



GE Medical Systems

Technical Publications

sm 2119703–100

Revision 9

MP Phase 4 + Vascular Option Generator Schematics

do not duplicate

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ATTENTION

**LES APPAREILS À RAYONS X SONT DANGEREUX À LA FOIS POUR LE PATIENT ET POUR LE MANIPULATEUR
SI LES MESURES DE PROTECTION NE SONT PAS STRICTEMENT APPLIQUEES**

Bien que cet appareil soit construit selon les normes de sécurité les plus sévères, la source de rayonnement X représente un danger lorsque le manipulateur est non qualifié ou non averti. Une exposition excessive au rayonnement X entraîne des dommages à l'organisme.

Par conséquent, toutes les précautions doivent être prises pour éviter que les personnes non autorisées ou non qualifiées utilisent cet appareil créant ainsi un danger pour les autres et pour elles-mêmes.

Avant chaque manipulation, les personnes qualifiées et autorisées à se servir de cet appareil doivent se renseigner sur les mesures de protection établies par la Commission Internationale de la Protection Radiologique, Annales 26 : Recommandations de la Commission Internationale sur la Protection Radiologique et les normes nationales en vigueur.

WARNING

**X-RAY EQUIPMENT IS DANGEROUS TO BOTH PATIENT AND OPERATOR
UNLESS MEASURES OF PROTECTION ARE STRICTLY OBSERVED**

Though this equipment is built to the highest standards of electrical and mechanical safety, the useful x-ray beam becomes a source of danger in the hands of the unauthorized or unqualified operator. Excessive exposure to x-radiation causes damage to human tissue.

Therefore, adequate precautions must be taken to prevent unauthorized or unqualified persons from operating this equipment or exposing themselves or others to its radiation.

Before operation, persons qualified and authorized to operate this equipment should be familiar with the Recommendations of the International Commission on Radiological Protection, contained in Annals Number 26 of the ICRP, and with applicable national standards.

ATENCION

**LOS APARATOS DE RAYOS X SON PELIGROSOS PARA EL PACIENTE Y EL MANIPULADOR
CUANDO LAS NORMAS DE PROTECCION NO ESTAN OBSERVADAS**

Aunque este aparato está construido según las normas de seguridad más estrictas, la radiación X constituye un peligro al ser manipulado por personas no autorizadas o incompetentes. Una exposición excesiva a la radiación X puede causar daños al organismo.

Por consiguiente, se deberán tomar todas las precauciones necesarias para evitar que las personas incompetentes o no autorizadas utilicen este aparato, lo que sería un peligro para los demás y para sí mismas.

Antes de efectuar las manipulaciones, las personas habilitadas y competentes en el uso de este aparato, deberán informarse sobre las normas de protección fijadas por la Comisión Internacional de la Protección Radiológica, Anales No 26: Recomendaciones de la Comisión Internacional sobre la Protección Radiológica y normas nacionales.

ACHTUNG

**RÖNTGENAPPARATE SIND EINE GEFAHR FÜR PATIENTEN SOWIE BEDIENTUNGSPERSONAL,
WENN DIE GELTENDEN SICHERHEITSVORKEHRUNGEN NICHT GENAU BEACHTET WERDEN**

Dieser Apparat entspricht in seiner Bauweise strengsten elektrischen und mechanischen Sicherheitsnormen, doch in den Händen unbefugter oder unqualifizierter Personen wird er zu einer Gefahrenquelle. Übermäßige Röntgenbestrahlung ist für den menschlichen Organismus schädlich.

Deswegen sind hinreichende Vorsichtsmaßnahmen erforderlich, um zu verhindern, daßunbefugte oder unqualifizierte Personen solche Geräte bedienen oder sich selbst und andere Personen deren Bestrahlung aussetzen können.

Vor Inbetriebnahme dieses Apparats sollte sich das qualifizierte und befugte Bedienungspersonal mit den geltenden Kriterien für den gefahrlosen Strahleneinsatz durch sorgfältiges Studium des Hefts Nr. 26 der Internationalen Kommission für Strahlenschutz (ICRP) vertraut machen: Empfehlungen der Internationalen Kommission für Strahlenschutz und anderer nationaler Normenbehörden.

WARNING

VOLTAGE PRESENT

Before any intervention:

1. Switch **OFF** CB2 on the AC Power Distribution (VPE1 A2 A25) in Positioner Cabinet.
2. Switch **OFF** Positioner Cabinet Circuit Breaker in Generator Power Cabinet.

LOCK OUT/ TAG OUT

When necessary, perform the following lock out/ tag out procedure:

- 1.. Cut the customer power distribution cabinet from its energy source.
- 2.. Inform all concerned parties of the lockout.
- 3.. Lock and put a lockout label on the cabinet.
- 4.. Verify the absence of voltage in the cabinet.
- 5.. Proceed with service to the equipment.
- 6.. Unlock the cabinet and remove the label from the cabinet.
- 7.. Power-up the system.

Direction 2119703–100

Revision 9

MP PHASE 4 Generator
Installation

IMPORTANT! ... X–RAY PROTECTION

X–RAY equipment if not properly used may cause injury. Accordingly, the instructions herein contained should be thoroughly read and understood before you attempt to place this equipment in operation. The General Electric Company, Medical Systems Group, will be glad to assist and cooperate in placing this equipment in use.

Although this apparatus incorporates a high degree of protection against x–radiation other than the useful beam. No practical design of equipment can provide complete protection. Nor can any practical design compel the operator to take

adequate precautions to prevent the possibility of any persons carelessly, unwisely, or unknowingly exposing themselves or others to radiation.

It is important that everyone having anything to do with x–radiation be properly trained and fully acquainted with the recommendations of the National Council on Radiation Protection and Measurements as published in NCRP Reports available from NCRP Publications, 7910 Woodmont Avenue, Room 1016, Bethesda, Maryland 20814 and of the International Commission on Radiation Protection, and take adequate steps to insure protection against injury.

All persons authorized to use the equipment must be cognizant of the danger of excessive exposure to x–radiation and the equipment is sold with the understanding that the General Electric Company, Medical Systems Group, its agents, and representatives have no responsibility for injury or damage which may result from exposure to x–radiation.

Various protective material and devices are available. It is urged that such materials or devices be used.

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WARNING

- THIS SERVICE MANUAL IS AVAILABLE IN ENGLISH ONLY.
- IF A CUSTOMER’S SERVICE PROVIDER REQUIRES A LANGUAGE OTHER THAN ENGLISH, IT IS THE CUSTOMER’S RESPONSIBILITY TO PROVIDE TRANSLATION SERVICES.
- DO NOT ATTEMPT TO SERVICE THE EQUIPMENT UNLESS THIS SERVICE MANUAL HAS BEEN CONSULTED AND IS UNDERSTOOD.
- FAILURE TO HEED THIS WARNING MAY RESULT IN INJURY TO THE SERVICE PROVIDER, OPERATOR OR PATIENT FROM ELECTRIC SHOCK, MECHANICAL OR OTHER HAZARDS.

AVERTISSEMENT

- CE MANUEL DE MAINTENANCE N’EST DISPONIBLE QU’EN ANGLAIS.
- SI LE TECHNICIEN DU CLIENT A BESOIN DE CE MANUEL DANS UNE AUTRE LANGUE QUE L’ANGLAIS, C’EST AU CLIENT QU’IL INCOMBE DE LE FAIRE TRADUIRE.
- NE PAS TENTER D’INTERVENTION SUR LES ÉQUIPEMENTS TANT QUE LE MANUEL SERVICE N’A PAS ÉTÉ CONSULTÉ ET COMPRIS.
- LE NON-RESPECT DE CET AVERTISSEMENT PEUT ENTRAÎNER CHEZ LE TECHNICIEN, L’OPÉRATEUR OU LE PATIENT DES BLESSURES DUES À DES DANGERS ÉLECTRIQUES, MÉCANIQUES OU AUTRES.

WARNUNG

- DIESES KUNDENDIENST–HANDBUCH EXISTIERT NUR IN ENGLISCHER SPRACHE.
- FALLS EIN FREMDER KUNDENDIENST EINE ANDERE SPRACHE BENÖTIGT, IST ES AUFGABE DES KUNDEN FÜR EINE ENTSPRECHENDE ÜBERSETZUNG ZU SORGEN.
- VERSUCHEN SIE NICHT, DAS GERÄT ZU REPARIEREN, BEVOR DIESES KUNDENDIENST–HANDBUCH NICHT ZU RATE GEZOGEN UND VERSTANDEN WURDE.
- WIRD DIESE WARNUNG NICHT BEACHTET, SO KANN ES ZU VERLETZUNGEN DES KUNDENDIENSTTECHNIKERS, DES BEDIENERS ODER DES PATIENTEN DURCH ELEKTRISCHE SCHLÄGE, MECHANISCHE ODER SONSTIGE GEFAHREN KOMMEN.

AVISO

- ESTE MANUAL DE SERVICIO SÓLO EXISTE EN INGLÉS.
- SI ALGÚN PROVEEDOR DE SERVICIOS AJENO A GEMS SOLICITA UN IDIOMA QUE NO SEA EL INGLÉS, ES RESPONSABILIDAD DEL CLIENTE OFRECER UN SERVICIO DE TRADUCCIÓN.
- NO SE DEBERÁ DAR SERVICIO TÉCNICO AL EQUIPO, SIN HABER CONSULTADO Y COMPRENDIDO ESTE MANUAL DE SERVICIO.
- LA NO OBSERVANCIA DEL PRESENTE AVISO PUEDE DAR LUGAR A QUE EL PROVEEDOR DE SERVICIOS, EL OPERADOR O EL PACIENTE SUFRAN LESIONES PROVOCADAS POR CAUSAS ELÉCTRICAS, MECÁNICAS O DE OTRA NATURALEZA.

ATENÇÃO

- ESTE MANUAL DE ASSISTÊNCIA TÉCNICA SÓ SE ENCONTRA DISPONÍVEL EM INGLÊS.
- SE QUALQUER OUTRO SERVIÇO DE ASSISTÊNCIA TÉCNICA, QUE NÃO A GEMS, SOLICITAR ESTES MANUAIS NOUTRO IDIOMA, É DA RESPONSABILIDADE DO CLIENTE FORNECER OS SERVIÇOS DE TRADUÇÃO.
- NÃO TENDE REPARAR O EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA.
- O NÃO CUMPRIMENTO DESTE AVISO PODE POR EM PERIGO A SEGURANÇA DO TÉCNICO, OPERADOR OU PACIENTE DEVIDO A‘ CHOQUES ELÉTRICOS, MECÂNICOS OU OUTROS.

AVVERTENZA

- IL PRESENTE MANUALE DI MANUTENZIONE È DISPONIBILE SOLTANTO IN INGLESE.
- SE UN ADDETTO ALLA MANUTENZIONE ESTERNO ALLA GEMS RICHIEDE IL MANUALE IN UNA LINGUA DIVERSA, IL CLIENTE È TENUTO A PROVVEDERE DIRETTAMENTE ALLA TRADUZIONE.
- SI PROCEDA ALLA MANUTENZIONE DELL’APPARECCHIATURA SOLO DOPO AVER CONSULTATO IL PRESENTE MANUALE ED AVERNE COMPRESO IL CONTENUTO.
- NON TENERE CONTO DELLA PRESENTE AVVERTENZA POTREBBE FAR COMPIERE OPERAZIONI DA CUI DERIVINO LESIONI ALL’ADDETTO ALLA MANUTENZIONE, ALL’UTILIZZATORE ED AL PAZIENTE PER FOLGORAZIONE ELETTRICA, PER URTI MECCANICI OD ALTRI RISCHI.

警告

- ・このサービスマニュアルには英語版しかありません。
- ・GEMS以外でサービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。
- ・このサービスマニュアルを熟読し理解せずに、装置のサービスを行わないで下さい。
- ・この警告に従わない場合、サービスを担当される方、操作員あるいは患者さんが、感電や機械的又はその他の危険により負傷する可能性があります。

注意:

- 本维修手册仅存有英文本。
- 非 GEMS 公司的维修员要求非英文本的维修手册时，客户需自行负责翻译。
- 未详细阅读和完全了解本手册之前，不得进行维修。
- 忽略本注意事项会对维修员，操作员或病人造成触电，机械伤害或其他伤害。

REVISION HISTORY

REV	DATE	REASON FOR CHANGE
0	Jul. 17, 1991	Schematics for production.
1	Oct. 31, 1991	Review of rev.0.
2	Mar. 04, 1992	Updated.
3	Jun. 04, 1992	
0	May 31, 1993	MP Phase 4 (Ph. 2). New Part No. 36004389 for sm.
0	July 15, 1995	MP Phase 4 (Ph. 4) + Vascular Option Generator. New Part No. 2119703–100 for Schematics (old Part No.: 36004385).
1	31–Jan–96	Updated (Technical Release 2) New schematics for: Measure and Commutation Board, Mini Bridge Board, Regulation Board, Control Board, Interface 2 Board, Grid/Bias Interface Board, AC Distribution Panel and Filter Board.
2	14–Jun–96	Updated (SPR BUCge17973) New schematic for CPU Board.
3	23–Oct–96	Schematic Update.
4	3–Apr–97	Schematic Update: Interface I Board and Measurement and Commutation
5	2–Dec–97	Update.
6	06–Mar–98	Updates for Butterfly: Modification to Schematic 2115419. Update Schematic 2127280 to revB.
7	09–Apr–99	Updates for NF2: Modification to Schematic 2140213–2. Update Schematic 2140213–2 to revA.
8	09–Feb.–2000	New Security Board. Updated Inverters 1 & 2 Block Diagrams.
9	25–Sept–2001	External ECM Power Supply updated on CPU Board schematic. (page 205)

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WARNING

**LINE VOLTAGE IS PRESENT ON MP PHASE 42 A1 A4
BOARD
WHEN MAIN CIRCUIT BREAKER IS "OFF"**

REMARK

There is a s/w protection circuit which prevents frequent "ON–OFF" cycling of the MP. The MP can be cycled "ON" and "OFF" only 7 times in a 21 minutes time period. Every 3 minutes one of the switch cycle counts is removed. (e.g. you could cycle indefinitely if you wait 3 minutes between each "ON–OFF" cycle).

This delay is required to protect certain components in the AC Supply board (MP Phase 41 A4 A1), from the effects of capacitor charge and discharge.

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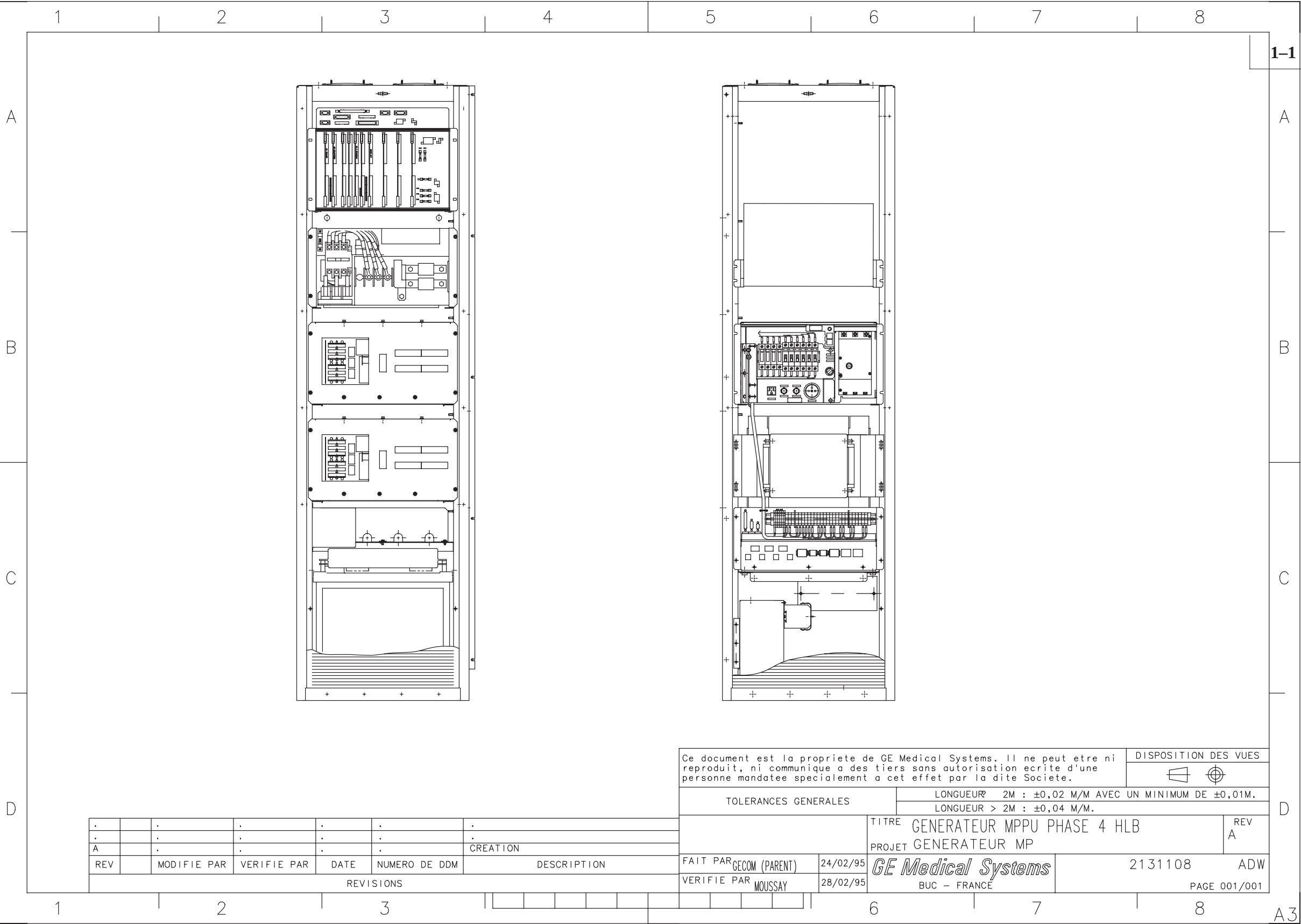
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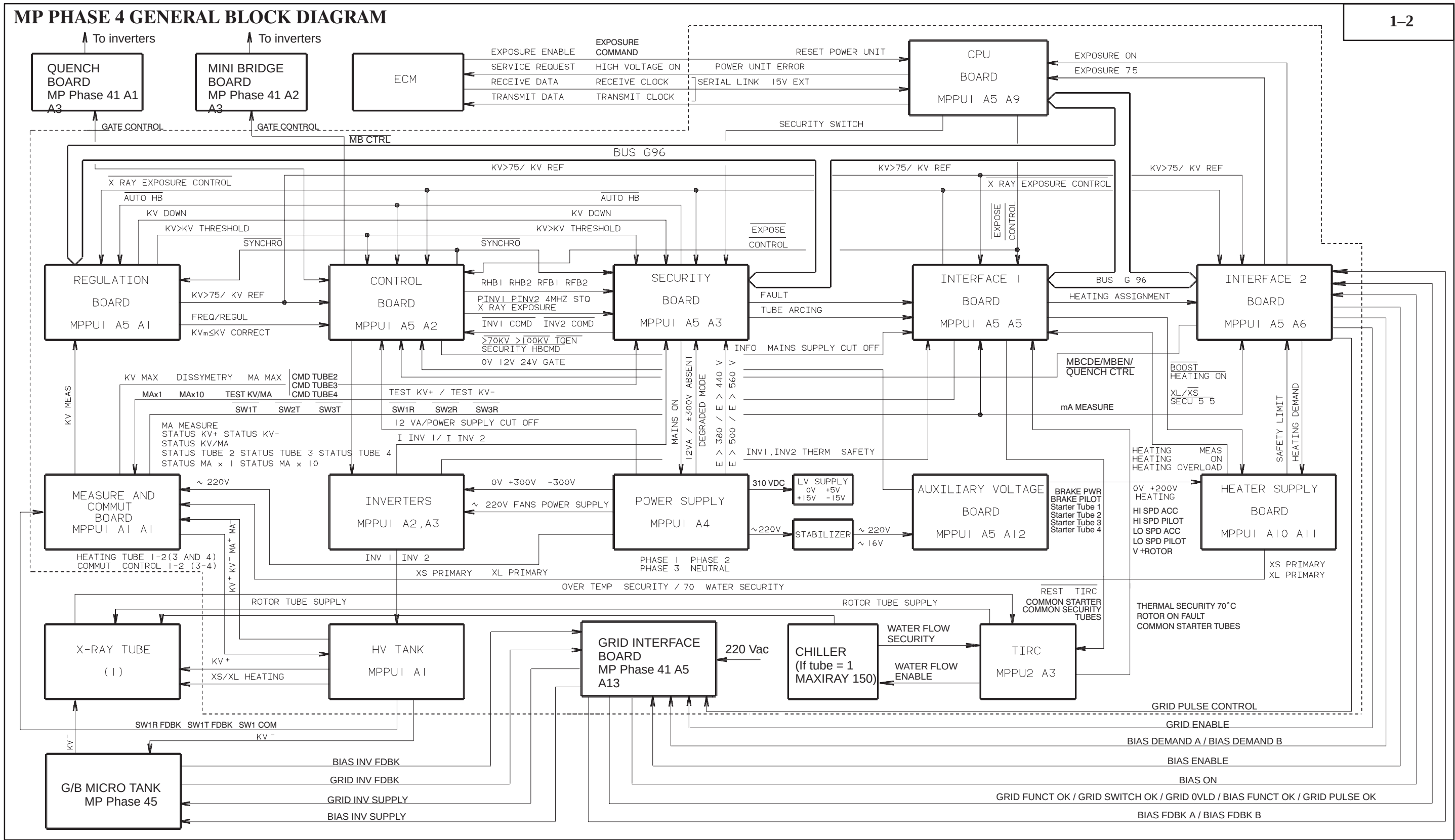
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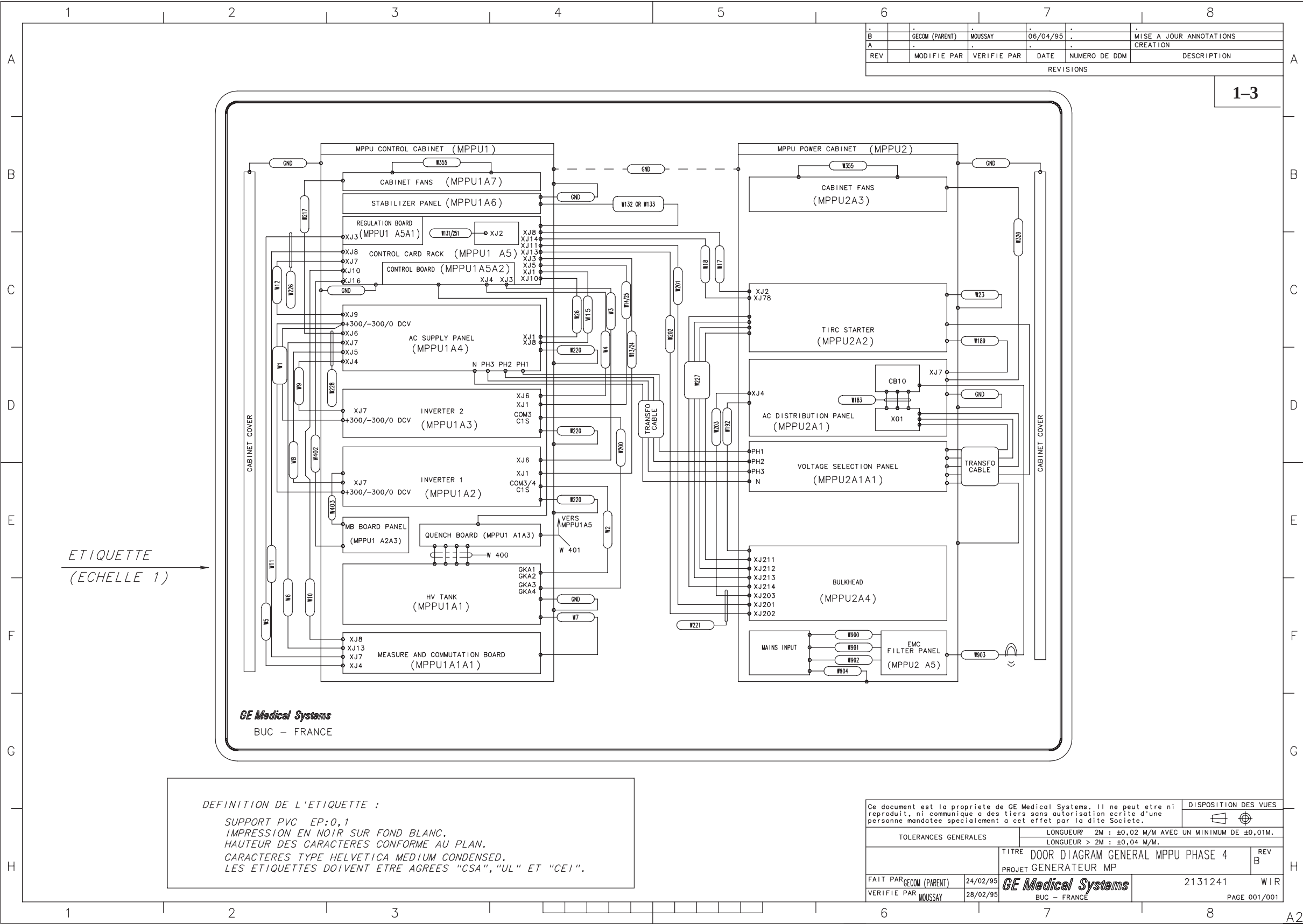
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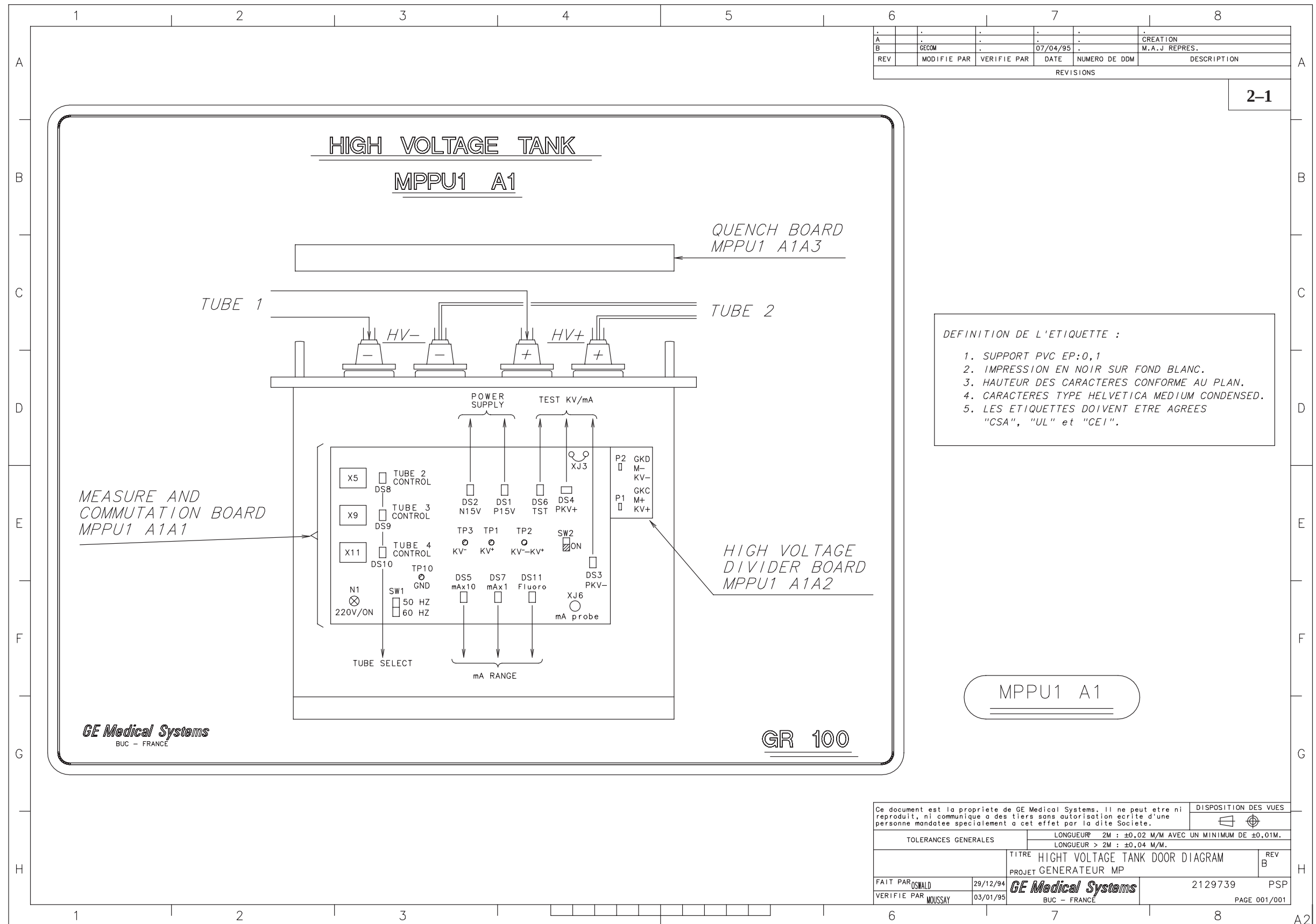
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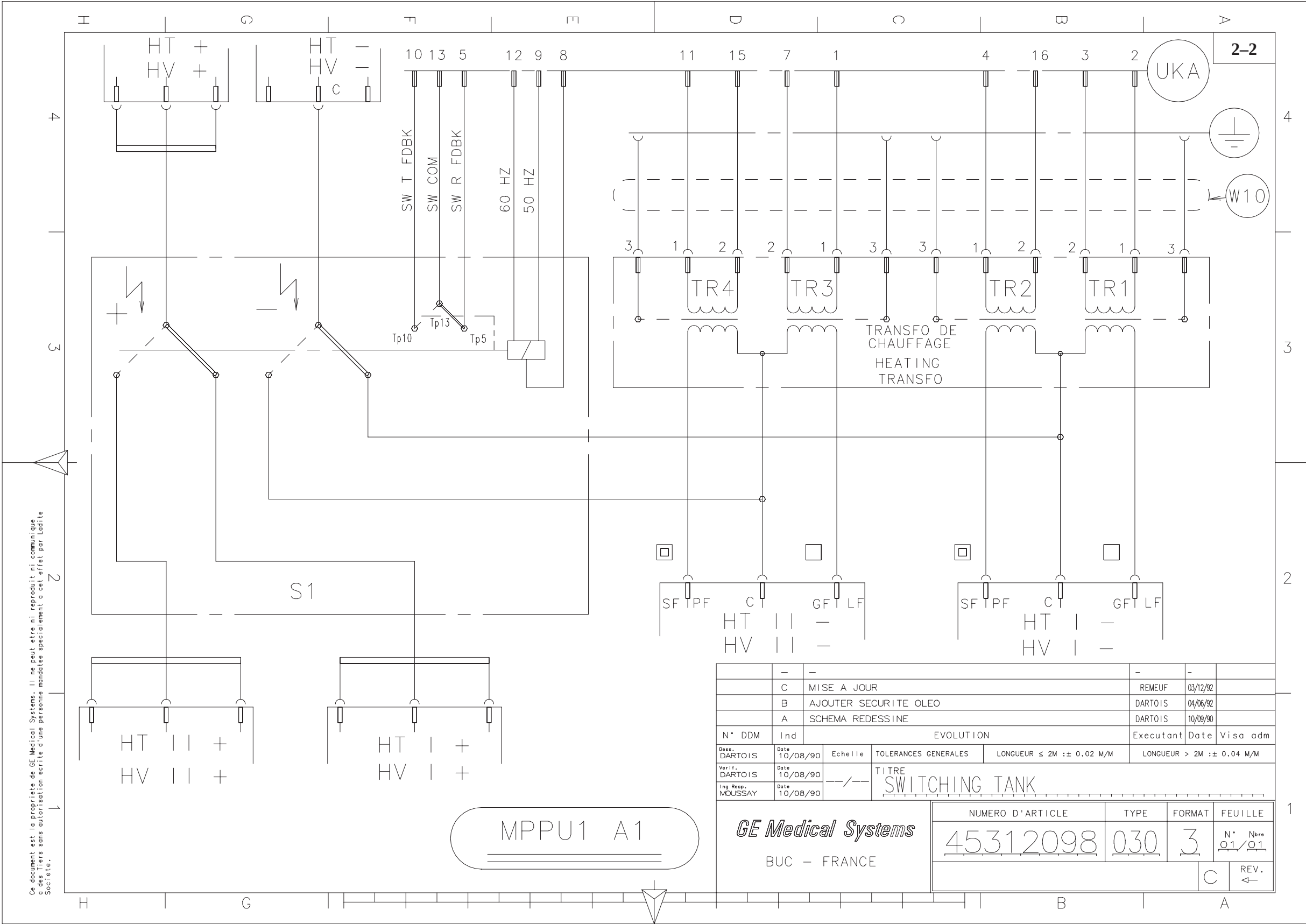




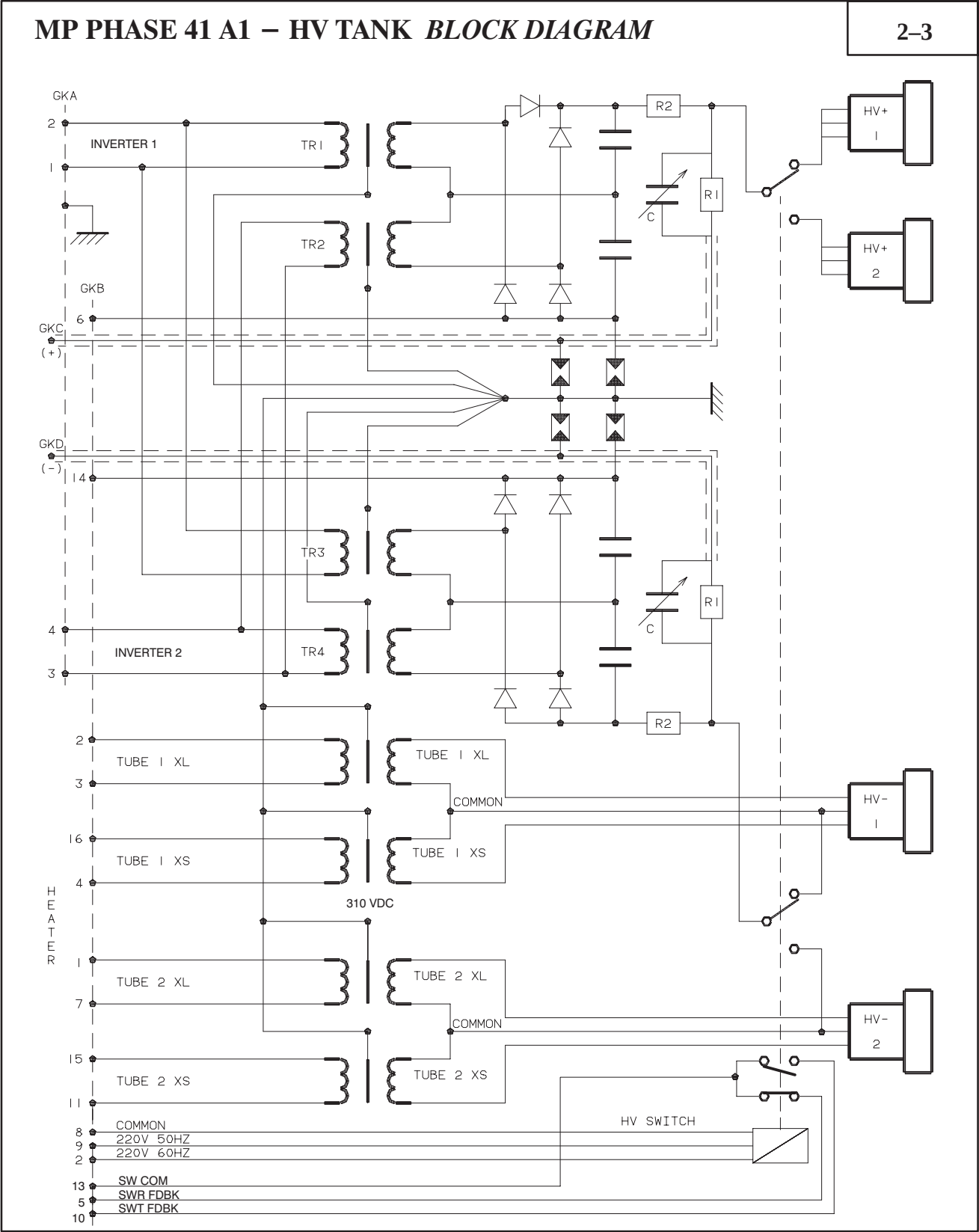
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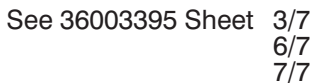


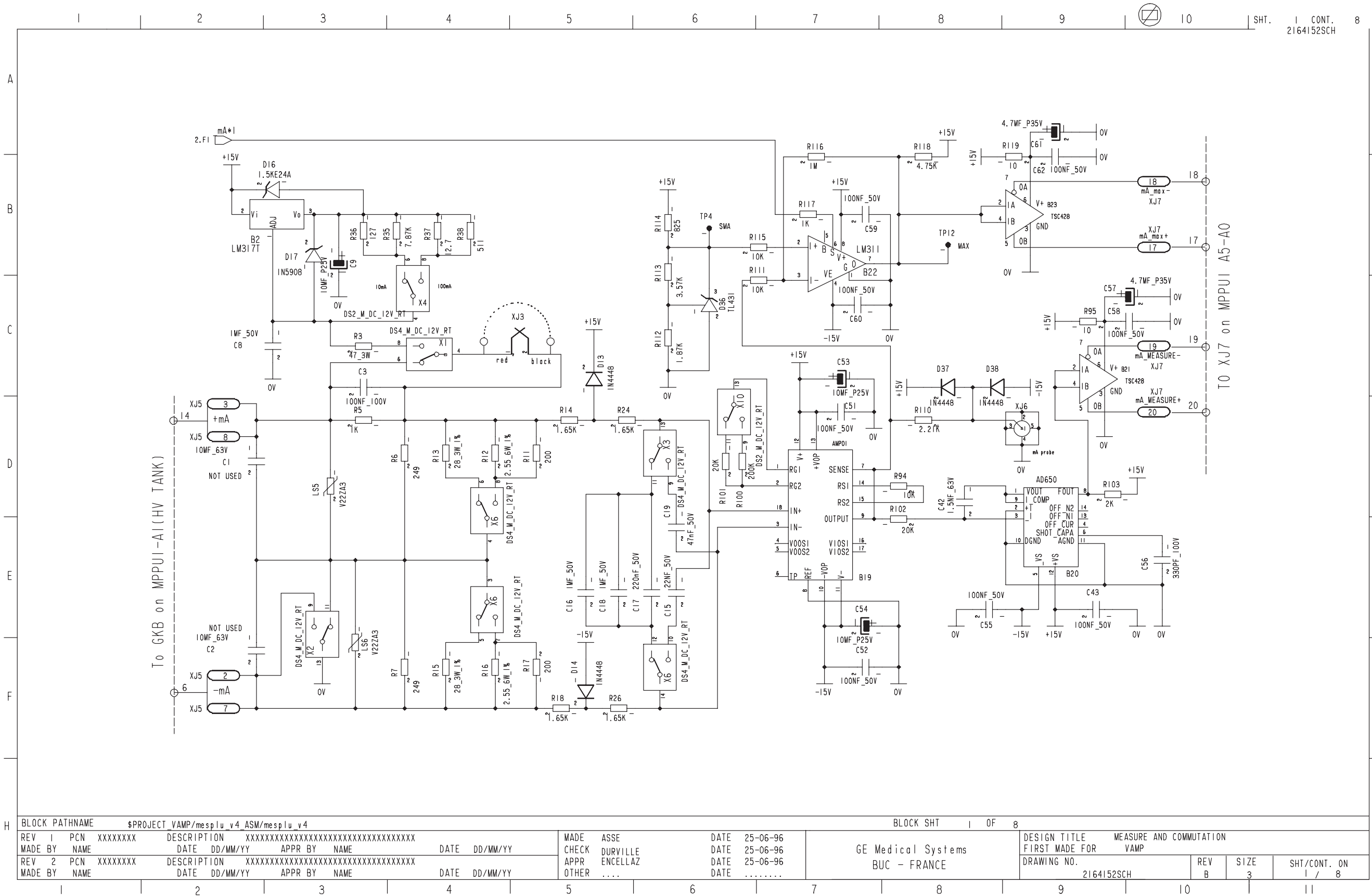
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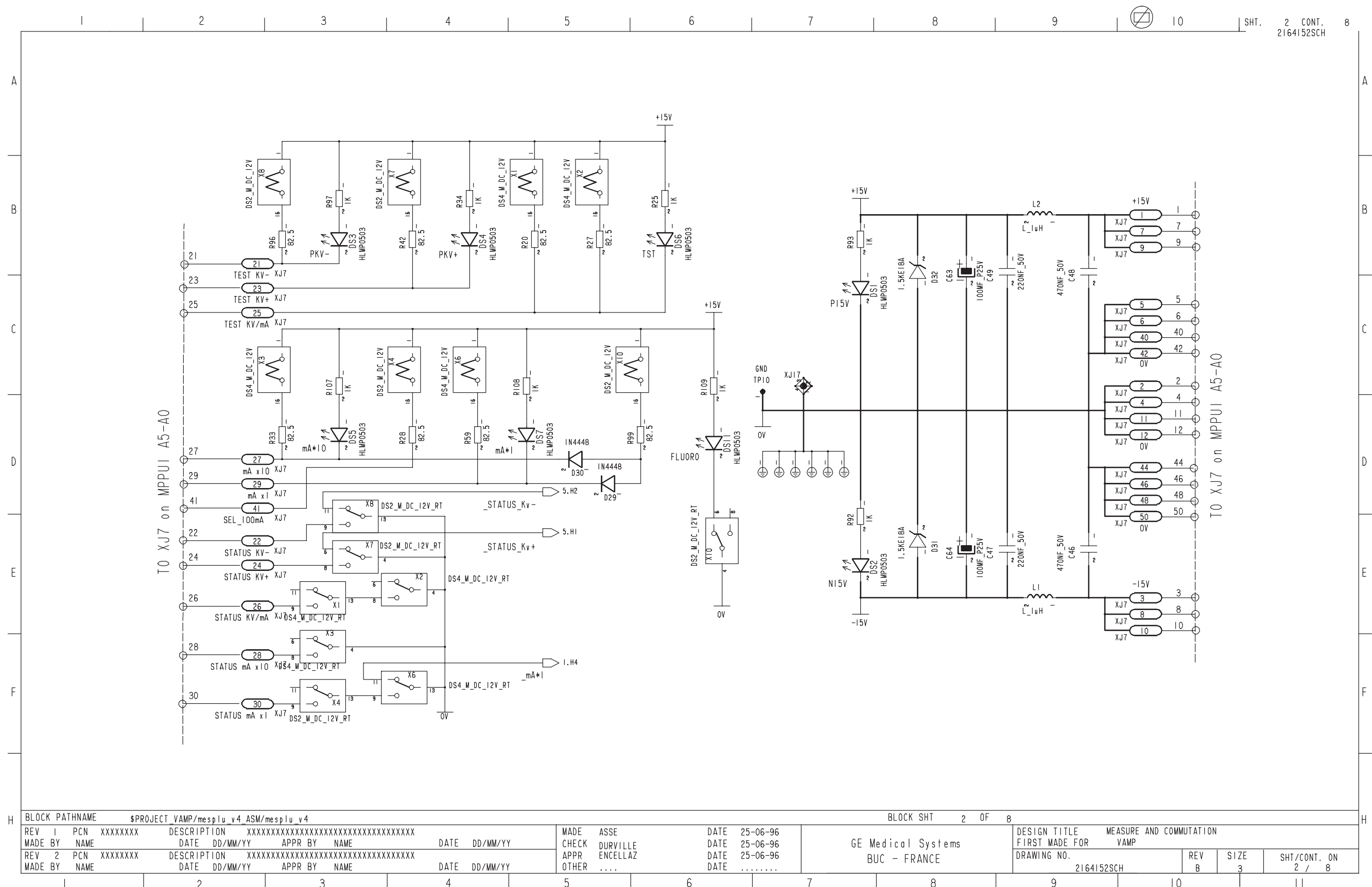
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XL	Large Focus	
kV+	High voltage anode	
kV-	High voltage cathode	
Test kV-mA		
SW1FDBK	Switch 1 Feedback	
SW2FDBK	Switch 2 Feedback	
SW3FDBK	Switch 3 Feedback	
SW1/2/3 T	High voltage switch 1/2/3 Feedback to Interface 1 Board	
SW1/2/3 R	High voltage switch 1/2/3 Feedback to Interface 1 Board	

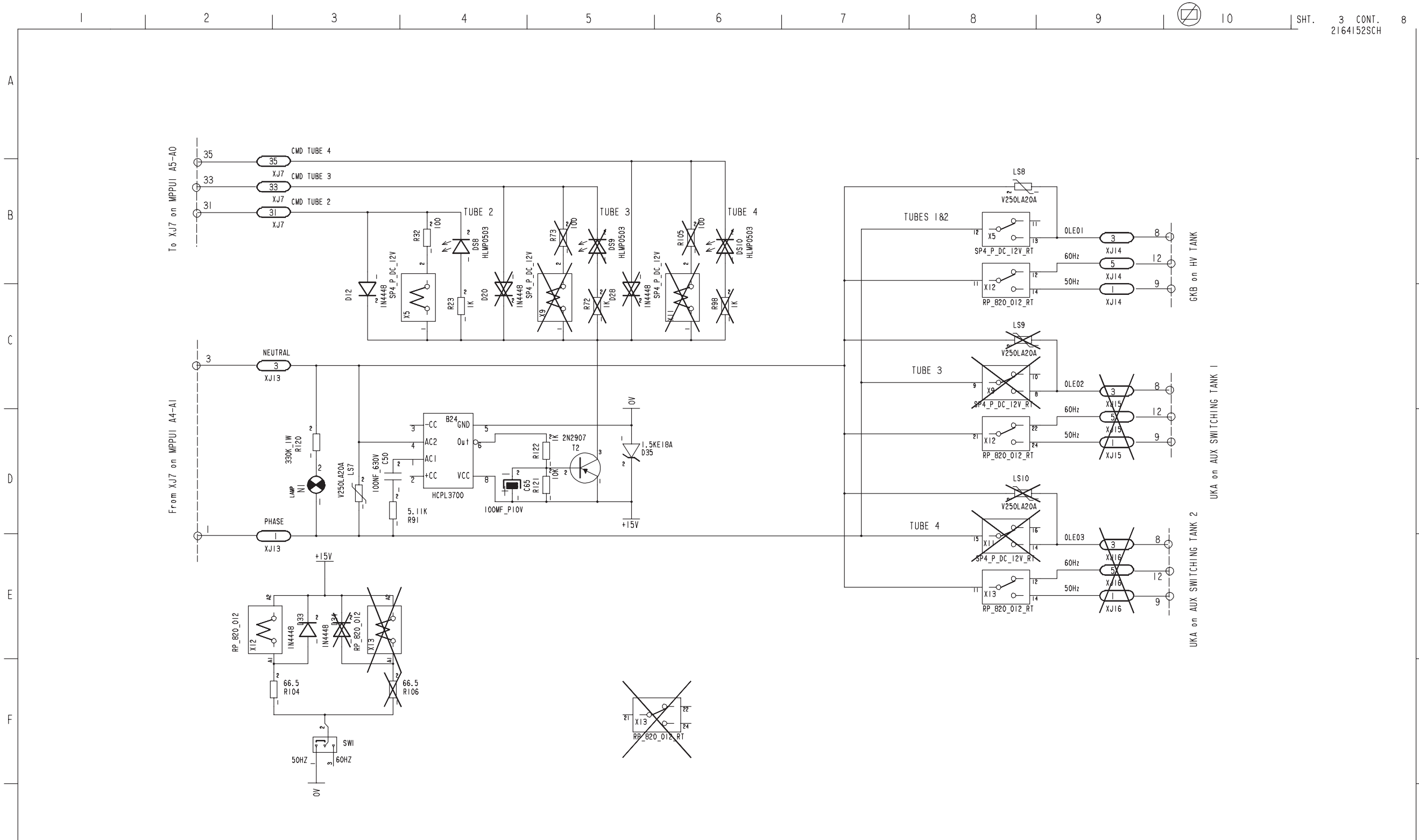
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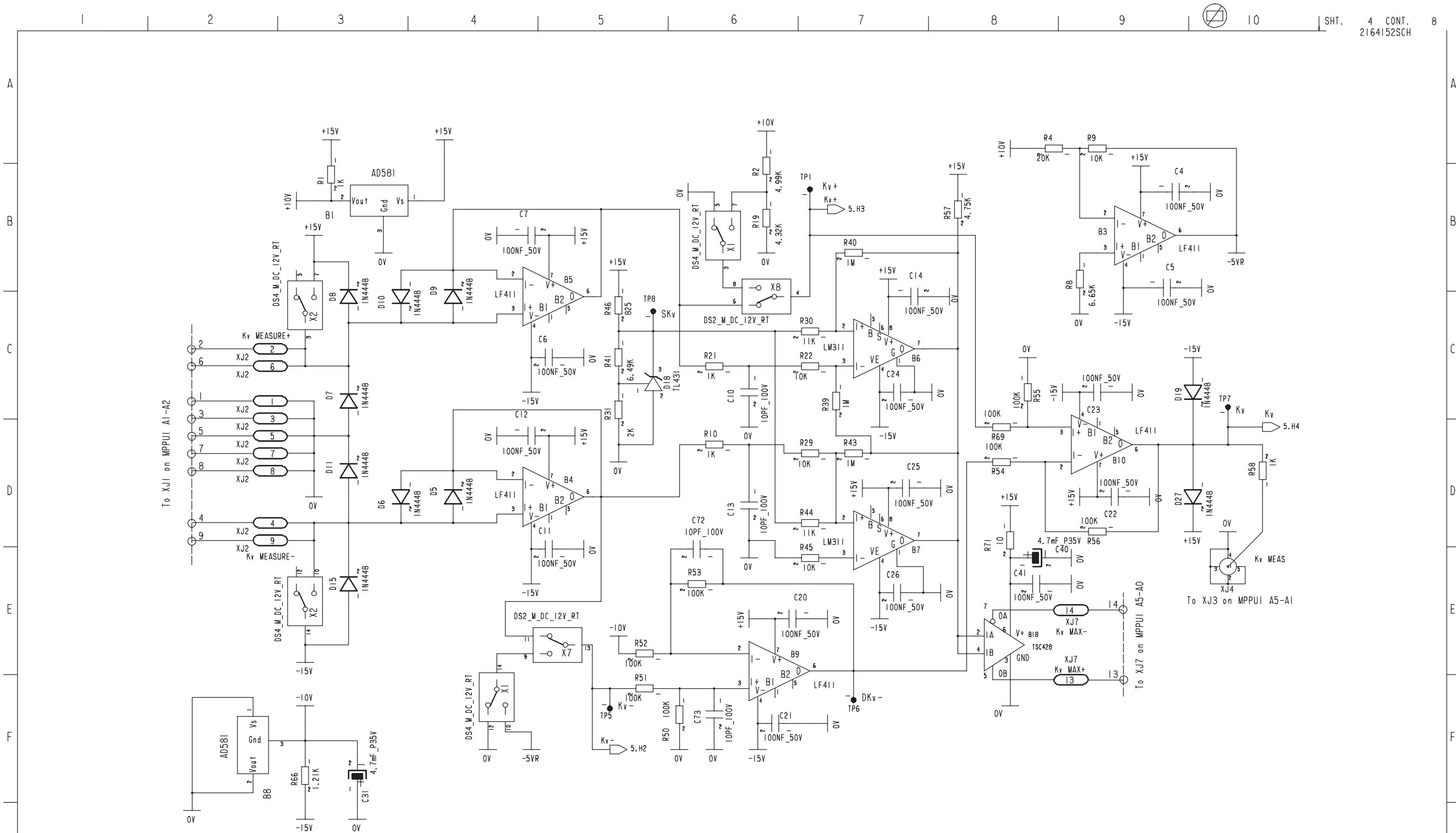




