IBM Maintenance Library

3115 Processing Unit Power Supplies

SY33-1075-3

Preface

This manual describes the operation of the power system and provides maintenance information for the 3115 and 3115-2 Processing Units. The manual supplements the System/370 Model 115 CE course and also serves as a recall aid; it is not intended for self-education, nor should it be used as an aid to make changes to the system.

The manual is divided into seven chapters.

Chapter 1 contains a general introduction.
Chapter 2 contains logic information in the form of an overview and in the form of simplified logic diagrams (SLDs). The SLDs show the logic circuit operation without regard to signal levels.
Chapter 3 describes the operation of the power system.
Chapter 4 describes the different types of power supplies.
Chapters 5 and 6 contain all the necessary maintenance information.
Chapter 7 contains a list of abbreviations.

> CEs should note that the 3115-2 Processing Unit is equipped with an Instruction Processing Unit (IPU) instead of a Machine Instruction Processor (MIP) as used in the 3115 Processing Unit.

Fourth Edition (November, 1976)

This is a major revision of, and makes obsolete, SY33-1075-2 and Technical Newsletters SN33-1621, SN33-1630, and SN33-1655. Technical information has been added relating to increased storage size (384K–512K). Other information in the manual has been updated and some publishing errors corrected. Changes are indicated by a vertical line to the left of the change.

Changes are continually made to the information in this manual; any such changes will be reported in subsequent revisions or Technical Newsletters.

Requests for copies of IBM publications should be made to your IBM representative or to the IBM branch office serving your locality.

Forms for readers' comments are provided at the back of the manual. If the forms have been removed, comments may be addressed to IBM Laboratories, Product Publications, Dept. 3179, 703 Boeblingen/Wuertt, P.O. Box 210, Germany. Comments become the property of IBM.

Prerequisite Reading

IBM 3115 Processing Unit, General System Information, SY33-1088.

Associated Publications

Maintenance Library Manuals

**IBM 3115 Processing Unit, Central Test Manual,* or
**IBM 3115-2 Processing Unit, Central Test Manual.* These manuals contain pages appropriate to the individual 3115 or 3115-2 Processing Unit.
IBM 3115 Processing Unit, Compatibility Features, SY33-1094.
**IBM 3115 Processing Unit, Input/Output Processor,* SY33-1079, or
**IBM 3115-2 Processing Unit, Input/Output Processor,* SY33-1098.
IBM 3115 Processing Unit, Installation Manual, Parts 1 896 850 through 1 896 875.
IBM 3115 Processing Unit, Integrated Communications Adapter and Line Adapter, B/M 1877939.
IBM 3115 Processing Unit, Integrated Console Printer Attachment, SY33-1087.
**IBM 3115 Processing Unit, Machine Instruction Processor,* SY33-1078, or
**IBM 3115-2 Processing Unit, Instruction Processing Unit,* SY33-1097.
**IBM 3115 Processing Unit, Magnetic Tape Adapter,* SY33-1081, or
**IBM 3115-2 Processing Unit, Magnetic Tape Adapter,* SY33-1101.
IBM 3115 Processing Unit, Main Storage, SY33-1092.
IBM 3115 Processing Unit, Main Storage Controller, SY33-1077.
IBM 3115 Processing Unit, Main Storage (Enhanced), SY33-1095.
IBM 3115 Processing Unit, Microinstructions, SY33-1089.
**IBM 3115 Processing Unit, Multiplexer Channel Front End,* SY33-1080, or
**IBM 3115-2 Processing Unit, Multiplexer Channel Front End,* SY33-1099.
IBM 3115 Processing Unit, Parts Catalog, S135-1001.
IBM 3115 Processing Unit, Service Processor Subsystem, SY33-1076.
IBM 3115 Processing Unit, 2560 Attachment, Front End, SY33-1083.
IBM 3115 Processing Unit, 3203 Attachment, Front End, SY33-1085.
**IBM 3115 Processing Unit, 3340 Direct Disk Attachment,* SY33-1082, or
**IBM 3115-2 Processing Unit, 3340 Direct Disk Attachment,* SY33-1100.
IBM 3115 Processing Unit, 5203 Attachment, Front End, SY33-1086.
IBM 3115 Processing Unit, 5425 Attachment, Front End, SY33-1084.

* These manuals are specific to the 3115 Processing Unit or the 3115-2 Processing Unit, as indicated in their title. Other manuals in this list are applicable to *both* models of Processing Unit.

System Library Manuals

IBM System/360 Principles of Operation, GA22-6821.
IBM System/370 Principles of Operation, GA22-7000.
IBM System/370 Model 115 Functional Characteristics, GA33-1510.
IBM System/370 Model 115 Operating Procedures, GA33-1513.

Contents

Safety

PERSONAL SAFETY

Personal safety cannot be over-emphasized; it is a vital part of customer engineering. To ensure your safety and that of co-workers, always observe the safety precautions given during your safety training and adhere to the following:

Observe all DANGER notices given in this manual. Example:

DANGER
Voltages in excess of 600V are present within the TSR. Therefore, safetv cover of TSR must be in place and TSR must be installed before applying input voltage.

General Safety Practices

Observe the general safety practices and the procedure for performing artificial respiration that are outlined in *CE Safety Practices* card, order no. S229-1264 (shown here).

Grounding

Ground current may reach dangerous levels. Never operate the system with the grounding conductor removed.

Line-Powered Equipment

Ground all line-powered test equipment through the third-wire grounding conductor in the power cord of the machine being tested.

Machine Warning Labels

Heed the warning labels in hazardous areas of the machines.

EQUIPMENT SAFETY

Observe all CAUTION notices given in this manual. Example:

CAUTION
Before installation of the new control card, set the adjustment screw of the main potentiometers to its original setting. This ensures that the output level is approximately correct, otherwise OV/UV condition will occur during PWR On.
Observe routing of cable string during installation of the control card. If input capacitor has been replaced, observe correct polarity of capacitor before reconnecting to control card. Polarity is indicated on control card.

CE SAFETY PRACTICES

All Customer Engineers are expected to take every safety precaution possible and observe the following safety practices while maintaining IBM equipment:

1. You should not work alone under hazardous conditions or around equipment with dangerous voltage. Always advise your manager if you MUST work alone.
2. Remove all power AC and DC when removing or assembling major components, working in immediate area of power supplies, performing mechanical inspection of power supplies and installing changes in machine circuitry.
3. Wall box power switch when turned off should be locked or tagged in off position. "Do not Operate" tags, form 229-1266, affixed when applicable. Pull power supply cord whenever possible.
4. When it is absolutely necessary to work on equipment having exposed operating mechanical parts or exposed live electrical circuitry anywhere in the machine, the following precautions must be followed:
   a. Another person familiar with power off controls must be in immediate vicinity.
   b. Rings, wrist watches, chains, bracelets, metal cuff links shall not be worn.
   c. Only insulated pliers and screwdrivers shall be used.
   d. Keep one hand in pocket.
   e. When using test instruments be certain controls are set correctly and proper capacity, insulated probes are used.
   f. Avoid contacting ground potential (metal floor strips, machine frames, etc. — use suitable rubber mats purchased locally if necessary).
5. Safety Glasses must be worn when:
   a. Using a hammer to drive pins, riveting, staking, etc.
   b. Power hand drilling, reaming, grinding, etc.
   c. Using spring hooks, attaching springs.
   d. Soldering, wire cutting, removing steel bands.
   e. Parts cleaning, using solvents, sprays, cleaners, chemicals, etc.
   f. All other conditions that may be hazardous to your eyes. REMEMBER, THEY ARE YOUR EYES.
6. Special safety instructions such as handling Cathode Ray Tubes and extreme high voltages, must be followed as outlined in CEM's and Safety Section of the Maintenance Manuals.
7. Do not use solvents, chemicals, greases or oils that have not been approved by IBM.
8. Avoid using tools or test equipment that have not been approved by IBM.
9. Replace worn or broken tools and test equipment.
10. The maximum load to be lifted is that which in the opinion of you and management does not jeopardize your own health or well-being or that of other employees
11. All safety devices such as guards, shields, signs, ground wires, etc. shall be restored after maintenance.
12. Each Customer Engineer is responsible to be certain that no action on his part renders product unsafe or exposes hazards to customer personnel.
13. Place removed machine covers in a safe out-of-the-way place where no one can trip over them.
14. All machine covers must be in place before machine is returned to customer.
15. Always place CE tool kit away from walk areas where no one can trip over it (i.e., under desk or table).
16. Avoid touching mechanical moving parts (i.e., when lubricating, checking for play, etc.).
17. When using stroboscope — do not touch ANYTHING — it may be moving.
18. Avoid wearing loose clothing that may be caught in machinery. Shirt sleeves must be left buttoned or rolled above the elbow.
19. Ties must be tucked in shirt or have a tie clasp (preferably nonconductive) approximately 3 inches from end. Tie chains are not recommended.
20. Before starting equipment, make certain fellow CE's and customer personnel are not in a hazardous position.
21. Maintain good housekeeping in area of machines while performing and after completing maintenance.

KNOWING SAFETY RULES IS NOT ENOUGH
AN UNSAFE ACT WILL INEVITABLY LEAD TO AN ACCIDENT
USE GOOD JUDGMENT — ELIMINATE UNSAFE ACTS

11/71 S229-1264-2

Artificial Respiration

GENERAL CONSIDERATIONS

1. **Start Immediately, Seconds Count**
   Do not move victim unless absolutely necessary to remove from danger. Do not wait or look for help or stop to loosen clothing, warm the victim or apply stimulants.
2. **Check Mouth for Obstructions**
   Remove foreign objects — Pull tongue forward.
3. **Loosen Clothing — Keep Warm**
   Take care of these items after victim is breathing by himself or when help is available.
4. **Remain in Position**
   After victim revives, be ready to resume respiration if necessary.
5. **Call a Doctor**
   Have someone summon medical aid.
6. **Don't Give Up**
   Continue without interruption until victim is breathing without help or is certainly dead.

Reprint Courtesy Mine Safety Appliances Co.

Rescue Breathing for Adults
Victim on His Back Immediately

1. **Clear throat** of water, food, or foreign matter.
2. **Tilt head back** to open air passage.
3. **Lift jaw up** to keep tongue out of air passage.
4. **Pinch nostrils** to prevent air leakage when you blow.
5. **Blow** until you see chest rise.
6. **Remove your lips** and allow lungs to empty.
7. **Listen** for snoring and gurglings, signs of throat obstruction.
8. **Repeat mouth to mouth breathings** 10-20 times a minute.

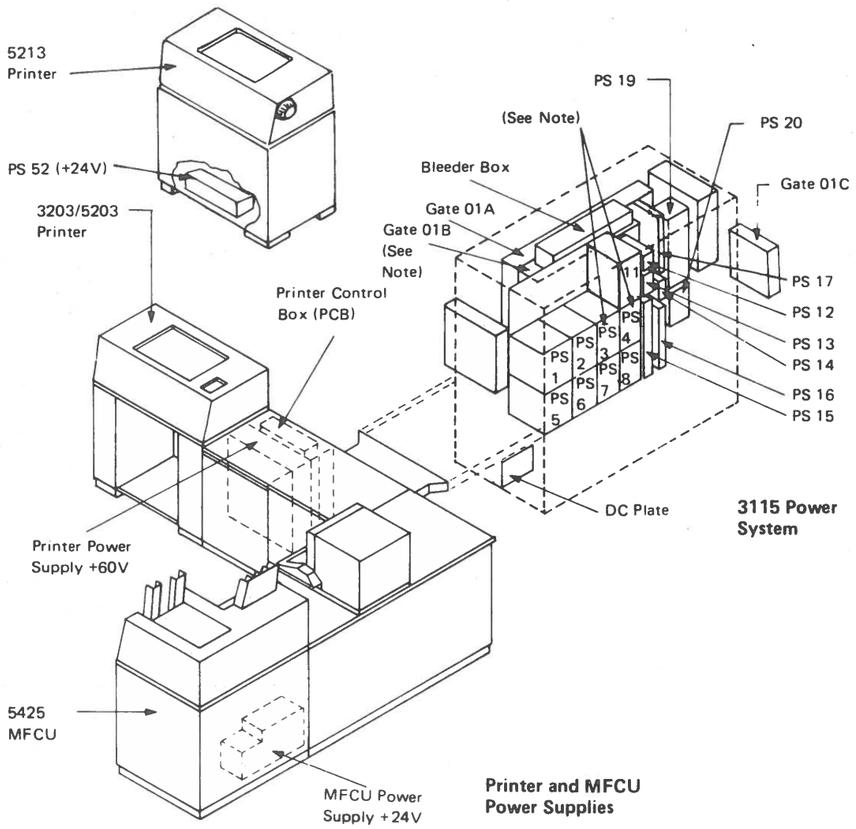
Continue rescue breathing until he breathes for himself.


Thumb and finger positions

Chapter 1. Introduction

Power System Arrangement

The power system of the Model 115 is divided into two main groups:
IBM 3115 Processing Unit power system.
Printer and MFCU power supplies.



3115 Power System

Printer and MFCU Power Supplies

Note: In the 3115 Processing Unit gate 01B and/or PS 3 are only installed for optional features. PS 4 is used for MSE only.

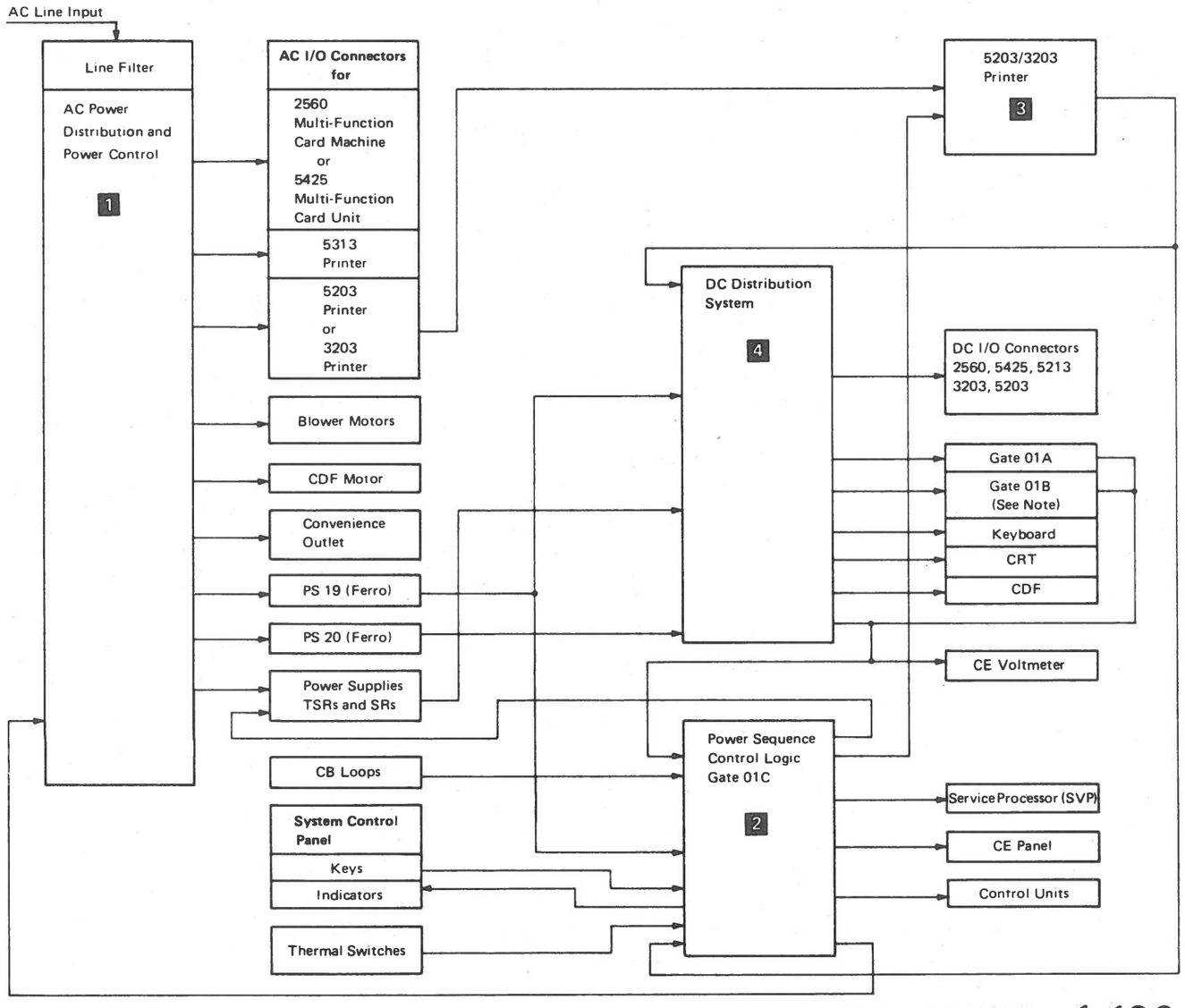
In the 3115-2 Processing Unit PS 4 is a standard feature, PS 3 is used for optional features.

PS 11 and 17 are used for storage extension up to 384K.

Function Principle

The power system consists of four main sections.

1. AC distribution and control
2. Power sequence control logic
3. Printer power supply
4. DC distribution system



AC Input Voltages to the Power System

- The power system of the Model 115 can be connected to the following different ac lines.

Frequency	No. of Phases	Type of Connection	Voltage	Max. Input Power
50 Hz ± 0.5 Hz	3	Y	380 or 408 ± 10%	12 kVA
		Δ	200 or 220 or 235 ± 10%	
60 Hz ± 0.5 Hz	3	Δ	200 or 208 or 230 ± 10%	

- The 5203 power subsystem is connected to the power system of the 3115 by an ac connector (AC2).
- If a 3203 Printer is attached instead of a 5203, the 3203 Printer is also connected to the AC2 connector.

The voltages on the AC2 connector are:

Frequency	No. of Phases	Voltage	Max. Current per Phase
50 Hz ± 0.5 Hz	3	220/380 ± 10%	20A
60 Hz ± 0.5 Hz	3	208 or 230 ± 10%	

- Power line transients (PLTs) are filtered by an ac line filter.
- The power system is immune to power line disturbances (PLDs) of 120 Hz maximum.
- If the voltage-dependent machine jumpering has to be changed, see ALD YD091 (50 Hz) or YD191 (60 Hz, 208/230V).

Physical Locations and Part Numbers

- Detailed information about physical locations and part numbers of components within the power system are given in the ALD:
  for 50 Hz PS starting on page YD011
  for 60 Hz PS starting on page YD111
  } See Note
- Details of power supplies, Transistor Switching Regulators (TSR), Series Regulators (SR), and Ferroresonant Transformers (Ferro or F), are shown in the ALD on the YF-pages.

Note: The cross references in this manual to the ALD pages for 50 Hz and 60 Hz are as shown in example below:

YD011/YD111

The first reference is valid for 50 Hz only and the second is valid for 60 Hz only.

Chapter 2. Principles of Operation

Power Interface

Power System

Voltage Distribution

ALD Page	Gate	Board	3115 Only	3115-2 Only
YD 201	01A	A1	DDA, MTA	DDA
YD 207		B1	Under-cover Modem (LAB)	IOP A, MTA, IPU Feat.
YD 213		C1	Printer Front End, IOP 8	Printer Front End, IOP 8
YD 203		A2	IOP E, MIP	IPU
YD 209		B2	IOP B, ICA	IOP B, ICA
YD 215		C2*	Card I/O-FE or MPX, IOP 9	Card I/O-FE or MPX, IOP 9
YD 205		A3	MSC	MSC
YD 211		B3	Main Storage or MSE	Main Storage or MSE
YD 217		C3	SVP	SVP
YD 219	01B	A1*	MPX, IOP 9	MPX, IOP 9
YD 221		A2	Spare	Line Adapter (LAB)
YD 223		A3	Spare	MS Ext. up to 384K
		B1	Spare	Spare
		B2	Spare	Spare
		B3	Spare	Spare
YD 591	01C	A1	Power Sequence Control	Power Sequence Control

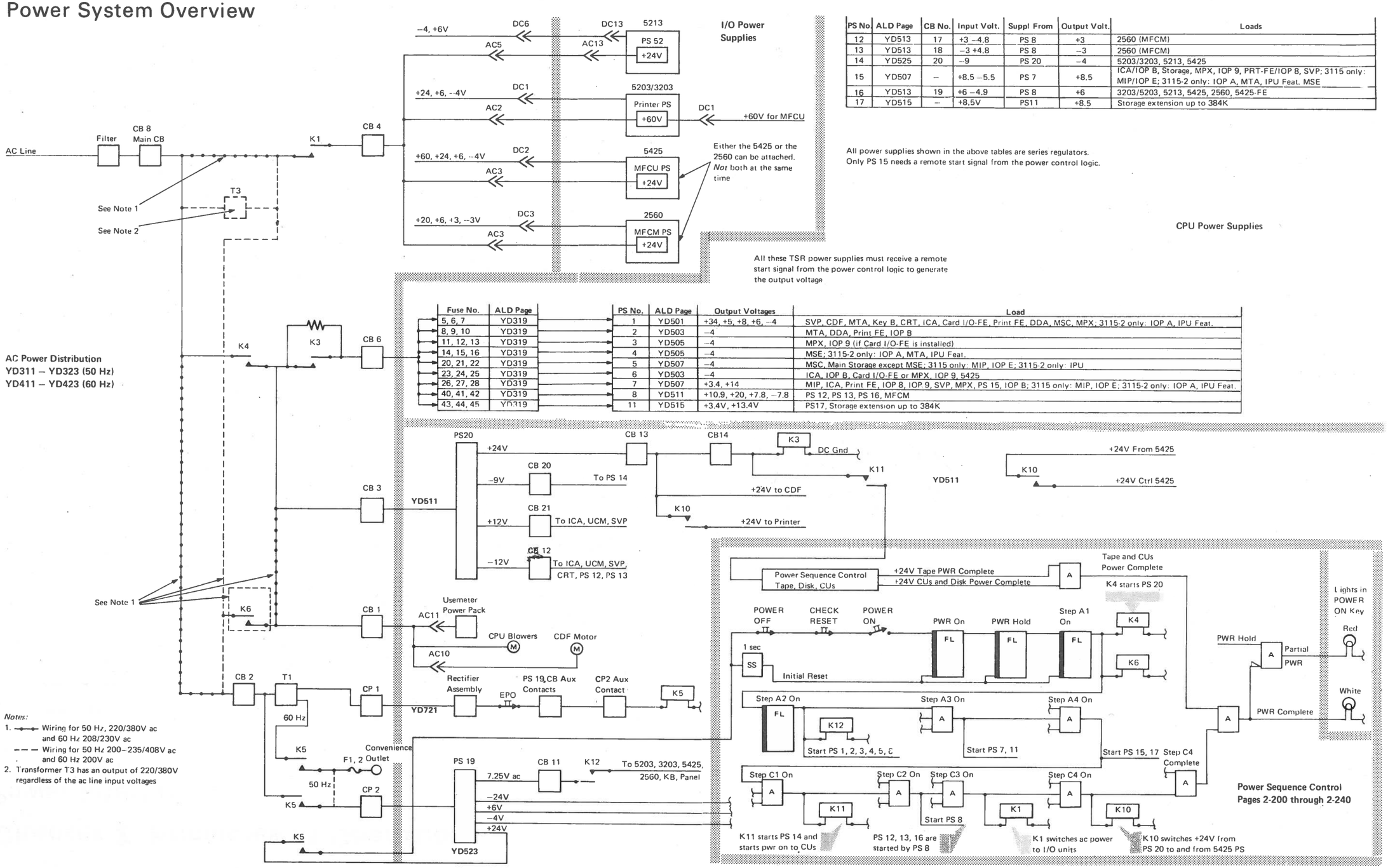
YD 257	YD 259
	YD 251
YD 253	YD 255
	YD 261

3203, 5203
CDF, CRT, KB
2560, 5425
5213

* If the multiplexer channel is installed *without* a card I/O front end, the multiplexer channel front end and IOP 9 will be located in 01A-C2.

If the multiplexer channel *and* card I/O front end are both installed, the card I/O front end is located in 01A-C2. The multiplexer channel front end and IOP 9 are installed in board 01B-A1.

Power System Overview



PS No.	ALD Page	CB No.	Input Volt.	Suppl From	Output Volt.	Loads
12	YD513	17	+3 –4.8	PS 8	+3	2560 (MFCM)
13	YD513	18	–3 +4.8	PS 8	–3	2560 (MFCM)
14	YD525	20	–9	PS 20	–4	5203/3203, 5213, 5425
15	YD507	–	+8.5 –5.5	PS 7	+8.5	ICA/IOP B, Storage, MPX, IOP 9, PRT-FE/IOP 8, SVP; 3115 only: MIP/IOP E; 3115-2 only: IOP A, MTA, IPU Feat. MSE
16	YD513	19	+6 –4.9	PS 8	+6	3203/5203, 5213, 5425, 2560, 5425-FE
17	YD515	–	+8.5V	PS11	+8.5	Storage extension up to 384K

All power supplies shown in the above tables are series regulators.
Only PS 15 needs a remote start signal from the power control logic.

