[2,3,4] SPI BUS

MP.CLK [2]

SPI BUS [2,3,4,5]

DAISY-CHAINED SPI BUS CABLE

SPI.MOSI+ J11 - 1
SPI.MOSI- J11 - 14
SPI.SCK+ J11 - 2
SPI.SCK- J11 - 15
SPI.RST+ J11 - 12
SPI.RST- J11 - 25

FROM BACKPLANE

MP.CLK+ J9 - 4
MP.CLK- J9 - 12

R5101 100R

U510 26C32

SP.MOSI+
SP.MOSI-
SPI.SCK+
SPI.SCK-
SPI.RST+
SPI.RST-
MP.CLK+
MP.CLK-

SPI.MOSI
SPI.SCK
SPI.RST
MP.CLK

+5V

R5081 10K 1
R5081 10K 2
R5081 10K 3
R5081 10K 4
R5081 10K 5

U407 74HCT04

SPI.SCK
SPI.SCK/
SPI.RST
SPI.RST/

SPI.MISO

R5081 10K 6
R5081 10K 7
R5081 10K 8
R5081 10K 9
R5081 10K 10

U508 LTC486

SP.MISO+
SP.MISO-

LU.EN/

SPI BUS EXPANSION

SP.MOSI+ J8 - 1 SPI.MOSI+
SP.MOSI- J8 - 14 SPI.MOSI-
SPI.SCK+ J8 - 2 SPI.SCLK+
SPI.SCK- J8 - 15 SPI.SCLK-
SPI.RST+ J8 - 12 SPI.RST+
SPI.RST- J8 - 25 SPI.RST-
SPI.A0+ J8 - 3 SPI.A0+
SPI.A0- J8 - 16 SPI.A0-
SPI.A1+ J8 - 4 SPI.A1+
SPI.A1- J8 - 17 SPI.A1-
SPI.A2+ J8 - 5 SPI.A2+
SPI.A2- J8 - 18 SPI.A2-
SPI.A3+ J8 - 6 SPI.A3+
SPI.A3- J8 - 19 SPI.A3-
SPI.A4+ J8 - 7 SPI.A4+
SPI.A4- J8 - 20 SPI.A4-
SPI.A5+ J8 - 8 SPI.A5+
SPI.A5- J8 - 21 SPI.A5-
SPI.A6+ J8 - 9 SPI.A6+
SPI.A6- J8 - 22 SPI.A6-
SPI.A7+ J8 - 10 SPI.A7+
SPI.A7- J8 - 23 SPI.A7-
SP.MISO+ J8 - 11 SPI.MISO+
SP.MISO- J8 - 24 SPI.MISO-
J8 - 13 SPARE

SP.MISO+ J11 - 11 SPI.MISO+
SP.MISO- J11 - 24 SPI.MISO-

DAISY-CHAINED SPI BUS CABLE

SPI.A0+ J11 - 3
SPI.A0- J11 - 16
SPI.A1+ J11 - 4
SPI.A1- J11 - 17
SPI.A2+ J11 - 5
SPI.A2- J11 - 18
SPI.A3+ J11 - 6
SPI.A3- J11 - 19
SPI.A4+ J11 - 7
SPI.A4- J11 - 20
SPI.A5+ J11 - 8
SPI.A5- J11 - 21
SPI.A6+ J11 - 9
SPI.A6- J11 - 22
SPI.A7+ J11 - 10
SPI.A7- J11 - 23
SPARE J11 - 13

U410 26C32

SPI.A0+
SPI.A0-
SPI.A1+
SPI.A1-
SPI.A2+
SPI.A2-
SPI.A3+
SPI.A3-

SPI.A0
SPI.A1
SPI.A2
SPI.A3

+5V

R4101 10K

U310 26C32

SPI.A4+
SPI.A4-
SPI.A5+
SPI.A5-
SPI.A6+
SPI.A6-
SPI.A7+
SPI.A7-

SPI.A4
SPI.A5
SPI.A6
SPI.A7

REGISTER SELECT

U408 74HCT138

E1 E2 E3 A0 A1 A2
00 01 02 03 04 05 06 07

LU.EN0/
ADC.EN/
ISI.EN/
PRS.EN/
OC0.EN/
OC1.EN/
DAC.EN/

LU REGISTER ENABLES [2,3,4,5]

