



RESEARCH-DEVELOPMENT AND TESTING NATIONAL
INSTITUTE FOR ELECTRICAL ENGINEERING
ICMET CRAIOVA
HIGH POWER DIVISION



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acreditat pentru
ÎNCERCARE



SR EN ISO / CEI 17025: 2005
CERTIFICAT DE ACREDITARE
nr. LJ 004 / 2007

TYPE TEST REPORT
No. 10564

CUSTOMER: PANEL ELEKTRIK SAN. VE TIC. LTD. STI
Org. San. Böl. 17 Cad. No. 27 Yakapinar / Adana - Turkey

MANUFACTURER: PANEL ELEKTRIK SAN. VE TIC. LTD. STI
Org. San. Böl. 17 Cad. No. 27 Yakapinar / Adana - Turkey

TESTED PRODUCT: 36 kV, 630 A, 16 kA MMMH 36-02 Load Break Switch
combination with Fuse

REFERENCE STANDARD: IEC 62271-200/2003 Annex A

TEST PERFORMED: Internal arc test

TEST DATE: 04.08.2009

TEST RESULT: Passed the tests

Report has 13 pages and it is edited in 4 copies from which copy 1 for laboratory and copies 2, 3 and 4 for customer.

HEAD OF HIGH POWER DIVISION:

Dr. Eng. George Curcanu



HEAD OF LABORATORY:

Eng. Constantin Iancu

DATE OF ISSUE: 29.09.2009

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1. IDENTIFICATION OF APPARATUS

Type MMMH36-02
Serial number/year 02-2009-0007
Technical specification/Drawing See pages 7 / See pages 8 to 11
Contract No.: 2266 / 01.06.2009
Product receiving date: 03.08.2009
Product condition at receiving: New

2. TECHNICAL CHARACTERISTICS ESTABLISHED BY PRODUCER

Rated voltage 36 kV
Rated normal current 630/50 A
Rated frequency 50 Hz
Rated short - time withstand current:
- peak value 40 kA
- r.m.s. value 16 kA
Rated duration of short-circuit 1 s
IAC clasification AFL
Internal fault current (Ik) 16 kA
Rated duration of internal fault current 1 s

3. TESTS PROGRAM

Tests were performed on MMMH36-01 and MMMH36-02 switchgears assembly as follows:

3.1 Three-phase current calibration test.

3.2 Internal arc test with: three-phase arc initiation point in the cables compartment on lower terminals of Load Break Switch of MMMH36-02 serial no. 02-2009-0007 positioned in the right side of the assembly and three-phase applied voltage on the input terminals of MMMH36-01 serial no. 01-2009-0007 (see drawing from page 12). Test parameters were: $I_p = 40$ kA, $I_k = 16$ kA, $t_k = 1$ s, $f = 50$ Hz.

Arc initiation was made with copper wire having 0.5 mm diameter.

Supply was made with copper cables of $3 \times 1 \times 240$ mm²

Switchgears assembly was placed in a special room with floor, two perpendicular walls and ceiling settled on a cable channel with dimensions of 1500 mm x 1400 mm x 600 mm.

The distances between switchgears assembly, walls and ceiling were:

- 100 mm from the lateral left wall
- 400 mm from the ceiling
- 150 mm from the rear wall

The combined vertical and horizontal indicators (simulators) made of 140 g/m² cotton fabrics were placed in the front and the right side of the switchgears assembly at 300 mm distance corresponding to accessibility class A.

Tests were performed according to own procedure PT 03.07.

4. RESPONSIBLE FOR TESTS: Eng. Ilie Sboru

5. PRESENT AT THE TESTS: Mr. Cenk Yuzereroğlu from PANEL ELEKTRİK - Turkey

6. TEST REPORT DOCUMENTATION

Oscillograms	2;	Tables	3;
Photos	2;	Drawings	4.