Fuse No.	ALD Page
5, 6, 7	YD319
8, 9, 10	YD319
11, 12, 13	YD319
14, 15, 16	YD319
20, 21, 22	YD319
23, 24, 25	YD319
26, 27, 28	YD319
40, 41, 42	YD319
43, 44, 45	YD319

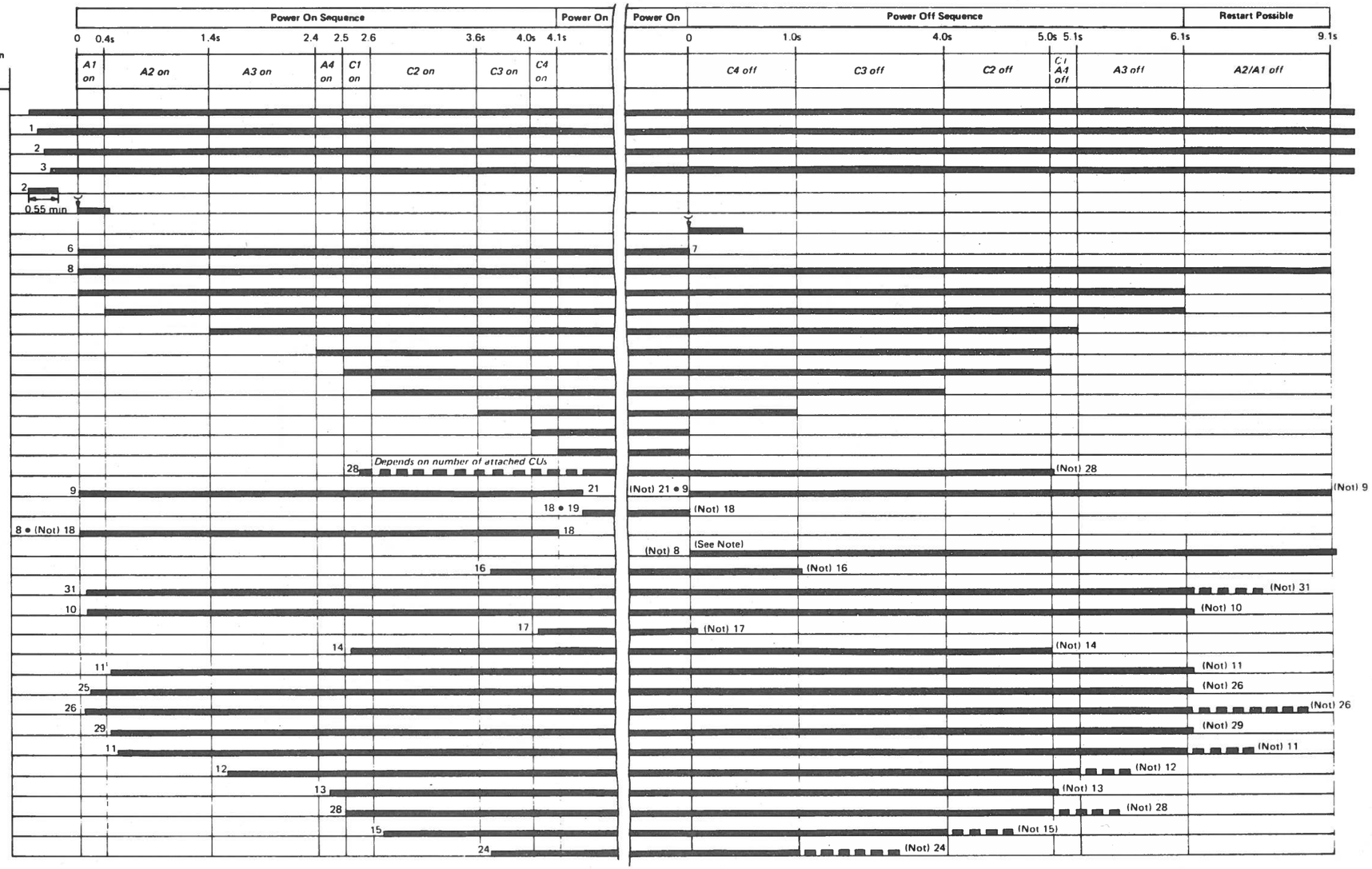
PS No.	ALD Page	Output Voltages	Load
1	YD501	+34, +5, +8, +6, –4	SVP, CDF, MTA, Key B, CRT, ICA, Card I/O-FE, Print FE, DDA, MSC, MPX; 3115-2 only: IOP A, IPU Feat.
2	YD503	–4	MTA, DDA, Print FE, IOP B
3	YD505	–4	MPX, IOP 9 (if Card I/O-FE is installed)
4	YD505	–4	MSE; 3115-2 only: IOP A, MTA, IPU Feat.
5	YD507	–4	MSC, Main Storage except MSE; 3115 only: MIP, IOP E; 3115-2 only: IPU
6	YD503	–4	ICA, IOP B, Card I/O-FE or MPX, IOP 9, 5425
7	YD507	+3.4, +14	MIP, ICA, Print FE, IOP 8, IOP 9, SVP, MPX, PS 15, IOP B; 3115 only: MIP, IOP E; 3115-2 only: IOP A, IPU Feat.
8	YD511	+10.9, +20, +7.8, –7.8	PS 12, PS 13, PS 16, MFCM
11	YD515	+3.4V, +13.4V	PS17, Storage extension up to 384K

Notes:

1. —●— Wiring for 50 Hz, 220/380V ac and 60 Hz 208/230V ac
   – – – Wiring for 50 Hz 200–235/408V ac and 60 Hz 200V ac
2. Transformer T3 has an output of 220/380V regardless of the ac line input voltages

Power Sequence — Timing

	No.	Signal or Name	Location on Diag 2-100 and 2-120
Main CB On	1	AC Line Voltage	A2
	2	+24V EPO	E4
	3	Contactor K5	D5
	4	Power Supply	E4
	5	Initial Reset	D6
Power Sequence Control	6	POWER ON Key	D6
	7	POWER OFF Key	D6
	8	PWR ON FL	D7
	9	PWR Hold FL	D7
	10	Step A1 On	D8
	11	Step A2 On	D6
	12	Step A3 On	D7
	13	Step A4 On	D8
	14	Step C1 On	E6
	15	Step C2 On	E6
	16	Step C3 On	E7
	17	Step C4 On	E8
	18	Step C4 Complete	E8
	19	Tape and CUs PWR Complete	D8
	20	Partial PWR (Red Light in Key on)	D9
	21	PWR Compl. (White Light in Key on)	D9
	22	PWR ON Reset	NS
	23	Normal PWR Off	NS
Contactors	24	K1	E7
	25	K3	C6
	26	K4 (K6)	D8
	27	K10	E8
	28	K11	E6
	29	K12	E6
Power Supplies	30	Primary AC to PSs	C4
	31	PS 20 (+24, +12, - 12, 9V)	D4
	32	PS 19 Output 7.25V ac	E4
	33	PS 1, 2, 3, 4, 5, 6 (--4, +5, +6, +8, +34V)	B6
	34	PS 7, PS 11 (+3.4, +14V)	B6
	35	PS 15, PS 17 (+8.5V)	A6
	36	PS 14 (- 4V)	A6
	37	PS 8, 12, 13, 16 (+20, +6, +3, - 3V)	C5/A6
	38	PSs in Printers and MFCU/MFCM	A5



Note: Thermal Failure The 'normal power off key' signal and the 'failure power off' signal (not shown here) will both be active (see page 3-100).

Power Sequence – Control

Logic Operation

The logic of the power sequence control is subdivided into several groups:

1 Timing Circuits
The timing circuits consist of an oscillator and time delay counter with decoders (time delay counter is reset after each sequence step).

2 Sequence Steps A1 through C4
Forward/reverse stepping is controlled by the PWR On FL being on or off in conjunction with the time delay counter.

3 On/Off Control
On/off control for PSs, contactors and power to tape, disk and CUs is executed by sequence steps. In the case of an uncontrolled power down (EPO or line voltage drop) no sequencing is provided.

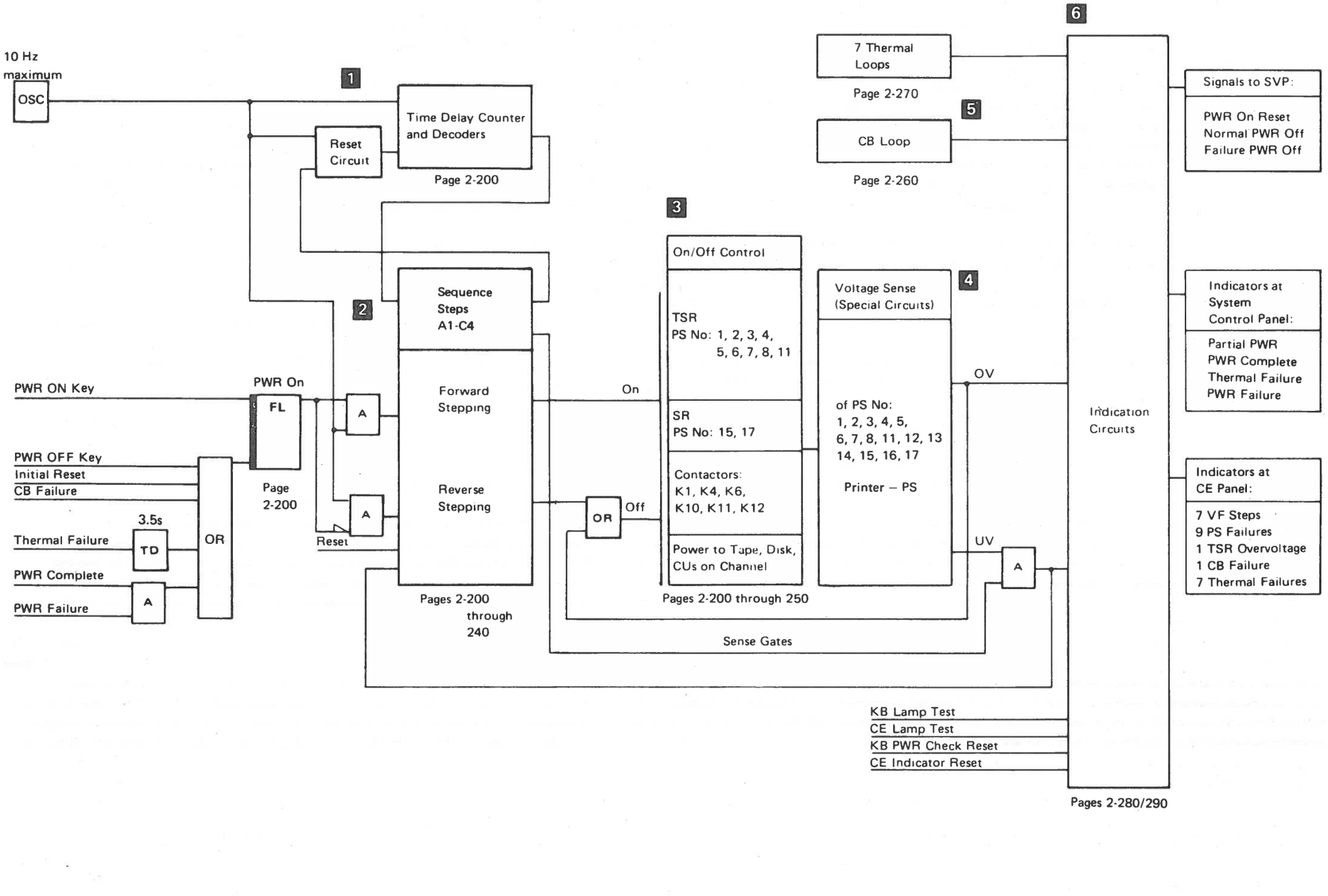
4 Voltage Sense Circuits
The voltage sense circuits check voltages of PSs for overvoltage (OV) and/or undervoltage (UV).

- *OV – Sense:* (for TSRs only) switches off the failing TSR and the OV condition is indicated at the CE Panel.
- *OV – Protection:* series regulators have overvoltage protection circuits. OV condition switches off the output voltage. This results in a UV sense.
- *UV – Sense:* (for all PSs) causes Power Check which has two different effects:
  1. During the power on sequence the sequence stops and remains at failing step.
  2. When power is complete UV sense initiates the power off sequence.

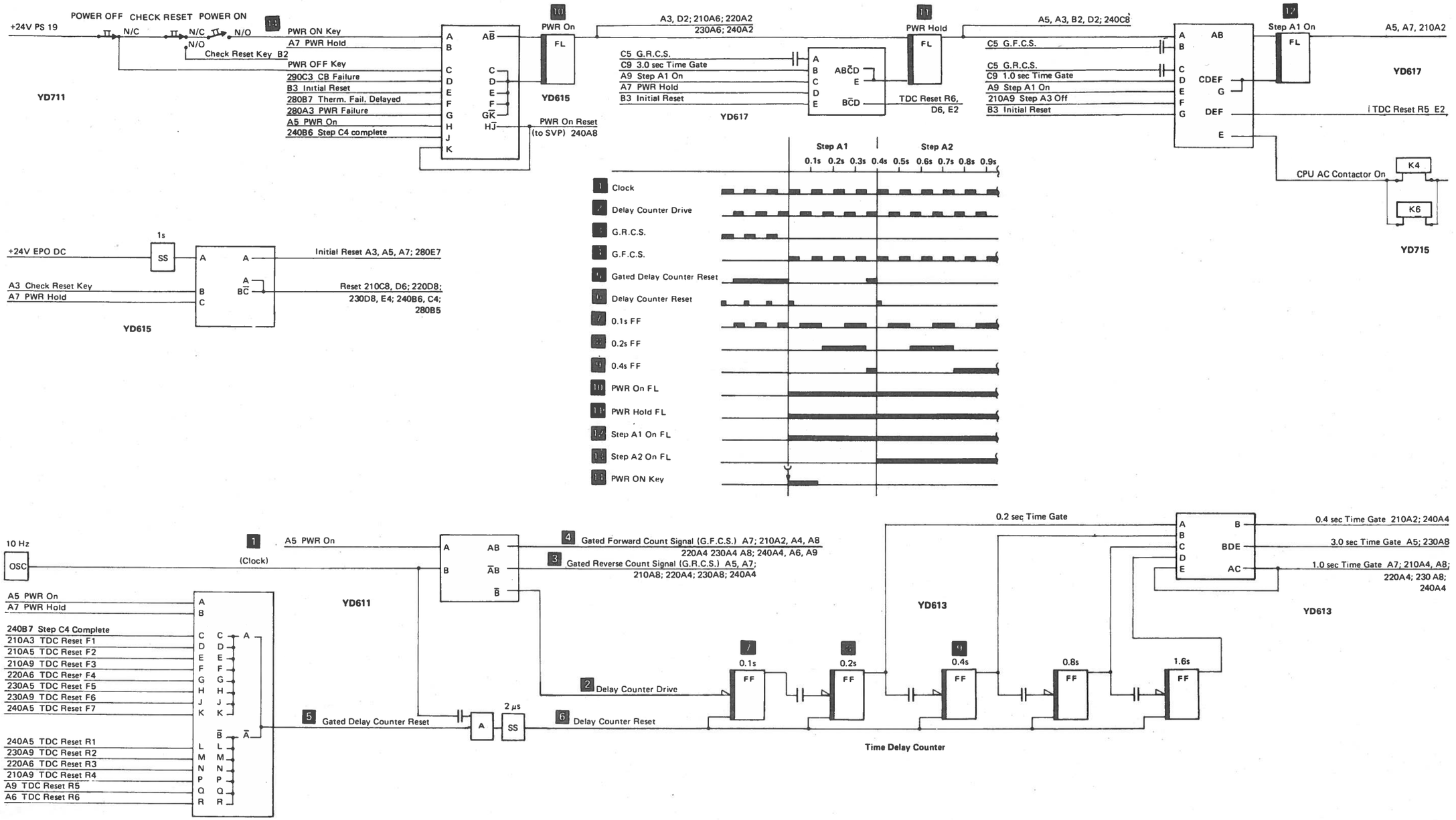
For more details, see Chapter 5 "Error Conditions".

5 Check Circuits
The check circuits supervise CBs and temperatures at several locations in the system.

6 Indication Circuits
The indicator circuits control signals to SVP and indicators.

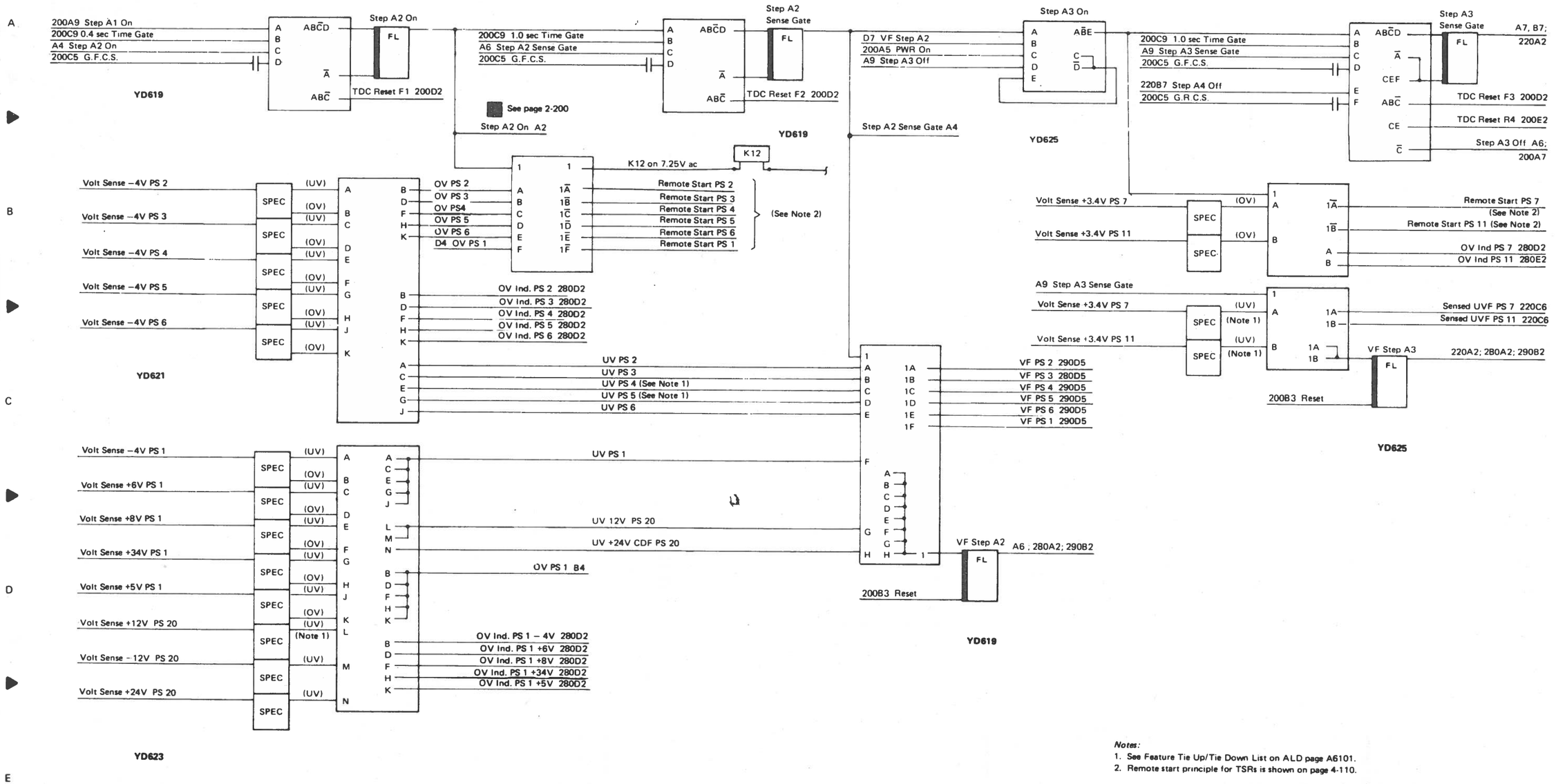


Power On, Step A1, and Timing Clock



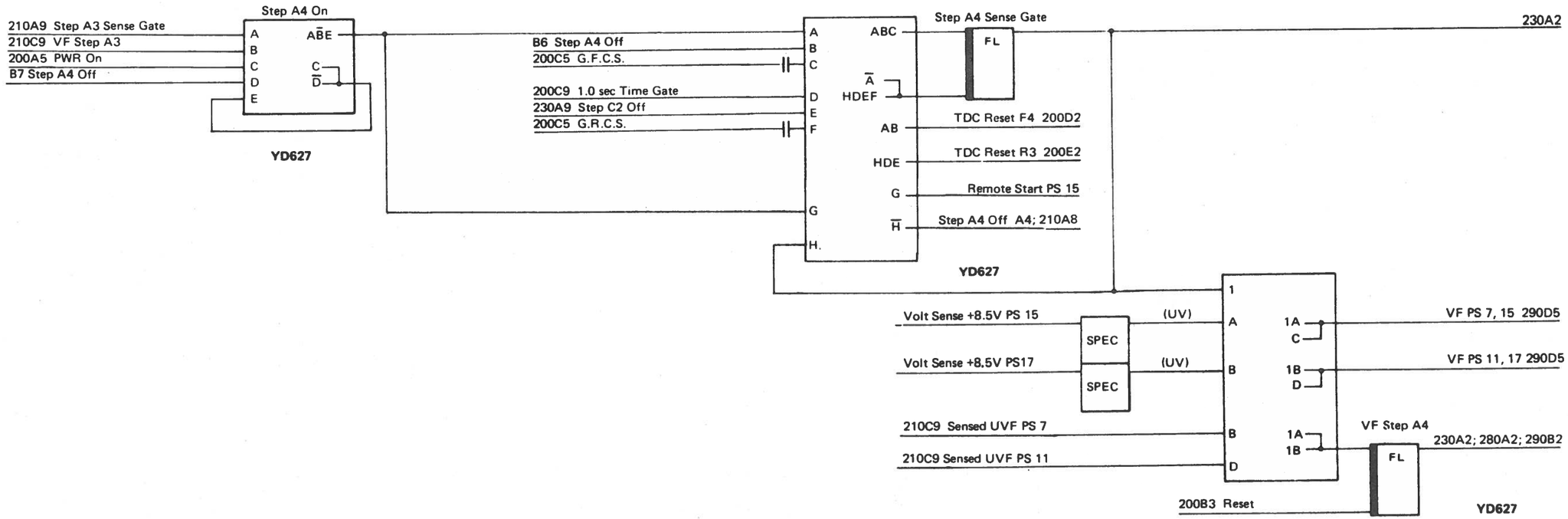
Power Sequence — Control (continued)

Steps A2 and A3



Notes:
1. See Feature Tie Up/Tie Down List on ALD page A6101.
2. Remote start principle for TSRs is shown on page 4-110.

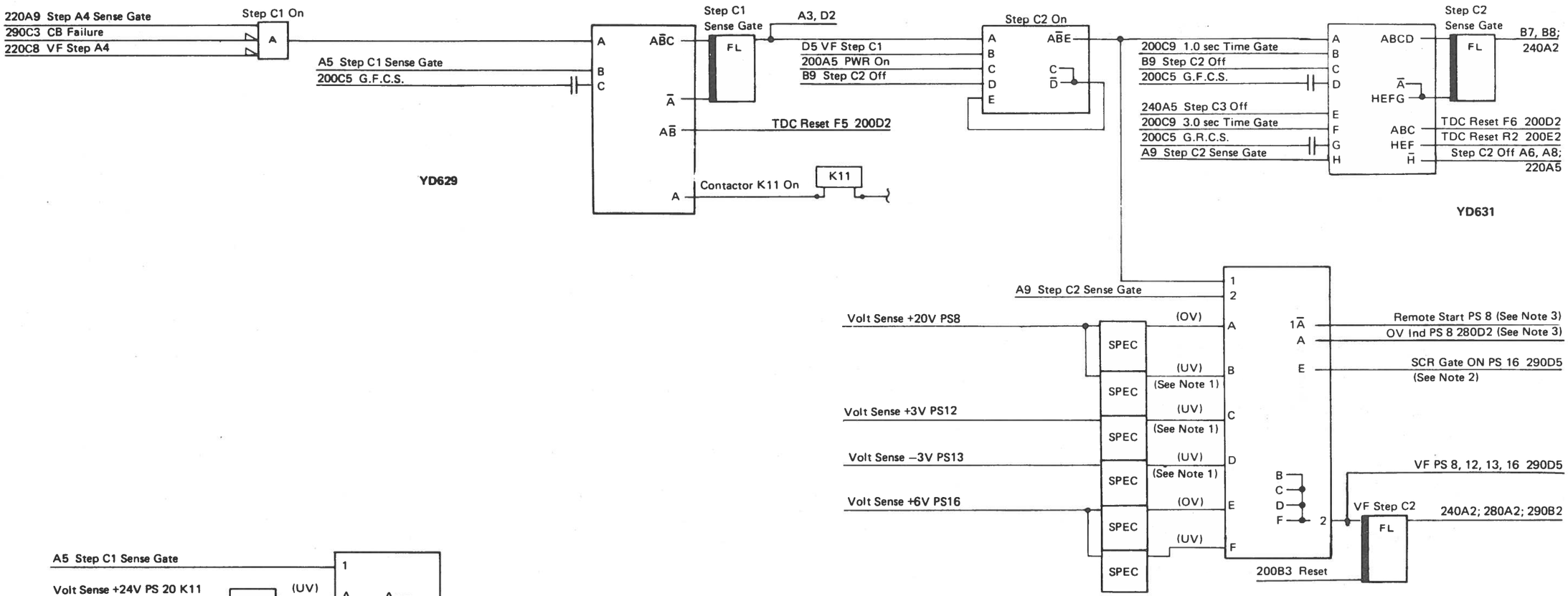
Step A4



Note: See Feature Tie Up/Tie Down List on ALD page A6101

Power Sequence — Control (continued)

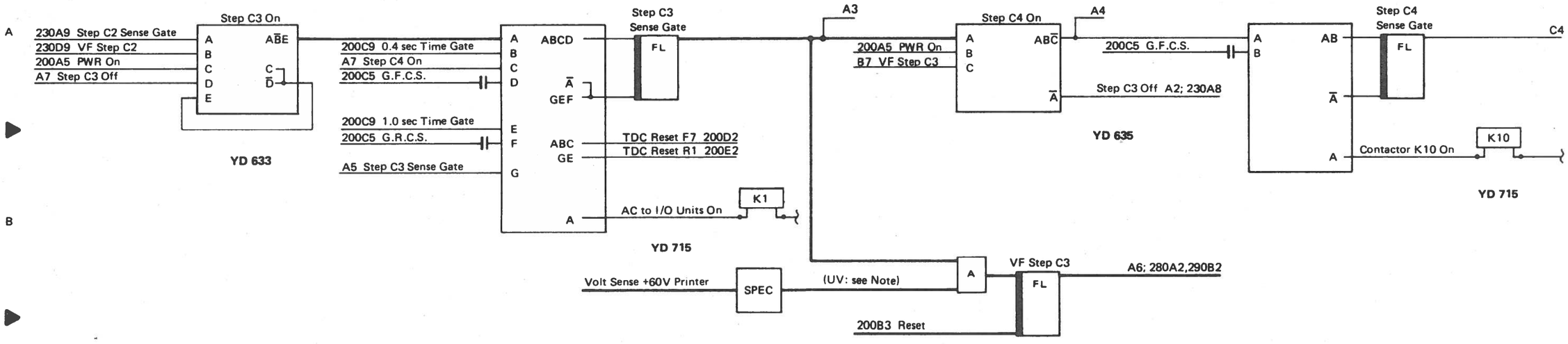
Steps C1 and C2

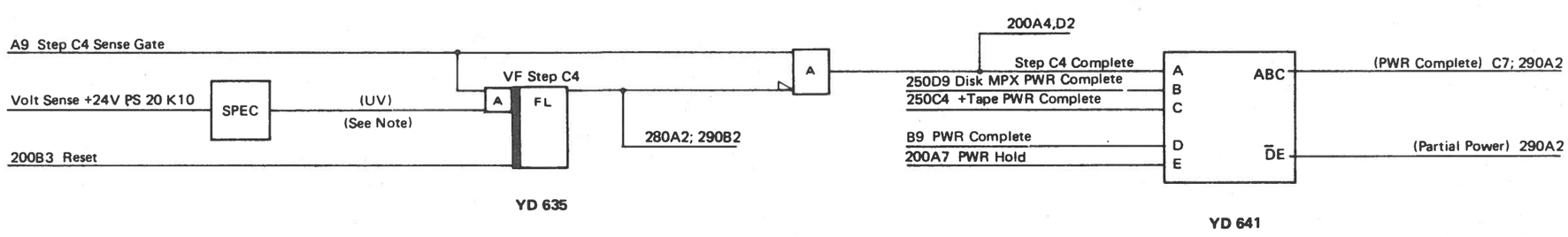


Notes:

1. See Feature Tie Up/Tie Down List on ALD page A6101.
2. The overvoltage condition of PS 14 and 16 is checked by the sense circuits. Output D or E active on this page switches off the corresponding PS output. This causes an undervoltage condition.
3. The remote start principle for TSRs is shown on page 4-110.

