Altair 8800i Computer

Schematic

Contents

NOTES

- IC locations are identified by a label of the form:
  U<board><alpha>

  <board> = two characters
  FP = Front Panel
  FN = Front Panel Interface

- The symbol —■— represents a connector pin. The solid black end is the male side, the white-filled end is the female side.
  Connector pins are identified by a label of the form:
  N <connector> . <pin>

- A small black marker on the upper half of a gate symbol indicates an open-collector output.

- 2023 Mar: This drawing / bhilpert.

RATIONAL

This document describes improvements made to an Altair 8800 computer. These improvements were performed in 2023-4 in the course of restoration of an 8800 received in poor condition. In making the improvements an attempt has been made to avoid anachronisms, that is, these improvements could have been made in the mid-late-1970s period of the Altair.

The improvements are:

- Beefed-up power supply.
  - The power supply current abilities are increased.
  - The two +5 sources are integrated into one.
  - The three step-down transformers are replaced by two. The rectifier and filters circuits are consequently also simplified.
  - The power supply location is moved to the right-side of the cabinet for cleaner organisation and access. The power supply is a removable module rather then being integrated into the cabinet.
  - There is space and provision for a small third transformer to be added acting as an auto-transformer on the line/primary side. This can be used to buck the line voltage down in circumstances of higher line voltage and/or light loading on the S100 bus to reduce power dissipation in the on-board regulators. This bucking can be applied to either or both of the step-down transformers as suits operating conditions.
    The original +5L,+16 transformer can be used as the auto-transformer.

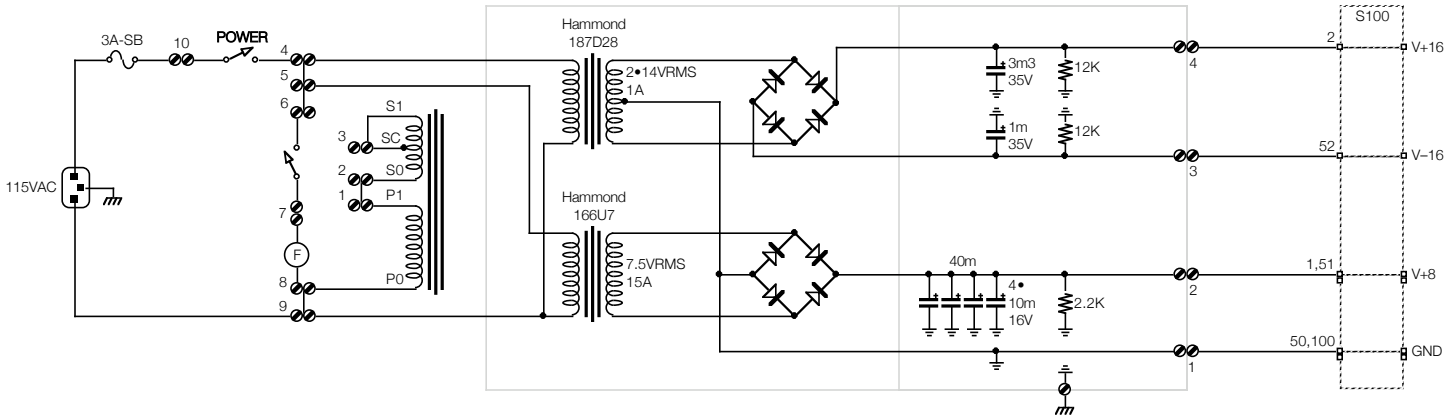
- Extended S100 bus. With the power supply occupying the right-most quarter of the cabinet there remains room for 12 S100 bus slots.

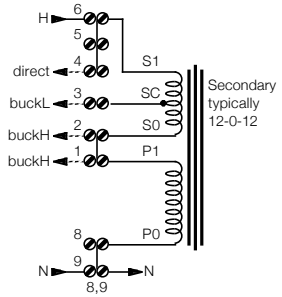
- Front panel wiring. The bundle of fixed-wiring between the front panel and the bus is replaced with ribbon cables and connectors to an interface board that plugs-in to the S100 bus.

