

ELECTRICAL RESEARCH AND DEVELOPMENT ASSOCIATION

P. B. No. 760, Makarpura Road, Vadodara-390 010. India. Gram : ELECSEARCH

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E-mail : erda@wilnetonline.net

**TEST REPORT****SHEET : 1 OF 3**

NAME & ADDRESS OF CUSTOMER FITWELL TECHNOLOGIES PVT. LTD. G/1047, GIDC, METODA TAL : LODHIKA DIST. RAJKOT : 360 005.	REPORT NO. : PHV/05/1377-1	
	DATE : 30.03.2002	
	CUSTOMER REF.NO: FTPL/215	DATE : 09.05.2001
	DATE OF SAMPLE RECEIPT	08.05.2001
	DATE OF TESTING	22.05.2001 to 13.09.2001
SAMPLE DESCRIPTION / IDENTIFICATION : CABLE TERMINATION KIT MFD. BY : A-1ELECTRICALS HEAT SHRINKABLE INDOOR TYPE VOLTAGE GRADE : 6.35/11 kV TYPE OF INSULATION : XLPE SIZE : 3 x 185 SQ.MM		
TEST DETAILS :		TEST SPECIFICATION : IS : 13573-1992
[1] CONDUCTOR RESISTANCE MEASUREMENT (Cl.No.6.12) [2] AC VOLTAGE WITHSTAND TEST (Cl.No. 6.2) [3] PARTIAL DISCHARGE TEST (Cl.No. 6.3) [4] IMPULSE WITHSTAND TEST (Cl.No. 6.4) [5] AC VOLTAGE LIFE TEST WITH CYCLIC CURRENT LOADING (Cl.No. 6.5.1) [6] PARTIAL DISCHARGE TEST (Cl.No. 6.3) [7] AC VOLTAGE LIFE TEST WITH CYCLIC CURRENT LOADING (Cl.No. 6.5.1) [8] THERMAL SHORT CIRCUIT TEST (Cl.No. 6.6)		
TEST RESULTS : AS PER SHEET 2 TO 3		
ENCLOSURES : Annexure - I & II		
WITNESSED BY : Mr. Harish Gandhi, Fitwell Technologies Pvt. Ltd.		
NOTE : ONLY THE TESTS ASKED FOR BY THE CLIENT HAVE BEEN CARRIED OUT.		
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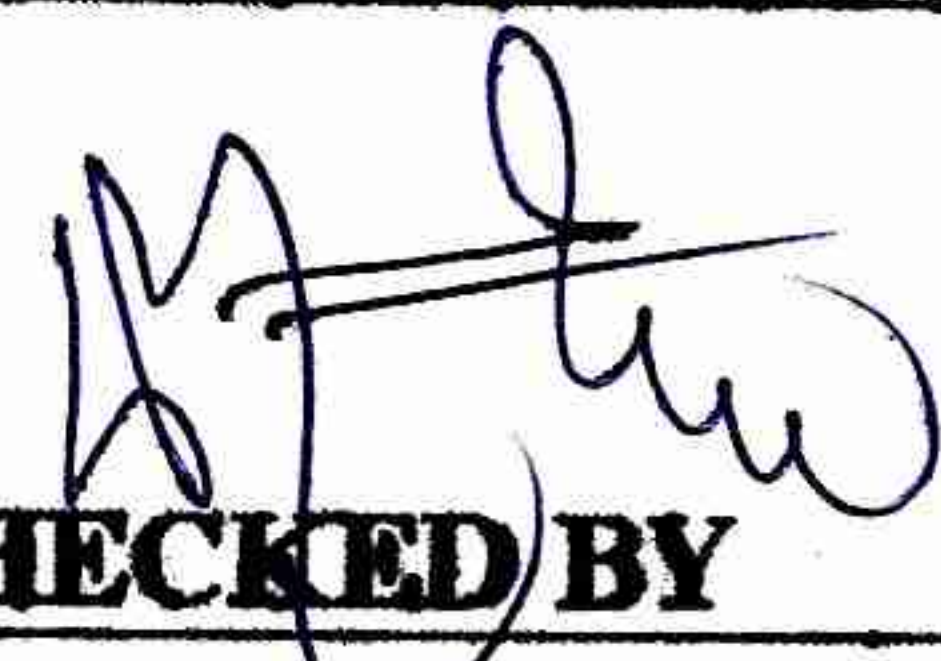
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**REPORT NO. : PHV/05/1377-1****SHEET : 2 OF 3****DATE : 30.03.2002**

SR. NO.	CLNO	TESTS	SPECIFIED LIMIT	OBTAINED VALUE	REMARKS
1.	6.12	<u>CONDUCTOR RESISTANCE</u> Conductor resistance at 20°C, ohm/km	---	R : 0.162 Y : 0.163 B : 0.163	---
2.	6.2	<u>AC VOLTAGE WITHSTAND TEST</u>	The sample shall withstand ac voltage of 35 kV for the duration of one minute without breakdown.	The sample withstood the applied voltage satisfactorily for the specified duration.	Conforms
3.	6.3	<u>PARTIAL DISCHARGE TEST</u> Partial Discharge at 2U ₀ , pC	Max. 20	R : <1 Y : 1.5 B : 2.0	Conforms
4.	6.4	<u>IMPULSE WITHSTAND TEST</u>	Sample shall withstand 75kV without breakdown for 10 +ve & 10 -ve shots	Please refer Annexure - I for detailed results	Conforms
5.	6.5.1	<u>AC VOLTAGE LIFE TEST WITH CYCLIC CURRENT LOADING</u>	The sample shall be subjected to three cycle consists of five hour heating period & three hour cooling period. The specified voltage of 2.5U ₀ shall be applied continuously during heating & cooling period. There shall be no breakdown or flashover during this period.	No breakdown or flashover was observed during the specified three cycles.	Conforms


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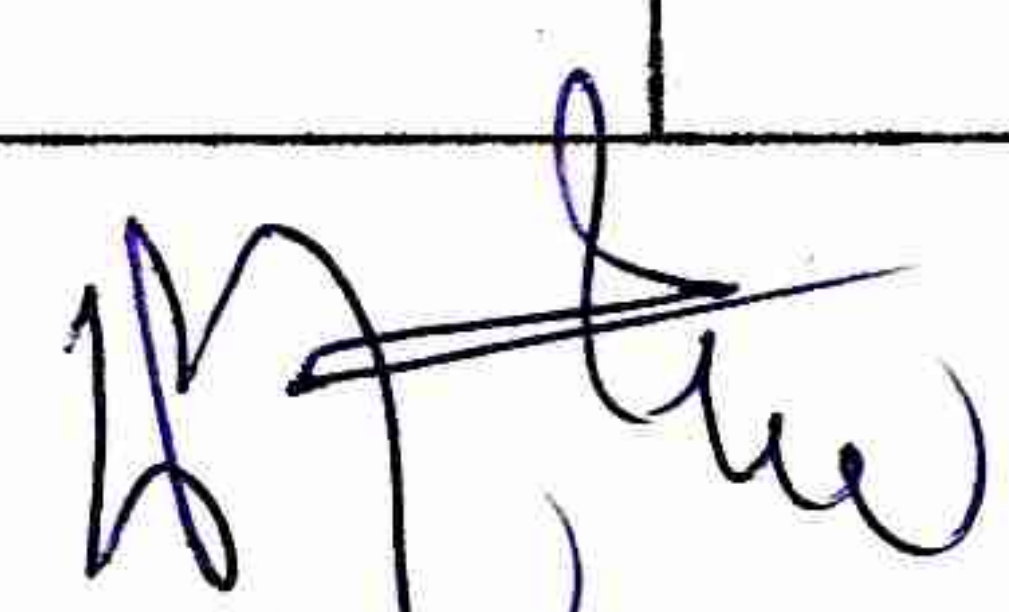
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**REPORT NO. : PHV/05/1377-1****SHEET : 3 OF 3****DATE : 30.03.2002**

SR. NO.	CLNO	TESTS	SPECIFIED LIMIT	OBTAINED VALUE	REMARKS
6.	6.3	<u>PARTIAL DISCHARGE TEST</u> Partial Discharge at $2U_0$, pC	Max. 20	R : 1.5 Y : 2.0 B : 2.5	Conforms
7.	6.5.1	<u>AC VOLTAGE LIFE TEST WITH CYCLIC CURRENT LOADING</u>	The sample shall be subjected to sixty cycle consists of five hour heating period & three hour cooling period. The specified voltage of $2.5U_0$ shall be applied continuously during heating & cooling period. There shall be no breakdown or flashover during this period.	No breakdown or flashover was observed during the specified sixty cycles.	Conforms
8.	6.6	<u>THERMAL SHORT CIRCUIT TEST</u>	There shall be no visible damage. The temperature of the conductor shall not exceed the maximum short circuit temperature i.e. 250°C .	Short circuit current (Avg.) : 17.82 kA Duration : 1.00 second Temperature after the shot : 105.8°C Please refer Annexure – II for short circuit waveforms	No abnormalities were observed. Conforms


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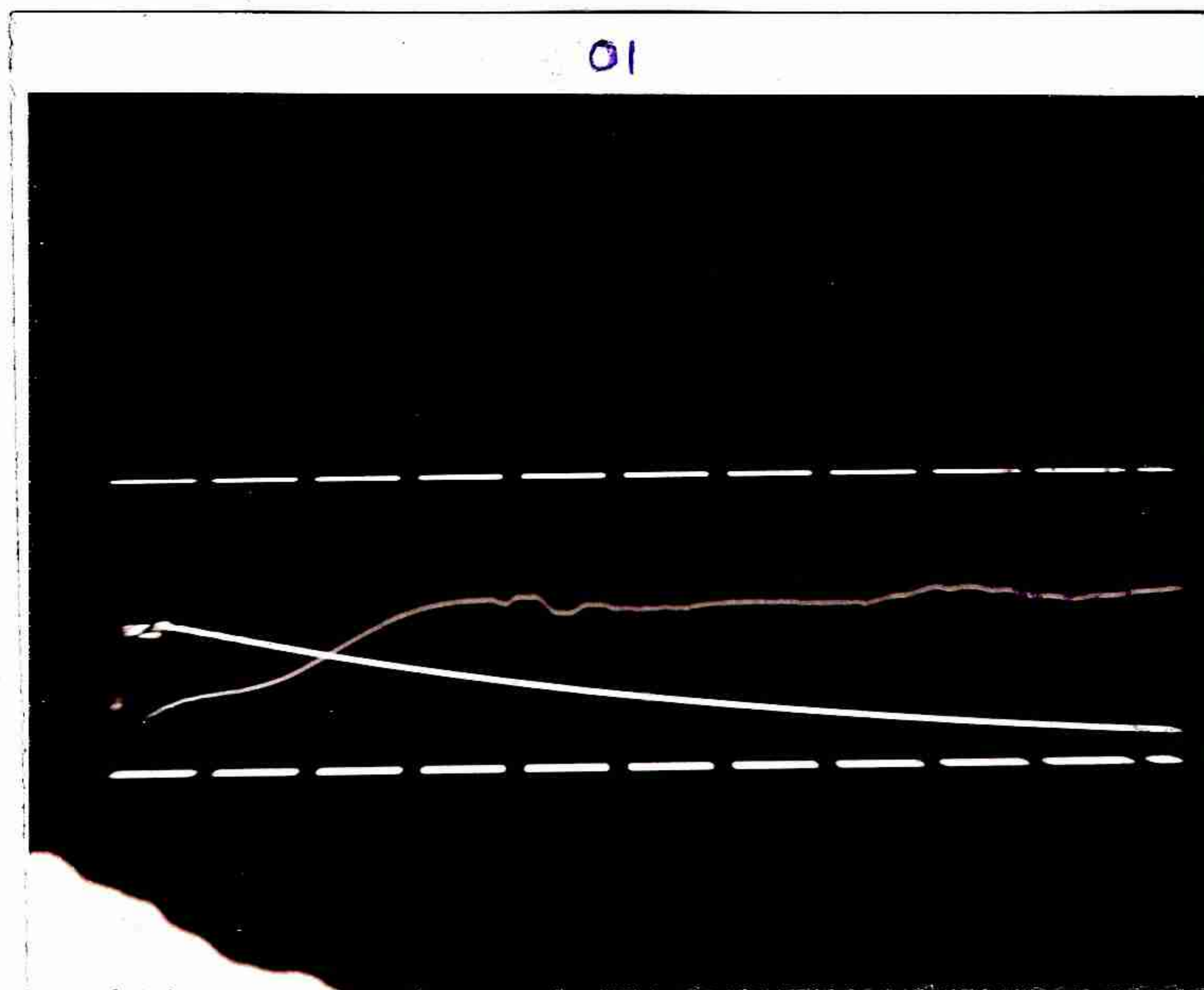
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ANNEXURE-I

TEST REPORT NO.: PHV/05/1377-1	Sheet No.: 1 of 4
DATE : 30/03/2002	
<u>LIGHTNING IMPULSE VOLTAGE WITHSTAND TEST ON HT CABLE TERMINATION</u> <u>(IS : 13573-192, CL. NO. 6.4)</u>	
<u>TEST PARAMETERS :</u>	
RATED VOLTAGE : 6.35/11 KV	
TEST VOLTAGE : 75 kVp	
WAVE SHAPE : 1.35/54 μ S	
NOS. OF SHOTS APPLIED : 10 POSITIVE & 10 NEGATIVE POLARITY SHOTS.	