Steps C3 and C4

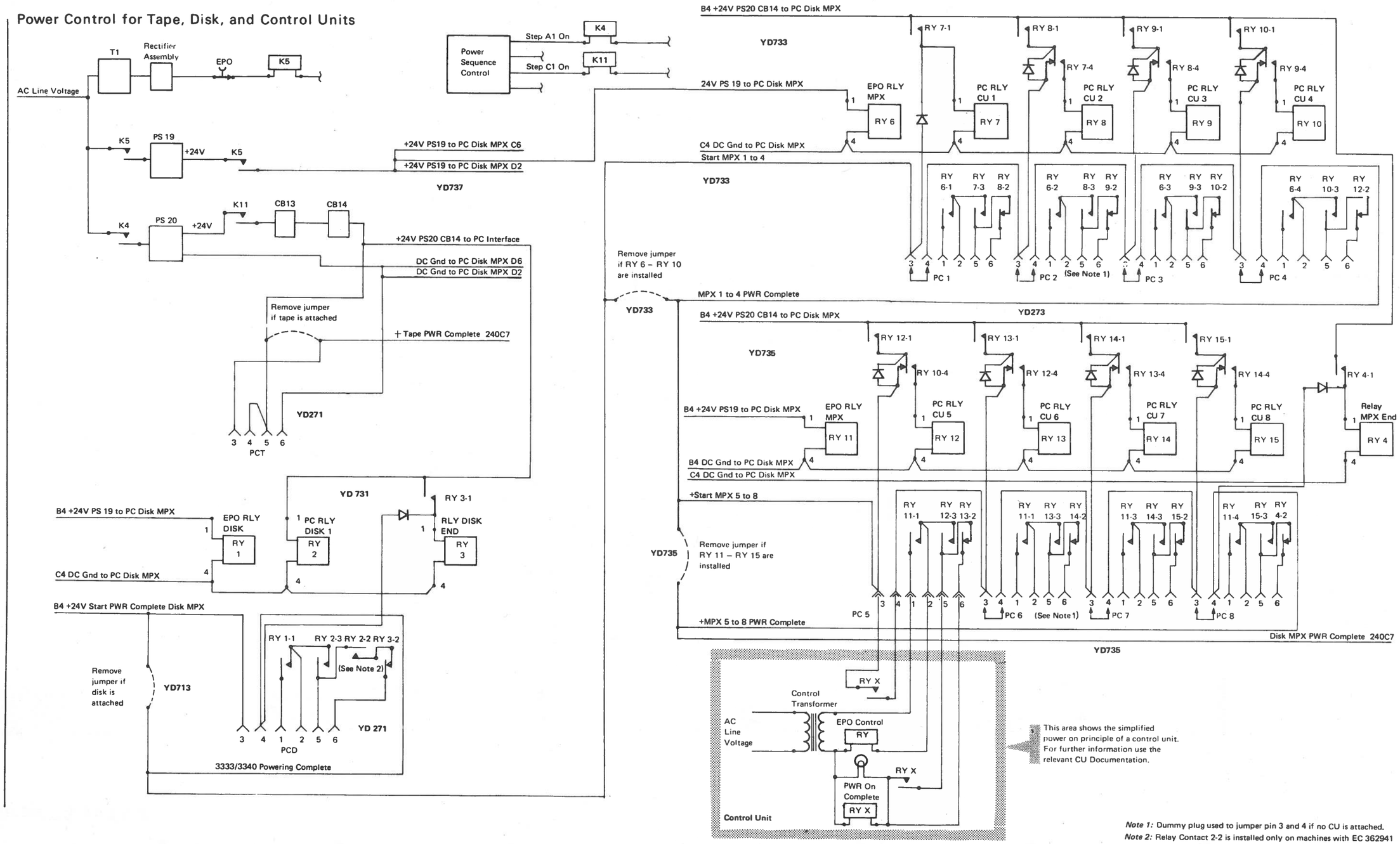




Note: See Feature Tie up/Tie down List on ALD A6101

Power Sequence — Control (continued)

Power Control for Tape, Disk, and Control Units



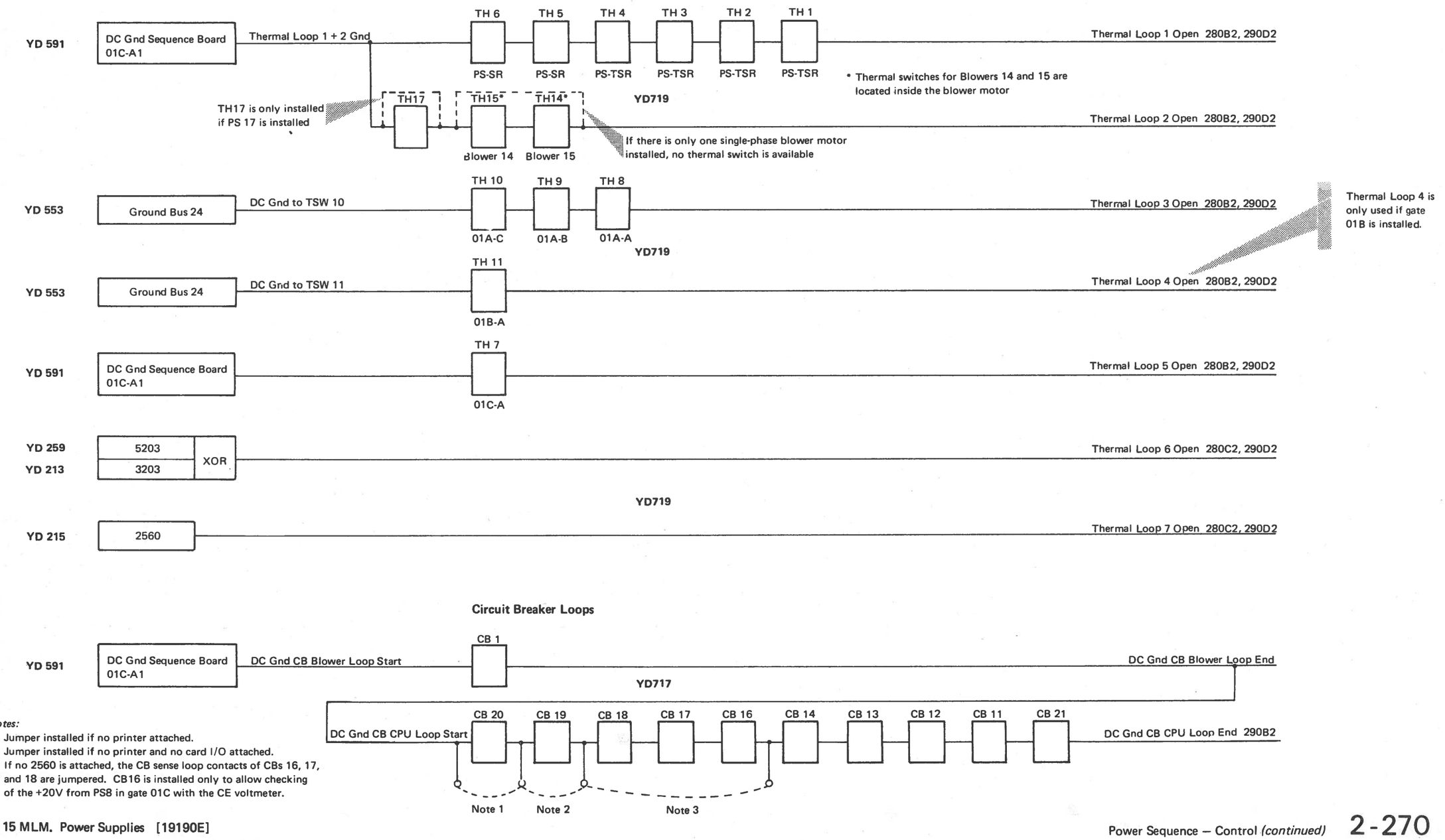
Note 1: Dummy plug used to jumper pin 3 and 4 if no CU is attached.

Note 2: Relay Contact 2-2 is installed only on machines with EC 362941

Thermal and Circuit Breaker Loops

For the physical locations of Thermal Switches and CBs, see Component Charts in the ALD.

Thermal Switch Loops



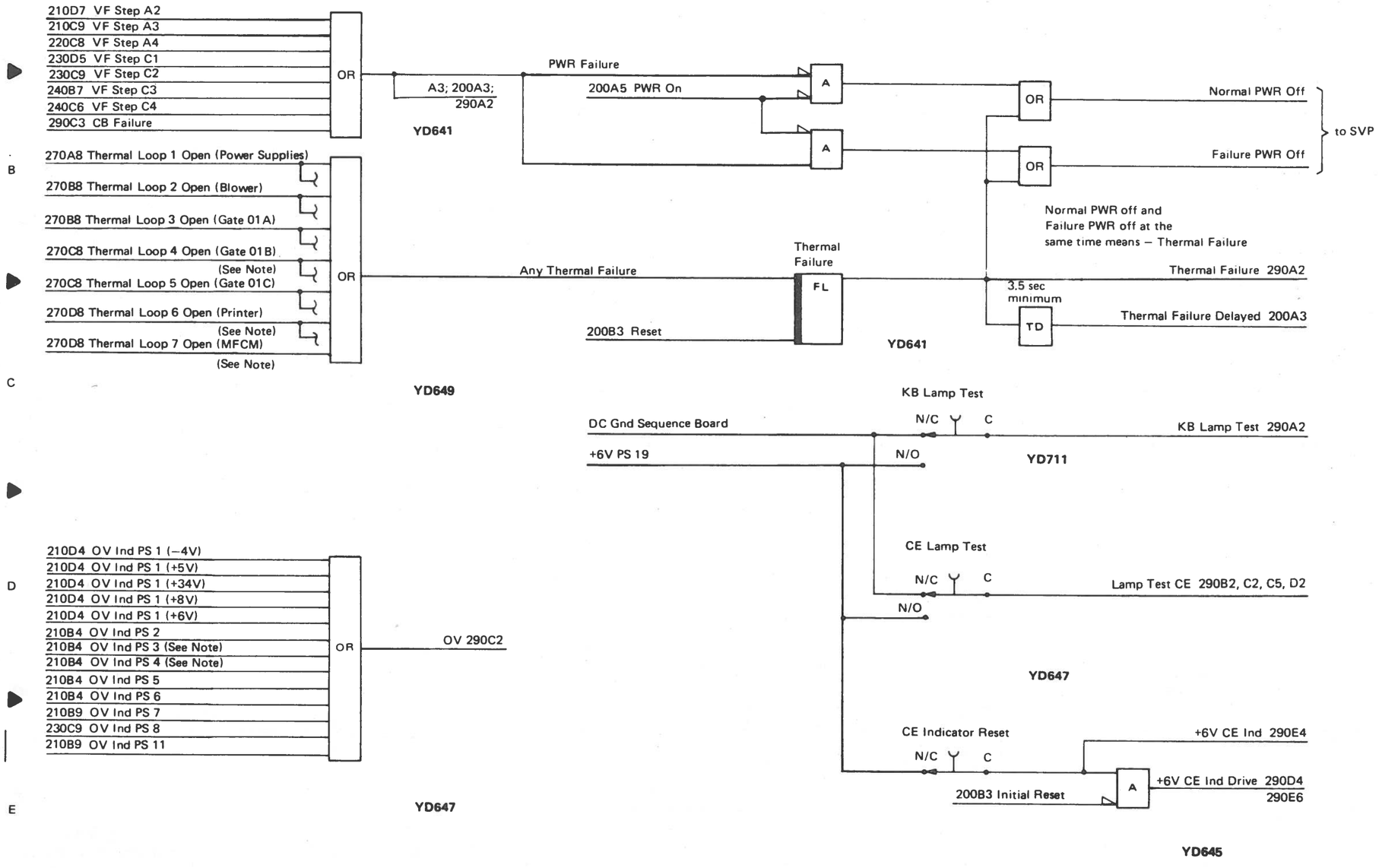
Circuit Breaker Loops

Notes:

1. Jumper installed if no printer attached.
2. Jumper installed if no printer and no card I/O attached.
3. If no 2560 is attached, the CB sense loop contacts of CBs 16, 17, and 18 are jumpered. CB16 is installed only to allow checking of the +20V from PS8 in gate 01C with the CE voltmeter.

Power Sequence – Control (continued)

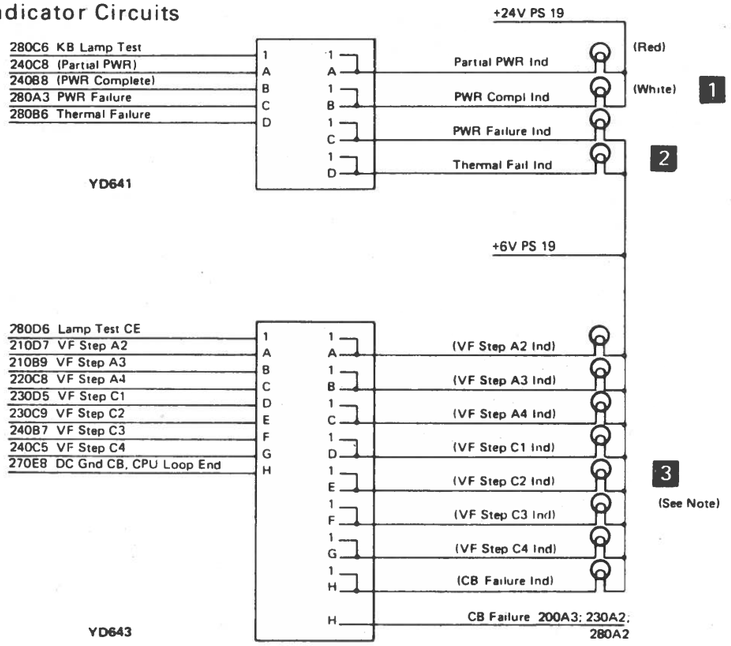
Failures and Test Switches



Note: See Feature Tie Up/Tie Down List on ALD page A6101

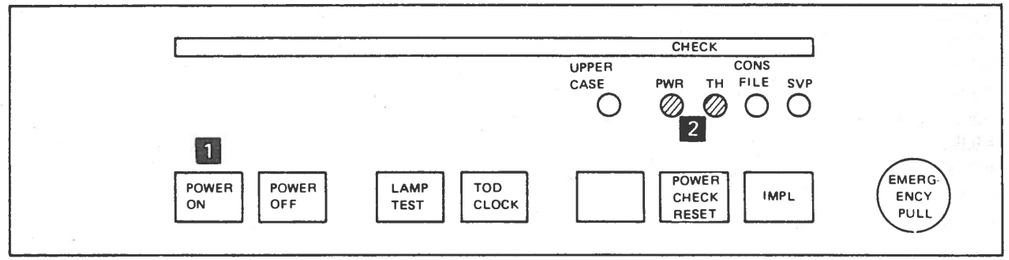
Indicator Circuits and Panels

Indicator Circuits

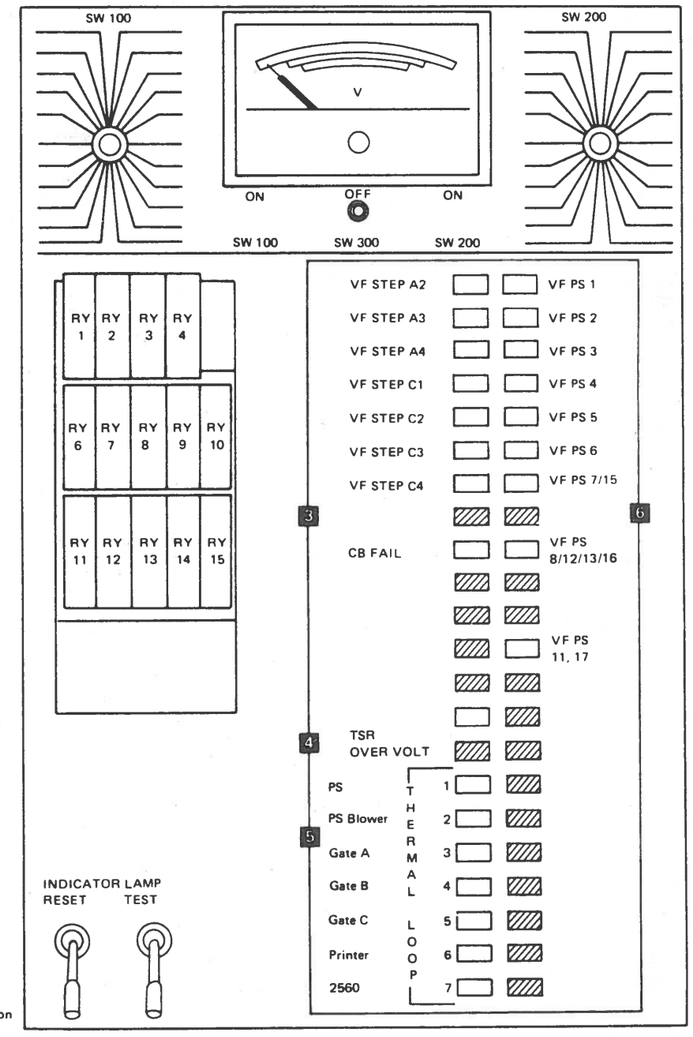


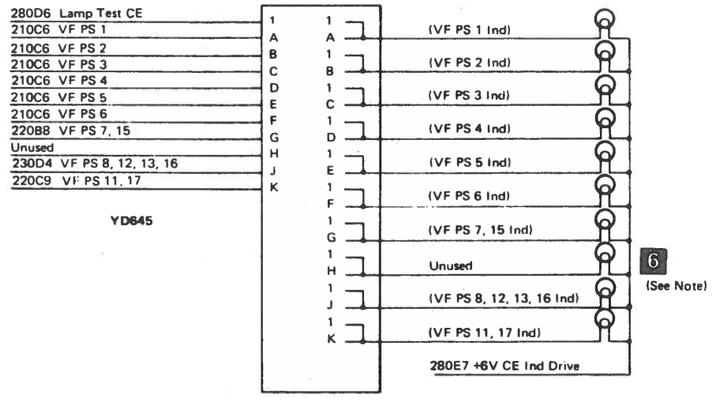
Note: These groups of indicators are Light Emitting Diodes (LEDs)

System Control Panel



CE Indicator Panel





Unused indicator position

Signal Source List

- Page numbers given on this page refer only to Chapter 2.

A

Any Thermal Failure	280B4

C

CB Failure	290C3
(CB Failure Ind)	290C3
Check Reset Key	200A3
(Clock)	200C2
Contactor K10 On	240A8
Contactor K11 On	230B5
CPU AC Connector on	200B9

D

Delay Counter Drive	200D5
Delay Counter Reset	200E5
DC Gnd CB Blower Loop End	270E8
DC Gnd CB CPU DC Loop End	270E8
DC Gnd to CU Interf RY	250B3
DC Gnd for RY 01	250B4
DC Gnd for RY 06	250B4
DC Gnd for RY 11	250B4
DC Gnd Sequence Board	270A2, C2, E2

F

Failure PWR Off	280B7

G

Gated Delay Counter Reset	200E4
Gated Forward Count Signal (G.F.C.S.)	200C5
Gated Reverse Count Signal (G.R.C.S.)	200C5

I

Initial Reset	200B3

K

KB Lamp Test	280C8
K12 On 7.25V AC	210B5

L

Lamp Test CE	280D7
Line Fault from IPI	200C3

N

Normal PWR Off	280A7

O

(OV)	280D3
OV Ind PS 2	210B4
OV Ind PS 3	210B4
OV Ind PS 4	210C4
OV Ind PS 5	210C4
OV Ind PS 6	210C4
OV Ind PS 1–4V	210D4
OV Ind PS 1 +5V	210D4
OV Ind PS 1 +6V	210D4
OV Ind PS 1 +8V	210D4
OV Ind PS 1 +34V	210D4
OV PS 1	210D4
OV PS 2	210B4
OV PS 3	210B4
OV PS 4	210B4
OV PS 5	210B4
OV PS 6	210B4
OV PS 11	210B9

P

(Partial PWR)	240C9
Partial PWR Ind	290A3
PWR Compl Ind	290A3
(PWR Complete)	240C9
PWR Failure	280A3
PWR Failure Ind	290A3
PWR Hold	200A7
PWR On	200A5
PWR On Reset	200A5

R

Remote Start PS 1	210B5
Remote Start PS 2	210B5
Remote Start PS 3	210B5
Remote Start PS 4	210B5
Remote Start PS 5	210B5
Remote Start PS 6	210B5
Remote Start PS 7	210B9
Remote Start PS 11	210B9
Remote Start PS 15	220B6
Reset	200B3

S

SCR Gate On PS 16	230C9
SCR GT Up PS 14	230E5
Sensed UVF PS 7	210B9
Sensed UVF PS 11	210C9
Step A1 On FL	200A9
Step A2 On FL	210A3
Step A2 Sense Gate FL	210A5
Step A3 On	210A7
Step A3 Sense Gate FL	210A9
Step A4 On	220A3
Step A4 Sense Gate FL	220A6
Step C1 On	230A3
Step C1 Sense Gate FL	230A5
Step C2 On	230A7
Step C2 Sense Gate FL	230A9
Step C3 On	240A3
Step C3 Sense Gate FL	240A5
Step C4 Complete	240B6
Step C4 On	240A6
Step C4 Sense Gate FL	240A9

T

TDC Reset F1	210A3
TDC Reset F2	210A5
TDC Reset F3	210A9
TDC Reset F4	220A6
TDC Reset F5	230A5
TDC Reset F6	230A9
TDC Reset F7	240A5
TDC Reset R1	240A5
TDC Reset R2	230A9
TDC Reset R3	220A6
TDC Reset R4	210A9
TDC Reset R5	200A9
TDC Reset R6	200A7
(TF PS Ind)	290D3
(TF Blower Ind)	290D3
(TF Gate A Ind)	290E3
(TF Gate B Ind)	290D3
(TF Gate C Ind)	290E3
(TF Printer Ind)	290E3
(TF 2560 Ind)	290E3
Thermal Failure	280B7
Thermal Failure Delayed	280B7
Thermal Failure Ind	290A3
Thermal Loop 1 Open	270A8
Thermal Loop 2 Open	270B8
Thermal Loop 3 Open	270B8
Thermal Loop 4 Open	270C8
Thermal Loop 5 Open	270C8
Thermal Loop 6 Open	270D8
Thermal Loop 7 Open	270D8
Thermal Loop 1+2 Gnd	270A3
(TSR Over Volt Ind)	290C3

U

UV +24V CDF PS 20	210D4
UF PS 2	210C4
UV PS 3	210C4
UV PS 4	210C4
UV PS 5	210C4
UV PS 6	210C4
UV 12V PS 20	210C4

V

VF PS 1	210C7
(VF PS 1 Ind)	290D6
VF PS 2	210C7
(VF PS 2 Ind)	290D6
VF PS 3	210C7
(VF PS 3 Ind)	290D6
VF PS 4	210C7
(VF PS 4 Ind)	290D6
VF PS 5	210C7
(VF PS 5 Ind)	290D6
VF PS 6	210C7
(VF PS 6 Ind)	290D6
VF PS 7, 15	220C8
(VF PS 7, 15 Ind)	290D6
VF PS 8, 12, 13, 16	230C9
(VF PS 8, 12, 13, 16 Ind)	290D6
VF PS 11, 17	220C9
(VF PS 11, 17 Ind)	290E6
VF Step A2 FL	210D7
(VF Step A2 Ind)	290B3
VF Step A3 FL	210C9
(VF Step A3 Ind)	290B3
VF Step A4 FL	220C8
(VF Step A4 Ind)	290B3
VF Step C1 FL	230D5
(VF Step C1 Ind)	290B3
VF Step C2 FL	230D9
(VF Step C2 Ind)	290C3
VF Step C3 FL	240B7
(VF Step C3 Ind)	290C3
VF Step C4 FL	240C5
(VF Step C4 Ind)	290C3

0.2 sec Time Gate	200D6
0.4 sec Time Gate	200C9
1.0 sec Time Gate	200C9
3.0 sec Time Gate	200C9
+6V CE Ind	280D8
+6V CE Ind Drive	280E8
+24V Cntl for RY 01	250B4
+24V Cntl for RY 06	250B4
+24V Cntl for RY 11	250B4
+24V CU Disk PWR Complete	250D8
+24V Disk PWR Complete	250E4
+24V for CU Interf RY	250B4
+24V for RY 02	250B4
+24V for RY 07-10	250B4
+24V for RY 12-15	250B4
+24V PC1 to PC4 PWR Complete	250C6
+24V PC5 to PC8 PWR Complete	250D6
+24V PS 20 K11	250B3
+24V PWR Control Disk	250B4
+24V PWR Control PC1 to PC4	250B6
+24V PWR Control PC5 to PC8	250D6
+24V Tape PWR Complete	250C4

Your comments may help us to improve this manual. Please use the reader's comment form (last sheet of the manual); if the form has been removed, send the comments to:
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2 Principles of Operation

Chapter 3. Operational Details

Power System On/Off Sequence

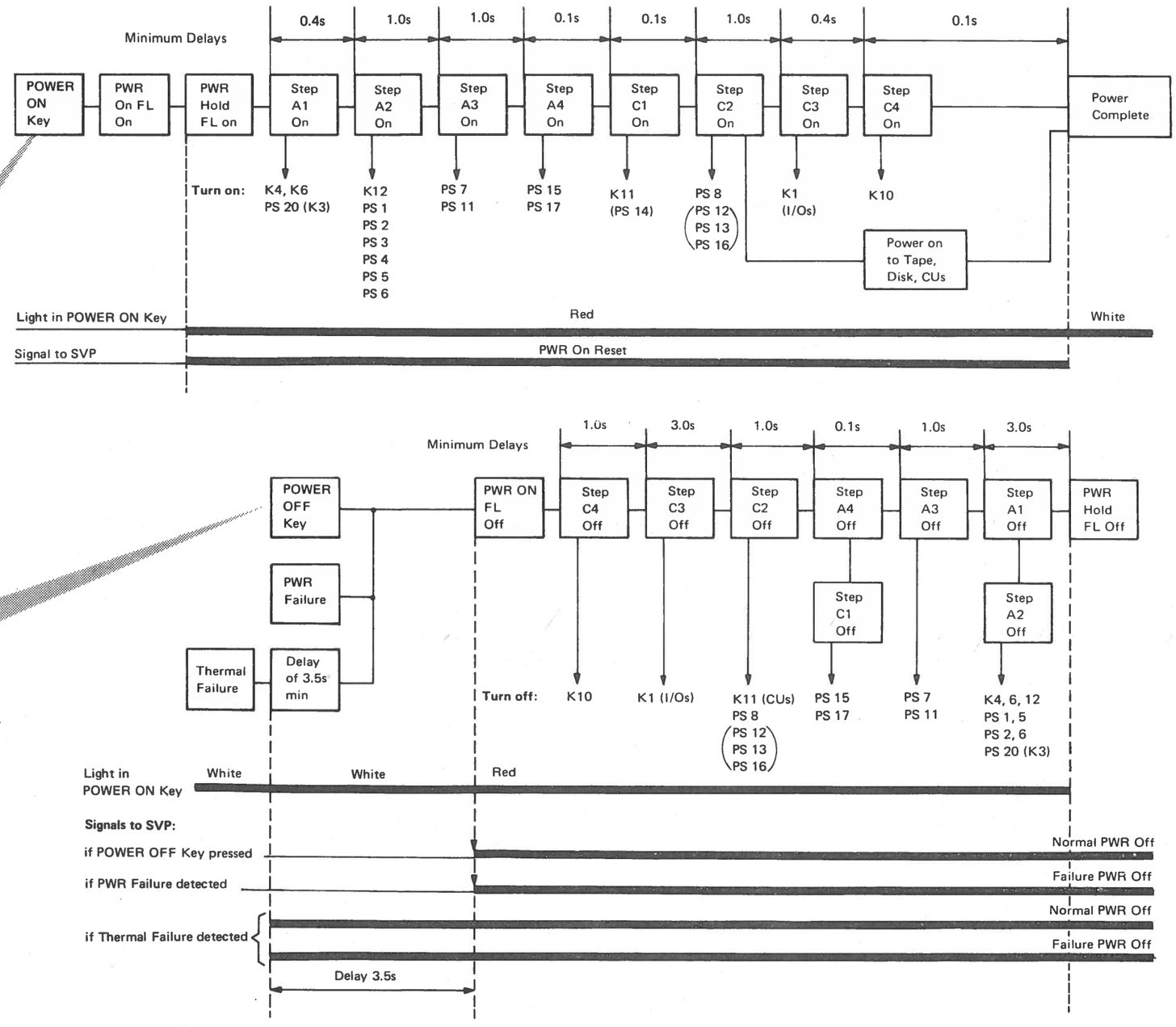
During on/off switching of the power system all primary and secondary voltages must be turned on/off by steps in a specific sequence. This is performed by the power on sequence and the power off sequence.

