GE Canada
Electronic Products Repair

Test Instructions for

4006L6500 ALL GROUPS
Device Number

Drive Control Card
Description of Device

Originated By: _____Maher Albasel_____
Typed Name

Approved By: _____
Signature

Date: Jan. 16, 2006
mm/dd/yy

Approval Date: Jan. 16, 2006
mm/dd/yy

TEST INSTRUCTIONS
PREVIOUS REVISION SHEET

Originated By	Date mm/dd/yy	Description of change
Martin Curtis	Unknown	Create Test Instruction for EPR
Carmine Sebastiani	01/30/95	Modified Test Instruction
Jason Humphries	11/17/00	Add new test.
Rogerio Cordeiro	August 9, 2004	Added upgrade information
Rogerio Cordeiro	May 6, 2005	Modified instructions to new format
Lucio Carrescia	Nov. 29, 2005	Corrected upgrade information and included info on cascades boxboard.
Maher Albasel	Jan. 16, 2006	Additional information to upgrades to include long bodied transistors

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1.   PURPOSE:

    a.   Static and dynamic test procedures for Drive Control Card 4006L6500 ALL GROUPS

2.   ELEMENTARY:

3.   EQUIPMENT:

    a.   Fluke 9010A Troubleshooter
    b.   Fluke 80188 Pod
    c.   Scope
    d.   Meter
    e.   SP3200 Test Panel
    f.   1 – 50 pin ribbon cable
    g.   1 – 34 pin ribbon cable
    h.   1 – 26 pin ribbon cable with stab connectors
    i.   Lambda Power Supply

4.   SET UP:

    a.   Connect the ribbon cables from JA and JF on the SP3200 Test panel to the JA and JF respectively on the card under test.
    b.   Connect the 26pin cable from JI to CP1 to CP6 respectively.
    c.   Pull switch (+15) on the Test panel away from the 34pin connector.
    d.   Connect Lambda to 120VAC supply.
    e.   Connect the Lambda power supply to the card under test.
    f.   Connect +5VDC and Com to the Test Panel.
    g.   Remove CPU (U1) and connect the pod to the U1 CPU socket. If the socket is the old style, it may need to be shaved down in order for the pod to be connected. If it is the CMOS style, a CPU adapter is required.
    h.   The technician should verify if the customer, CASCADES BOXBOARD INC, wants G007 firmware installed. This applies to this customer only.

5.   PROCEDURE:

    a.   Setup Fluke Troubleshooter and pod.
    b.   Load program tape 4006L6500 dated Jan. 4, 1995. Or hook RS-232 connection to Fluke and Computer and down load file to Fluke with the following procedure:
        i.   Computer
            1.   Load up HyperTerminal
            2.   Type in Fluke
            3.   Click on OK
            4.   Click on OK
            5.   In the bits per second window, select 9600
   6.   Click on OK