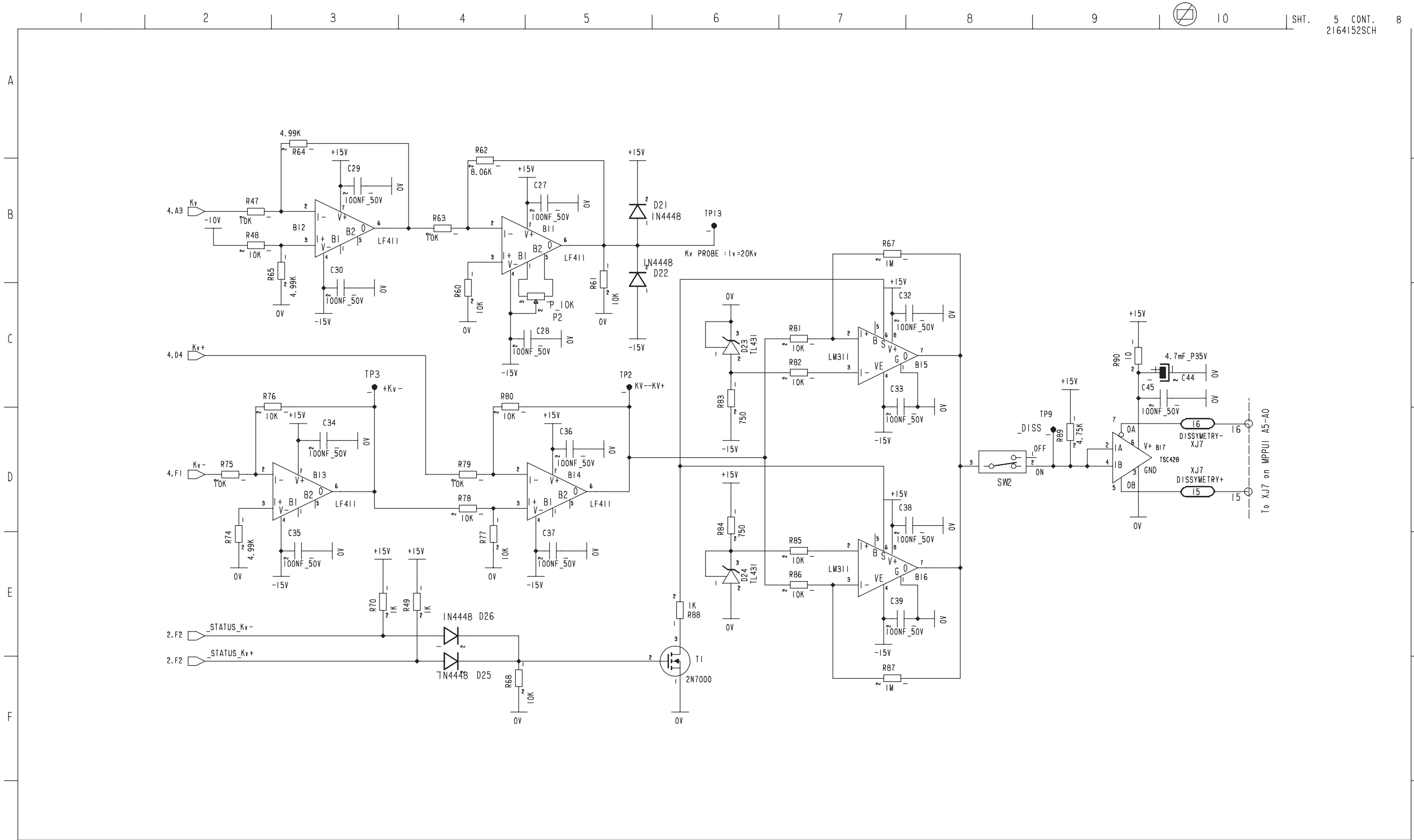




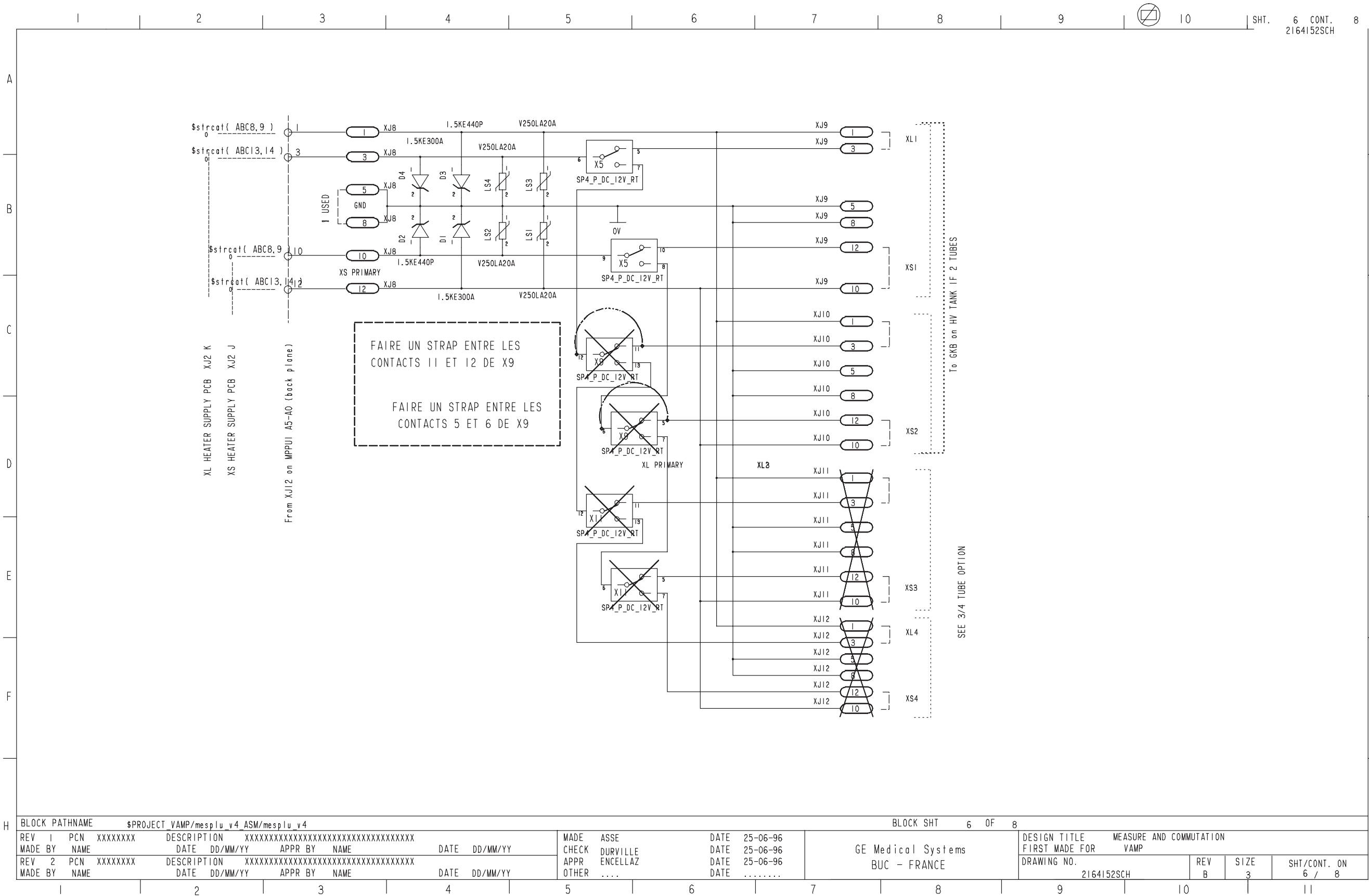
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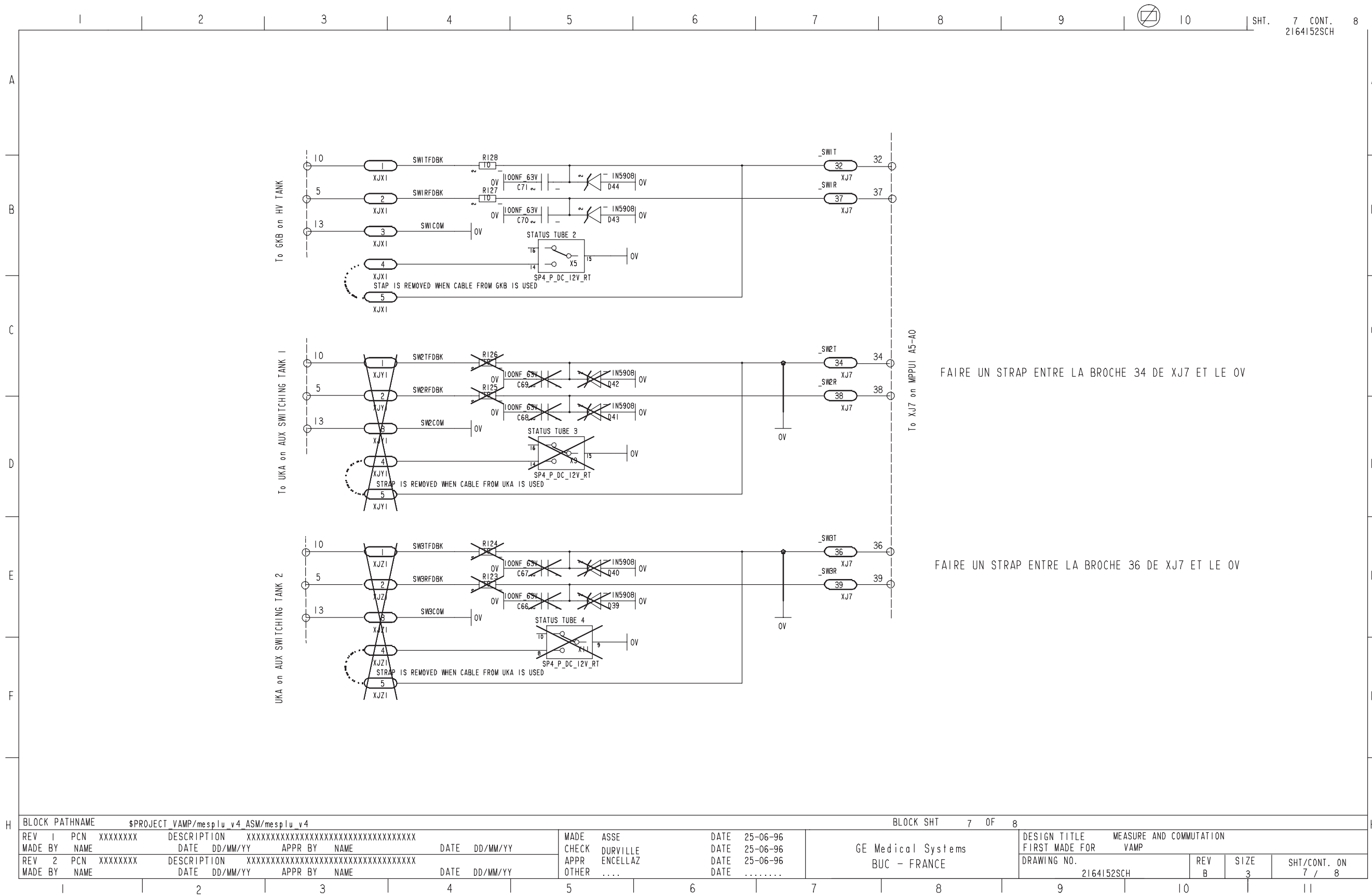


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MADE BY	NAME		DATE DD/MM/YY	APPR BY NAME	CHECK	DURVILLE	DATE	25-06-96			
REV 2	PCN	XXXXXXXX	DESCRIPTION	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	APPR	ENCELLAZ	DATE	25-06-96	BUC - FRANCE		
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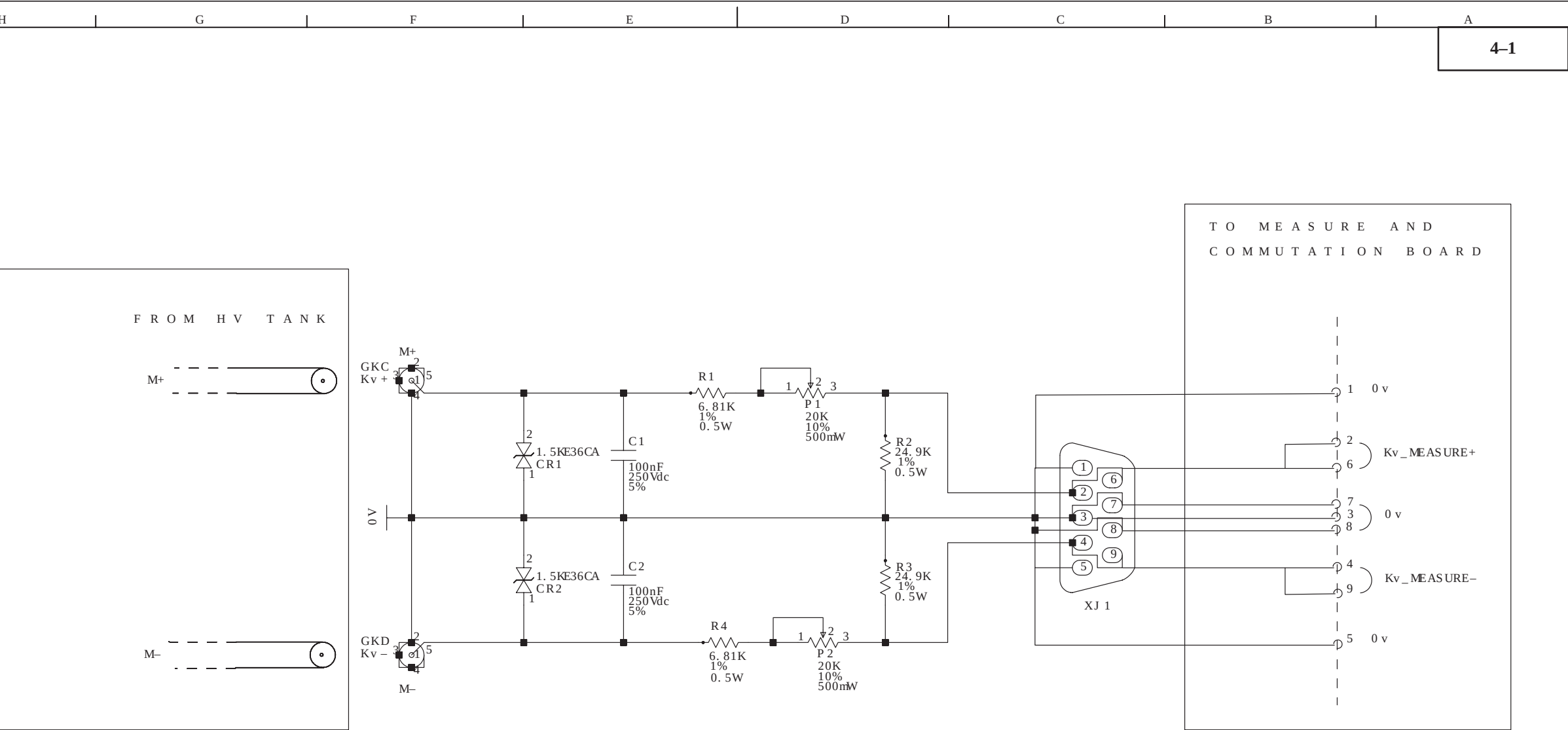


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MADE BY		NAME				DATE		DD/MM/YY		APPR BY		NAME		DATE		DD/MM/YY		CHECK		DURVILLE		DATE		25-06-96		FIRST MADE FOR						VAMP									
REV 2		PCN		XXXXXXXX		DESCRIPTION				XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX										APPR		ENCELLAZ		DATE		25-06-96		BUC - FRANCE				DRAWING NO.				REV		SIZE		SHT/CONT. ON	
MADE BY		NAME				DATE		DD/MM/YY		APPR BY		NAME		DATE		DD/MM/YY		OTHER				DATE				2164152SCH						B		3		5 / 8					





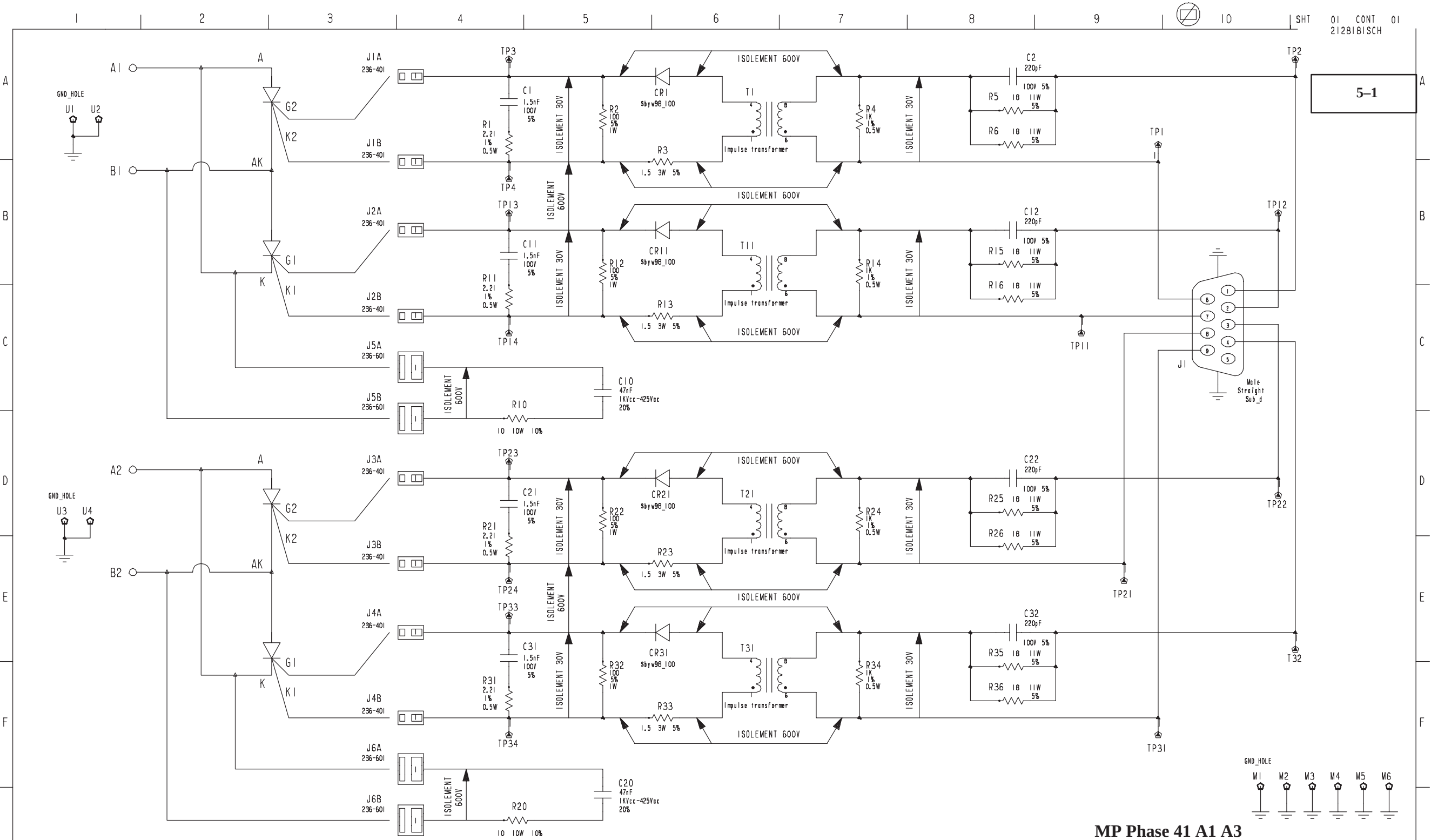
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MP PHASE 41 A1 A2¹

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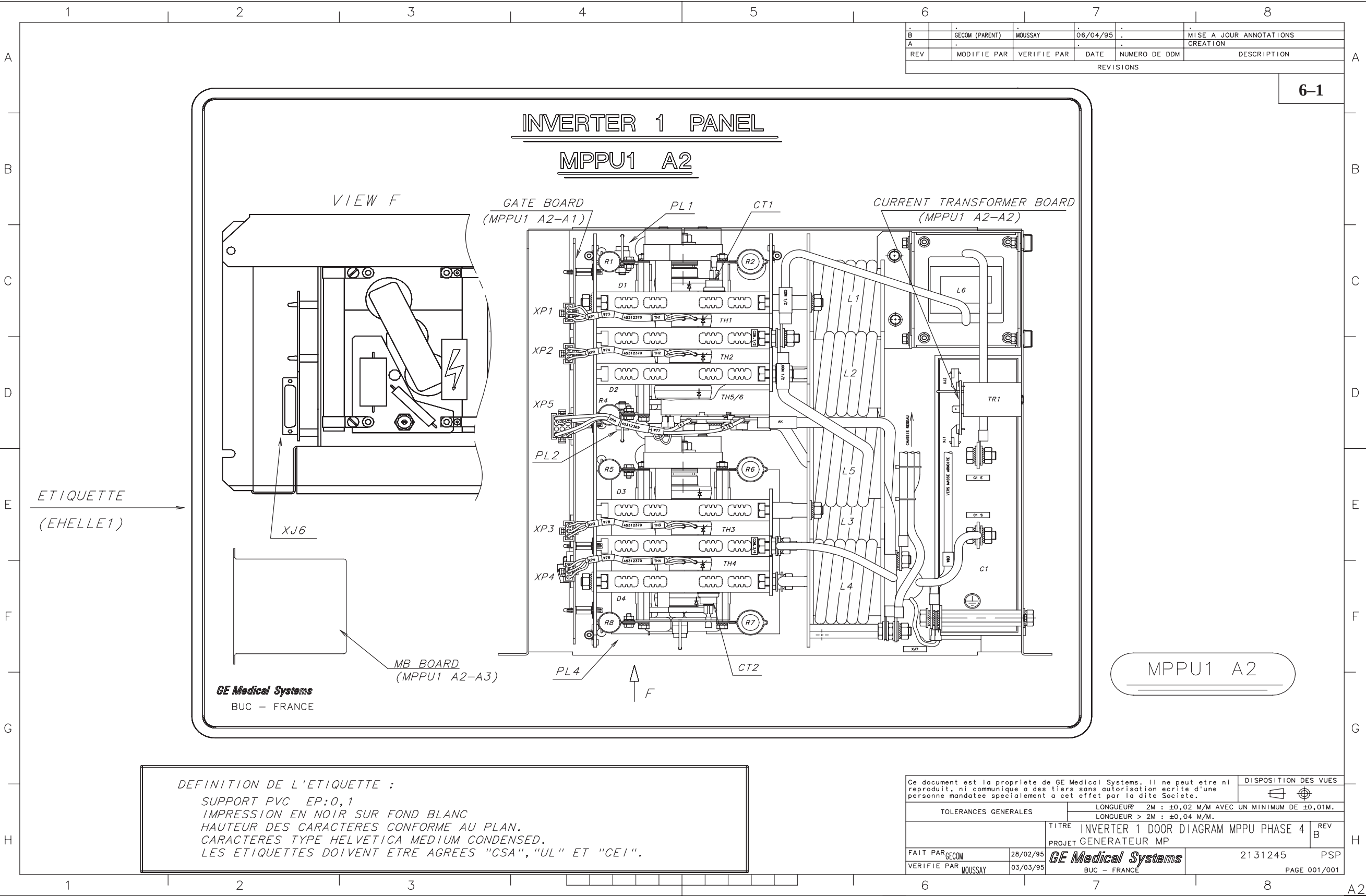


5-1

MP Phase 41 A1 A3

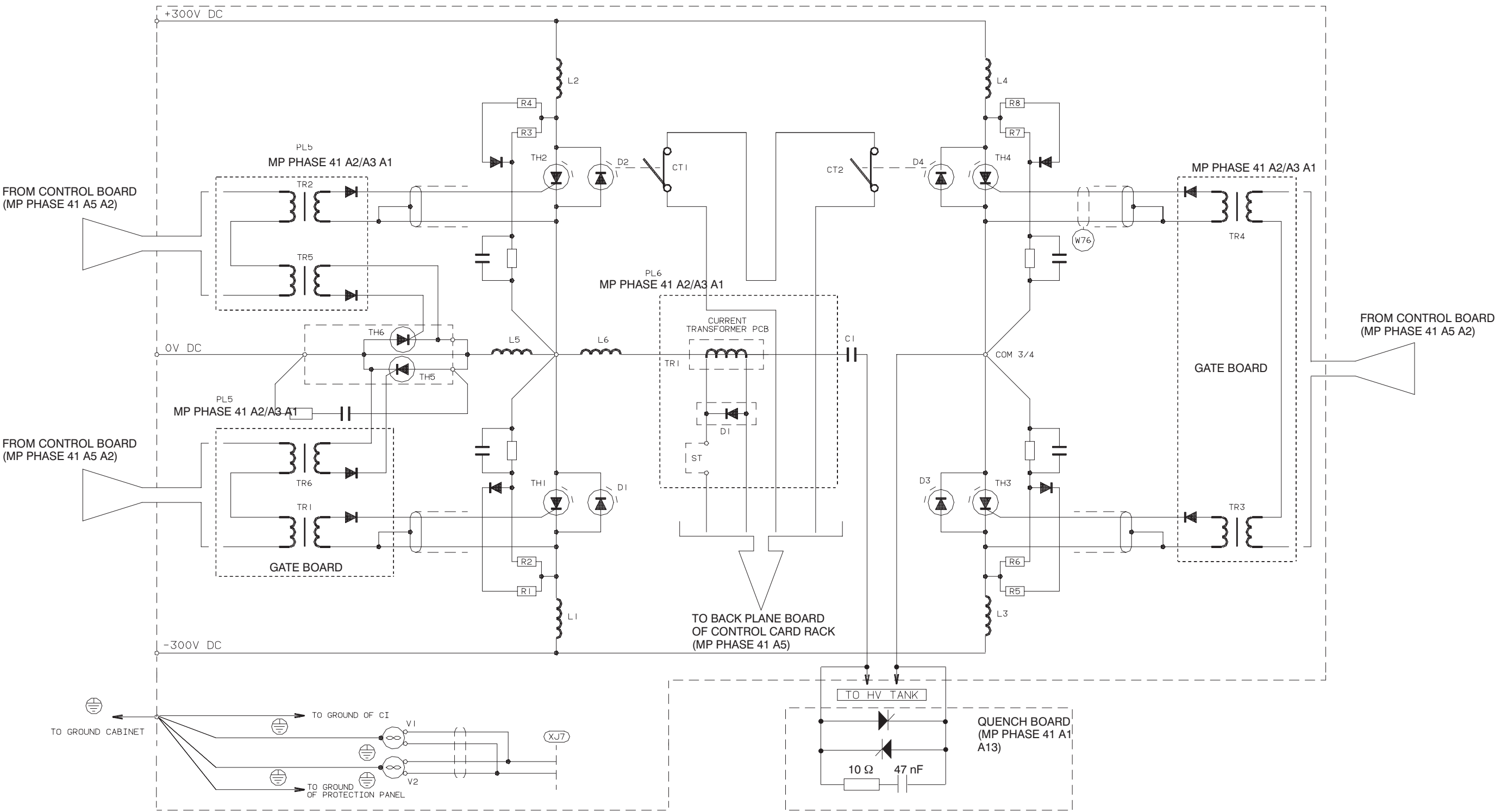
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REV 1	PCN XXXXXXXX	DESCRIPTION XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	DATE DD/MM/YY	MADE CHECK APPR OTHER	ASSE MENARD JP	DATE 19-01-95	DESIGN TITLE QUENCH
MADE BY NAME	DATE DD/MM/YY	APPR BY NAME	DATE DD/MM/YY	NAME	NAME	DATE DD/MM/YY	FIRST MADE FOR VAMP
REV 2	PCN XXXXXXXX	DESCRIPTION XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	DATE DD/MM/YY	NAME	NAME	DATE DD/MM/YY	DRAWING NO. 2128181SCH
MADE BY NAME	DATE DD/MM/YY	APPR BY NAME	DATE DD/MM/YY	NAME	NAME	DATE DD/MM/YY	REV A SIZE 3 SHT/CONT 01 / 01 ON

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MP PHASE 41 A3 – INVERTER 2 BLOCK DIAGRAM

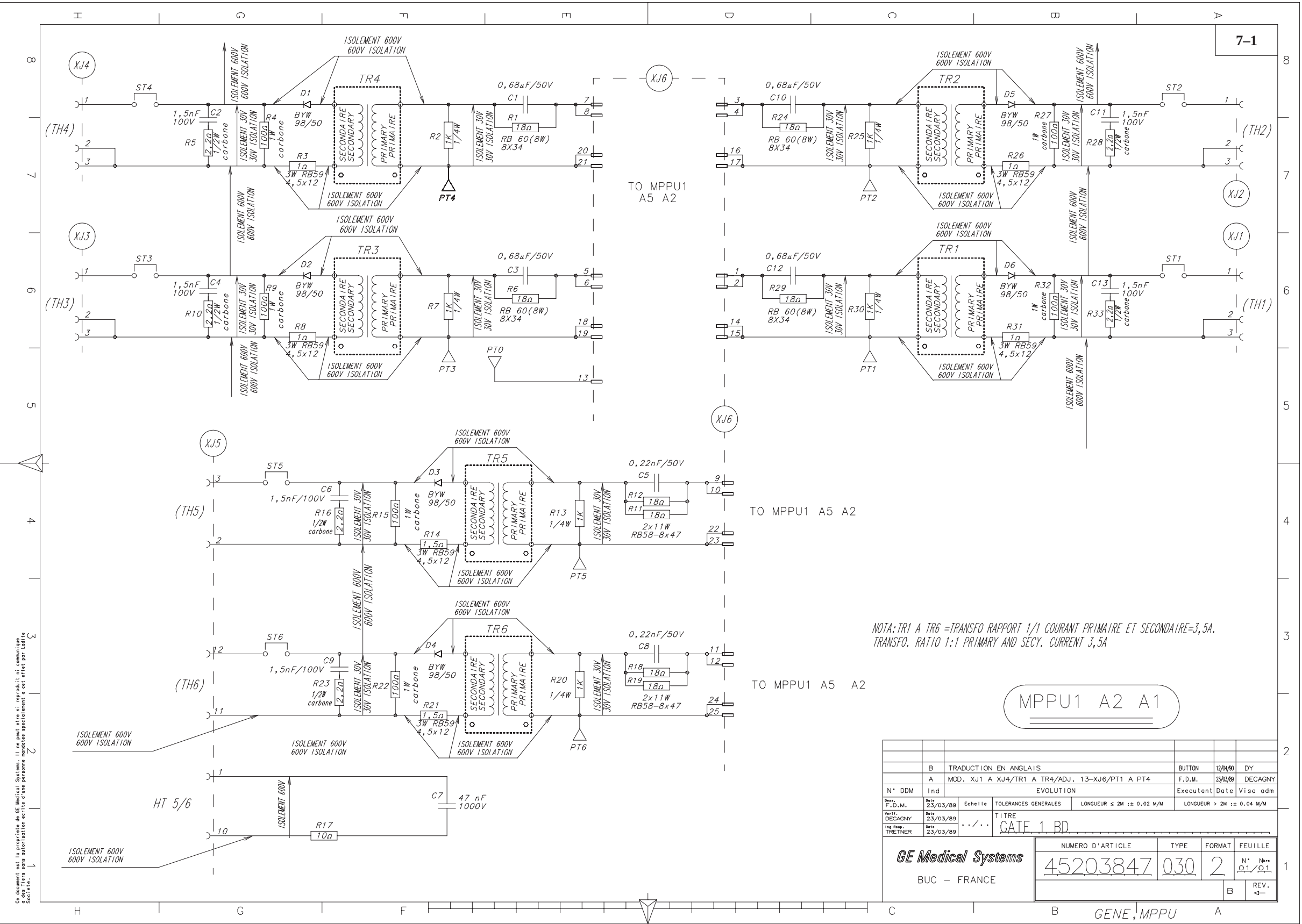
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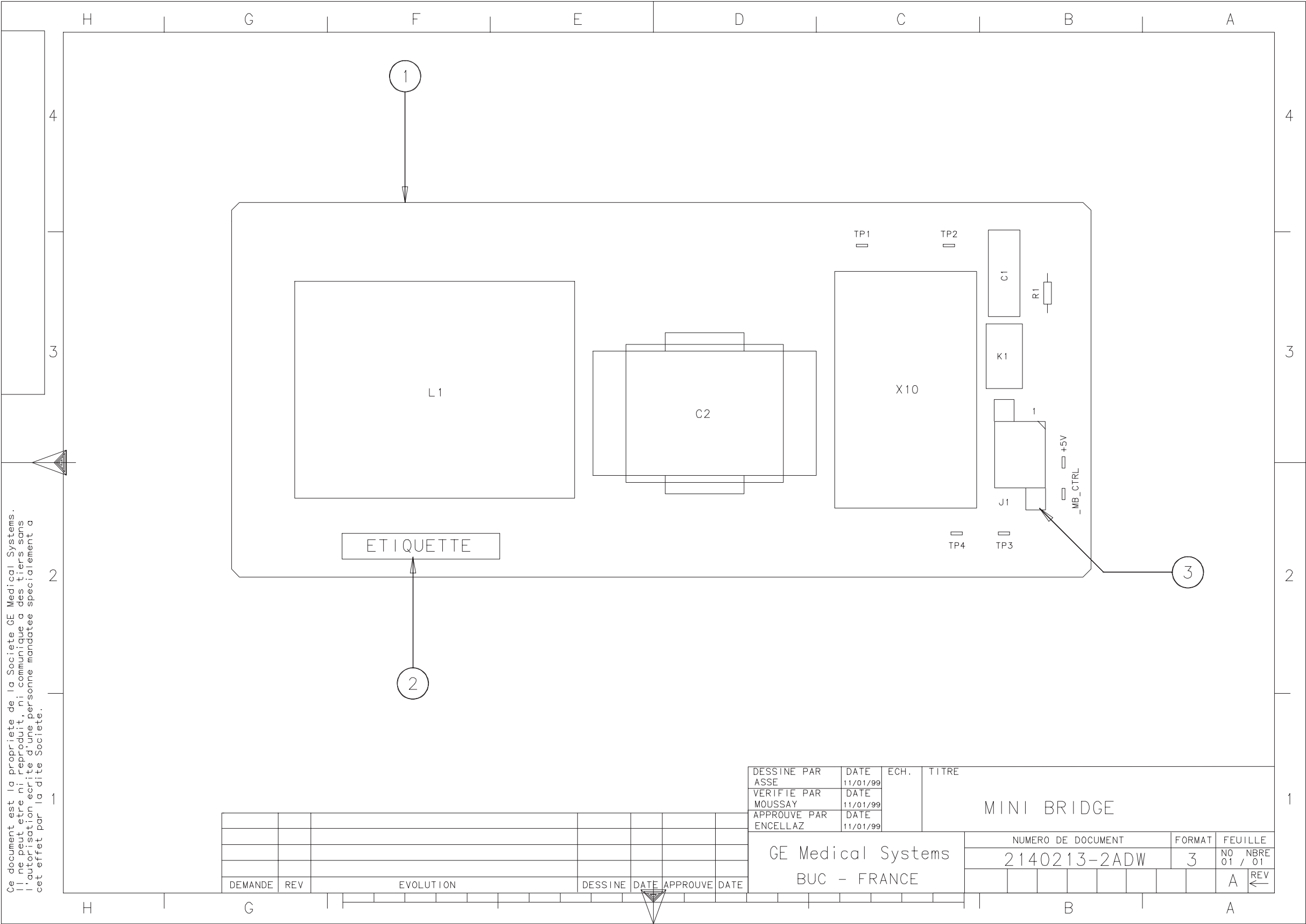


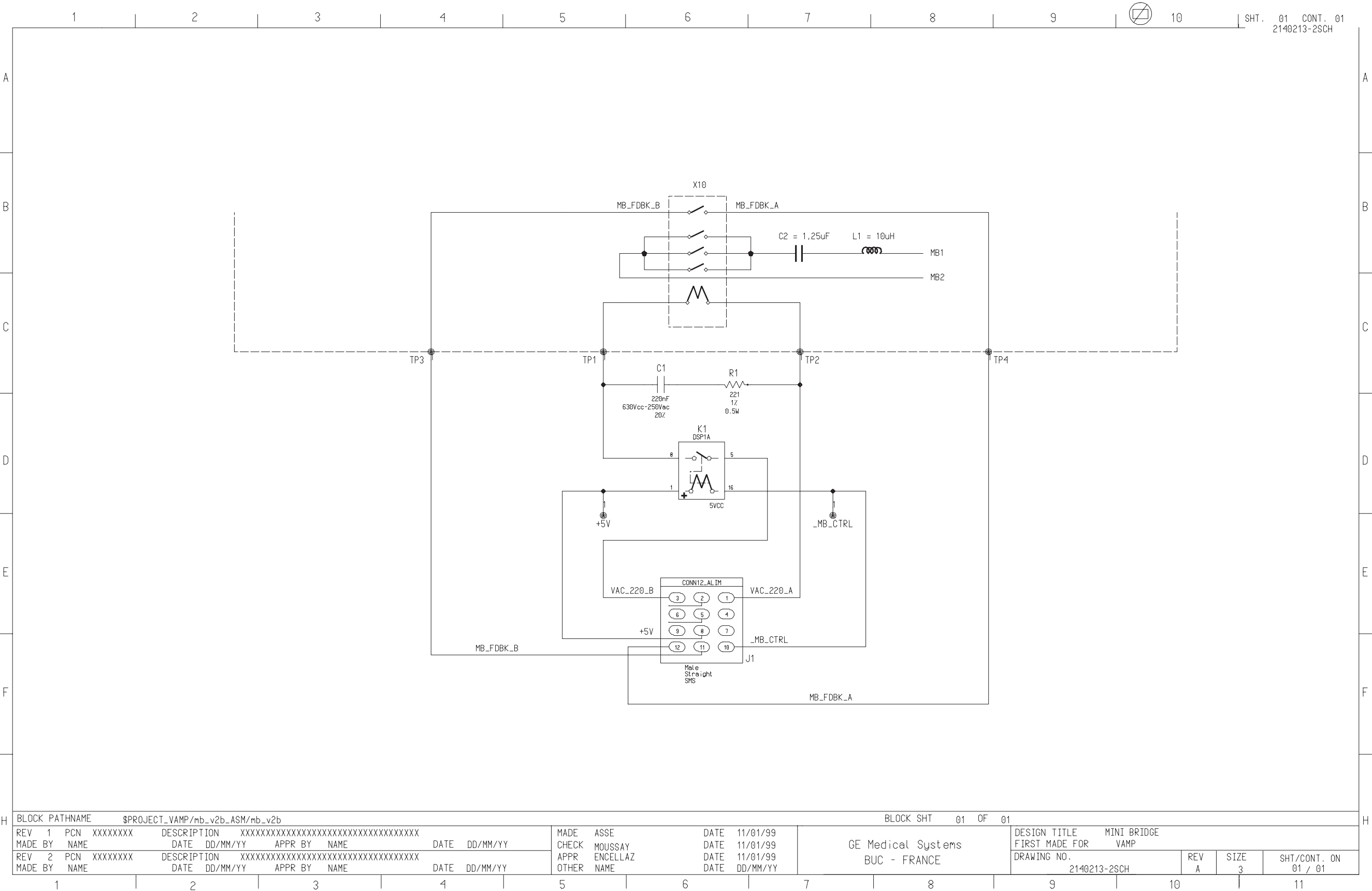
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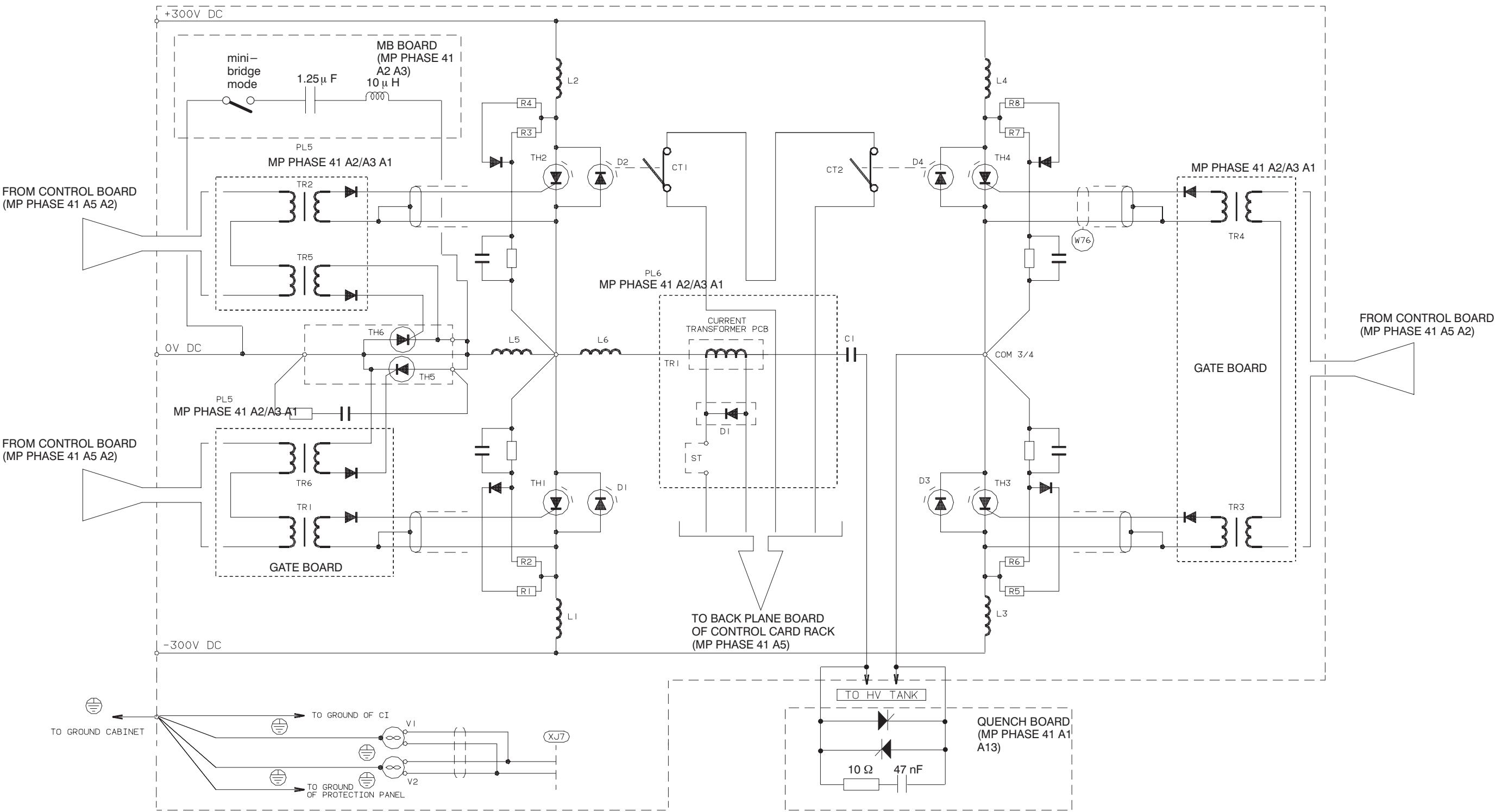