Power On Sequence

- Initiated by the POWER ON key.
- Sequence steps are switched on starting with step A1 going up through step C4 (forward stepping).
- Stepping is controlled by the logic of the power sequence control.
- The light within the POWER ON key indicates the status of the sequence.
- Power on reset signal is sent to SVP.

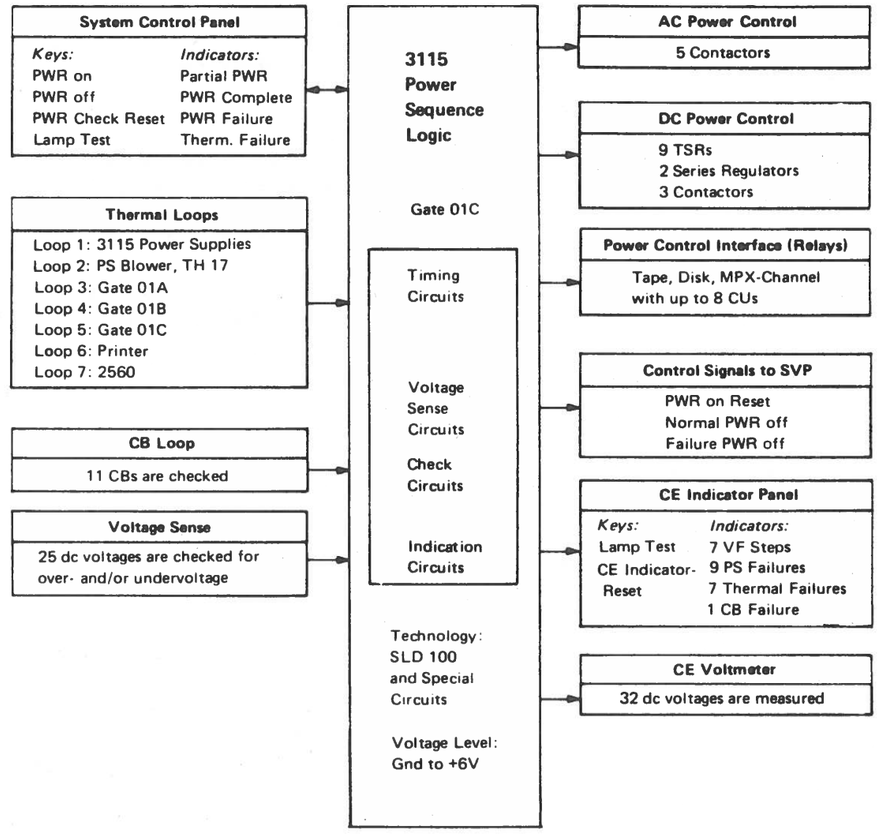
Power Off Sequence

- Initiated by the POWER OFF key or failure conditions.
- Sequence steps are switched off starting with step C4 going down through step A1 (reverse stepping).
- Stepping is controlled by the logic of the power sequence control.
- The light within the POWER ON key indicates the status of the sequence.
- The POWER OFF key or power failure initiate immediately the power-off sequence. At the same time the corresponding signals to the SVP are generated.
- Thermal failure generates immediately the corresponding signals to the SVP. After a delay of approximately 3.5 seconds, the power off sequence is initiated.



Power Sequence Control

- Main function: controls the power on/off sequence and supervises the correct functioning of the power system.
- Consists of several function groups and logic circuits.
- The 3115 power sequence logic is subdivided into several circuits as shown in the diagram.
- Timing circuits of the 3115 logic generate and control steps A1 through C4 of the power on/off sequence.
- The diagram shows the relationship between the several function groups and the logic.
- More details are shown in Chapter 2, "Principles of Operation".



Chapter 4. Functional Units

Types of Power Supplies

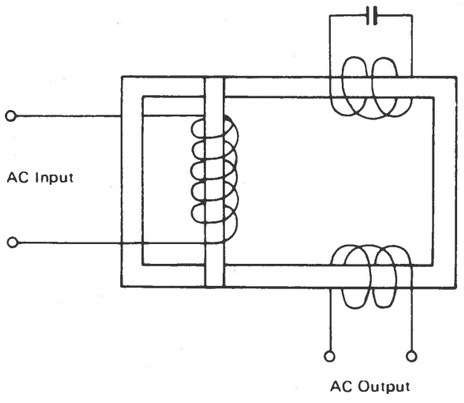
- Three different types of power supplies (PSs) are used in the power system:

1 Ferroresonant Transformer (F) → AC Input → F → 1 through 4 ac/dc outputs

2 Series Regulator (SR) → DC Input → SR → 1 dc output

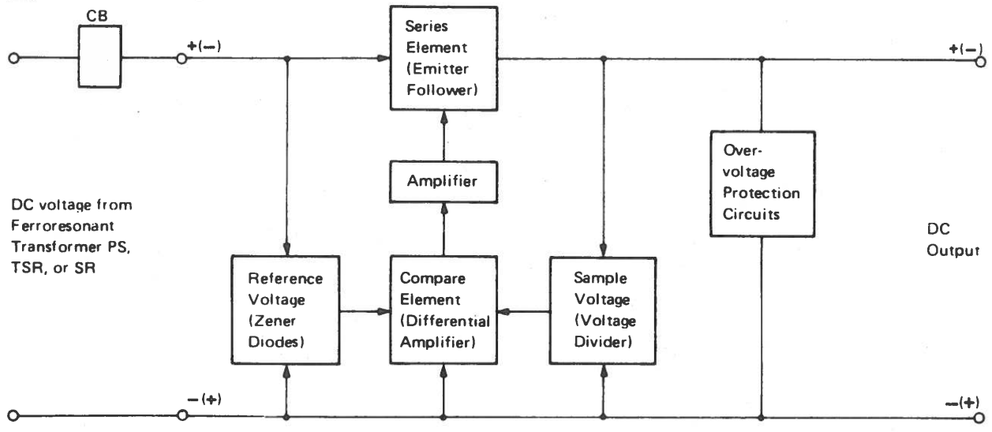
3 Transistor Switching Regulator (TSR) → AC Input → TSR → 1 through 5 dc outputs

1 Ferroresonant Transformer



- AC output voltage(s) (if required) rectified to dc.
- Output voltage(s) may vary due to line voltage and frequency variations within the system operating limits of ± 10% and ± 0.5 Hz.

2 Series Regulator



- Series regulators are used for positive and negative voltages.
- DC output voltage is controlled by comparing a sample output voltage with a reference voltage.
- Any difference is amplified which controls a series element.
- The over voltage protection circuit short circuits the SR output when an over voltage condition occurs. This trips the CB in the input circuit, or causes the TSR to switch off.

F On/Off Control

- By applying/removing the ac input.

SR On/Off Control

- By applying/removing the dc input.

3 Transistor Switching Regulator

The TSR consists of four main sections:

AC to DC Converter Section (Part of Control Card)

- Rectifies the ac input voltage and converts it to a high dc voltage.
- The input capacitor buffers power disturbance so that the TSR operates satisfactorily during PLD.

20 kHz Inverter Section (Switch Card)

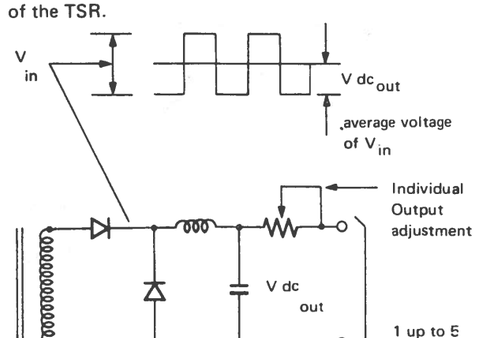
- Generates an ac voltage across the primary coil of the transformer by alternately turning the switching transistors on and off at a 20 kHz rate.

Control Section (Control Card)

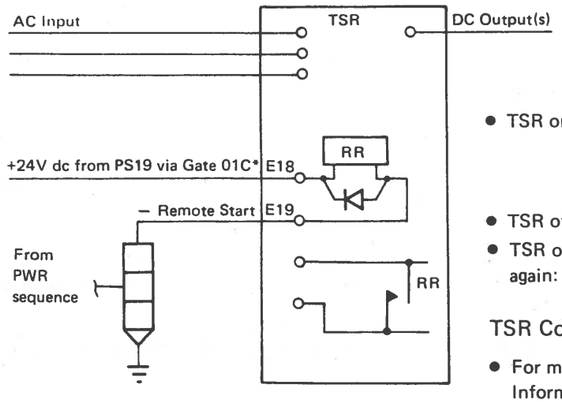
- Controls the on-off ratio of the two transistors in the inverter section by generating a 20 kHz frequency.
- Controls UV/OV protection circuits within the TSR. These circuits will switch off the TSR if voltage is out of the tolerance given by the TSR operating limits.
- The control section is equipped with a main potentiometer to adjust all output voltage(s) simultaneously.

Output Section (Output Card)

- Each dc output has a separate secondary coil on the output transformer.
- Some TSRs have additional potentiometers in the output section to adjust the output voltages individually.
- Output voltage(s) may vary, due to line voltage and frequency variations, within the system operating limits of ± 10% and ± 0.5 Hz.
- The transformer has an additional secondary coil for control functions, also to supply the control section of the TSR.



TSR On/Off Control



- TSR on:
  1. By applying ac input voltage.
  2. After 200 ms (minimum) by applying 24V dc to reed relays (RR).
  3. After 1 second dc output voltage(s) up.
- TSR off: By removing voltage from RR.
- TSR on again: Possible 2 seconds after TSR off.

TSR Components

- For more details see Chapter 6, "Maintenance Information"

* CAUTION
Short circuit of wire E18 to frame may damage the +24V net of board 01C-A1. If a damaged +24V net is suspected, check if +24V is present at the following pins of board 01C-A1:

F2-D02	B1-D03
F2-D03	F6-A01
F2-D04	F3-A01
F2-D05	
F3-D02	
A2-D03	

Every D03 pin of every card location is also connected to the +24V net (see ALD YD591).

4 Functional Units

Flexible Distribution System

FDS cables are used for prime dc distribution. An FDS cable consists of a thin copper band surrounded by layers of insulation.

Handling FDS Cables

FDS cables must be handled carefully. Do not drag an FDS cable over sharp corners or edges. Route it carefully through gate openings.

Installation of FDS Cables

Each bill of material to install a feature contains a detailed description for handling and routing FDS cables, and a folding tool.

Trouble Shooting on FDS Cables

Check for a short circuit from cable to cable and for a short circuit to ground (e.g. machine frame).

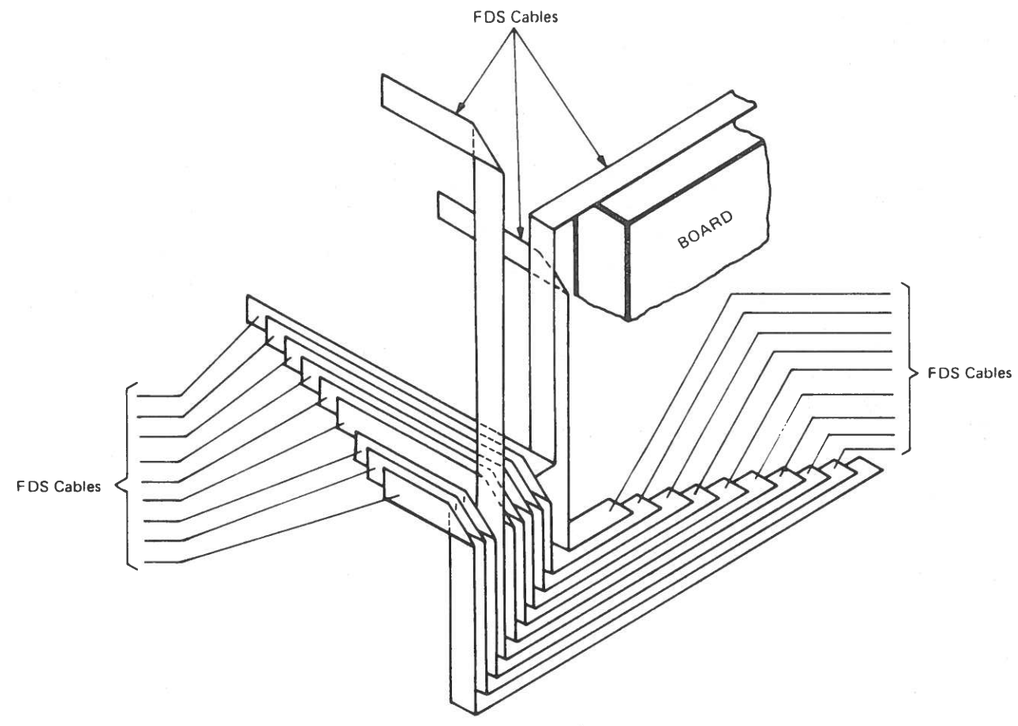
Repairing FDS Cables

Damage to insulation can be repaired by Mylar tape (IBM part no. 817 979) or a similar tape. Use at least two complete turns of tape around the FDS cable, but not more than two and a half turns.

Refolding FDS Cables

Do not refold the cable, or reverse the fold direction more than once at any fold mark. Use the tool for recovery from misfold, straighten the FDS cable carefully and repair the insulation as described before in "Repairing FDS Cables". Then fold the cable correctly using the folding tool.

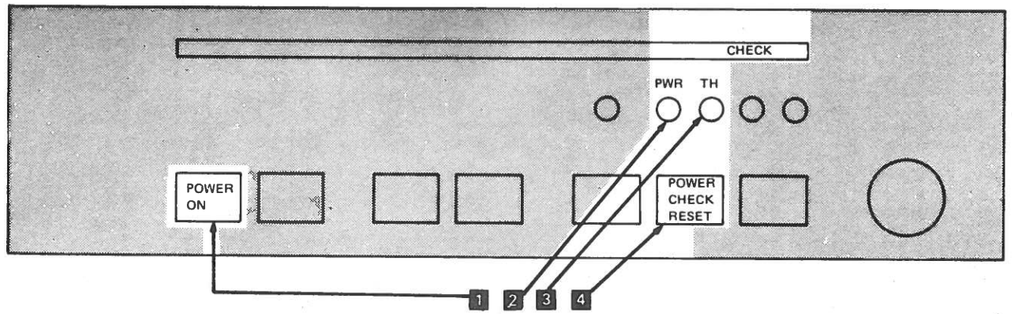
Example of FDS Cable Routing



Chapter 5. Error Conditions

Failure Indications

System Control Panel

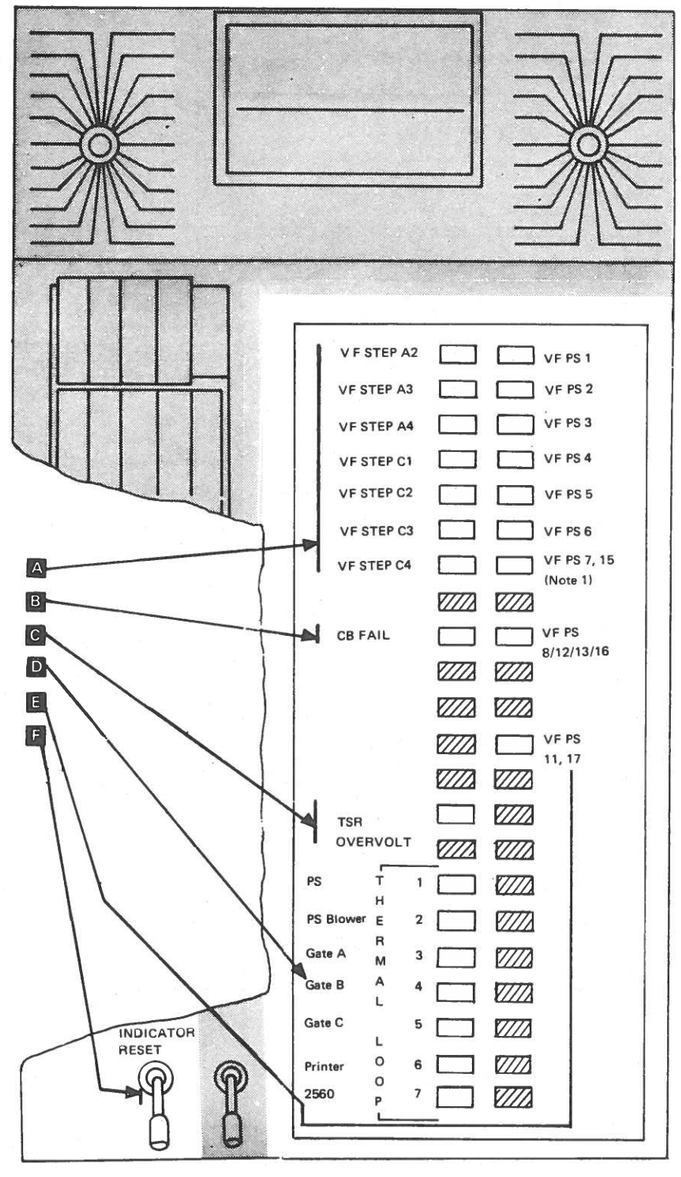


Failure Condition	Effect during		Indicators			
	PWR On Sequence	PWR Complete	on System Control Panel		on CE-Indicator Panel	
Power Failure on Tape, Disk or CUs	Indication only		1	POWER ON key (red)	–	–
Voltage Failure (UV and/or OV Sense)	Sequence stops and remains at failing step	–	1 2	POWER ON key (red PWR Check	A Failing Sequence Step	E Failing PS and C OV Indicator if OV Sense
	–	System PWR steps down	2	PWR Check		
CB Failure	System PWR steps down		2	PWR Check	–	B CB Failure
Thermal Failure			3	Thermal Check	–	D Open Thermal Loop
Reset Indicators			4	by POWER CHECK RESET key after System PWR has stepped down		F by CE Indicator Reset Switch

Notes:

1. PS 14 has no separate failure indicator. VF of PS 14 will be indicated by VF step C1.
2. TSR overvoltage indication is *not* related to a specific sequence step and *not* to a specific TSR. Overvoltage condition of a TSR is detected by the sequence logic.
   If overvoltage condition of a TSR is detected:
   1. TSR overvoltage indicator is set
   2. The failing TSR is switched off, this causes UV condition of this TSR
   3. The corresponding VF PS indicator is set
   4. The corresponding VF Step indicator is set

CE Indicator Panel



Unused indicator position

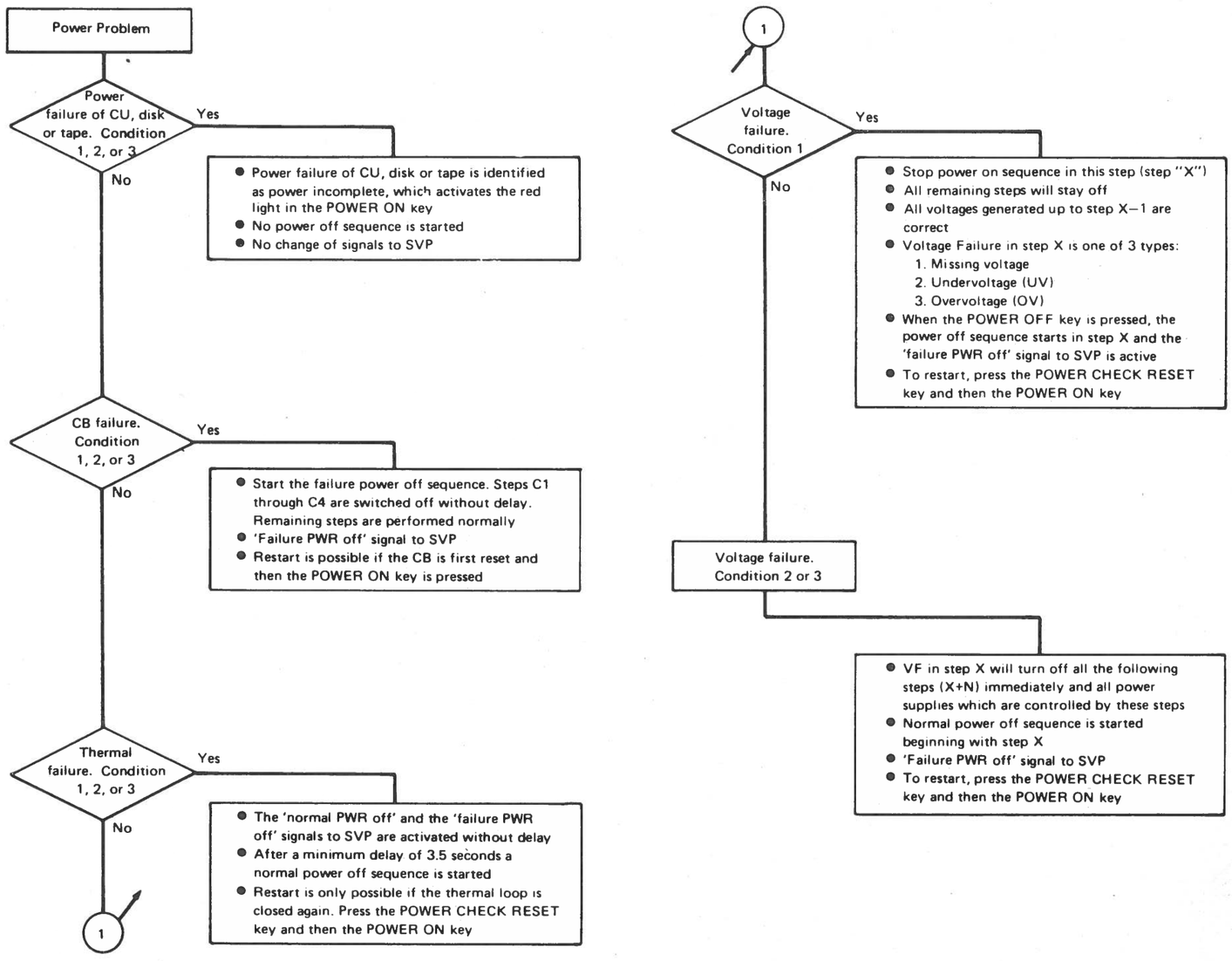
Failure Conditions

- The power control logic may be in one of three conditions. In each condition, a failure can occur:

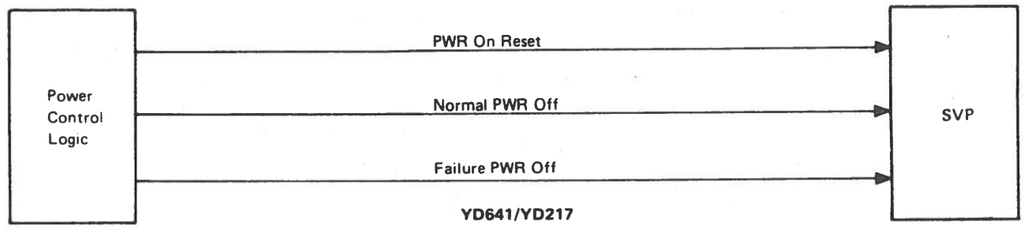
  Condition 1: POWER ON key red indicating 'system power on' and 'control units power complete' or 'system power on' and 'control units power incomplete'

  Condition 2: POWER ON key red indicating 'system power complete' and 'control units power incomplete'

  Condition 3: POWER ON key white indicating 'system power complete' and 'control units power complete'



Power System Signals to SVP



Four logic signals are transmitted by three lines to the SVP. These four signals give the status information of the power system.