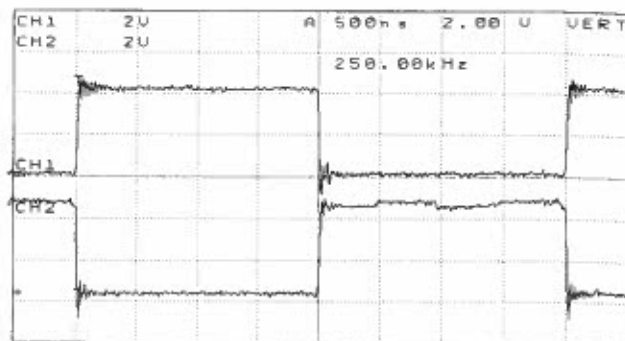Drive Control Card
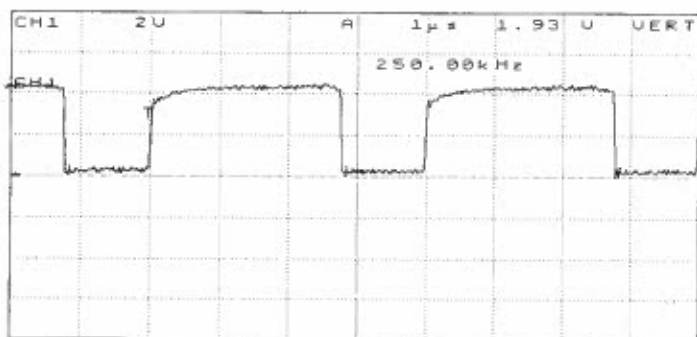4006L6500 ALL GROUPS
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  ii. Fluke
    1. Press the AUX I/F key
    2. Press the READ key
    3. Press the YES.
  iii. Computer
    1. Click on TRANSFER.
    2. Click on SEND TEXT FILE.
    3. In the Files of type, change to all files
    4. Go to J:\EPR\Main\Fluke\Hex\4006L6500.hex
  iv. Power up the UUT
    1. Turn on the Variable AC power supply
    2. Measure 5 volts on U20 pin28
  v. Fluke
    1. Press the EXEC key
    2. Press the 2 key
    3. Press the YES key. If an active interrupt @F00064 – LOOP? occurs, just press the CONT. button and continue with the program on the tape.
    4. Refer to sheets 2 and 3 for any waveform the Fluke program asks you to verify.
 c. Once all tests are complete. Remove all cables and re-install CPU.
 d. Install Card into SP3200 drive and follow SP3200 Test Instructions in order to setup and run drive. Connect oscilloscope CH1 to TP27 and CH2 to TP28. Ensure nice clean square wave.
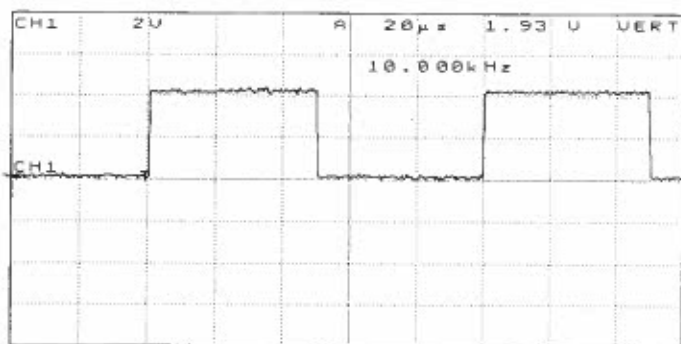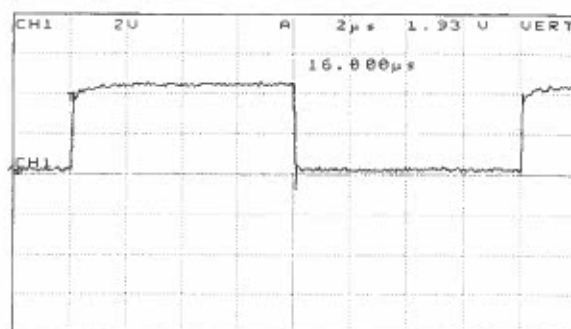

