



PARS SWITCH CO.

SALES ENGINEERING DEPARTMENT

***TYPE TEST REPORT
FP72D OUTDOOR
(FPS3625D)***

CESI

CESI

client PARS SWITCH Co. - Tehran - IRAN

equipment under test Three-pole SF₆ outdoor circuit-breaker 36 kV type FP72D

tests performed Short-time withstand and peak withstand current test
Short-circuit tests

normative documents IEC 62271-100 (2001)

receipt date of the sample September 9, 2002

test date: from September 25, 2002 to September 26, 2002

the test results relate only to the sample tested
this document shall not be reproduced except in full without the written approval of CESI



no. of pages 28 no. of pages annexed 100

issue date October 21, 2002

prepared PeC/TEST - P. BECCARINI

verified PeC/TEST - G. GHEZZI

approved PeC/TEST - V. SCARIONI

Giuseppe Beccarini
Stefano Ghezzi

CESI
CENTRO ELETTROTECNICO Sperimentale ITALIANO
Business Unit
Prove e Componenti
Il Responsabile del Laboratorio

tests witnessed by:

Mr. Mohammad Ghiasabadi	- PARS SWITCH Co.
Mr. Mojtaba Alimohammadi	- PARS SWITCH Co.
Mr. Nosrat Mohammadi	- PARS SWITCH Co.
Mr. Naser Dizajian	- PARS SWITCH Co.
Mr. Jamal Halvachi	- PARS SWITCH Co.
Mrs. Faezeh Fazeli	- E.P.I.L. Co.

identification of the object: effected.

The Manufacturer guarantees that the tested object is manufactured according to the submitted drawings.

CESI checked that these drawings adequately represent in shape and dimensions the essential details and the parts of the tested object.

These drawings identified by CESI and numbered A2/032166 no.1 to 14 have been returned to the Client.

the data necessary to permit repetition of the tests are contained in the document marked:
GPS-A2/029941

The measurement uncertainties of the test results reported in this document are the following:

voltage: $\pm 5\%$; **current:** $\pm 5\%$; **time:** $\pm 5\%$

The measurement uncertainties are estimated at the level of twice the standard deviation (corresponding, in the case of normal distribution, to a confidence level of about 95 %) and have to be considered as maximum values.

activity code: 35067J

keywords: 12015R 23410N 31020W 45070T 53001D 62310N

contents	page	test date
rated characteristics of the tested object assigned by the Client	4	
table of the no-load operations	5	
measurement of the resistance and power frequency voltage withstand dry test on the main circuit tests performed	6	
Three-phase short-time withstand and peak withstand current test with 25,2 kA for 3,02 s	7	September 25, 2002
Three-phase short-circuit tests; test duty T10 with 2,40 kA at 36,7 kV	8	September 25, 2002
Three-phase short-circuit tests; test duty T30 with 6,10 kA at 36,7 kV	9	September 25, 2002
Three-phase short-circuit tests; test duty T60 with 13,7 kA at 36,7 kV	10	September 26, 2002
Three-phase short-circuit tests; test duty T100s with 20,0 kA at 36,7 kV	11	September 26, 2002
Three-phase short-circuit tests; test duty T100a with 20,0 kA at 36,7 kV	12	September 26, 2002
Single-phase short-circuit tests; breaking operation with 20,3 kA at 21,4 kV	13	September 26, 2002
Single-phase short-circuit tests; breaking operation with 25,4 kA at 21,4 kV	14	September 26, 2002
Three-phase short-circuit tests; test duty T100s with 25,0 kA at 36,7 kV	15	September 26, 2002
Three-phase short-circuit tests; test duty T100a with 25,0 kA at 36,7 kV	16	September 26, 2002
circuit-diagrams	17 to 19	
photos	20 to 28	
pages annexed		
Oscillograms (no.100)		

rated characteristics of the tested object assigned by the Client

manufacturer	PARS SWITCH Co. - Tehran - IRAN
type	FP72D (FP3625D) outdoor
serial number	10001
voltage	36 kV
normal current	1250 A
frequency	50 Hz
lightning impulse withstand voltage	170 kV
power frequency withstand voltage	70 kV
short-circuit making current	62,5 kA at 36 kV
short-circuit breaking current	25 kA at 36 kV
d.c. component	31 %
minimum opening duration	45 ms
transient recovery voltage (TRV)	
first pole to clear factor	1,5
peak value (U _c)	62 kV
rate of rise (U/t)	0,57 kV/μs
operating sequence	O-3min-CO-3min-CO
short-circuit duration	3 s
operating mechanism	type BLRM
supply voltage	
closing devices	110 V d.c.
opening devices	110 V d.c.
motor	110 V d.c.
supply pressure (referred to 20 °C)	
breaking device	0,45 MPa abs.

table of the no-load operations

Vn = rated voltage of the auxiliary devices.

oscillograms	operating sequence	supply voltage						gas operating pressure for		time of			made	
		opening device		closing device		motor		operation	interruption	opening	closing	opening	before the test	after the test
no.	-	V	% Vn	V	% Vn	V	% Vn	MPa abs.	MPa abs.	ms	ms	ms	no.	no.
1/1	O	121	110	-	-	121	110	-	0,45	40	-	-	1	-
2/2	CO	121	110	121	110	121	110	-	0,45	-	70	39	1	-
3/3	CO	110	100	110	100	110	100	-	0,45	-	73	40	1	-
4/3	CO	77	70	93,5	85	93,5	85	-	0,45	-	78	47	1	-
8/1	O	77	70	-	-	93,5	85	-	0,45	47	-	-	-	1
44/4	CO	121	110	121	110	121	110	-	0,45	-	74	38	-	24
45/3	CO	110	100	110	100	110	100	-	0,45	-	79	39	-	24
46/3	CO	77	70	93,5	85	93,5	85	-	0,45	-	82	44	-	24

Measurement of the resistance of the main circuit

resistance measured with 100 A d.c.

measurement effected	resistance ($\mu\Omega$) across the pole			ambient air temperature °C
	R	S	T	
before the tests	28	29	35	14
after the test no.1	29	29	28	15

Power frequency voltage withstand dry test on the main circuit

tests effected	applied voltage (kV for 60 s) across the pole		
	R	S	T
after the test no.17	56	56	56

note: no discharge occurred during the test

Three-phase short-time withstand and peak withstand current test

with 25,2 kA for 3,02 s

test circuit: see D001

power factor: <0,15

frequency: 50 Hz

supply voltage for operating devices			gas operating pressure for	
closing V d.c.	opening V d.c.	motor V d.c.	operation MPa abs.	interruption MPa abs.
-	-	-	-	0,45

condition of the apparatus before the tests: new, see photo no.1

live side of test circuit connected to: lower terminals.

date: September 25, 2002

test no.	oscillogram no.	duration s	test current				notes
			maximum peak		rms value	average	
			kA	phase	kA	kA	
1	7/2	3,02	63,8	T	25,2 25,2 25,2	25,2	-

conditions of the apparatus after the tests: externally as before the test ; after the test the circuit-breaker operated properly, see oscillogram no.8

Three-phase short-circuit tests

test duty T10 with 2,40 kA at 36,7 kV

test circuit: see D002

power factor: < 0,15

frequency: 50 Hz

prospective transient recovery voltage

U_c kV	t_3 μs	t_e μs	U_1 kV	t_1 μs	U_t kV	t_2 μs	t_d μs
77	27	3	-	-	-	-	-

supply voltage for operating devices			gas operating pressure for	
closing V d.c.	opening V d.c.	motor V d.c.	operation MPa abs.	interruption MPa abs.
93,5	77	93,5	-	0,45

condition of the apparatus before the tests: as after the test no.1

live side of the test circuit connected to: lower terminals.

date: September 25, 2002

test no.	oscillogram no.	operating sequence	applied voltage (phase-to- earth)	making current (peak value)	breaking current			power frequency recovery voltage		maximum overvoltage	duration of			
					ac component (rms value)	average	dc component	phase-to- earth	phase-to- phase (average)		closing	opening	pre-arc	arc
			kV	kA / phase	kA	kA	% / phase	kV	kV	kV	ms	ms	ms	ms
2	10/3	O	-	-	2,40 2,40 2,40	2,40	< 20	21,2 21,2 21,2	36,7	79,7	-	47	-	10
3	11/4	3min CO	21,2 21,2 21,2	-	2,40 2,40 2,40	2,40	< 20	21,2 21,2 21,2	36,7	79,2	79	49	-	8
4	12/4	3min CO	21,2 21,2 21,2	-	2,40 2,40 2,40	2,40	< 20	21,2 21,2 21,2	36,7	80,9	80	47	-	10

conditions of the apparatus after the tests: after an external visual inspection the apparatus is deemed to be able to continue the tests.

Three-phase short-circuit tests

test duty T30 with 6,10 kA at 36,7 kV

test circuit: see D002

power factor: <0,15

frequency: 50 Hz

prospective transient recovery voltage

U_s kV	t_s μ s	t_d μ s	U_1 kV	t_1 μ s	U_2 kV	t_2 μ s	t_d μ s
66	25	3	-	-	-	-	-

supply voltage for operating devices			gas operating pressure for	
closing V d.c.	opening V d.c.	motor V d.c.	operation MPa abs.	interruption MPa abs.
93,5	77	93,5	-	0,45

condition of the apparatus before the tests: as after the test no.4

live side of the test circuit connected to: lower terminals.

date: September 25, 2002

test	oscillogram	operating sequence	applied voltage (phase-to-earth)	making current (peak value)	breaking current			power frequency recovery voltage		maximum overvoltage	duration of			
					ac component (rms value)	average	dc component	phase-to-earth	phase-to-phase (average)		closing	opening	pre-arc	arc
no.	no.	-	kV	kA / phase	kA	kA	% / phase	kV	kV	kV	ms	ms	ms	ms
5	13/3	O	-	-	6,10	6,10	<20	21,2	36,7	64,6	-	48	-	9
					6,10			21,2						
					6,10			21,2						
6	15/4	3min CO	21,2	-	6,10	6,10	<20	21,2	36,7	65,5	80	46	-	10
			21,2		6,10			21,2						
			21,2		6,10			21,2						
7	16/4	3min CO	21,2	-	6,10	6,10	<20	21,2	36,7	65,5	79	47	-	10
			21,2		6,10			21,2						
			21,2		6,10			21,2						

conditions of the apparatus after the tests: after an external visual inspection the apparatus is deemed to be able to continue the tests.

Three-phase short-circuit tests

test duty T60 with 13,7 kA at 36,7 kV

test circuit: see D002

power factor: < 0,15

frequency: 50 Hz

prospective transient recovery voltage

U_c kV	t_2 μs	t_c μs	U_1 kV	t_1 μs	U_c kV	t_2 μs	t_c μs
65	47	3	-	-	-	-	-

supply voltage for operating devices			gas operating pressure for	
closing V d.c.	opening V d.c.	motor V d.c.	operation MPa abs.	interruption MPa abs.
93,5	77	93,5	-	0,45

condition of the apparatus before the tests: as after the test no.7

live side of the test circuit connected to: lower terminals.

date: September 26, 2002

test no.	oscillogram no.	operating sequence	applied voltage (phase-to- earth)	making current (peak value)	breaking current			power frequency recovery voltage		maximum overvoltage	duration of			
					ac component (rms value)	average	dc component	phase-to- earth	phase-to- phase (average)		closing	opening	pre-arc	arc
8	18/3	O	-	-	13,7 13,7 13,7	13,7	< 20	21,2 21,2 21,2	36,7	65,5	-	48	-	11
9	19/4	3min CO	21,2 21,2 21,2	-	13,7 13,7 13,7	13,7	< 20	21,2 21,2 21,2	36,7	66,3	80	46	-	10
10	20/4	3min CO	21,2 21,2 21,2	-	13,7 13,7 13,7	13,7	< 20	21,2 21,2 21,2	36,7	66,3	80	46	-	10

conditions of the apparatus after the tests: after an external visual inspection the apparatus is deemed to be able to continue the tests.

Three-phase short-circuit tests

test duty T100s with 20,0 kA at 36,7 kV

test circuit: see D001

power factor: <0,15

frequency: 50 Hz

prospective transient recovery voltage							
U ₁ kV	t ₁ μs	t ₂ μs	U ₁ kV	t ₁ μs	U ₂ kV	t ₂ μs	t ₃ μs
63	110	9	-	-	-	-	-

supply voltage for operating devices			gas operating pressure for	
closing V d.c.	opening V d.c.	motor V d.c.	operation MPa abs.	interruption MPa abs.
93,5	77	93,5	-	0,45

condition of the apparatus before the tests: as after the test no.10

live side of the test circuit connected to: lower terminals.

date: September 26, 2002

test no.	oscillogram no.	operating sequence	applied voltage (phase-to- earth)	making current (peak value)	breaking current			power frequency recovery voltage		maximum overvoltage	duration of			
					ac component (rms value)	average	dc component	phase-to- earth	phase-to- phase (average)		closing	opening	pre-arc	arc
			kV	kA / phase	kA	kA	% / phase	kV	kV	kV	ms	ms	ms	ms
11	24/3	CO	-	-	20,0 20,0 20,0	20,0	<20	21,2 21,2 21,2	36,7	64,7	-	47	-	11
12	25/4	3min CO	21,2 21,2 21,2	50,3 / R	20,0 20,0 20,0	20,0	<20	21,2 21,2 21,2	36,7	63,8	80	48	-	10
13	26/4	3min CO	21,2 21,2 21,2	51,1 / S	20,0 20,0 20,0	20,0	<20	21,2 21,2 21,2	36,7	63,0	77	43	-	13

conditions of the apparatus after the tests: after an external visual inspection the apparatus is deemed to be able to continue the tests.

Three-phase short-circuit tests

test duty T100a with 20,0 kA at 36,7 kV

test circuit: see D001

power factor: <0,15

frequency: 50 Hz

time constant (To) : 101 ms

prospective transient recovery voltage

U_e kV	t_2 μ s	t_0 μ s	U_1 kV	t_1 μ s	U_e kV	t_2 μ s	t_0 μ s
63	110	9	-	-	-	-	-

condition of the apparatus before the tests: as after the test no.13

live side of the test circuit connected to: lower terminals.

date: September 26, 2002

test no.	oscillogram no.	operating sequence	applied voltage (phase-to- earth)	making current (peak value)	breaking current			power frequency recovery voltage		maximum overvoltage	duration of			
					ac component (rms value)	average	dc component	phase-to- earth	phase-to- phase (average)		closing	opening	pre-arc	arc
			kV	kA / phase	kA	kA	% / phase	kV	kV	kV	ms	ms	ms	ms
14	27/3	O	-	-	20,0 20,0 20,0	20,0	33 / T	21,2 21,2 21,2	36,7	61,5	-	40	-	11
15	28/3	3min O	-	-	20,0 20,0 20,0	20,0	34 / S	21,2 21,2 21,2	36,7	64,0	-	40	-	13
16	29/3	3min O	-	-	20,0 20,0 20,0	20,0	32 / R	21,2 21,2 21,2	36,7	62,3	-	39	-	12

conditions of the apparatus after the tests: after an external visual inspection the apparatus is deemed to be able to continue the tests.

Single-phase short-circuit tests

breaking operation with 20,3 kA at 21,4 kV

test circuit: see D031

power factor: <0,15

frequency: 50 Hz

prospective transient recovery voltage							
U_c kV	t_3 μ s	t_d μ s	U_1 kV	t_1 μ s	U_c kV	t_2 μ s	t_d μ s
44,5	93	-	-	-	-	-	-

supply voltage for operating devices			gas operating pressure for	
closing V d.c.	opening V d.c.	motor V d.c.	operation MPa abs.	interruption MPa abs.
-	77	-	-	0,45

condition of the apparatus before the tests: as after the test no.16

live side of the test circuit connected to: lower terminal

pole under test: T

date: September 26, 2002

test no.	oscillogram no.	operating sequence	applied voltage kV	making current (peak value) kA	breaking current		power frequency recovery voltage kV	maximum over- voltage kV	duration of			
					ac component (rms value) kA	dc component %			closing ms	opening ms	pre-arc ms	arc ms
17	33/2	0	-	-	20,3	<20	21,4	46,2	-	48	-	11

conditions of the apparatus after the tests: after the test the circuit-breaker operated properly.

Single-phase short-circuit tests

breaking operation with 25,4 kA at 21,4 kV

test circuit: see D031

power factor: <0,15

frequency: 50 Hz

prospective transient recovery voltage

U_i kV	t_3 μs	t_o μs	U_i kV	t_1 μs	U_c kV	t_2 μs	t_s μs
44,3	87	-	-	-	-	-	-

supply voltage for operating devices			gas operating pressure for	
closing V d.c.	opening V d.c.	motor V d.c.	operation MPa abs.	interruption MPa abs.
-	77	-	-	0,45

condition of the apparatus before the tests: as after the test no.17

live side of the test circuit connected to: lower terminal

pole under test: T

date: September 26, 2002

test no.	oscillogram no.	operating sequence	applied voltage kV	making current (peak value) kA	breaking current		power frequency recovery voltage kV	maximum over- voltage kV	duration of			
					ac component (rms value) kA	dc component %			closing ms	opening ms	pre-arc ms	arc ms
18	34/3	O	-	-	25,4	<20	21,4	46,5	-	46	-	13

conditions of the apparatus after the tests: after an external visual inspection the apparatus is deemed to be able to continue the tests.

Three-phase short-circuit tests

test duty T100s with 25,0 kA at 36,7 kV

test circuit: see D001

power factor: <0,15

frequency: 50 Hz

prospective transient recovery voltage							
U_c kV	t_3 μ s	t_9 μ s	U_1 kV	t_1 μ s	U_c kV	t_2 μ s	t_2 μ s
62	106	9	-	-	-	-	-

supply voltage for operating devices			gas operating pressure for	
closing V d.c.	opening V d.c.	motor V d.c.	operation MPa abs.	interruption MPa abs.
93,5	77	93,5	-	0,45

condition of the apparatus before the tests: as after the test no.18

live side of the test circuit connected to: lower terminals.

date: September 26, 2002

test	oscillogram	operating sequence	applied voltage (phase-to-earth)	making current (peak value)	breaking current			power frequency recovery voltage		maximum overvoltage	duration of			
					ac component (rms value)	average	dc component	phase-to-earth	phase-to-phase (average)		closing	opening	pre-arc	arc
no.	no.	-	kV	kA / phase	kA	kA	% / phase	kV	kV	kV	ms	ms	ms	ms
19	38/3	O	-	-	25,0 25,0 25,0	25,0	< 20	21,2 21,2 21,2	36,7	62,3	-	48	-	12
20	39/4	3min CO	21,2 21,2 21,2	64,7 / S	25,0 25,0 25,0	25,0	< 20	21,2 21,2 21,2	36,7	64,6	86	48	-	15
21	40/4	3min CO	21,2 21,2 21,2	63,8 / R	25,0 25,0 25,0	25,0	< 20	21,2 21,2 21,2	36,7	59,6	80	46	2	12

conditions of the apparatus after the tests: after an external visual inspection the apparatus is deemed to be able to continue the tests.

Three-phase short-circuit tests

test duty T100a with 25,0 kA at 36,7 kV

test circuit: see D001

power factor: <0,15

frequency: 50 Hz

time constant (To) : 101 ms

prospective transient recovery voltage							
U _c kV	t ₃ μs	t ₂ μs	U ₁ kV	t ₁ μs	U ₂ kV	t ₂ μs	t ₃ μs
62	106	9	-	-	-	-	-

supply voltage for operating devices			gas operating pressure for	
closing V d.c.	opening V d.c.	motor V d.c.	operation MPa abs.	interruption MPa abs.
-	121	-	-	0,45

condition of the apparatus before the tests: as after the test no.21

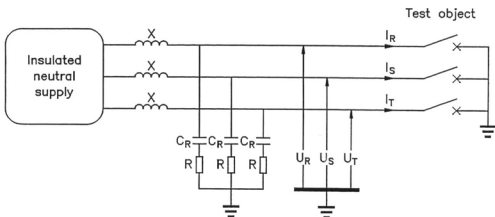
live side of the test circuit connected to: lower terminals.

date: September 26, 2002

test no.	oscillogram no.	operating sequence	applied voltage (phase-to- earth)	making current (peak value) kA / phase	breaking current			power frequency recovery voltage		maximum overvoltage kV	duration of			
					ac component (rms value) kA	average kA	dc component % / phase	phase-to- earth kV	phase-to- phase (average) kV		closing ms	opening ms	pre-arc ms	arc ms
22	41/3	O	-	-	25,0 25,0 25,0	25,0	31 / T	21,2 21,2 21,2	36,7	60,4	-	38	-	13
23	42/3	3min O	-	-	25,0 25,0 25,0	25,0	32 / S	21,2 21,2 21,2	36,7	57,7	-	39	-	14
24	43/3	3min O	-	-	25,0 25,0 25,0	25,0	31 / R	21,2 21,2 21,2	36,7	59,4	-	39	-	15

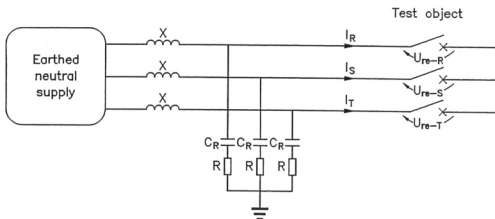
conditions of the apparatus after the tests: see photos no.2 to 16 ; a hole with adjunct exit of SF6 gas on the pole S is compared (photos no.2 to 4).

circuit-diagram D001



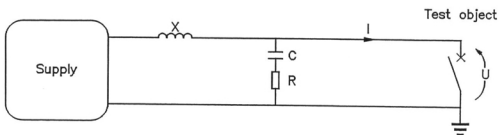
Symbols used in this diagram are the same as those on the oscillograms.

circuit-diagram D002



Symbols used in this diagram are the same as those on the oscillograms.

circuit-diagram D031



Symbols used in this diagram are the same as those on the oscillograms.

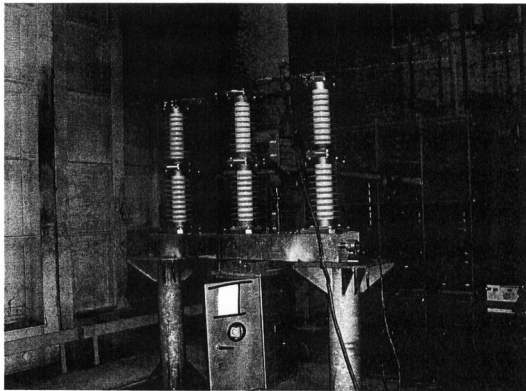


Photo no. 1

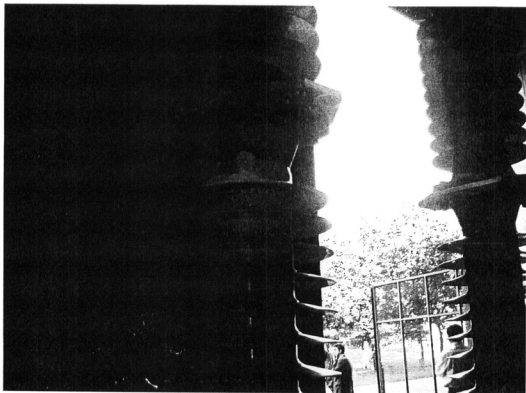


Photo no. 2

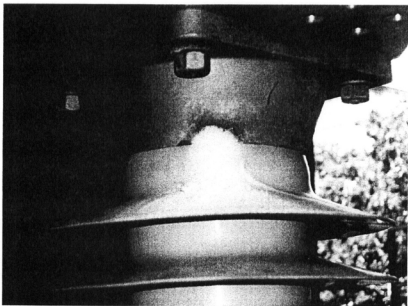


Photo no. 3

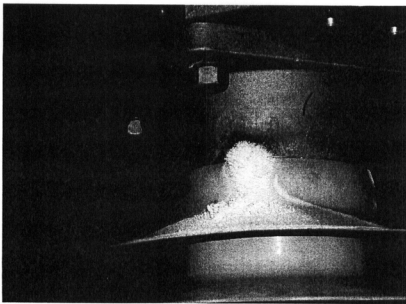


Photo no. 4

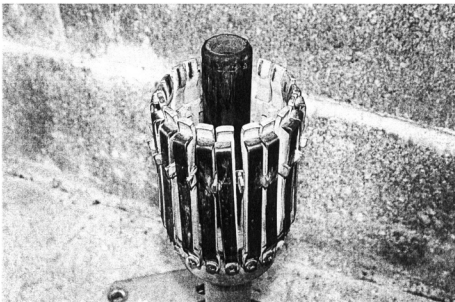


Photo no. 5
Phase R

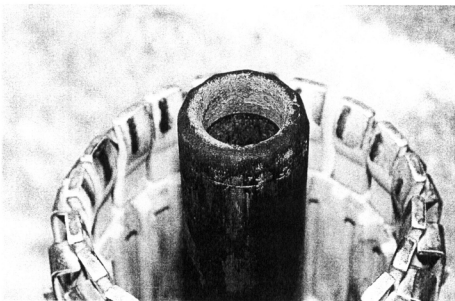


Photo no. 6
Phase R

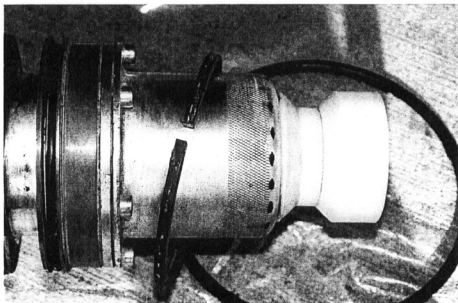


Photo no. 7
Phase R

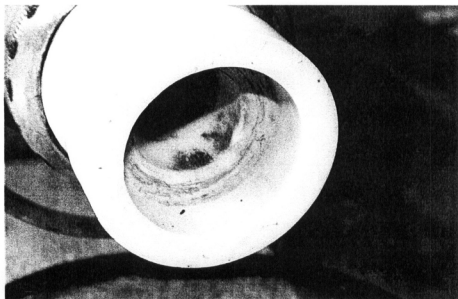


Photo no. 8
Phase R

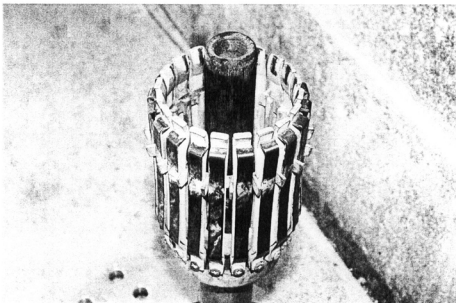


Photo no. 9
Phase S

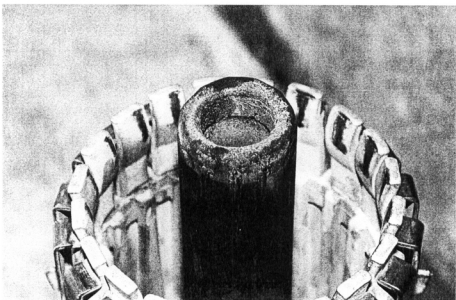


Photo no. 10
Phase S

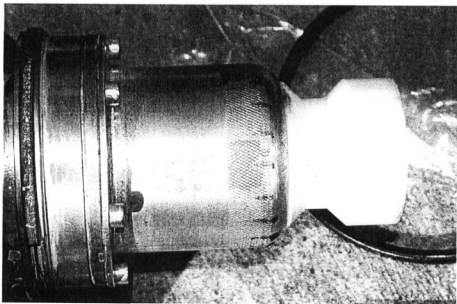


Photo no. 11
Phase S

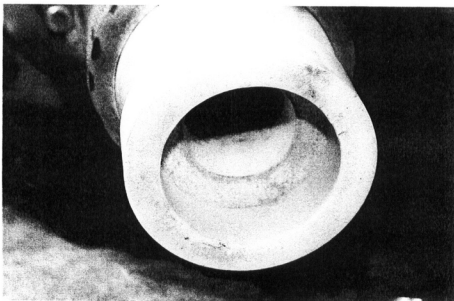


Photo no. 12
Phase S

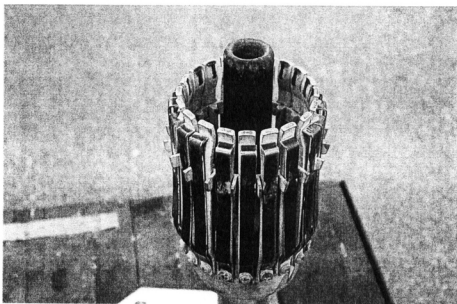


Photo no. 13
Phase T

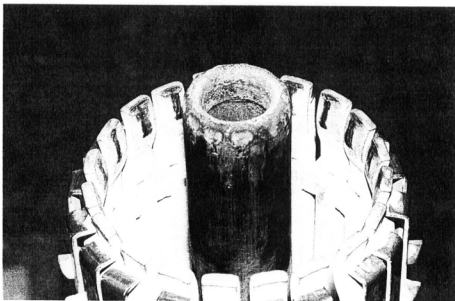


Photo no. 14
Phase T

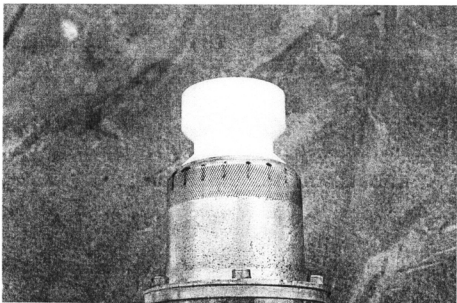


Photo no. 15
Phase T

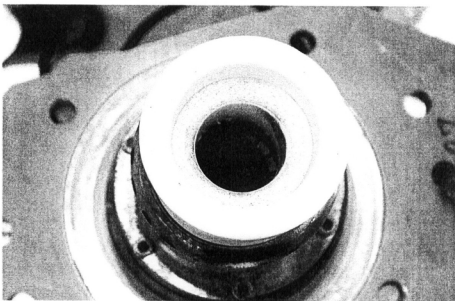


Photo no. 16
Phase T

C.C
0.45V

Dt=39.54ms

I.C
2.A
1.0
1.A

SC1
50.V

SC2
50.V

SC3
50.V

645. 664. 683. 702. 721. 740.ms

CESI-GPS A2/029941 n.1

1.9ms/div

Tip.pvva POSIZ CICH CO OSC= POS



C.C
0.45V

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

SC3
50.V

10. 248. 486. 724. 962. 1200.ms

CESI-GPS A2/029941 n.2

Tip.pvva POSIZ CICH CO OSCU POS

23.8ms/div



C.C
0.45V

Dt=39.19ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

SC3
50.V

640. 662. 684. 706. 728. 750.ms

CESI-GPS A2/029941 n.2

2.2ms/div



C.C
0.45V

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

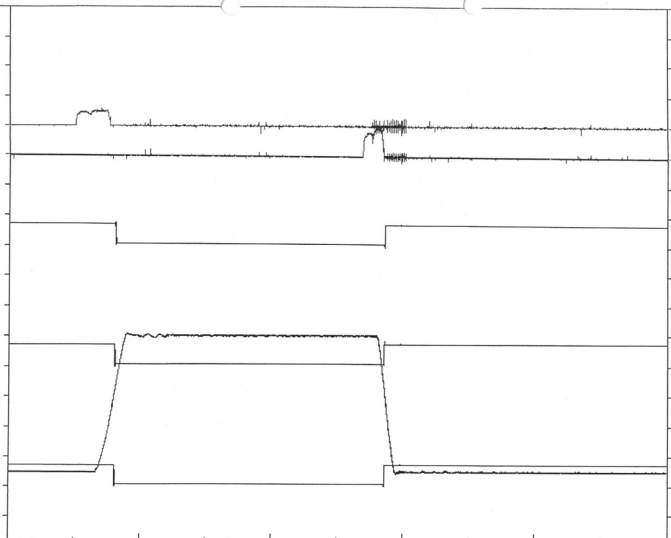
SC3
50.V

10. 248. 486. 724. 962. 1200.ms

CESI-GPS A2/029941 n.3

ITio.npva POST2 CEC= CO OSC= POS

23.8ms/div



C.C
0.45V

Dt=73.13ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

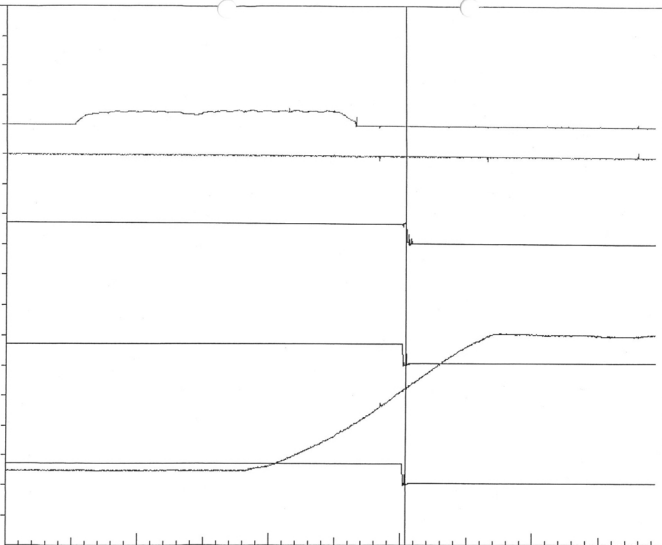
SC3
50.V

115. 144. 173. 202. 231. 260.ms

CESI-GPS A2/029941 n.3

2.9ms/div

TID-PPVH P052Z CICH CO OSCO P05



C.C
0.45V

Dt=39.78ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

SC3
50.V

637. 656. 675. 694. 713. 732.ms

CESI-GPS A2/029941 n.3

1.9ms/div

ATA 4000 BASET FTCH 20 ACQU 900

C.C
0.45V

I.C
1.A
I.O
1.A

SC1
50.V

SC2
50.V

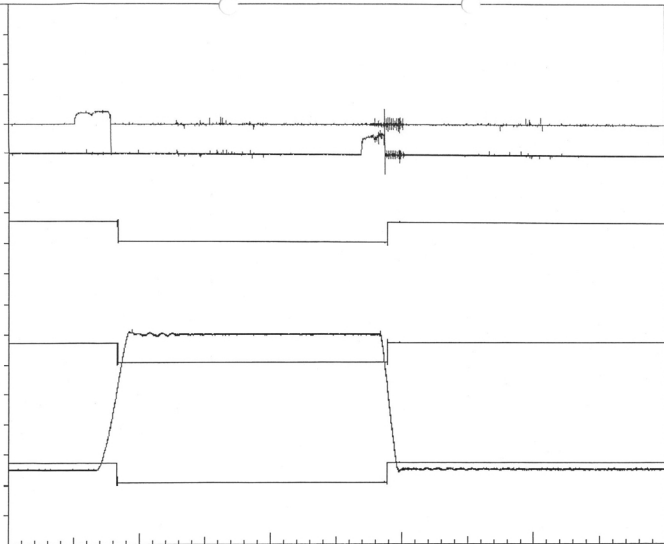
SC3
50.V

10. 248. 486. 724. 962. 1200.ms

CESI-GPS A2/029941 n.4

23.8ms/div

*** HIGH IMPEDANCE INPUT FOR ALL SCHEMATA ***



C.C
0.45V

Dt=77.76ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

SC3
50.V

116. 145. 174. 203. 232. 261.ms

CESI-GPS A2/029941 n.4

2.9ms/div

C.C
0.45V

Dt=46.79ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

SC3
50.V

643. 664. 685. 706. 727. 748.ms

CESI-GPS A2/029941 n.4

2.1ms/div

ATA 1000 BAPEN 1000 CH 1000 BAPEN

Dt=3022.3ms

P14
4.V

UR
10.KV

IR
35.KA

US
10.KV

IS
35.KA

UT
10.KV

IT
35.KA

50. 720. 1390. 2060. 2730. 3400.ms

CESI-GPS A2/029941 n.7

Tip. prov. PRON CICH 1SEC OSC 1SEC

67.ms/div

IT.p=63.8kA

P14
4.V

UR
10.KV

IR
35.KA

US
10.KV

IS
35.KA

UT
10.KV

IT
35.KA

206. 236. 266. 296. 326. 356.ms

CESI-GPS A2/029941 n.7

Tip.prva PROVA CECH 1SEC 05CH 1SEC

3.ms/div

C.C
0.45V

Dt=46.92ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

SC3
50.V

133. 154. 175. 196. 217. 238.ms

CESI-GPS A2/029941 n.8

2.1ms/div

C.C
0.45V
P14
4.U

I.O
1.A
URER
30.KV

IR
3.KA

URES
30.KV

IS
3.KA

URET
30.KV

IT
3.KA

UARC
0.3KV

30. 124. 218. 312. 406. 500.ms

CESI-GPS A2/029941 n.10

Tip. prev. PROV. CESC 0 OSC 0

9.4ms/div

C.C
0.45V
P14
4.V

Dt=46.79ms
Dt=10.37ms

I.O
1.A
URER
30.KV

IR
3.KA

URES
30.KV

IS
3.KA

URET
30.KV

IT
3.KA

UARC
0.3KV

98. 119. 140. 161. 182. 203.ms

CESI-GPS A2/029941 n.10

2.1ms/div

Tip.pvz PROVA CESC 0 OSCO 0

URER.p=79.7kV

URER
30.KV

URES
30.KV

URET
30.KV

150.12 152.62 155.12 157.62 160.12 162.62ms

CESI-GPS R2/029941 n.10

0.25ms/div

C.C
0.45V
P14
4.U

Dt=39.31ms
Dt=12.11ms

I.O
1.A
UR
30.KV

IR
25.KA

US
30.KV

IS
25.KA

UT
30.KV

IT
25.KA

UARC
0.3KV

38. 76. 114. 152. 190. 228.ms

CESI-GPS A2/029941 n.29

3.8ms/div

Tid:0PV0 PROVA CICH 0 OSCo 0

UT.p=62.3kV

UR
30.KV

US
30.KV

UT
30.KV

131.8 133.8 135.8 137.8 139.8 141.8ms

CESI-GPS A2/029941 n.29

TIP:PRV= PROVH CEC= 0 OSC= 0

0.2ms/div

C.C
0.45V
P14
4.V

I.O
1.A

U
30.KV

I
25.KA

UARC
0.3KV

30. 124. 218. 312. 406. 500.ms

CESI-GPS A2/029941 n.33

9.4ms/div

C.C
0.45V
P14
4.V

Dt=47.62ms
Dt=10.6ms

I.O
1.A

U
30.KV

I
25.KA

UARC
0.3KV

108. 137. 166. 195. 224. 253.ms

CESI-GPS A2/029941 n.33

2.9ms/div

C.C
0.45V
Pi4
4.V

I.O
1.A

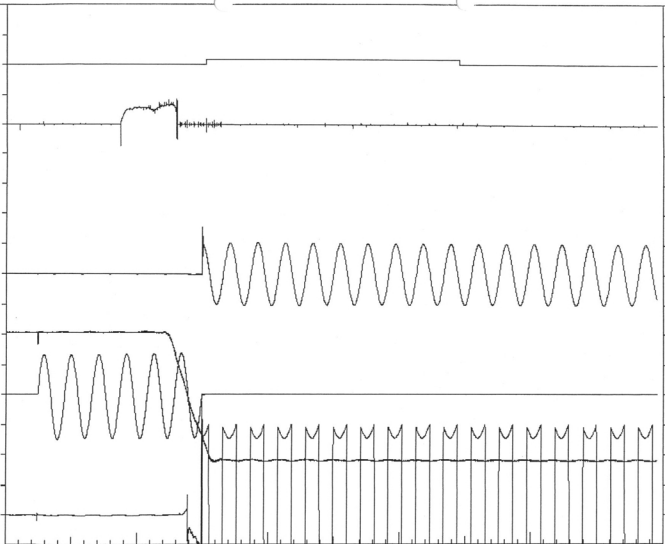
U
30.KV

I
25.KA

UARC
0.3KV

CESI-6PS A2/029941 n.34

9.5ms/div



C.C
0.45V
P14
4.V

Dt=46.41ms
Dt=12.98ms

I.O
1.A

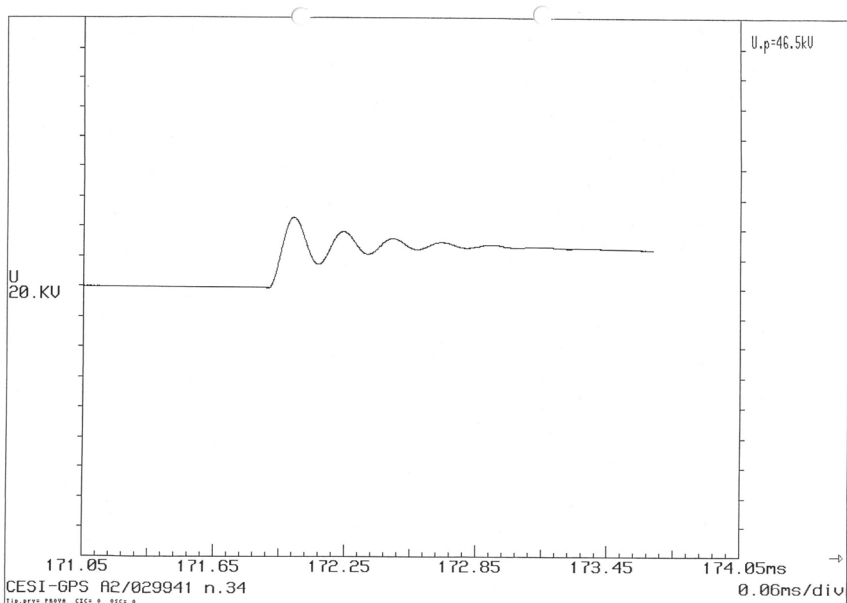
U
30.KV

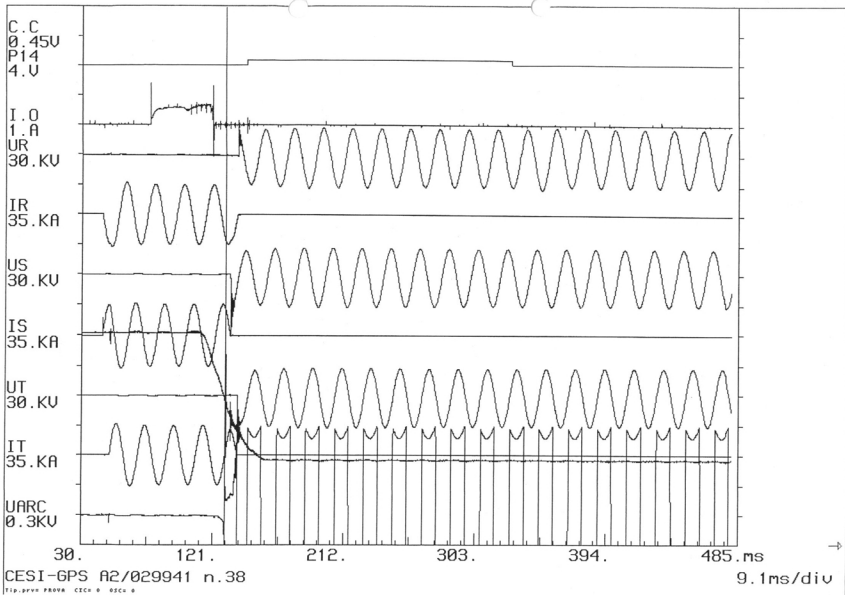
I
25.KA

UARC
0.3KV

CESI-GPS A2/029941 n.34

3.ms/div





C.C
0.45V
P14
4.U

Dt=48.35ms
Dt=12.42ms

I.O
1.A
UR
30.KV

IR
35.KA

US
30.KV

IS
35.KA

UT
30.KV

IT
35.KA

UARC
0.3KV

71. 100. 129. 158. 187. 216.ms

CESI-GPS A2/029941 n.38

2.9ms/div

Tin:0000 P000A CEC:0 OSC:0

US.p=62.3kV

UR
30.KV

US
30.KV

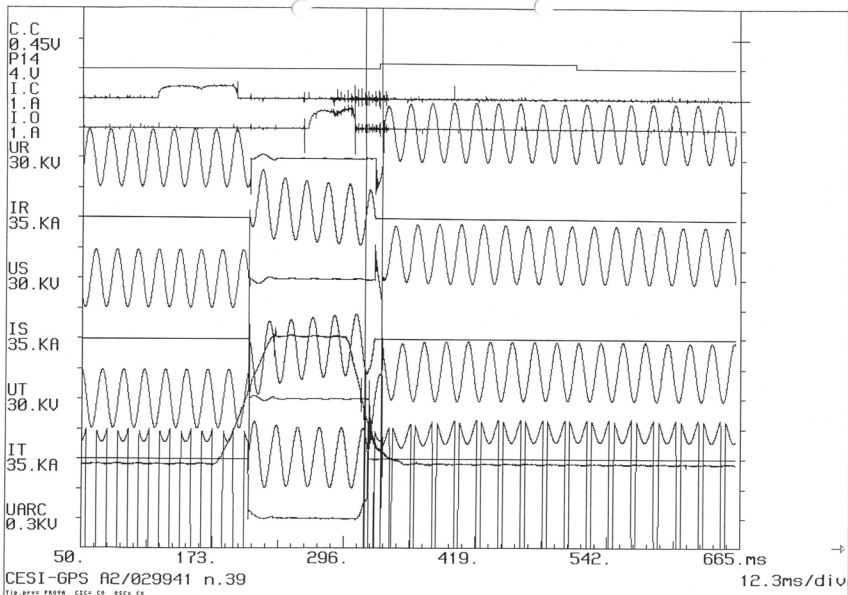
UT
30.KV

128.46 130.96 133.46 135.96 138.46 140.96ms

CESI-GPS A2/029941 n.38

0.25ms/div

File: C:\GPS\A2\029941.n38



C.C
0.45V
P14
4.U
I.C
1.A
I.O
1.A
UR
30.KV

IR
35.KA

US
30.KV

IS
35.KA

UT
30.KV

IT
35.KA

UARC
0.3KV

IS.p=64.7kA
Dt=86.25ms

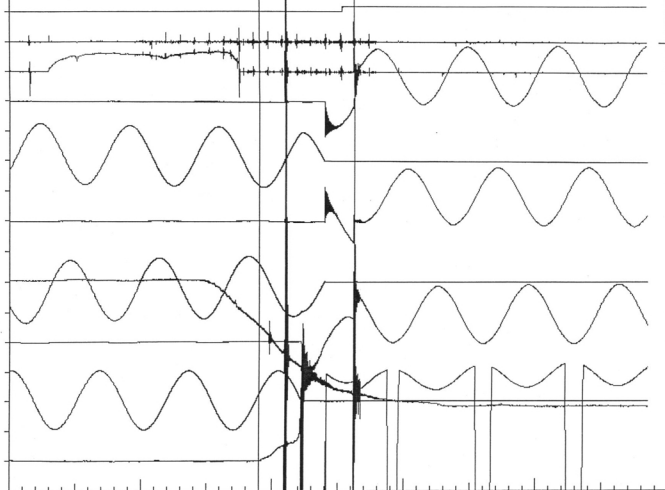
114. 146. 178. 210. 242. 274.ms

CESI-GPS A2/029941 n.39

3.2ms/div

C.C
0.45V
P14
4.U
I.C
1.A
I.O
1.A
UR
30.KV
IR
35.KA
US
30.KV
IS
35.KA
UT
30.KV
IT
35.KA
UARC
0.3KV

Dt=48.23ms
Dt=15.ms



252. 282. 312. 342. 372. 402.ms

CESI-GPS A2/029941 n.39

3.ms/div

UT.p=60.6kV
UT.p=64.6kV

UR
30.KV

US
30.KV

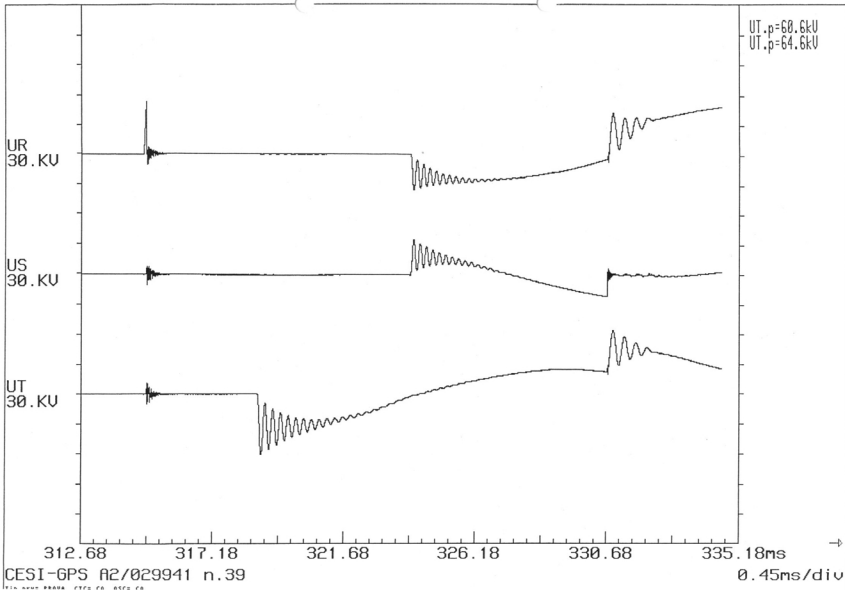
UT
30.KV

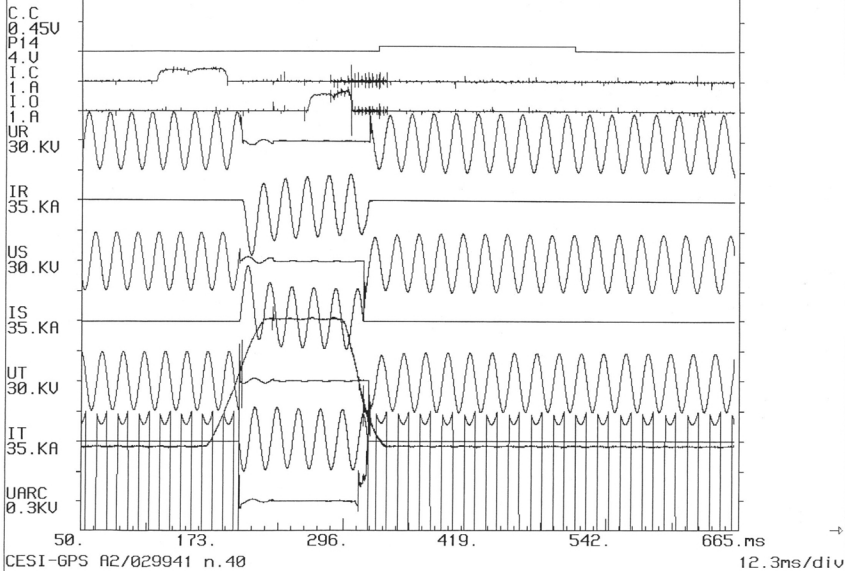
312.68 317.18 321.68 326.18 330.68 335.18ms

