Burroughs	
BURROUGHS MACHINES LIMITED CUMBERNAULD, SCOTLAND, U.K.	
TITLE	**MAIN MTR FLOW** (Page 1 of 5)
ENG: JEB	DATE:
DWG NO.: 2801 8265	REV.: A
CLASSIFICATION CODE: 2-9520	RELEASED: DEC 14 1977

NOTE: IF NO METER LIMITS ARE STATED IN ANY MEASUREMENTS IN THE FOLLOWING PROCEDURES, THEN TTL LIMITS MAY BE ASSUMED

START 1

Power off
Lift cover
POWER OFF INSPECTION
Check that all PCB's are plugged in and that all harness plugs are in place
Check that the ribbon is correctly fitted
Check that the turret connections to the Sensor and Solenoid boards are in place
Check that the Stacker belt is in place
Check bridge motor and stacker motor can rotate by hand
Rotate man motor anticlockwise by hand and check that all the fixed rollers for the horizontal, vertical and low speed drivers rotate
Open document transport and check Sensors 1 and 2 boards are firmly held and not obviously misplaced
Blow dirt out of Skew and Dog Ear Sensors
Close document transport
Check that Sieko printer drum can be rotated by hand
Check that none of the hammer springs on the Sieko Printer are missing
Check that no wire has broken from the Solenoid coils and can be obviously seen

Remove hammer slug and check that it is in good condition

ALL OK? NO → Take remedial action referring if necessary to the Mechanical Adjustments Section 4

YES

Re-insert hammer slug
Close Doc. transport

POWER OFF INSPECTION COMPLETE

2

2

POWER ON INSPECTION

MTR switch on
All mode switches off
Jam access switches on
Power on
At this point check that none of the Solenoids on the machine are permanently picked
Also check that the ribbon motor is not driving continuously and that the encode wheel can be turned by hand away from the home position
Check that no seiko printer hammers are firing
Are all the above conditions met?

? NO → If the ribbon motor is driving continuously remove ribbon and return to main flow

If the detent or hammer solenoid is picked all the time then remove J15

YES

Is ON Lamo Lit

3

METER–DVM
Common DAO (GND)
Lead AAO (+24V)
Reading +23.5V to +26.1V

? NO → POWER SUPPLY MP 58

YES

METER–DVM
Common DAO (GND)
Lead FF5 (-12V)
Reading -11.6V to -12.4V

? NO → POWER SUPPLY MP 62

YES

METER–DVM
Common DAO (GND)
Lead BC7U (-9V)
Reading -8.5V to -9.5V

? NO → POWER SUPPLY MP 68

YES

METER–DVM
Common DAO (GND)
Lead FAO
Reading -2.95V to -3.35V

? NO → POWER SUPPLY MP 70

YES

Connect and remove a 3.1 resistor from DAO (GND) to AAO (+24V)
Does circuit breaker stay on

Connect and remove a 3.1 resistor from DAO (GND) to DF6 (+5V)
Does circuit breaker stay on

? NO → POWER SUPPLY MP 74

YES

Connect and Remove a 3.1 Ω Resistor from DAO (GND) to FF5 (–12V).
Does Circuit Breaker Stay on.

? NO → POWER SUPPLY MP 75

YES

Power off
METER–REPEAT COUNT
TTL input
Switch -ve
Common DAO (GND)
Lead EA1R (INIT)
Depress start on meter
Power on
Count = 1 within 5 seconds (note count may be more than 1 due to noise)

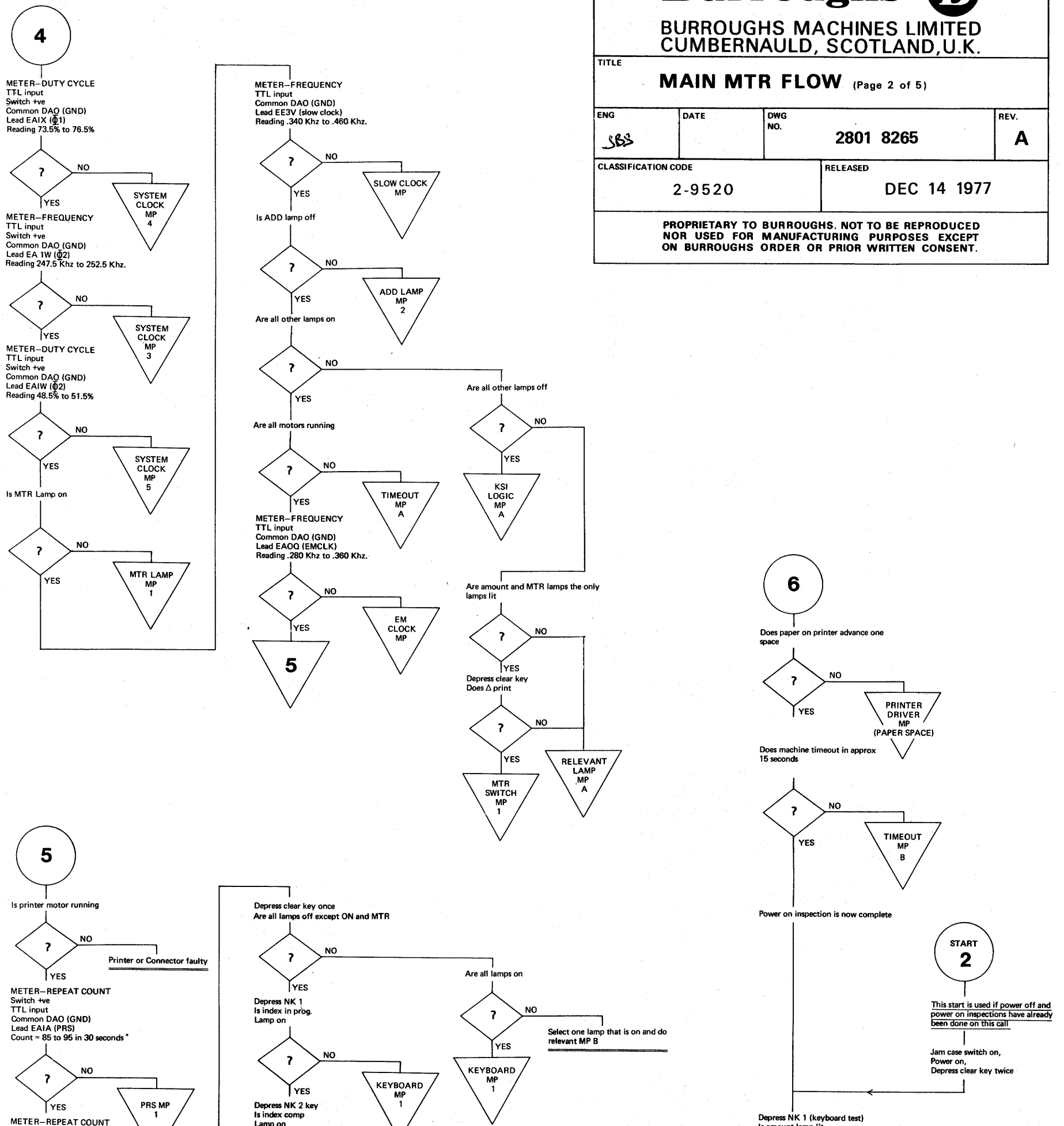
? NO → INITIALIZE MP

YES

METER–FREQUENCY
TTL input
Switch +ve
Common DAO (GND)
Lead EAIX (Φ1)
Reading 247.5 Khz.

? NO →

YES



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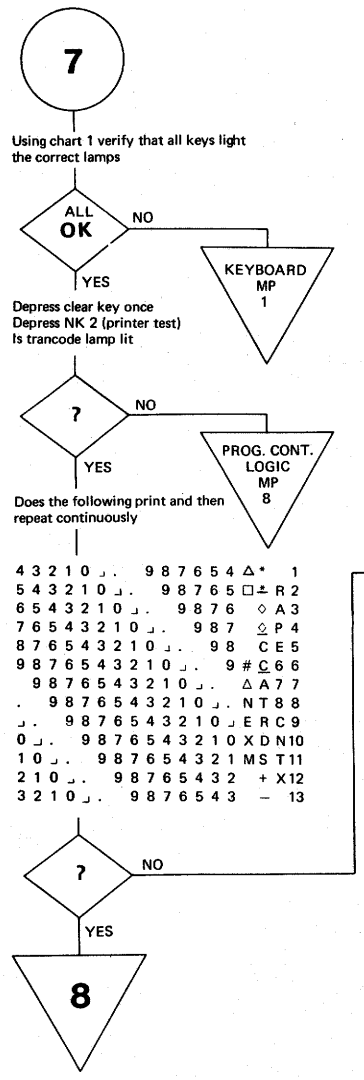

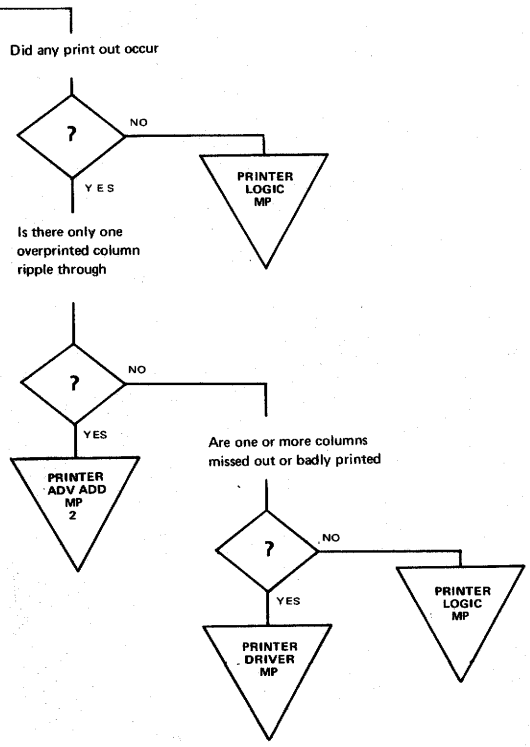

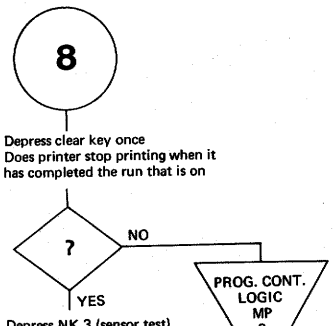

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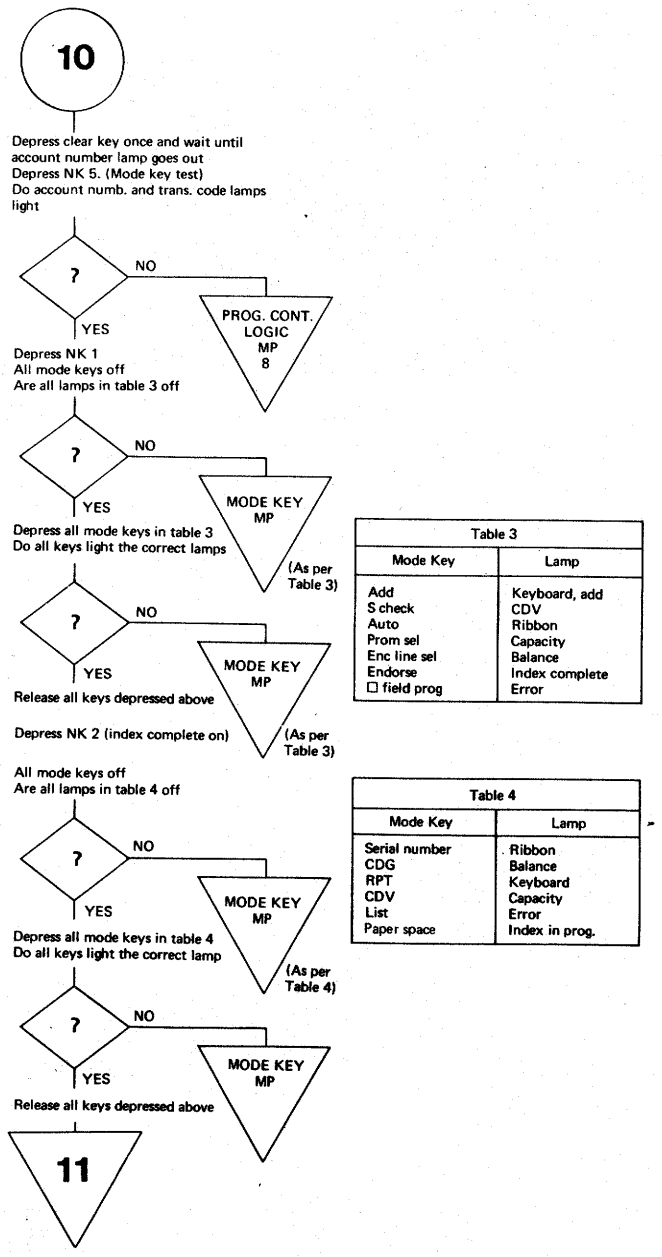
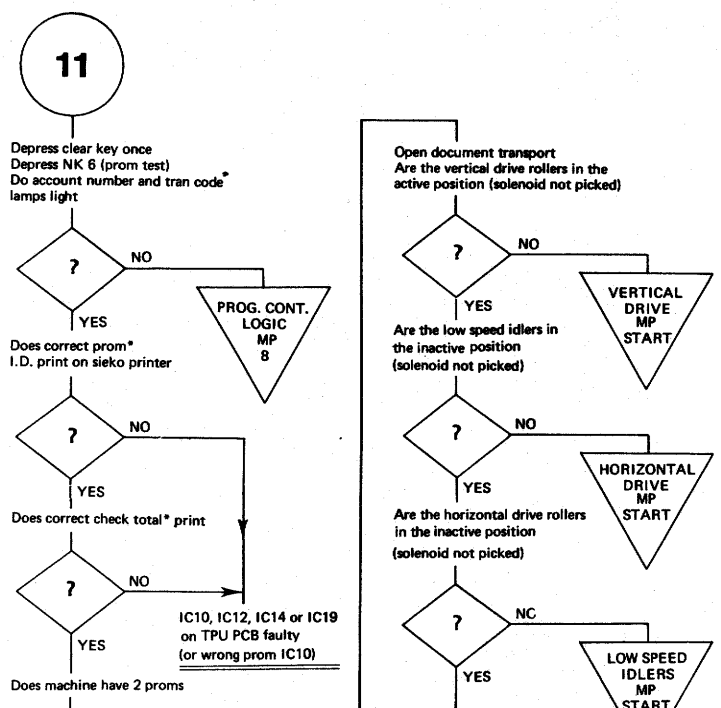


Table 3	
Mode Key	Lamp
Add	Keyboard, add
S check	CDV
Auto	Ribbon
Prom sel	Capacity
Enc line sel	Balance
Endorse	Index complete
☐ field prog	Error

Table 4	
Mode Key	Lamp
Serial number	Ribbon
CDG	Balance
RPT	Keyboard
CDV	Capacity
List	Error
Paper space	Index in prog.



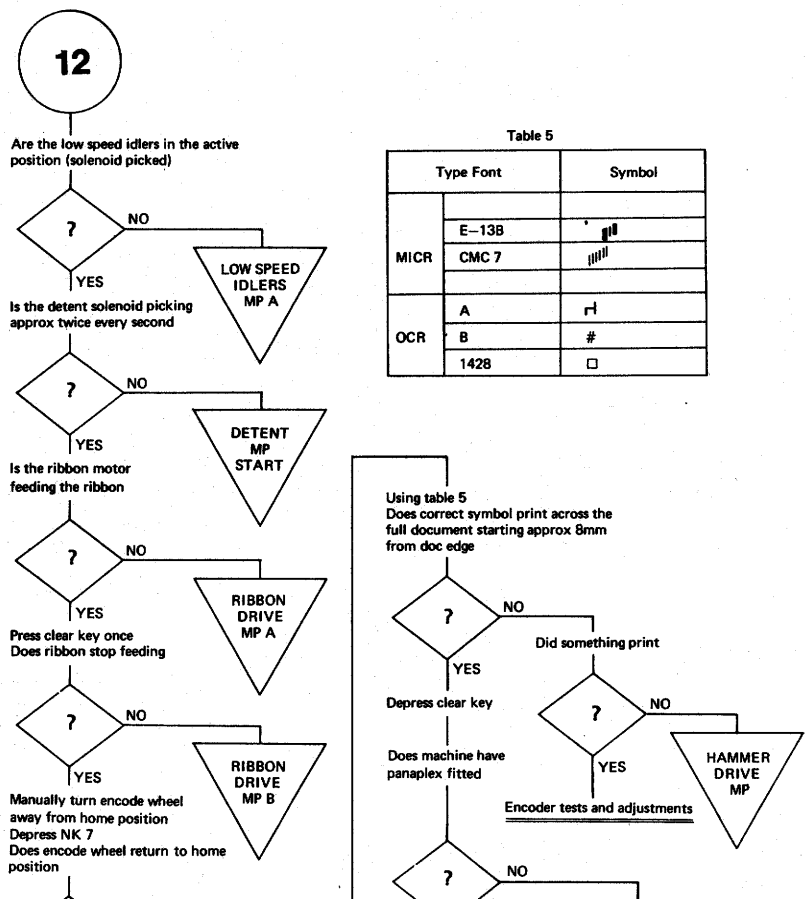


Table 5

Type Font		Symbol
MICR		
	E–13B	
	CMC 7	
OCR	A	
	B	#
	1428	☐

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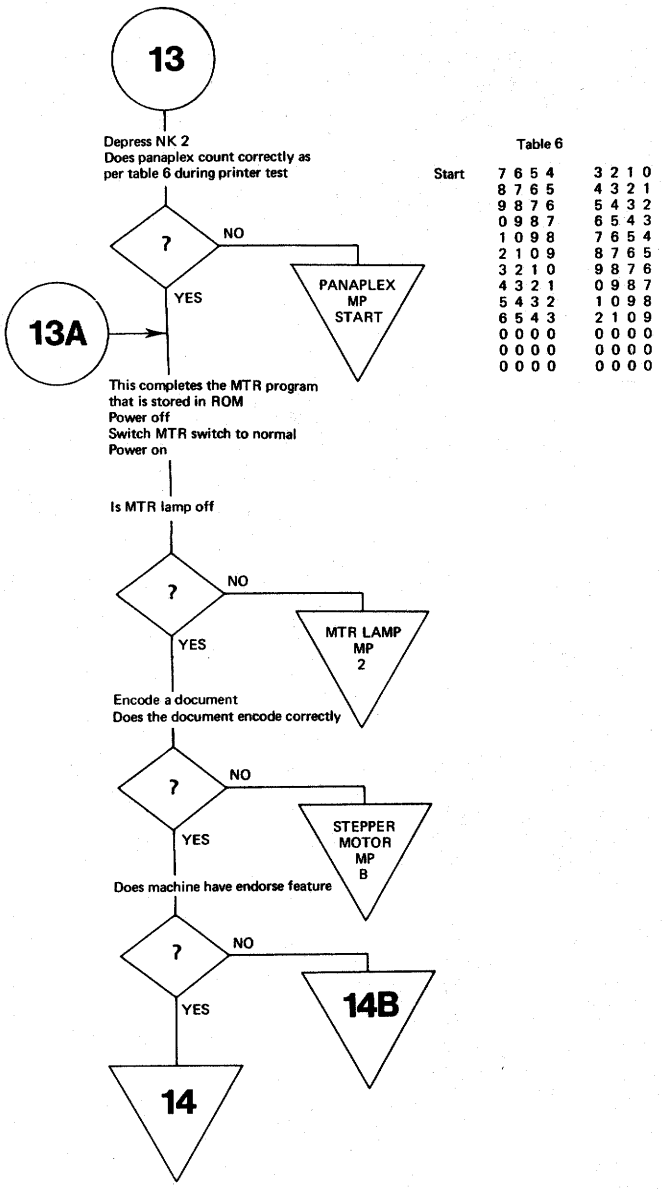

Table 6

Start										
	7	6	5	4		3	2	1	0
	8	7	6	5		4	3	2	1
	9	8	7	6		5	4	3	2
	0	9	8	7		6	5	4	3
	1	0	9	8		7	6	5	4
	2	1	0	9		8	7	6	5
	3	2	1	0		9	8	7	6
	4	3	2	1		0	9	8	7
	5	4	3	2		1	0	9	8
	6	5	4	3		2	1	0	9
	0	0	0	0		0	0	0	0
	0	0	0	0		0	0	0	0
	0	0	0	0		0	0	0	0

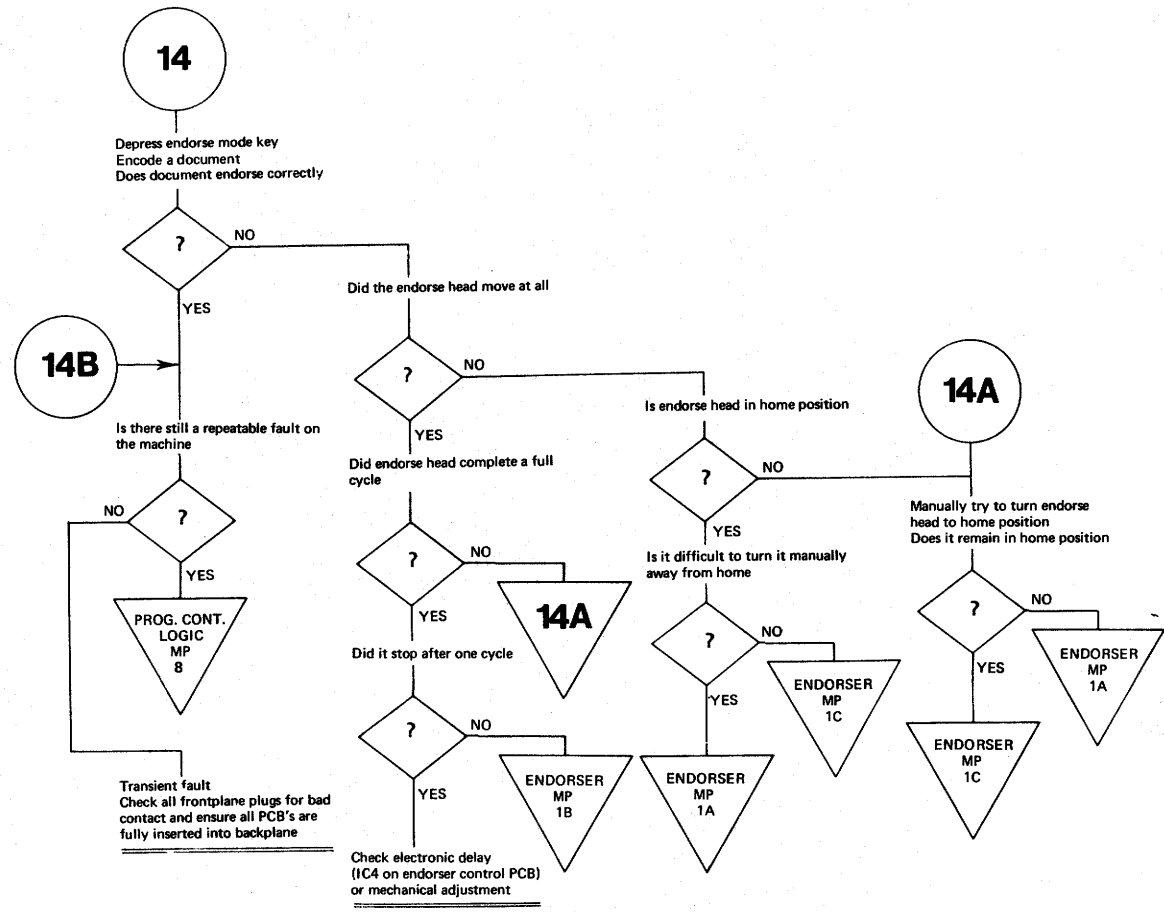

CHART 1

Lamp '0' = OFF '1' = ON

Key	Indexing In Prog.	F8	F7	F6	Indexing Complete	Keyboard	Error	Ribbon	Hexidecimal Code
0	1	0	1	1	0	0	0	0	B 0
1	1	0	1	1	0	0	0	1	B 1
2	1	0	1	1	0	0	1	0	B 2
3	1	0	1	1	0	0	1	1	B 3
4	1	0	1	1	0	1	0	0	B 4
5	1	0	1	1	0	1	0	1	B 5
6	1	0	1	1	0	1	1	0	B 6
7	1	0	1	1	0	1	1	1	B 7
8	1	0	1	1	1	0	0	0	B 8

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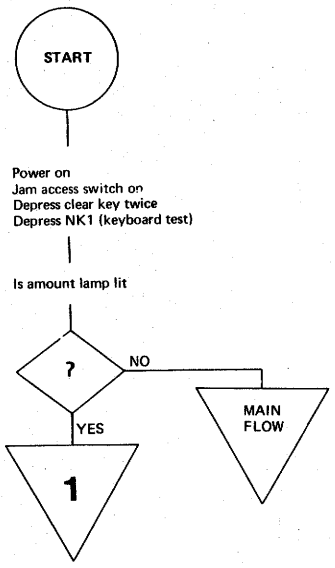
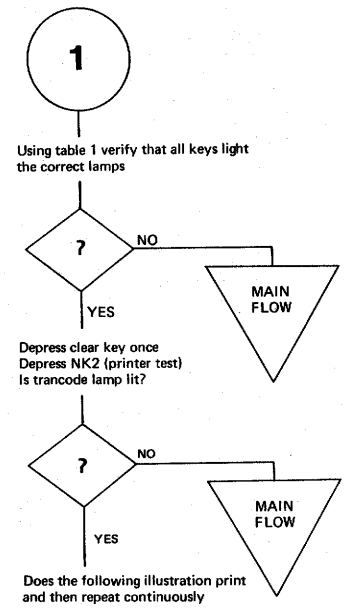


Table 1

Lamp '0' = OFF '1' = ON

Key	Indexing In Prog.	F8	F7	F6	Indexing Complete	Keyboard	Error	Ribbon	Hexidecimal Code
0	1	0	1	1	0	0	0	0	B 0
1	1	0	1	1	0	0	0	1	B 1
2	1	0	1	1	0	0	1	0	B 2
3	1	0	1	1	0	0	1	1	B 3
4	1	0	1	1	0	1	0	0	B 4
5	1	0	1	1	0	1	0	1	B 5
6	1	0	1	1	0	1	1	0	B 6
7	1	0	1	1	0	1	1	1	B 7
8	1	0	1	1	1	0	0	0	B 8
9	1	0	1	1	1	0	0	1	B 9
00	1	0	1	1	1	0	1	0	B A
000	1	0	1	1	1	0	1	1	B B
SP	1	0	1	1	1	1	0	1	B D
III	1	0	1	1	1	1	1	0	B E
RESET	1	1	1	0	0	0	0	1	E 1
NC	1	1	1	0	0	0	1	0	E 2
+	1	1	1	0	0	0	1	1	E 3
–	1	1	1	0	0	1	0	0	E 4
PN	1	1	1	0	0	1	0	1	E 5
*	1	1	1	0	0	1	1	0	E 6
AC	1	1	1	0	0	1	1	1	E 7
A	1	1	1	0	1	0	0	0	E 8
NA	1	1	1	0	1	0	0	1	E 9
ND	1	1	1	0	1	0	1	0	E A
C	1	1	1	0	1	0	1	1	E B
◇	1	1	1	0	1	1	0	0	E C
SN	1	1	1	0	1	1	0	1	E D
SKP	1	1	1	0	1	1	1	0	E E
NP	1	1	1	0	1	1	1	1	E F
PANAPLEX CLEAR	1	0	1	0	0	1	1	1	A 7
D1	1	0	1	0	1	1	0	0	A C
D2	1	0	1	0	1	1	0	1	A D
D3	1	0	1	0	1	1	1	0	A E
D4 (N)	1	0	1	0	1	1	1	1	A F
AMT	1	1	1	1	0	0	0	0	F 0
TC	1	1	1	1	0	0	0	1	F 1
AN	1	1	1	1	0	0	1	0	F 2
RT	1	1	1	1	0	0	1	1	F 3
AX	1	1	1	1	0	1	0	0	F 4
F6	1	1	1	1	0	1	0	1	F 5
F7	1	1	1	1	0	1	1	0	F 6
F8	1	1	1	1	0	1	1	1	F 7



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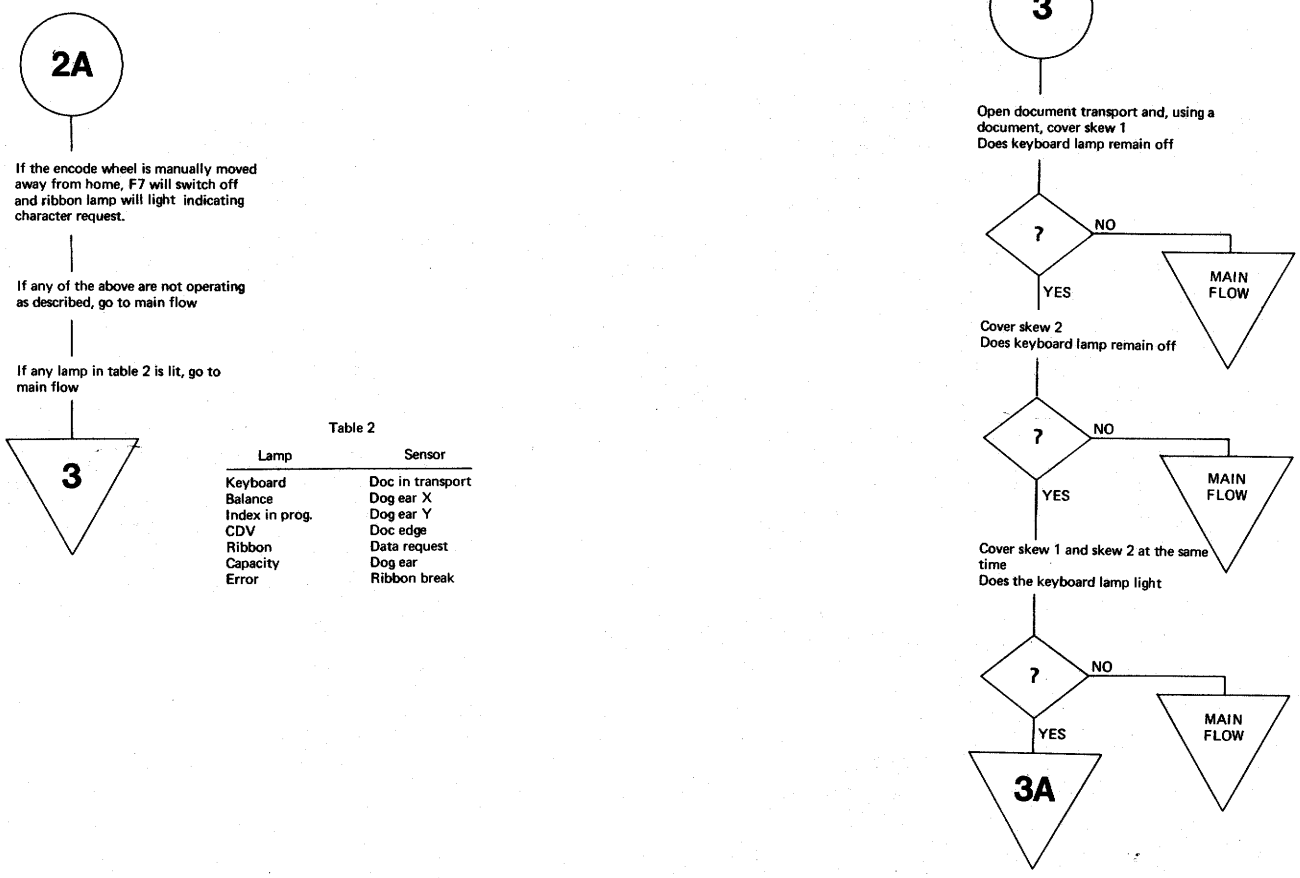

Table 2

Lamp	Sensor
Keyboard	Doc in transport
Balance	Dog ear X
Index in prog.	Dog ear Y
CDV	Doc edge
Ribbon	Data request
Capacity	Dog ear
Error	Ribbon break

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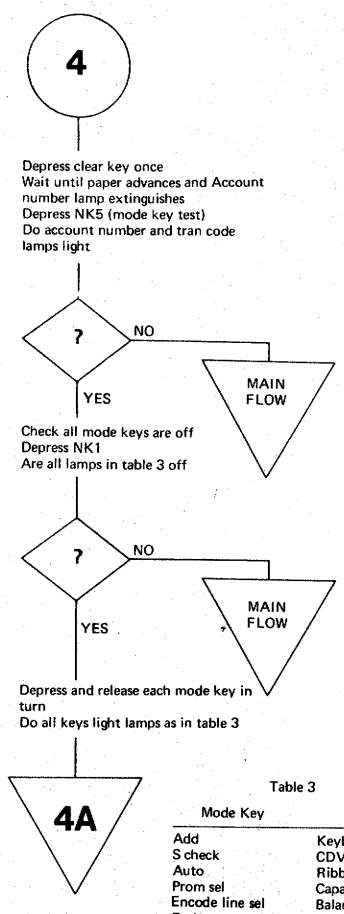

Table 3

Mode Key	Lamp
Add	Keyboard add
S check	CDV
Auto	Ribbon
Prom sel	Capacity
Encode line sel	Balance
Endorse	Index complete
☐ field prog.	Error

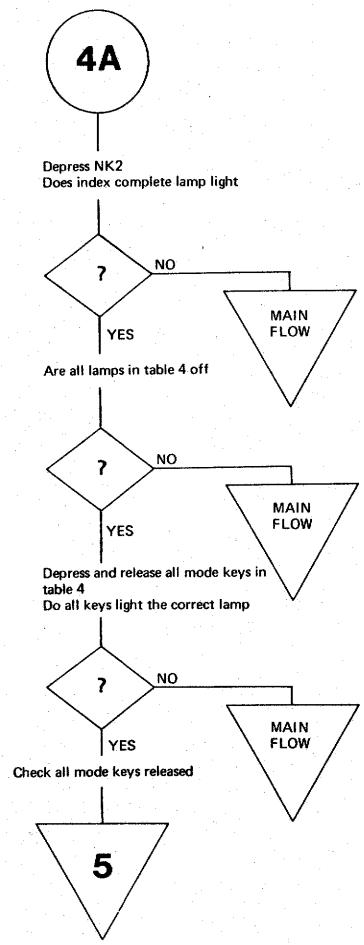

Table 4

Mode Key	Lamp
Serial Number	Ribbon
CDG	Balance
RPT	Keyboard
CDV	Capacity
List	Error
Paper space	Index in prog.

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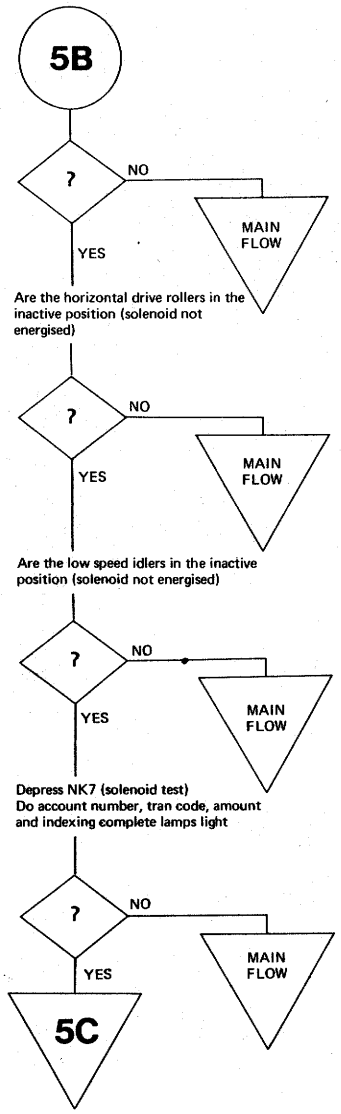

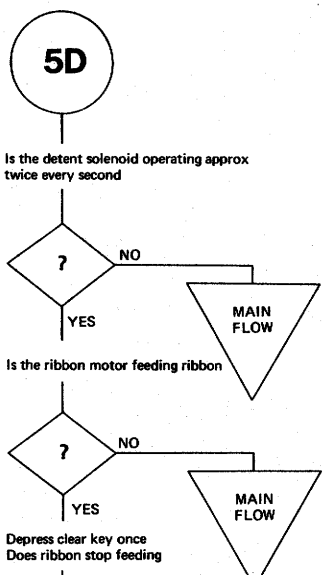

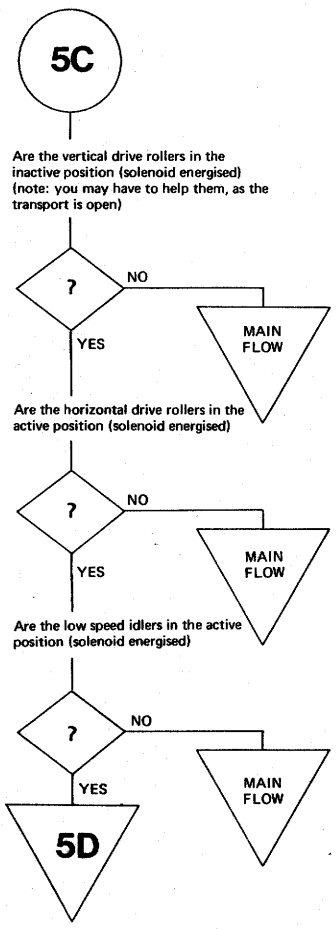

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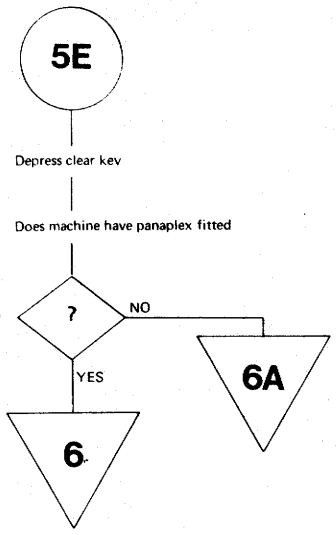


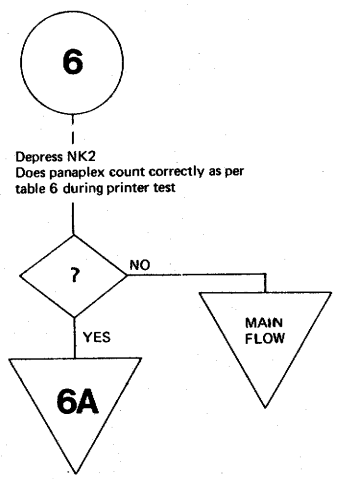
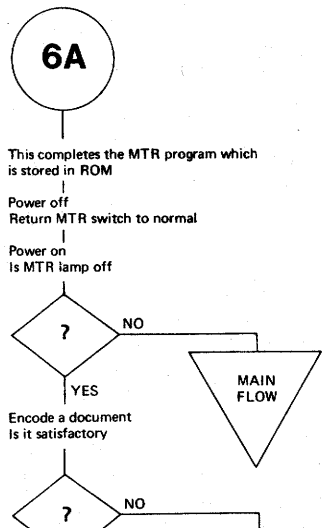
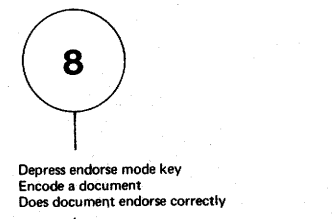


Table 6

Start	7	6	5	4					3	2	1	0			
	8	7	6	5					4	3	2	1			
	9	8	7	6					5	4	3	2			
	0	9	8	7					6	5	4	3			
	1	0	9	8					7	6	5	4			
	2	1	0	9					8	7	6	5			
	3	2	1	0					9	8	7	6			
	4	3	2	1					0	9	8	7			
	5	4	3	2					1	0	9	8			
	6	5	4	3					2	1	0	9			
	0	0	0	0					0	0	0	0			
	0	0	0	0					0	0	0	0			
	0	0	0	0					0	0	0	0			





START A — Lamp fails to light

Power off
Remove lamp L6 from indicator PCB
Check lamp for continuity
Resistance = 20Ω approx

OK? NO → Lamp faulty
YES

Replace lamp
Power on
Lamp lit?