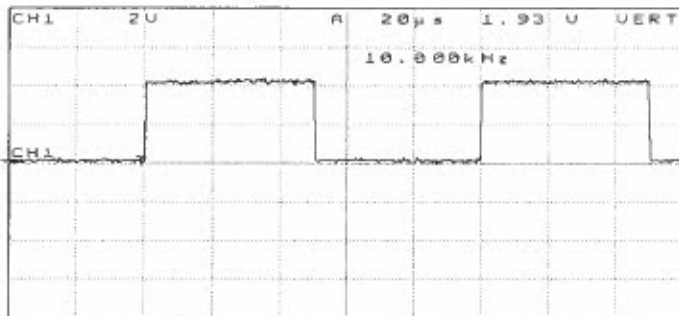U20 - 13

U20 - 13, 17

U17 - 9
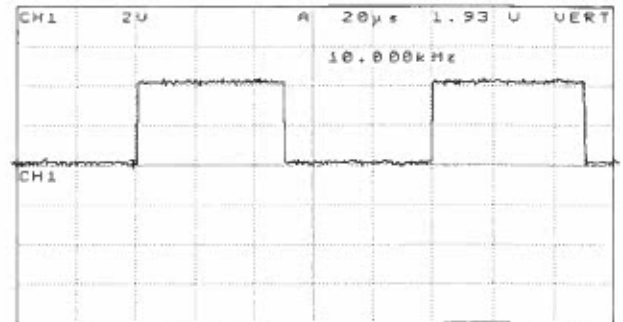

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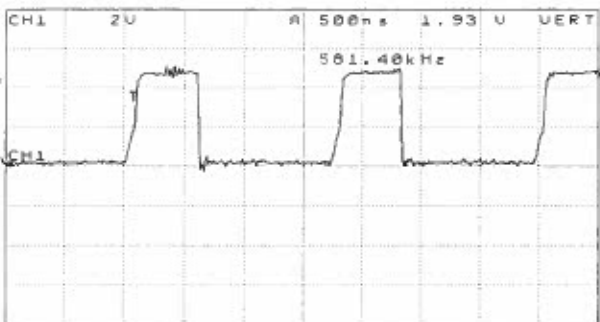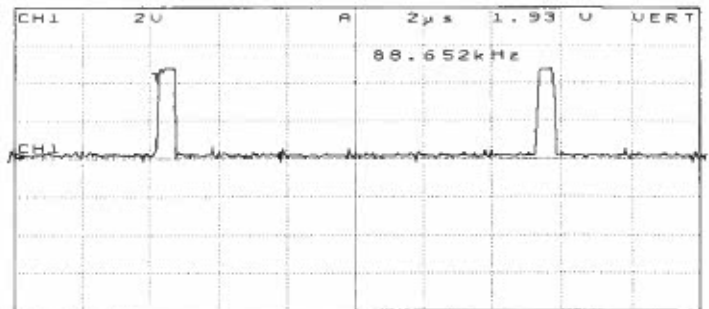
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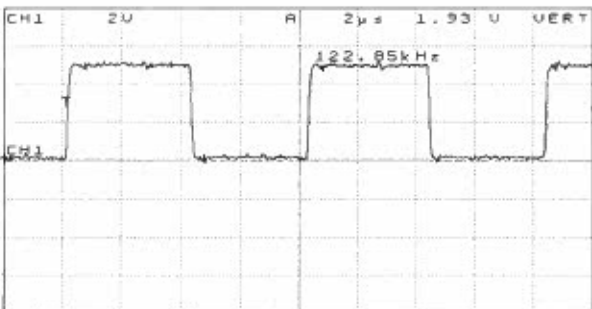
U18 - 13

U20 - 9

U20 - 9

U57 - 4

U19 - 10

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CH1	2U		A	500ns	1.93 U	VERT

250.00kHz

U19 - 13

CH1	2U		A	500ns	1.93 U	VERT

250.00kHz
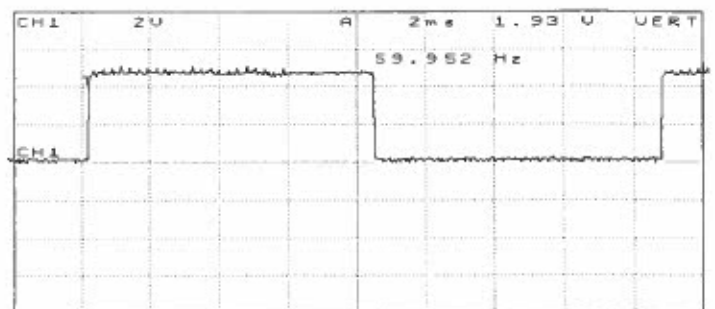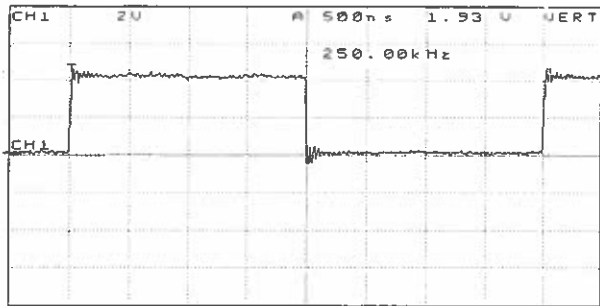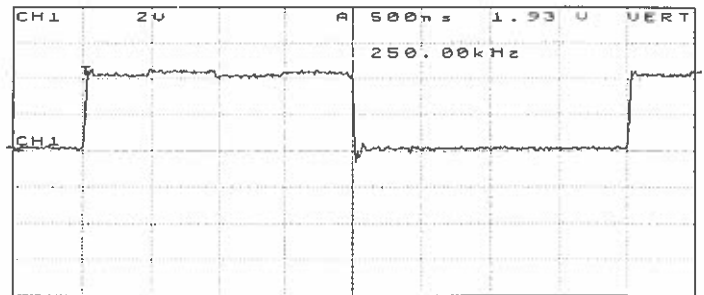
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6.   UPGRADES:

   a.   G002 cards do not require upgrades.
   b.   Cards with 0166C7853AA-3 are upgraded to Rev9 already.
   c.   Rev0 to Rev1 G001 cards.
     i.   Change R65 from 0177A1460 P339=158kΩ ¼W 1% to 0177A1460 P399=33.2Ω ¼W 1%.
   d.   Rev1 to Rev2
     i.   Change part 154=C15 from 0177A1281 P002=10pF 100V 5% to 0177A1281 P001=5pF 100V 5%. (Will change again later.)
     ii.   Cut trace on both sides of U48-PIN2 on the component side.
     iii.   Cut trace on solder side between R155 and C120 trace closest to VR1.
     iv.   Jumper U48-PIN13 to U49-PIN13.
     v.   Jumper U48-PIN12 to U49-PIN12.
   e.   Rev2 to Rev3
     i.   Remove + marking from LED1 to LED8.
     ii.   Add + marking above LED1 and below LED8 on opposite side of original marking.
     iii.   Remount LED1 to LED8.
   f.   Rev3 to Rev4
     i.   Add (0177A1090 P008=1N961B) Z2 and Z3 back to back with each other from U27-PIN28 to GND, use traces between U35 and U26 closest to VR2.
     ii.   Remove U65.
     iii.   Jumper U65-PIN2 to U65-PIN5.
     iv.   Jumper U65-PIN9 to U65-Pin12.
     v.   Change R21 from 0177A1460 P320=100kΩ ¼W 1% to 0177A1460 P304=68.1kΩ ¼W 1%.
     vi.   Change R23 from 0177A1460 P311=80.6kΩ¼W 1% to 0177A1460 P290=49.9kΩ ¼W 1%.
     vii.   Change C15 from 0177A1281 P001=5pF 100V 5% to 0177A1281 P015=47pF 100V 5%.
   g.   Rev4 to Rev5
     i.   Add C17 0177A1283 P009=0.01μF 50V 20% from U24-PIN7 to GND of C123. (Will be removed later.)
     ii.   Add C18 0177A1283 P009=0.01μF 50V 20% from U24-PIN8 to GND of C123. (Will be removed later.)
     iii.   Add C19 0177A1283 P009=0.01μF 50V 20% from U24-PIN14 to GND of C124. (Will be removed later.)
   h.   Rev5 to Rev6
     i.   Remove R75 0177A1460 P094=475kΩ ¼W 1%.
     ii.   Add new R75 0177A1460 P223=10kΩ ¼W 1% into original hole closest to C36 and the other end to U23-PIN14 =15V buss instead of the previous 5V buss.
   i.   Rev6 to Rev7
     i.   Remove C17, C18, C19.
     ii.   Change U24 0177A1636 P001=LM148 to 0239A2554 P001= LF347N.
     iii.   Change C16 0177A1281 P024=100pF 100V to 0177A1281 P041=470pF 500V.
   j.   Rev7 to Rev8
     i.   Add 0177A1283 P016=0.1μF 50V 20% to U43-PIN8 and U43-PIN14.
   k.   Rev8 to Rev9
     i.   Add 0177A1460 P223=10kΩ ¼W 1%=10kΩ to feed through hole near U27-PIN2 to GND, use caps above U27.
   l.   Rev9 to Rev10
     i.   Change R156 from 0177A1460 P353=221kΩ ¼W 1% to 0177A1460 P320=100kΩ ¼W 1%.