7. DATA OF TESTING AND MEASURING CIRCUIT

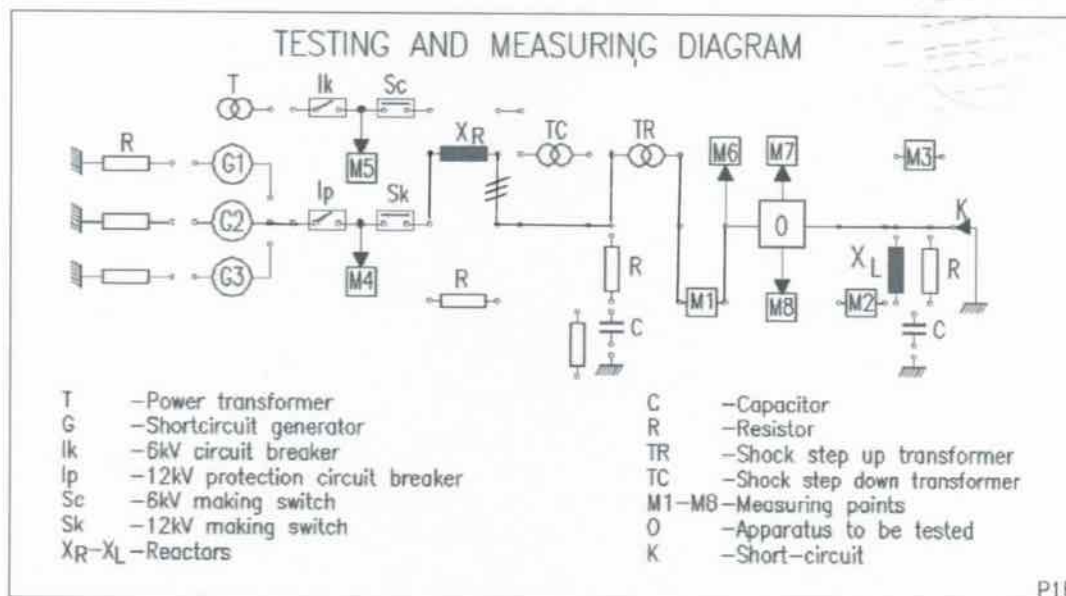


Table 1

Phases number		3
Source/ connection		G2 /Δ
Transformer/Rate		TR 4, 5, 6 / 1.07
Earthing	Source	-
	Apparatus	Net earthing connection
Reactor	[Ω]	0.6
Power factor		<0.15
M1 - Apparatus current – Rogowski coils 30 kA/V		
M4 - Supply source voltage - Voltage transformer 15000 V/100 V		
M6 - Apparatus voltage – Voltage transformer 35000/100V		
M8 – Data acquisition system TRAS 10-12		

8. INTERNAL ARC TEST

The test results are presented in table 2.

Table 2

Oscillogram No.	URS UST UTR [kV]	IpR IpS IpT [kA]	I _{tR} I _{tR} I _{tT} [kA]	t _t [sec.]	I _{t med} [kA]	DURS DUST DU _{TR} [V]	Remarks
76584/2009	6.1	41	16.0	0.2	16.13	-	Current calibration
	6.1	-	16.0			-	
	6.1	-	16.4			-	
76585/2009	6.4	37.8	16.0	1	16.2	954	Test on cables compartment
	6.4	-	16.3			1166	
	6.4	-	16.3			1307	

Measurements were performed with expanded uncertainty of: 1% for voltage; 1% for current; 0.5% for time and the confidence level P = 95 %.

8.1. Symbols used in tables and oscillograms

$I_R I_S I_T$ = Short-circuit current

$I_{pR} I_{pS} I_{pT}$ = Peak values of short-time withstand currents on the phases R, S, T.

$I_{tR} I_{tS} I_{tT}$ = R.m.s. values of short - time withstand currents on the phases R, S, T.

t_t = The duration of short - circuit

$I_t \text{ med}$ = Effective current mean value

$DURS, DUST, DU_{TR}$ = Voltage drop on arc

URS, UST, U_{TR} = No-load applied voltage

8.2 Remarks

1. Aspect of MMMH36-02 and MMMH36-01 switchgears assembly and simulators in the test circuit before the test is presented in photo 1.
2. Aspect of MMMH36-02 and MMMH36-01 switchgears assembly and simulators in the test circuit after the test is presented in photo 2.
3. During the tests:
 - the doors did not open;
 - the indicators did not ignite;
 - no detached parts of the switchgears assembly were observed;
 - the diaphragms for pressure relief positioned in the rear of the switchgears worked correctly

