.0				42.5				41.5		
Broken current	per phase	A	46.0	46.0	46.0		46.0	47.7	46.0		47.7	47.7	47.7
	average	A	46.0				46.6				47.1		
Aperiodic component		%	< 20				< 20				< 20		
Recovery voltage	per phase	kV	14.1	14.3	14.0		14.3	14.3	14.0		14.3	14.5	14.0
	average	kV	14.1				14.2				14.3		
	phase to phase	kV	24.4				24.6				24.7		
Time	opening	ms	25				25				25		
	arcing	ms	6.5				6				6.5		
	break	ms	31.5				31.0				31.5		
Remarks													

1421

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RESULTS OF THE MAKING AND BREAKING TESTS

Test-duty : Test-duty No. 3

Operating conditions of the apparatus : See page 6

Test conditions : See pages 6 - 10 - 11

Apparatus condition before tests : Having performed the previous tests

Oscillogram No. B 3665.94.04.18			110			t			t	
Operating sequence			C-O				C-O			C-O
Applied voltage		kV	24.2							
Peak current		A	220	470	470					
Closing time		ms	49.5							
Broken current	per phase	A	47.7	46.0	46.0					
	average	A	46.6							
Aperiodic component		%	< 20							
Recovery voltage	per phase	kV	14.5	14.5	14.0					
	average	kV	14.3							
	phase to phase	kV	24.7							
Time	opening	ms	25							
	arcing	ms	10.7							
	break	ms	35.7							
Remarks										

Apparatus condition after tests : No deterioration was noted

1422

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RESULTS OF THE SHORT-CIRCUIT MAKING TESTS

Apparatus in test : Switch SM6 inside cubicle SM6 type QM

Operating conditions of the apparatus : See page 7

Test conditions : See page 7

Apparatus condition before tests : Having performed the previous tests

Oscillogram No. B 3665.94.04.18			117	t	118	t	
Operating sequence			C		C		C
Applied voltage		kV	24.6		24.7		
Peak current	I1	kA	18.9		31.5		
	I2	kA	30.8		19.4		
	I3	kA	31.5		28.7		
Making current	I1	kA	12.8		12.9		
	I2	kA	13.0		12.8		
	I3	kA	12.7		12.7		
	average	kA	12.8		12.8		
Time	pre-arcing	ms	/		/		
	closing	ms	41.0		38		
	current	ms	150		150		
Fuse							
Remarks							

Apparatus condition after tests : No deterioration was noted.

1423

RESULTS OF THE NO-LOAD OPERATIONS AFTER TESTS

RATINGS

Motor supply voltage : 220 Vac

Pressure of the interrupting medium : 0.4 bar gauge

Supply voltage of the opening coil : 220 Vac

Supply voltage of the closing coil : 220 Vac

Oscillogram No. B 3665.94.04.18			119	120	121	
Operating sequence			C - O	C - O	C - O	C - O
Motor supply voltage		Vac	242	220	187	
Pressure of the interrupting medium	gauge	bar	0.4	0.4	0.4	
	absolute	bar	1.4	1.4	1.4	
Supply voltage of the coil	opening	Vac	242	220	187	
	closing	Vac	242	220	187	
Time	opening	ms	24	28.5	25	
	closing	ms	39	47	41	

1424

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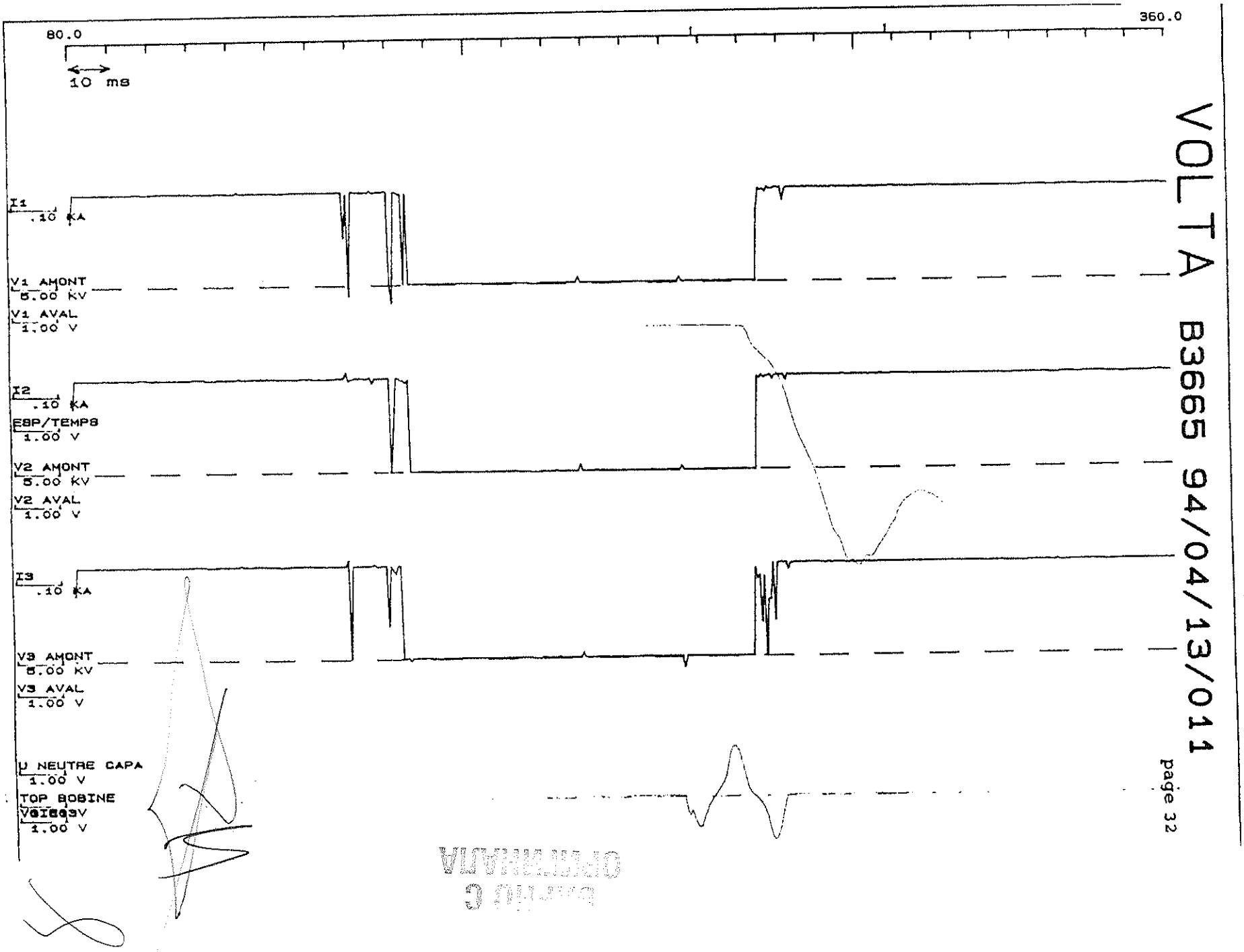
MEASUREMENT OF THE RESISTANCE OF THE MAIN CIRCUIT

Measurement of the voltage drop under 100 Adc

Voltage drop (mV)	Pole 1	Pole 2	Pole 3
Before tests	6.50	7.16	6.64
After tests	5.85	6.24	6.60
Ratio after / before	0.82	0.87	0.99

Satisfactory results : Variations of the voltage drops below 20 %

1425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360.0
10 ms
I1
.10 KA
V1 AMONT
5.00 KV
V1 AVAL
1.00 V
I2
.10 KA
ESP/TEMPS
1.00 V
V2 AMONT
5.00 KV
V2 AVAL
1.00 V
I3
.10 KA
V3 AMONT
5.00 KV
V3 AVAL
1.00 V
U NEUTRE CAPA
1.00 V
TOP BOBINE
V3
1.00 V
VOLTA B3665 94/04/13/011
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2