CALIBRATION PULSE

WAVE FORM NO.	: 01
TIME/DIV. FOR FRONT WAVE	: 0.5 μ S
TIME/DIV. FOR TAIL WAVE	: 10 μ S
PEAK MAGNITUDE	: 51 kVp
ATTENUATION FACTOR	: 2.00
DIVIDER RATIO	: 200
REFERENCE VOLTAGE OF CRO	: 300 Volts

 PREPARED BY,	 CHECKED BY,
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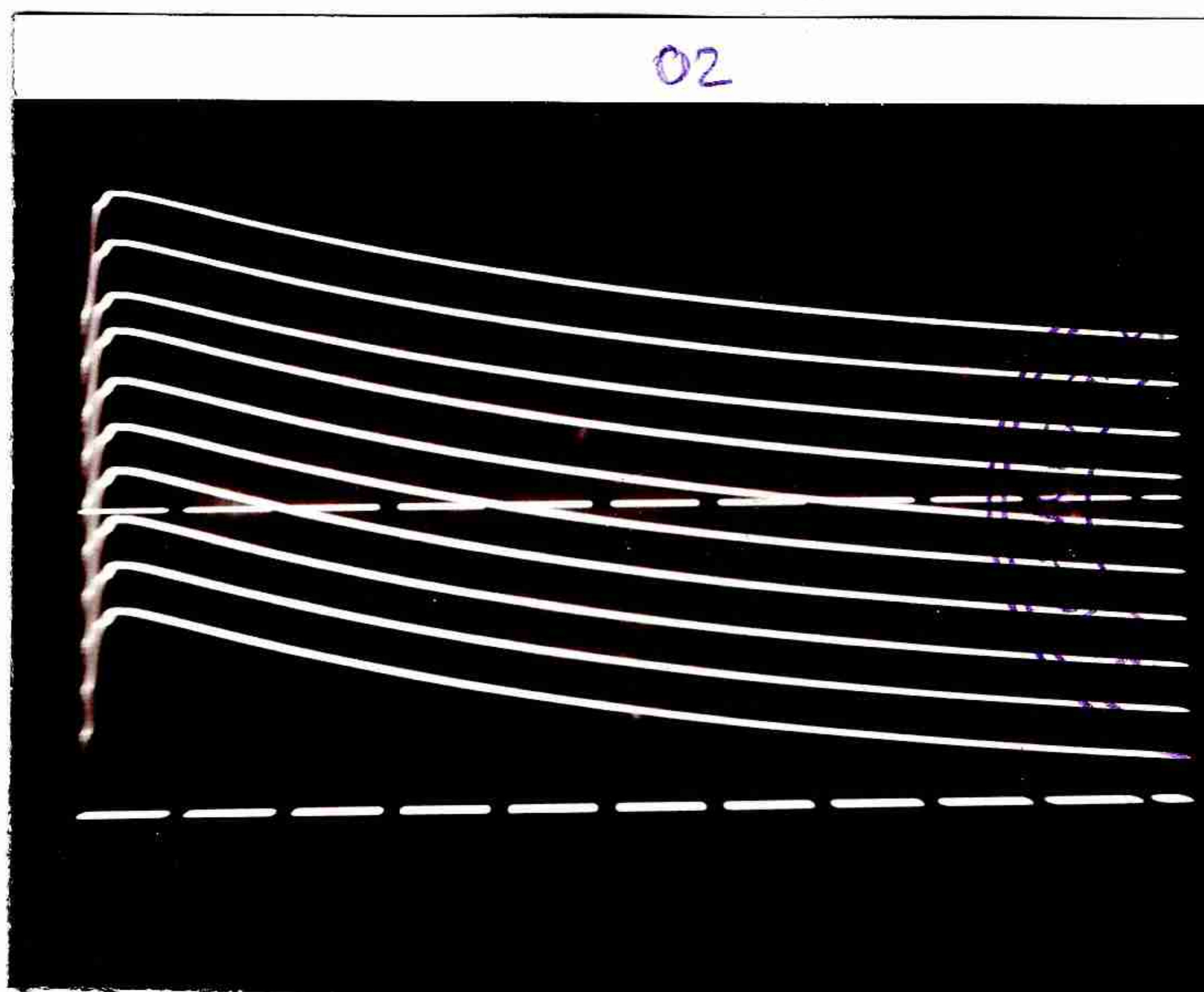
TEST REPORT NO.: PHV/05/1377-1
DATE : 30/03/2002

Sheet No. 2 of 4

IMPULSE VOLTAGE APLIED ON R - PHASE

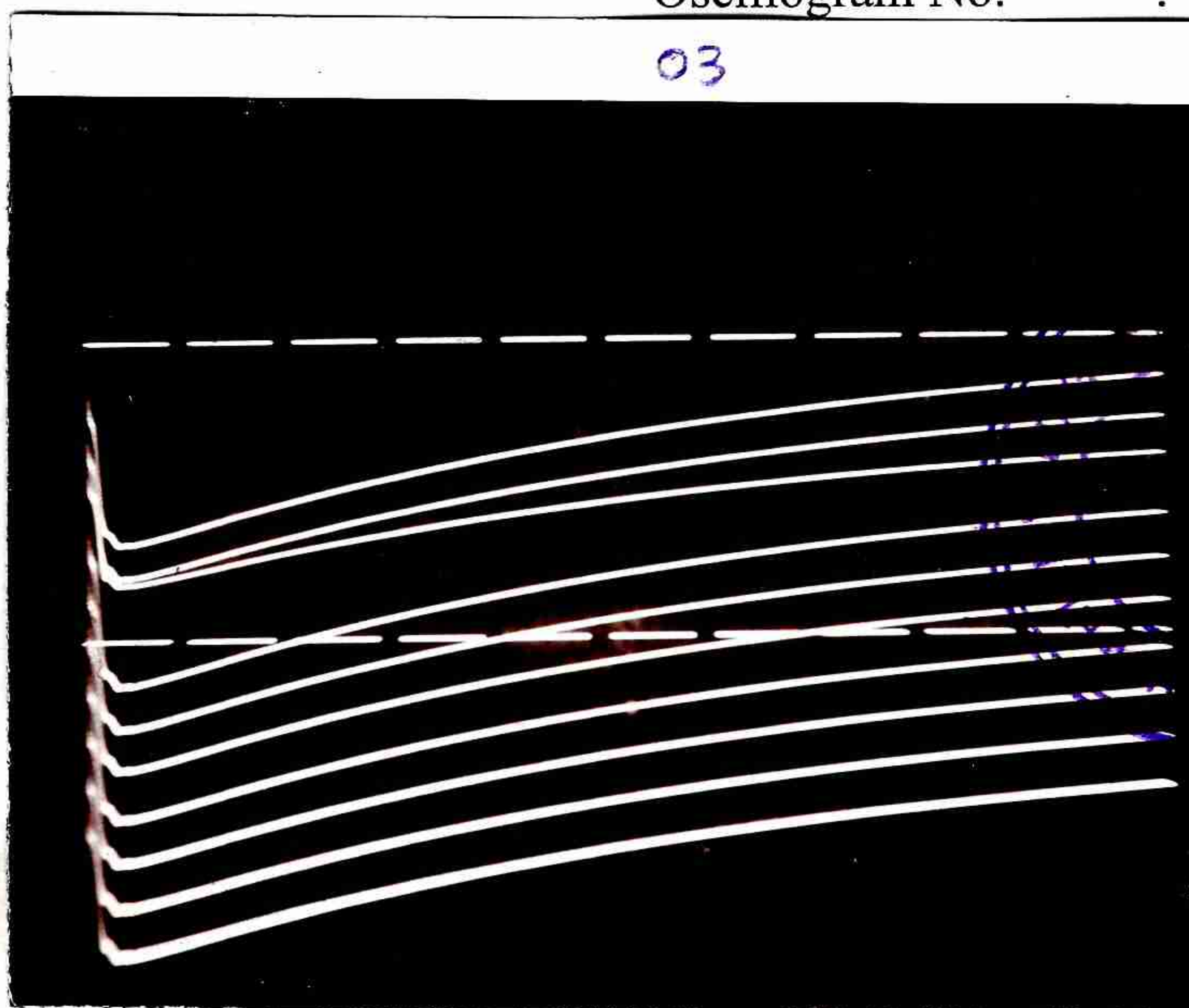
POSITIVE POLARITY :

No. of Shots Applied : 10
Attenuation Factor : 2.00
Time/Div for Voltage : 10 μ S
Oscillogram No. : 02



NEGATIVE POLARITY :

No. of Shots Applied : 10
Attenuation Factor : 2.00
Time/Div for Voltage : 10 μ S
Oscillogram No. : 03



A. S. Chopra
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H. M. ...
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TEST REPORT NO.: PHV/05/1377-1

Sheet No. 3 of 4

DATE : 30/03/2002

IMPULSE VOLTAGE APPLIED ON Y - PHASE

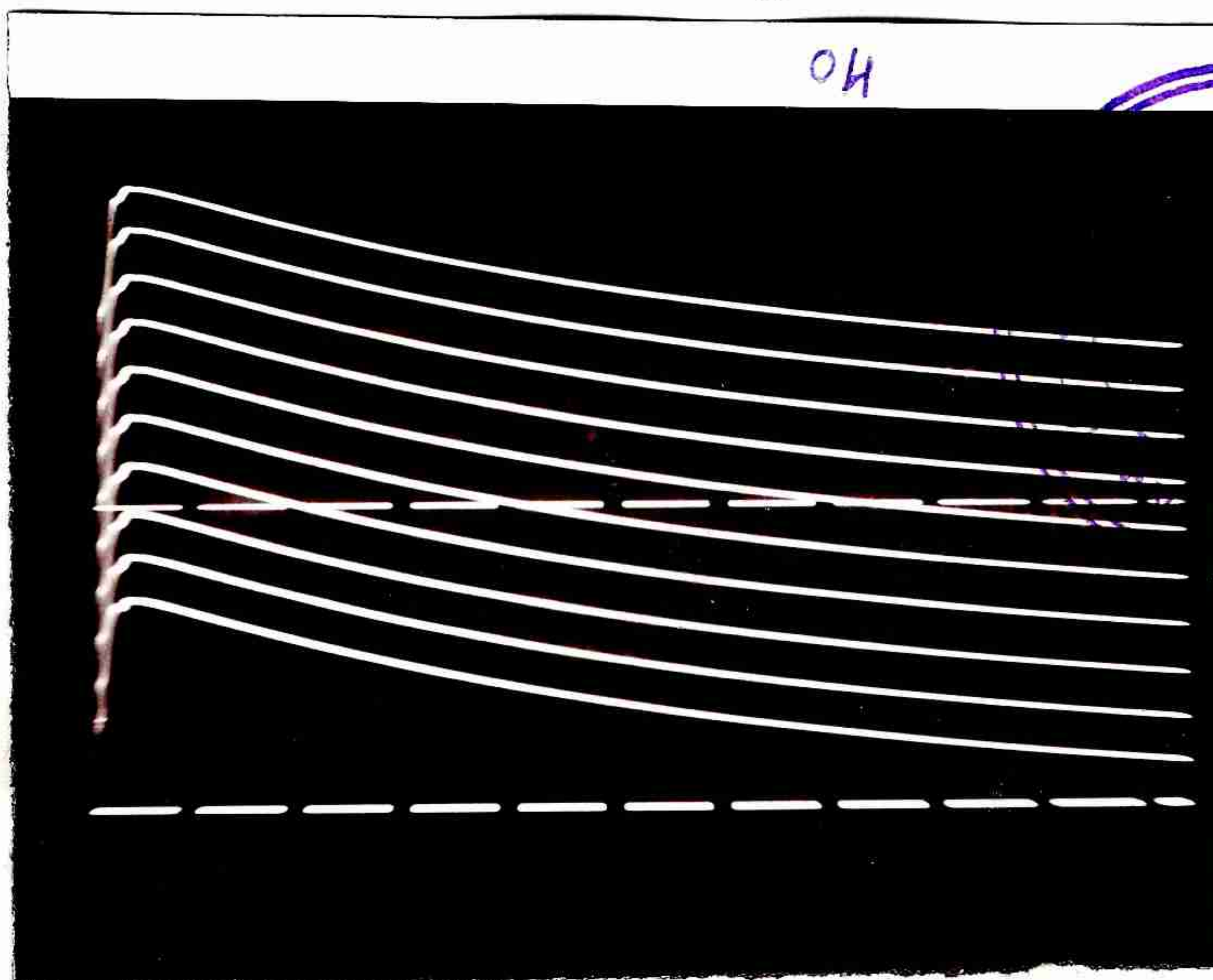
POSITIVE POLARITY :

No. of Shots Applied : 10

Atenuation Factor : 2.00

Time/Div for Voltage : 10 μ S

Oscillogram No. : 04



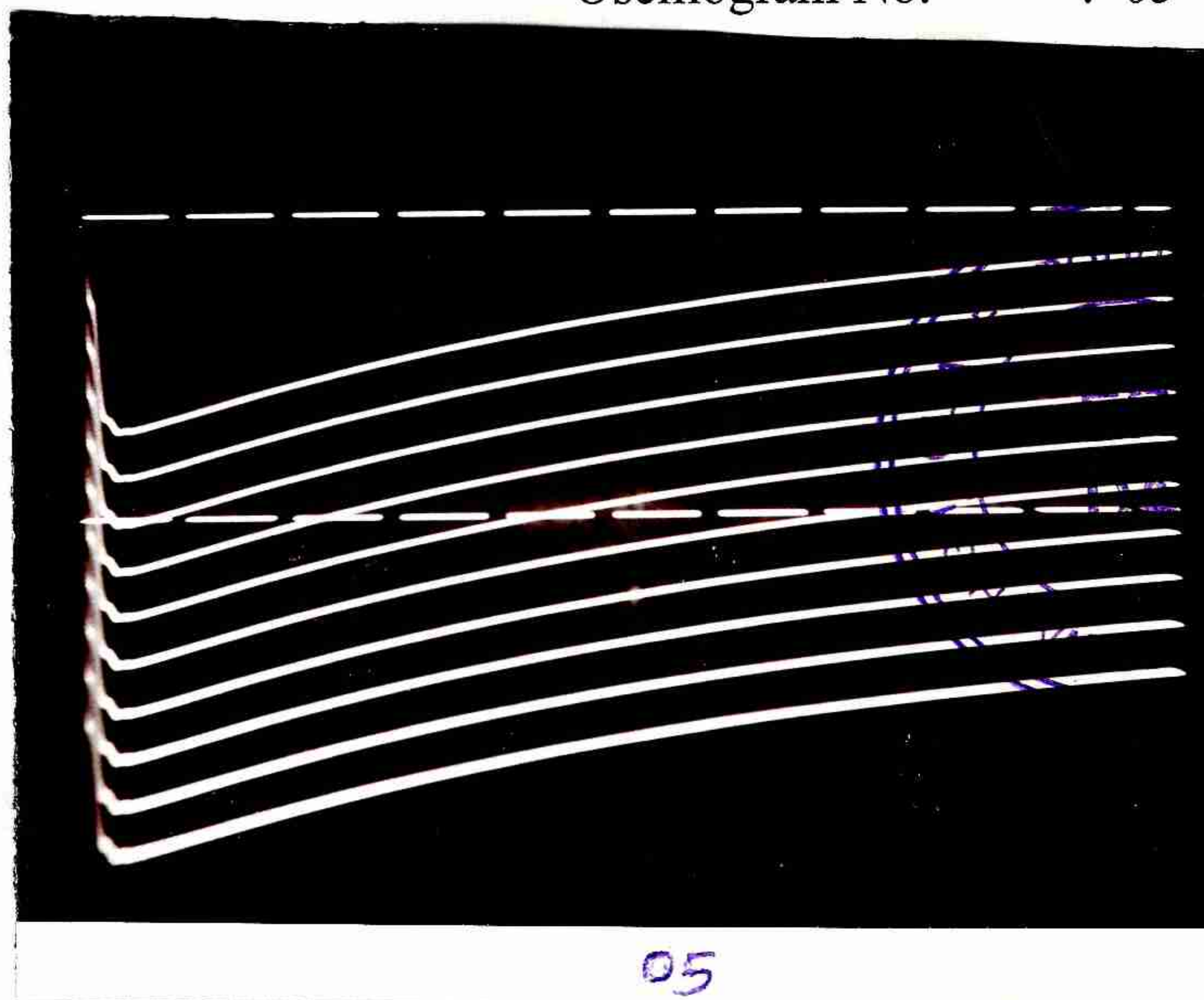
NEGATIVE POLARITY :