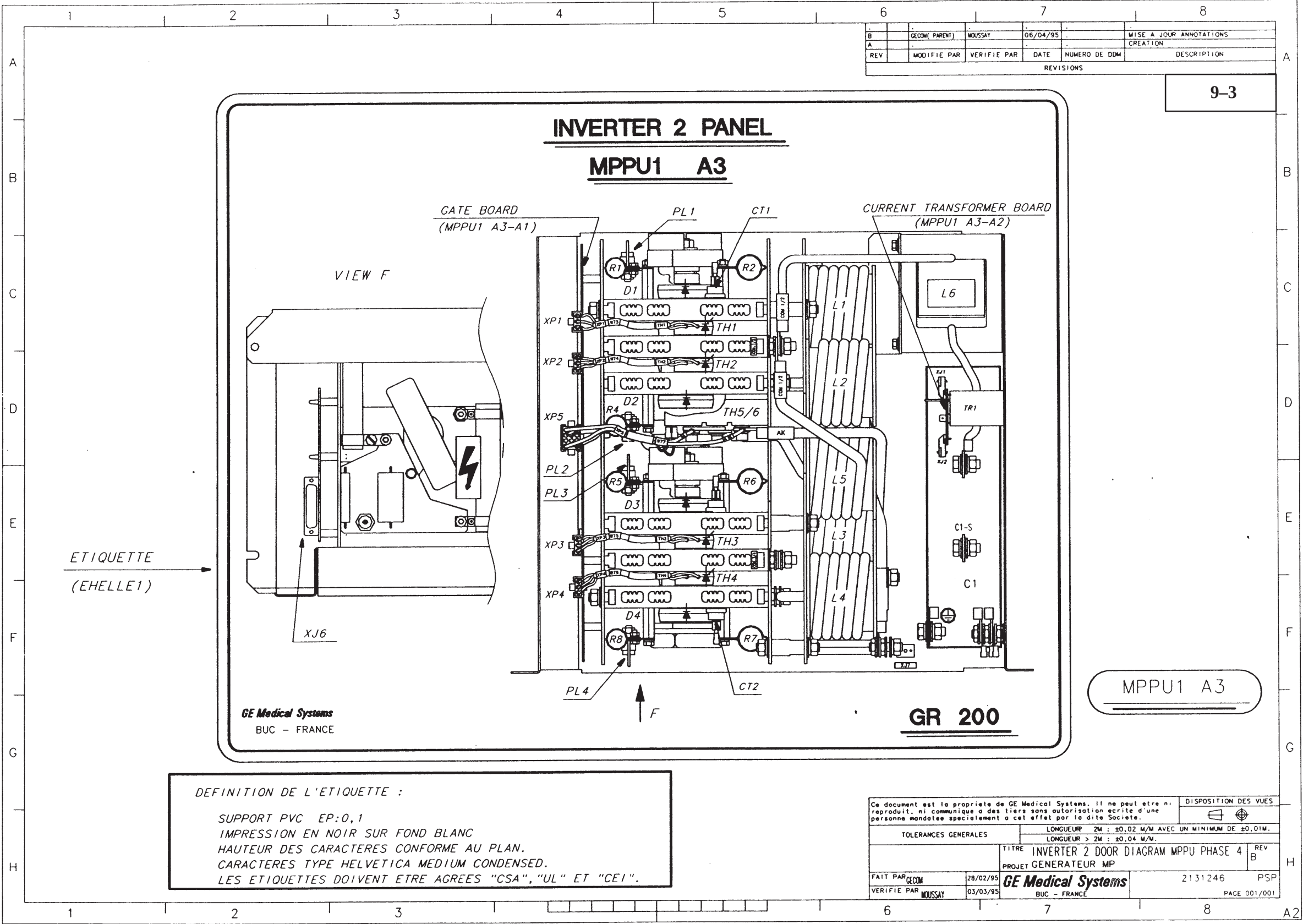


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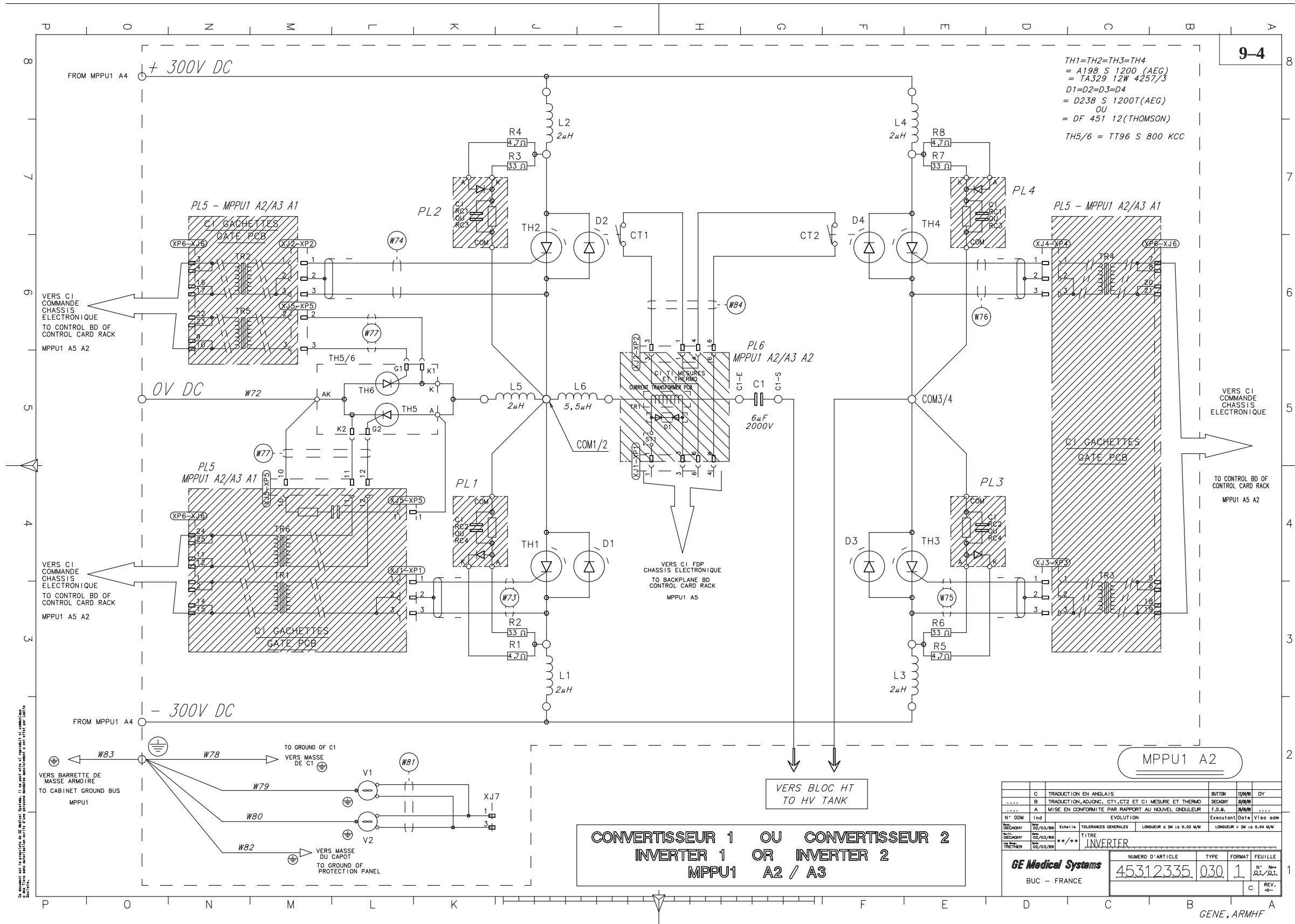
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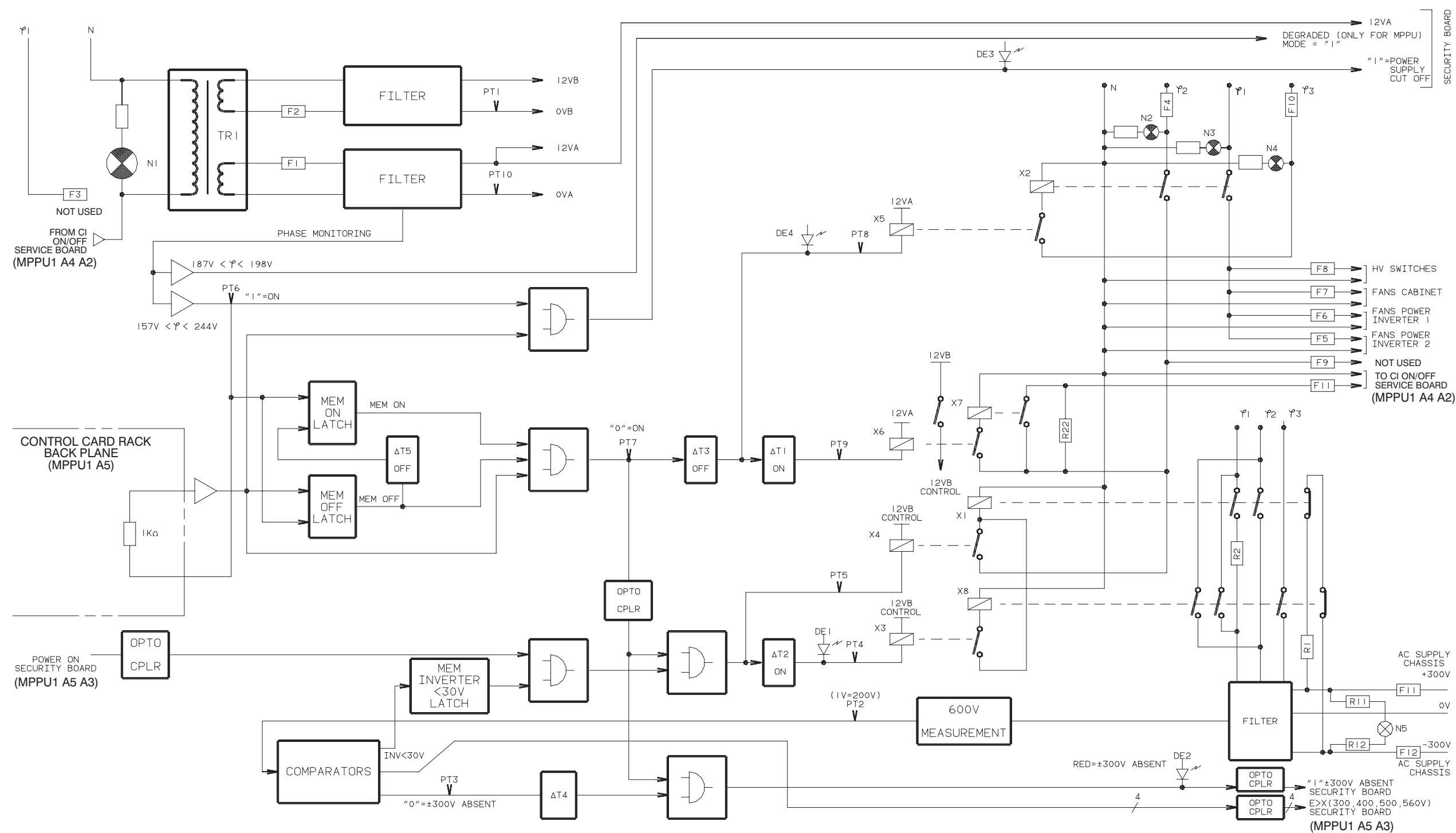
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MP PHASE 41 A4 – AC SUPPLY PANEL *BLOCK DIAGRAM*

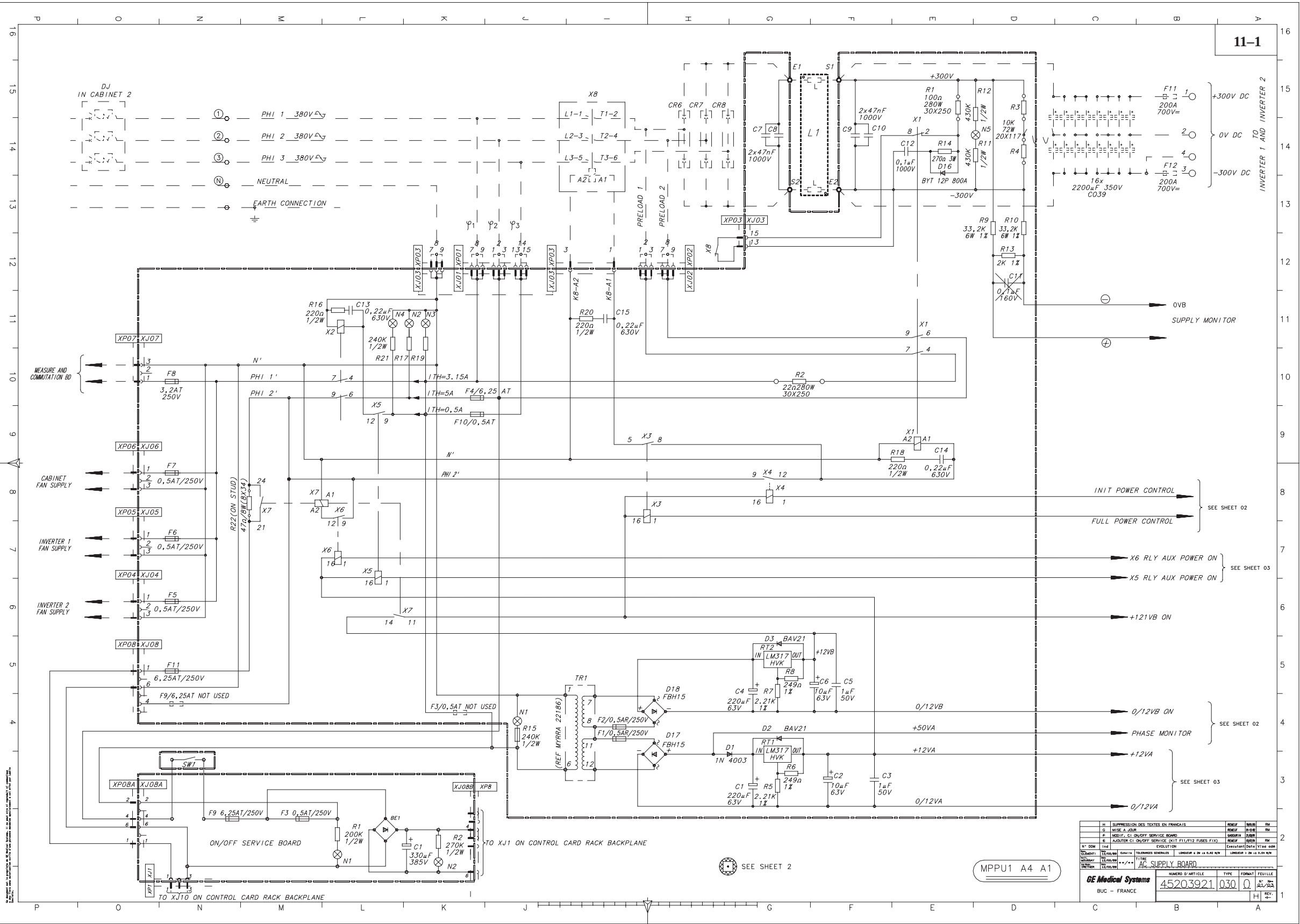
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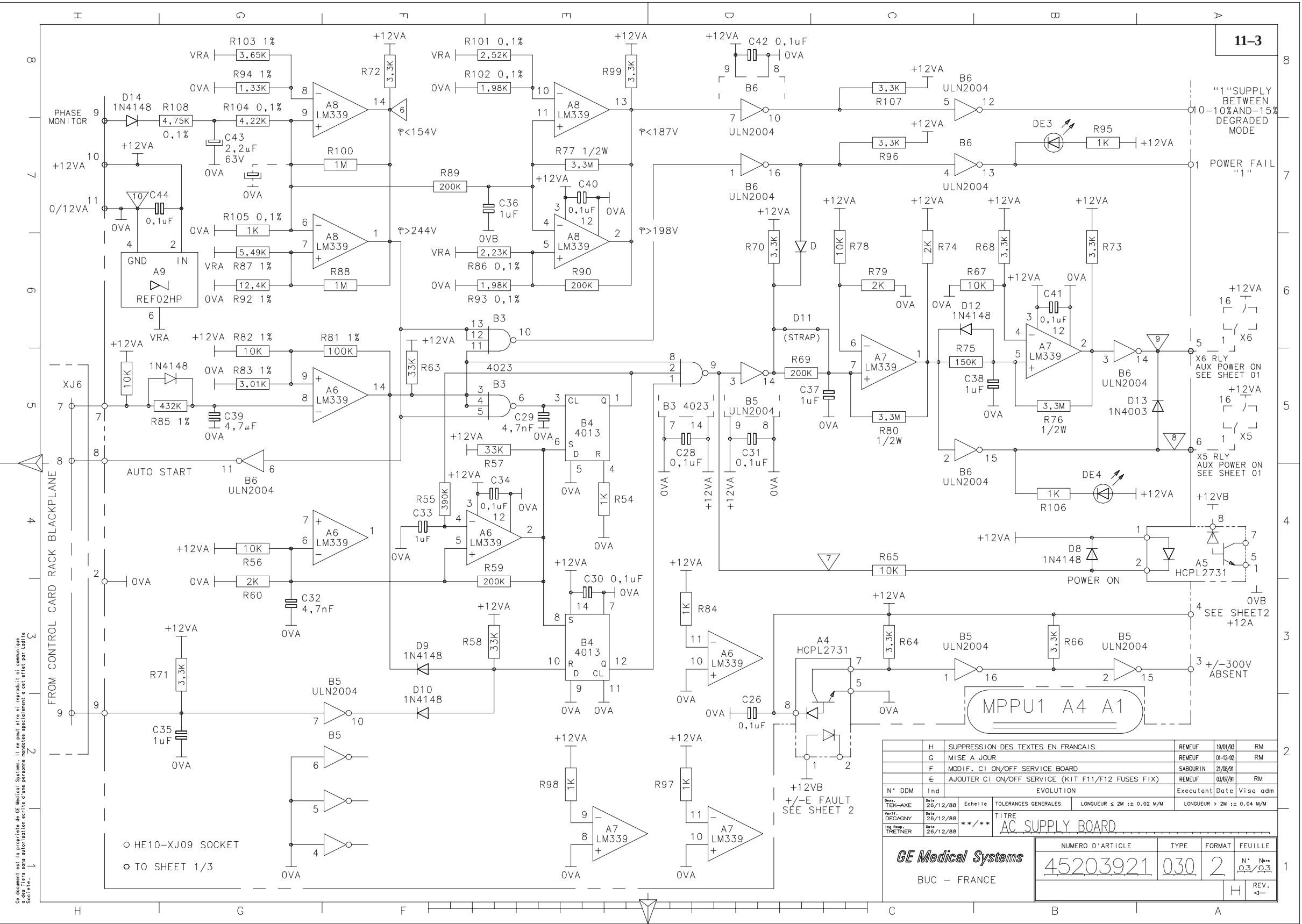


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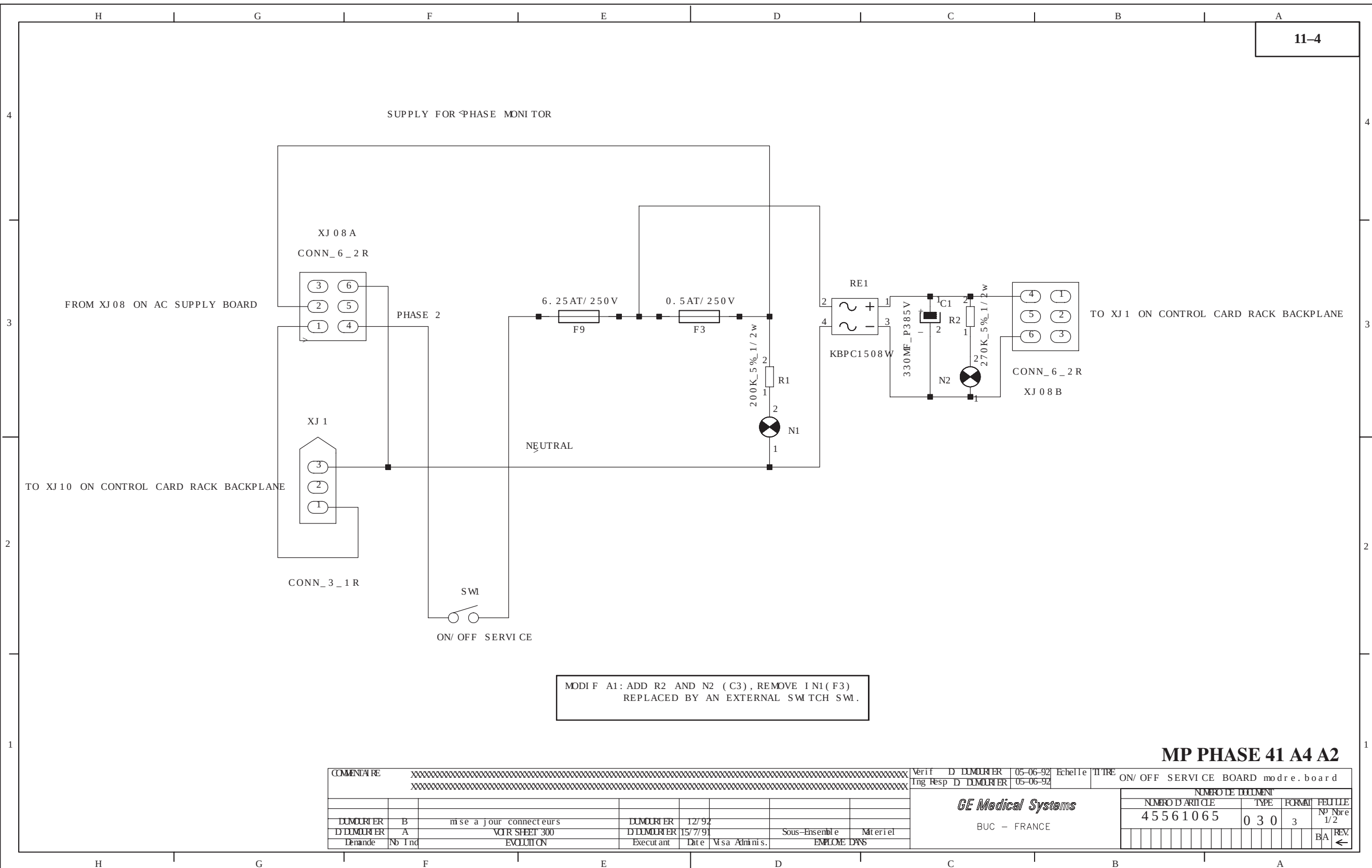




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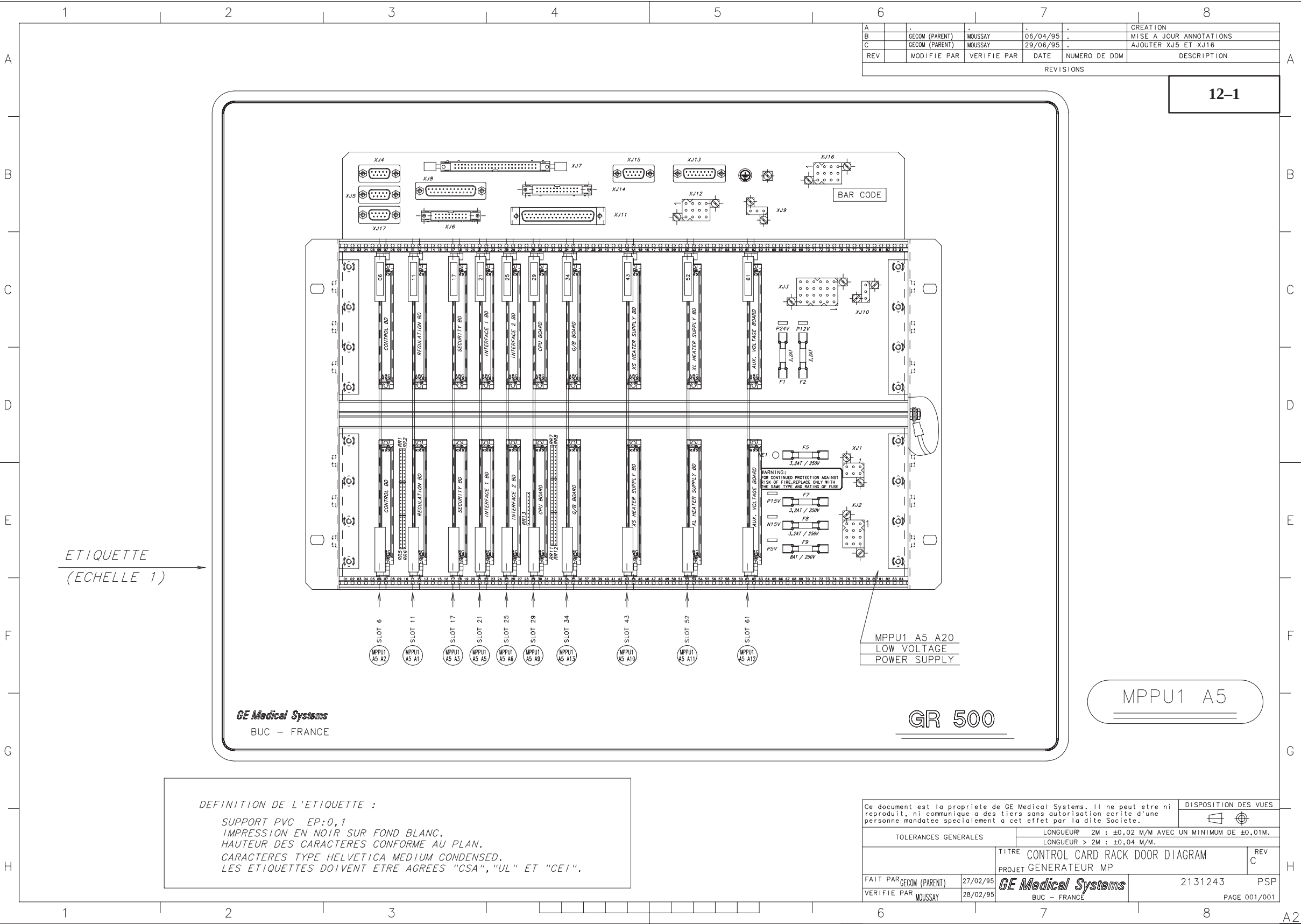
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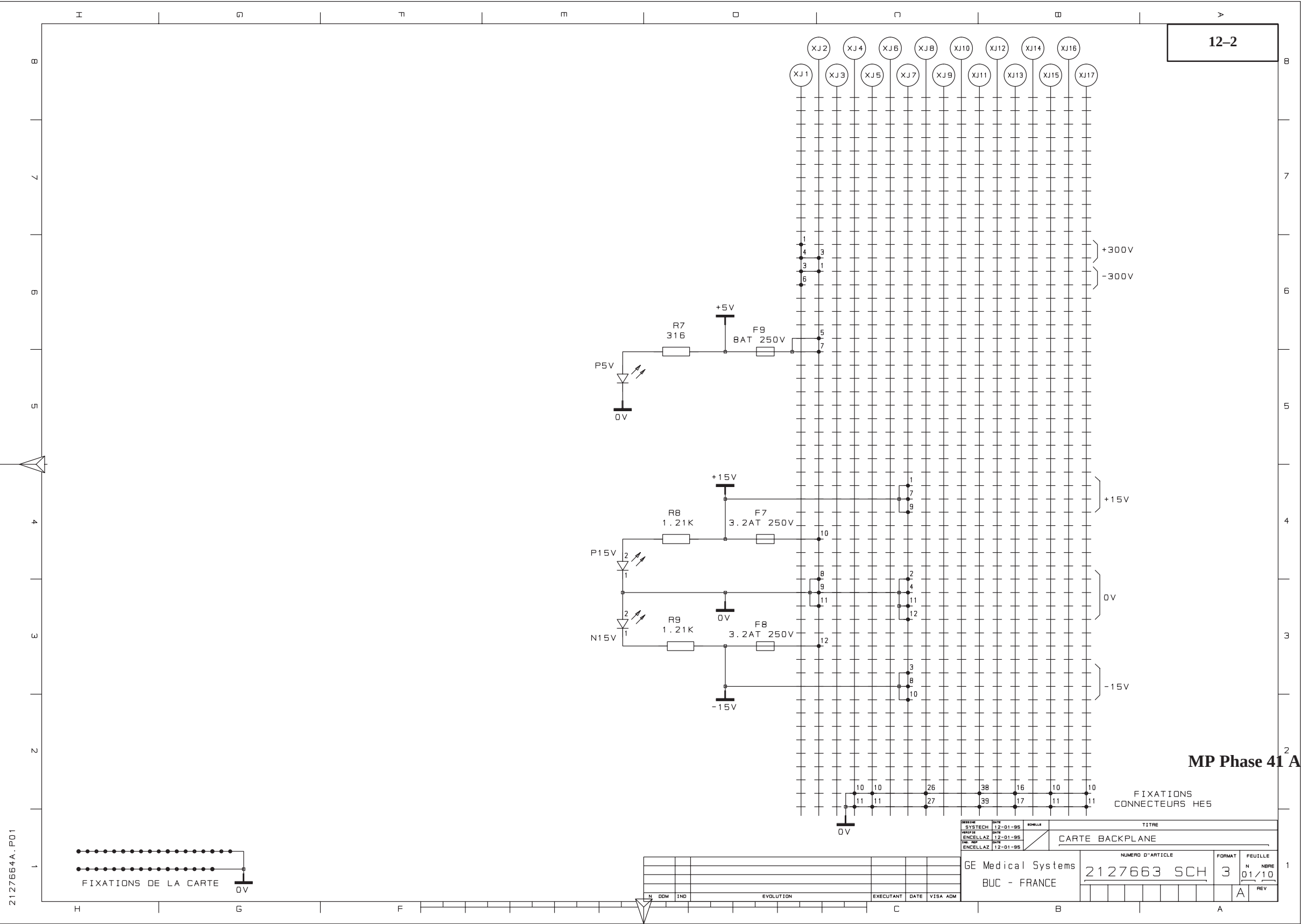
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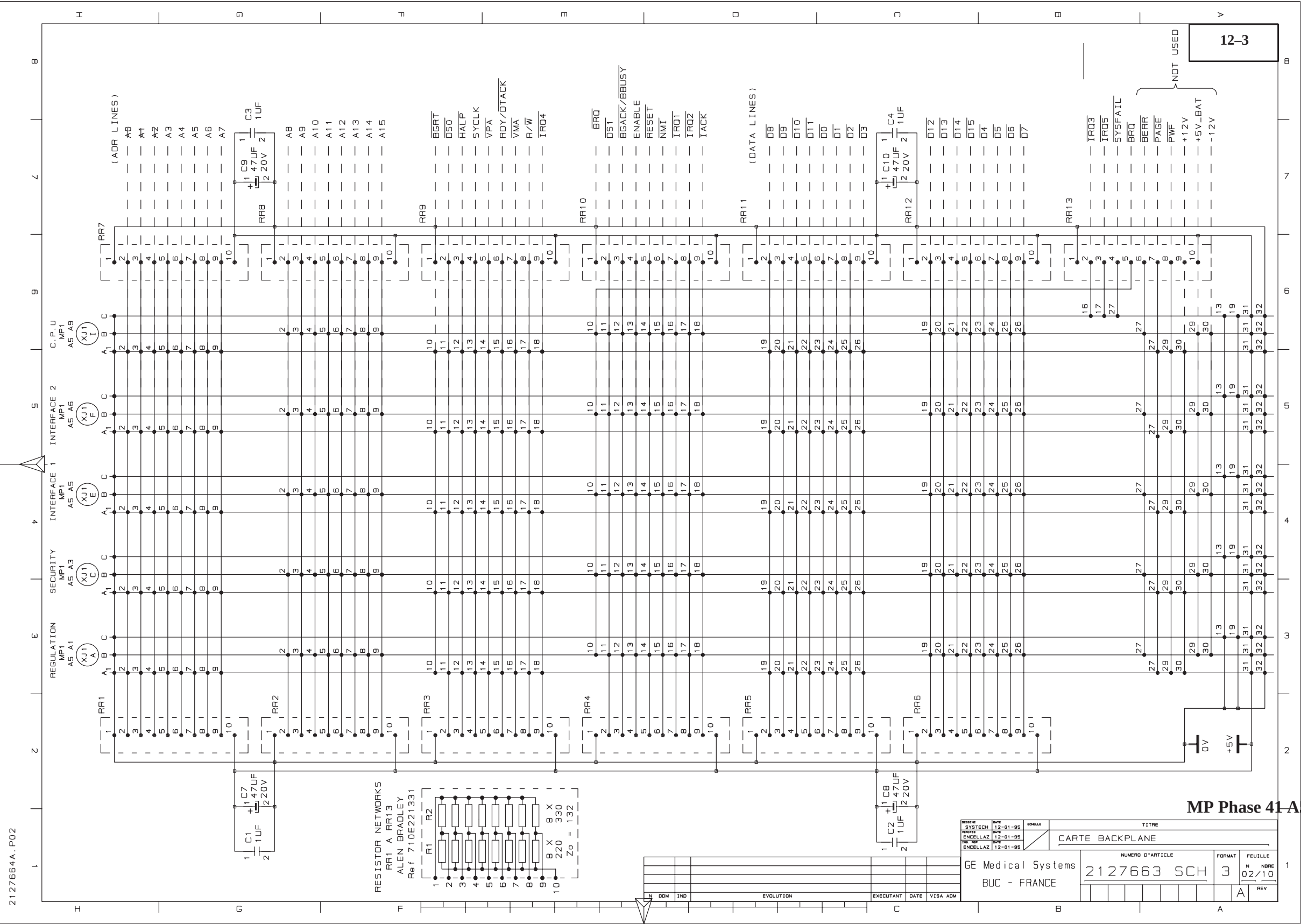
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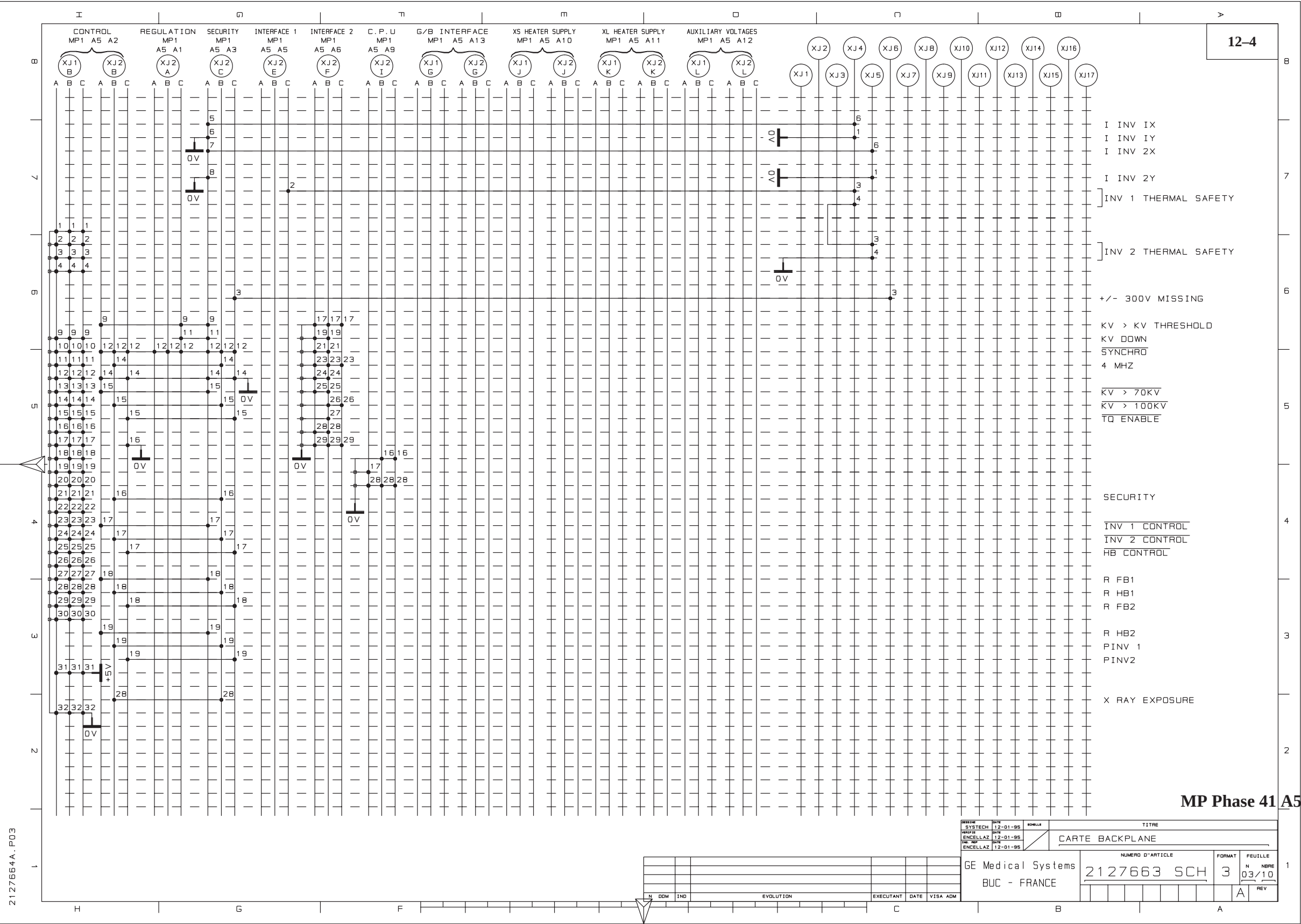
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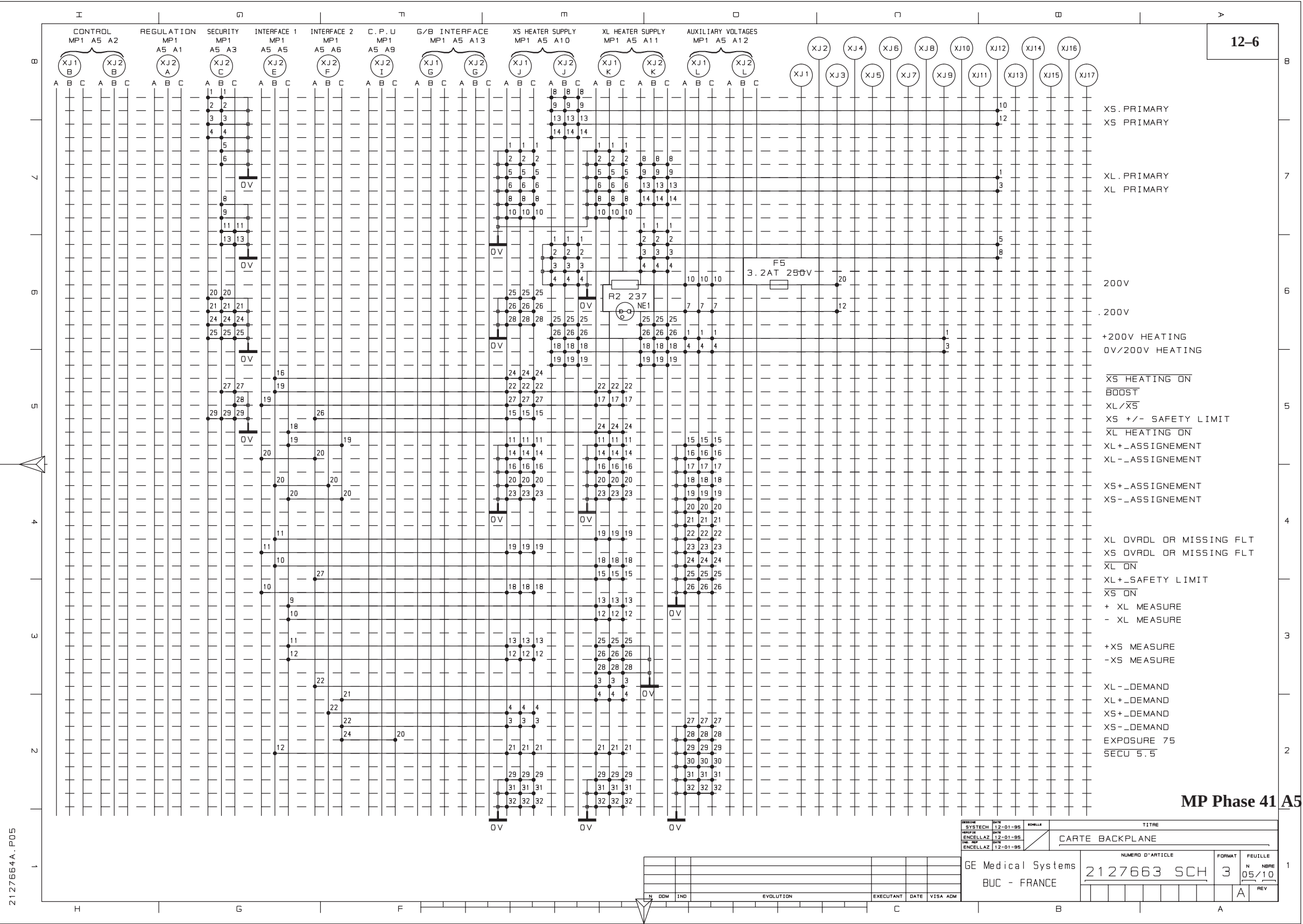
MP Phase 41 A5



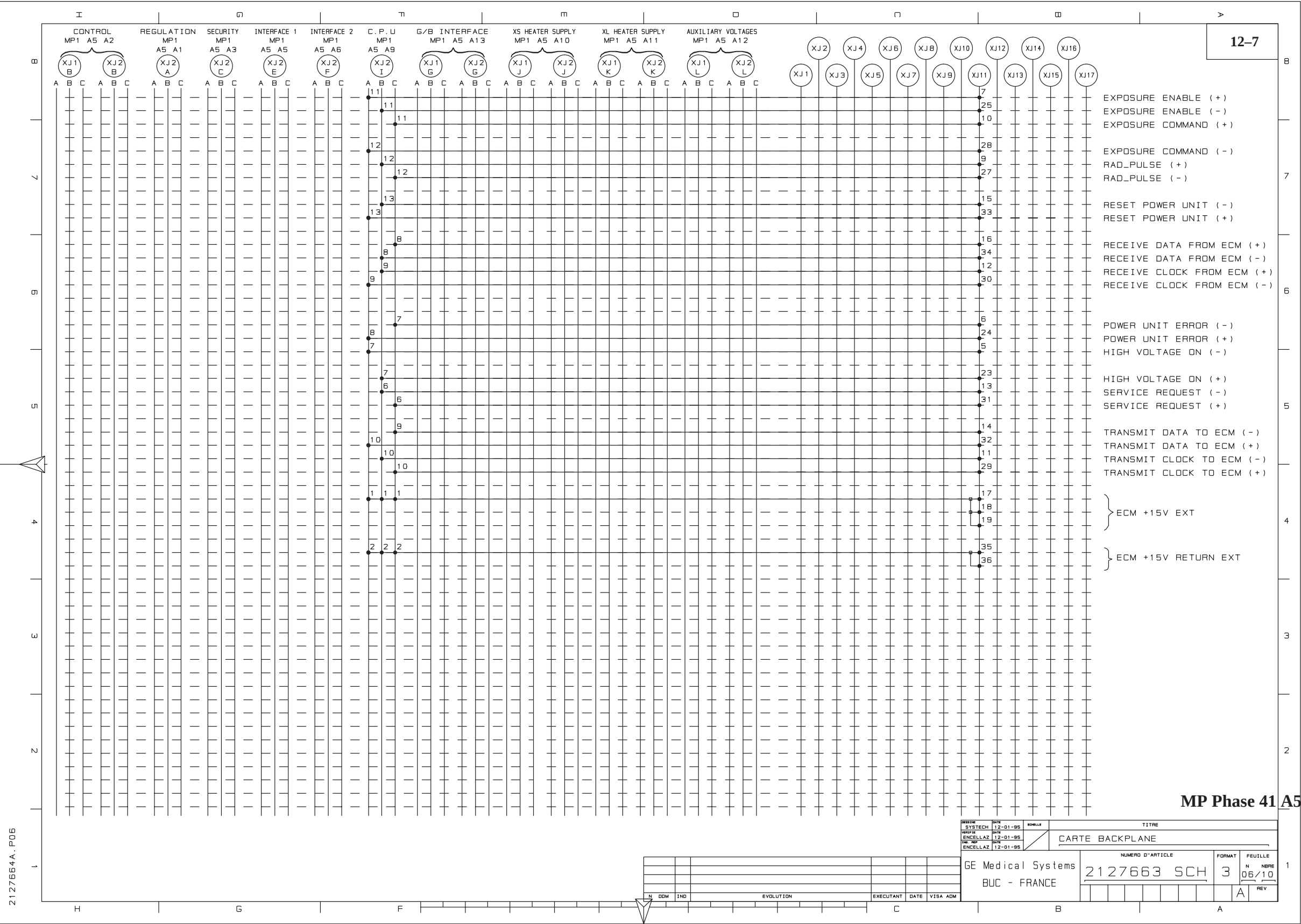
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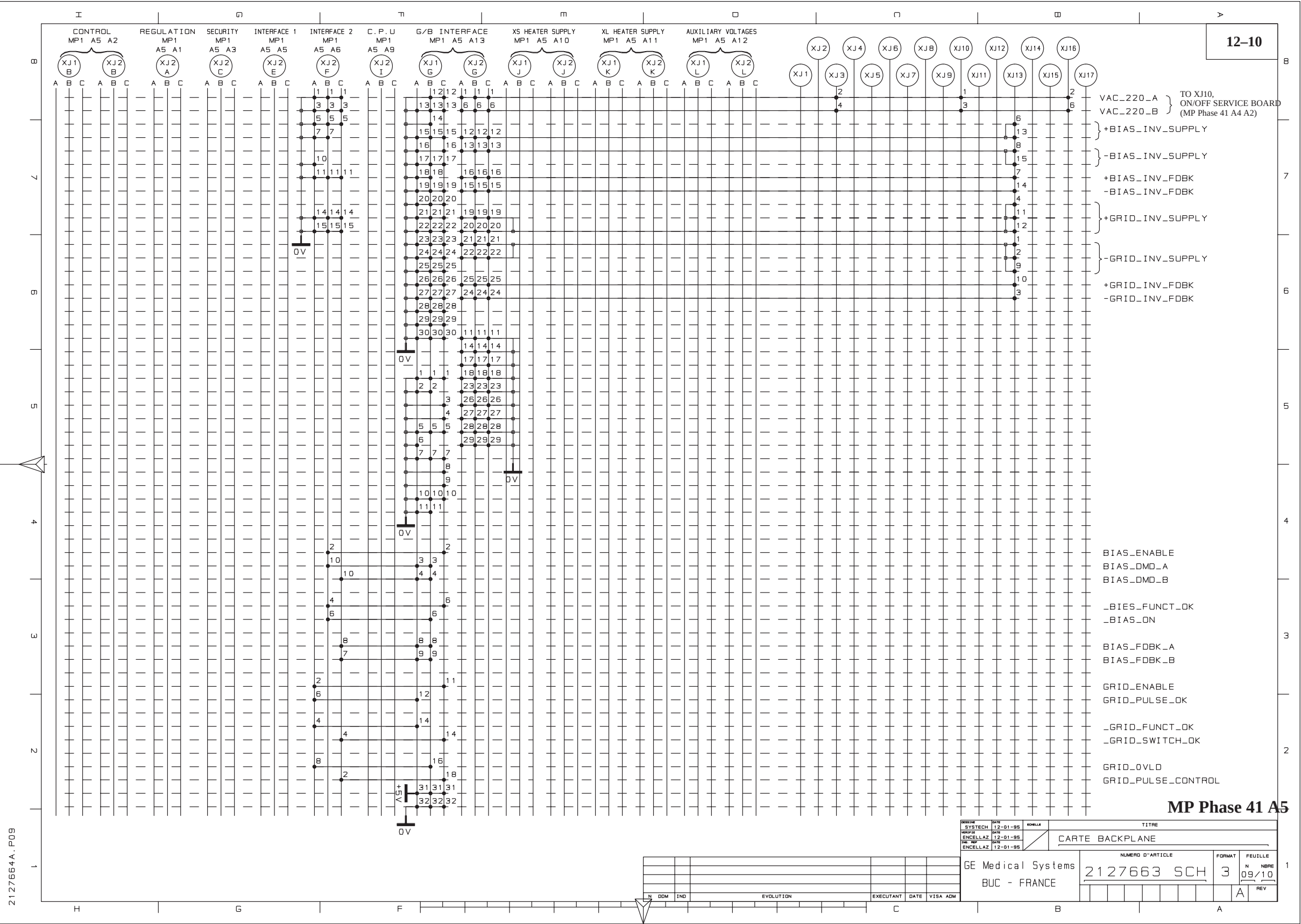
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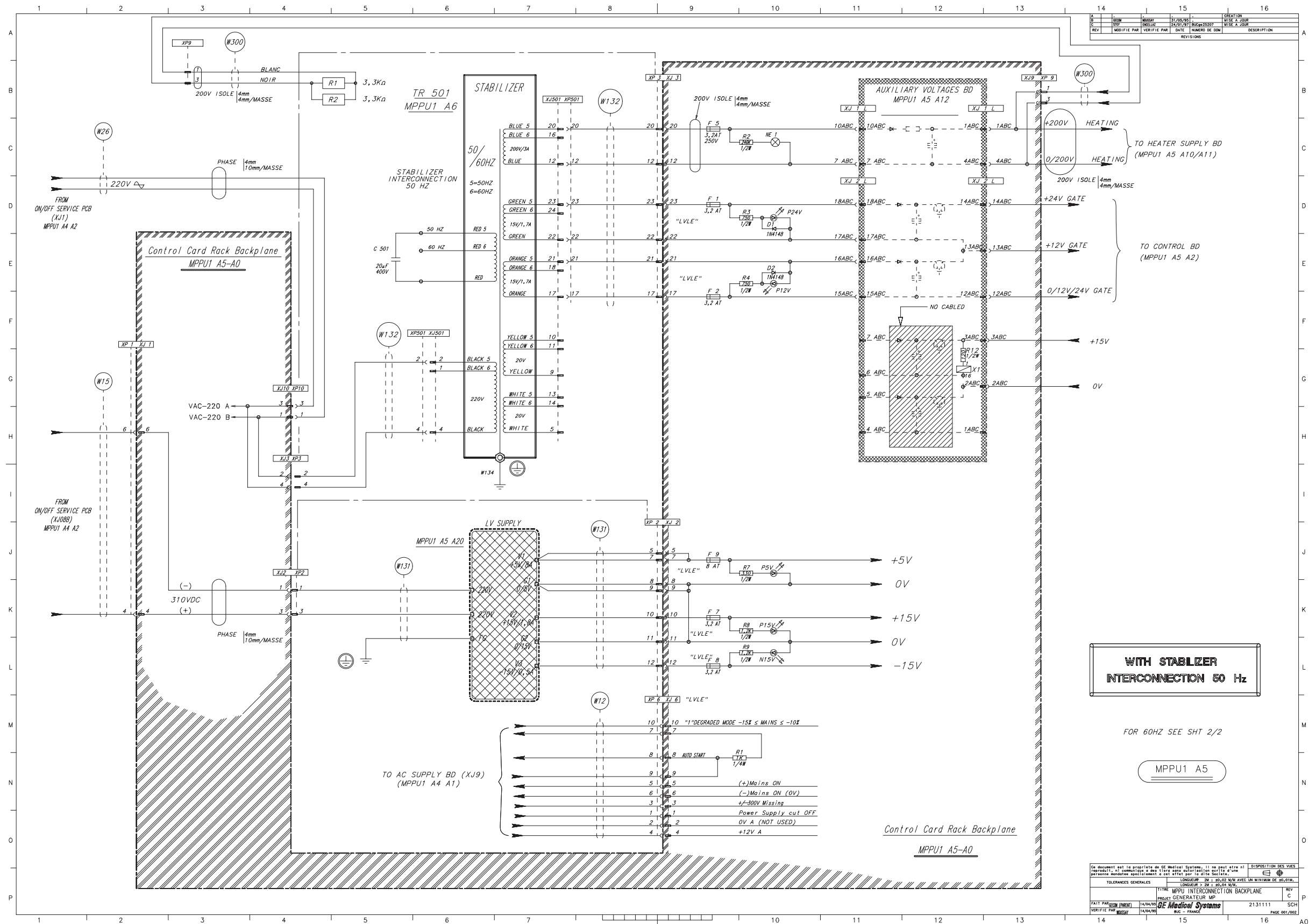
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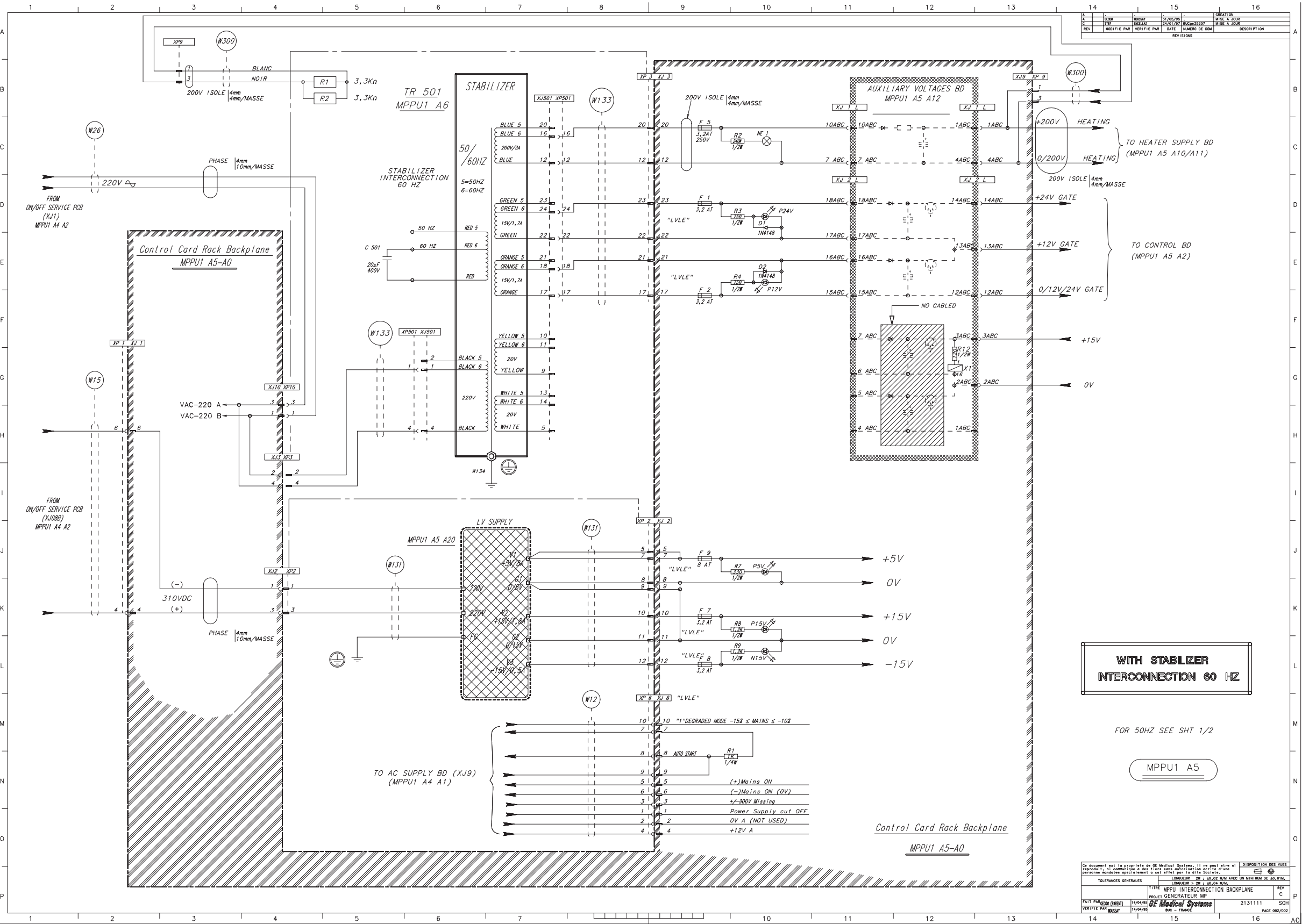