VOLTA B3665 94/04/13/012

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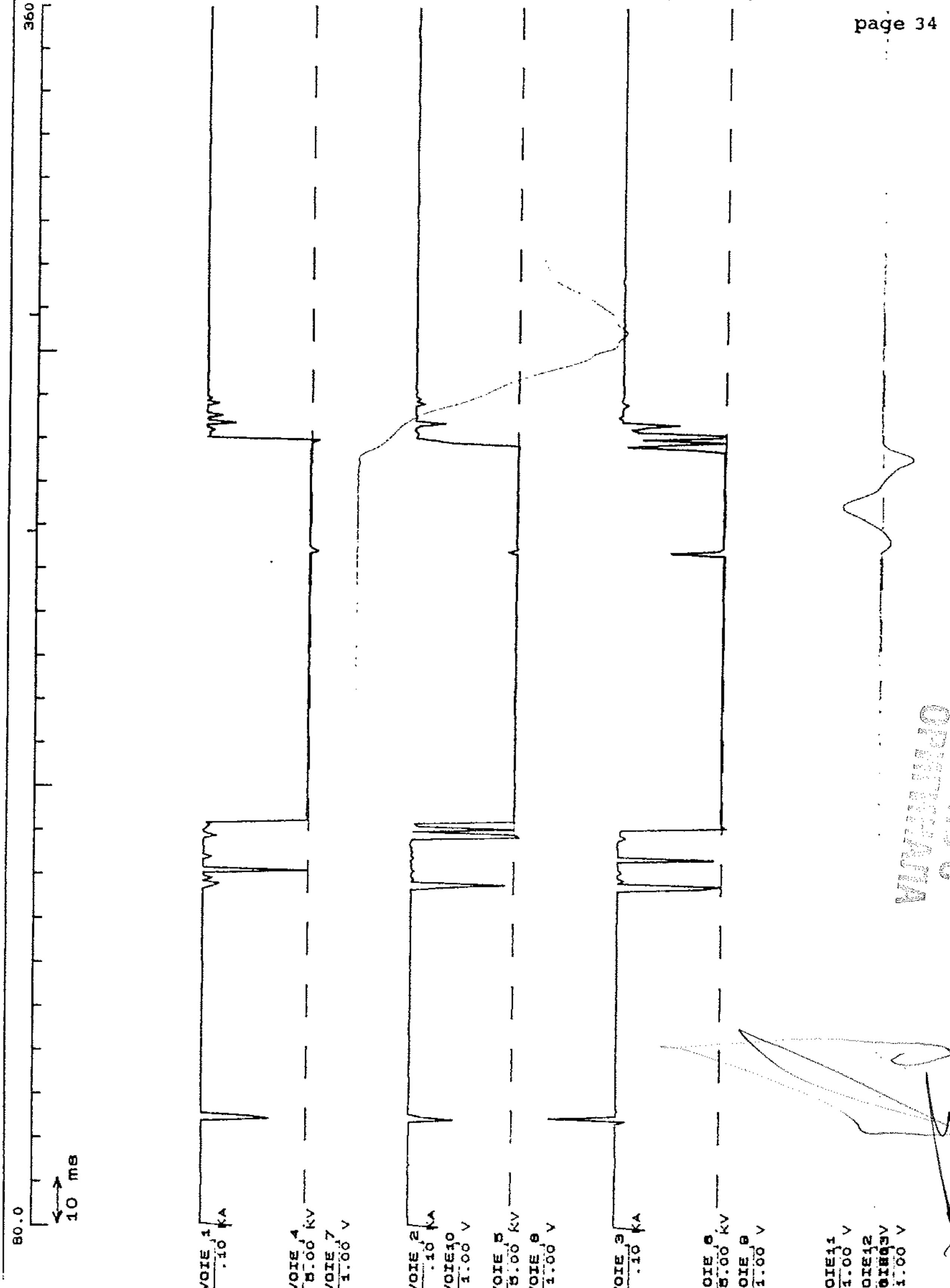
VOLTA B3665 94/04/13/013



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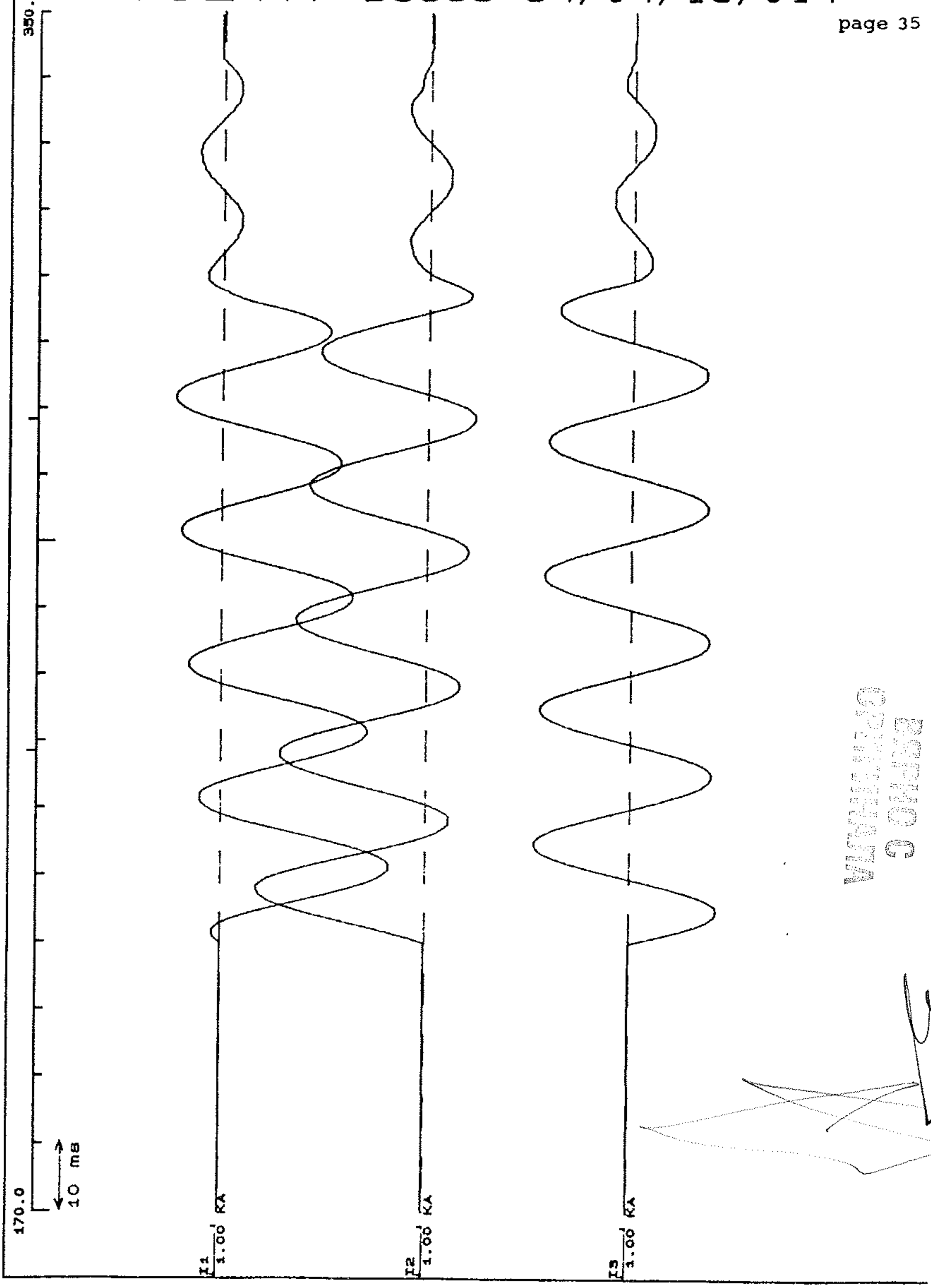

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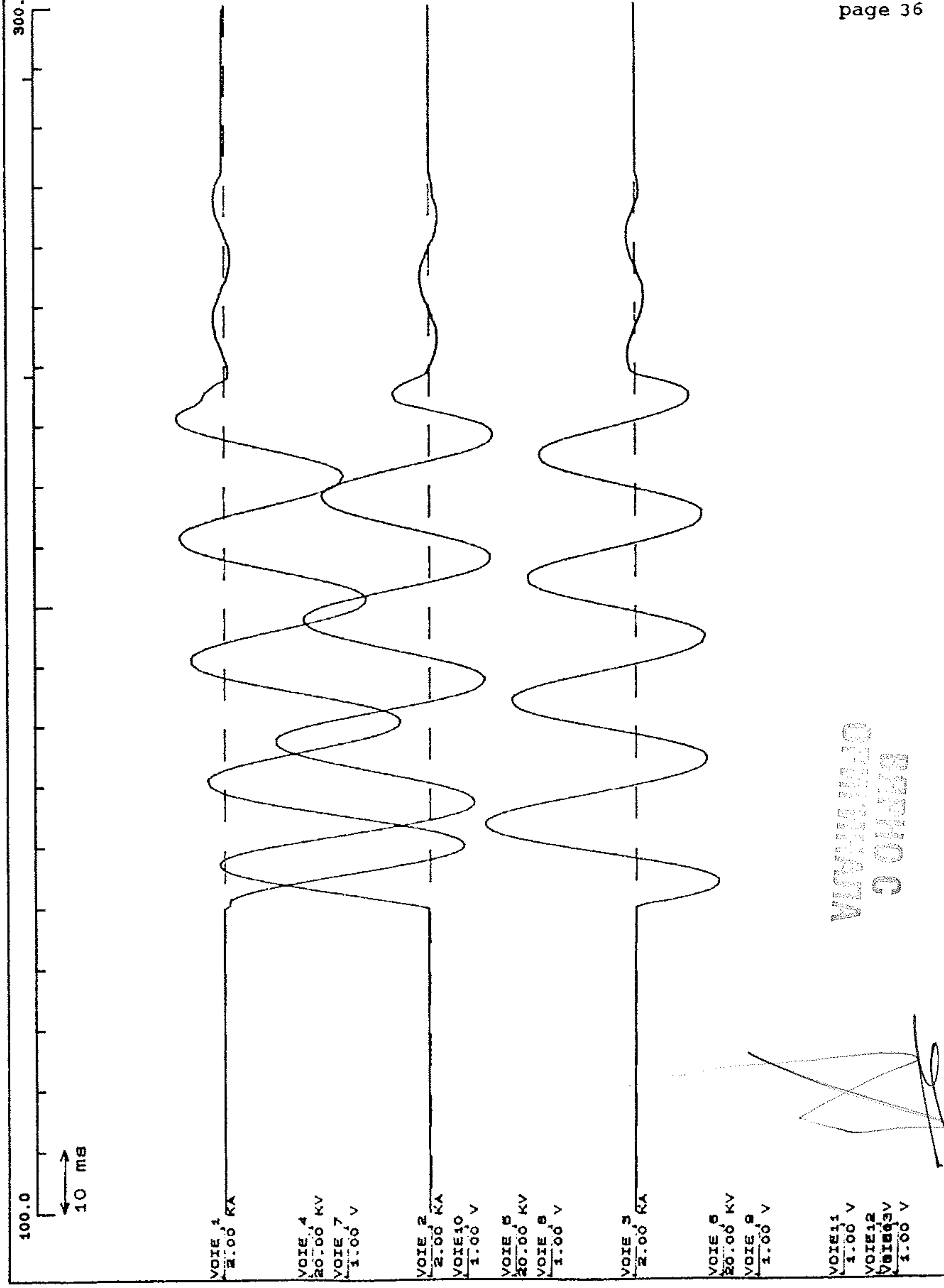