OK? NO
YES

Faulty connection between lamp and PCB

METER–DUTY CYCLE
Common–DAO (GND)
Lead–EC7I
Positive logic
Reading = 45 to 55%

OK? NO
YES

METER–DUTY CYCLE
Common–DAO (GND)
Lead–EC7H
Positive logic
Reading = 0 to 2%

OK? NO
YES

Power off
Lamp driver PCB on extender
METER–DUTY CYCLE
Common–DAO (GND)
Lead–IC2 pin 8 (lamp DRV PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO → IC3, IC1, IC2, IC4 or IC5 on lamp driver PCB faulty
YES

METER–DUTY CYCLE
Common–DAO (GND)
Lead–IC2 pin 10 (lamp DRV PCB)
Positive logic
Reading = 45 to 55%

OK? NO → IC2 on lamp DRV PCB faulty
YES

Q8, R8, on lamp DRV PCB or harness faulty

Power off
Reinsert lamp driver PCB
KSI PCB on extender
METER–DUTY CYCLE
Common–DAO (GND)
Lead–IC11 pin 13 (KSI PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO
YES

IC11 on KSI PCB or IC3 on lamp driver PCB faulty

Power off
Reinsert lamp driver PCB
KSI PCB on extender
METER–DUTY CYCLE
Common–DAO (GND)
Lead–IC11 pin 1 (KSI PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO
YES

IC11 on KSI PCB or IC2 on lamp driver PCB faulty

Power off
Replace IC11 and IC10 on KSI PCB
Power on
Repeat previous duty cycle measurement
Reading = 45 to 55%

OK? NO
YES

KSI LOGIC MP 3

Replaced IC11 or IC10 on KSI PCB faulty

1

1

Power off
Replace IC11 and IC10 on KSI PCB
METER–DUTY CYCLE
Common–DAO (GND)
Lead IC11 pin 13 (KSI PCB)
positive logic
Power on
Reading = 45 to 55%

OK? NO
YES

Replaced IC10 or IC11 on KSI PCB faulty

KSI LOGIC MP 2

2

Meter and common as before
Lead–EC7I
Check reading = 45 to 55%

OK? NO
YES

IC3, IC2, IC1, IC4 or IC5 on lamp driver PCB faulty

Power off
Reinsert lamp driver PCB
KSI PCB on extender
Power on
Meter and common as before
Lead–IC11 pin 13
Check reading = 45 to 55%

OK? NO → KSI LOGIC MP 2
YES

IC11 on KSI PCB or IC3 on lamp driver PCB or backplane harness faulty

3

Power off
Reinsert lamp driver PCB
KSI PCB on extender
Power on
Meter and common as before
Lead–IC11 pin 1
Check reading = 45 to 55%

OK? NO
YES

IC11 KSI PCB or IC2 lamp driver PCB or harness faulty

Was previous reading = 98 to 100%

? NO → KSI LOGIC MP 4
YES

METER–DVM
Common–DAO (GND)
Lead–IC10 pin 14
Check reading = -11.4 to -12.6V

OK? YES → Harness faulty
NO

Power off
Replace IC10 on KSI PCB with new chip
Power on
Is fault still on machine

? NO → Replaced IC faulty
YES

KSI LOGIC MP 4

START B — Lamp fails to extinguish

NOTE: ALL DUTY CYCLE MEASUREMENTS ARE FOR POSITIVE LOGIC

Power off
Lamp driver PCB on extender
Power on
Short IC2 pin 10 to DAO (GND) and remove short
Did lamp extinguish when pin was shorted

? NO → Q8 on lamp Driver PCB faulty
YES

METER–DUTY CYCLE (TTL)
Common–DAO (GND)
Lead IC2 Pin 10
Check reading = 45 to 55%

OK? NO
YES

Meter and common as before
Lead IC2 pin 8
Check reading = 45 to 55%

OK? NO
YES

Meter and common as before
Lead IC2 pin 8
Check reading = 0 to 0.3%

OK? NO → IC2 on lamp Driver PCB faulty
YES

Meter and common as before
Lead–EC7H
Check reading = 0 to 0.3%

OK? NO → IC2 on Lamp Driver PCB faulty
YES

Power off
Reinsert Lamp Driver PCB
KSI PCB on Extender
Power on
Meter and Common as before
Lead IC11 Pin 1
Check reading = 98 to 100%

OK? NO
YES

Meter and Common as before
Lead – EDOR
Check reading = 0 to 0.3%

OK? NO → IC11 on KSI PCB or IC2 on lamp driver PCB faulty
YES

Faulty harness

KSI LOGIC MP 3

Burroughs

BURROUGHS MACHINES LIMITED
CUMBERNAULD, SCOTLAND, U.K.

TITLE: **ACCOUNT NO. LAMP** (Page 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8281	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977

Burroughs

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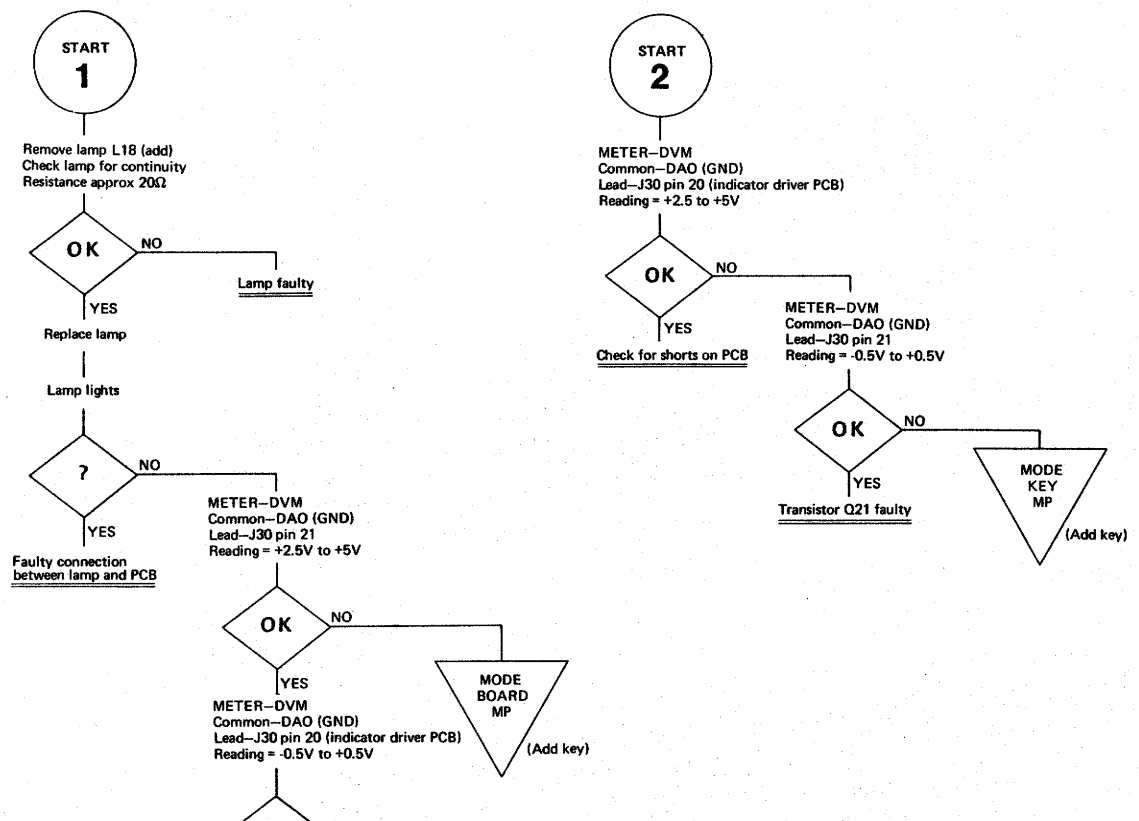
TITLE			
ADD LAMP (Page 1 of 1)			
ENG: JBS	DATE:	DWG NO.: 2801 8299	REV.: A
CLASSIFICATION CODE: 2-9520		RELEASED: DEC 14 1977	

Start 1: Add lamp fails to light when add key is active
Start 2: Add lamp fails to extinguish when add key is released



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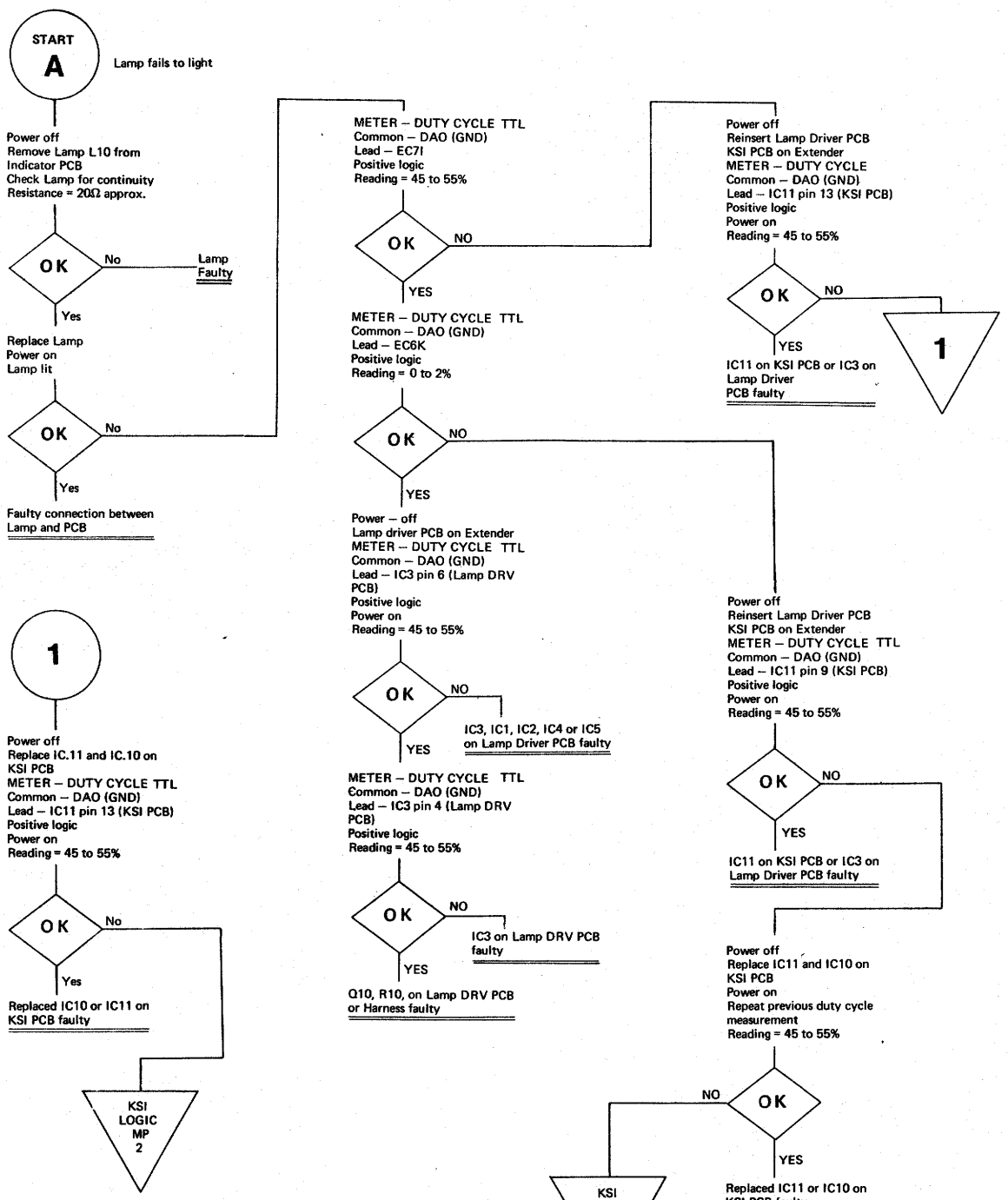
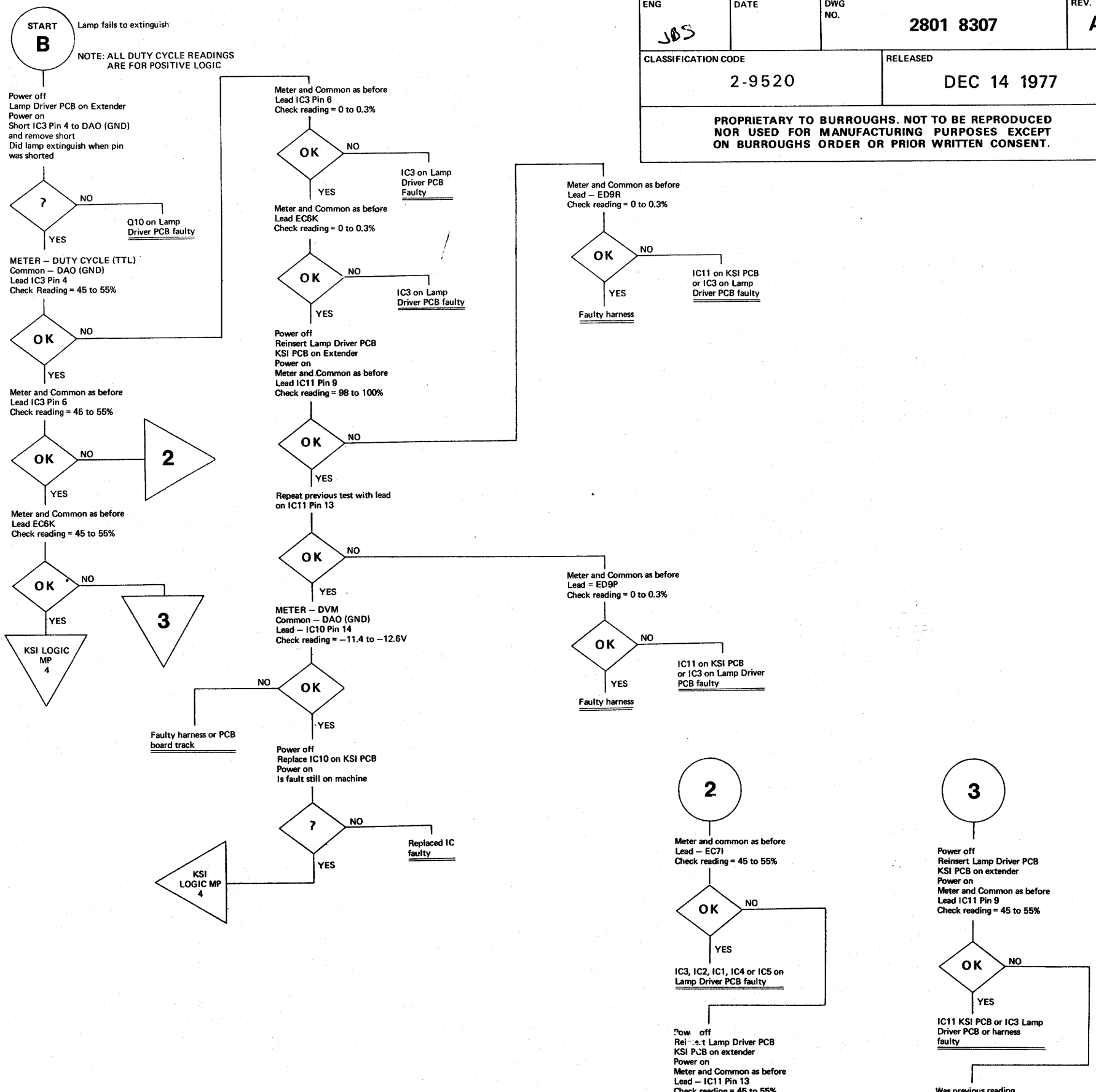
TITLE			
AMOUNT LAMP (Page 1 of 2)			
ENG: JBS	DATE:	DWG NO.: 2801 8307	REV.: A
CLASSIFICATION CODE: 2-9520		RELEASED: DEC 14 1977	



Burroughs	
BURROUGHS MACHINES LIMITED CUMBERNAULD, SCOTLAND, U.K.	
TITLE	**AMOUNT LAMP** (Page 2 of 2)
ENG: JBS	DATE:
DWG NO.: 2801 8307	REV.: A
CLASSIFICATION CODE: 2-9520	RELEASED: DEC 14 1977



START A

Lamp fails to light

Power off
Remove Lamp L2 from Indicator PCB
Check Lamp for continuity
Resistance = 20Ω approx.

OK? NO → Lamp faulty
YES

Replace Lamp
Power on
Lamp lit

OK? NO
YES

Faulty connection between Lamp and PCB

METER – DUTY CYCLE
Common – DAO (GND)
Lead – EC7I
Positive logic
Reading = 45 to 55%

OK? NO
YES

METER – DUTY CYCLE
Common – DAO (GND)
Lead – EC7F
Positive logic
Reading = 0 to 2%

OK? NO
YES

Power off
Lamp driver PCB on extender
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC1 pin 8 (Lamp DRV PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO → IC3, IC1, IC2, IC4 or IC5 on Lamp Driver PCB faulty
YES

METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC1 pin 10 (Lamp DRV PCB)
Positive logic
Reading = 45 to 55%

OK? NO → IC1 on Lamp DRV PCB faulty
YES

Q2, R2, on Lamp DRV PCB or Harness faulty

Power off
Reinsert Lamp Driver PCB
KSI PCB on extender
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC11 pin 13 (KSI PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO
YES

IC11 on KSI PCB or IC3 on Lamp Driver PCB faulty

1

Power off
Reinsert Lamp Driver PCB
KSI PCB on extender
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC11 Pin 5 (KSI PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO
YES

IC11 on KSI PCB or IC1 on Lamp Driver PCB faulty

Power off
Replace IC11 and IC10 on KSI PCB
Power on
Repeat previous duty cycle measurement
Reading = 45 to 55%

OK? NO → KSI LOGIC MP 3
YES

Replaced IC11 or IC10 on KSI PCB faulty

Lamp fails to extinguish

START B

NOTE: ALL DUTY CYCLE MEASUREMENTS ARE FOR POSITIVE LOGIC

Power off
Lamp Driver PCB on extender
Power on
Short IC1 Pin 10 to DAO (GND) and remove short
Did lamp extinguish when pin was shorted

? NO → Q2 on Lamp Driver PCB faulty
YES

METER – DUTY CYCLE (TTL)
Common – DAO (GND)
Lead IC1 Pin 10
Check reading = 45 to 55%

OK? NO
YES

Meter and Common as before
Lead IC1 Pin 8
Check reading 45 to 55%

Meter and Common as before
Lead IC1 Pin 8
Check reading = 0 to 0.3%

OK? NO → IC1 on Lamp Driver PCB faulty
YES

Meter and Common as before
Lead – EC7F
Check reading = 0 to 0.3%

OK? NO → IC1 on Lamp Driver PCB faulty
YES

Power off
Reinsert Lamp Driver PCB
KSI PCB on Extender
Power on
Meter and Common as before
Lead IC11 Pin 5
Check reading = 98 to 100%

OK? NO
YES

Meter and Common as before
Lead – ED0S
Check reading = 0 to 0.3%

OK? NO → IC11 on KSI PCB or IC1 on Lamp Driver PCB faulty
YES

Faulty harness

1

Power off
Replace IC11 and IC10 on KSI PCB
METER – DUTY CYCLE
Common – DAO (GND)
Lead IC11 pin 13 (KSI PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO
YES

Replaced IC10 or IC11 on KSI PCB faulty

KSI LOGIC MP 2

2

Meter and Common as before
Lead EC7T
Check reading = 45 to 55%

OK? NO
YES

IC3, IC2, IC1, IC4 or IC5 on Lamp Driver PCB faulty

Power off
Reinsert Lamp Driver PCB
KSI PCB on extender
Power on
Meter and Common as before
Lead – IC11 Pin 13
Check reading = 45 to 55%

OK? NO → KSI LOGIC MP 2
YES

Replaced IC10 or IC11 on KSI PCB faulty

3

Power off
Reinsert Lamp Driver PCB
KSI PCB on extender
Power on
Meter and Common as before
Lead IC11 Pin 5
Check reading = 45 to 55%

OK? NO
YES

IC11 KSI PCB or IC1 Lamp Driver PCB or harness faulty

Was previous reading = 98 to 100%

? NO → KSI LOGIC MP 4
YES

METER – DVM
Common – DAO (GND)
Lead – IC10 Pin 14
Check reading = –11.4 to –12.6V

OK? YES → Harness faulty
NO

Power off
Replace IC10 on KSI PCB with new chip
Power on
Is fault still on machine

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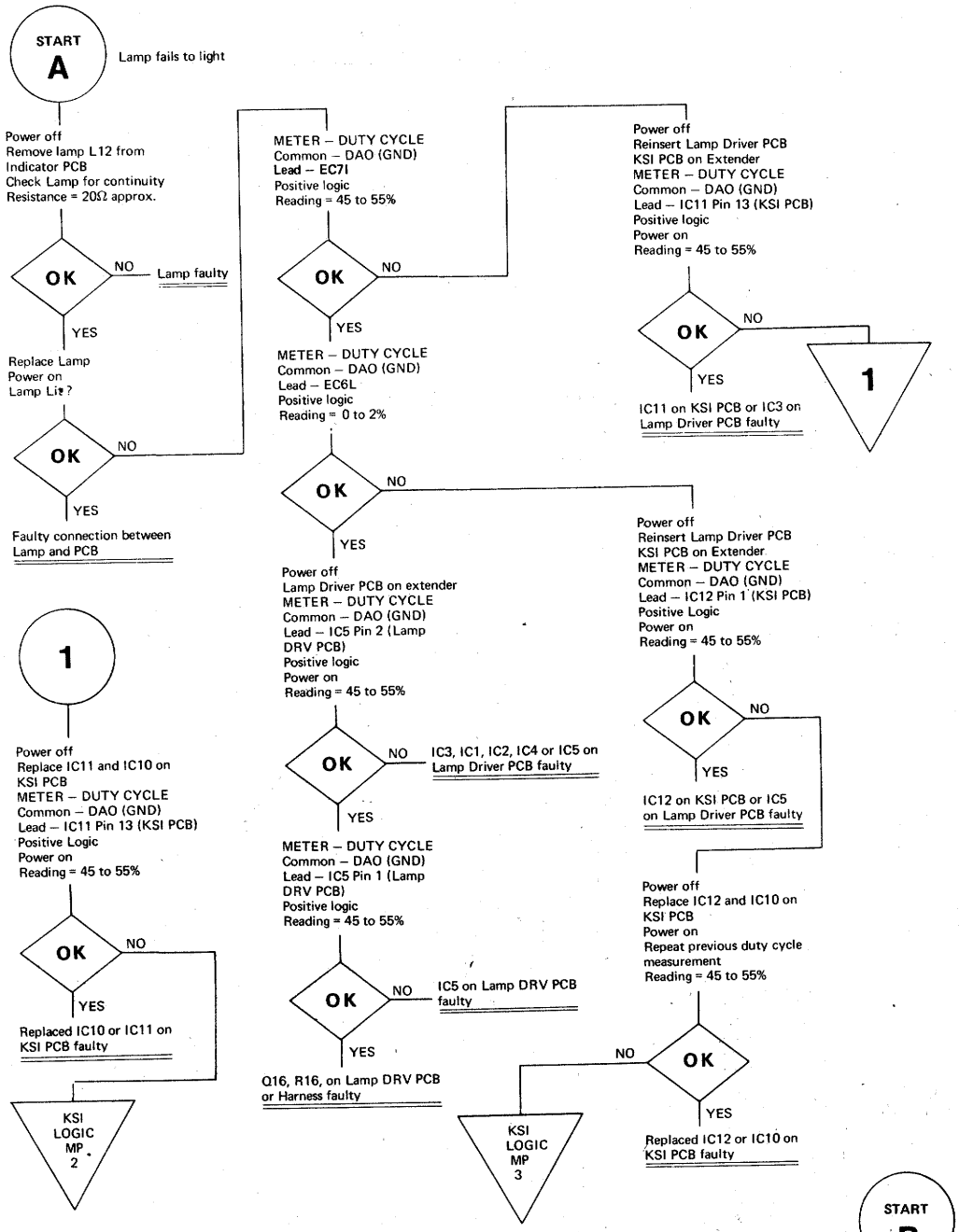
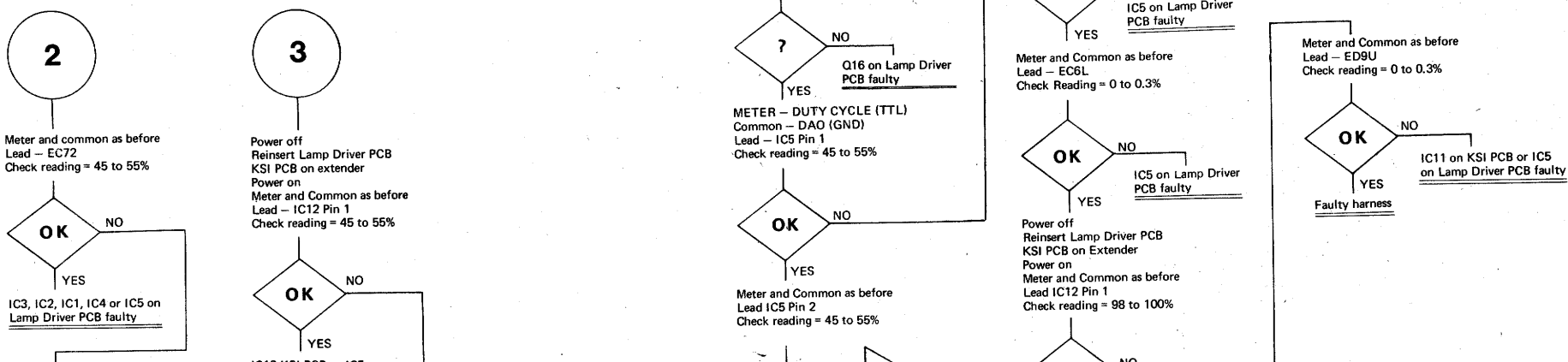
TITLE

AUX. ON US LAMP (Page 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8315	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977





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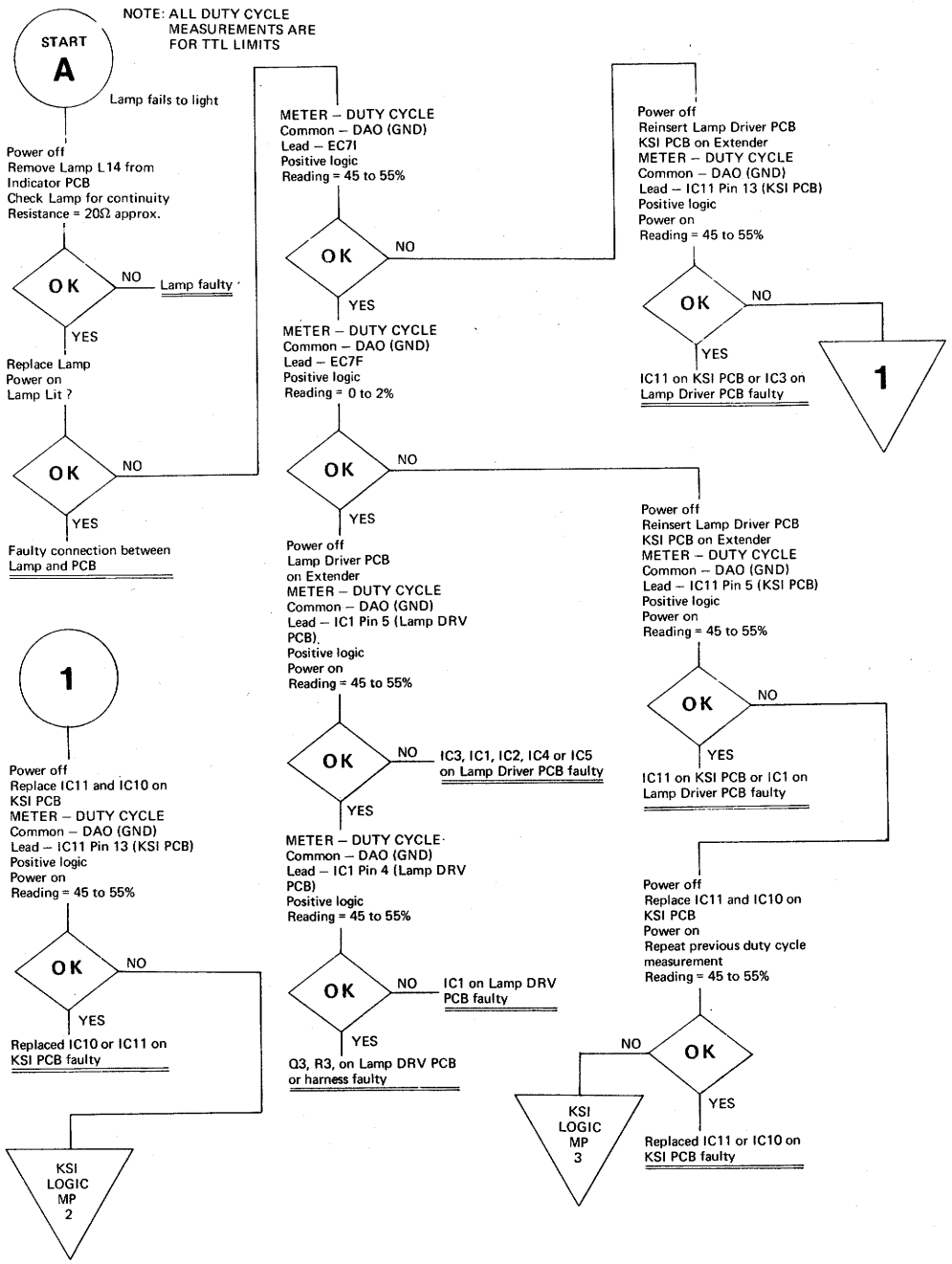
TITLE

BALANCE LAMP (Page 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8323	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977



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CUMBERNAULD, SCOTLAND, U.K.

TITLE

CAPACITY LAMP (Page 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8331	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977

NOTE: ALL DUTY CYCLE MEASUREMENTS ARE FOR TTL LIMITS

START A

Lamp fails to light

Power off
Remove Lamp L16 from Indicator PCB
Check Lamp for continuity
Resistance = 20Ω approx.

OK? NO → Lamp faulty

YES

Replace lamp
Power on
Lamp lit ?

OK? NO

YES

Faulty connection between Lamp and PCB

OK? NO

METER – DUTY CYCLE
Common – DAO (GND)
Lead – EC7I
Positive logic
Reading 45 to 55%

OK? NO

YES

METER – DUTY CYCLE
Common – DAO (GND)
Lead – EC7E
Positive logic
Reading = 0 to 2%

OK? NO

YES

Power off
Lamp Driver PCB on Extender
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC1 Pin 2 (Lamp DRV PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO → IC3, IC1, IC2, IC4 or IC5 on Lamp Driver PCB faulty

YES

METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC1 Pin 1 (Lamp DRV PCB)
Positive logic
Reading = 45 to 55%

OK? NO → IC1 on Lamp DRV PCB faulty

YES

Q4, R4, on Lamp DRV PCB or harness faulty

Power off
Reinsert Lamp Driver PCB
KSI PCB on Extender
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC11 Pin 13 (KSI PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO

YES

IC11 on KSI PCB or IC3 on Lamp Driver PCB faulty

1

Power off
Reinsert Lamp Driver PCB
KSI PCB on Extender
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC11 Pin 3 (KSI PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO

YES

IC11 on KSI PCB or IC1 on Lamp Driver PCB faulty

Power off
Replace IC11 and IC10 on KSI PCB
Power on
Repeat previous Duty Cycle measurement
Reading = 45 to 55%

OK? NO → KSI LOGIC MP 3

YES

Replaced IC11 or IC10 on KSI PCB faulty

1

Power off
Replace IC11 and IC10 on KSI PCB
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC11 Pin 13 (KSI PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO

YES

Replaced IC10 or IC11 on KSI PCB faulty

KSI LOGIC MP 2

NOTE: ALL DUTY CYCLE MEASUREMENTS ARE FOR POSITIVE LOGIC

START B

Lamp fails to extinguish

Power off
Lamp Driver PCB on Extender
Power on
Short IC1 Pin 1 to DAO (GND) and remove short
Did Lamp extinguish when pin was shorted

? NO → Q4 on Lamp Driver PCB faulty

YES

METER – DUTY CYCLE (TTL)
Common – DAO (GND)
Lead IC1 Pin 1
Check reading = 45 to 55%

OK? NO

YES

Meter and Common as before
Lead – IC1 Pin 2
Check reading = 0 to 0.3%

OK? NO → IC1 on Lamp Driver PCB faulty

YES

Meter and Common as before
Lead – EC7E
Check reading = 0 to 0.3%

OK? NO → IC1 on Lamp Driver PCB faulty

YES

Power off
Reinsert Lamp Driver PCB
KSI PCB on Extender
Power on
Meter and Common as before
Lead – IC11 Pin 3
Check reading = 98 to 100%

Meter and Common as before
Lead – ED9S
Check reading = 0 to 0.3%

OK? NO → IC11 on KSI PCB or IC1 on Lamp Driver PCB faulty

YES

Faulty harness

2

Meter and Common as before
Lead – EC7I
Check reading = 45 to 55%

OK? NO

YES

IC3, IC2, IC1, IC4 or IC5 on Lamp Driver PCB faulty

Power off
Reinsert Lamp Driver PCB
KSI PCB on Extender
Power on
Meter and Common as before
Lead – IC11 Pin 13
Check reading = 45 to 55%

OK? NO → KSI LOGIC MP 2

YES

IC11 on KSI PCB or IC3 on Lamp Driver PCB or Backplane harness faulty

3

Power off
Reinsert Lamp Driver PCB
KSI PCB on Extender
Power on
Meter and Common as before
Lead – IC11 Pin 3
Check reading = 45 to 55%

OK? NO

YES

IC11 KSI PCB or IC1 Lamp Driver PCB or harness faulty

Was previous reading = 98 to 100%

? NO → KSI LOGIC MP 4

YES

METER – DVM
Common – DAO (GND)
Lead – IC10 Pin 14
Check reading = –11.4 to –12.6V

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TITLE

CDV LAMP (Page 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8349	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977

Burroughs

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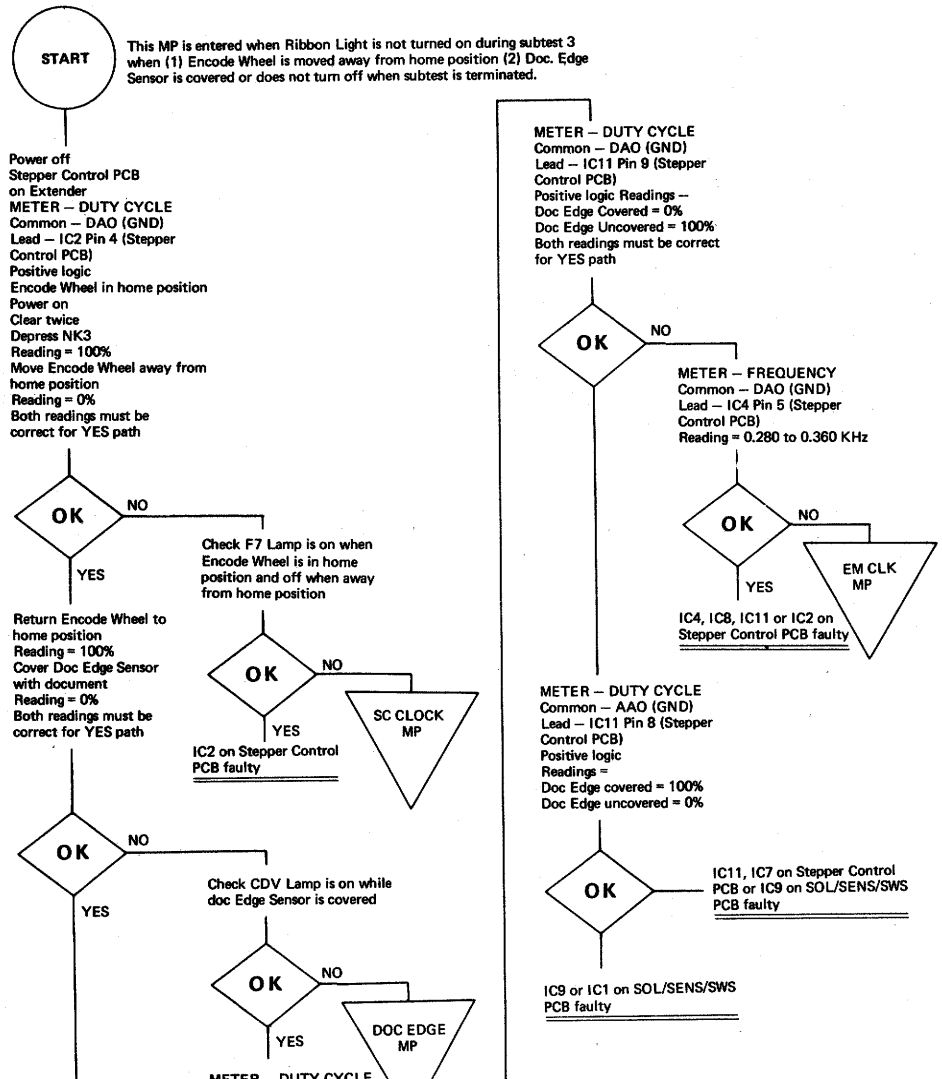
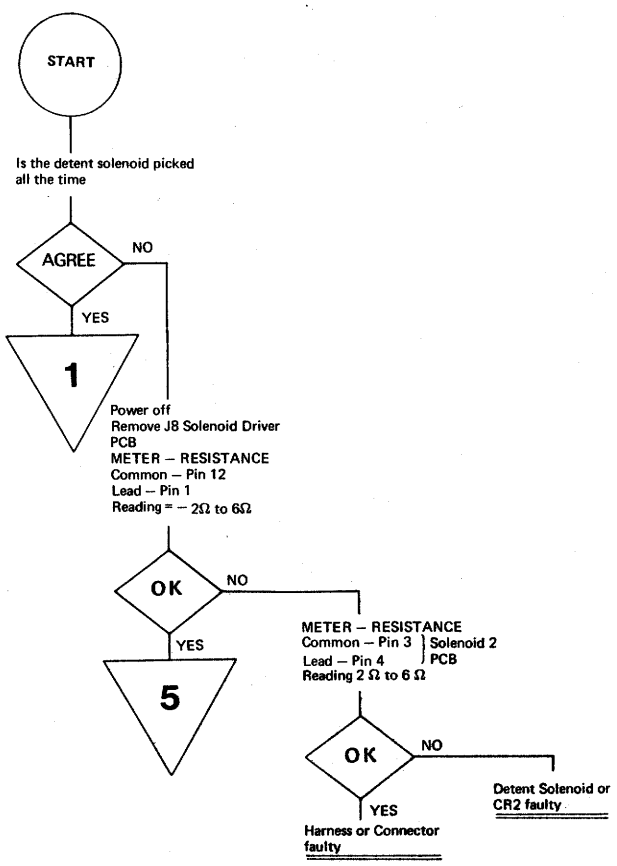
TITLE

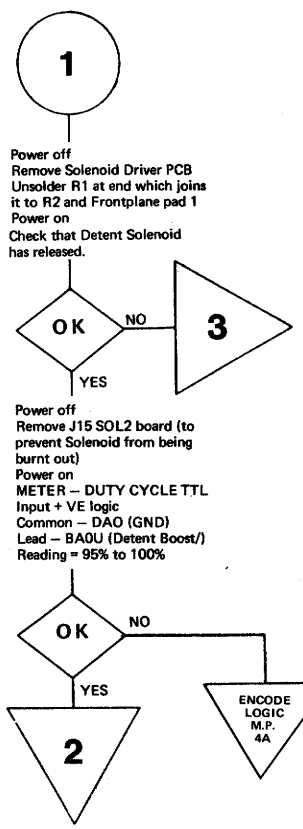
CHARACTER REQUEST (Page 1 of 1)

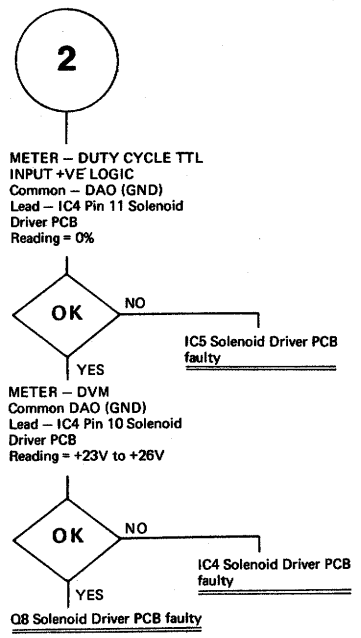
ENG	DATE	DWG NO.	REV.
JBS		2801 8356	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977









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TITLE			
DETENT (Page 1 of 2)			
ENG. JBS	DATE	DWG NO. 2801 8364	REV. A
CLASSIFICATION CODE 2-9520		RELEASED DEC 14 1977	