No. of Shots Applied : 10

Atenuation Factor : 2.00

Time/Div for Voltage : 10 μ S

Oscillogram No. : 05



A. S. Pawar
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Humayun
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TEST REPORT NO.: PHV/05/1377-1

Sheet No.4 of 4

DATE : 30/03/2002

IMPULSE VOLTAGE APLLIED ON B - PHASE

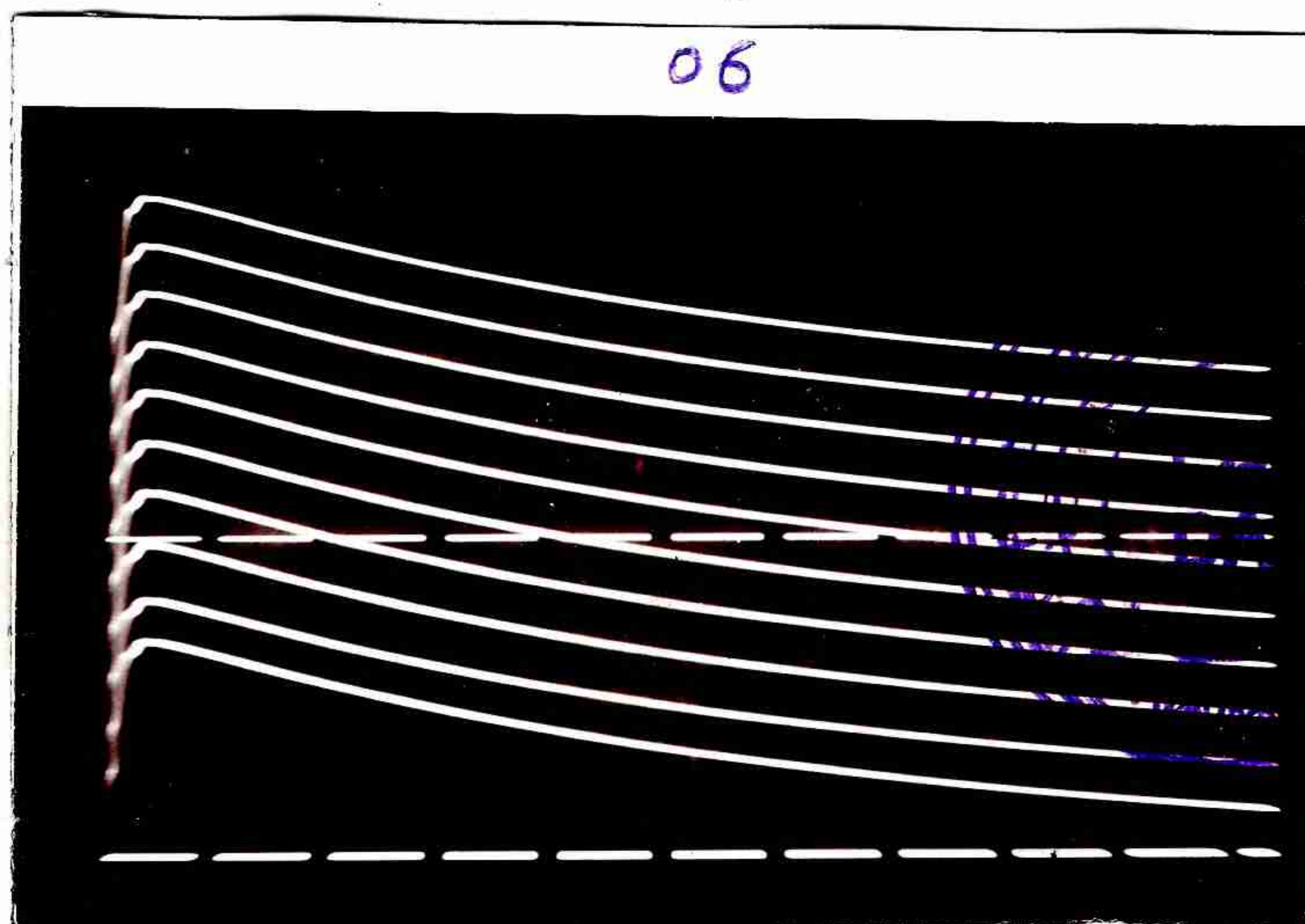
POSITIVE POLARITY :

No. of Shots Applied : 10

Atenuation Factor : 2.00

Time/Div for Voltage : 10 μ S

Oscillogram No. : 06



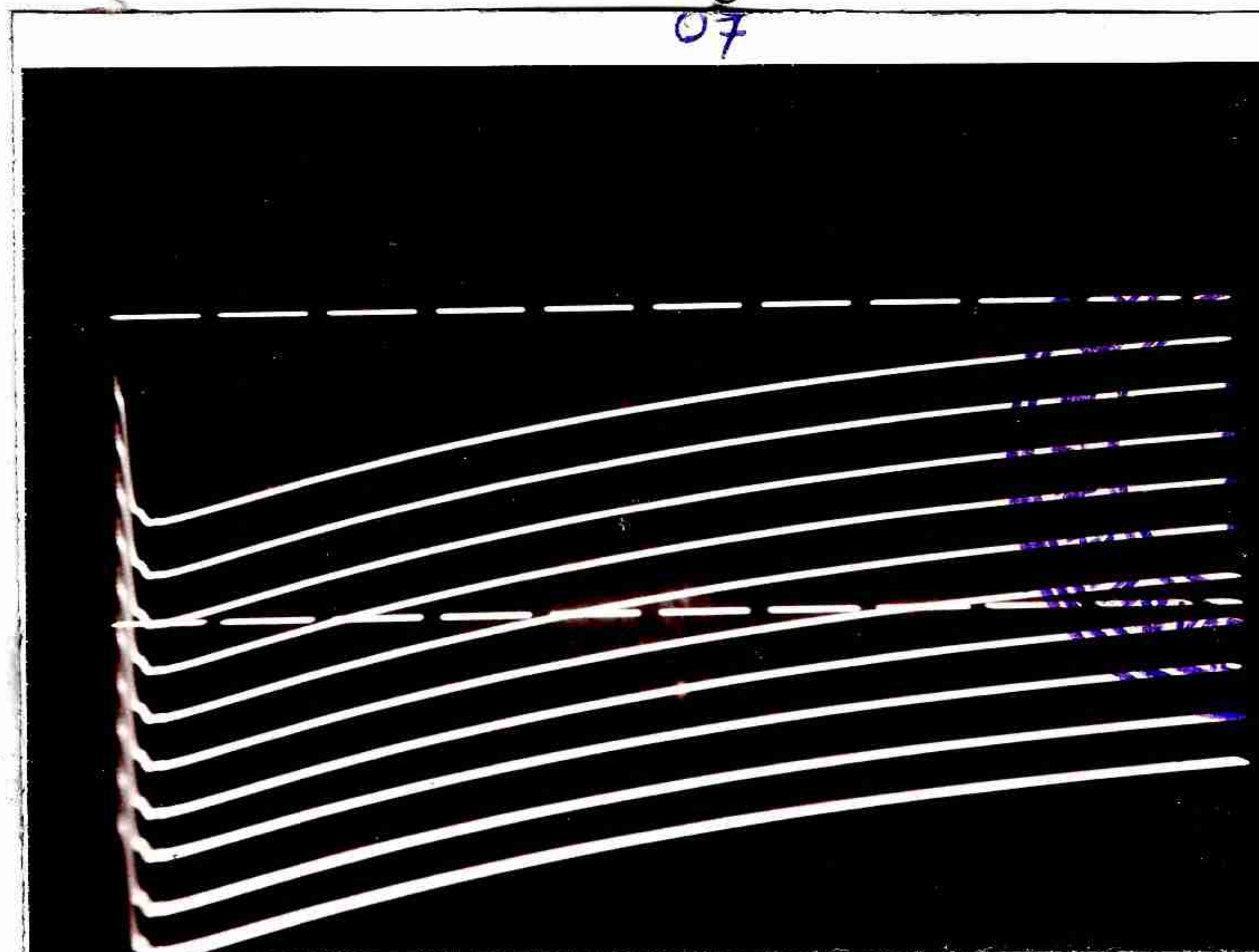
NEGATIVE POLARITY :

No. of Shots Applied : 10

Atenuation Factor : 2.00

Time/Div for Voltage : 10 μ S

Oscillogram No. : 07



REMARKS : The cable termination CONFORMS to the requirements of above mentioned standard with respect to the test carried out.


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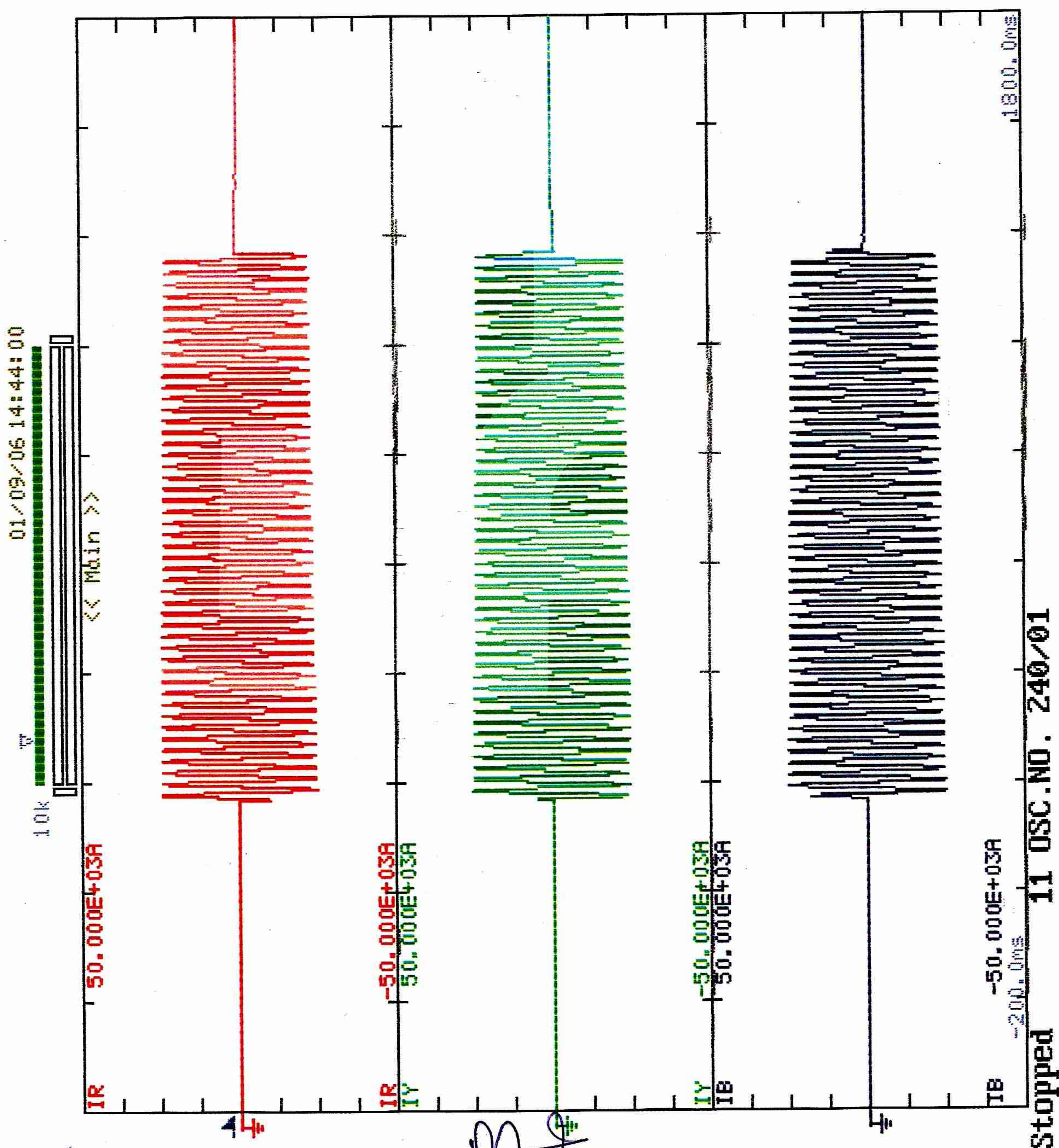
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ANNEXURE - II

REPORT NO. : PHV/05/1377-1
DATE : 30.03 2002

SHEET : 1 OF 1



No: 1051263

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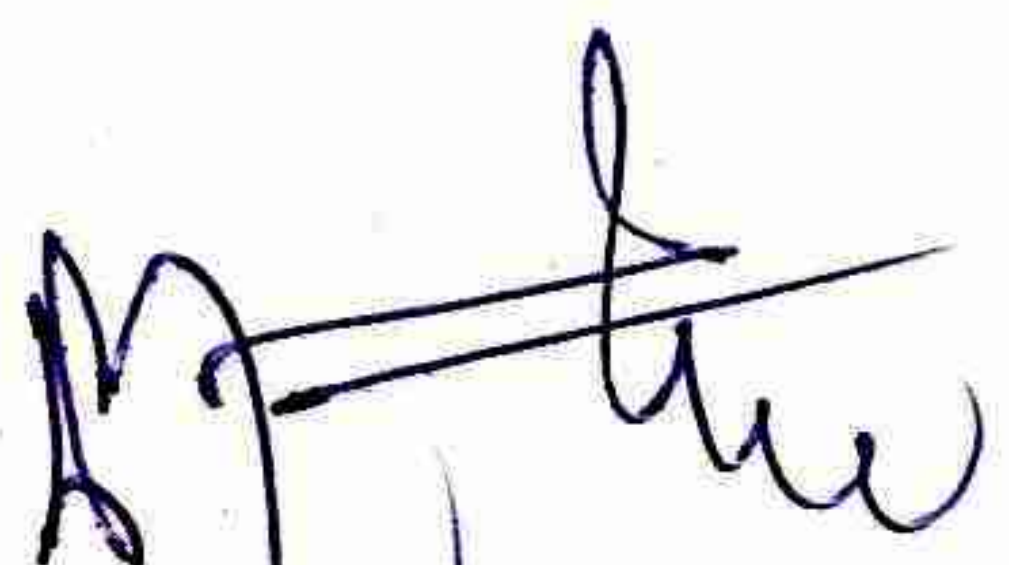
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**TEST REPORT****SHEET : 1 OF 2**