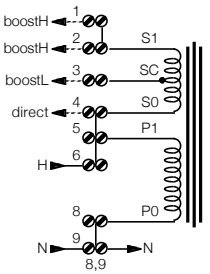
- Front-panel Data LEDS output port. The front-panel Data LEDs can be used as a display during program execution by writing to I/O Port 0xFF.

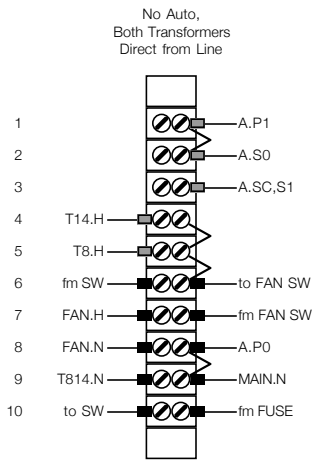
- Front-panel RDY. The 8800 uses pRDY (S100.72) to start/stop the CPU for front panel operations. pRDY is a shared assert-LOW signal open for use by other boards. The 8800 front panel however, rather poorly, uses a totem-pole driver for pRDY rather than an OC driver. The 8800i provides an OC driver for this signal. As well, a jumper is provided to choose between driving pRDY (S100.72) or xRDY (S100.3).

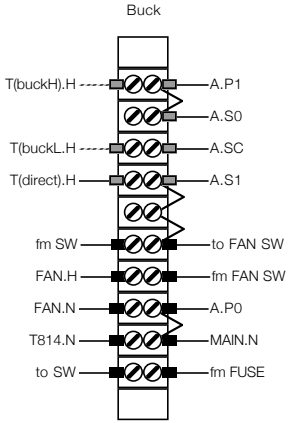
- CPU board alteration. The dropping resistors of the ±12V zener-regulated supplies on the CPU board may best be increased for higher voltages from the ±12V Source supplies.