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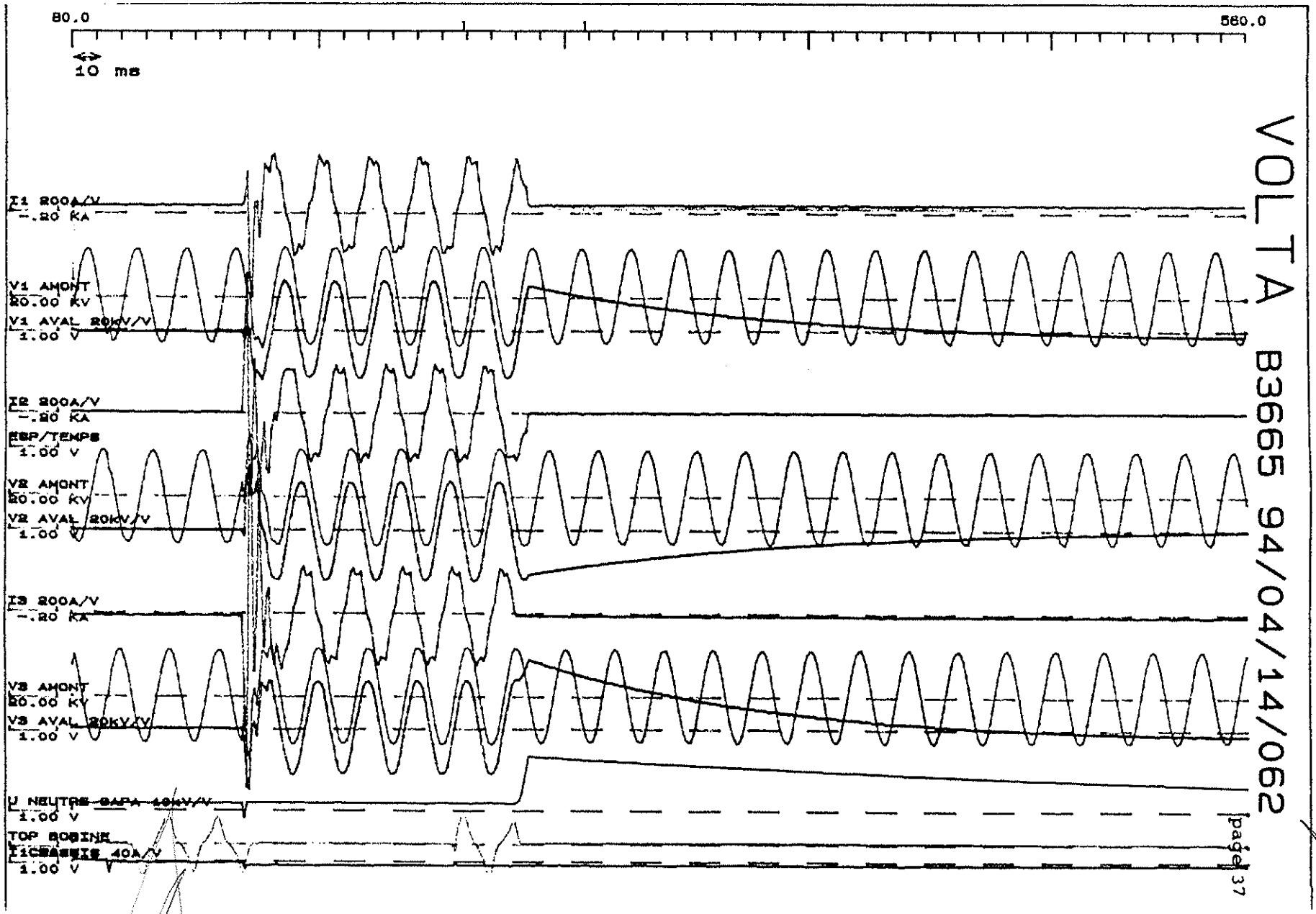
80.0
560.0
10 ms
I1 200A/V
-.20 KA
V1 AMONT
20.00 KV
V1 AVAL 20KV/V
1.00 V
I2 200A/V
-.20 KA
ESP/TEMPS
1.00 V
V2 AMONT
20.00 KV
V2 AVAL 20KV/V
1.00 V
I3 200A/V
-.20 KA
V3 AMONT
20.00 KV
V3 AVAL 20KV/V
1.00 V
U NEUTRE GAPA 40kV/V
1.00 V
TOP BOBINE
1.00 V
VOLTA B3665 94/04/14/062
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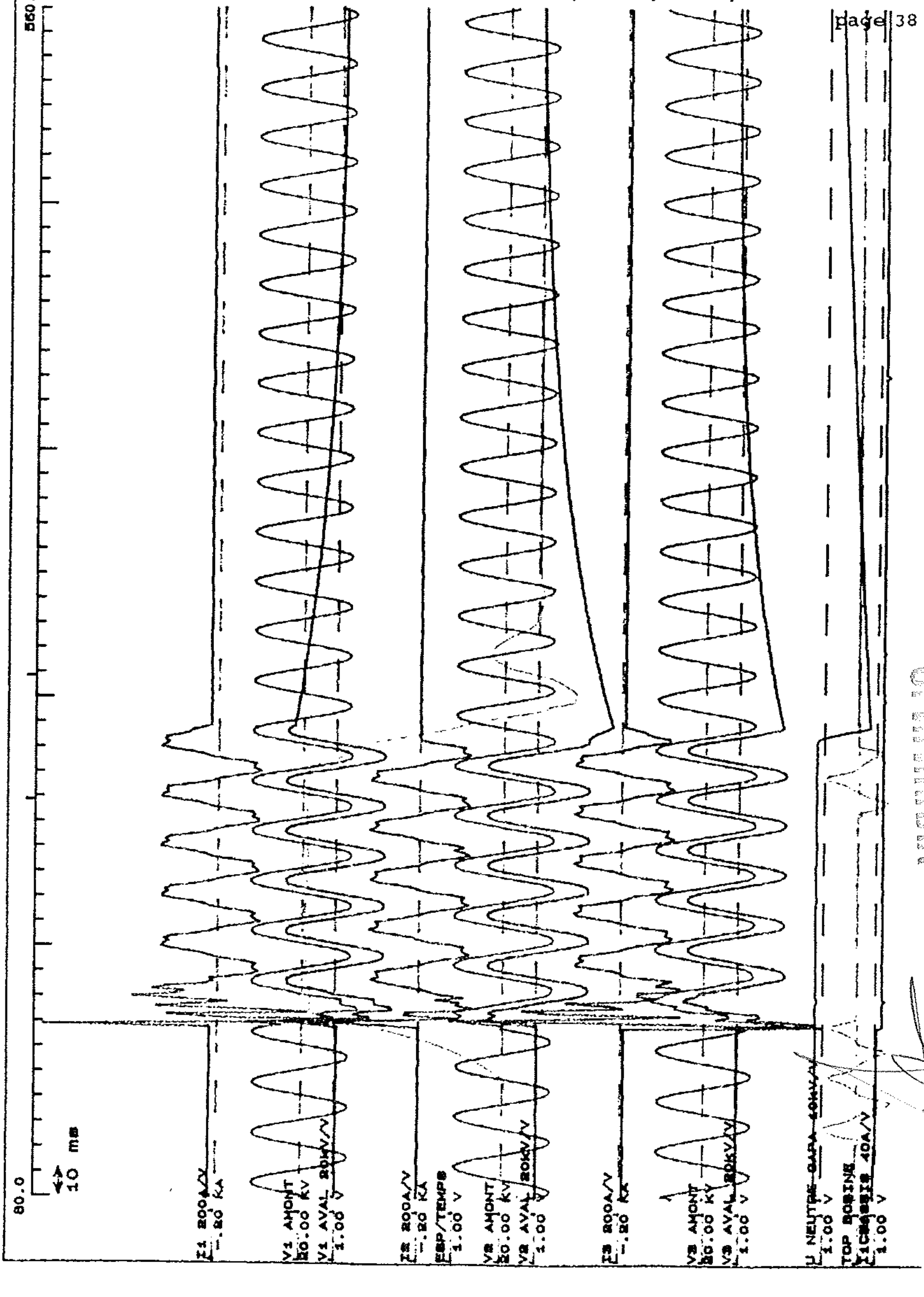
1431