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MNEMONICS

13-0

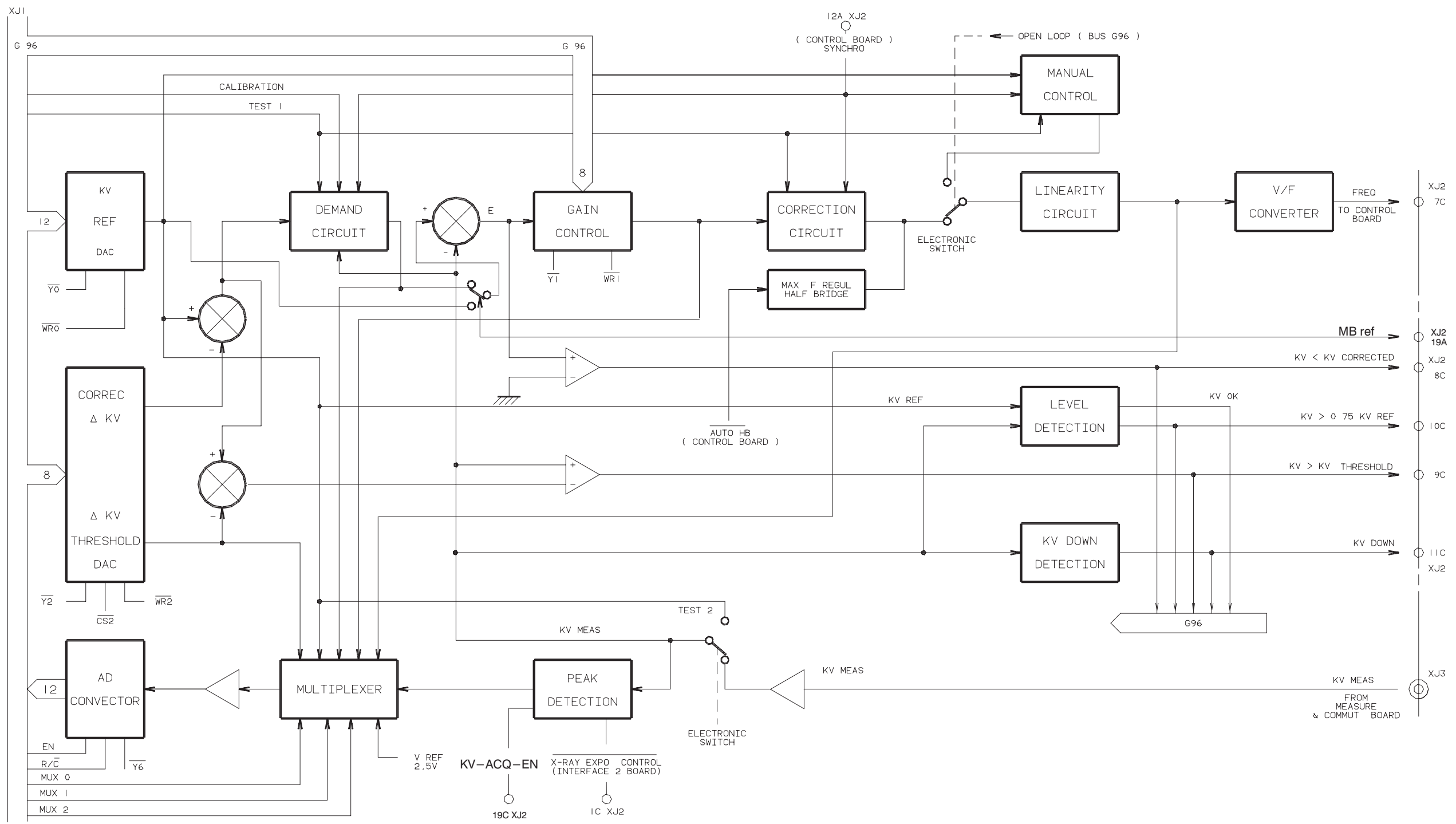
MP PHASE 41 A5 A1 – REGULATION BOARD

VERR	Voltage Error
VF	Input Voltage of Voltage/Frequency Converter
STSADC	Analog/Digital converter Status
FREQ	V/F Frequency Output
kV < kV CORRECTED	kV value measured < kV corrected value
MB ref.	Mini bridge kV ref.
kV > 0.75 kV REF.	kV value measured > 0.75 kV ref. value
kV > kV THRESHOLD	kV value measured > kV threshold value
kV DOWN	Spit detection
kV MEAS.	kV value measurement
kV-ACQ-EN	kV measure reset
AUTO HB	Half bridge enable

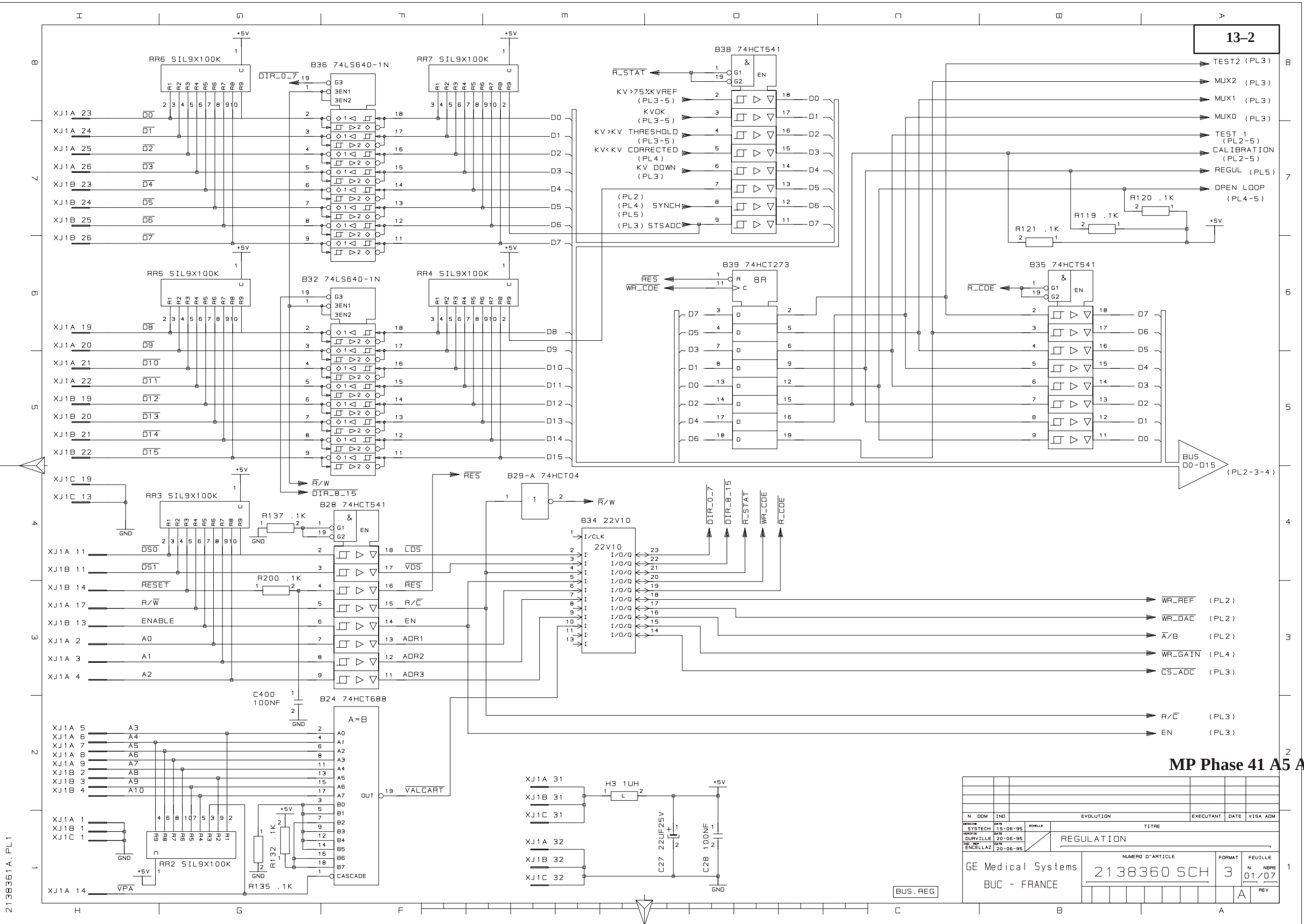
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MP PHASE 41 A5 A1 – REGULATION BOARD *BLOCK DIAGRAM*

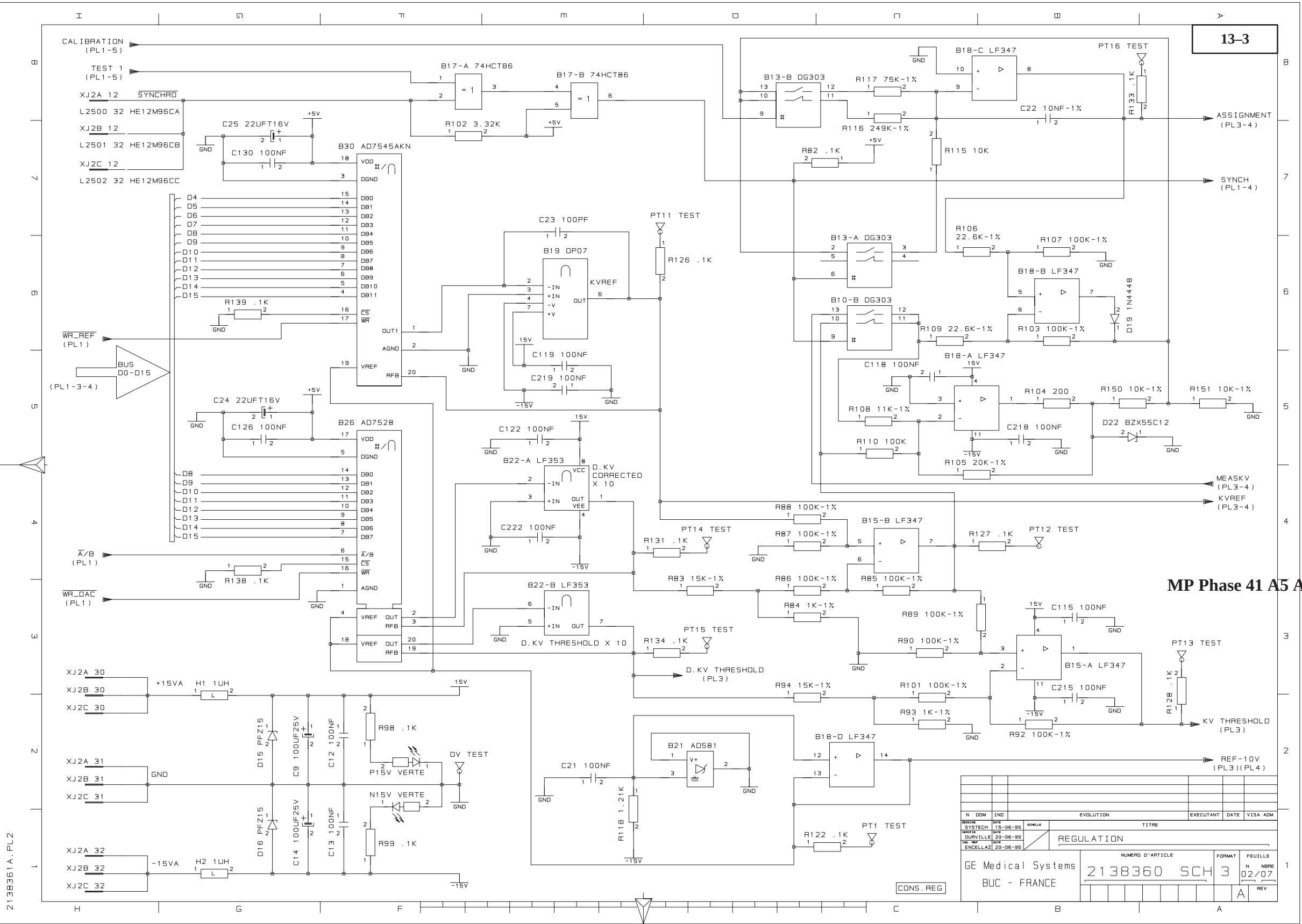
13-1



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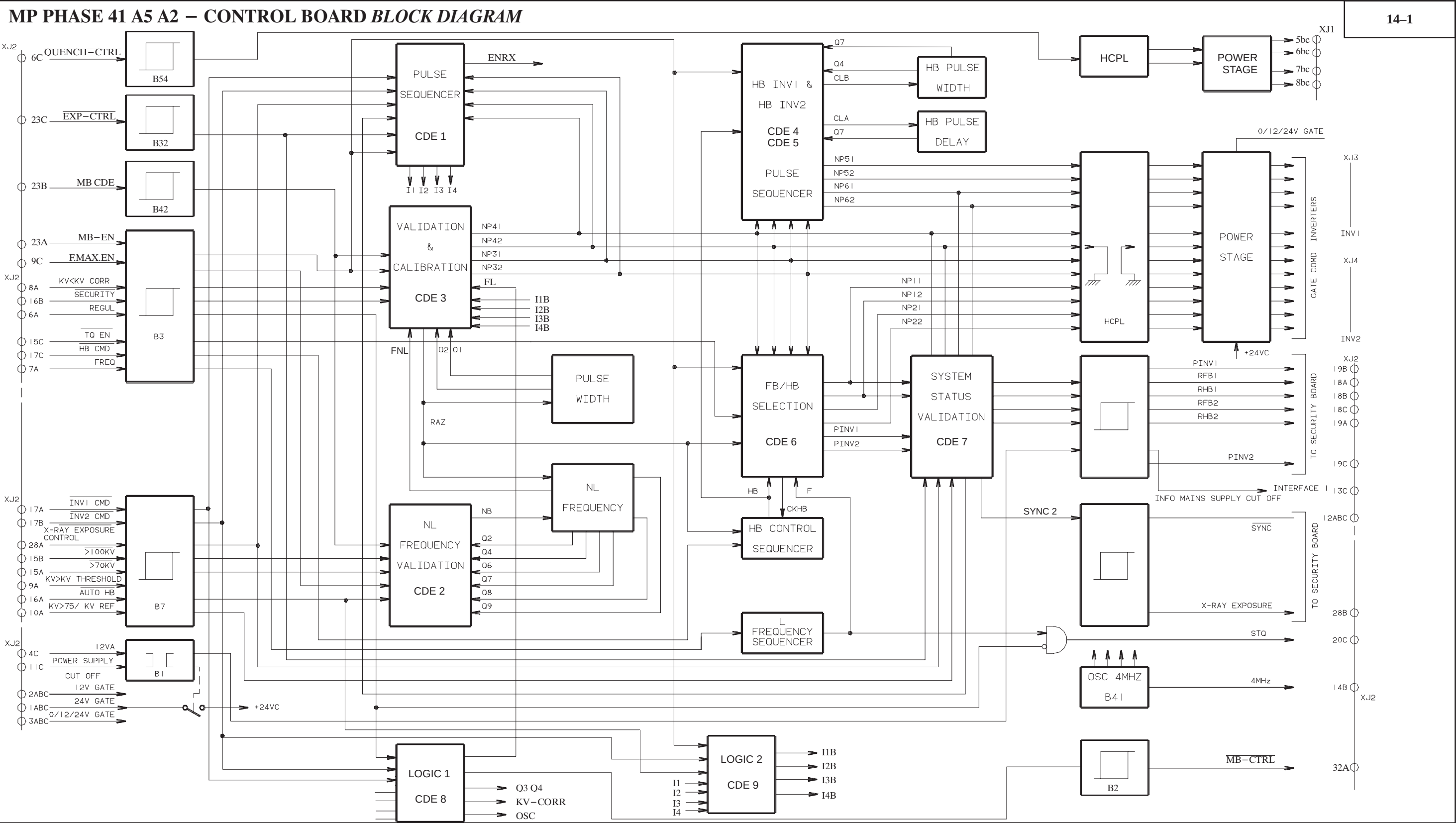
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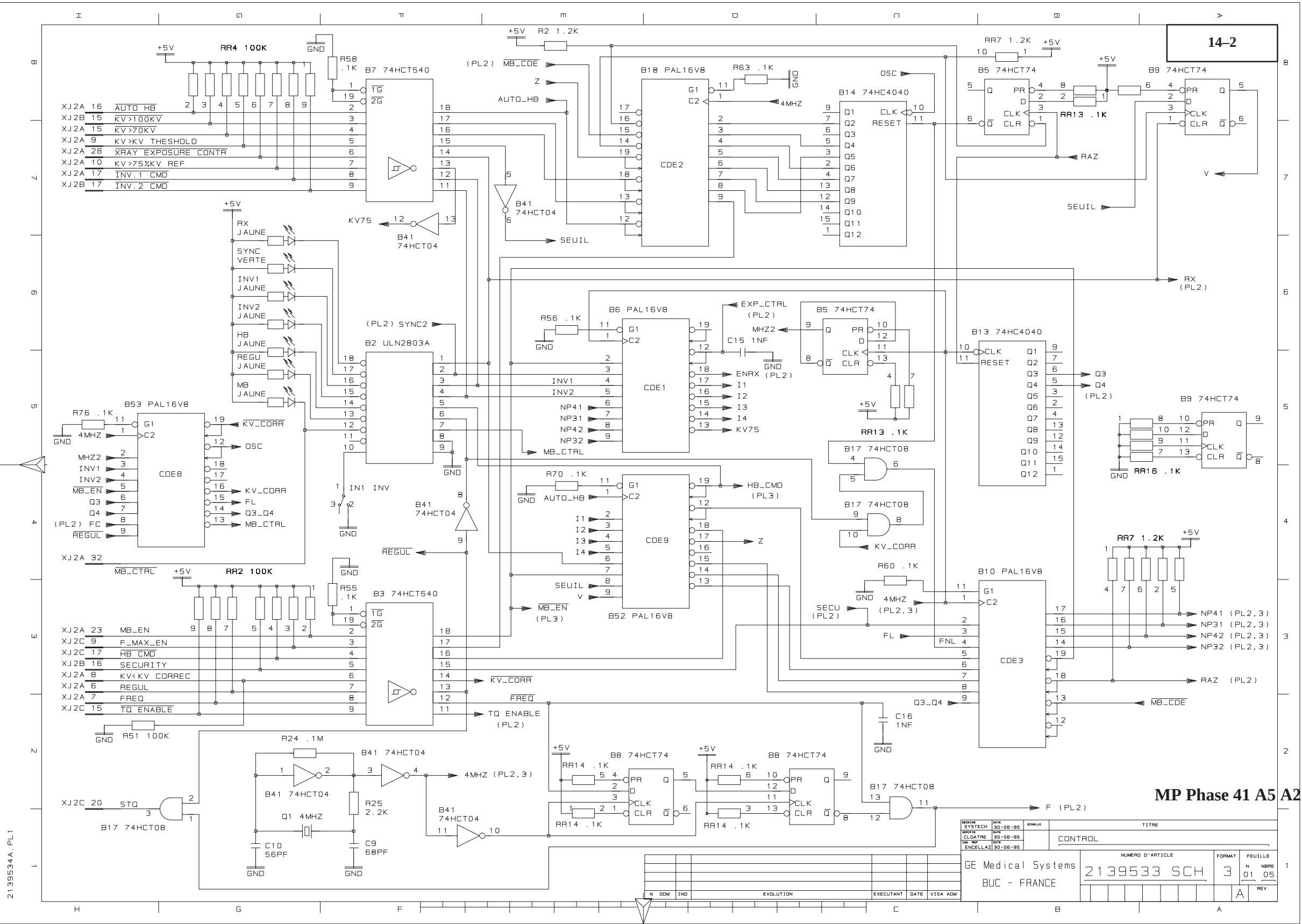


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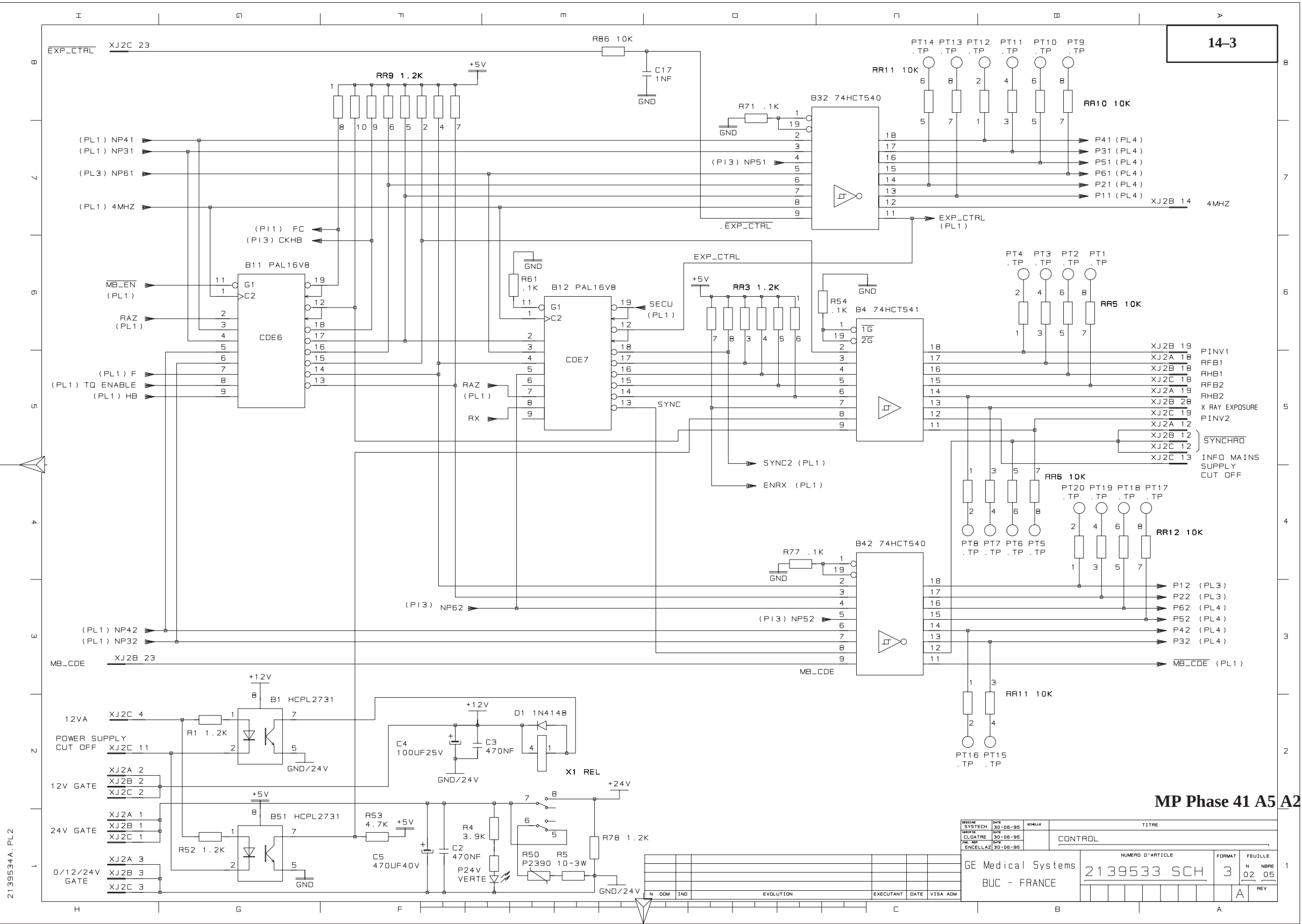
MNEMONICS		14-0
MP PHASE 41 A5 A2 – CONTROL BOARD		
STQ	Sense TQ (checks operating enable with TQ min interlock) TQ min actuated.	
TQ	Time between thyristor current cancel and voltage applied to its terminals.	
HB CMD	Half Bridge Command	
AUTO HB	Half-bridge enable – enables half-bridge connection when KV threshold is reactivated	
P INV1	Pulse Inverter 1	
P INV2	Pulse Inverter 2	
RFB1 RFB2	Return Full Bridge Inverter 1 or 2	
RHB1 RHB2	Return Half Bridge Inverter 1 or 2	
SYNC	Signal enabled with the first inverter pulse and remains active during inverter running	
MB CDE	Mini bridge command	
MB EN	Mini bridge enable (actived in grided mode)	
FMAX EN	Frequency limitation change	
MB CTRL	Mini bridge activated	
QUENCH CTRL	Quench mode activated	

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MNEMONICS

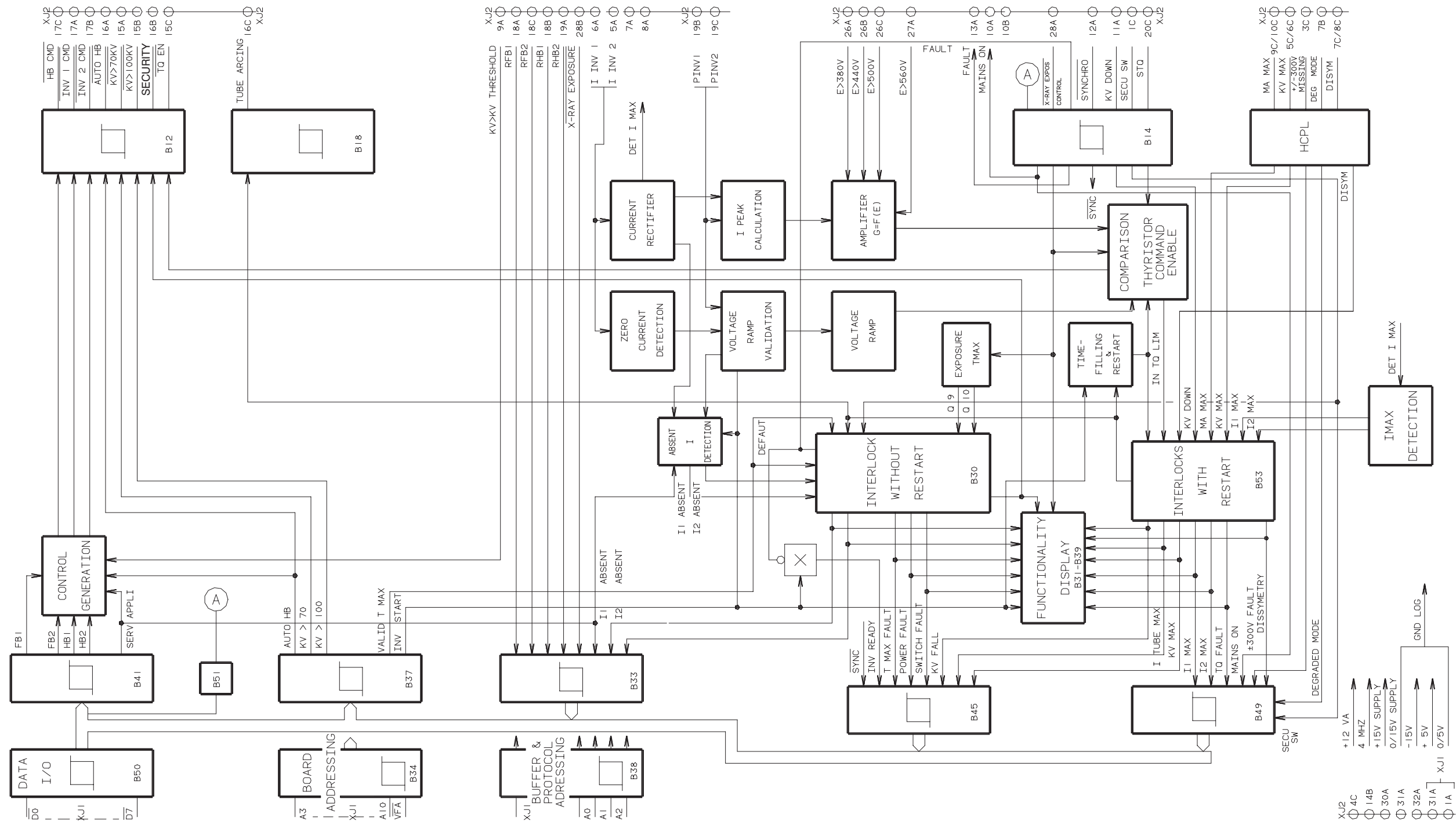
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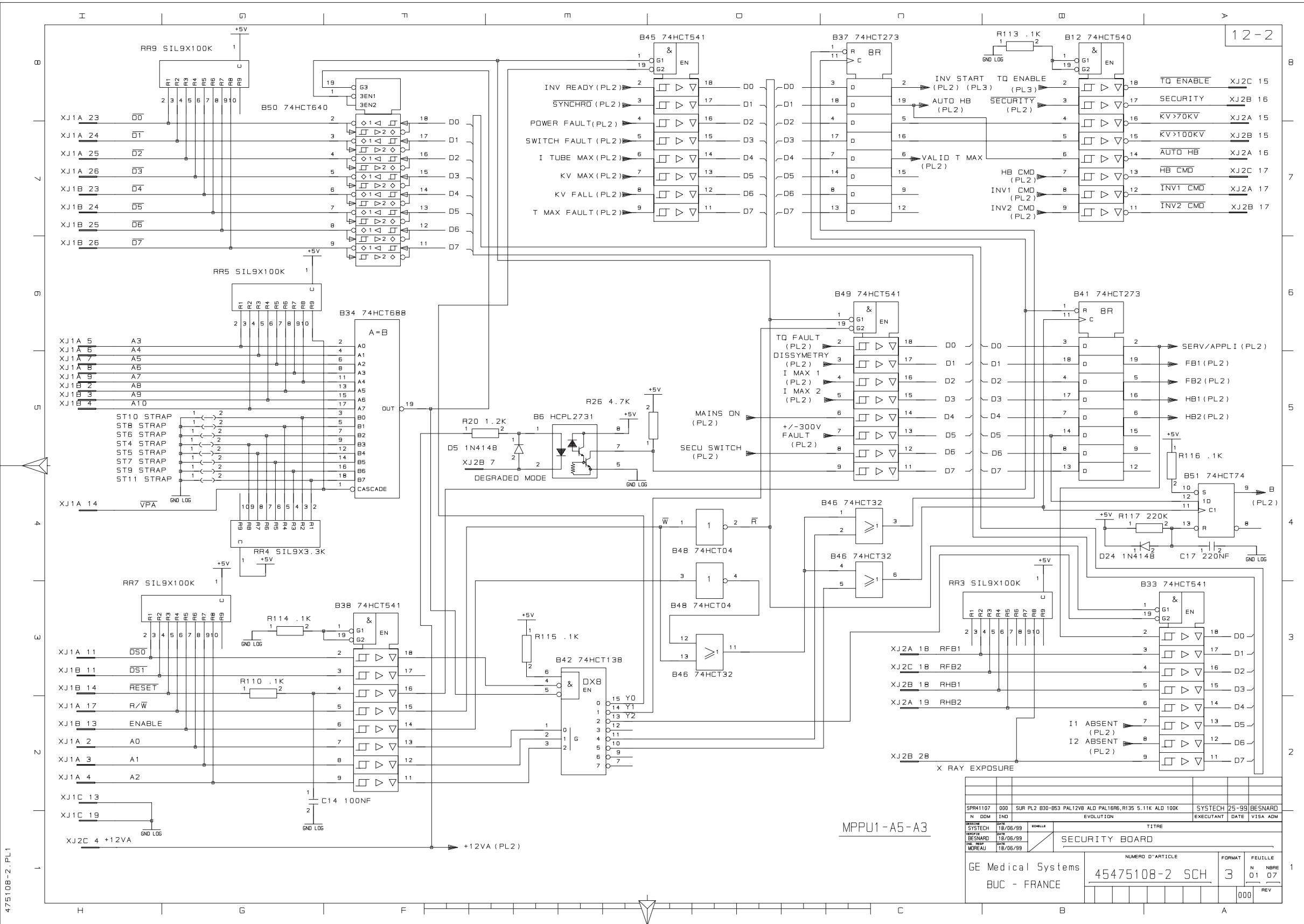
MP PHASE 41 A5 A3 – SECURITY BOARD

TQ EN	Enable given by TQ min interlock
AUTO HB	Half bridge enable – enables half–bridge connection when KV threshold is reactivated
INV1 CMD	Inverter 1 Command
INV2 CMD	Inverter 2 Command
HB CMD	Half bridge command
SECURITY	One secutity activated
RFB1	Feedback Full bridge 1
RFB2	Feedback Full bridge 2
RHB1	Feedback Half bridge 1
RHB2	Feedback Half bridge 2
I INV 1	Current into inverter 1
I INV 2	Current into inverter 2
E > 380 V	Inverter dc voltage > 380 V
E > 440 V	Inverter dc voltage > 440 V
E > 500 V	Inverter dc voltage > 500 V
E > 560 V	Inverter dc voltage > 560 V
STQ	Thyristor tq limitation

MP PHASE 41 A5 A3 – SECURITY BOARD BLOCK DIAGRAM

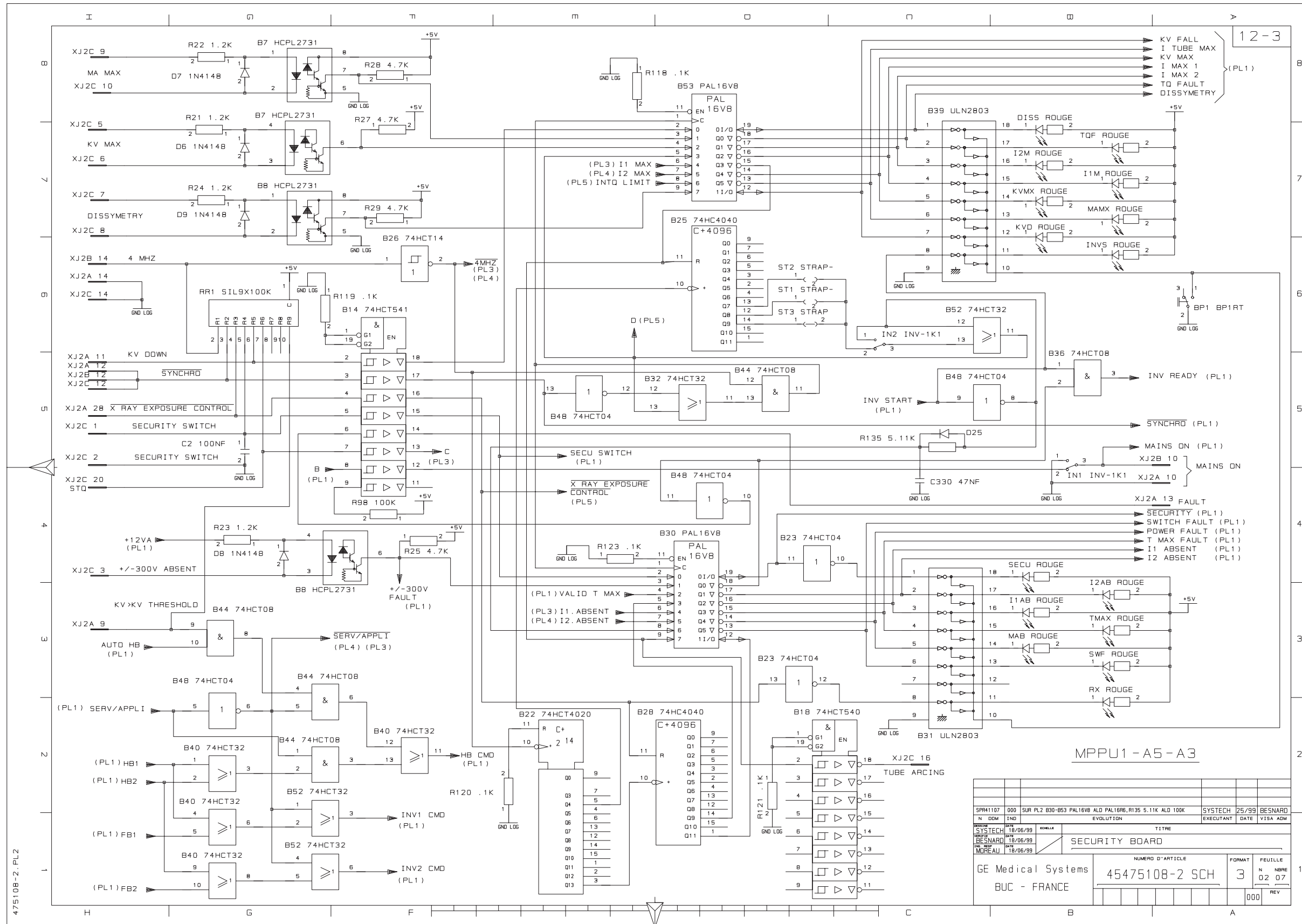
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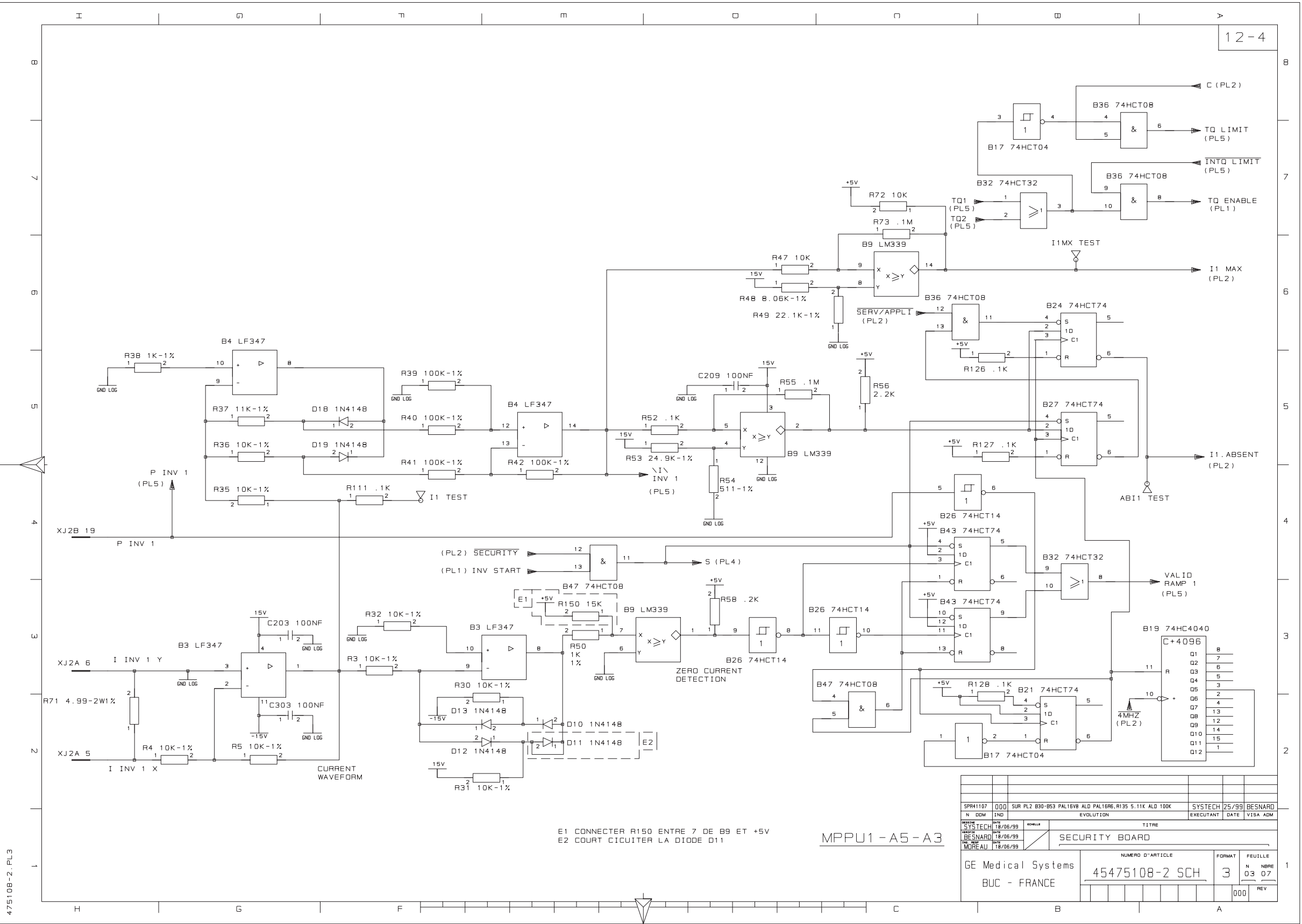


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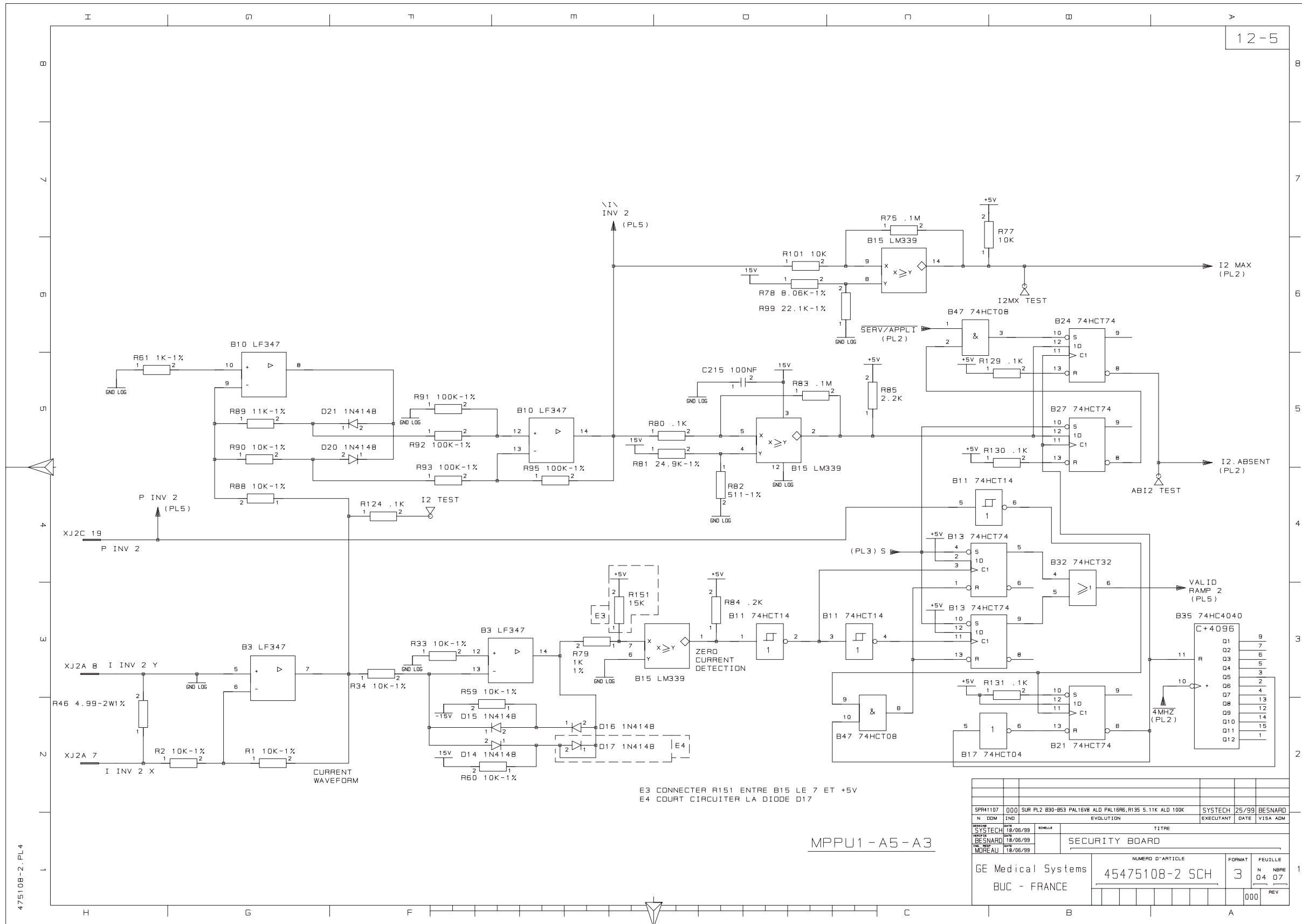
MPPU1-A5-A3