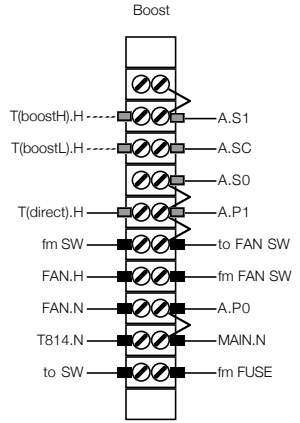












Configured Position

Fixed position

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Section: Power Supply

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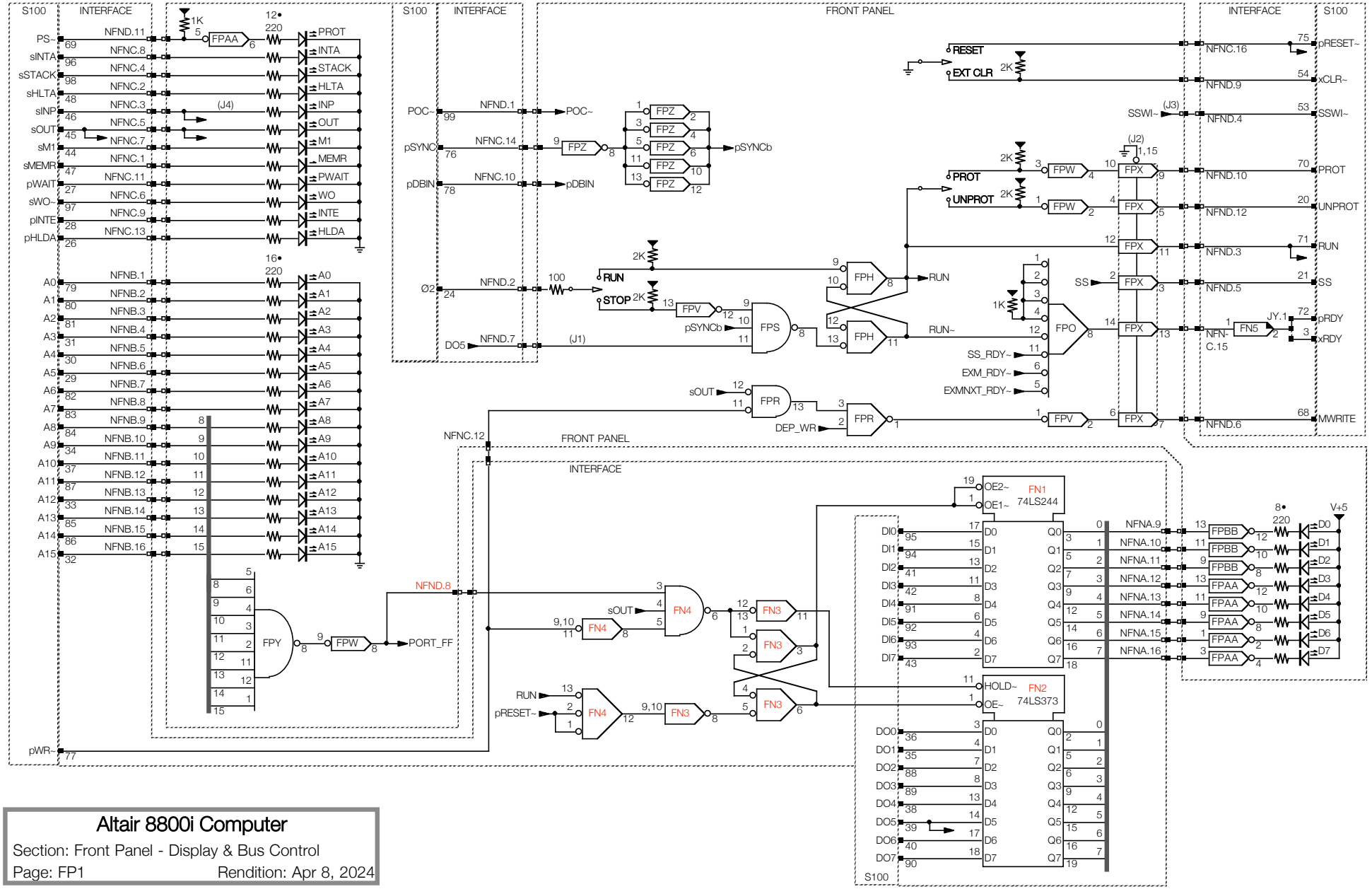