8.3 Assessment of the test result

Table 3

Criterion	Result
1.The doors, covers etc. correctly secured do not open	Fulfilled
2. Parts which may cause a hazard do not fly off	Fulfilled
3. Arcing does not cause holes to develop in the freely accessible external parts of the enclosure as a result of burning or other effects	Fulfilled
4.The indicators do not ignite	Fulfilled
5. All earthing connections are still effective	Fulfilled

9. TEST RESULT: PASSED THE TEST



Photo 1 -Aspect of MMMH36-02 and MMMH36-01 switchgears assembly and simulators in the test circuit before the test



Photo 2 -Aspect of MMMH36-02 and MMMH36-01 switchgears assembly and simulators in the test circuit after the test



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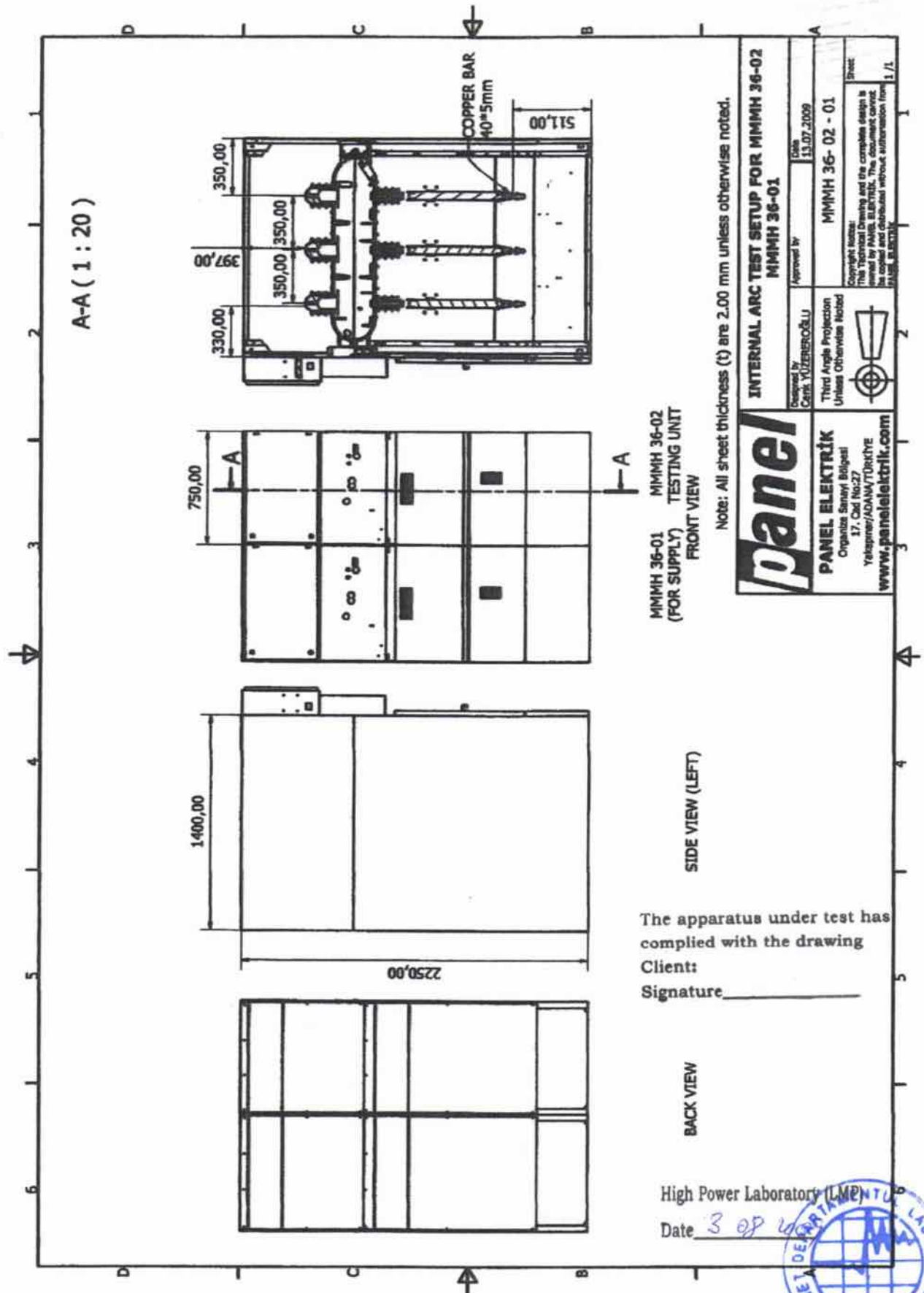
MMM36-02 LOAD BREAK SWITCH COMBINATION WITH FUSE	
Rated Voltage	36 kV
Rated power frequency withstand voltage (1 min)	
Phase to earth and phase to phase	70 kV
At isolating distance	80 kV
Rated Lightning impulse withstand voltage 1.2/50ms	
Phase to earth and phase to phase	170 kV
Across Interrupter	195 kV
Rated frequency	50/60 Hz
Rated current	630 A
Rated peak withstand voltage	40 kA
Rated short-time withstand current (1s)	16 kA
Load Break Switch	
Brand	ULUSOY
Type	LBS36
Serial Number	
Operating Pressure	0.5 Bar
Min. Operating Pressure	0.4 Bar
Rated Voltage	36 kV
Rated Frequency	50 / 60 Hz
Rated current	630 A
Fuses	
Brand	EFO
Type	BID
Rated Voltage	36 kV
Dimension	537 mm
Serial Number R	
Serial Number S	
Serial Number T	
Grounding Disconnecter	
Brand	ULUSOY
Type	UET36-2
Rated short-time withstand current (1s)	1 kA
Rated short-circuit making current (peak)	2.5 kA
Isolator with capacitive sensor	
Brand	ULUSOY
Type	UKAP36