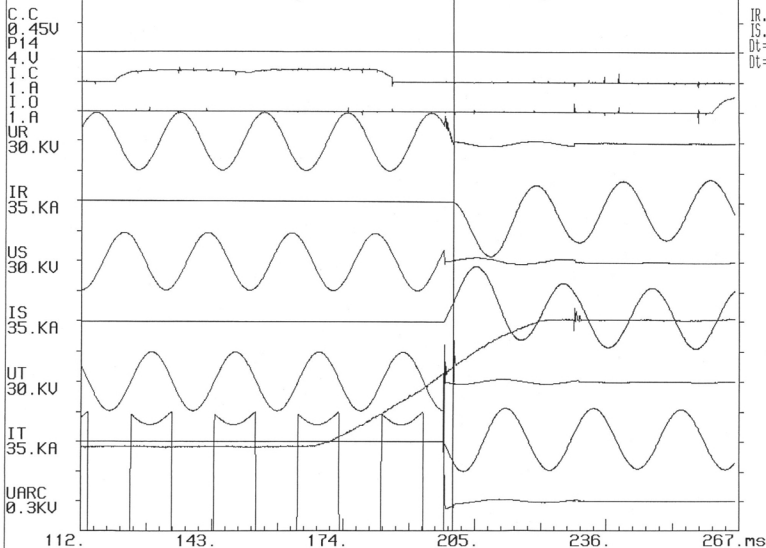
CESI-GPS A2/029941 n.39

0.45ms/div

Via nave PRADA 1770 10 0520 10







CESI-GPS A2/029941 n.40

3.1ms/div

C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
UR
30.KV

Dt=46.16ms
Dt=11.94ms

IR
35.KA

US
30.KV

IS
35.KA

UT
30.KV

IT
35.KA

UARC
0.3KV

252. 280. 308. 336. 364. 392.ms

CESI-GPS A2/029941 n.40

2.8ms/div

US.p=59.6kV

UR
30.KV

US
30.KV

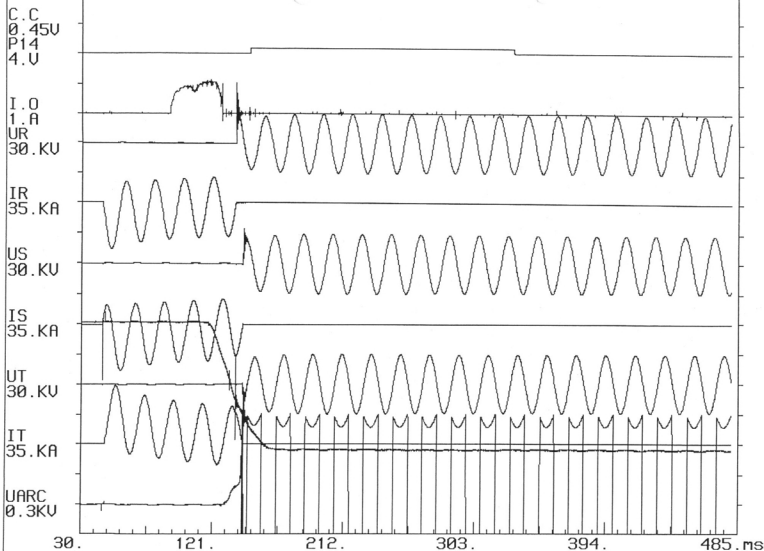
UT
30.KV

313. 315. 317. 319. 321. 323.ms

CESI-GPS A2/029941 n.40

TIP:PRVA PROVVA CICH CO OSCO CO

0.2ms/div



C.C
0.45V
P14
4.U

Dt=37.52ms
Dt=13.18ms

I.O
1.A
UR
30.KV

IR
35.KA

US
30.KV

IS
35.KA

UT
30.KV

IT
35.KA

UARC
0.3KV

37. 75. 113. 151. 189. 227.ms

CESI-GPS A2/029941 n.41

3.8ms/div

UR.p=60.4kV

UR
30.KV

US
30.KV

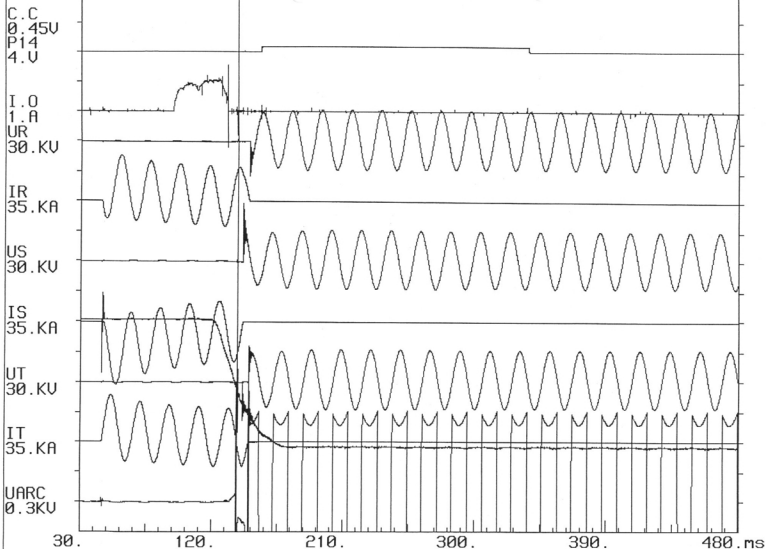
UT
30.KV

135.7 137.7 139.7 141.7 143.7 145.7ms

CESI-GPS A2/029941 n.41

Tip.pvva PROVA CICLO OSCIL

0.2ms/div



C.C
0.45V
P14
4.V

Dt=38.76ms
Dt=13.53ms

I.O
1.A
UR
30.KV

IR
35.KA

US
30.KV

IS
35.KA

UT
30.KV

IT
35.KA

UARC
0.3KV

36. 75. 114. 153. 192. 231.ms

CESI-GPS A2/029941 n.42

3.9ms/div

T10.DVH P00VA C1C0 0 OSC0 0

US.p=57.7kV

UR
30.KV

US
30.KV

UT
30.KV

136.09 138.59 141.09 143.59 146.09 148.59ms

CESI-GPS A2/029941 n.42

0.25ms/div

Tip.pvva PROVA CICH 0 OSC 0

C.C
0.45V
P14
4.V

I.O
1.A
UR
30.KV

IR
35.KA

US
30.KV

IS
35.KA

UT
30.KV

IT
35.KA

UARC
0.3KV

30. 120. 210. 300. 390. 480.ms

CESI-GPS A2/029941 n.43

9.ms/div

C.C
0.45V
P14
4.V

Dt=38.77ms
Dt=15.2ms

I.O
1.A
UR
30.KV

IR
35.KA

US
30.KV

IS
35.KA

UT
30.KV

IT
35.KA

UARC
0.3KV

38. 76. 114. 152. 190. 228.ms

CESI-GPS A2/029941 n.43

3.8ms/div

Tip.prvv PROVn CECG 0 OSCG 0

US.p=59.4kV

UR
30.KV

US
30.KV

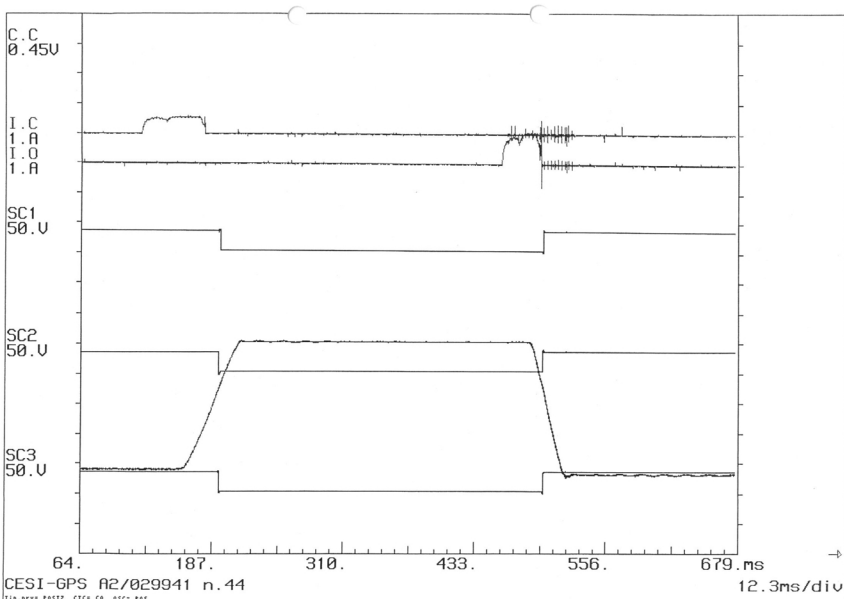
UT
30.KV

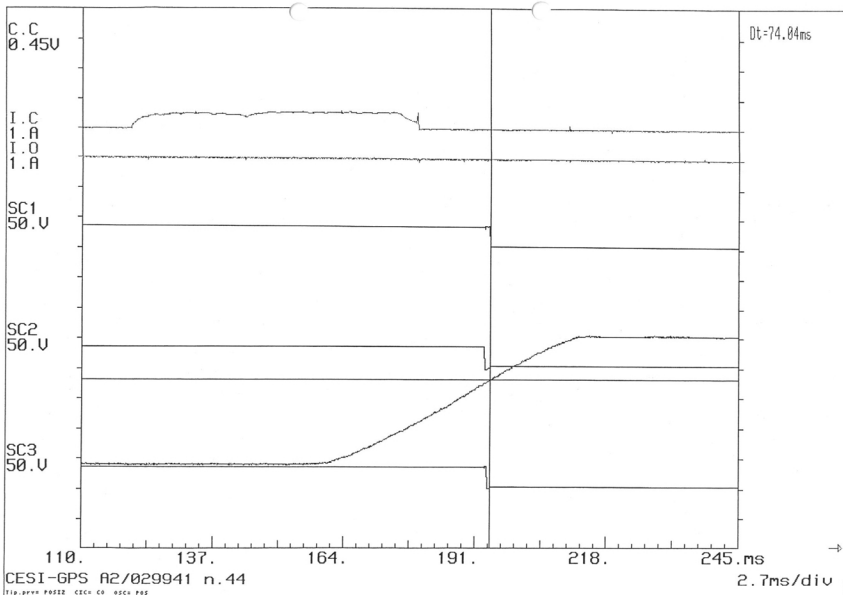
132.4 135.4 138.4 141.4 144.4 147.4ms

CESI-GPS R2/029941 n.43

Tip.prv= PRVA CEC= 0 OSC= 0

0.3ms/div





C.C
0.45V

Dt=73.99ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

SC3
50.V

116. 140. 164. 188. 212. 236.ms

CESI-GPS A2/029941 n.44

TIP.PRIN POSIZ CICH CO OSCU PDS

2.4ms/div

C.C
0.45V

Dt=37.72ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

SC3
50.V

454. 472. 490. 508. 526. 544.ms

CESI-GPS A2/029941 n.44

1.8ms/div

TIP:PRVZ P0512 CICH CO OSCA POS

C.C
0.45V

I.C
1.A
I.O
1.A

SC1
50.V

SC2
50.V

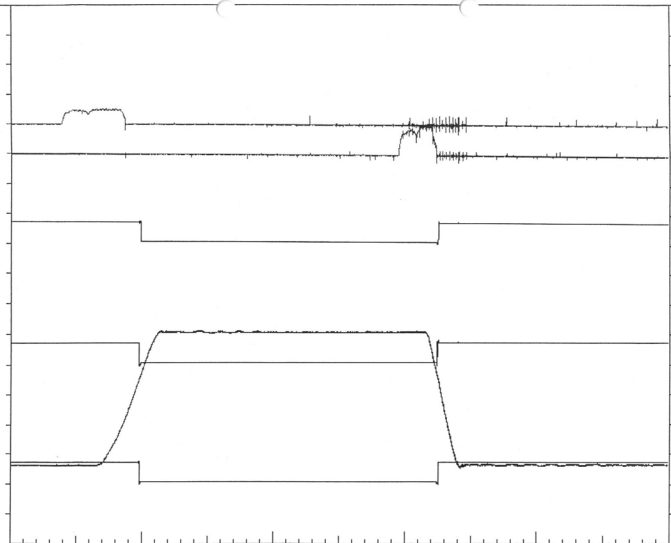
SC3
50.V

69. 201. 333. 465. 597. 729.ms

CESI-GPS R2/029941 n.45

13.2ms/div

Tip. grve P0512 CICH Co OSC P05



C.C
0.45U

Dt=79.06ms

I.C
1.A
I.O
1.A

SC1
50.V

SC2
50.V

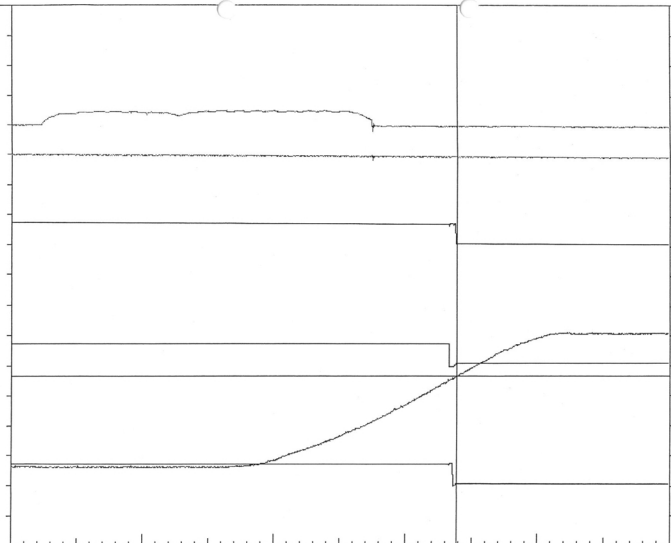
SC3
50.V

114. 139. 164. 189. 214. 239.ms

CESI-GPS A2/029941 n.45

2.5ms/div

Tip.pvu P032Z CEC= C0 OSC= P05



C.C.
0.45V

Dt=39.31ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

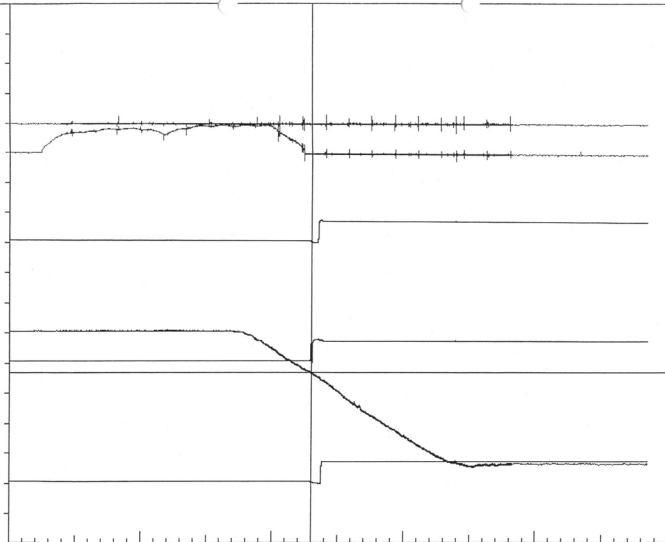
SC3
50.V

453. 472. 491. 510. 529. 548.ms

CESI-GPS R2/029941 n.45

1.9ms/div

Tip.09VH POSIZ CICH CO OSCA POS



C.C
0.45V

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

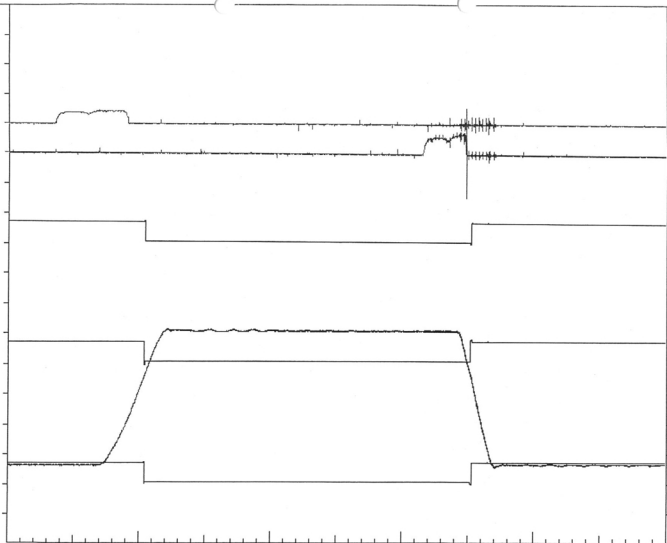
SC3
50.V

77. 198. 319. 440. 561. 682.ms

CESI-GPS A2/029941 n.46

Tip:prv= POSIZ CICH C0 OSC= POS

12.1ms/div



C.C
0.45V

Dt=82.35ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

SC3
50.V

113. 140. 167. 194. 221. 248.ms

CESI-GPS A2/029941 n.46

2.7ms/div

TID:0FVR POSIZ CICH CO OSCA POS

C.C
0.45V

Dt=44.83ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

SC3
50.V

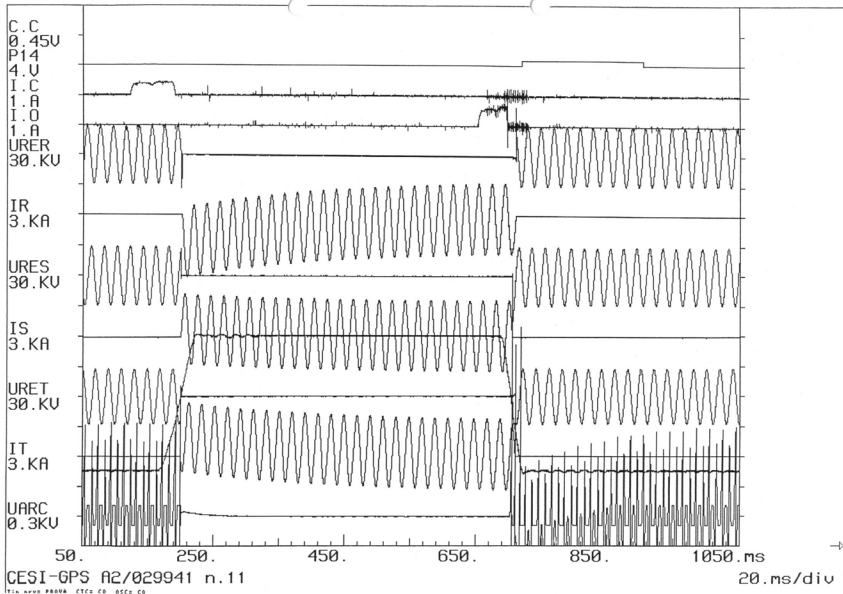
455. 475. 495. 515. 535. 555.ms

CESI-GPS R2/029941 n.46

Ultima pagina

2.ms/div

Fin Auto RCT7 CTG CO OSCO POS



C.C
0.45U
P14
4.U
I.C
1.A
I.O
1.A
URER
30.KU

Dt=79.05ms

IR
3.KA

URES
30.KU

IS
3.KA

URET
30.KU

IT
3.KA

UARC
0.3KU

111. 144. 177. 210. 243. 276.ms

CESI-GPS A2/029941 n.11

3.3ms/div

C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
URER
30.KV

IR
3.KA

URES
30.KV

IS
3.KA

URET
30.KV

IT
3.KA

UARC
0.3KV

Dt=49.13ms
Dt=8.25ms

600. 640. 680. 720. 760. 800.ms

CESI-GPS A2/029941 n.11

4.ms/div

URES.p=79.2kV

URER
30.KV

URES
30.KV

URET
30.KV

702.1 704.1 706.1 708.1 710.1 712.1ms

0.2ms/div

CESI-GPS A2/029941 n.11

Tip.prima PRON CICH CO OSCO CO



C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
URER
30.KV

IR
3.KA

URES
30.KV

IS
3.KA

URET
30.KV

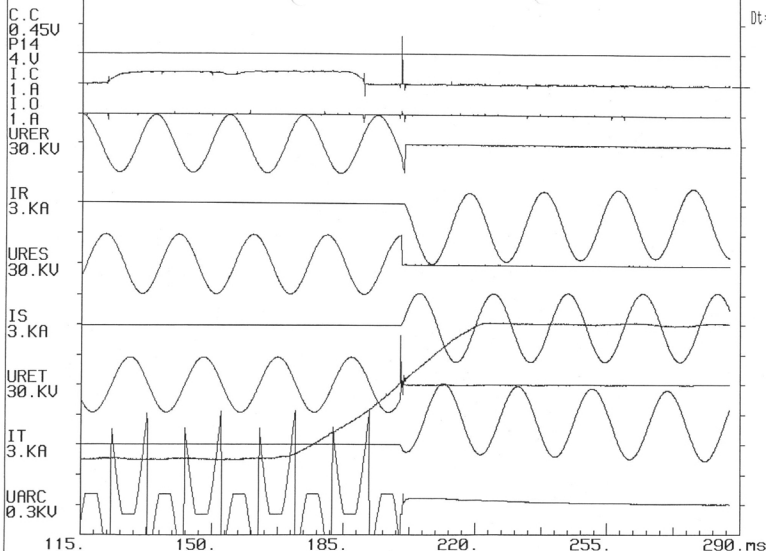
IT
3.KA

UARC
0.3KV

50. 250. 450. 650. 850. 1050.ms

CESI-GPS A2/029941 n.12

20.ms/div



C.C
0.45V
P14
4.U
I.C
1.A
I.O
1.A
URER
30.KV

Dt=47.39ms
Dt=9.99ms

IR
3.KA

URES
30.KV

IS
3.KA

URET
30.KV

IT
3.KA

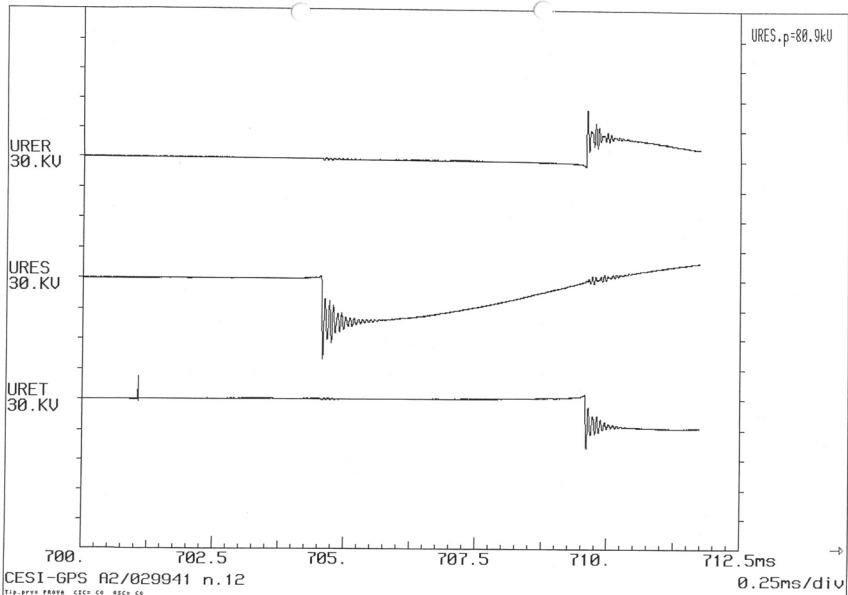
UARC
0.3KV

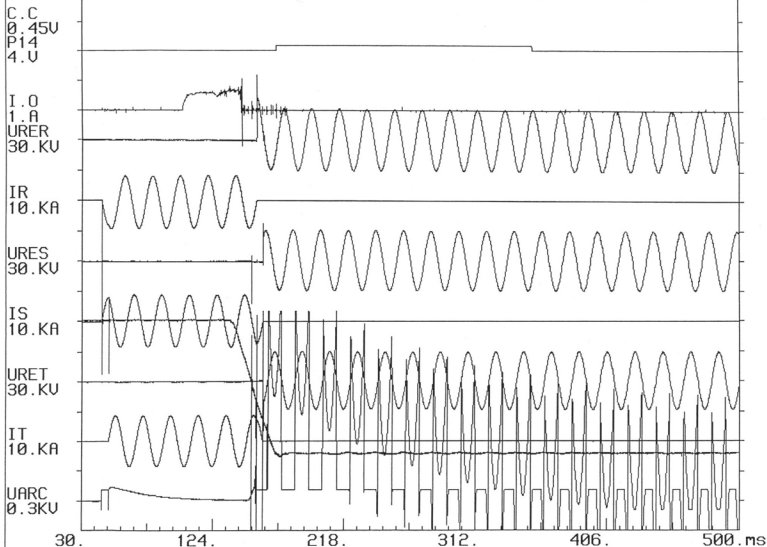
620. 654. 688. 722. 756. 790.ms

CESI-GPS A2/029941 n.12

3.4ms/div

Tip:prva PROVA CECI CO OSCO CO





CESI-GPS A2/029941 n.13

9.4ms/div

C.C
0.45V
P14
4.V

Dt=48.31ms
Dt=9.47ms

I.O
1.A
URER
30.KV

IR
10.KA

URES
30.KV

IS
10.KA

URET
30.KV

IT
10.KA

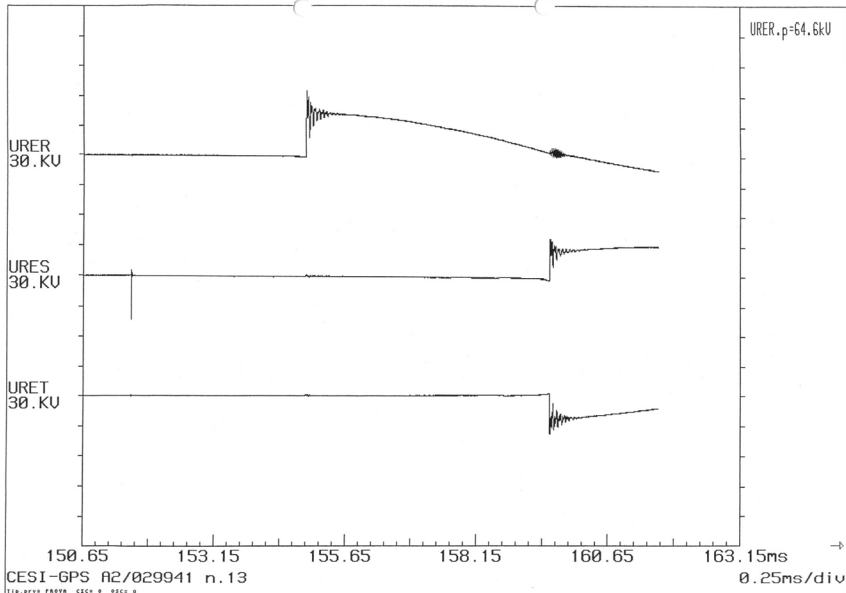
UARC
0.3KV

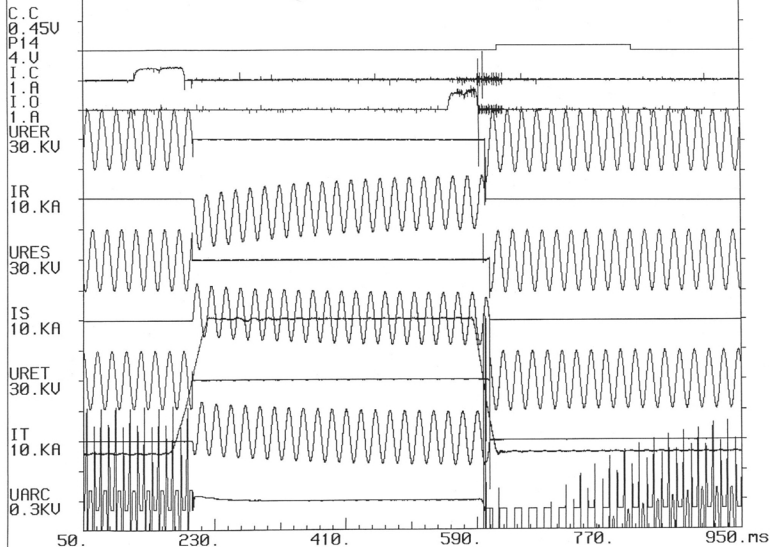
94. 114. 134. 154. 174. 194.ms

CESI-GPS A2/029941 n.13

2.ms/div

Tip.primo PRIMA CECU 0 OSCU 0





CESI-GPS A2/029941 n.15

18.ms/div

C.C
0.45V
P14
4.U
I.C
1.A
I.O
1.A
URER
30.KV

Dt=80.45ms

IR
10.KA

URES
30.KV

IS
10.KA

URET
30.KV

IT
10.KA

UARC
0.3KV

112. 143. 174. 205. 236. 267.ms

CESI-GPS A2/029941 n.15

3.1ms/div

C.C
0.45U
P14
4.U
I.C
1.A
I.O
1.A
URER
30.KU

IR
10.KA

URES
30.KU

IS
10.KA

URET
30.KU

IT
10.KA

UARC
0.3KU

Dt=45.71ms
Dt=10.42ms

544. 567. 590. 613. 636. 659.ms

CESI-GPS A2/029941 n.15

2.3ms/div

Tip. priv. PRIMA CICE CO OSCO CO

URER.p=65.5kV

URER
30.KV

URES
30.KV

URET
30.KV

596.79 599.29 601.79 604.29 606.79 609.29ms

CESI-GPS A2/029941 n.15

Tip.pvva PRVA CEC= CO OSC= CO

0.25ms/div

C.C
0.45V
P14
4.U
I.C
1.A
I.O
1.A
URER
30.KU

IR
10.KA

URES
30.KU

IS
10.KA

URET
30.KU

IT
10.KA

UARC
0.3KU

50. 230. 410. 590. 770. 950.ms

CESI-GPS A2/029941 n.16

Tip. provv. PROVVA C2Ch C0 OSCu C0

18.ms/div



C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
URER
30.KV

Dt=78.66ms

IR
10.KA

URES
30.KV

IS
10.KA

URET
30.KV

IT
10.KA

UARC
0.3KV

114. 144. 174. 204. 234. 264.ms

CESI-GPS A2/029941 n.16

3.ms/div

TID:DPVH PROVA CECM CO OSCO CO

C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
URER
30.KV

Dt=47.13ms
Dt=9.69ms

IR
10.KA

URES
30.KV

IS
10.KA

URET
30.KV

IT
10.KA

UARC
0.3KV

540. 562. 584. 606. 628. 650.ms

CESI-GPS A2/029941 n.16

2.2ms/div

URER.p=65.5kV

URER
30.KV

URES
30.KV

URET
30.KV

596.5 599.5 602.5 605.5 608.5 611.5ms

CESI-GPS A2/029941 n.16

Tip.prima PRIMA CICH CO OSCO CO

0.3ms/div

C.C
0.45V
P14
4.V

I.O
1.A
URER
30.KV

IR
15.KA

URES
30.KV

IS
15.KA

URET
30.KV

IT
15.KA

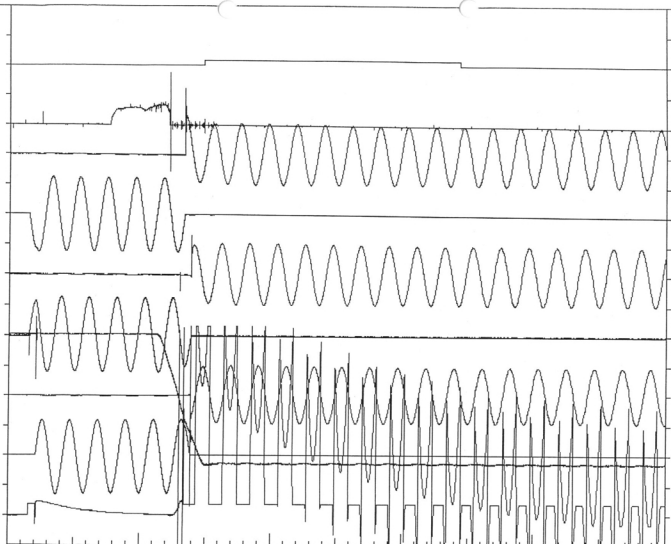
UARC
0.3KV

30. 124. 218. 312. 406. 500.ms

CESI-GPS A2/029941 n.18

9.4ms/div

TIP-DVVR PROV. CECI 0 OSC 0



C.C
0.45V
P14
4.V

Dt=47.55ms
Dt=10.97ms

I.O
1.A
URER
30.KV

IR
15.KA

URES
30.KV

IS
15.KA

URET
30.KV

IT
15.KA

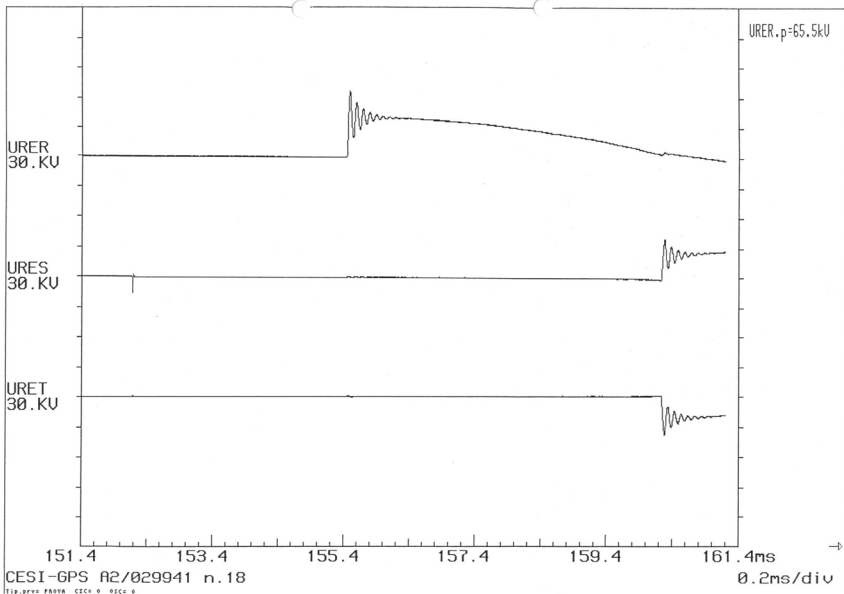
UARC
0.3KV

93. 120. 147. 174. 201. 228.ms

CESI-GPS A2/029941 n.18

2.7ms/div

TID:0PVV PROVA CECU 0 OSCU 0



C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
URER
30.KV

IR
15.KA

URES
30.KV

IS
15.KA

URET
30.KV

IT
15.KA

UARC
0.3KV

50. 210. 370. 530. 690. 850.ms

CESI-GPS A2/029941 n.19

16.ms/div

TIP:BYV P8998 CEC: CO BSCH CO

C.C
0.45U
P14
4.U
I.C
1.A
I.O
1.A
URER
30.KU

Dt=80.3ms

IR
15.KA

URES
30.KU

IS
15.KA

URET
30.KU

IT
15.KA

UARC
0.3KU

113. 145. 177. 209. 241. 273.ms

CESI-GPS A2/029941 n.19

3.2ms/div

C.C
0.45U
P14
4.U
I.C
1.A
I.O
1.A
URER
30.KU

Dt=46.48ms
Dt=9.71ms

IR
15.KA

URES
30.KU

IS
15.KA

URET
30.KU

IT
15.KA

UARC
0.3KU

442. 468. 494. 520. 546. 572.ms

CESI-GPS A2/029941 n.19

Tip.pvva PAVVA CICH CO OSCO CO

2.6ms/div

URES.p=66.3kV

URER
30.kV

URES
30.kV

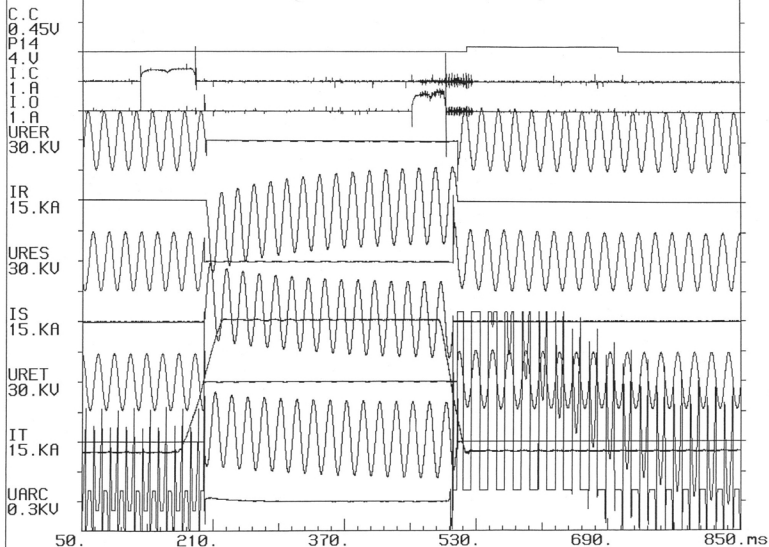
URET
30.kV

501.24 502.74 504.24 505.74 507.24 508.74ms

CESI-GPS A2/029941 n.19

Tip.prim PROVA CICH CO OSC CO

0.15ms/div



CESI-GPS A2/029941 n.20

16.ms/div

C.C
0.45V
P14
4.U
I.C
1.A
I.O
1.A
URER
30.KV

Dt=80.05ms

IR
15.KA

URES
30.KV

IS
15.KA

URET
30.KV

IT
15.KA

UARC
0.3KV

113. 145. 177. 209. 241. 273.ms

CESI-GPS A2/029941 n.20

3.2ms/div

1111 1111 1111 1111 1111 1111 1111 1111 1111 1111

C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
URER
30.KV

Dt=45.77ms
Dt=9.75ms

IR
15.KA

URES
30.KV

IS
15.KA

URET
30.KV

IT
15.KA

UARC
0.3KV

443. 470. 497. 524. 551. 578.ms

CESI-GPS A2/029941 n.20

2.7ms/div

URES.p=66.3kV

URER
30.KV

URES
30.KV

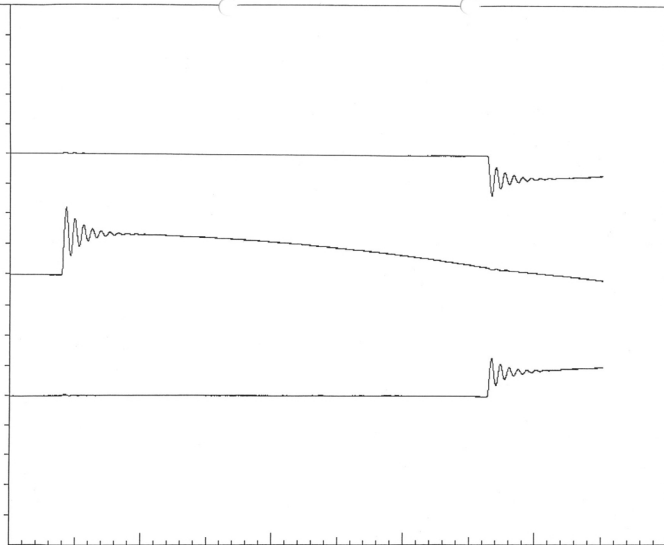
URET
30.KV

501.21 502.71 504.21 505.71 507.21 508.71ms

CESI-GPS A2/029941 n.20

0.15ms/div

Tip.0000 PROVA CEC- CO 05CH CO



C.C
0.45V
P14
4.U

I.O
1.A
UR
30.KV

IR
25.KA

US
30.KV

IS
25.KA

UT
30.KV

IT
25.KA

UARC
0.3KV

30. 126. 222. 318. 414. 510.ms

CESI-GPS A2/029941 n.24

9.6ms/div

File name: PR0000 FTF: 0.0000 0

C.C
0.45V
P14
4.V

Dt=46.74ms
Dt=10.75ms

I.O
1.A
UR
30.KV

IR
25.KA

US
30.KV

IS
25.KA

UT
30.KV

IT
25.KA

UARC
0.3KV

97. 128. 159. 190. 221. 252.ms

CESI-GPS A2/029941 n.24

3.1ms/div

UT.p=64.7kV

UR
30.KV

US
30.KV

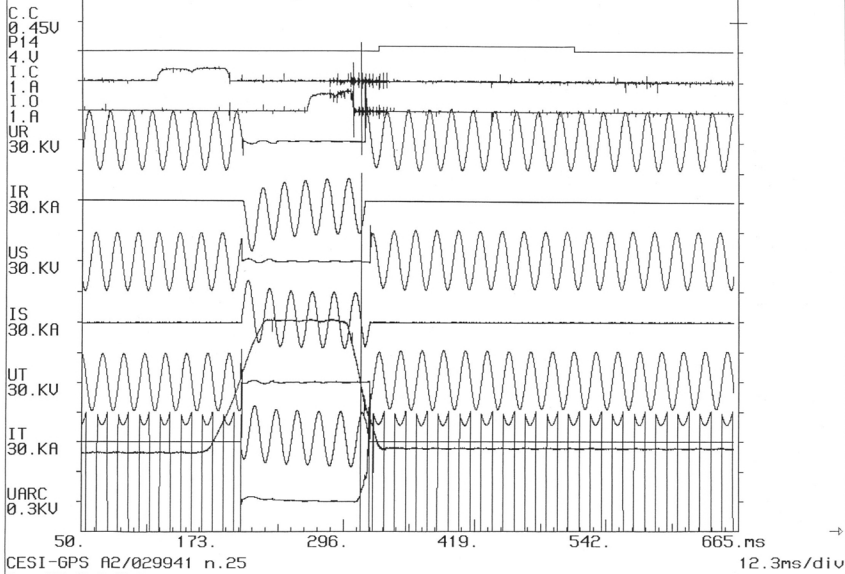
UT
30.KV

158.78 160.28 161.78 163.28 164.78 166.28ms

CESI-GPS A2/029941 n.24

0.15ms/div





C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
UR
30.KV

IR
30.KA

US
30.KV

IS
30.KA

UT
30.KV

IT
30.KA

UARC
0.3KV

IR_p=50.3kA
Dt=80.33ms

114. 147. 180. 213. 246. 279.ms

CESI-GPS A2/029941 n.25

3.3ms/div

C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
UR
30.KV
IR
30.KA
US
30.KV
IS
30.KA
UT
30.KV
IT
30.KA
UARC
0.3KV

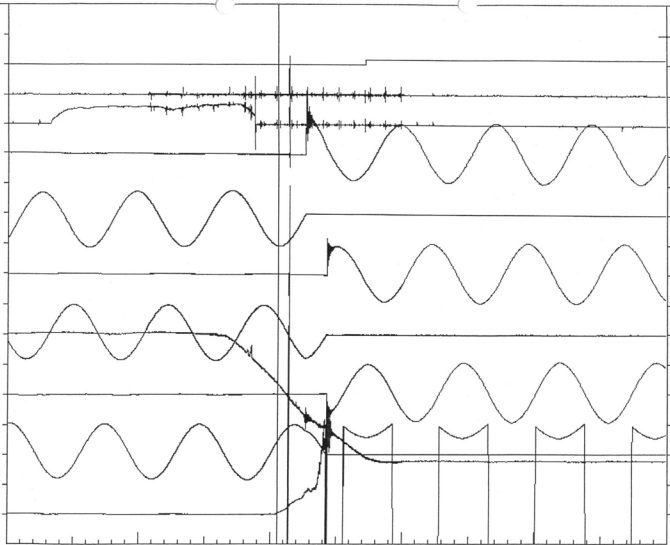
Dt=48.21ms
Dt=10.46ms

252. 280. 308. 336. 364. 392.ms

CESI-GPS A2/029941 n.25

2.8ms/div

TIN SPRV PRVAV CECI CO OSCO CO



UR.p=63.8kV

UR
30.KV

US
30.KV

UT
30.KV

310.85 313.35 315.85 318.35 320.85 323.35ms

CESI-GPS A2/029941 n.25

TIP.DPVV PROVA CICH CO OSCO CO

0.25ms/div

C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
UR
30.KV

IR
30.KA

US
30.KV

IS
30.KA

UT
30.KV

IT
30.KA

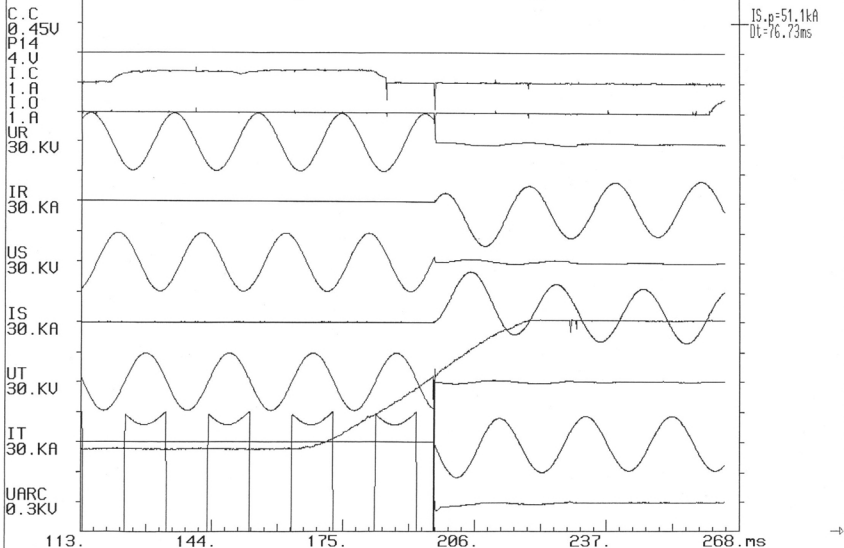
UARC
0.3KV

50. 173. 296. 419. 542. 665.ms

CESI-GPS A2/029941 n.26

TIA APVZ PROVA CTCG CO. DEFE 20

12.3ms/div



C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
UR
30.KV

Dt=42.69ms
Dt=12.57ms

IR
30.KA

US
30.KV

IS
30.KA

UT
30.KV

IT
30.KA

UARC
0.3KV

252. 279. 306. 333. 360. 387.ms

CESI-GPS A2/029941 n.26

2.7ms/div

TID.prv= PROVH CEC= CO OSCH CO

US.p=63.0kV

UR
30.KV

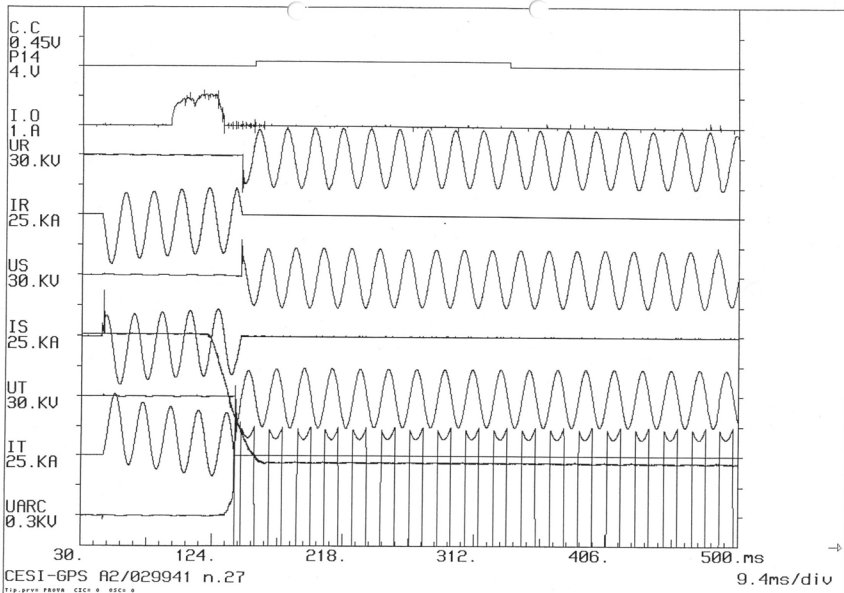
US
30.KV

UT
30.KV

306.78 309.28 311.78 314.28 316.78 319.28ms

CESI-GPS A2/029941 n.26

0.25ms/div



C.C
0.45V
P14
4.V

Dt=40.08ms
Dt=11.1ms

I.O
1.A
UR
30.KV

IR
25.KA

US
30.KV

IS
25.KA

UT
30.KV

IT
25.KA

UARC
0.3KV

38. 76. 114. 152. 190. 228.ms

CESI-GPS A2/029941 n.27

3.8ms/div

UT.p=61.5kV

UR
30.KV

US
30.KV

UT
30.KV

139.44 140.94 142.44 143.94 145.44 146.94ms

CESI-GPS A2/029941 n.27

0.15ms/div

ITin NPV2 PROVA CECG 0 OSCG 0

C.C
0.45V
P14
4.V

I.O
1.A
UR
30.KV

IR
25.KA

US
30.KV

IS
25.KA

UT
30.KV

IT
25.KA

UARC
0.3KV

30. 125. 220. 315. 410. 505.ms

CESI-GPS A2/029941 n.28

9.5ms/div

Tin nrvv PROVA CICH 0 OSC 0

C.C
0.45U
P14
4.U

Dt=39.88ms
Dt=12.49ms

I.O
1.A
UR
30.KU

IR
25.KA

US
30.KU

IS
25.KA

UT
30.KU

IT
25.KA

UARC
0.3KU

38. 74. 110. 146. 182. 218.ms

CESI-GPS A2/029941 n.28

3.6ms/div

TIN APUS PROVA CTCS 0 DTCS 0

UT.p=64.0kV

UR
30.KV

US
30.KV

UT
30.KV

136. 138. 140. 142. 144. 146.ms

CESI-GPS A2/029941 n.28

Tip.prvv PROVA CICH 0 OSC=0

0.2ms/div

C.C
0.45V
P14
4.V

I.O
1.A
UR
30.KV

IR
25.KA

US
30.KV

IS
25.KA

UT
30.KV

IT
25.KA

UARC
0.3KV

30. 125. 220. 315. 410. 505.ms
CESI-GPS A2/029941 n.29

9.5ms/div



CESI

CESI

client PARS SWITCH CO. - Zanjan (Iran)

equipment under test SF₆ circuit-breaker type FP72D outdoor, serial number: 10001, 36kV, 1250A.

tests performed Dry lightning impulse withstand voltage test;
Dry and wet power-frequency withstand voltage test.

normative documents IEC 62271-100 (2001-05); IEC 60694 (2001-05)

receipt date of the sample September 9, 2002

test date from September 19, 2002 to September 20, 2002

the test results relate only to the sample tested
this document shall not be reproduced except in full without the written approval of CESI



no. of pages 13 **no. of pages annexed** 2

issue date November 5, 2002

prepared PeC/TEST - C. Del Giorgio

verified PeC/TEST - A. Elli

approved PeC/TEST - V. Scarioni

CESI
CENTRO ELETTROTECNICO SPERIMENTALE ITALIANO
Business Unit
Prove e Componenti
Il Responsabile del Laboratorio

tests witnessed by:	Mr. Mohammad Ghiasabadi	- PARS SWITCH Co.
	Mr. Mojtaba Alimohammadi	- PARS SWITCH Co.
	Mr. Nosrat Mohammadi	- PARS SWITCH Co.
	Mr. Naser Dizajian	- PARS SWITCH Co.
	Mr. Jamal Halvachi	- PARS SWITCH Co.
	Mrs. Faezeh Fazeli	- E.P.I.L. Co.
	Mr. Sirous Javanmard	- E.P.I.L. Co.

identification of the object: effected

The Manufacturer guarantees that the tested object is manufactured according to the submitted drawings.

CESI checked that these drawings adequately represent in shape and dimensions the essential details and the parts of the tested object.

These drawings identified by CESI and numbered **A2/032166 no.1 to 14** have been returned to the Client.

Test results

The values obtained and the general performance are considered to comply with the reference Standard (see page 1) and to justify the relevant ratings assigned by the Manufacturer.

The data necessary to permit repetition of the tests are contained in the document marked: AT - A2/029227

The measurement uncertainties of the test results reported in this document are the following:

- dielectric tests with impulse voltage : **peak voltage:** $\pm 3 \%$; **time parameters:** $\pm 10 \%$
- dielectric tests with alternating voltage : **voltage (rms):** $\pm 3 \%$

The measurement uncertainties are estimated at the level of twice the standard deviation (corresponding, in the case of normal distribution, to a confidence level of about 95 %) and have to be considered as maximum values.

test laboratory:	P180 (100 kJ)
activity code:	35067J
keywords:	12015R, 23410N, 31020W, 44020H, 53001D, 62510X, 62530L.

contents	page	test date
Rated characteristics of the tested object assigned by the Client	4	---
Dielectric tests	5	---
Dry lightning impulse withstand voltage test	6 + 7	September 19-20, 2002
Dry power frequency withstand voltage test	8 + 9	September 20, 2002
Wet power frequency withstand voltage test	10	September 20, 2002
Circuits A002 - A059	11 + 12	---
Panoramic view of the test object	13	---
 pages annexed		
- oscillogramm from test report AT-A2/029227 (total pages:2)		
 reference document		
- drawings identified by CESI and numbered A2/032166 no.1 to 14		

Rated characteristics of the tested object assigned by the Client

circuit-breaker	
manufacturer	PARS SWITCH Co. - Zanjan (Iran)
type	FP72D outdoor
serial number	10001
voltage	36 kV
normal current	1250 A
frequency	50 Hz
lightning impulse withstand voltage (peak value)	
- common value	170 kV
- across the isolating distance	195 kV
power frequency withstand voltage (r.m.s. value)	
- common value	70 kV
- across the isolating distance	80 kV
short-circuit making current	62,5 kA at 36 kV
short-circuit breaking current	25 kA at 36 kV
minimum opening time	45 ms

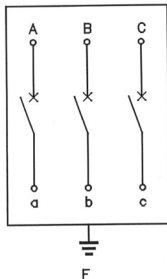
Supply pressure of SF₆ gas (referred to 20°C) 3,5 bar

Operating mechanism

Type	BLRM
Supply voltage	
closing devices	110 Vd.c.
opening devices	110 Vd.c.
motor	110 Vd.c.

name and signature of Client's witness _____

Dielectric tests



test condition	circuit-breaker	voltage	earth connected	isolated points
no.	position	applied to	to	
1	closed	Aa	BC bc F	--
2		Bb	AC ac F	--
3		Cc	AB ab F	--
4	open	A	BC abc F	--
5		B	AC abc F	--
6		C	AB abc F	--
7	open	a	ab ABC F	--
8		b	ac ABC F	--
9		c	ab ABC F	--
10	open	A	a	BC bc F
11		B	b	AC ac F
12		C	c	AB ab F
13	open	a	A	bc BC F
14		b	B	ac AC F
15		c	C	ab AB F

Since the arrangement of the outer poles is symmetrical with respect to the centre pole and the frame, according to IEC 60694 (2001-05) par. 6.2.5, test conditions no.3, 6, 9, 12 and 15 have been omitted.

Photo no. 1 - Aa: left pole; Bb: central pole .

NOTE: wet power-frequency tests across the isolating distance are not necessary.