BOARD SELECT

U409 74HCT138

SPI ADDRESS TABLE:

ADDRESS - READ REGISTERS

80H INPUT STATUS 0
82H CABLE DETECT + VERSION
83H PLATE ROTATOR STATUS

ADDRESS - WRITE REGISTERS

86H DIGITAL-TO-ANALOG CONVERTER

ADDRESS - READ/WRITE REGISTERS

81H ANALOG-TO-DIGITAL CONVERTER (8 CHANNELS)
84H OUTPUT CONTROL 0
85H OUTPUT CONTROL 1

CREO

LOAD UNLOAD ELECTRONICS
SPI BUS
SCHEMATIC DIAGRAM

DESIGNED BY	DOCUMENT NUMBER	LAST ECO
D.WONG	10-0738B-B-SD01	897
DRAWN BY	LAST REVISED BY	APPROVED BY
D.WONG	D.FREEMAN	D.WONG
DESIGN DATE	LAST MODIFIED DATE	SHEET
1993:08:24	1996:04:17	1 OF 5

[1] SPI BUS

[1] LU REGISTER ENABLES

CYLINDER POSITION DETECT

FROM LOAD UNLOAD SENSORS

LEC.RET/ GND — J4 - 3, J4 - 4
LEC.EXT/ GND — J4 - 5, J4 - 6
TEC.RET/ GND — J4 - 7, J4 - 8
TEC.EXT/ GND — J4 - 9, J4 - 10
RC.RET/ GND — J4 - 11, J4 - 12
RC.EXT/ GND — J4 - 13, J4 - 14
LRC.RET/ GND — J4 - 15, J4 - 16
LRC.EXT/ GND — J4 - 17, J4 - 18

+5V, R1011 10K (1 / 2 3 4 5 6 7 8 9 10)

RC101 100R/50P (2-19, 3-18, 4-17, 5-16, 6-15, 7-14, 8-13, 9-12)

U100 74HC14 (1-2, 3-4, 5-6, 9-8, 11-10, 13-12)
U201 74HC14 (1-2, 3-4)

U407 74HCT04 (5-6)

LU.EN0/
SPI.SCK/

INPUT STATUS 0 REGISTER

SPI ADDRESS 80H

U200 74HC589
OE (10), SS-PL/ (13), SCK (11), LCK (12), SA (14), A (15), B (1), C (2), D (3), E (4), F (5), G (6), H (7), QH (9)

LEC.RET
LEC.EXT
TEC.RET
TEC.EXT
RC.RET
RC.EXT
LRC.RET
LRC.EXT

CABLE DETECT

LRSB.CD+ / LRSB.CD- — J2 - 5, J2 - 6
BB.CD+ / BB.CD- — J4 - 25, J4 - 26
LUS.CD+ / LUS.CD- — J4 - 1, J4 - 2
AVM.CD+ / AVM.CD- — J7 - 1, J7 - 2
PFO.CD+ / PFO.CD- — J1 - 1, J1 - 2
TEMP.CD+ / TEMP.CD- — J3- 1, J3- 2

+5V, R1071 10K (1 / 2 3 4 5 6 7 8 9 10)

RC107 100R/50P (2-19, 3-18, 4-17, 5-16, 6-15, 7-14, 8-13, 9-12)

U106 74HC14 (1-2, 3-4, 5-6, 9-8, 11-10, 13-12)
U206 74HC14 (11-10, 13-12)

U407 74HCT04 (1-2)