1. PWR On Reset (POR)
   - Active after POWER ON key is pressed and Step C5 not complete.
   - POR drops if: a) Power system complete
     b) CB failure detected
     c) Thermal failure detected.
2. Normal PWR Off
   - Active when POWER OFF key is pressed and no failure is detected by the power system.
3. Failure PWR Off
   - Active if a failure is detected by the power control logic, and system power is complete.
   - Active when system power is turned off by the POWER OFF key after a failure condition which previously had stopped the power on sequence.
4. Failure PWR Off and Normal PWR Off
   - Both lines active at the same time indicate that a thermal failure has been detected. After a minimum time of 3.5 seconds the power off sequence is started.

Chapter 6. Maintenance Information

Power System Trouble Shooting

DANGER
Press POWER OFF,
switch off main CB (CB8),
for maintenance on electrical
components (wiring, powers,
etc.).

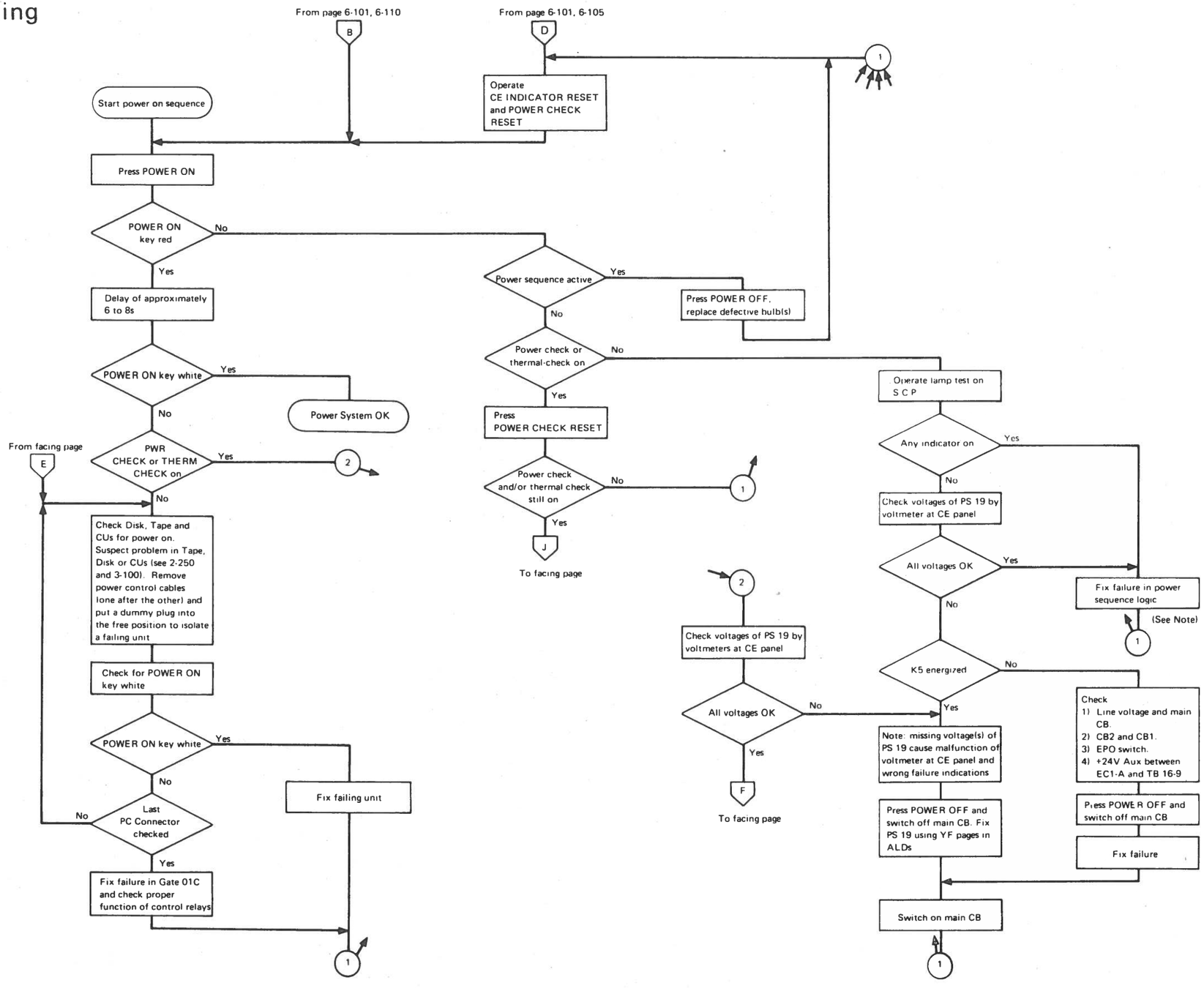
General Note: If no IPI detector is installed the power system is not checked for a missing phase. A missing phase may cause power failures or thermal failures (blowers too slow or not running).
Check ac line as follows:
1. Switch off main CB (CB8).
2. Check for 3 phases of line voltage present at the entry of main CB.

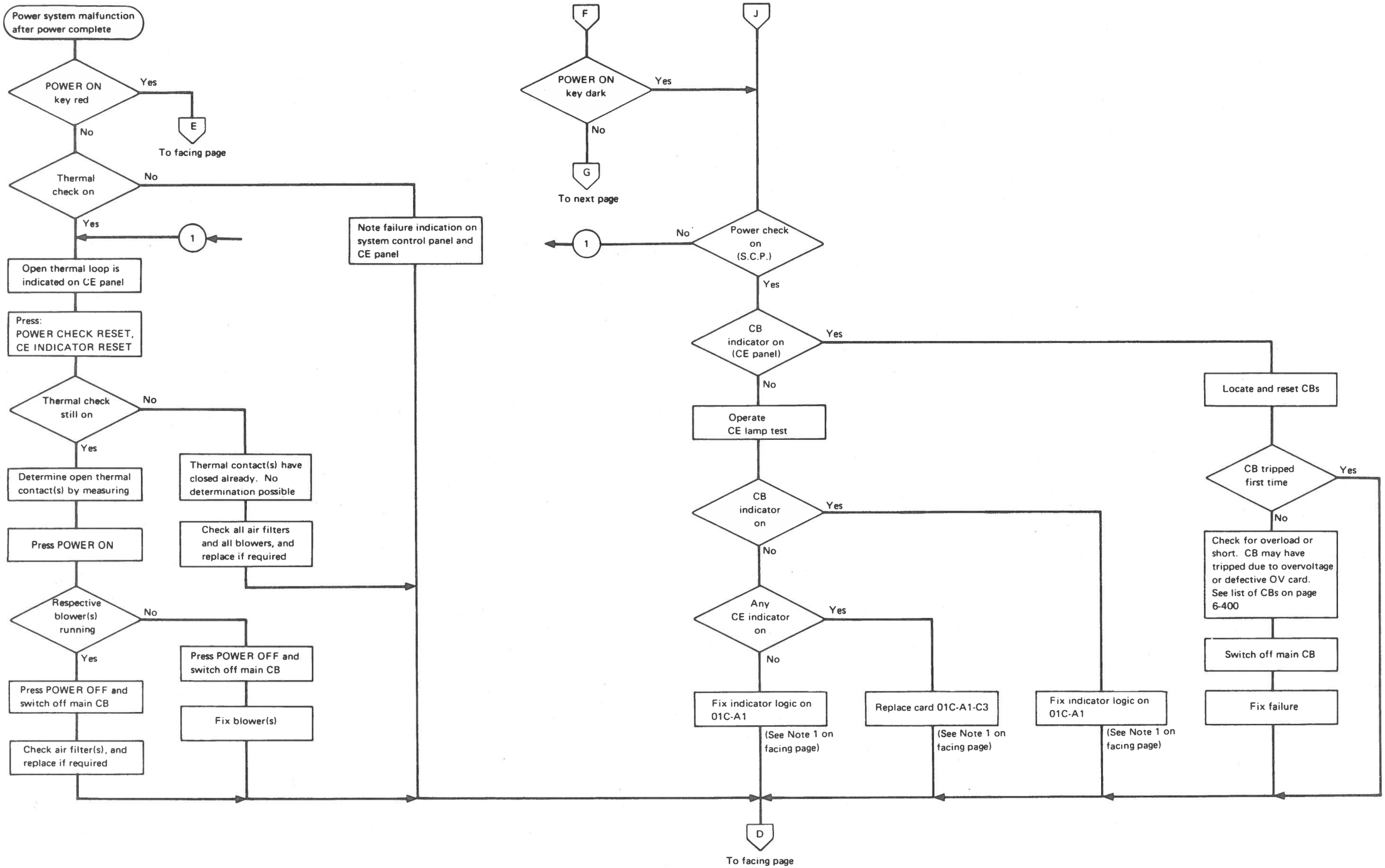
Note: Control voltages on Power Sequence Control Board 01C-A1 are present with power off. For card replacement switch off main CB.

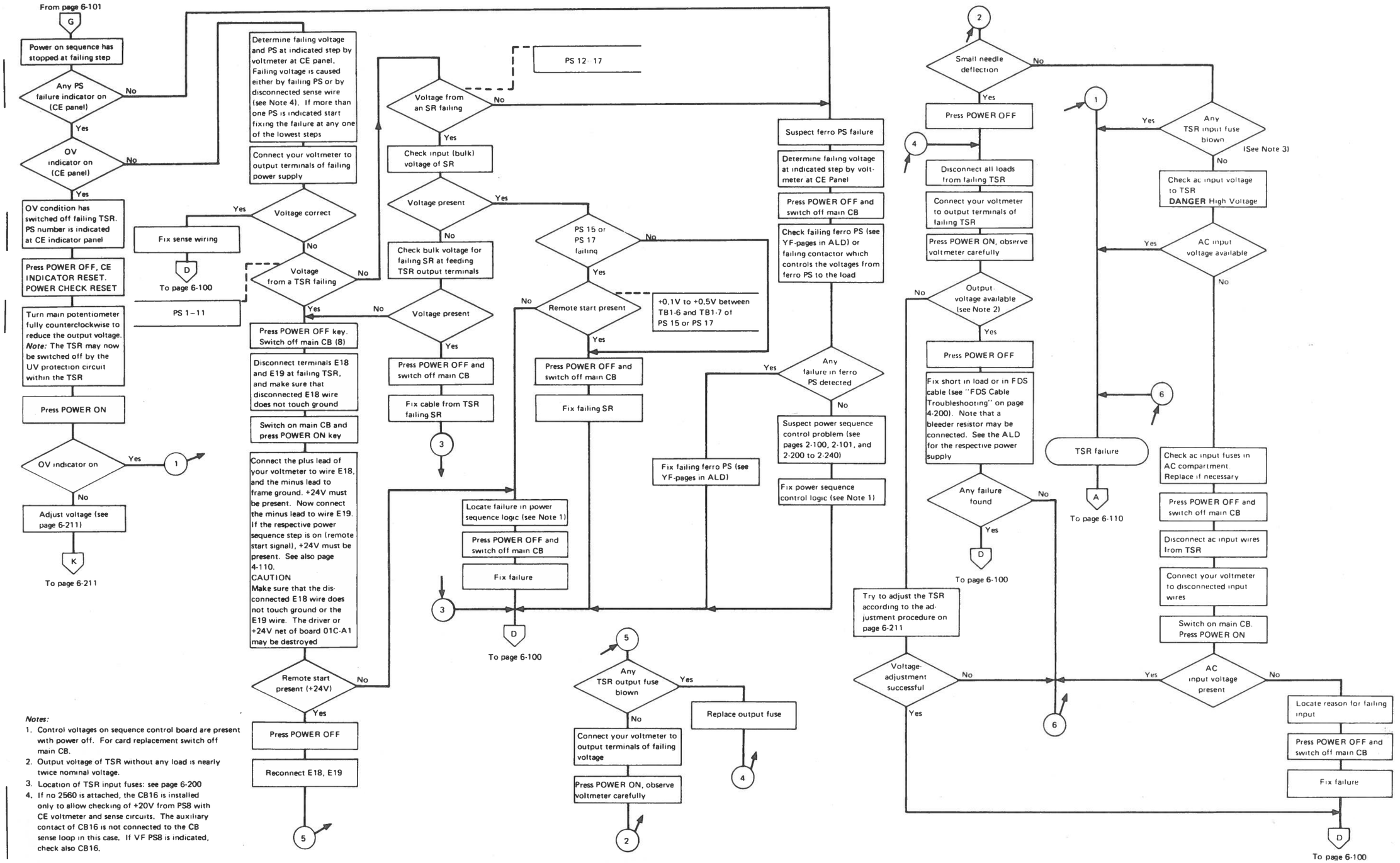
If it is desired to stop the power on sequence at a particular step, plug jumpers as shown.

Jumper Plugging in Position 01C-A1-C03				
Step	From	To	From	To
A2	B07	D08	B04	D08
A3	B03	D08	B04	D08
A4	B08	D08	B04	D08
C1	B02	D08	B04	D08
C2	D06	D08	B04	D08
C4	B09	D08	B04	D08

Pins are shown on ALD page YD641




Power system malfunction after power complete
POWER ON key red
Yes
No
E
To facing page
Thermal check on
No
Yes
1
Note failure indication on system control panel and CE panel
Open thermal loop is indicated on CE panel
Press: POWER CHECK RESET, CE INDICATOR RESET
Thermal check still on
No
Yes
Thermal contact(s) have closed already. No determination possible
Check all air filters and all blowers, and replace if required
Determine open thermal contact(s) by measuring
Press POWER ON
Respective blower(s) running
No
Yes
Press POWER OFF and switch off main CB
Fix blower(s)
Press POWER OFF and switch off main CB
Check air filter(s), and replace if required
From facing page
F
POWER ON key dark
Yes
No
G
To next page
From facing page
J
1
No
Power check on (S.C.P.)
Yes
CB indicator on (CE panel)
Yes
No
Locate and reset CBs
Operate CE lamp test
CB tripped first time
Yes
No
CB indicator on
Yes
No
Check for overload or short. CB may have tripped due to overvoltage or defective OV card. See list of CBs on page 6-400
Any CE indicator on
Yes
No
Switch off main CB
Fix indicator logic on 01C-A1
(See Note 1 on facing page)
Replace card 01C-A1-C3
(See Note 1 on facing page)
Fix indicator logic on 01C-A1
(See Note 1 on facing page)
Fix failure
D
To facing page



Notes:

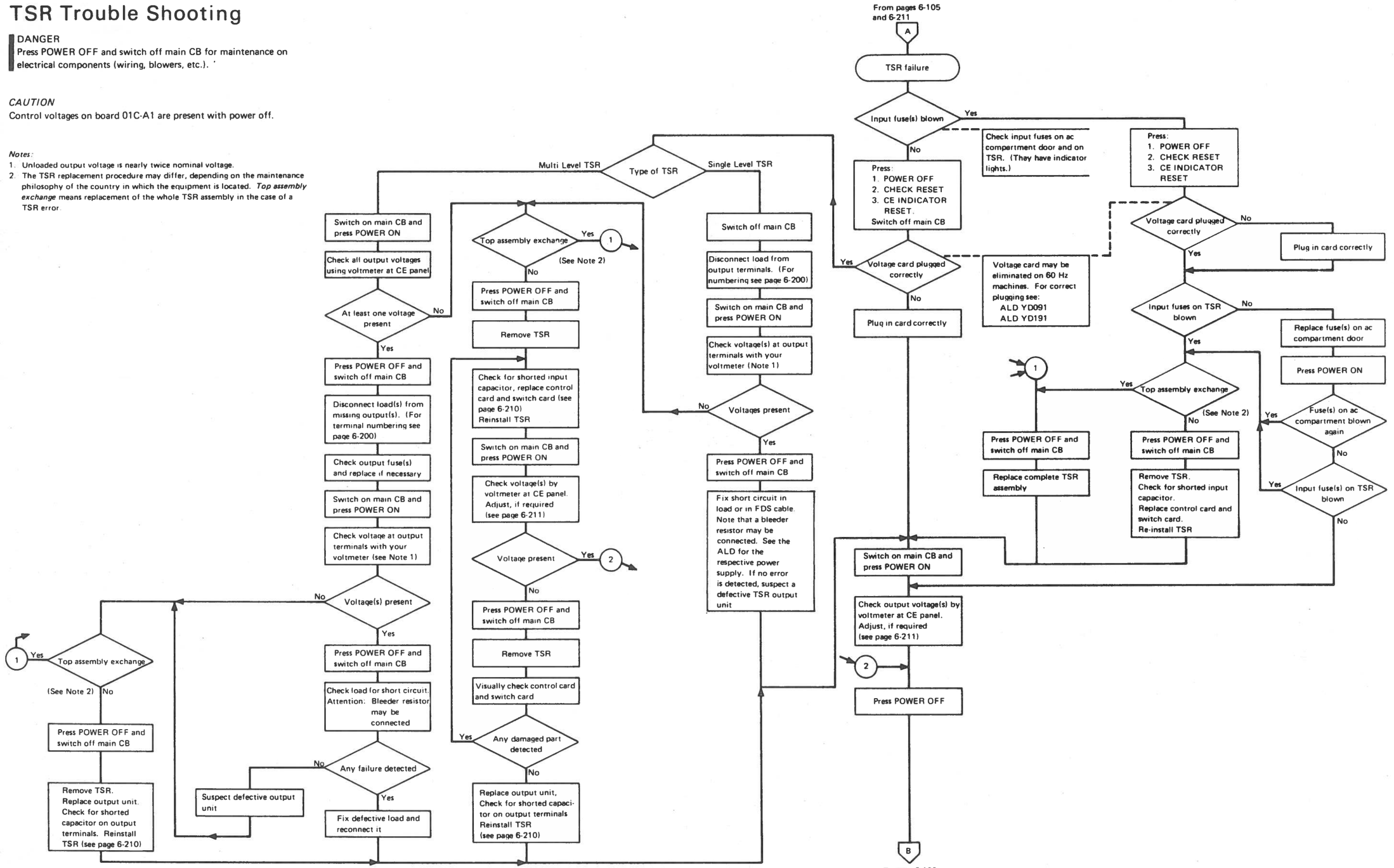
1. Control voltages on sequence control board are present with power off. For card replacement switch off main CB.
2. Output voltage of TSR without any load is nearly twice nominal voltage.
3. Location of TSR input fuses: see page 6-200
4. If no 2560 is attached, the CB16 is installed only to allow checking of +20V from PS8 with CE voltmeter and sense circuits. The auxiliary contact of CB16 is not connected to the CB sense loop in this case. If VF PS8 is indicated, check also CB16.

TSR Trouble Shooting

DANGER
Press POWER OFF and switch off main CB for maintenance on electrical components (wiring, blowers, etc.).

CAUTION
Control voltages on board 01C-A1 are present with power off.

Notes:
1. Unloaded output voltage is nearly twice nominal voltage.
2. The TSR replacement procedure may differ, depending on the maintenance philosophy of the country in which the equipment is located. *Top assembly exchange* means replacement of the whole TSR assembly in the case of a TSR error.



TSR Components

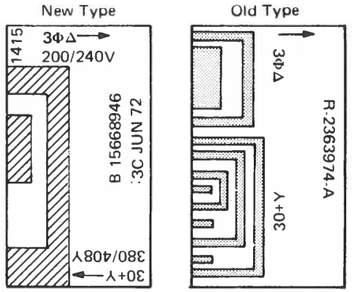
FRU = Field Replaceable Units

- Control card and switch card, must be replaced together
- Output unit (different part no. for each type of TSR)
- Input capacitor
- Output fuse(s)

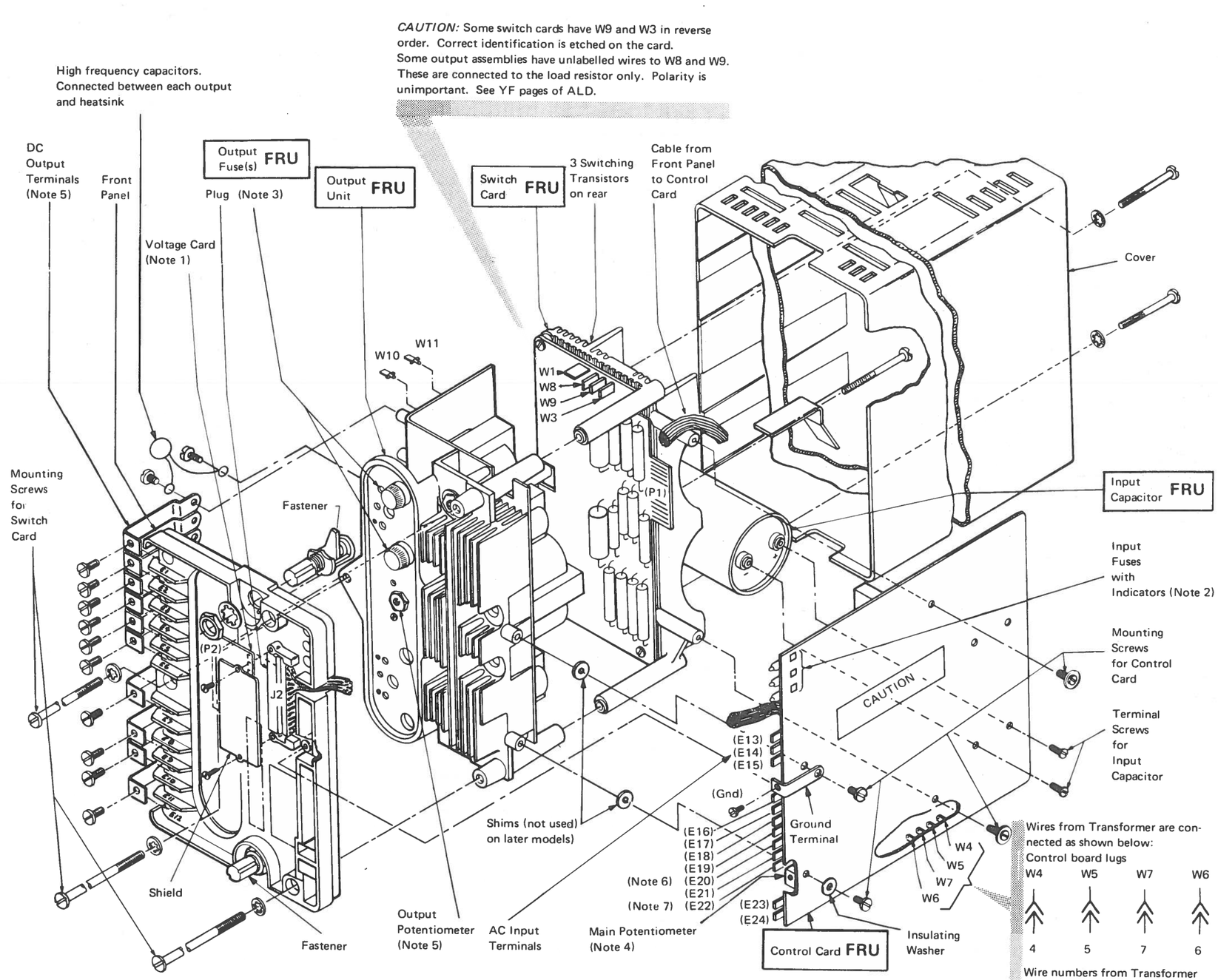
Notes:

1. Voltage card: only on 3 phase TSRs.
   In USA 60 Hz TSRs are available which have no voltage card. Plugging of the voltage card depends on line voltage. Refer to ALD YD091/YD191.
   CAUTION: Two different types of voltage card are available in the field. These cards are *not* interchangeable.
   If there are 5 wires connected to connector J2 the *new* card must be used.
   If there are 15 wires connected to connector J2 the *old* card must be used.

TSR Voltage Card



2. Input fuses: there are additional input fuses with indicators located on the ac compartment door of the 3115 (see pages 2-100 and 2-120).
3. Output fuses: only on TSRs with more than one output.
4. Main potentiometer: varies all output voltages simultaneously.
5. Output potentiometer: maximum two on front of output unit. Some TSRs have additional output potentiometers (rheostats, not shown in the figure). They are located between the output terminals and are multiturn potentiometers.
6. **DANGER**
   AC line voltage on E20.
7. E22 is not used on later models.
   For TSR part numbers see component chart on ALD page YD075/YD175.



TSR Replacement Procedures

DANGER
Voltages in excess of 600V are present within the TSR. Therefore, safety cover of TSR must be in place and TSR must be installed before applying input voltage.
Refer to page 6-200.

1 Replacement of TSR

1.1 Removal

1. Press POWER OFF key and switch off main CB.
2. Disconnect ac input and control input from control card.
3. Disconnect dc output(s) from terminals.
4. Loosen both fasteners, take out TSR.

1.2 Installation

1. Unscrew fasteners to their stops.
2. Install TSR and fasten it.
3. Reconnect input and output wiring.

2 Replacement of Control Card and Switch Card

Under no circumstances are the input fuses on the control card to be replaced.

2.1 Removal

DANGER
Allow at least two minutes after POWER OFF switch has been operated before removing cover from the TSR, (discharge time of input capacitor).

1. Remove TSR.
2. Remove the two cover screws, then the cover.
3. Short the input capacitor to discharge it completely.
4. Remove a) Two terminal screws for input capacitor on control card.
   b) Four mounting screws for control card (observe the different screws).
   Note: Shims may be present between control card assembly and output assembly.
   c) Ground terminal.

CAUTION
5. Before removing the pluggable voltage card make a careful note of the visible inscription in its top-left corner:
   3ΦΔ or 3Φ+Y or 3Φ−Y
   THE CARD MUST BE RETURNED TO THIS SAME POSITION.
   IMPORTANT: Observe the two different Y-plugging possibilities.
   Remove voltage card.

6. Remove upper mounting screw for shield holding the plug on front panel.
7. Loosen lower mounting screw only so that the plug becomes free.
8. Carefully loosen plug between control card and switch card (P1-J1).
9. Remove four slip-on connectors on bottom edge of control card (W4 through W7).
   Note that W6 and W7 are out of sequence (see page 6-200).

Note: Before removal of control card note routing of cable from voltage card to control card for later reinstallation.