Dry lightning impulse withstand voltage test

test object: SF₆ circuit-breaker

test circuit: A002

test condition	positive polarity						negative polarity						test date
	requested voltage	correction factor	applied voltage	applied impulses	flashover	test result	requested voltage	correction factor	applied voltage	applied impulses	flashover	test result	
			kV _{peak}	no.	no.				kV _{peak}	no.	no.		
no.	kV _{peak}	K	kV _{peak}	no.	no.		kV _{peak}	K	kV _{peak}	no.	no.		
1	170,0	0,984	167,3	15	0	withstand	170,0	0,984	167,3	15	0	withstand	September 19, 2002
2	170,0	0,984	167,3	15	0	withstand	170,0	0,984	167,3	15	0	withstand	September 19, 2002
4	170,0	0,984	167,3	15	0	withstand	170,0	0,984	167,3	15	0	withstand	September 19, 2002
5	170,0	0,984	167,3	15	0	withstand	170,0	0,984	167,3	15	0	withstand	September 19, 2002
7	170,0	0,984	167,3	15	0	withstand	170,0	0,984	167,3	15	0	withstand	September 19, 2002
8	170,0	0,984	167,3	15	0	withstand	170,0	0,984	167,3	15	0	withstand	September 19, 2002

note:

cont'd

cont'd

test condition	positive polarity						negative polarity						test date
	requested voltage	correction factor	applied voltage	applied impulses	flashover	test result	requested voltage	correction factor	applied voltage	applied impulses	flashover	test result	
no.	kV _{peak}	K	kV _{peak}	no.	no.		kV _{peak}	K	kV _{peak}	no.	no.		
10	195,0	1,000	195,0	15	0	withstand	195,0	1,000	195,0	15	0	withstand	September 20, 2002
11	195,0	1,000	195,0	15	0	withstand	195,0	1,000	195,0	15	0	withstand	September 20, 2002
13	195,0	1,000	195,0	15	0	withstand	195,0	1,000	195,0	15	0	withstand	September 20, 2002
14	195,0	1,000	195,0	15	0	withstand	195,0	1,000	195,0	15	0	withstand	September 20, 2002

note:

Dry power frequency withstand voltage test**test object:** SF₆ circuit-breaker**test circuit:** A059

test condition no.	required (U) kV _{rms}	voltage		test duration s	test result	test date
		correction factor K _t	applied (U × K _t) kV _{rms}			
1	70,0	0,986	69,0	60	withstand	September 20, 2002
2	70,0	0,986	69,0	60	withstand	September 20, 2002
4	70,0	0,986	69,0	60	withstand	September 20, 2002
5	70,0	0,986	69,0	60	withstand	September 20, 2002
7	70,0	0,986	69,0	60	withstand	September 20, 2002
8	70,0	0,986	69,0	60	withstand	September 20, 2002

note:

cont'd

cont'd

test condition	required (U)	voltage		test duration	test result	test date
		correction factor	applied ($U \times K_t$)			
no.	kV _{max}	K_t	kV _{max}	s		
10	80,0	1,000	80,0	60	withstand	September 20, 2002
11	80,0	1,000	80,0	60	withstand	September 20, 2002
13	80,0	1,000	80,0	60	withstand	September 20, 2002
14	80,0	1,000	80,0	60	withstand	September 20, 2002

note:

Wet power frequency withstand voltage test

test object: SF₆ circuit-breaker

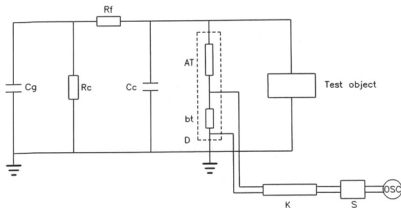
test circuit: A059

	precipitation conditions			water temperature °C	water resistivity Ω × m
	precipitation rate mm / min				
	pole A	pole B	--		
vertical	1,4	1,5	--	18,8	100,0
horizontal	1,2	1,3	--		

test condition no.	required (U) kV _{ma}	voltage		test duration s	test result	test date
		correction factor K _t	applied (U × K _t) kV _{ma}			
1	70,0	0,986	69,0	60	withstand	September 20, 2002
2	70,0	0,986	69,0	60	withstand	September 20, 2002
4	70,0	0,986	69,0	60	withstand	September 20, 2002
5	70,0	0,986	69,0	60	withstand	September 20, 2002
7	70,0	0,986	69,0	60	withstand	September 20, 2002
8	70,0	0,986	69,0	60	withstand	September 20, 2002

note:

Circuit A002



lightning impulse test circuit

Cg : Impulse generator capacitance

Rf : Front resistor

Rc : Tail resistor

Cc : Load capacitance

D : Divider type RC series

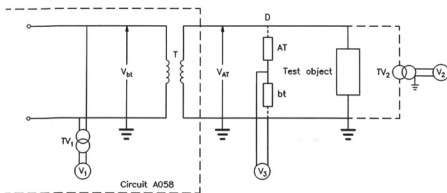
K : coaxial cable

S : attenuation and termination unit

Osc : Oscilloscope

measured wave-shape: oscillogram No.1 and 2

Circuit A059



power frequency measuring circuit

TV₂: voltage transformerV₂ : voltmeterD : voltage divider type RC series
low voltage armV₃ : voltmeterTV₁: voltage transformerV₁ : voltmeter

Panoramic view of the test object

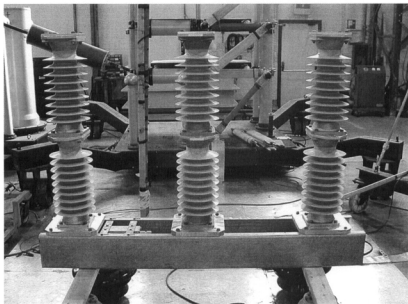
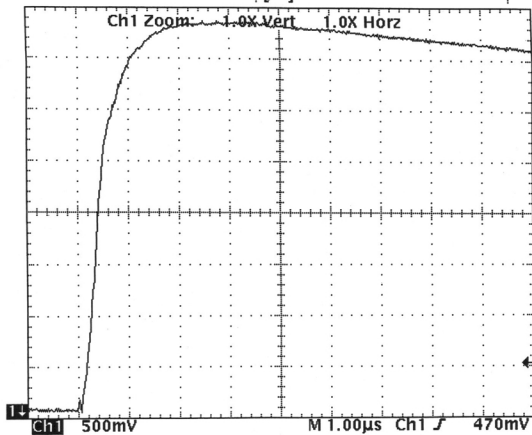


Photo no. 1

Tek Run: 50.0MS/s HI Res

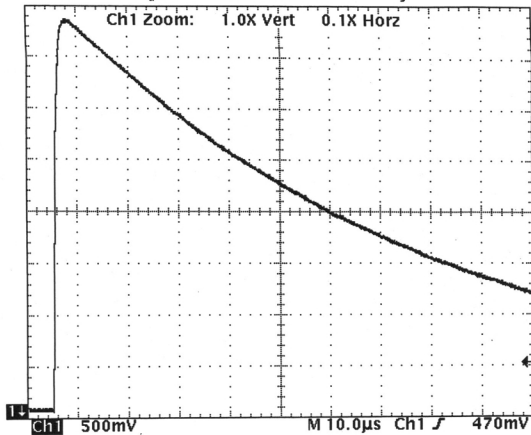
Trig



Tek Run: 50.0MS/s

Hi Res

110%



Ultima pagina
Last page

CESI

Via Rubattino, 54 - 20134 Milano, Italy - Ph. +39 02 2125.1 - Fax +39 02 2125 5440

client PARS SWITCH CO. - Zanjan (Iran)

equipment under test SF₆ circuit-breaker type FP72D outdoor, serial number: 10001, 36kV, 1250A.

tests performed temperature-rise test
measurement of the resistance of the main circuit

normative documents IEC 62271-100 (2001-05); IEC 60694 (2001-05)

receipt date of the sample September 9, 2002

test date from October 2, 2002 to October 2, 2002

the test results relate only to the sample tested
this document shall not be reproduced except in full without the written approval of CESI

no. of pages 14 **no. of pages annexed** -

issue date October 3, 2002

prepared PeC/TEST - A. Garanzini *A. Garanzini*

verified PeC/TEST - A. Elli *A. Elli*

approved PeC/TEST - V. Scarioni *V. Scarioni*

CESI
CENTRO ELETTROTECNICO SPERIMENTALE ITALIANO
Business Unit
Prove e Componenti
Il Responsabile del Laboratorio

tests witnessed by: Mr. Mojtaba Alimohammadi - PARS SWITCH Co.
Mr. Naser Dizajian - PARS SWITCH Co.

identification of the object: requested

the data necessary to permit repetition of the tests are contained in the document marked: —

The measurement uncertainties of the test results reported in this document are the following:

voltage: $\pm 5 \%$; **current:** $\pm 5 \%$; **time:** $\pm 5 \%$

The measurement uncertainties are estimated at the level of twice the standard deviation (corresponding, in the case of normal distribution, to a confidence level of about 95 %) and have to be considered as maximum values.

laboratory information

CESI testing team: Garanzini

test laboratory: MP3

activity code: 35067J

keywords: 12015R, 23410N, 31020W, 45070T, 53001D, 62440N

Rated characteristics of the tested object assigned by the Client

circuit-breaker	PARS SWITCH Co. - Zanjan (Iran)
manufacturer	
type	FP72D outdoor
serial number	10001
voltage	36 kV
normal current	1250 A
frequency	50 Hz
lightning impulse withstand voltage (peak value)	
- common value	170 kV
- across the isolating distance	195 kV
power frequency withstand voltage (r.m.s. value)	
- common value	70 kV
- across the isolating distance	80 kV
short-circuit making current	62,5 kA at 36 kV
short-circuit breaking current	25 kA at 36 kV
minimum opening time	45 ms
Supply pressure of SF ₆ gas (referred to 20°C)	3,5 bar
Operating mechanism	
Type	BLRM
Supply voltage	
closing devices	110 Vd.c.
opening devices	110 Vd.c.
motor	110 Vd.c.

name and signature of Client's witness _____

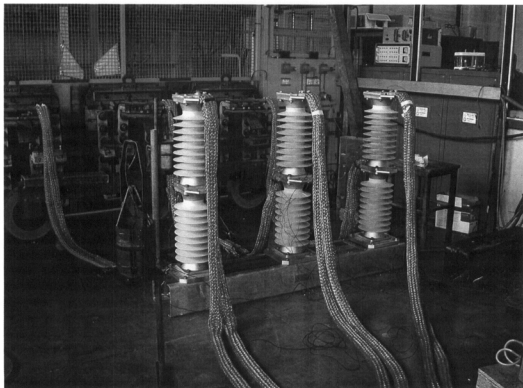


Photo no. 1
Panoramic view of the test object

measurement of the resistance of the main circuit

resistance measured with 100 A d.c.

measurement effected	resistance ($\mu\Omega$) across the pole			ambient air temperature
	R	S	T	°C
before the temperature rise test	30,0	27,0	35,0	19,1
after the temperature rise test	29,0	26,0	34,0	20,2

note: ■■■■

Verification of temperature-rise limits**test arrangements and test procedure**

The circuit breaker was placed on the floor of the test room and was arranged as in normal use.

The three-phase supply was connected to the lower terminals of the circuit breaker by means of one flexible copper conductor per-phase, having a cross-sectional area of 1200 mm^2 , the short-circuit was connected to the upper terminals by means of one flexible copper conductor per-phase, having a cross-sectional area of 1200 mm^2 (see photo no. 1).

Before and after the temperature-rise test, the resistance of the main circuits was measured by means of a DC supply of 100 A.

measurement of temperatures

The ambient air temperature was obtained from the average of the temperatures measured by means of three copper-constantan thermocouples, put into small vessels containing about half litre of oil, equally located around the assembly at about half its height and at a distance of about 1 m from the tested object.

The temperatures of the different parts of the tested object were measured by means of copper-constantan thermocouples appropriately fixed in the points indicated on page 7 and specified in the table of results.

arrangement of thermocouples

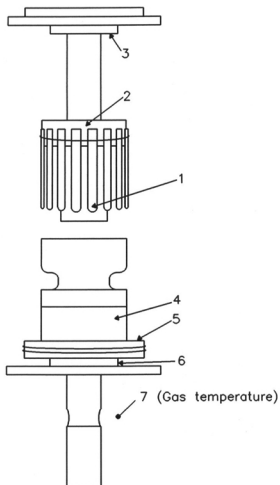




Photo no.2
Panoramic view of the test object

Verification of temperature-rise limits**test arrangements and test procedure**

The circuit breaker was placed on the floor of the test room and was arranged as in normal use.

The three-phase supply was connected to the lower terminals of poles R and T and upper terminal of pole S of the circuit breaker by means of one flexible copper conductor per-phase, having a cross-sectional area of 1200 mm², the short-circuit was connected to the upper terminals of poles R and T and lower terminal of pole S by means of one flexible copper conductor per-phase, having a cross-sectional area of 1200 mm² (see photo no.2).

Before and after the temperature-rise test, the resistance of the main circuits was measured by means of a DC supply of 100 A.

measurement of temperatures

The ambient air temperature was obtained from the average of the temperatures measured by means of three copper-constantan thermocouples, put into small vessels containing about half litre of oil, equally located around the assembly at about half its height and at a distance of about 1 m from the tested object.

The temperatures of the different parts of the tested object were measured by means of copper-constantan thermocouples appropriately fixed in the points indicated on page 7 and specified in the table of results.

laboratory information

test laboratory : MP3
 CESI testing team : A. Garanzini
 test date : October 2, 2002

characteristics of supply circuit

test	regulator		alternator		transformer	
	type	diagram	type	diagram	type	ratio
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

characteristics of measuring instrumentation

measure	transducer		Data Acq. Syst. (SAD)		
	ref.	position	ref.		
Ir	M1-AN1	-	BA1		
Is	M2-AN2	-	BA1		
It	M3-AN3	-	BA1		
T1-T13	-	-	BA1		

measurement of temperatures:

The copper-constantan thermocouples used for measuring the temperatures during the verification of temperature-rise limits were previously checked in accordance with CESI procedure 92/015552.

MOD_SEWOSTIT

CESI

Via Rubattino, 54 - 20134 Milano, Italy - Ph. +39 02 2125.1 - Fax +39 02 2125 5440

client PARS SWITCH CO. - Zanjan (Iran)

equipment under test SF₆ circuit-breaker type FP72D outdoor, serial number: 10001, 36kV, 1250A.

tests performed Mechanical operation tests at ambient air temperature
Measurement of the resistance of the main circuit

normative documents IEC 62271-100 (2001-05)

receipt date of the sample September 9, 2002

test date from September 23, 2002 to September 27, 2002

the test results relate only to the sample tested
this document shall not be reproduced except in full without the written approval of CESI

no. of pages 13 no. of pages annexed 62

issue date September 27, 2002

prepared PeC/TEST - P. Settimio

verified PeC/TEST - A. Elli

approved PeC/TEST - V. Scarioni

Settimio Puerino
A. Elli
CESI
CENTRO ELETTROTECNICO SPERIMENTALE ITALIANO
Business Unit
Prove e Componenti
Il Responsabile del Laboratorio

tests witnessed by:

Mr. Mohammad Ghiasabadi
Mr. Mojtaba Alimohammadi
Mr. Nosrat Mohammadi
Mr. Naser Dizajian
Mr. Jamal Halvachi
Mrs. Faezeh Fazeli
Mr. Sirous Javanmard

- PARS SWITCH Co.
- PARS SWITCH Co.
- PARS SWITCH Co.
- PARS SWITCH Co.
- PARS SWITCH Co.
- E.P.I.L. Co.
- E.P.I.L. Co.

identification of the object: requested

the data necessary to permit repetition of the tests are contained in the document marked: —

The measurement uncertainties of the test results reported in this document are the following:

voltage: $\pm 5\%$; current: $\pm 5\%$; time: $\pm 5\%$

The measurement uncertainties are estimated at the level of twice the standard deviation (corresponding, in the case of normal distribution, to a confidence level of about 95 %) and have to be considered as maximum values.

laboratory information

CESI testing team:

Settimio

test laboratory: CT443

activity code: 35067J

keywords: 12015R, 23410N, 31020W, 45070T, 53001D, 62501B

Rated characteristics of the tested object assigned by the Client

circuit-breaker	
manufacturer	PARS SWITCH Co. - Zanjan (Iran)
type	FP72D outdoor
serial number	10001
voltage	36 kV
normal current	1250 A
frequency	50 Hz
lightning impulse withstand voltage (peak value)	
- common value	170 kV
- across the isolating distance	195 kV
power frequency withstand voltage (r.m.s. value)	
- common value	70 kV
- across the isolating distance	80 kV
short-circuit making current	62,5 kA at 36 kV
short-circuit breaking current	25 kA at 36 kV
minimum opening time	45 ms
Supply pressure of SF ₆ gas (referred to 20 °C)	3,5 bar
Operating mechanism	
Type	BLRM
Supply voltage	
closing devices	110 Vd.c.
opening devices	110 Vd.c.
motor	110 Vd.c.

name and signature of Client's witness _____

measurement of the resistance of the main circuit

resistance measured with 100 A d.c.

measurement effected	resistance ($\mu\Omega$) across the pole			ambient air temperature °C
	R	S	T	
before the test no.1	34,0	33,0	41,0	24
after the test no. 4060	28,0	29,0	32,0	24

note: 

Mechanical operation tests at ambient air temperature

type of tests: mechanical operation tests at the rated control voltage

ambient air temperature: 20 °C

condition of the apparatus before the tests: new

date: September 23, 2002

test	oscill.	type of operation	supply voltage of operating devices		current in the coil	current in the motor		duration of motor operation	operating time			max delta t between poles	duration of closing impulse	duration of opening impulse	speed contact	auxiliary contacts	
			coils	motor	C/O	peak	steady state		R	S	T					concord	discord
no.	no.	-	V d.c.	V d.c.	A	A	A	s	ms	ms	ms	ms	ms	ms	m / s	ms	ms
1	1/3	C	110	110	0,736	12,3	3,38	5,24	79	75	75	4,0	80	-	1,50	86	61
2	2/2	O	110	110	0,837	-	-	-	42	43	44,5	2,5	-	52,5	2,56	37	53
3	-	C	110	110	0,702	12,2	3,43	5,36	78,5	75,5	75	3,5	78	-	-	85,5	60,5
4	-	O	110	110	0,685	-	-	-	41,5	42	43,5	2,0	-	55	-	37	52,5
5	-	C	110	110	0,706	12,2	3,39	5,36	77	74	74	3,0	79	-	-	85	60
6	-	O	110	110	0,886	-	-	-	41	42	43,5	2,5	-	63	-	36	51
7	-	C	110	110	0,729	12,2	3,33	5,22	76,5	73,5	73	3,5	78	-	-	84	59
8	-	O	110	110	0,697	-	-	-	39	40	41	2,0	-	52	-	34	49,5
9	3/2	C	110	110	0,729	12,2	3,35	5,30	76	74	74	2,0	78	-	-	85	60
10	4/1	O	110	110	0,708	-	-	-	39	40	41,5	2,5	-	49,5	-	34	49,5

C = closing operation ; O = opening operation

Mechanical operation tests at ambient air temperature

type of tests: mechanical operation tests at the maximum control voltage

ambient air temperature: 20 °C

condition of the apparatus before the tests: -

date: September 23, 2002

test	oscill.	type of operation	supply voltage of operating devices		current in the coil C/O	current in the motor		duration of motor operation	operating time			max delta t between poles	duration of closing impulse	duration of opening impulse	speed contact	auxiliary contacts	
			coils	motor		peak	steady state		R	S	T					concord	discord
no.	no.	-	V d.c.	V d.c.	A	A	A	s	ms	ms	ms	ms	ms	ms	m / s	ms	ms
11	5/2	C	121	121	0,958	12,2	3,37	5,05	75	71	71,5	4,0	76	-	-	87	58
12	6/1	O	121	121	0,774	-	-	-	40,5	41,5	43,5	3,0	-	54	-	36,5	52
13	-	C	121	121	0,988	12,3	3,38	5,00	75	71,5	72	3,5	77	-	-	82,5	58
14	-	O	121	121	0,810	-	-	-	40,5	41,5	43	2,5	-	50,5	-	35,5	50,5
15	-	C	121	121	0,963	13,8	3,35	5,02	75	71,5	72,5	3,5	77	-	-	83,5	58
16	-	O	121	121	1,29	-	-	-	41,5	42,5	44	2,5	-	54,5	-	36,5	52
17	-	C	121	121	0,783	13,2	3,36	4,97	73,5	70,5	71	3,0	75	-	-	82	56
18	-	O	121	121	0,765	-	-	-	38,5	40	41	2,5	-	50	-	34	49,5
19	7/2	C	121	121	0,744	13,3	3,36	4,97	74	71,5	71,5	2,5	79	-	-	86,5	61
20	8/1	O	121	121	0,87	-	-	-	41,5	43	44	2,5	-	54	-	37	52,5

C = closing operation ; O = opening operation

Mechanical operation tests at ambient air temperature

type of tests: mechanical operation tests at the minimum control voltage

ambient air temperature: 20 °C

condition of the apparatus before the tests: -

date: September 23, 2002

test	oscill.	type of operation	supply voltage of operating devices		current in the coil	current in the motor		duration of motor operation	operating time			max delta t between poles	duration of closing impulse	duration of opening impulse	speed contact	auxiliary contacts	
			coils	motor	C/O	peak	steady state		R	S	T					concord	discord
no.	no.	-	V d.c.	V d.c.	A	A	A	s	ms	ms	ms	ms	ms	ms	m / s	ms	ms
21	9/2	C	93,5	93,5	0,665	10,56	3,40	6,65	82	80	80	2,0	85	-	-	90	65
22	10/1	O	77	93,5	0,660	-	-	-	47	48,5	49,5	2,5	-	58,5	-	42	58
23	-	C	93,5	93,5	0,712	10,26	3,37	6,62	83	79,5	80,5	2,5	85,5	-	-	91,5	66
24	-	O	77	93,5	0,708	-	-	-	44	45	46,3	2,3	-	56,5	-	39	55
25	-	C	93,5	93,5	0,681	10,59	3,39	6,62	80	77	77,5	3,0	82	-	-	88,5	63
26	-	O	77	93,5	0,631	-	-	-	43	44	45,5	2,5	-	54,5	-	38	54
27	-	C	93,5	93,5	0,639	9,66	3,36	6,59	83	80	80	3,0	84	-	-	91	66
28	-	O	77	93,5	0,660	-	-	-	45,5	46,5	48	2,5	-	57	-	40,5	56
29	11/2	C	93,5	93,5	1,03	10,2	3,37	6,60	83,5	81,5	81	2,5	85	-	-	92	66
30	12/1	O	77	93,5	0,819	-	-	-	45,5	46,5	48	2,5	-	58	-	40,5	56

C = closing operation ; O = opening operation

Mechanical operation tests at ambient air temperature

type of tests: mechanical operation tests at the rated and maximum control voltage

ambient air temperature: 20 °C

condition of the apparatus before the tests: -

date: September 24 and 25, 2002

test	oscill.	type of operation	supply voltage of operating devices		current in the coil	current in the motor		duration of motor operation	operating time			max delta t between poles	duration of closing impulse	duration of opening impulse	speed contact	auxiliary contacts	
			coils	motor	C/O	peak	steady state		R	S	T					concord	discord
no.	no.	-	V d.c.	V d.c.	A	A	A	s	ms	ms	ms	ms	ms	ms	m / s	ms	ms
tests at the rated voltage																	
1029	13/2	C	110	110	0,81	12,34	3,38	5,3	75	72,5	72,5	2,5	83,5	-	-	82,5	56,5
1030	14/1	O	110	110	0,724	-	-	-	42,5	43,5	45	2,5	-	53	-	37	53,5
tests at the maximum voltage																	
1031	15/2	C	121	121	0,814	12,84	3,61	4,86	78,5	75	77	3,5	78	-	-	86	60
1032	16/1	O	121	121	0,715	-	-	-	39	40,5	41,5	2,5	-	48,5	-	33,5	50,5
2029	17/2	C	121	121	0,787	14,02	3,6	4,97	77	74,5	73,5	3,5	77	-	-	84	59
2030	18/1	O	121	121	0,771	-	-	-	39	42,5	41,5	3,5	-	50	-	34	50

C = closing operation ; O = opening operation

Mechanical operation tests at ambient air temperature

type of tests: mechanical operation tests at the minimum and rated control voltage

ambient air temperature: 20 °C

condition of the apparatus before the tests: -

date: September 26 and 27, 2002

test	oscill.	type of operation	supply voltage of operating devices		current in the coil C/O	current in the motor		duration of motor operation	operating time			max delta t between poles	duration of closing impulse	duration of opening impulse	speed contact m / s	auxiliary contacts	
			coils	motor		peak	steady state		R	S	T					concord	discord
no.	no.	-	V d.c.	V d.c.	A	A	A	s	ms	ms	ms	ms	ms	ms	m / s	ms	ms

tests at the minimum voltage

2031	19/2	C	93,5	93,5	0,63	10,1	3,46	6,54	85	83	82	3,0	83,5	-	-	92	68
2032	20/1	O	77	93,5	0,58	-	-	-	45,5	46,5	48	2,5	-	55,5	-	40,5	56
3029	21/2	C	93,5	93,5	0,737	9,5	3,51	6,55	89	85,5	85	4,0	87	-	-	95	71
3030	22/1	O	77	93,5	0,488	-	-	-	63	65	67	4,0	-	63,5	-	59	74

tests CO at the rated voltage without any intentional time-delay

3031	23/3	C (*)	110	110	0,747	11,53	3,45	5,45	77	74	73,5	3,5	77	-	-	83,5	59,5
3032		O	110	110	0,702	-	-	-	37	37,5	39,5	2,5	-	45	-	32	47
4029	24/2	C (**)	110	110	0,738	11,0	3,49	5,50	78	74	75,5	4,0	76,5	-	-	85	60
4030		O	110	110	0,673	-	-	-	41	42	43,5	2,5	-	41,5	-	36	51

C = closing operation ; O = opening operation

(*) CO duration: pole R 47,5 ms pole S 51,0 ms pole T 53,5 ms

(**) CO duration: pole R 49,5 ms pole S 54,5 ms pole T 55,0 ms

Mechanical operation tests at ambient air temperature

type of tests: mechanical operation tests at the rated control voltage

ambient air temperature: 20 °C

condition of the apparatus before the tests: -

date: September 27, 2002

test	oscill.	type of operation	supply voltage of operating devices		current in the coil C/O	current in the motor		duration of motor operation	operating time			max delta t between poles	duration of closing impulse	duration of opening impulse	speed contact	auxiliary contacts	
			coils	motor		peak	steady state		R	S	T					concord	discord
no.	no.	-	V d.c.	V d.c.	A	A	A	s	ms	ms	ms	ms	ms	ms	m / s	ms	ms
4031	25/2	C	110	110	0,733	12,24	3,51	5,61	79,5	75	76	4,5	76	-	-	85,5	61
4032	26/1	O	110	110	0,663	-	-	-	41,5	42,5	44	2,5	-	55	-	36	51,5
4033	-	C	110	110	0,715	11,63	3,52	5,51	76	74	73	3,0	76	-	-	83	59
4034	-	O	110	110	0,667	-	-	-	41	42	43,6	2,6	-	51,6	-	36	51,2
4035	-	C	110	110	0,69	11,94	3,55	5,48	77,6	76	74,8	2,8	76	-	-	84,8	59,2
4036	-	O	110	110	0,75	-	-	-	41,6	42,8	44,8	3,2	-	51	-	36,4	52
4037	-	C	110	110	0,84	12,5	3,56	5,51	78	75,6	76	2,4	77,6	-	-	86	61,2
4038	-	O	110	110	0,778	-	-	-	42,4	43,2	45,2	2,8	-	51,6	-	37,2	52,8
4039	27/3	C	110	110	1,15	12,4	3,51	5,65	77,6	73,6	74	4,0	76,8	-	1,40	84,8	59,2
4040	28/2	O	110	110	0,766	-	-	-	43,2	44,4	46	2,8	-	53,2	2,54	38	53,6

C = closing operation ; O = opening operation

Mechanical operation tests at ambient air temperature

type of tests: mechanical operation tests at the maximum control voltage

ambient air temperature: 20 °C

condition of the apparatus before the tests: -

date: September 27, 2002

test	oscill.	type of operation	supply voltage of operating devices		current in the coil	current in the motor		duration of motor operation	operating time			max delta t between poles	duration of closing impulse	duration of opening impulse	speed contact	auxiliary contacts	
			coils	motor	C/O	peak	steady state		R	S	T					concord	discord
no.	no.	-	V d.c.	V d.c.	A	A	A	s	ms	ms	ms	ms	ms	ms	m / s	ms	ms
4041	29/2	C	121	121	0,984	11,22	3,54	5,46	77,8	73,2	73,6	4,2	77	-	-	84	59,2
4042	30/1	O	121	121	0,954	-	-	-	40,8	42	43,6	2,8	-	50,8	-	35,6	51,2
4043	-	C	121	121	1,18	12,84	3,46	4,95	75,2	71,2	71,6	3,6	75,2	-	-	81,6	56,8
4044	-	O	121	121	1,09	-	-	-	41,6	42,4	44	2,4	-	51,2	-	36,4	52
4045	-	C	121	121	0,886	13,2	3,51	4,90	76	72,8	73,6	3,2	74,4	-	-	81,6	57,6
4046	-	O	121	121	0,846	-	-	-	40,4	41,2	42,4	2,0	-	50	-	35,2	50
4047	-	C	121	121	1,04	13,6	3,53	4,95	76,8	72,8	74,4	4,0	75	-	-	83,2	59,2
4048	-	O	121	121	0,861	-	-	-	39,6	40,4	42,4	2,8	-	50	-	34,4	49,6
4049	31/2	C	121	121	0,895	12,99	3,47	4,91	74,8	70	70,8	4,4	72,4	-	-	80,8	56,4
4050	32/1	O	121	121	0,843	-	-	-	40,4	41,2	42,4	2,0	-	49,2	-	34,8	49,6

C = closing operation ; O = opening operation

Mechanical operation tests at ambient air temperature

type of tests: mechanical operation tests at the minimum control voltage

ambient air temperature: 20 °C

condition of the apparatus before the tests: -

date: September 27, 2002

test	oscill.	type of operation	supply voltage of operating devices		current in the coil	current in the motor		duration of motor operation	operating time			max delta t between poles	duration of closing impulse	duration of opening impulse	speed contact	auxiliary contacts	
			coils	motor	C/O	peak	steady state		R	S	T					concord	discord
no.	no.	-	V d.c.	V d.c.	A	A	A	s	ms	ms	ms	ms	ms	ms	m / s	ms	ms
4051	33/2	C	93,5	93,5	0,96	10,04	3,45	6,44	82,8	79,6	80,4	3,2	84,4	-	-	90	65,6
4052	34/1	O	77	93,5	0,633	-	-	-	44,8	46	47,6	2,8	-	53,6	-	40	55,2
4053	-	C	93,5	93,5	0,615	9,68	3,44	6,47	81,2	77,6	77,2	4,0	78,8	-	-	87,6	63,2
4054	-	O	77	93,5	0,669	-	-	-	44,8	46	47,2	2,4	-	54,4	-	39,6	55,6
4055	-	C	93,5	93,5	0,766	10,62	3,46	6,45	81,2	79,2	78,8	2,2	81,6	-	-	88,8	64
4056	-	O	77	93,5	0,631	-	-	-	42,8	43,6	45,6	3,2	-	52,4	-	38	53,6
4057	-	C	93,5	93,5	0,675	10,44	3,43	6,42	80,4	78,4	78	2,4	80,8	-	-	88,4	63,6
4058	-	O	77	93,5	0,667	-	-	-	46	47,2	48,8	2,8	-	56,8	-	40,8	56,8
4059	35/3	C	93,5	93,5	0,684	10,24	3,46	6,42	82,8	80,4	80	2,8	81,6	-	1,65	90,4	66
4060	36/2	O	77	93,5	0,598	-	-	-	49,2	50,4	52	2,8	-	58,8	2,60	44,4	59,6

C = closing operation ; O = opening operation

List of instruments used for the tests**Transient recorder and manual torque:**

DIFA MEASURING SYSTEM model TS9000 TRANSISCOPE CESI number 005755;
Plug-in for transient recorder DIFA MEASURING SYSTEM model CM12D CESI number
006507/007856/007850/007855/007827/7837/6497/7816.

Voltage measurement of control circuit:

KNICK model 8820C1 CESI number 009846 with input $\pm 20\text{mA}$ and output $\pm 10\text{V} - 20\text{mA}$.

Current measurement of control circuit:

KNICK model 8215C1 CESI number 009847 with input $\pm 150\text{mV}$ and output $\pm 10\text{V} - 20\text{mA}$.

Voltage measurement of motor:

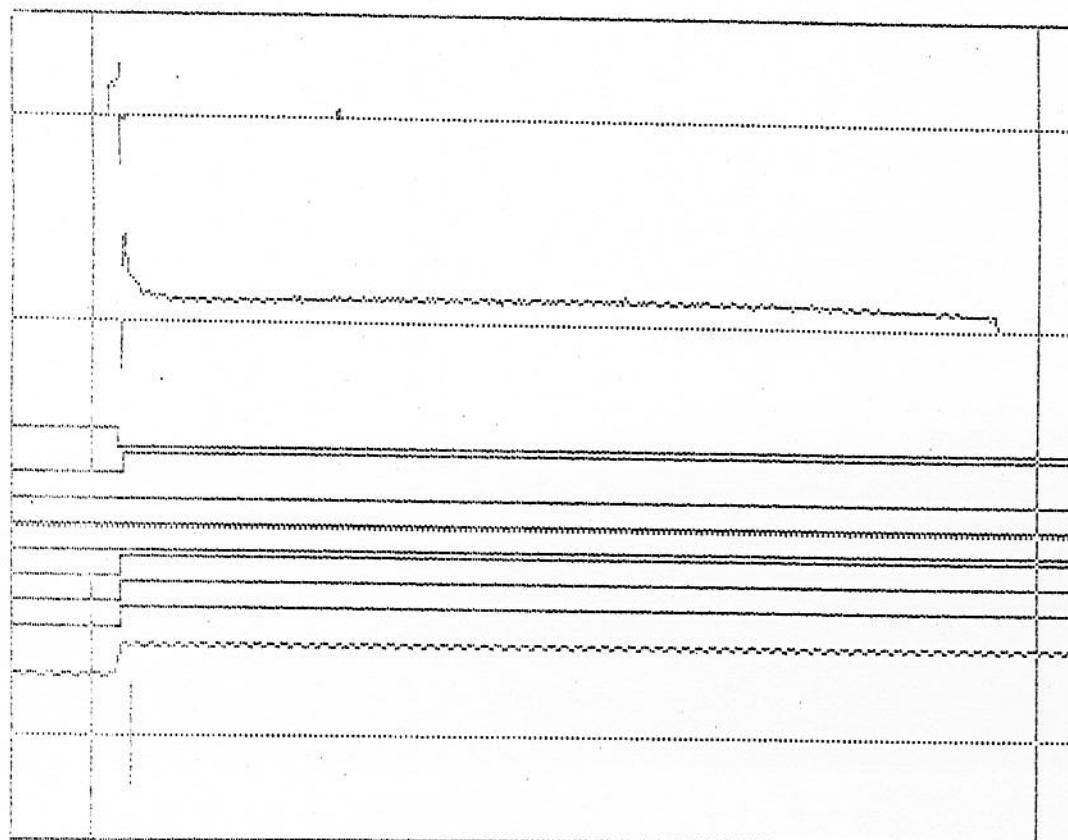
KNICK model 8820C1 CESI number 009848 with input $\pm 20\text{mA}$ and output $\pm 10\text{V} - 20\text{mA}$.

Current measurement of motor:

KNICK model 7215C1 CESI number 009849 with input $\pm 150\text{mV}$ and output $\pm 10\text{V} - 20\text{mA}$.

Resistance measurement :

Microohmmeter MOH 600 A CESI number 14204



CH	BL	MAX	V
1	1	957.6	m
2	1	2046.	m
3	1	37.	m
4	1	8920.	m
		115.1	m
		130.1	m
		-10.2	m
		199.6	m

X : 2
 Y : 1
 FC: 0.00000
 LC: 5.61250
 Δt: 5.62200
 f : 292.968
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.4
 USER NR
 TEST NR 111
 FS: -1.06300
 LS: 5.85250

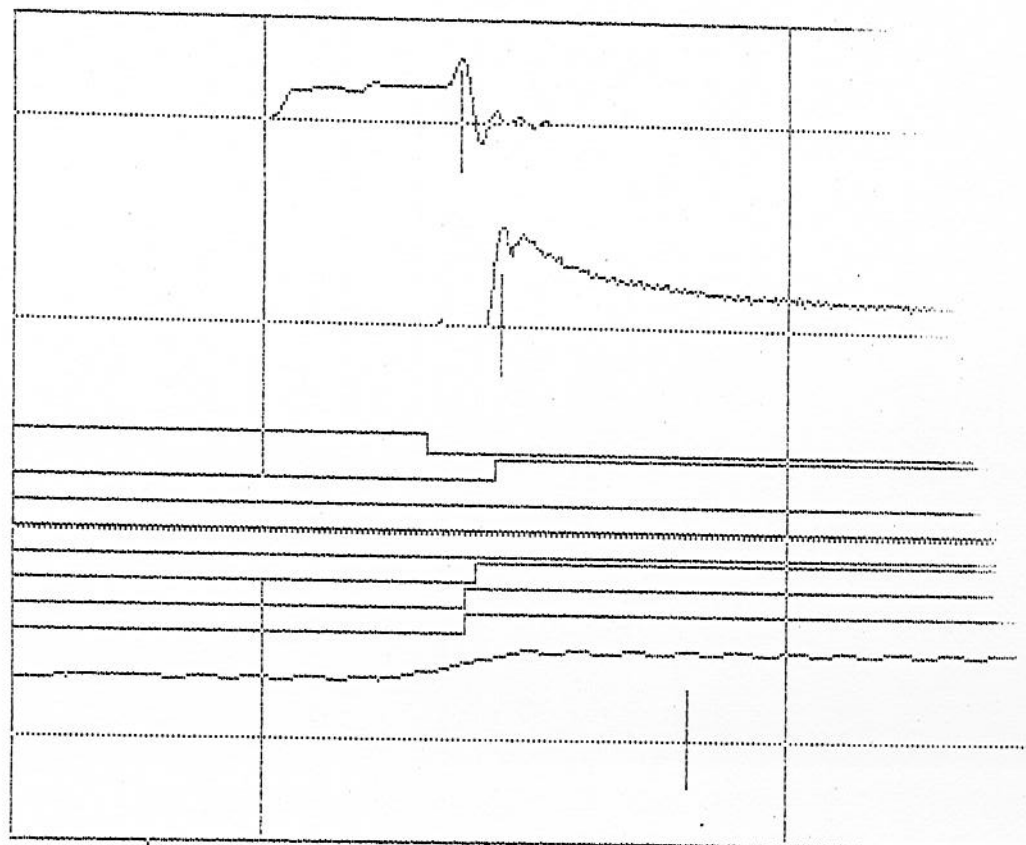
USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2 / 031269-001 / A





BL MAX V
 1 57.6 m
 1 846. m
 1 37. m
 1 920. m
 15.1 m
 70.1 m
 1.6 m
 9.6 m

1
 04. 00
 195 00
 612 00
 766-2
 3- - 0
 0: 0.4
 1
 83.0
 750-

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	R
-----	-----	---------	---------	--------	--------	---

CESI GPS

'A 2/ 031269-001/B



CH BL MAX V
 3 1-4963. m
 4 1 7720. m
 116.6 m
 117.6 m

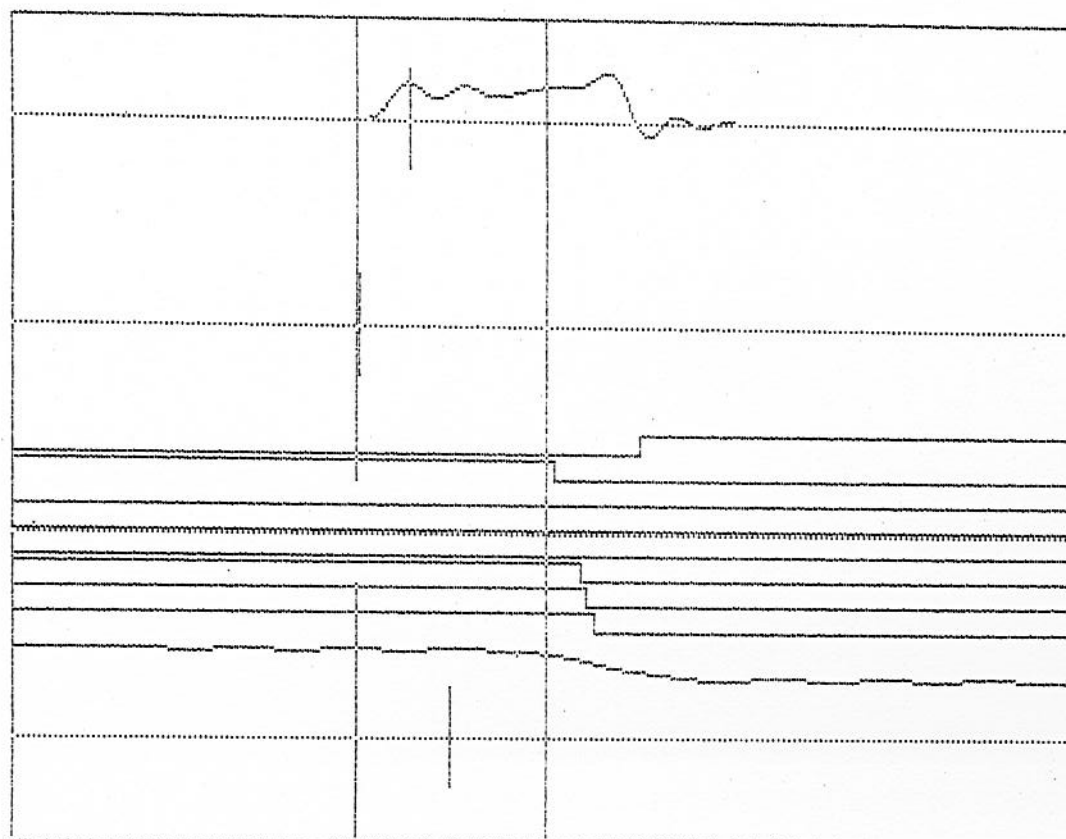
X : 128
 Y : 1
 FC: .107500
 LC: .107500
 Δt: .010000
 F : 1972.65
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.4
 USER NR
 TEST NR 111
 FS: .067000
 LS: .156500

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-001/e



CH BL MAX V
 1 1 558.6 m
 2 1 6880. m
 3 1-2243. m
 4 1 8880. m
 49.6 m
 40.1 m
 39.6 m
 57.1 m

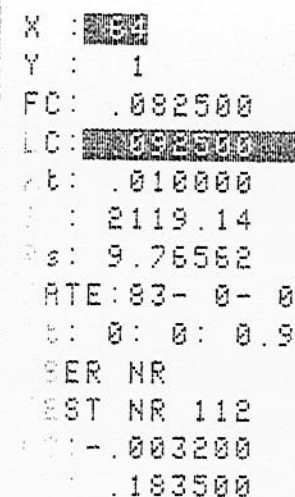
X : 62
 Y : 1
 FC: .039500
 LC: 0.0000
 Δt: .035500
 F : 1943.36
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.9
 USER NR
 TEST NR 112
 FS: -.004900
 LS: .175000

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

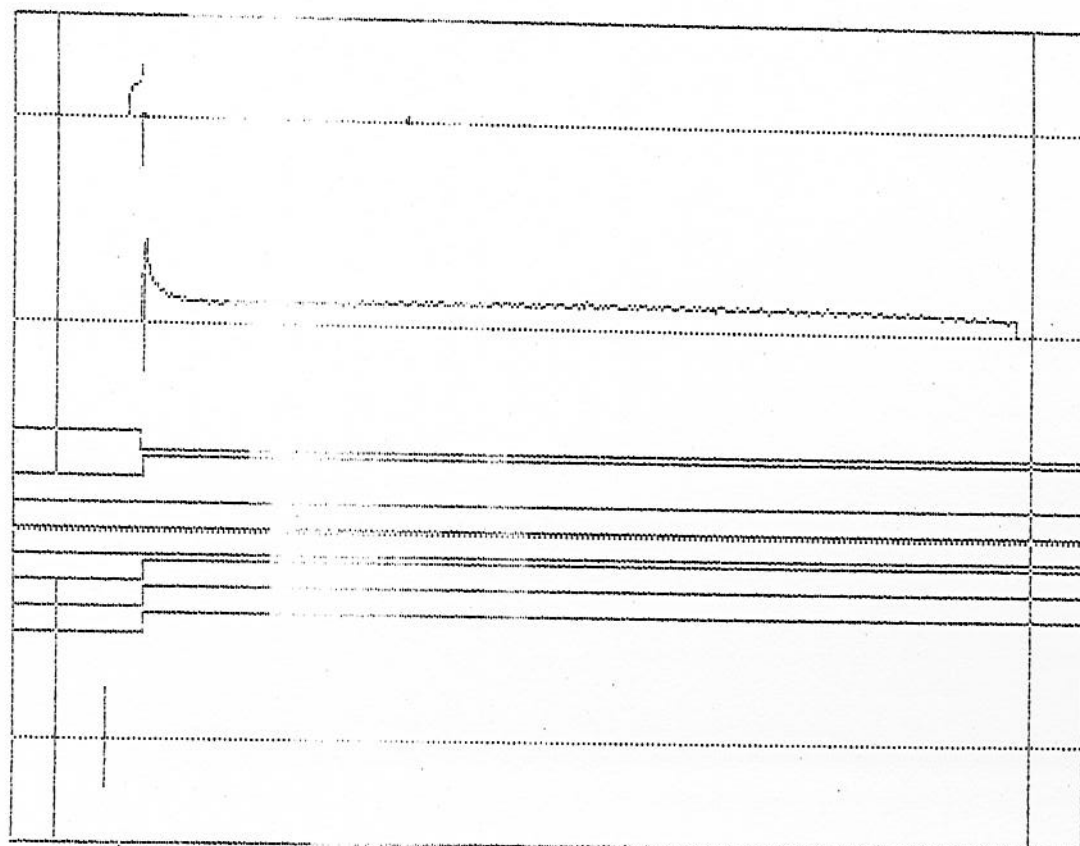
CESI GPS

A 2/ 031269-002/A

[illegible]

CESI GPS

A 2/ 031269-002 / 15



CH BL MAX V
 1 1 580.5 m
 2 1 2046. m
 3 1 37. m
 4 1 14. m
 113.6 m
 131.1 m
 -76.7 m
 -16.3 m

X : **112**
 Y : 1
 FC: -.076800
 LC: **5.42000**
 Δt: 5.51680
 f : 3710.93
 Rs: 9.76562
 DATE: 83- 0- 0
 Rb: 0: 0: 0.6
 USER NR
 TEST NR 115
 FS: -.128000
 LS: 5.74400

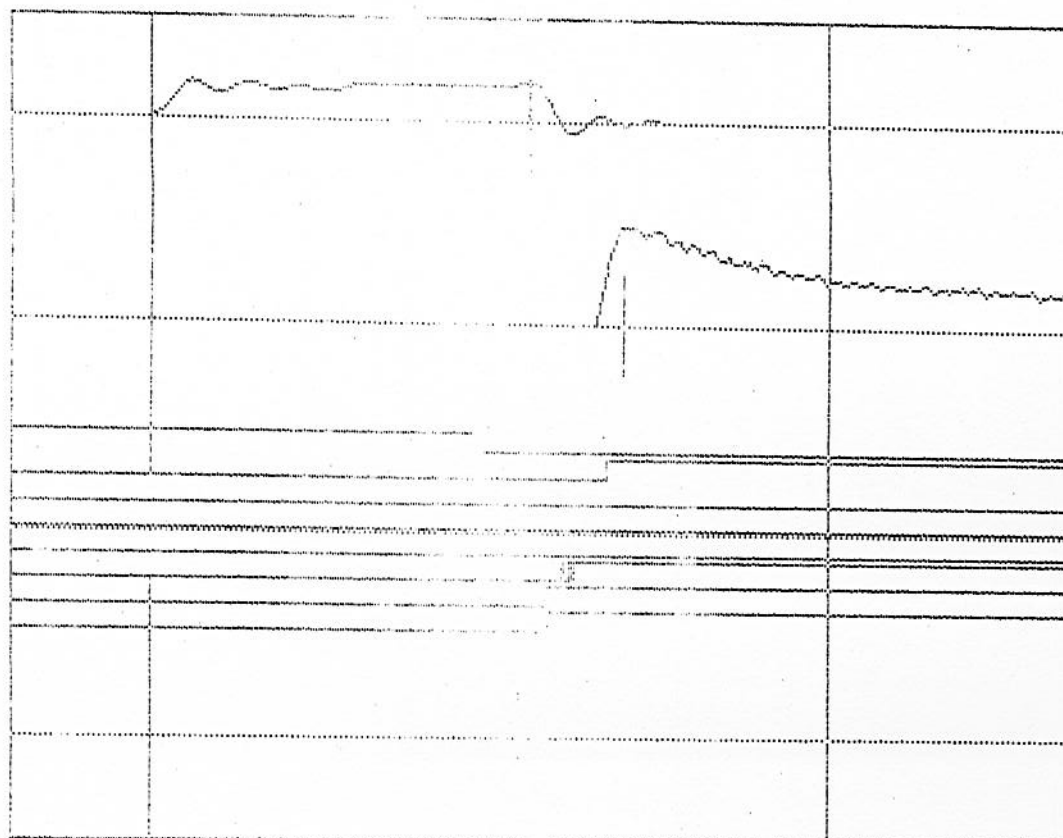
USE RED KEY TO START NEXT RECORDING

MAX	MIN	MAX MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-003/A



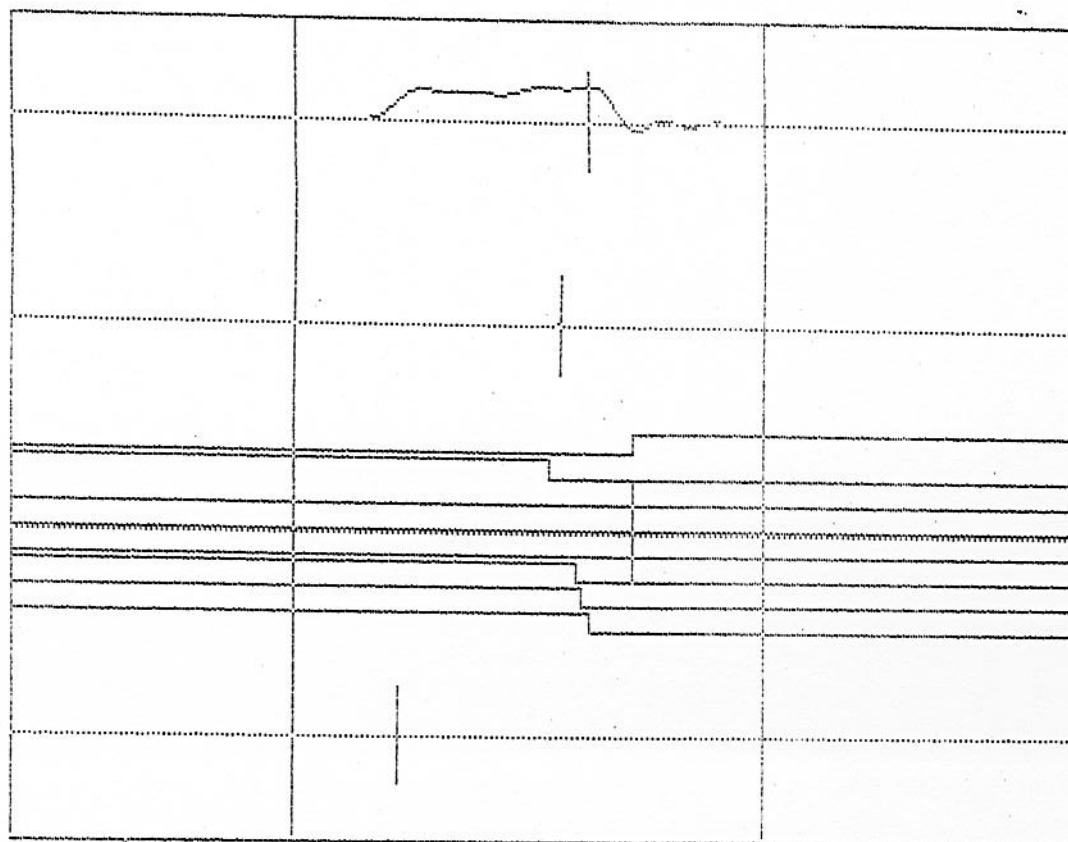


USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-003/B



CH BL MAX V
 1 1 540. m
 2 1 68.8 m
 3 1 37. m
 4 1 14. m
 85.6 m
 80.6 m
 94.1 m
 50.6 m

X : 154
 Y : 1
 FC: .031000
 LC: 118500
 Δt: .087500
 F : 2734.37
 Rs: 9.78562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.1
 USER NR
 TEST NR 116
 FS: -.004300
 LS: .178000

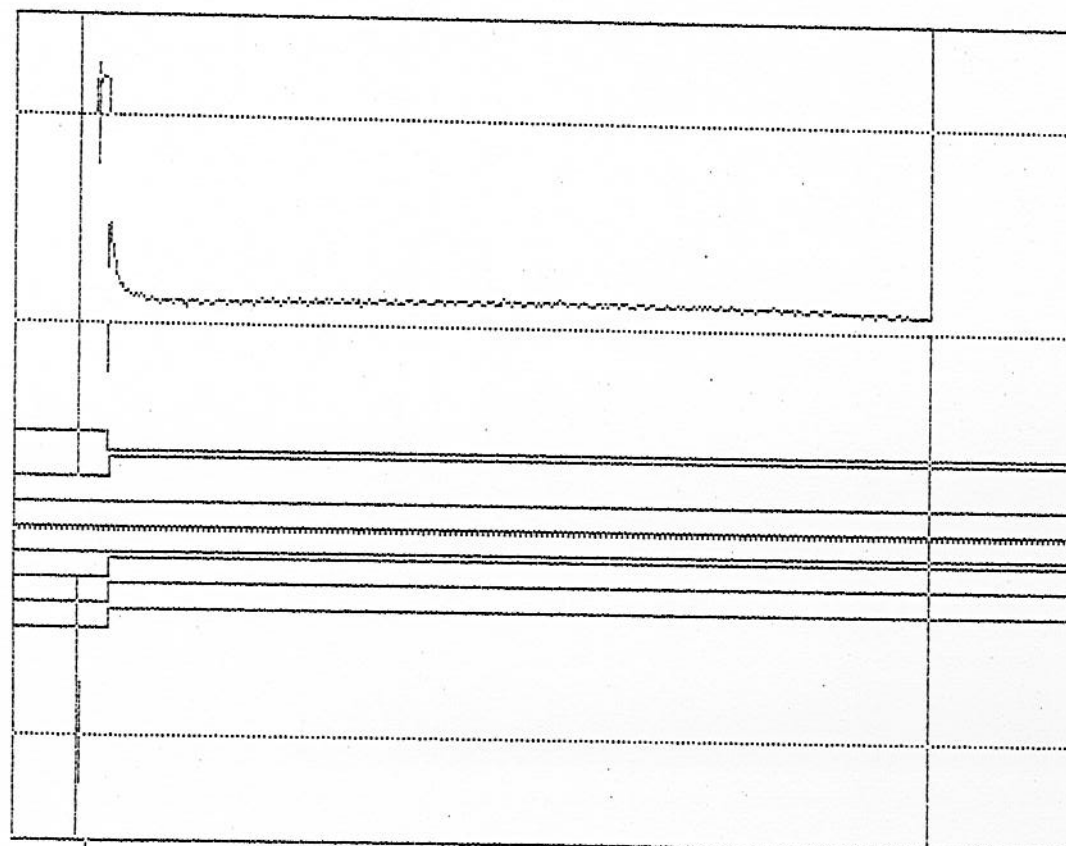
USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-004





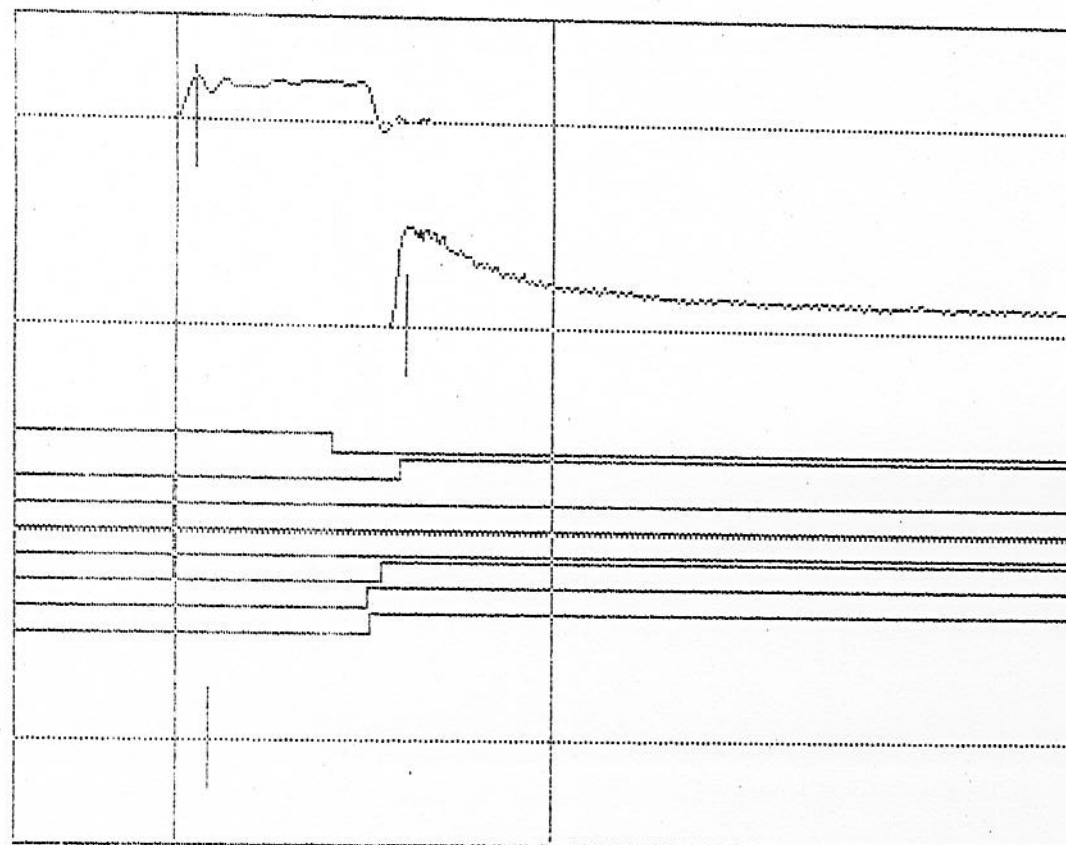
CH BL MAX V
 1 1 639.6 m
 2 1 2046. m
 3 1 37. m
 4 1 14. m
 49.6 m
 127.1 m
 -12.7 m
 -6400. u
 X : 2
 Y : 1
 FC: -.012800
 LC: 5.04000
 Δt: 5.05280
 F : 3349.61
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.5
 USER NR
 TEST NR 117
 FS: -.089600
 LS: 5.93600