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m.   Rev10 to Rev11
  i.   Remove U51 0177A1644 P020 bend U51-PIN6 up around IC, and replace in location.
  ii.   Add 0177A1460 P029=100Ω ¼W 1% from U51-PIN6 to U33-PIN12.
  iii.   Add 0177A1283 P004=0.0022µF 50V 20% from U51-PIN7 to U33-Pin12.
  iv.   Jumper U33-PIN11 to U33-PIN7.
  v.   Jumper U33-P13 to hole of U51-PIN6.
n.   All NEC counters only to be replaced with Intel counters.
o.   Any boards that contain short bodied transistors on Q3-Q24 should be changed to long bodied transistors part number 0177A1480 P016.
p.   4006L6500AAG001 Refers to the baseboard, the hardware level.
  i.   Rev0 to Rev1 allows V/F circuit to sense direction during self-diagnostics.
  ii.   Rev1 to Rev2 corrects performance problems.
  iii.   Rev2 to Rev3 corrects masking error.
  iv.   Rev3 to Rev4 improves the V/F circuit.
  v.   Rev4 to Rev5 reduce noise on input channels.
  vi.   Rev5 to Rev6 corrects shutdown problems.
  vii.   Rev6 to Rev7 reduce noise from adjacent channels.
  viii.   Rev7 to Rev8 eliminate random trip from PLL loss.
  ix.   Rev8 to Rev9 reduce static problems with firing components.
  x.   Rev9 to Rev10 improve PLL adjustability.
  xi.   Rev10 to Rev11 corrects over speed problems = 4006L6500AAG002 R0
q.   4006L6500ABG001 Silpac3200 drive
r.   4006L6500ADG001 Silpac3200 plus drive
s.   4006L6500AEG001 Silpac3200 high performance drive

7.   END:

DOSx Data Map

Io - 230	RUN_PB	049	MOTOL.	19+16
10 - 212	16K_PB	50	CLIF	19+16
215	12K_PB	51		19+16
231	5K_PB	52	MOT	18+11
211	JOGR_PB	53	TOLL	19+16
214	JOGF_PB	54	STOP	19+16
232	STOP_PB	55	LOCAL.	19+16

56		19+16.
57		19+18
58		19+170
59		19+171
60	~ 3SPD	19+172
61		19+173
62		19+174
63	~ M1	19+175
64		19+176

2.2   INTERPRETING CARD-MOUNTED LEDs (continued)

LED	DESCRIPTION	RECOMMENDED ACTION
1	80188 MICROPROCESSOR TEST FAILED	REPLACE DCC
2	STATIC RAM TEST FAILED	" "
3	EPROM CHECKSUM TEST FAILED	REPLACE EPROMS or DCC
4	NON-VOLATILE RAM TEST FAILED	REPLACE DCC
5	80188 TIMER TEST FAILED	" "
6	8254 TIMER TEST FAILED	" "
7	INTERRUPT CONTROLLER TEST FAILED	" "
8	DUAL PORT RAM TEST FAILED	SEE TABLE 1.4: "DUAL PORT COMM. BAD"

TABLE 2.1 - DRIVE CONTROL CARD LED DIAGNOSTIC REPORTING

LED	DESCRIPTION	RECOMMENDED ACTION
1	80188 MICROPROCESSOR TEST FAILED	REPLACE DIC
2	STATIC RAM TEST FAILED	" "
3	EPROM CHECKSUM TEST FAILED	REPLACE EPROMS or DIC
4	LCD DISPLAY TEST FAILED (Note: LED on steady, not flashing for LCD test only)	REPLACE RIBBON CABLE, LCD DISPLAY MODULE, or DIC