VOLTA B3665 94/04/14/063



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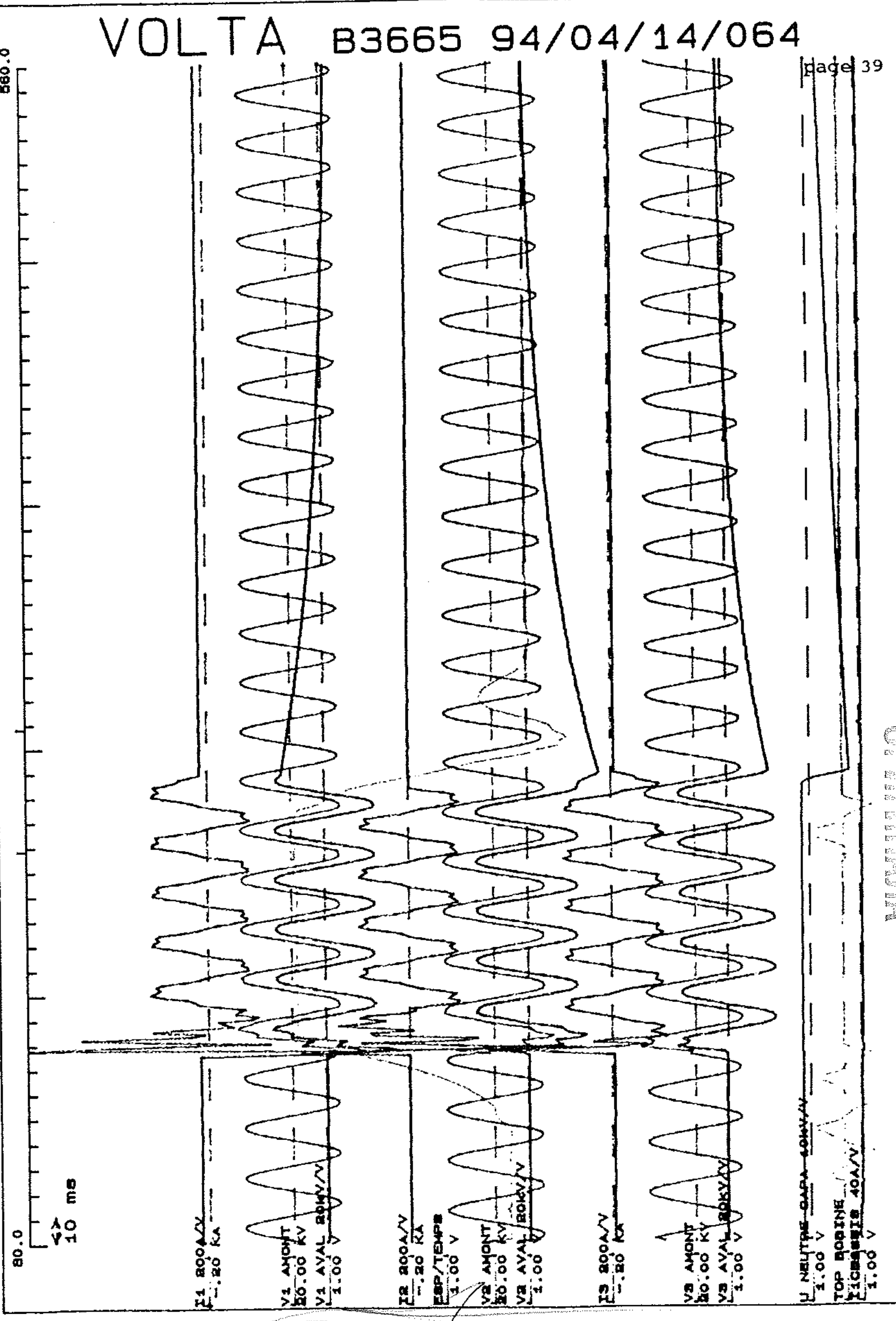
VOLTA B3665 94/04/14/064