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-005 /A



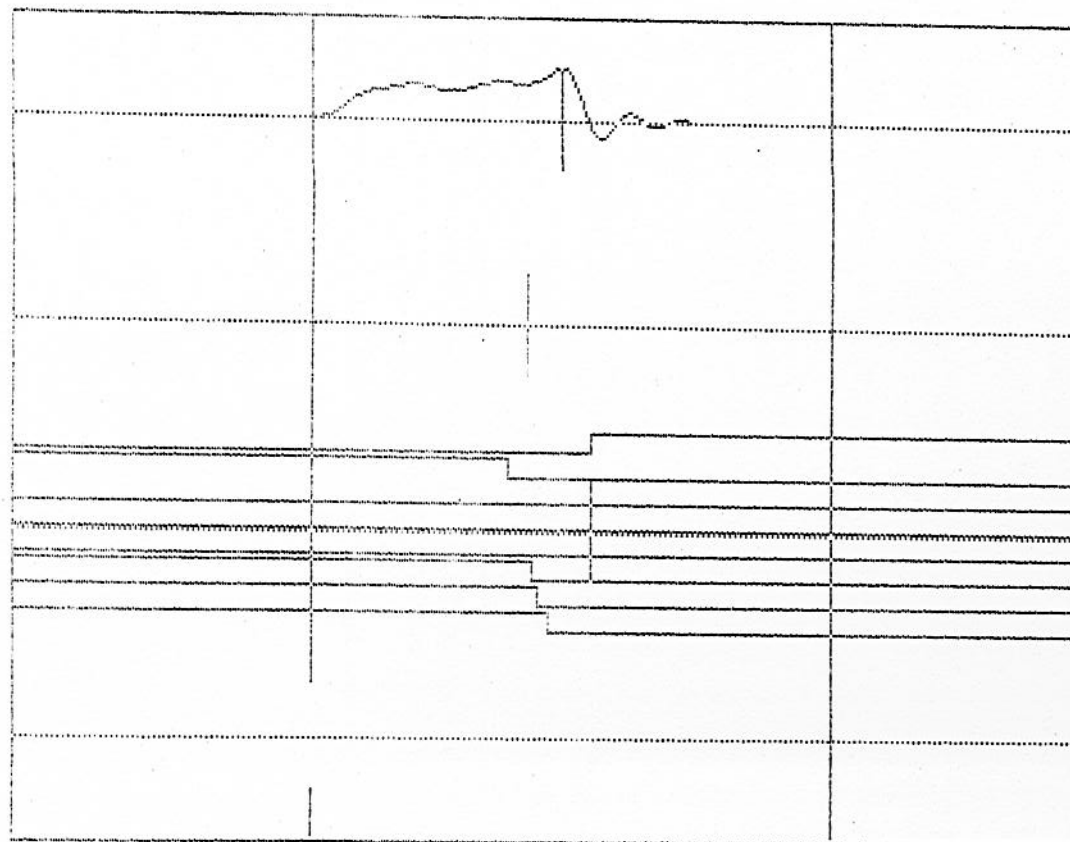
CH BL MAX V
 1 1 639.6 m
 2 1 2046. m
 3 1 37. m
 4 1 14. m
 49.6 m
 127.1 m
 41.6 m
 54.6 m
 X : 32
 Y : 1
 FC: .041500
 LC: 132000
 Δt: .140500
 F : 1953.12
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.5
 USER NR
 TEST NR 117
 FS: -.003600
 LS: .301000

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-005 /B



CH BL MAX V
 1 1 786. m
 2 1 36. m
 3 1 37. m
 4 1 10. m
 86.6 m
 88.1 m
 92.1 m
 40.1 m

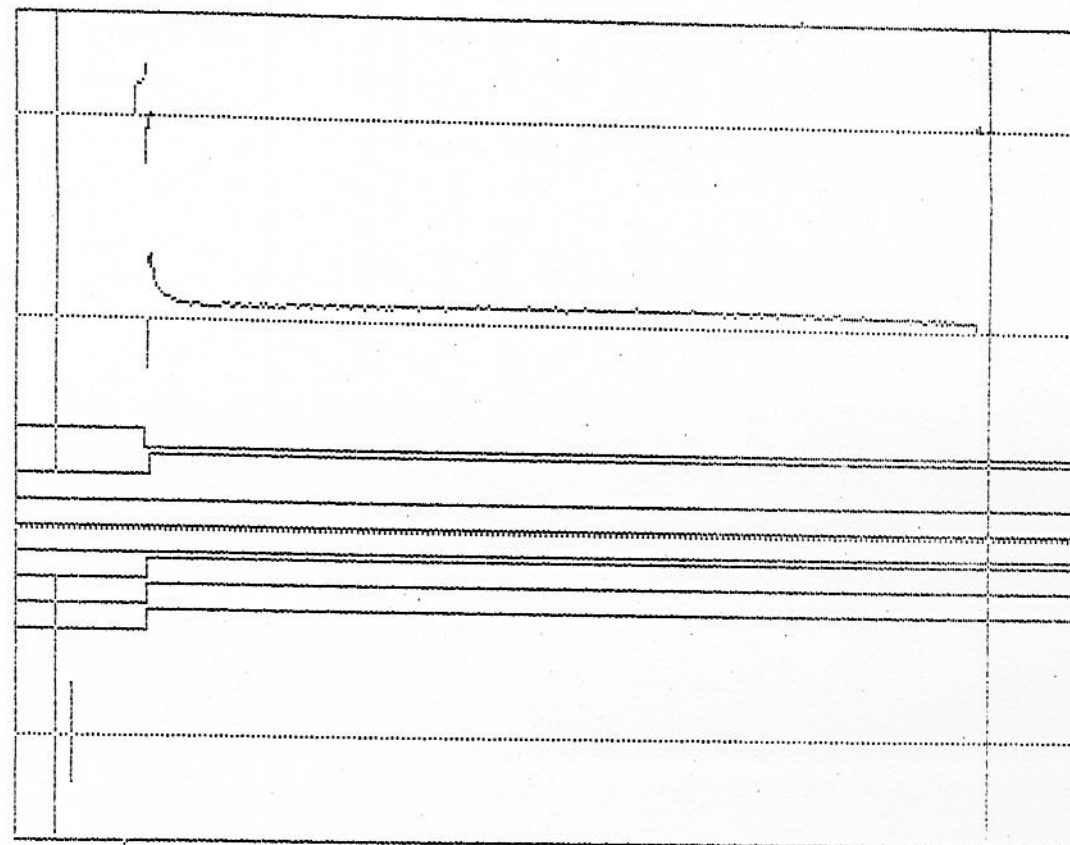
X : 6.4
 Y : 1
 FC: 840000
 LC: .137000
 Δt : .097000
 f : 1093.75
 R_s: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.8
 USER NR
 TEST NR 118
 FS: -.003200
 LS: .183500

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	---------------	---------------	--------	-----

CESI GPS

A 2/ 031269-00 6



CH BL MAX V
 1 1 695.1 m
 2 1 2238. m
 3 1 37. m
 4 1 14. m
 112.6 m
 130.6 m
 -84.7 m
 -63.5 m

X : **2**
 Y : 1
 FC: -.084800
 LC: **5.15000**
 Δt: 5.24480
 F : 3554.68
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.
 USER NR
 TEST NR 125
 FS: -.132800
 LS: 5.72000

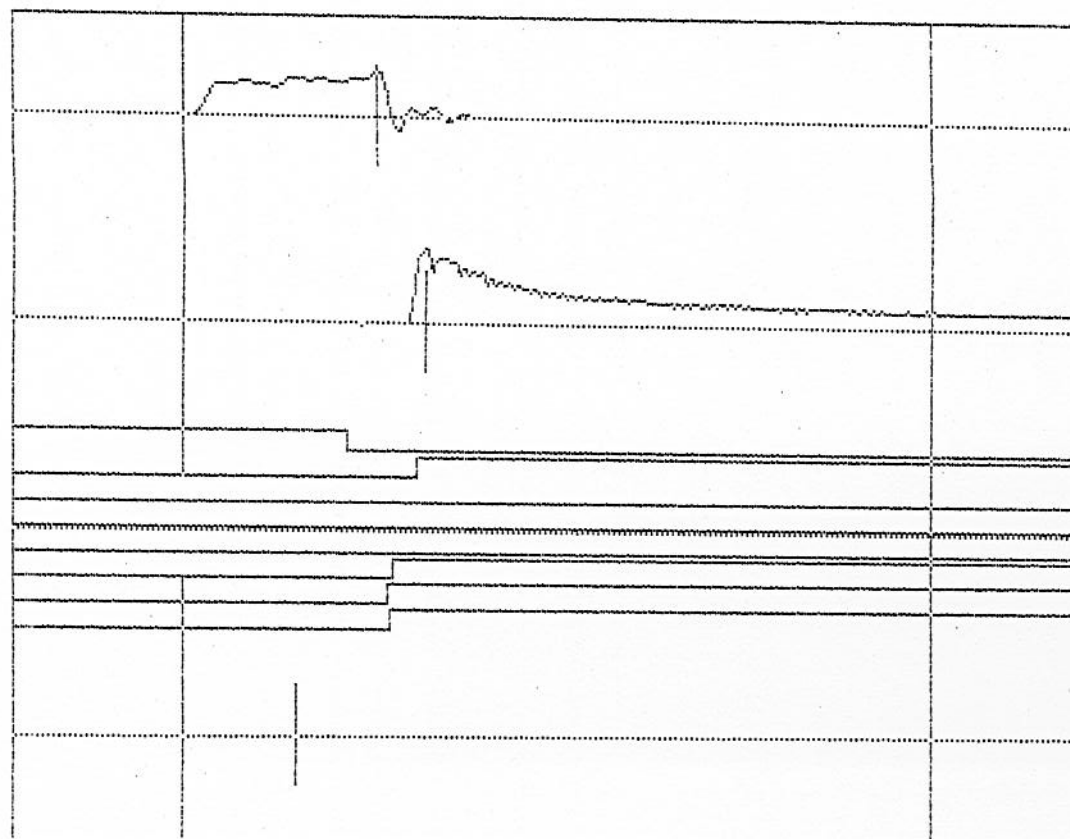
USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

'A 2/ 031269-00 7/A





CH BL MAX V
 1 1 895.1 m
 2 1 2238. m
 3 1 37. m
 4 1 14. m
 112.6 m
 130.6 m
 40.1 m
 82.6 m

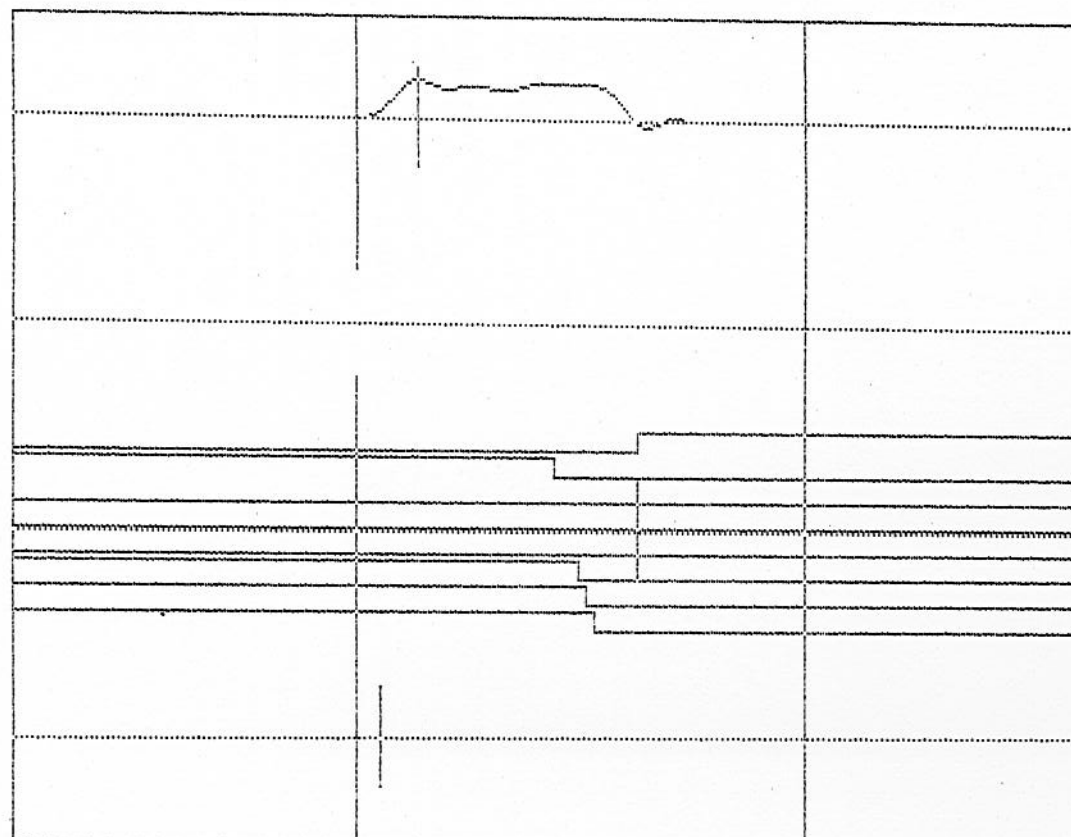
X : 33
 Y : 1
 FC: .040000
 LC: 328300
 Δt: .280000
 P : 3349.61
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.
 USER NR
 TEST NR 125
 FS: -.004600
 LS: .376000

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-007/B



CH BL MAX V
 1 1 579.6 m
 2 1 18. m
 3 1 37. m
 4 1 14. m
 51.6 m
 48.1 m
 92.6 m
 44.6 m

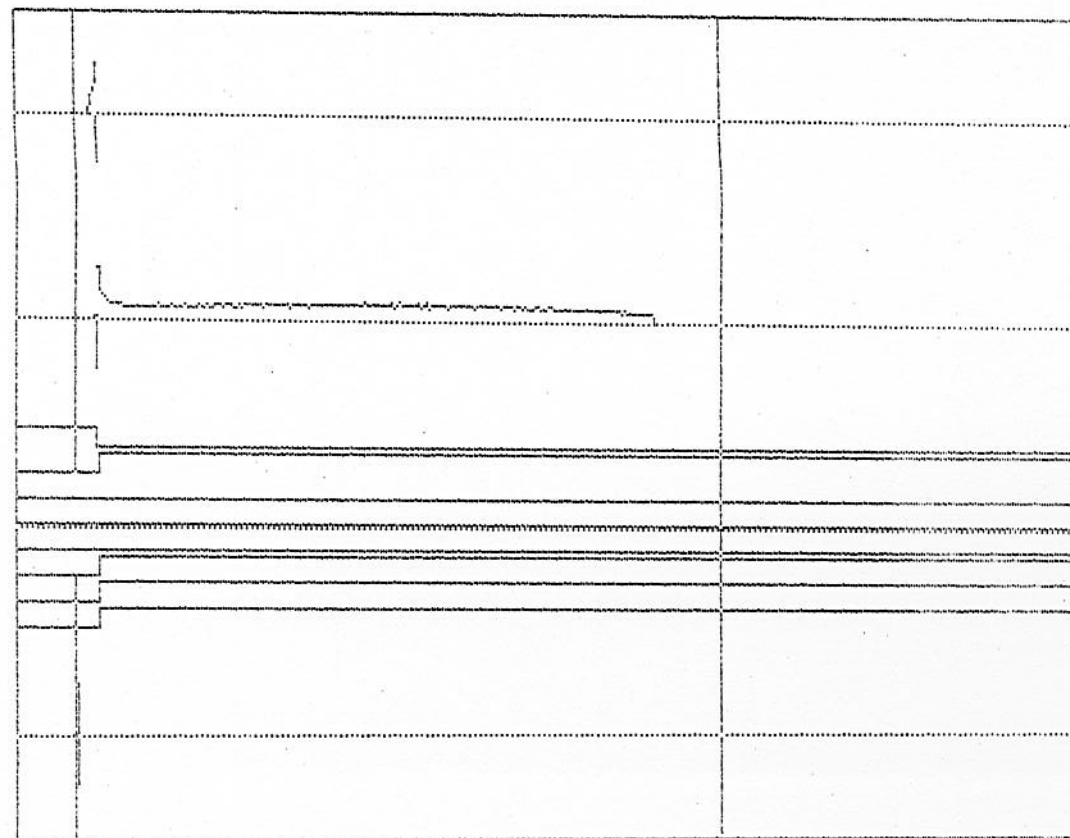
X : 50
 Y : 1
 FC: .040000
 LC: .040000
 Δt: .004000
 F : 2890.62
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.5
 USER NR
 TEST NR 126
 FS: -.004000
 LS: .175500

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-00 8



CH BL MAX V
 1 1 873. m
 2 1 1767. m
 3 1 37. m
 4 1 14. m
 120.1 m
 137.6 m
 -28.7 m
 -17.1 m

X :
 Y : 1
 FC: -.028800
 LC:
 Δt: 7.59600
 f : 2560.36
 Rs: 9.76562
 DATE: 83- 0- 0
 RT: 0: 0: 0.9
 USER NR
 TEST NR 127
 FS: -.169600
 LS: 11.9200

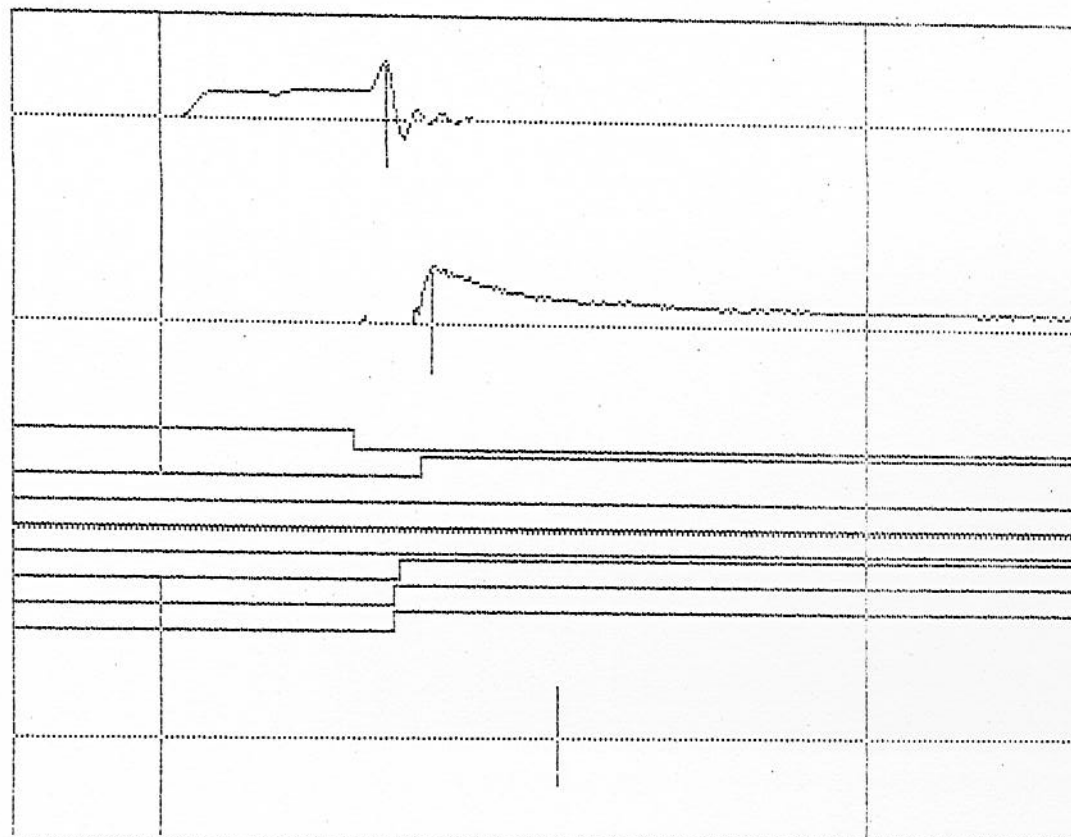
USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-00 9/A





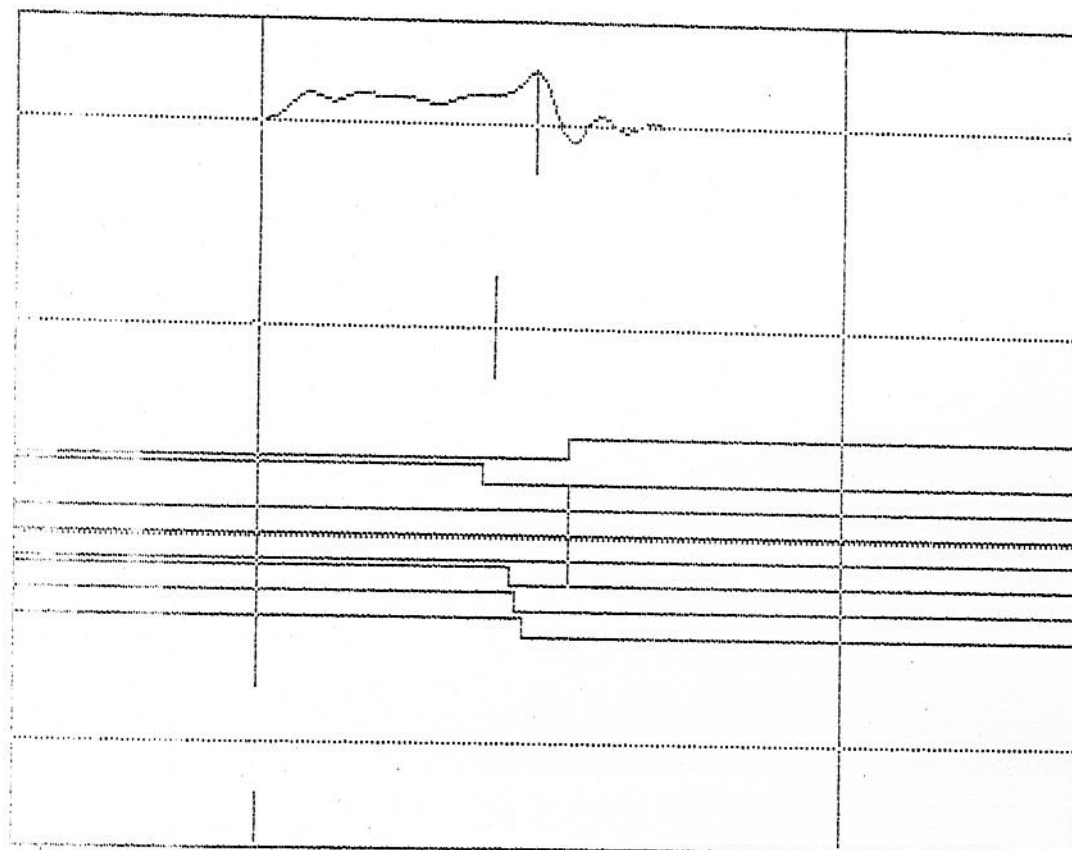
CH PL 000 4
 1E 1 178. E
 2 1 150. E
 3 1 37. E
 4 1 14. E
 128.1 E
 137.6 E
 38.1 E
 104.8 E
 X :
 Y : 1
 FC: .637846
 LC:
 Δt: .264888
 F : 3118.84
 Rs: 9.76888
 DATE: 93- 8- 8
 RT: 8: 0. 3 E
 USER NR
 TEST NR 197
 FS: -.883069
 LS: .388848

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-00 9/B



CH	BL	MAX	V
1	1	792.6	m
2	1	94.2	m
3	1	37.	m
4	1	10.	m
		91.6	m
		84.1	m
		98.1	m
		40.1	m

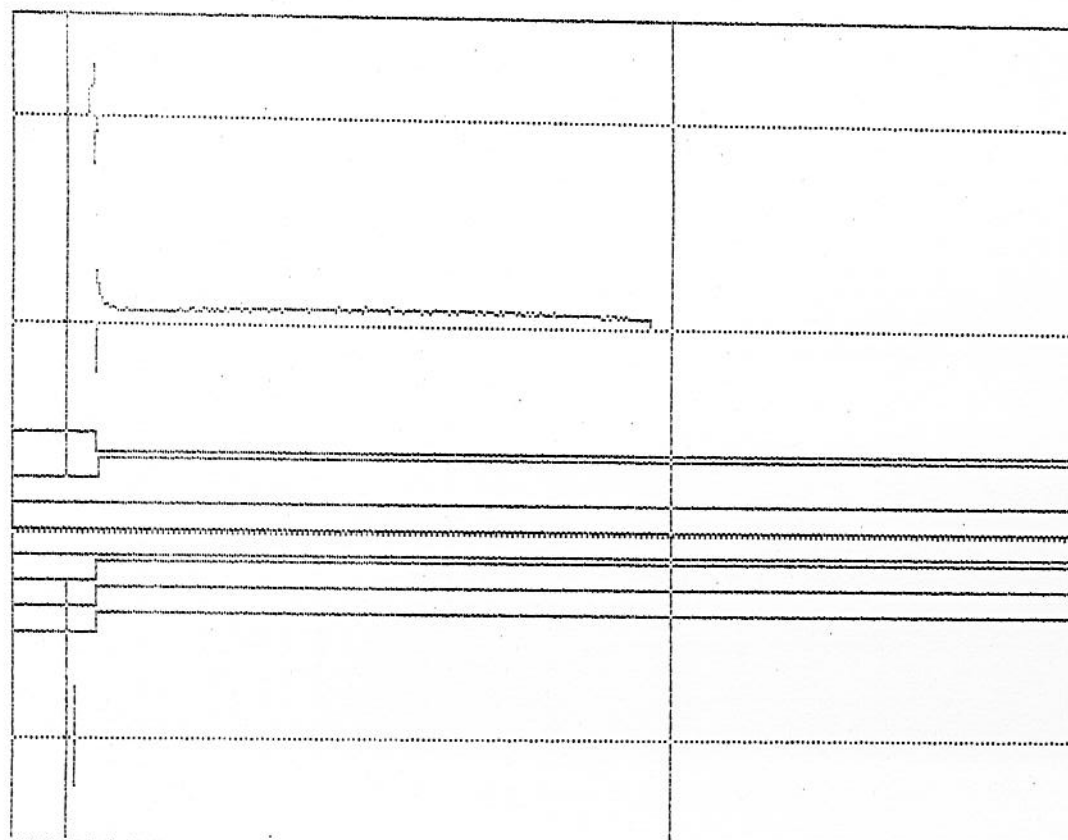
X : 134
 Y : 1
 FC: .040000
 LC: 149000
 Δt: .109000
 F : 3017.57
 R_s: 9.76562
 DATE: 83- 0- 0
 RT: 0: 0: 0.1
 USER NR
 TEST NR 129
 FS: -.001100
 LS: .194000

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-010



CH BL MAX V
 1 1 727.5 m
 2 1 1698. m
 3 1 37. m
 4 1 14. m
 121.6 m
 138.1 m
 -44.7 m
 -22.7 m

X :
 Y : 1
 FC: -.044800
 LC: 6.97500
 Δt: 7.02080
 F : 2392.57
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.2
 USER NR
 TEST NR 136
 FS: -.172800
 LS: 11.9040

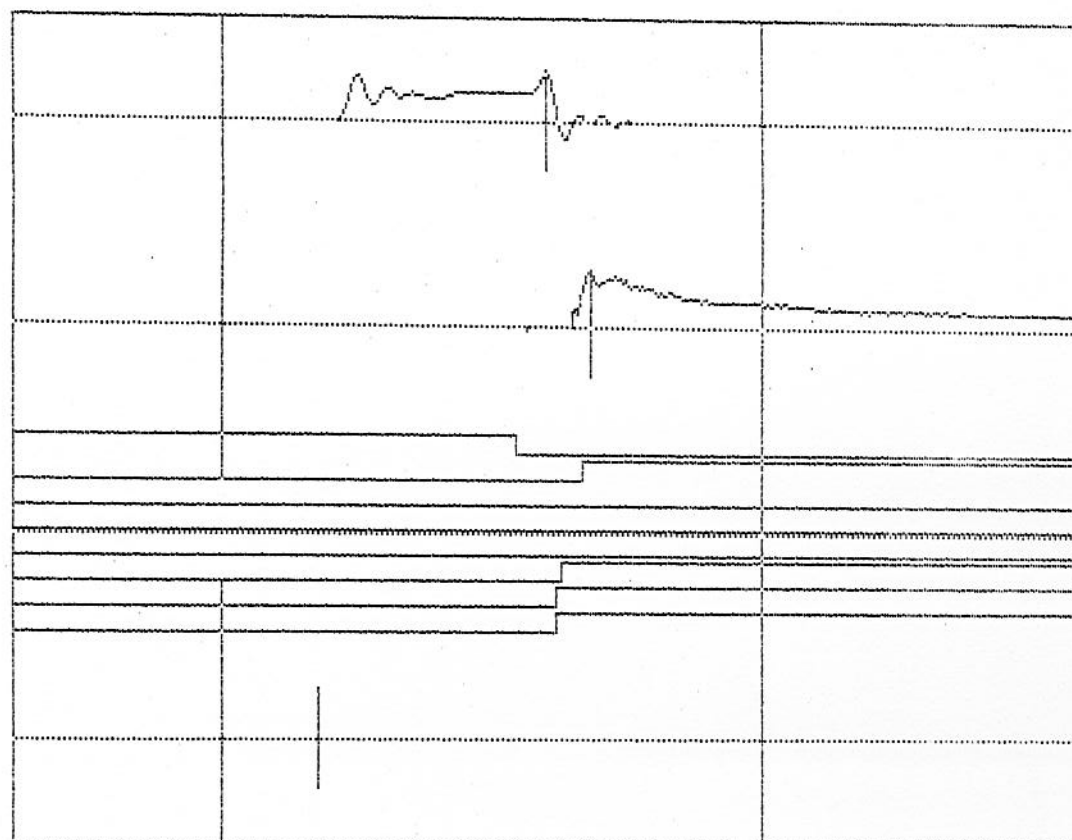
USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-011/A





CH BL MAX V
 1 1 727.5 m
 2 1 1698. m
 3 1 37. m
 4 1 14. m
 121.6 m
 138.1 m
 100. m
 36.6 m

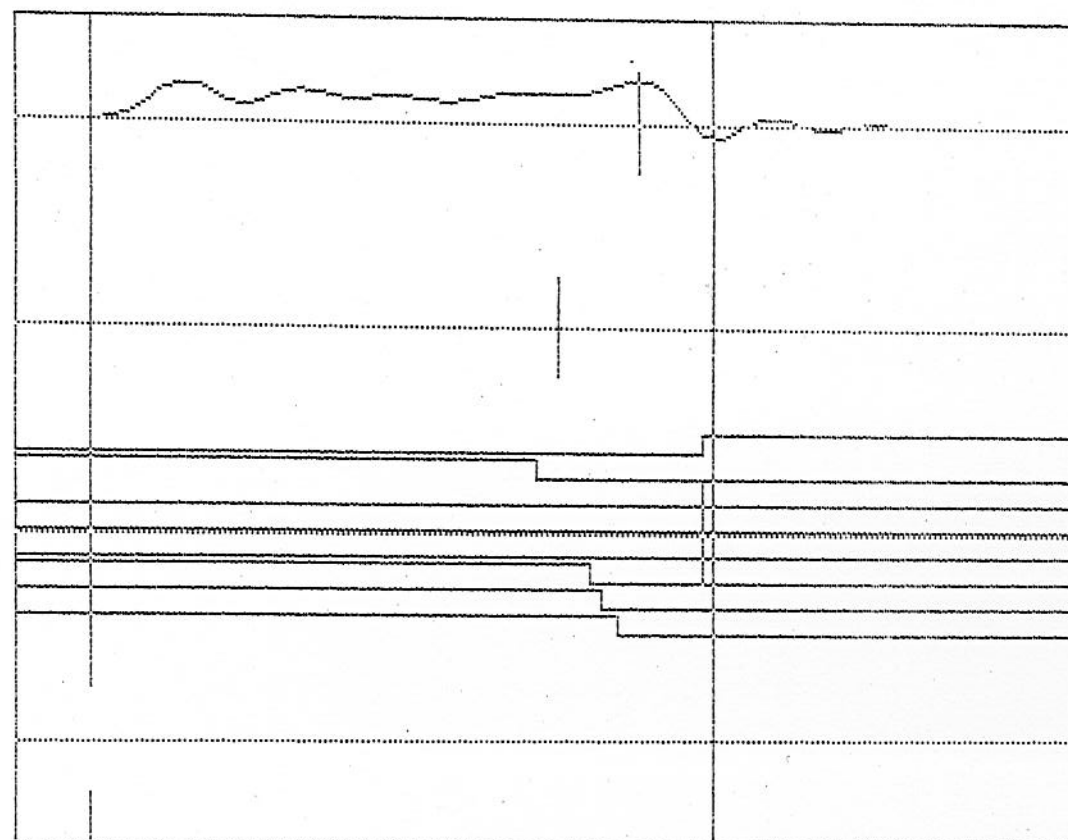
X : 32
 Y : 1
 FC: 0
 LC: 202000
 Δt: .202000
 F : 2734.37
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.2
 USER NR
 TEST NR 136
 FS: -.015600
 LS: .321000

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/031269-011/B



CH BL MAX V
 1 1 642.6 m
 2 1 19.2 m
 3 1 37. m
 4 1 10. m
 51.6 m
 84.1 m
 97.6 m
 40.6 m

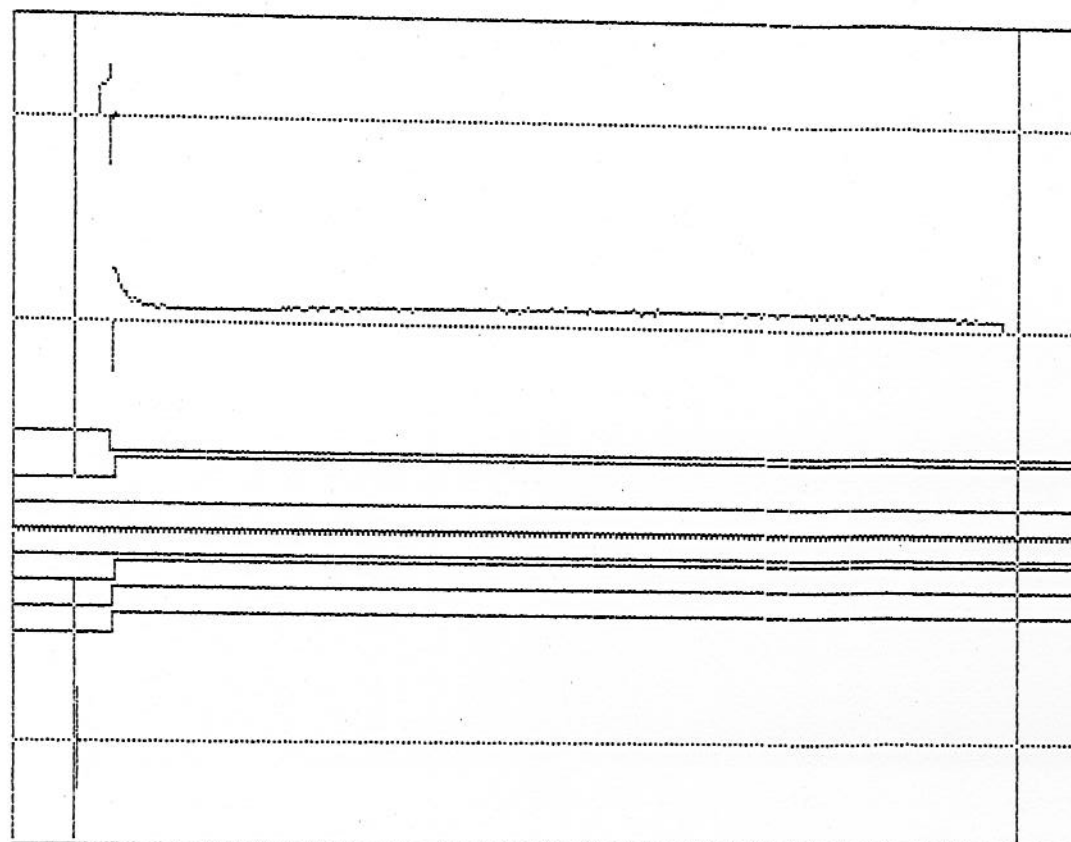
X : 123
 Y : 1
 FC : 033500
 LC : .099500
 Δt : .058000
 P : 273.437
 Rs : 9.78562
 DATE: 83- 0- 0
 RT: 0: 0: 0.7
 USER NR
 TEST NR 137
 FS : .033500
 LS : .133000

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-012



CH BL MAX V
 1 1 540.6 m
 2 1 2058. m
 3 1 37. m
 4 1 14. m
 107.1 m
 134.6 m
 -20.7 m
 -15.1 m

X : 2

Y : 1

FC: -020300

LC: 5.52800

Δt: 5.54800

f : 224.609

R_s: 9.76562

DATE: 83- 0- 0

Rt: 0: 0: 0.7

USER NR

TEST NR 129

FS: -.094400

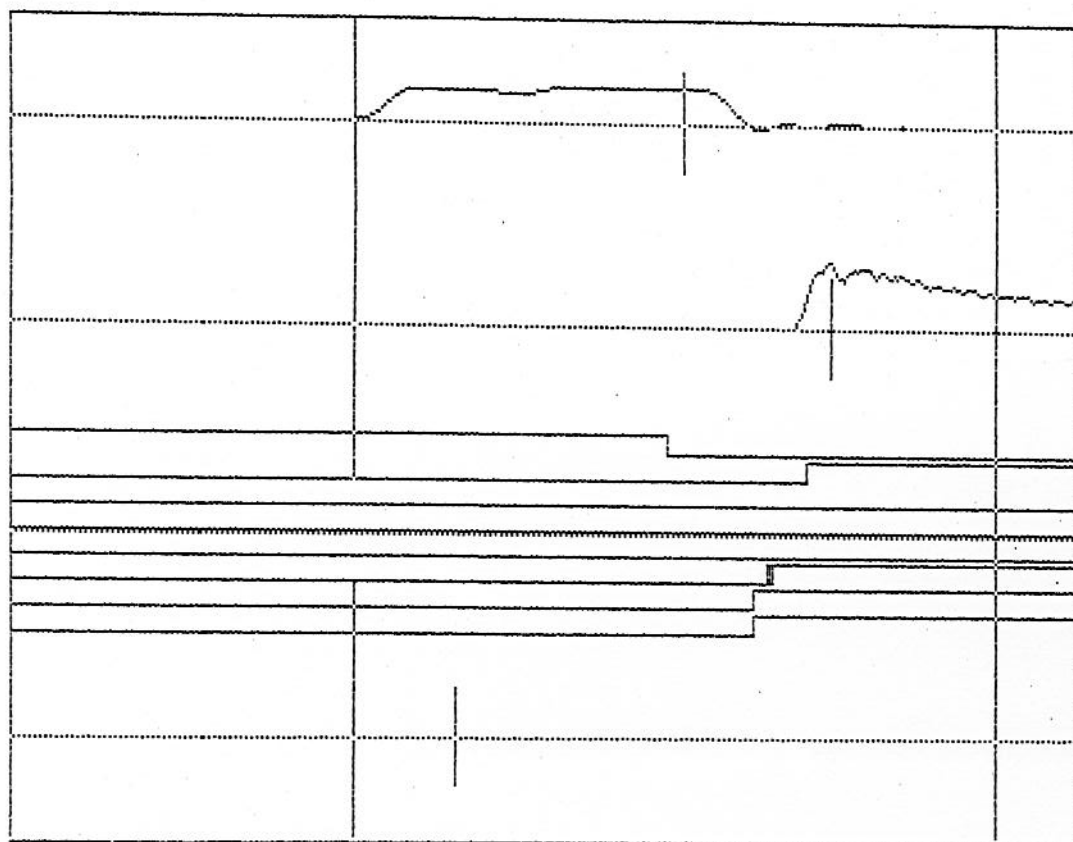
LS: 5.91200

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-013/A



CH BL MAX V
 1 1 540.6 m
 2 1 2058. m
 3 1 37. m
 4 1 14. m
 107.1 m
 134.6 m
 45.6 m
 64.6 m

X : 64
 Y : 1
 FC: .045500
 LC: 165500
 Δt: .120000
 F : 3603.51
 R_s: 9.76562
 DATE: 83- 0- 0
 R_t: 0: 0: 0.7
 USER NR
 TEST NR 129
 FS: -.003800
 LS: .180500

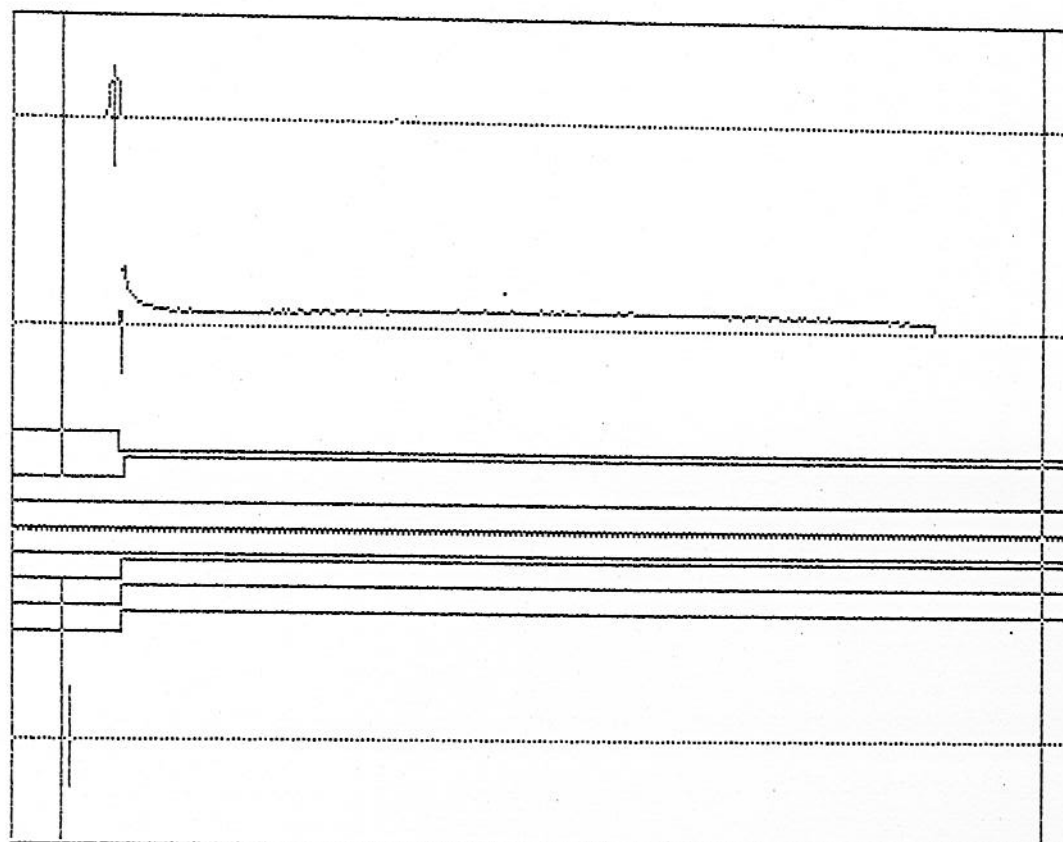
USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-013/B





CH BL MAX V
 1 1 597.6 m
 2 1 2143. m
 3 1 37. m
 4 1 14. m
 82.1 m
 132.1 m
 -44.7 m
 -34.1 m

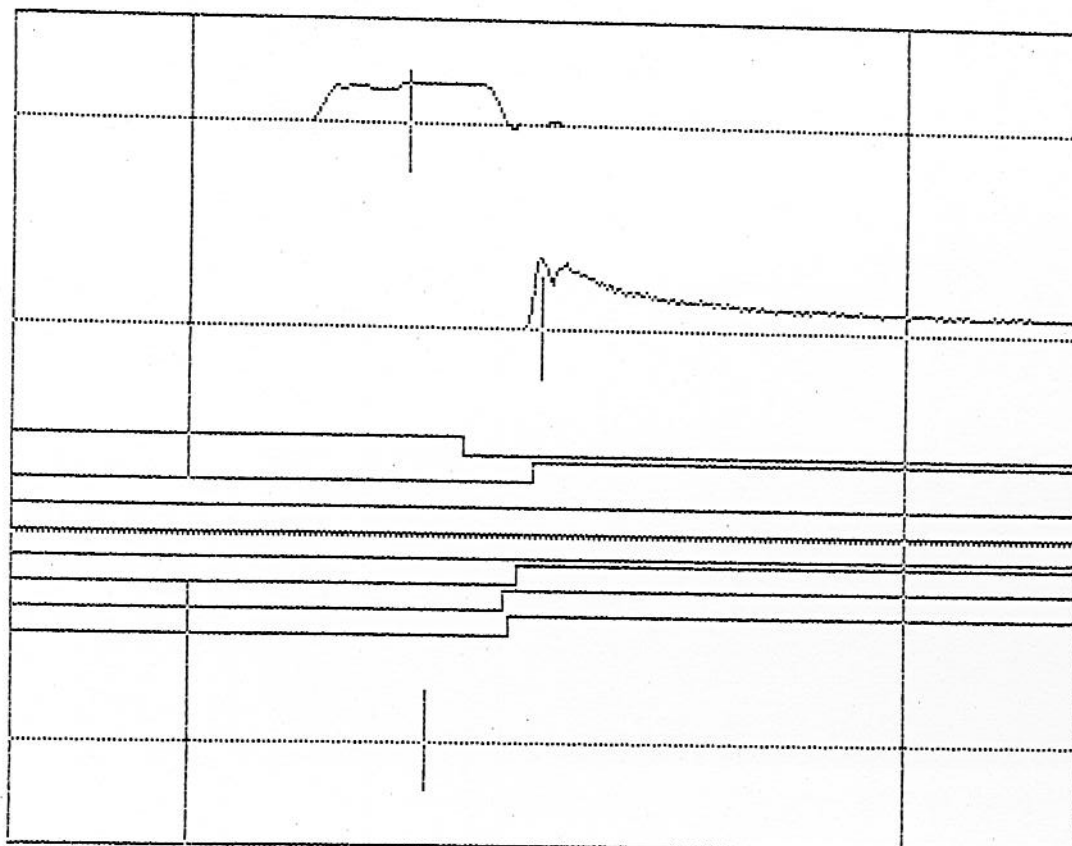
X : 2
 Y : 1
 FC: -044800
 LC: 5.63200
 Δt: 5.67680
 f : 195.312
 R_s: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.4
 USER NR
 TEST NR 131
 FS: -.108800
 LS: 5.84000

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-015/#



CH BL MAX V
 1 1 597.6 m
 2 1 2143. m
 3 1 37. m
 4 1 14. m
 82.1 m
 132.1 m
 100. u
 89.6 m

X : 32
 Y : 1
 FC: 0
 LC: .268000
 Δt: .268000
 F : 644.531
 R_s: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.4
 USER NR
 TEST NR 131
 FS: -.013200
 LS: .333000

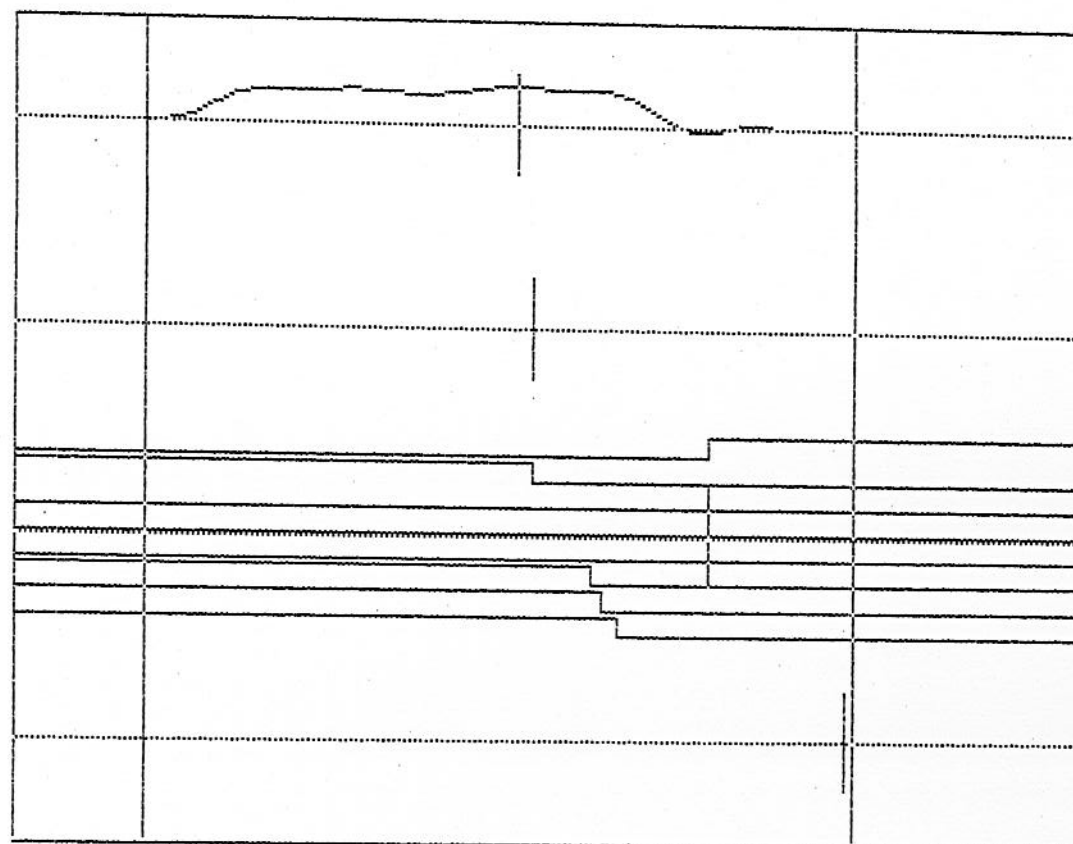
USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-015/B

15/B



CH BL MAX V
 1 1 569.1 m
 2 1 9000. m
 3 1 37. m
 4 1 14. m
 75.6 m
 77.1 m
 93.6 m
 106.6 m

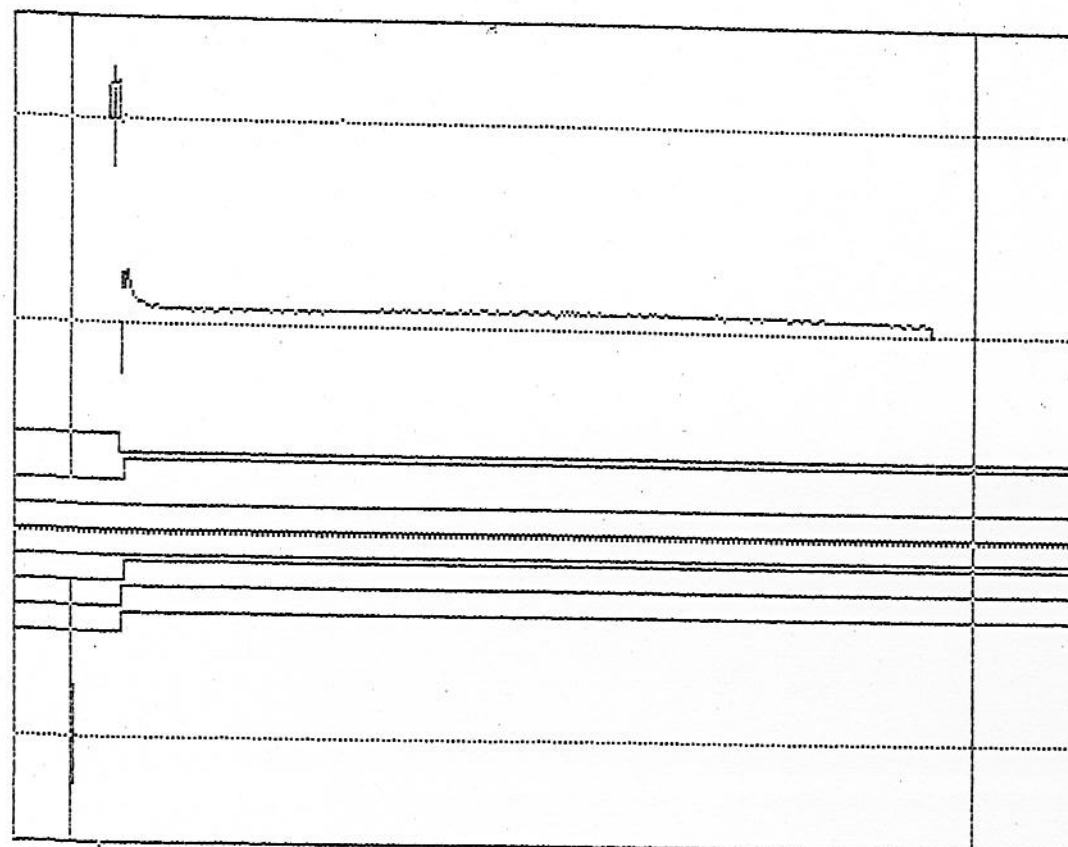
X : 128
 Y : 1
 FC: .041000
 LC: 107000
 Δt: .066000
 F : 3056.64
 R_s: 9.76562
 DATE: 83- 8- 8
 Rt: 0: 0: 0.8
 USER NR
 TEST NR 132
 FS: .029000
 LS: .128500

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-010



CH BL MAX V
 1 1 595.5 m
 2 1 2346. m
 3 1 37. m
 4 1 14. m
 83.1 m
 131.6 m
 -36.7 m
 -32.9 m

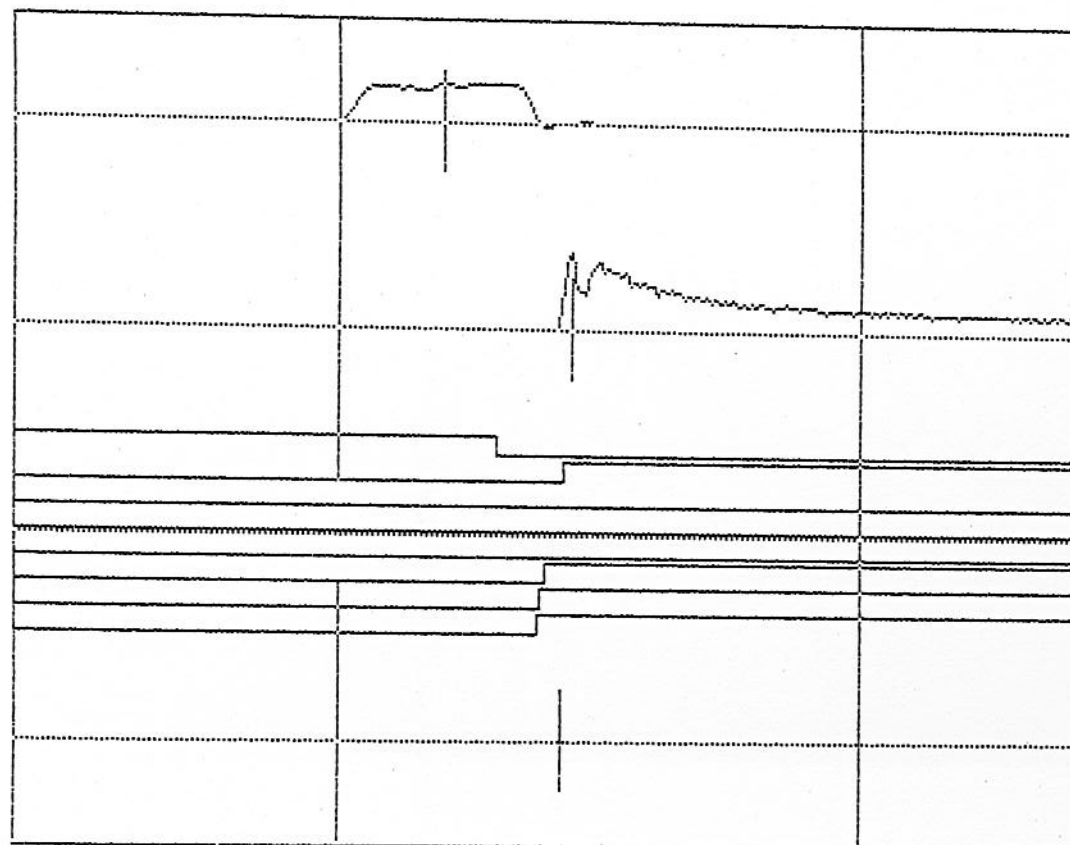
X : 2
 Y : 1
 FC: -.036800
 LC: 5.20800
 Δt: 5.24480
 f : 3496.09
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.8
 USER NR
 TEST NR 136
 FS: -.104000
 LS: 5.96400