NAME & ADDRESS OF CUSTOMER FITWELL TECHNOLOGIES PVT. LTD. G/1047, GIDC, METODA TAL : LODHIKA DIST. RAJKOT : 360 005.	REPORT NO. : PHV/05/1378-1	
	DATE : 30.03.2002	
	CUSTOMER REF.NO: Nil	DATE : ----
	DATE OF SAMPLE RECEIPT	11.10.2001
	DATE OF TESTING	20.10.2001
SAMPLE DESCRIPTION / IDENTIFICATION : CABLE TERMINATION KIT MFD. BY : A-1ELECTRICALS HEAT SHRINKABLE INDOOR TYPE VOLTAGE GRADE : 6.35/11 kV TYPE OF INSULATION : XLPE SIZE : 3 x 240 SQ.MM		
TEST DETAILS :		TEST SPECIFICATION : IS : 13573-1992
[1] DYNAMIC SHORT CIRCUIT TEST (Cl.No.6.11).....Series 2		
TEST RESULTS : AS PER SHEET 2 of 2.		
ENCLOSURES : Annexure- I & II.		
WITNESSED BY : Mr. Harish Gandhi, Fitwell Technologies Pvt. Ltd.		
NOTE : ONLY THE TESTS ASKED FOR BY THE CLIENT HAVE BEEN CARRIED OUT.		
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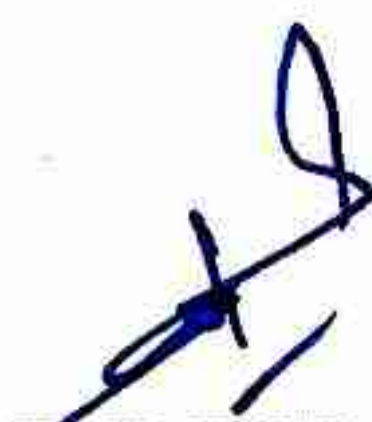
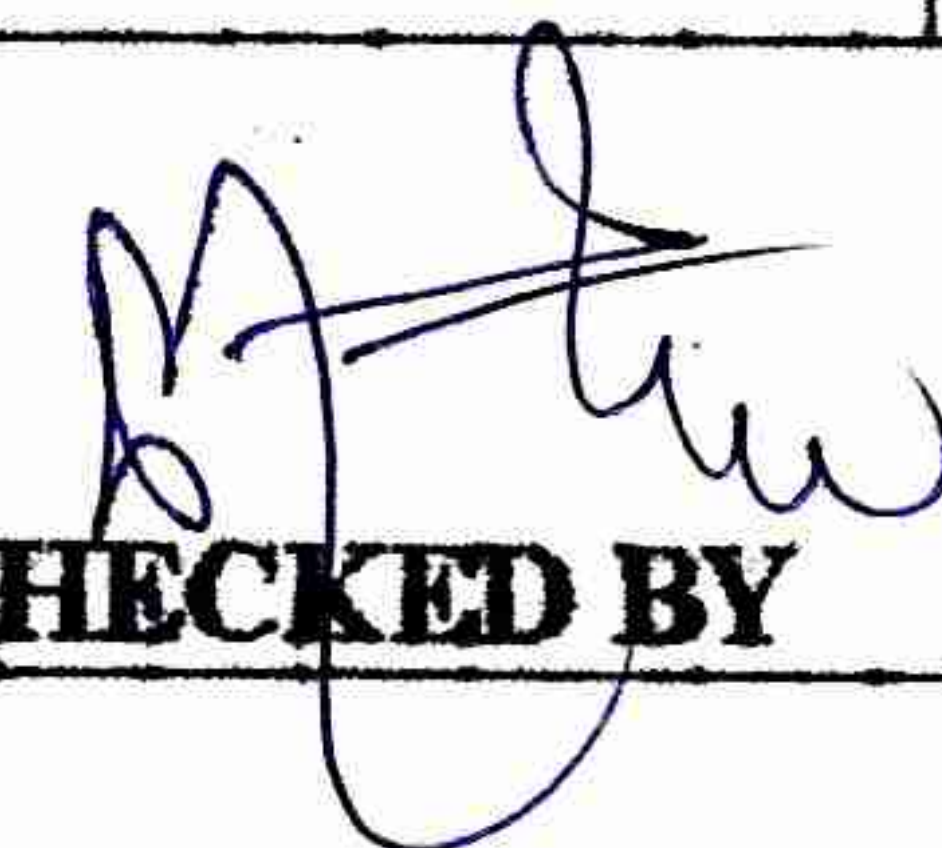
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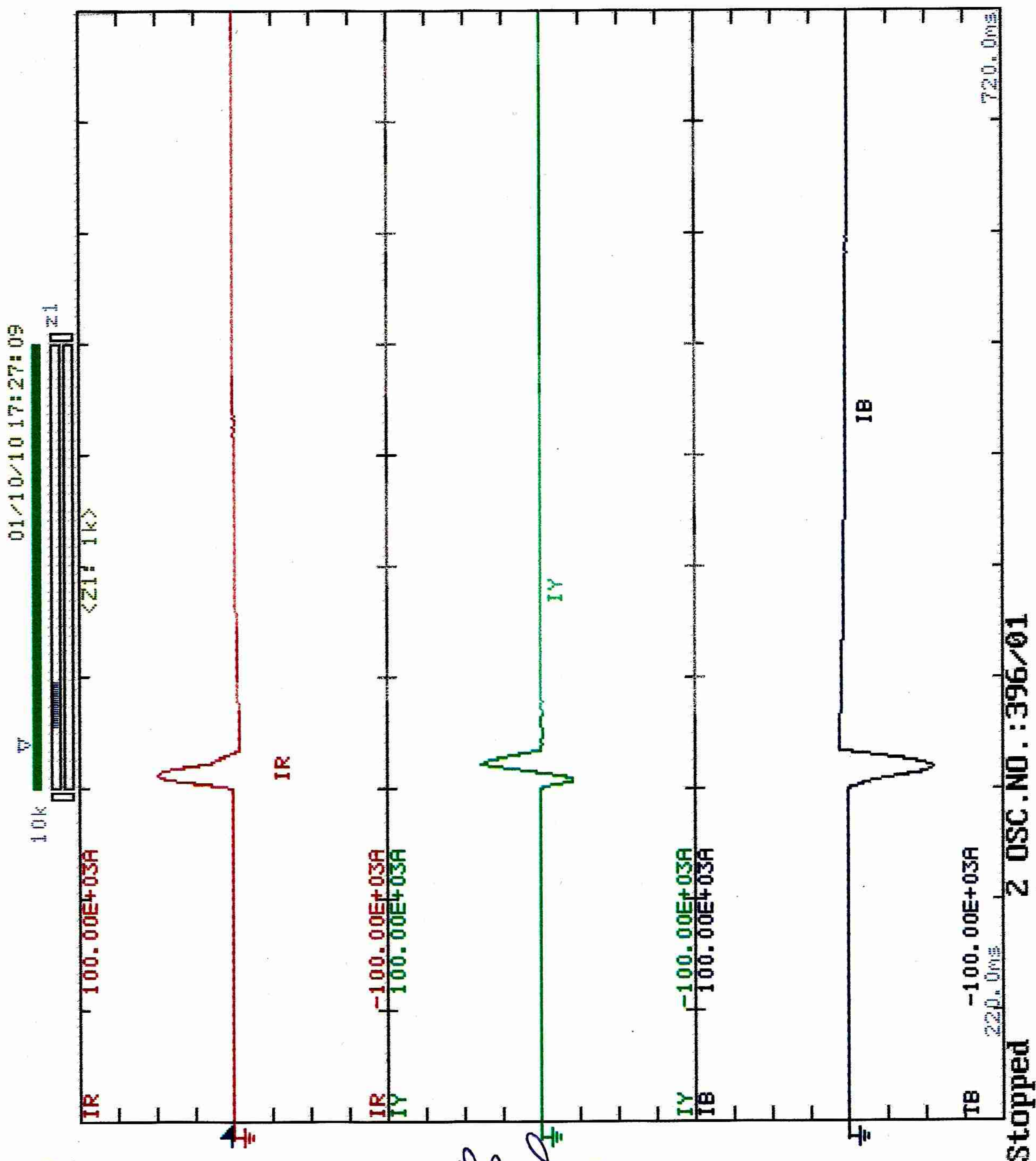
**REPORT NO. : PHV/05/1378-1****SHEET : 2 OF 2****DATE : 30.03.2002**

SR. NO.	CLNO	TESTS	SPECIFIED LIMIT	OBTAINED VALUE	REMARKS
1.	6.11	<u>DYNAMIC SHORT CIRCUIT TEST</u>	No mechanical damage shall be observed.	<u>Loop : 1</u> <u>Loop : 2</u> <u>Short circuit current (Peak):</u> 53.8 kA 59.37 kA 42.7 kA 43.75 kA 58.9 kA 49.47 kA <u>Duration (milliseconds) :</u> 21.0 19.5 21.0 19.5 21.0 19.5 <u>Temperature after the shot :</u> 94.6°C 91.0°C Please refer Annexure - I & II for short circuit waveforms	No abnormalities were observed. Conforms
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ANNEXURE - I

REPORT NO. : PHV/05/1378-1
DATE : 30.03 2002

SHEET : 1 OF 1



No. 1061889

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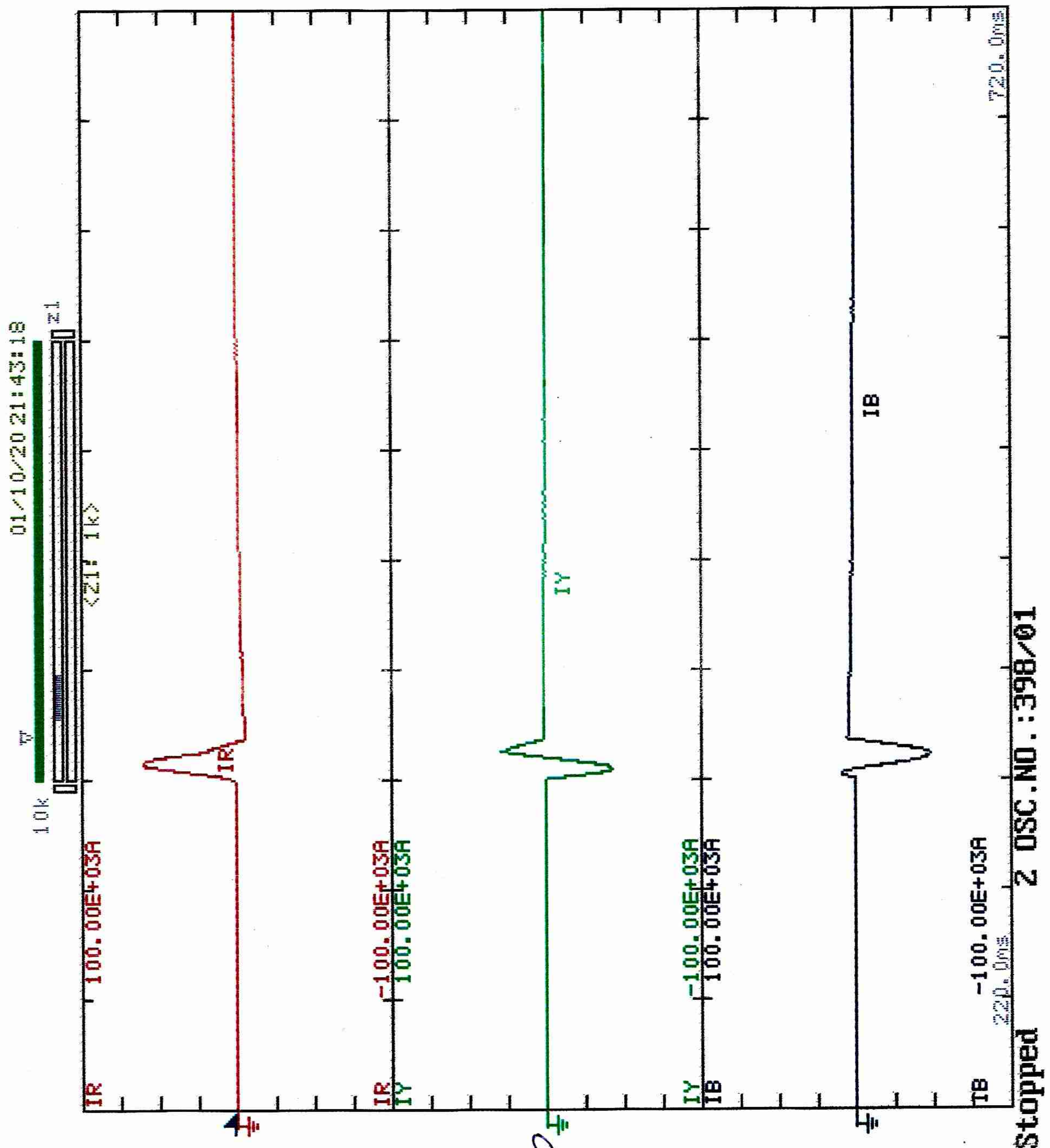
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ANNEXURE - II

REPORT NO. : PHV/05/1378-1

DATE : 30.03 2002

SHEET : 1 OF 1



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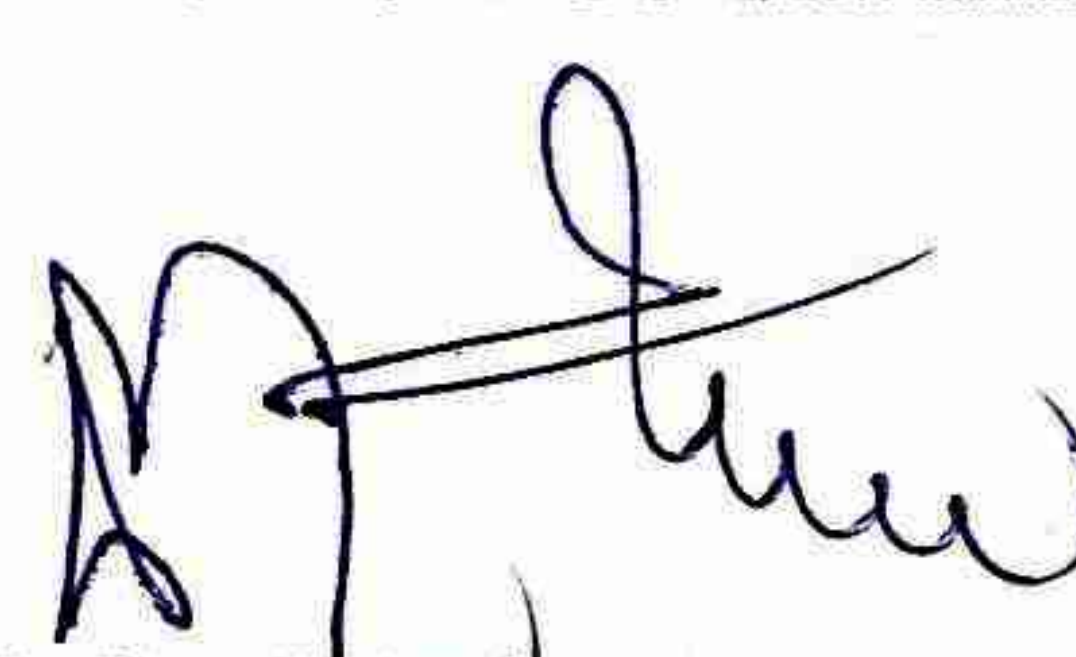
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**TEST REPORT****SHEET : 1 OF 4**