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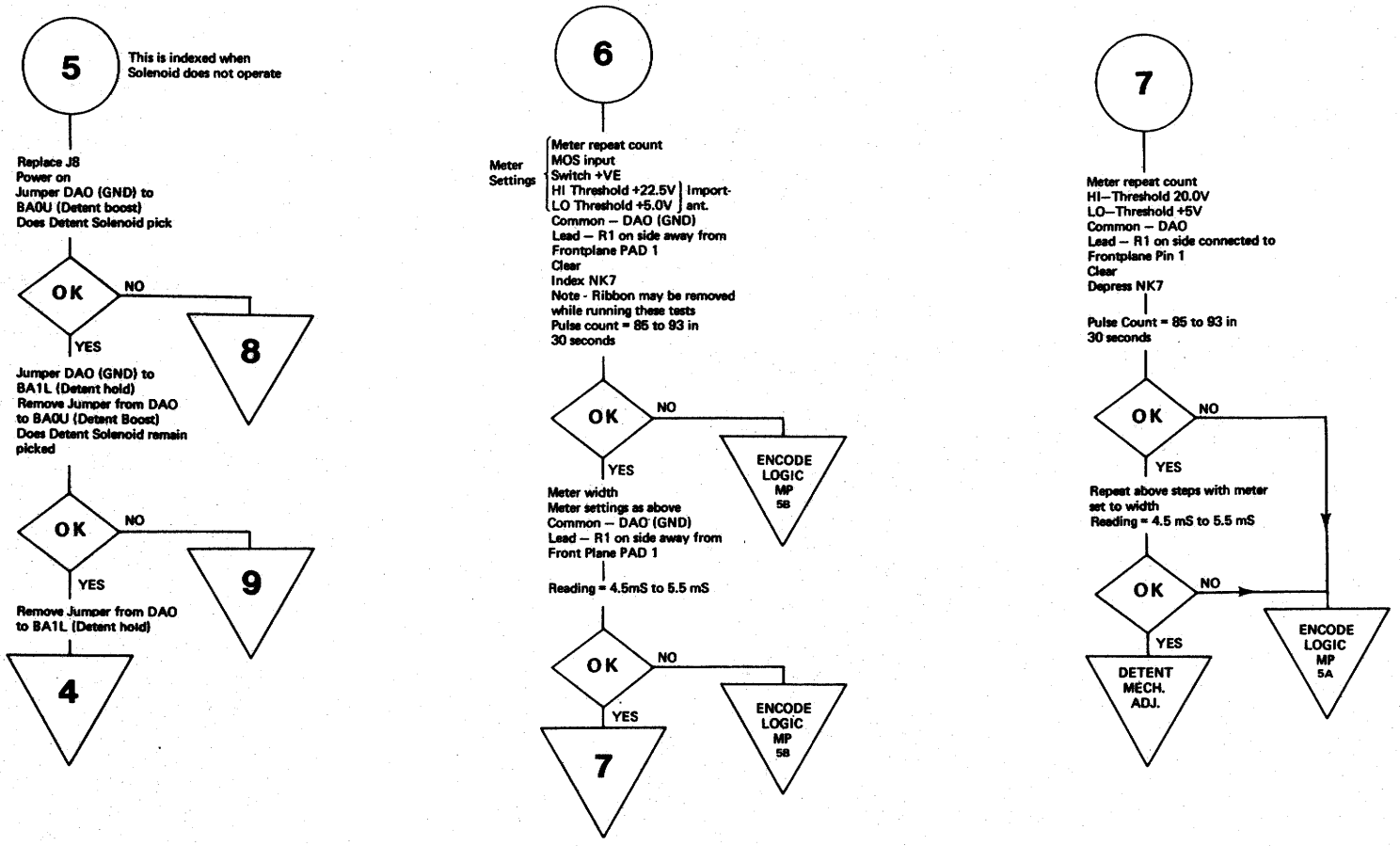
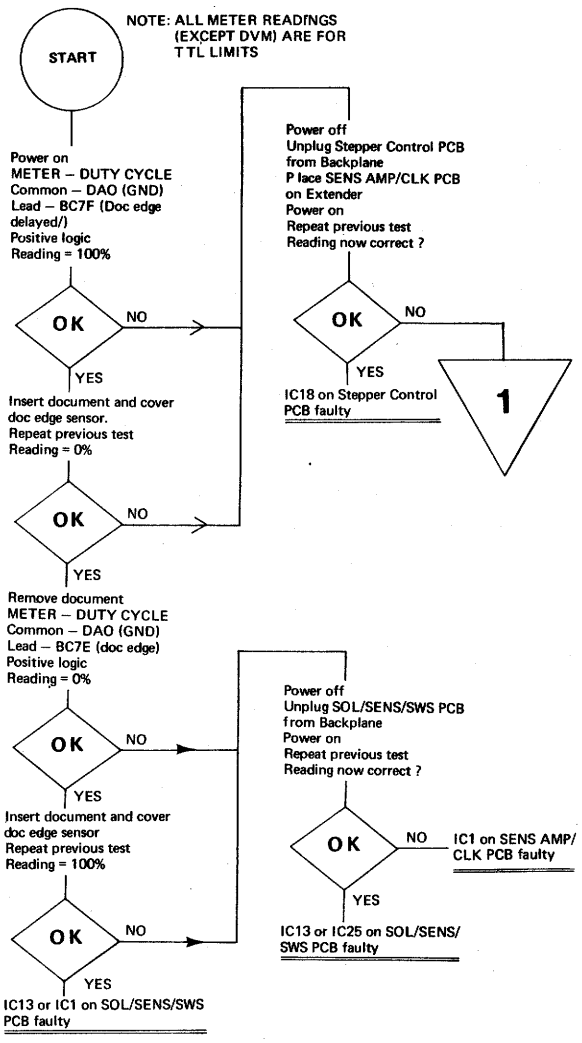
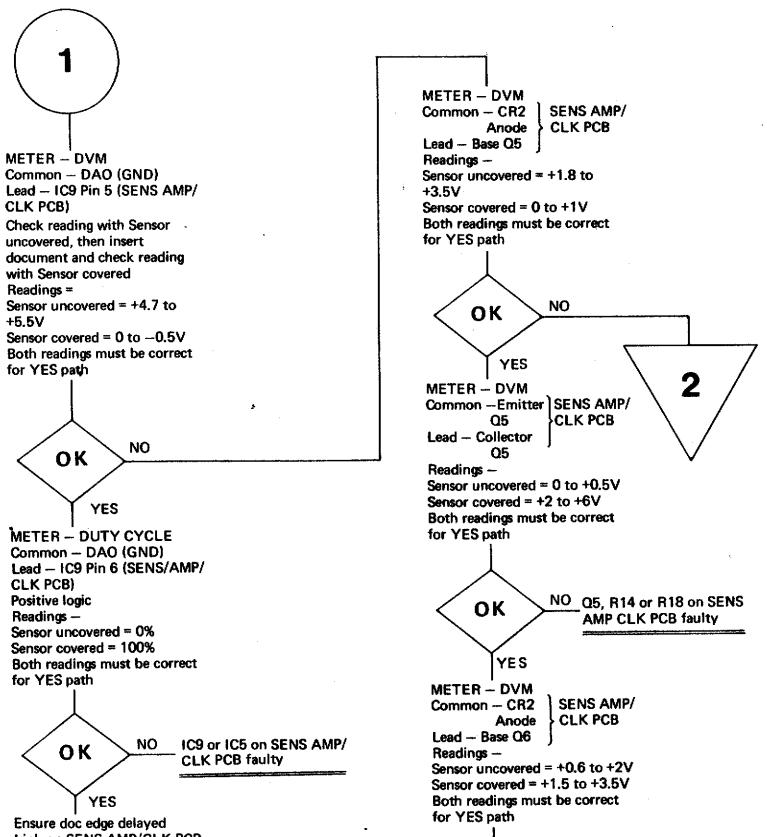
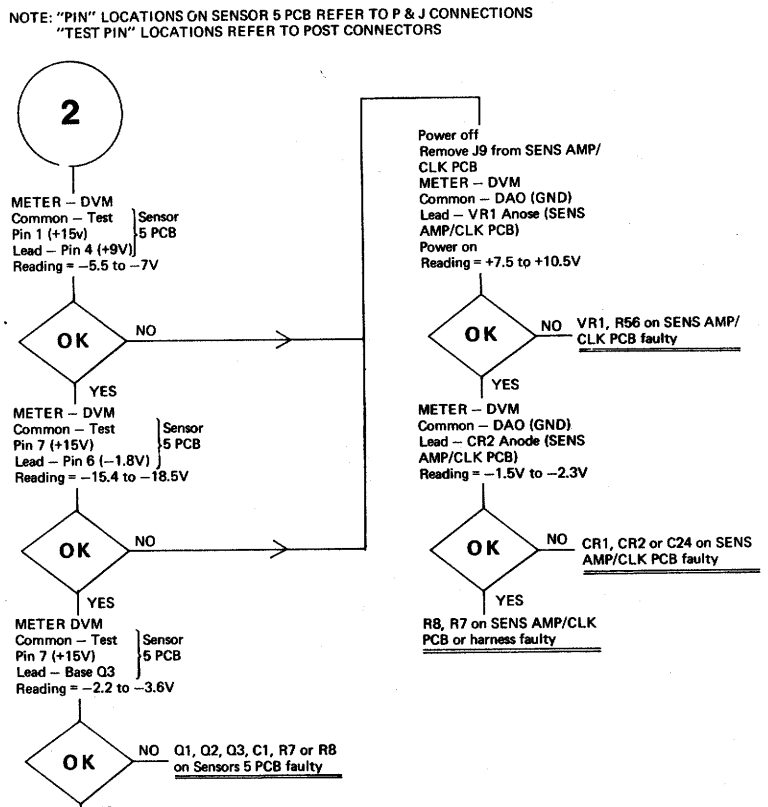
TITLE			
DETENT (Page 2 of 2)			
ENG: JBS	DATE:	DWG NO.: 2801 8364	REV.: A
CLASSIFICATION CODE: 2-9520		RELEASED: DEC 14 1977	









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TITLE

DOC. EDGE (Page 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8372	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977

This procedure is entered when the keyboard lamp fails to turn on or off when SKEW 1 and SKEW 2 are covered or uncovered during subtest 3

START

Power off. Sensor AMP/ CLOCK PCB on Extender
Inspect document track to ensure SK1 & SK2 are not covered
MTR mode on
All other modes off
METER – DUTY CYCLE
Common – DAO (GND)
Lead – BC6G (DIT delayed)
Positive logic
Power on
Open document transport
Cover SKEW 1 and SKEW 2 Sensors with document
Reading = 100%

OK NO → METER – DVM
Common – DAO (GND)
Lead – IC10 Pin 5 (SENS/ AMP/CLK PCB)
Cover SK1 and SK2
Reading = 0 to –0.8V

OK NO → Uncover SK1, leave SK2 covered
Reading = +4.5 to +5.5V

OK NO → 1

YES
Uncover SK1 & SK2
Reading = 0%

OK NO → METER – DVM
Common – DAO (GND)
Lead – IC10 Pin 6 (SENS AMP/ CLK PCB)
Cover SK2
Reading = 0 to –0.8V

OK NO → Uncover SK2 cover SK1
Reading = +4.5 to +5.5V

OK NO → 2

YES
Cover SK1 without covering SK2
Reading = 0%

OK NO → METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC6 Pin 1 (SENS/ AMP/CLK PCB)
Positive logic
Cover SK1 and SK2
Reading = 100%

OK NO → IC10 or IC6 on SENS/AMP/ CLK PCB faulty

YES
Cover SK2 without covering SK1
Reading = 0%

OK NO → Uncover SK1 & SK2
Reading = 0%

OK NO → IC10 or IC6 on SENS/AMP/ CLK PCB faulty

YES → 3

OK NO → IC13 or IC1 on SOL/SENS/ SWS PCB faulty

YES

1

Power off
Remove J11 from sensors 2 PCB
METER – DVM
Common – CR2 Anode (SENS AMP/CLK PCB)
Lead – Pin 3 on Sensors 2 PCB
Power on
Reading = +3V to +11V

OK NO → Remove J10 from Sensors 1 PCB
METER – DVM
Common – J10 Pin 2
Lead – J10 Pin 1
Reading = +15.3 to +18.5V

OK NO → 7

YES
Cover SK1
Reading = 0 to +1V

OK NO

YES
Uncover SK1 & SK2
Reading = 0%

OK NO → 7

YES → 3

3

METER – FREQUENCY
Common – DAO (GND)
Lead – IC6 Pin 3 (SENS/AMP/ CLK PCB)
Reading = 0.280 to 0.360 KHz

OK NO → METER – FREQUENCY
Common – DAO (GND)
Lead – IC9 Pin 9 (SENS AMP/ CLK PCB)
Reading = .280 to .360 KHz

OK NO → EM CLOCK MP

YES → IC9 or IC6 on SENS/AMP/ CLK PCB faulty

YES
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC6 Pin 8 (SENS/AMP/ CLK PCB)
Positive logic
Cover SK1 and SK2
Reading = 0%

OK NO → IC6 or IC2 on SENS AMP/ CLK PCB faulty

YES
Uncover SK1 & SK2
Reading = 100%

OK NO → IC6 or IC2 on SENS AMP/ CLK PCB faulty

YES → IC2 on SENS/AMP/CLK PCB or IC13 on SOL/SENS/SWS PCB faulty

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TITLE

DOC. IN TRANSPORT (Page 1 of 2)

ENG	DATE	DWG NO.	REV.
JBS		2801 8380	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977

Burroughs

BURROUGHS MACHINES LIMITED
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TITLE			
DOC. IN TRANSPORT (Page 2 of 2)			
ENG: JBS	DATE:	DWG NO.: **2801 8380**	REV.: **A**
CLASSIFICATION CODE: 2-9520		RELEASED: DEC 14 1977	

4

METER – DVM
Common – CR2 Anode } SENS AMP/CLK PCB
Lead – Base Q7
Readings –
SK1 covered = +1.5 to +3.5V
SK1 uncovered = +0.6 to +2.0V
Both readings must be correct for YES path

OK — NO → Q7, R22 or R21 on SENS AMP/CLK PCB faulty

YES → Q7, IC10 or R20 on SENS AMP/CLK PCB faulty

5

Power off
Remove Sensor 1 and Sensor 2 PCBs keeping together
Testing continues on bench
N.B. check PCB's do not short on bench
Reconnect J10 and J11 to Sensor 1 and Sensor 2 PCB's
METER – DVM
Common – Point B } SENSOR 2 PCB
Lead – Point A
Power on
Reading = +12 to +16.5V

OK — NO → C1, SENSOR 1 PCB or R5 R6, C1 SENSOR 2 PCB, or R46 SENS AMP/CLK PCB faulty

YES
METER – DVM
Common – Base Q7 } SENSOR 2 PCB
Lead – Point A
Reading = +1.5 to +3.5V

OK — NO → Q5, Q6, Q7, Q8, R5, R6 or C1 on Sensor 2 PCB faulty

YES
METER – DVM
Common – Junction of C1 and LED 3 (SENSOR 1 PCB)
Lead – Junction R3 and LED 3 (SENSOR 1 PCB)
Reading = –1 to –2V

OK — NO → R3 or LED 3 on SENSOR 1 PCB faulty

YES
METER – DVM
Common – Junction of R5 and Q4 (SENSOR 2 PCB)
Lead – Emitter Q7 (SENSOR 2 PCB)
Note reading
Insert document between LED 3 and Q3 (SK1)
Reading varies 0.1 to 0.2V

OK — NO → Q3 on SENSOR 2 PCB faulty

YES → Q7 or R3 on SENSOR 2 PCB faulty

6

Power off
Remove Sensor 1 and Sensor 2 PCBs keeping together
Testing continues on bench
N.B. Check PCBs do not short on bench
Reconnect J10 and J11 to Sensor 1 and Sensor 2 PCB's
METER – DVM
Common – Point B } Sensor 2 PCB
Lead – Point A
Power on
Reading = +13 to +14.5V

OK — NO → C1 Sensor 1 PCB R5, R6, C1, Sensor 2 PCB or R46 SENS AMP/CLK PCB faulty

YES
METER – DVM
Common – Base Q7 } Sensor 2 PCB
Lead – Point A
Reading = +1.5V to +3.5V

OK — NO → Q5, Q6, Q7, Q8 R5, R6 or C1 on Sensor 2 PCB faulty

YES
METER – DVM
Common – Junction of C1 and LED 3 (Sensor 1 PCB)
Lead – Junction R4 and LED 4 (Sensor 1 PCB)
Reading = –1 to –2V

OK — NO → R4 or LED 4 on Sensor 1 PCB faulty

YES
METER – DVM
Common – Junction of R5 and Q4 (Sensor 2 PCB)
Lead – Emitter Q8 (Sensor 2 PCB)
Note reading
Insert document between LED 4 and Q4 (SK2)
Reading varies 0.1 to 0.2V

2

Power off
Remove J11 from SENSORS 2 PCB
METER – DVM
Common – CR2 Anode } (SENS AMP/CLK PCB)
Lead – Pin 2
Power on
Reading = +3 to +11V

OK — NO → Remove J10 from Sensors 1 PCB
METER – DVM
Common – J10 Pin 2
Lead – J10 Pin 1
Read ng = +15.3 to +18.5V

YES
Cover SK2
Reading = 0 to +1V

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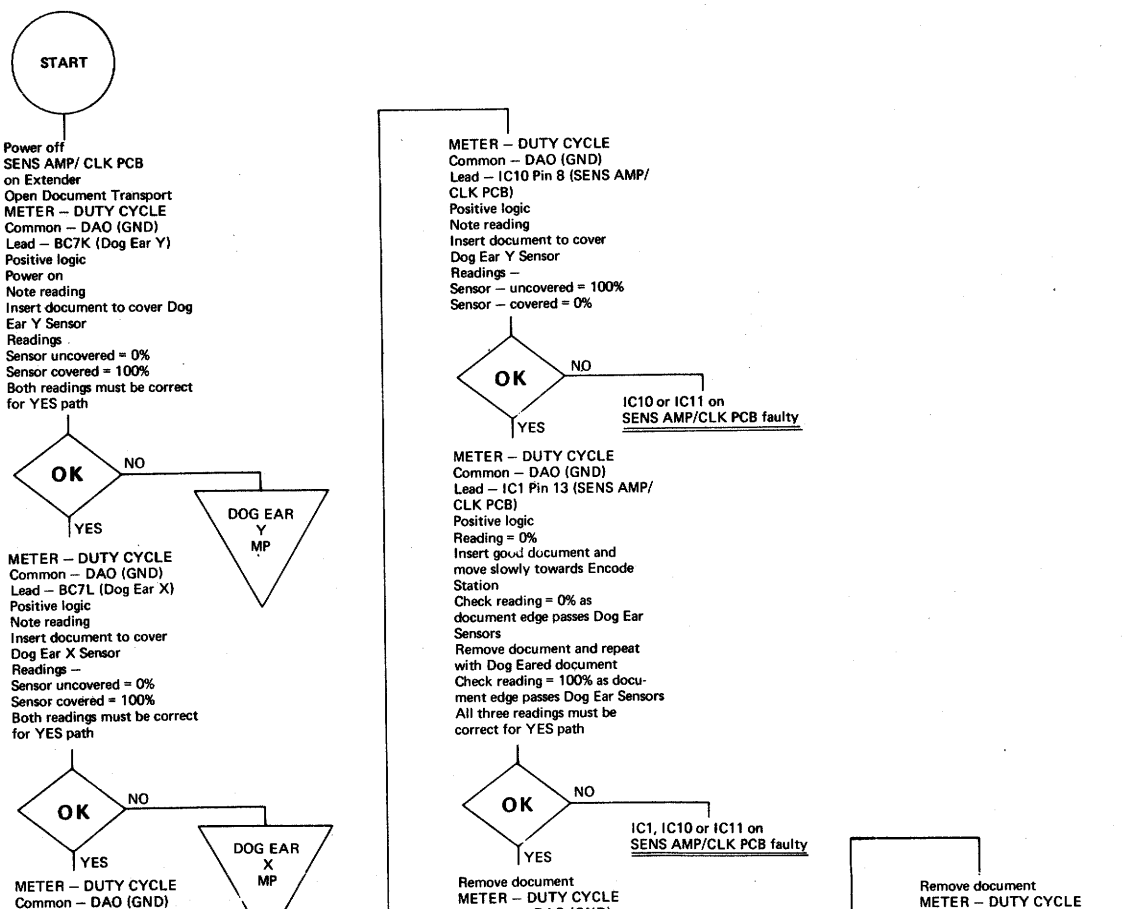
TITLE

DOG EAR (Page 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8398	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977



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TITLE			
DOG EAR X (Page 1 of 1)			
ENG: JJS	DATE:	DWG NO.: **2801 8406**	REV.: **A**
CLASSIFICATION CODE: 2-9520		RELEASED: DEC 14 1977	

START

Power off
Unplug SOL/SENS/SWS PCB from Backplane
Place SENS AMP/CLK PCB on Extender
METER – DUTY CYCLE
Common – DAO (GND)
Lead – BC7L (Dog Ear X)
Positive logic TTL Limits
Power on
Reading = 0%

OK? NO → (to Insert document to cover Dog Ear X Sensor)
YES

Insert document to cover Dog Ear X Sensor
Reading = 100%

OK? NO → (to Power off / Plug in SOL/SENS/SWS PCB)
YES

Power off
Plug in SOL/SENS/SWS PCB
Power on
Note reading, then insert document to cover Dog Ear X Sensor
Readings –
Sensor uncovered = 0%
Sensor covered = 100%

OK? NO → IC10 on SOL/SENS/SWS PCB faulty
YES

IC10 or IC2 on SOL/SENS/SWS PCB faulty

METER – DVM
Common – DAO (GND)
Lead – IC11 Pin 5 (SENS AMP/CLK PCB)
Note reading, then insert document to cover Dog Ear X Sensor
Readings –
Sensor uncovered = +4.7 to +5.5V
Sensor covered = 0 to −0.5V
Both readings must be correct for YES path

OK? NO →
YES

IC1 or IC11 on SENS AMP/CLK PCB faulty

METER – DVM
Common – CR2 Anode } SENS AMP/CLK PCB
Lead – Base Q13
Readings –
Sensor uncovered = +1.8 to +3.5V
Sensor covered = 0 to +1V
Both readings must be correct for YES path

OK? NO → 1
YES

METER – DVM
Common – Emitter Q13 } SENS AMP/CLK PCB
Lead – Collector Q13
Readings –
Sensor uncovered = 0 to +0.5V
Sensor covered = +2 to +6V
Both readings must be correct for YES path

OK? NO → Q13, R38 or R42 on SENS AMP/CLK PCB faulty
YES

METER – DVM
Common – CR2 Anode } SENS AMP/CLK PCB
Lead – Base Q14
Readings –
Sensor uncovered = +0.6 to +2V
Sensor covered = +1.5 to +3.5V
Both readings must be correct for YES path

OK? NO → Q14, R39, R40 on SENS AMP/CLK PCB faulty
YES

Q14, IC11 or R41 on SENS AMP/CLK PCB faulty

1

Power off
Remove J11 from Sensor 2 PCB
METER – DVM
Common – CR2 Anode (SENS AMP/CLK PCB)
Lead – Pin 4 (Sensor 2 PCB)
Power on
Readings –
Sensor uncovered = +3 to +11V
Sensor covered = 0 to +1V

OK? NO →
YES

Q13, R37, C21 on SENS AMP/CLK PCB or harness faulty

Remove J10 from Sensor 7 PCB
METER – DVM
Common – J10 Pin 2
Lead – J10 Pin 1
Reading = +15.3 to +18.5V

OK? NO → 2
YES

Remove Sensor 1 and Sensor 2 PCB's keeping together
Testing continues on bench
N.B. Check PCB's, do not short on bench
Reconnect J10 and J11 to PCB's
METER – DVM
Common – Pin B } Sensor 2 PCB
Lead – Pin A
Power on
Reading = +12 to +16.5V

OK? NO → C1 Sensor 1 PCB, R5, R6, C1 on Sensor 2 PCB or R46 SENS AMP/CLK PCB faulty
YES

METER –DVM
Common – Base Q7 } Sensor 2 PCB
Lead – Point A
Reading = +1.5 to +3.5V

2

METER – DVM
Common – DAO (GND)
Lead – CR2 Anode (SENS AMP/CLK PCB)
Reading = −1.5 to −2.3V

OK? NO → CR1, CR2 or C24 on SENS AMP/CLK PCB, faulty
YES

METER – DVM
Common – DAO (GND)
Lead – Junction of R46 and J9 Pin 2 } SENS AMP/CLK PCB
Reading = +11 to +13.6V

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TITLE			
DOG EAR Y (Page 1 of 1)			
ENG: JBS	DATE:	DWG NO.: 2801 8414	REV.: A
CLASSIFICATION CODE: 2-9520		RELEASED: DEC 14 1977	

START

Power off
Unplug SOL/SENS/SWS PCB from Backplane
Place SENS AMP/CLK PCB on Extender
METER – DUTY CYCLE (TTL)
Common – DAO (GND)
Lead – BC7K
Positive logic
Power on
Reading = 0%

OK? NO → YES

Insert document to cover Dog Ear Y Sensor
Reading = 100%

OK? NO → YES

Power off
Plug in SOL/SENS/SWS PCB
Power on
Note Reading, then insert document to cover Dog Ear Y Sensor
Readings –
Sensor uncovered = 0%
Sensor covered = 100%
Both readings must be correct for YES path

OK? NO → IC14 on SOL/SENS/SWS PCB faulty

YES

IC14 or IC2 on SOL/SENS/SWS PCB faulty

METER – DVM
Common – DAO (GDN)
Lead – IC11 Pin 11 (SENS AMP/CLK PCB)
Note Reading, then insert document to cover Dog Ear Y Sensor
Readings –
Sensor uncovered = +4.7 to +5.5V
Sensor covered = 0 to –0.5
Both readings must be correct for YES path

OK? NO →

YES

IC11 on SENS AMP/CLK PCB faulty

METER – DVM
Common – CR2 Anode } SENS AMP/CLK PCB
Lead – Base Q12
Readings –
Sensor uncovered = +1.8V to +3.5V
Sensor covered = 0 to +1V
Both readings must be correct for YES path

OK? NO → 1

YES

METER – DVM
Common – Emitter Q12 } SENS AMP
Lead – Collector Q12 } CLK PCB
Readings
Sensor uncovered = 0 to +0.5V
Sensor covered = +2 to +6V
Both readings must be correct for YES path

OK? NO → Q12, R35 or R31 on SENS AMP/CLK PCB faulty

YES

METER – DVM
Common – CR2 Anode } SENS AMP/CLK PCB
Lead – Base Q11
Readings –
Sensor uncovered = +0.6 to +2V
Sensor covered = +1.5 to +3.5V
Both readings must be correct for YES path

OK? NO → Q11, IC11 or R32 on SENS AMP/CLK PCB faulty

YES

Q11, R34 or R33 on SENS AMP/CLK PCB faulty

1

Power off
Remove J11 from sensor 2 PCB
METER – DVM
Common – CR2 Anode (SENS AMP/CLK PCB)
Lead – Pin 5 (Sensor 2 PCB)
Power on
Readings –
Sensor uncovered = +3 to +11V
Sensor covered = 0 to +1V

OK? NO →

YES

Q12, R36, C20 on SENS AMP/CLK PCB or harness faulty

Remove J10 from Sensor 1 PCB
METER – DVM
Common – J10 Pin 2
Lead – J10 Pin 1
Reading = 15.3 to 18.5

OK? NO → 2

YES

Power off
Remove Sensor 1 and Sensor 2 PCB's keeping together
Testing continues on bench
N.B. Check PCB's. do not short on bench
Reconnect J10 and J11 to PCB's
METER – DVM
Common – Pin B Sensor 2
Lead – Pin A PCB
Power on
Reading = +12 to +16.5V

OK? NO → C1 on Sensor 1 PCB R5, R6, C1 on Sensor 2 PCB or R46 on SENS AMP/CLK PCB faulty

YES

METER – DVM
Common – Base Q7 } Sensor 2
Lead – Point A } PCB
Reading = +1.5 to +3.5V

OK? NO → Q5, Q6, Q7, Q8, R5, R6 or C1 on Sensor 2 PCB faulty

2

METER – DVM
Common – DAO (GND)
Lead – CR2 Anode (SENS AMP/CLK PCB)
Reading = –1.5V to –2.3V

NO → CR1, CR3 or CR4

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TITLE

EM CLOCK (Page 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8422	A

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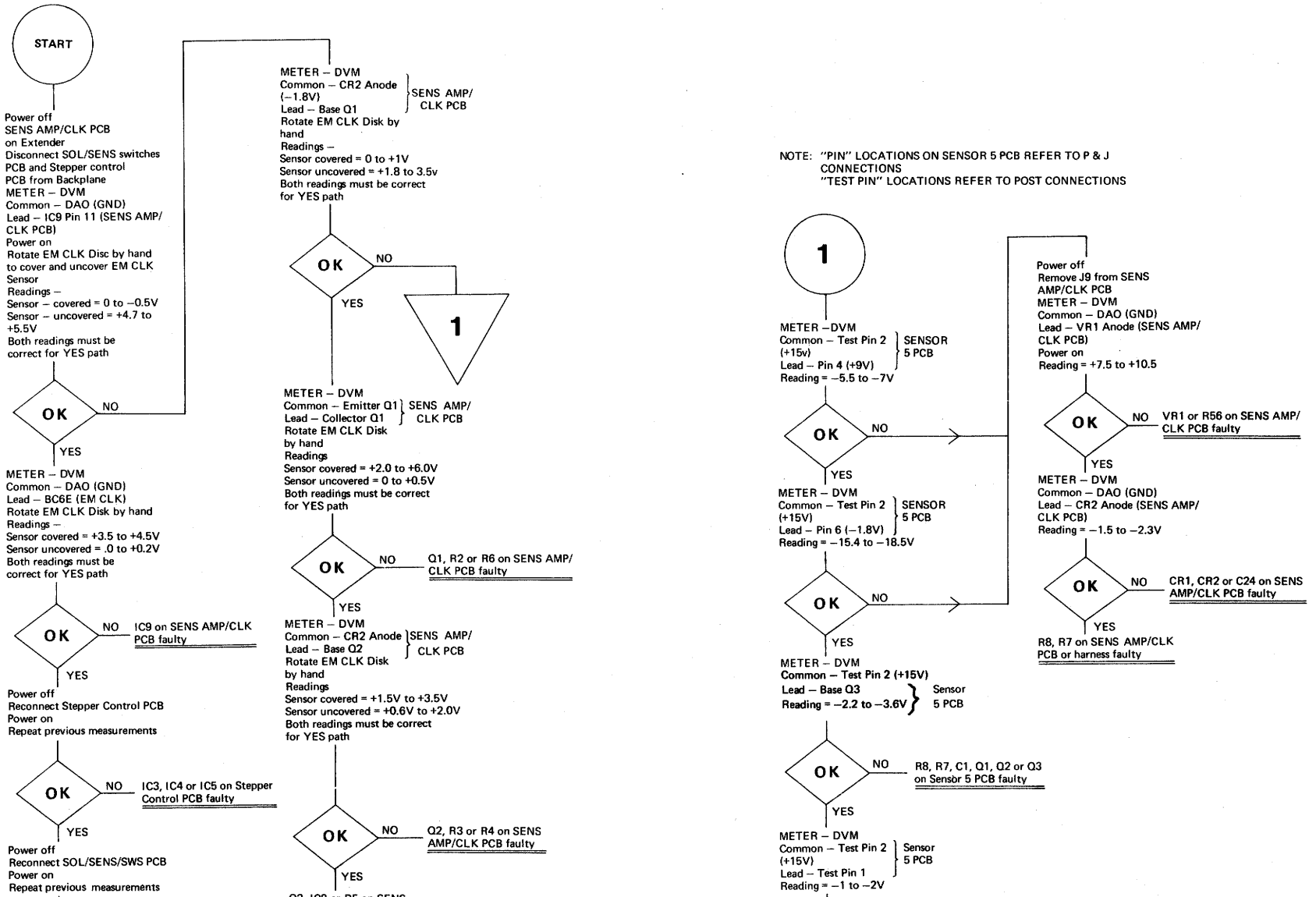

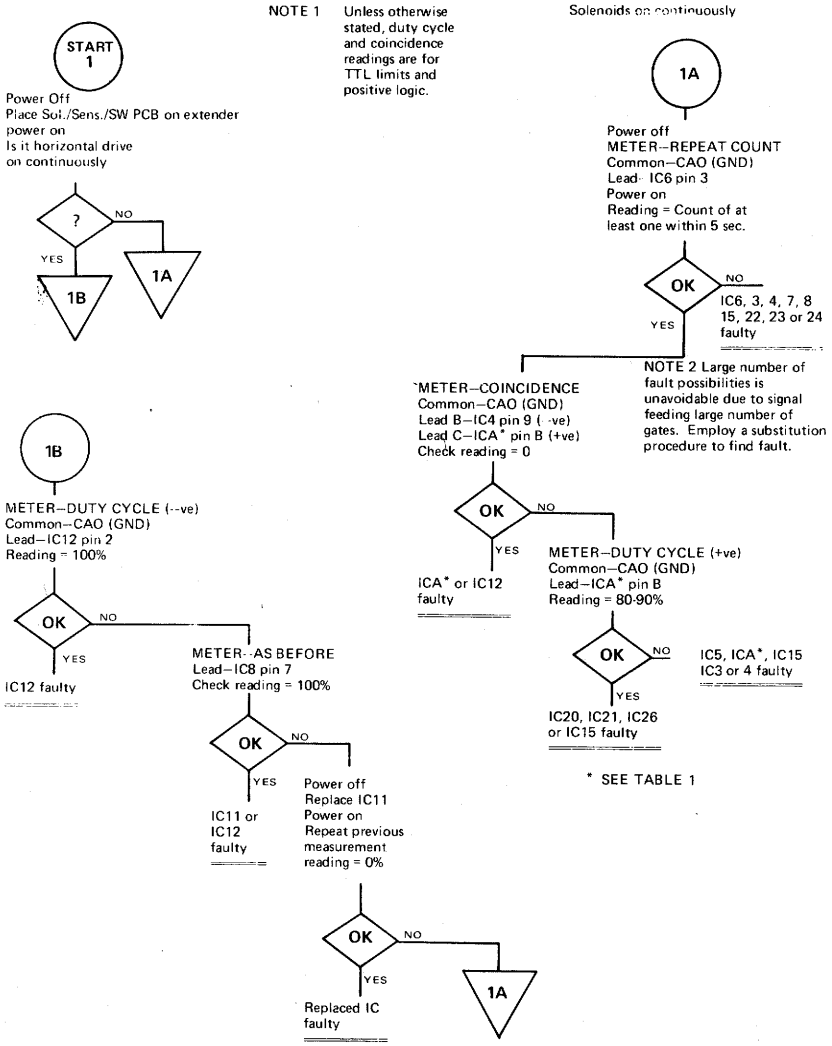

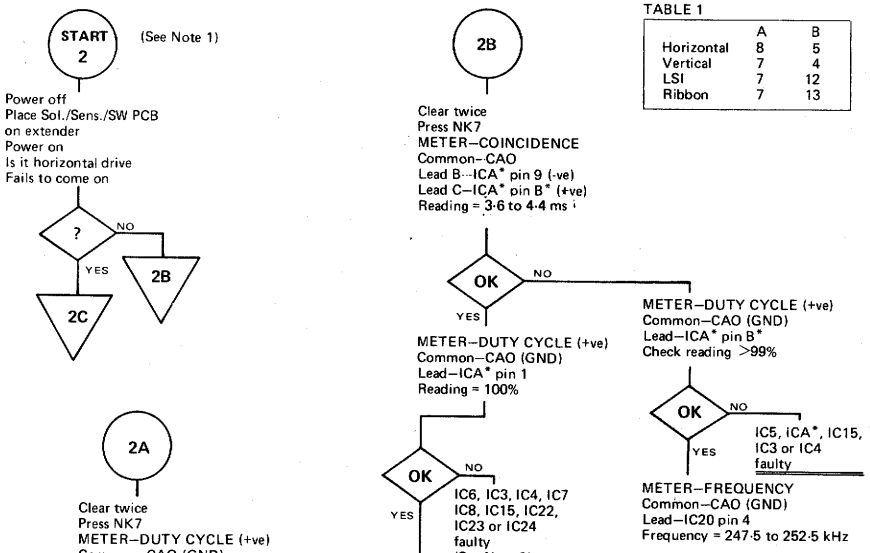

	A	B
Horizontal	8	5
Vertical	7	4
LSI	7	12
Ribbon	7	13

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JBS		2801 8430	A

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Solenoids fail to go off

Test 7

START 3

Power off
Place Sol./Sens./SW PCB
On extender
Power on
METER–COINCIDENCE
Common–CAO (GND)
Lead B–ICA* pin 9 (–ve)
Lead C–ICA* pin B* (–ve)
Check reading = 0·7 to 1·3 μs

OK? NO → IC5, ICA*, IC3, IC4 or IC15 faulty

YES → ICA* faulty

* SEE TABLE 1

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D. Boost

4A (See Note 1)

Power off
Place stepper control PCB
on extender
Power on
METER–DUTY CYCLE (+ve)
Common–CAO
Lead–IC14 pin 12
Check reading = 100%

OK? NO → 4C

YES → 4D

Detent on continuously

D. Hold

4B (See Note 1)

Power off
Place Stepper Control PCB
on extender
Power on
METER–DUTY CYCLE (+ve)
Common–CAO
Lead–IC20 pin 1
Reading = 100%

OK? NO → 4C

YES → 4E

4C

Power off
Place Sol./Sens./SW PCB
on extender
Power on
METER–REPEAT COUNT
Common–CAO
Lead–IC3 pin 1
Check count of at least
one within 5 secs.

OK? NO → IC6, IC3, IC4, IC7, IC8 IC22, IC23 or IC24 faulty (See Note 2)

YES →

METER–DUTY CYCLE (+ve)
Common–CAO
Lead–IC3 pin 9
Check reading = 100%

OK? NO →

4E

4F

D. Boost

START 5A

(See Note 1)

Power off
Place Stepper Control PCB
on extender
Power on
Clear twice
Press NK7
METER—REPEAT COUNT
Common—CAO
Lead—IC14 pin 12
Count = 85 to 93
in 30 secs.

OK — NO

YES

Repeat reading
with meter set
to width
Reading= 4·5 to 5·5 ms

OK — NO

YES

4D

5C

Detent fails Test 7

(See Note 1)

START 5B

Power off
Place Stepper Control PCB
on extender
Power on
Clear twice
Press NK7
METER—REPEAT COUNT
Common—CAO
Lead—IC10 pin 1
Count = 85 to 93 in 30 secs.