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-01 7/A



CH BL MAX V
 1 1 595.5 m
 2 1 2346. m
 3 1 37. m
 4 1 14. m
 83.1 m
 131.6 m
 44.1 m
 127.6 m

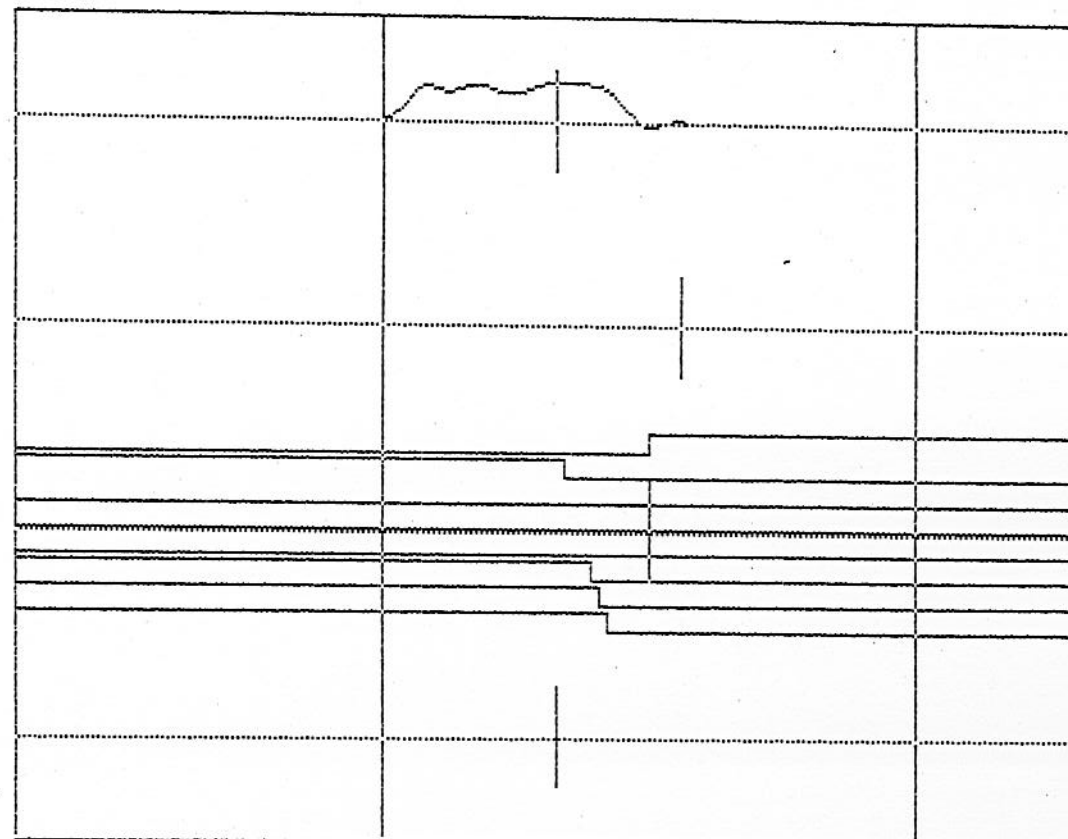
X : 32
 Y : 1
 FC: 044000
 LC: .239000
 Δt: .195000
 P : 1181.64
 R_s: 9.76562
 DATE: 83- 0- 0
 RE: 0: 0: 0.8
 USER NR
 TEST NR 136
 FS: -.015400
 LS: .322000

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-017/B



CH BL MAX V
 1 1 578.1 m
 2 1 9000. m
 3 1 37. m
 4 1 14. m
 75.1 m
 98.6 m
 92.6 m
 75.1 m

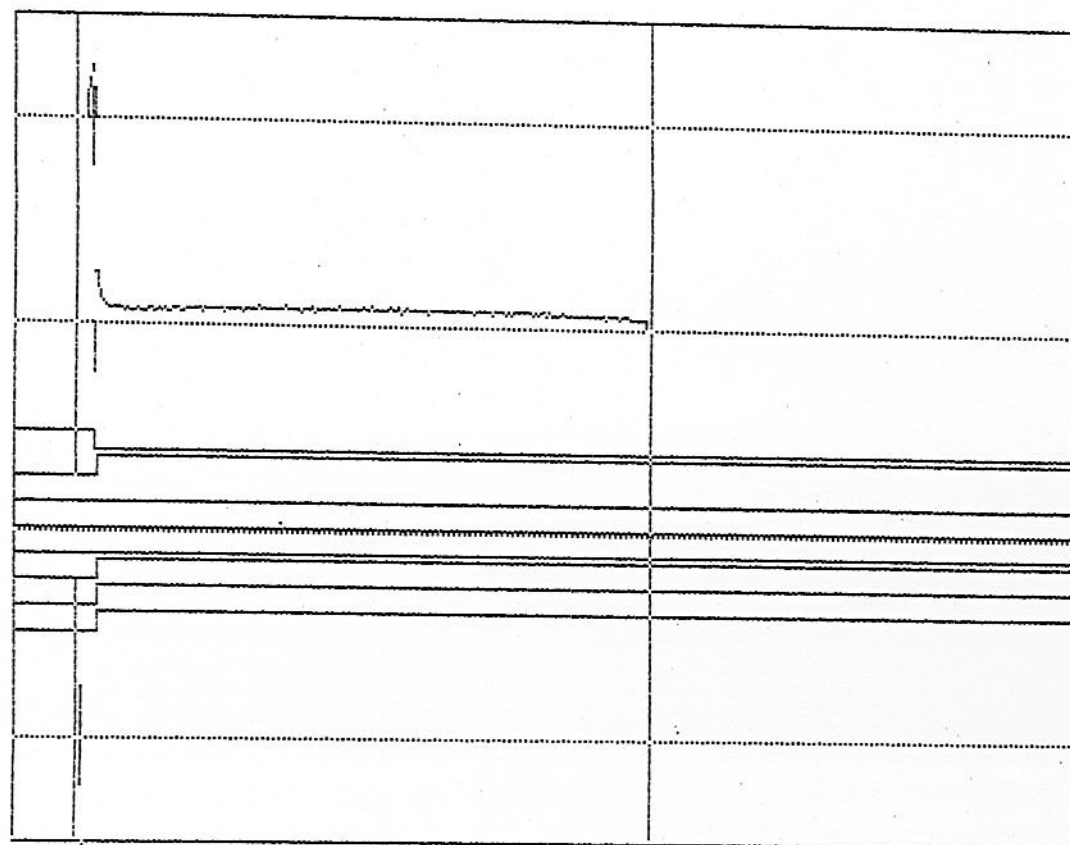
X : 64
 Y : 1
 FC: .042500
 LC: .142500
 Δt: .100000
 F : 3291.01
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.7
 USER NR
 TEST NR 137
 FS: -.005200
 LS: .173500

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-018



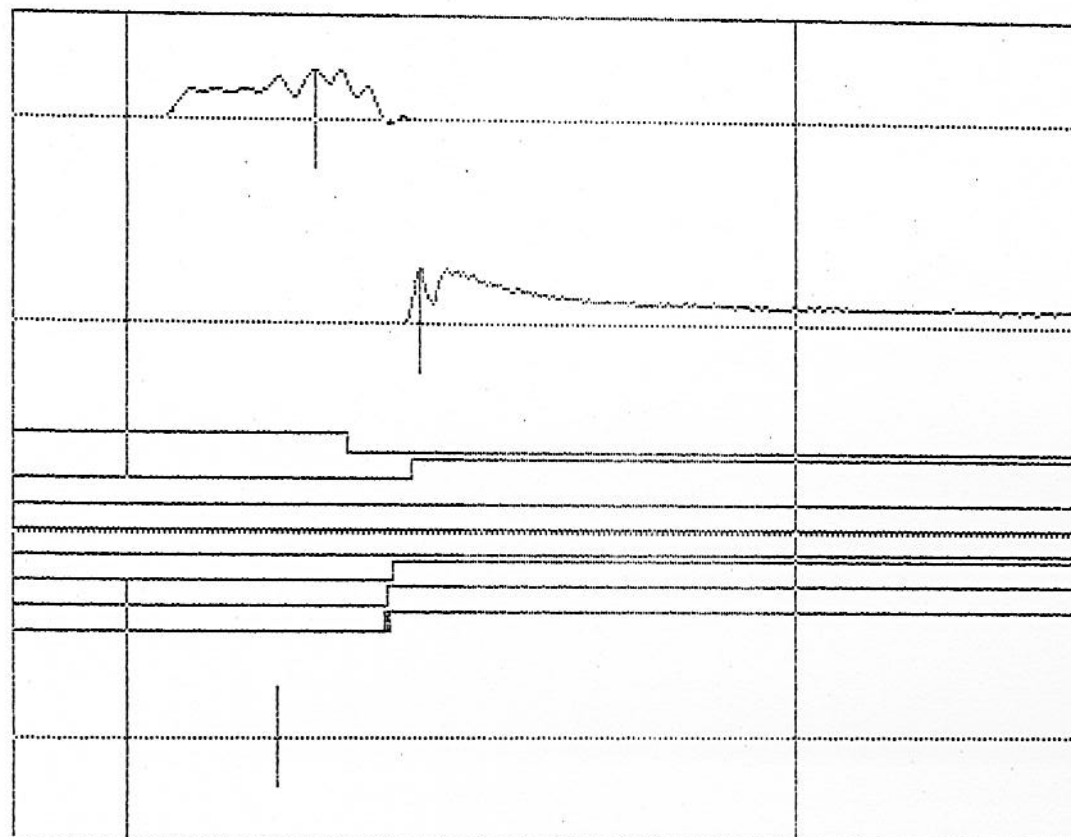
CH BL MAX V
 1 1 756. m
 2 1 1677. m
 3 1 37. m
 4 1 14. m
 102.1 m
 141.6 m
 -20.7 m
 -7100. μ
 X : XXXXXXXXXX
 Y : 1
 FC: -.020800
 LC: XXXXXXXXXX
 Δt : 8.76480
 F : 2314.45
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.
 USER NR
 TEST NR 138
 FS: -.168000
 LS: 11.9280

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	---------------	---------------	--------	-----

CESI GPS

A 2/ 031269-01 9/A



CH BL MAX V
 1 1 756. m
 2 1 1677. m
 3 1 37. m
 4 1 14. m
 102.1 m
 141.6 m
 32.1 m
 88.1 m

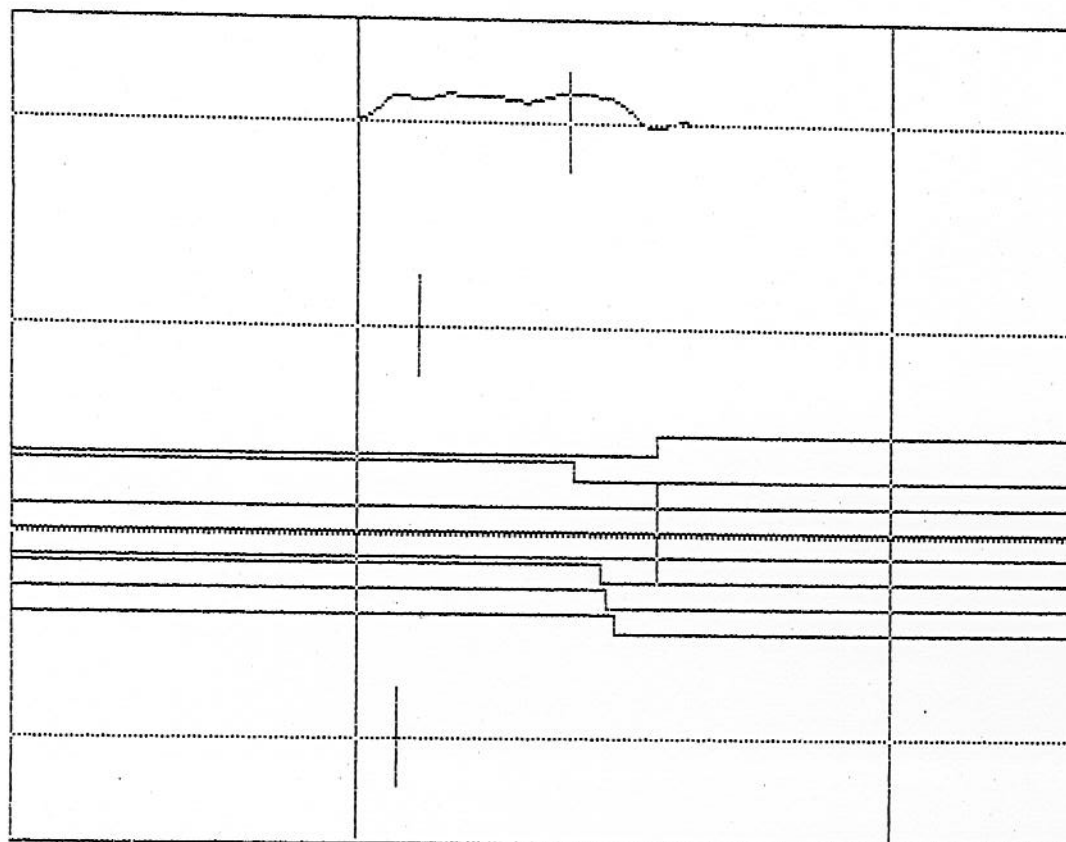
X : 32
 Y : 1
 FC: .032000
 LC: 282000
 Δt: .250000
 F : 2851.56
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.
 USER NR
 TEST NR 138
 FS: -.002000
 LS: .389000

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-019/B



CH BL MAX V
 1 1 432. m
 2 1 10.2 m
 3 1 37. m
 4 1 14. m
 81.1 m
 53.1 m
 97.6 m
 49.1 m

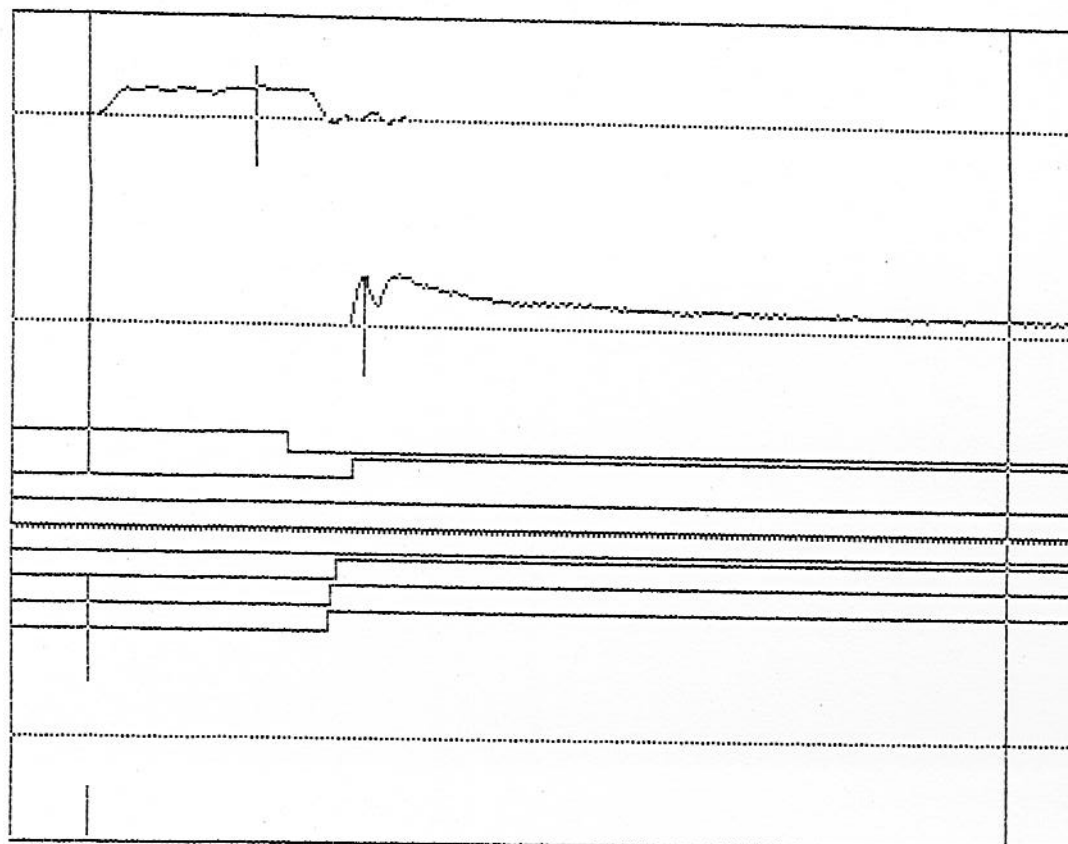
X : 64
 Y : 1
 FC: .041500
 LC: 141500
 Δt: .100000
 F : 3212.89
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.1
 USER NR
 TEST NR 139
 FS: -.004600
 LS: .176500

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-020



CH BL MAX V
 1 1 461.1 m
 2 1 1585. m
 3 1 37. m
 4 1 4000. μ
 104.6 m
 144.6 m
 42.1 m
 42.6 m

X : 32
 Y : 1
 FC: 042000
 LC: .386000
 Δt : .344000
 F : 273.437
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.7
 USER NR
 TEST NR 103
 FS: .014000
 LS: .413000

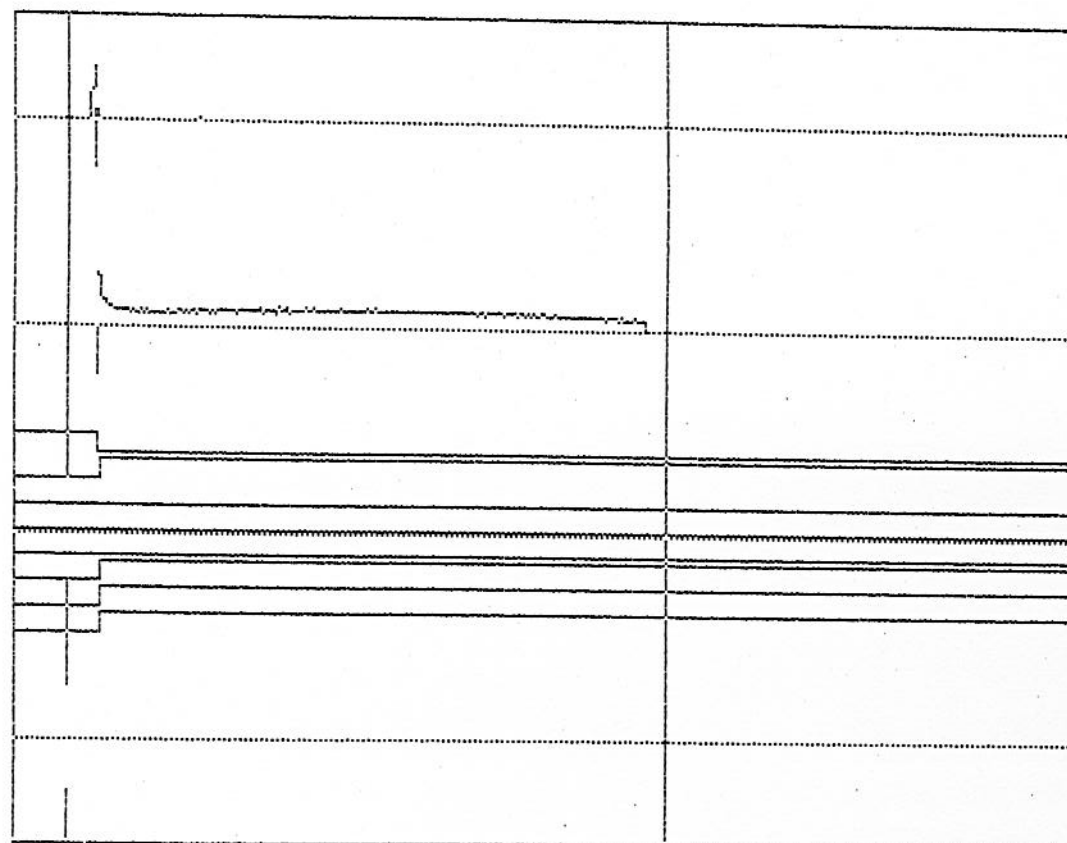
USE RED KEY TO START NEXT RECORDING

DISK	PRINTER	XY	PLT	DEMUX	VP		RETURN	
------	---------	----	-----	-------	----	--	--------	--

CESI GPS

A 2/ 031269-021/A





CH BL MAX V
 1 1 461.1 m
 2 1 1585. m
 3 1 37. m
 4 1 4000. u
 104.6 m
 144.6 m
 -44.7 m
 -44.7 m

X : XXXXXXXXXX

Y : 1

FC: XXXXXXXXXX

LC: 6.93600

Δt : 6.98000

F : 195.312

R_s: 9.76562

DATE: 83- 0- 0

Rt: 0: 0: 0.7

USER NR

TEST NR 103

FS: -.172800

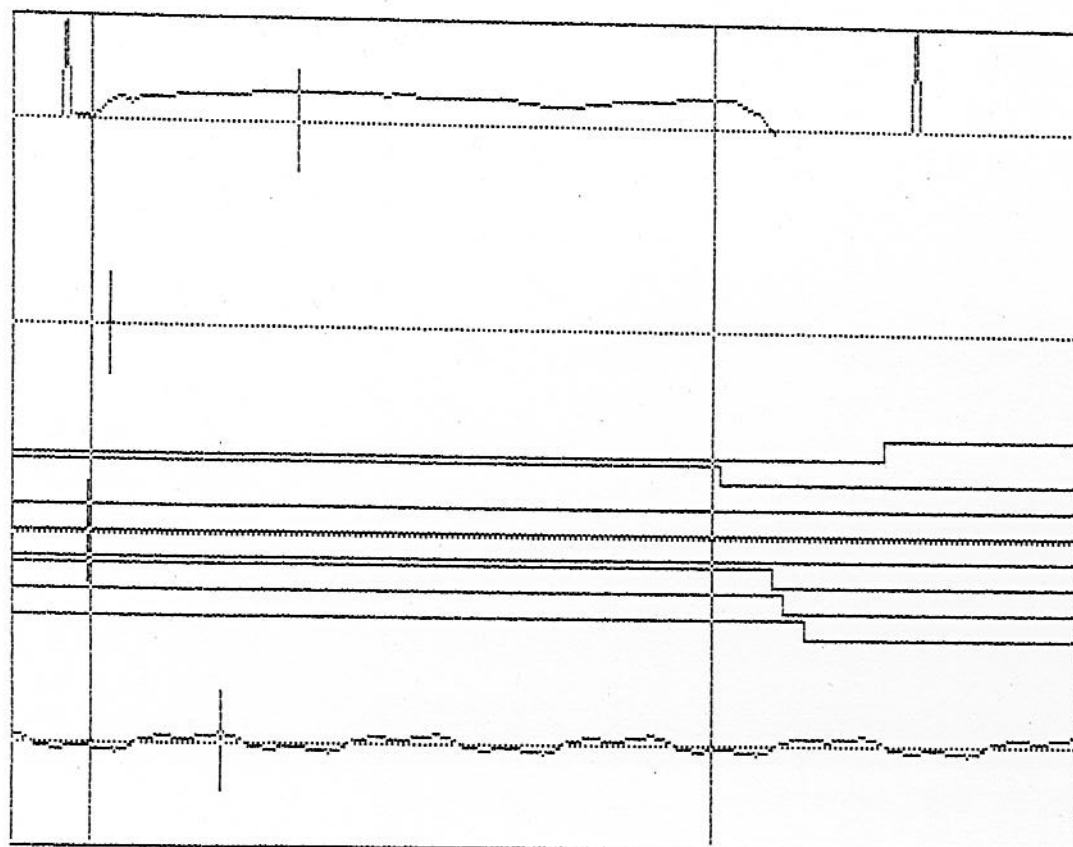
LS: 11.9040

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	---------------	---------------	--------	-----

CESI GPS

A 2/ 031269-021/B



CH BL MAX V
 5 1 428. m
 2 1 13.2 m
 3 1-2243. m
 4 1 860. m
 61.6 m
 44.1 m
 42.1 m
 54.6 m

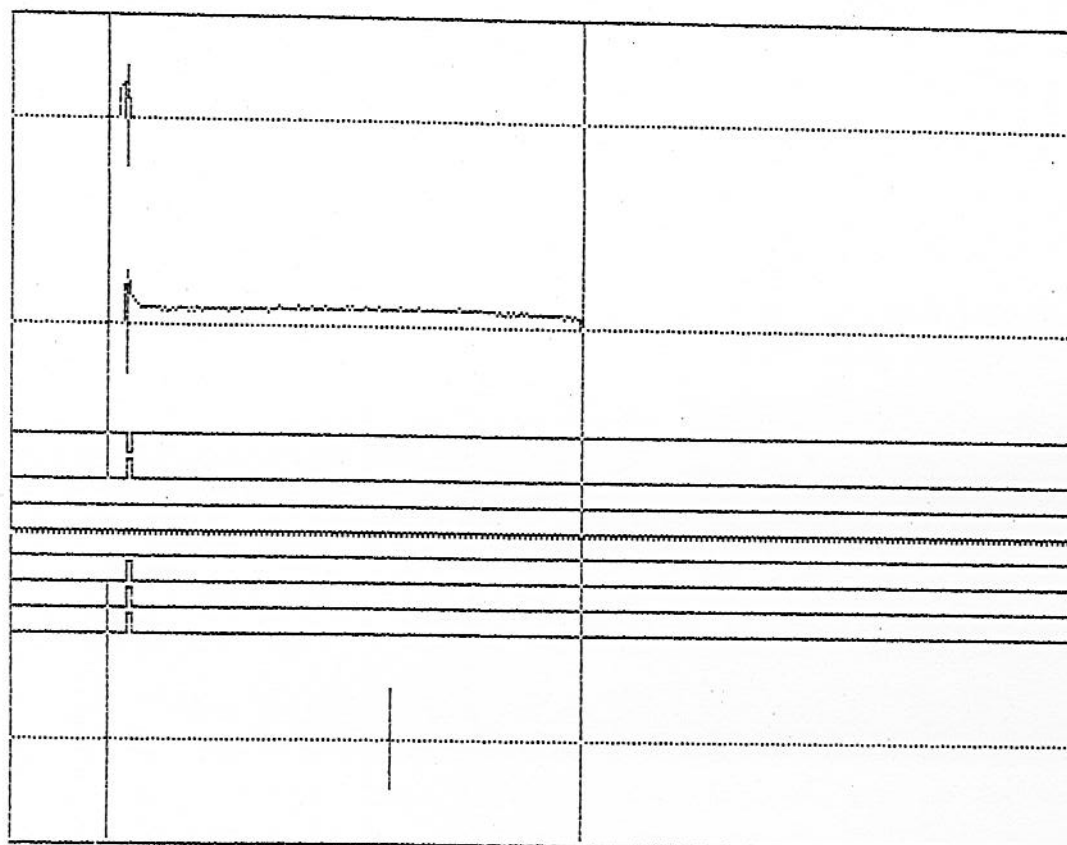
X : 128
 Y : 1
 FC: .042000
 LC: 100000
 Δt: .058000
 F : 2540.82
 R_s: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.
 USER NR
 TEST NR 102
 FS: .035000
 LS: .134500

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-022



CH BL MAX V
 1 1 1140. m
 2 1 1923. m
 3 1 37. m
 4 1 14. m
 378.6 m
 354.6 m
 128.1 m
 3532. m

X : 1

Y : 1

FC: 128000

LC: 5.79200

Δt: 5.66400

f : 351.562

R_s: 9.76562

DATE: 83- 0- 0

RE: 0: 0: 0.8

USER NR

TEST NR 104

FS: -.204800

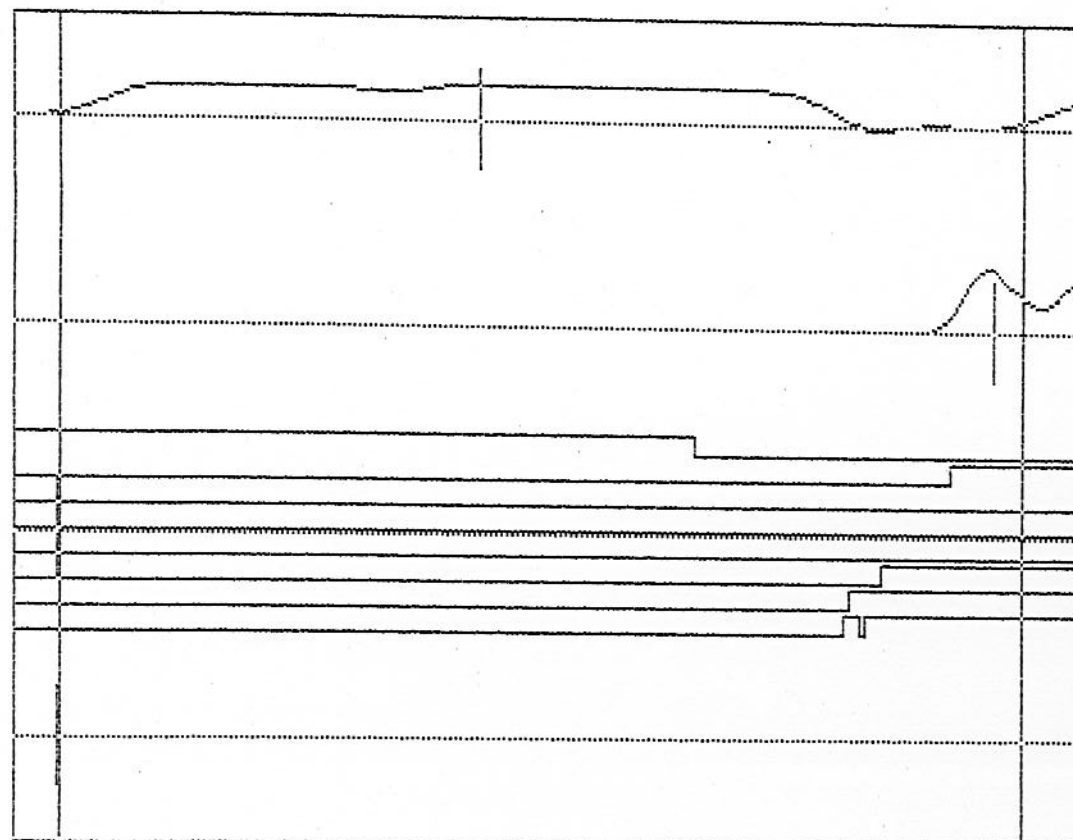
LS: 11.7440

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-023/A



CH BL MAX V
 1 1 549. m
 2 1 1923. m
 3 1 37. m
 4 1 10. m
 306.6 m
 354.6 m
 267.1 m
 267.1 m

X : 128
 Y : 1
 FC: .267000
 LC: 357000
 Δt: .090000
 F : 3681.64
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.8
 USER NR
 TEST NR 104
 FS: .263000
 LS: .362500

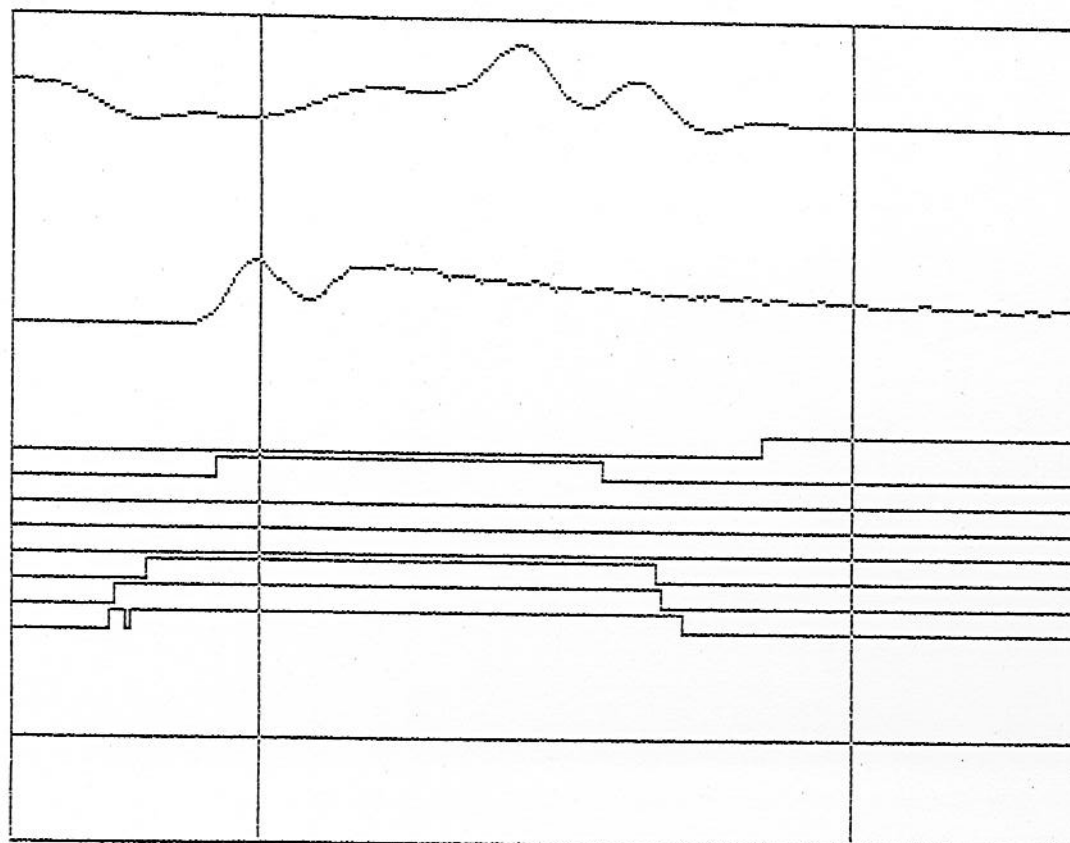
USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-023/B





CH	BL	ΔAMPL	V
1	1	8100.	μ
2	1	1027.	m
3	1	2280.	m
4	1	0.	

X : 1128
 Y : 1
 FC: 354500
 LC: .410000
 Δt: .055500
 f : 898.437
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.8
 USER NR
 TEST NR 104
 FS: .331500
 LS: .431000

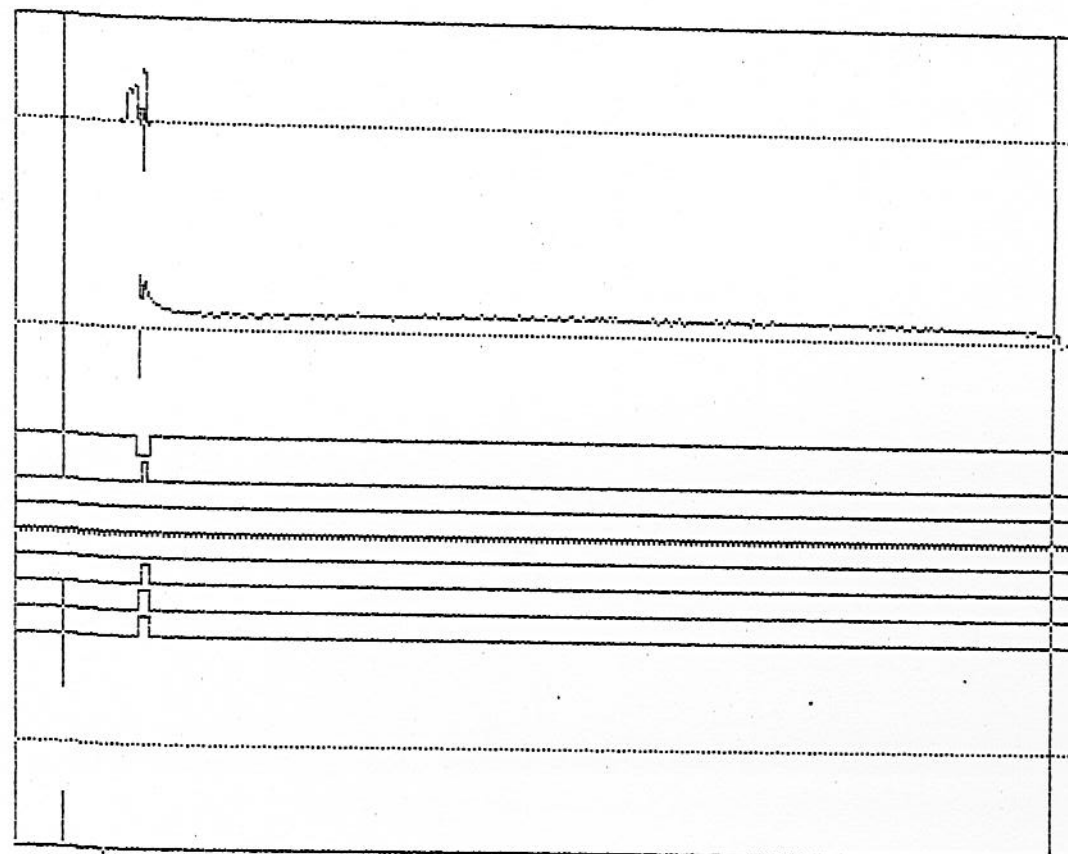
USE RED KEY TO START NEXT RECORDING

MID CRS	X/Y EXP	SCALE	SL INT	AMPL	ΔAMPL	SMP/T	ETC
---------	---------	-------	--------	------	-------	-------	-----

CESI GPS

A 2/ 031269-023/e





CH BL MAX V
 1 1 729. m
 2 1 1834. m
 3 1 37. m
 4 1 14. m
 231.8 m
 211.1 m
 -52.7 m
 -51.4 m

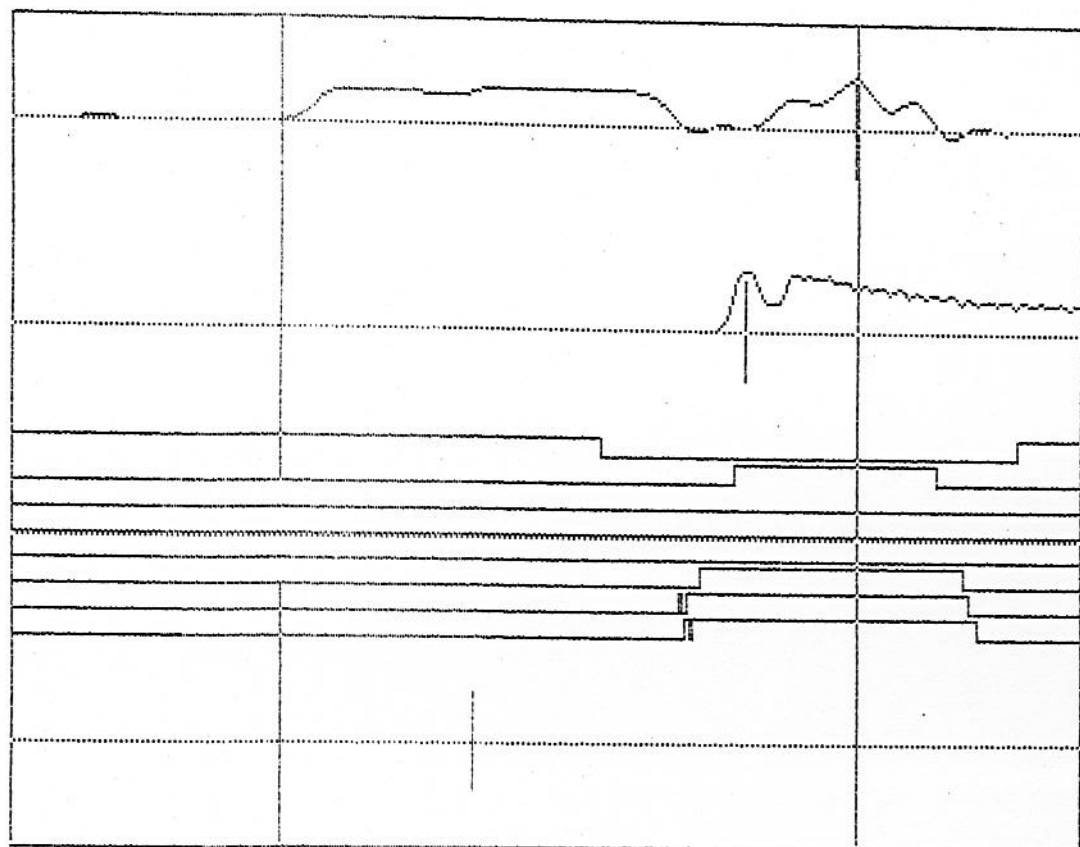
X : 2
 Y : 1
 FC: -.052800
 LC: 5.65600
 Δt: 5.70880
 P : 3789.06
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.
 USER NR
 TEST NR 546
 FS: -.110400
 LS: 5.83200

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-024/A



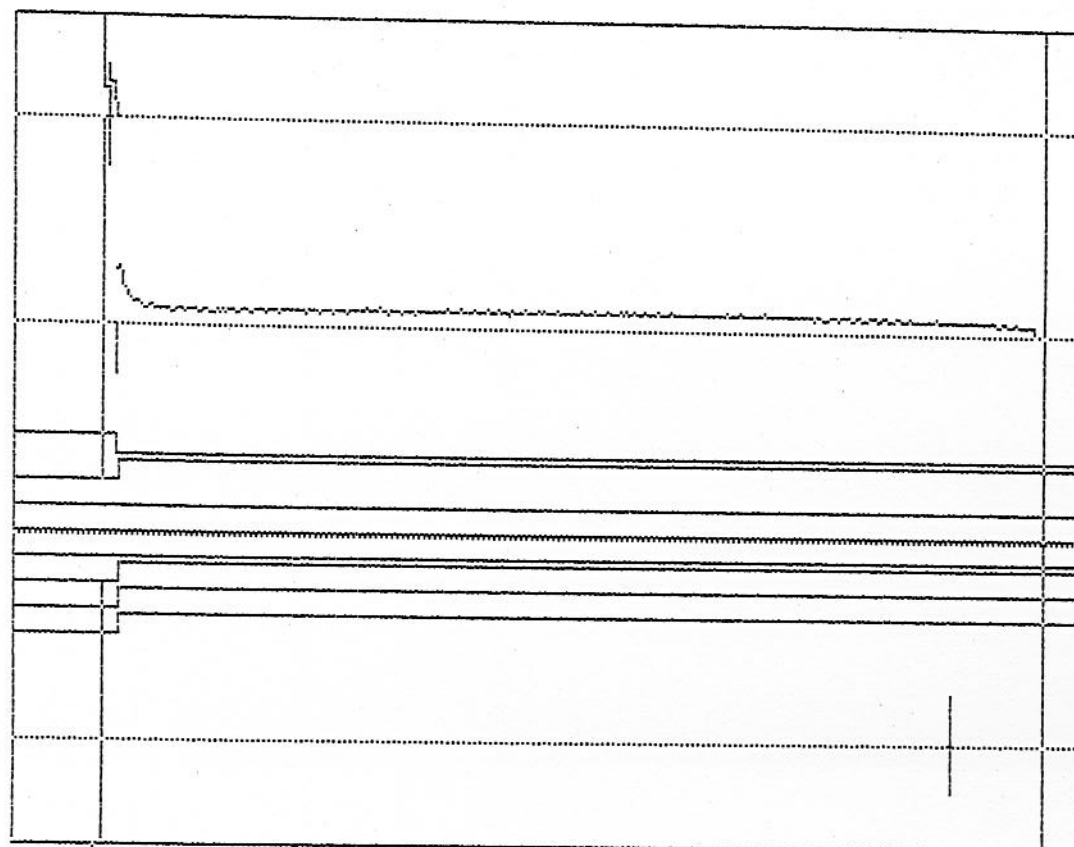
CH BL MAX V
 1 1 729. m
 2 1 1834. m
 3 1 37. m
 4 1 14. m
 231.6 m
 211.1 m
 124.1 m
 160.1 m
 X : 84
 Y : 1
 FC: .124000
 LC: 232000
 Δt: .100000
 F : 3085.93
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.
 USER NR
 TEST NR 546
 FS: .074000
 LS: .273500

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-024 / B



CH BL MAX V
 1 1 540. m
 2 1 2049. m
 3 1 37. m
 4 1 20. m
 83.6 m
 131.6 m
 36.1 m
 5121. m

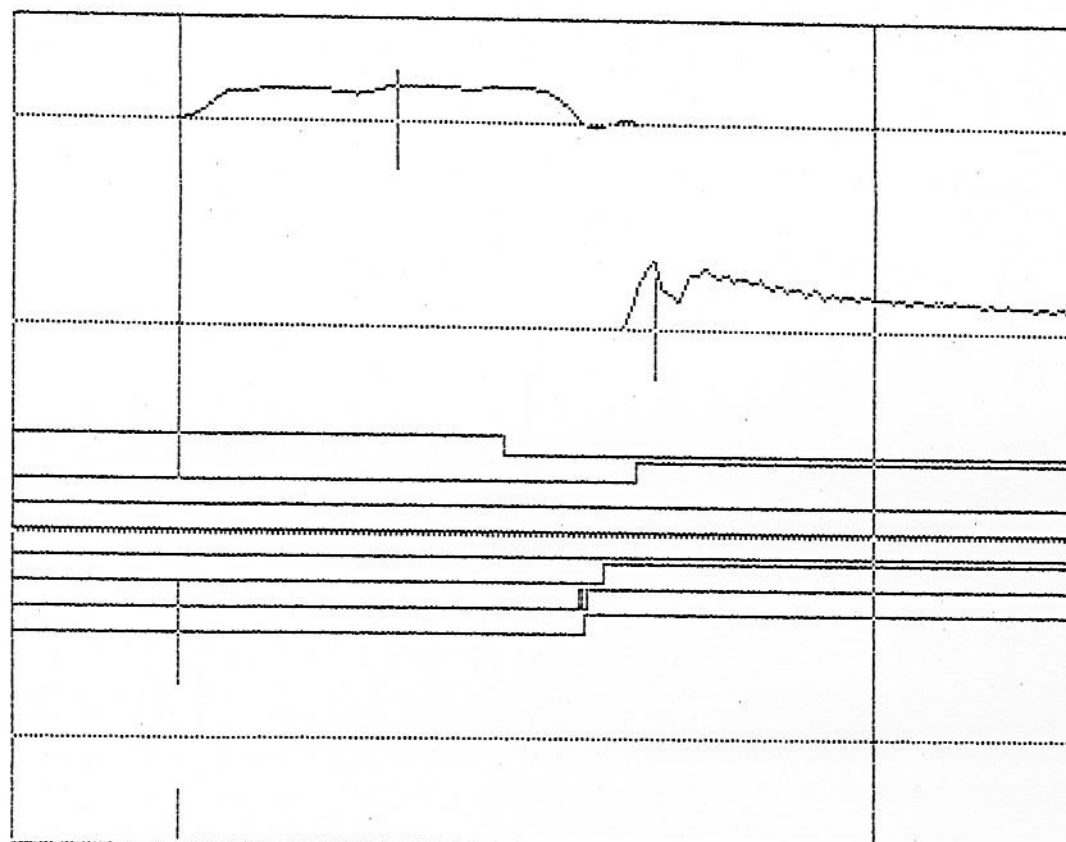
X : 2
 Y : 1
 FC: 336000
 LC: 5.66800
 Δt : 5.63200
 f : 322.265
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.9
 USER NR
 TEST NR 547
 FS: -.098400
 LS: 5.89200

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	---------------	---------------	--------	-----

CESI GPS

A 2/ 031269-025/A



CH BL MAX V
 1 1 540. m
 2 1 2049. m
 3 1 37. m
 4 1 14. m
 83.6 m
 131.6 m
 42.6 m
 42.6 m

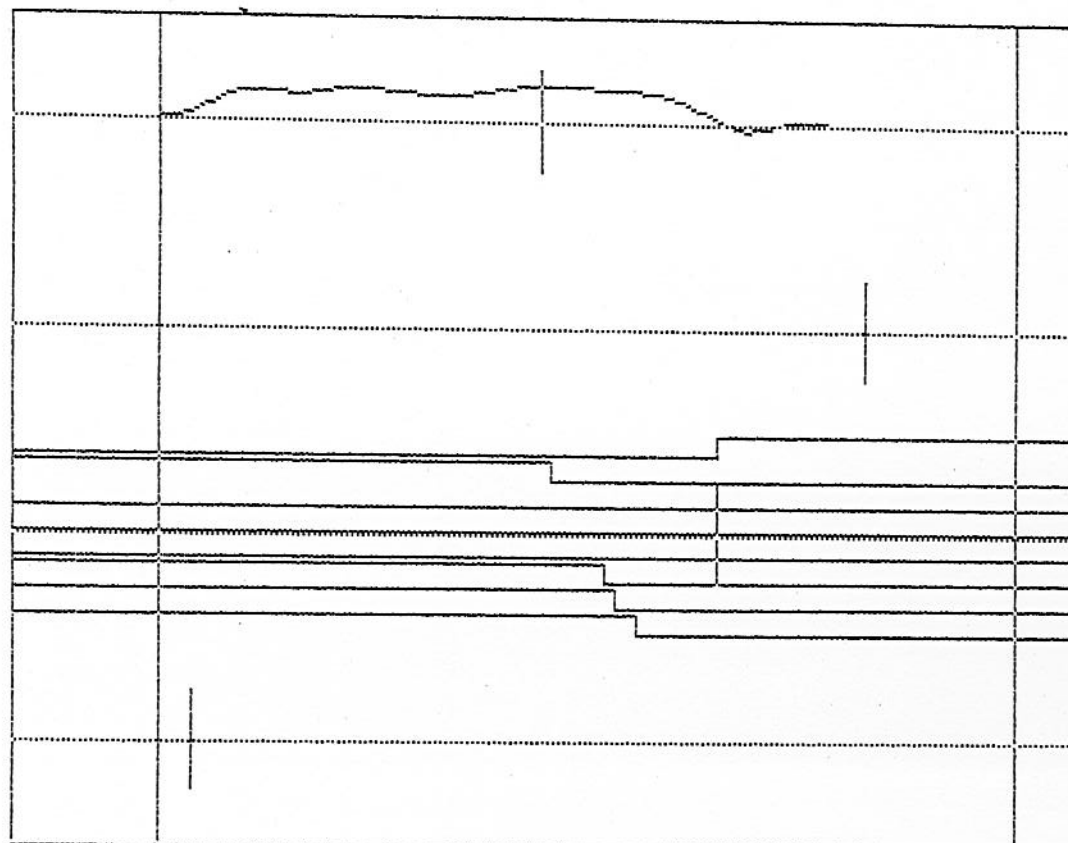
X : 34
 Y : 1
 FC: .042500
 LC: 172500
 Δt: .130000
 F : 3144.53
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.9
 USER NR
 TEST NR 547
 FS: .011500
 LS: .211000

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-025 /B



CH BL MAX V
 1 1 534. m
 2 1 7200. u
 3 1 37. m
 4 1 14. m
 78.1 m
 108.6 m
 94.6 m
 45.6 m

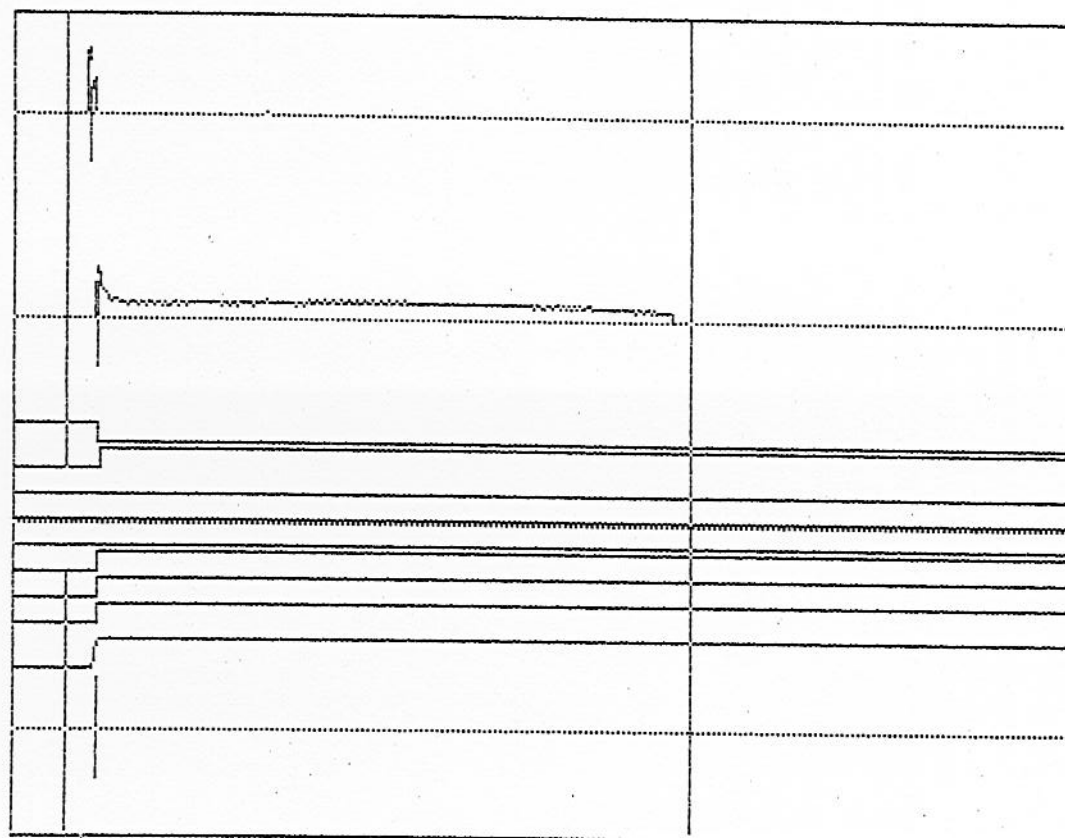
X : 128
 Y : 1
 FC: .042500
 LC: 122500
 Δt: .000000
 F : 3662.11
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.8
 USER NR
 TEST NR 549
 FS: .029000
 LS: .128500

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-026



CH BL MAX V
 1 1 1036. m
 2 1 2071. m
 3 1 37. m
 4 1 9014. m
 52.1 m
 130.9 m
 -44.7 m
 147.7 m