NAME & ADDRESS OF CUSTOMER FITWELL TECHNOLOGIES PVT. LTD. G/1047, GIDC, METODA TAL : LODHIKA DIST. RAJKOT : 360 005.	REPORT NO. : PHV/05/1377-2	
	DATE : 30.03.2002	
	CUSTOMER REF.NO: FTPL/215	DATE : 09.05.2001
	DATE OF SAMPLE RECEIPT	08.05.2001
	DATE OF TESTING	22.05.2001 to 13.09.2001
SAMPLE DESCRIPTION / IDENTIFICATION : CABLE TERMINATION KIT MFD.BY : A-1ELECTRICALS HEAT SHRINKABLE OUTDOOR TYPE VOLTAGE GRADE : 6.35/11 kV TYPE OF INSULATION : XLPE SIZE : 3 x 185 SQ.MM		
TEST DETAILS :		TEST SPECIFICATION : IS : 13573-1992
[1] CONDUCTOR RESISTANCE MEASUREMENT (Cl.No.6.12) [2] AC VOLTAGE WITHSTAND TEST (Cl.No. 6.2) [3] AC VOLTAGE WITHSTAND TEST(Under wet condition) (Cl.No. 6.2) [4] PARTIAL DISCHARGE TEST (Cl.No. 6.3) [5] IMPULSE WITHSTAND TEST (Cl.No. 6.4) [6] AC VOLTAGE LIFE TEST WITH CYCLIC CURRENT LOADING (Cl.No. 6.5.1) [7] PARTIAL DISCHARGE TEST (Cl.No. 6.3) [8] AC VOLTAGE LIFE TEST WITH CYCLIC CURRENT LOADING (Cl.No. 6.5.1) [9] THERMAL SHORT CIRCUIT TEST (Cl.No. 6.6)		
TEST RESULTS : AS PER SHEET 2 TO 4.		
ENCLOSURES : Annexure - I & II		
WITNESSED BY : Mr. Harish Gandhi, Fitwell Technologies Pvt. Ltd.		
NOTE : ONLY THE TESTS ASKED FOR BY THE CLIENT HAVE BEEN CARRIED OUT.		
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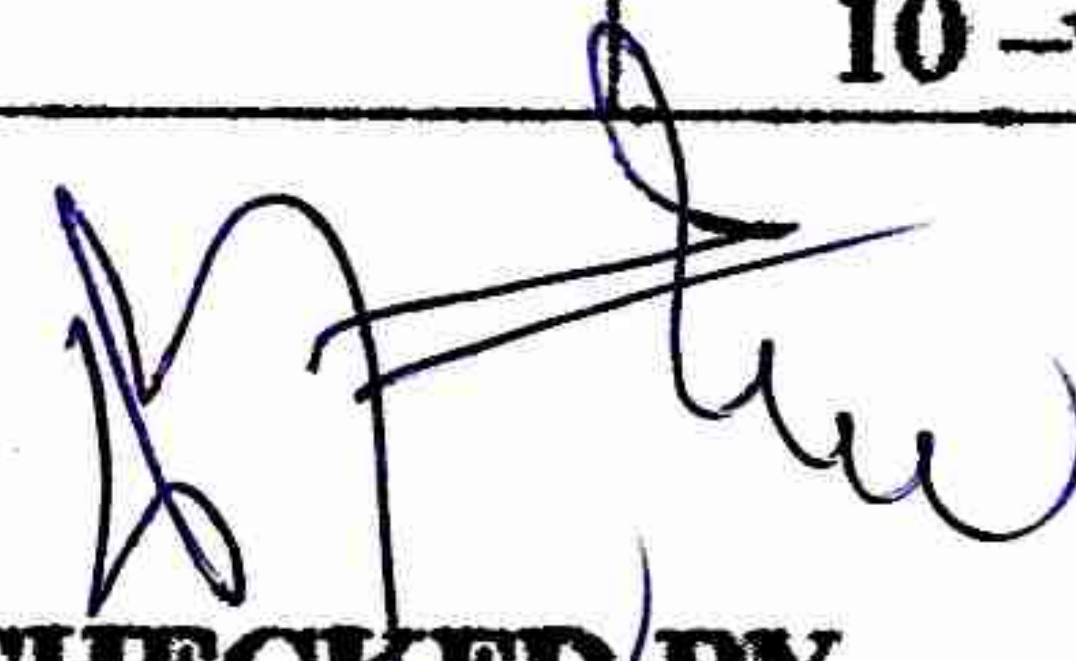
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**REPORT NO. : PHV/05/1377-2****SHEET : 2 OF 4****DATE : 30.03.2002**

SR. NO.	CLNO	TESTS	SPECIFIED LIMIT	OBTAINED VALUE	REMARKS
1.	6.12	<u>CONDUCTOR RESISTANCE</u> Conductor resistance at 20°C, ohm/km	---	R : 0.155 Y : 0.157 B : 0.158	---
2.	6.2	<u>AC VOLTAGE WITHSTAND TEST</u>	The sample shall withstand ac voltage of 35 kV for the duration of one minute without breakdown.	The sample withstood the applied voltage satisfactorily for the specified duration.	Conforms
3.	--	<u>AC VOLTAGE WITHSTAND TEST (UNDER WET CONDITION)</u>	The sample shall withstand ac voltage of 28 kV for the duration of one minute without breakdown	The sample withstood the applied voltage satisfactorily for the specified duration	Conforms
4.	6.3	<u>PARTIAL DISCHARGE TEST</u> Partial Discharge at 2U ₀ , pC	Max. 20	R : <1 Y : 1.5 B : 1.5	Conforms
5.	6.4	<u>IMPULSE WITHSTAND TEST</u>	Sample shall withstand 75kV without breakdown for 10 +ve & 10 -ve shots	Please refer Annexure - I for detailed results	Conforms
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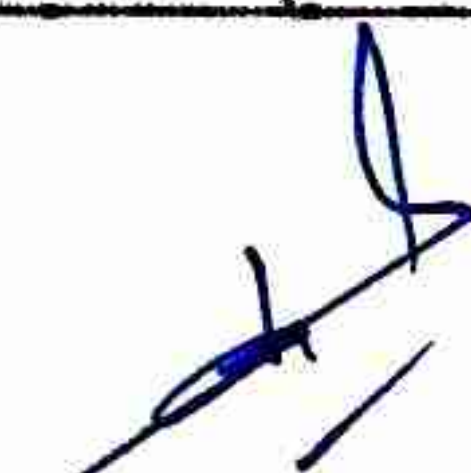
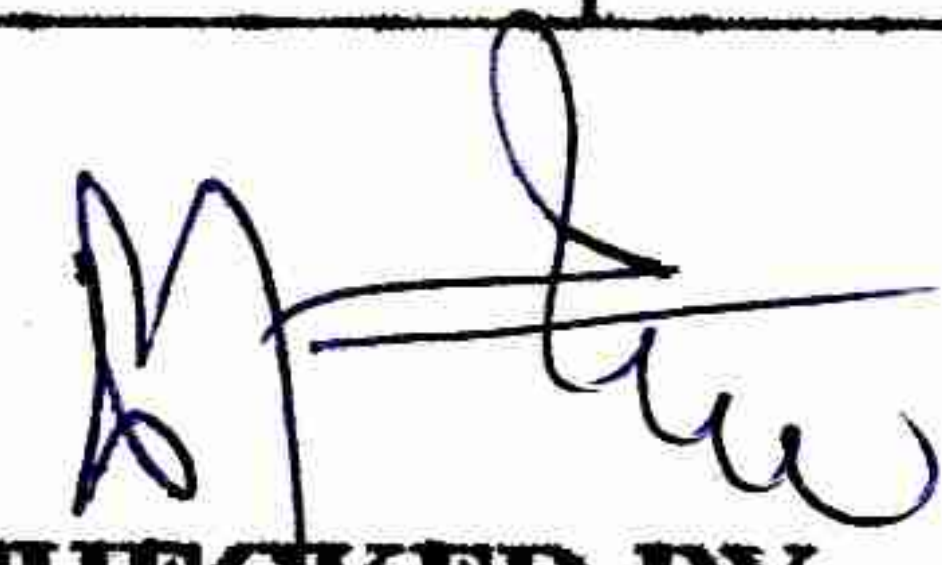
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SR. NO.	CLNO	TESTS	SPECIFIED LIMIT	OBTAINED VALUE	REMARKS
6.	6.5.1	<u>AC VOLTAGE LIFE TEST WITH CYCLIC CURRENT LOADING</u>	The sample shall be subjected to three cycle consists of five hour heating period & three hour cooling period. The specified voltage of $2.5U_0$ shall be applied continuously during heating & cooling period. There shall be no breakdown or flashover during this period.	No breakdown or flashover was observed during the specified three cycles.	Conforms
7.	6.3	<u>PARTIAL DISCHARGE TEST</u> Partial Discharge at $2U_0$, pC	Max. 20	R : 2.0 Y : 2.0 B : 2.0	Conforms


PREPARED BY
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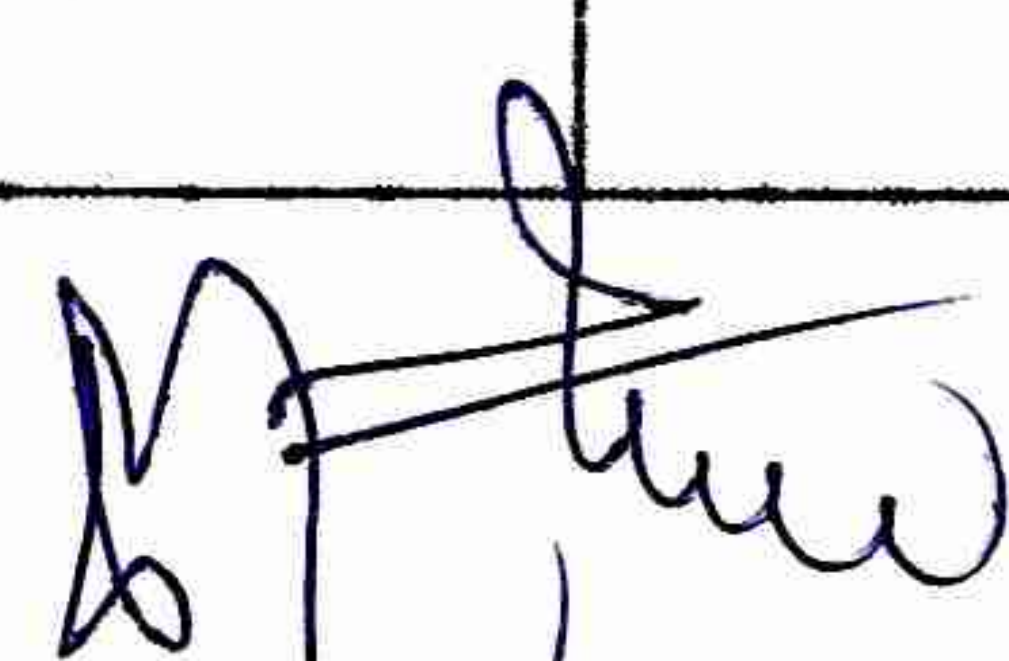
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**REPORT NO. : PHV/05/1377-2****SHEET : 4 OF 4****DATE : 30.03.2002**

SR. NO.	CI.NO	TESTS	SPECIFIED LIMIT	OBTAINED VALUE	REMARKS
8.	6.5.1	<u>AC VOLTAGE LIFE TEST WITH CYCLIC CURRENT LOADING</u>	The sample shall be subjected to sixty cycle consists of five hour heating period & three hour cooling period. The specified voltage of $2.5U_0$ shall be applied continuously during heating & cooling period. There shall be no breakdown or flashover during this period.	No breakdown or flashover was observed during the specified sixty cycles.	Conforms
9.	6.6	<u>THERMAL SHORT CIRCUIT TEST</u>	There shall be no visible damage. The temperature of the conductor shall not exceed the maximum short circuit temperature i.e. 250°C .	Short circuit current (Avg.) : 17.83 kA Duration : 1.003 second Temperature after the shot : 107°C Please refer Annexure - II for short circuit waveforms	No abnormalities were observed. Conforms


PREPARED BY
CHECKED BY

ANNEXURE-I

TEST REPORT NO.: PHV/05/1377-2

Sheet No.: 1 of 4

DATE : 30/03/2002

LIGHTNING IMPULSE VOLTAGE WITHSTAND TEST ON HT CABLE TERMINATION **(IS : 13573-192, CL. NO. 6.4)**

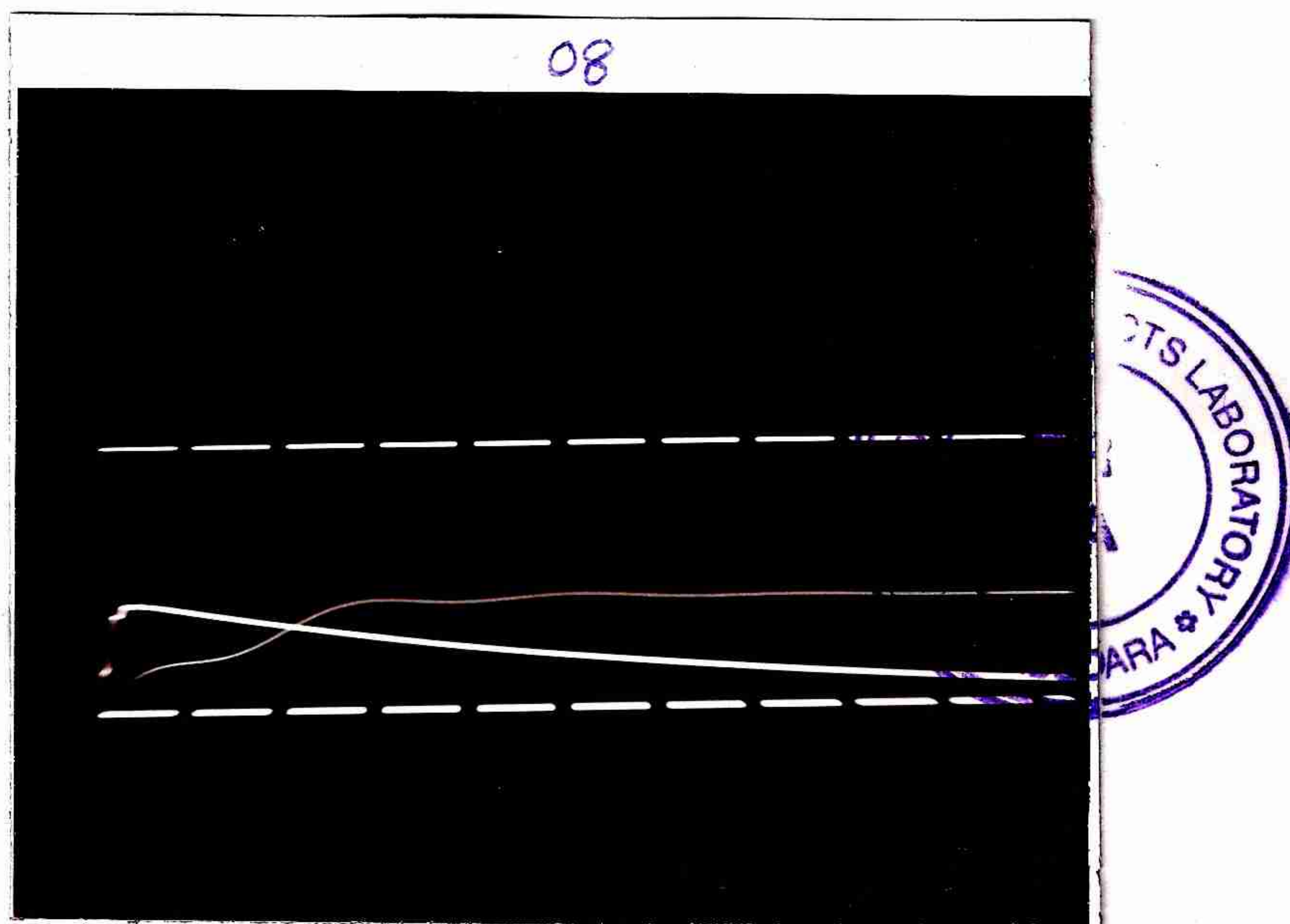
TEST PARAMETERS :

RATED VOLTAGE : 6.35/11 KV

TEST VOLTAGE : 75 kVp

WAVE SHAPE : 1.31/47 μ S

NOS. OF SHOTS APPLIED : 10 POSITIVE & 10 NEGATIVE POLARITY SHOTS.