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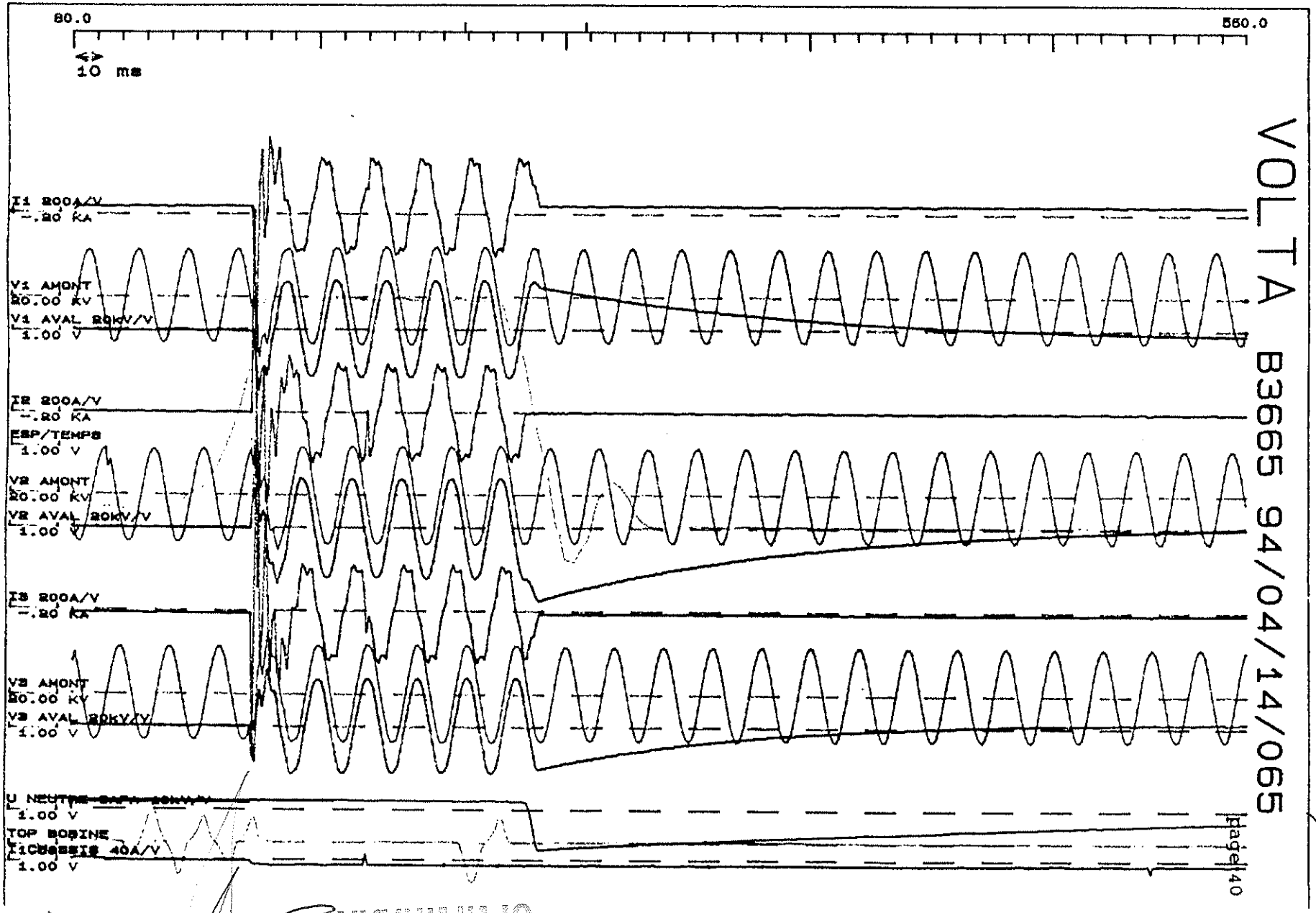
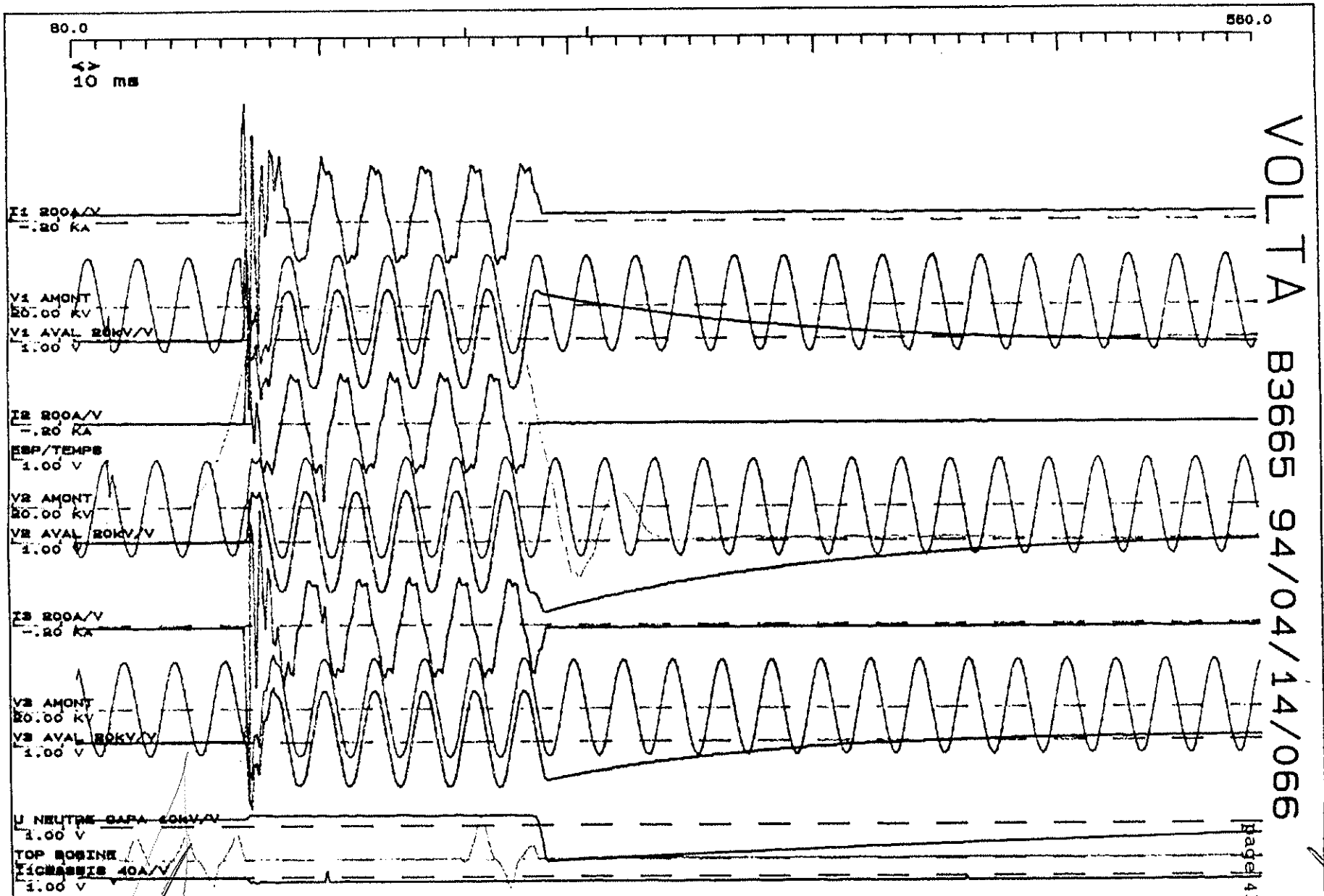

80.0
560.0
10 ms
I1 200A/V
-.20 KA
V1 AMONT
20.00 KV
V1 AVAL 20KV/V
1.00 V
IR 200A/V
-.20 KA
ESP/TEMPS
1.00 V
V2 AMONT
20.00 KV
V2 AVAL 20KV/V
1.00 V
IS 200A/V
-.20 KA
V3 AMONT
20.00 KV
V3 AVAL 20KV/V
1.00 V
1.00 V
TOP BOBINE
1.00 V
VOLTA B3665 94/04/14/065
page 40

1434


80.0
560.0
<>
10 ms
I1 200A/V
-.20 KA
V1 AMONT
20.00 KV
V1 AVAL 20KV/V
1.00 V
I2 200A/V
-.20 KA
ESP/TEMPS
1.00 V
V2 AMONT
20.00 KV
V2 AVAL 20KV/V
1.00 V
I3 200A/V
-.20 KA
V3 AMONT
20.00 KV
V3 AVAL 20KV/V
1.00 V
U NEUTRE GAPA 40KV/V
1.00 V
TOP BOBINE
TIGRESSIS 40A/V
1.00 V
VOLTA B3665 94/04/14/066
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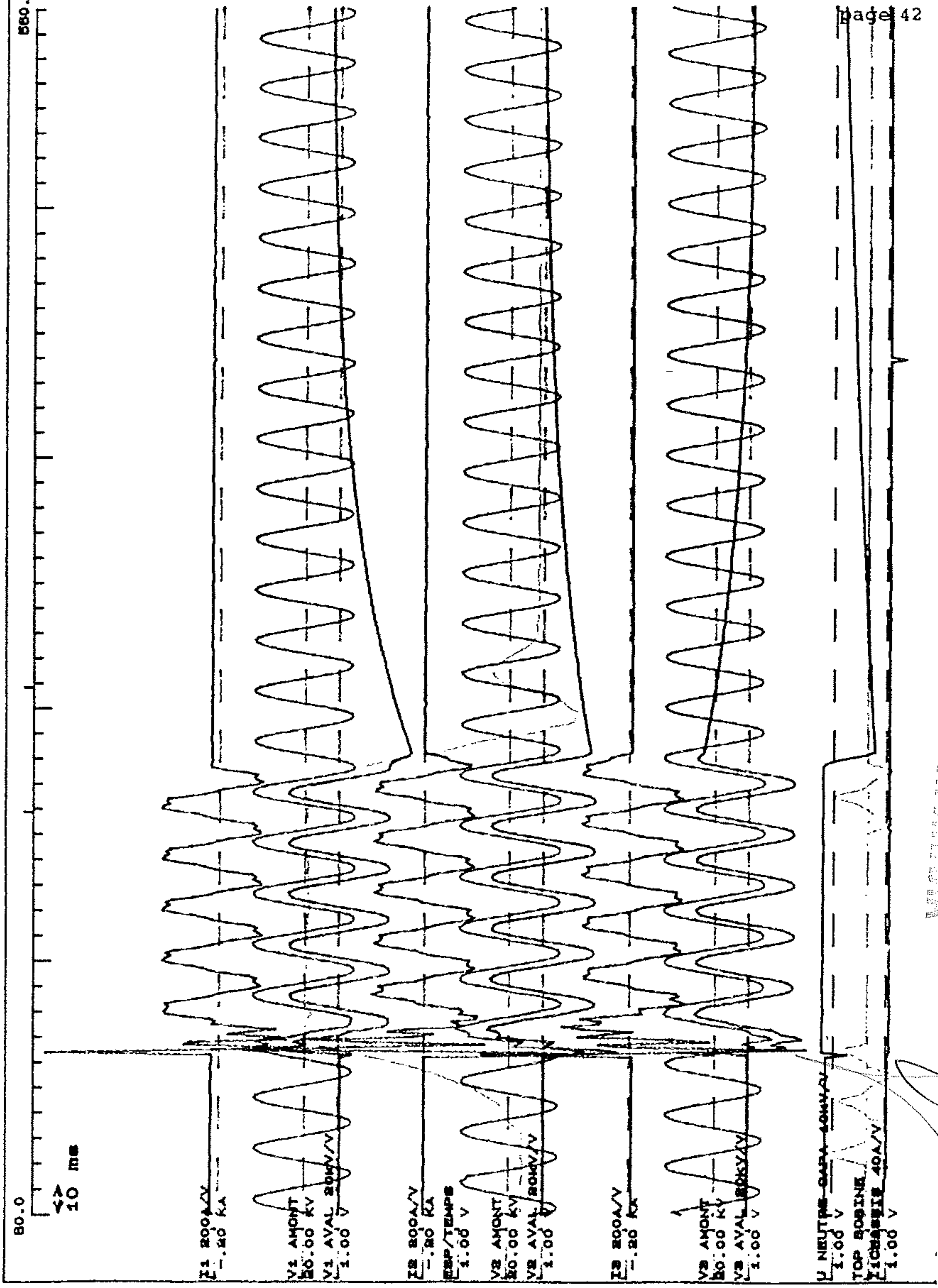
VOLTA B3665 94/04/14/067