X : 0.01
 Y : 1
 FC: 0.44800
 LC: 5.83680
 Δt: 5.88160
 P : 195.312
 Rs: 9.78562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.1
 USER NR
 TEST NR 556
 FS: -.172800
 LS: 9.52320

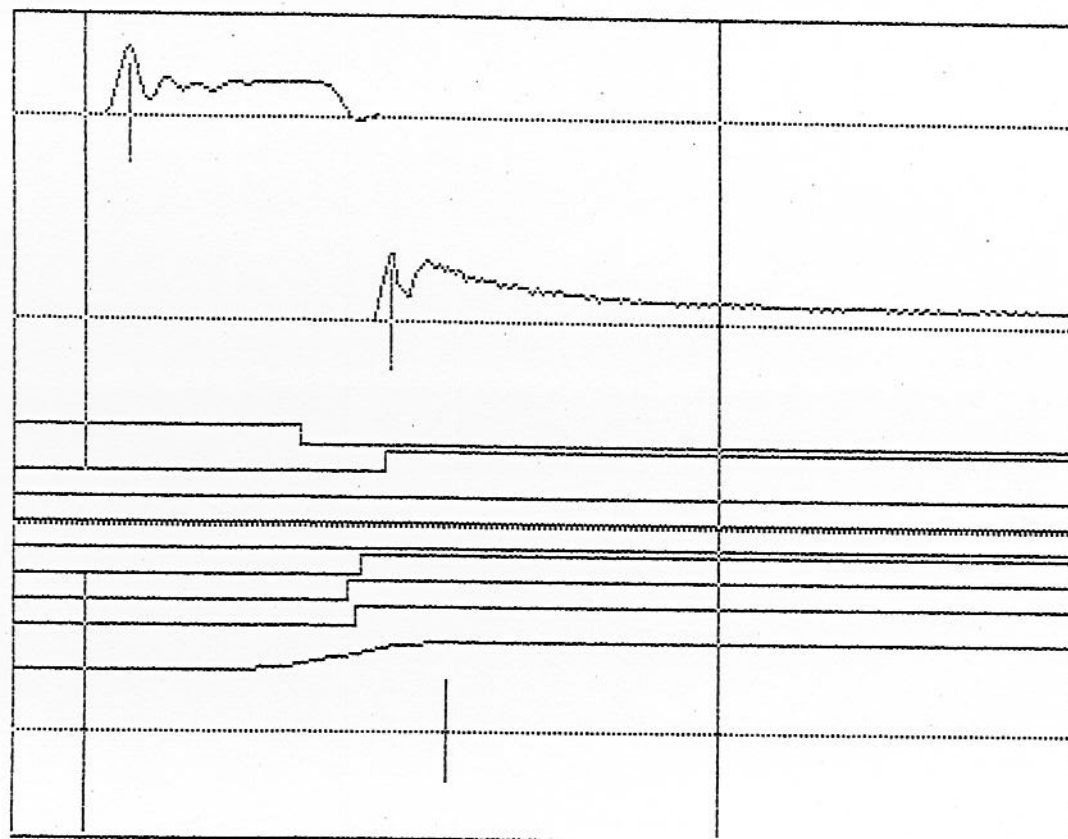
USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-027/A





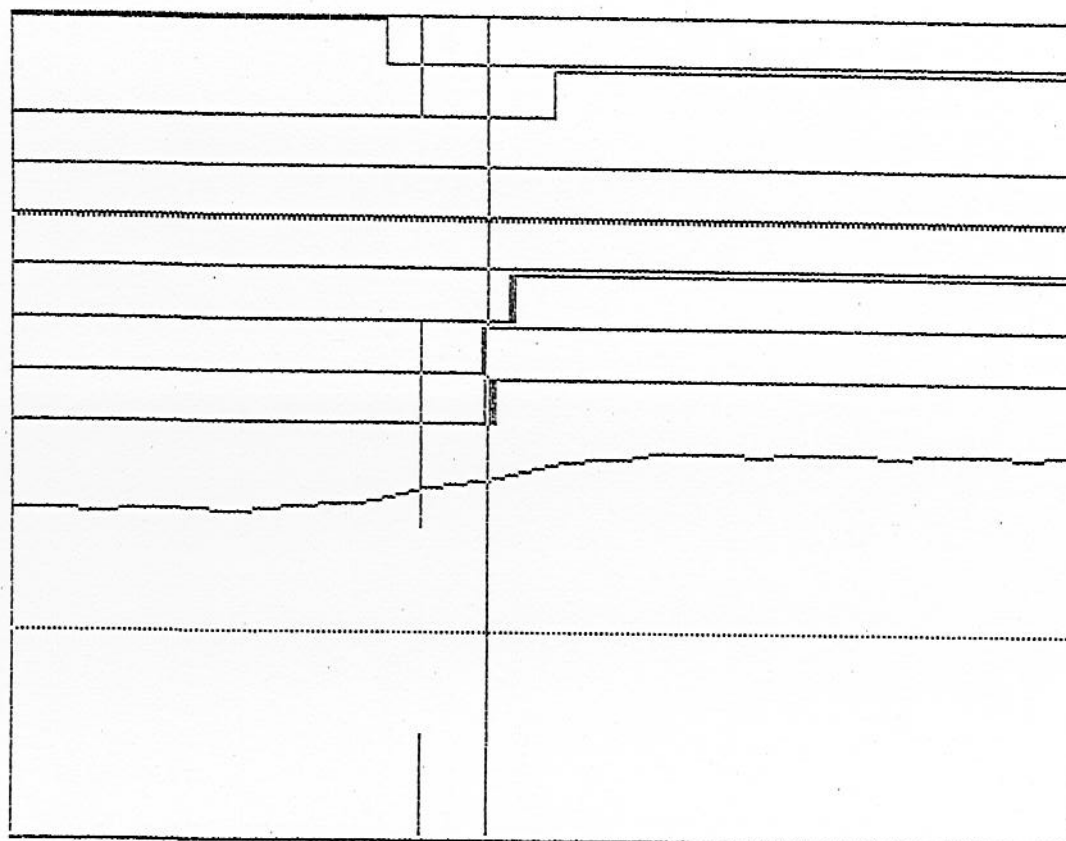
CH BL MAX V
 1 1 1036. m
 2 1 2071. m
 3 1 37. m
 4 1 9014. m
 52.1 m
 130.9 m
 38.5 m
 147.7 m
 X : 32
 Y : 1
 FC: .038400
 LC: 228800
 Δt: .190400
 F : 2587.89
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.1
 USER NR
 TEST NR 556
 FS: .016800
 LS: .336000

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/031269-027/B



CH BL MIN V
 3 1-5083. m
 4 1 7104. m
 108.5 m
 108.5 m

X : 64
 Y : 1
 FC: 108400
 LC: .118400
 Δt: .010000
 F : 1503.90
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.1
 USER NR
 TEST NR 556
 FS: .046800
 LS: .206400

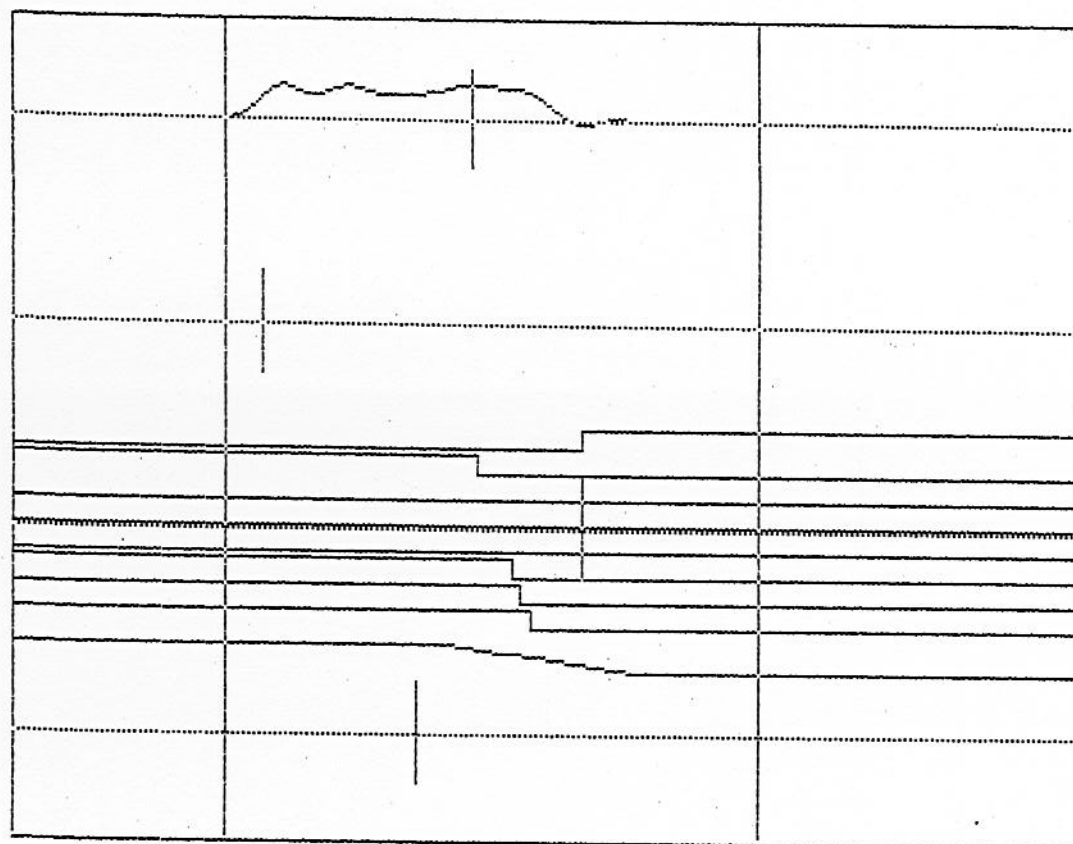
USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-027 /C





CH BL MAX V
 1 1 533.1 m
 2 1 6000. u
 3 1 37. m
 4 1 8994. m
 76.5 m
 44.9 m
 92.9 m
 68.1 m

X : 454
 Y : 1
 FC: .039200
 LC: .039200
 Δt: .000000
 f : 2724.61
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.9
 USER NR
 TEST NR 557
 FS: .007600
 LS: .167200

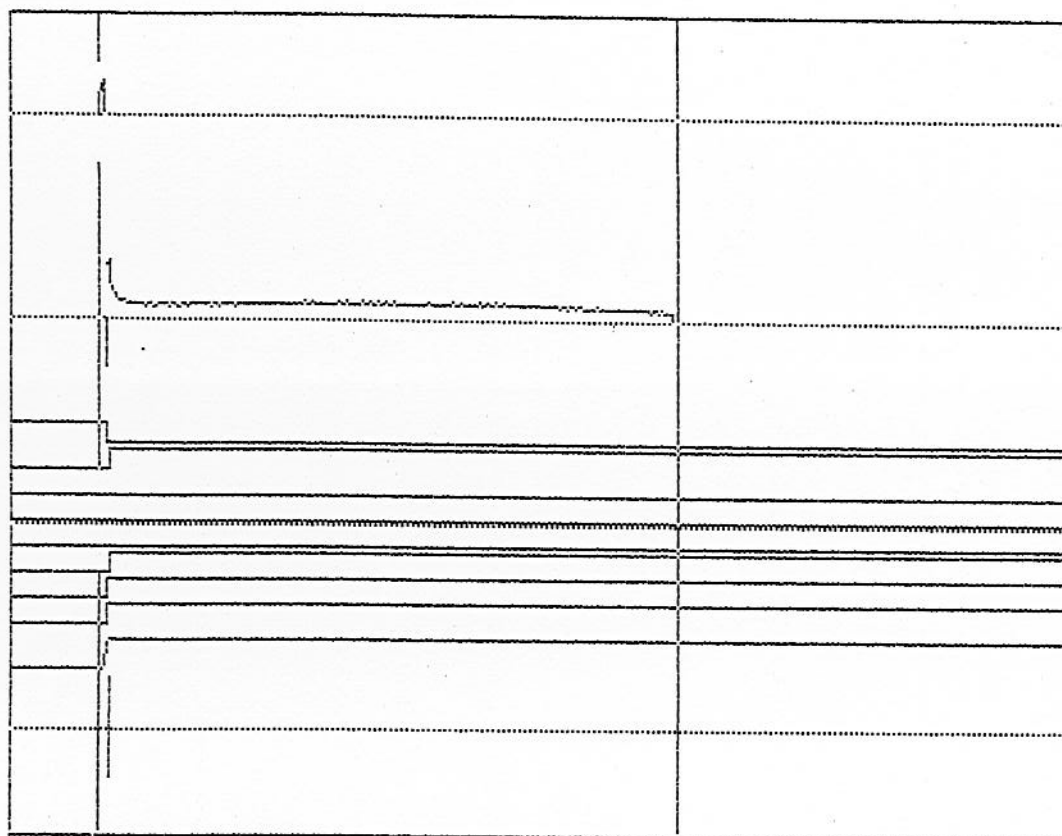
USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-028 /A





CH BL MAX V

1 1 1528. m
2 1 1878. m
3 1 37. m
4 1 9014. m
52.9 m
131.7 m
43.3 m
145.7 m

X : 0.0001

Y : 1

FC: 043200

LC: 5.62400

Δt: 5.58080

F : 322.265

R_s: 9.78562

DATE: 83- 0- 0

Rt: 0: 0: 0.3

USER NR

TEST NR 558

FS: - .200400

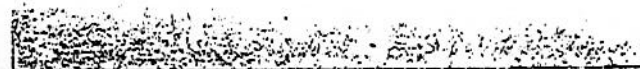
LS: 9.41280

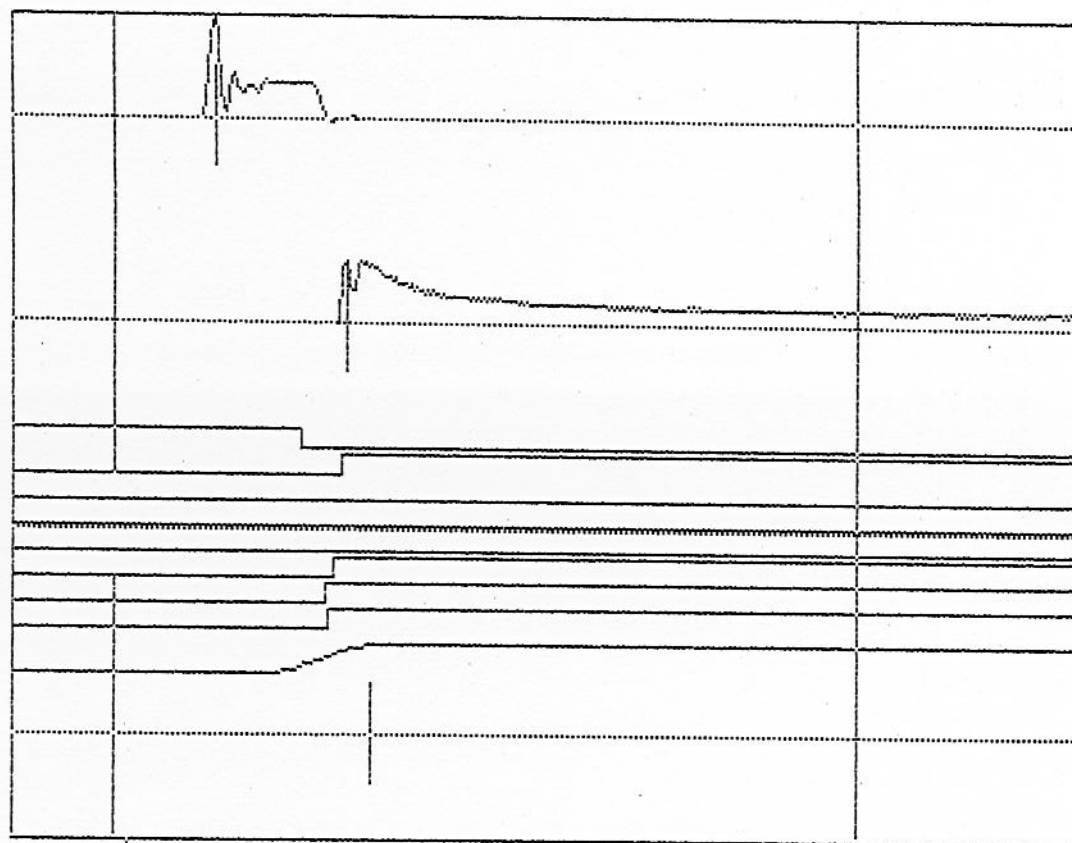
USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-029/A





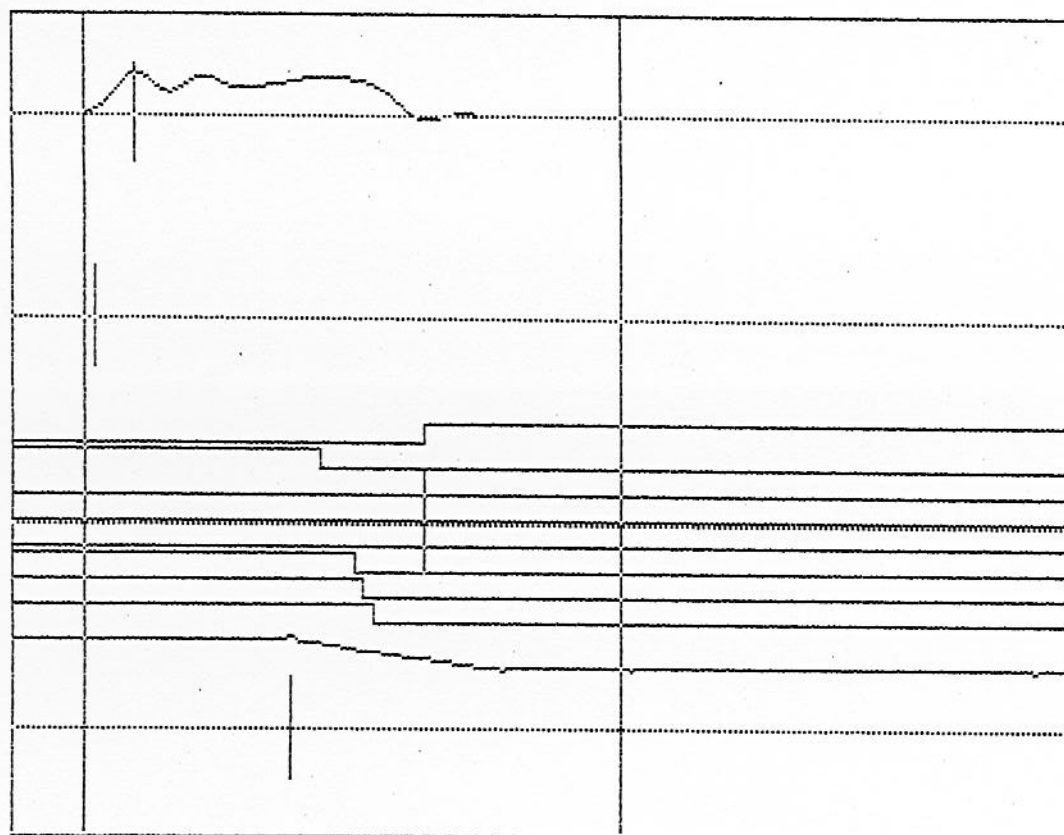
CH BL MAX V
 1 1 1528. m
 2 1 1878. m
 3 1 37. m
 4 1 9014. m
 52.9 m
 131.7 m
 -1900. u
 145.7 m
 X : 0.000
 Y : 1
 FC: -.002000
 LC: 438400
 Δt: .440400
 F : 3095.70
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.3
 USER NR
 TEST NR 558
 FS: -.017200
 LS: .569600

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-029/B



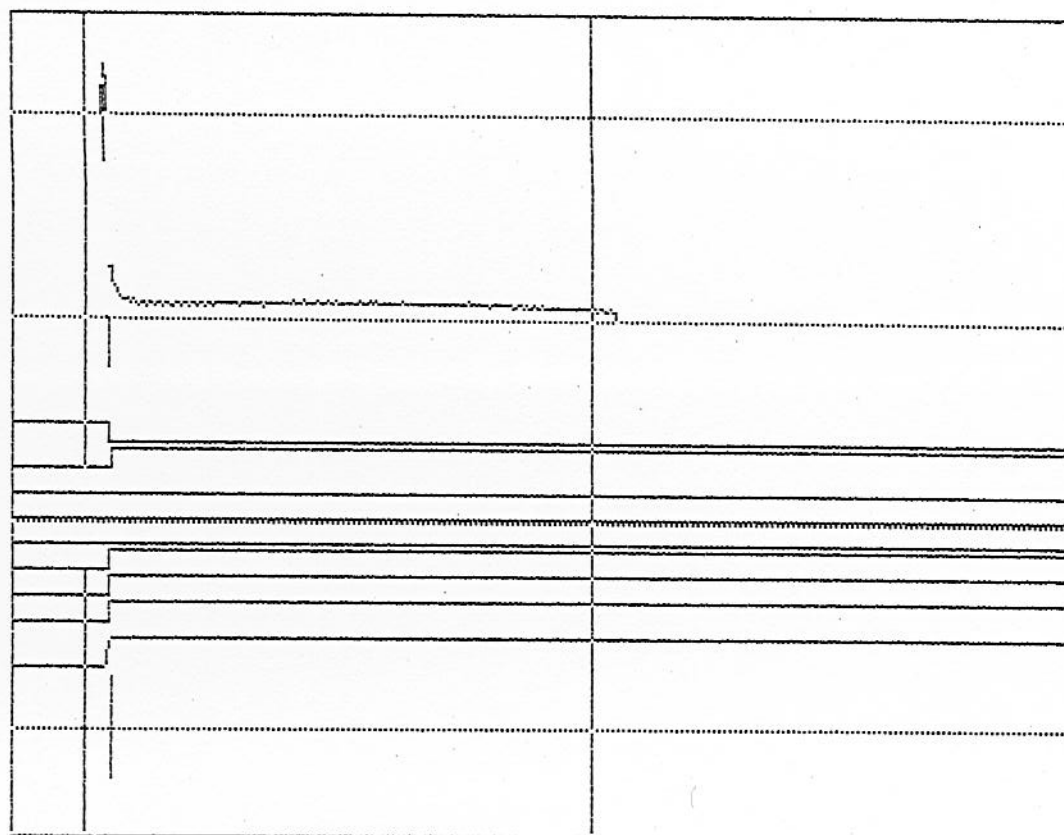
CH BL MAX V
 1 1 636.6 m
 2 1 7200. m
 3 1 37. m
 4 1 9250. m
 44.1 m
 38.1 m
 87.7 m
 67.7 m
 X : 84
 Y : 1
 FC: .036400
 LC: 117200
 Δt: .080800
 F : 2236.32
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.6
 USER NR
 TEST NR 563
 FS: .025600
 LS: .185200

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-030



CH BL MAX V
 1 1 597.6 m
 2 1 2166. m
 3 1 37. m
 4 1 9030. m
 80.1 m
 128.9 m
 -27.4 m
 149.3 m

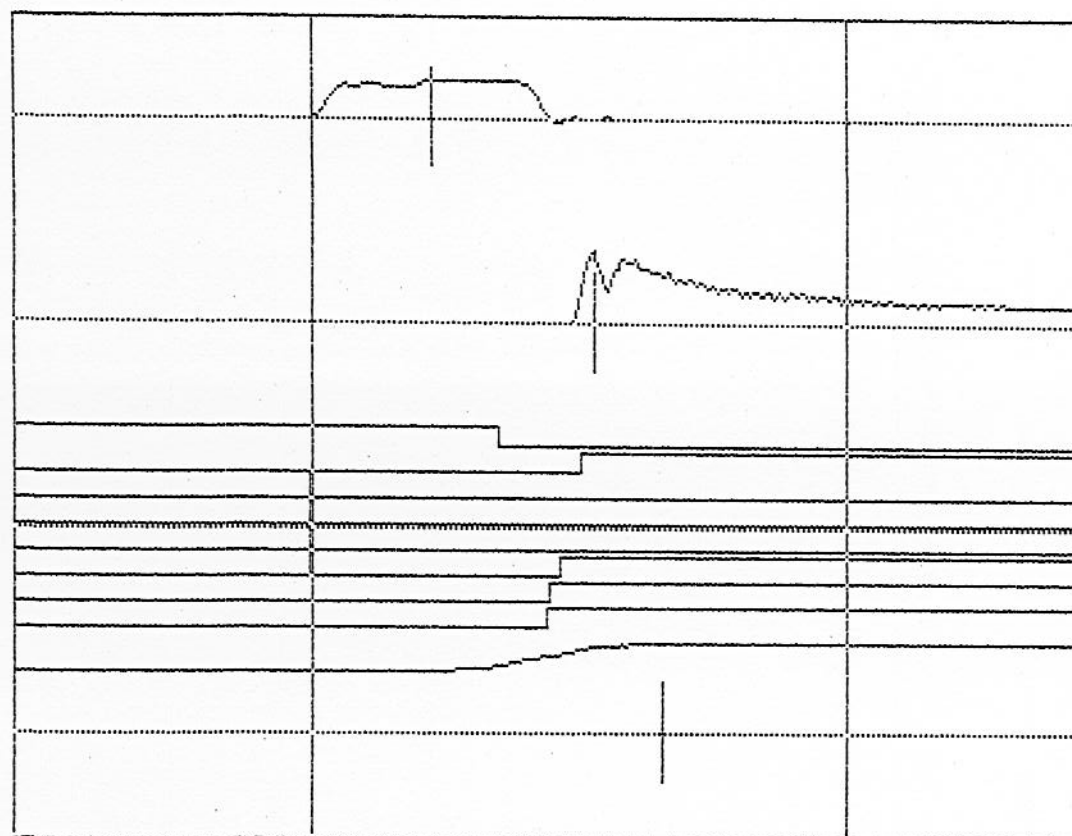
X :
 Y : 1
 FC:
 LC: 4.77960
 Δt: 4.80710
 F : 263.671
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.2
 USER NR
 TEST NR 571
 FS: -.200300
 LS: 9.41320

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-031/A



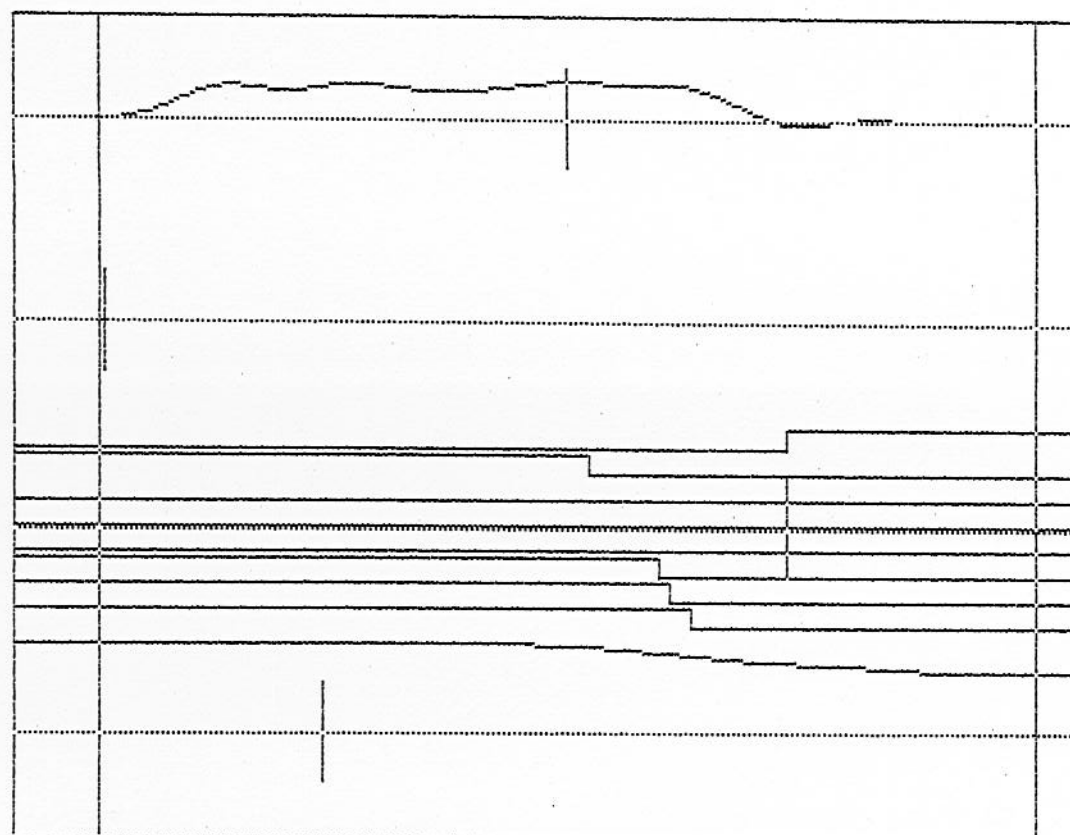
CH BL MAX V
 1 1 597.6 m
 2 1 2166. m
 3 1 37. m
 4 1 9030. m
 80.1 m
 128.9 m
 43.7 m
 149.3 m
 X : 32
 Y : 1
 FC: .043600
 LC: 204000
 Δt: .160400
 F : 3046.87
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.2
 USER NR
 TEST NR 571
 FS: -.011400
 LS: .273600

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-031/B



CH BL MAX V
 1 1 561.6 m
 2 1 6000. m
 3 1 37. m
 4 1 9010. m
 76.5 m
 41.7 m
 92.9 m
 58.1 m

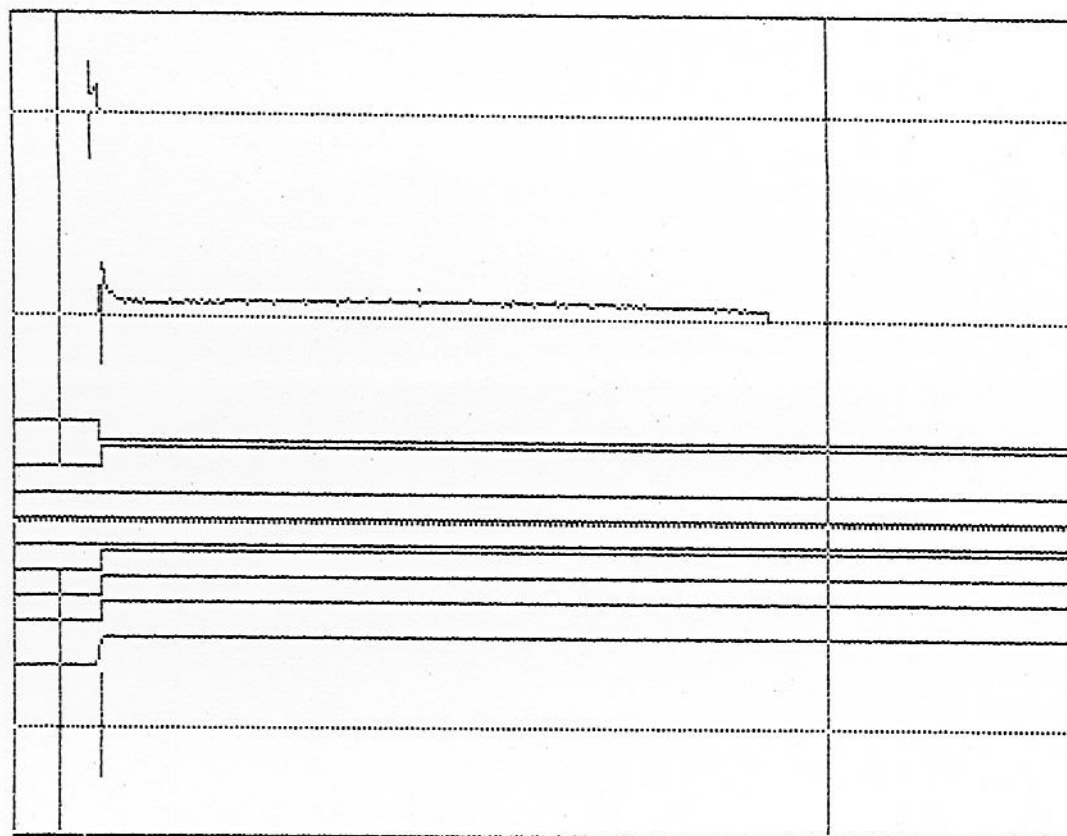
X : 128
 Y : 1
 FC: 041200
 LC: .111200
 Δt: .070000
 F : 312.500
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.6
 USER NR
 TEST NR 572
 FS: .034800
 LS: .114400

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-032



CH BL MAX V
 1 1 640.5 m
 2 1 1674. m
 3 1 37. m
 4 1 9050. m
 51.7 m
 136.9 m
 -68.7 m
 147.7 m

X :
 Y : 1
 FC:
 LC: 7.11680
 Δt: 7.18560
 F : 166.015
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.7
 USER NR
 TEST NR 573
 FS: -.177600
 LS: 9.50400

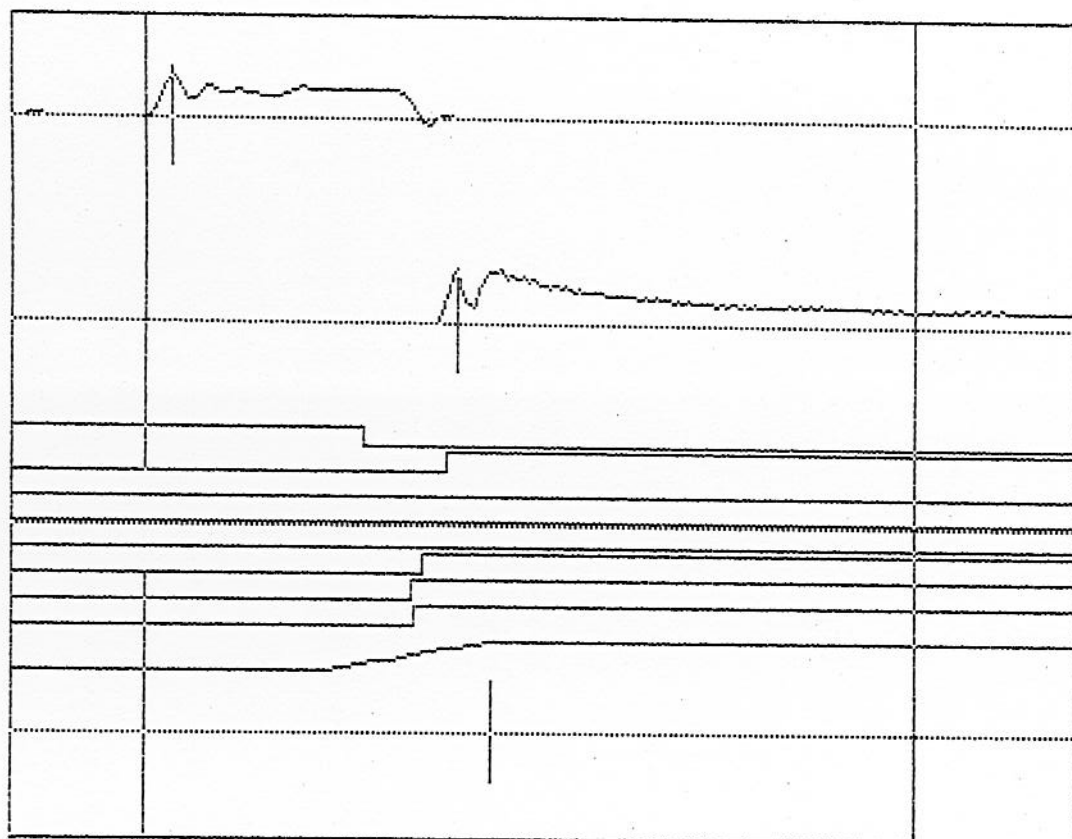
USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

'A 2/ 031269-033/A





CH BL MAX V
 1 1 640.5 m
 2 1 1674. m
 3 1 37. m
 4 1 9050. m
 51.7 m
 136.9 m
 43.3 m
 147.7 m

X : 32
 Y : 1
 FC: 043200
 LC: .274000
 Δt: .230800
 f : 488.281
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.7
 USER NR
 TEST NR 573
 FS: .003200
 LS: .322400

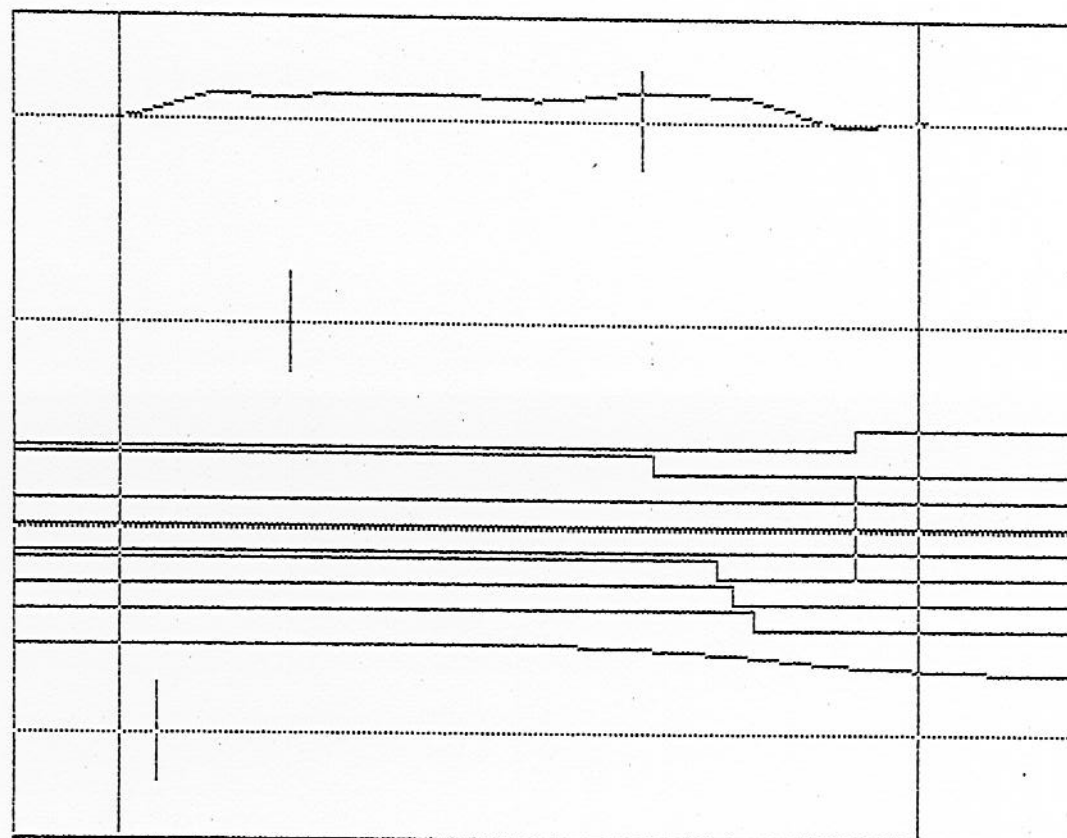
USE RED KEY TO START NEXT RECORDING

DISK	PRINTER	XY	PLT	DEMUX	VP		RETURN	
------	---------	----	-----	-------	----	--	--------	--

CESI GPS

A 2/ 031269-033 /B





CH BL MAX V
 1 1 422.1 m
 2 1 6000. u
 3 1 37. m
 4 1 9010. m
 82.5 m
 56.1 m
 98.5 m
 46.1 m
 X : 128
 Y : 1
 FC: .043200
 LC: .103200
 Δt: .060000
 F : 3320.31
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.3
 USER NR
 TEST NR 574
 FS: .035200
 LS: .114800

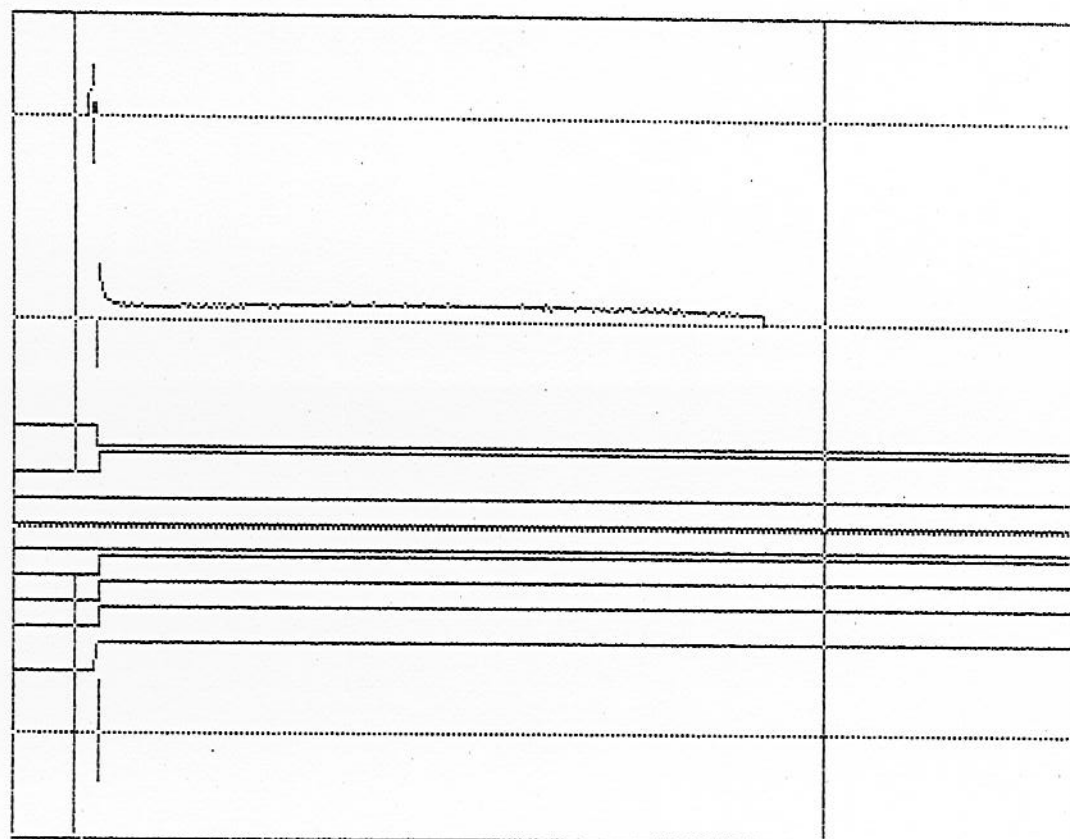
USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-034





CH BL MAX V
 1 1 456. m
 2 1 1707. m
 3 1 37. m
 4 1 9014. m
 106.5 m
 137.3 m
 -20.7 m
 148.5 m

X :
 Y : 1
 FC:
 LC: 7.11680
 Δt: 7.13760
 F : 224.609
 R_s: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.1
 USER NR
 TEST NR 581
 FS: -.168000
 LS: 9.54240

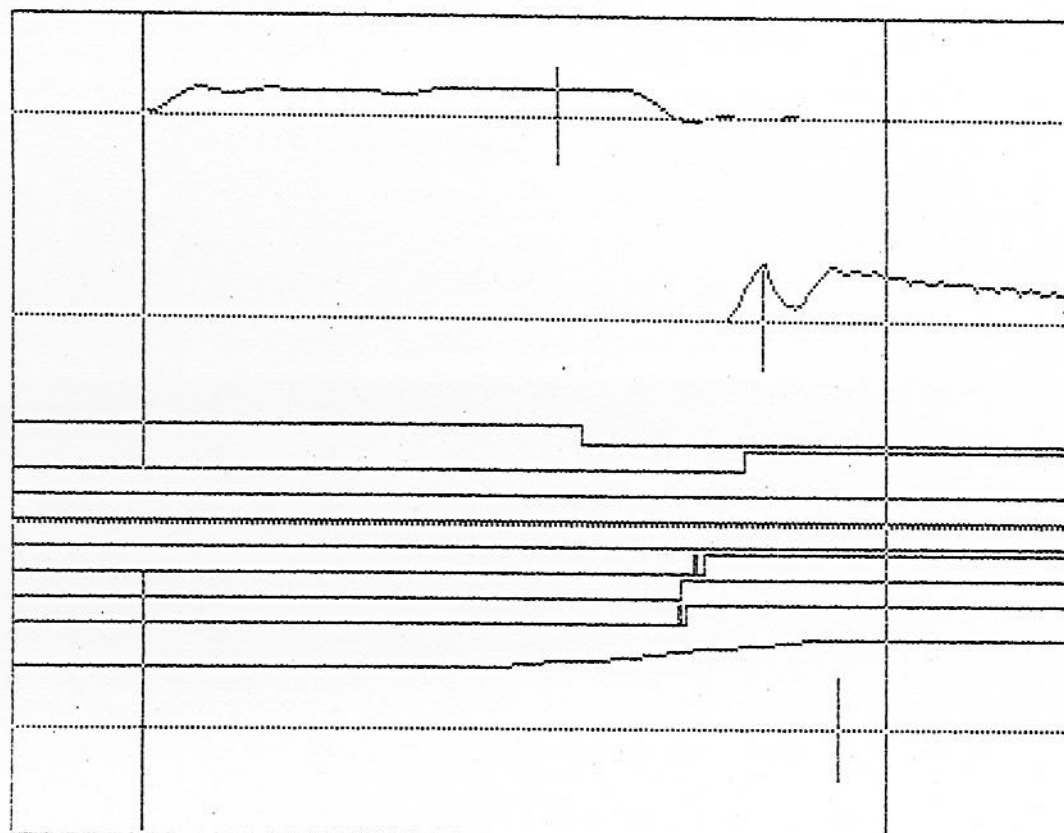
USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-035 /A





CH BL MAX V
 1 1 456. m
 2 1 1707. m
 3 1 37. m
 4 1 9014. m
 106.5 m
 137.3 m
 44.1 m
 148.5 m

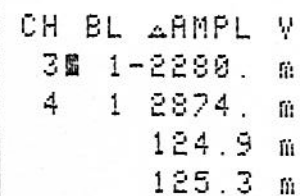
X : 64
 Y : 1
 FC: .044000
 LC: 155600
 Δt: .111600
 f : 3203.12
 R_s: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.1
 USER NR
 TEST NR 581
 FS: .024400
 LS: .184000

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-035 /B



```

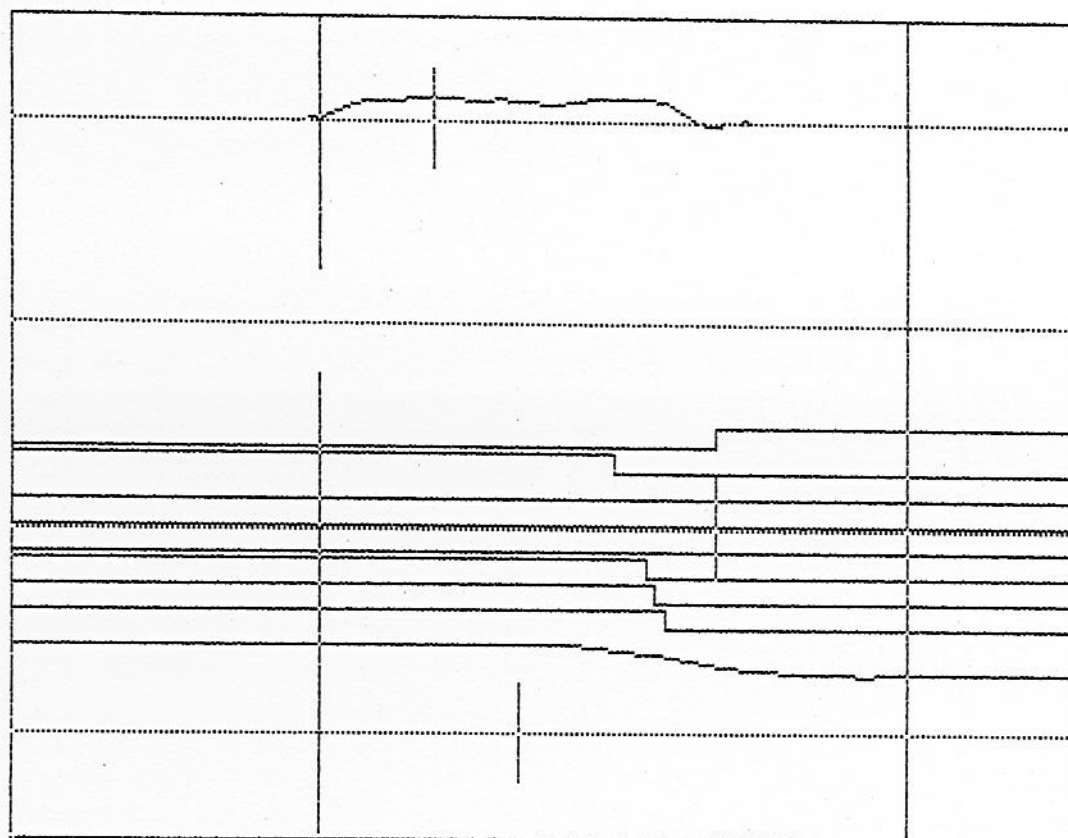
X : 164
Y : 1
FC: 083200
LC: .169200
Δt: .086000
F : 703.125
Rs: 9.76562
DATE:83- 0- 0
Rt: 0: 0: 0.1
USER NR
TEST NR 581
FS: .054400
LS: .214000

```

MID CRS	X/Y EXP	SCALE	SL INT	AMPL	Δ AMPL	SMP/T	ETC
---------	---------	-------	--------	------	---------------	-------	-----

CESI GPS

A 2/ 031269-035 / e



CH BL MAX V
 1 1 353.1 m
 2 1 6000. m
 3 1 37. m
 4 1 9000. m
 62.9 m
 45.7 m
 105.3 m
 75.7 m
 X : 64
 Y : 1
 FC: .045600
 LC: 134000
 Δt: .000400
 F : 3281.25
 Rs: 9.76562
 DATE: 83- 0- 0
 Rt: 0: 0: 0.6
 USER NR
 TEST NR 582
 FS: -.000100
 LS: .159200

USE RED KEY TO START NEXT RECORDING

MAX	MIN	NXT MAX	NXT MIN	Δ CRS+	Δ CRS-	RETURN	ETC
-----	-----	---------	---------	--------	--------	--------	-----

CESI GPS

A 2/ 031269-036/A



CESI

Via Rubattino, 54 - 20134 Milano, Italy - Ph. +39 02 2125.1 - Fax +39 02 2125 5440

CESI

CESI

client PARS SWITCH Co. - Tehran - IRAN

equipment under test Three-pole SF₆ outdoor circuit-breaker 36 kV type FP72D

tests performed Short-time withstand and peak withstand current test
Short-circuit tests

normative documents IEC 62271-100 (2001)

receipt date of the sample September 9, 2002

test date: from September 25, 2002 to September 26, 2002

the test results relate only to the sample tested
this document shall not be reproduced except in full without the written approval of CESI



no. of pages 23 no. of pages annexed 77

issue date October 21, 2002

prepared PeC/TEST - P. BECCARINI

verified PeC/TEST - G. GHEZZI

approved PeC/TEST - V. SCARIONI

CESI
CENTRO ELETTROTECNICO SPERIMENTALE ITALIANO
Business Unit
Prove e Componenti
Il Responsabile del Laboratorio

tests witnessed by:

Mr. Mohammad Ghiasabadi	- PARS SWITCH Co.
Mr. Mojtaba Alimohammadi	- PARS SWITCH Co.
Mr. Nosrat Mohammadi	- PARS SWITCH Co.
Mr. Naser Dizajian	- PARS SWITCH Co.
Mr. Jamal Halvachi	- PARS SWITCH Co.
Mrs. Faezeh Fazeli	- E.P.I.L. Co.

identification of the object: effected.

The Manufacturer guarantees that the tested object is manufactured according to the submitted drawings.

CESI checked that these drawings adequately represent in shape and dimensions the essential details and the parts of the tested object.