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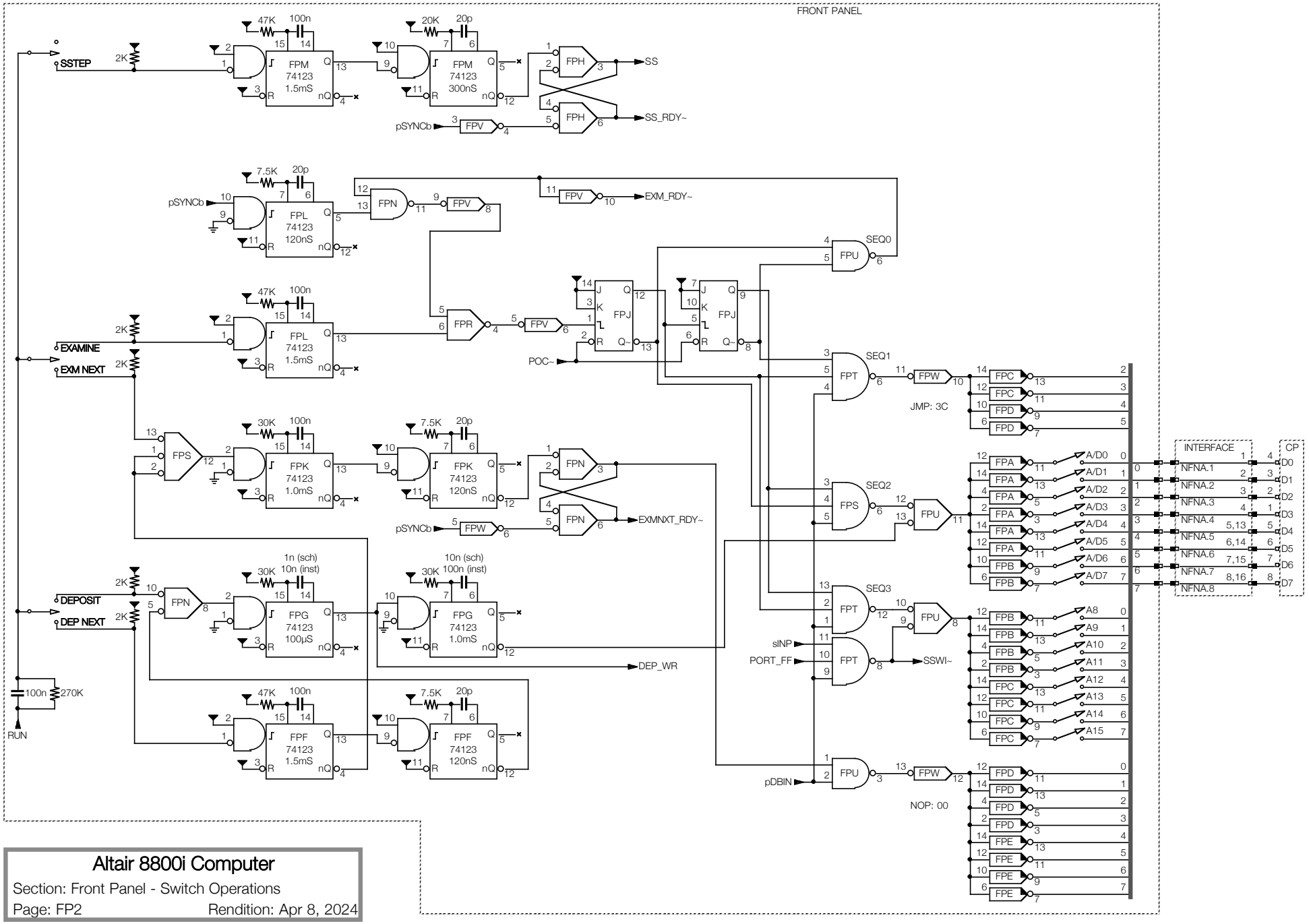
Section: Front Panel - Display & Bus Control

Page: FP1 Rendition: Apr 8, 2024



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Section: Front Panel - Switch Operations