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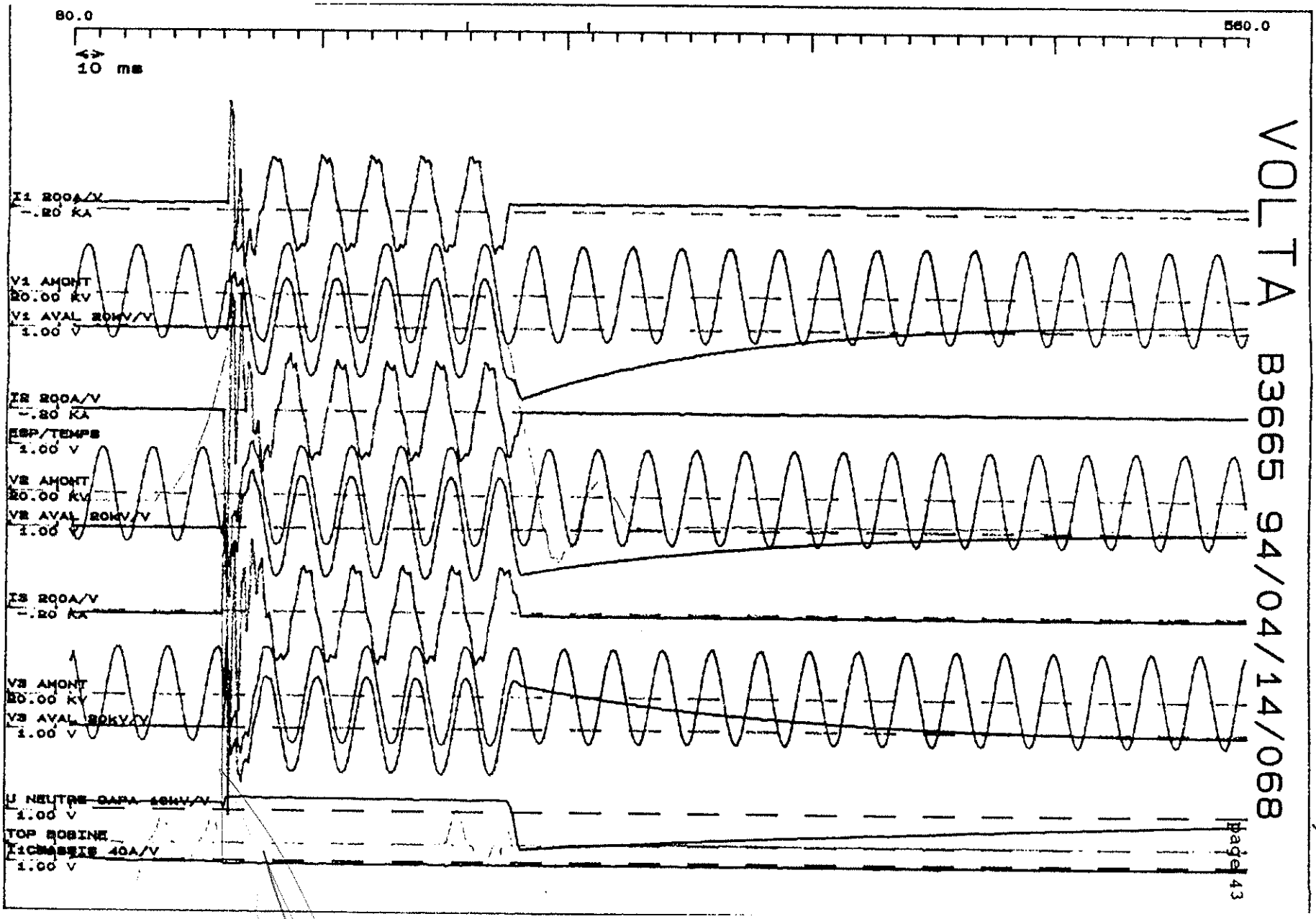
80.0
560.0
10 ms
I1 200A/V
-.20 KA
V1 AMONT
20.00 KV
V1 AVAL 20KV/V
1.00 V
IR 200A/V
-.20 KA
ESP/TEMPS
1.00 V
V2 AMONT
20.00 KV
V2 AVAL 20KV/V
1.00 V
I3 200A/V
-.20 KA
V3 AMONT
20.00 KV
V3 AVAL 20KV/V
1.00 V
U NEUTRE GAP4 40kV/V
1.00 V
TOP BOBINE
I CHASSIS 40A/V
1.00 V
VOLTA B3665 94/04/14/068
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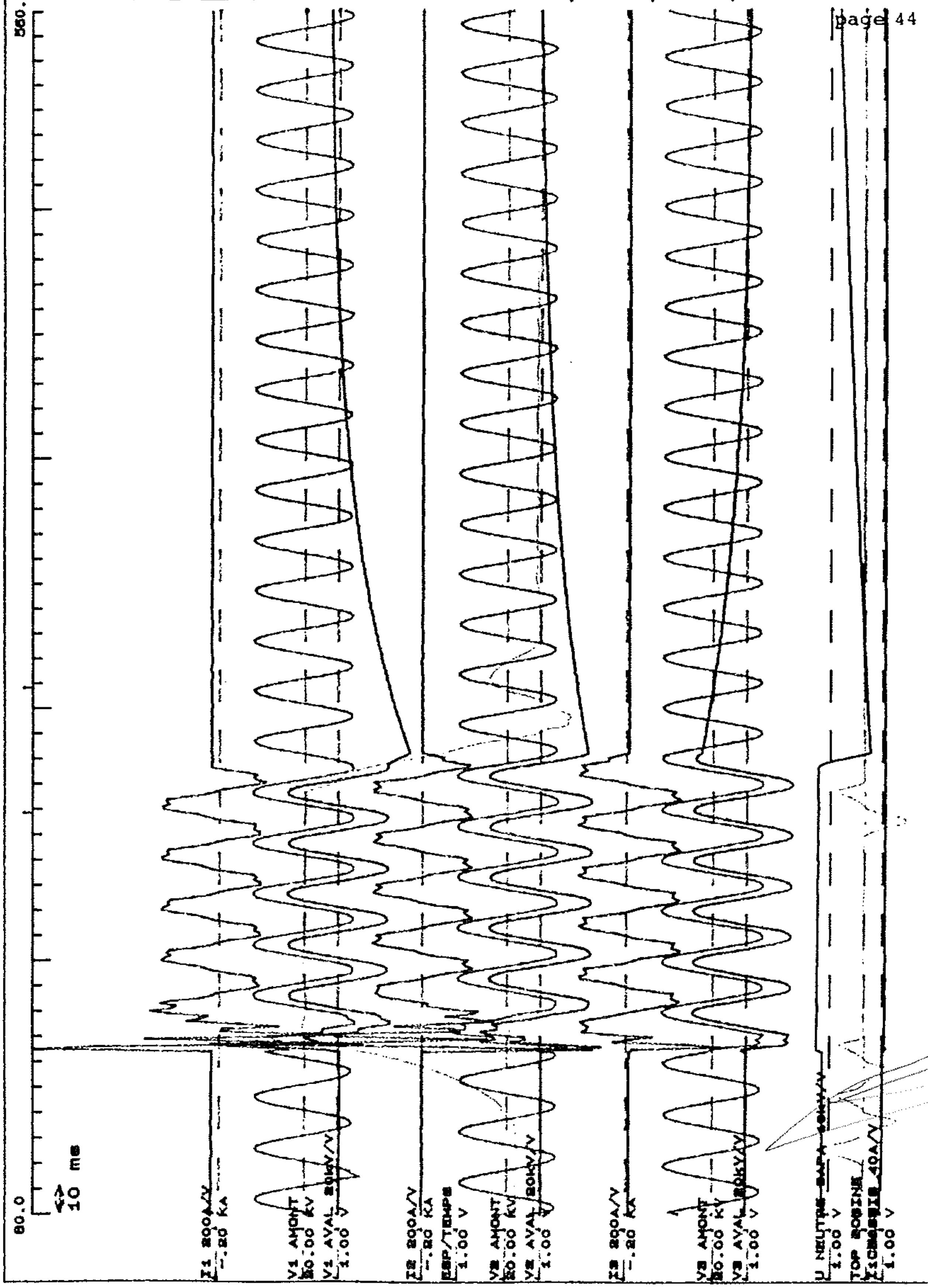
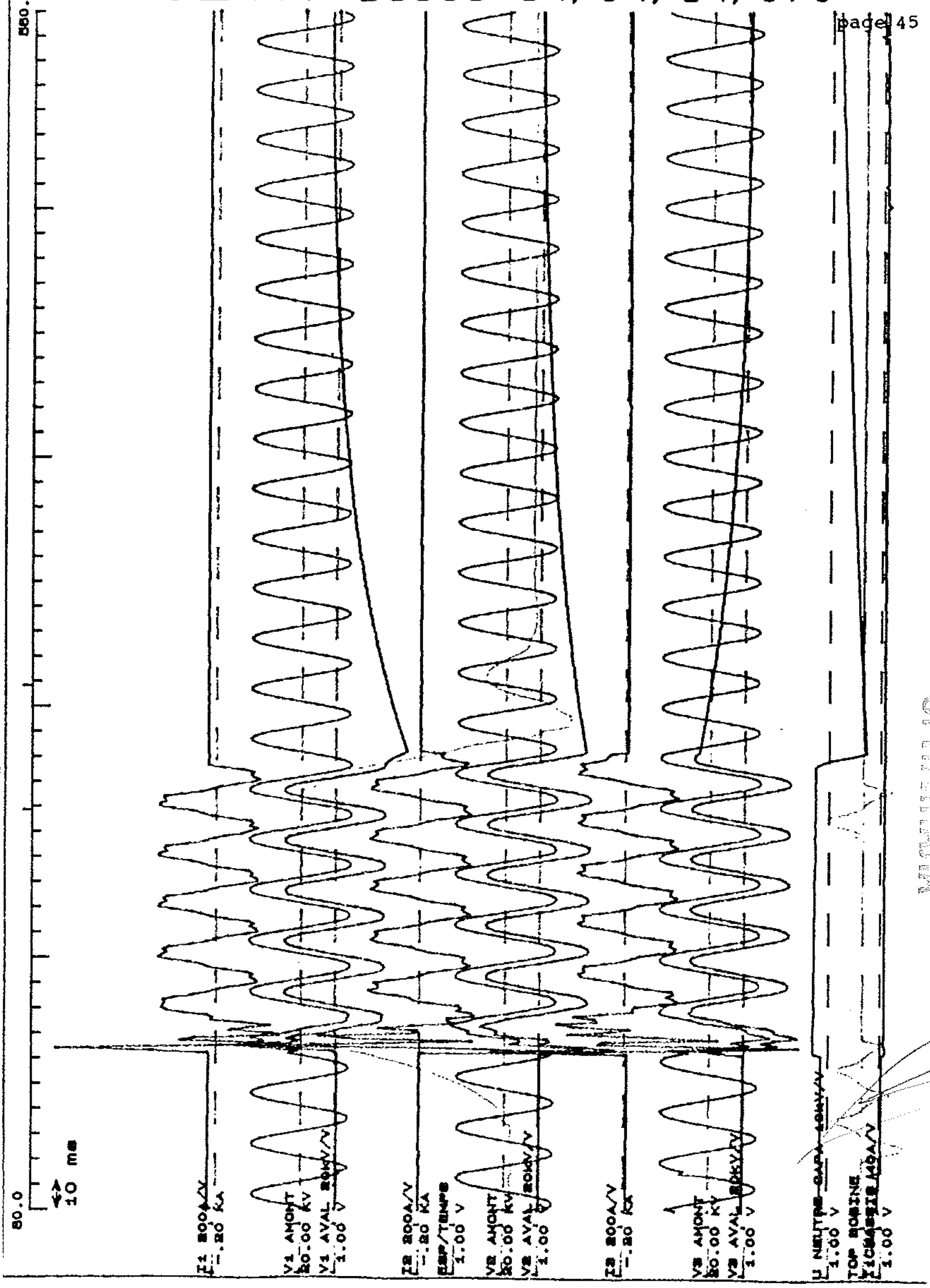
VOLTA B3665 94/04/14/069