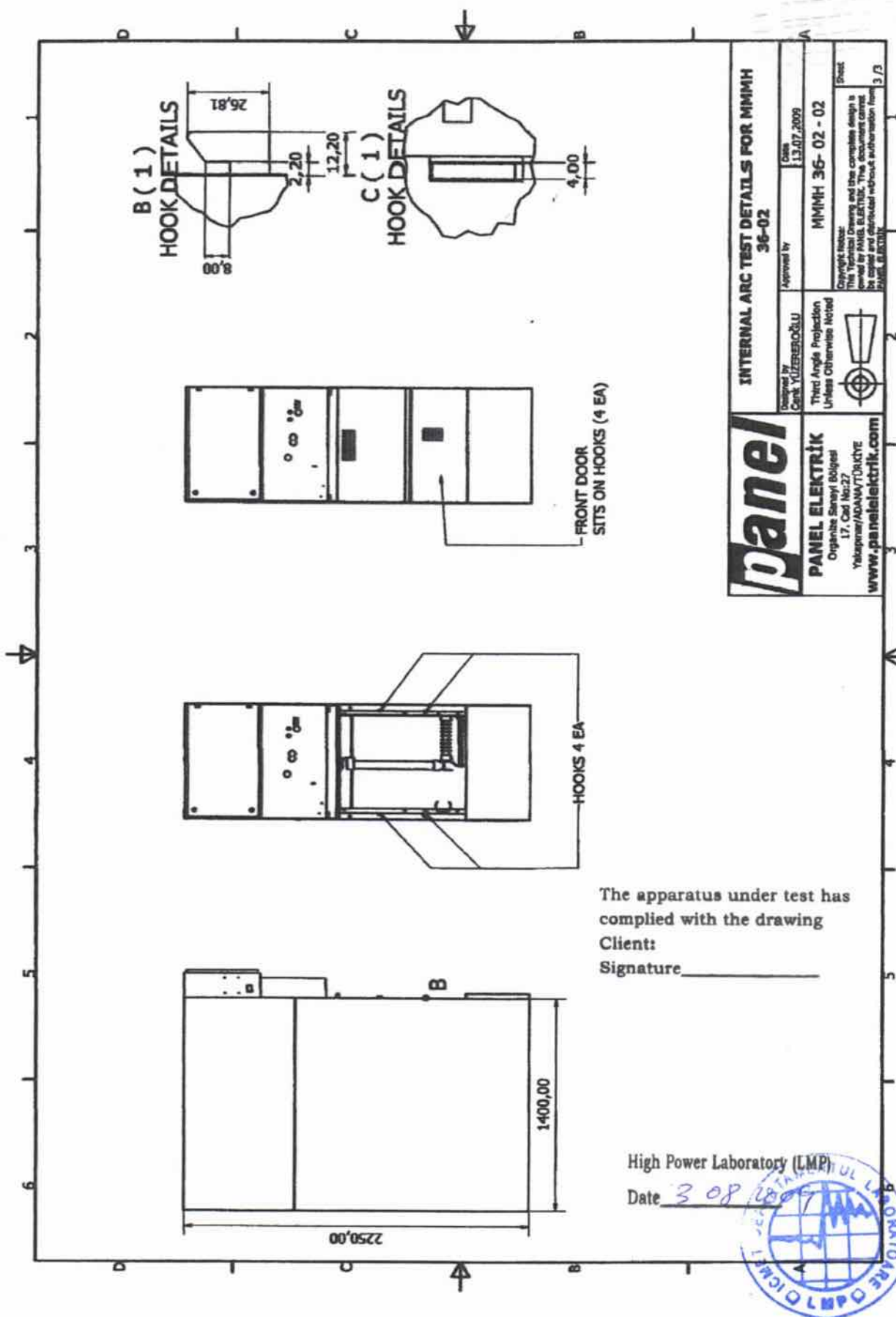
Address: H.Sabancı Organize San. 17 Cad. No: 27 ADANA/TURKEY