IS1.EN/
SPI.SCK/

LRSB.CD
BB.CD
LUS.CD
AVM.CD
PFO.CD
TEMP.CD

INPUT STATUS 1 REGISTER

SPI ADDRESS 82H

U105 74HC589
OE (10), SS-PL/ (13), SCK (11), LCK (12), SA (14), A (15), B (1), C (2), D (3), E (4), F (5), G (6), H (7), QH (9)

[1] SPI BUS

VERSION

U304 74HC589
OE (10), SS-PL/ (13), SCK (11), LCK (12), SA (14), A (15), B (1), C (2), D (3), E (4), F (5), G (6), H (7), QH (9) SPI.MISO

SPI.RST

+5V, J13 (LSB 1 … MSB 13)

VER.D0 (2-1), VER.D1 (4-2), VER.D2 (6-3), VER.D3 (8-4), VER.D4 (10-5), VER.D5 (12-6), VER.D6 (14-7)

R3041 10K (1 / 2 3 4 5 6 7 8 9 10)

NOTE:

1. ADD JUMPERS TO CHANGE VERSION SIGNATURE.
2. ADD MSB & LSB LABELS TO SILKSCREEN LAYER.

PLATE FLYOFF DETECT

FROM PLATE FLYOFF SENSOR

+24V — J1 - 3, J1 - 5
FLYOFF — J1 - 6
ALARM/ — J1 - 7
GND — J1 - 4
GND — J1 - 8

+5V, +24V

R1001 470R, R1002 470R

RC103 100R/50P (8-13, 9-12)

U201 74HC14 (5-6, 9-8, 11-10)

U203 74HCT74 (S, D, CP, R, Q)

U303 74HCT02 (8-9-10, 2-3-1)

U302 74HCT74 (S, D, CP, R, Q)

[1] MP.CLK

SPI.RST
[4] PFO.CLR

PFOC.DET

PFOA.DET

SPARE COMPONENTS

NOTE:

TRACES TO SPARE DEVICES ARE TO BE CUTTABLE ON THE SOLDER SIDE.

U201 74HC14 (13-12)
U303 74HCT02 (5-6-4, 11-12-13)

CREO

LOAD UNLOAD ELECTRONICS
INPUT STATUS
SCHEMATIC DIAGRAM

DESIGNED BY: D.WONG	DOCUMENT NUMBER: 10-0738B-B-SD02	LAST ECO: 897
DRAWN BY: D.WONG	LAST REVISED BY: D.FREEMAN	APPROVED BY: D.WONG
DESIGN DATE: 1993:08:24	LAST MODIFIED DATE: 1996:04:17	SHEET: 2 OF 5

[1] SPI BUS

[1] LU REGISTER ENABLES

SPI BUS [1]

NOTE:

1. PI FILTER NETWORKS ARE TO BE PLACED AS CLOSE AS POSSIBLE TO J3.

2. ALL TRACES IN TEMPERATURE SENSE CIRCUIT ARE TO BE KEPT AS SHORT AS POSSIBLE.

TEMPERATURE SENSE

NOTE:

TRACES BETWEEN THE INPUTS OF THE OPERATIONAL AMPLIFIERS ARE TO BE CUTTABLE ON THE SOLDER SIDE.

TO / FROM TEMPERATURE SENSORS

TEMP0+ J3-3
TEMP0- J3-4
TEMP1+ J3-5
TEMP1- J3-6
TEMP2+ J3-7
TEMP2- J3-8
TEMP3+ J3-9
TEMP3- J3-10

E5005 21-201-J — TEMP+ — A+5V
E5004 21-201-J — TEMP0
E5003 21-201-J — TEMP1
E5002 21-201-J — TEMP2
E5001 21-201-J — TEMP3

C6001 100P, C6005 100P, C6002 100P, C6004 100P, C6003 100P, C5003 100P, C5002 100P, C5004 100P, C5001 100P, C5005 100P — AGND