CALIBRATION PULSE

WAVE FORM NO.	:	08
TIME/DIV. FOR FRONT WAVE	:	0.5 μ S
TIME/DIV. FOR TAIL WAVE	:	10 μ S
PEAK MAGNITUDE	:	51 kVp
ATTENUATION FACTOR	:	2.00
DIVIDER RATIO	:	200
REFERENCE VOLTAGE OF CRO	:	300 Volts

PREPARED BY,

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TEST REPORT NO.: PHV/05/1377-2

Sheet No. 2 of 4

DATE : 30/03/2002

IMPULSE VOLTAGE APLIED ON R - PHASE

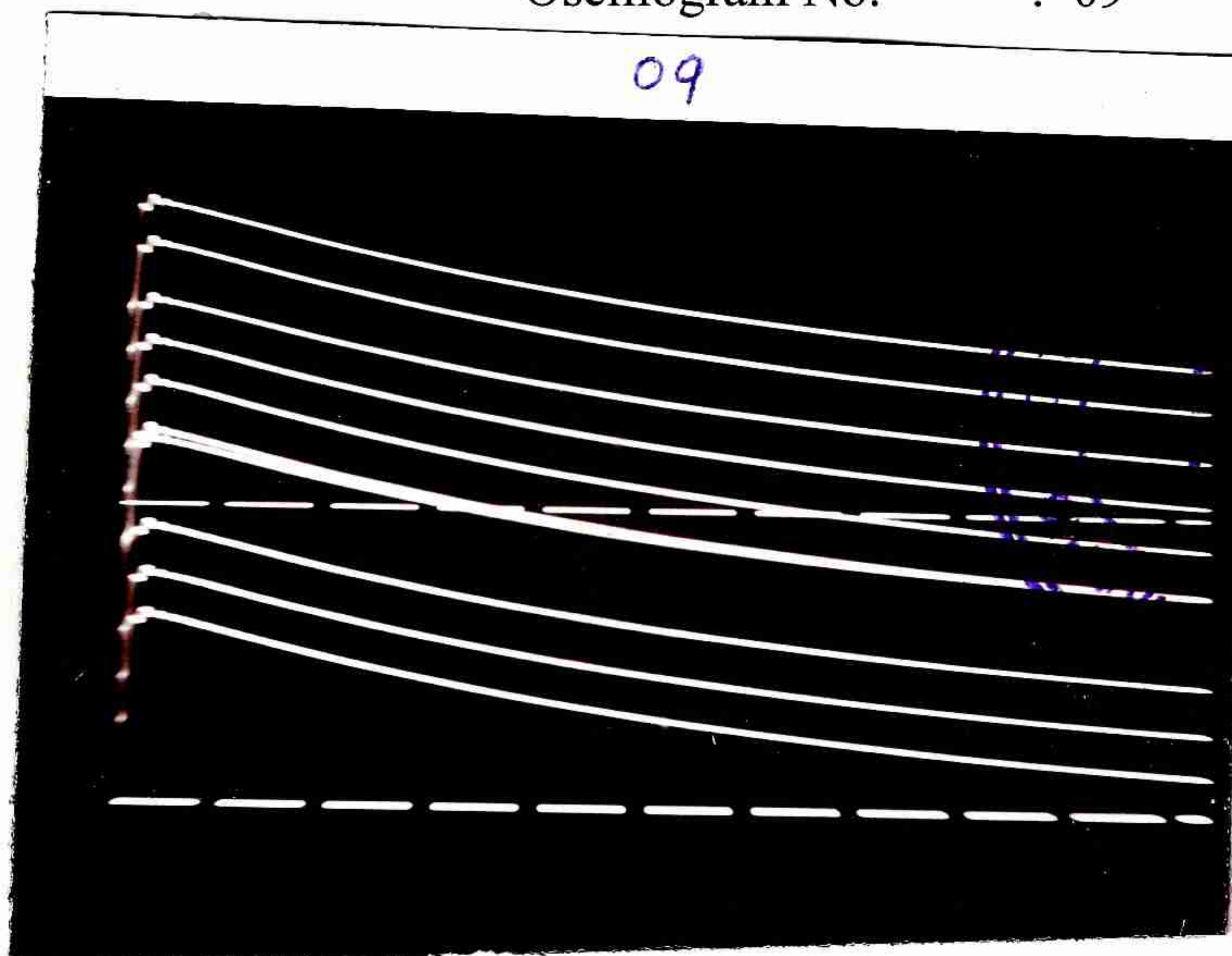
POSITIVE POLARITY :

No. of Shots Applied : 10

Atenuation Factor : 2.00

Time/Div for Voltage : 10 μ S

Oscillogram No. : 09



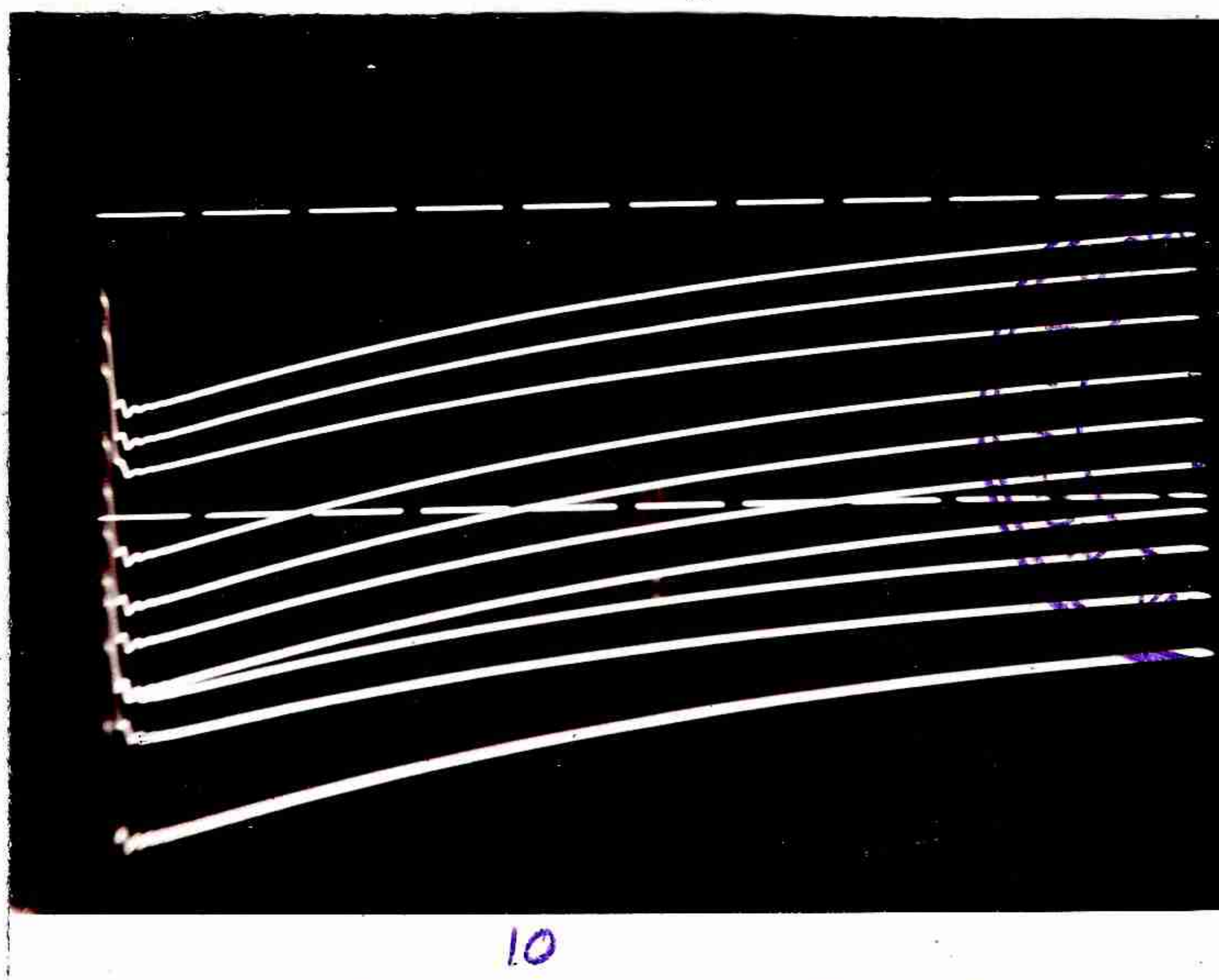
NEGATIVE POLARITY :

No. of Shots Applied : 10

Atenuation Factor : 2.00

Time/Div for Voltage : 10 μ S

Oscillogram No. : 10



A. S. Kulkarni
PREPARED BY,

Arumy
CHECKED BY,

No: 1095779



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TEST REPORT NO.: PHV/05/1377-2

Sheet No. 3 of 4

DATE : 30/03/2002

IMPULSE VOLTAGE APPLIED ON Y - PHASE

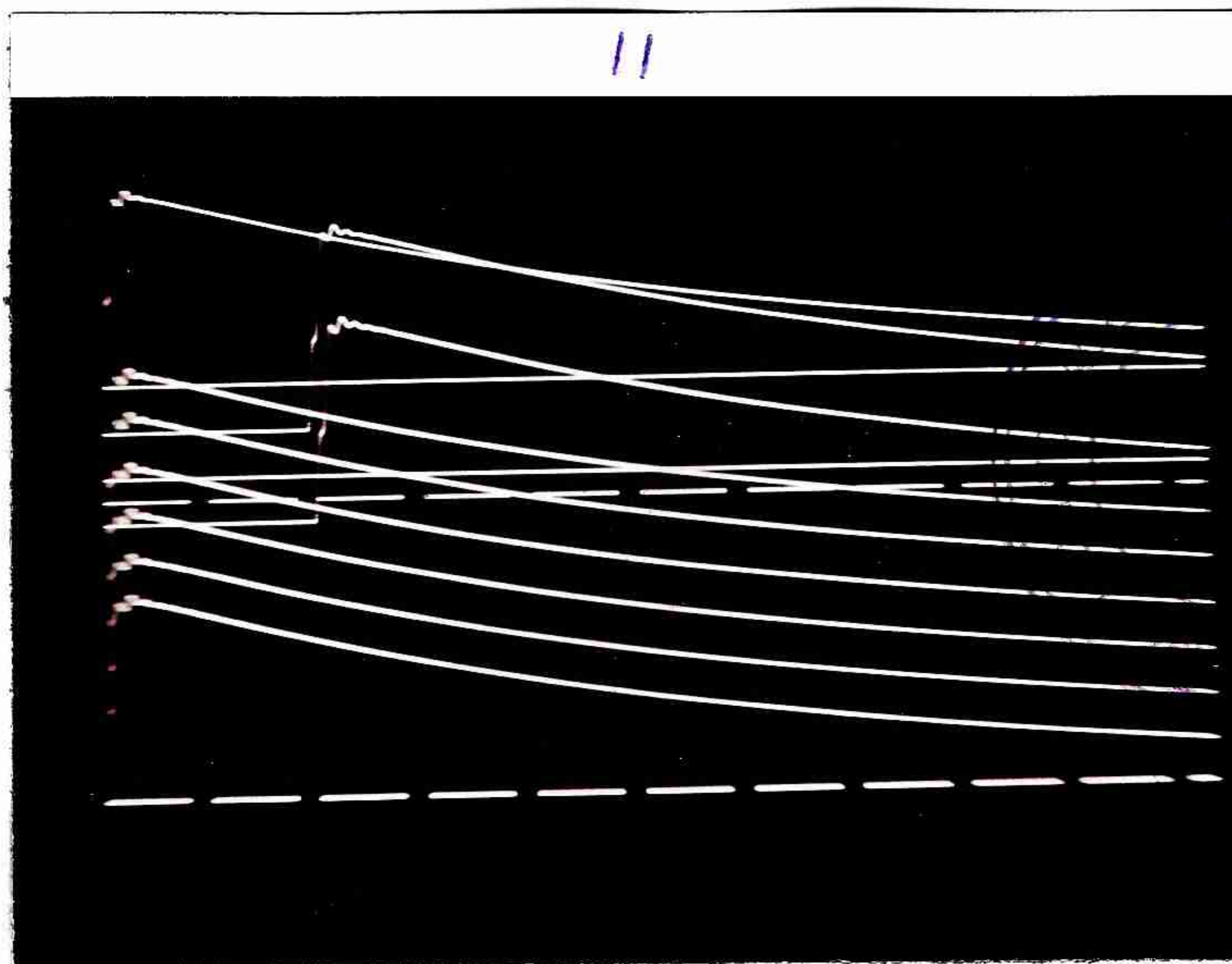
POSITIVE POLARITY :