1438

VOLTA B3665 94/04/14/070

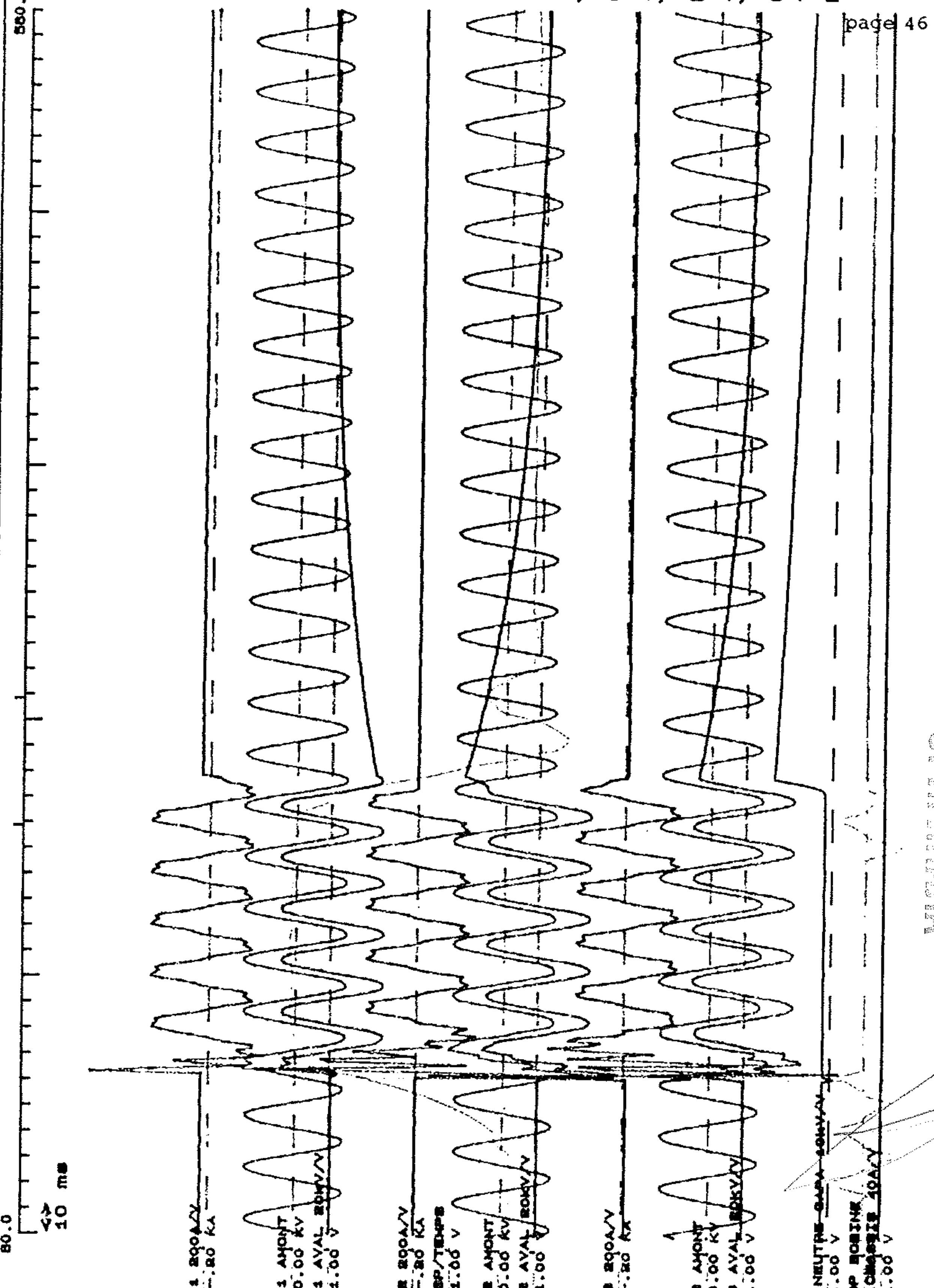
page 45



1439

VOLTA B3665 94/04/14/071

page 46



1440

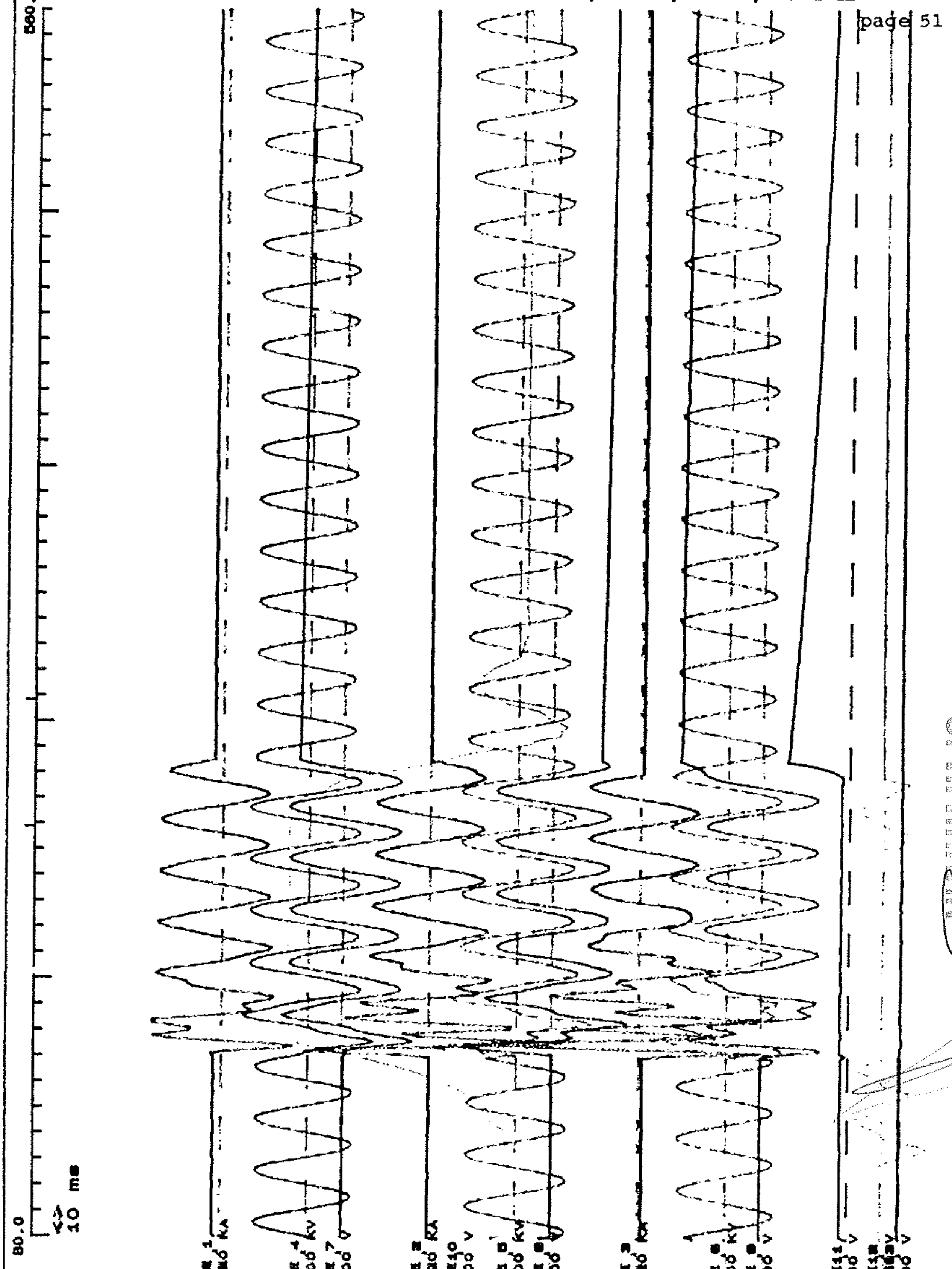
VOLTA B3665 94/04/15/079
page 48
880.0
80.0
10 ms
VOIE 1
-.80 KA
VOIE 4
80.00 KV
VOIE 7
1.00 V
VOIE 2
-.80 KA
VOIE10
1.00 V
VOIE 5
80.00 KV
VOIE 8
1.00 V
VOIE 3
-.80 KA
VOIE 6
80.00 KV
VOIE 9
1.00 V
VOIE11
1.00 V
VOIE12
1.00 V

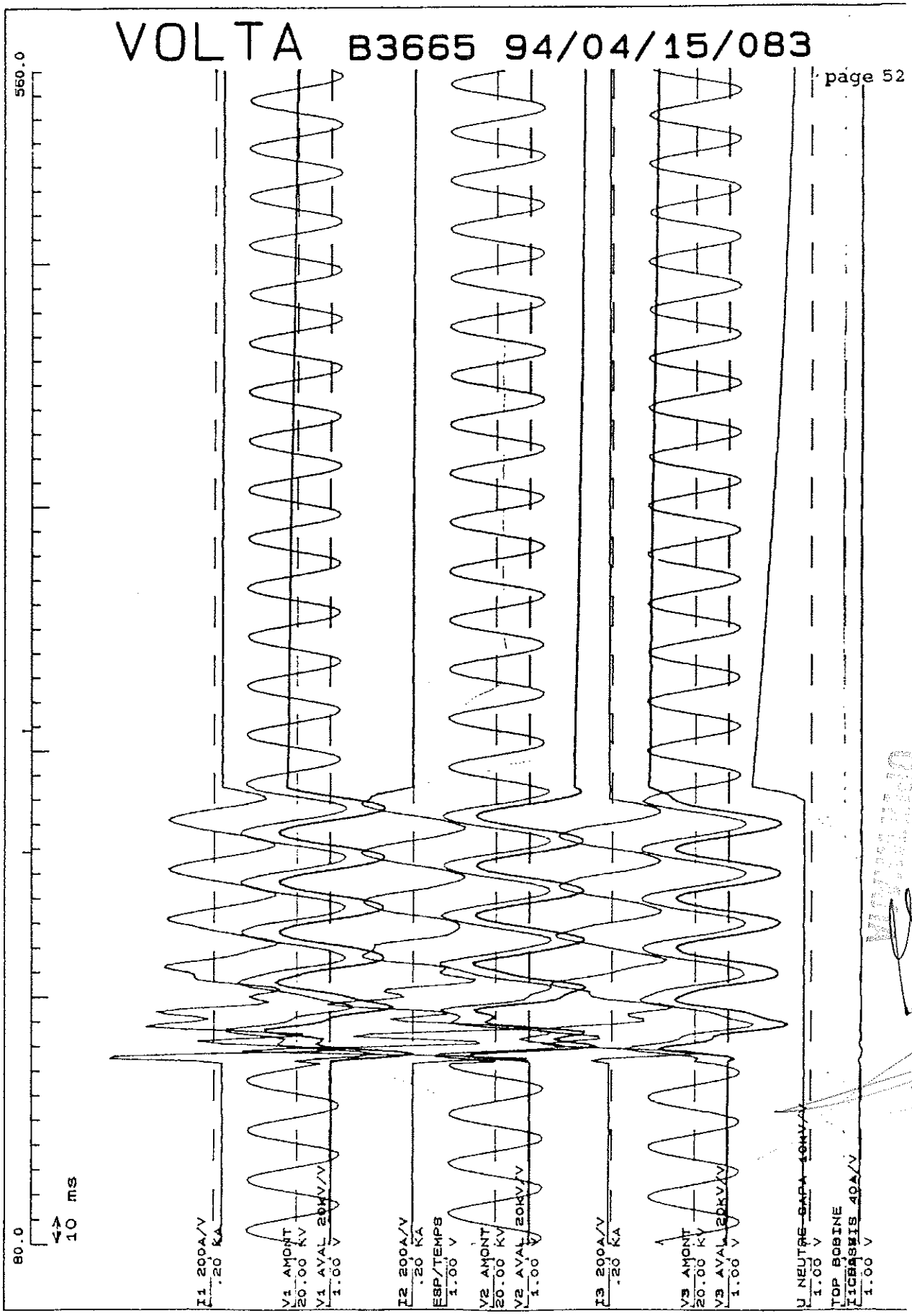
3

VOLTA B3665 94/04/15/081

1444

VOLTA B3665 94/04/15/082




VOLTA B3665 94/04/15/083
page 52
560.0
80.0
10 ms
I1 200A/V
.20 KA
V1 AMONT
20.00 KV
V1 AVAL 20KV/V
1.00 V
I2 200A/V
.20 KA
ESP/TEMPS
1.00 V
V2 AMONT
20.00 KV