R502 1K0 (16, 15, 14, 13, 12, 11, 10, 9)

R5014 4K99,1%, R5013 4K99,1%, R5012 4K99,1%, R5011 4K99,1%

C4021 47N, C4022 47N, C4023 47N, C4024 47N

D4012 5082-2835, D4011 5082-2835, D4013 5082-2835, D4014 5082-2835, D4016 5082-2835, D4015 5082-2835, D4019 5082-2835, D4017 5082-2835

U401 OMIT, U401 OMIT, U402 OMIT, U402 OMIT

D4020 5082-2835, R5015 1K0, D4018 5082-2835

TP.ADC TP6012, AGND TP6011

NOTE:

ADD TESTPOINT LABELS TO SILKSCREEN LAYER.

ANALOG-TO-DIGITAL CONVERTER REGISTER

SPI ADDRESS 81H

U400 TLC2543

ADC.EN/ 15
SPI.SCK 18
SPI.MOSI 17
CS, CLK, DIN, REF+, REF-, EOC 19, DOUT 16 SPI.MISO

ADC.CH0 1 AIN0
ADC.CH1 2 AIN1
ADC.CH2 3 AIN2
ADC.CH3 4 AIN3
5 AIN4
6 AIN5
7 AIN6
ADC.CH7 8 AIN7
9 AIN8
11 AIN9
12 AIN10

AGND

NOTE:

TRACES FOR UNUSED INPUTS TO AGND ARE TO BE CUTTABLE ON THE SOLDER SIDE.

C4001 22U, C4002 100N, D4001 1N5817

NOTE:

C4001, C4002 AND D4001 ARE TO BE PLACED NEAR U400.

OUTPUT CONTROL REGISTER

SPI ADDRESS 84H

SPI.RST/
OC0.EN/
SPI.SCK
SPI.MOSI

U108 TPIC2801

RST 11, SIOE 5, SCLK 6, SI 7
Y0 4, Y1 3, Y2 2, Y3 1, Y4 15, Y5 14, Y6 13, Y7 12
SO 9

U109 TPIC2801

RST 11, SIOE 5, SCLK 6, SI 7
Y0 4, Y1 3, Y2 2, Y3 1, Y4 15, Y5 14, Y6 13, Y7 12
SO 9 SPI.MISO

NOTE:

OUTPUT CURRENT IS LIMITED TO 250 mA PER CHANNEL BY SYSTEM POWER BUDGET.

+24V

LEADING EDGE CYL. — J7 - 3 LEC.ENB+, J7 - 4 LEC.ENB-
TRAILING EDGE CYL. — J7 - 5 TEC.ENB+, J7 - 6 TEC.ENB-
LOAD RAMP CYL. — J7 - 7 LRC.ENB+, J7 - 8 LRC.ENB-
ROLLER CYL. — J7 - 9 RC.ENB+, J7 - 10 RC.ENB-
UNLOCK CYL. — J7 - 11 TEL.ENB+, J7 - 12 TEL.ENB-
J7 - 13 SPO0+, J7 - 14 SPO0-
J7 - 15 SPO1+, J7 - 16 SPO1-
J7 - 17 SPO2+, J7 - 18 SPO2-
TABLE UP — J7 - 19 TBL.UP+, J7 - 20 TBL.UP-
EXIT DOOR OPEN — J7 - 21 EXIT.OPEN+, J7 - 22 EXIT.OPEN-
EXIT DOOR CLOSE — J7 - 23 EXIT.CLOSE+, J7 - 24 EXIT.CLOSE-
TABLE DOWN — J7 - 25 TBL.DOWN+, J7 - 26 TBL.DOWN-
J7 - 27 SPO4+, J7 - 28 SPO4-
J7 - 29 SPO5+, J7 - 30 SPO5-
J7 - 31 SPARE, J7 - 32 SPARE
J7 - 33 SPARE, J7 - 34 SPARE