These drawings identified by CESI and numbered A2/032166 no.1 to 14 have been returned to the Client.

the data necessary to permit repetition of the tests are contained in the document marked:
GPS-A2/029941

The measurement uncertainties of the test results reported in this document are the following:

voltage: $\pm 5 \%$; **current:** $\pm 5 \%$; **time:** $\pm 5 \%$

The measurement uncertainties are estimated at the level of twice the standard deviation (corresponding, in the case of normal distribution, to a confidence level of about 95 %) and have to be considered as maximum values.

activity code: 35067J

keywords: 12015R 23410N 31020W 45070T 53001D 62310N

contents	page	test date
rated characteristics of the tested object assigned by the Client	4	
table of the no-load operations	5	
measurement of the resistance and power frequency voltage withstand dry test on the main circuit	6	
tests performed		
Three-phase short-time withstand and peak withstand current test with 25,2 kA for 3,02 s	7	September 25, 2002
Three-phase short-circuit tests; test duty T10 with 2,40 kA at 36,7 kV	8	September 25, 2002
Three-phase short-circuit tests; test duty T30 with 6,10 kA at 36,7 kV	9	September 25, 2002
Three-phase short-circuit tests; test duty T60 with 13,7 kA at 36,7 kV	10	September 26, 2002
Three-phase short-circuit tests; test duty T100s with 20,0 kA at 36,7 kV	11	September 26, 2002
Three-phase short-circuit tests; test duty T100a with 20,0 kA at 36,7 kV	12	September 26, 2002
Single-phase short-circuit tests; breaking operation with 20,3 kA at 21,4 kV	13	September 26, 2002
circuit-diagrams	14 to 16	
photos	17 to 23	
pages annexed		
Oscillograms (no.77)		

rated characteristics of the tested object assigned by the Client

manufacturer	PARS SWITCH Co. - Tehran - IRAN
type	FP72D (FP3625D)outdoor
serial number	10001
voltage	36 kV
normal current	1250 A
frequency	50 Hz
lightning impulse withstand voltage	170 kV
power frequency withstand voltage	70 kV
short-circuit making current	50 kA at 36 kV
short-circuit breaking current	20 kA at 36 kV
d.c. component	31 %
minimum opening duration	45 ms
transient recovery voltage (TRV)	
first pole to clear factor	1,5
peak value (Uc)	62 kV
rate of rise (U/t)	0,57 kV/μs
operating sequence	O-3min-CO-3min-CO
short-circuit duration	3 s
operating mechanism	type BLRM
supply voltage	
closing devices	110 V d.c.
opening devices	110 V d.c.
motor	110 V d.c.
supply pressure (referred to 20 °C)	
breaking device	0,45 MPa abs.

table of the no-load operations

Vn = rated voltage of the auxiliary devices.

oscillograms	operating sequence	supply voltage						gas operating pressure for		time of			made	
		opening device		closing device		motor		operation	interruption	opening	closing	opening	before the test	after the test
no.	-	V	% Vn	V	% Vn	V	% Vn	MPa abs.	MPa abs.	ms	ms	ms	no.	no.
1/1	O	121	110	-	-	121	110	-	0,45	40	-	-	1	-
2/2	CO	121	110	121	110	121	110	-	0,45	-	70	39	1	-
3/3	CO	110	100	110	100	110	100	-	0,45	-	73	40	1	-
4/3	CO	77	70	93,5	85	93,5	85	-	0,45	-	78	47	1	-
8/1	O	77	70	-	-	93,5	85	-	0,45	47	-	-	-	1
44/4	CO	121	110	121	110	121	110	-	0,45	-	74	38	-	17
45/3	CO	110	100	110	100	110	100	-	0,45	-	79	39	-	17
46/3	CO	77	70	93,5	85	93,5	85	-	0,45	-	82	44	-	17

Measurement of the resistance of the main circuit

resistance measured with 100 A d.c.

measurement effected	resistance ($\mu\Omega$) across the pole			ambient air temperature °C
	R	S	T	
before the tests	28	29	35	14
after the test no.1	29	29	28	15

Power frequency voltage withstand dry test on the main circuit

tests effected	applied voltage (kV for 60 s) across the pole		
	R	S	T
after the test no.17	56	56	56

note: no discharge occurred during the test

Three-phase short-time withstand and peak withstand current test

with 25,2 kA for 3,02 s

test circuit: see D001

power factor: <0,15

frequency: 50 Hz

supply voltage for operating devices			gas operating pressure for	
closing V d.c.	opening V d.c.	motor V d.c.	operation MPa abs.	interruption MPa abs.
-	-	-	-	0,45

condition of the apparatus before the tests: new, see photo no.1

live side of test circuit connected to: lower terminals.

date: September 25, 2002

test no.	oscillogram no.	duration s	test current			notes
			maximum peak kA	phase	rms value kA	
1	7/2	3,02	63,8	T	25,2 25,2 25,2	25,2

conditions of the apparatus after the tests: externally as before the test ; after the test the circuit-breaker operated properly, see oscillogram no.8

Three-phase short-circuit tests

test duty T10 with 2,40 kA at 36,7 kV

test circuit: see D002

power factor: <0,15

frequency: 50 Hz

prospective transient recovery voltage							
U_0 kV	t_3 μ s	t_4 μ s	U_1 kV	t_1 μ s	U_2 kV	t_2 μ s	t_6 μ s
77	27	3	-	-	-	-	-

supply voltage for operating devices			gas operating pressure for	
closing V d.c.	opening V d.c.	motor V d.c.	operation MPa abs.	interruption MPa abs.
93,5	77	93,5	-	0,45

condition of the apparatus before the tests: as after the test no.1

live side of the test circuit connected to: lower terminals.

date: September 25, 2002

test no.	oscillogram no.	operating sequence	applied voltage (phase-to- earth)	making current (peak value)	breaking current			power frequency recovery voltage		maximum overvoltage	duration of			
					ac component (rms value)	average	dc component	phase-to- earth	phase-to- phase (average)		closing	opening	pre-arc	arc
		-	kV	kA / phase	kA	kA	% / phase	kV	kV	kV	ms	ms	ms	ms
2	10/3	O	-	-	2,40 2,40 2,40	2,40	<20	21,2 21,2 21,2	36,7	79,7	-	47	-	10
3	11/4	3min CO	21,2 21,2 21,2	-	2,40 2,40 2,40	2,40	<20	21,2 21,2 21,2	36,7	79,2	79	49	-	8
4	12/4	3min CO	21,2 21,2 21,2	-	2,40 2,40 2,40	2,40	<20	21,2 21,2 21,2	36,7	80,9	80	47	-	10

conditions of the apparatus after the tests: after an external visual inspection the apparatus is deemed to be able to continue the tests.

Three-phase short-circuit tests

test duty T30 with 6,10 kA at 36,7 kV

test circuit: see D002

power factor: <0,15

frequency: 50 Hz

prospective transient recovery voltage							
U_c kV	t_3 μ s	t_4 μ s	U_1 kV	t_1 μ s	U_2 kV	t_2 μ s	t_4 μ s
66	25	3	-	-	-	-	-

supply voltage for operating devices			gas operating pressure for	
closing V d.c.	opening V d.c.	motor V d.c.	operation MPa abs.	interruption MPa abs.
93,5	77	93,5	-	0,45

condition of the apparatus before the tests: as after the test no.4

live side of the test circuit connected to: lower terminals.

date: September 25, 2002

test no.	oscillogram no.	operating sequence	applied voltage (phase-to- earth)	making current (peak value)	breaking current			power frequency recovery voltage		maximum overvoltage	duration of			
					ac component (rms value)	average	dc component	phase-to- earth	phase-to- phase (average)		closing	opening	pre-arc	arc
			kV	kA / phase	kA	kA	% / phase	kV	kV	kV	ms	ms	ms	ms
5	13/3	O	-	-	6,10 6,10 6,10	6,10	<20	21,2 21,2 21,2	36,7	64,6	-	48	-	9
6	15/4	3min CO	21,2 21,2 21,2	-	6,10 6,10 6,10	6,10	<20	21,2 21,2 21,2	36,7	65,5	80	46	-	10
7	16/4	3min CO	21,2 21,2 21,2	-	6,10 6,10 6,10	6,10	<20	21,2 21,2 21,2	36,7	65,5	79	47	-	10

conditions of the apparatus after the tests: after an external visual inspection the apparatus is deemed to be able to continue the tests.

Three-phase short-circuit tests

test duty T60 with 13,7 kA at 36,7 kV

test circuit: see D002

power factor: <0,15

frequency: 50 Hz

prospective transient recovery voltage							
U_0 kV	t_0 μ s	t_1 μ s	U_1 kV	t_2 μ s	U_2 kV	t_3 μ s	t_4 μ s
65	47	3	-	-	-	-	-

supply voltage for operating devices			gas operating pressure for	
closing V d.c.	opening V d.c.	motor V d.c.	operation MPa abs.	interruption MPa abs.
93,5	77	93,5	-	0,45

condition of the apparatus before the tests: as after the test no.7

live side of the test circuit connected to: lower terminals.

date: September 26, 2002

test no.	oscillogram no.	operating sequence	applied voltage (phase-to- earth)	making current (peak value)	breaking current			power frequency recovery voltage		maximum overvoltage	duration of			
					ac component (rms value)	average	dc component	phase-to- earth	phase-to- phase (average)		closing	opening	pre-arc	arc
		-	kV	kA / phase	kA	kA	% / phase	kV	kV	kV	ms	ms	ms	ms
8	18/3	O	-	-	13,7 13,7 13,7	13,7	<20	21,2 21,2 21,2	36,7	65,5	-	48	-	11
9	19/4	3min CO	21,2 21,2 21,2	-	13,7 13,7 13,7	13,7	<20	21,2 21,2 21,2	36,7	66,3	80	46	-	10
10	20/4	3min CO	21,2 21,2 21,2	-	13,7 13,7 13,7	13,7	<20	21,2 21,2 21,2	36,7	66,3	80	46	-	10

conditions of the apparatus after the tests: after an external visual inspection the apparatus is deemed to be able to continue the tests.

Three-phase short-circuit tests

test duty T100s with 20,0 kA at 36,7 kV

test circuit: see D001

power factor: < 0,15

frequency: 50 Hz

prospective transient recovery voltage							
U_i kV	t_3 μ s	t_4 μ s	U_i kV	t_1 μ s	U_i kV	t_2 μ s	t_4 μ s
63	110	9	-	-	-	-	-

supply voltage for operating devices			gas operating pressure for	
closing V d.c.	opening V d.c.	motor V d.c.	operation MPa abs.	interruption MPa abs.
93,5	77	93,5	-	0,45

condition of the apparatus before the tests: as after the test no.10

live side of the test circuit connected to: lower terminals.

date: September 26, 2002

test no.	oscillogram no.	operating sequence	applied voltage (phase-to- earth)	making current (peak value)	breaking current			power frequency recovery voltage		maximum overvoltage	duration of			
					ac component (rms value)	average	dc component	phase-to- earth	phase-to- phase (average)		closing	opening	pre-arc	arc
11	24/3	CO	-	-	20,0 20,0 20,0	20,0	<20	21,2 21,2 21,2	36,7	64,7	-	47	-	11
12	25/4	3min CO	21,2 21,2 21,2	50,3 / R	20,0 20,0 20,0	20,0	<20	21,2 21,2 21,2	36,7	63,8	80	48	-	10
13	26/4	3min CO	21,2 21,2 21,2	51,1 / S	20,0 20,0 20,0	20,0	<20	21,2 21,2 21,2	36,7	63,0	77	43	-	13

conditions of the apparatus after the tests: after an external visual inspection the apparatus is deemed to be able to continue the tests.

Three-phase short-circuit tests

test duty T100a with 20,0 kA at 36,7 kV

test circuit: see D001

power factor: <0,15

frequency: 50 Hz

time constant (To) : 101 ms

prospective transient recovery voltage							
U _e kV	t ₃ μs	t _e μs	U ₁ kV	t ₁ μs	U ₂ kV	t ₂ μs	t _e μs
63	110	9	-	-	-	-	-

supply voltage for operating devices			gas operating pressure for	
closing V d.c.	opening V d.c.	motor V d.c.	operation MPa abs.	interruption MPa abs.
-	121	-	-	0,45

condition of the apparatus before the tests: as after the test no.13

live side of the test circuit connected to: lower terminals.

date: September 26, 2002

test no.	oscillogram no.	operating sequence	applied voltage (phase-to- earth)	making current (peak value)	breaking current			power frequency recovery voltage		maximum overvoltage	duration of			
					ac component (rms value)	average	dc component	phase-to- earth	phase-to- phase (average)		closing	opening	pre-arc	arc
14	27/3	0	-	-	20,0 20,0 20,0	20,0	33 / T	21,2 21,2 21,2	36,7	61,5	-	40	-	11
15	28/3	3min 0	-	-	20,0 20,0 20,0	20,0	34 / S	21,2 21,2 21,2	36,7	64,0	-	40	-	13
16	29/3	3min 0	-	-	20,0 20,0 20,0	20,0	32 / R	21,2 21,2 21,2	36,7	62,3	-	39	-	12

conditions of the apparatus after the tests: after an external visual inspection the apparatus is deemed to be able to continue the tests.

Single-phase short-circuit tests

breaking operation with 20,3 kA at 21,4 kV

test circuit: see D031

power factor: <0,15

frequency: 50 Hz

prospective transient recovery voltage							
U_0 kV	t_3 μ s	t_4 μ s	U_1 kV	t_1 μ s	U_2 kV	t_2 μ s	t_6 μ s
44,5	93	-	-	-	-	-	-

supply voltage for operating devices			gas operating pressure for	
closing V d.c.	opening V d.c.	motor V d.c.	operation MPa abs.	interruption MPa abs.
-	77	-	-	0,45

condition of the apparatus before the tests: as after the test no.16

live side of the test circuit connected to: lower terminal

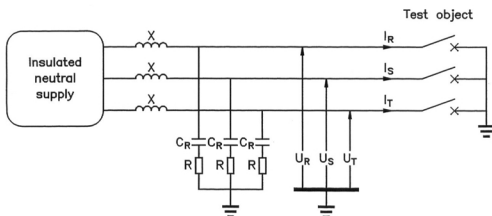
pole under test: T

date: September 26, 2002

test no.	oscillogram no.	operating sequence	applied voltage kV	making current (peak value) kA	breaking current		power frequency recovery voltage kV	maximum over- voltage kV	duration of			
					ac component (rms value) kA	dc component %			closing ms	opening ms	pre-arc ms	arc ms
17	33/2	O	-	-	20,3	<20	21,4	46,2	-	48	-	11

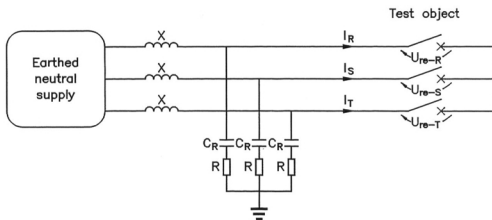
conditions of the apparatus after the tests: see photos no.2 to 13 ; after the test the circuit-breaker operated properly, see oscillograms no.44 to 46

circuit-diagram D001



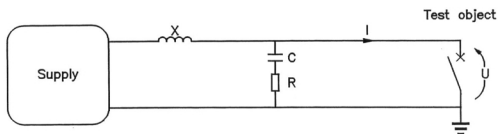
Symbols used in this diagram are the same as those on the oscillograms.

circuit-diagram D002



Symbols used in this diagram are the same as those on the oscillograms.

circuit-diagram D031



Symbols used in this diagram are the same as those on the oscillograms.

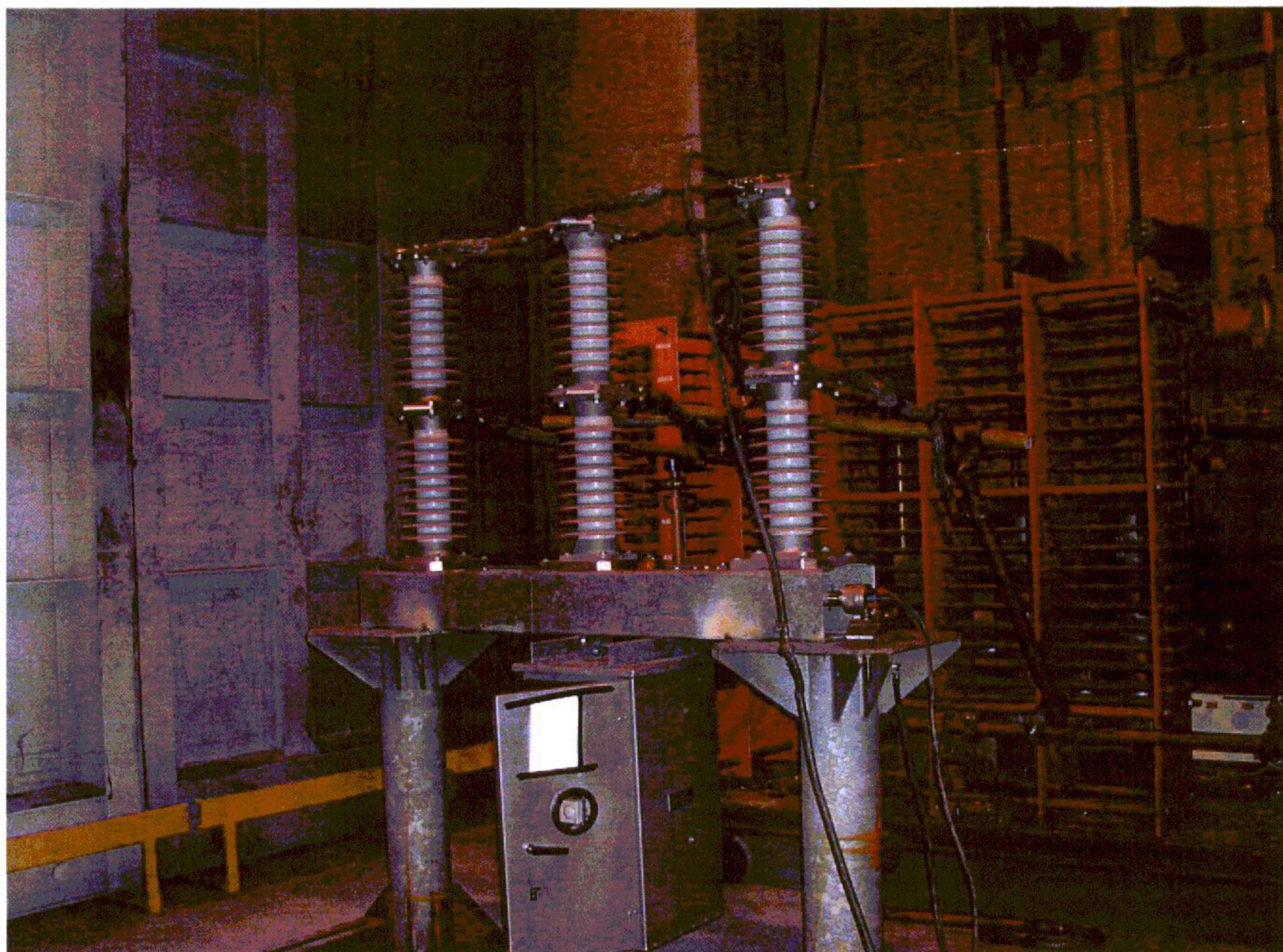


Photo no. 1



Photo no. 2
Phase R



Photo no. 3
Phase R

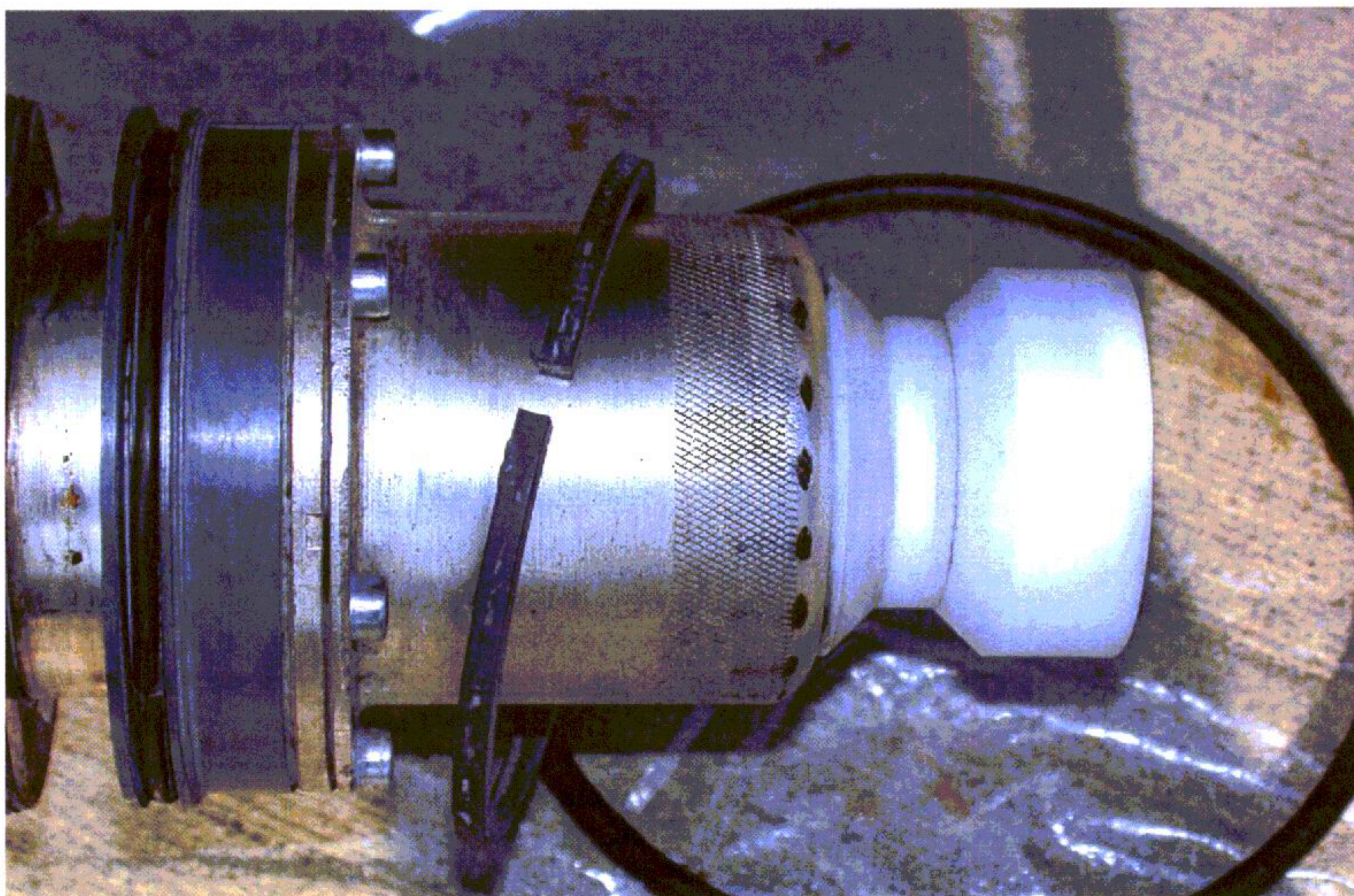


Photo no. 4
Phase R



Photo no. 5
Phase R



Photo no. 6
Phase S



Photo no. 7
Phase S

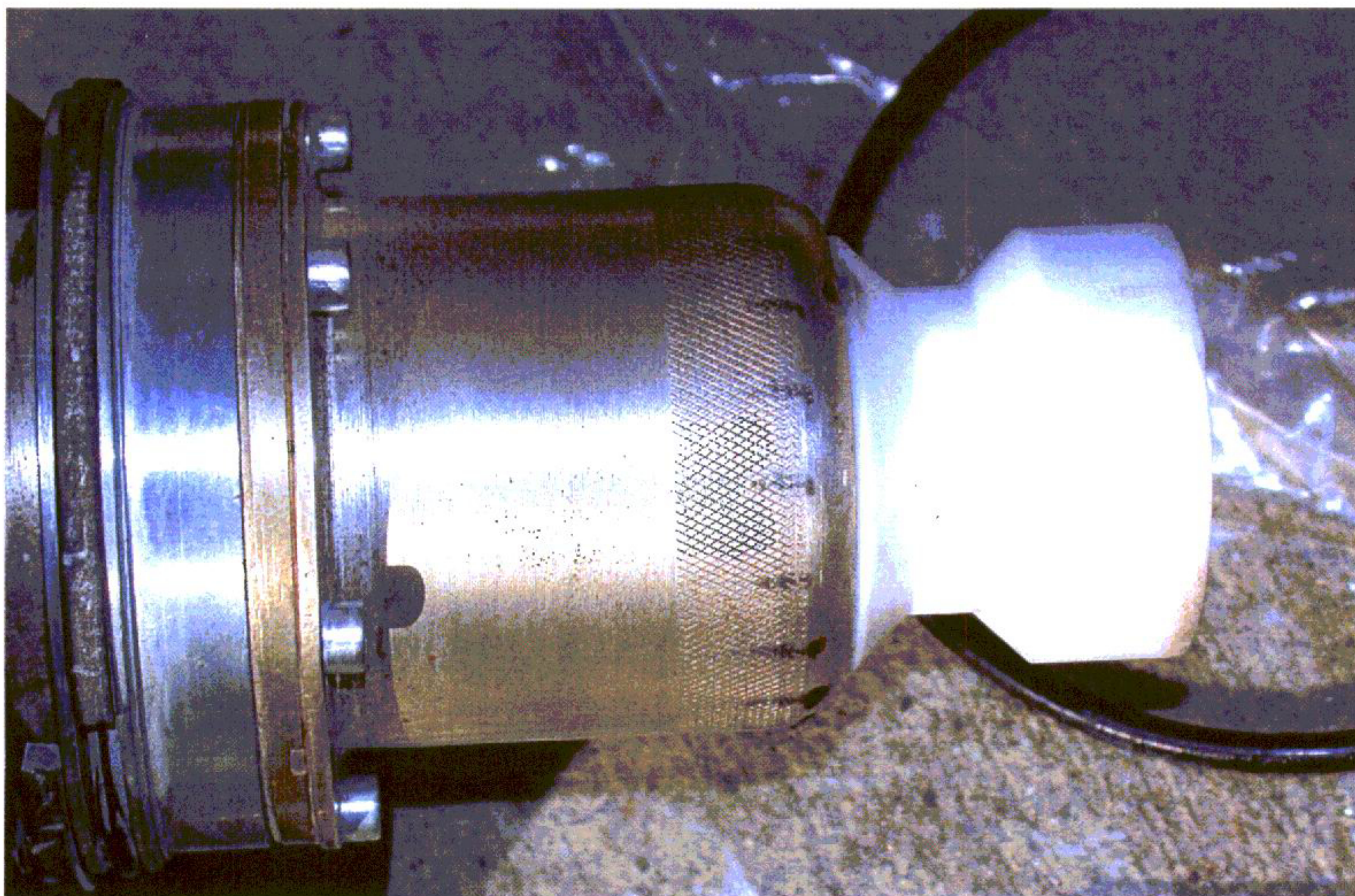


Photo no. 8
Phase S



Photo no. 9
Phase S

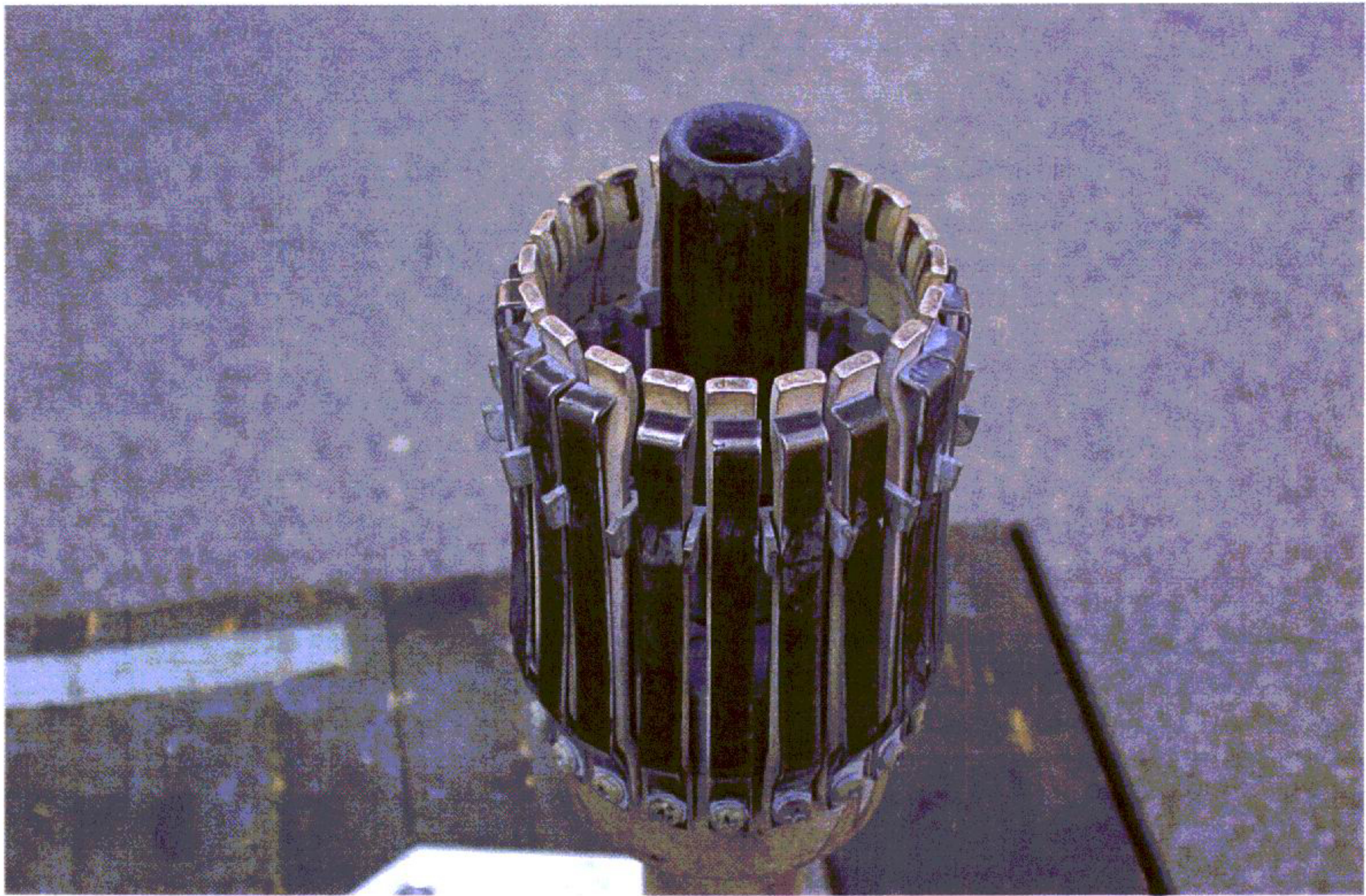


Photo no. 10
Phase T

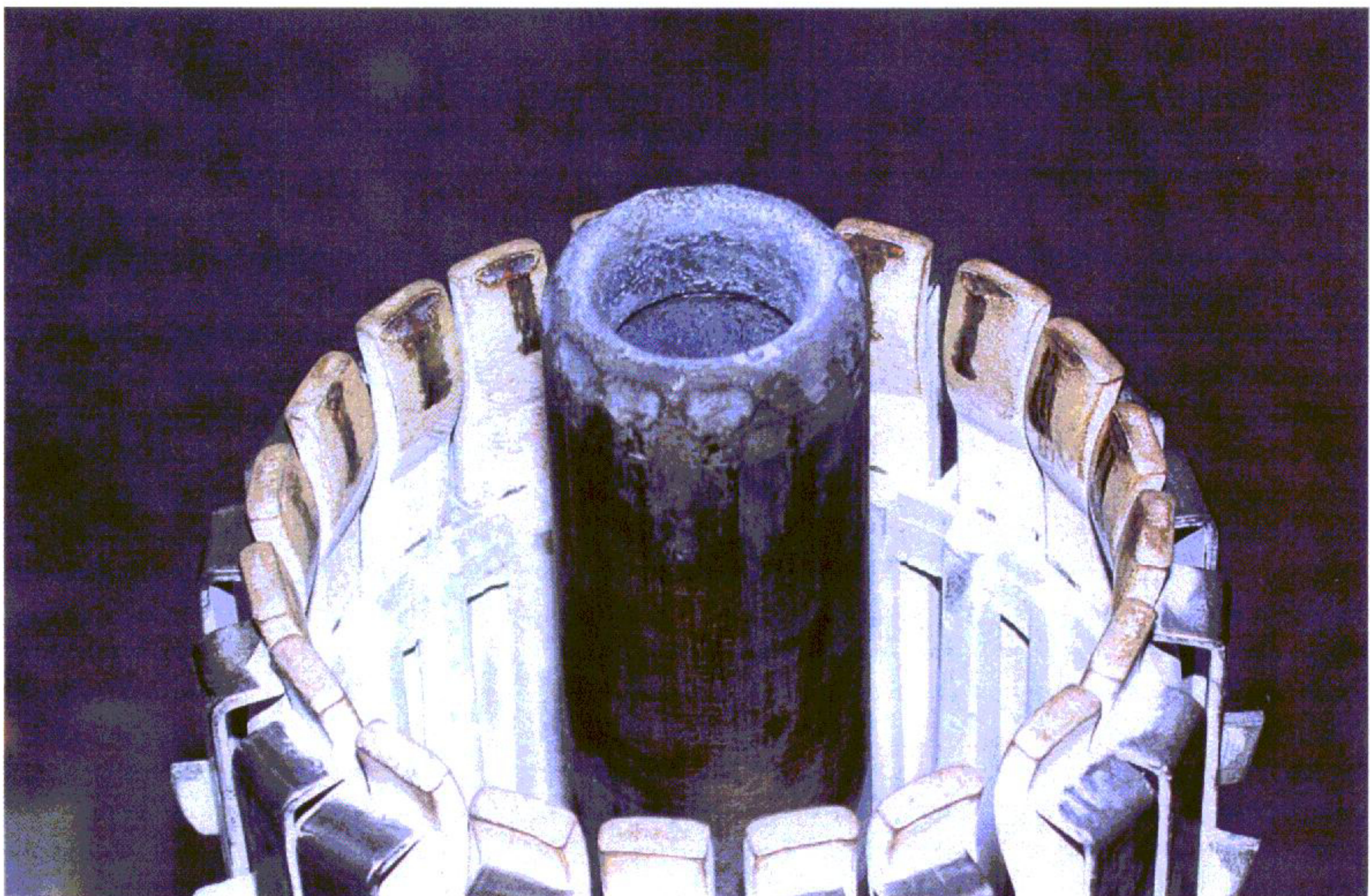


Photo no. 11
Phase T

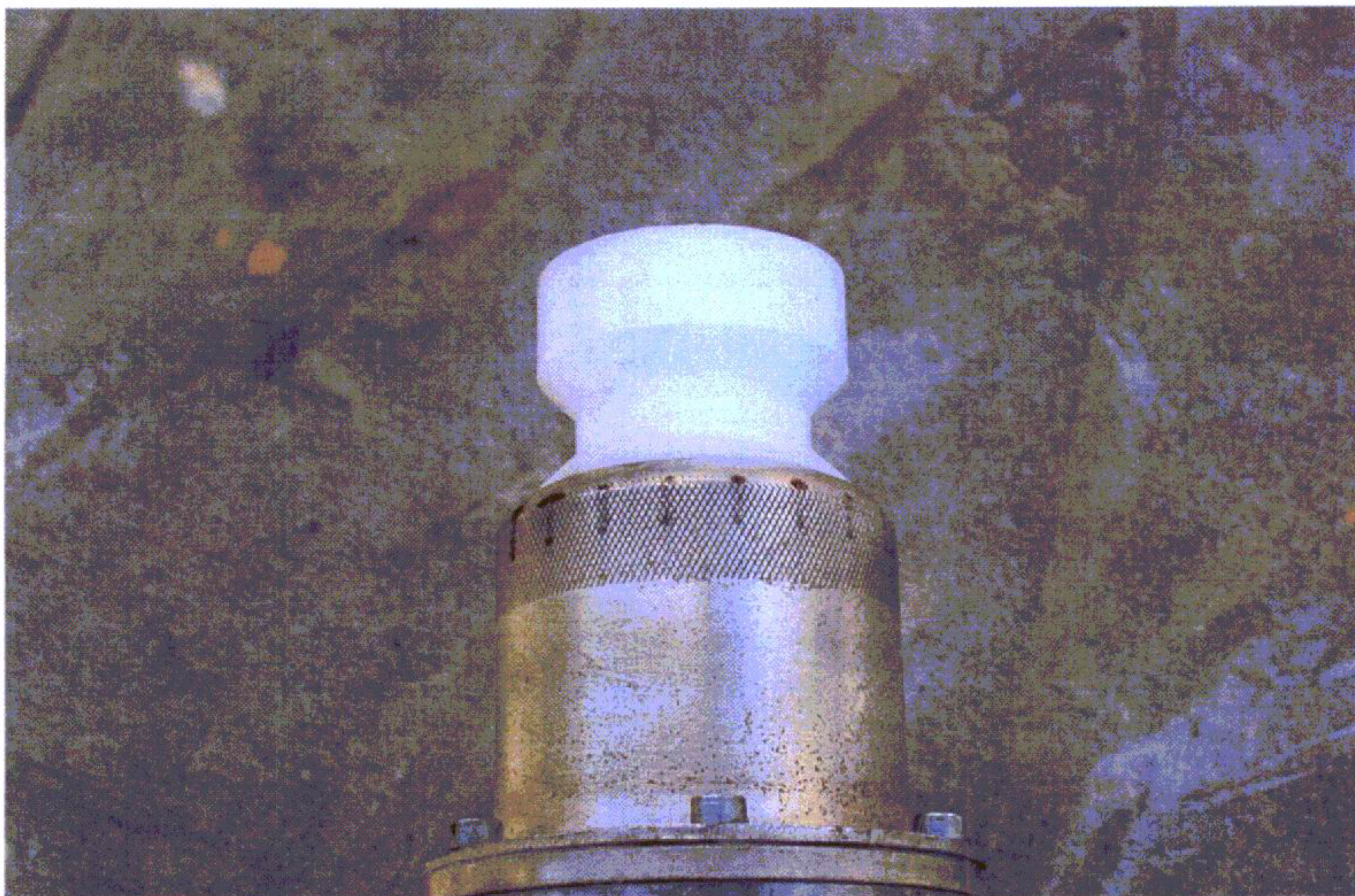


Photo no. 12
Phase T

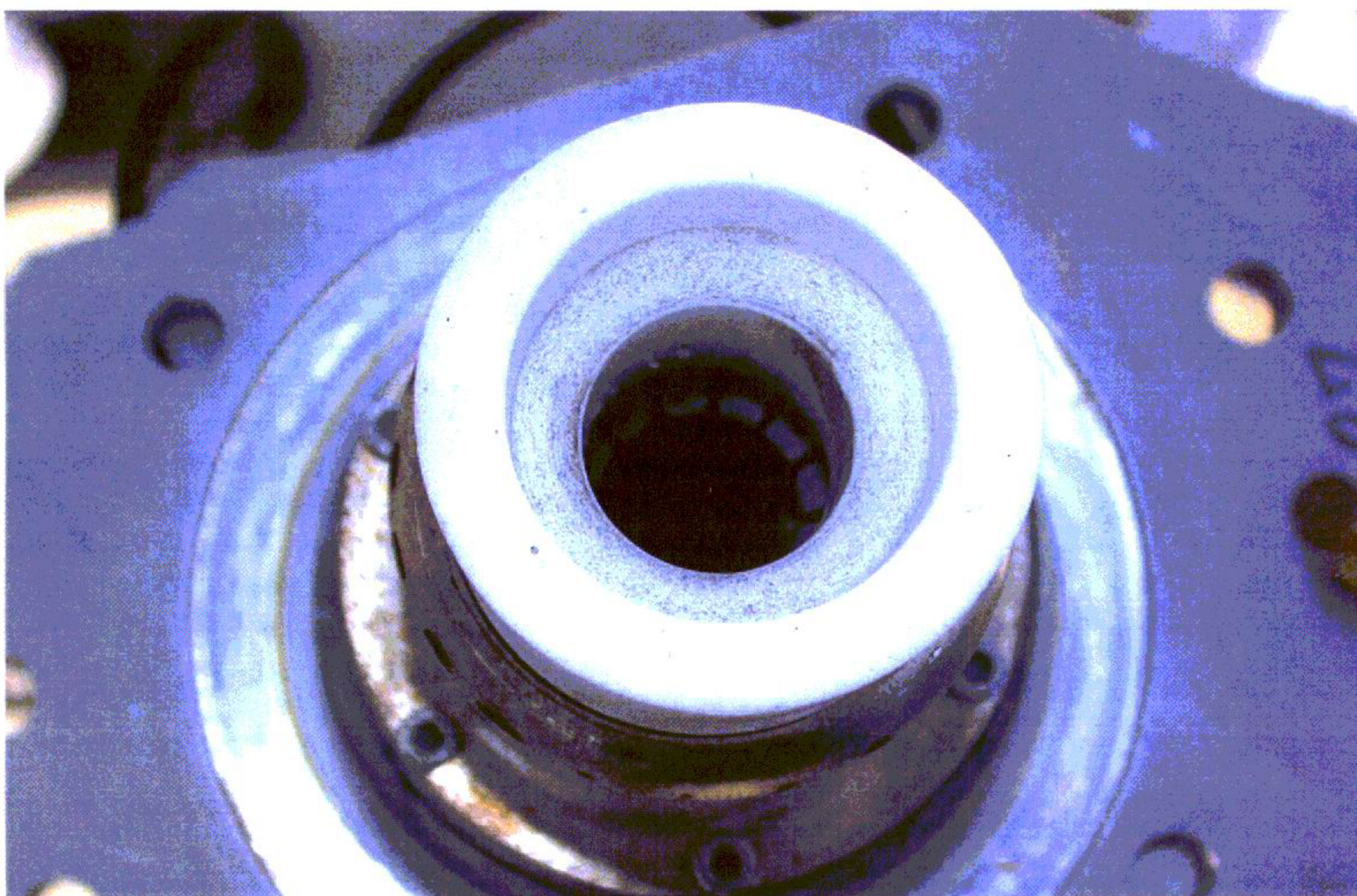


Photo no. 13
Phase T

C.C
0.45V

Dt=39.54ms

I.C
2.A
I.O
1.A

SC1
50.V

SC2
50.V

SC3
50.V

645. 664. 683. 702. 721. 740.ms

CESI-GPS A2/029941 n.1

1.9ms/div

Tip. prov. P0512 CEC- CO OSC- P05

C.C
0.45V

I.C
1.A
I.O
1.A

SC1
50.V

SC2
50.V

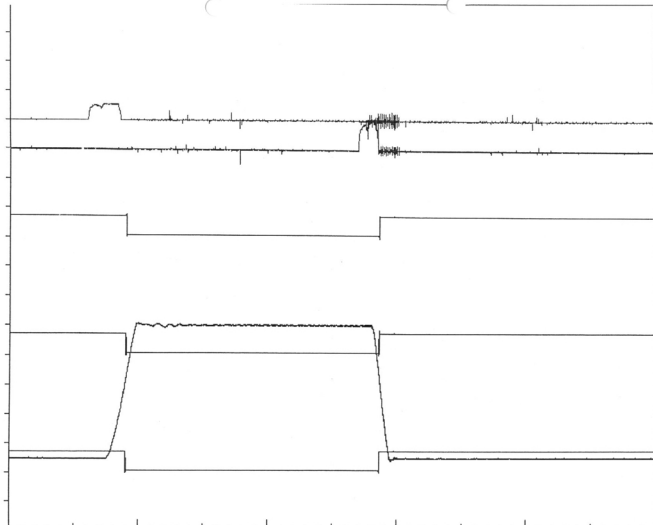
SC3
50.V

10. 248. 486. 724. 962. 1200.ms

CESI-GPS A2/029941 n.2

Tip.prima POSTIZ CECr CO OSCr POS

23.8ms/div



C.C
0.45V

Dt=39.19ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

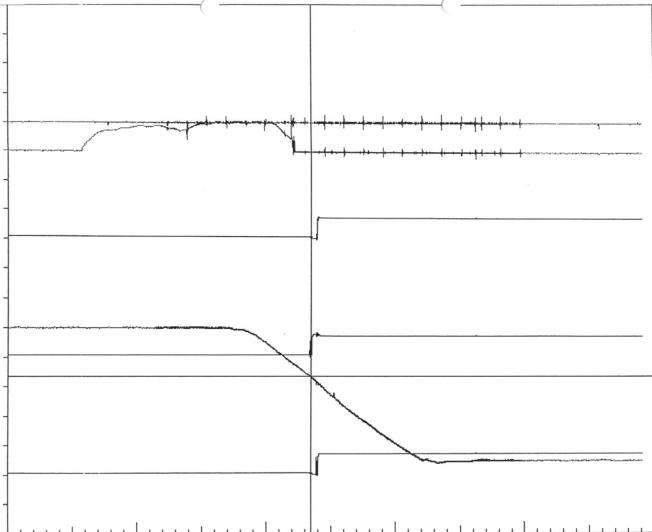
SC3
50.V

640. 662. 684. 706. 728. 750.ms

CESI-GPS A2/029941 n.2

2.2ms/div

Tip. priv. POSIZ CICH CO. OSC. POS



C.C
0.45V

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

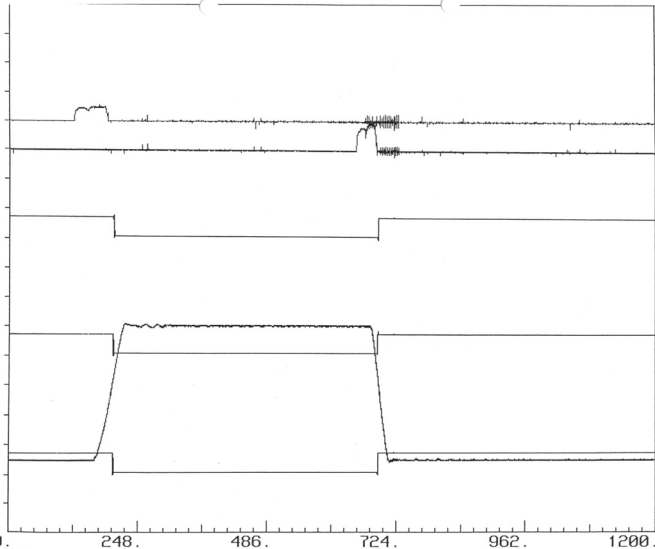
SC3
50.V

10. 248. 486. 724. 962. 1200.ms

CESI-GPS R2/029941 n.3

23.8ms/div

Tip. prva POST2 CEC= CO OSC= POS



C.C
0.45V

Dt=73.13ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

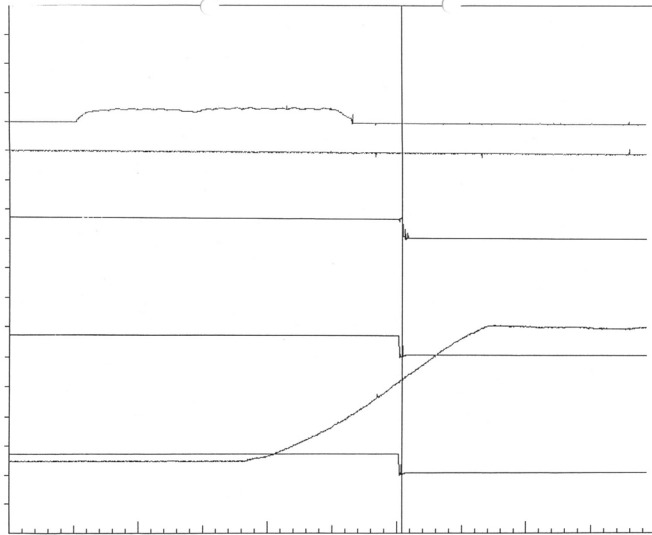
SC3
50.V

115. 144. 173. 202. 231. 260.ms

CESI-GPS A2/029941 n.3

2.9ms/div

Tip. prev. POSIZ. CICH CO. OSCA POS



C.C
0.45V

Dt=39.78ms

I.C
1.A
I.O
1.A

SC1
50.V

SC2
50.V

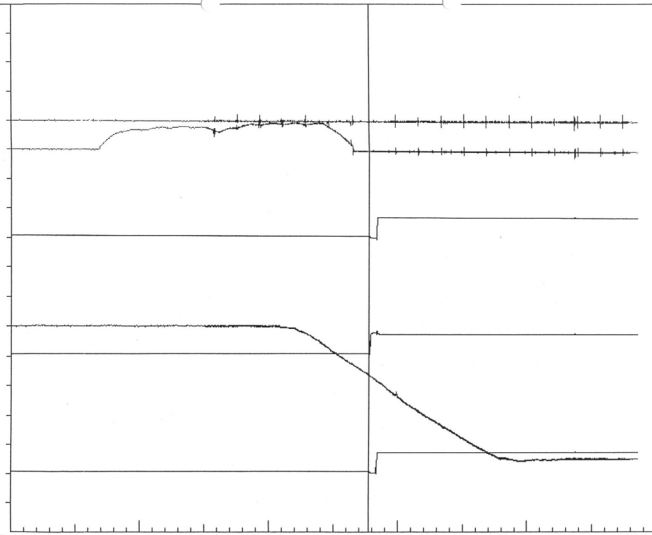
SC3
50.V

637. 656. 675. 694. 713. 732.ms

CESI-6PS A2/029941 n.3

1.9ms/div

Tlp.prima P0522 CESC C0 OSCA P05



C.C
0.45V

I.C
1.A
I.O
1.A

SC1
50.V

SC2
50.V

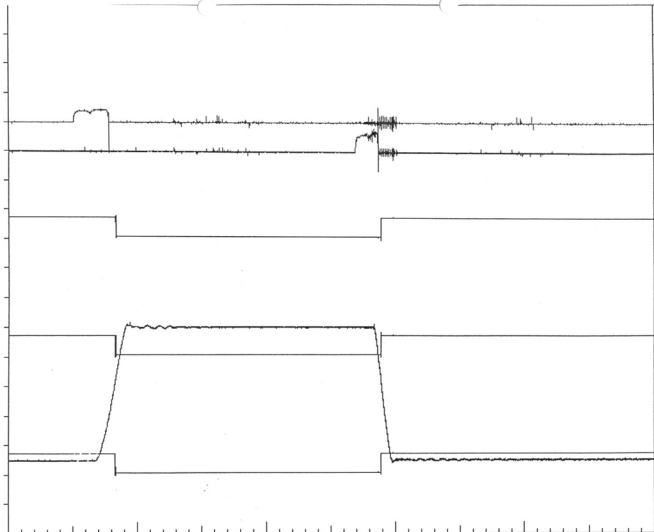
SC3
50.V

10. 248. 486. 724. 962. 1200.ms

CESI-GPS A2/029941 n.4

23.8ms/div

Tlp.prim POSIZ CECN CO OSCN PMS



C.C
0.45V

Dt=77.76ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

SC3
50.V

116. 145. 174. 203. 232. 261.ms

CESI-GPS A2/029941 n.4

2.9ms/div

Tip.prvn P0522 CICH CO OSCN P05

C.C
0.45V

Dt=46.79ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

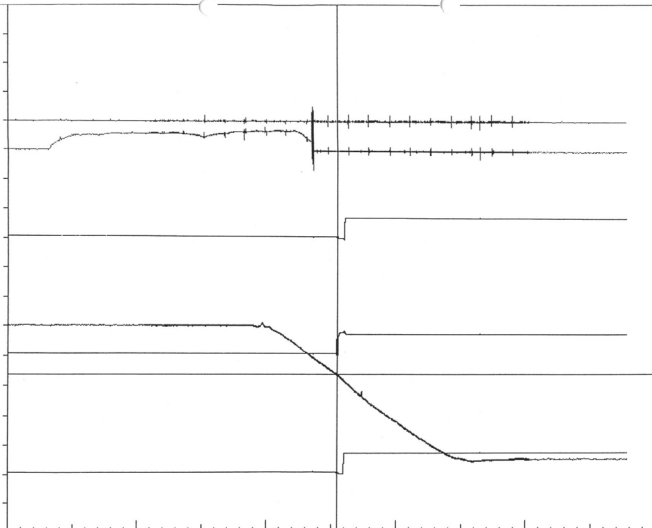
SC3
50.V

643. 664. 685. 706. 727. 748.ms

CESI-GPS A2/029941 n.4

2.1ms/div

Tip.prvn P052Z CICH CO 85Ch P05



Dt=3022.3ms

P14
4.U

UR
10.KV

IR
35.KA

US
10.KV

IS
35.KA

UT
10.KV

IT
35.KA

50. 720. 1390. 2060. 2730. 3400.ms

CESI-GPS A2/029941 n.7

67.ms/div

Tip. PRVA PROVA CICH 1SEC OSC 1SEC

IT.p=63.8kA

P14
4.U

UR
10.KV

IR
35.KA

US
10.KV

IS
35.KA

UT
10.KV

IT
35.KA

206. 236. 266. 296. 326. 356.ms

CESI-GPS A2/029941 n.7

3.ms/div

Tip.prvn PROVA CICH 1SEC OSC 1SEC

C.C
0.45V

Dt=46.92ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

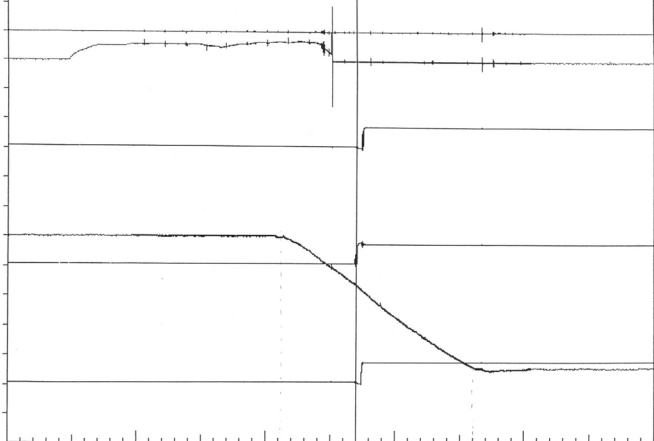
SC3
50.V

133. 154. 175. 196. 217. 238.ms

CESI-GPS A2/029941 n.8

2.1ms/div

Tip. prev POSTZ CISC 0 OSCN POS



C.C
0.45V
P14
4.V

I.O
1.A
URER
30.KV

IR
3.KA

URES
30.KV

IS
3.KA

URET
30.KV

IT
3.KA

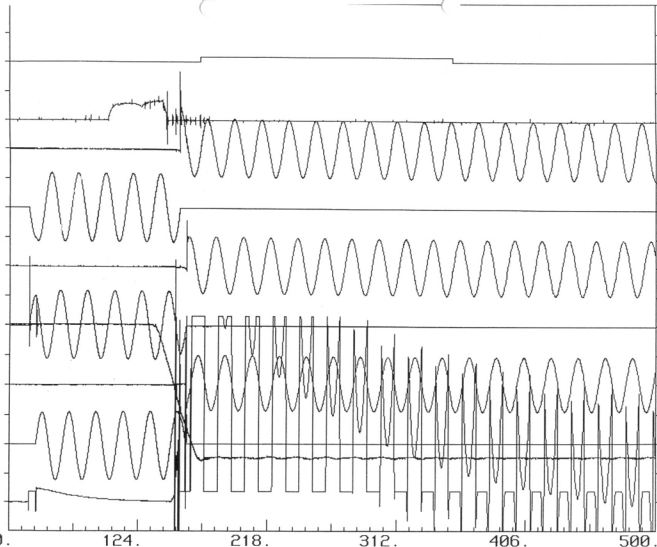
UARC
0.3KV

30. 124. 218. 312. 406. 500.ms

CESI-GPS A2/029941 n.10

9.4ms/div

Tip. priv. PROVA CEC 0 OSC 0



C.C
0.45V
P14
4.U

Dt=46.79ms
Dt=10.37ms

I.O
1.A
URER
30.KV

IR
3.KA

URES
30.KV

IS
3.KA

URET
30.KV

IT
3.KA

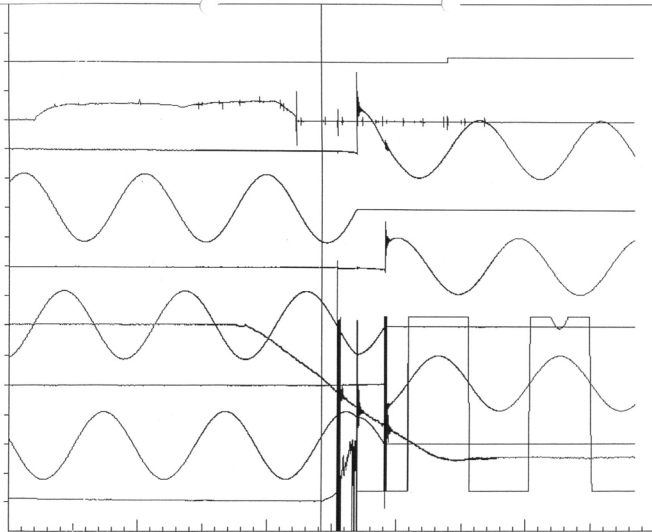
UARC
0.3KV

98. 119. 140. 161. 182. 203.ms

CESI-GPS A2/029941 n.10

2.1ms/div

Tip. prov. PROVA CICH 0 OSCO 0



URER.p=79.7kV

URER
30.KV

URES
30.KV

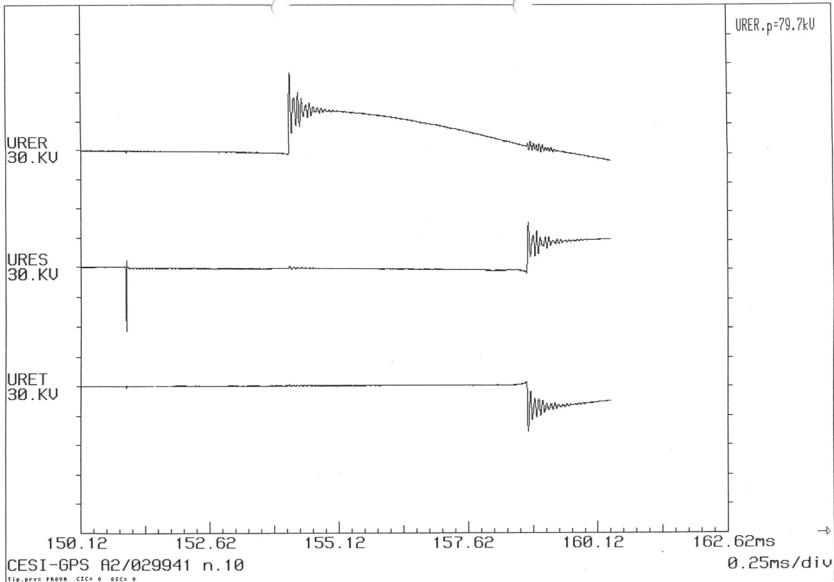
URET
30.KV

150.12 152.62 155.12 157.62 160.12 162.62ms

CESI-GPS A2/029941 n.10

0.25ms/div

Tip.prim PROVA CICH 0 OSC 0



C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
URER
30.KV

IR
3.KA

URES
30.KV

IS
3.KA

URET
30.KV

IT
3.KA

UARC
0.3KV

50. 250. 450. 650. 850. 1050.ms

CESI-GPS A2/029941 n.11

20.ms/div

Tlp.prvv PROV. C3C= C0 OSC= C0

C.C
0.45V
P14
4.V
I.C
1.A
1.0
1.A
URER
30.KV

Dt=79.05ms

IR
3.KA

URES
30.KV

IS
3.KA

URET
30.KV

IT
3.KA

UARC
0.3KV

111. 144. 177. 210. 243. 276.ms

CESI-GPS A2/029941 n.11

3.3ms/div

TIP. PRVA PROVA CECH CO OSCO CO

C.C
0.45U
P14
4.U
I.C
1.A
I.O
1.A
URER
30.KU
IR
3.KA
URES
30.KU
IS
3.KA
URET
30.KU
IT
3.KA
UARC
0.3KU

Dt=49.13ms
Dt=8.25ms

600. 640. 680. 720. 760. 800.ms

CESI-GPS A2/029941 n.11

4.ms/div

Tlp.prvz PROVA CEX CO OSC CO

URES.p=79.2kV

URER
30.KV

URES
30.KV

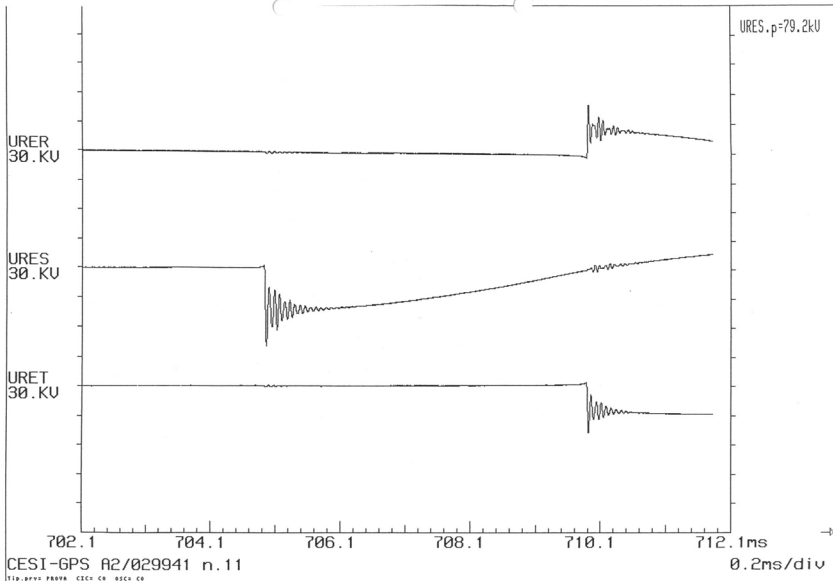
URET
30.KV

702.1 704.1 706.1 708.1 710.1 712.1ms

0.2ms/div

CESI-GPS A2/029941 n.11

Tip. prova PROVA CECI CO OSCO CO



C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
URER
30.KV

IR
3.KA

URES
30.KV

IS
3.KA

URET
30.KV

IT
3.KA

UARC
0.3KV

50. 250. 450. 650. 850. 1050.ms

CESI-GPS A2/029941 n.12

20.ms/div

Tip. priv. PROVA CICH CO OSCO CO

C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
URER
30.KV

Dt=79.84ms

IR
3.KA

URES
30.KV

IS
3.KA

URET
30.KV

IT
3.KA

UARC
0.3KV

115. 150. 185. 220. 255. 290.ms

CESI-GPS A2/029941 n.12

3.5ms/div

Tip.prvv PR00A CICH CO OSCO CO

C.C
 0.45V
 P14
 4.V
 I.C
 1.A
 I.O
 1.A
 URER
 30.KV
 IR
 3.KA
 URES
 30.KV
 IS
 3.KA
 URET
 30.KV
 IT
 3.KA
 UARC
 0.3KV