No. of Shots Applied : 10

Attenuation Factor : 2.00

Time/Div for Voltage : 10 μ S

Oscillogram No. : 11



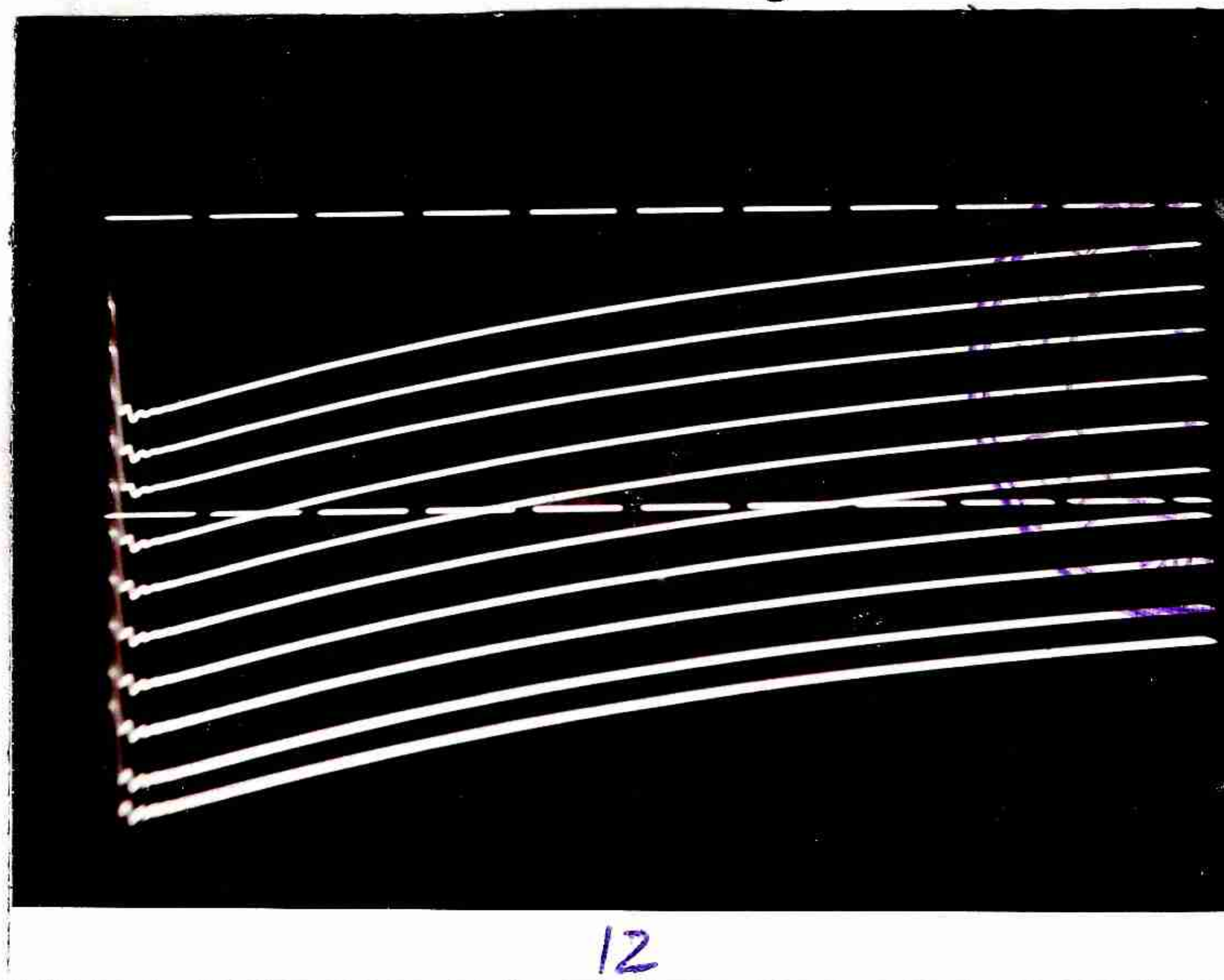
NEGATIVE POLARITY :

No. of Shots Applied : 10

Attenuation Factor : 2.00

Time/Div for Voltage : 10 μ S

Oscillogram No. : 12




PREPARED BY,


CHECKED BY,

No 1095780



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Sheet No.4 of 4

DATE : 30/03/2002

IMPULSE VOLTAGE APLLIED ON B - PHASE

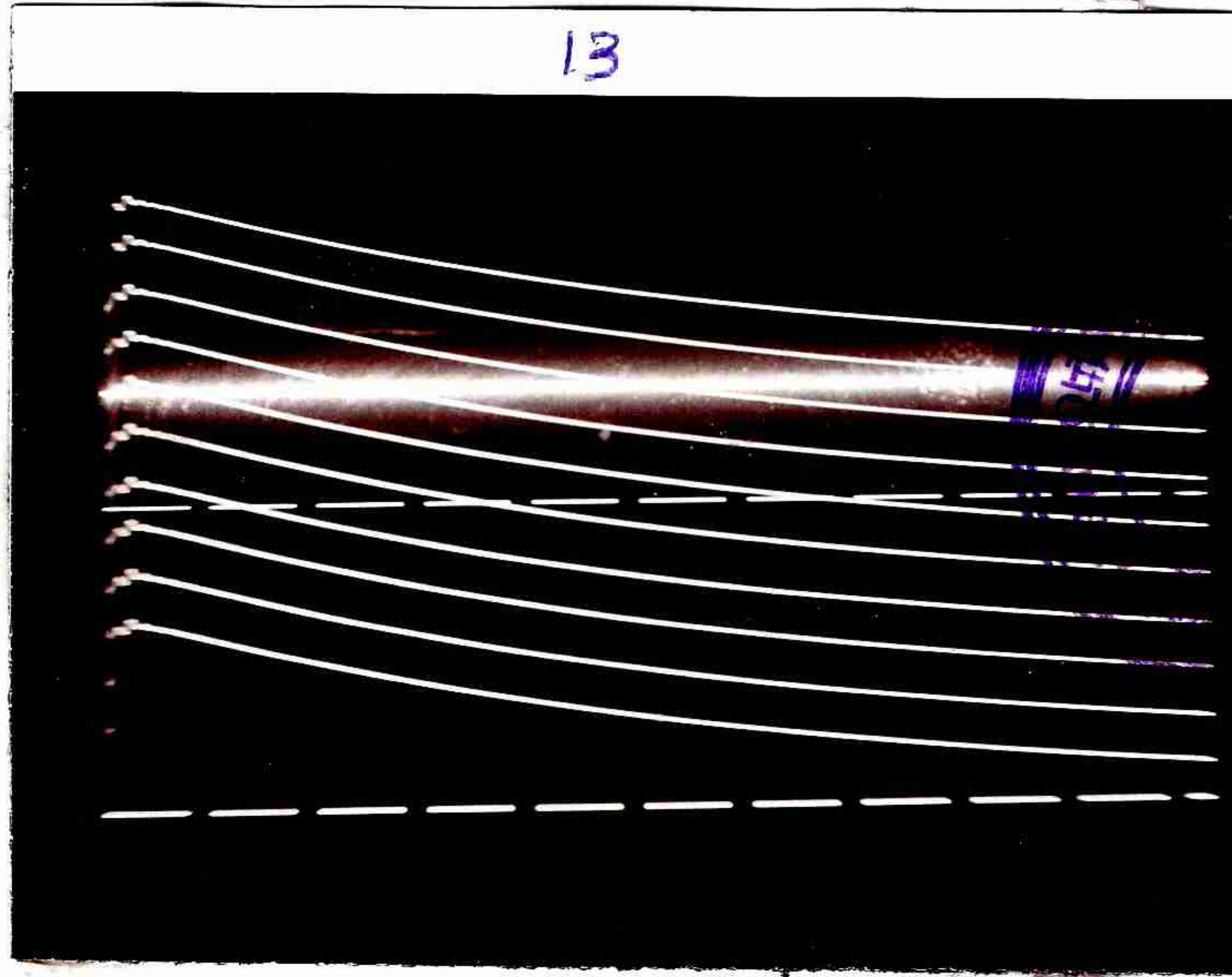
POSITIVE POLARITY :

No. of Shots Applied : 10

Atenuation Factor : 2.00

Time/Div for Voltage : 10 μ S

Oscillogram No. : 13



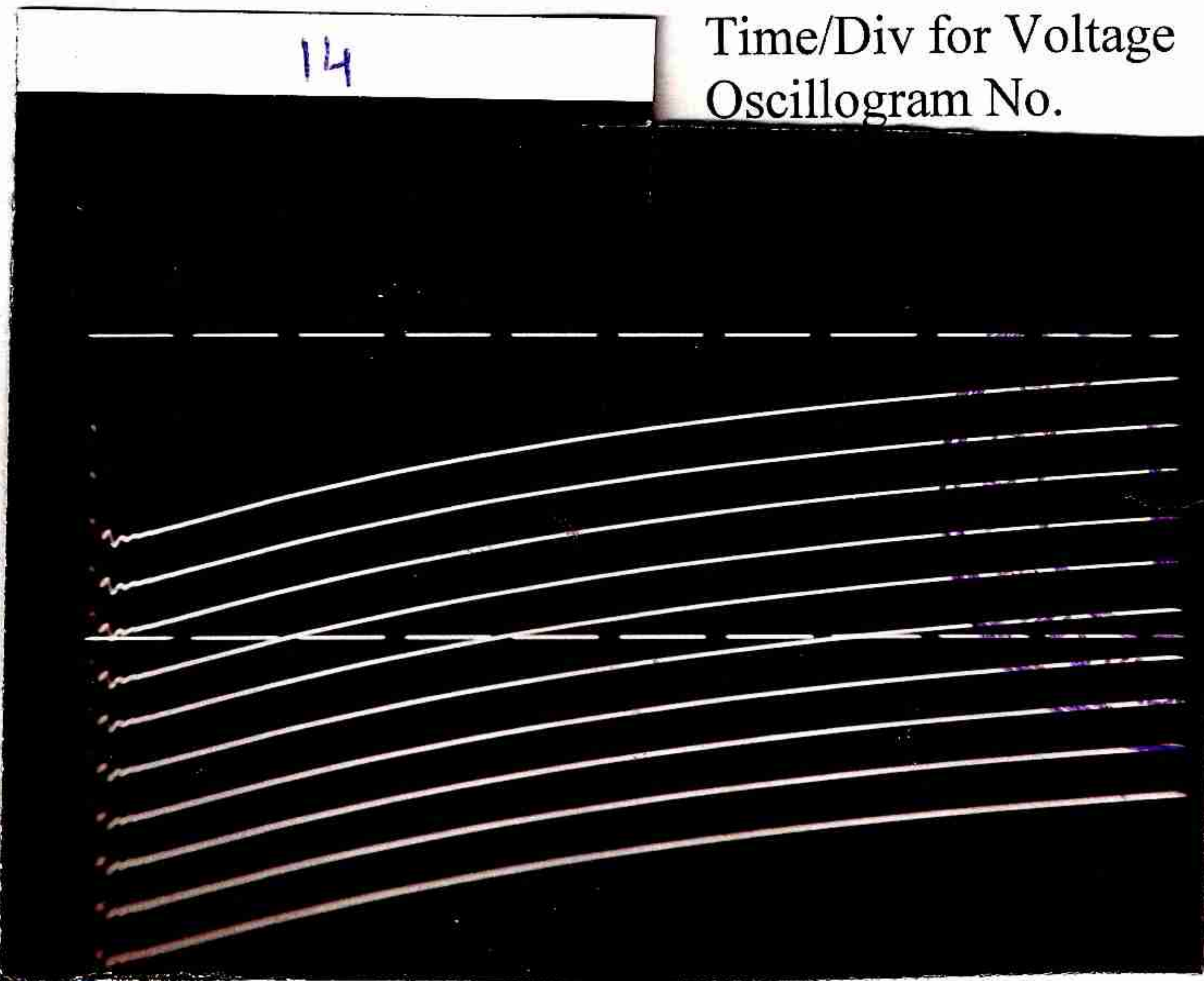
NEGATIVE POLARITY :

No. of Shots Applied : 10

Atenuation Factor : 2.00

Time/Div for Voltage : 10 μ S

Oscillogram No. : 14



REMARKS : The cable termination CONFORMS to the requirements of above mentioned standard with respect to the test carried out.