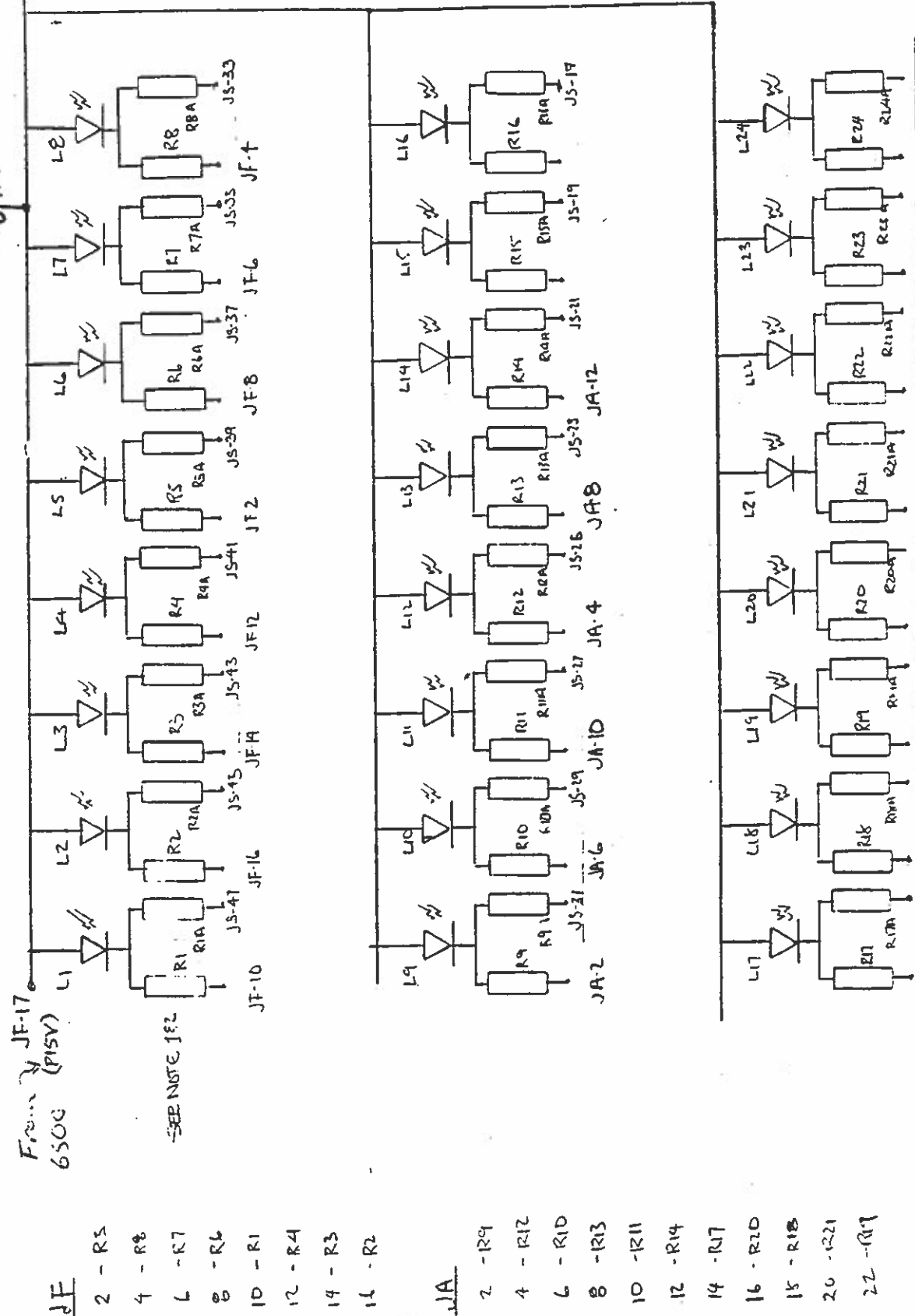TABLE 2.2 - DRIVE INTERFACE CARD LED DIAGNOSTIC REPORTING

LED	DESCRIPTION	RECOMMENDED ACTION
1	80188 MICROPROCESSOR TEST FAILED	REPLACE HCC
2	STATIC RAM TEST FAILED	" "
3	EPROM CHECKSUM TEST FAILED	REPLACE EPROMS or HCC
4	LCD DISPLAY TEST FAILED (Note: LED on steady, not flashing for LCD test only)	REPLACE RIBBON CABLE, LCD DISPLAY MODULE, or HCC
5	BATTERY-BACKED RAM TEST FAILED	REPLACE HCC
6	80188 TIMER TEST FAILED	" "
7	8254 TIMER TEST FAILED	" "
8	INTERRUPT CONTROLLER TEST FAILED	" "