OK — NO

YES

Repeat reading with
meter set to width
Reading = 4·5 to 5·5 ms

OK — NO

YES

4E

5E

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5C

Power off
Place Sol. Sens./SW PCB
on extender
Power on
METER—DUTY CYCLE (+ve)
Common—CAO (GND)
Lead—IC3 pin 1
Reading = 100%

OK — NO — IC6, 3, 4, 7, 8, 15, 22, 23 or 24 faulty

YES

Clear twice
Press NK7
METER—DUTY CYCLE (+ve)
Common—CAO
Lead—IC3 pin 12
Reading = 99·7 to 99·9%

5E

METER—FREQUENCY
Common—CAO (GND)
Lead—IC20 pin 4
Reading = 247·5 to 252·5 kHz

OK — NO — IC19 or 20 faulty

YES

IC26, IC21, IC20 or IC15 faulty

L. Ham

6A

(See Note 1)

Power off
Place Stepper Control PCB
on extender
Power on
METER—DUTY CYCLE (+ve)
Common—CAO
Lead—IC9 pin 9
Check reading = 100%

OK — NO — 6C

YES

IC9 faulty or
IC5 on Sol. Driver
PCB faulty

Hammer on continuously

M. Ham

6B

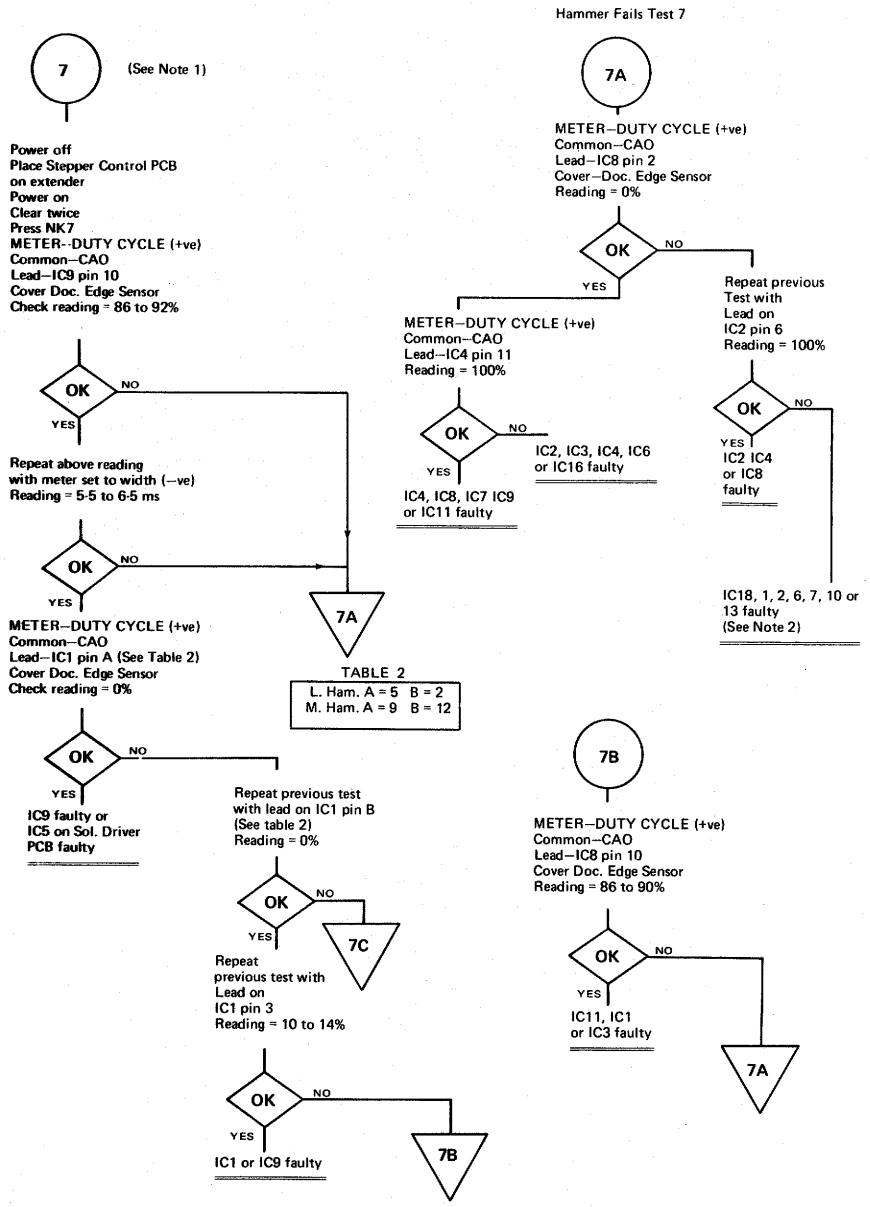
(See Note 1)

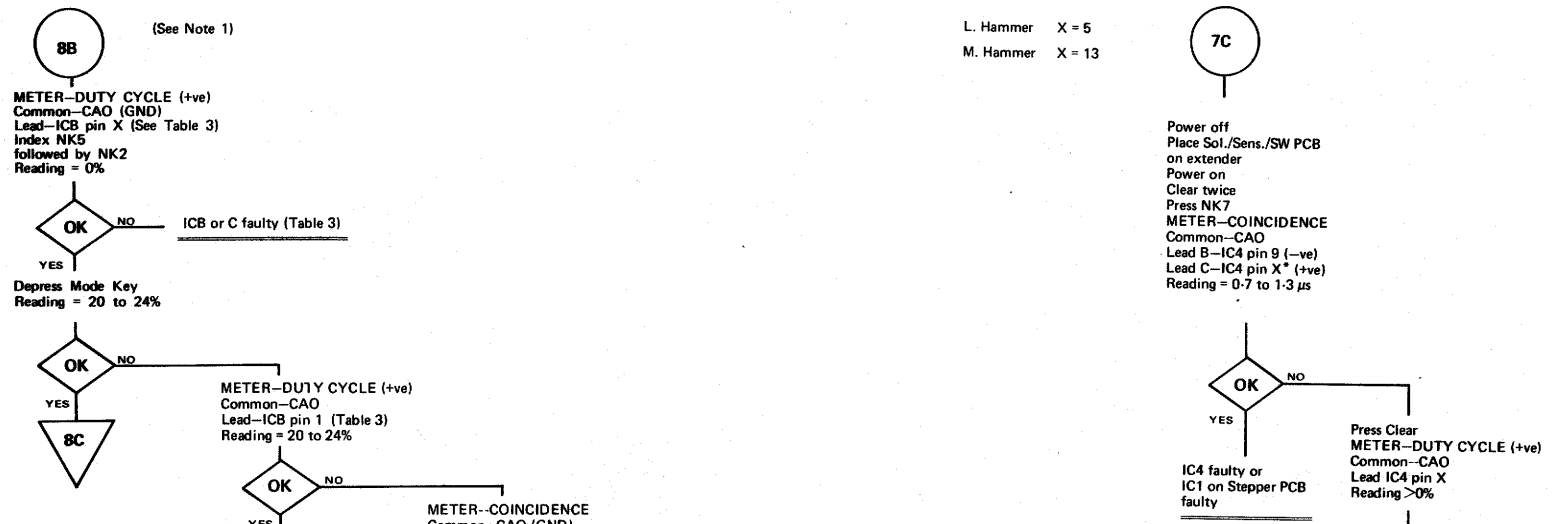
Power off
Place Stepper Control PCB
on extender
Power on
METER—DUTY CYCLE (+ve)
Common—CAO
Lead—IC9 pin 12
Check reading = 100%

OK — NO — 6C

YES

IC9 faulty
or IC5 on Sol. Driver PCB
faulty





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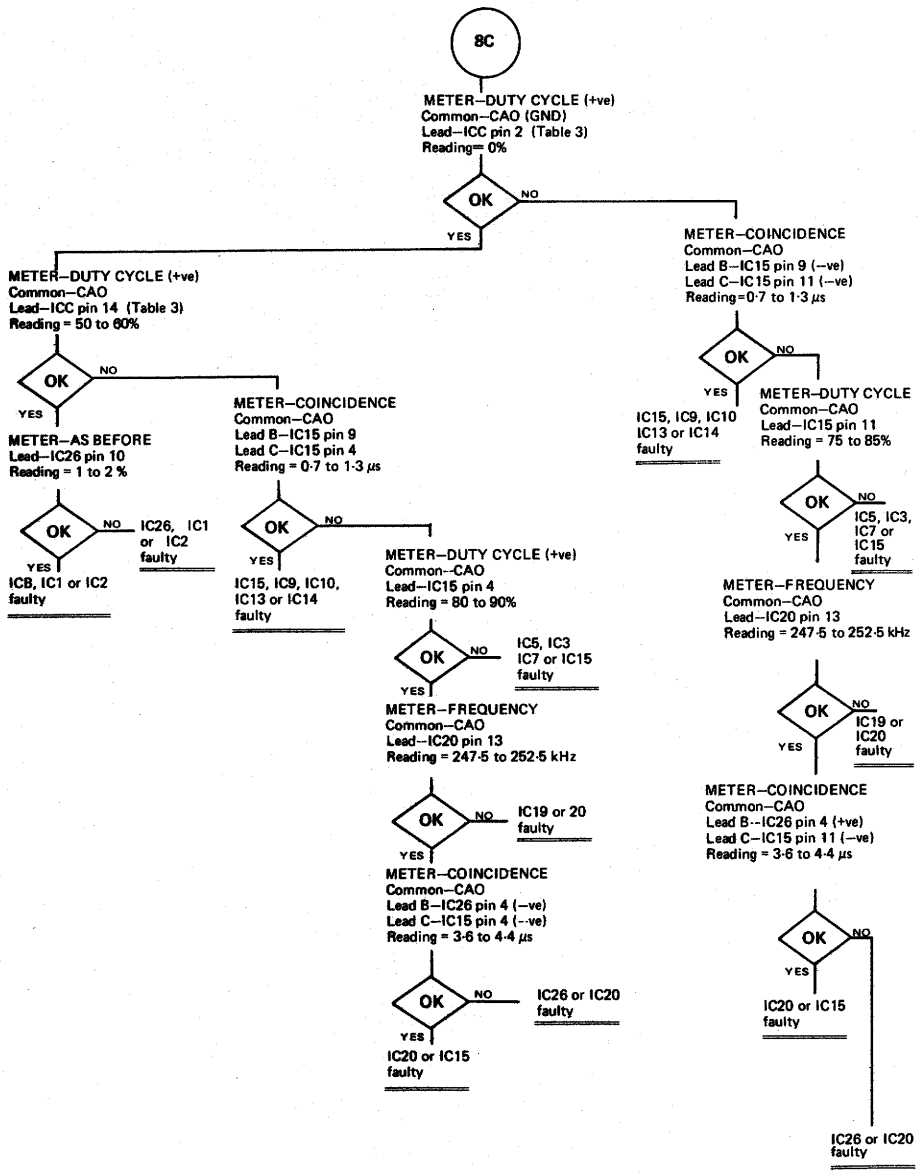

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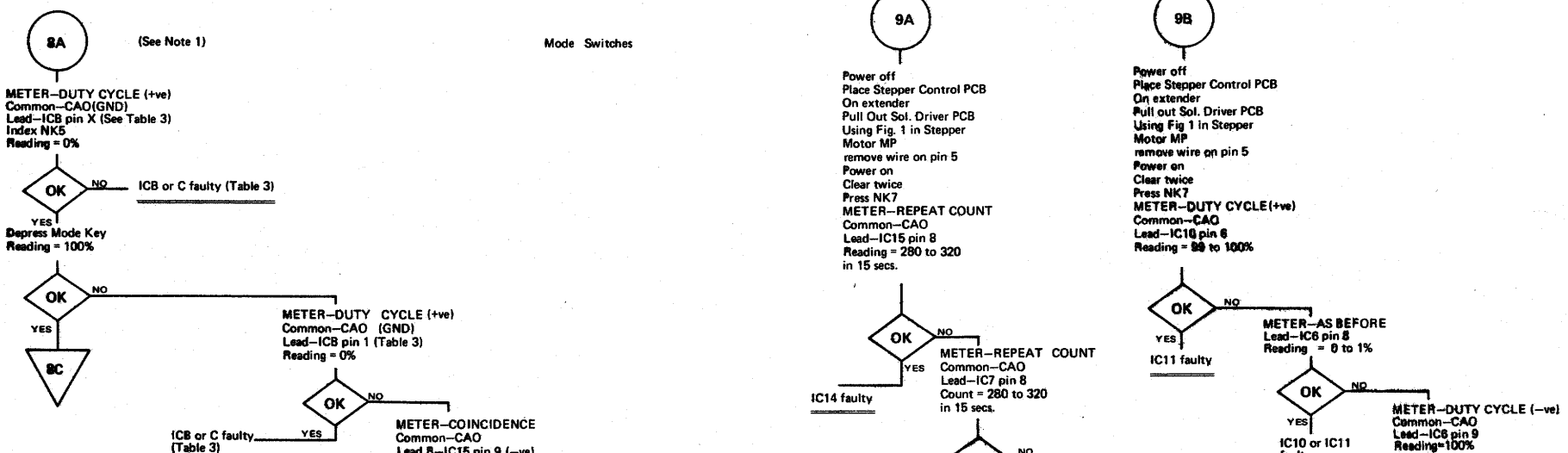

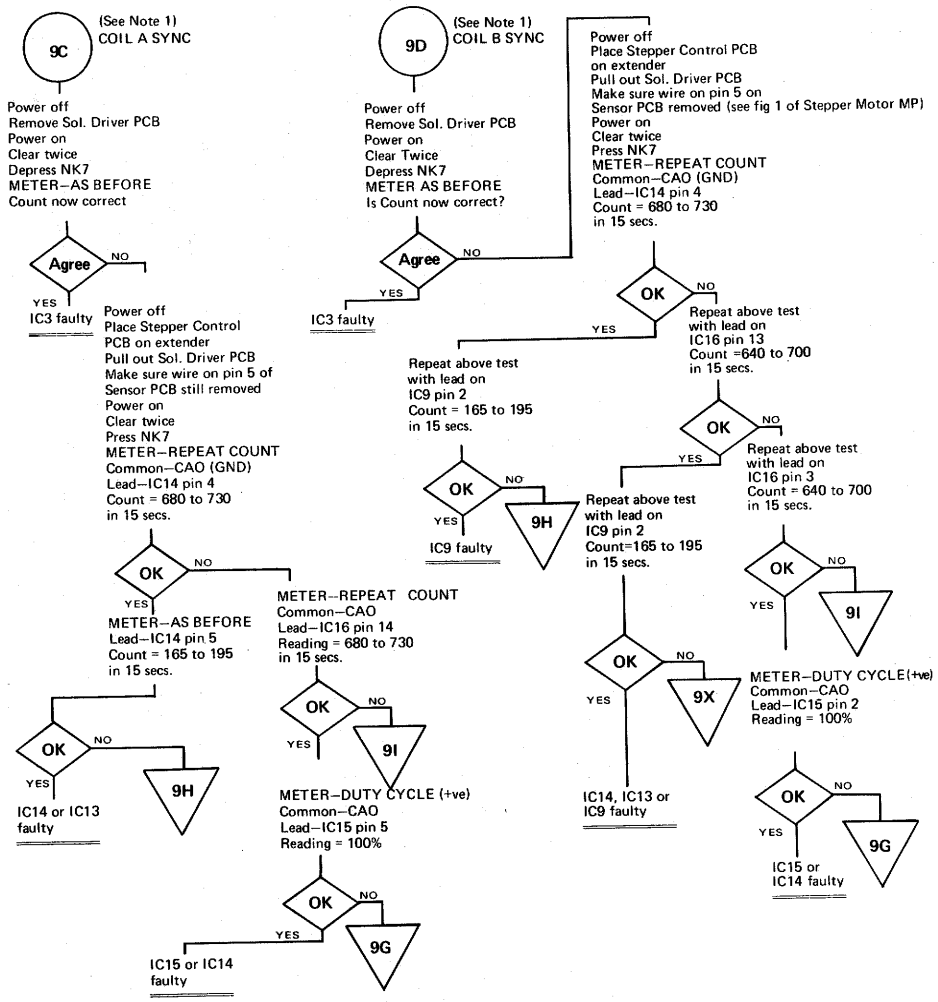

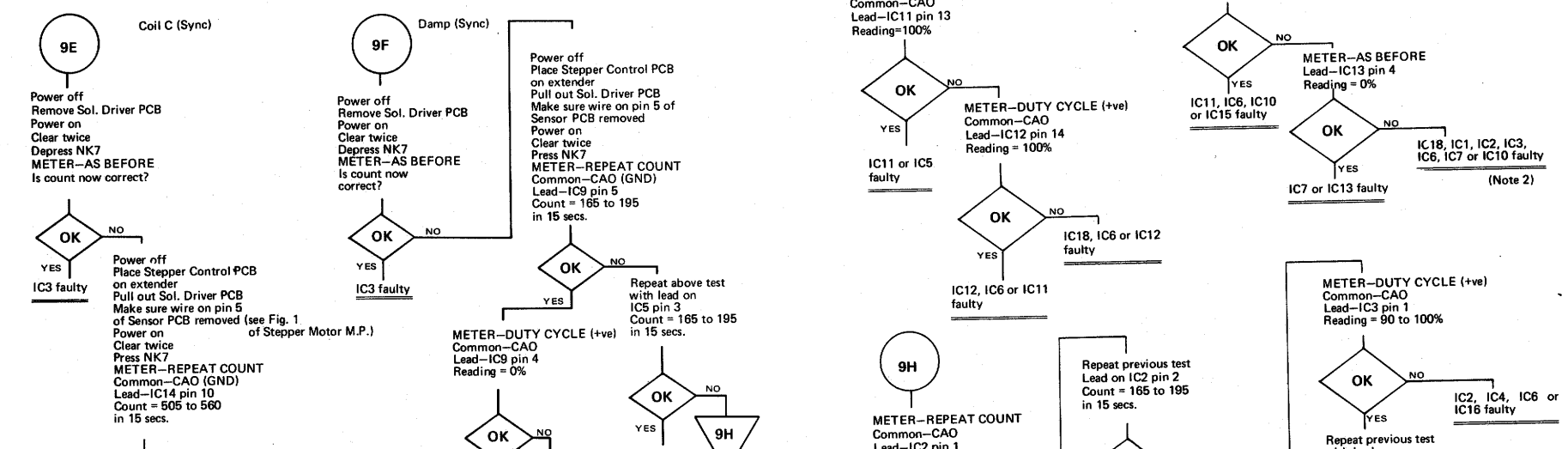

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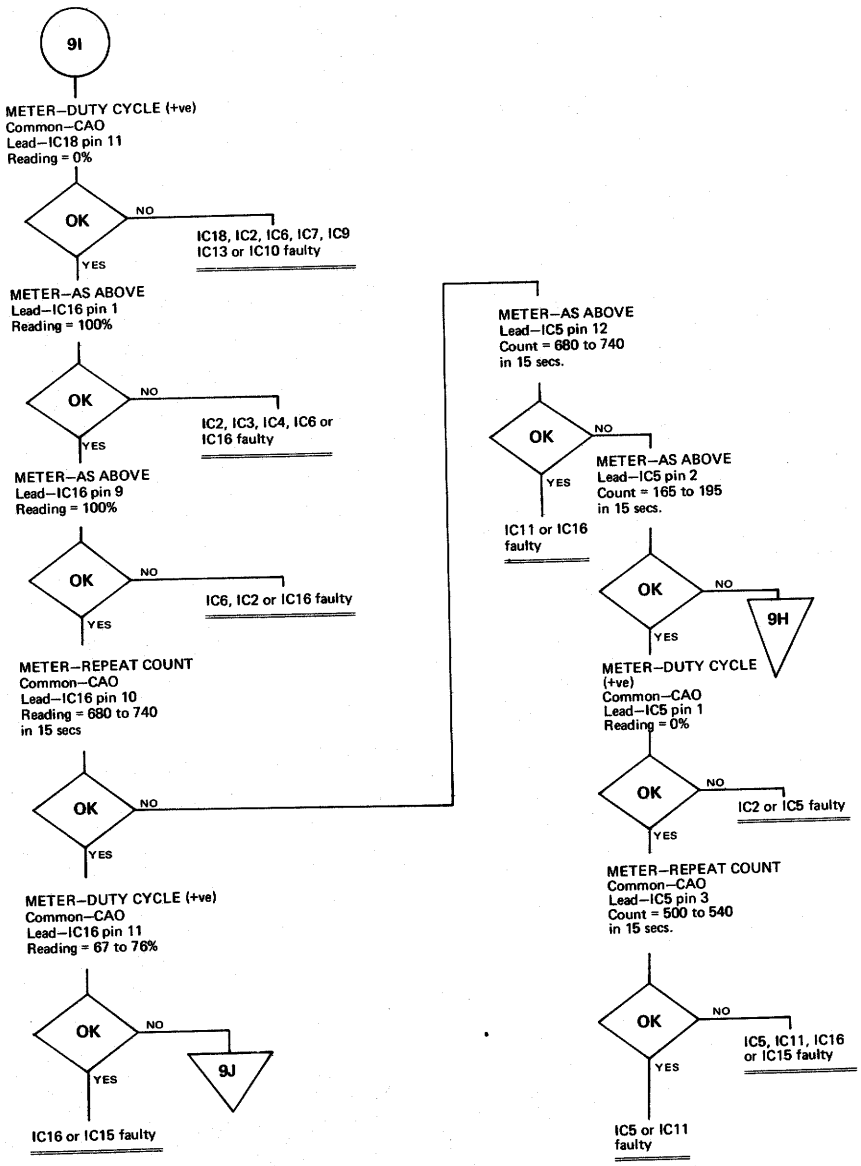

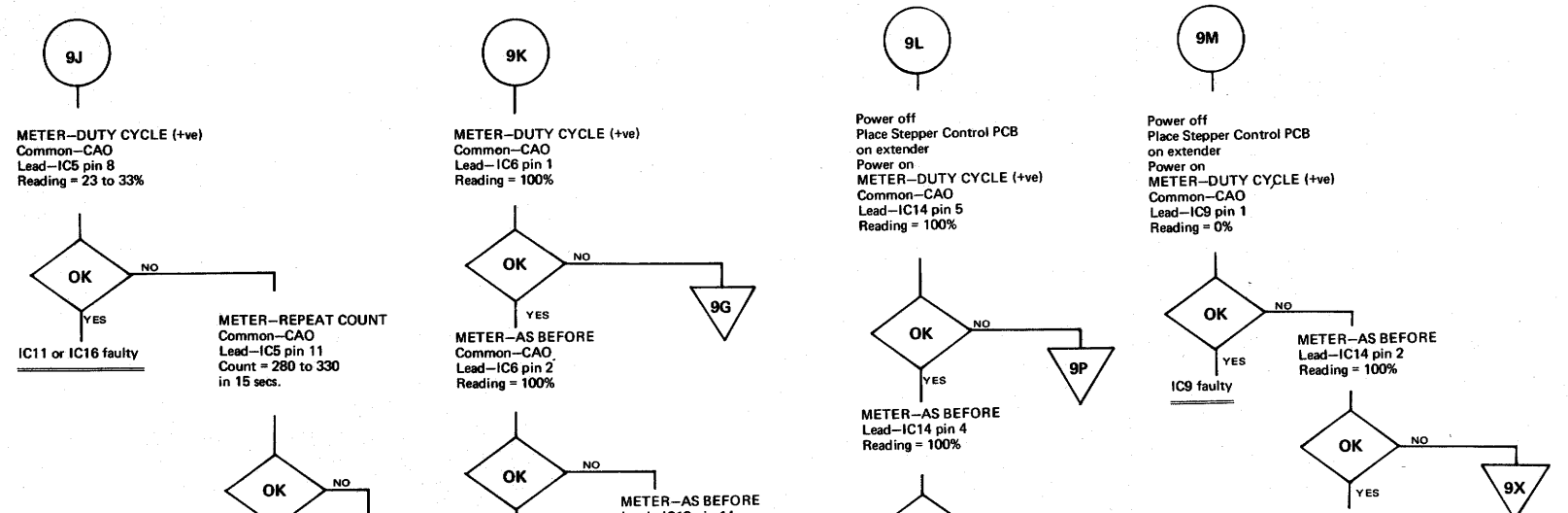

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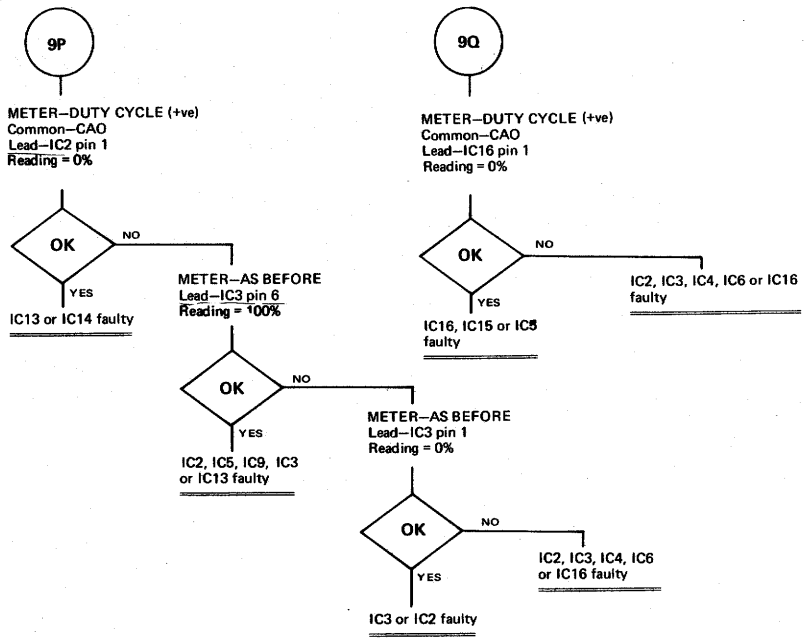

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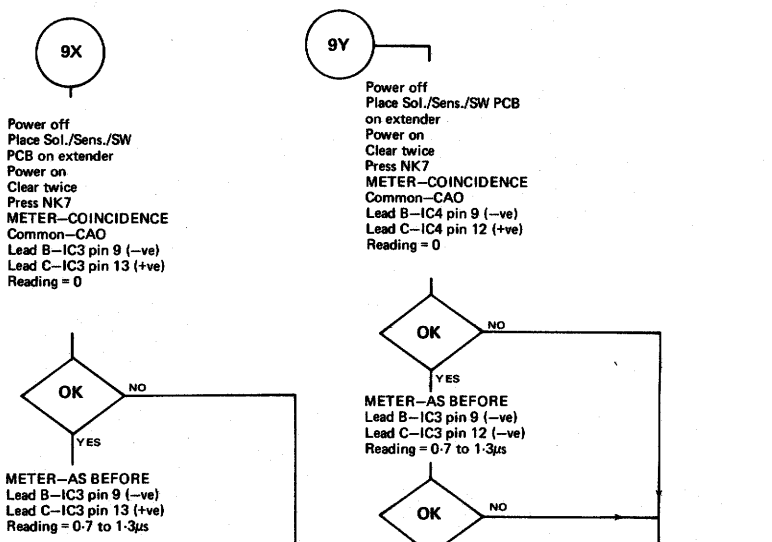

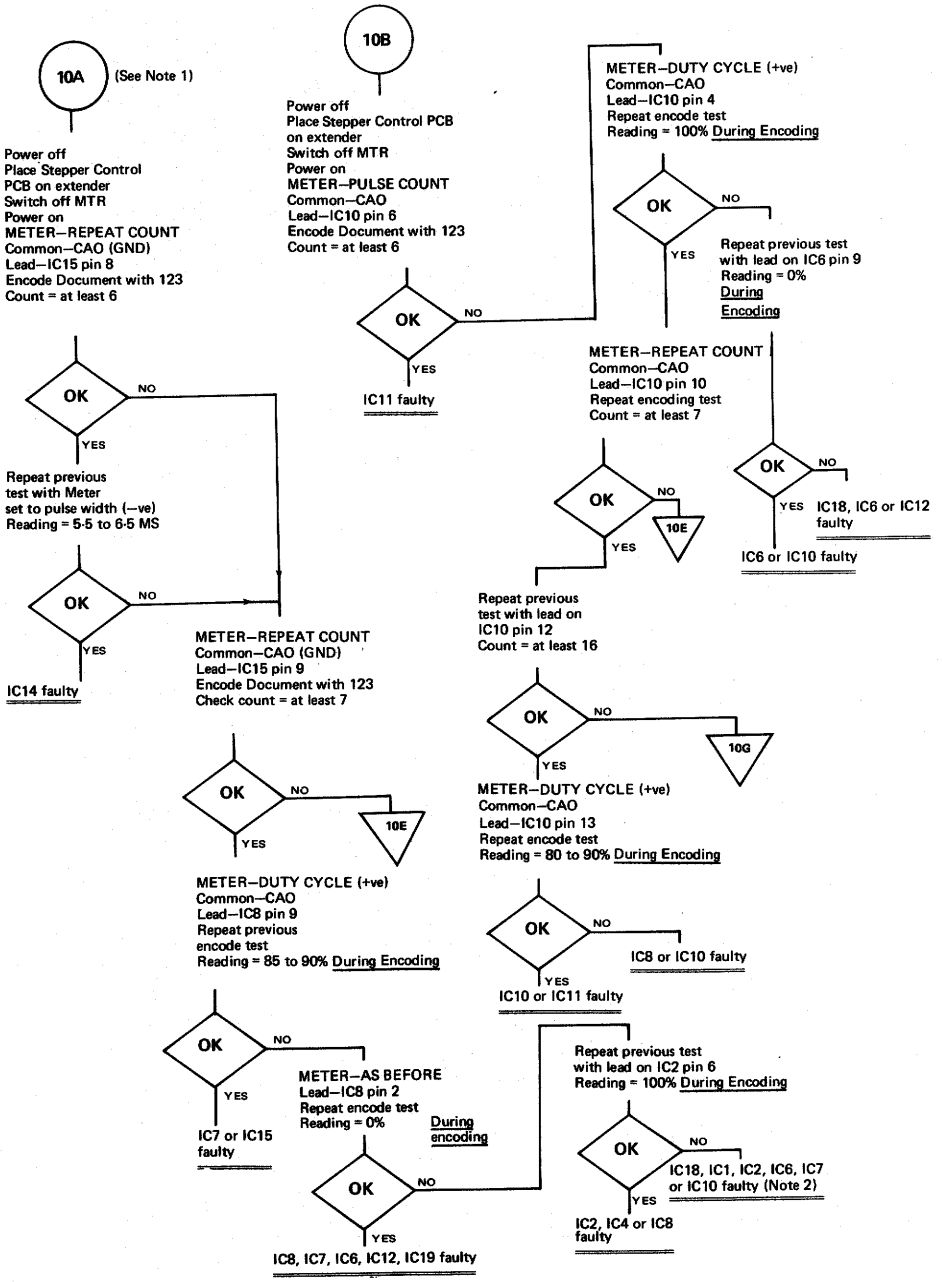

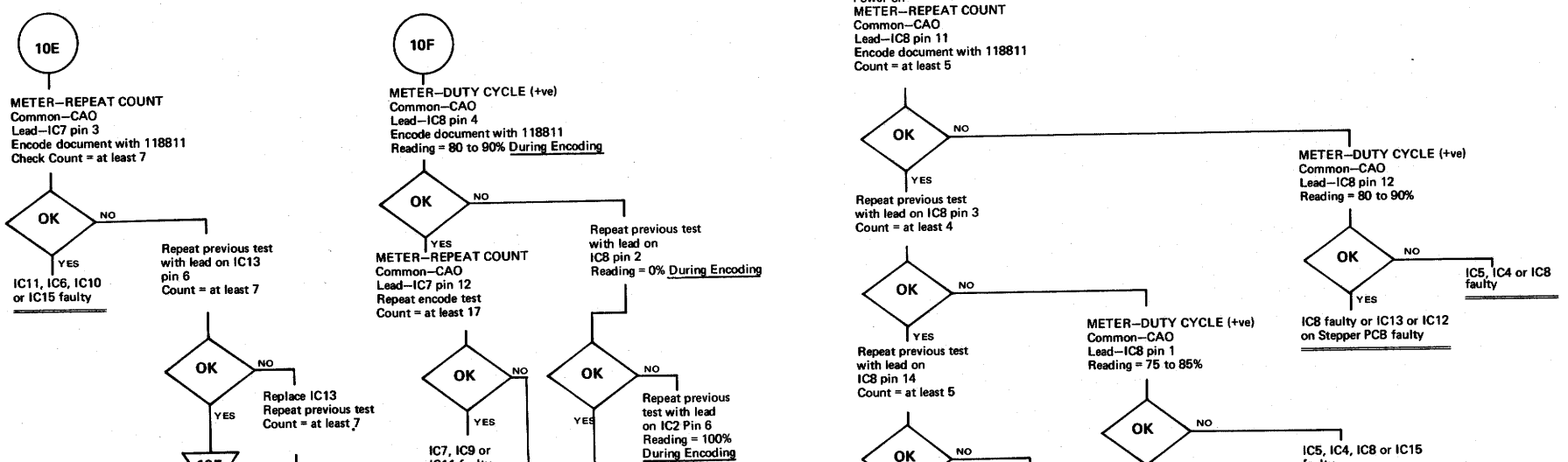

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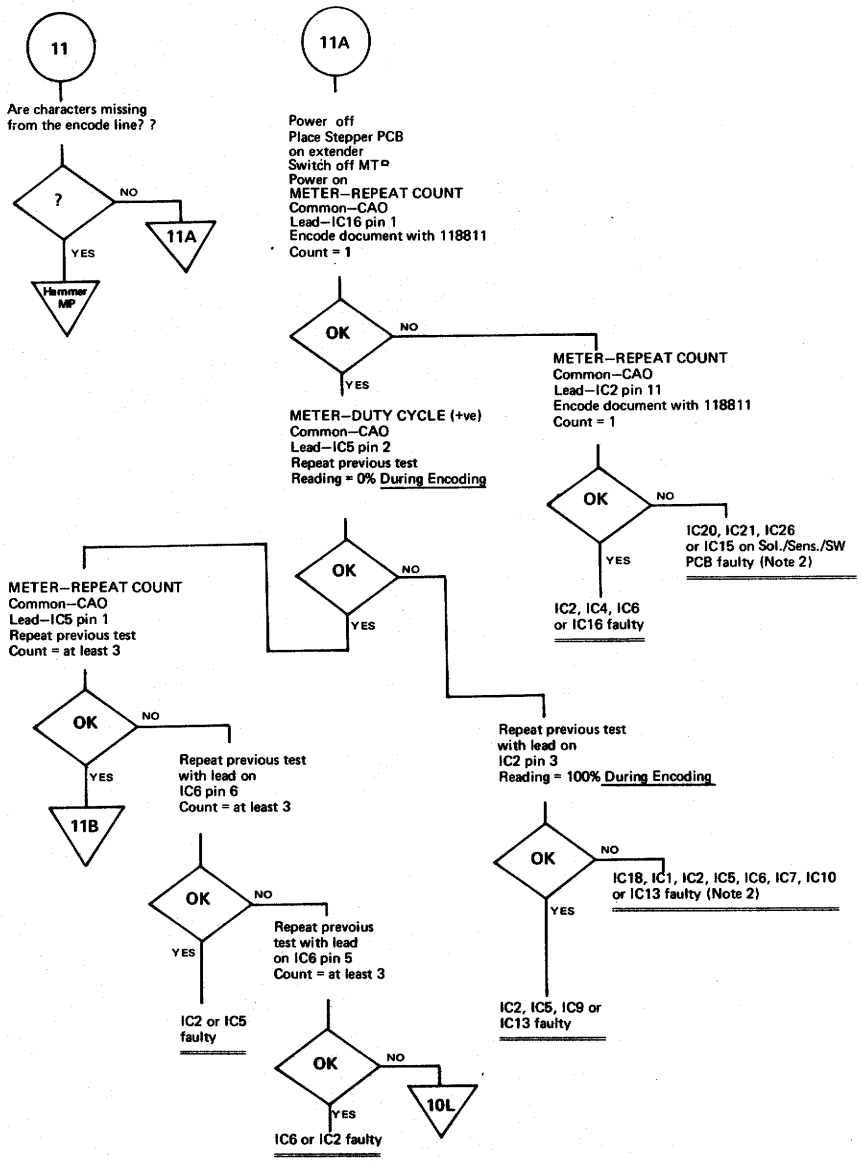

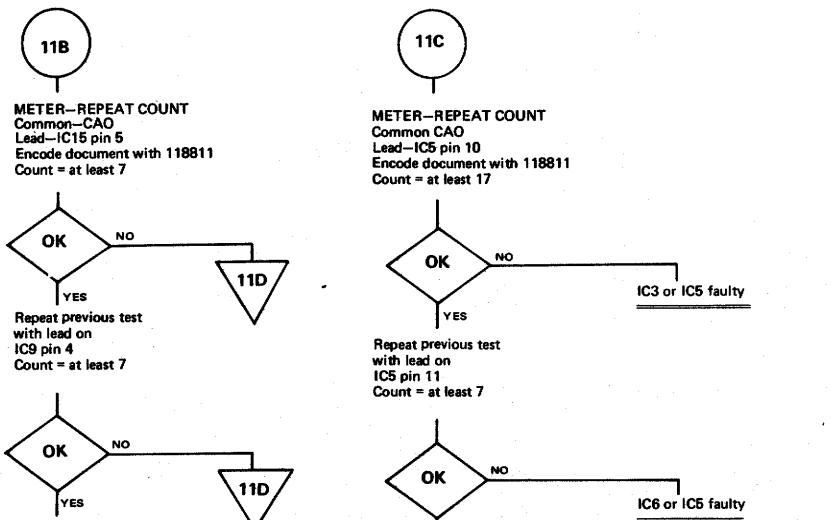

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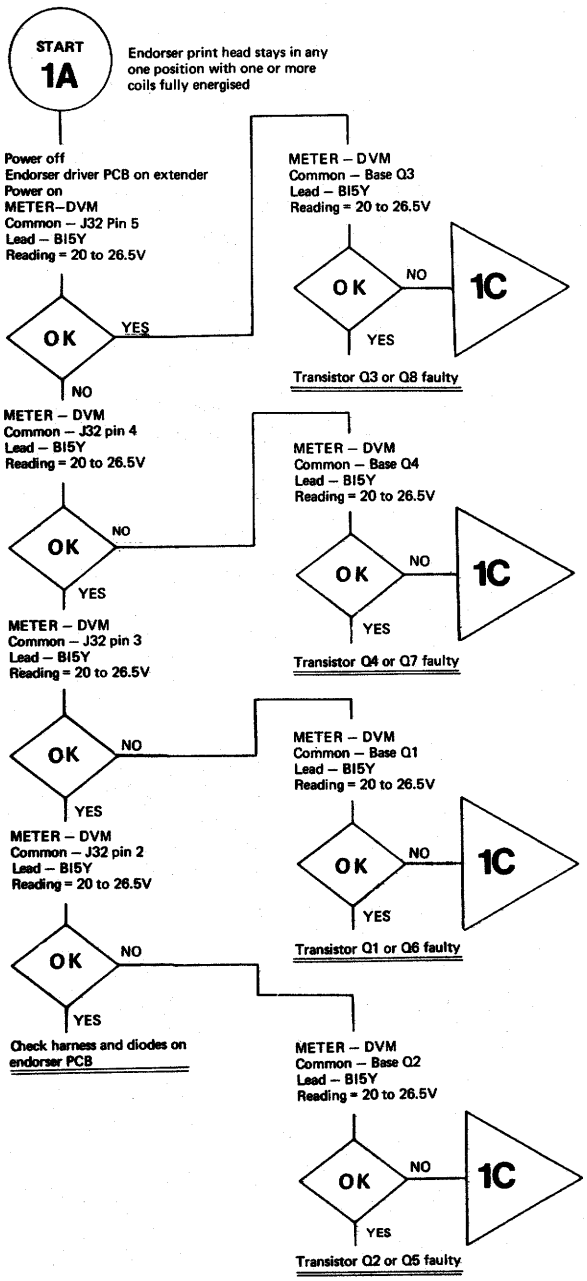