10. Carefully remove control card from front panel. *Do not damage* main potentiometer.
11. Remove three mounting screws for switch card.
12. Remove switch card from front panel.
13. Remove four slip-on connectors from switch card (W1, 3, 8, 9).
    Some output assemblies have unlabelled wires connected to W8 and W9. W8 and W9 are connected to a load resistor. The polarity is unimportant. See YF pages in the ALD.
14. Check input capacitor *visually,* and replace if defective.

2.2 Installation

CAUTION
Observe routing of cable string during installation of the control card.

Install control card and switch card in reverse sequence.

Ensure correct polarity of the input capacitor before reconnecting it to the control card. Polarity is indicated on the control card on the land pattern side.

3 Replacement of Output Unit

3.1 Removal

1. Remove TSR (see 1.1).
2. Remove control card and switch card (see 2.1).
3. Remove all output terminal straps and high frequency filter capacitors from the output assembly.
4. Remove output unit from front panel.

3.2 Installation

Install new output unit in reverse sequence.

TSR Voltage Adjustment

From page 6-105

TSR voltage adjustment

K

CAUTION:
Before starting voltage adjustment read carefully the following instructions:

1. Adjustment is required only if voltage(s) measured by voltmeter at CE panel is (are) outside the tolerance(s) shown at switches 100 and 200.
   In this case, adjust voltage(s) as accurately as possible to 0% within ± 2%. Allow 15 minutes warm-up time before performing adjustments and checks.
2. All load(s) must be connected to the output terminals.
3. For adjusting the hollow shaft type rheostat use a special tool or an insulated screwdriver not less than 3/16 in (4,8 mm) wide.
   Reason:
   the adjustment stems are hollow and have a torque screw inside which must not be changed.
4. Clockwise turning of a potentiometer increases voltage.
5. Do not turn main potentiometer fully, otherwise the TSR is switched off by UV/OV protection circuits within the TSR. That means, no output voltage is available.
6. Locations of potentiometers are shown on
   ALD YD015 (50Hz)
   ALD YD115 (60Hz)

Center main potentiometer and all output potentiometers/rheostats if present (see next page)

Connect your voltmeter to prime voltage output terminals or use voltmeter in gate 01C. (See list of prime voltages on next page)

Press POWER ON

OV indicator on — Yes

Press POWER OFF and reset all indicators

Reduce prime voltage: turn main potentiometer 1/8 turn counter-clockwise. (Do not turn fully, otherwise the TSR may not start due to UV/OV protection circuits within the TSR)

No

Output voltage present — No

Press POWER OFF and reset all indicators

Turn main potentiometer 5 to 10 degrees clockwise. Caution: Main potentiometer is very sensitive

Yes

Adjust main potentiometer for specified prime voltage (See table on next page)

OV trips before desired level — No

Yes

Turn all individual output potentiometers counter-clockwise

Reset OV indicator and press POWER ON

Disconnect your voltmeter (if used) Allow 15 minutes warmup time

Check voltage adjustment of prime voltage by using voltmeter in gate 01C and adjust by main potentiometer if necessary

Adjust all remaining output voltages by the individual output potentiometers. (See hints on next page)

All voltages within tolerance — No

Deviate with prime voltage adjustment from zero and try to adjust remaining voltage(s) within tolerance

All voltages within tolerances — Yes

No

TSR failure

A

To page 6-110

Yes

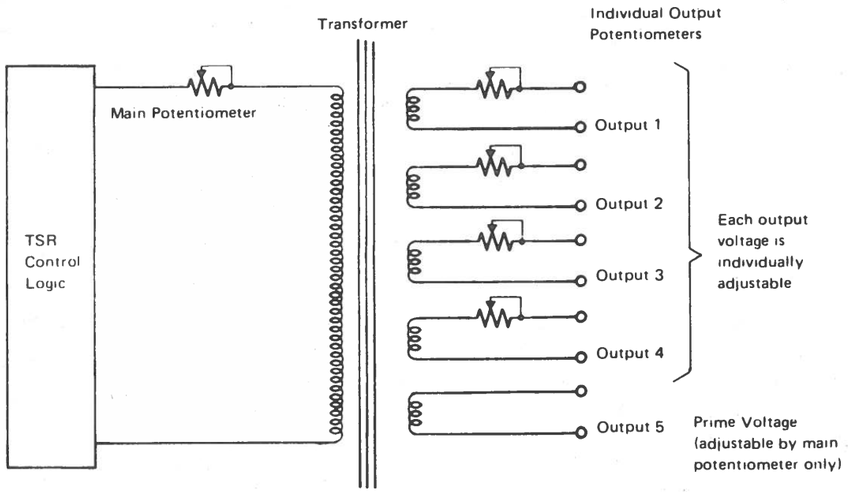
TSR OK

Press POWER OFF

D

To page 6-100

TSR Adjustment Principle



Hints for Voltage Adjustment

1. Main potentiometer will raise or lower all output voltages simultaneously. The voltages are increased when the potentiometer is turned clockwise.
2. The individual output adjustments will raise or lower a specific output voltage.
3. Prime output levels (levels with no output potentiometer/rheostat) can *only* be adjusted by the main potentiometer.
   Therefore, if during adjustment of the main potentiometer an overvoltage condition occurs before the desired voltage is reached, it indicates that one or more of the output potentiometers/rheostats are adjusted too high.
   This can be corrected by turning the output potentiometers/rheostats in a counter-clockwise direction. This should be done in small steps until adjustment of prime voltage is possible.
4. Outputs of TSR(s) feeding an SR have no individual adjustment potentiometer. These output levels are changed simultaneously by the main potentiometer.

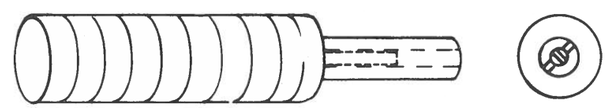
List of TSR Prime Voltages

PS No.	Prime Voltage	Output Terminals
1	+34V	E1 (+), E2 (–)
2, 3, 4, 5, 6	–4.0V	E1 (+), E3 (–)
7, 11	+3.4V	E9 (+), E10 (–)
8	+20V	E4 (+), E6 (–)

Individual Output Potentiometers/Rheostats

There are 2 types of output rheostats:

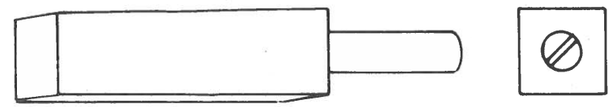
1. Hollow Shaft Type



- contains a torque screw (to be adjusted at the manufacturing plant only)
- stem moves in when turning clockwise
- total travel approximately 20 turns
- turning torque very heavy
- to find the center of the output rheostat, place two marks on the adjustment screwdriver, 1 inch (25 mm) and 2 inches (50 mm) from the tip of the blade. Turn the ¼ inch (6.25 mm) shaft until the 1 inch (25 mm) mark is flush with the supply front panel.

CAUTION
For rheostat adjustment there is a special screwdriver (P/N 2361840) available. Never turn the shaft in a clockwise direction beyond the 2 inch (50 mm) mark on the screwdriver.

2. Solid Shaft Type



- stem does not move in or out when turning
- total travel approx. 50 turns
- turning torque very light
- to find the center, turn carefully to the end of travel and then turn 25 turns back.

Output rheostats located at E8 and E11 of the TSR dc output terminals are multiturn adjustment type.

Output potentiometers R3, R21 and R24 protrude from the power supply. Front plate and are ¾ turn.

All potentiometers and rheostats increase voltage output when turned clockwise.

DC Voltage Distribution Summary

All power supply output voltages shown in the tables in this section in the "Output Voltage" column are measured at the sense points, (if a sense point is available).

The sense points are used by the power control logic for the voltage sense circuits and by the CE voltmeter in gate 01C.

The CE should adjust the power supply output voltage as close as possible to 0% reading at the CE voltmeter.

Bulk voltages and bias voltages used for the series regulators are not shown in this table.

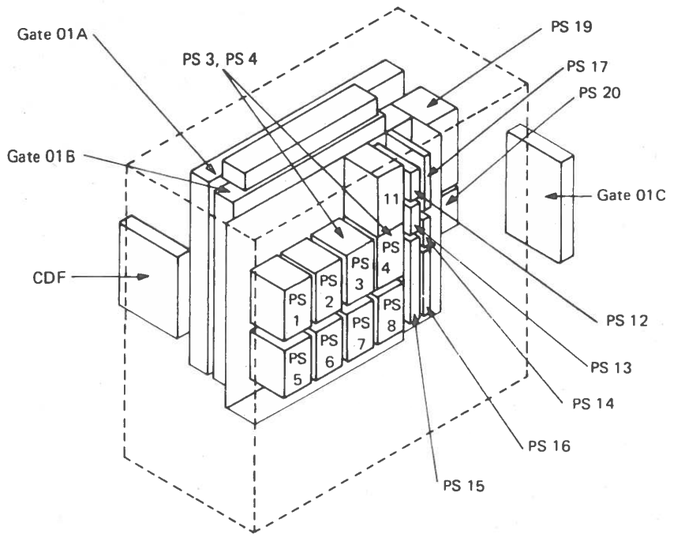
For more detailed information see pages 6-310 through 6-330.

Power Supply No.		1					2	3	4	5	6	7	8	11	12	13	14	15	16	17	19					20			52	Prt PS	5425 PS
Output Voltages		−4	+6	+8	+5	+34	−4	−4	−4	−4	−4	+3.4	+20	+3.4	+3.2	−3.2	−4.17	+8.5	+6.25	+ 8.5	AC 7.25	24	+24	−4	+6	+12	−12	+24	+24	+60	+24
Load	01A-A1		•				•																							
	01A-A2									•		•						•												
	01A-A3		•							•																				
	01A-B1		▲						▲			▲						▲								★	★				
	01A-B2		•								•	•						•								•	•				
	01A-B3								• XOR • See Note			•						•													
	01A-C1		•				•					•						•			•										
	01A-C2		•								•	•	•					•	•		•										
	01A-C3	•	•									•						•								•	•				
	01B-A1		•					•				•						•													
	01B-A2																									▲	▲				
	01B-A3								▲			▲		▲				▲		▲											
	01C-A1																					•	•	•	•						
	CRT		•	•		•																					•				
	CDF	•	•																									•			
	KB				•																										
	5213																•		•										•		
	5203/3203																•		•									•		•	
	2560														•	•			•		•										
	5425										•								•											•	•

Note: Board 01A-B3 is supplied with −4V from PS4 only if MSE is installed.

★ - 3115 only
▲ - 3115-2 only

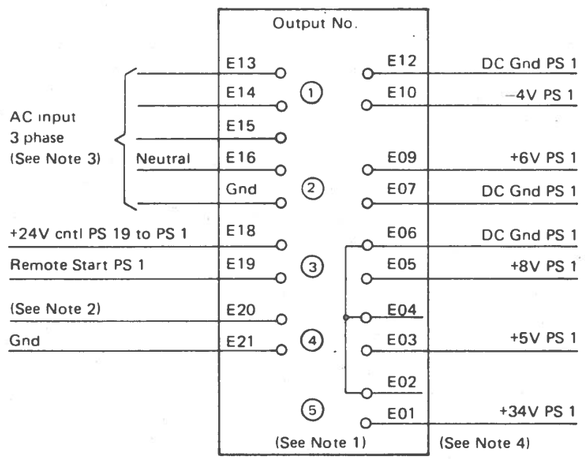
PS 1—11: Locations and Voltage Distribution



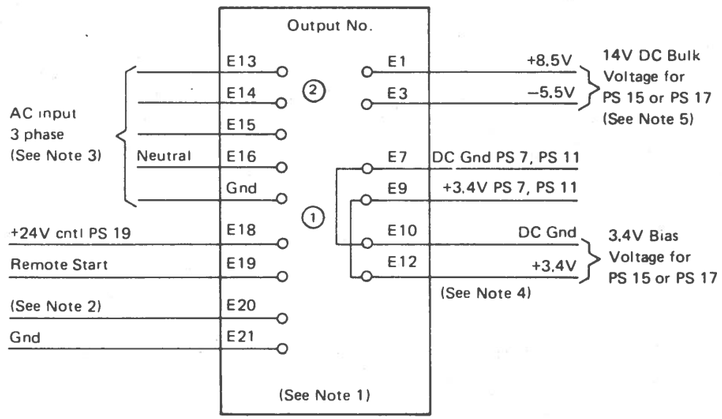
Notes:

1. For physical locations of input and output connections: See page 6-200.
2. **DANGER**
   AC line voltage on E20.
3. The neutral-input (E16) is only used for 50 Hz. For information about Δ/Y plugging of voltage-card at the TSR: see ALD-Page YD091/YD191.
4. Voltages for reference only. For TSR voltage adjustment, see page 6-211. Physical locations of adjustment potentiometers are shown on ALD page YD015.
5. Positive Bulk voltages for SR power supplies generated by TSRs have the negative potential floating.
   Example: Bulk voltage is 14V (+8.5V and −5.5V). Output Voltage of SR power supply is +8.5V.
   The −5.5V nominal voltage from TSR is variable and depends on the load current of the SR power supply.

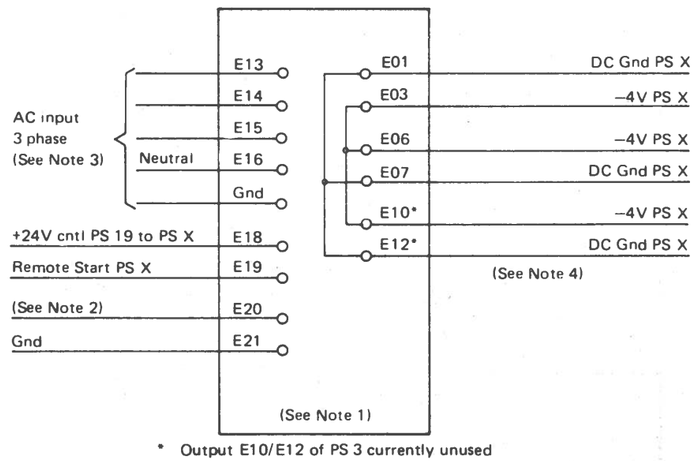
PS 1
Type: TSR
ALD: YD501, YF774



PS 7, 11
Type: TSR
ALD: YD507, YD515, YF773

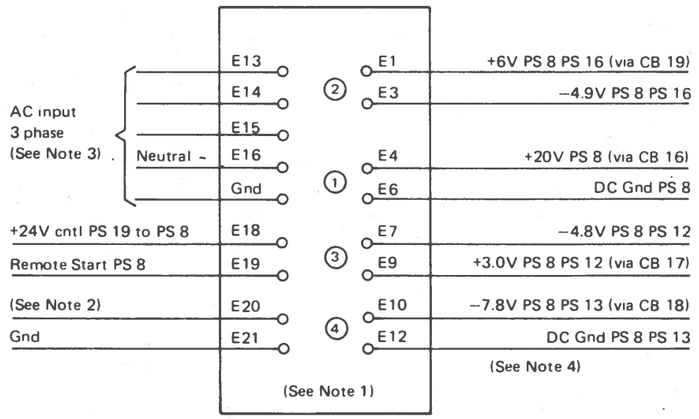


PS 2, 3, 4, 5, 6
Type: TSR
ALD: YD503, 505, 507, YF775



* Output E10/E12 of PS 3 currently unused

PS 8
Type: TSR
ALD: YD511, YF847



Output No. 2: Bulk voltage for PS 16
Output No. 3: Bulk voltage for PS 12
Output No. 4: Bulk voltage for PS 13
(See Note 5)

PS 1–11: Locations and Voltage Distribution (continued)

PS No.	Type	Location	Input Voltage	Output No.	Output Voltage	Current (A) Min	Current (A) Max	Feeds PS No.	Adjustment (See Note 1)	UV Trip Range From	UV Trip Range To	OV Trip Range From	OV Trip Range To	Sense Points Voltage	Sense Points Gnd	Load	Exit on ALD Page	Load Connection Points (See Note 2) Voltage	Load Connection Points (See Note 2) Gnd or Opposite Polarity
1	TSR	3115	AC 3 Ph.	1	–4.0	16.8	35.0	–	B	–3.0	–3.4	–4.5	–4.7	01A-C3 L4B06	GB 24-14	SVP CDF	YD217 YD251	01A-C3 Y4, Z4 TB 22-7	01A-C3 Y3, Y6, Z1, Z3 GB 24
				2	+6.0	15.0	25.0	–	B	+4.6	+5,2	+6.7	+7.2	01A-A3 Q6D02	GB 24-14	DDA, MTA★ MSC ICA, IOP B Printer FE Card I/O FE MPX SVP CRT CDF IOP A, MTA▲ Bleeder R16, R18	YD201 YD205 YD209 YD213 YD215 YD215 YD217 YD251 YD251 YD207 YD501	01A-A1 K5 B11 01A-A3 L5 B11 01A-B2 K2, J2, H2, G2, K4, J4-B11 H4, G4-B11 01A-C1 U2 D09 (for 5203) U2 B11 (for 3203) 01A-C2 T2, U2-B11 (for 2560 only) 01A-C2 B3-B11 01A-C3 L2-B11 TB 22-5 TB 22-6 01A-B1 S2-B11, T2-B11 TB 18-1	01A-A1 Y3, Y6, Z1, Z3 01A-A3 Y3, Z1, Z3 01A-B2 Y3, Z1, Z3 01A-C1 Y3, Y6, Z1, Z3 01A-C2 Y3, Z1, Z3 01A-C2 Y3, Z1, Z3 01A-C3 Y3, Y6, Z1, Z3 GB 24-15 01A-C3 T2 01A-B1 Y3, Z1 TB 18-2
				3	+8.0	0.8	3.0	–	B	+5,5	+6.4	+9.0	+9.8	TB 23-6	GB 24-14	CRT	YD251	TB 23-6	GB 24-15
				4	+5.0	1.0	2.0	–	B	+3.7	+4.2	+5.8	+6.9	TB 23-7	GB 24-14	Keyboard Bleeder R23	YD251 YD501	TB 23-7 TB 18-7	GB 24-5 TB 18-8
				5	+34	0.15	0.75	–	A	+21.5	+26.5	+37.5	+39.0	TB 23-5	GB 24-14	CRT	YD251	TB 23-5	GB 24-15
2	TSR	3115	AC 3 Ph.	1	–4.0	16.8	84.0	–	A	–3.0	–3.5	–4.5	–4.9	01A-C1 L4B06	GB 24-14	Prtr FE, IOP 8 DDA, MTA★	YD213 YD201	01A-C1 Y4, Z4 01A-A1 Y4, Z4	01A-C1 Y3, Y6, Z1, Z3 01A-A1 Y3, Z3, Y6, Z1
3	TSR	3115	AC 3 Ph.	1	–4.0	16.8	84.0	–	A	–3.0	–3.5	–4.5	–4.9	01B-A1 L4B06	GB 24-14	MPX/IOP 9 ••	YD219	01B-A1 Y4, Z4	01B-A1 Y3, Z3
4	TSR	3115	AC 3 Ph.	1	–4.0	16.8	84.0	–	A	–3.0	–3.5	–4.5	–4.9	01A-B3 L4B06★ 01A-B1 L4B06▲	GB 24-14 GB 24-14	MSE (Memory 1) IOP A, MTA▲ MSE (Memory 2)▲ Bleeder R36, R37★	YD211 YD207 YD223 YD505	See ALD page TW051 01A-B1 Y4, Z4 See ALD page TW052 TB19-9	See ALD page TW 051 01A-B1 Y3, Z1 See ALD page TW 052 TB19-10
5	TSR	3115	AC 3 Ph.	1	–4.0	16.8	84.0	–	A	–3.0	–3.5	–4.5	–4.9	01A-A3 L4B06	GB 24-14	MIP, IOP E ★, IPU▲ MSC Storage (See Note 3)	YD203 YD205 YD211	01A-A2 Y4, Z4 01A-A3 Z4 See ALD page TW 051	01A-A2 Y3, Y6, Z1, Z3 01A-A3 Y3, Z1, Z3 See ALD page TW 051
6	TSR	3115	AC 3 Ph.	1	–4.0	16.8	84.0	–	A	–3.0	–3.5	–4.5	–4.9	01A-C2 L4B06	GB 24-14	ICA, IOP B Card I/O FE *or* MPX	YD209 YD215	01A-B2 Y4, Z4 01A-C2 Y4, Z4	01A-B2 Y3, Z1, Z3 01A-C2 Y3, Z1, Z3
										–2.8	–3.4 (for 5425 only)			PS 6-E10	GB 24-14	5425 (MFCU)	YD255	DC 2-A03	DC 2-B01, B04

(See Note 4 on page 6-320)

Notes:

1. A = Voltage is adjusted by the main potentiometer of TSR
   B = Voltage is adjusted by the individual potentiometer in the TSR
   C = Voltage is adjusted by the individual potentiometer in the SR.
   The potentiometer is located on the regulator card of the SR.
2. In these columns Y and Z connectors are shown.
   The pins are connected as shown in the example on page 6-321.
   For wiring refer to the respective ALD page.
3. Board 01A-B3 is supplied with –4V from PS 4 only if MSE is installed. If MSE is not installed, the board 01 A-B3 is supplied with –4V from PS 5.

For physical location of terminal blocks and ground bus, see component charts in ALD

★ = 3115 only
▲ = 3115-2 only
•• If MPX *and* card I/O front end are installed, MPX and IOP 9 are located in board 01B-A1. If MPX is installed *without* card I/O front end, MPX and IOP 9 are located in board 01A-C2.

PS No.	Type	Location	Input Voltage	Output No.	Output Voltage	Current (A) Min	Current (A) Max	Feeds PS No.	Adjustment (See Note 1)	UV Trip Range From	UV Trip Range To	OV Trip Range From	OV Trip Range To	Sense Points Voltage	Sense Points Gnd	Load	Exit on ALD Page	Load Connection Points (See Note 2) Voltage	Load Connection Points (See Note 2) Gnd or Opposite Polarity
7	TSR	3115	AC 3 Ph.	1	+3.4	9.2	46.2		A	+2.5	+2.9	+4.3	+4.5	01A-B3 G2 D03	GB 24-14	MIP ★	YD203	01A-A2 R1-C13, R1-A13 Q1-D13, Q1-B13	01A-A2 Y3, Z1, Z3
																IPU ▲	YD203	01A-A2 Y4, Z4	01A-A2 Y3, Z1, Z3
																ICA, IOP 8	YD209	01A-B2 N4-D03, M4-D03	01A-B2 Y3, Z1, Z3
																Storage (MS)	YD211	01A-B3 D6-B02, D6-C02, S6-C02 G6-C02, G6-D02, S6-D02 P6-C02, P6-B02	01A-B3 Y3, Z1, Z3
																Storage (MSE)	YD211	01A-B3 S6-D02, S6-C05, R6-D02 R6-E04, D6-C02, D6-B05 L6-A02, K6-E05	01A-B3 D6-C05, D6-B02 L6-A05, K6-E02 S6-D05, S6-C02
																MPX, IOP 9**	YD219	01B-A1 M4-D03	01B-A1 Y3, Z1, Z3
																Prtr FE, IOP 8	YD213	01A-C1 L2-D03, H4-D03	01A-C1 Y3, Y6, Z1, Z3
																MPX, IOP 9**	YD215	01A-C2 M4-D03	01A-C2 Y3, Z1, Z3
																SVP	YD217	01A-C3 D3-D12, D2-D03	01A-C3 Y3, Y6, Z1, Z3
																PS 15	YD507	PS 15-TB 1-11	PS 15-TB 1-9
																Bleeder R28, R29 (see Note 3)	YD507	TB 19-1	TB 19-2
																IOP A, MTA ▲	YD207	01A-B1 J4-D03, K4-D03 L4-D03, M4-D03	01A-B1 D6-B02, D6-C05 K6-E02, P6-C05 Y3, Z1
																Memory 2 (MSE)▲	YD223	01B-A3 D6-B05, D6-C02 K6-E05, L6-A02 S6-C05, S6-D03 R6-E04, R6-D02	01B-A3 D6-C05, D6-B02 L6-A05, K6-E02 S6-D05, S6-C02
				2	14	3.5	17.5	–	D	–	–	–	–	–	–	PS 15 Bleeder R30, R31 (see Note 3)	YD507 YD507	PS 15-TB 1-4 PS 15-TB 19-3	PS 15-TB 1-2 PS 15-TB 19-4
8	TSR	3115	AC 3 Ph.	1	+20.0	1.0	2.0	–	A	+14.0	+16.5	+22.5	+26.5	TB 23-8	GB 24-14	2560 (MFCM) Bleeder R19 R20, R27	YD215 YD511	01A-C2 U5-D09 TB 18-3	01A-C2 Y3, Z1, Z3 TB 18-4
				2	+10.9	4.0	20.0	PS 16	D	–	–	–	–	–	–	PS 16 Bleeder R21, R22	YD511 YD511	PS 16-TB 1-4 TB 18-5	PS 16-TB 1-1 TB 18-6
				3	+7.8	1.4	7.0	PS 12	D	–	–	–	–	–	–	PS 12 Bleeder R25	YD511 YD511	PS 12-TB 1-4 TB 18-10	PS 12-TB 1-1 TB 18-9
				4	–7.8	1.4	7.0	PS 13	D	–	–	–	–	–	–	PS 13 Bleeder R24	YD511 YD511	PS 13-TB 1-1 TB 18-12	PS 13-TB 1-4 TB 18-11
11	TSR	3115	AC 3 Ph.	1	+3.4	9.2	46.2		A	+2.5	+2.9	+4.3	4:5	01B-A3 G02 D03	GB 24-14	Memory 2 Ext. (MSE 384K)	YD515	see ALD TW 052	see ALD TW 052
				2	14	3.5	17.5	PS 17	D	–	–	–	–	–	–	PS 17	YD515	PS 17-TB 1-3	PS 17-TB 1-1

Notes:

1. A = Voltage is adjusted by the main potentiometer of TSR.
   B = Voltage is adjusted by the individual potentiometer in the TSR.
   C = Voltage is adjusted by the individual potentiometer in the SR. The potentiometer is located on the regulator card of the SR.
   D = Voltage cannot be adjusted (Bulk voltage for SR power supplies).
2. In these columns Y and Z connectors are shown. The pins are connected as shown in the example on page 6-321. For wiring refer to the respective ALD Page.
3. If board 01B-A3 (Memory 2) is installed, bleeder resistors R28, R29, R30 and R31 are removed.