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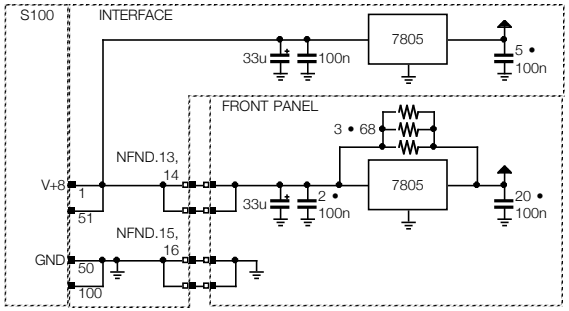
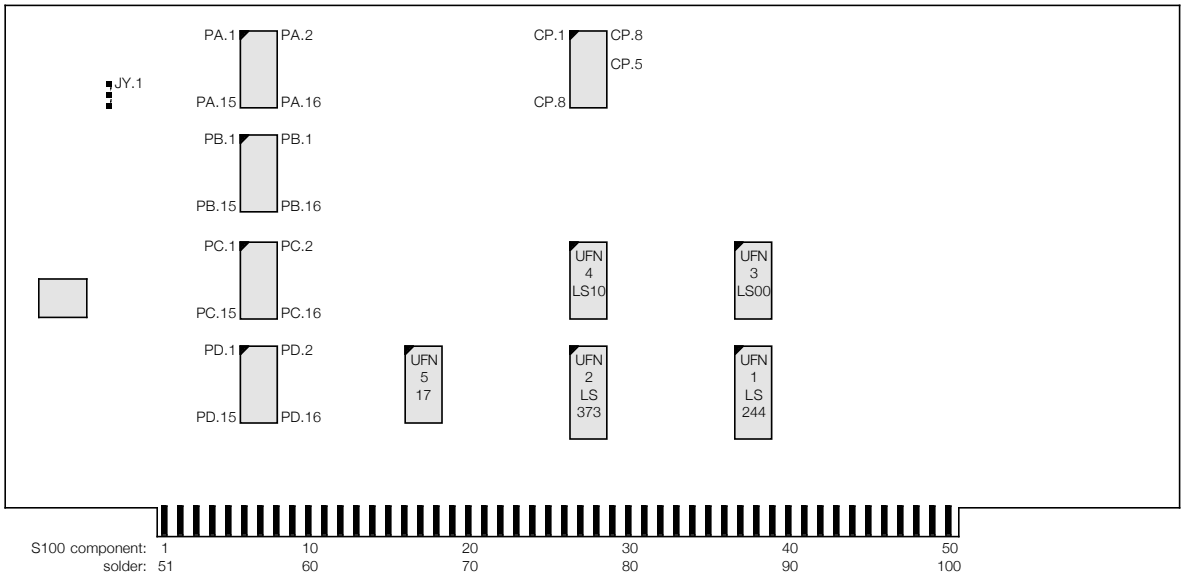
S100					S100
	CP0	A1	2	CP1	
	CP2	3	4	CP3	
	CP4	5	6	CP5	
	CP6	7	8	CP7	
	D0	9	10	D1	
	D2	11	12	D3	
	D4	13	14	D5	
	D6	15	16	D7	
79	A0	B1	2	A1	80
81	A2	3	4	A3	31
30	A4	5	6	A5	29
82	A6	7	8	A7	83
84	A8	9	10	A9	34
37	A10	11	12	A11	87
33	A12	13	14	A13	85
86	A14	15	16	A15	32
	-			-	
	-			-	
47	sMEMR	C1	2	sHLTA	48
46	sINP	3	4	sSTACK	98
45	sOUT	5	6	sWO~	97
44	sM1	7	8	SINTA	96
28	pINTE	9	10	pDBIN	78
27	pWAIT	11	12	pWR~	77
26	pHLDA	13	14	pSYNC	76
72	pRDY	15	16	pRESET~	75
99	POC~	D1	2	Ø2	24
71	RUN	3	4	SSWI~	53
21	SS	5	6	MWRITE	68
39	DO5	7	8	PORT_FF	-
54	xCLR~	9	10	PROT	70
69	PS~	11	12	UNPROT	20
1	V+8	13	14	V+8	51
50	GND	15	16	GND	100





UFNx	Type	a	b	c	d	e	f
1	74LS244	√	-	-	-	-	-
2	74LS373	√	-	-	-	-	-
3	74LS00	√	√	√	√	-	-
4	74LS10	√	√	√	-	-	-
5	7417	√	u	u	u	u	u

Total ICs: 5

Type	Count	Pins	V+5	GND
74LS00	1	14	14	7
74LS10	1	14	14	7
7417	1	14	14	7
74LS244	1	20	20	10
74LS373	1	20	20	10
Total:	5			

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Section: Front Panel - Interface Board Layout & ICs

Page: FP3 Rendition: Apr 8, 2024