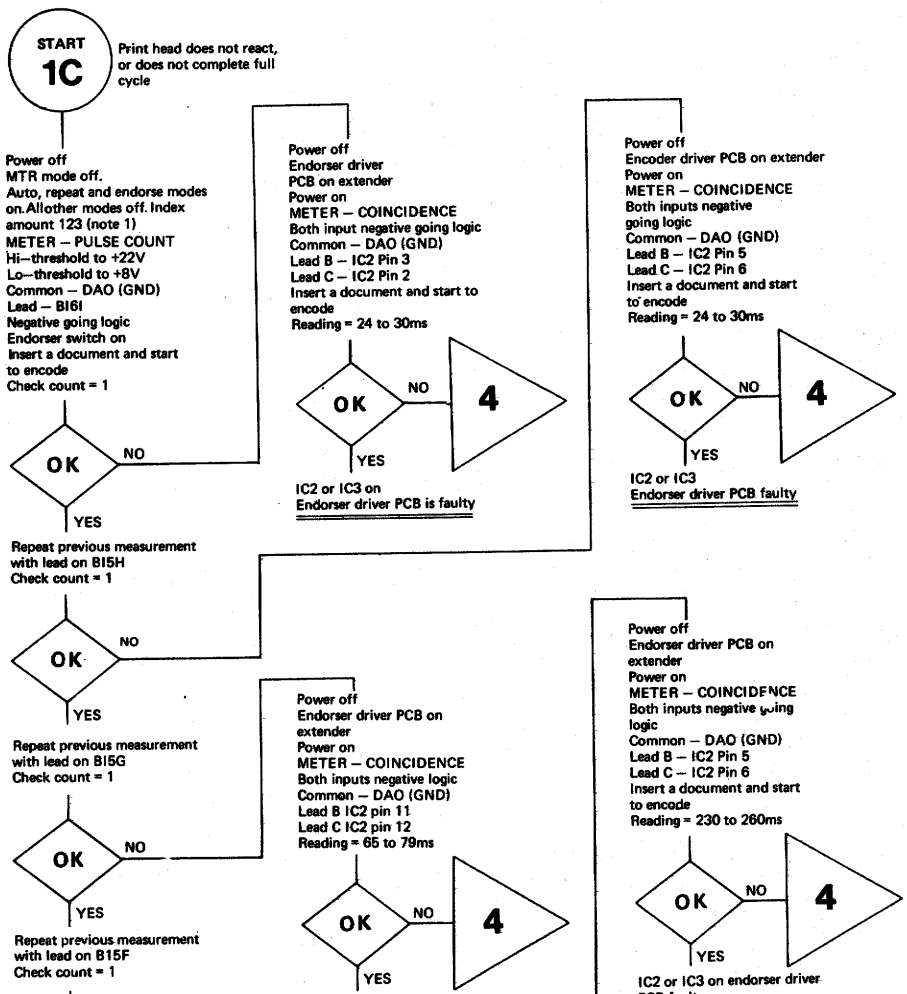

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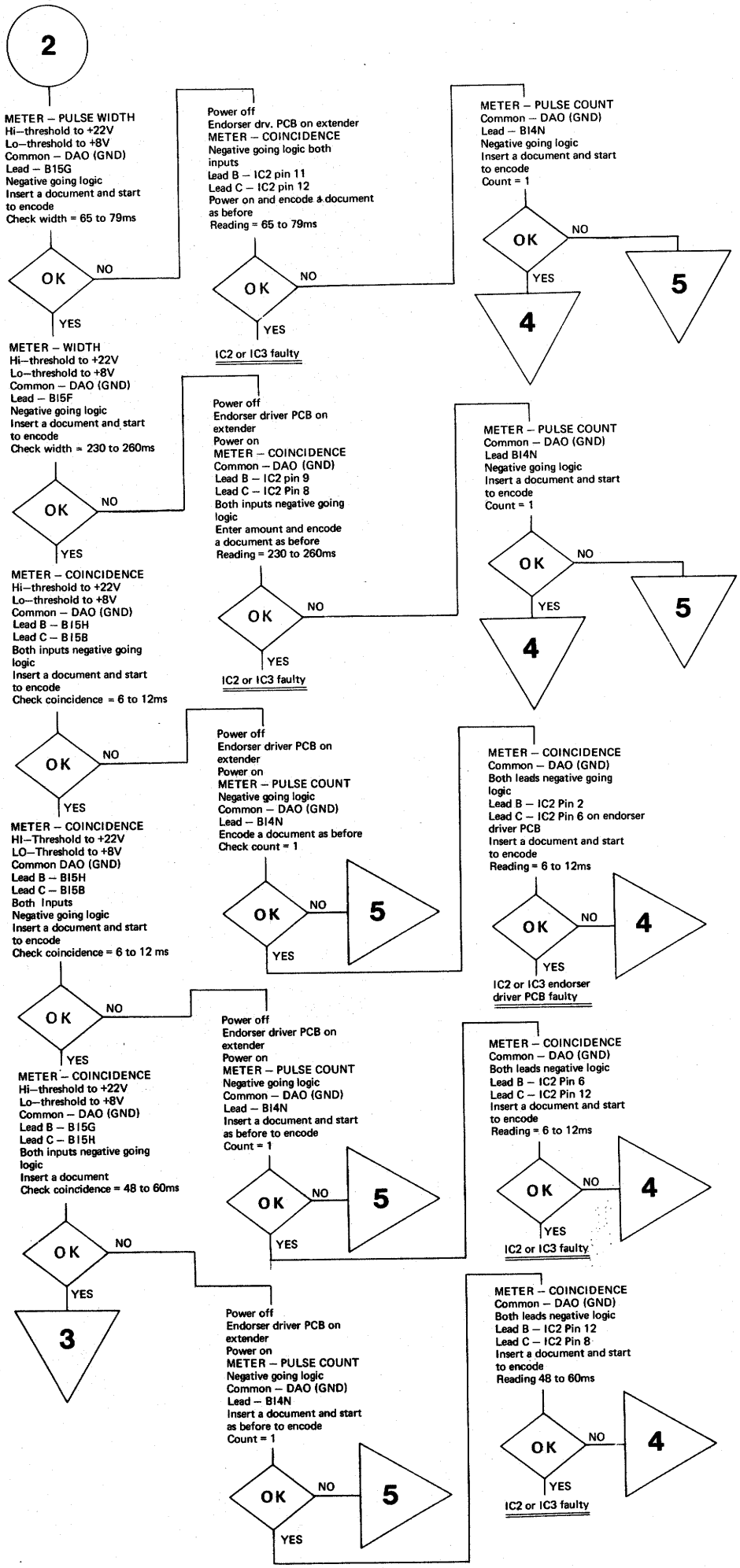
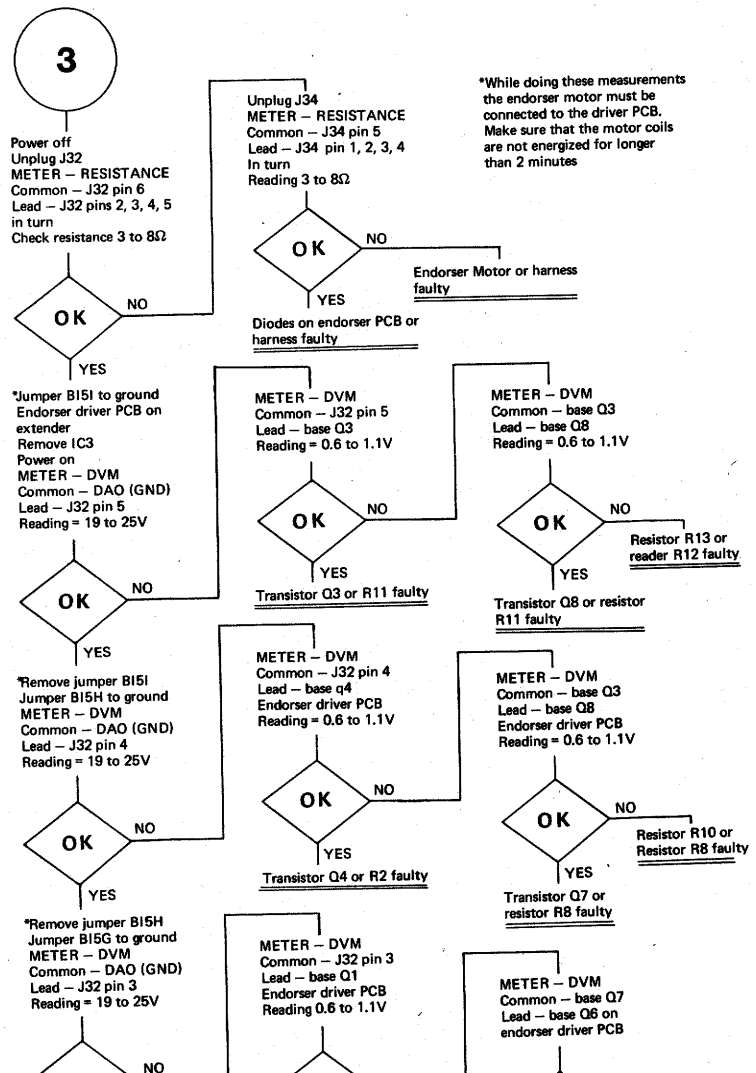
NOTE: METER READINGS, UNLESS OTHERWISE STATED, ARE FOR TTL LIMITS AND POSITIVE LOGIC





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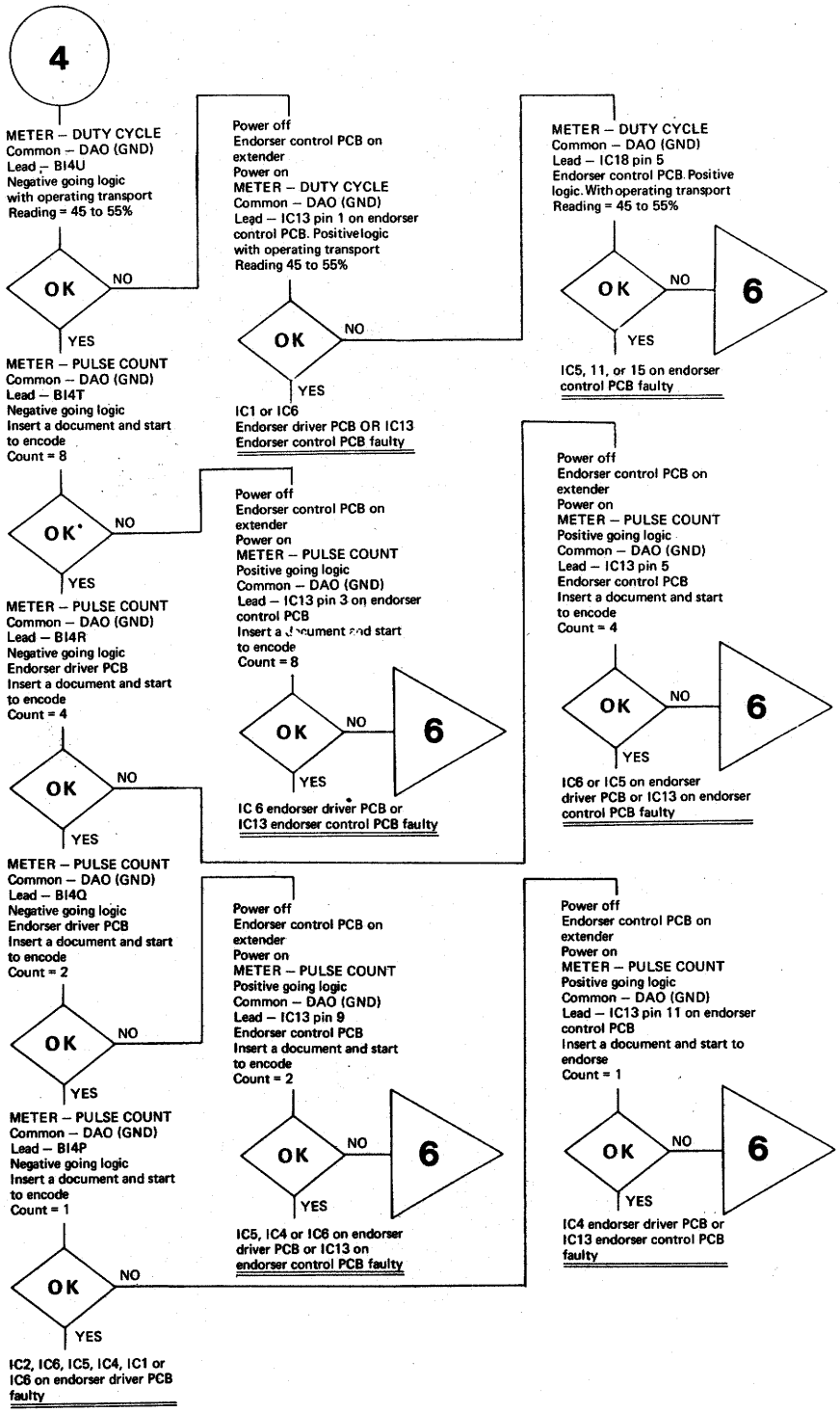

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7

METER – PULSE COUNT
Negative going logic
Common – DAO (GND)
Lead – IC19 pin 13 on endorser control PCB
Insert a document and encode
Count = 1

OK? NO → METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC19 pin 13
Endorser control PCB
Positive going logic
Reading = 100%

OK? NO → METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC18 pin 11
Endorser control PCB
Reading = 0%

OK? NO → IC14 faulty
YES → IC18 or IC19 faulty

YES → **7C**

YES → METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC19 pin 12
Reading = 100%

OK? NO → IC19 or IC15 on endorser control PCB faulty

YES → METER – DUTY CYCLE
Common – DAO (GND)
Endorser control PCB
Lead IC19 pin 10
Reading = 100%

OK? NO → **6A**

YES → METER – PULSE COUNT
Common – DAO (GND)
Lead – IC19 pin 11
Endorser control PCB
Negative going logic
Insert a document and start to encode
Count = 1

OK? NO → Repeat previous measurement with lead on IC18 pin 13 and negative going logic
Count = 1

OK? NO → **9**

YES → IC18, IC19 faulty

YES → METER – PULSE WIDTH
Common – DAO (GND)
Lead – IC19 pin 9 on endorser control PCB
Positive logic
Encode a document
Reading = 280 to 320ms

OK? NO → Repeat previous procedure with lead on IC19 pin 8
Reading = 280 to 320ms

OK? NO → IC15 or IC19 on endorser control PCB faulty

YES → IC15 or IC16 on endorser control PCB faulty

YES → Repeat previous procedure with lead on IC15 pin 9
Reading = 280 to 320ms

OK? NO → **7B**

YES → **7A**

7A

METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC15 pin 1 on endorser control PCB
Reading = 100%

OK? NO → Backplane harness tracks on PCB or IC15 faulty

YES → IC15 faulty

7B

METER – PULSE WIDTH
Common – DAO (GND)
Lead – IC15 pin 8
Negative logic
Insert a document and start to encode
Reading = 280 to 320ms

OK? NO → IC15 on endorser control PCB faulty

YES → IC15 or IC17 on endorser control PCB faulty

8A

METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC17 pin 4
Reading = 0%

OK? NO → METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC17 pin 6 on endorser control PCB
Reading = 100%

YES → IC16, 18, 19 or 20 faulty

8

METER – DUTY CYCLE
Common – DAO (GND)
Lead – BG8L
Reading = 45 to 55%
with operating transport

OK? NO → EM CLOCK MP

YES → METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC9 pin 2 on endorser control PCB
Reading = 45 to 55% with operating transport

OK? NO → IC9 or IC16 or IC19 or IC20 on endorser control PCB faulty

YES → METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC16 pin 1 on endorser control PCB
Reading = 100%
Change meter scale
METER – PULSE COUNT
Insert a document and start to encode
Check count = 1

7C

Power off
Remove IC19 (endorse cont. PCB)
Power on
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC14 pin 1
Endorser control PCB
Reading = 100%

OK? NO → IC15, IC14, R6 or R7 faulty

YES → METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC14 pins 9, 10, 3 & 4 in turn
All reading = 100%

OK? NO → IC14 or R2 faulty

YES → METER – PULSE COUNT
Common – DAO (GND)
Lead – IC14 pin 15
Is the meter counting continuously while the transport operates

? NO → IC14, IC11, IC10, IC12 or IC18 on endorser control PCB faulty

YES → METER – PULSE COUNT
Common – DAO (GND)
Lead – IC18 pin 12 on endorser control PCB
Check count = 0

OK? NO → Power off
Reinsert IC19
Power on
METER – PULSE COUNT
Common – DAO (GND)
Lead – IC18 pin 13 on endorser control PCB
Is the meter counting continuously

YES → IC15, IC16 or IC19 faulty

? NO → **9**

YES → IC15, IC18 or IC19 faulty

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TITLE

ENDORSER (Page 5 of 6)

ENG	DATE	DWG NO.	REV.
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CLASSIFICATION CODE	RELEASED
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9

Power off
On encoder control PCB
Solder link LK1 to MICR position
Adjust IC4 for longest delay (lift leg 5 only)
Power on
METER – PULSE COUNT
Common – DAO (GND)
Lead – IC7 pin 13
Encode a document as before
Check count = 1

OK? NO
YES

METER – PULSE COUNT
Common – DAO (GND)
Lead – IC7 pin 12
Insert a document and start to encode
Check count = 4

OK? NO
YES

METER – PULSE COUNT
Common – DAO (GND)
Lead – IC7 pin 10
Insert a document and start to encode
Check count = 5

OK? NO
YES

METER – PULSE COUNT
Common – DAO (GND)
Lead – IC7 pin 9
Insert a document and start to encode
Check count = 5

OK? NO
YES

IC7, 18, 16, 19 or 20 on endorser control PCB faulty

→ 9A

9A

METER – PULSE COUNT
Common – DAO (GND)
Lead –IC8 pin 10 on endorser control PCB
Negative going logic
Encode a document as before
Reading = 108

OK? NO → METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC8 pin 1
Reading = 100%
Change meter scale
METER – PULSE COUNT
Negative going logic
Encode a document as before
Check count = 1

OK? NO → 10
YES → 11

YES

METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC8 pin 4 (Reading 0%) and IC8 pins 5, 6, 7 (Reading 100%)
} without endorsing

All OK? NO
YES

IC8 or IC4 faulty
Ensure IC4 and LK1 are set up again to original machine condition

METER – PULSE WIDTH
Common – DAO (GND)
Lead – IC8 pin 9
Negative going logic
Insert a document and start to encode
Reading = 15 to 20ms

OK? NO → METER – PULSE WIDTH
Common – DAO (GND)
Lead – IC10 pin 3 on endorser control PCB
Positive logic
Insert a document and start to encode
Reading = 15 to 20ms

OK? NO → 6
YES

IC10 or IC8 on endorser control PCB faulty

YES

METER – PULSE WIDTH
Common – DAO (GND)
Lead – IC8 pin 1
Positive going logic
Insert a document and start to encode
Reading = 270 to 310 ms

OK? NO → 10
YES

IC8 faulty

10

METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC16 pin 11 on endorser control PCB
Reading = 45 to 55%
(with operating transport)

OK? NO
YES

METER – WIDTH
Common – DAO (GND)
Lead – IC16 pin 12 on endorser control PCB
Negative going logic
Encode a document as before
Check reading = 280 to 320ms

OK? NO
YES

IC8 or IC16 on endorser control PCB faulty

METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC18 pin 1 on endorser control PCB
Negative logic
Reading = 45 to 55%
(with operating transport)

OK? NO
YES

IC16 or IC18 on endorser control PCB faulty

METER – DUTY CYCLE
Common – DAO (GND)
Lead – BG8L
Positive logic
Reading = 45 to 55%
(with operating transport)

OK? NO → EM CLOCK MP
YES

IC9, 16, 18, 19 or 20 on endorser control PCB faulty

METER – PULSE COUNT
Common – DAO (GND)
Lead – IC7 pin 8
Negative going logic
Is the meter counting continuously

OK? NO
YES

IC19, IC16 or IC18

11

12

METER – DVM
Common – DAO (GND)
Lead – IC6 pin 2 on endorser control PCB
Reading = 3.0 to 5.25V
Switch off endorse switch
Reading now = 0 to 0.7V

Both OK? NO → MODE KEY MP
YES

Switch on Endorse switch
METER – PULSE COUNT
Common – DAO (GND)
Lead – IC6 pin 3 on endorser control PCB
Insert a document and start to encode
Check count = 1

OK? NO → 14
YES

METER – PULSE COUNT
Common – DAO (GND)
Lead – IC6 pin 1 on endorser control PCB
Negative going logic
Insert a document and start to encode
Check count = 1

OK? NO
YES

METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC17 pin 3
Positive going logic
Reading = 100%

OK? NO
YES

IC6 or tracks on PCB faulty

METER – PULSE COUNT
Common – DAO (GND)
Lead – IC6 Pin 5 on endorser control PCB
Insert document and start to encode
Check count = 1

OK? NO
YES

IC6 or IC5 faulty

METER – PULSE COUNT
Common – DAO (GND)
Lead – IC6 Pin 6 on endorser control PCB
Insert a document and start to encode

METER – PULSE COUNT
Common – DAO (GND)
Lead – IC17 pin 2 on endorser control PCB
Positive logic
Encode a document as before
Check count = 1

OK? NO → 12A
YES

METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC17 Pin 3
Positive going logic
Reading = 100%

OK? NO → INITIALIZE MP
YES

IC17 or IC6 endorser control PCB faulty

12A

METER – PULSE COUNT
Common – DAO (GND)
Lead IC5 pin 1 on endorser control PCB
Insert a document and start to encode
Is the meter counting continuously?

? NO
YES

IC6, IC5, or IC3 faulty

Repeat previous measurement with lead on IC6 pin 11 is the meter counting continuously

? NO
YES

IC3 or IC6 faulty

METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC6 pin 9
Reading = 100%

OK? NO
YES

IC6 or IC11 faulty

IC11 or IC10 faulty

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TITLE: **ENDORSER** (Page 6 of 6)	
ENG: JBS	DATE:
DWG NO.: 2801 8448	REV.: A
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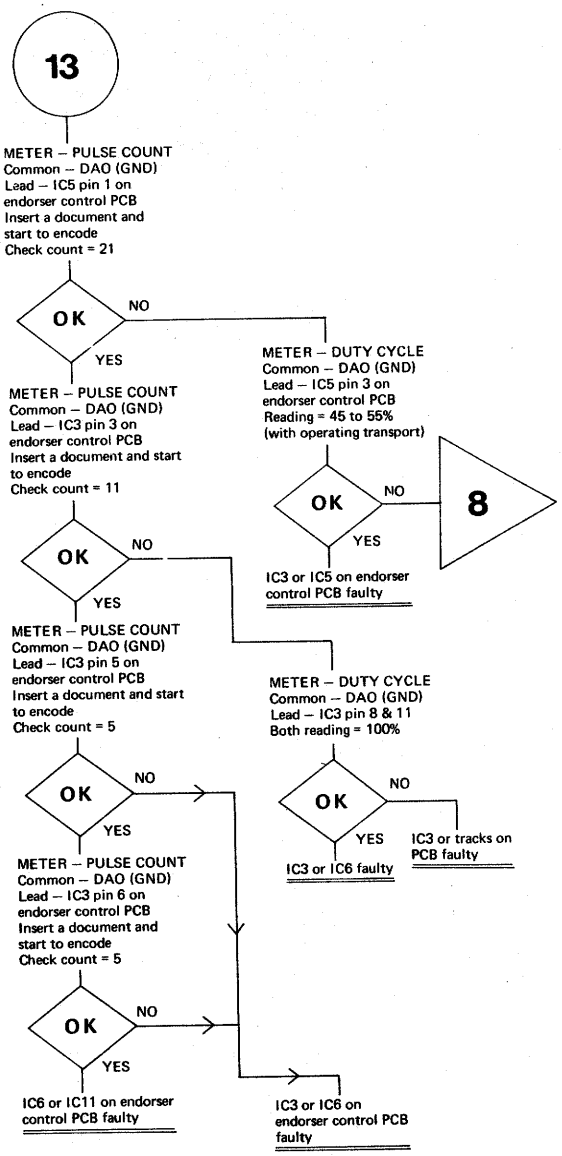

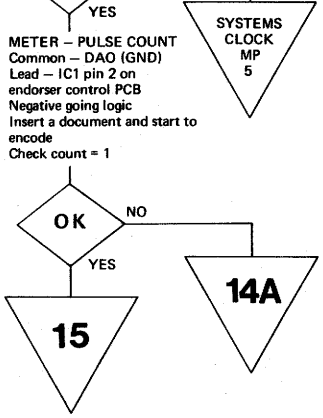

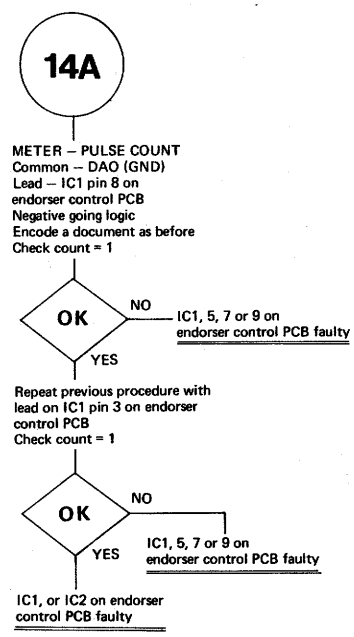

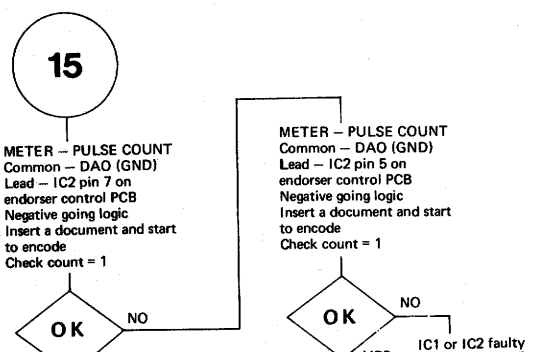

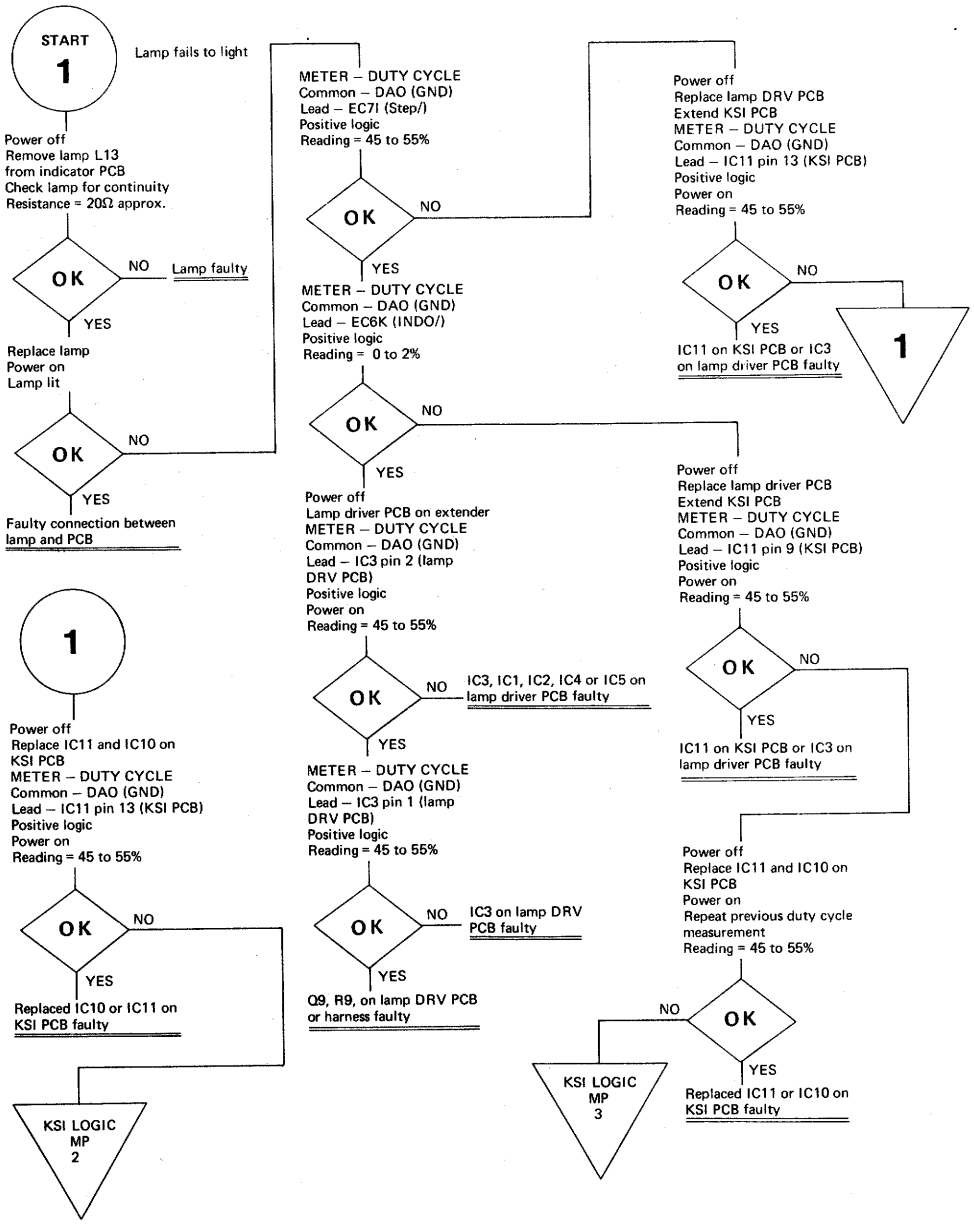

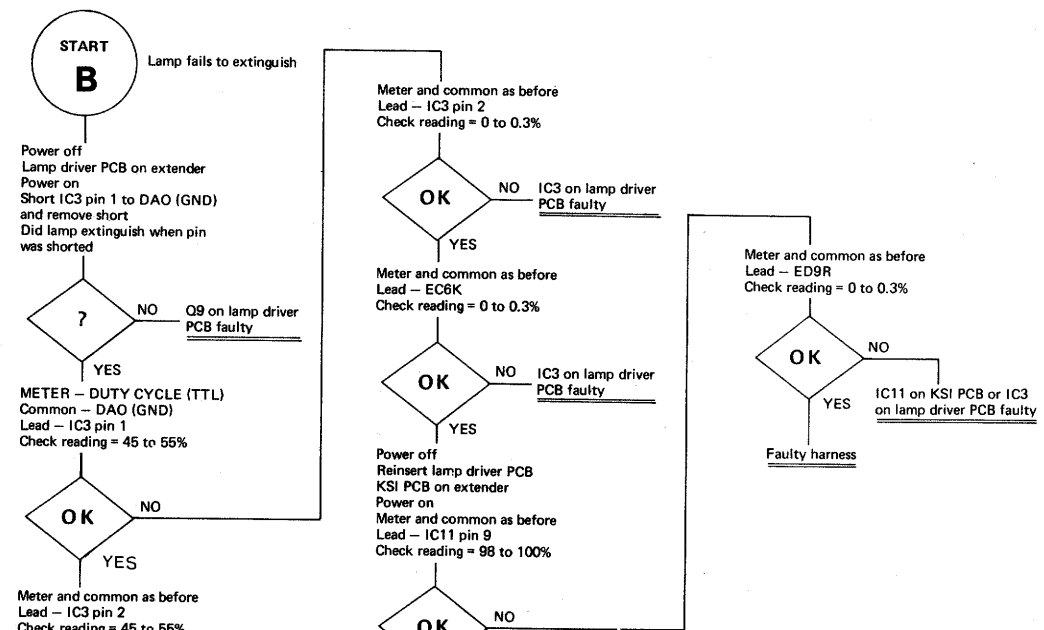

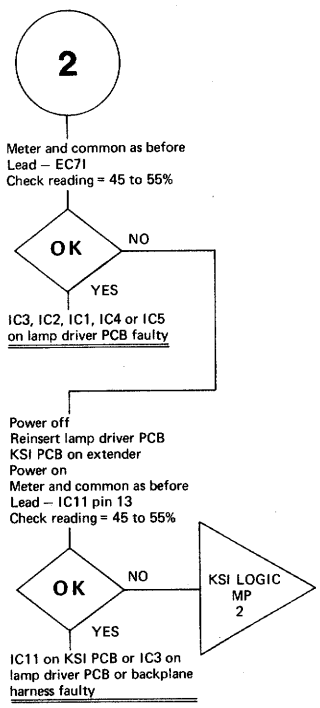

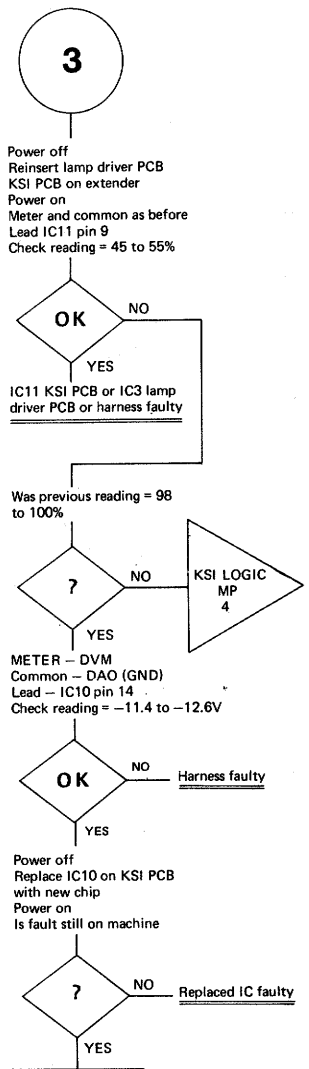

NOTE: UNLESS OTHERWISE STATED,
ALL DUTY CYCLE MEASUREMENTS
ARE FOR POSITIVE LOGIC

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TITLE

ERROR LAMP (PAGE 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8455	A

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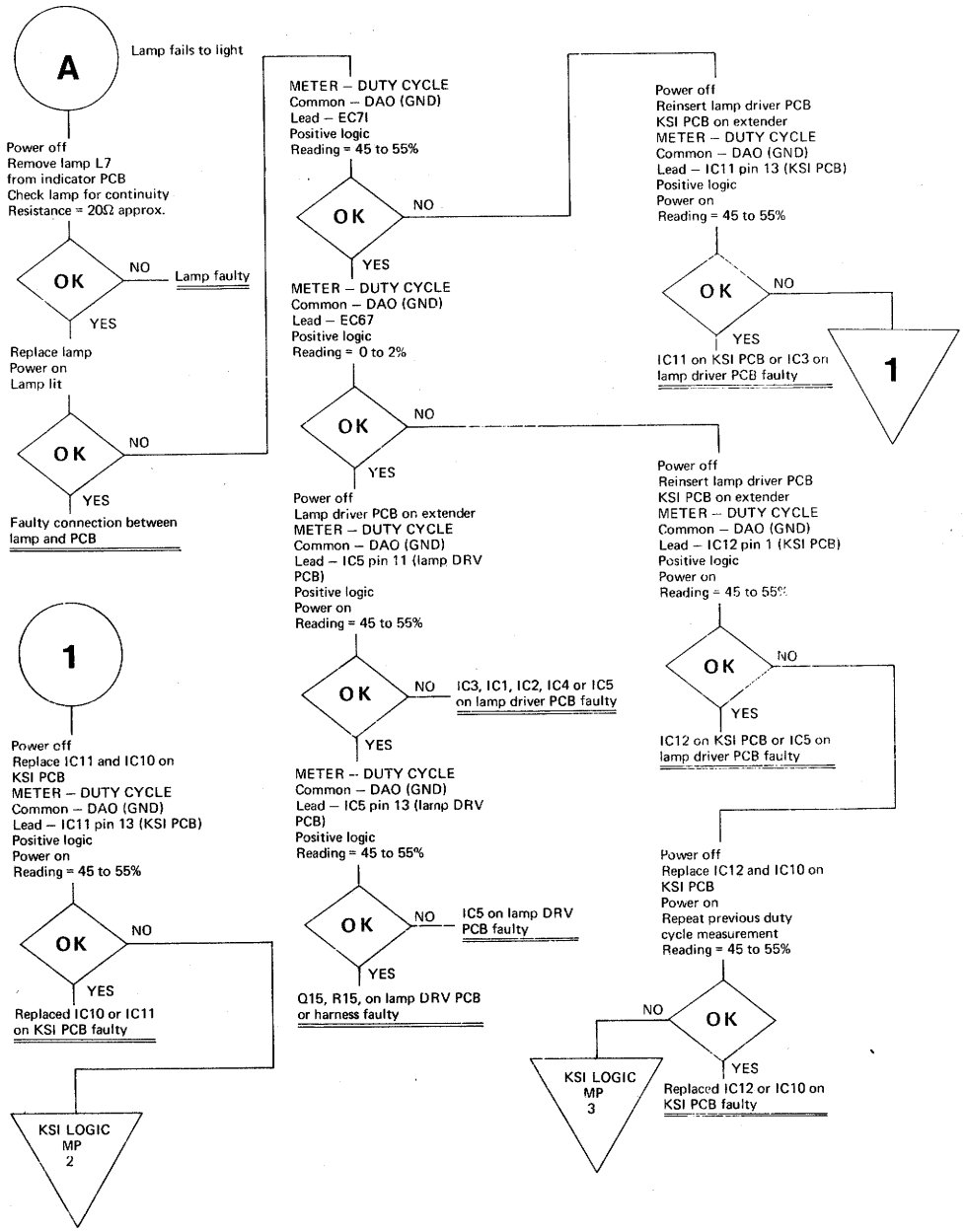

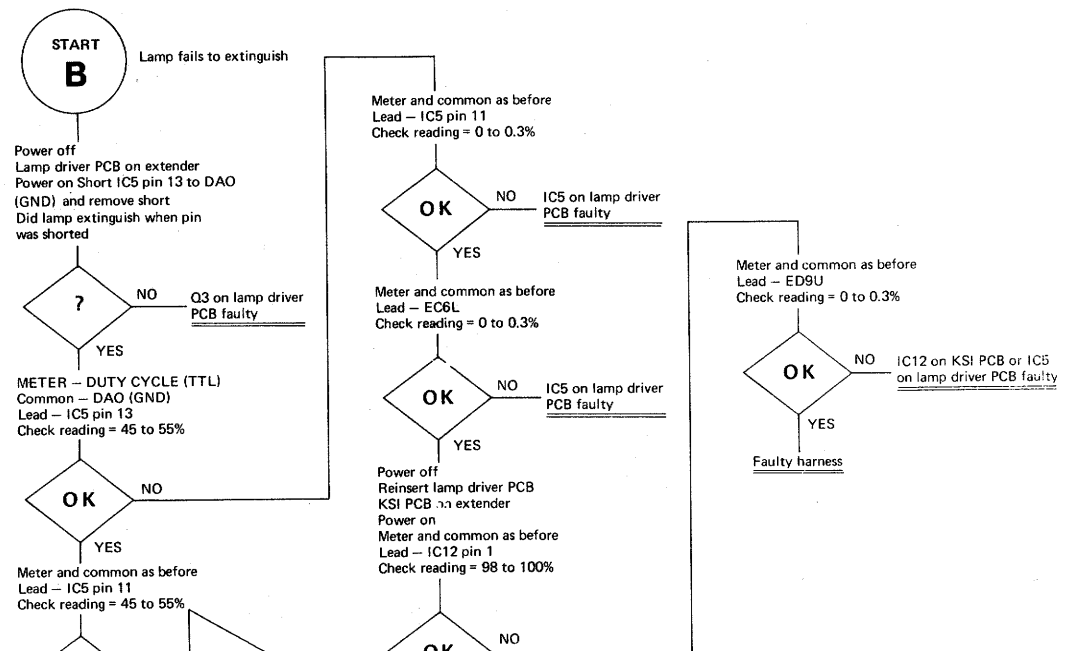

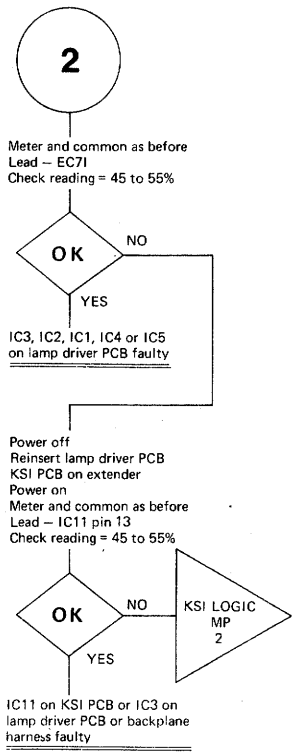

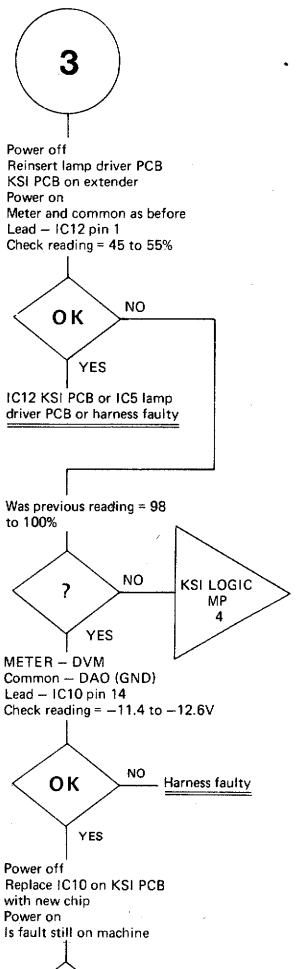

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ALL DUTY CYCLE MEASUREMENTS
ARE FOR POSITIVE LOGIC

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TITLE

F6 LAMP (PAGE 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8463	A

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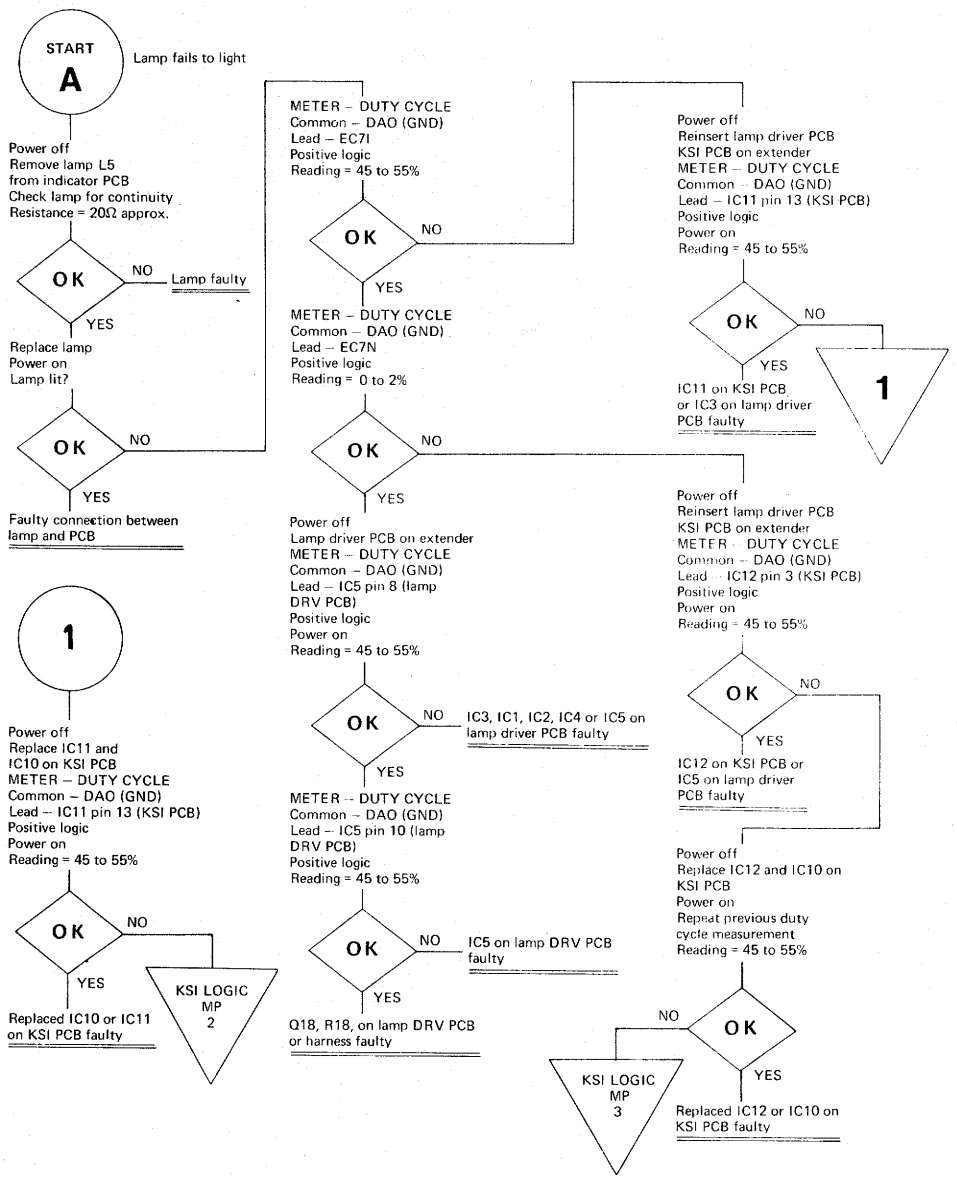