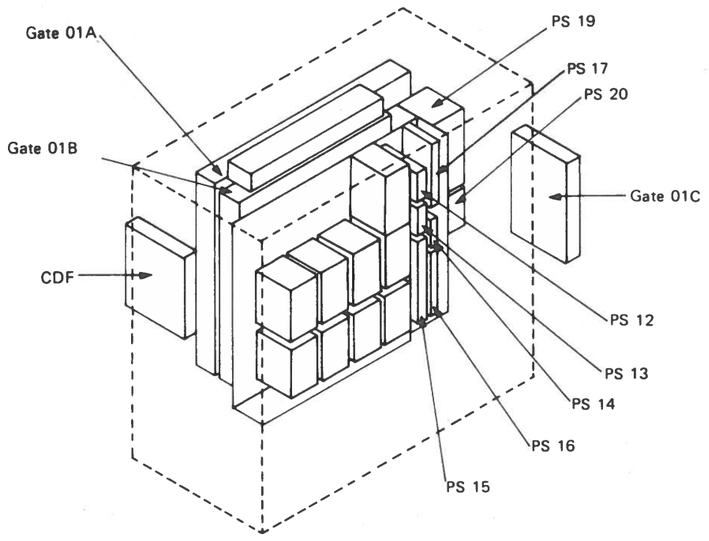
★ = 3115 only

▲ = 3115-2 only

** If MPX *and* card I/O front end are installed, MPX and IOP 9 are located in board 01B-A1. If MPX is installed *without* card I/O front end, the MPX and IOP 9 are located in board 01A-C2.

For physical locations of TBs and Gnd Bus, see component charts in ALD.

PS 12—17: Locations and Voltage Distribution



For physical locations of TBs, see ALD page YD019.

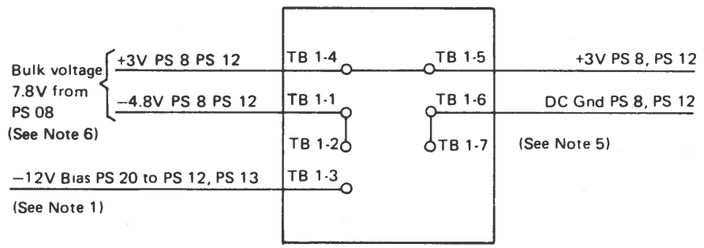
Notes:

1. Bias voltage for PS 12 is referred to TB 1-7.
2. Bias voltage for PS 13 is referred to TB 1-4.
3. OV signal from voltage sense circuit located in gate 01C to OV protection SCR located at the respective TB.
4. If a 5425 is attached, a special UV detection circuit for −4V of PS 6 is installed near PS 16.

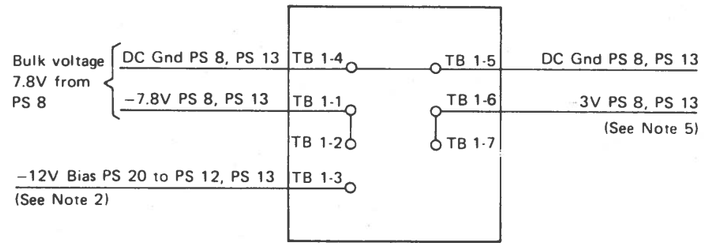
   The UV detection circuit acts as a protection circuit for the 5425 hammer drivers in the case of an uncontrolled power down (EPO or line voltage drop).

   If −4V from PS 6 drops below −3V, the protection circuit will short the output of PS 16. The short circuit of PS 16 output prevents uncontrolled hammer firing in the 5425. The normal power off sequence is not affected by this circuit.
5. The output voltage of each SR power supply can be adjusted by an individual potentiometer which is located on the regulator card of the SR. Adjust to 0% reading at the CE voltmeter.
6. Positive bulk voltages for SR power supplies generated by TSRs have the negative potential floating.
   Example: Bulk voltage is 14V (+8.5V and −5.5V).
   Output voltage of SR power supply is +8.5V.
   The −5.5V nominal voltage from TSR is variable and depends on the load current of the SR power supply.

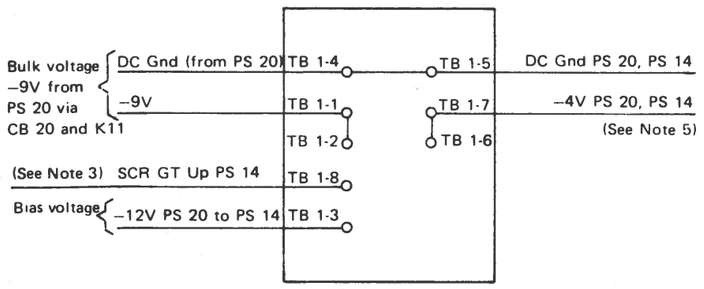
PS 12
Type: SR
ALD: YD513, YF356



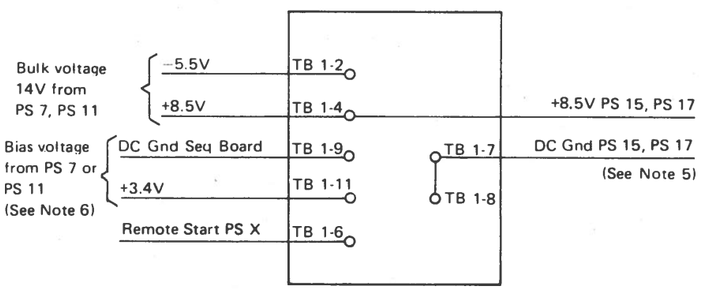
PS 13
Type: SR
ALD: YD513, YF356



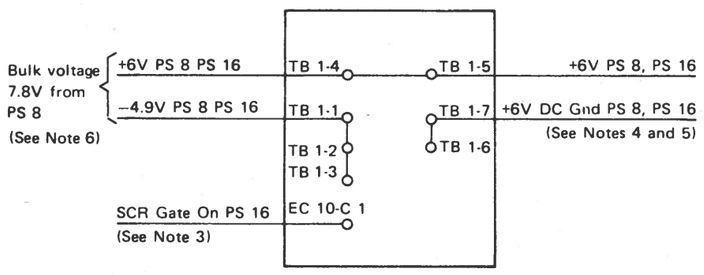
PS 14
Type: SR
ALD: YD525, YF808



PS 15, 17
Type: SR
ALD: YD507, YD515, YF714



PS 16
Type: SR
ALD: YD511, YF354



PS No.	Type	Location	Input Voltage	Output No.	Output Voltage	Current (A) Min	Current (A) Max	Feeds PS No.	Adjustment (See Note 1)	UV Trip Range From	UV Trip Range To	OV Trip Range From	OV Trip Range To	Sense Points Voltage	Sense Points Gnd	Load	Exit on ALD Page	Load Connection Points (See Note 2) Voltage	Load Connection Points (See Note 2) Gnd or Opposite Polarity
12	SR	3115	7.8V dc from PS 08	1	+3.2	0.2	7.0	–	C	+1.8	+2.5	+3.8	+4.2	TB 23-9	GB 24-14	2560 (MFCM)	YD255	DC 3-A03	DC 3-A04
13	SR	3115	7.8V dc from PS 08	1	–3.2	0.2	7.0	–	C	–1.8	–2.5	–3.8	–4.2	TB 23-10	GB 24-14	2560 (MFCM)	YD255	DC 3-B01	DC 3-B02
14	SR	3115	9.0V dc from PS 20	1	–4.17	–	6.0	–	C	–3.0	–3.5	–4.5	–4.9	TB 23-13	GB 24-14	5203/3203 5213	YD259 YD261	DC 1-A03 DC 6-08	DC 1-A04 DC 6-10
15	SR	3115	14V dc from PS 07	1	+8.5	2.0	18.0	–	C	+5.5	+6.4	+9.0	+9.5	01A-B3 G3-D07	GB 24-14	MIP, IOP E ★ IPU▲ MTA, IOP A▲ Memory 2 (MSE)▲ ICA, IOP B Main Storage MPX/IOP 9** Prtr FE, IOP 8 MPX/IOP 9** SVP	YD203 YD203 YD223 YD209 YD211 YD219 YD213 YD215 YD217	01A-A2 R1-D11, R1-B11 01A-A2 S2-D07, S4-J07 01A-B1 J2-J07, K2-J07 L2-J07, M2-J07 01B-A3 G6-C05, G6-D02 P6-B05, P6-C02 01A-B2 N3-D07, M3-D07 N5-D07, M5-D07 See ALD page TW 051 01B-A1 M2-D07 01A-C1 L2-D07, H3-D07 01A-C2 M2-D07 01A-C3 D3-D07, D2-D07	01A-A2 Y3, Y6, Z1, Z3 01A-A2 Y3, Z1, Z3 01A-A2 D6-B02, D6-C05 K6-B02, P6-C05 Y3, Z1 01B-A3 G6-D05, G6-C0 P6-C05, P6-B0 01A-B2 Y3, Z1, Z3 See ALD page TW 051 01B-A1 Y3, Z1, Z3 01A-C1 Y3, Y6, Z1, Z3 01A-C2 Y3, Z1, Z3 01A-C3 Y3, Y6, Z1, Z3
16	SR	3115	10.9V dc from PS 08	1	+6.25	–	24.0	–	C	+4.6	+5.2	+6.7	+7.0	TB 23-12	GB 24-14	5203, 3203 5213 5425 2560 5425 FE	YD259 YD261 YD255 YD255 YD215	DC 1-A02 DC 6-09, 11 DC 2-A02 DC 3-A01 01A-C2 T2-B11, U2-B11	DC 1-A04 DC 6-10, 12 DC 2-B01, B04 DC 3-A02, A04, B02 01A-C2 Y3, Z1, Z3
17	SR	3115	DC from PS 11		+8.5V	2.0	18.0	–	C	+5.5	+6.4	+9.0■	+9.5■	01B-A3 G02-J07	GB 24-14	Memory 2 extension MSE 384K	YD515	see ALD page TW 052	see ALD page TW 052

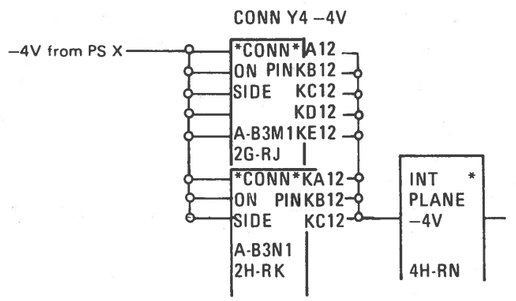
Notes:

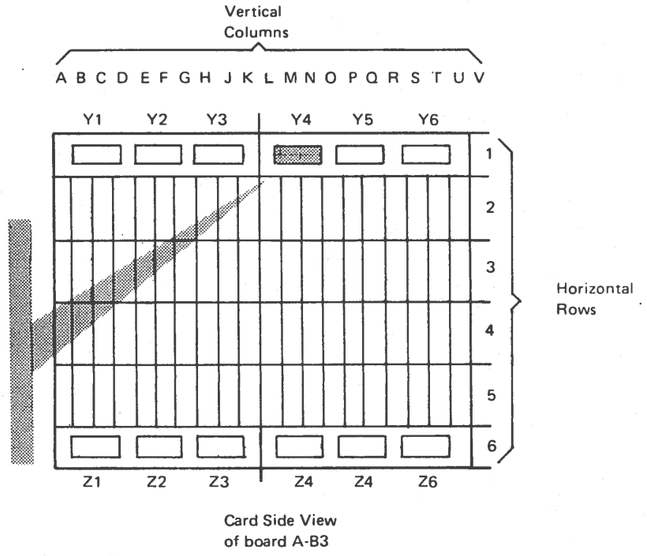
1. C = Voltage is adjusted by the individual potentiometer in the SR. The potentiometer is located on the regulator card of the SR. Adjust to 0% reading on the CE voltmeter.
2. In these columns Y and Z connectors are shown. The pins are connected as shown in the example on the right. For wiring refer to respective ALD Page.

For physical locations of TBs and Gnd Bus, see component charts in ALD.

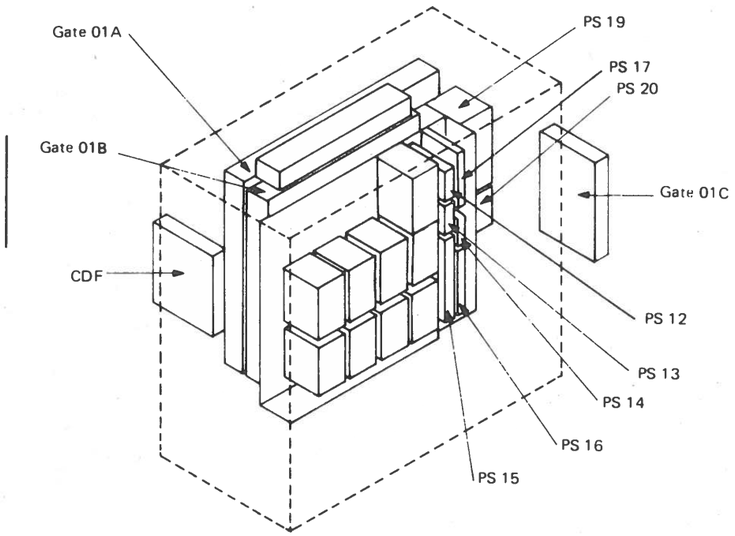
★ = 3115 only
▲ = 3115-2 only
** If MPX *and* card I/O front end are installed, MPX and IOP 9 are located in board 01B-A1. If MPX is installed *without* card I/O front end, MPX and IOP 9 are located in board 01A-C2.
■ Overvoltage sense circuit mounted outside of 01C gate next to power supply or part of power supply.

Example: –4V from PS X to board A-B3.





PS 19–20: Locations and Voltage Distribution



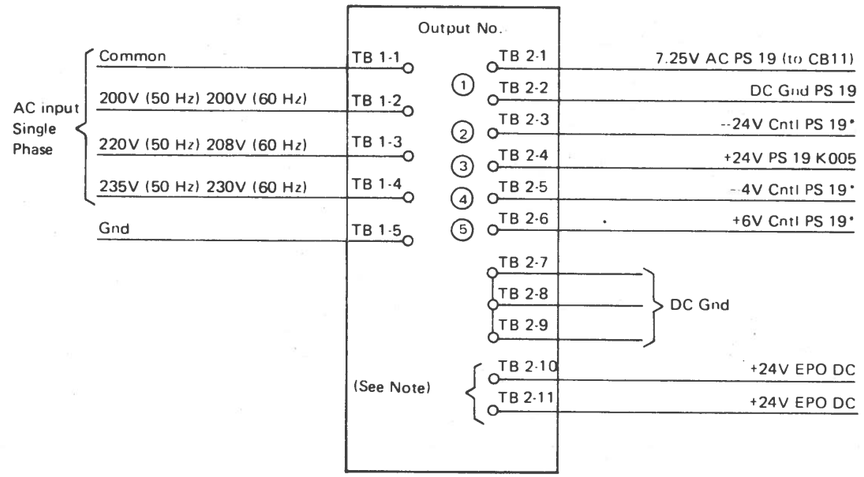
Note: The auxiliary contacts of the CBs, located in PS 19, are connected to TB 2-10 and TB 2-11.

The three CBs of PS 19 control the voltages from PS 19 to gate 01C (for internal wiring of PS 19 see ALD-page YF809 (50 Hz) or page YF810 (60 Hz)).

If one of these CBs opens, the supply to the power control logic in Gate 01C is disconnected and emergency power off occurs.

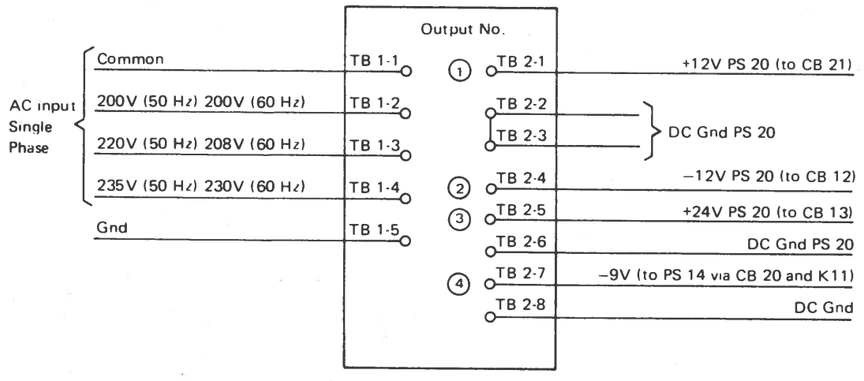
For physical locations of TBs, see ALD YD029/YD129.

PS 19
Type: Ferro
ALD: YD523, YF809/YF810



* These voltages are used in the sequence board 01C-A1. +24V from PS 19 is also used in the sequence board, but this voltage is controlled by K5.

PS 20
Type: Ferro
ALD: YD525, YF806/YF807



PS No.	Type	Location	Input Voltage	Output No.	Output Voltage	Current (A) Min	Current (A) Max	Feeds PS No.	Adjustment (See Note 1)	UV Trip Range From	UV Trip Range To	OV Trip Range From	OV Trip Range To	Sense Points Voltage	Sense Points Gnd	Load	Exit on ALD Page	Load Connection Points (See Note 2) Voltage	Load Connection Points (See Note 2) Gnd or Opposite Polarity
19	Ferro	3115	AC 1 Ph.	1	7.25 ac	–	12.0	–	–	–	–	–	–	–	–	52-3, 32-3 5425 Op Console 2560	YD213 YD215 YD711 YD253	01A-C1 V5 B03 01A-C2 T3 B11, T4 B11 KC 1-BB AC 3-B3	01A-C1 V5 B04 01A-C2 T3 B08, T4 B08 KC 1-DD AC 3-B2
				1	–24	–	0.7	–	–	–	–	–	–	–	–	Pwr-Cntl Log	YD591	01C-A1 F3-E01, F6-E01	01C-A1 F2-E14, F5-E14
				3	+24	–	3.0	–	–	–	–	–	–	–	–	Pwr-Cntl Log	YD591	01C-A1 F3-A01, F6-A01	01C-A1 F2-E14, F5-E14
				4	–4.0	–	0.3	–	–	–	–	–	–	–	–	Pwr-Cntl Log	YD591	01C-A1 A1-B13	01C-A1 F2-E14, F5-E14
				5	+6.0	–	2.0	–	–	–	–	–	–	–	–	Pwr-Cntl Log	YD591	01C-A1 F2-A14, F5-A14	01C-A1 F2-E14, F5-E14
20	Ferro	3115	AC 1 Ph.	1	+12	–	6.5	–	–	+8.4	+10.0	–	–	TB 23-18	GB 24-14	ICA UCM, LAB★ UCM, LAB▲ SVP	YD209 YD207 YD221 YD217	01A-B2 K3-, J3-, H3-, G3-B11 K5-, J5-, H5-, G5-B11 01A-B1 P1-E11, Q1-D11 Q1-C13, R1-B13 01B-A2 P1-E11, Q1-D11 Q1-C13, R1-B13 01A-C3 Q2-B04	01A-B2 Y3, Z1, Z3 01A-B1 R1-A11, R1-E11, R1-D13 Q1-A13, Q1-B11, Q1-E13 01B-A2 R1-A11, R1-E11, R1-D13 Q1-A13, Q1-B11, Q1-E13 01A-C3 Y3, Y6, Z1, Z3
				2	–12	–	3.5	–	–	–8.0	–10.4	–	–	TB 23-30	GB 24-14	ICA UCM, LAB★ UCM, LAB▲ SVP CRT PS 12 PS 13	YD209 YD207 YD221 YD217 YD251 YD521 YD521	01A-B2 K3-, J3-, H3-, G3-B09 01A-B1 R1-C11, S1-A11, S1-A13 01B-A2 R1-C11, S1-A11, S1-A13 01A-C3 Q2-D10 TB 23-19 PS 12-TB 1-3 PS 13-TB 1-3	01A-B2 Y3, Z1, Z3 01A-B1 R1-A11, R1-E11, R1-D13 Q1-B11, Q1-A13, Q1-E13 01B-A2 R1-A11, R1-E11, R1-D13 Q1-B11, Q1-A13, Q1-E13 01A-C3 Y3, Y6, Z1, Z3 GB 24-15 PS 12-TB 1-7 PS 13-TB 1-7
				3	+24	—	8.0	—	—	+15.0	+20.6	—	—	TB 23-04 TB 23-03 (See Note 4) TB 23-02 (See Note 5)	GB 24-14	CDF 5203, 3203 Contactor K3 Power Cntl I/F via K11 Bleeder R32	YD251 YD257 YD525 YD543 YD553	TB 23-4 DC 1-A01 CB 14-2 TB 23-2 TB 19-5	GB 24-49 DC 1-A04, B02 TB 16-12 TB 16-12 TB 19-6
				4	–9	—	6.0	14	—			—	—	—	—	PS 14	YD525	PS 14-TB 1-1	PS 14-TB 1-4

PS 52 and Printer PS: Locations and Voltage Distributions

PS No.	Type	Location	Input Voltage	Output No.	Output Voltage	Current (A) Min	Current (A) Max	Feeds PS No.	Adjustment (See Note 1)	UV Trip Range From	UV Trip Range To	OV Trip Range From	OV Trip Range To	Sense Points Voltage	Sense Points Gnd	Load	Exit on ALD Page	Load Connection Points (See Note 2) Voltage	Load Connection Points (See Note 2) Gnd or Opposite Polarity
52 (Note 3)	Ferro	5213	AC 1 Ph.	1	+24	–	6.0	–	–	–	–	–	–	–	–	5213	YD261	PS 52-TB 1-8	PS 52-TB 1-9
Print PS	Ferro	5203/ 3203	AC 3 Ph.	1	+60	–	36.0	–	–	+39.0	+52.0	–	–	TB 23-1	GB 24-14	5203/3203 5425	YD259 YD255	DC 1-B01 DC 2-A04	DC 1-B02 DC 2-B01, B04

Notes:

1. The output voltages of ferro power supplies are not adjustable.
2. In these columns Y and Z connectors are shown. The pins are connected as shown in the example on page 6-321. For wiring refer to the respective ALD Page.
3. PS 52 is shown on ALD page YF828/YF829.
4. +24V via K10-T1.
5. +24V via K11-T2.

★ = 3115 only
▲= 3115-2 only

For physical locations of TBs, see ALD YD029/YD129

Contactors, Circuit Breakers, Connectors, and Fuses

Contactors

Contactor No.	Coil on ALD Page	Coil on MLM Page	Used for AC/DC	Control Function	Contacts on ALD Page
K1	YD715	2-100E7	ac	AC power to all I/O units	YD311/YD411
K3	YD715	2-100C6	ac	Short of inrush-current limiting resistors for TSRs	YD311/YD411
K4	YD715	2-100D8	ac	AC power to blowers, usemeter transformer TSRs, PS 20 and CDF	YD311/YD411
K5	YD721	2-100D5	ac/dc	EPO control	YD315/YD415
K6	YD715	2-100D8	ac	AC power to blowers, usemeter transformer and CDF in case of 200V ac input volt	YD311/YD411
K10	YD715	2-100E8	dc	+24V dc control of 5425 and +24V from PS 20 to 5203/3203	YD525
K11	YD715	2-100E6	dc	+24V dc from PS 20 to power-control-interface and diff. I/Os and –9V to PS 14	YD525
K12	YD715	2-100D6	ac	7.25V ac from PS 19 to loads	YD523

Physical locations: See ALD YD013/YD113 and YD017/YD117

AC- and PC-Connectors

Connector No.	Shown on ALD Page	Shown on MLM Page	Connector used for
AC2	YD257	2-100A4	3203/5203
AC3	YD253	2-100B4	2560/5425
AC5	YD531	2-100A4	5213
AC10	YD251	2-100D4	CDF
AC11	YD781	2-100D4	Usemeter Power Pack
AC13 (at 5213 Box)	YD531	2-100A5	5213
PC1-PC8	YD273	2-250	Control Units for MPX-Channel
PCD	YD271	2-250	CU for Disk
PCT	YD271	2-250	CU for Tape

Physical locations: See YD013/YD017/YD035
YD113/YD117/YD135
AC connector chart: See ALD YD051/YD151

DC- and KC-Connectors

Connector No.	Shown on ALD Page	Shown on MLM Page	Connector used for
DC1	YD259	2-100A4	5203/3203
DC2	YD255	2-100A4	5425
DC3	YD255	2-100B4	2560
DC4	–	–	Spare
DC5	YD259	NS	5203 Thermo Loop
DC6	YD531	2-100A4	5213
DC8	YD781	NS	Usemeter and CE Key
DC13	YD531	2-100A5	5213
KC1	YD711 YD721	NS	Keyboard connector

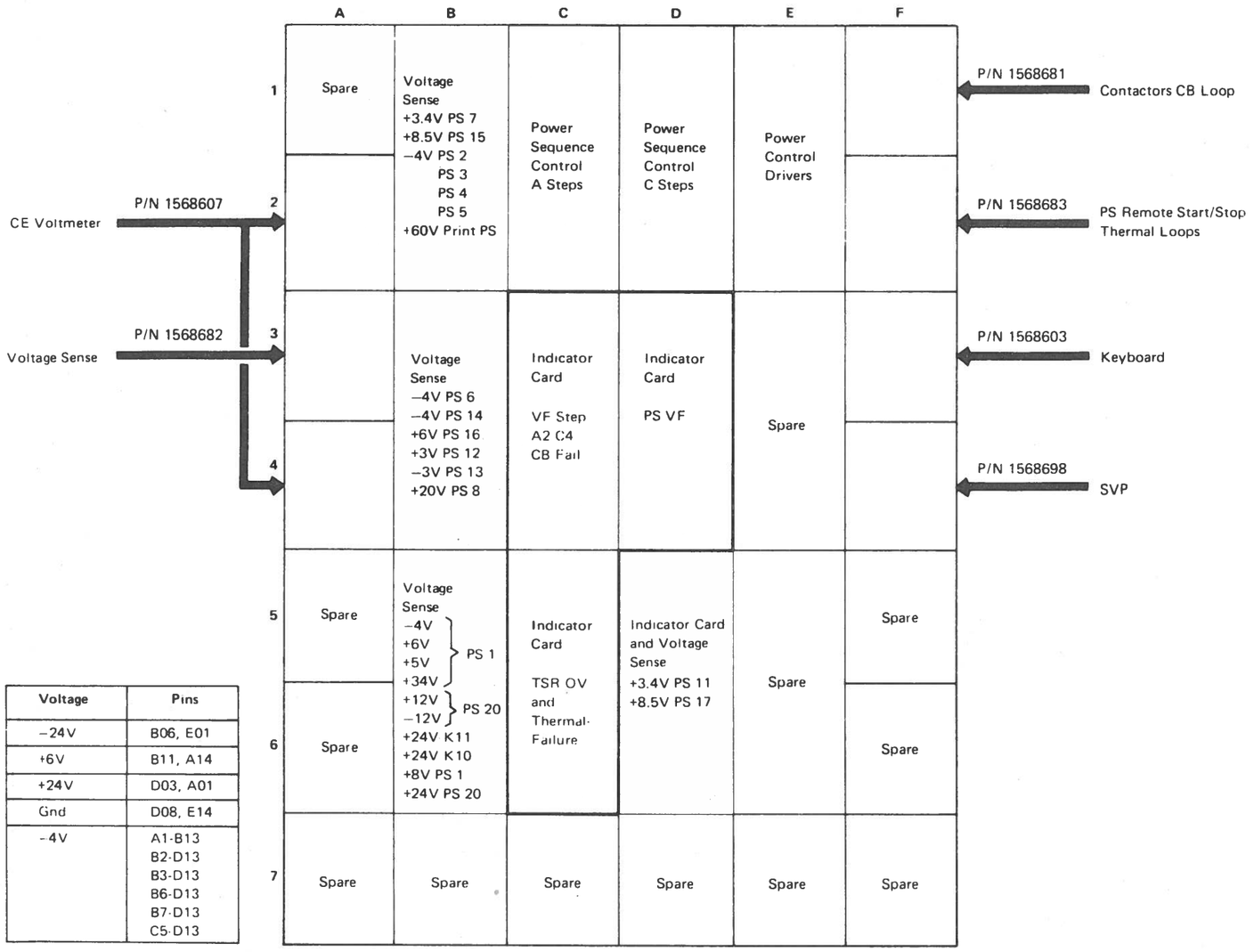
Physical locations: See ALD YD037/YD137
YD013/YD113 for 5213
DC connector chart: See ALD YD055/YD155