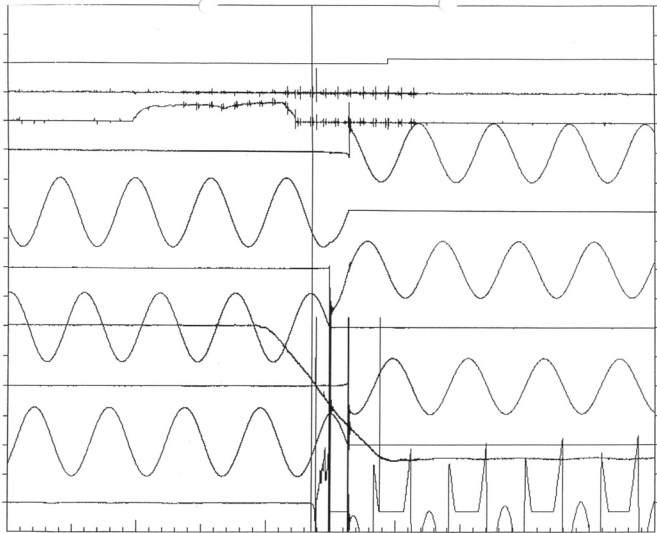
Dt=47.39ms
 Dt=9.99ms

620. 654. 688. 722. 756. 790.ms

CESI-GPS A2/029941 n.12

3.4ms/div

Tip.prvn PROVA CICH CO OSCU CO



URES.p=80.9kV

URER
30.KV

URES
30.KV

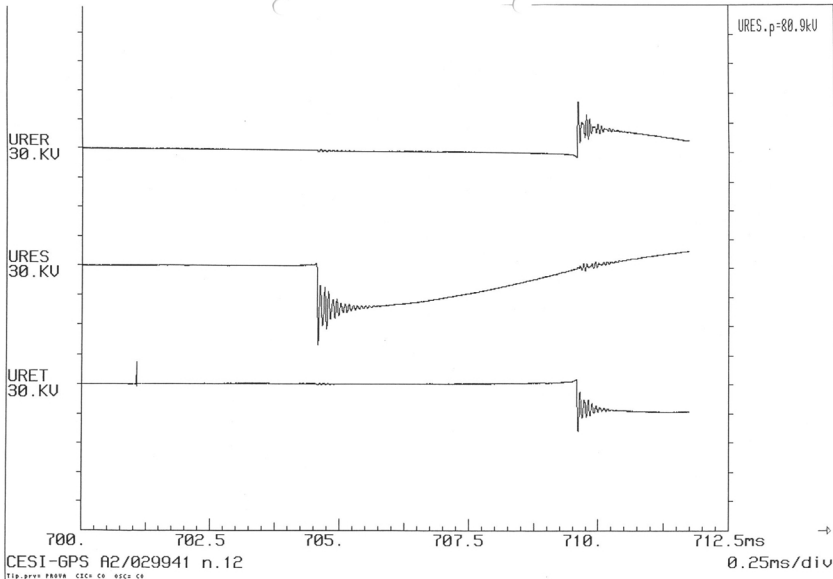
URET
30.KV

700. 702.5 705. 707.5 710. 712.5ms

CESI-GPS A2/029941 n.12

0.25ms/div

Tip.prvi PROVA CICH CO OSCO CO



C.C
0.45V
P14
4.U

I.O
1.A
URER
30.KV

IR
10.KA

URES
30.KV

IS
10.KA

URET
30.KV

IT
10.KA

UARC
0.3KV

30. 124. 218. 312. 406. 500.ms

CESI-GPS A2/029941 n.13

9.4ms/div

Tip.prvu PROVH CICH 0 OSCO 0

C.C
0.45V
P14
4.V

Dt=48.31ms
Dt=9.47ms

I.O
1.A
URER
30.KV

IR
10.KA

URES
30.KV

IS
10.KA

URET
30.KV

IT
10.KA

UARC
0.3KV

94. 114. 134. 154. 174. 194.ms

CESI-GPS A2/029941 n.13

2.ms/div

Tip.pvva PROVA CICH 0 OSC 0

URER.p=64.6kV

URER
30.KV

URES
30.KV

URET
30.KV

150.65 153.15 155.65 158.15 160.65 163.15ms

CESI-GPS A2/029941 n.13

Tip.prvs PROVA CIO 0 OSC 0

0.25ms/div

C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
URER
30.KV

IR
10.KA

URES
30.KV

IS
10.KA

URET
30.KV

IT
10.KA

UARC
0.3KV

50. 230. 410. 590. 770. 950.ms

CESI-GPS A2/029941 n.15

18.ms/div

Tip. prov. PROV. CICH CO OSCO CO

C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
URER
30.KV

Dt=80.45ms

IR
10.KA

URES
30.KV

IS
10.KA

URET
30.KV

IT
10.KA

UARC
0.3KV

112. 143. 174. 205. 236. 267.ms

CESI-GPS A2/029941 n.15

3.1ms/div

Tip.pvvv P800A CICH CO OSCO CO

C.C
 0.45V
 P14
 4.V
 I.C
 1.A
 I.O
 1.A
 URER
 30.KV
 IR
 10.KA
 URES
 30.KV
 IS
 10.KA
 URET
 30.KV
 IT
 10.KA
 UARC
 0.3KV

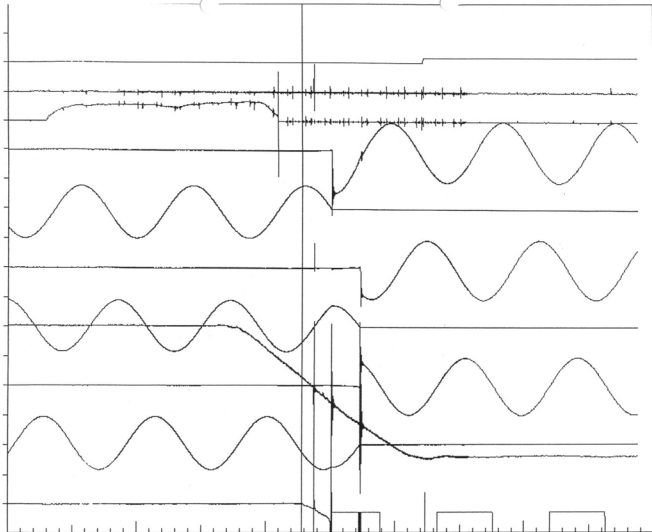
Dt=45.71ms
 Dt=10.42ms

544. 567. 590. 613. 636. 659.ms

CESI-GPS A2/029941 n.15

2.3ms/div

Tip: prova PROVA CICH CO OSCO CO



URER.p=65.5kV

URER
30.KV

URES
30.KV

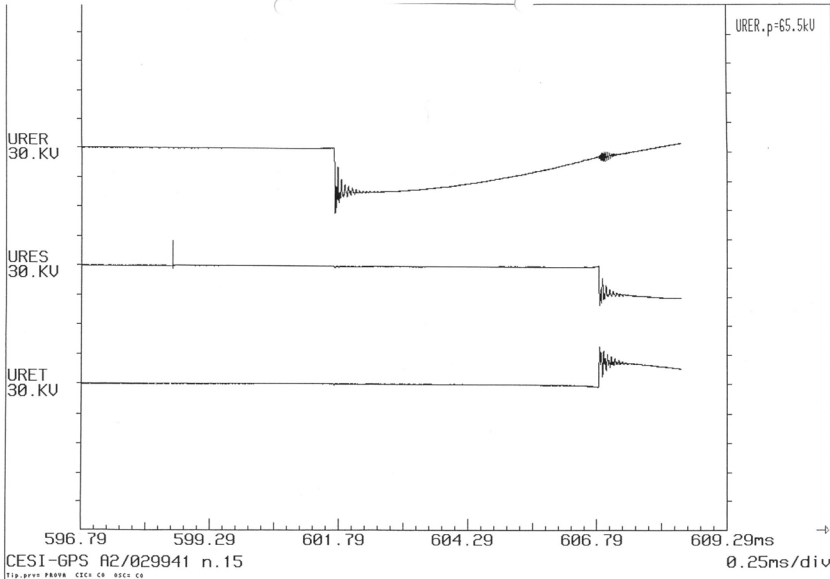
URET
30.KV

596.79 599.29 601.79 604.29 606.79 609.29ms

CESI-GPS A2/029941 n.15

0.25ms/div

Tip.prim PROVA CICLO OSCO



C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
URER
30.KV

IR
10.KA

URES
30.KV

IS
10.KA

URET
30.KV

IT
10.KA

UARC
0.3KV

50. 230. 410. 590. 770. 950.ms

CESI-GPS A2/029941 n.16

18.ms/div

Tip.pvva PROVA CEC= CO OSC= CO

C.C
0.45V
P14
4.V
I.C
1.A
1.0
1.A
URER
30.KV

Dt=78.66ms

IR
10.KA

URES
30.KV

IS
10.KA

URET
30.KV

IT
10.KA

UARC
0.3KV

114. 144. 174. 204. 234. 264.ms

CESI-GPS A2/029941 n.16

3.ms/div

Tip.pvva PROVA CICH CO OSCO CO

C.C
0.45V
P14
4.U
I.C
1.A
I.O
1.A
URER
30.KV

IR
10.KA

URES
30.KV

IS
10.KA

URET
30.KV

IT
10.KA

UARC
0.3KV

Dt=47.13ms
Dt=9.69ms

540. 562. 584. 606. 628. 650.ms

CESI-GPS A2/029941 n.16

2.2ms/div

Tip.prima PR098 CECI CA OSCI CA

URER.p=65.5kV

URER
30.KV

URES
30.KV

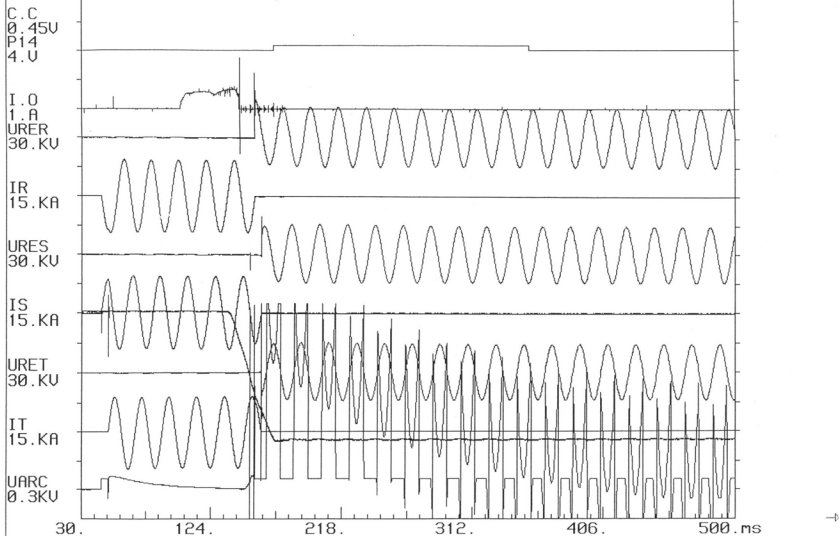
URET
30.KV

596.5 599.5 602.5 605.5 608.5 611.5ms

CESI-GPS A2/029941 n.16

0.3ms/div

Tip.prvn PR00A CICH CO OSCO CO



CESI-GPS A2/029941 n.18

9.4ms/div

TIP:PRV PROVA CICH 0 OSC 0

C.C
0.45V
P14
4.U

Dt=47.55ms
Dt=10.97ms

I.O
1.A
URER
30.KU

IR
15.KA

URES
30.KU

IS
15.KA

URET
30.KU

IT
15.KA

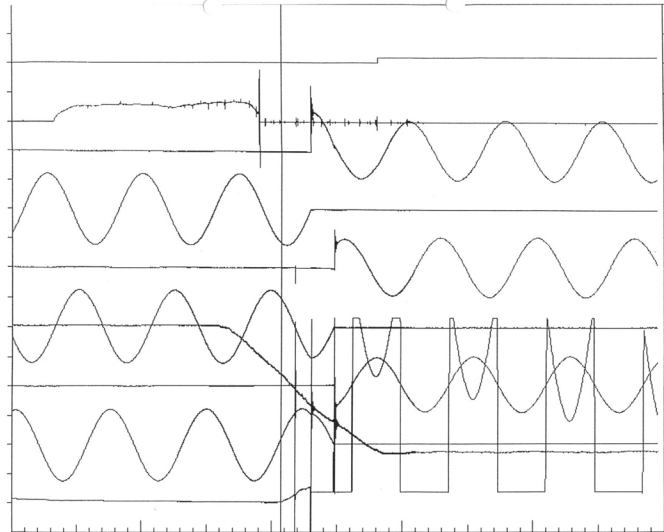
UARC
0.3KU

93. 120. 147. 174. 201. 228.ms

CESI-GPS A2/029341 n.18

2.7ms/div

Tip.prvu PRAVA CEC=0 OSC=0



URER.p=65.5kV

URER
30.KV

URES
30.KV

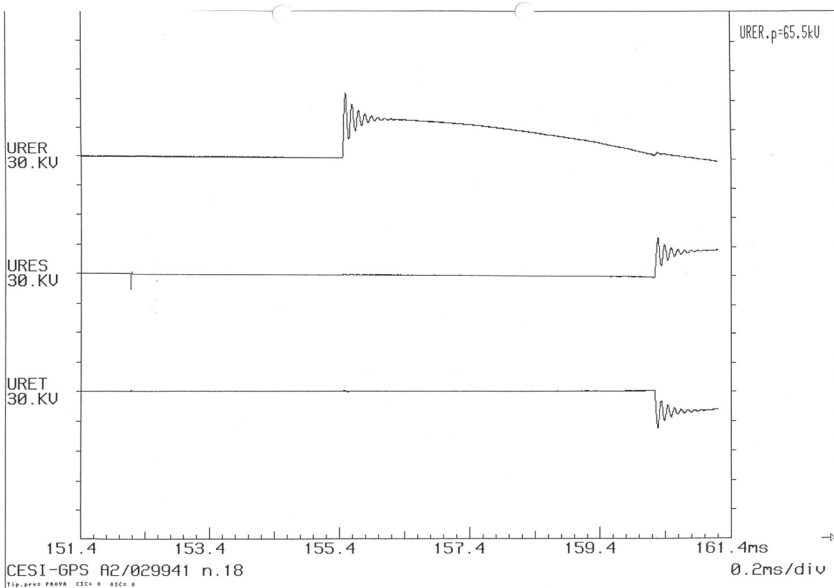
URET
30.KV

151.4 153.4 155.4 157.4 159.4 161.4ms

CESI-GPS A2/029941 n.18

0.2ms/div

Tip.prima PRIMA CEC=0 OSC=0



C.C
0.45V
P14
4.U
I.C
1.A
I.O
1.A
URER
30.KV

IR
15.KA

URES
30.KV

IS
15.KA

URET
30.KV

IT
15.KA

UARC
0.3KV

50. 210. 370. 530. 690. 850.ms

CESI-GPS A2/029941 n.19

16.ms/div

Tip. prova PROVA CICH CO OSCO CO

C.C
0.45V
P14
4.U
I.C
1.A
I.O
1.A
URER
30.KV

IR
15.KA

URES
30.KV

IS
15.KA

URET
30.KV

IT
15.KA

UARC
0.3KV

Dt=80.3ms

113. 145. 177. 209. 241. 273.ms

CESI-GPS A2/029941 n.19

3.2ms/div

C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
URER
30.KV

IR
15.KA

URES
30.KV

IS
15.KA

URET
30.KV

IT
15.KA

UARC
0.3KV

Dt=46.48ms
Dt=9.71ms

442. 468. 494. 520. 546. 572.ms

CESI-GPS A2/029941 n.19

2.6ms/div

Tip.pvu PROVA CECI CO BSCA CE

URES.p=66.3kV

URER
30.kV

URES
30.kV

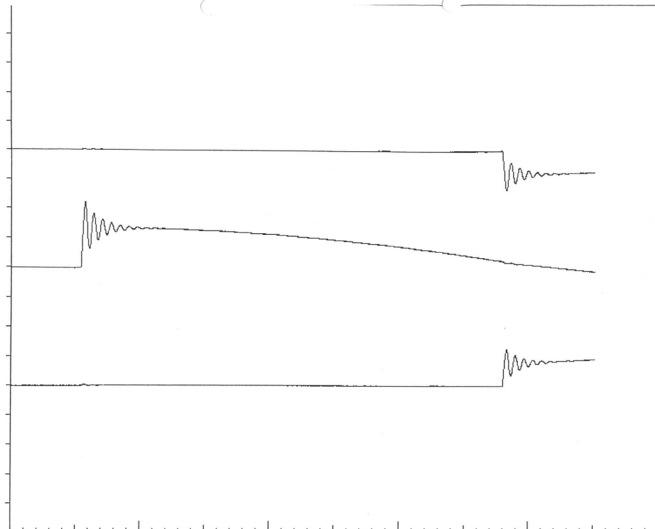
URET
30.kV

501.24 502.74 504.24 505.74 507.24 508.74ms

CESI-GPS A2/029941 n.19

0.15ms/div

Tip.prima PRIMA CICH CO OSCO CO



C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
URER
30.KV

IR
15.KA

URES
30.KV

IS
15.KA

URET
30.KV

IT
15.KA

UARC
0.3KV

50. 210. 370. 530. 690. 850.ms

CESI-GPS A2/029941 n.20

16.ms/div

Tip. prov. PROVA CEC= CO OSC= CO

C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
URER
30.KV

Dt=80.05ms

IR
15.KA

URES
30.KV

IS
15.KA

URET
30.KV

IT
15.KA

UARC
0.3KV

113. 145. 177. 209. 241. 273.ms

CESI-GPS A2/029941 n.20

3.2ms/div

Tip.pvva PAOVA CICH CO OSCO CO

C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
URER
30.KV

IR
15.KA

URES
30.KV

IS
15.KA

URET
30.KV

IT
15.KA

UARC
0.3KV

$\Delta t = 45.77\text{ms}$
 $\Delta t = 9.75\text{ms}$

443. 470. 497. 524. 551. 578.ms

CESI-GPS A2/029941 n.20

2.7ms/div

Tip. prova PROVA CICH Co. BSCo Co.

URES.p=66.3kV

URER
30.KV

URES
30.KV

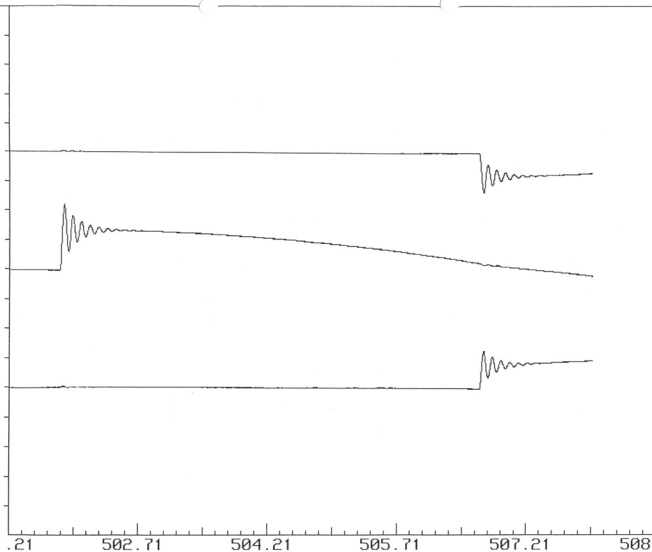
URET
30.KV

501.21 502.71 504.21 505.71 507.21 508.71ms

CESI-GPS A2/029941 n.20

0.15ms/div

TIP-PRV PROVA CICH CO OSCO CO



C.C
0.45V
P14
4.U

I.O
1.A
UR
30.KV

IR
25.KA

US
30.KV

IS
25.KA

UT
30.KV

IT
25.KA

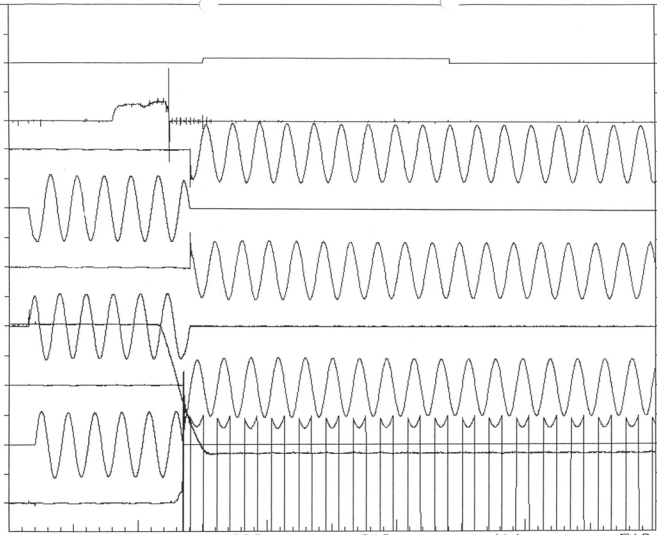
UARC
0.3KV

30. 126. 222. 318. 414. 510.ms

CESI-GPS A2/029941 n.24

9.6ms/div

Tip.prvn P807A CZCh 0 OSC 0



C.C.
0.45V
P14
4.V

Dt=46.74ms
Dt=10.75ms

I.O
1.A
UR
30.KV

IR
25.KA

US
30.KV

IS
25.KA

UT
30.KV

IT
25.KA

UARC
0.3KV

97. 128. 159. 190. 221. 252.ms

CESI-GPS A2/029941 n.24

3.1ms/div

Tip. prova PROVA CICH 0 OSC 0

UT.p=64.7kV

UR
30.KV

US
30.KV

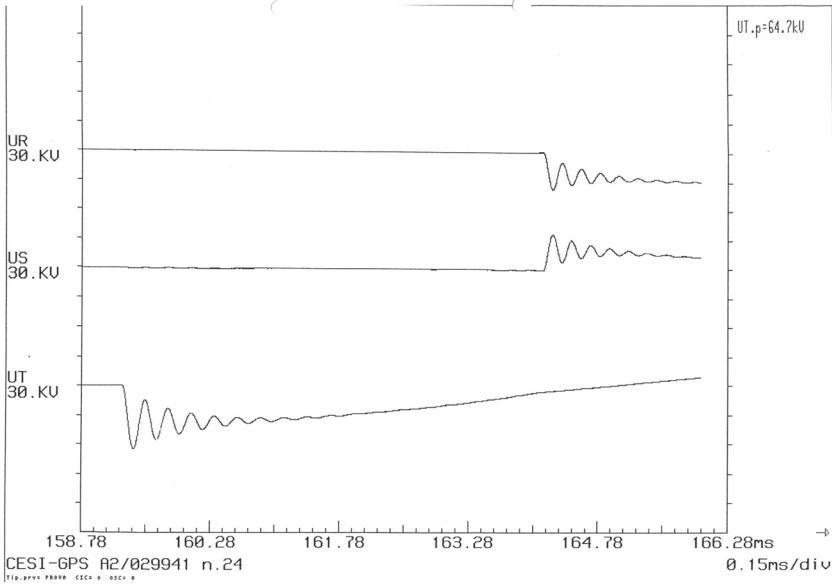
UT
30.KV

158.78 160.28 161.78 163.28 164.78 166.28ms

CESI-GPS R2/029941 n.24

0.15ms/div

Tip.prima PROVA CECO 0 OSCO 0



C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
UR
30.KV

IR
30.KA

US
30.KV

IS
30.KA

UT
30.KV

IT
30.KA

UARC
0.3KV

50. 173. 296. 419. 542. 665.ms

CESI-GPS A2/029941 n.25

12.3ms/div

Tip. priv. PROVA CECu Co OSCu Co

C.C
0.45U
P14
4.U
I.C
1.A
I.O
1.A
UR
30.KV
IR
30.KA
US
30.KV
IS
30.KA
UT
30.KV
IT
30.KA
UARC
0.3KV

IR.p=50.3kA
Dt=80.33ms

114. 147. 180. 213. 246. 279.ms

CESI-GPS A2/029941 n.25

3.3ms/div

TIP:PPV PROVA CECI CE OSCA CE

C.C
0.45V
P14
4.V
I.C
1.A
I.O
1.A
UR
30.KV
IR
30.KA
US
30.KV
IS
30.KA
UT
30.KV
IT
30.KA
UARC
0.3KV

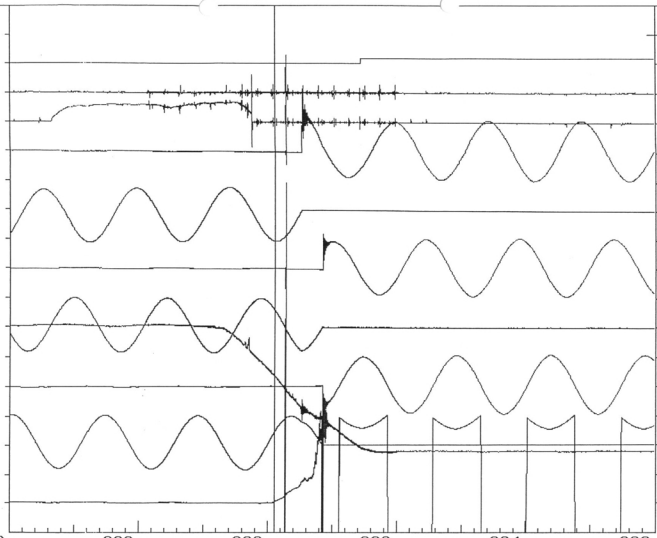
Dt=48.21ms
Dt=10.46ms

252. 280. 308. 336. 364. 392.ms

CESI-GPS A2/029941 n.25

2.8ms/div

Tip.pvva PROVA CCE= CO OSC= CO



UR.p=63.8kV

UR
30.KV

US
30.KV

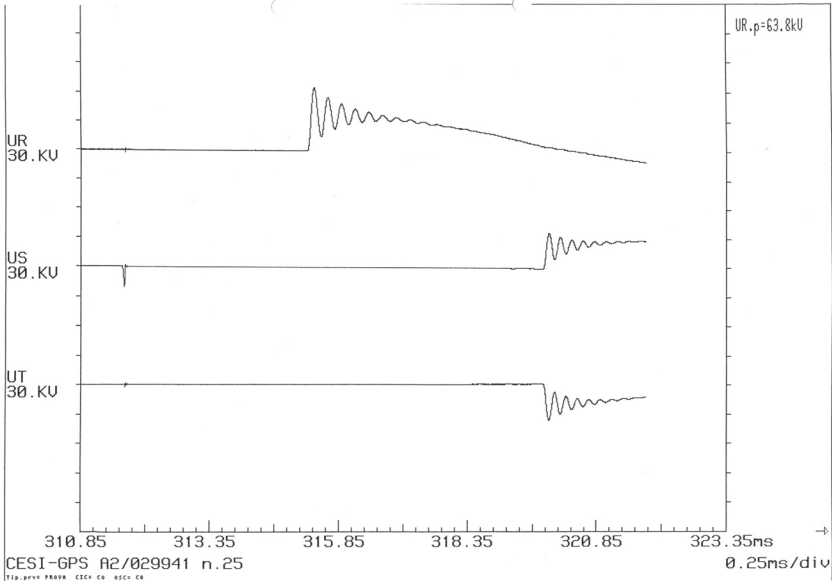
UT
30.KV

310.85 313.35 315.85 318.35 320.85 323.35ms

CESI-GPS R2/029941 n.25

0.25ms/div

Tip.prim PROVA CICH Co OSC Co



C.C
0.45V
P14
4.U
I.C
1.A
I.O
1.A
UR
30.KV

IR
30.KA

US
30.KV

IS
30.KA

UT
30.KV

IT
30.KA

UARC
0.3KV

50.

173.

296.

419.

542.

665.ms

CESI-GPS A2/029941 n.26

12.3ms/div

TIP-PRVA PROVA CECU CO OSCU CO

C.C
0.45V
Pi4
4.U
I.C
1.A
I.O
1.A
UR
30.KV

IR
30.KA

US
30.KV

IS
30.KA

UT
30.KV

IT
30.KA

UARC
0.3KV

IS.p=51.1kA
Dt=76.73ms

113. 144. 175. 206. 237. 268.ms

CESI-GPS A2/029941 n.26

3.1ms/div

Tip. priv. PROVA CICH CO BSC CO

C.C
0.45V
P14
4.U
I.C
1.A
I.O
1.A
UR
30.KV
IR
30.KA
US
30.KV
IS
30.KA
UT
30.KV
IT
30.KA
UARC
0.3KV

Dt=42.69ms
Dt=12.57ms

252. 279. 306. 333. 360. 387.ms

CESI-GPS A2/029941 n.26

2.7ms/div

TIP. PRV PROVA CICH CO. OSCO CO

US.p=63.0kV

UR
30.KV

US
30.KV

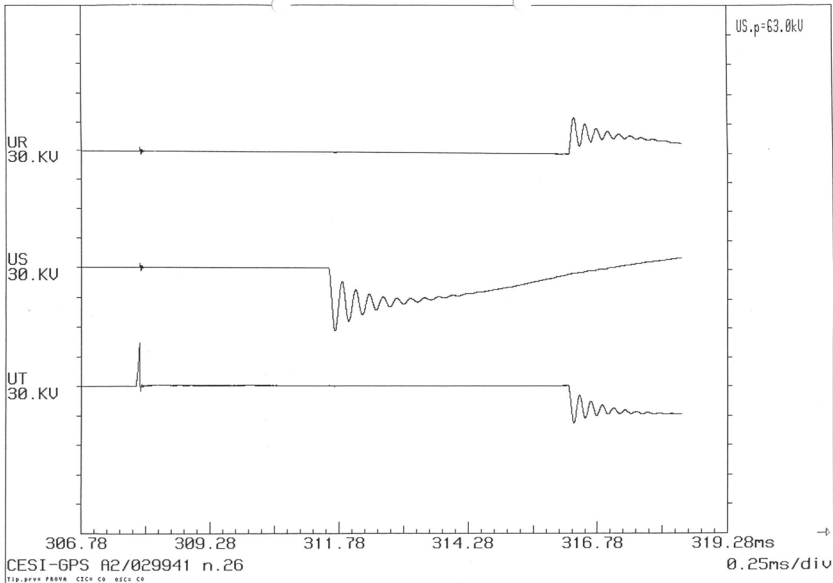
UT
30.KV

306.78 309.28 311.78 314.28 316.78 319.28ms

CESI-GPS A2/029941 n.26

0.25ms/div

Tip. prova PRIMA CICH CO OSCO CO



C.C.
0.45V
P14
4.V

I.O
1.A
UR
30.KV

IR
25.KA

US
30.KV

IS
25.KA

UT
30.KV

IT
25.KA

UARC
0.3KV

30. 124. 218. 312. 406. 500.ms

CESI-GPS A2/029941 n.27

9.4ms/div

Tip.prvx PROVA CICH 0 OSCZ 0

C.C
0.45V
P14
4.U

Dt=40.08ms
Dt=11.1ms

I.O
1.A
UR
30.KV

IR
25.KA

US
30.KV

IS
25.KA

UT
30.KV

IT
25.KA

UARC
0.3KV

38. 76. 114. 152. 190. 228.ms

CESI-GPS A2/029941 n.27

3.8ms/div

Tip. prov. PROVA CICH 0 OSCO 0

UT.p=61.5kV

UR
30.KV

US
30.KV

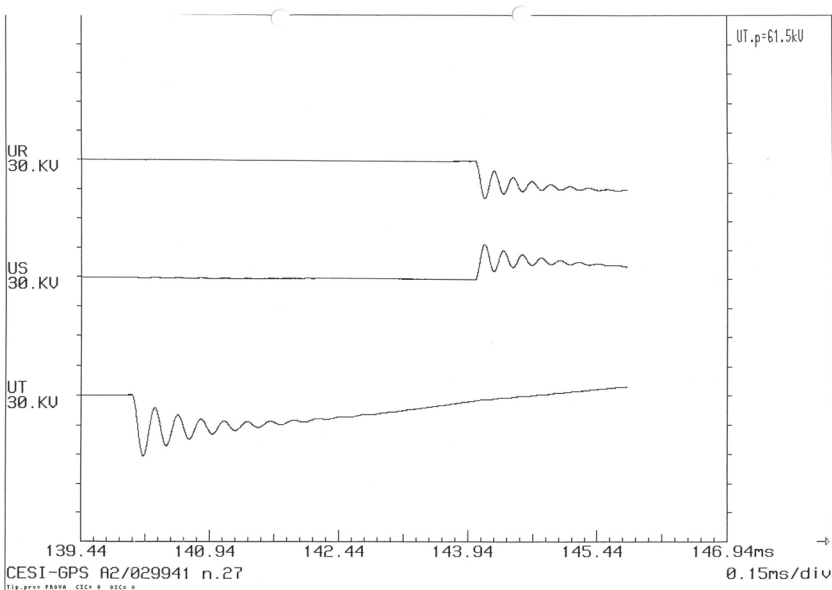
UT
30.KV

139.44 140.94 142.44 143.94 145.44 146.94ms

CESI-GPS R2/029941 n.27

0.15ms/div

Tip.pvva PROVA CICH 0 OSCO 0



C.C
0.45V
P14
4.U

I.O
1.A
UR
30.KV

IR
25.KA

US
30.KV

IS
25.KA

UT
30.KV

IT
25.KA

UARC
0.3KV

30.

125.

220.

315.

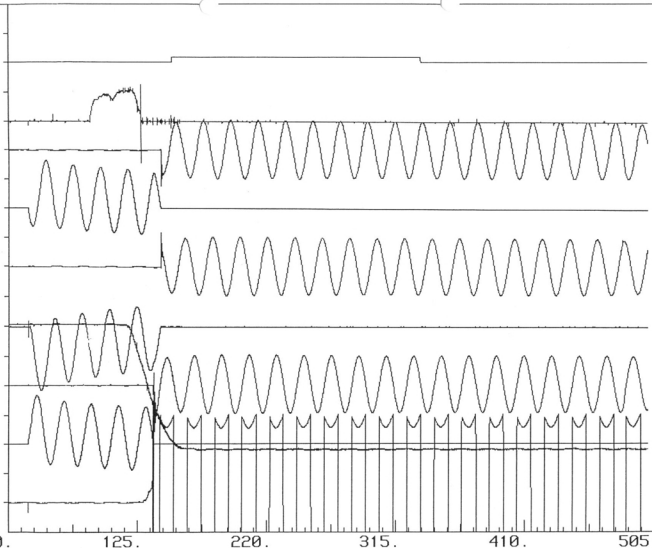
410.

505.ms

CESI-GPS A2/029941 n.28

9.5ms/div

Tip. priv. PROVA CEC 0 OSC 0



C.C
0.45V
Pi4
4.U

Dt=39.88ms
Dt=12.49ms

I.O
1.A
UR
30.KV

IR
25.KA

US
30.KV

IS
25.KA

UT
30.KV

IT
25.KA

UARC
0.3KV

38. 74. 110. 146. 182. 218.ms

CESI-GPS A2/029941 n.28

3.6ms/div

Tip.pvva PROVA CICH 0 OSCO 0

UT.p=64.0kV

UR
30.KV

US
30.KV

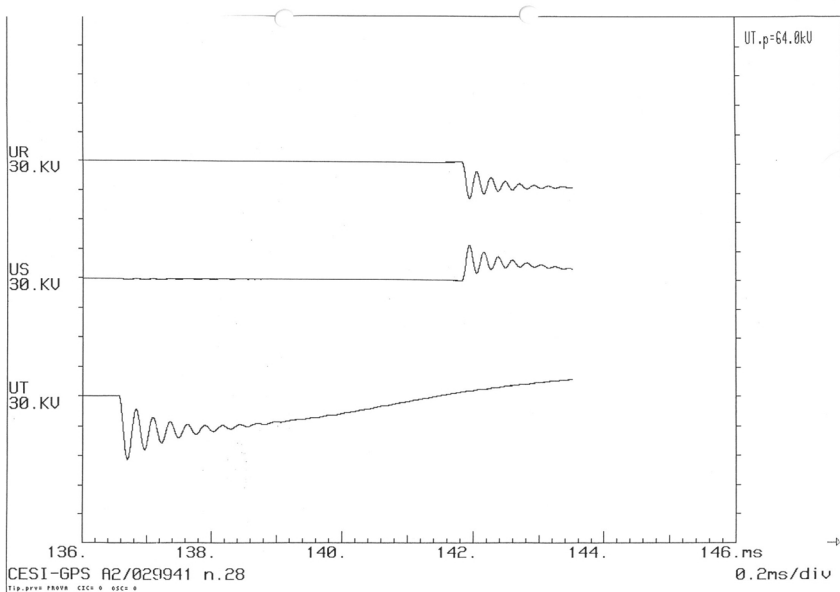
UT
30.KV

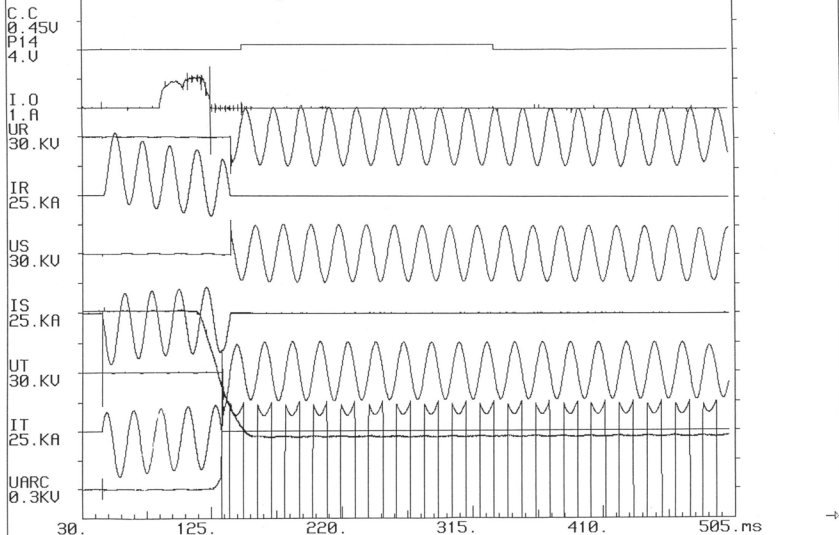
136. 138. 140. 142. 144. 146.ms

CESI-GPS A2/029941 n.28

0.2ms/div

Tip.pvva PROV8 CICH 0 OSC= 0





CESI-GPS A2/029941 n.29

Tip. prova PR09A CICH 0 OSC 0

C.C
0.45V
P14
4.V

Dt=39.31ms
Dt=12.11ms

I.O
1.A
UR
30.KV

IR
25.KA

US
30.KV

IS
25.KA

UT
30.KV

IT
25.KA

UARC
0.3KV

38. 76. 114. 152. 190. 228.ms

CESI-GPS A2/029941 n.29

3.8ms/div

Tip. prova PROVA CECI 0 OSC 0

UT.p=62.3kV

UR
30.KV

US
30.KV

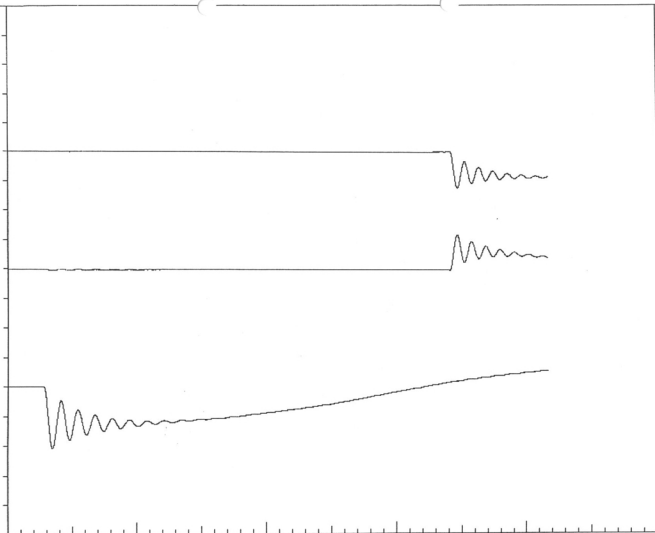
UT
30.KV

131.8 133.8 135.8 137.8 139.8 141.8ms

0.2ms/div

CESI-GPS A2/029941 n.29

TID:prvx PROVA CICH 0 OSC 0



C.C
0.45V
P14
4.V

I.O
1.A

U
30.KV

I
25.KA

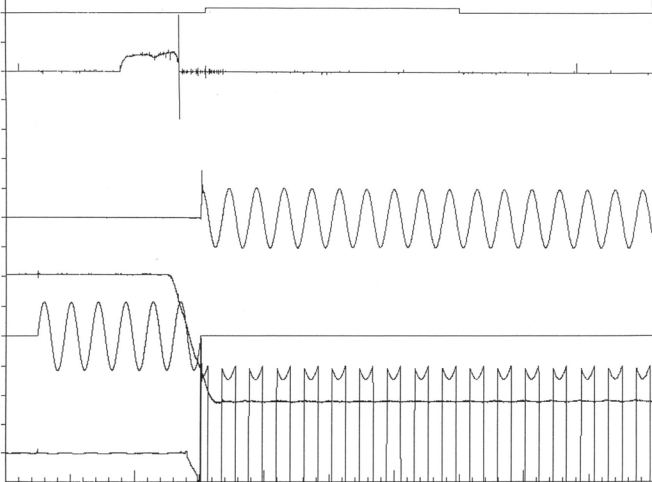
UARC
0.3KV

30. 124. 218. 312. 406. 500.ms

CESI-GPS A2/029941 n.33

9.4ms/div

Tip:prva PRVA CICH 0 OSC 0



C.C
0.45V
P14
4.V

Dt=47.62ms
Dt=10.6ms

I.O
1.A

U
30.KV

I
25.KA

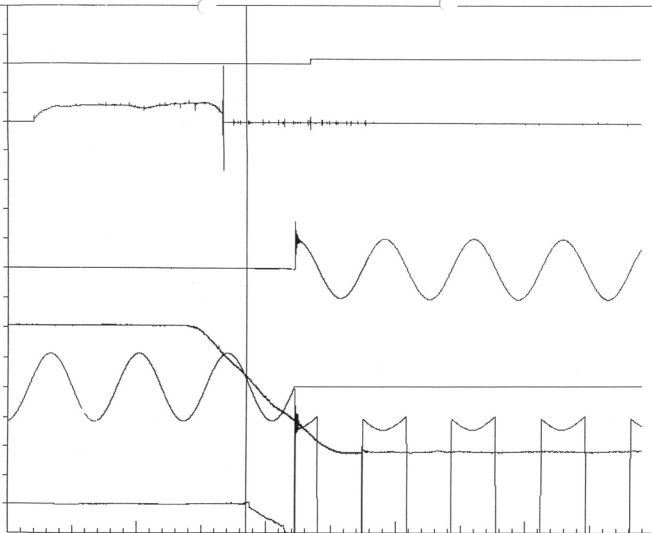
UARC
0.3KV

108. 137. 166. 195. 224. 253.ms

CESI-GPS A2/029941 n.33

2.9ms/div

Tip.0000 PROVA CICH 0 OSC 0



C.C
0.45V

I.C
1.A
I.O
1.A

SC1
50.V

SC2
50.V

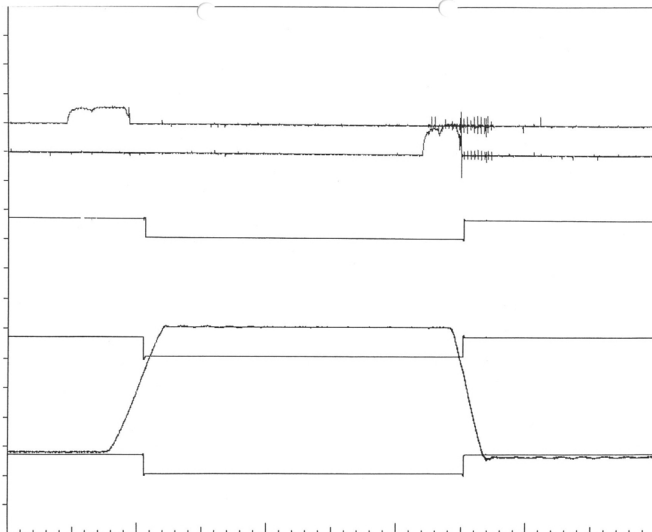
SC3
50.V

64. 187. 310. 433. 556. 679.ms

CESI-GPS A2/029941 n.44

Tip. prova POSIZ CICH CO OSCU POS

12.3ms/div



C.C
0.45V

Dt=74.04ms

I.C
1.A
I.O
1.A

SC1
50.V

SC2
50.V

SC3
50.V

110. 137. 164. 191. 218. 245.ms

CESI-GPS A2/029941 n.44

2.7ms/div

Tip. prva POSIZ CICH Co OSCIL P02

C.C
0.45V

Dt=73.99ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

SC3
50.V

116. 140. 164. 188. 212. 236.ms

CESI-GPS A2/029941 n.44

2.4ms/div

Tip. prov. P052Z CICH CO 05C0 P05

C.C
0.45V

Dt=37.72ms

I.C
1.A
I.O
1.A

SC1
50.V

SC2
50.V

SC3
50.V

454. 472. 490. 508. 526. 544.ms

CESI-GPS R2/029941 n.44

1.8ms/div

Tip.0000 POSIZ CICH CO OSCU PAS

C.C
0.45V

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

SC3
50.V

69. 201. 333. 465. 597. 729.ms

CESI-GPS R2/029941 n.45

Tip.pvu POS22 CICH CO OSC= POS

13.2ms/div

C.C
0.45V

Dt=79.06ms

I.C
1.A
I.O
1.A

SC1
50.V

SC2
50.V

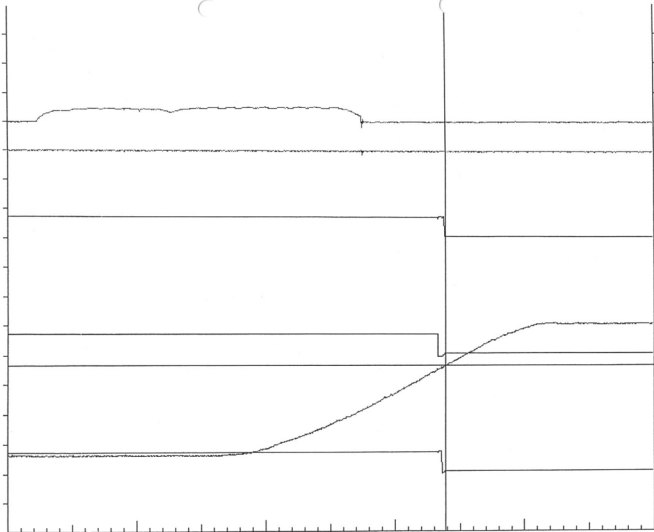
SC3
50.V

114. 139. 164. 189. 214. 239.ms

CESI-GPS R2/029941 n.45

2.5ms/div

Tip.pvva POSIZ CICH CO OSCU POS



C.C
0.45V

Dt=39.31ms

I.C
1.A
I.O
1.A

SC1
50.V

SC2
50.V

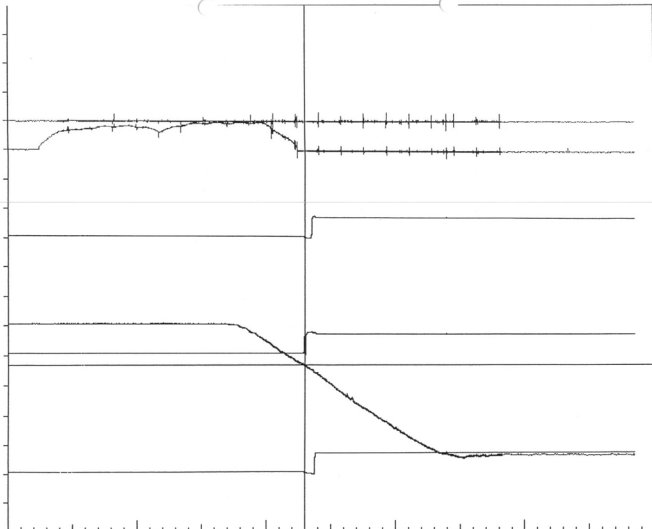
SC3
50.V

453. 472. 491. 510. 529. 548.ms

CESI-GPS R2/029941 n.45

1.9ms/div

Tip. prva pozic CICH CO OSC= POS



C.C
0.45V

I.C
1.A
I.O
1.A

SC1
50.V

SC2
50.V

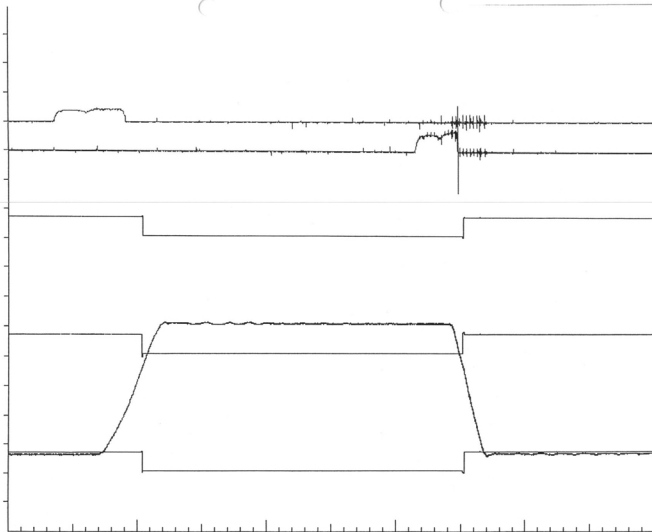
SC3
50.V

77. 198. 319. 440. 561. 682.ms

CESI-GPS R2/029941 n.46

Tip. prva POSIZ CICH CO OSCN POS

12.1ms/div



C.C
0.45V

Dt=82.35ms

I.C
1.A
1.0
1.A

SC1
50.V

SC2
50.V

SC3
50.V

113. 140. 167. 194. 221. 248.ms

CESI-GPS A2/029941 n.46

2.7ms/div

Tip.pvvs P0532 C1C= CO OSC= POS

C.C
0.45V

Dt=44.03ms

I.C
1.A
I.O
1.A

SC1
50.V

SC2
50.V

SC3
50.V

455. 475. 495. 515. 535. 555.ms

CESI-GPS A2/029941 n.46

Tip.prim 00512 CECI CO. 05CH 005

Ultima pagina

Last page

2.ms/div