Tel: 00 90 322 394 36 97

Fax: 00 90 322 394 37 00

www.panelelektrik.com





The apparatus under test has
complied with the drawing

Client:

Signature _____

High Power Laboratory (LMP)

Date 30/08/2009



TEST SETUP SINGLE LINE DIAGRAM FOR MMMH
36-02

Designed by

Approved by

Date

Third Angle Projection
Unless Otherwise Noted

MMMh 36-02 - 04

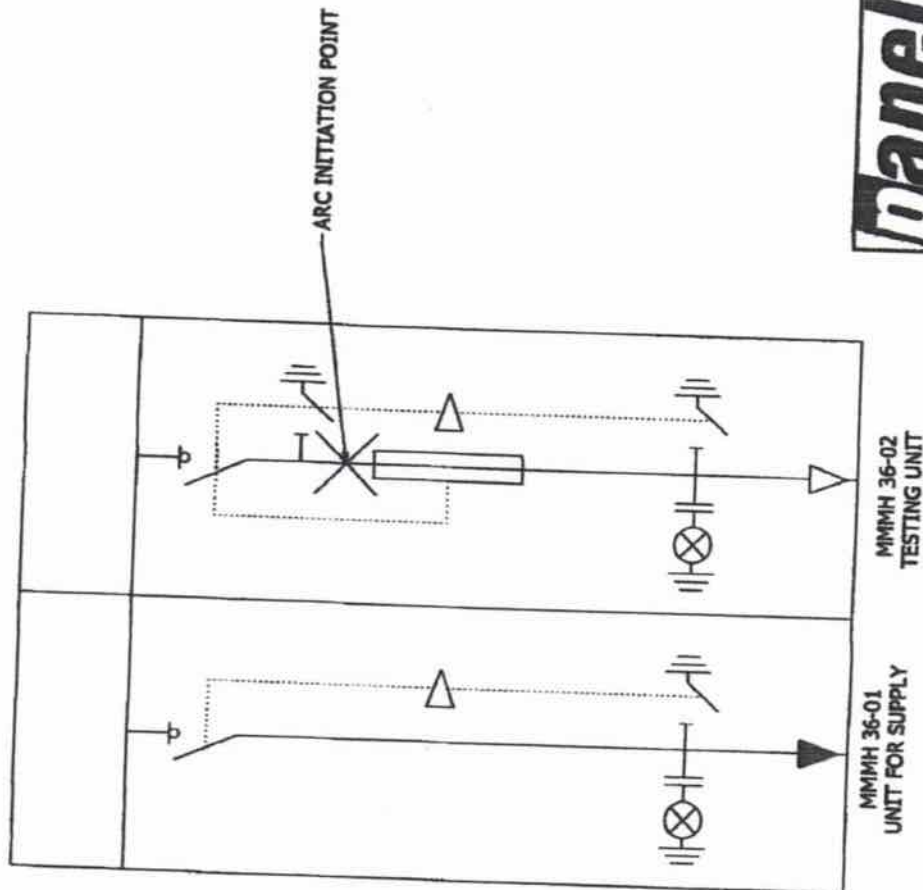
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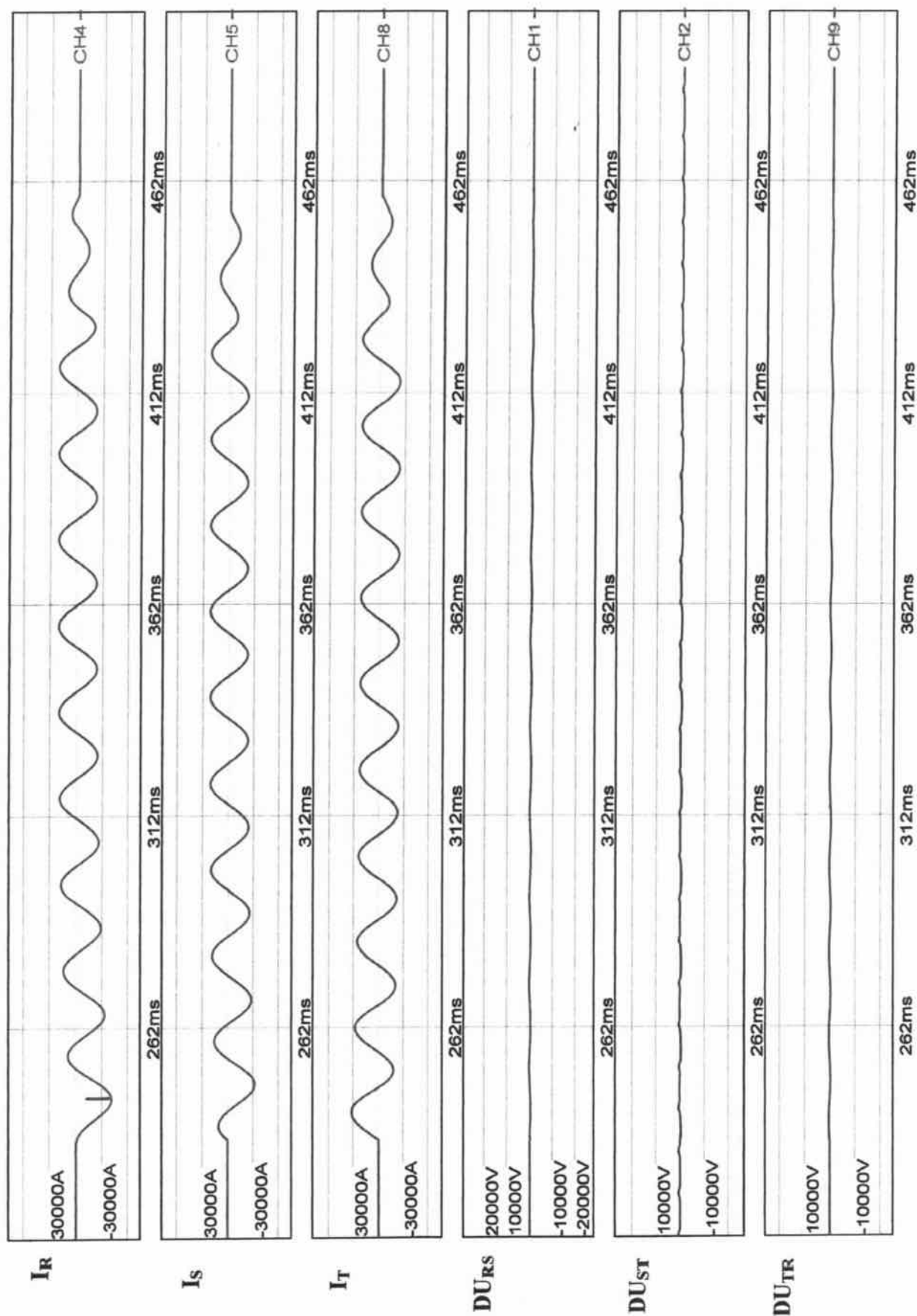