Circuit Breakers/Circuit Protectors/Fuses

CB or CP	Shown on ALD Page	Shown on MLM Page	Used for AC/DC	Protection for Circuit
CB1	YD313/411	2-100D4	ac	Blowers, Usemeter, CDF
CP1	YD315/415	2-100E4	ac	EPO
CB2	YD311/411	2-100E3	ac	PS 19, T1, Convenience Outlet
CP2	YD319/419	2-100E4	ac	PS 19
CB3	YD319/411	2-100C4	ac	PS 20
CB4	YD311/411	2-100A4	ac	2560, 3203, 5203, 5213, 5425
CB6	YD311/411	2-100B4	ac	AC to Fuse Bus for TSRs
CB8	YD311/411	2-100A2	ac	Main-line CB
CB11	YD523	2-100E5	ac	7.25V ac to Console, Printer, Card I/O
CB12	YD525	2-100D5	dc	–12V to ICA, UCM, SVP, CRT, PS 12, PS 13
CB13	YD525	2-100C5	dc	+24V to Printer, CDF, Power Control I/F, K3
CP13	YD531	NS	dc	+24V of 5213
CB14	YD525	2-100C6	dc	+24V to K3, Power Control I/F
CB15	–	·	–	Space
CB16	YD511	NS	dc	+20V from PS 8 to Board 01A-C2
CB17	YD511	NS	dc	+3V Bulk voltage from PS 8 to PS 12
CB18	YD511	NS	dc	+7.8V Bulk voltage from PS 8 to PS 13
CB19	YD511	NS	dc	+6V Bulk voltage from PS 8 to PS 16
CB20	YD525	2-100C5	dc	–9V Bulk voltage to PS 14
CB21	YD525	2-100D5	dc	+12V to ICA, UCM, SVP
F1, F2	YD315	2-100/120	ac	AC voltage to Conv. Outlet
F5, F6, F7	YD319	2-100/120	ac	Line voltage to PS 1
F8, F9, F10	YD319	2-100/120	ac	Line voltage to PS 2
F11, F12, F13	YD319	2-100/120	ac	Line voltage to PS 3
F14, F15, F16	YD319	2-100/120	ac	Line voltage to PS 4
F20, F21, F22	YD319	2-100/120	ac	Line voltage to PS 5
F23, F24, F25	YD319	2-100/120	ac	Line voltage to PS 6
F26, F27, F28	YD319	2-100/120	ac	Line voltage to PS 7
F40, F41, F42	YD319	2-100/120	ac	Line voltage to PS 8
F43, F44, F45	YD319	2-100	ac	Line voltage to PS 11
F113, F213	YD531	NS	ac	220V ac to 5213

Physical locations: See ALD YD013/YD113 for AC-CBs
YD017/YD117 for DC-CBs

Power Sequence Control Board 01C-A1

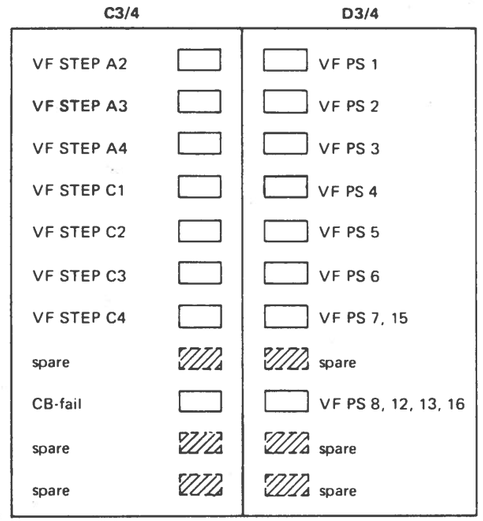


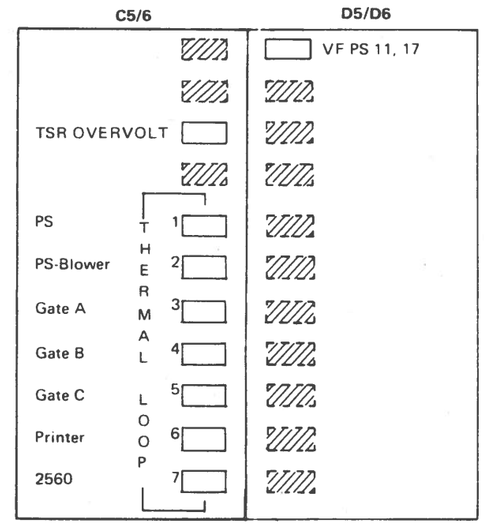
Voltage	Pins
−24V	B06, E01
+6V	B11, A14
+24V	D03, A01
Gnd	D08, E14
-4V	A1-B13 B2-D13 B3-D13 B6-D13 B7-D13 C5-D13

CAUTION: Voltages are also present when system power off.

For socket listing: see ALD A1311

Indicators





▨ - Unused indicator position

Power Control Voltages from PS19 to Board 01C-A1

Power Control Voltages from PS 19 to Board 01C-A1 (see ALD YD591)

CAUTION: Voltages are also present when system power off.

Voltage	Input pins to board 01C-A1	Pins connected to voltage net	Output pins of board 01C-A1	Output voltage used for:
−24V	F6-E01, F3-E01	Every B06 pin	A2-B06	CE meter
+6V	F2-A14, F5-A14	Every B11 pin	F3-B11 F1-B11 A2-B11	Console panel CE indicator lights CE meter
−4V	A1-B13	B2, B3, B6, B7, C5-D13	A2-D06	CE meter
+24V	F3-A01, F6-A01	Every D03 pin	A2-D03 F2-D02 F2-D03 F2-D04 F2-D05 F3-D02	CE meter Rem. start PS1 and PS6 Rem. start PS6 and PS7 Rem. start PS2 and PS8 Rem. start PS3 and PS4 Console panel
DC-Gnd	F2-E14, F5-E14	Every D08 pin	A2-D08, A4-D08 F1-D08 F2-D06 F2-D07 F2-D08 F3-D07	CE meter CE indicator lights TH loop 1 and 2 PS15 bias TH loop 5 Console panel

Chapter 7. Reference Information

Abbreviations

A

ac	alternating current
ALD	automated logic diagram

C

CB	circuit-breaker
cd	card
CDF	console disk file
chnl	channel
CE	customer engineer
cntrl	control
compl	complete
conv outl	convenience outlet
CP	circuit protector
cpltd	completed
CPU	central processing unit
CRT	cathode ray tube (screen)
CU	control unit

D

dc	direct current
DDA	direct disk attachment

E

EC	edge connector
EC	engineering change
EPO	emergency power off

F

F	ferroresonant transformer power supply
FDS	flexible distribution system
FE	front end
feat	feature
ferro	ferroresonant transformer
FF	flip-flop
FL	flip latch
FRU	field replaceable unit

G

G.F.C.S.	gated forward count signal
gnd	ground
G.R.C.S.	gated reverse count signal

H

Hz	hertz

I

ICA	integrated communications adapter
ind	indicator
interf	interface
IOP	input/output processor
I/O	input/output
IPI	input power interrupt
IPU	instruction processing unit

K

K	contactor
KB	keyboard
KC	keyboard connector

L

LAB	line adapter base
LED	light emitting diode
loc	location

M

MFCM	multifunction card machine (2560)
MFCU	multifunction card unit (5425)
MIP	machine instruction processor
MPX	multiplexer channel
MS	main storage
MSC	main storage controller
MSE	main storage (enhanced)
MTA	magnetic tape adapter

N

NS	not shown

O

osc	oscillator
OV	overvoltage

P

PCB	power control box
PCD	power control connector for disk
PCT	power control connector for tape
ph	phase
PLD	power line disturbance
PLT	power line transients
POR	power on reset
prtr	printer
PS	power supply
pwr	power

R

R	resistor
RC	regulator card
rect asm	rectifier assembly
RPQ	request for price quotation
RR	reed relay
RSS	remote start stop
RY	relay

S

SCP	system control panel
SC	sequence connector
SCRGT	silicon-controlled rectifier gate
seq	sequence
SLD	solid logic dense
SPEC	special circuits
SR	series regulator
SS	singleshot
SVP	service processor
sw	switch

T

T	transformer
TB	terminal block
TD	time delay
TDC	time delay counter
TF	thermal failure
th	thermal, thermo
therm	thermal
TSR	transistor switching regulator

U

UCM	under-cover modem
UV	undervoltage
UVF	undervoltage failure

V

V	volt
VF	voltage failure
volt	voltage

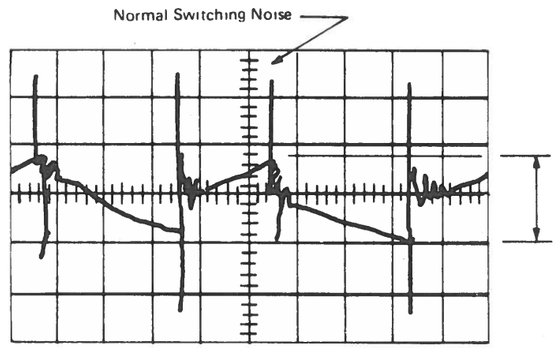
Appendix A

Service Procedures

The procedures on this page must be followed, to prevent component damage.

1. When machine power is off, control voltages from PS19 are present at gate 01C and at the system control panel. To remove the control voltages, switch off the main circuit breaker (CB8).
2. Before removing a TSR, always switch off the main circuit breaker (CB8).
   Reasons
   a. Safety.
   b. To remove +24V from TSR terminal E18. If the E18 wire touches frame ground when +24V is present, the +24V net of power control board 01C-A1 will be damaged. See also page 4-110.
3. Check that the TSR voltage selection card (200/240V or 380/408V) is plugged correctly. (This card may not be installed on 60-Hz TSRs.)
   Reason: If the voltage selection card is plugged incorrectly, the TSR may be damaged.
4. Do not switch off the machine by switching off the main circuit breaker (CB8) or the customer's wall CB.
   Reason: TSRs without EC 740200 and without EC 740205 may be damaged.
5. Never remove the –4V supply to the 5425 when +60V is present.
   Reason: The 5425's print hammer fuses will blow or the driver circuits may be damaged.
6. Never remove the –4V from PS14 or +6V from PS16 to 5213 when PS52 (printer power supply) is on.
   Reason: The 5213's magnet driver resistors will overheat.
7. Never remove the +8V or +34V from PS1 to the CRT individually; always disconnect both at the same time.
   Reason: Disconnecting the +8V or +34V individually may damage the analog card in the CRT unit.
8. Do not use a rubber band to hold the spring-loaded voltmeter switch lever in gate 01C at the right or left position.
   Reason: The meter may be damaged or made less accurate.
9. Procedure for distinguishing between a faulty TSR and a shorted load circuit:
   a. Connect your CE voltmeter to the TSR's output terminals.
   b. Bring power up and watch the voltmeter. If there is a small needle deflection, there may be an overcurrent condition, indicating a shorted load circuit. If there is no needle deflection, the TSR has no remote start signal or is defective. See also the flowchart on page 6-105.
   c. If there was a small needle deflection in step b, disconnect the load circuit from the TSR's output terminals. When the defective load circuit is disconnected, the TSR's output voltage will be about twice the nominal voltage. See also the flowchart on page 6-105.
10. If you suspect noise problems, check all ground connections as described under "Check Ground Connections" in Chapter 9 of *IBM 3115 Processing Unit, Installation Manual,* Parts 1 896 850 through 1 896 875.

    The following figure shows a typical output waveform for TSR4, measured at the TSR's output terminals. Switching noise can only be measured directly at the TSR's output terminals, and is not included in the maximum ripple limit of 3% of nominal voltage. Switching noise should not be present at the logic boards.



Input Power Interrupt Detector (Optional Feature)

Note: The principle of the input power interrupt (IPI) detector is shown only on this page. There are no references to the IPI detector in other parts of the MLM.

To prevent malfunction of the system if the line input voltage drops, machines may be equipped with an input power interrupt (IPI) detector, which is located to the left of Gate 01C over PS 14.

The IPI detector checks the ac input voltage to the TSRs. If the voltage drops below 174 volts for more than 18 ms the signal 'line fault from IPI' is generated.

The signal 'line fault from IPI' is not generated if the sensed voltage falls below 190 volts for less than 13 ms (see the waveform on this page).

The voltage of the three phases is sensed by the sense circuits of the IPI detector.

The signal 'line fault from IPI' forces the 'initial reset' signal which resets all latches in the power sequence control logic within 2 ms.

If the latches in the power sequence control logic are reset, the 'remote start' signal is removed from the TSRs and all contactors which are controlled by the power sequence logic are dropped.

The signal 'line fault from IPI' is not latched and is automatically reset within 50 ms (minimum) to 100 ms (maximum) after the error condition has disappeared.

The sense input of the IPI detector is controlled by an external inhibit signal. The 'inhibit IPI step A2' signal becomes inactive when power sequence step A2 becomes active.

This inhibit signal is necessary to avoid the signal 'line fault from IPI' until the line voltage is applied to the TSRs in step A2.

An LED indicator on the IPI detector is set on when a 'line fault' signal is generated.

The CE can reset the indicator by an INDICATOR RESET switch which is located on the lower part of the IPI detector.

The LED indicator on the IPI detector is valid only if:

1. The power line disturbance did not exceed 150 ms.
2. The inhibit signal is correct.
3. The customer did not operate the main line switch after the ac line failure.

The IPI detector is not field adjustable. The complete IPI detector box must be exchanged if an IPI detector fault is suspected.

IPI Detector Quick Test

A quick test for correct operation of the IPI detector is described below:

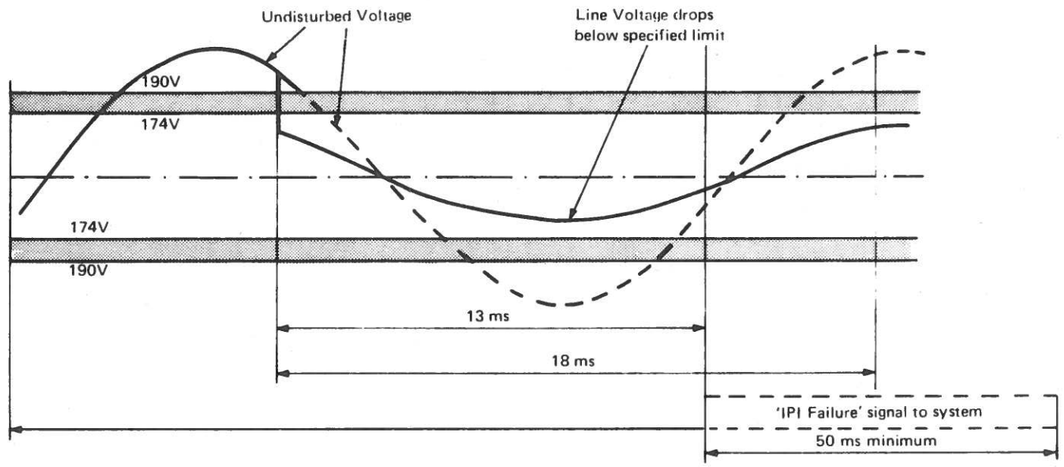
With system power on, remove any one of fuses F5, F6, or F7. As a result, the system will immediately power down and the IPI detector will be on.

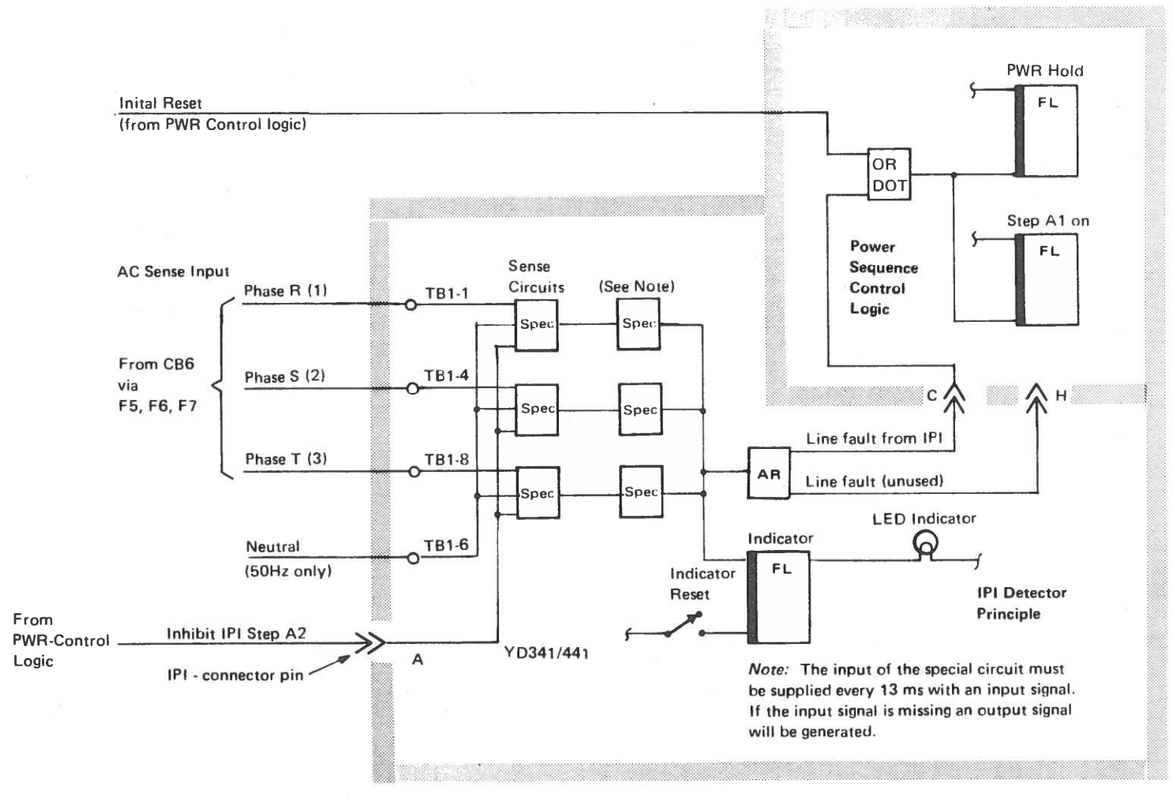
Operate the INDICATOR RESET switch to reset the IPI indicator and press the POWER ON key.

The power on sequence will start up to step A2. During step A2 the 'inhibit IPI step A2' is removed and the sense circuits will detect the missing phase. The system will be powered down, without the power off sequence, by the IPI detector signal 'line fault from IPI'. The IPI indicator will be set to on. Reset the indicator and reinsert the fuse.

If a failure is suspected in the IPI detector, the IPI connector may be removed. The system will then operate without the IPI facility.

The IPI detector is supplied with +24V from PS19.





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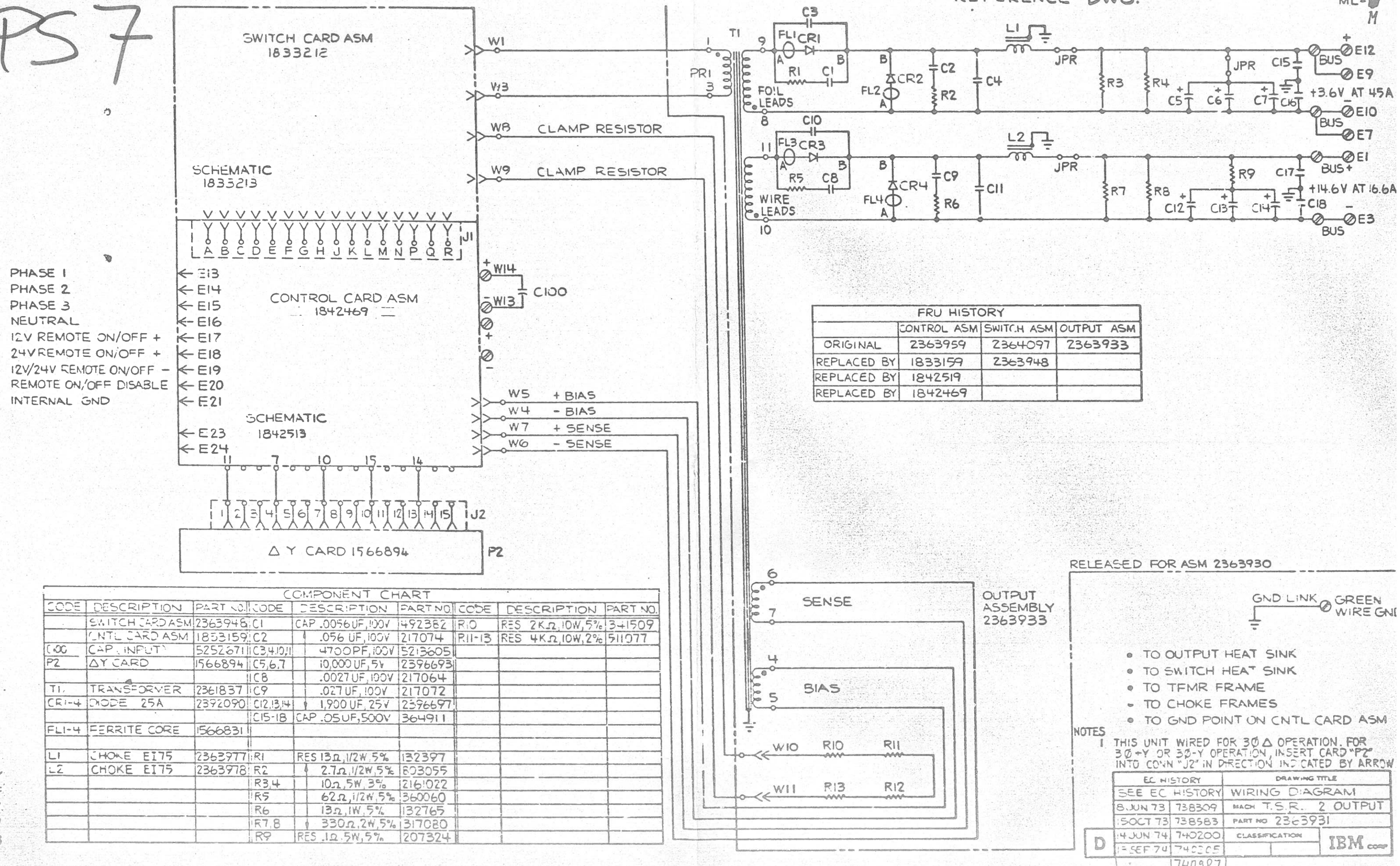
PS7

TRANSISTOR SWITCHING REGULATOR

REFERENCE DWG.

MASTER

YF773
ML=M



FRU HISTORY			
	CONTROL ASM	SWITCH ASM	OUTPUT ASM
ORIGINAL	2363959	2364097	2363933
REPLACED BY	1833159	2363948	
REPLACED BY	1842519		
REPLACED BY	1842469		

COMPONENT CHART								
CODE	DESCRIPTION	PART NO.	CODE	DESCRIPTION	PART NO	CODE	DESCRIPTION	PART NO.
	SWITCH CARD ASM	2363948	C1	CAP .0056UF,100V	492382	R10	RES 2KΩ,10W,5%	341509
	CNTL CARD ASM	1833159	C2	.056 UF,100V	217074	R11-13	RES 4KΩ,10W,2%	511077
C100	CAP, INPUT	5252671	C3,4,10,11	4700PF,100V	5213605			
P2	ΔY CARD	1566894	C5,6,7	10,000 UF,5V	2396693			
			C8	.0027 UF,100V	217064			
T1	TRANSFORVER	2361837	C9	.027 UF,100V	217072			
CR1-4	DIODE 25A	2392090	C12,13,14	1,900 UF,25V	2396697			
			C15-18	CAP .05UF,500V	364911			
FL1-4	FERRITE CORE	1566831						
L1	CHOKE EI75	2363977	R1	RES 13Ω,1/2W,5%	132397			
L2	CHOKE EI75	2363978	R2	2.7Ω,1/2W,5%	803055			
			R3,4	10Ω,5W,3%	216022			
			R5	62Ω,1/2W,5%	360060			
			R6	13Ω,1W,5%	132765			
			R7,8	330Ω,2W,5%	317080			
			R9	RES .1Ω,5W,5%	207324			

RELEASED FOR ASM 2363930

GND LINK — GREEN WIRE GND

- TO OUTPUT HEAT SINK
- TO SWITCH HEAT SINK
- TO TFMR FRAME
- TO CHOKE FRAMES
- TO GND POINT ON CNTL CARD ASM

NOTES
1. THIS UNIT WIRED FOR 3Ø Δ OPERATION. FOR 3Ø-Y OR 3Ø-Y OPERATION, INSERT CARD "P2" INTO CONN "J2" IN DIRECTION INDICATED BY ARROW

EC HISTORY		DRAWING TITLE
SEE EC HISTORY		WIRING DIAGRAM
8 JUN 73	738309	MACH T.S.R. 2 OUTPUT
5 OCT 73	738583	PART NO 2363931
14 JUN 74	740200	CLASSIFICATION
13 SEP 74	740905	
	1740987	

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