LOAD UNLOAD OUTPUTS

ROL.ENB/ [4]
ROL.DIR/ [4]
PRC.FLT [4]

LOAD RAMP SENSOR BOARD INTERFACE

+5V

J2 - 1 +5V
J2 - 3 +5V
J2 - 11 SPARE
J2 - 12 SPARE
J2 - 13 SPARE
J2 - 14 SPARE
J2 - 2 GND
J2 - 4 GND

TO / FROM LOAD RAMP SENSOR BOARD

LR.QUE+ J2 - 7
LR.QUE- J2 - 8
LR.LDG+ J2 - 9
LR.LDG- J2 - 10

FROM PLATE ROTATOR

PROC.FLT+ J10 - 11
PROC.FLT- J10 - 24

R3001 100R, R300 2K2

R3011 10K

U301 26C32

LR.QUE
LR.LDG
PRC.FLT
ALE.SP

U509 26C31

J9 - 5 SPARE
J9 - 6 SPARE
J9 - 13 SPARE
J9 - 14 SPARE
J9 - 1 LU.QUE+
J9 - 9 LU.QUE-
J9 - 3 LU.LDG+
J9 - 11 LU.LDG-
J9 - 2 ALE.SP+
J9 - 10 ALE.SP-

TO BACKPLANE

CREO

LOAD UNLOAD ELECTRONICS
SENSOR BOARD I/F, OUTPUT CONTROL
TEMPERATURE SENSE
SCHEMATIC DIAGRAM

DESIGNED BY	DOCUMENT NUMBER	LAST ECO
D.WONG	10-0738B-B-SD03	897
DRAWN BY	LAST REVISED BY	APPROVED BY
D.WONG	D.FREEMAN	D.WONG
DESIGN DATE	LAST MODIFIED DATE	SHEET
1993:08:25	1996:04:17	3 OF 5

[1] SPI BUS

[1] LU REGISTER ENABLES

SPI BUS [1]

PLATE ROTATOR STATUS REGISTER

SPI ADDRESS 83H

U307 74HC589

U407 74HCT04

U308 26C32

R3071 10K

FROM PLATE ROTATOR

PL.SENS+ J10 - 7
PL.SENS- J10 - 20
PR.LID+ J10 - 8
PR.LID- J10 - 21
PROC.BSY+ J10 - 9
PROC.BSY- J10 - 22
PROC.RDY+ J10 - 10
PROC.RDY- J10 - 23
PRIF.PWR J10 - 13

R309 2K2 ×8
R3101 100R ×8
100R/50P
RC104
R1041 10K

PRS.EN/
SPI.SCK/
PL.SENS
PR.LID
PROC.BSY
PROC.RDY
PRC.FLT
PR.PWR
PR.OVRC

[5] PR.OVRC
[3] PRC.FLT

R1042 10K

PR.CD+ J10 - 12
PR.CD- J10 - 25

PRS.CD+ J5 - 1
PRS.CD- J5 - 2
BRIDGE+ J5 - 3
BRIDGE- J5 - 4
EXIT.DR+ J5 - 5
EXIT.DR- J5 - 6
PRS.SPI0+ J5 - 7
PRS.SPI0- J5 - 8
PRS.SPI1+ J5 - 9
PRS.SPI1- J5 - 10
SPARE J5 - 11
SPARE J5 - 12
SPARE J5 - 13
SPARE J5 - 14

PLATE ROTATOR SENSORS

RC104 100R/50P ×8
U204 74HC14

U205 74HC589

PR.CD
PRS.CD
BRIDGE
EXIT.DR
PRS.SPI0
PRS.SPI1

SPI.MISO

R1111 2K2
U110 LM385Z-2.5A
C1101 22U

LM385Z-2.5A
BOTTOM VIEW

OUTPUT CONTROL REGISTER

SPI ADDRESS 85H

SPI.RST/
OC1.EN/
SPI.MOSI

U507 74HC299
U505 74HC299
U506 74HCT273
U504 74HCT273

CONV.ENB
RESERVED
DBG.BIT
GND
PFO.CLR [2]

[3] ROL.DIR/ → ROL.DIR/
[3] ROL.ENB/ → ROL.ENB/

SPARE COMPONENTS

NOTE:

TRACES TO UNUSED INPUTS ARE TO BE CUTTABLE ON THE SOLDER SIDE.