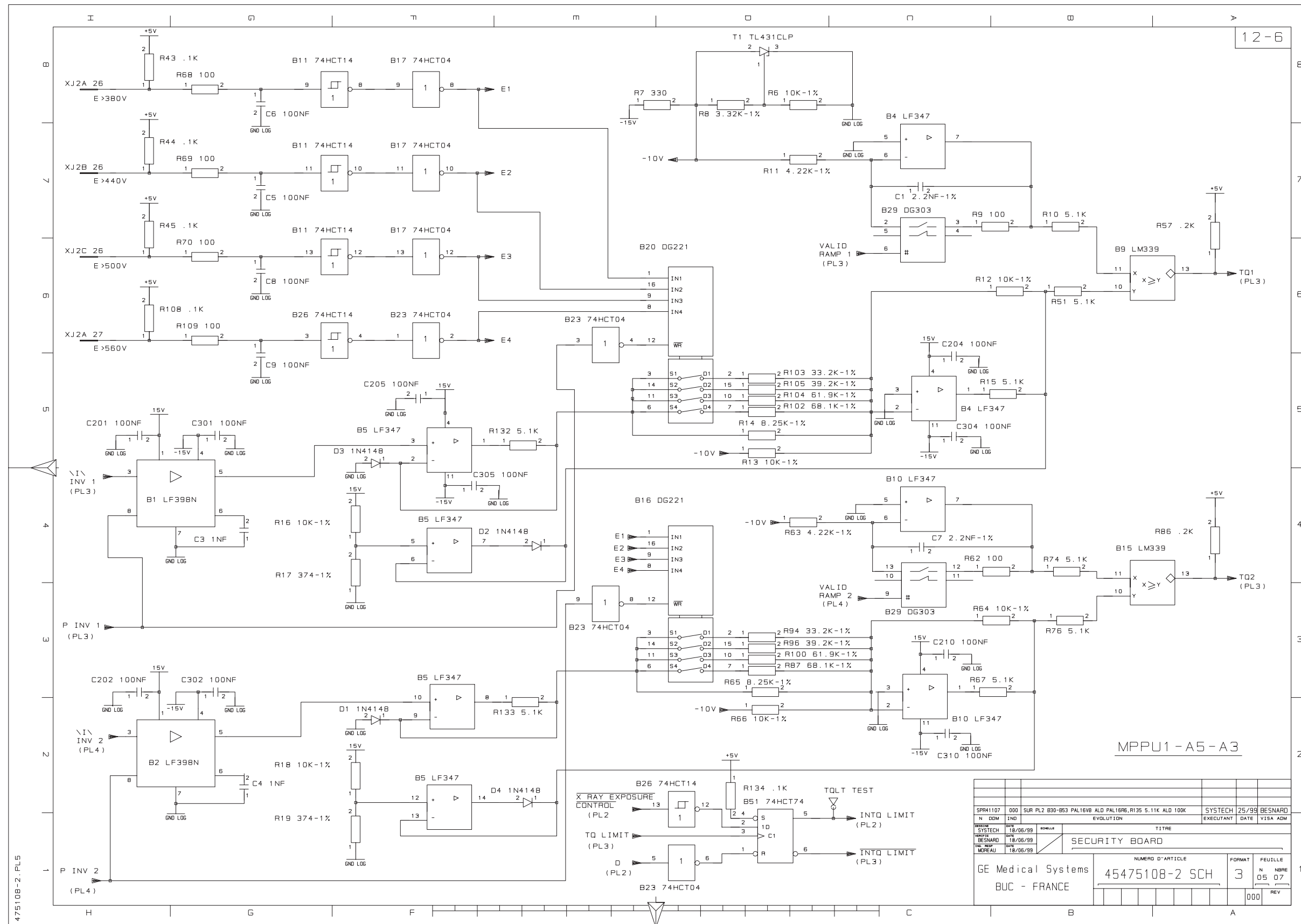
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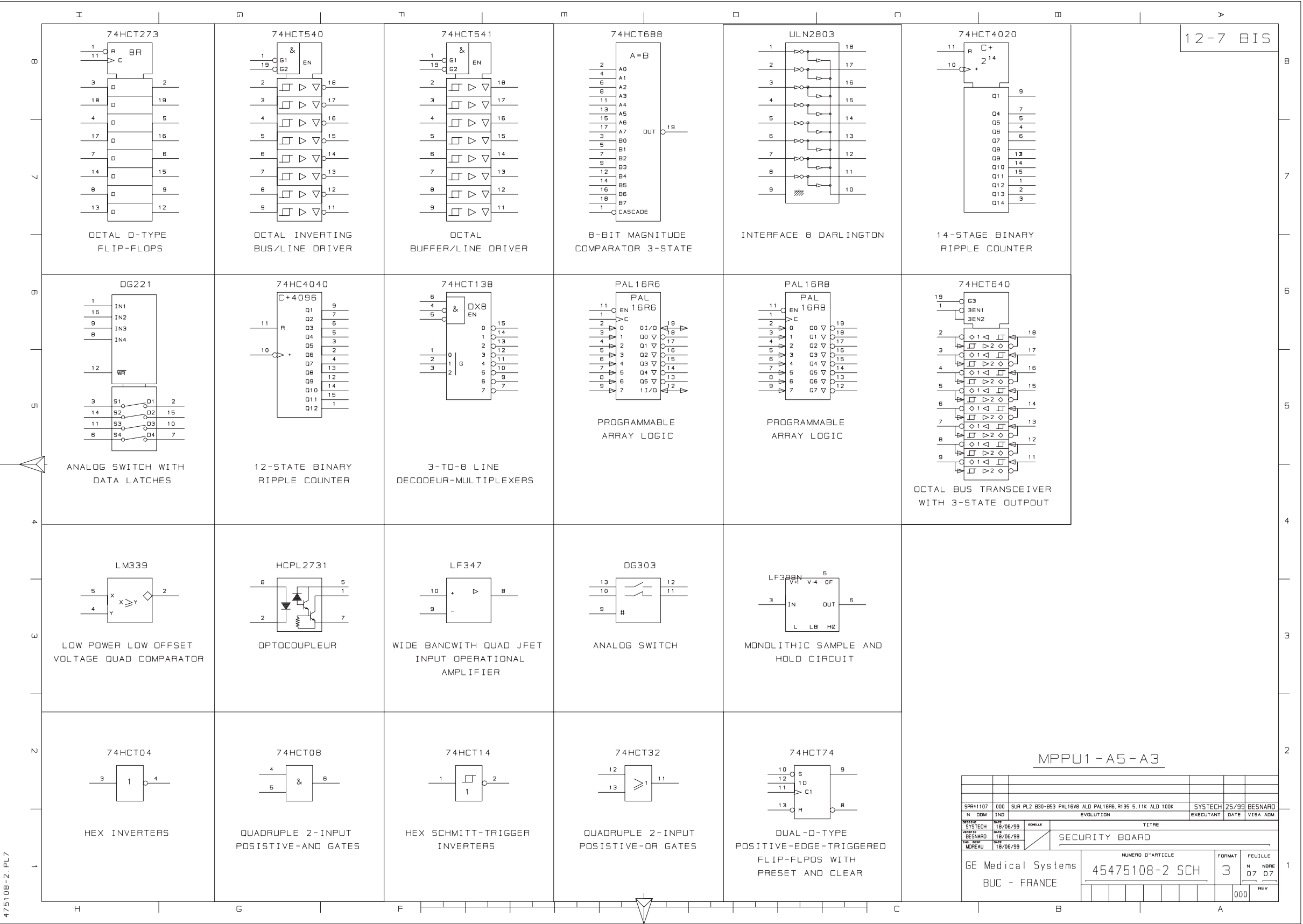
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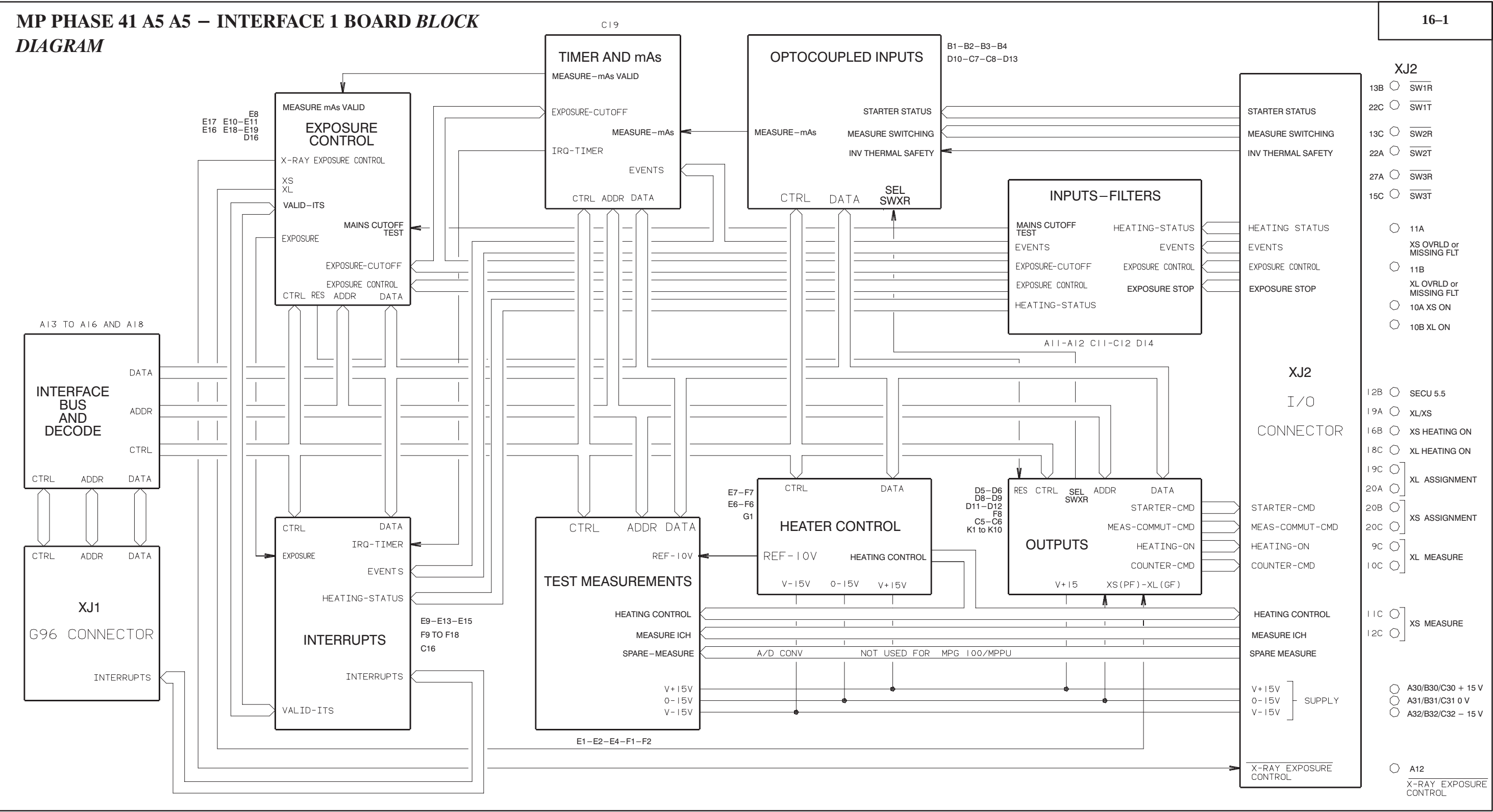
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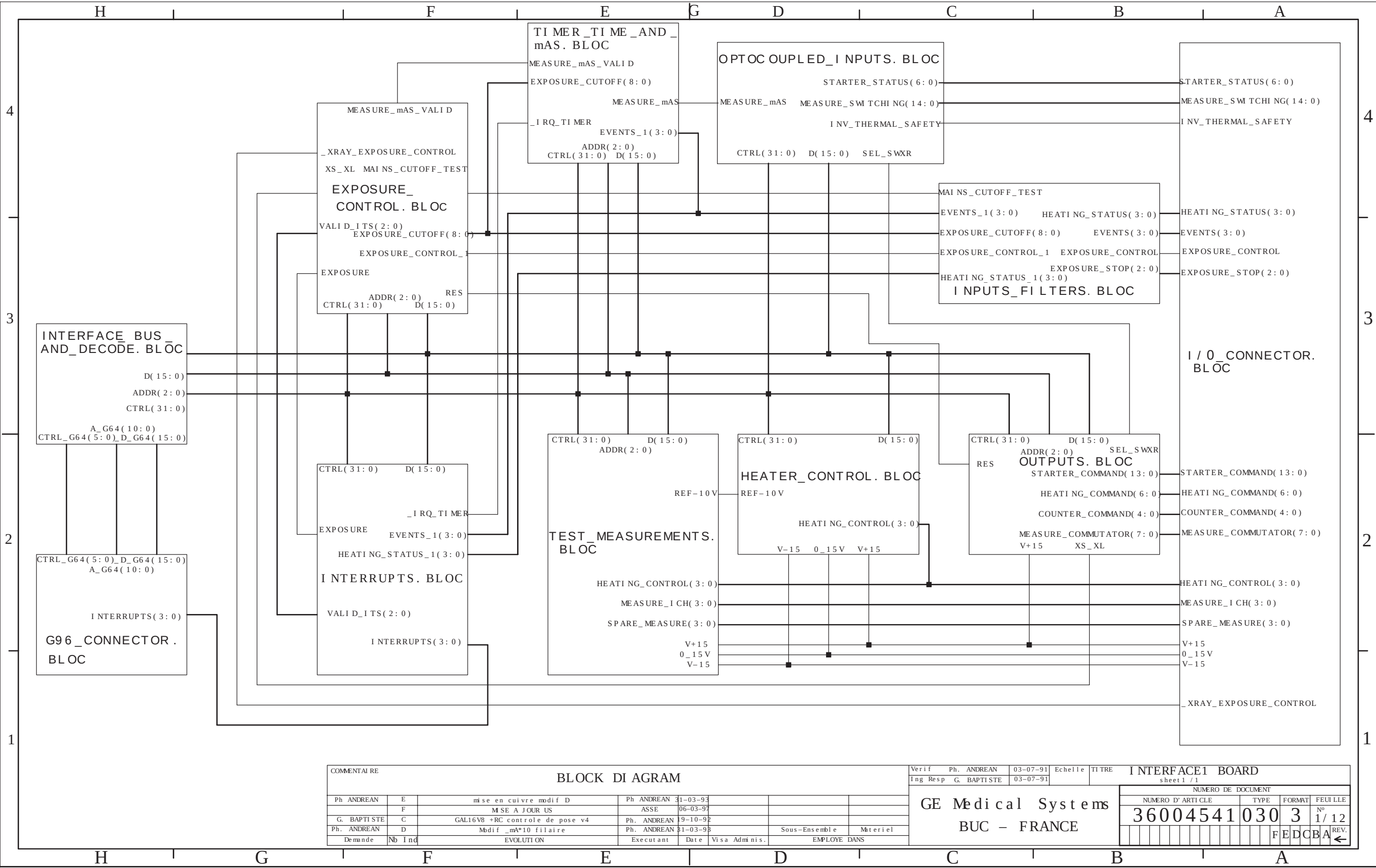


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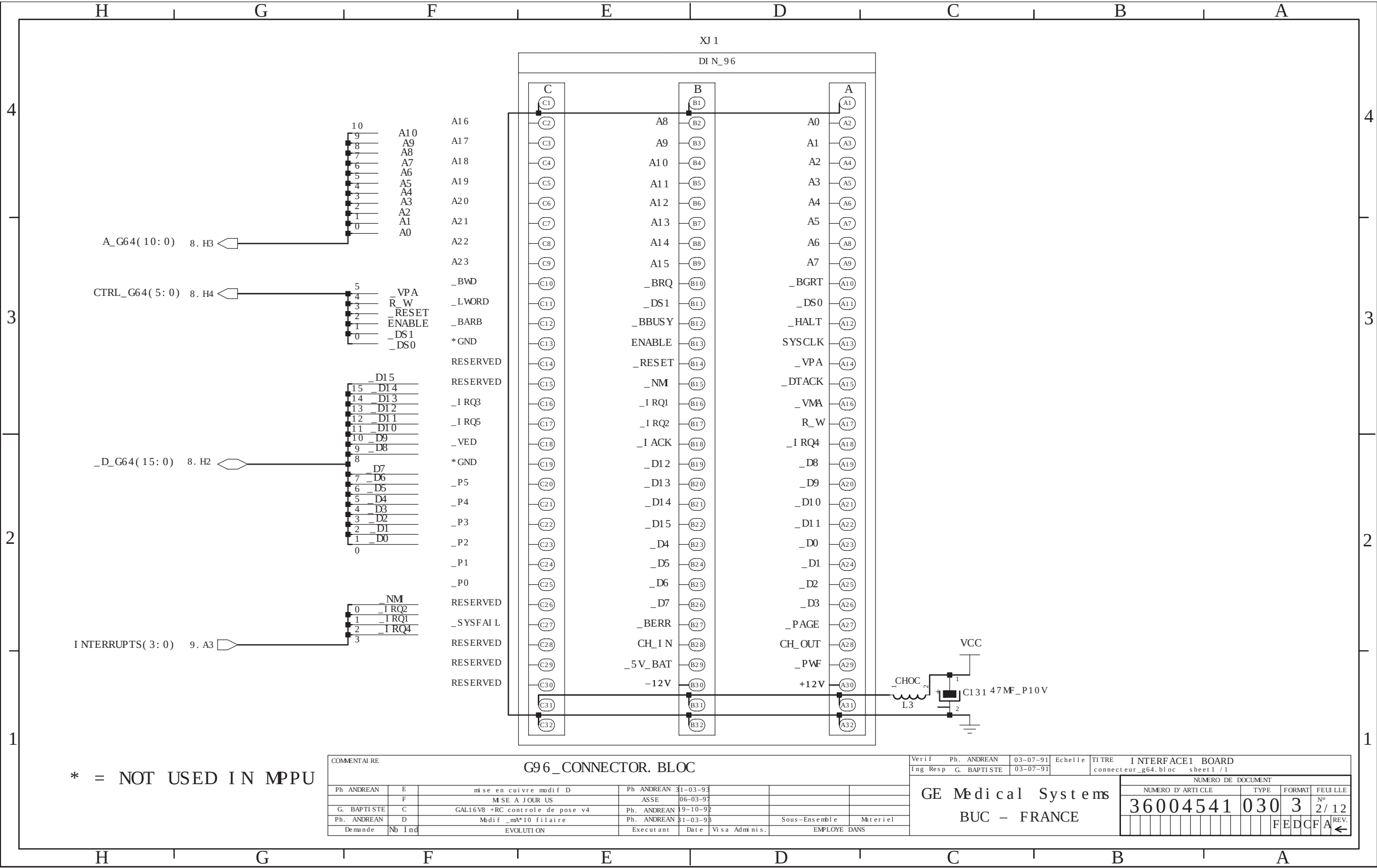
MNEMONICS		16-0
MP PHASE 41 A5 A5 – INTERFACE 1 BOARD		
SW1 R	High voltage switch 1 Feedback	
SW1 T	High voltage switch 1 Feedback	
SW2 R	High voltage switch 2 Feedback	
SW2 T	High voltage switch 2 Feedback	
SW3 R	High voltage switch 3 Feedback	
SW3 T	High voltage switch 3 Feedback	

MP PHASE 41 A5 A5 – INTERFACE 1 BOARD BLOCK
DIAGRAM





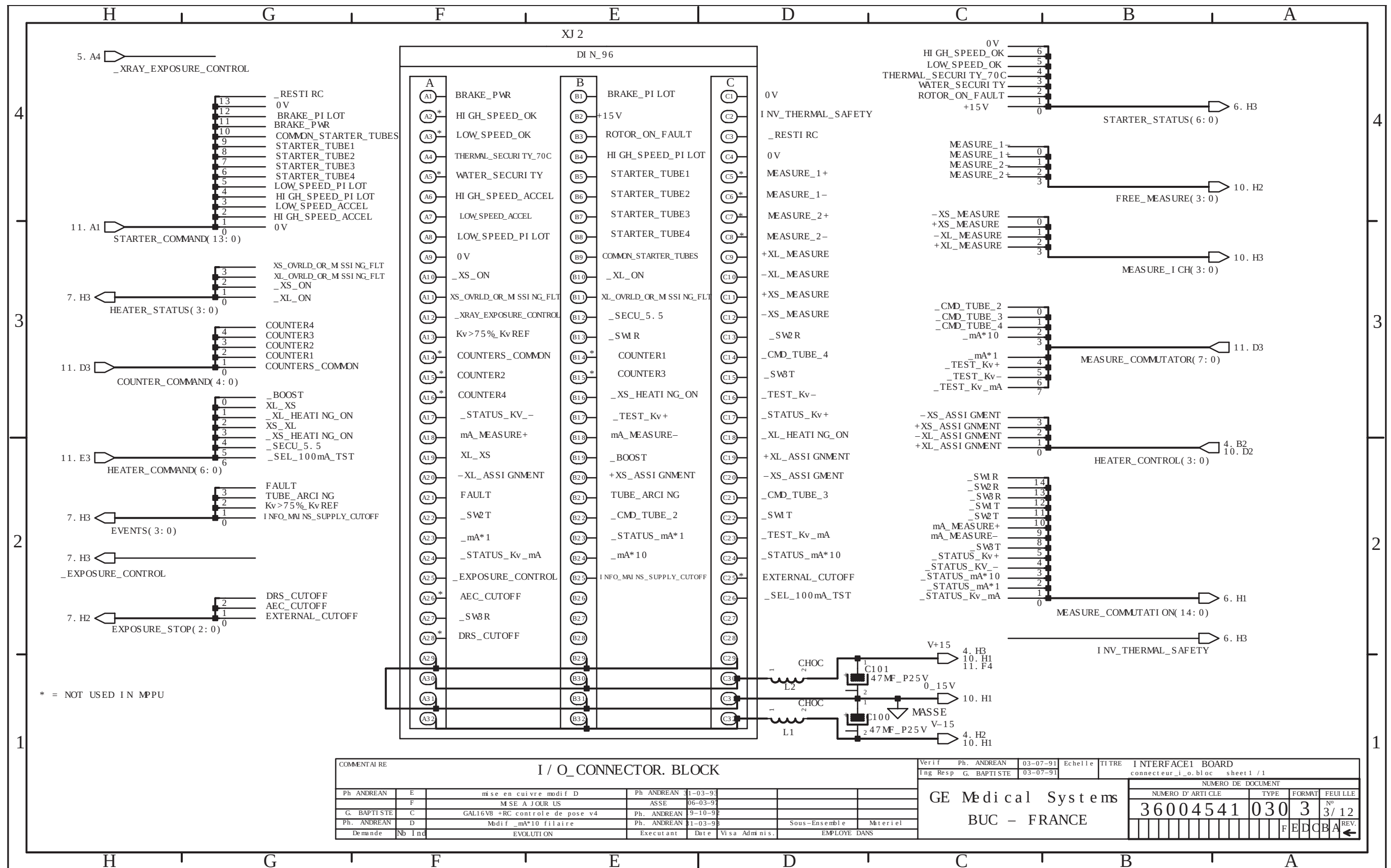
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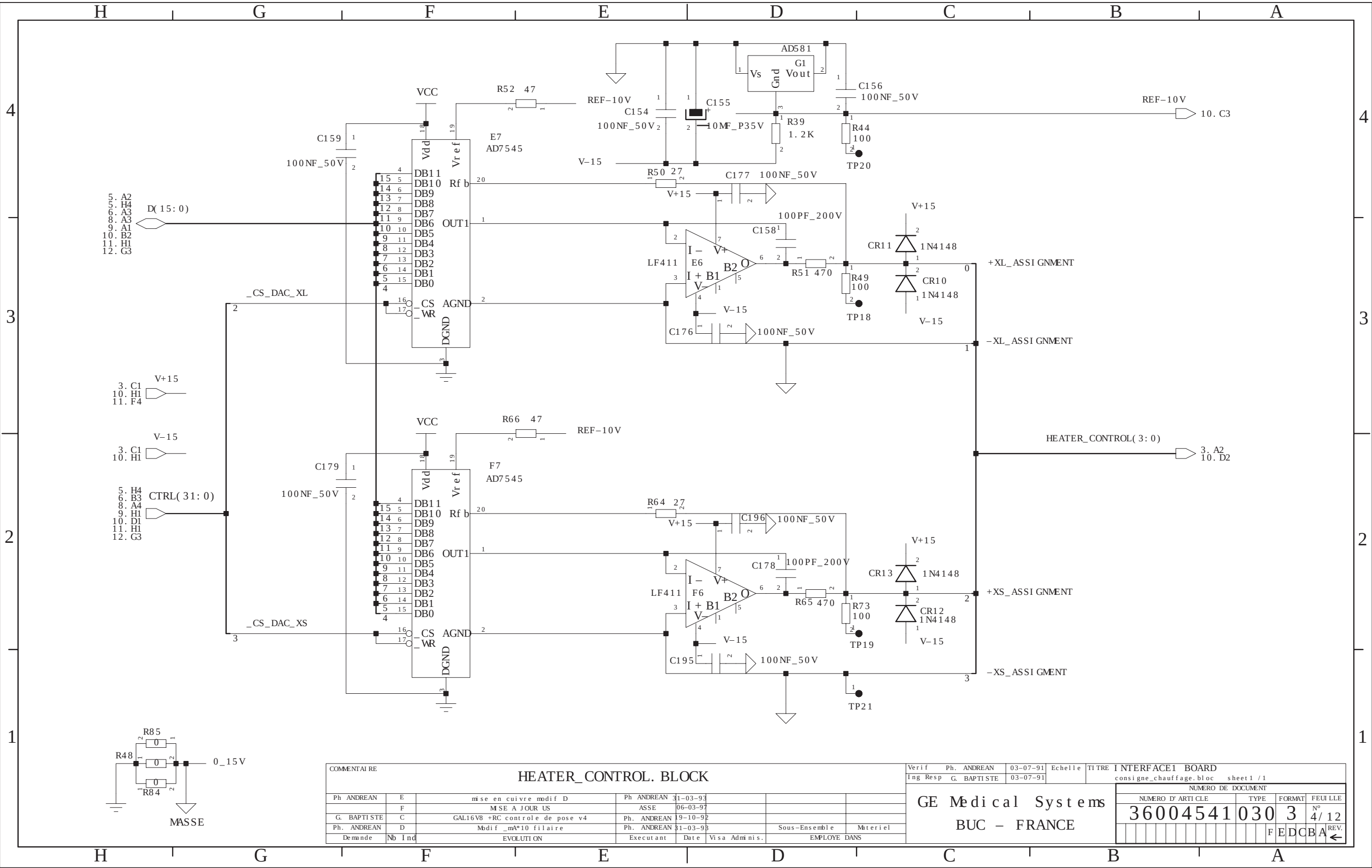
* = NOT USED IN MPPU

COMMENTAIRE						G96_CONNECTOR. BLOC				Verif	Ph. ANDREAN	03-07-91	Echelle	TITRE I NTERFACE1 BOARD			
										Ing Resp	G. BAPTISTE	03-07-91		connecteur_g64.bloc sheet1 / 1			
										GE Medical Systems				NUMERO DE DOCUMENT			
														NUMERO D'ARTICLE			
														TYPE			
														FORMAT			
														FEUILLE			
														N°			
														2 / 12			
														REV.			
														FEDCFA			

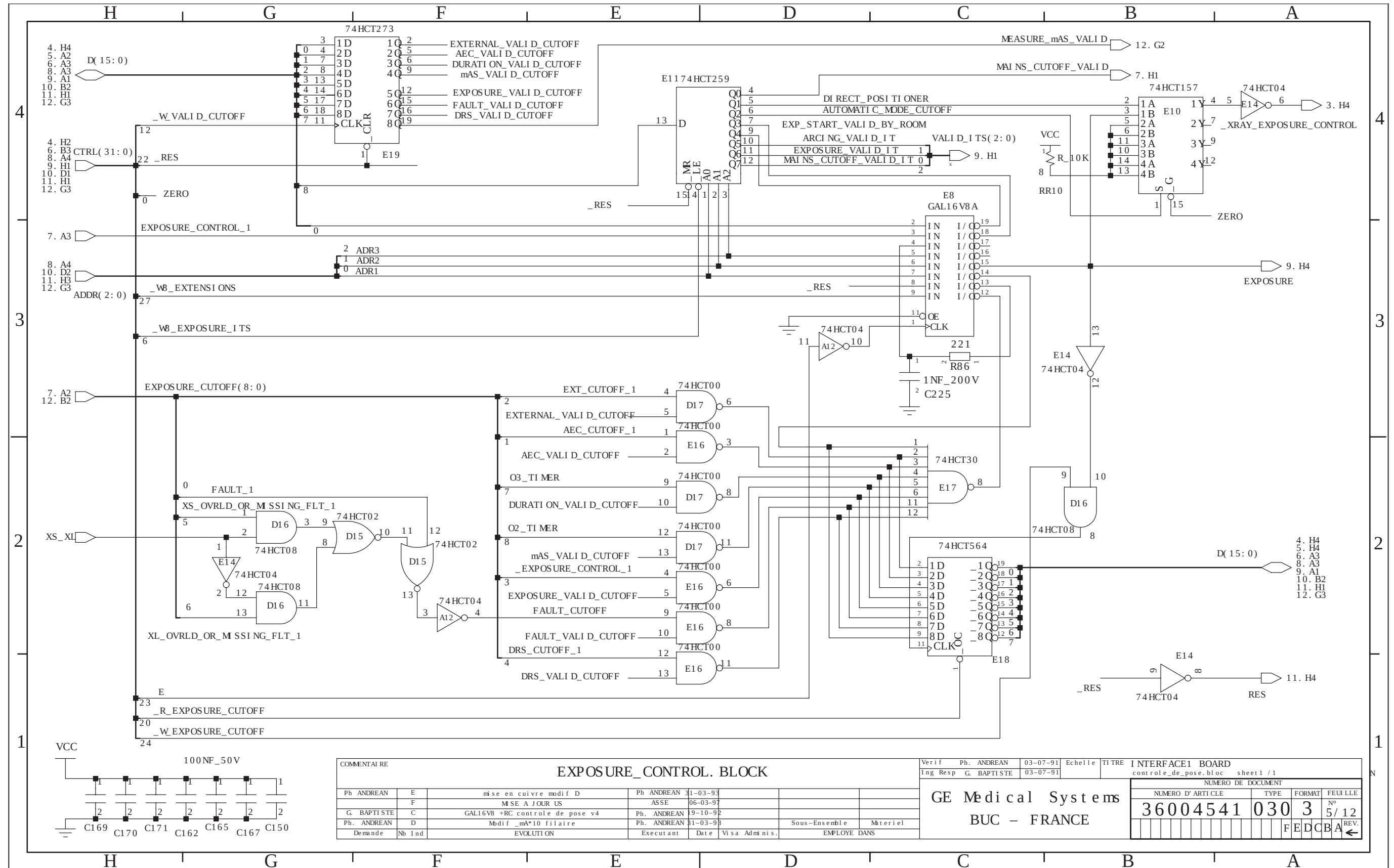
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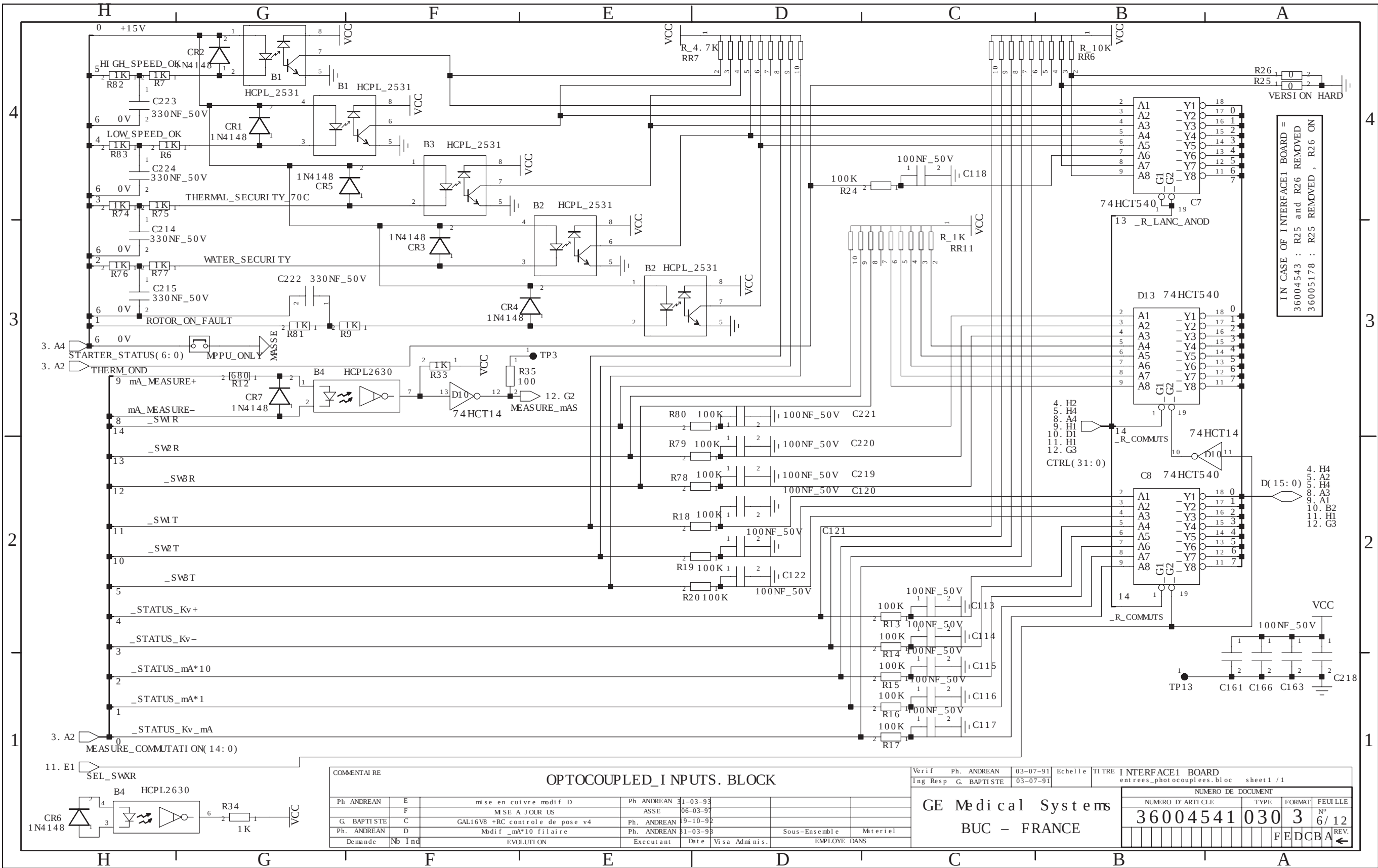
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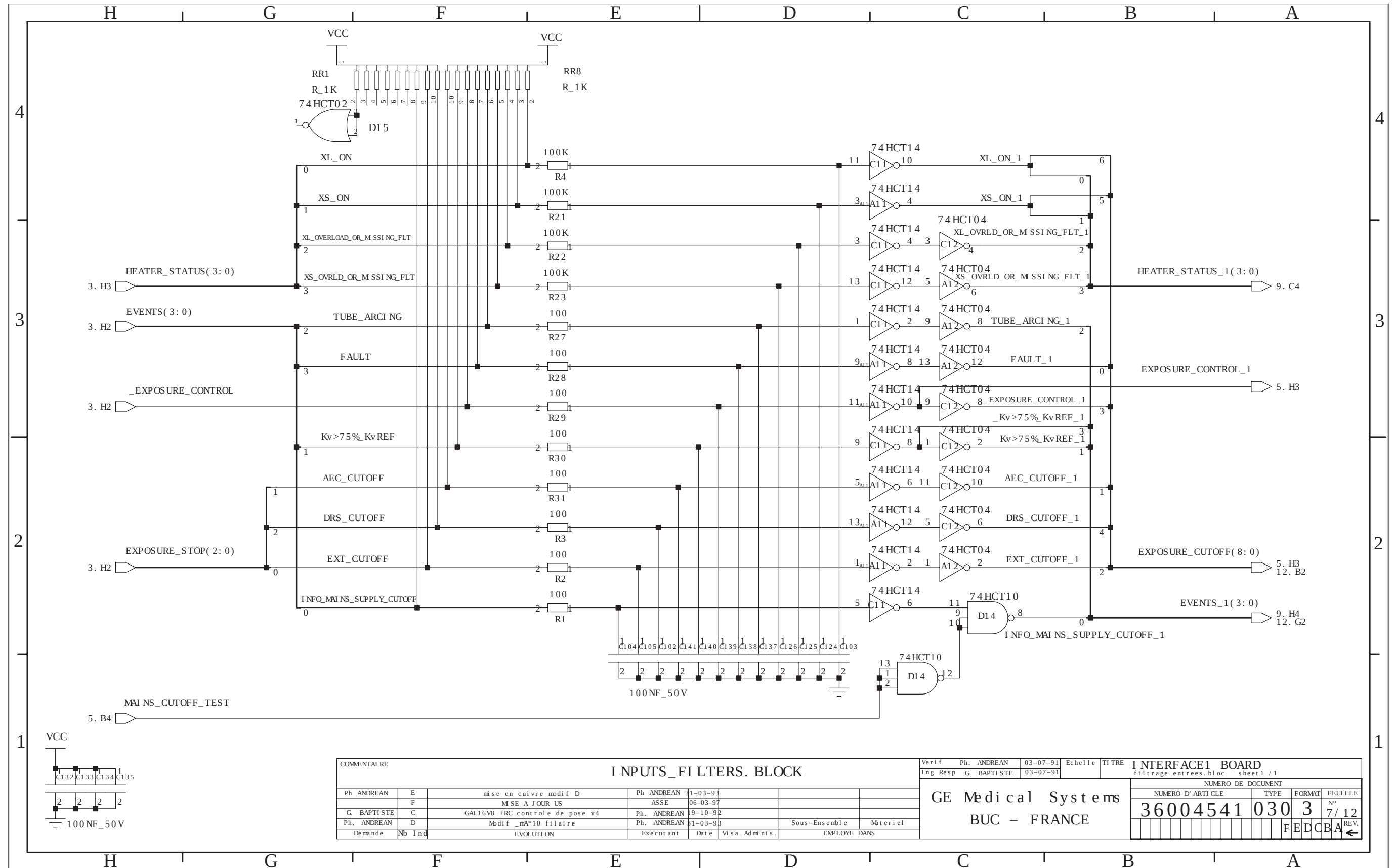
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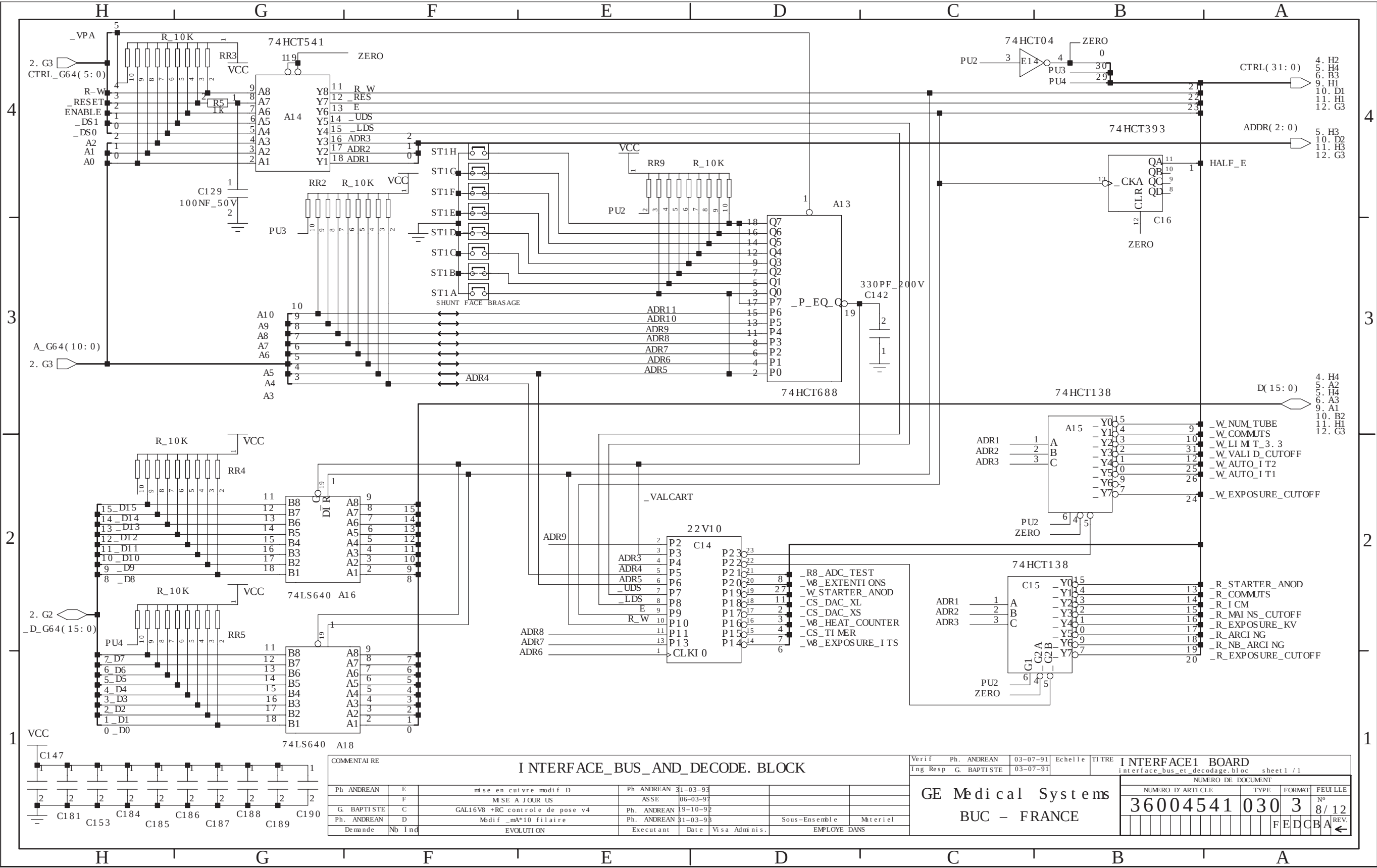
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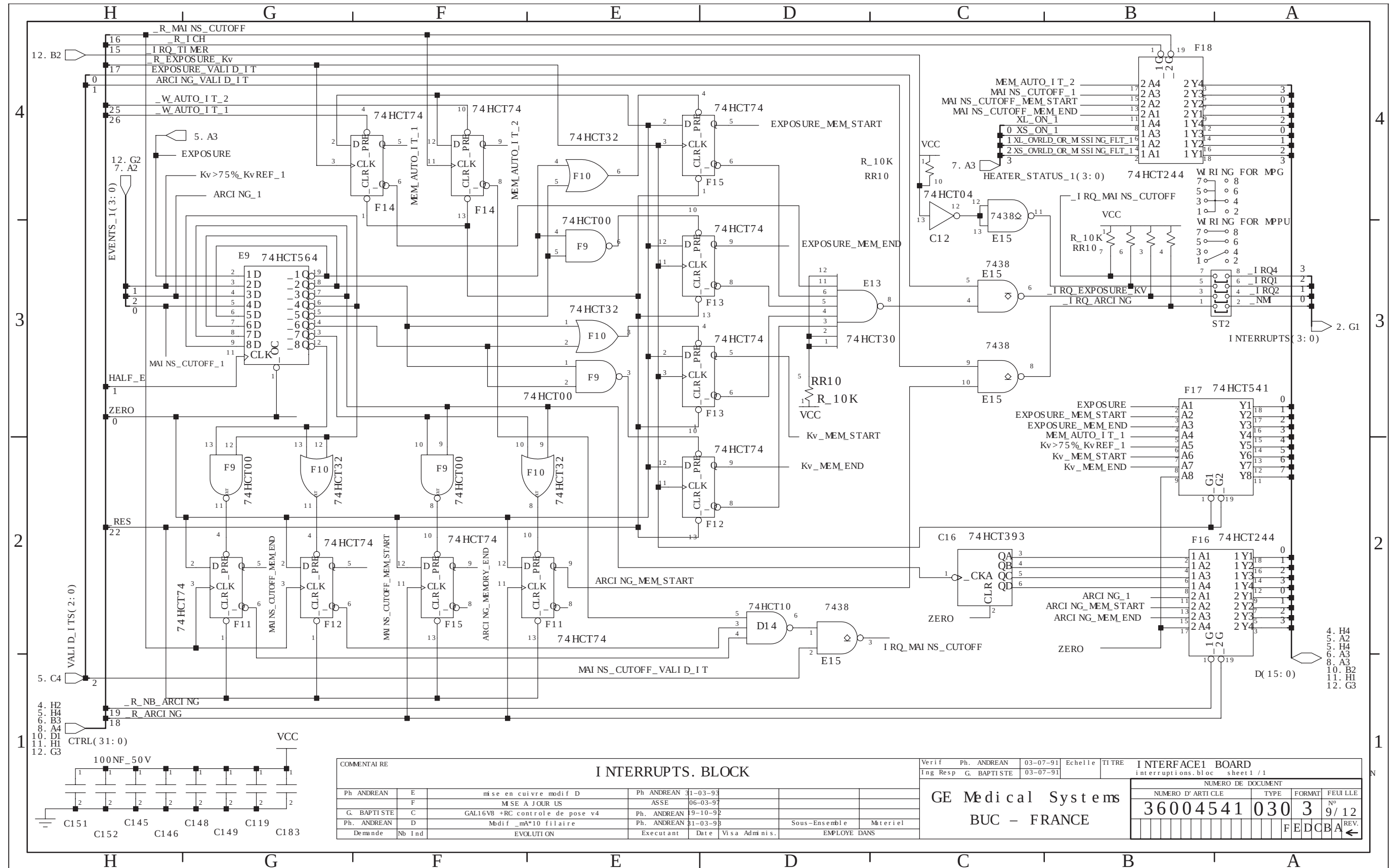
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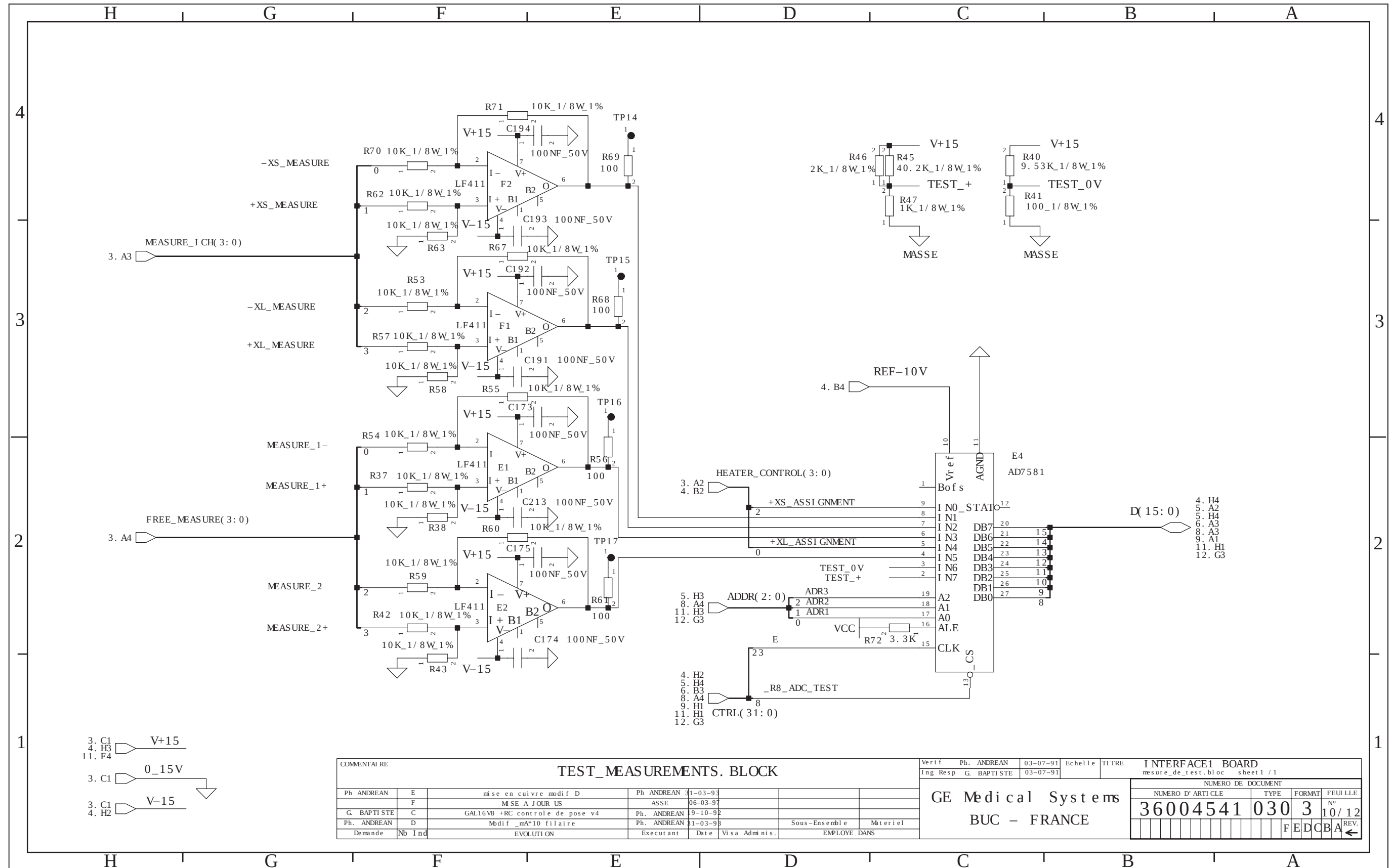
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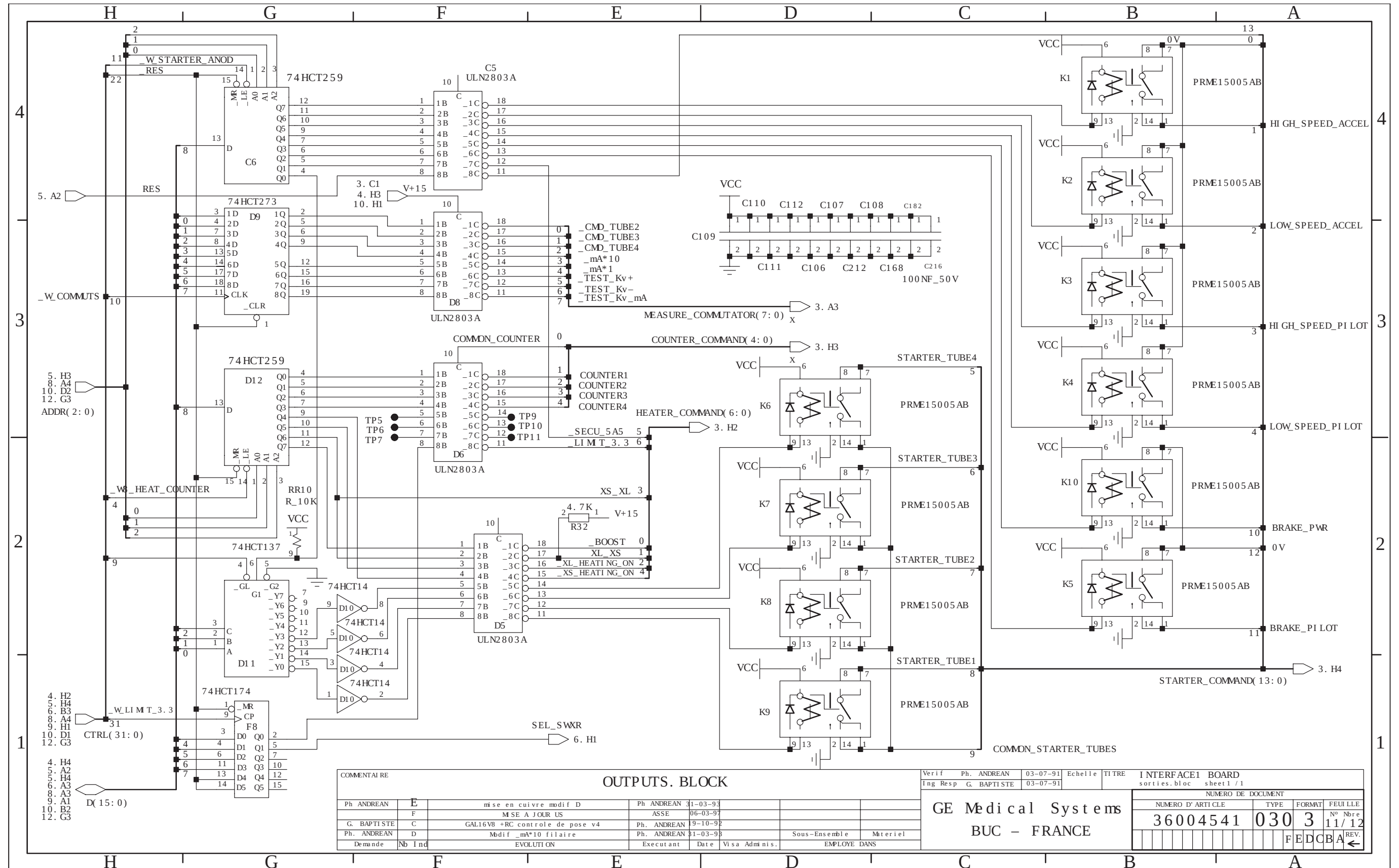
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MNEMONICS