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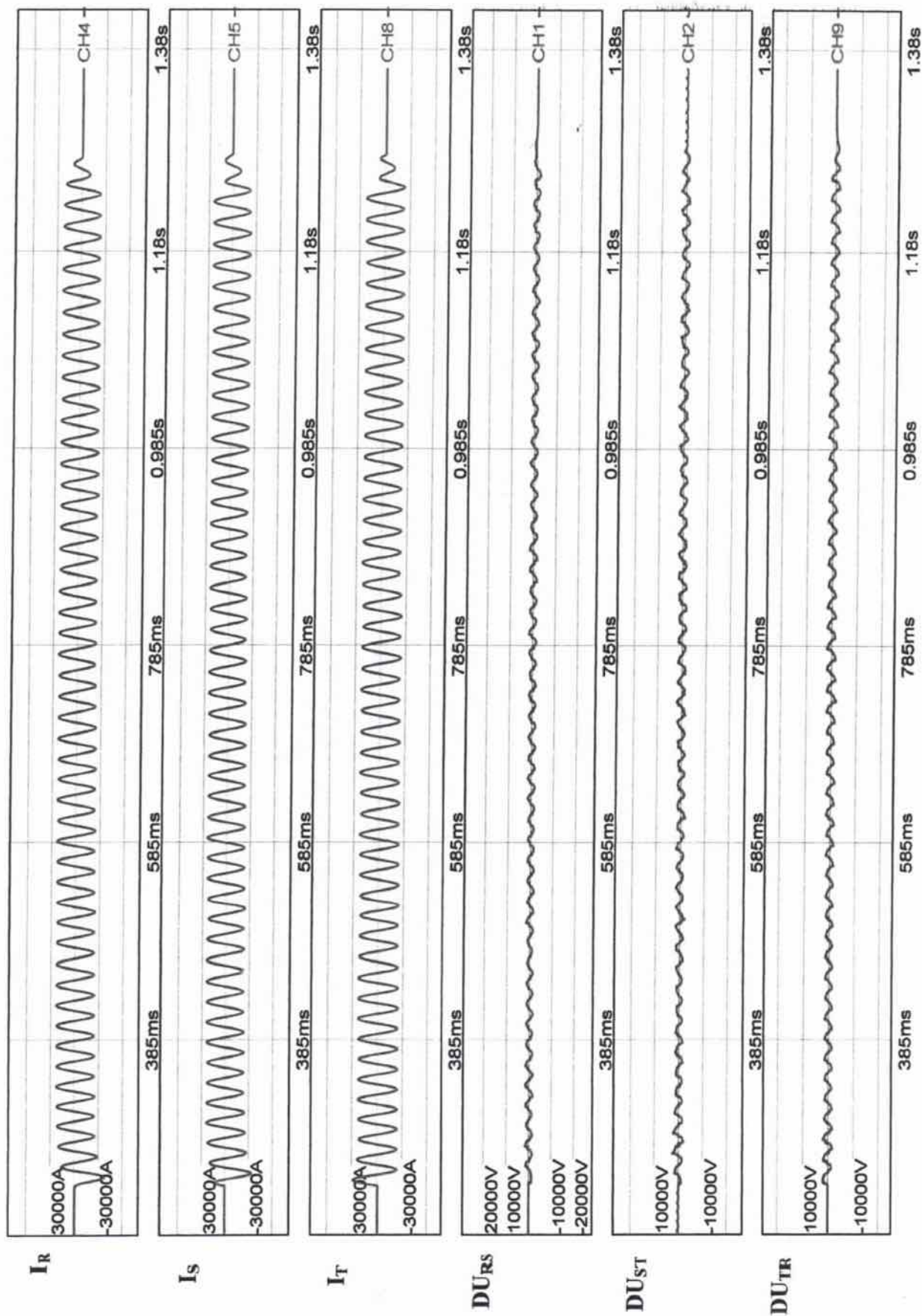
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Oscillogram No. 76584 / 2009



Oscillogram No. 76585 / 2009