U111 LM358

RC104 100R/50P

CONVEYOR MOTOR DRIVER

F.+24V

U206 74HC14
R3102 4K7
Q2102 2N3906
CONV.ENB
D2101 UF4002
R2101 432R
Q2101 TIP120

J10 - 1 CONVEYOR+
J10 - 14 CONVEYOR+
J10 - 2 CONVEYOR-
J10 - 15 CONVEYOR-

NOTE:

Q1101 AND Q2101 ARE TO BE MOUNTED VERTICALLY WITH AAVID 576802 HEAT SINK.

DIGITAL-TO-ANALOG CONVERTER

SPI ADDRESS 86H

U211 AD7543

SPI.RST/
LU.EN0/
DAC.EN/
SPI.SCK
SPI.MOSI

CLR/ LD1/ LD2/ STB1 STB2 STB3/ STB4 SRI RFB OUT1 OUT2 AGND VREF NC

R1112 21K0,1% METAL
R1113 2K49,1% METAL
U111 LM358

ROLLER MOTOR DRIVER

F.+24V
Q1101 TIP41C
ROL.PWR
D1101 UF4002

ROLLER DIRECTION RELAY
+24V
D1102 UF4002
K1101 A-24W-K
ROL.DIR/
ROL.ENB/
ROL.REF

J10 - 3 ROLLER+
J10 - 16 ROLLER+
J10 - 4 ROLLER-
J10 - 17 ROLLER-

U406 26C31

PR.FOG
PROC.SEL

J10 - 19 PR.FOG+
J10 - 6 PR.FOG-
J10 - 5 PROC.SEL/+
J10 - 18 PROC.SEL/-

U206 74HC14

NOTE:

TRACES TO UNUSED INPUTS ARE TO BE CUTTABLE ON THE SOLDER SIDE.