PREPARED BY,

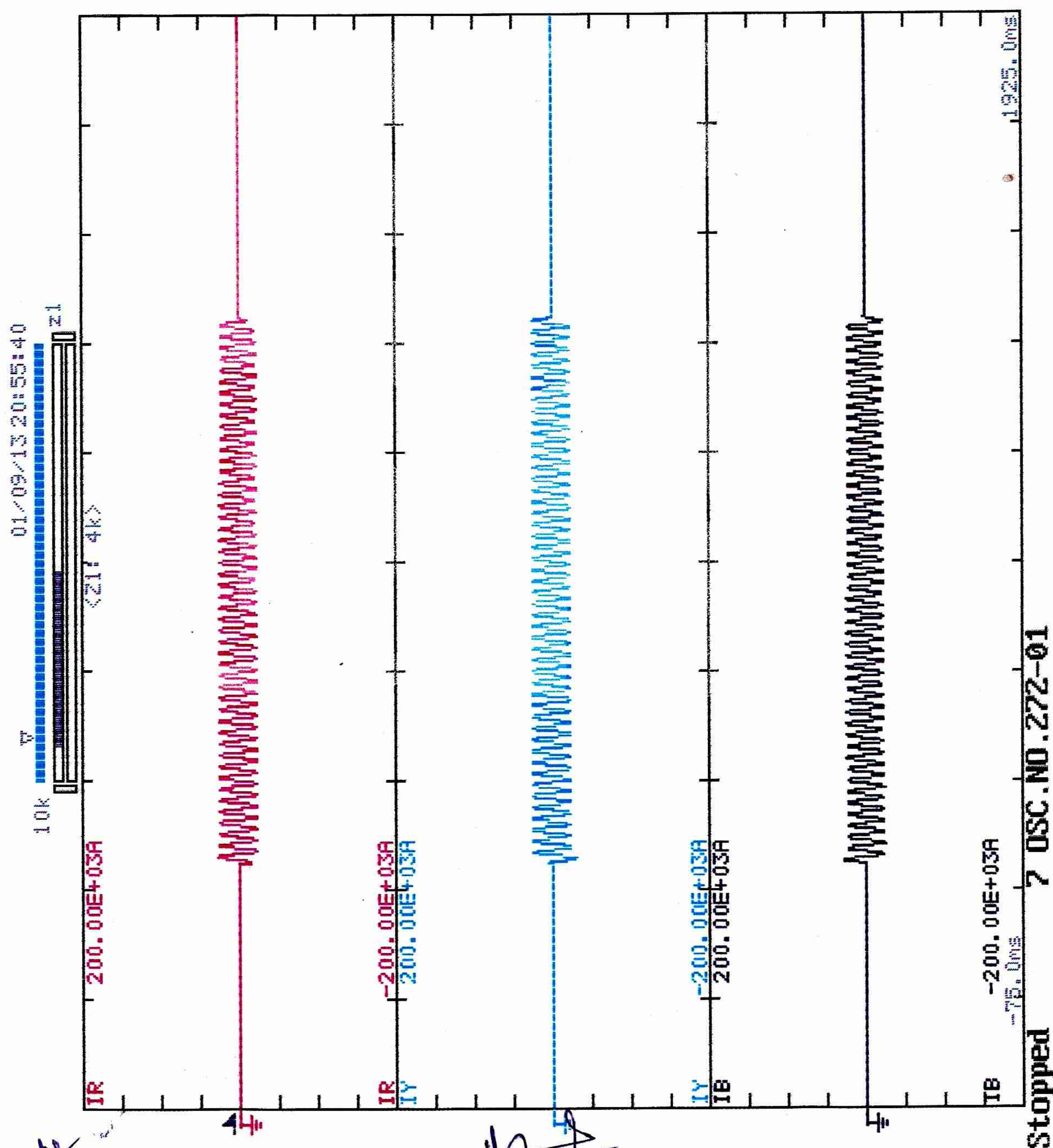
CHECKED BY,

No 1095784

ANNEXURE - II

REPORT NO. : PHV/05/1377-2
DATE : 30.03 2002

SHEET : 1 OF 1



Nº 1051462

PREPARED BY

CHECKED BY

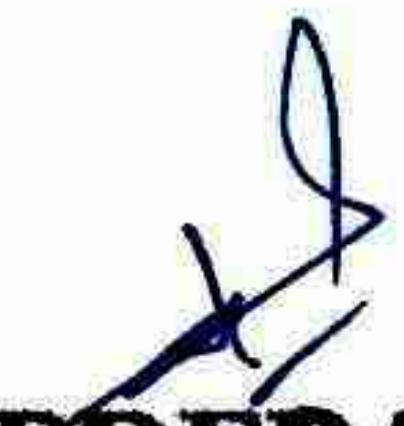
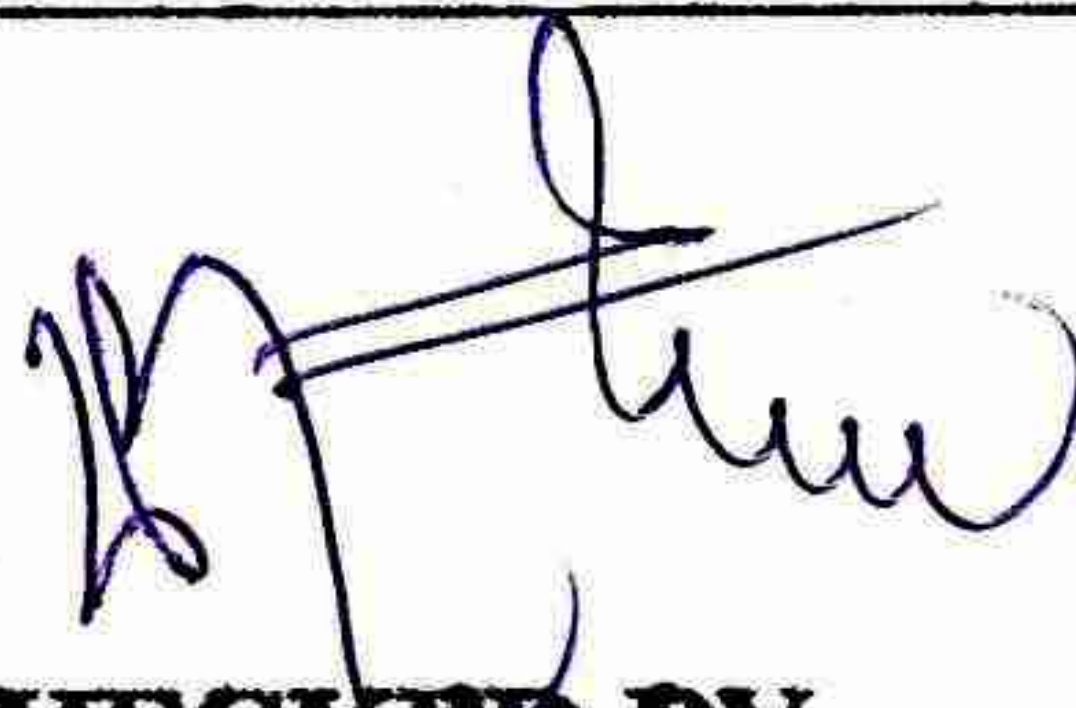
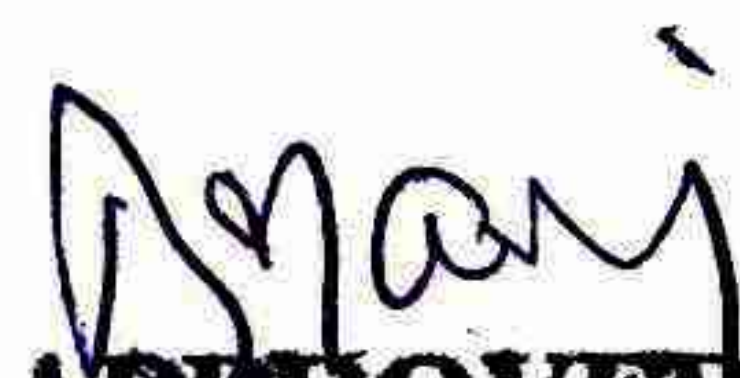
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**TEST REPORT****SHEET : 1 OF 2**

NAME & ADDRESS OF CUSTOMER FITWELL TECHNOLOGIES PVT. LTD. G/1047, GIDC, METODA TAL : LODHIKA DIST. RAJKOT : 360 005.	REPORT NO. : PHV/05/1378-2	
	DATE : 30.03.2002	
	CUSTOMER REF.NO: Nil	DATE : ----
	DATE OF SAMPLE RECEIPT	11.10.2001
	DATE OF TESTING	20.10.2001
SAMPLE DESCRIPTION / IDENTIFICATION : CABLE TERMINATION KIT MFD. BY : A-1ELECTRICALS HEAT SHRINKABLE OUTDOOR TYPE VOLTAGE GRADE : 6.35/11 kV TYPE OF INSULATION : XLPE SIZE : 3 x 240 SQ.MM		
TEST DETAILS :		TEST SPECIFICATION : IS : 13573-1992
[1] DYNAMIC SHORT CIRCUIT TEST (Cl.No.6.11).....Series 2		
TEST RESULTS : AS PER SHEET 2 of 2.		
ENCLOSURES : Annexure- I & II.		
WITNESSED BY : Mr. Harish Gandhi, Fitwell Technologies Pvt. Ltd.		
NOTE : ONLY THE TESTS ASKED FOR BY THE CLIENT HAVE BEEN CARRIED OUT.		
 PREPARED BY	 CHECKED BY	 APPROVED BY

Note: 1. This report relates only to the particular sample received for testing at ERDA.

2. This report can not be reproduced in part under any circumstances.

3. Publication of this report requires prior permission in from writing Director, ERDA

4. Only the tests asked for by the party have been carried out.

N^o 1020125

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**REPORT NO. : PHV/05/1378-2****SHEET : 2 OF 2****DATE : 30.03.2002**

SR. NO.	CLNO	TESTS	SPECIFIED LIMIT	OBTAINED VALUE	REMARKS
1.	6.11	<u>DYNAMIC SHORT CIRCUIT TEST</u>	No mechanical damage shall be observed.	<u>Loop : 1</u> <u>Loop : 2</u> <u>Short circuit current (Peak):</u> 57.0 kA 50.0 kA 58.8 kA 54.5 kA 47.9 kA 58.6 kA <u>Duration (milliseconds) :</u> 21.5 21.5 21.5 21.5 21.5 21.5 <u>Temperature after the shot :</u> 94.8°C 92.0°C Please refer Annexure – I & II for short circuit waveforms	No abnormalities were observed. Conforms

PREPARED BY**CHECKED BY**N^o 1020128



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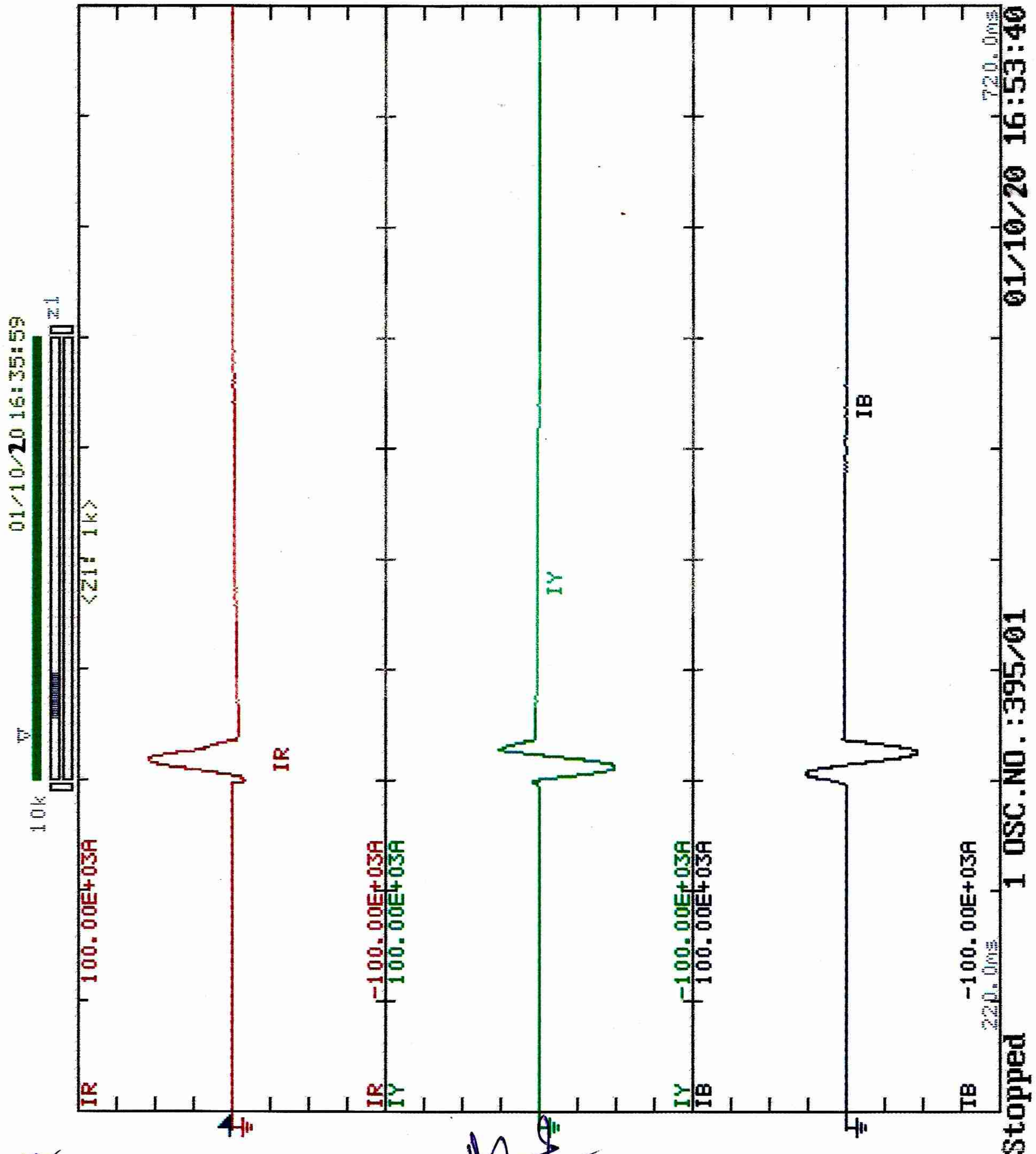
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ANNEXURE - I

REPORT NO. : PHV/05/1378-2
DATE : 30.03 2002

SHEET : 1 OF 1



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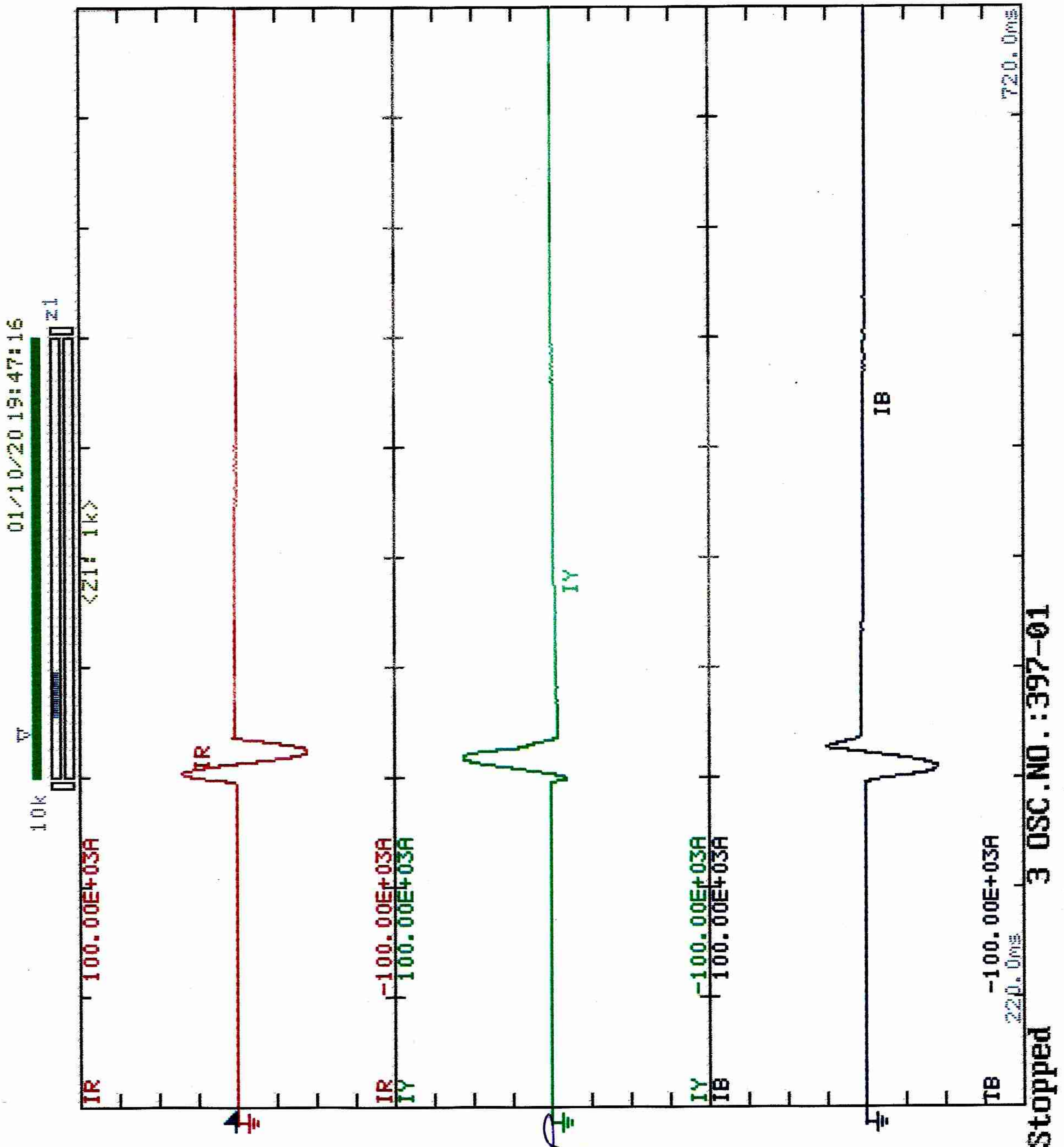
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ANNEXURE - II

REPORT NO. : PHV/05/1378-2
DATE : 30.03 2002

SHEET : 1 OF 1



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