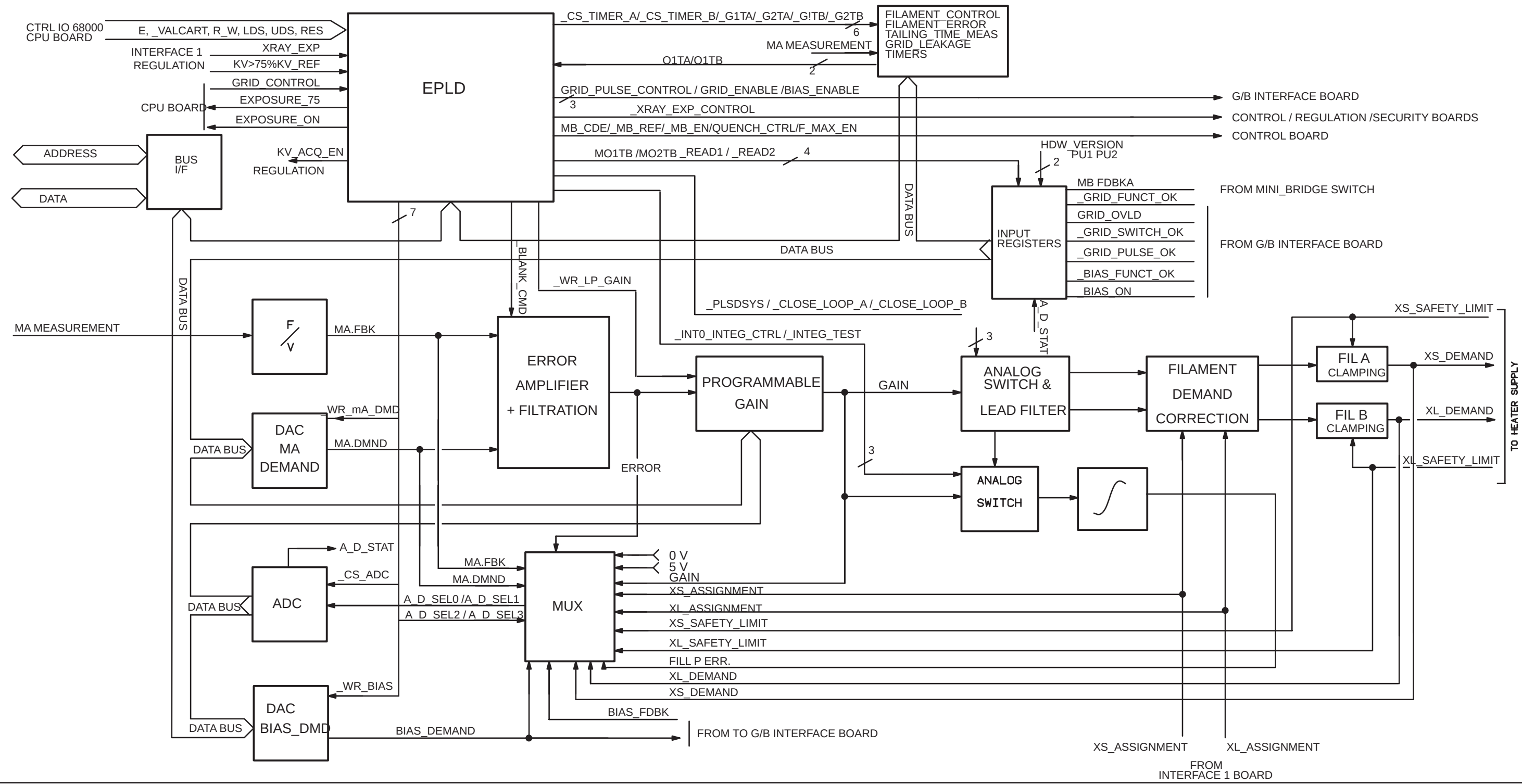
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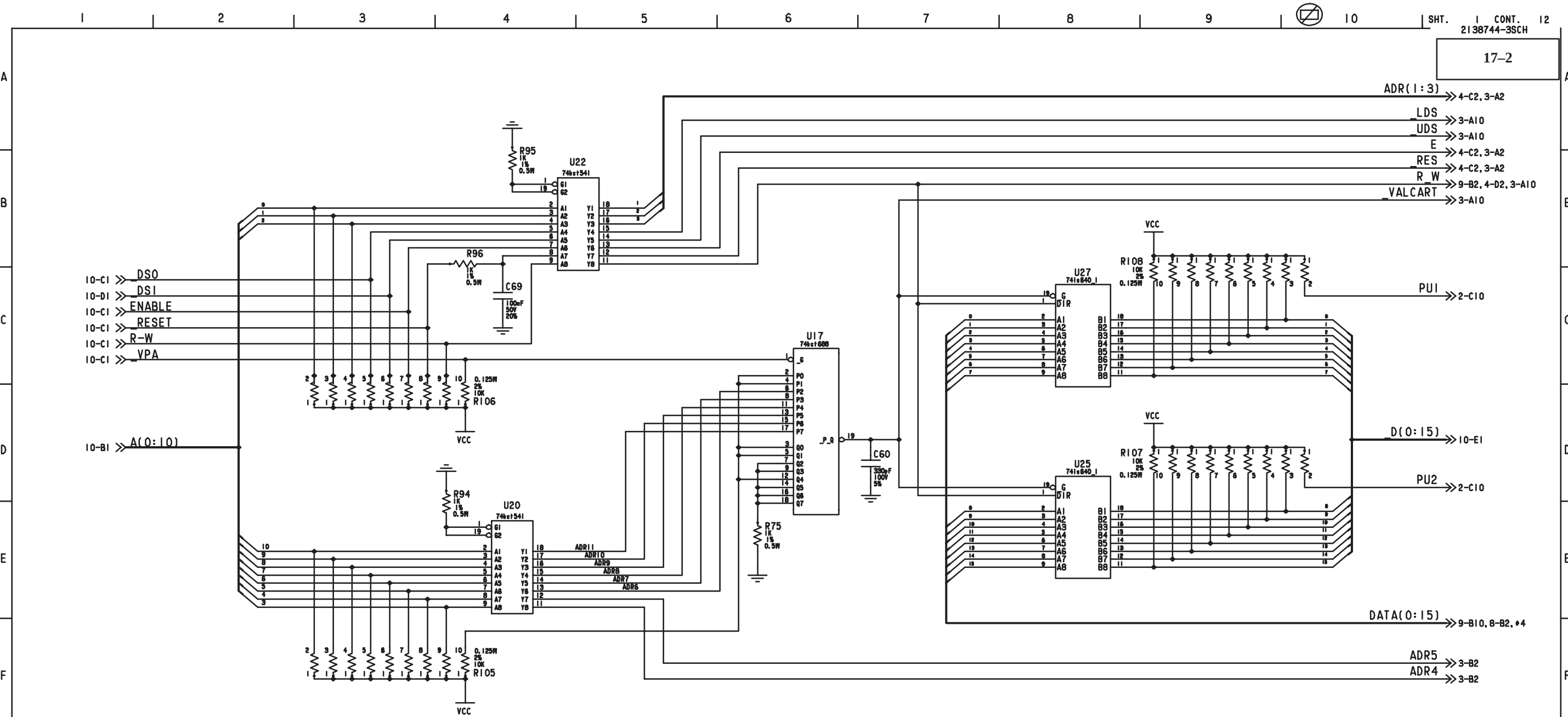
MP PHASE 41 A5 A6 – INTERFACE 2 BOARD

MB FDBKA	Mini bridge operation Feedback
GRID FUNCT OK	Grid function OK
GRID 0VLD	Grid current overload
GRID SWITCH OK	36 V grid switch OK
GRID PULSE OK	Feedback to Int2 board
BIAS FUNCT OK	Bias voltage OK
BIAS ON	Bias voltage Feedback to Int 2 Board

MP PHASE 41 A6 – INTERFACE 2 BOARD BLOCK DIAGRAM

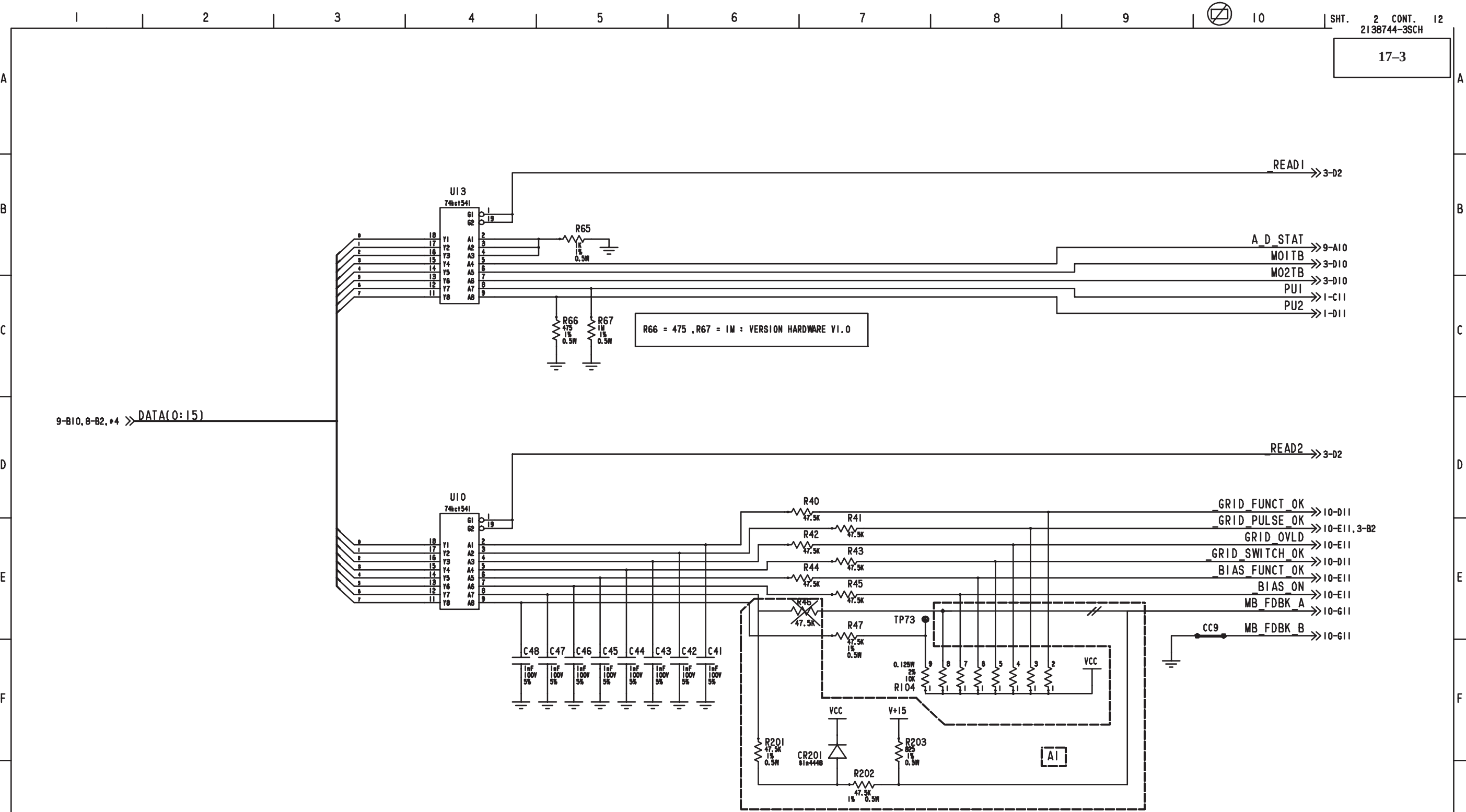
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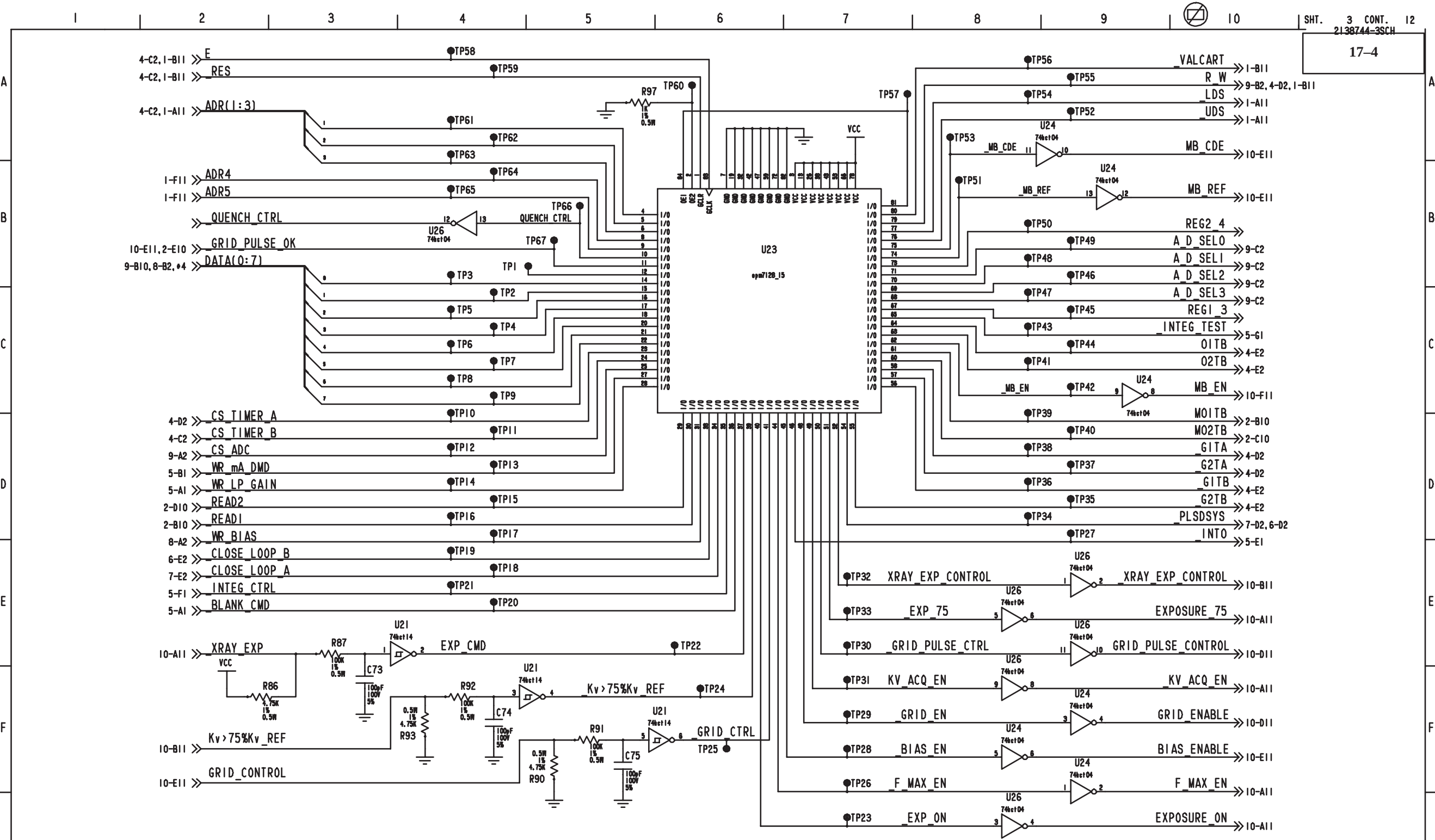
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MADE BY	NAME	DATE DD/MM/YY	APPR BY NAME	CHECK CLOATRE	DATE 10/10/96		FIRST MADE FOR VAMP				
REV 2	PCN XXXXXXXX	DESCRIPTION XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	DATE DD/MM/YY	APPR ENCELLAZ	DATE 10/10/96		DRAWING NO.		REV A	SIZE 3	SHT/CONT. ON 1 / 12
MADE BY	NAME	DATE DD/MM/YY	APPR BY NAME	OTHER	DATE		2138744-3SCH				

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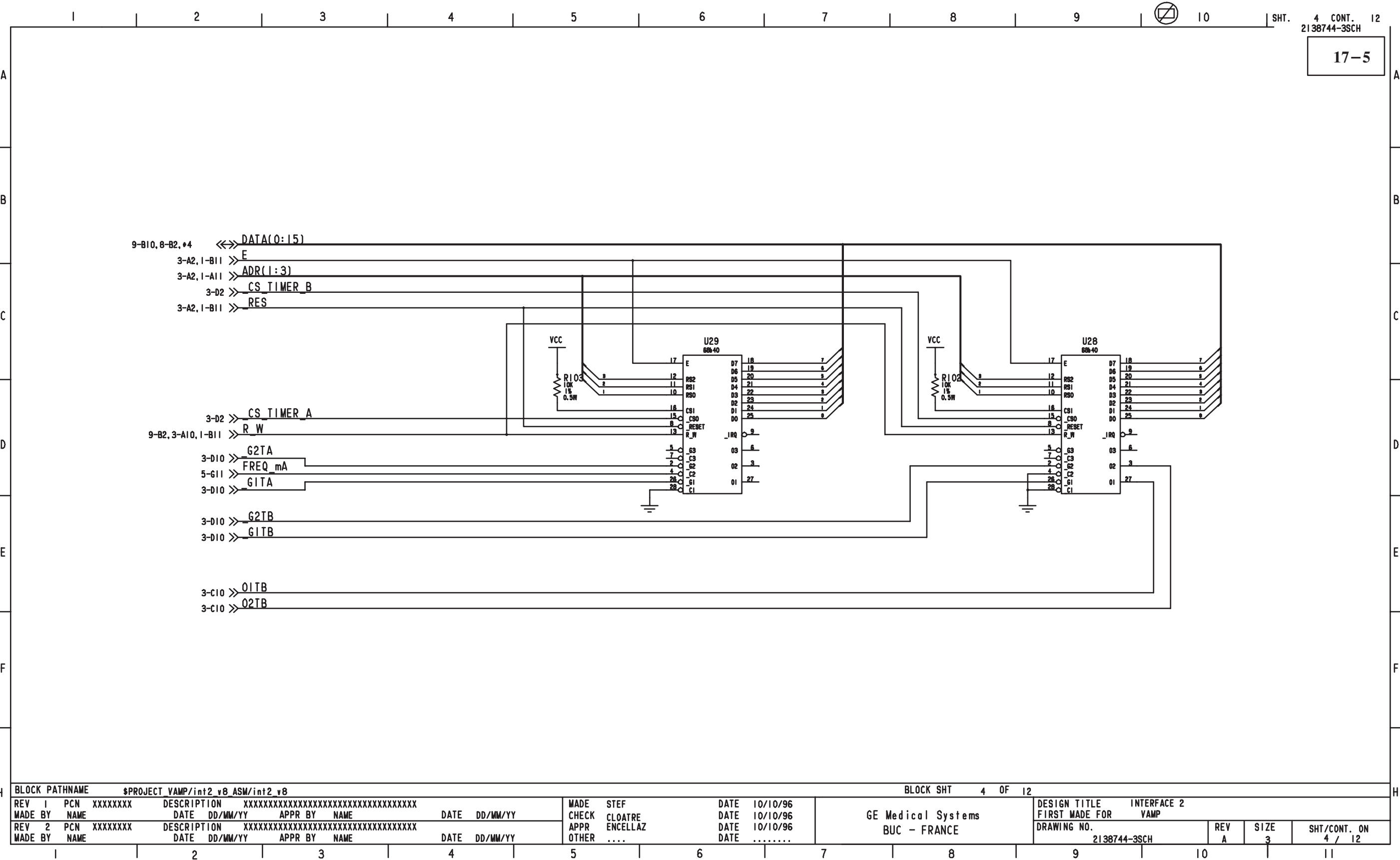
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REV 1	PCN	XXXXXXX	DESCRIPTION	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	MADE	STEF	DATE	10/10/96	GE Medical Systems BUC - FRANCE										DESIGN TITLE										INTERFACE 2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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MADE BY	NAME		DATE	DD/MM/YY	APPR BY	NAME	DATE	DD/MM/YY											OTHER		DATE		2138744-3SCH										REV A										SIZE 3										SHT/CONT. ON 2 / 12																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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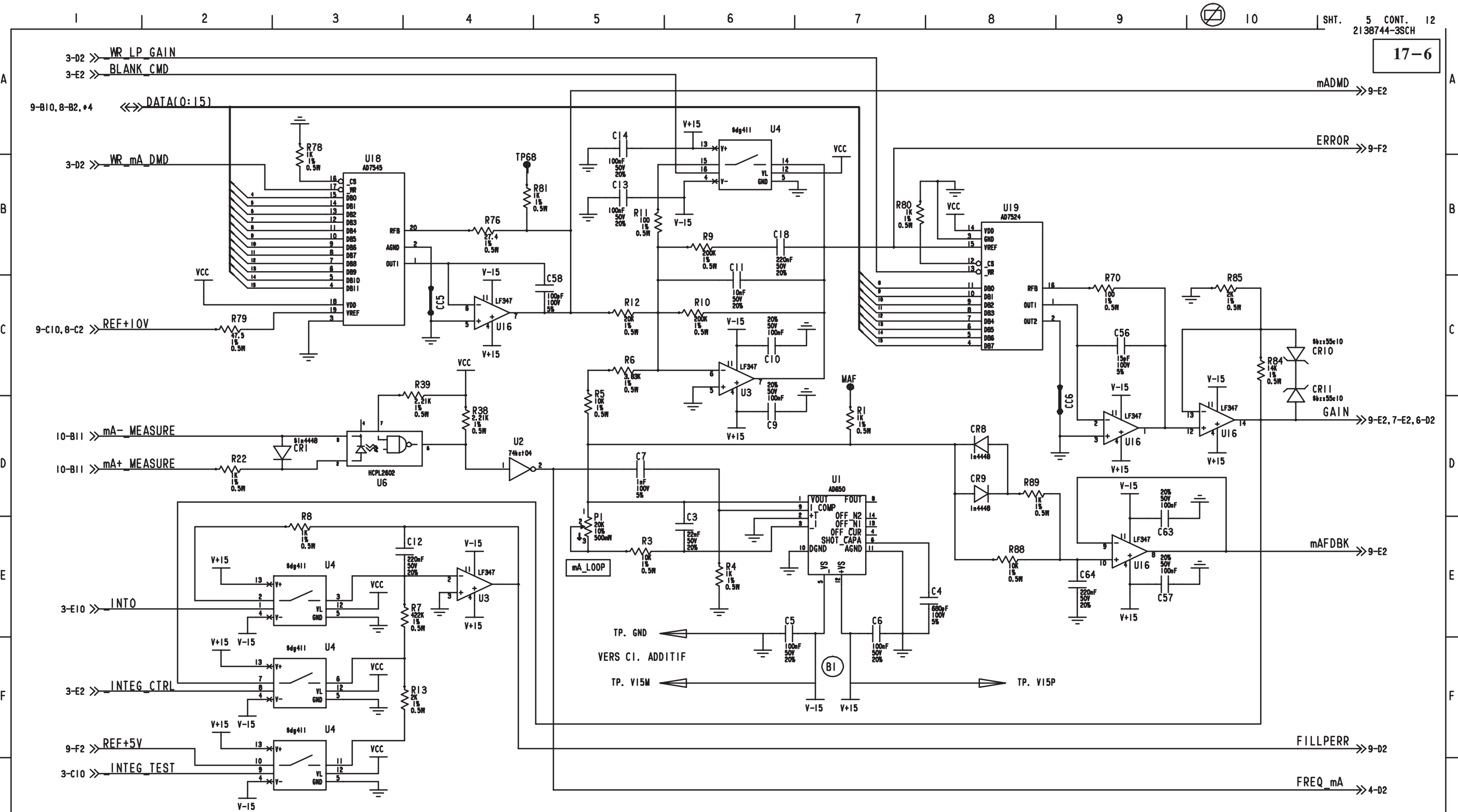


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MADE BY	NAME		DATE	DD/MM/YY	APPR BY	NAME	DATE	DD/MM/YY	DATE			10/10/96	FIRST MADE FOR VAMP								
REV 2	PCN	xxxxxxx	DESCRIPTION xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx			APPR	ENCCELLAZ	DATE	10/10/96	BUC - FRANCE		DRAWING NO.		REV	SIZE	SHT/CONT. ON					
MADE BY	NAME		DATE	DD/MM/YY	APPR BY	NAME	DATE	DD/MM/YY	DATE			10/10/96	2138744-3SCH		A	3	3 / 12				
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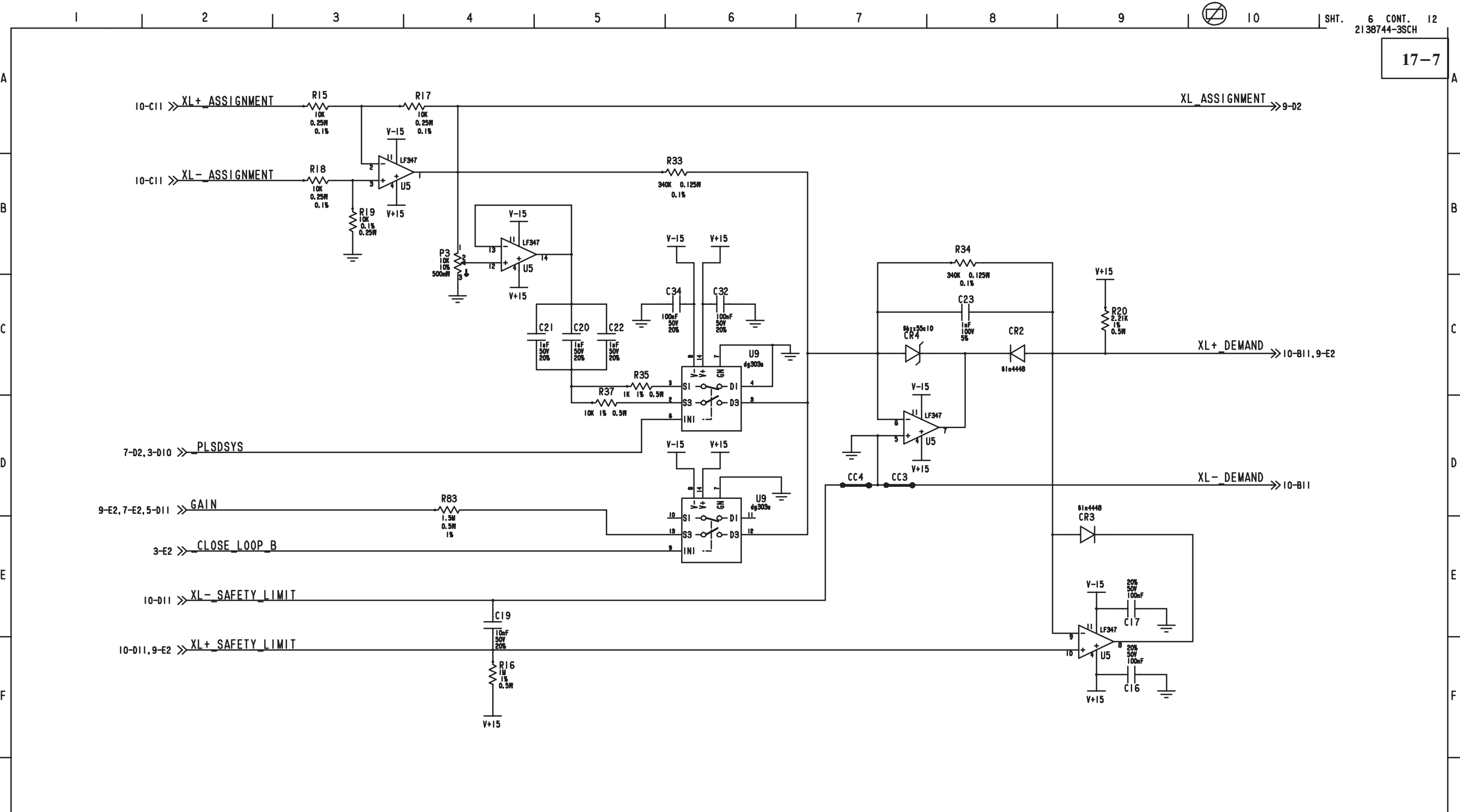


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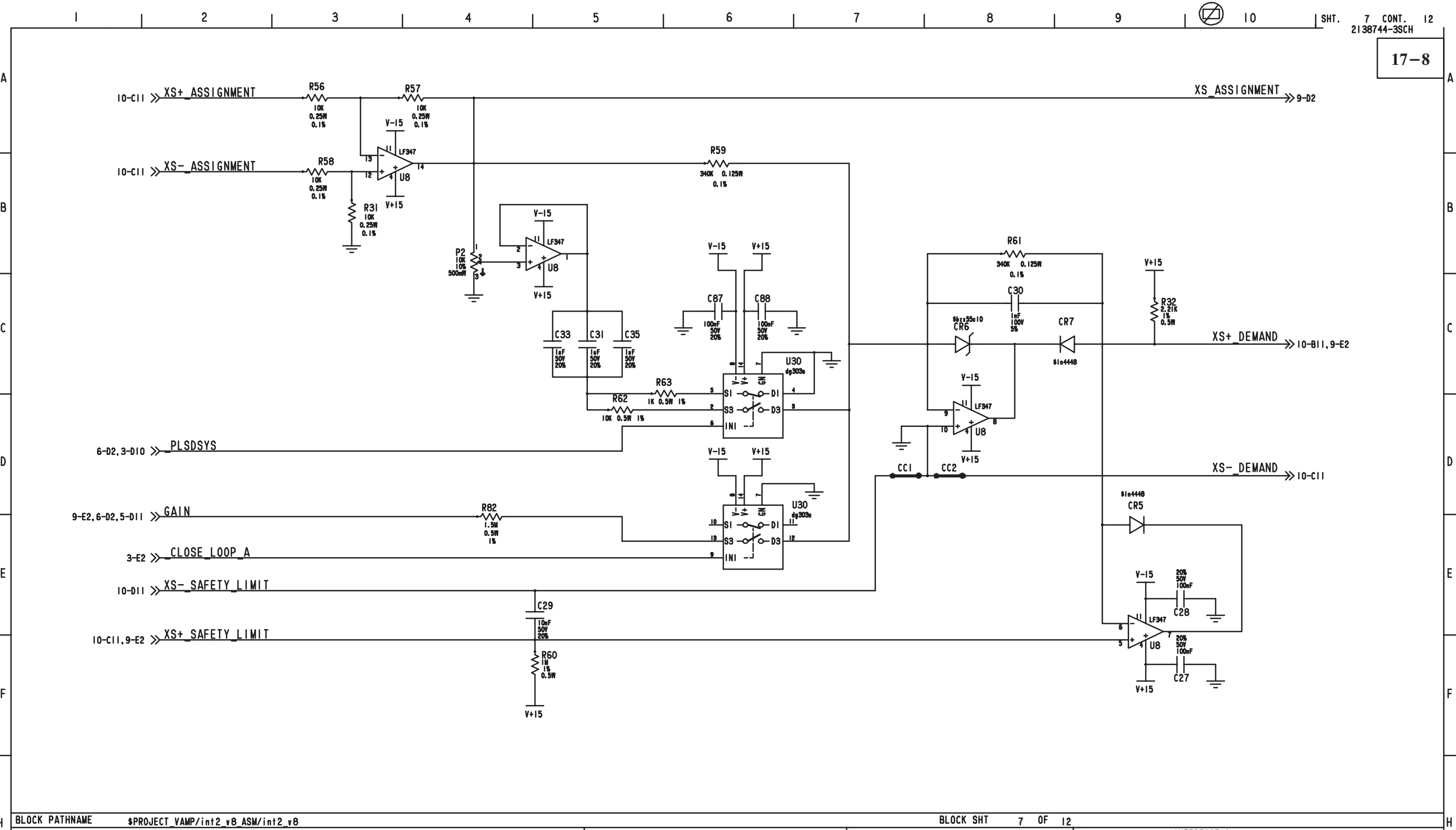
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MADE BY	NAME		DATE	DD/MM/YY	OTHER		DATE				
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									2138744-3SCH	A	3
									SHT/CONT. ON		
									5 / 12		

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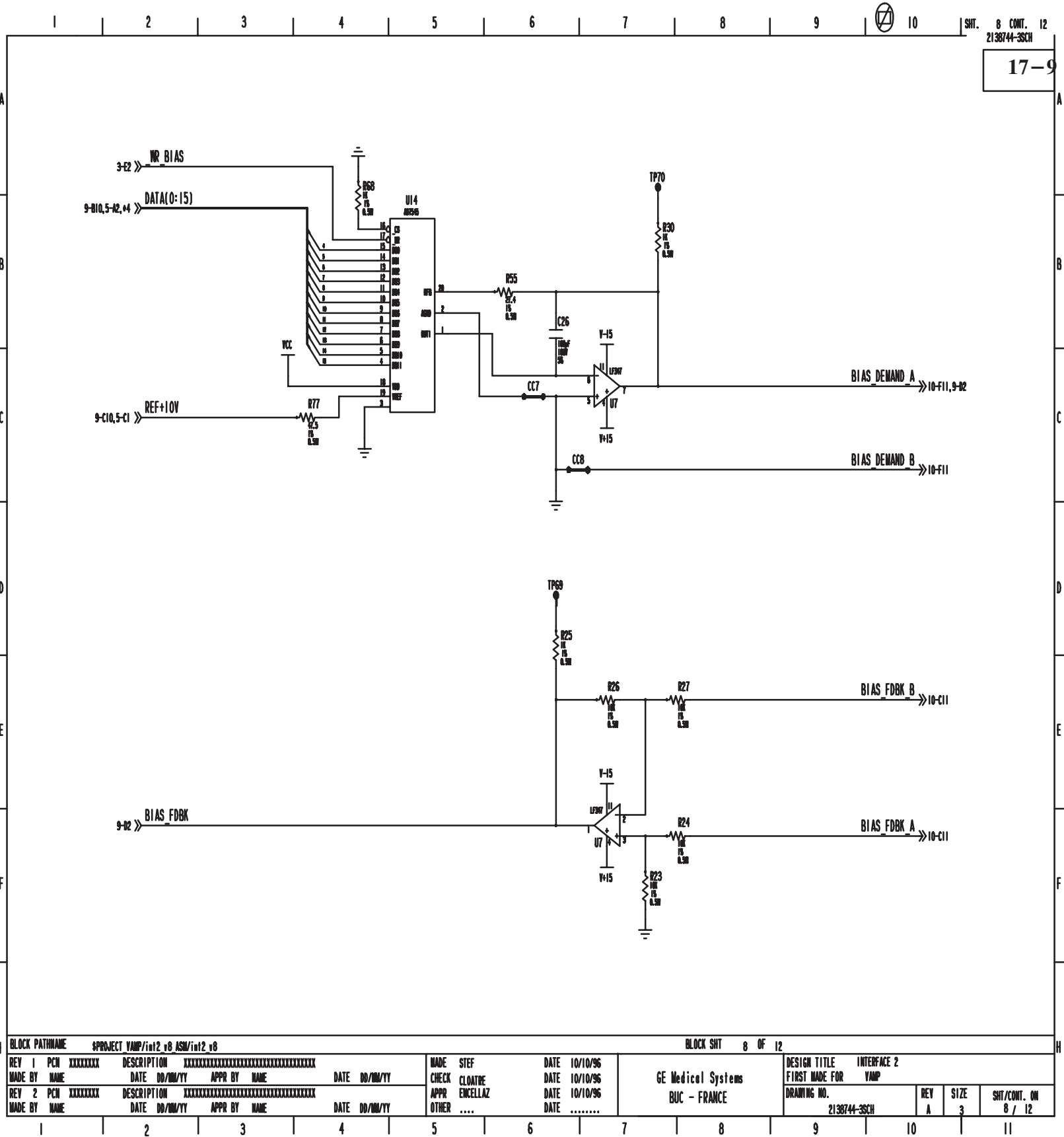
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MADE BY		NAME				DATE		DD/MM/YY		APPR BY		NAME				CHECK		CLOATRE		DATE		10/10/96		FIRST MADE FOR												VAMP									
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MADE BY		NAME				DATE		DD/MM/YY		APPR BY		NAME				OTHER				DATE				2138744-3SCH												A		3		6 / 12					
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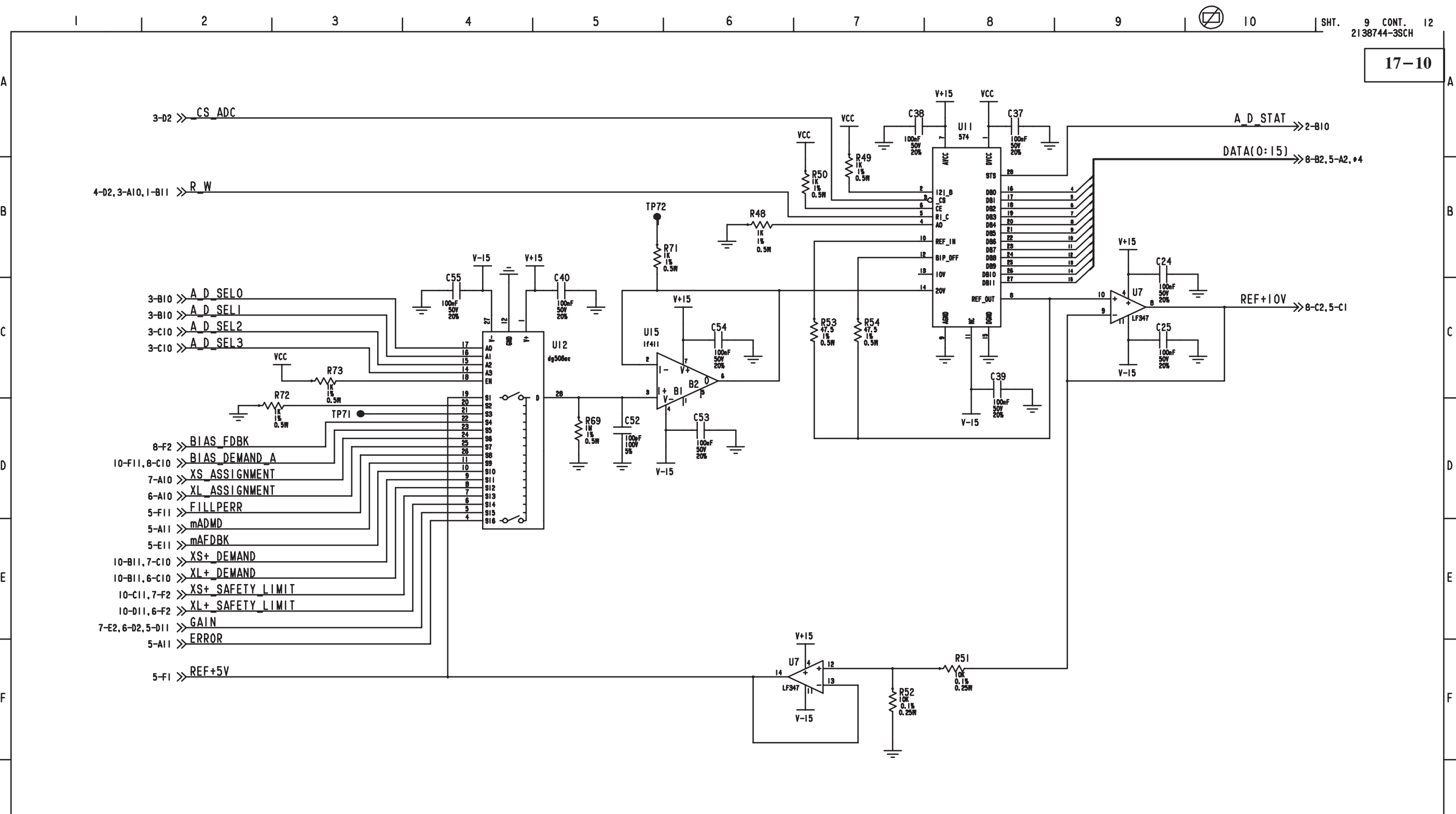


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MADE BY NAME DATE DD/MM/YY APPR BY NAME DATE DD/MM/YY				OTHER		DATE															
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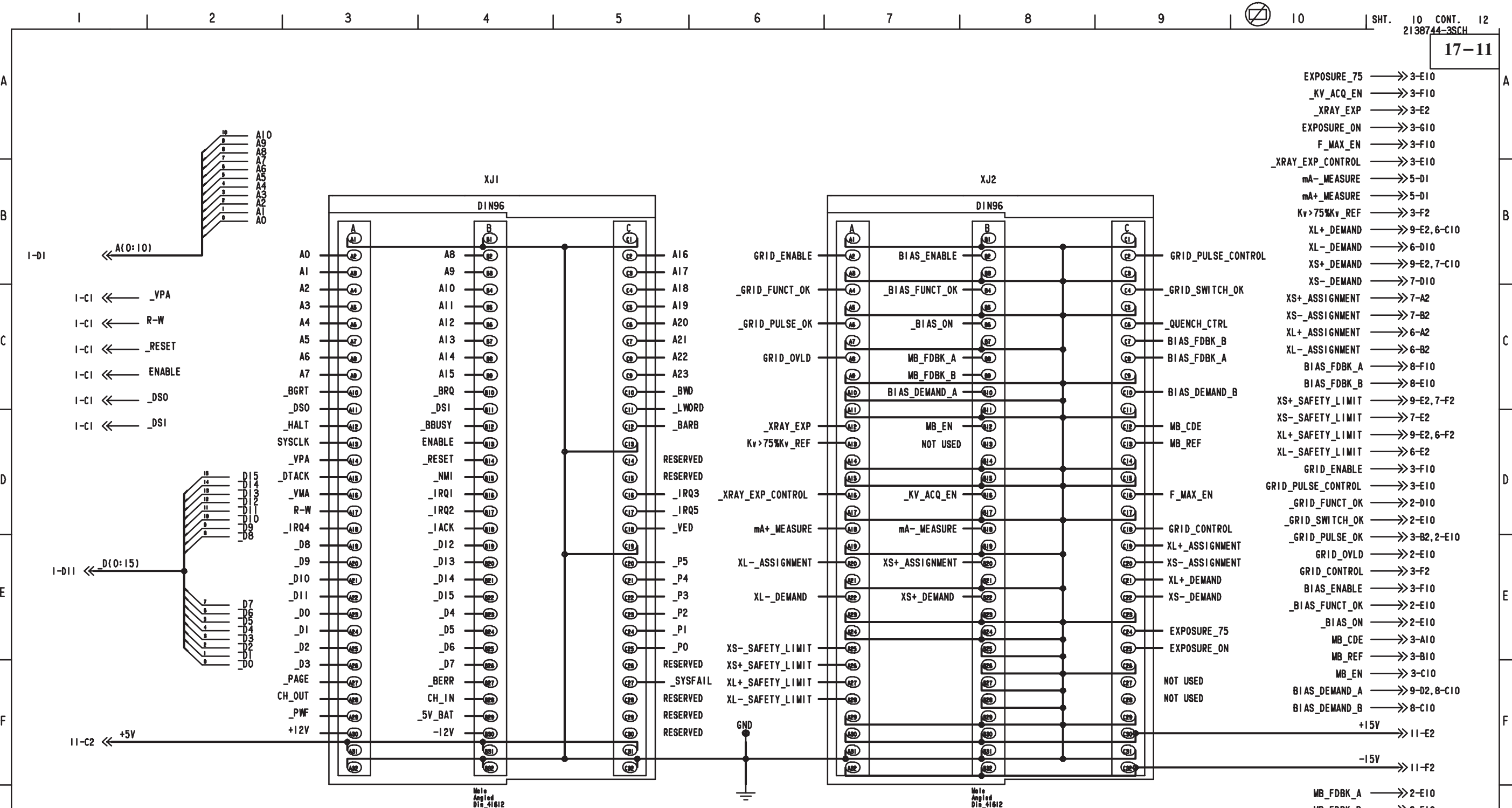


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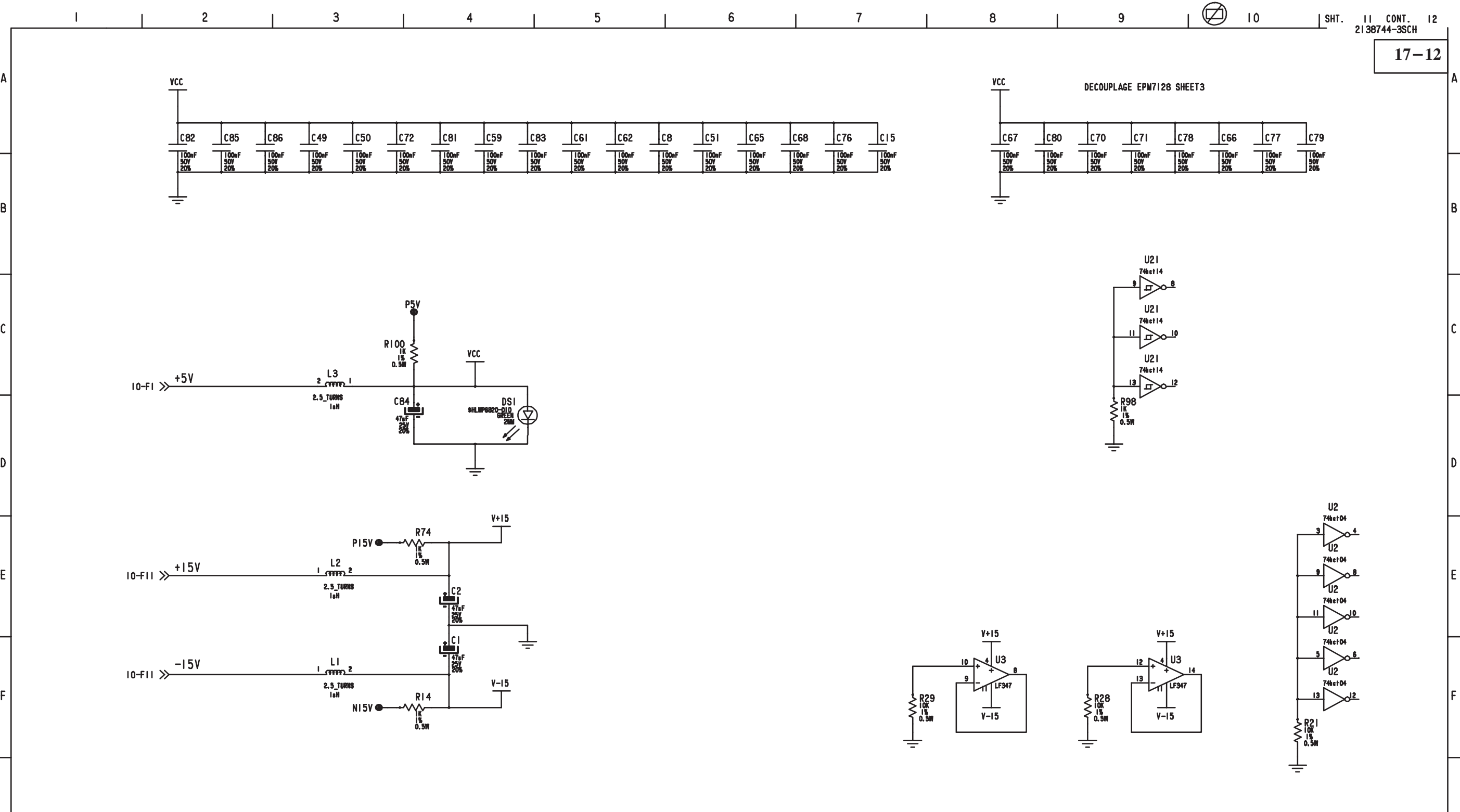
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REV 2	PCN	xxxxxxx	DESCRIPTION xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx			APPR	ENCCELLAZ	DATE	10/10/96	BUC - FRANCE			DRAWING NO.			REV	SIZE	SHT/CONT. ON														
MADE BY	NAME		DATE	DD/MM/YY	APPR BY	OTHER		DATE					2138744-3SCH			A	3	9 / 12														
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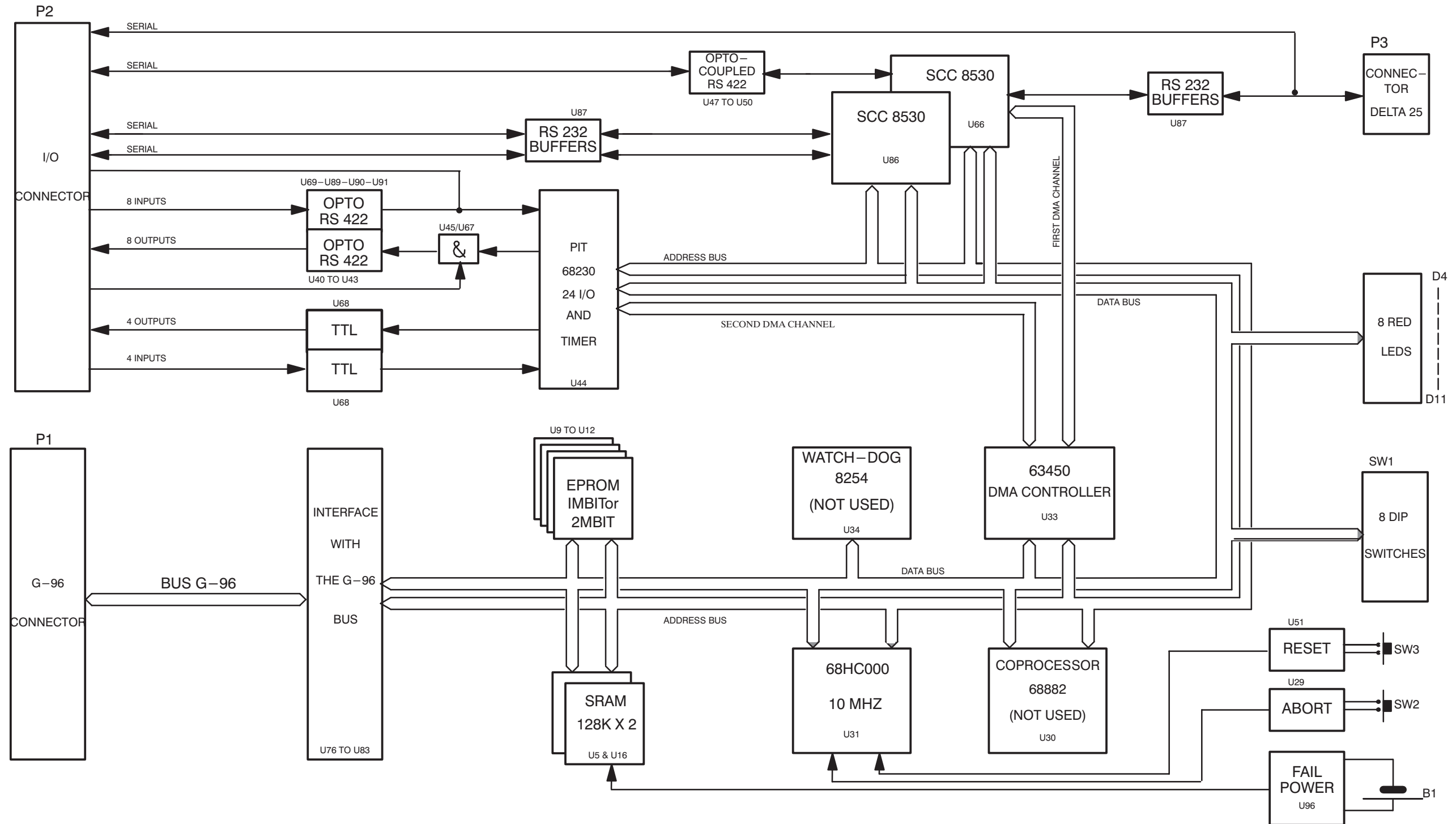