V2 AVAL 20KV/V
1.00 V
I3 200A/V
.20 KA
V3 AMONT
20.00 KV
V3 AVAL 20KV/V
1.00 V
U NEUTRE GAP1 10KV/V
1.00 V
TOP BOBINE
1.00 V

1446

VOLTA B3665 94/04/15/084
page 5
560.0
80.0
10 ms
VOIE 1
.20 KA
VOIE 4
20.00 KV
VOIE 7
1.00 V
VOIE 2
.20 KA
VOIE10
1.00 V
VOIE 5
20.00 KV
VOIE 8
1.00 V
VOIE 3
.20 KA
VOIE 6
20.00 KV
VOIE 9
1.00 V
VOIE11
1.00 V
VOIE12
1.00 V

1447

VOLTA B3665 94/04/15/085
page 5
560.0
80.0
10 ms
I1 200A/V
.20 KA
V1 AMONT
20.00 KV
V1 AVAL 20KV/V
1.00 V
I2 200A/V
.20 KA
ESP/TEMPS
1.00 V
V2 AMONT
20.00 KV
V2 AVAL 20KV/V
1.00 V
I3 200A/V
.20 KA
V3 AMONT
20.00 KV
V3 AVAL 20KV/V
1.00 V
U NEUTRE CAPA 10KV/V
1.00 V
TOP BOBINE
I CHASSIS 40A/V
1.00 V