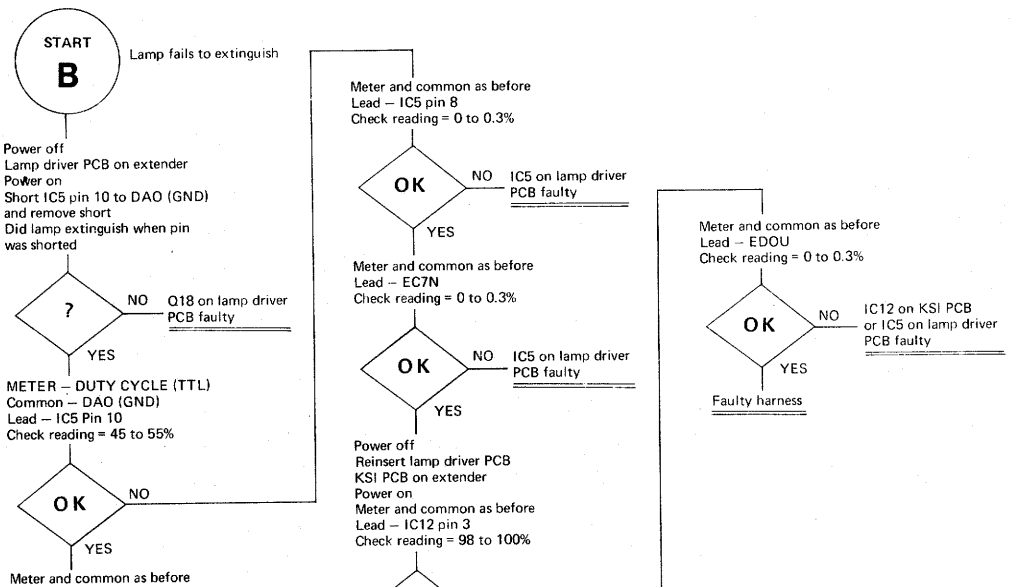

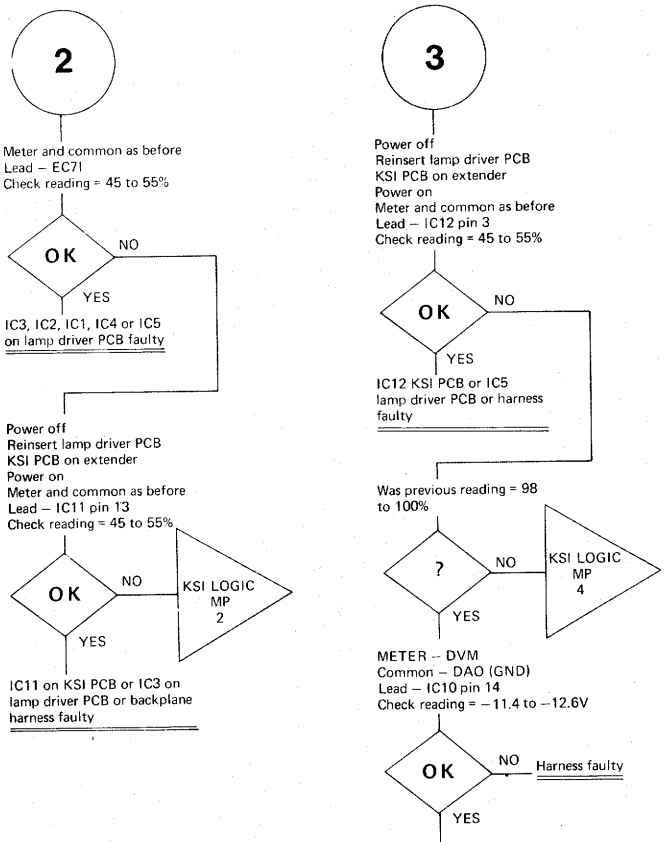

NOTE: UNLESS OTHERWISE STATED,
ALL DUTY CYCLE MEASUREMENTS
ARE FOR POSITIVE LOGIC

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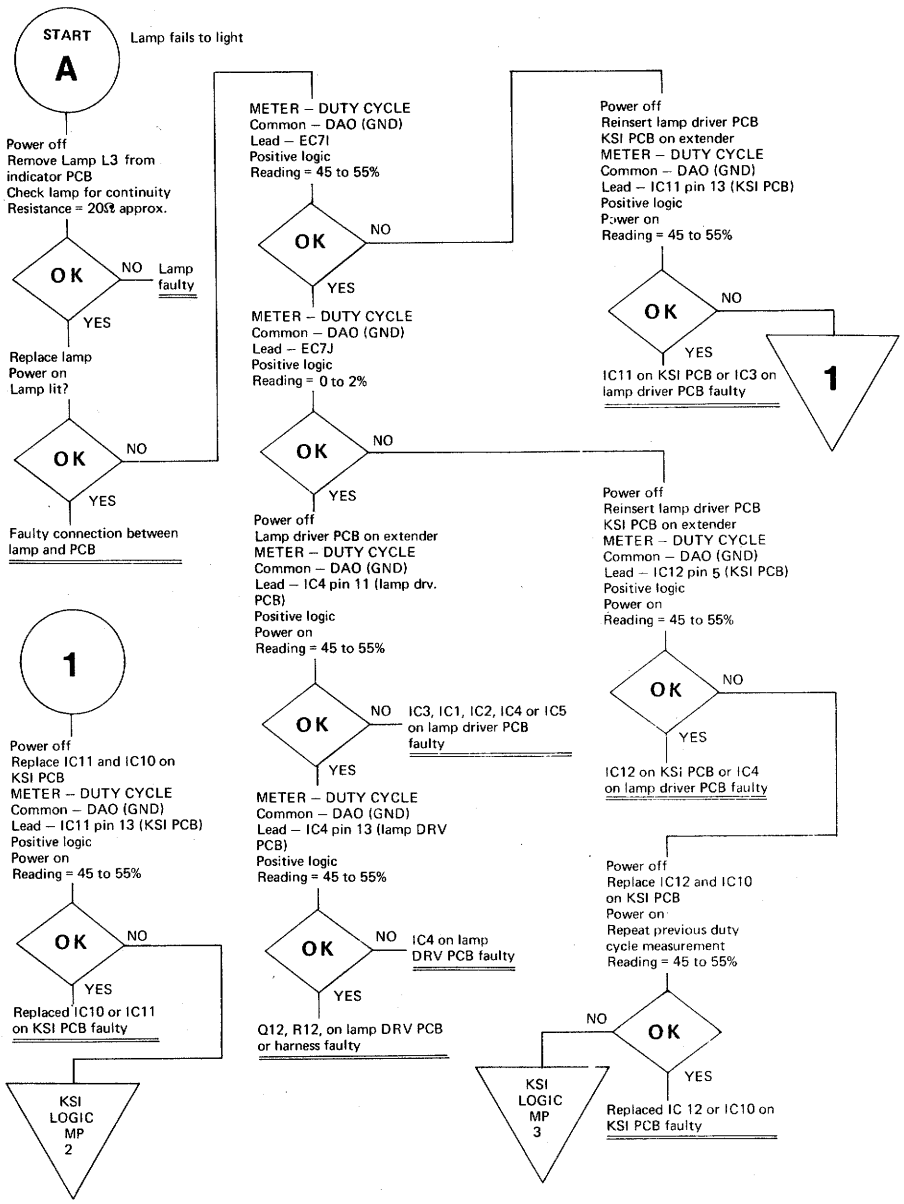
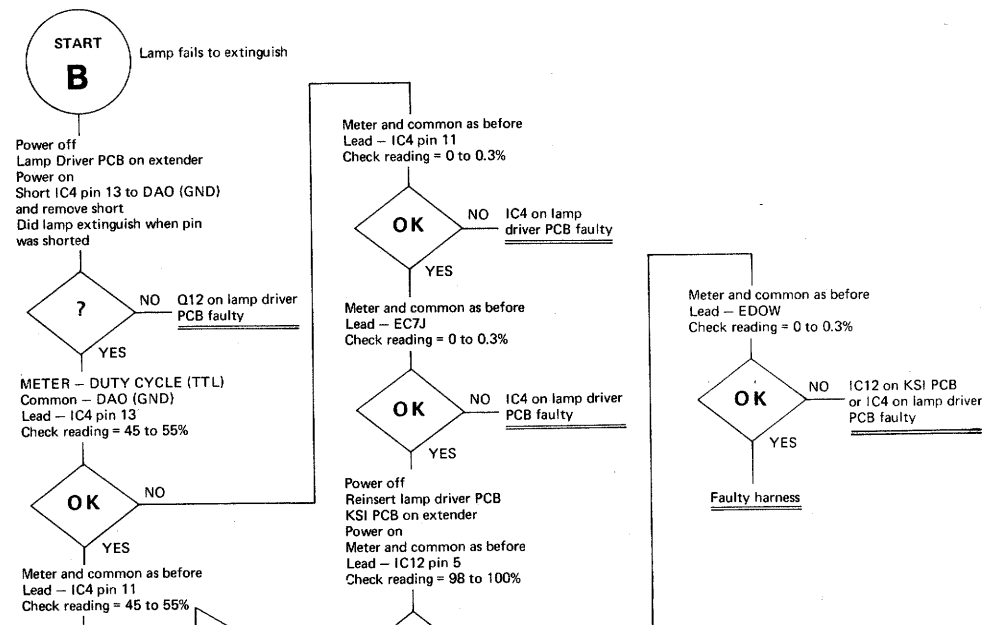
TITLE

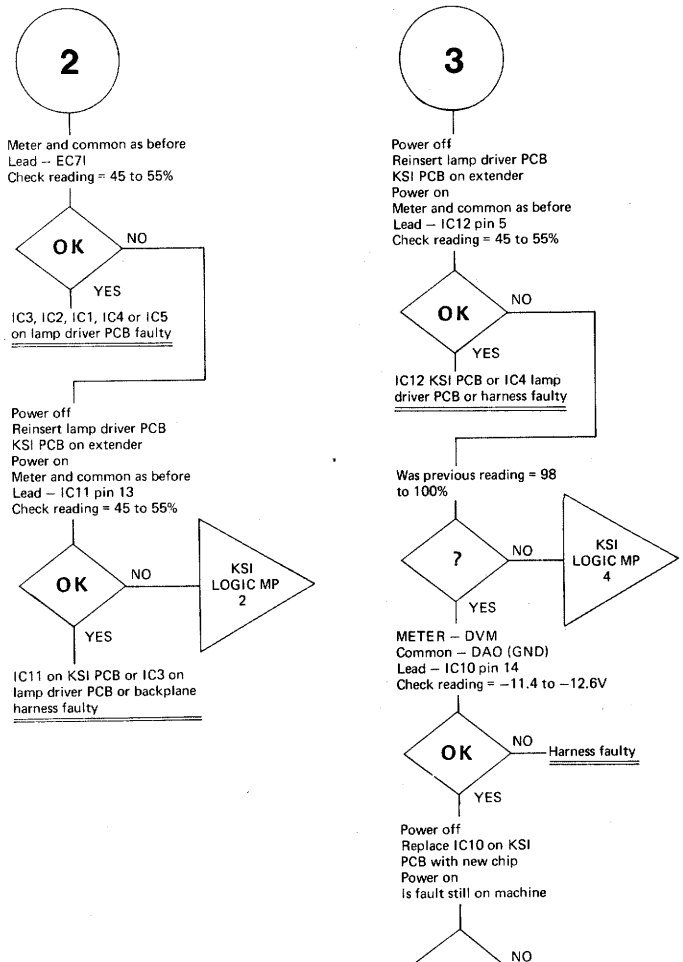
F7 LAMP (PAGE 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8471	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977







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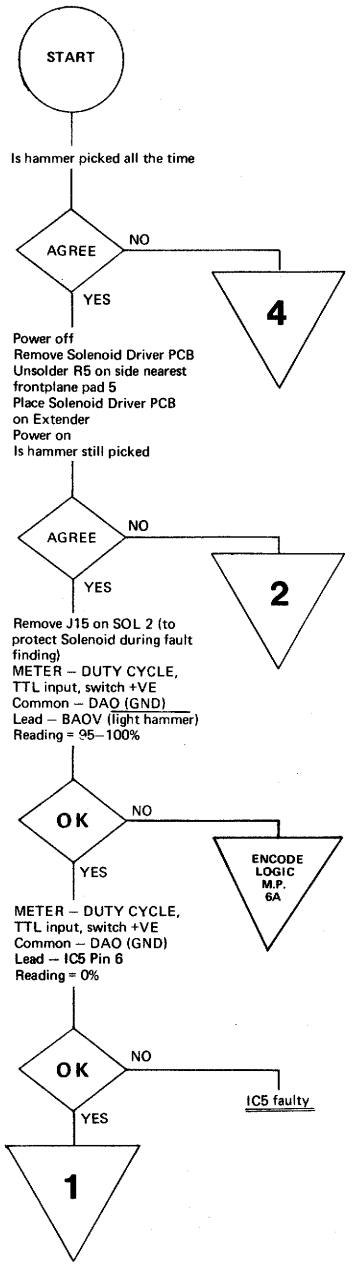
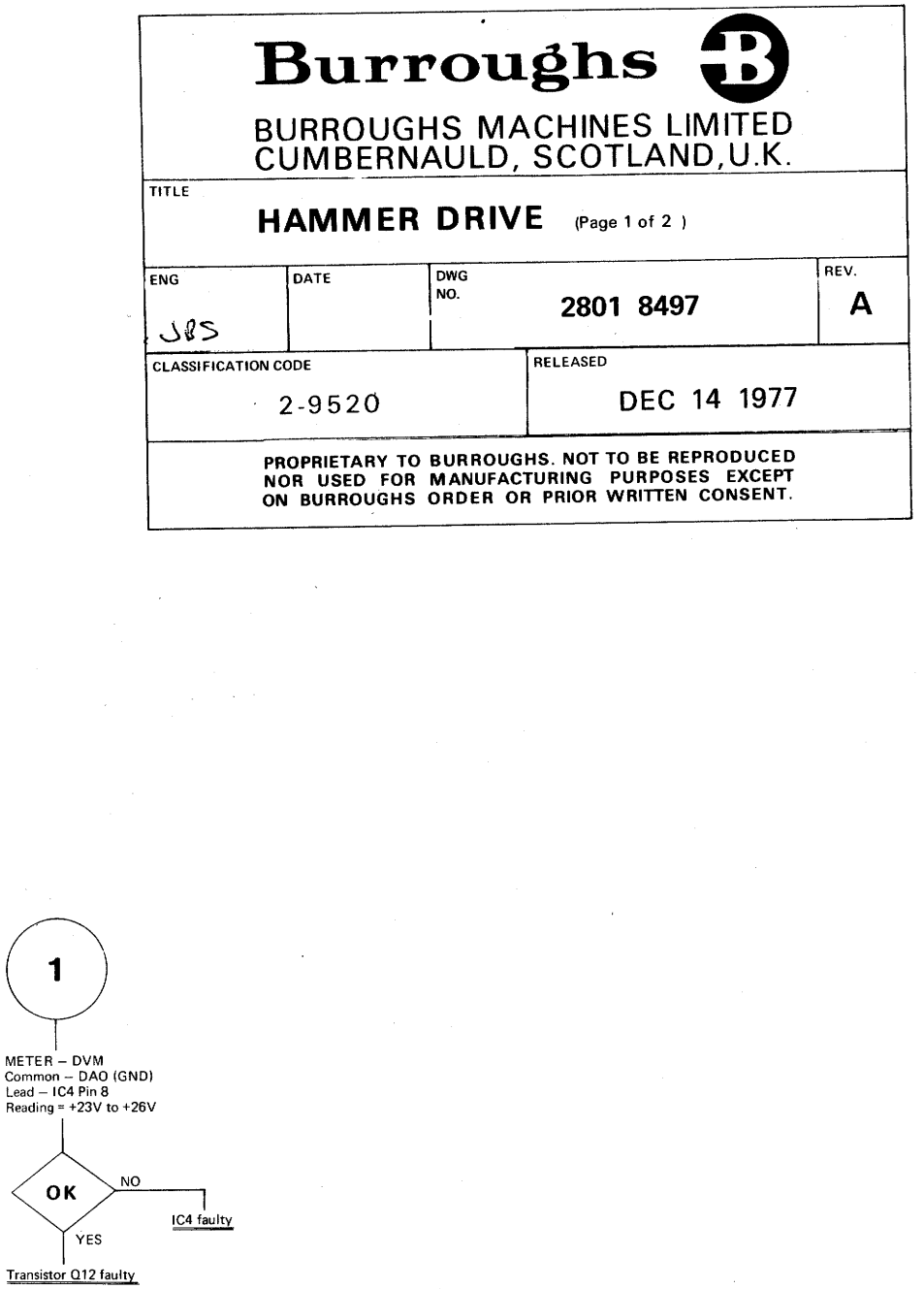
TITLE			
F8 LAMP 1of 1			
ENG: JBS	DATE:	DWG NO.: **2801 8489**	REV.: **A**
CLASSIFICATION CODE: 2-9520		RELEASED: DEC 14 1977	

NOTE: UNLESS OTHERWISE STATED, DUTY CYCLE MEASUREMENTS ARE FOR TTL LIMITS AND POSITIVE LOGIC


START
Is hammer picked all the time
AGREE
NO
YES
4
Power off
Remove Solenoid Driver PCB
Unsolder R5 on side nearest frontplane pad 5
Place Solenoid Driver PCB on Extender
Power on
Is hammer still picked
AGREE
NO
YES
2
Remove J15 on SOL 2 (to protect Solenoid during fault finding)
METER – DUTY CYCLE,
TTL input, switch +VE
Common – DAO (GND)
Lead – BAOV (light hammer)
Reading = 95–100%
OK
NO
YES
ENCODE LOGIC M.P. 6A
METER – DUTY CYCLE,
TTL input, switch +VE
Common – DAO (GND)
Lead – IC5 Pin 6
Reading = 0%
OK
NO
IC5 faulty
YES
1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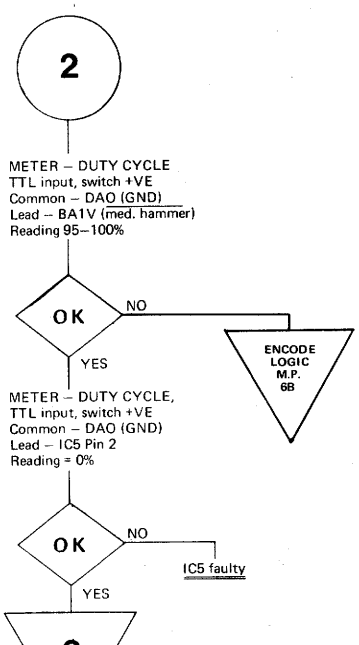
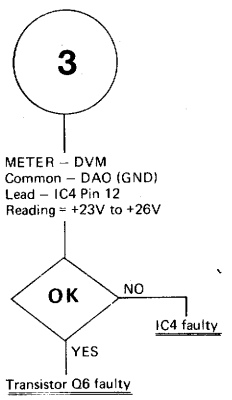
BURROUGHS MACHINES LIMITED
CUMBERNAULD, SCOTLAND, U.K.
TITLE
HAMMER DRIVE (Page 1 of 2)
ENG
JBS
DATE
DWG NO.
2801 8497
REV.
A
CLASSIFICATION CODE
2-9520
RELEASED
DEC 14 1977
PROPRIETARY TO BURROUGHS. NOT TO BE REPRODUCED NOR USED FOR MANUFACTURING PURPOSES EXCEPT ON BURROUGHS ORDER OR PRIOR WRITTEN CONSENT.

1
METER – DVM
Common – DAO (GND)
Lead – IC4 Pin 8
Reading = +23V to +26V
OK
NO
IC4 faulty
YES
Transistor Q12 faulty


2
METER – DUTY CYCLE
TTL input, switch +VE
Common – DAO (GND)
Lead – BA1V (med. hammer)
Reading 95–100%
OK
NO
YES
ENCODE LOGIC M.P. 6B
METER – DUTY CYCLE,
TTL input, switch +VE
Common – DAO (GND)
Lead – IC5 Pin 2
Reading = 0%
OK
NO
IC5 faulty
YES
3


3
METER – DVM
Common – DAO (GND)
Lead – IC4 Pin 12
Reading = +23V to +26V
OK
NO
IC4 faulty
YES
Transistor Q6 faulty

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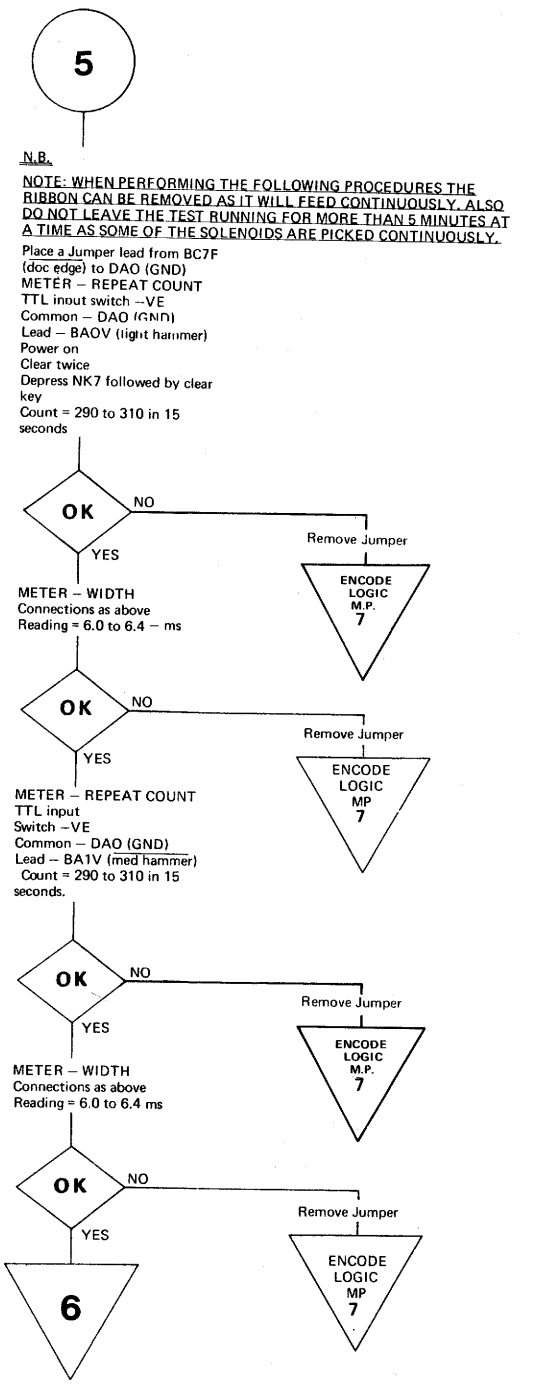
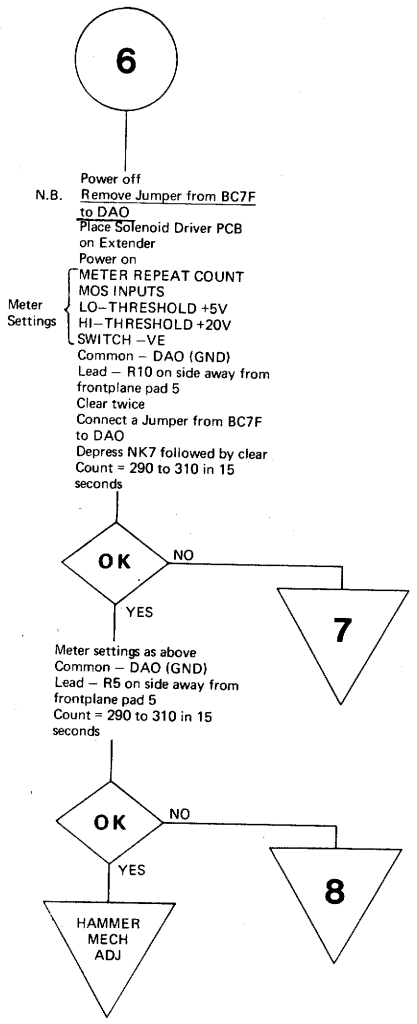
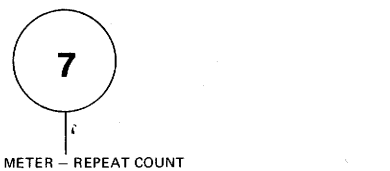
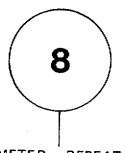
TITLE	**HAMMER DRIVE** (Page 2 of 2)
ENG: JBS	DATE:
DWG NO.: **2801 8497**	REV.: **A**
CLASSIFICATION CODE: 2-9520	RELEASED: DEC 14 1977









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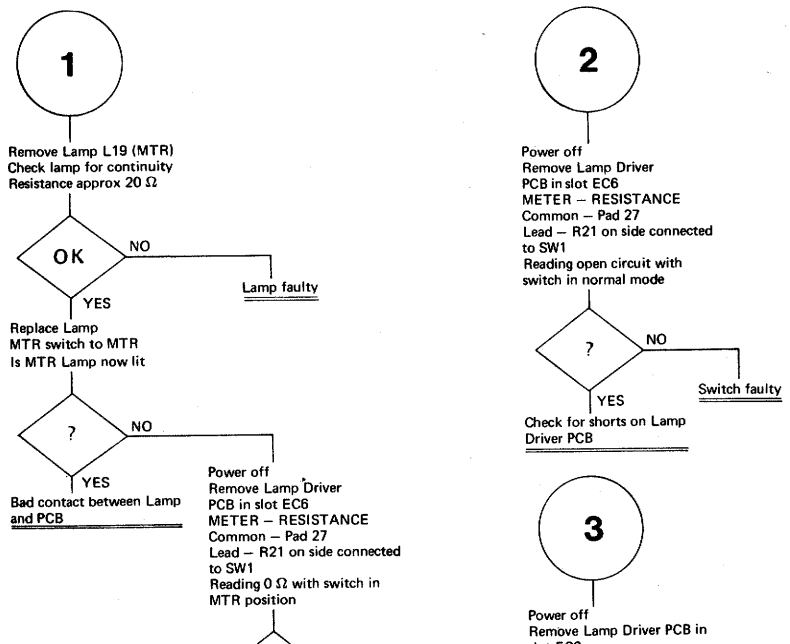
TITLE			
MTR LAMP (Page 1 of 1)			
ENG: JBS	DATE:	DWG NO.: **2801 8505**	REV.: **A**
CLASSIFICATION CODE: 2-9520		RELEASED: DEC 14 1977	

START 1 – MTR Lamp fails to light when MTR switch is on
START 2 – MTR Lamp fails to go off when in normal mode
START 3 – MTR Signal not correct on Backplane



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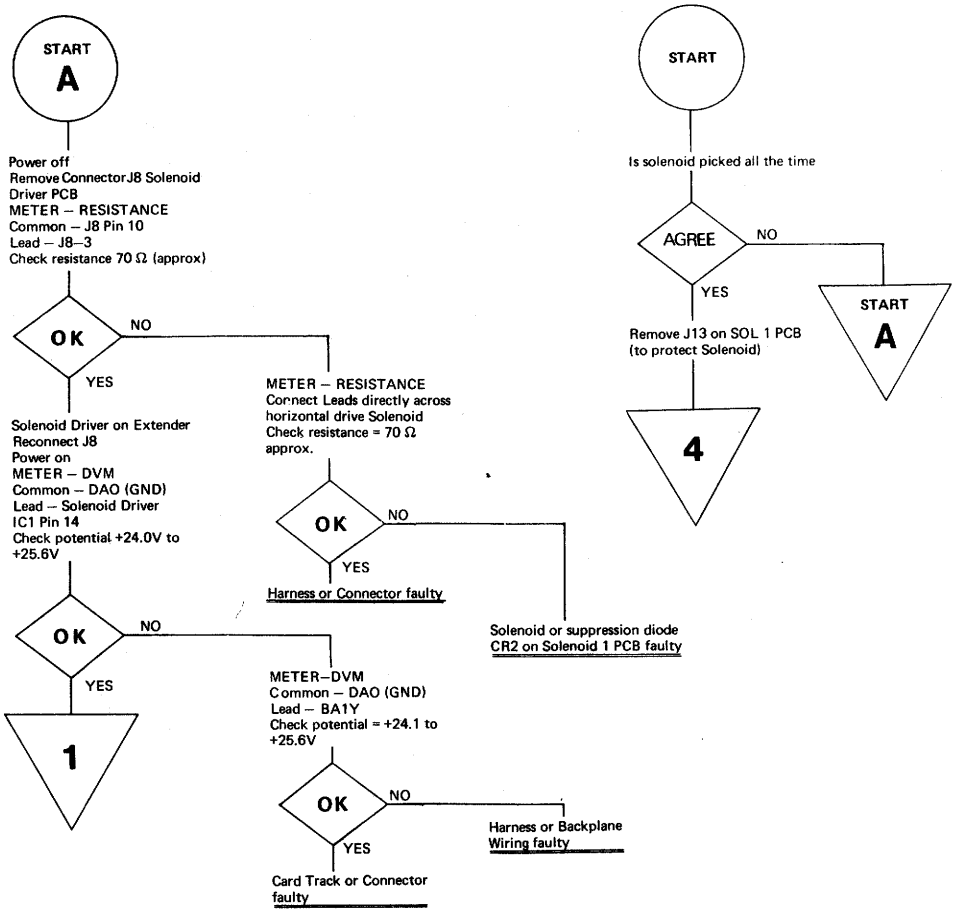
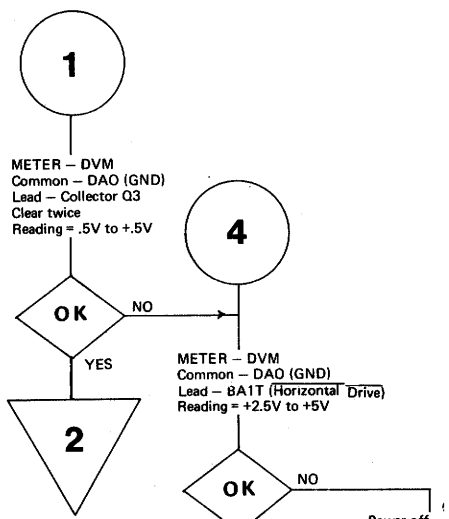
TITLE

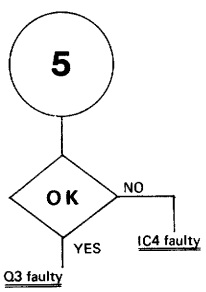
HORIZONTAL DRIVE (Page 1 of 1)

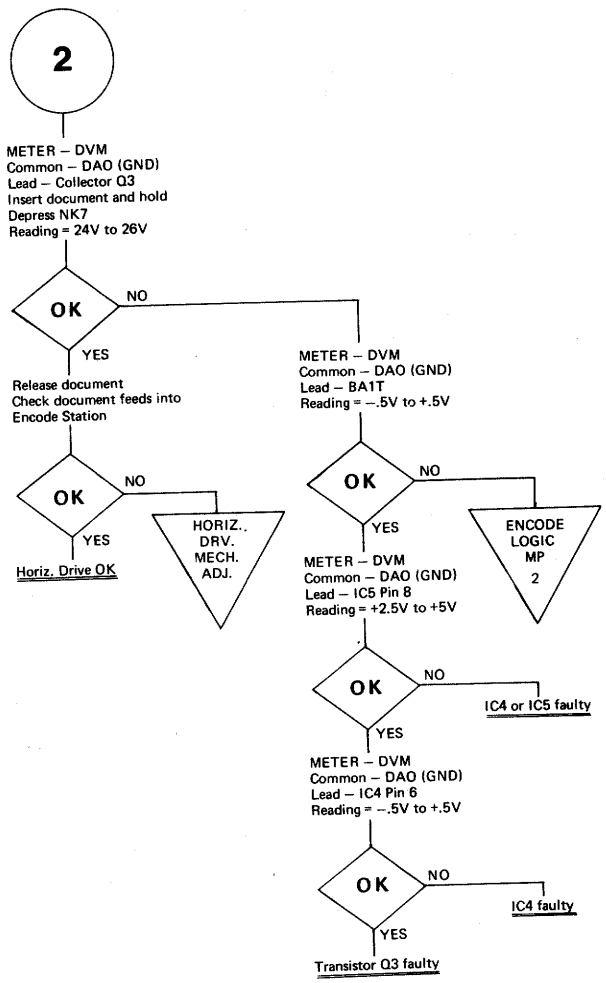
ENG	DATE	DWG NO	REV.
JBS		2801 8513	A

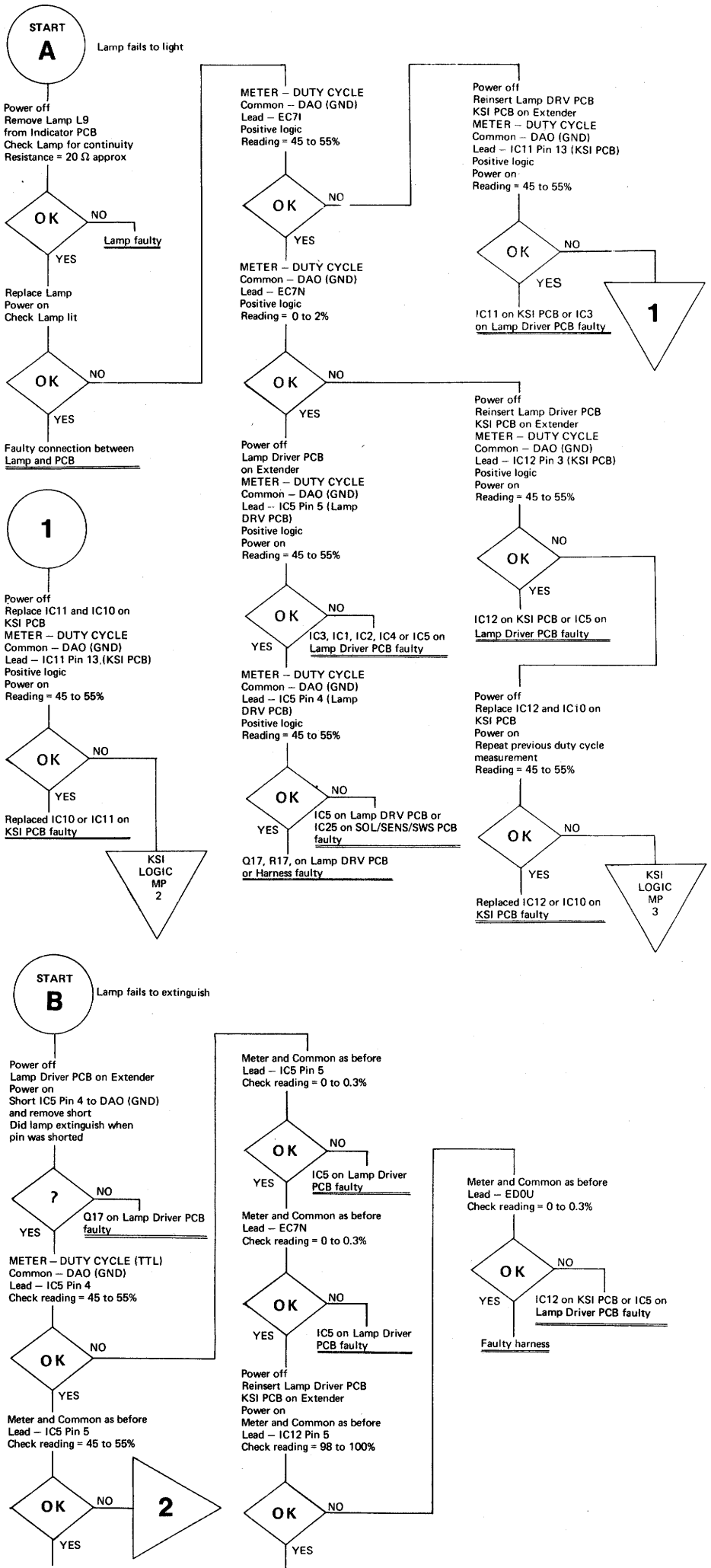
CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977











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TITLE

INDEX. COMP. LAMP (Page 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8521	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977

NOTE: UNLESS OTHERWISE STATED,
ALL DUTY CYCLE MEASUREMENTS
ARE FOR POSITIVE LOGIC

Lamp fails to light

START A

Power off
Remove lamp L1 from Indicator PCB
Check Lamp for continuity
Resistance = 20 Ω (approx)

OK? NO → Lamp faulty
YES

Replace Lamp
Power on
Lamp lit ?