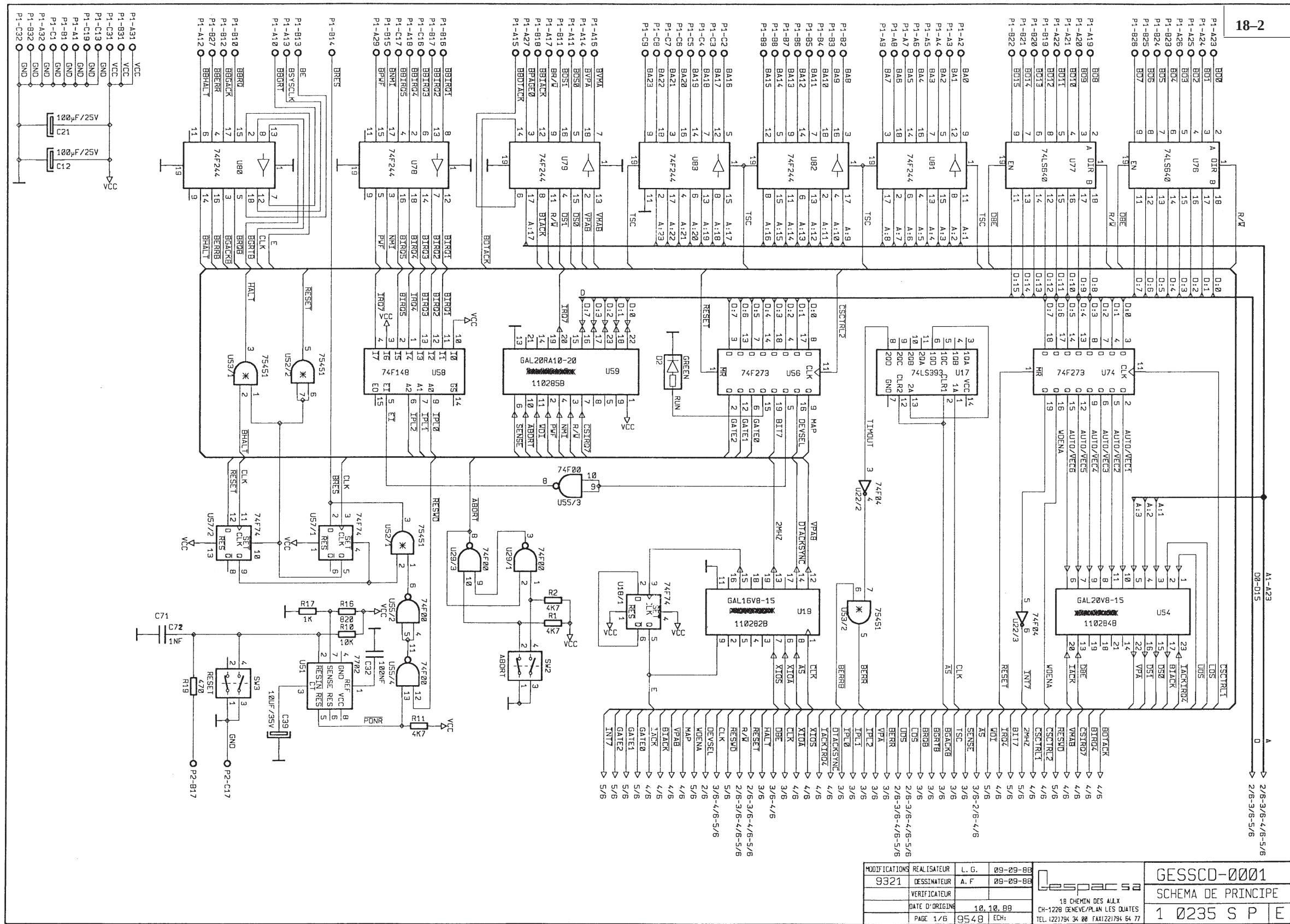
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MADE BY	NAME		DATE	DD/MM/YY	APPR BY	NAME		OTHER		DATE	
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								BUC - FRANCE		FIRST MADE FOR	VAMP
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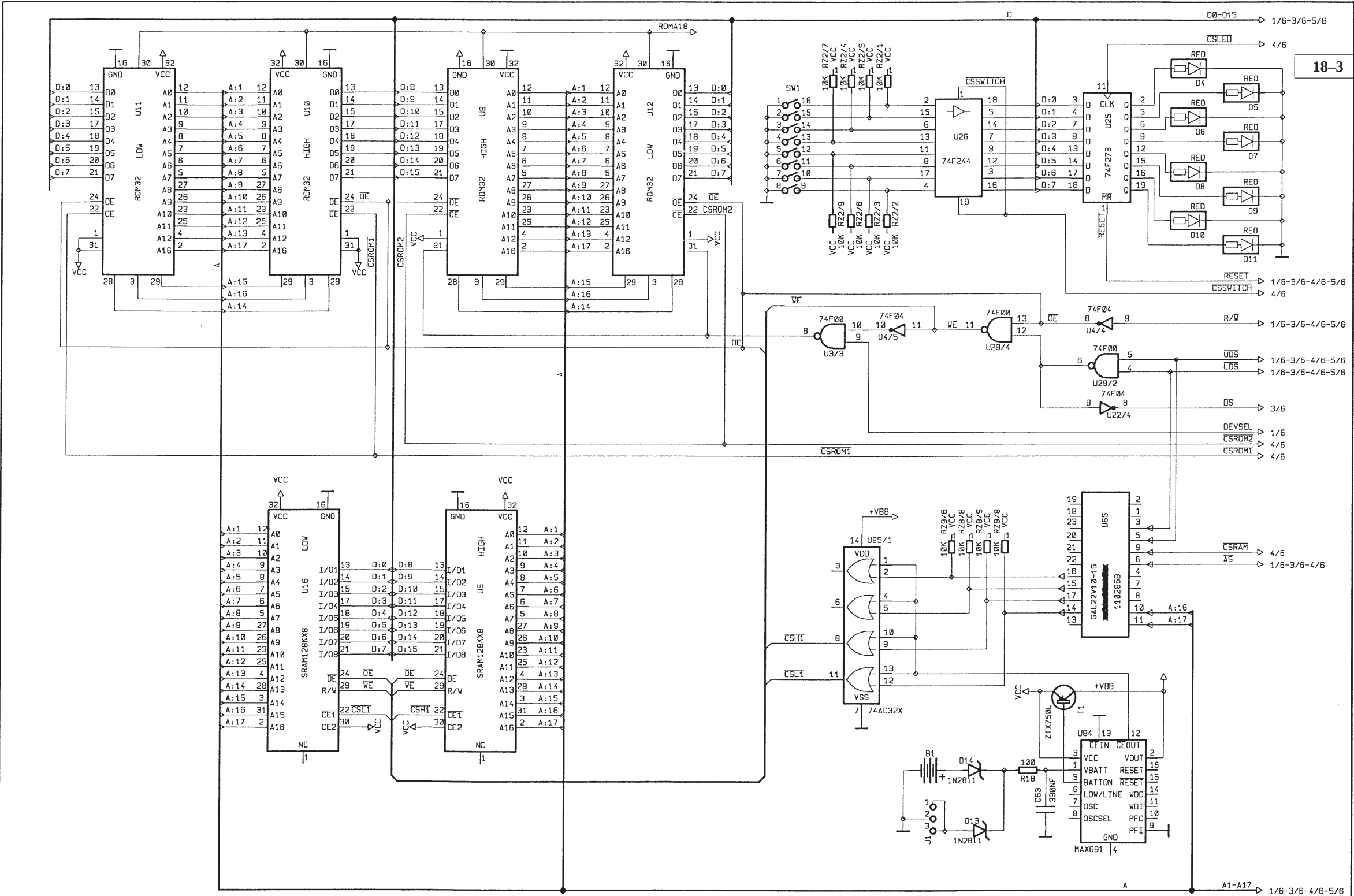
MP PHASE 41 A5 A9 – CPU BOARD *BLOCK* *DIAGRAM*

18-1





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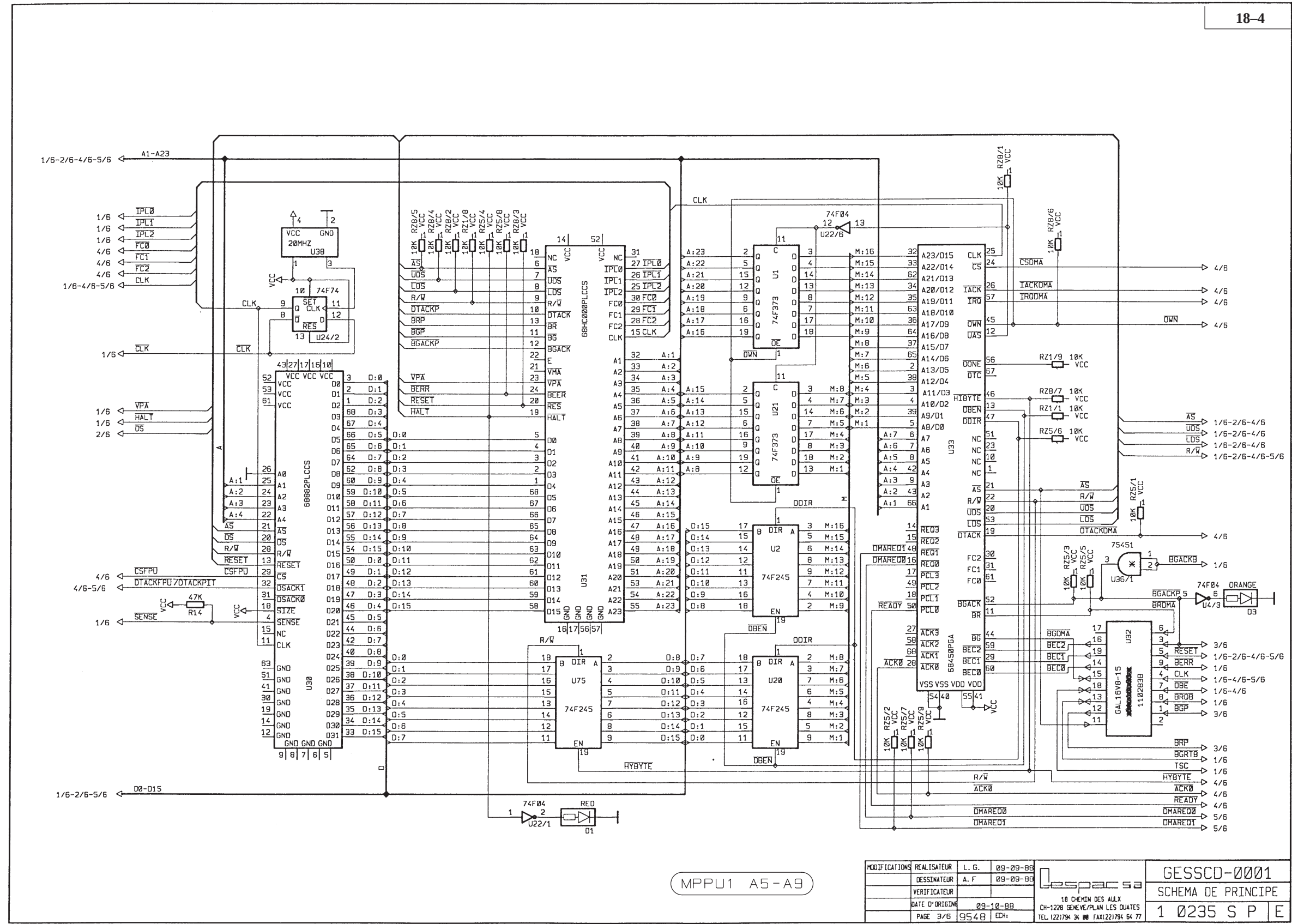


MPPU1 A5-A9

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	DESSINATEUR	A. F.	09-09-88	
	VERIFICATEUR			
	DATE D'ORIGINE	09.10.88		
PAGE	2/6	9548	ECH:	

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SCHEMA DE PRINCIPE
1 0235 S P E

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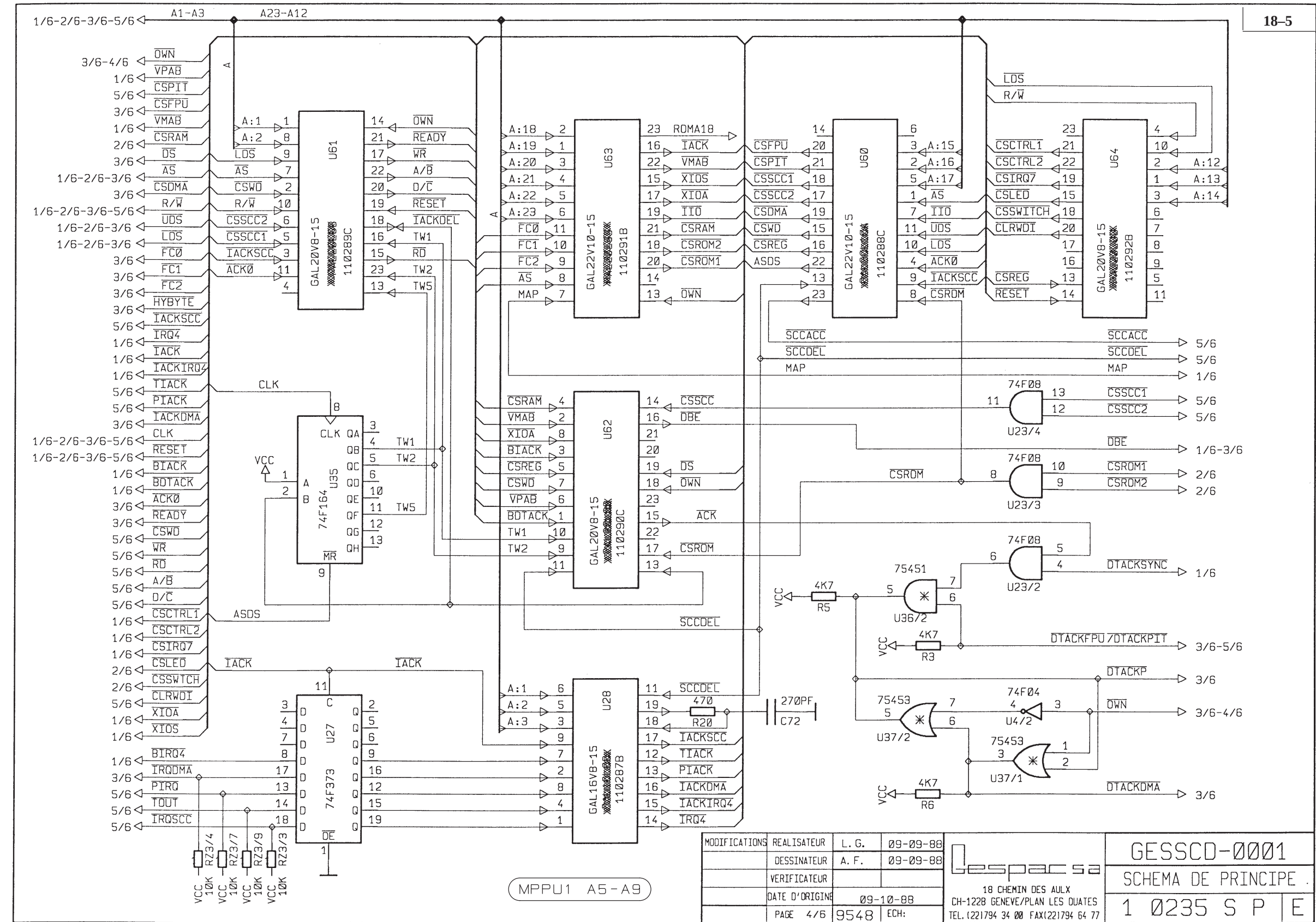


MPPU1 A5-A9

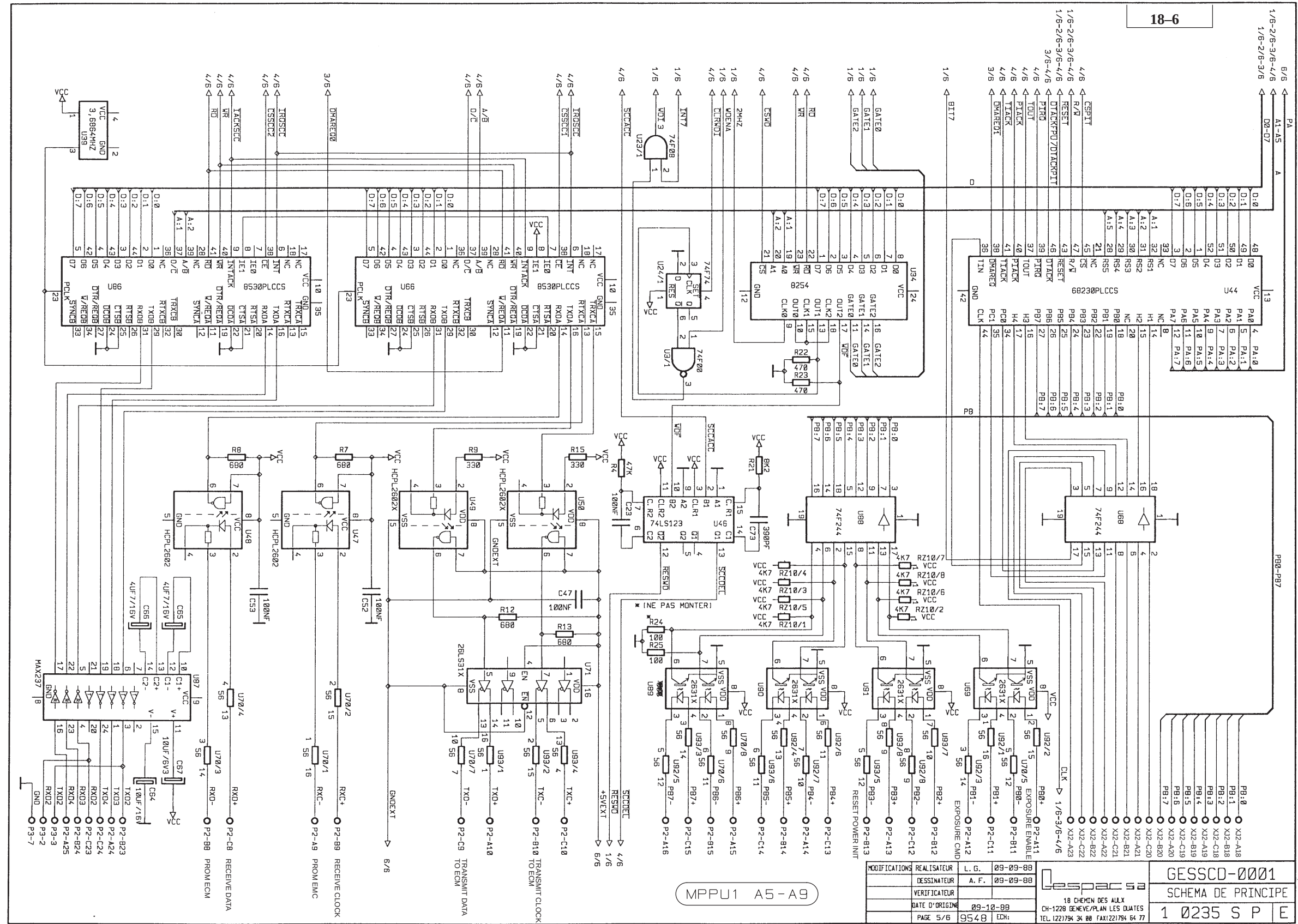
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DESSINATEUR	A. F.	09-09-88	
VERIFICATEUR			
DATE D'ORIGINE	09-10-88		
PAGE	3/6	9548	ECH

Lespac sa	GESSCD-0001
18 CHEMIN DES ALIX CH-1228 GENEVE/PLAN LES QUATES TEL. 1221794 34 FAX 1221794 64 77	SCHEMA DE PRINCIPE
	1 0235 S P E

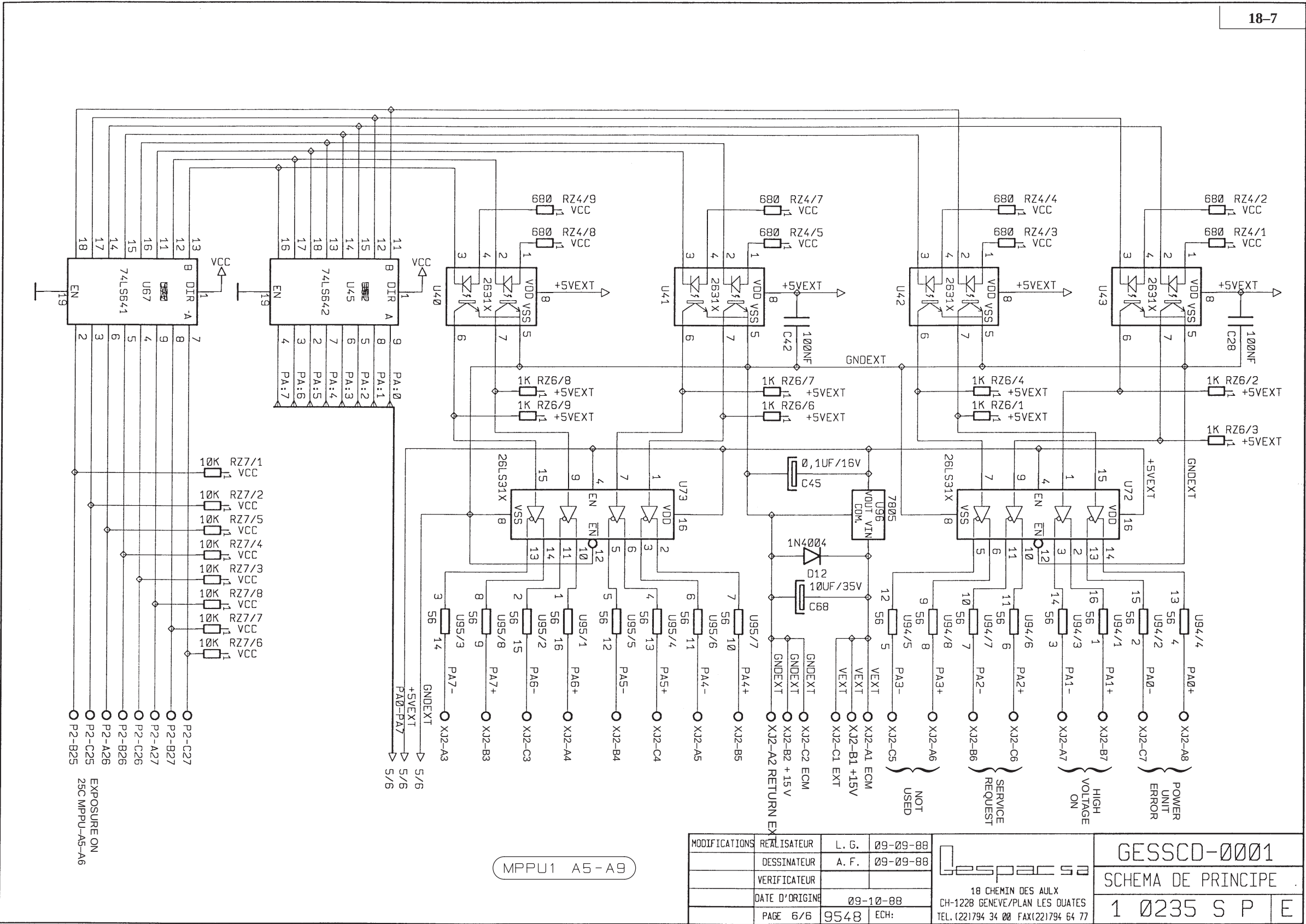
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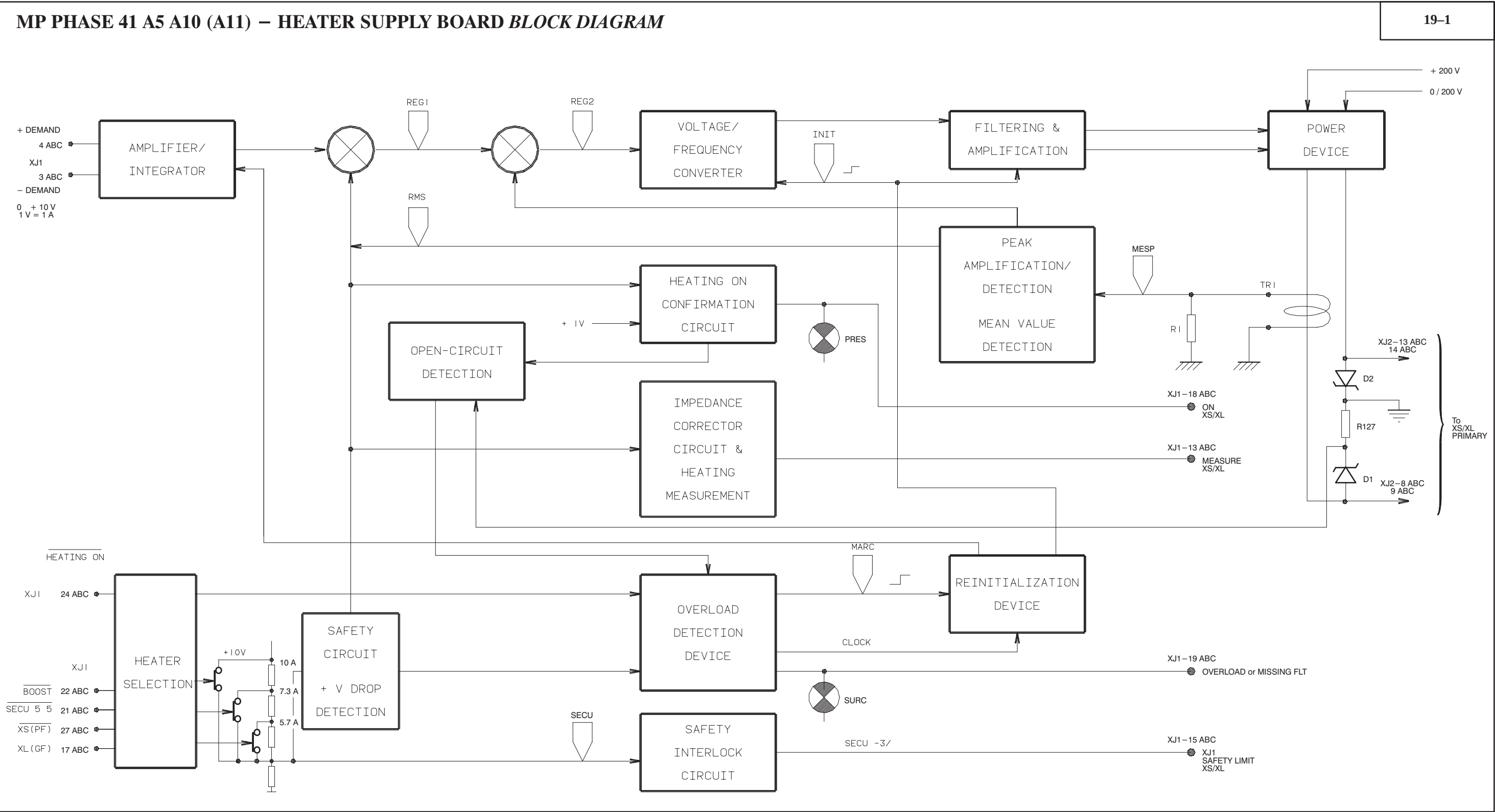
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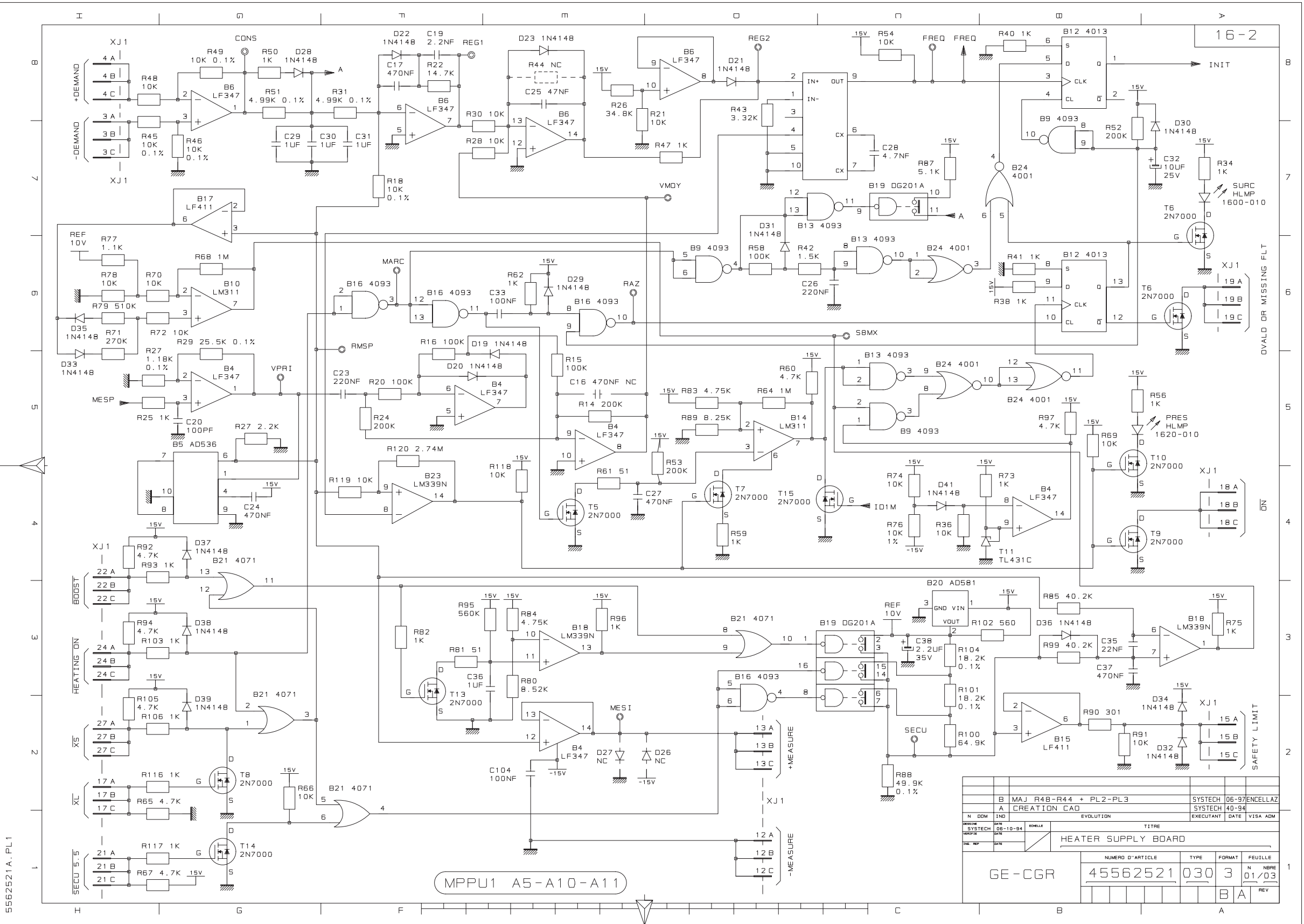
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MNEMONICS		19-0
MP PHASE 41 A5 A10 – HEATER SUPPLY BOARD		
XS	Small Focus	
XL	Large Focus	
XS/XL DEMAND	RMS Filament Current Requested	

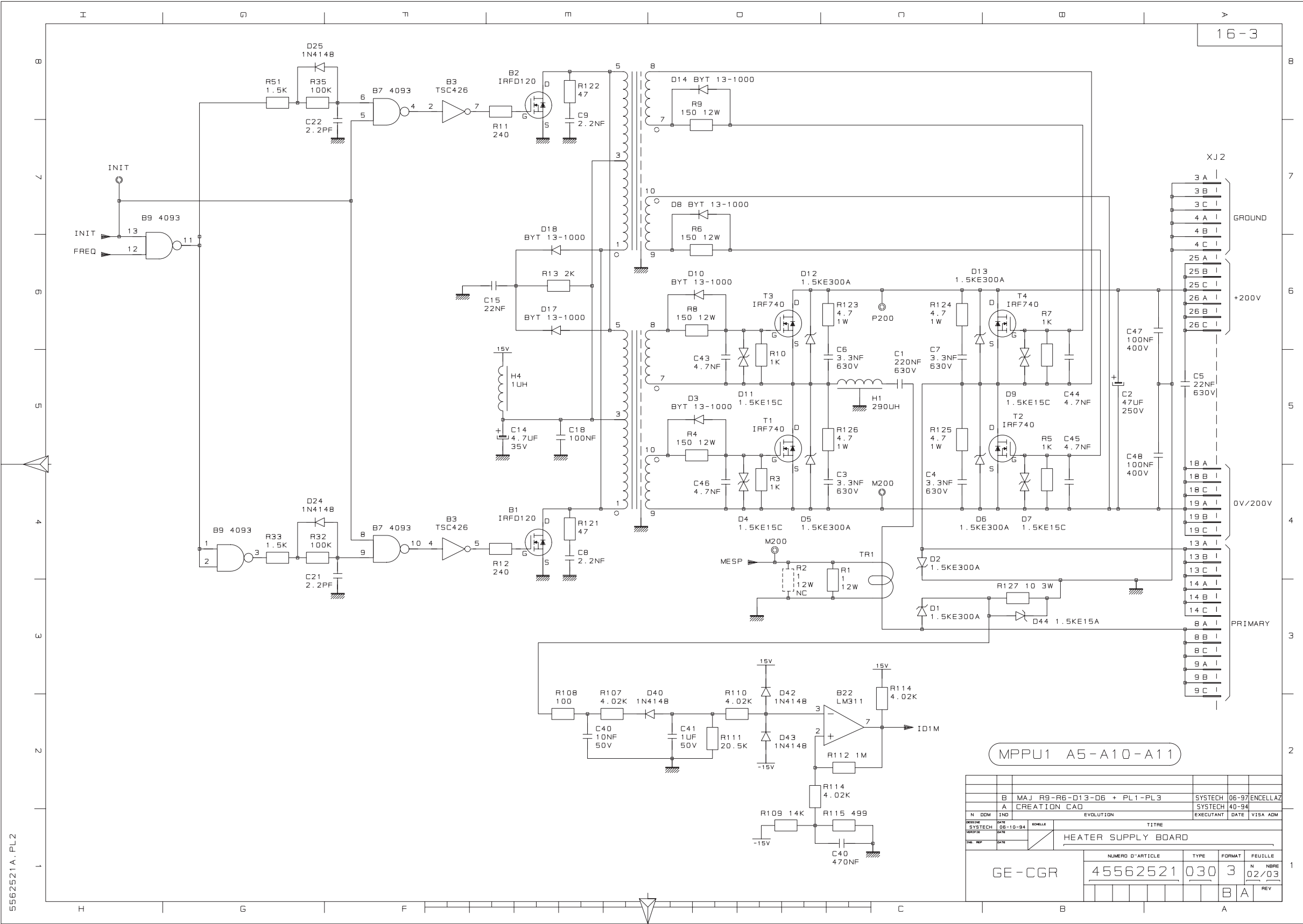
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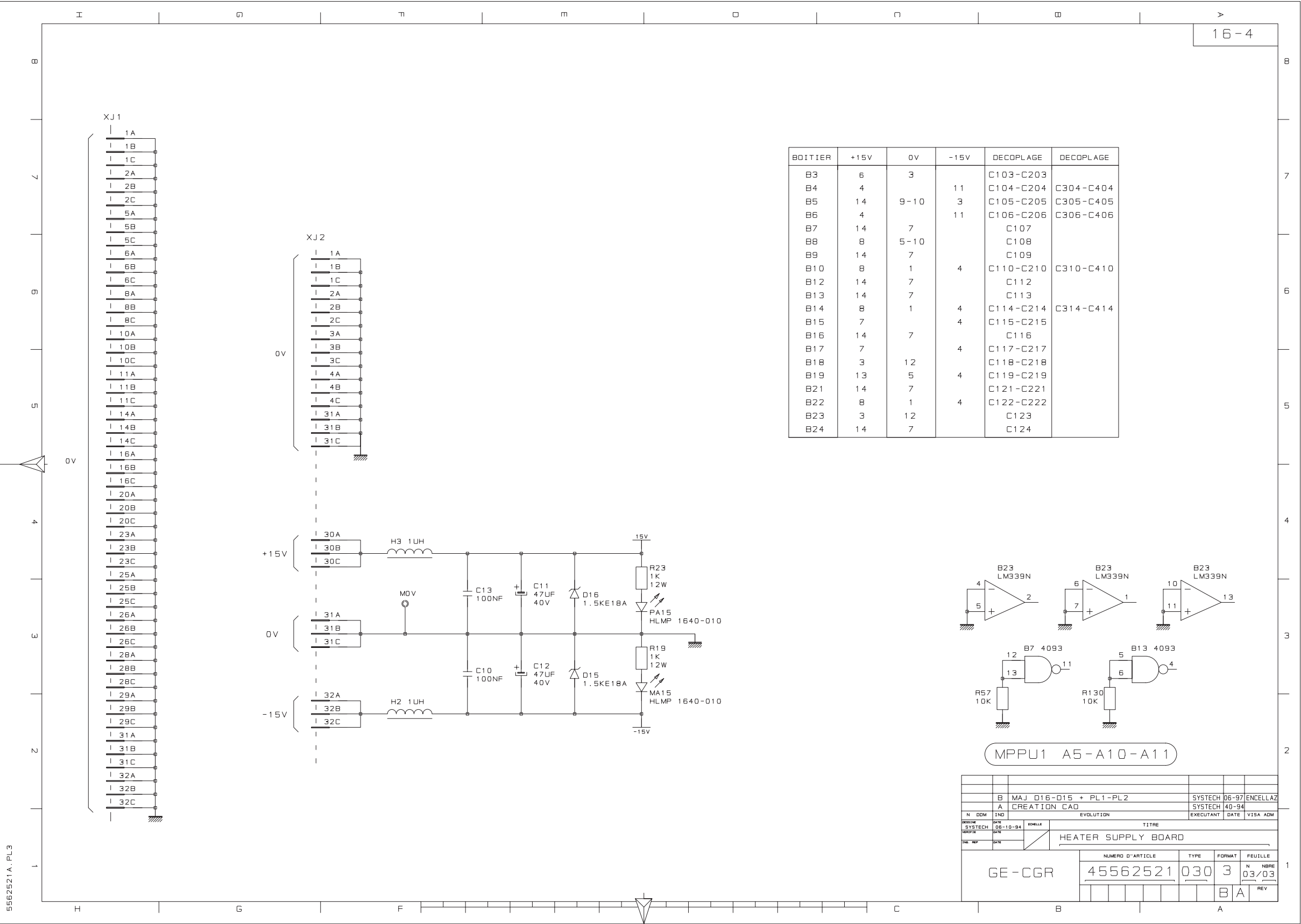
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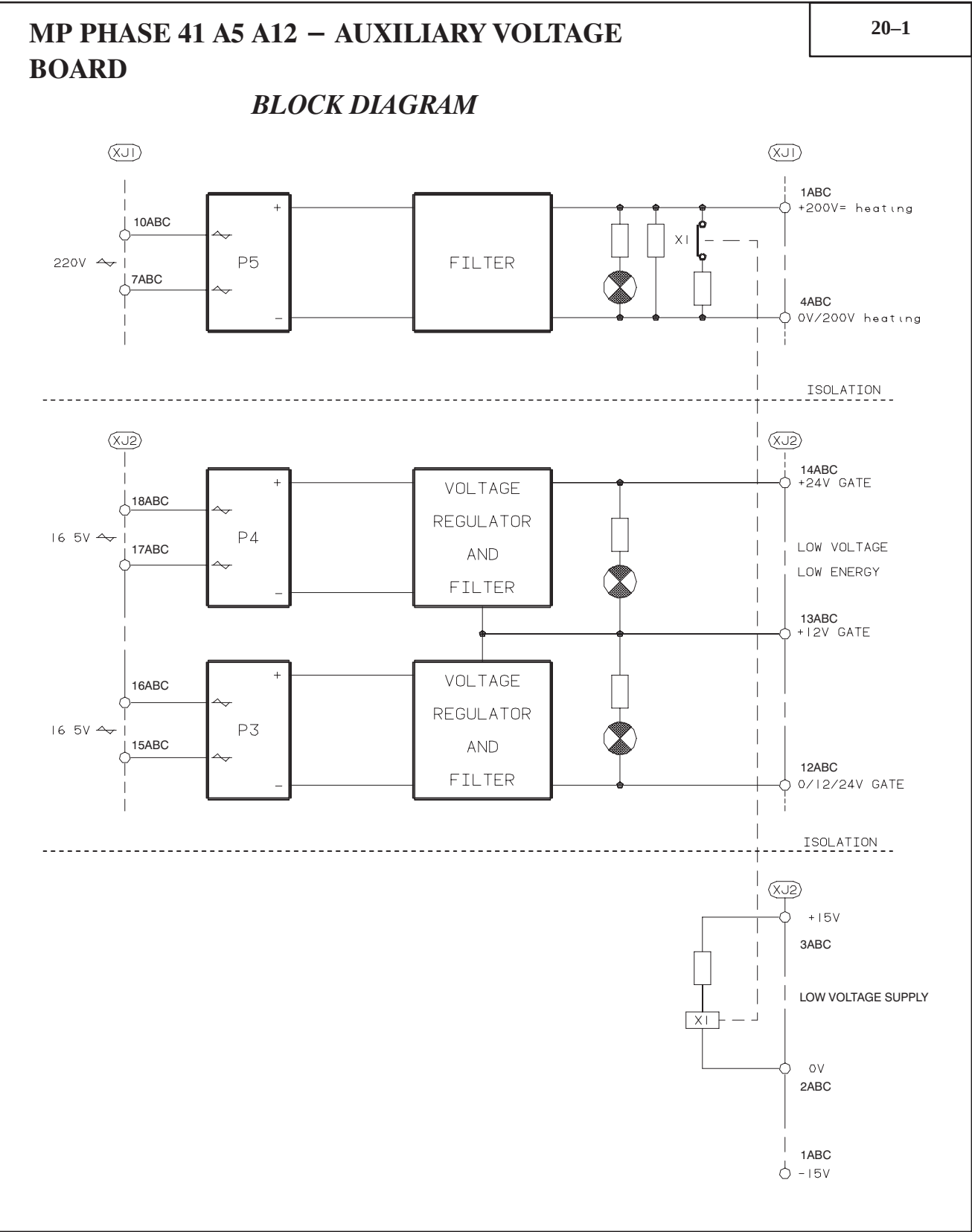
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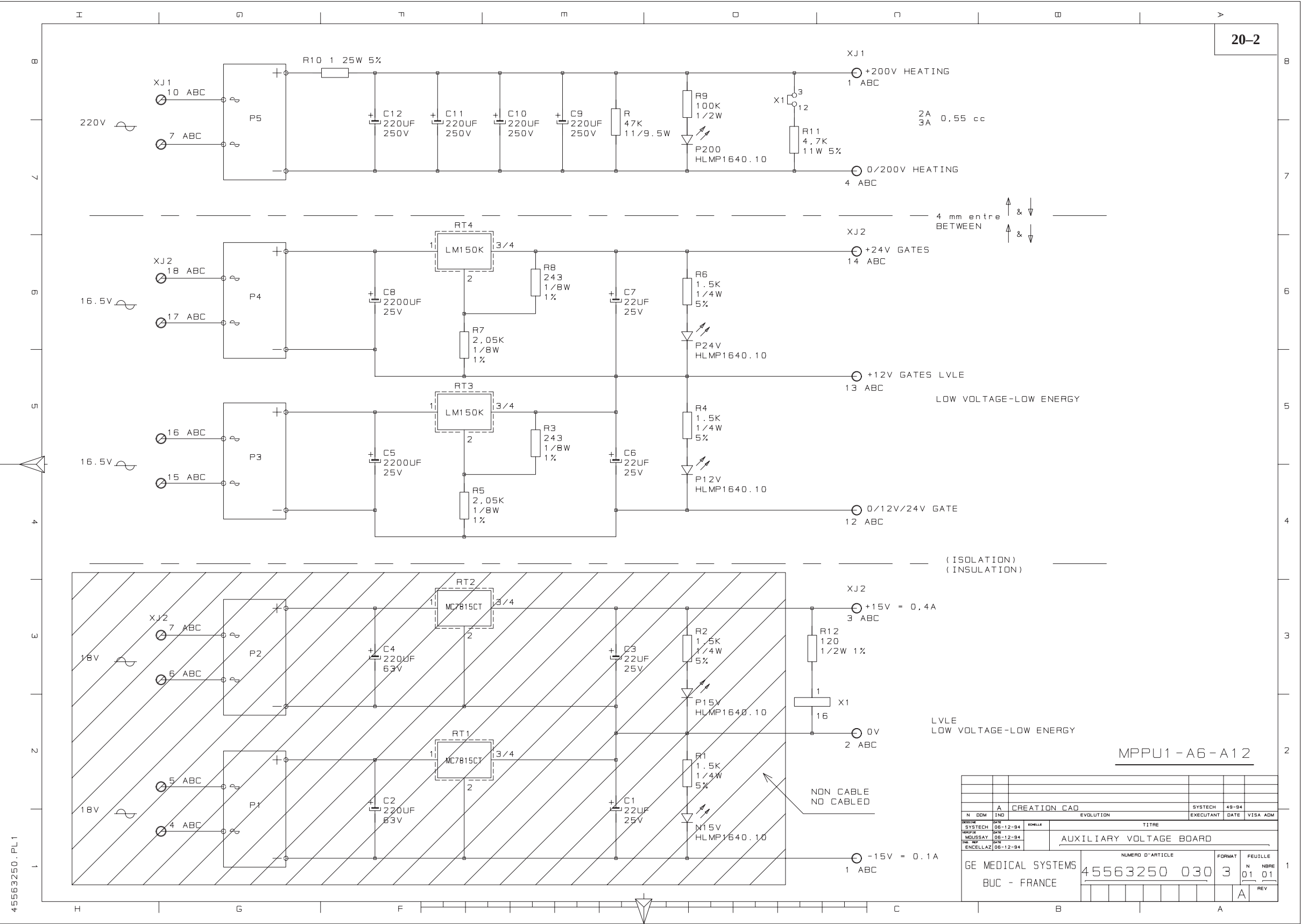
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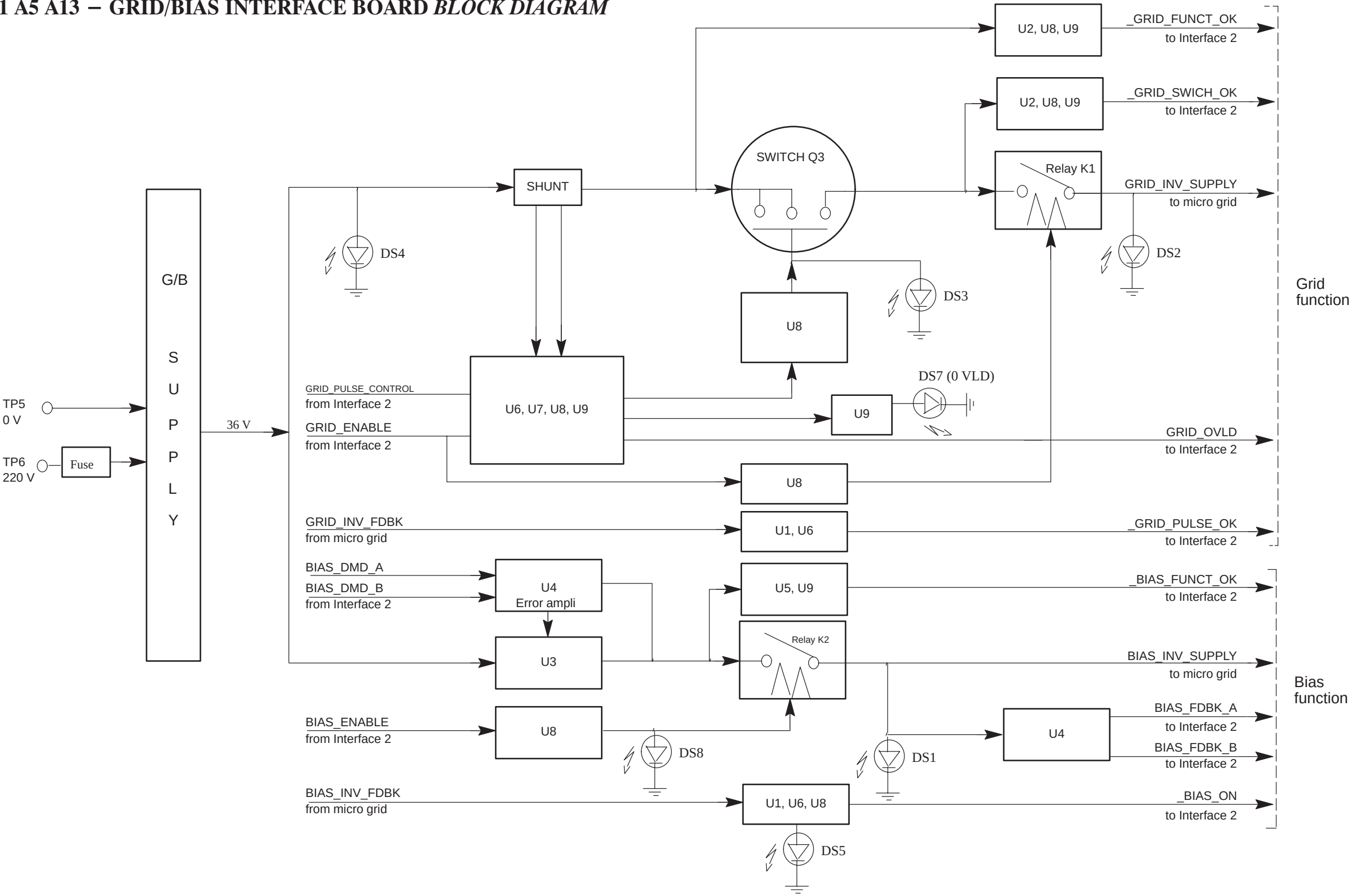
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MNEMONICS		21-0
MP PHASE 41 A5 A13 – GRID/BIAS INTERFACE BOARD		
GRID INV FDBK	Micro grid inverter Feeback (grid operation)	
BIAS DMD A	Bias voltage value	
BIAS DMD B	Bias voltage value	
BIAS ENABLE	Bias enable	
BIAS INV FDBK	Micro grid inverter Feedback (bias operation)	
GRID FUNCT OK	36 V power supply OK	
GRID SWITCH OK	36 V grid switch OK	
GRID INV SUPPLY	Gird power supply	
GRID 0VLD	Grid current overload	
GRID PULSE OK	Feedback to Int 2 Board	
BIAS FUNCT OK	Bias voltage OK	
BIAS INV SUPPLY	Bias power voltage	
BIAS FDBK A	Bias voltage Feedback	
BIAS FDBK B	Bias voltage Feedback	
BIAS ON	Bias voltage Feedback to Int 2 Board	