TABLE 2.3 - HELPER CONTROL CARD LED DIAGNOSTIC REPORTING

ST·1

ELECTROSTATIC ... 256 TEST BOX- S13200

SW1 PSV
1A

JS
17 - R1LA
19 - R5A
21 - R14A
23 - R13A
25 - R12A
27 - R11A
29 - R10A
31 - R9A
33 - R8 A
35 - R7A
37 - R6A
39 - R5A
41 - R4A
43 - R3A
45 - R2A
47 - R1A

DRIVE CONTROL

From JF-17
6500 (P15V)

SEE NOTE 1&2

JF
2 - R5
4 - R8
6 - R7
8 - R6
10 - R1
12 - R4
14 - R3
16 - R2

JA
2 - R9
4 - R12
6 - R10
8 - R13
10 - R11
12 - R14
14 - R17
16 - R18
18 - R21
20 - R24
22 - R17

NOTE 1. R1-R24 .750Ω/4W 177A1457 - P46
2. R1A-R24A - 330Ω 1/4W) 177A1457 P37

4. JF - 34 PIN CONNECTOR
5. JA - 50 PIN CONNECTOR

TEST BOX - SP32

SP - 2

DRIVE INTERFACE
1A   PSV   JR

DRIVE CONTROL

SEE NOTE 1, 2, 3

NOTE. JUM
TOGETHER
JR-1,3,5,7
11,13,AN
(JR 21 -37

JR 22 (Dcom) 2 - SW
4 - SW
6 - SW
8 - SW
10 - SW
12 - SW
16 - SW

DRIVE CONTROL
JF
JF-29 (Dcom)
1K - SW1
20 - SW2
22 - SW3
24 - SW4
26 - SW12
28 - SW14
29 - SW19
30 - SW15
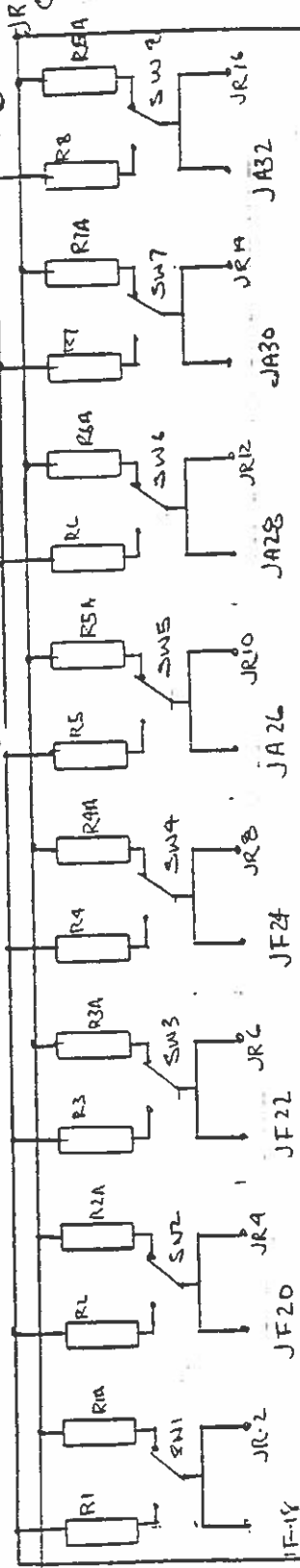
JA
26 - SW5
28 - SW6
30 - SW7
32 - SW8
34 - SW9
36 - SW10
38 - SW11
50 - SW18
45 - SW16
46 - SW17
49 - SW15
48 - com
42 - ccm
43 - SW20
47 - SW21
1 - SW21