OK? NO
YES

Faulty connection between Lamp and PCB

METER – DUTY CYCLE
Common – DAO (GND)
Lead – EC7I
Positive logic
Reading = 45 to 55%

OK? NO
YES

METER – DUTY CYCLE
Common – DAO (GND)
Lead – EC7J
Positive logic
Reading = 0 to 2%

OK? NO
YES

Power off
Lamp driver PCB on Extender
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC4 Pin 2 (Lamp DRV PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO → IC3, IC1, IC2, IC4, or IC5 on Lamp Driver PCB faulty
YES

METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC4 Pin 1 (Lamp DRV PCB)
Positive logic
Reading = 45 to 55%

OK? NO → IC4 on Lamp DRV PCB or IC25 on SOL/SENS/SW PCB faulty
YES

Q13, R13 on Lamp DRV PCB or Harness faulty

Power off
Reinsert Lamp Driver PCB
KSI PCB on Extender
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC11 Pin 13 (KSI PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO
YES

IC11 on KSI PCB or IC3 on Lamp Driver PCB faulty

1

Power off
Reinsert Lamp Driver PCB
KSI PCB on Extender
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC12 Pin 5 (KSI PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO
YES

IC12 on KSI PCB or IC4 on Lamp Driver PCB faulty

Power off
Replace IC12 and IC10 on KSI PCB
Power on
Repeat previous duty cycle measurement
Reading = 45 to 55%

OK? NO
YES

Replaced IC12 or IC10 on KSI PCB faulty

KSI LOGIC MP 3

1

Power off
Replace IC11 and IC10 on KSI PCB
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC11 Pin 13 (KSI PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO
YES

Replaced IC10 or IC11 on KSI PCB faulty

KSI LOGIC MP 2

START B

Lamp fails to extinguish

Power off
Lamp Driver PCB on Extender
Power On
Short IC4 Pin 1 to DAO (GND) and remove short
Did Lamp extinguish when pin was shorted

? NO → Q13 on Lamp Driver PCB faulty
YES

METER – DUTY CYCLE (TTL)
Common – DAO (GND)
Lead – IC4 Pin 1
Check reading = 45 to 55%

OK? NO
YES

Meter and Common as before
Lead – IC4 Pin 2
Check reading = 0 to 0.3%

OK? NO → IC4 on Lamp Driver PCB faulty
YES

Meter and Common as before
Lead – EC7J
Check reading = 0 to 0.3%

OK? NO → IC4 on Lamp Driver PCB faulty
YES

Power off
Reinsert Lamp Driver PCB
KSI PCB on Extender
Power on
Meter and Common as before
Lead – IC12 Pin 5
Check reading = 98 to 100%

Meter and Common as before
Lead – ED0W
Check reading = 0 to 0.3%

OK? NO → IC12 on KSI PCB or IC4 on Lamp Driver PCB faulty
YES

Faulty harness

2

Meter and Common as before
Lead – EC7I
Check reading = 45 to 55%

OK? NO
YES

IC3, IC2, IC1, IC4 or IC5 on Lamp Driver PCB faulty

Power off
Reinsert Lamp Driver PCB
KSI PCB on Extender
Power on
Meter and Common as before
Lead – IC11 Pin 13
Check reading = 45 to 55%

OK? NO → KSI LOGIC MP 2
YES

IC11 on KSI PCB or IC3 on Lamp Driver PCB or Backplane harness faulty

3

Power off
Reinsert Lamp Driver PCB
KSI PCB on Extender
Power on
Meter and Common as before
Lead IC12 Pin 5
Check reading = 45 to 55%

OK? NO
YES

IC12 KSI PCB or IC4 Lamp Driver PCB or harness faulty

Was previous reading = 98 to 100%

? NO → KSI LOGIC MP 4
YES

METER – DVM
Common – DAO (GND)
Lead – IC10 Pin 14
Check reading = –11.4 to –12.6V

OK? NO → Harness faulty
YES

Power off
Replace IC10 on KSI PCB with new chip
Power on
Is fault still on machine

NOTE: UNLESS OTHERWISE STATED, DUTY CYCLE MEASUREMENTS ARE FOR TTL LIMITS AND POSITIVE LOGIC

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TITLE			
IND. IN PROG. LAMP 1of 1			
ENG: JBS	DATE:	DWG NO.: 2801 8539	REV.: A
CLASSIFICATION CODE: 2-9520		RELEASED: DEC 14 1977	

Burroughs

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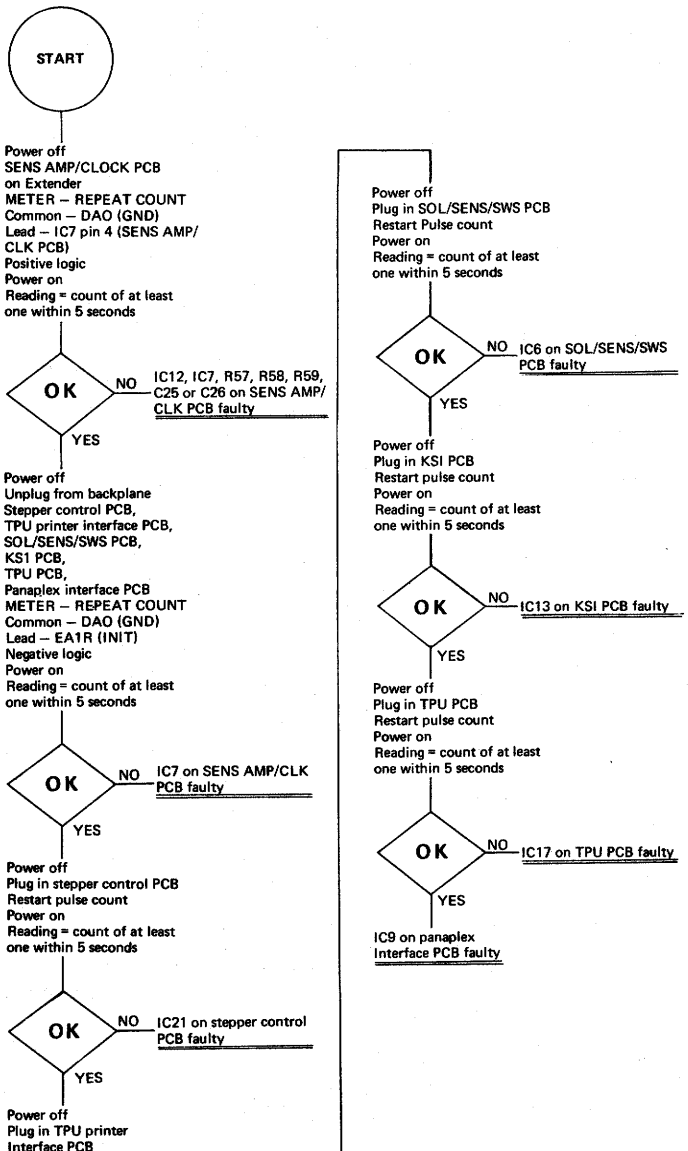
TITLE

INITIALIZE (Page 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8547	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977



If more than one key is faulty, choose a faulty key and follow this procedure. Refer to Table 1 for underlined pins.

START

Power off
Keyboard scan PCB on Extender
Power on
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC1 pin A
on keyboard scan PCB
Reading = 89 to 93%

OK? NO → Is the meter fault lamp lit ? NO → Power off, Remove IC2, IC3 on keyboard scan PCB, Power on, METER – DUTY CYCLE, Common – DAO (GND), Lead – IC LSI pin E, Reading = 88 to 95%

OK? NO → KSI LOGIC MP 5

YES → IC1, IC2, or IC3 faulty

YES → Power off, Remove chip IC1, METER – RESISTANCE, Common – IC1 pin 14, Lead – IC1 pins 1 through 13, Check all resistances = 31.35 to 34.65K Ω

OK? NO → IC1 on keyboard scan PCB faulty

YES → LSI chip on keyboard scan PCB faulty

YES → METER – DUTY CYCLE, Common – DAO (GND), Lead – J29 pin B on keyboard scan PCB, Reading = 89 – 93%

OK? NO → 3

YES → METER – DUTY CYCLE, Common – DAO (GND), Lead – P28 pin B on keyboard PCB, Reading = 89 to 92%

OK? NO → Harness faulty

YES → METER – DUTY CYCLE, Common – DAO (GND), Lead – J29 pin C, Reading = 98 to 100%, Depress selected key and hold, Reading now = 88 to 93%

BOTH OK? NO → Is the meter fault lamp lit ? NO → 2

YES → Power off, Remove chip 7 on keyboard scan PCB, Check resistance between pin 14 and pins 1 through 13 = 31.35 to 34.65 KΩ

OK? NO → IC7 on keyboard scan PCB faulty

YES → IC4 or IC9 on keyboard scan PCB faulty

YES → METER – DUTY CYCLE, Common – DAO (GND), Lead – ICA pin D, Reading = 98 to 100%, Depress selected key and hold, Reading now = 88 to 93%

BOTH OK? NO → Is the meter fault lamp lit ? NO → IC4, IC8 or LSI IC on keyboard scan PCB faulty

YES → KSI LOGIC MP 6

YES → Power off, Remove IC6 on keyboard scan PCB, Check resistance between pin 14 and pins 1 through 13 of IC6 = 31.35 to 34.65K Ω

OK? NO → IC6 on keyboard scan PCB faulty

YES → IC4, IC9 or LSI IC faulty

2 For pin references now see Table 2

Power off
Remove front plane plug J29 on keyboard scan PCB
METER – RESISTANCE
Common – J29 pin A
(Table 2)

NOTE: FOR DUTY CYCLE READINGS THE METER SETTINGS ARE AS FOLLOWS:–
INPUTS – MOS
HI–THRESHOLD – +2.5V
LO–THRESHOLD – +0.5V
POSITIVE LOGIC

3

Power off

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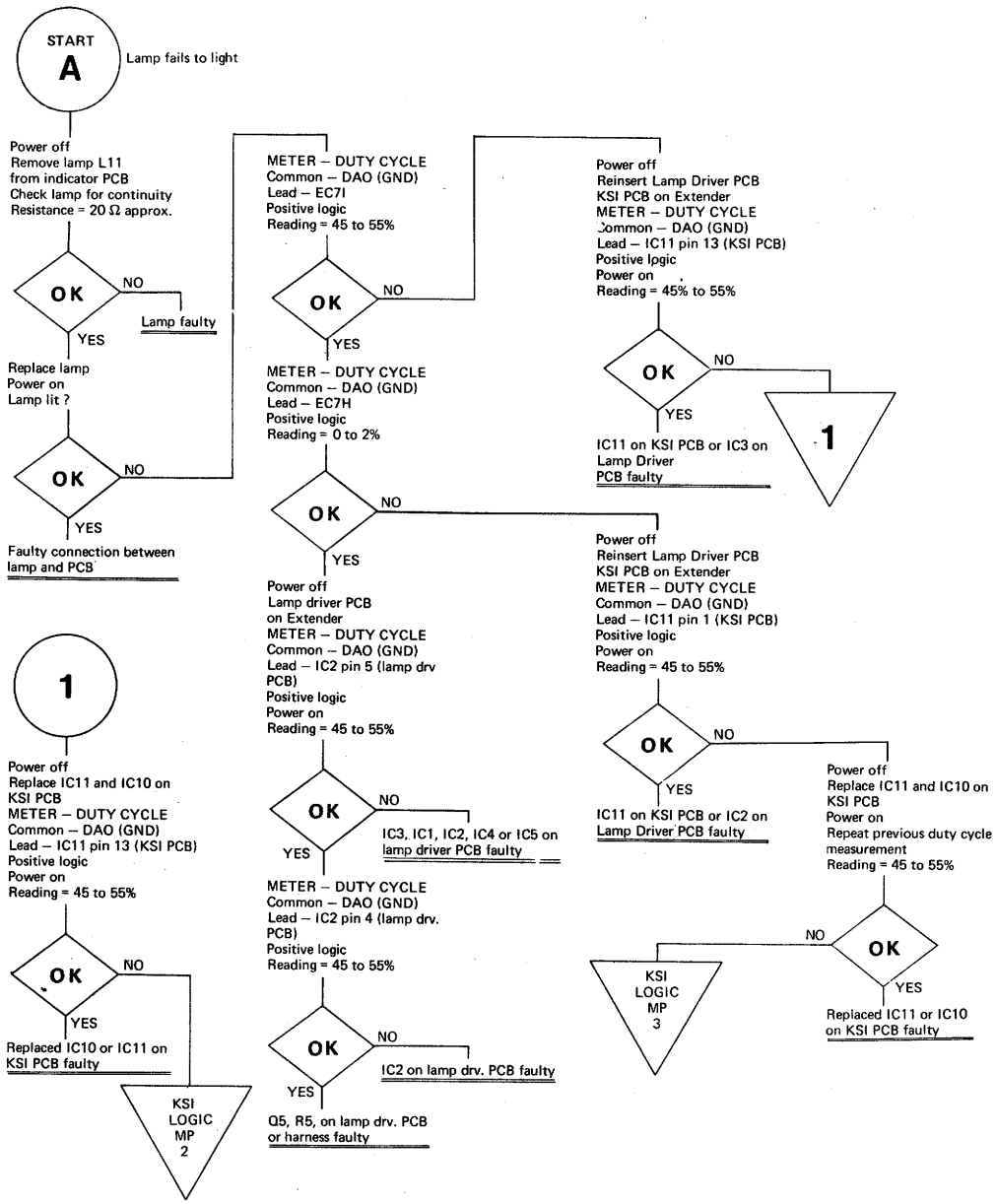
TITLE **KEYBOARD** (Page 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8554	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977

	TABLE 1							TABLE 2		
Keys	PIN A	PIN B	PIN C	PIN D	IC A	PIN E	IC B	PIN A	PIN B	PIN C
1	1	16	3	9	9	28	3	3	16	
2	1	16	2	1	9	28	3	2	16	
3	1	16	14	11	4	28	3	14	16	
4	1	16	5	5	9	28	3	4	16	16
5	3	11	2	1	9	30	2	2	11	7
6	3	11	14	11	4	30	2	14	11	11
7	3	11	5	5	9	30	2	5	11	4
8	3	11	3	9	9	30	2	3	11	18
9	4	4	14	11	4	31	2	14	4	15
0	2	7	5	5	9	29	3	5	7	8
D1	1	16	12	11	9	28	3	12	16	
D2	13	18	5	5	9	33	3	5	18	
D3	2	7	12	11	9	29	3	12	7	
D4	3	11	12	11	9	30	2	12	11	
00	4	4	2	1	9	31	2	2	4	
000	2	7	14	11	4	29	3	14	7	
AX	4	4	13	13	4	31	2	13	4	
AN	4	4	5	5	9	31	2	5	4	
AMT	4	4	6	3	9	31	2	6	4	
RT	2	7	2	1	9	29	3	2	7	
TC	2	7	3	9	9	29	3	3	7	
F6	2	7	9	13	9	29	3	9	7	
F7	4	4	17	3	4	31	2	17	4	
F8	4	4	1	1	4	31	2	1	4	
Sp	1	16	13	13	4	28	3	13	16	
III	4	4	12	11	9	31	2	12	4	
NP	12	15	6	3	9	34	3	6	15	
SKP	12	15	5	5	9	34	3	5	15	
SN	12	15	3	9	9	34	3	3	15	
◊	12	15	2	1	9	34	3	2	15	
C	12	15	9	13	9	34	3	9	15	
A	12	15	10	9	4	34	3	10	15	
NA	12	15	1	1	4	34	3	1	15	
ND	12	15	17	3	4	34	3	17	15	
CLEAR	10	8	6	3	9	37	2	6	8	
NC	10	8	5	5	9	37	2	5	8	
RST	10	8	3	9	9	37	2	3	8	
*	10	8	12	11	9	37	2	12	8	
AC	10	8	10	9	4	37	2	10	8	
DN	10	8	1	1	4	37	2	1	8	
CR	10	8	13	13	4	37	2	13	8	
+	10	8	14	11	4	37	2	14	8	
CC	1	16	1	1	4	28	3	1	16	



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TITLE

KEYBOARD LAMP (Page 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8562	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977

NOTE: UNLESS OTHERWISE STATED,
ALL DUTY CYCLE MEASUREMENTS
ARE FOR POSITIVE LOGIC

START

This is a basic power-on inspection of the KSI board It must be, or have been, completed successfully once on this call before entering any of the KSI logic MP

Power off
KSI board on extender
METER – COUNT
Limits – TTL
Positive logic
Common – DAO (GND)
Lead – IC6 Pin 8 (INIT/)
KSI board
Start counting
Power on
Check count of at least 1 and counting stops within 5 seconds

OK? NO → IC13, IC12, IC6 or KSI faulty (KSI board)

YES

METER – DUTY CYCLE
Limits – TTL
Positive logic
Common – DAO (GND)
Lead – IC6 Pin 8 (INIT/)
KSI board
Check duty cycle 100%, fault lamp extinguished and signal lamp lit

OK? NO → IC13, IC12, IC6 or KSI faulty (KSI board)

YES

METER – DUTY CYCLE
Limits – TTL
Negative logic
Common – DAO (GND)
Lead – IC6 Pin 5 (AVL)
KSI board
Check duty cycle 100%, fault lamp extinguished and signal lamp lit

OK? NO → Harness to keyboard faulty

YES

METER – FREQUENCY
Limits – TTL
Positive logic
Common – DAO (GND)
Lead – IC6 Pin 6 (Slow CLK)
KSI board
Check frequency
.340 to .460 KHz

OK? NO

YES

→ 12

METER – FREQUENCY
Limits – +3.0V, –10.0V
Common – DAO (GND)
Lead – KSI Pin 38 (Ø1 LSI)
KSI board
Check frequency
247.5 to 252.5 KHz

OK? NO → IC8, C6 or IC11 faulty (Keyboard Scan PCB) or KSI faulty (KSI PCB)

YES

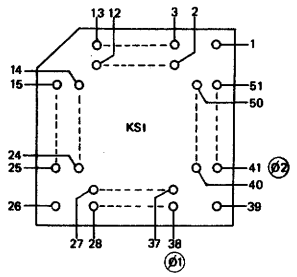
METER – FREQUENCY
Limits – +3.0V, –10.0V
Common – DAØ (GND)
Lead – KSI Pin 41 (Ø2 LSI)
KSI board
Check frequency
247.5 to 252.5 KHz

OK? NO → IC8, C5, IC11 or Scan LSI faulty (Keyboard Scan PCB) or KSI faulty (KSI PCB)

YES

Power on inspection complete
You may now return to the relevant KSI logic manual procedure

Reference Drawing
KSI Pin Connections
as seen from above



START 1

This procedure is used when only the ON lamp and the MTR lamp are lit when the machine is first switched on and no keys depressed and the machine is NOT in the main program

Have you completed successfully the KSI board power-on inspection already on this call?

OK? NO → KSI LOGIC MP START

YES

Power off
Remove plug P16 from the ROM PCB

Are any lamps lit other than the ON lamp and MTR lamp

OK? NO → Choose a lamp which does not light and do the relevant lamp M.P.A. → LAMP MP A

YES

METER – DUTY CYCLE
Limits – TTL
Positive logic
Common – DAO (GND)
Lead – IC11 Pin 13 (Step)
KSI PCB
Check duty cycle
45% to 55%

OK? NO

START 2

This procedure is used when the step signal is missing (indicators)

Have you completed successfully the KSI power-on inspection already on this call?

OK? NO → KSI LOGIC MP START

YES

Power off
Remove plug P16 from the ROM PCB
KSI board on Extender
Power on
METER – DUTY CYCLE
Limits – TTL
Positive logic
Common – DAO (GND)
Lead – IC11 Pin 13 (step)
KSI PCB
Check duty cycle
45% to 55%

OK? NO → IC11, IC10 or KSI faulty (KSI PCB)

YES

METER – FREQUENCY
Limits – TTL
Positive logic
Common – DAO (GND)
Lead – IC11 Pin 13 (Step)
KSI PCB
Check frequency
.090 KHz to .120 KHz

OK? NO → KSI faulty

YES

Power off
Reconnect plug P16 on the

START 3

This procedure is used when a lamp fails to light and the lamp MP points to a fault in the logic

Have you completed successfully the KSI power-on inspection already on this call

OK? NO → KSI LOGIC MP START

YES

Power off
Remove plug P16 from the ROM PCB
Power on
Does the lamp which was faulty, light

OK? NO → KSI faulty (KSI PCB)

YES

Power off
Reconnect Plug P16 on the ROM PCB

START 7

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TITLE
KSI LOGIC (Page 1 of 3)

ENG	DATE	DWG NO.	REV.
JBS		2801 8570	A

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TITLE **KSI LOGIC** (Page 2 of 3)			
ENG JBS	DATE	DWG NO. 2801 8570	REV. A
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START 4

This procedure is used when a lamp fails to be extinguished and the lamp MP points to a fault in the logic

Have you completed successfully the KSI power-on inspection already on this call

? NO → KSI LOGIC MP START

YES

START 7

START 5

This procedure is used when one or more KA signal is not correct (Keyboard)

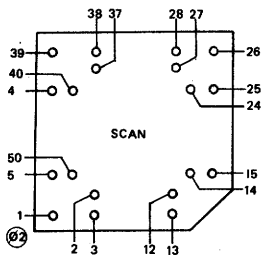
Power off
Keyboard scan PCB on Extender
Power on
METER – FREQUENCY
Limits – +3.0V, –10.0V
Common – DAO (GND)
Lead – Scan LSI Pin 1 (Ø2)
Keyboard Scan PCB
Check ~~f~~requency
247.5 to 252.5 KHz

OK NO → IC8, C5, IC11 or Scan LSI faulty (Keyboard Scan PCB) or KSI faulty (KSI PCB)

YES

IC1 or Scan LSI faulty (Keyboard Scan PCB)

Reference Drawing
Scan LSI Pin connections as seen from above



6

This procedure is used when the machine does not respond correctly to a key and the keyboard MP points to a fault in the logic

Have you completed successfully the KSI power-on inspection already on this call

OK NO → KSI LOGIC MP START

YES

Power off
Power on – wait 5 seconds
Press the clear key once
Are all the lamps extinguished except the ON lamp and MTR lamp

OK NO → 9

YES

Press the clear key once
Press numeric key 1 once
Are the ON, MTR and amount lamps lit and no other lamp lit ?

OK NO → 10

YES

Press once the key which failed to give the correct response
Check that the correct lamps are lit as shown in Chart 1 (Keycodes)

OK NO → 11

YES

Check once more the test in which the machine failed to respond correctly to the key

START 7

This procedure is used to determine whether any other PCB affects the transfer of information between the TPU and KSI

Power off
Remove from the card rack all PCB's except Sensor Amplifier/Clock Data Memory TPU
ROM (or PROM)
KSI
Keyboard Scan
Lamp Driver

Make sure the TPU–ROM connector, keyboard harness, lamp driver harness and sensor amplifier harness are all securely in place

Power on
Return to the test, measurement, or sequence of tests which originally led to the failure diagnosis
Is the test or measurement now satisfactory ?

OK NO → PROG. CONT. LOGIC MP 1

YES

Power off
Reinsert the TPU–Printer interface PCB in the card rack
Power on
Return to the test, measurement, or sequence of tests which originally led to the failure diagnosis
Is the test or measurement now satisfactory ?

OK NO → 13

YES

Power off
Reinsert the Solenoids/Sensors/Switches PCB in the card rack with harnesses connected
Power on
Return to the test measurement, or sequence of tests which originally led to the failure diagnosis
Is the test or measurement now satisfactory ?

8

Power off
Reinsert the stepper control PCB in the card rack
Power on
Return to the test, measurement, or sequence of tests which originally led to the

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9

Power off
Replace the first listed chip
Power on
Return to the test, measurement, or sequence of tests which originally led to the failure diagnosis
If the test or measurement is satisfactory, power off
Reinsert all the boards and harnesses and do the machine confidence check
If the test or measurement is not satisfactory, replace the next listed chip

IC11	(KSI Board)
IC13	(KSI Board)
IC 8	(KSI Board)
IC 9	(KSI Board)
IC21	(TPU Board)

If, after replacing these chips, the test or measurement is still not satisfactory, go to the Program Control Logic MP. Entry 10.

PROG. CONT LOGIC MP 10

10

This procedure consists of chip replacement to determine if a logic fault exists on the auxiliary keyboard
Power off
Replace the first listed chip
Power on
Return to the test, measurement or sequence of tests which originally led to the failure diagnosis
If the test or measurement then proves to be satisfactory, then do the machine confidence check
If the test or measurement is not satisfactory, replace the next listed chip

IC 1	(KSI Board)
IC 2	(KSI Board)
IC 3	(KSI Board)
IC 4	(KSI Board)
KSI	(KSI Board)
Scan LSI	(Keyboard Scan PCB)

If the test or measurement is still unsatisfactory, then reinsert the old scan LSI and KSI and go to the Program Control Logic MP Entry 1

PROG. CONT. LOGIC MP 1

11

Power off
TPU Board on Extender
Make sure TPU–ROM connector is securely in place
Power on – wait 5 seconds
METER – DUTY CYCLE
Limits – TTL
Negative logic
Common – DAO (GND)
Lead – IC21 Pin 2 (RQST/)
TPU Board
Check duty cycle 100%
Fault lamp extinguished and signal lamp lit

OK? NO → Power off
Replace IC11 (KSI Board) and IC21 (TPU Board)
Power on
Wait 5 seconds
Repeat the previous test

OK? NO → Power off
Replace IC 1 (KSI Board)
Power on
Wait 5 seconds
Repeat the previous test

OK? NO → Power off
Replace IC 2 (KSI Board)
Power on
Wait 5 seconds
Repeat the previous test

OK? NO → Power off
Replace IC 3 (KSI Board)
Power on
Wait 5 seconds
Repeat the previous test

OK? NO → Power off
Replace IC 4 (KSI Board)
Power on
Wait 5 seconds
Repeat the previous test

OK? NO → Power off
Replace KSI (KSI Board)
Power on
Wait 5 seconds
Repeat the previous test

OK? NO → Power off
Replace Scan LSI (Keyboard Scan PCB)
Power on
Wait 5 seconds
Repeat the previous test

OK? NO → Keyboard Scan PCB faulty (Replace the complete PCB)

YES → Transient fault
Check that no board is loose in backplane connector and no frontplane plugs are loose

YES → **10**

13

Power off
Replace IC2, IC17, IC18, IC6, IC20 on the TPU–Printer interface PCB
Power on
Return to the test, measurement or sequence of tests which originally led to the failure diagnosis
Is the test or measurement now satisfactory ?

OK? NO → TPU–Printer interface PCB faulty (Replace the complete PCB)

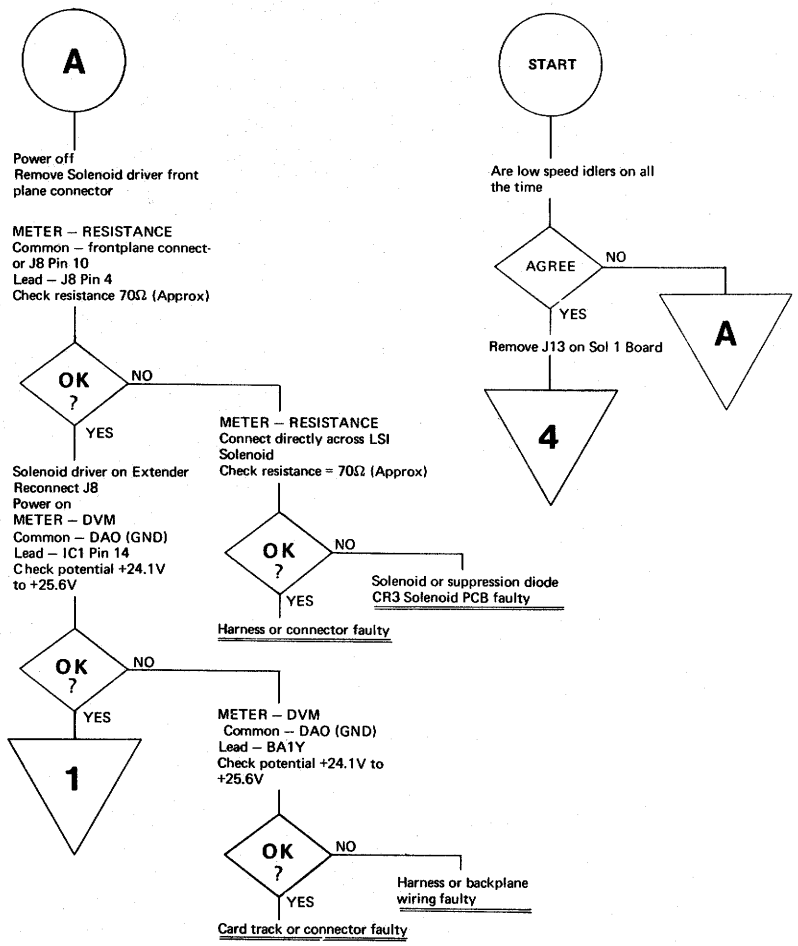
YES → Transient fault
Check that no board is loose in backplane connector and no frontplane plugs are loose

14

Power off
Replace IC26, IC1, IC2, IC5, IC6 on the Solenoids/Sensors/Switches PCB
Power on
Return to the test, measurement or sequence of tests which originally led to the failure diagnosis
Is the test or measurement now satisfactory ?

OK? NO → Solenoids/Sensors/Switches PCB faulty (Replace the complete PCB)

YES → Transient fault
Check that no board is loose in backplane connector and no frontplane plugs are loose



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TITLE

LOW SPEED IDLERS (Page 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8588	A

CLASSIFICATION CODE	RELEASED
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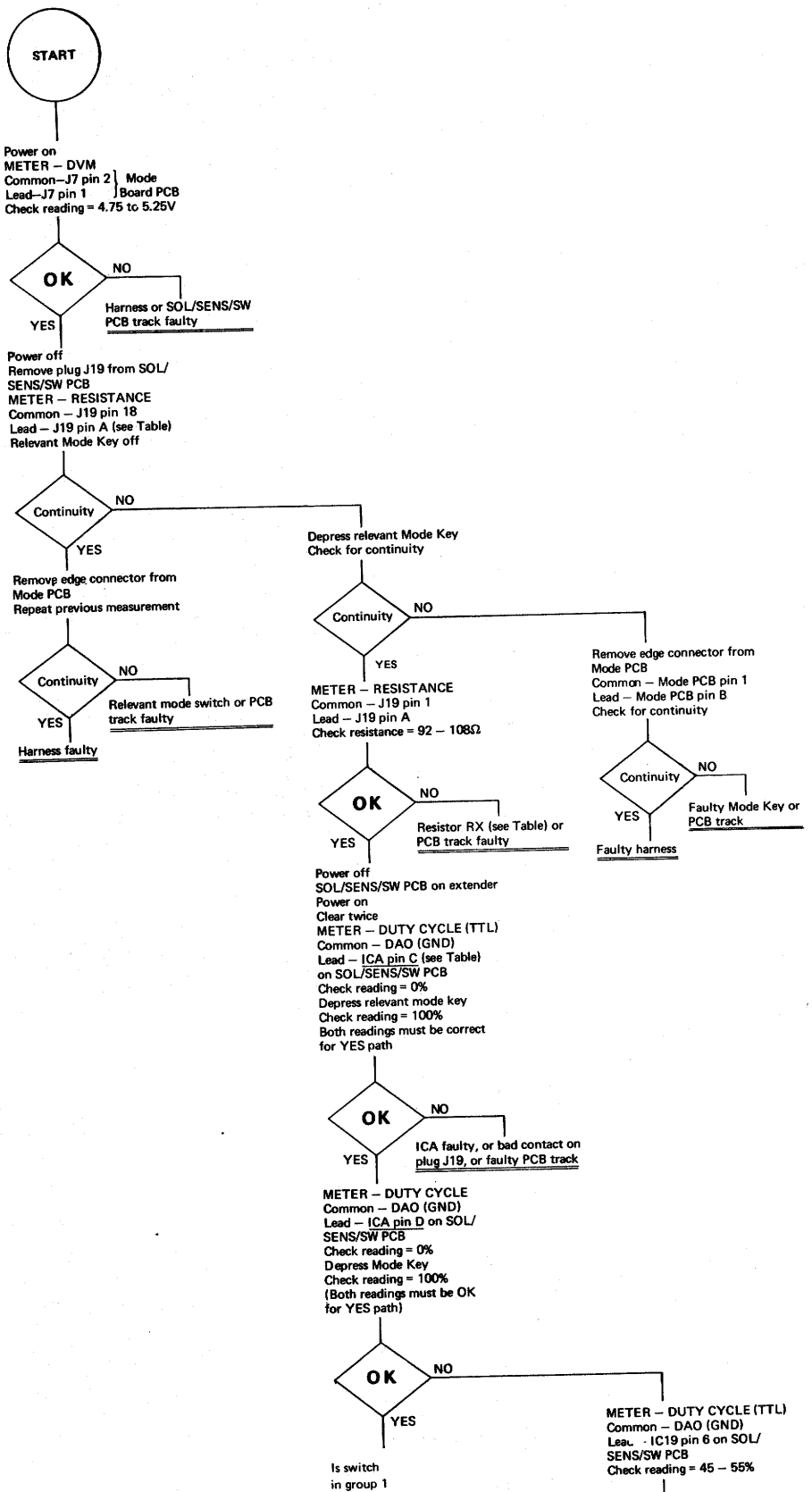
TITLE			
MODE KEYS (Page 1 of 1)			
ENG: JBS	DATE:	DWG NO.: 2801 8596	REV.: A
CLASSIFICATION CODE: 2-9520		RELEASED: DEC 14 1977	



NOTE: ALL DUTY CYCLE READINGS ARE FOR POSITIVE LOGIC AND TTL LIMITS

KEY	SOL/SENS/SW PCB PIN A	RX	MODE PCB PIN B	ICA	PIN C	PIN D
ADD	A10	3	11	23	3	2
LIST.	A 3	7	13	22	13	12
AUTO	A13	6	8	22	11	10
REP.	A11	2	7	23	4	5
P./ADV.	A14	4	16	24	4	2
PROM. SEL.	A 7	1	3	23	14	15
E LINE SEL.	A 9	5	4	23	11	10
END.	A15	9	6	24	13	15
SER. NO.	A 4	13	5	22	3	2
CDG	A12	10	10	23	6	7
CDV	A 8	15	14	23	13	12
SCHECK	A 5	14	9	22	4	5
PROG.	A 2	12	15	22	14	15
CAP.	A 6	11	19	22	6	7

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TITLE

MTR SWITCH (Page 1 of 1)

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JBS		2801 8604	A

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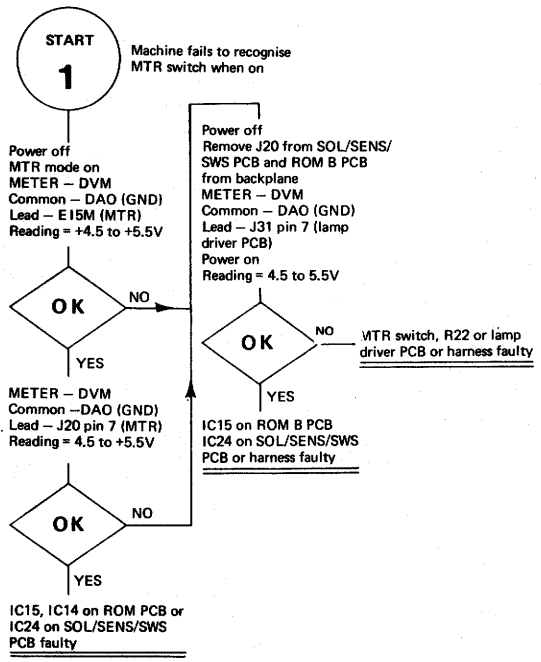

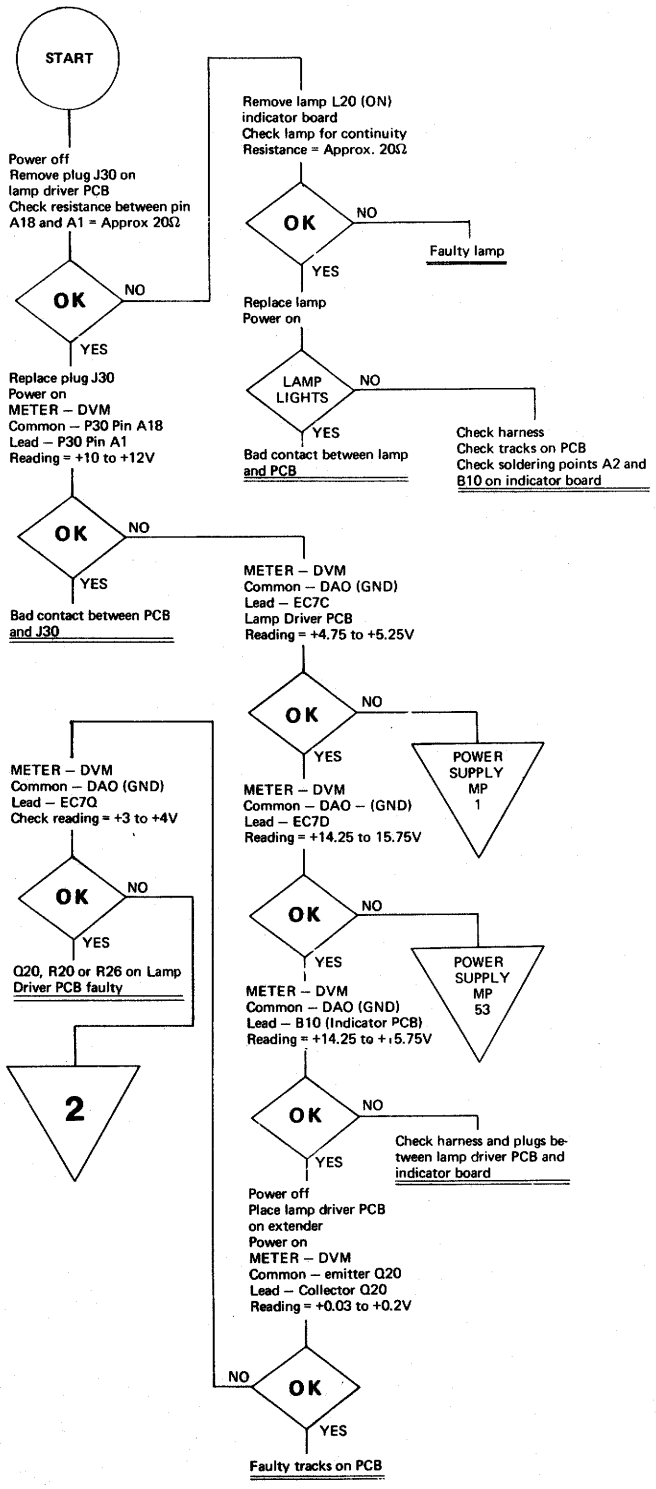

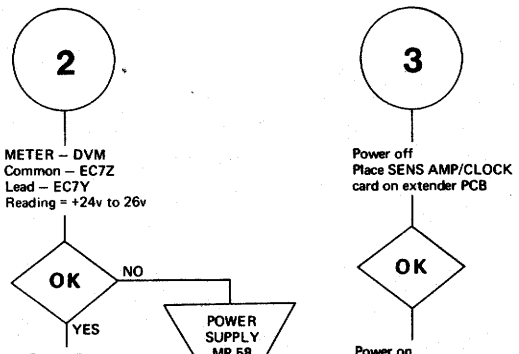

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TITLE			
ON LAMP (Page 1 of 1)			
ENG: JBS	DATE:	DWG NO.: 2801 8612	REV.: A
CLASSIFICATION CODE: 2-9520		RELEASED: DEC 14 1977	

IF THERE IS MORE THAN ONE FAULT ON THE PANAPLEX, DO ONE FAULT AT A TIME AS THERE IS A LOT OF SHARED LOGIC

START

CAUTION: HIGH VOLTAGE IS PRESENT ON PANAPLEX DRIVER BOARD

Power off
Place panaplex interface board on extender
Power on
Depress panaplex clear key
Are O's displayed

AGREE — NO → Are 8's displayed

AGREE — NO → 1A

YES

1A

Switch SW1 on
Panaplex interface board to the active position
Is 8888 8888 displayed

AGREE — NO → 1

YES

1B

Clear twice
Switch SW1 to the normal position
Depress NK 2
Do the lights count correctly as per chart # 4

OK — NO → 16

YES

Panaplex OK

1A

METER – DUTY CYCLE
TTL input switch +VE
Common – DAO (GND)
Lead IC12 pin 3
Reading – 100%

OK — NO → S1 Switch faulty

YES

1B

CHART 4

COLUMN	8	7	6	5	4	3	2	1
START	7	6	5	4	3	2	1	0
	8	7	6	5	4	3	2	1
	9	8	7	6	5	4	3	2
	0	9	9	7	6	5	4	3
	1	0	9	8	7	6	5	4
	2	1	0	9	8	7	6	5
	3	2	1	0	9	8	7	6
	4	3	2	1	0	9	8	7
	5	4	3	2	1	0	9	8
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0

COLUMN 8 7 6 5 4 3 2 1

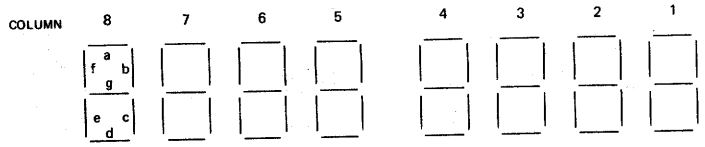

FIGURE # 1
PANAPLEX VIEWED FROM THE FRONT

A	B	C	D	E
SEGMENT	PANAPLEX DRIVER J23 PIN NUMBER	PANAPLEX DRIVER J22 PIN NUMBER	PANAPLEX INTERFACE J25 PIN NUMBER	PANAPLEX INTERFACE IC12 PIN NUMBER
a	15	13	13	13
b	13	14	14	12
c	9	17	17	11
d	6	16	16	10
e	4	15	15	9
f	1	11	11	15
g	11	12	12	14

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PANAPLEX (Page 1 of 6)

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1

Is there at least one segment lit in each and every column

AGREE — NO → 3

YES

Using figure # 1
find segment or segments not lit

METER – DUTY CYCLE
TTL input switch +VE
Common – DAO
Lead – IC12 pin
As per Chart # 1 Column E
Reading 24.8% to 25.0%

OK — NO → Is faulty segment a, b, c, d, e, or g

YES

METER – DUTY CYCLE
TTL input switch +VE
Common – DAO
Lead – Pin on J25
as per Chart # 1 Column D
Reading 75% to 75.2%

OK — NO → If faulty segment a, b, c, d, e or g then IC16 faulty
If faulty segment f then IC8 faulty

YES

2

Is faulty segment a, b, c, d, e, or g

OK — NO → Power off
Remove IC8
Power on
Repeat above measurement

YES

Power off
Remove IC16
Power on
Repeat above measurement

OK — NO → IC16 faulty

YES

OK — NO → IC12 faulty

YES

IC 8 faulty

2

METER – DUTY CYCLE
TTL input switch +VE
Common – DAO (GND)
L ead – pin on J22 as per Chart # Column C
Reading = 75% to 75.2%