TP6052
TP6051

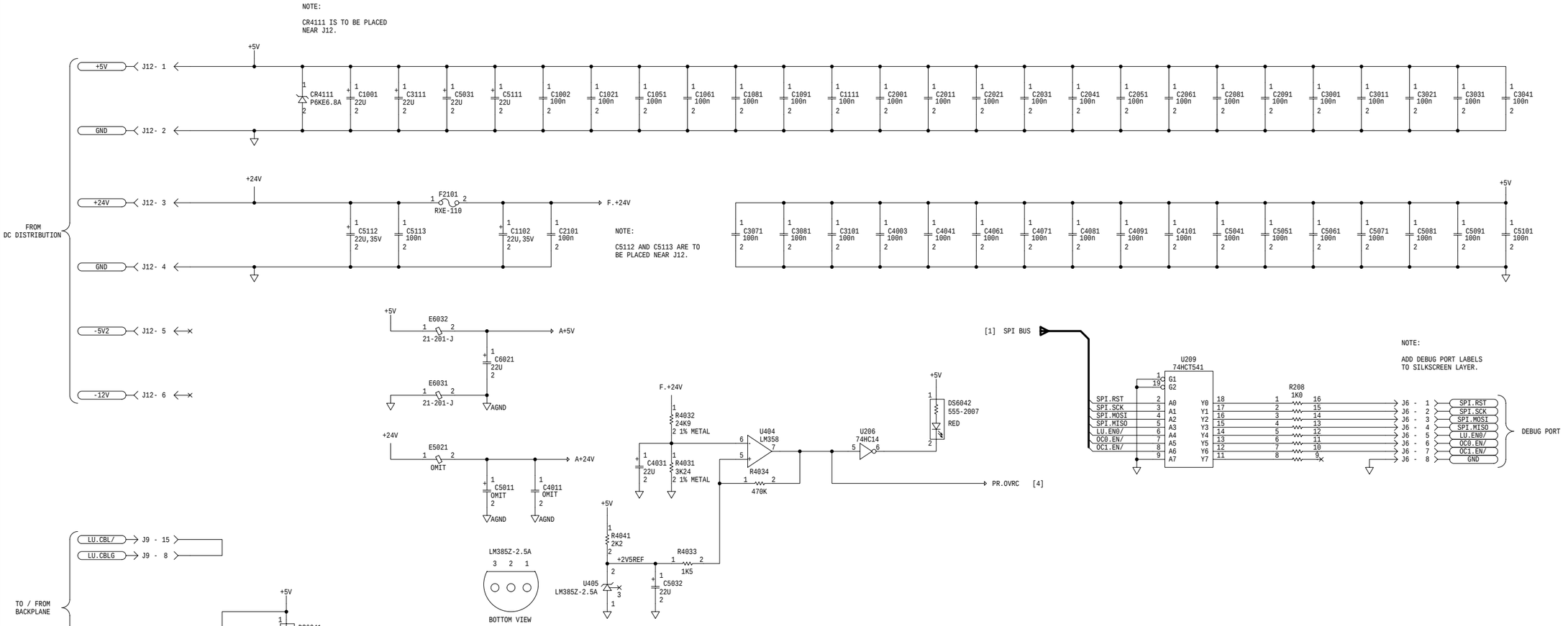
NOTE:

ADD TESTPOINT LABELS TO SILKSCREEN LAYER.

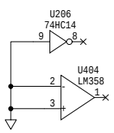
CREO

LOAD UNLOAD ELECTRONICS
PLATE ROTATOR INTERFACE
SCHEMATIC DIAGRAM

DESIGNED BY	DOCUMENT NUMBER	LAST ECO
D.WONG	10-0738B-B-SD04	897
DRAWN BY	LAST REVISED BY	APPROVED BY
D.WONG	D.FREEMAN	D.WONG
DESIGN DATE	LAST MODIFIED DATE	SHEET
1994:02:21	1996:04:17	4 OF 5



SPARE DEVICES



NOTE:

TRACES TO SPARE DEVICES ARE TO BE CUTTABLE ON THE SOLDER SIDE.

POWER AND GROUND PIN CONNECTIONS

COMPONENT	LOCATION	GND	+5V	+24V	AGND	A+5V	A+24V
26C31	U406, U509	8	16				
26C32	U301, U308, U310, U410, U510	8	16				
74HC589	U105, U200, U202, U205, U304, U307	8	16				
74HCT138	U408, U409	8	16				
74HC14	U100, U102, U106, U201, U204, U206	7	14				
74HCT04	U407	7	14				
74HC299	U505, U507	10	20				
74HCT02	U303	7	14				
74HCT273	U504, U506	10	20				
74HCT541	U209	10	20				
74HCT74	U203, U302	7	14				
TPIC2801	U108, U109	8	10				
LTC486	U508	8	16				
LM358	U404	4	8				
TLC2543	U400				10	20	
LT1013	U401, U402				4		8
AD7543	U211	12	14				
LM358	U111	4		8			

CREO

LOAD UNLOAD ELECTRONICS
POWER AND GROUND
SCHEMATIC DIAGRAM

DESIGNED BY	DOCUMENT NUMBER	LAST ECO
D.WONG	10-0738B-B-SD05	897
DRAWN BY	LAST REVISED BY	APPROVED BY
D.WONG	D.FREEMAN	D.WONG
DESIGN DATE	LAST MODIFIED DATE	SHEET
1994:03:02	1996:04:17	5 OF 5