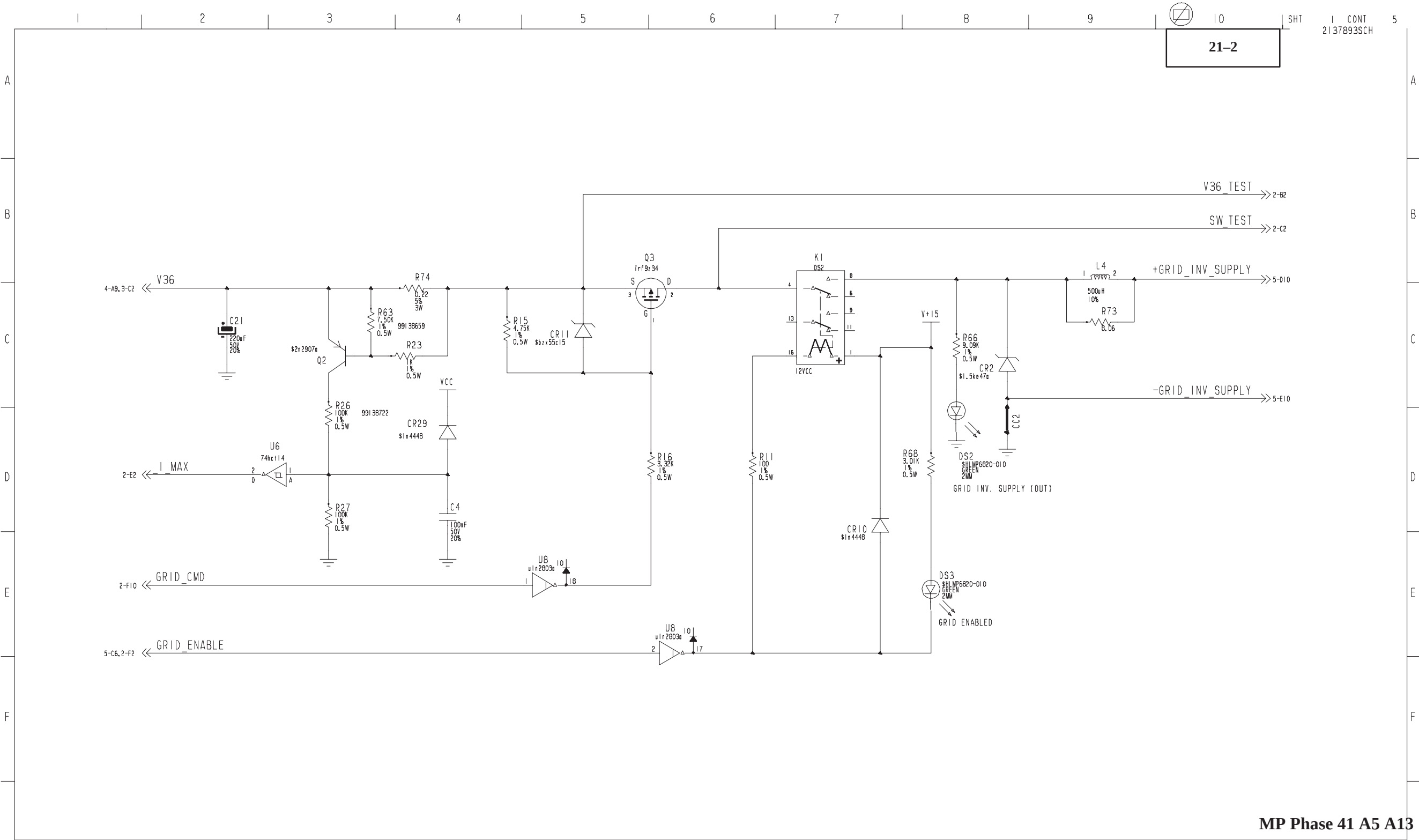
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MP PHASE 41 A5 A13 – GRID/BIAS INTERFACE BOARD BLOCK DIAGRAM

21-1

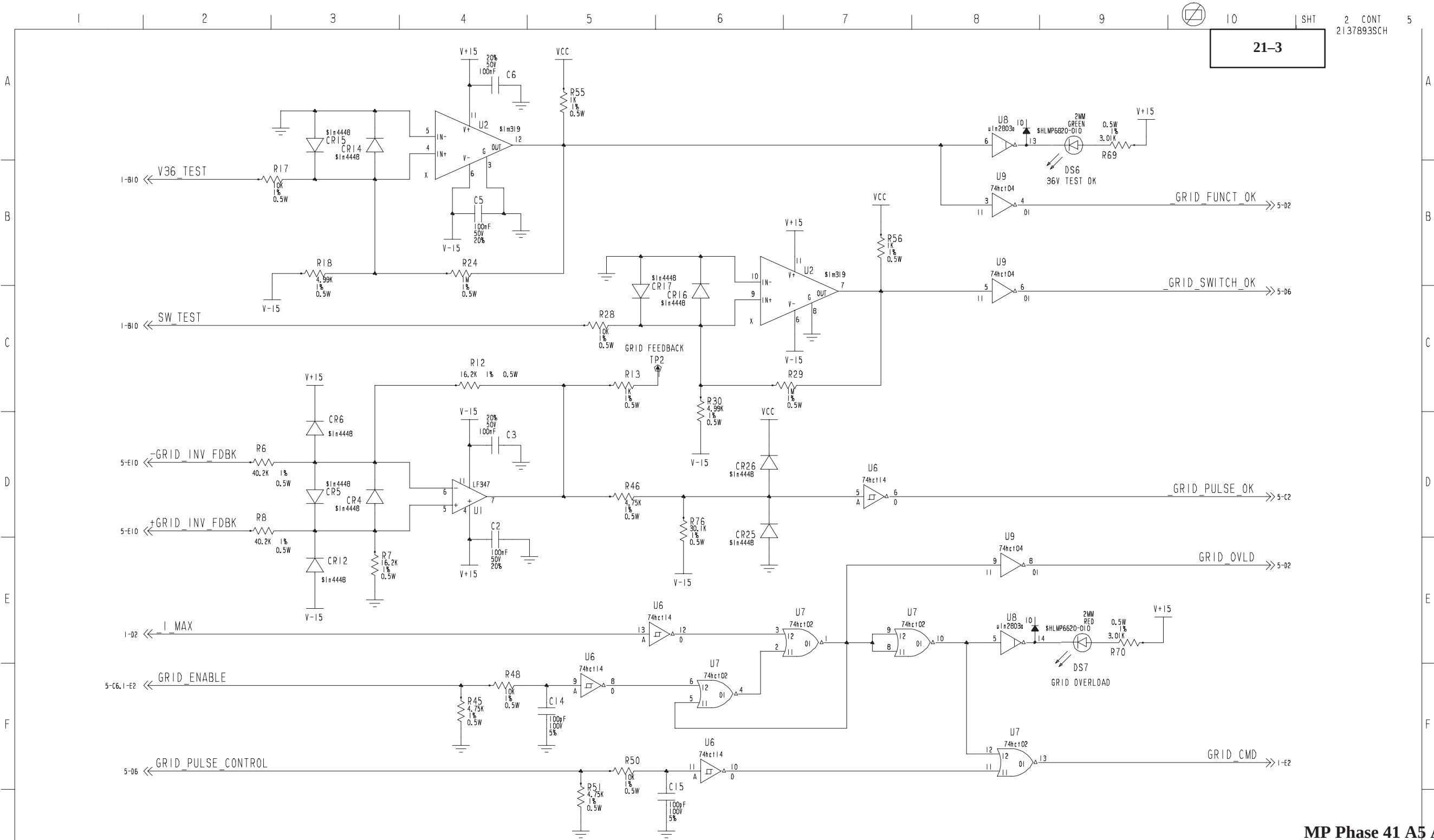


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MP Phase 41 A5 A13

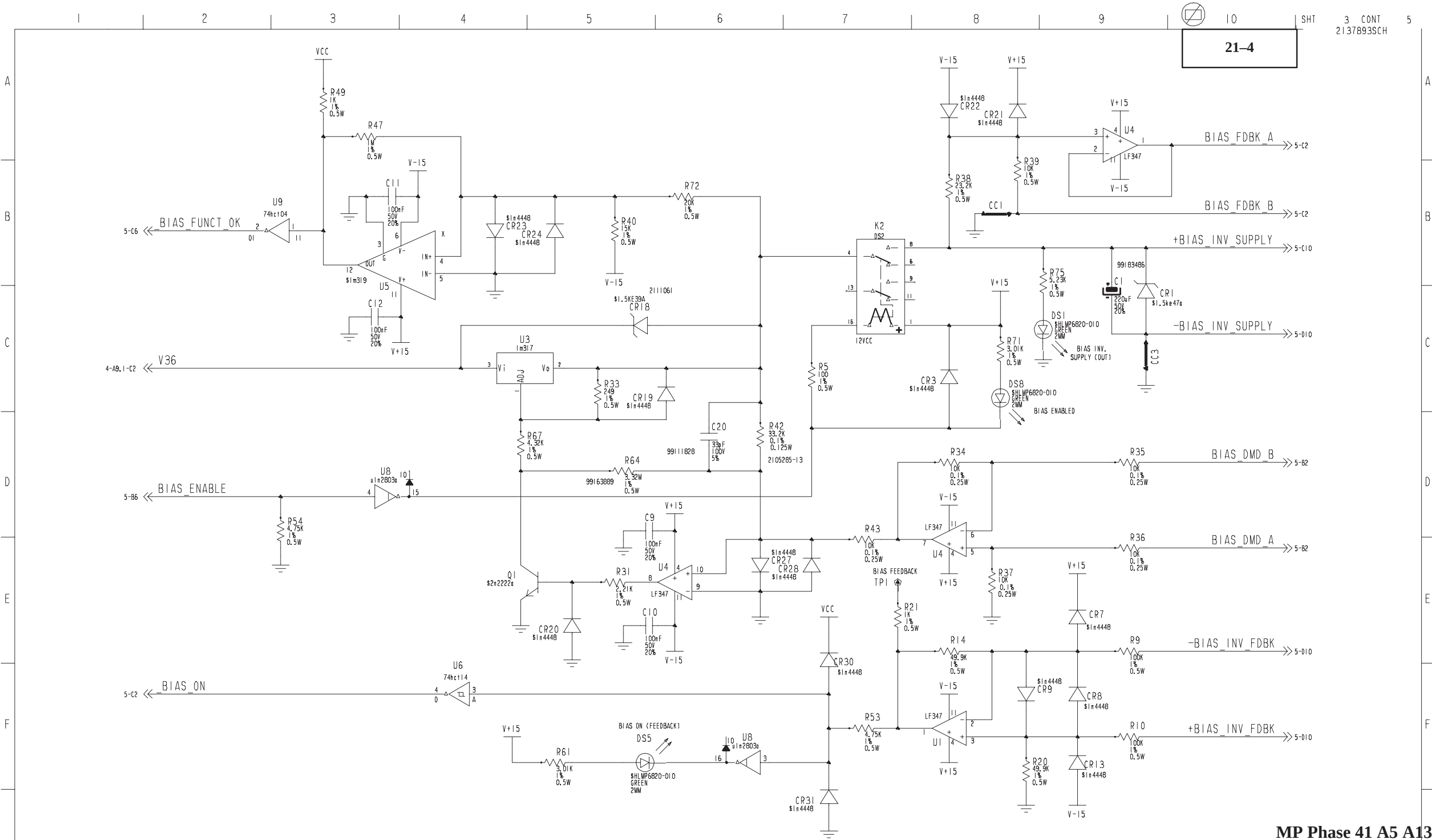
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REV 2	PCN	xxxxxxx	DESCRIPTION	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	APPR	NAME	DATE	DD/MM/YY	BUC - FRANCE		
MADE BY	NAME		DATE	DD/MM/YY	OTHER		DATE				
									DESIGN TITLE		
									G/B INTERFACE		
									FIRST MADE FOR		
									VAMP		
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									2137893SCH		
									REV	SIZE	SHT/CONT ON
									A	3	1 / 5



MP Phase 41 A5 A13

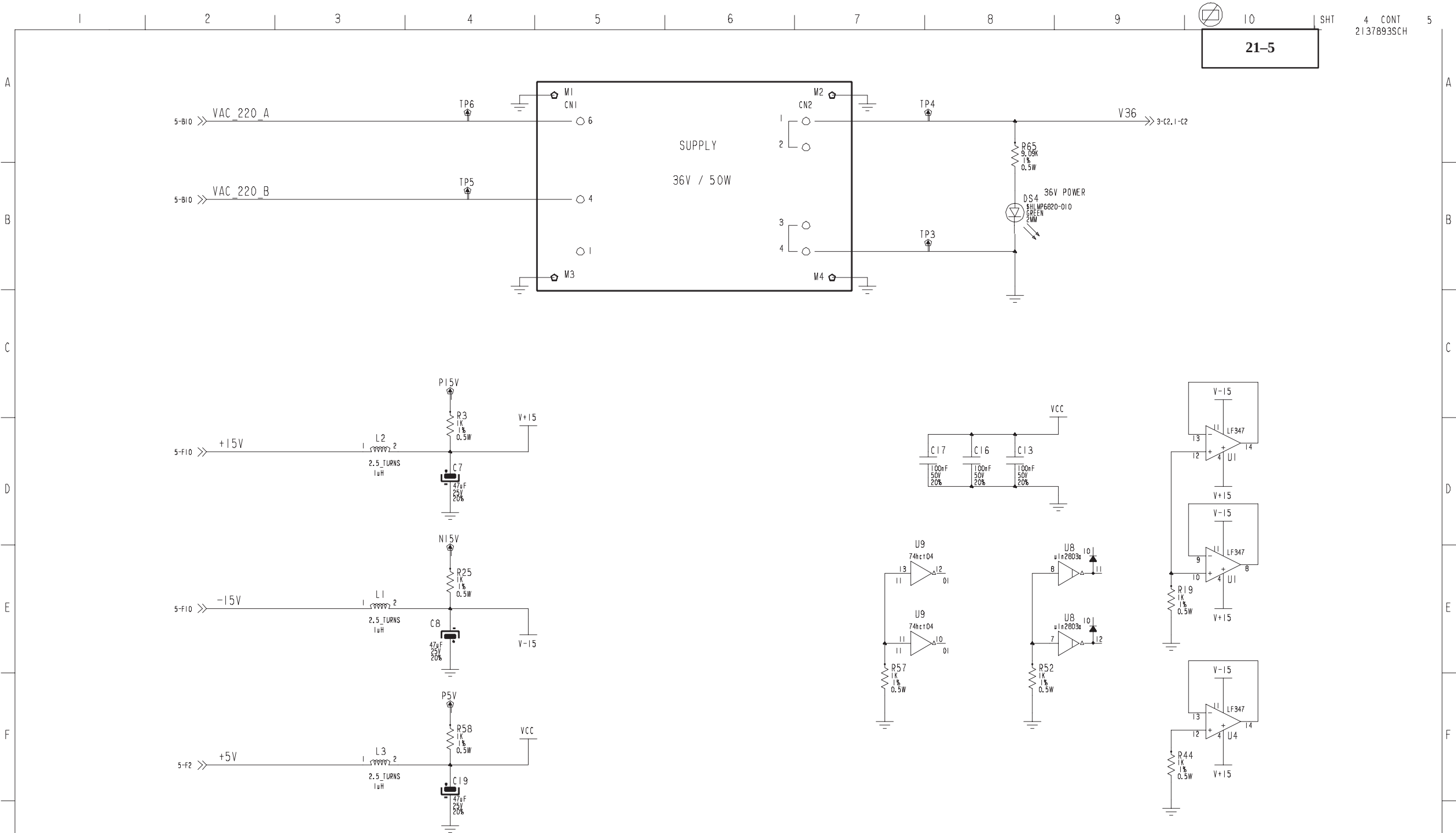
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REV 2	PCN	xxxxxxx	DESCRIPTION	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	APPR	NAME	DATE	DD/MM/YY	BUC - FRANCE		
MADE BY	NAME		DATE	DD/MM/YY	OTHER		DATE		DESIGN TITLE		
									G/B INTERFACE		
									FIRST MADE FOR		
									VAMP		
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									2137893SCH		
									REV	SIZE	SHT/CONT
									A	3	2 / 5

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MP Phase 41 A5 A13

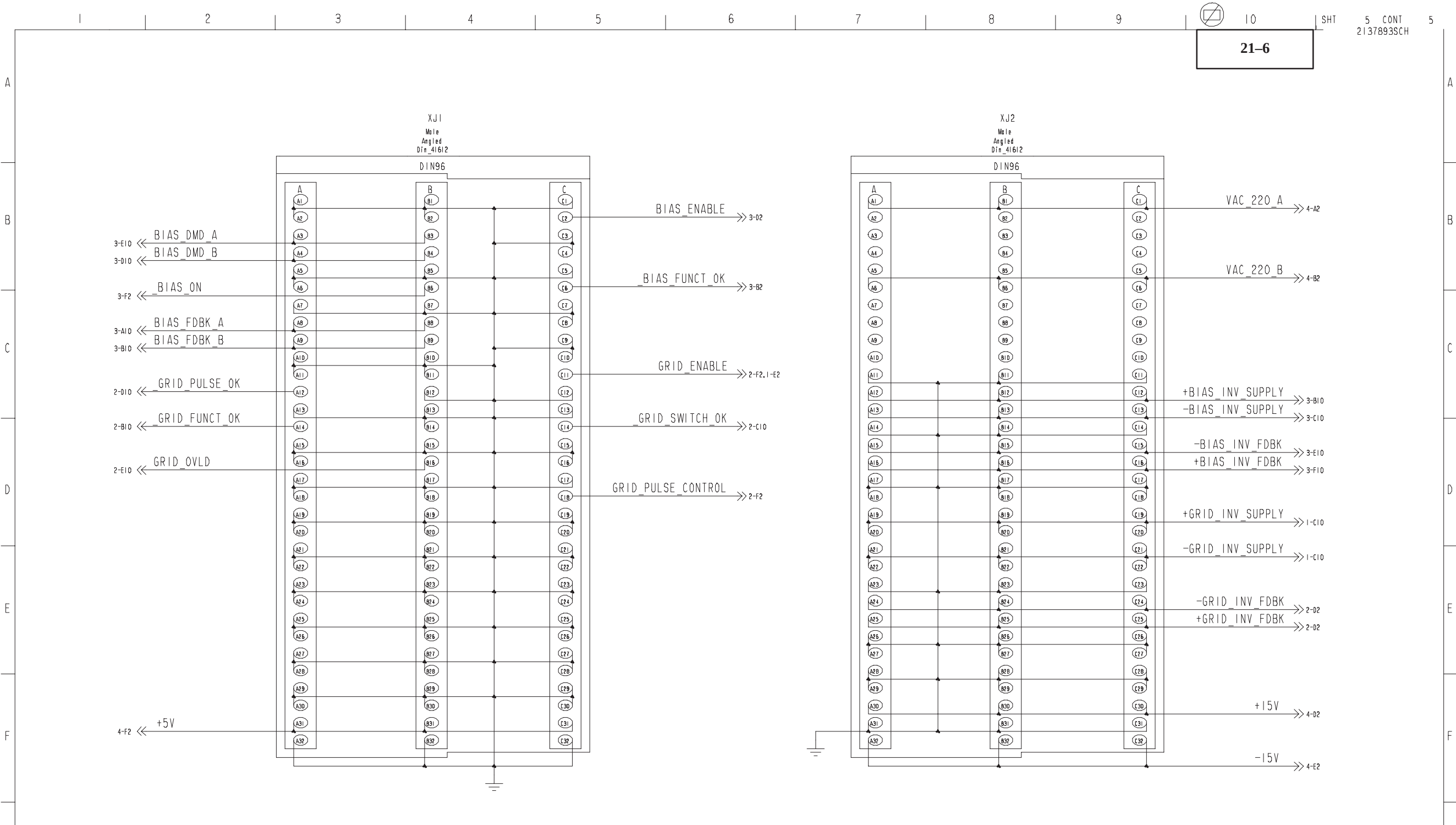
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REV 2	PCN	xxxxxxx	DESCRIPTION	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	APPR	NAME	DATE	DD/MM/YY	BUC - FRANCE		
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									G/B INTERFACE		
									FIRST MADE FOR		
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									REV	SIZE	SHT/CONT ON
									A	3	3 / 5



MP Phase 41 A5 A13

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MADE BY	NAME		DATE	DD/MM/YY	CHECK	ENCELLAZ	DATE	07-06-95			
REV 2	PCN	xxxxxxx	DESCRIPTION	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	APPR	NAME	DATE	DD/MM/YY	BUC - FRANCE		
MADE BY	NAME		DATE	DD/MM/YY	OTHER		DATE				
									DESIGN TITLE		
									G/B INTERFACE		
									FIRST MADE FOR		
									VAMP		
									DRAWING NO.		
									2137893SCH		
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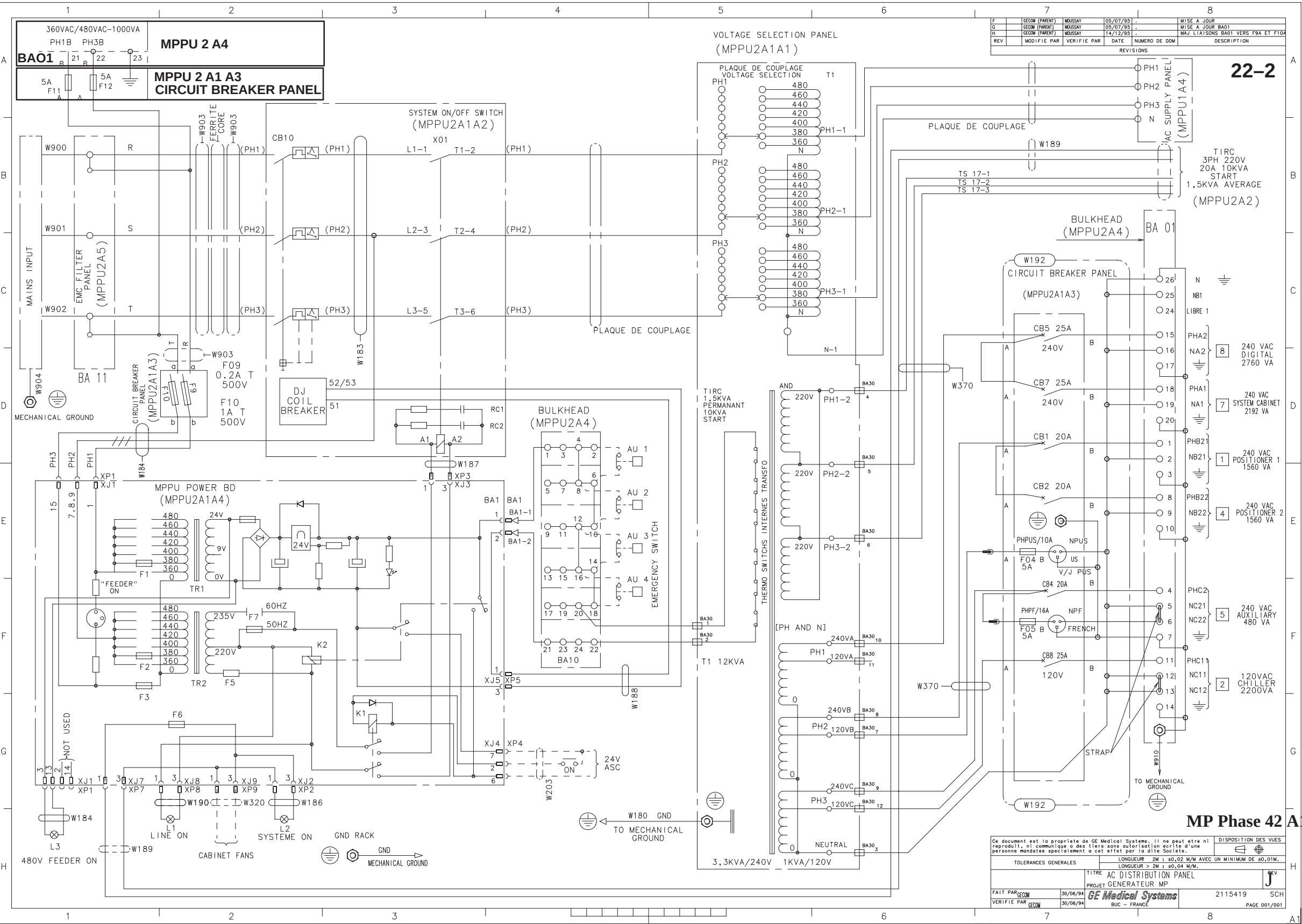


MP Phase 41 A5 A13

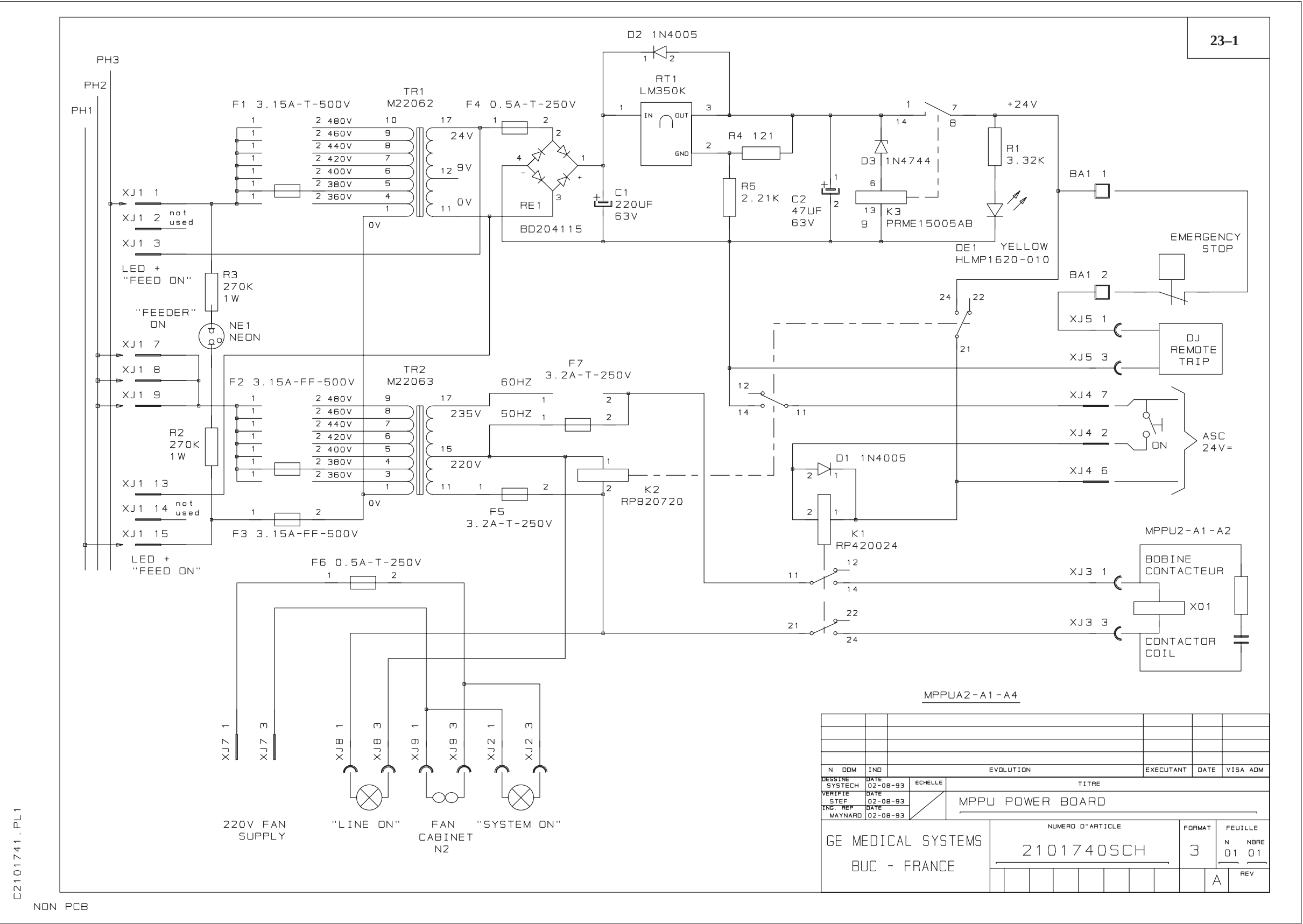
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MADE BY		NAME				DATE			DD/MM/YY			APPR	BY	NAME	DATE													07-06-95			FIRST MADE FOR										VAMP																																																																			
REV	2	PCN	xxxxxxx			DESCRIPTION			xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx			MADE	NGO	DATE	DD/MM/YY			BUC - FRANCE										DRAWING NO.										REV										SIZE										SHT/CONT										ON																																								
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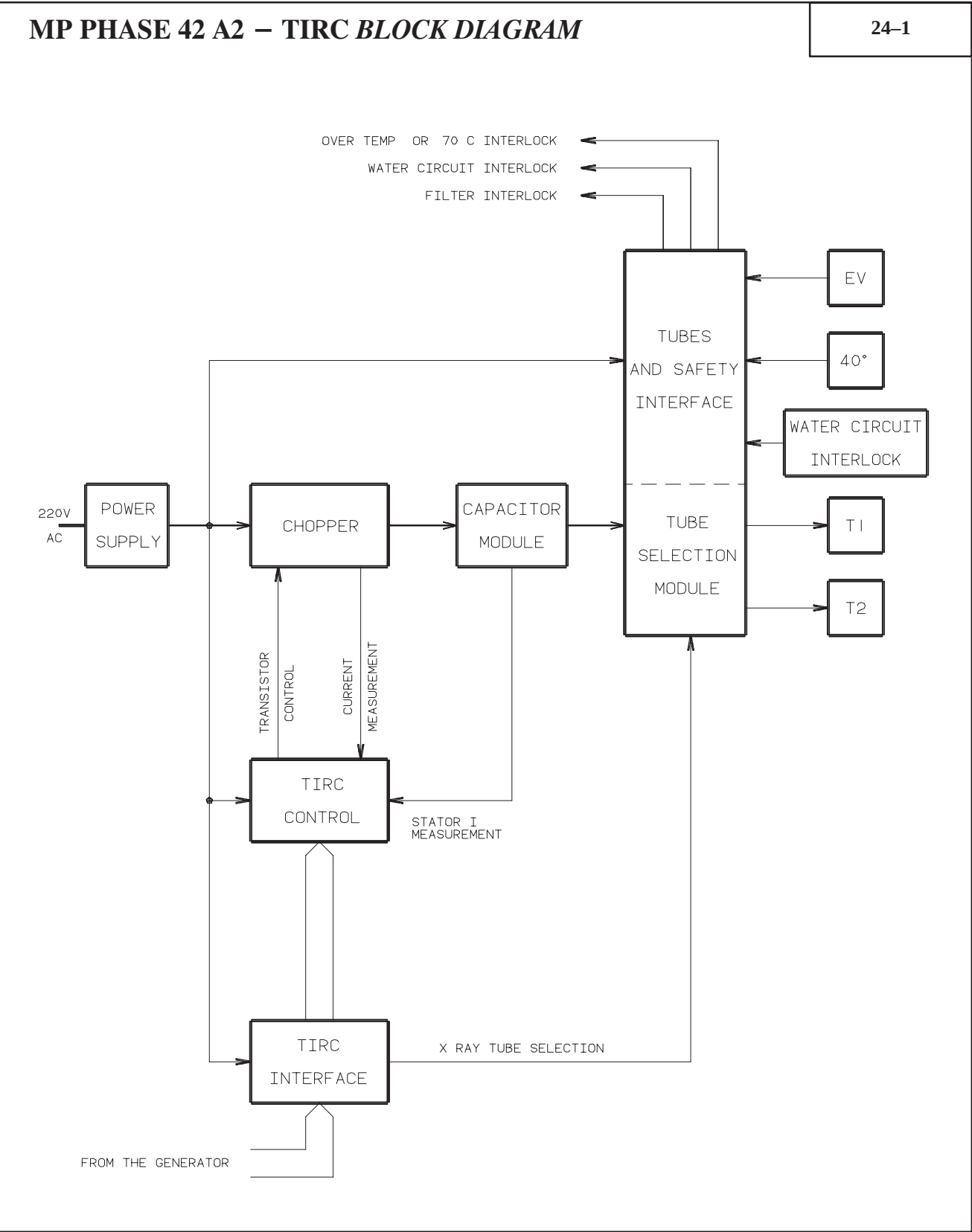


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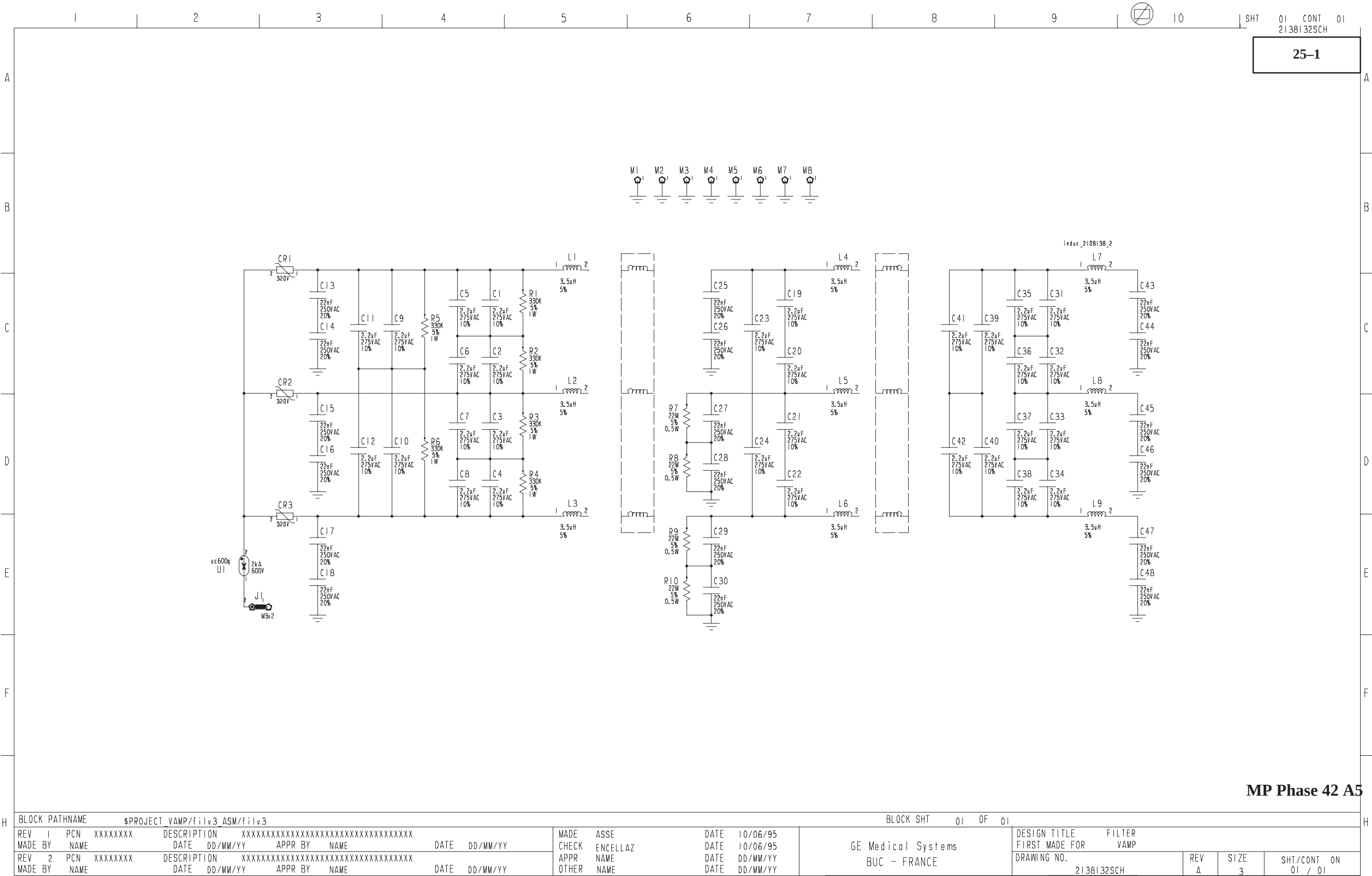


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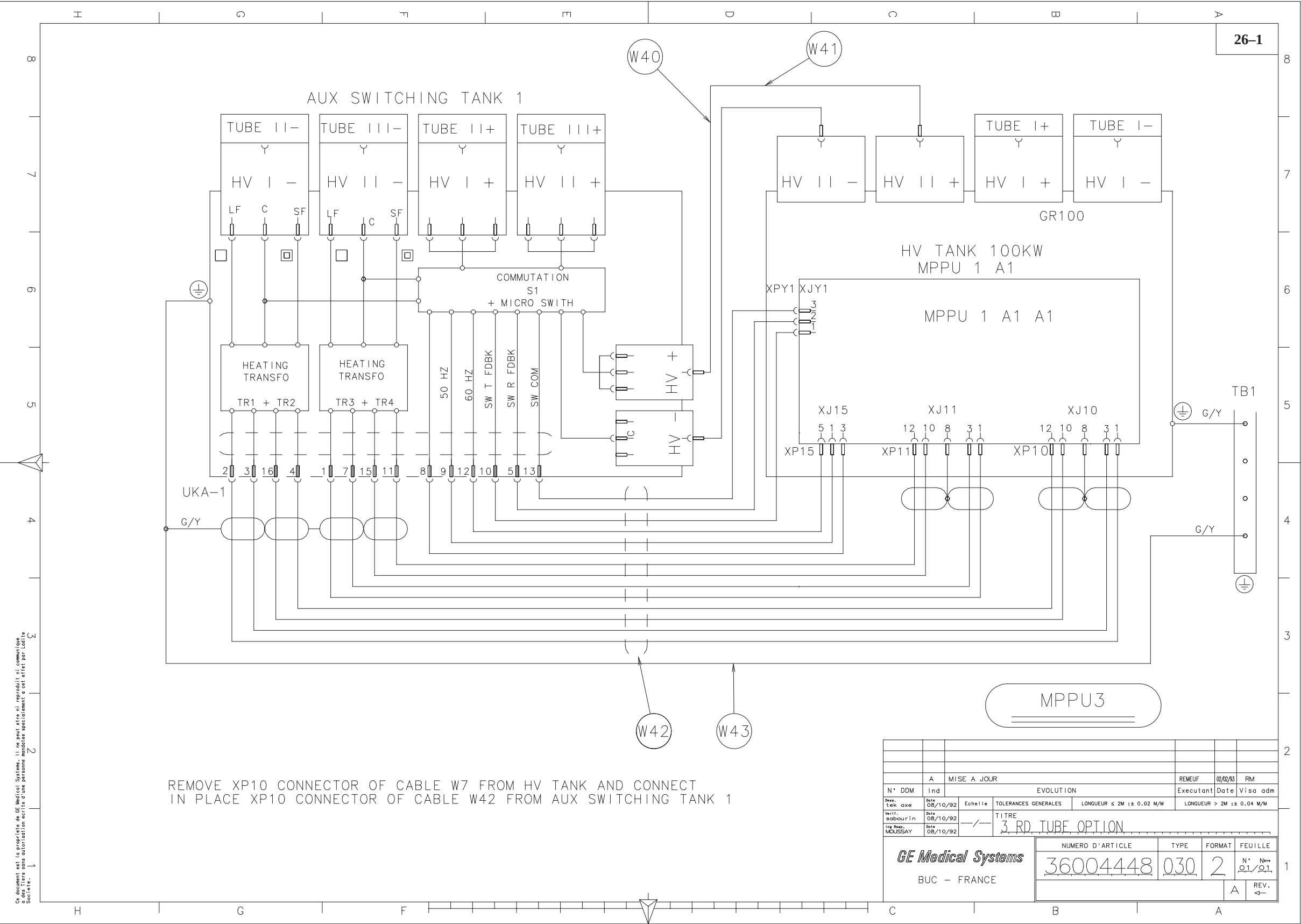
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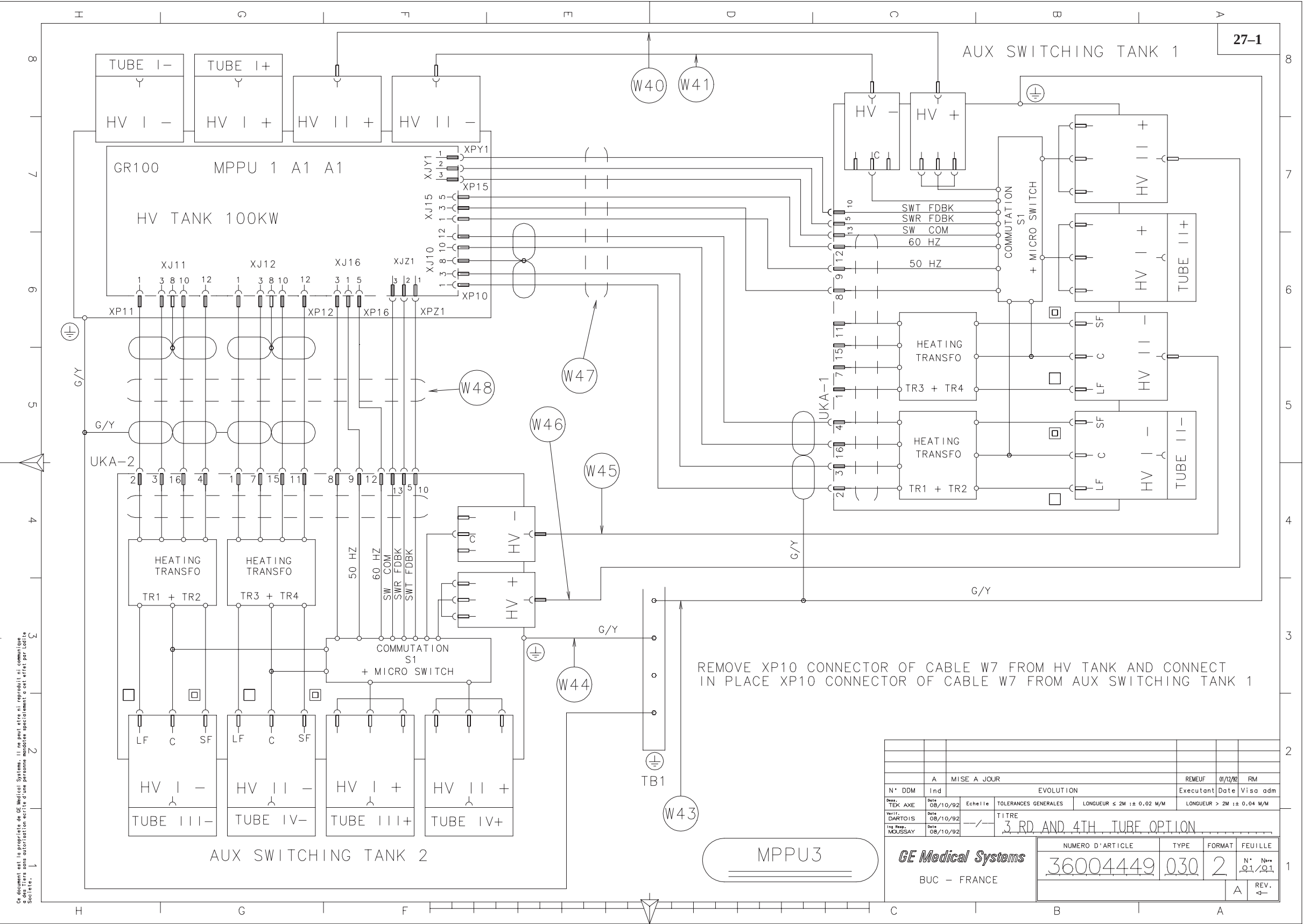


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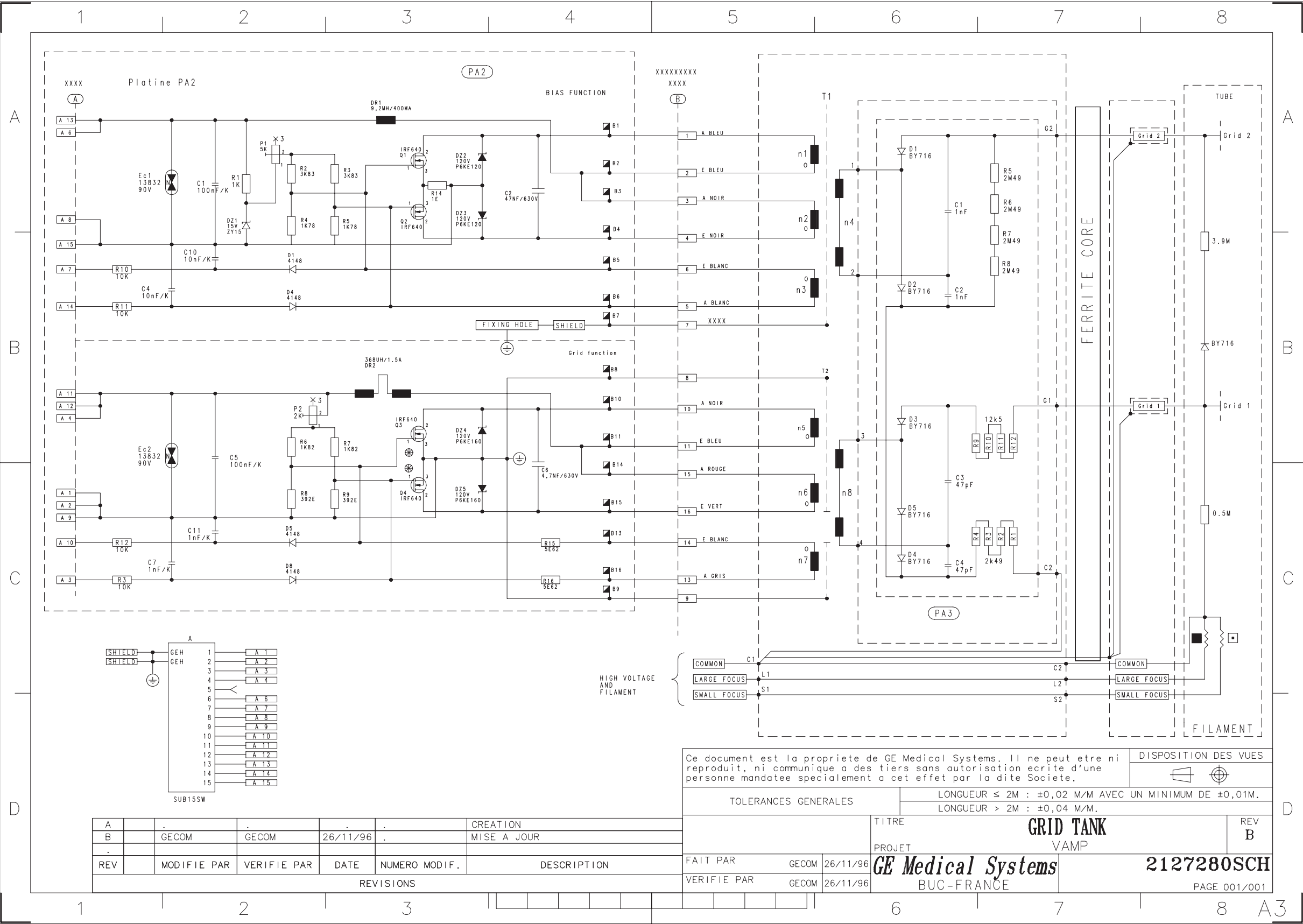


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