R1 - R8 = 300 Ω ¼ W -177A1457-P36
R1A - R24A = 100 Ω ¼ W 177A1457-P25
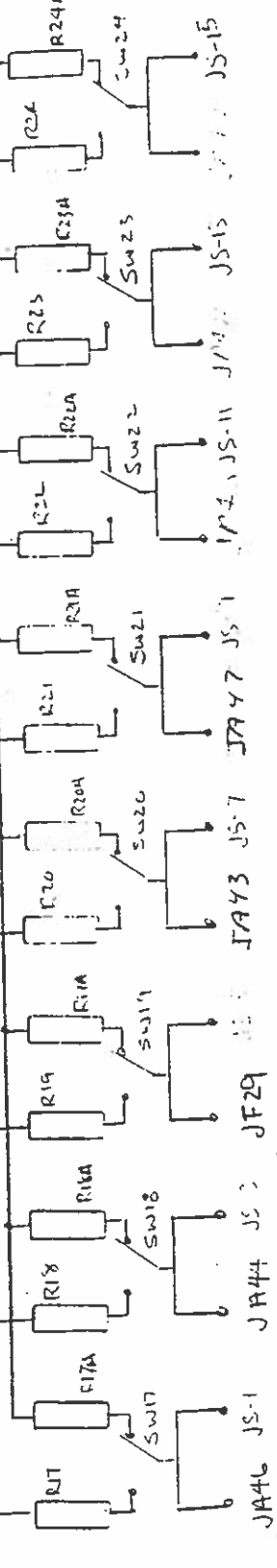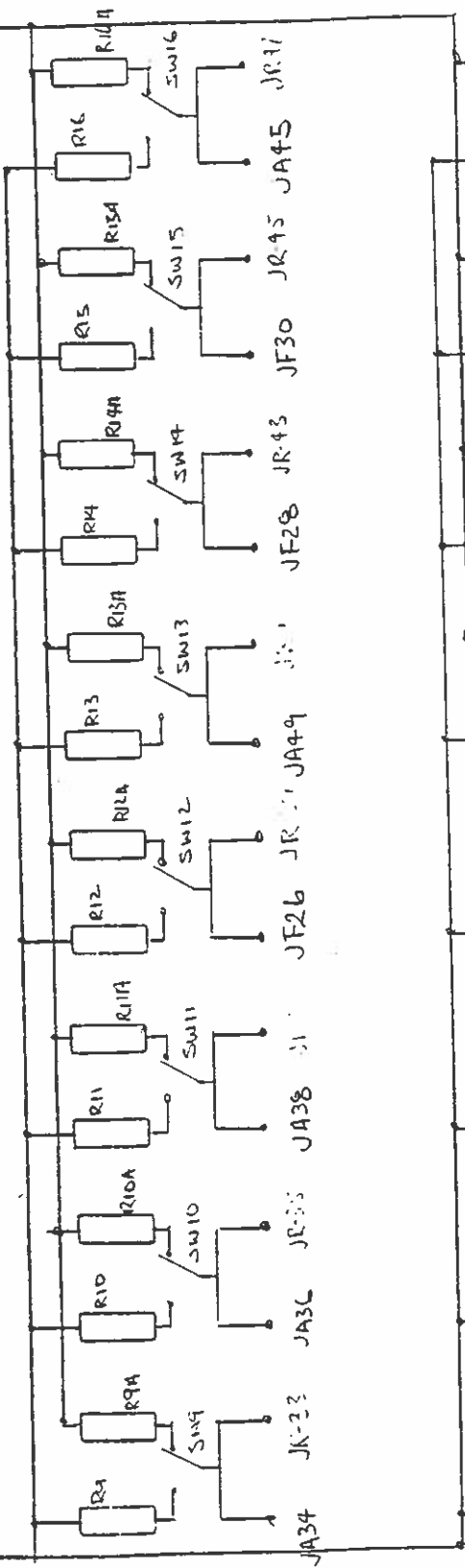
4. DRIVE CONTROL DOES NOT REQUIRE PSV TO RESISTORS.
5. JR - 50 PIN CONNECTOR.