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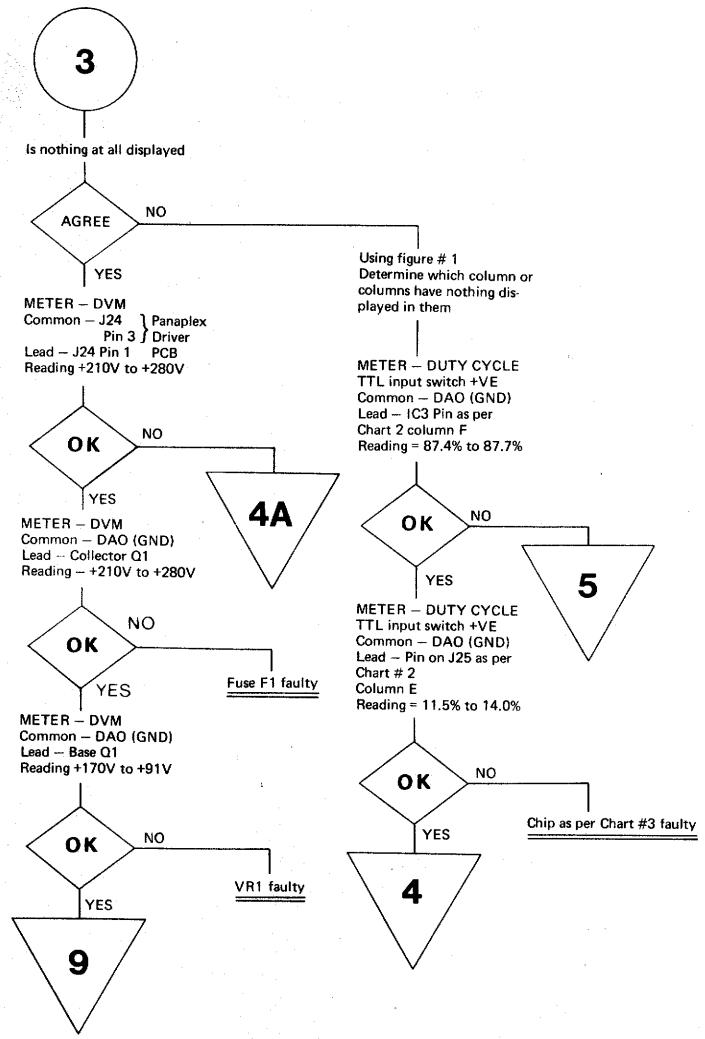
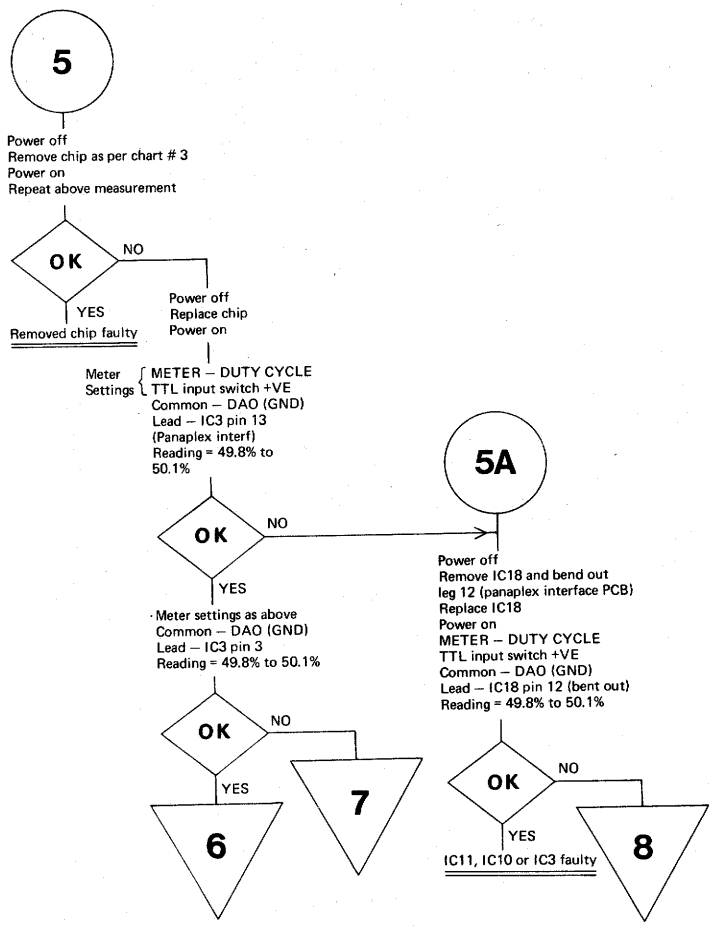
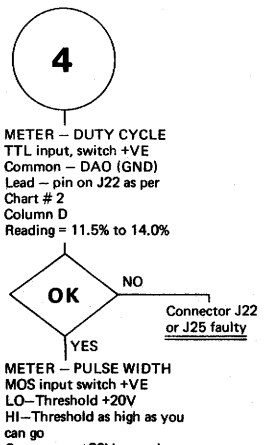
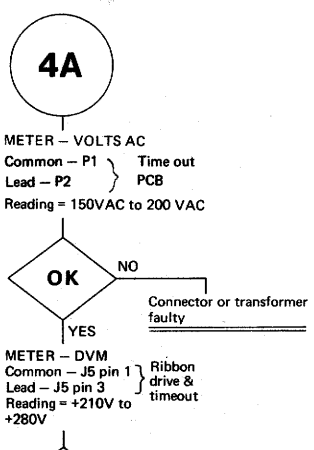
CLASSIFICATION CODE: 2-9520	RELEASED: DEC 14 1977









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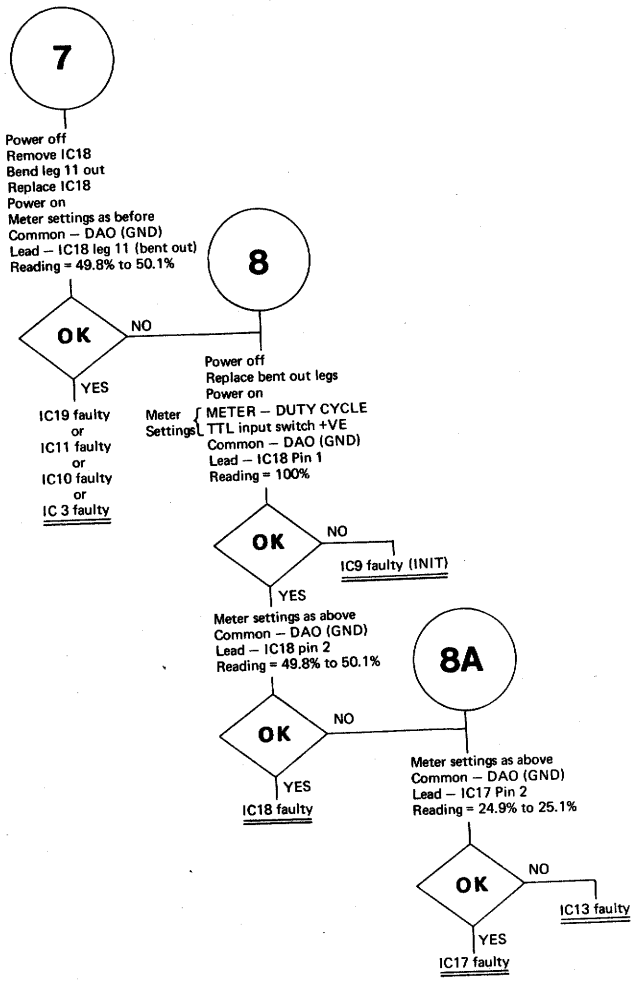

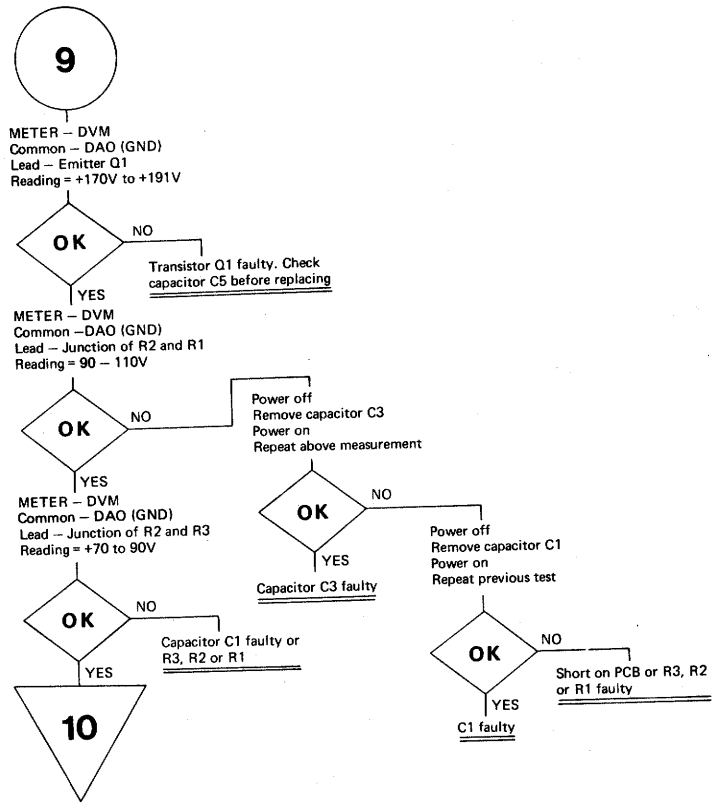

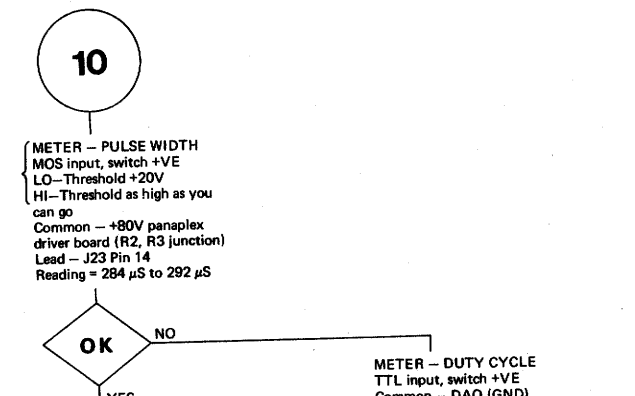

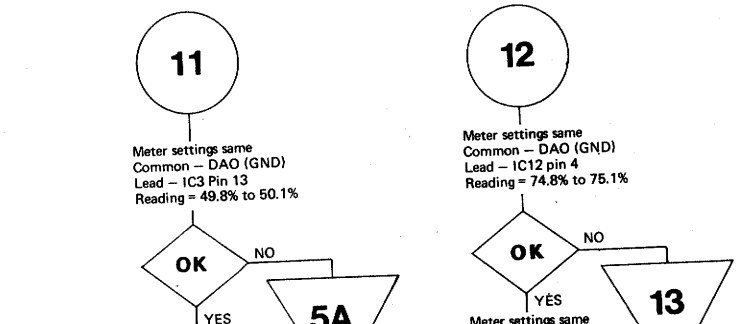

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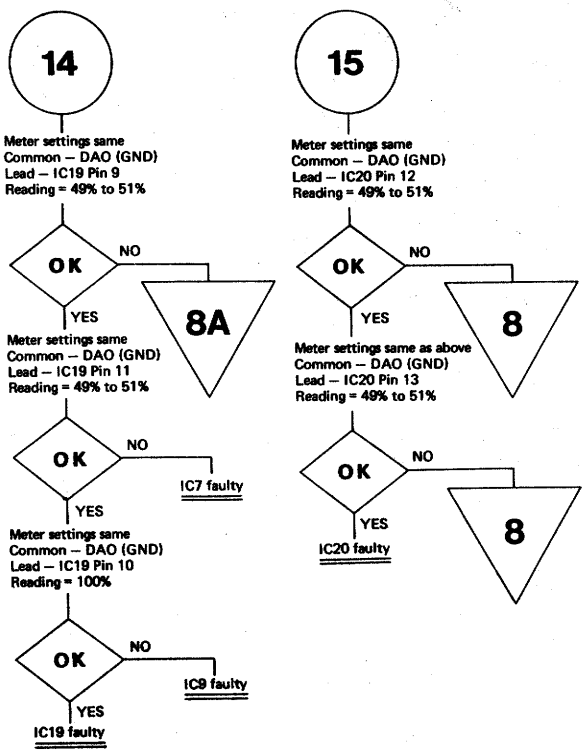

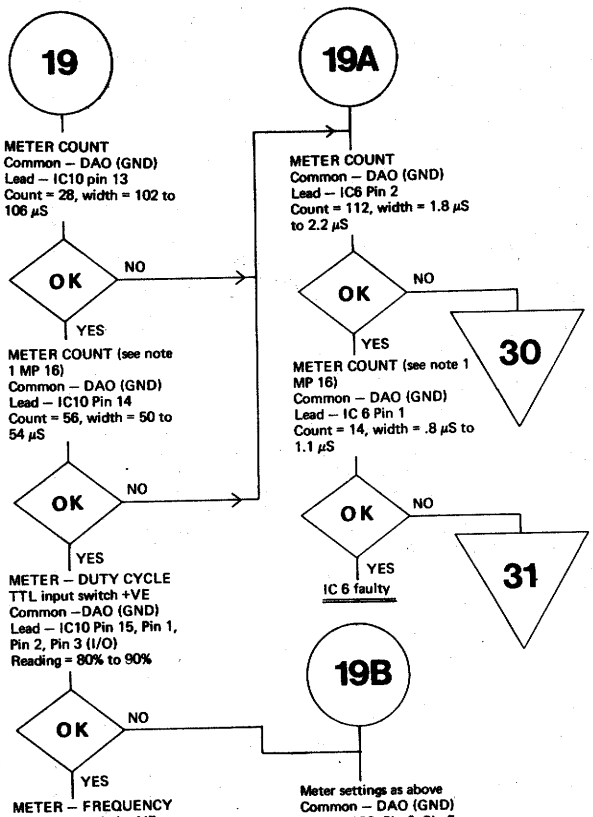

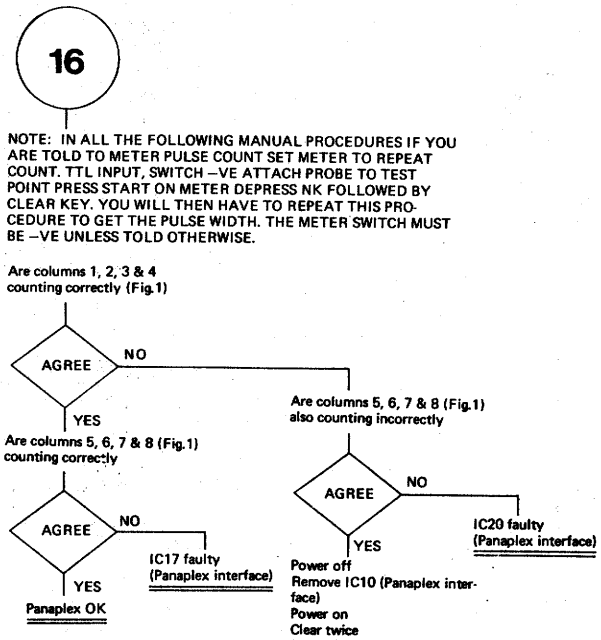

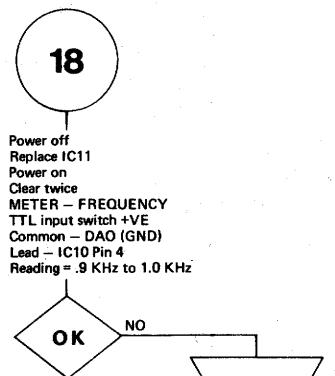

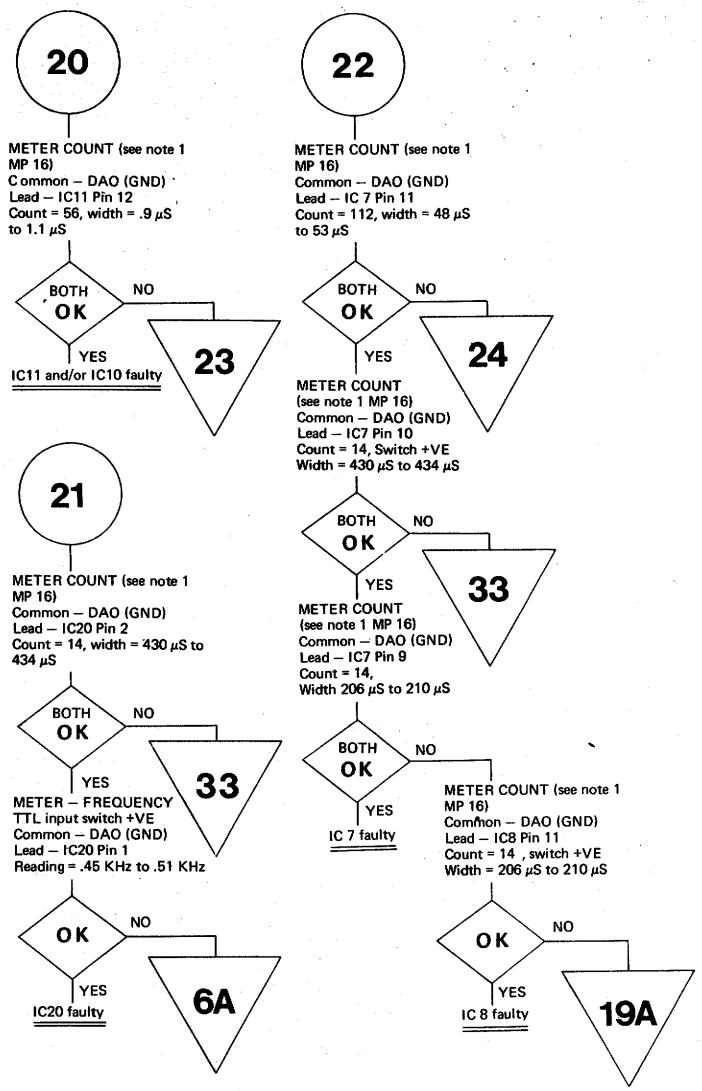

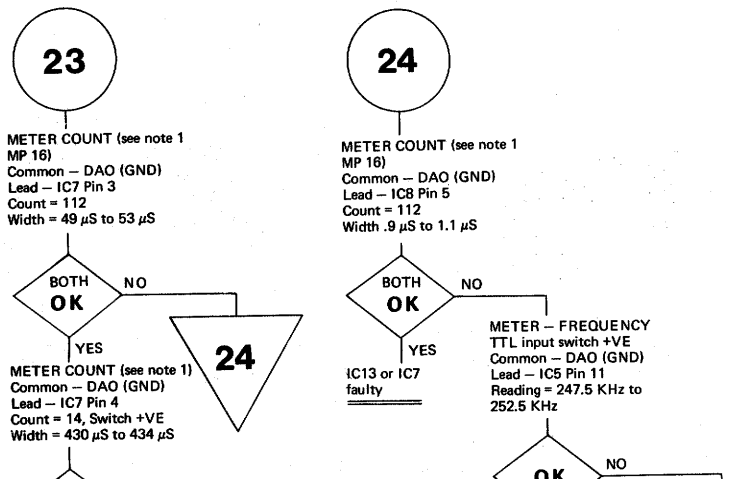

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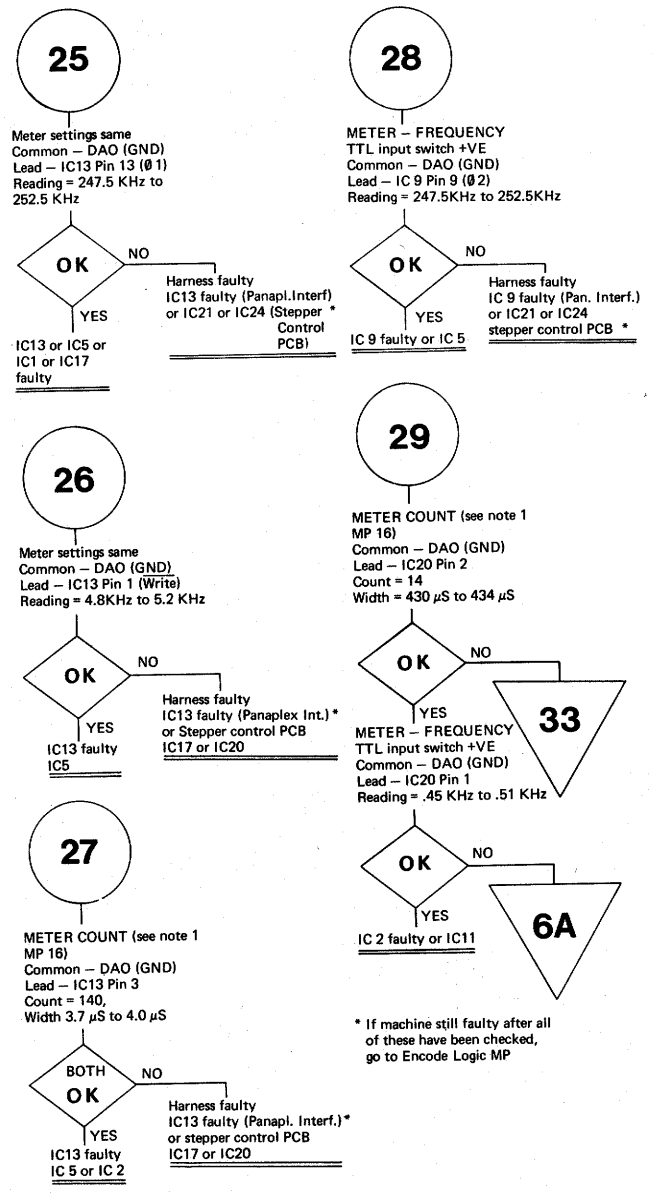

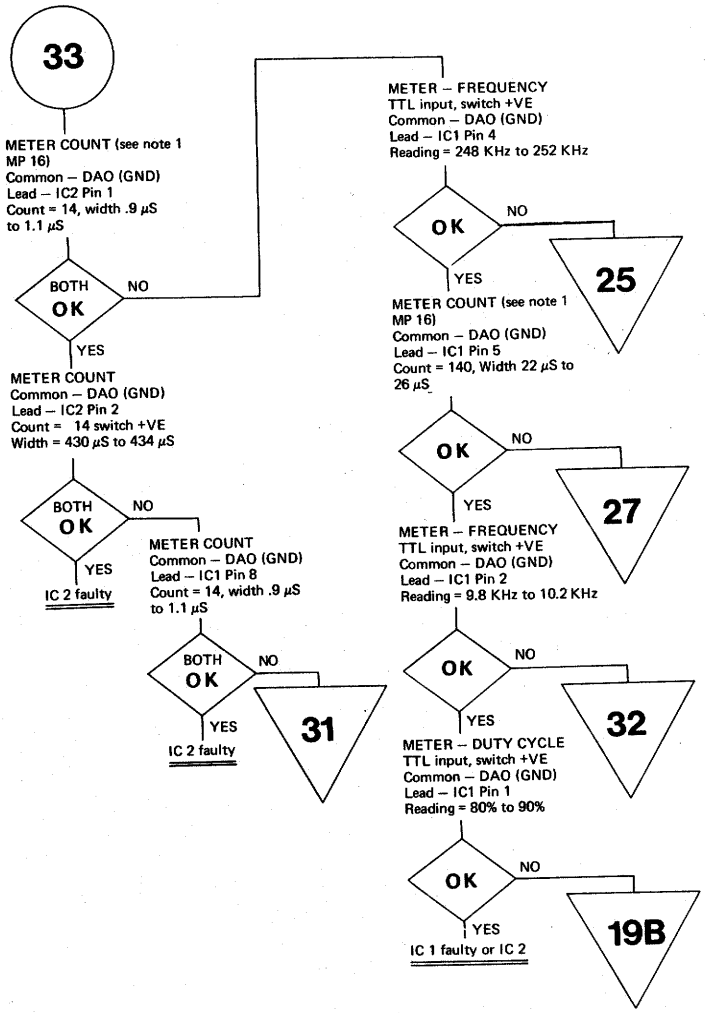

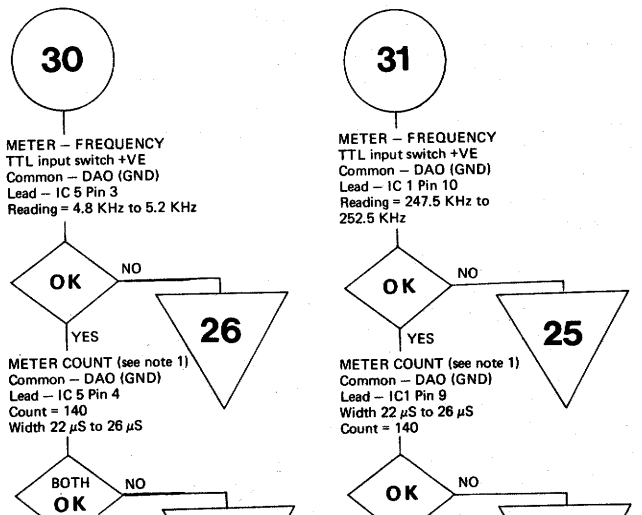

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N.B: WHEN USING THIS MANUAL PROCEDURE INSPECT EACH BOARD AS IT IS MENTIONED FOR OBVIOUS SHORTS OR OPEN CIRCUITS, BOTH TO OTHER BOARDS, TRACKS, CHASSIS OR OTHER MECHANICAL INSTALLATIONS. REMOVE SUCH SHORTS, ETC. IF THE MACHINE APPEARS TO BE COMPLETELY 'DEAD' CHECK THE MAINS FUSE AND ON SWITCH FIRST

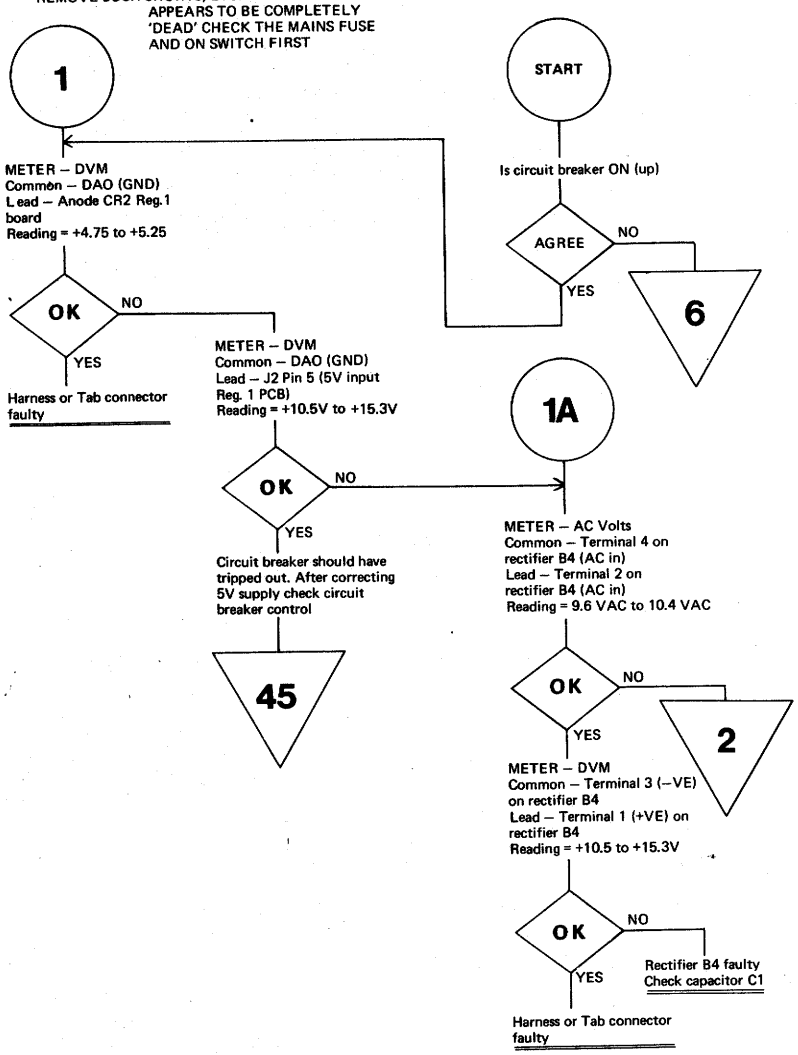

CHART # 1

SUPPLY VOLTAGE	PATCHBOARD CONNEC.	READING	TRANSFORMER WIRE
	2A1	0V	1
100V	1A1	90V to 110V	2
110V	1A4	100V to 120V	3
120V	1A7	110V to 130V	4
220V	1B1	210V to 230V	5
230V	1B4	220V to 240V	6
240V	1B7	230V to 250V	7

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4

Replace connector on Tab P1
Remove stacker motor
connector on patchboard 2
2A7
METER – RESISTANCE KΩ
Common – connector 2A7
(disconn.)
Lead – connector 2B8
Reading = greater than .13KΩ

OK? NO → Stacker motor faulty
YES

Replace connector on 2A7
Remove feed motor
Connector on patchboard 3
3A7
METER – RESISTANCE KΩ
Common connector 3A7
(Disconn.)
Lead – connector 3A4
Reading = greater than 0.13KΩ

OK? NO → Feed motor faulty
YES

Replace connector 3A7
Remove bridge motor
Connector on patchboard 3
3A1
METER – RESISTANCE KΩ
Common – connector 3A1 (Dis-
con.)
Lead – Connector 3B1
Reading = greater than .13KΩ

OK? NO → Bridge motor faulty
YES

Replace connector on 3A1
Remove ribbon drive
Connector on patchboard 3
3B7
METER – RESISTANCE KΩ
Common – connector 3B7
(Disconn.)
Lead – connector 3B1 and
then 3B4
Reading = greater than 3.0KΩ

OK? NO → Ribbon motor faulty (Ribbon Drv PCB)
YES

Capacitors C2, C3 or C4
shorted or short on ribbon
drive and timeout PCB

5

METER – VOLTS AC
Common – Terminal 2 (Mains Switch)
Lead – Terminal 3 (MS1)
Reading = local mains supply

AGREE? NO
YES → Circuit breaker faulty

Common – Terminal 1 (Mains Switch)
Lead – Terminal 4 (MS1)
Reading = local mains supply

OK? NO
YES → Switch MS faulty

METER – VOLTS AC
Common – Live on mains
terminal block

7

In the following procedures (7 thru 15) when a short is suggested check for PCB's shorted to chassis, plugs not correctly located on PCB, and staples or paper clips on PCB's

Power off
Remove all frontplane plugs
from cards in backplane
Switch circuit breaker on
Power on
Did circuit breaker trip out

? NO
YES

Power off
Remove all cards from backplane
Switch circuit breaker on
Power on
Did circuit breaker trip-out

? NO → 16
YES

Power off
Disconnect link 1 on
regulator 3 board (circuit
breaker disable)
Switch circuit breaker on
Power on
Watch for any overheating com-
ponents such as smoking
resistors etc.
Do any components over-
heat within 30 seconds

? NO → 34
YES

Power off and determine
location of overheating com-
ponent.
Go to relevant entry dependent
on which regulator it is on:

+24V reg.	– Entry	58
+15V "	– "	53
+ 5V "	– "	1
–12V "	– "	62
– 9V "	– "	68
– 3V "	– "	34

Power off
Replace J8 on Solenoid
driver PCB
Power on
Does circuit breaker stay on

? NO → 9
YES

Power off
Replace J9 on SENS AMP/
CLOCK PCB
Power on
Does circuit breaker stay on

? NO → 10
YES

Power off
Replace J26 on printer driver
PCB
Power on
Does circuit breaker stay on

? NO → 11
YES

Only if Endorse Feature Fitted:
Power off
Replace J32 on en-
dorser driver PCB
Power on
Does circuit breaker
stay on

? NO

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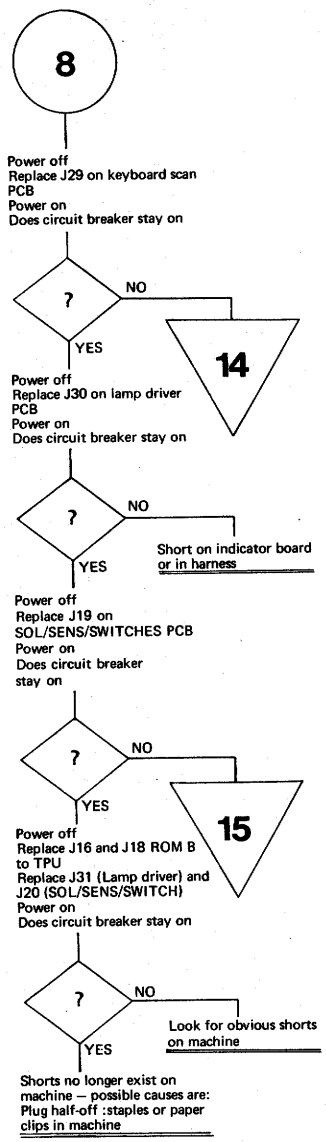

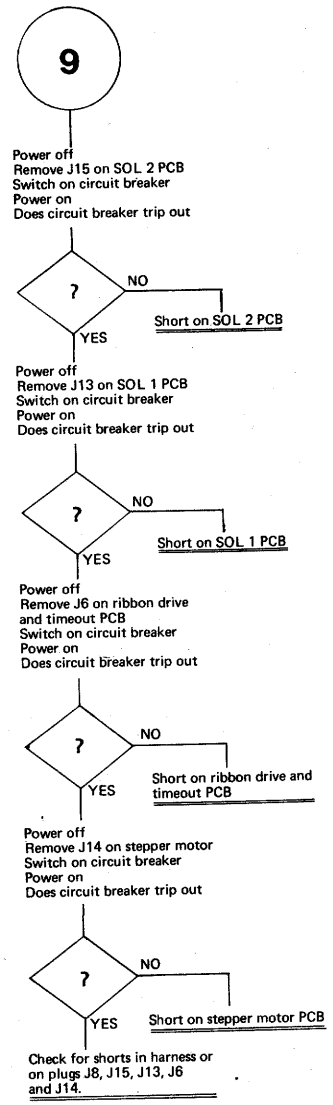

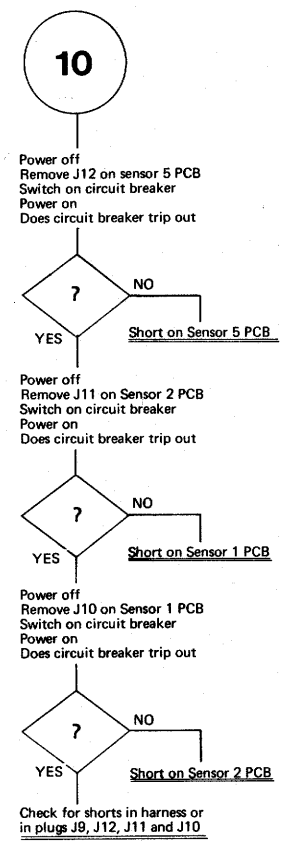

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16

In the following procedures if the circuit breaker trips out when a board is replaced, power off, remove all boards except the one just replaced, switch C/B on, power on. Does C/B trip out ?

Yes. Board replaced is faulty
No. Go to MP 74

Replace solenoid driver PCB (BAO)
Power on
Does circuit breaker stay on

? NO → 18
YES

Power off
Replace stepper control PCB (BB3)
Power on
Does circuit breaker stay on

? NO → 19
YES

Power off
Replace Sensor AMP/CLOCK PCB (BC6)
Power on
Does circuit breaker stay on

? NO → 20
YES

Power off
Replace TPU/Printer interface PCB (BD9)
Power on
Does circuit breaker stay on

? NO → 21
YES

Power off
Replace printer data control PCB (BE2)
Power on
Does circuit breaker stay on

? NO → 22
YES

Power off
Replace printer driver PCB (BF5)
Power on
Does circuit breaker stay on

? NO → 23
YES

Power off
Replace Endorser control PCB (BG8)
Power on
Does circuit Breaker stay on

Only if Endorse

? NO
YES

17

Power off
Replace ROM B board (E14)
Power on
Does circuit breaker stay on

? NO → 27
YES

Power off
Replace TPU PCB (EG8)
Power on
Does circuit breaker stay on

? NO → 28
YES

Power off
Replace data mem. PCB (EF5)
Power on
Does circuit breaker stay on

? NO → 29
YES

Power off
Replace keyboard scan PCB (EE2)
Power on
Does circuit breaker stay on

? NO → 30
YES

Power off
Replace KSI PCB (ED9)
Power on
Does circuit breaker stay on

? NO → 31
YES

Power off
Replace lamp driver PCB (EC6)
Power on
Does circuit breaker stay on

?

18

There is a short on solenoid driver PCB. Check capacitors C1, C2, C3 and C4 for dead short.

19

There is a short on stepper control PCB. Possible cause:— capacitors C1, C2, C5, C6, C9, C10, C13, C14, C17, C18, C21, C22, or C25 shorted

20

There is a short on SENS AMP/ CLOCK PCB. Possible cause:— Capacitors C1, C2, C3, C4, C9, C10, C11, C12, C13, C14 or C24 shorted.

21

There is a short on TPU/ printer interface PCB. Possible cause:— Capacitors C1, C2, C4, C5, C6, C7, C8, C10, C11, C17, C18, C22 or C23 shorted

22

There is a short on print data control PCB. Possible cause:— Capacitors C1, C2, C3, C4, C6, C8, C12, C15, C20, C24 or C25 shorted.

23

There is a short on printer driver PCB, Possible cause:— C3, C5, C6, C7, C9, C10, C12 or C14, shorted

27

There is a short on ROM B PCB. Possible cause:—
C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12 or C13 shorted

28

There is a short on TPU PCB. Possible cause:—
C1, C2, C3, C5, C6, C7, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C23, C24, C25 or C26 shorted

29

There is a short on data memory PCB. Possible cause:—
C1, C2, C3, C5, C7, C9, C10, C11, C12, C13, C14 or C15 shorted

30

There is a short on keyboard scan PCB. Possible cause:—
C1, C2, C3, C4, C9 or C12 shorted

31

There is a short on KSI PCB. Possible cause:—
C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, or C11 shorted.

32

There is a short on lamp driver PCB. Possible cause:—
C1, C2, C3, C4, C5 or C6 shorted.

33

There is a short on SOL/SENS/ Switches PCB. Possible cause:-
C1, C2, C6, C7, C10, C11, C12, C14, C15, C17, C18, C22, C23 or C27 shorted

34

Carefully replace link 1 (Reg. 3 PCB)
Does circuit breaker trip

? NO → **52**

YES

Power off
Remove link 1 Reg.3 PCB
Switch circuit breaker on
Power on
METER — DVM
Common — DAO (GND)
Lead — J4 pin 7 (Regulator 3 PCB)
Reading = +4.75V to +5.25V

? NO → **45**

YES

METER — DVM
Common — DAO (GND)
Lead — J4 pin 12 (Reg. 3 PCB)
Reading = +14.4V to +15.7V

? NO → **53**

YES

METER — DVM
Common — DAO (GND)
Lead — Cathode VR2
Reading = +23.5V to +26.1V

? NO → **58**

YES

METER — DVM
Common — DAO (GND)
Lead — J4 Pin 6 (Reg. 3 PCB)
Reading = −11.6V to −12.4V

? NO → **62**

YES

METER — DVM
Common — DAO (GND)
Lead — collector Q8
Reading = 0V to +.1V

? NO → **52**

YES

METER — DVM
Common — Base Q8
Lead — Cathode CR1
Reading = +3V to +10V

? NO → Transistor Q8 faulty

YES

METER — DVM
Common — DAO (GND)
Lead — Anode CR1
Reading = 0V to +2.2V

? NO → **36**

YES

METER — DVM
Common — DAO (GND)
Lead — Anode CR4
Reading = 0V to +2.2V

35

METER — DVM
Common — DAO (GND)
Lead — Anode CR3
Reading = 0V to +2.2V

? NO → **44**

YES

METER — DVM
Common — DAO (GND)
Lead — Cathode CR3
Reading = 0V to 2.2V

? NO → Short on Reg. 3 PCB

YES

Transistor Q8 faulty

36

METER — DVM
Common — DAO (GND)
Lead — Anode CR7
Reading = +11.0V to +13V

? NO → **51**

YES

METER — DVM
Common — DAO (GND)
Lead — junction R31 and IC4 Pin 2
Reading = +4.5V to +6V

? NO → R31 faulty (open)

YES

METER — DVM
Common — DAO (GND)
Lead — R32 junction with IC4 Pin 3
Reading = less than 4.5V

? NO → **37**

YES

METER — DVM
Common — R32 junction with IC4 Pin 3
Lead — R31 junction with IC4 Pin 2
Reading = 0V to +1V

? NO → **45**

YES

IC4 faulty

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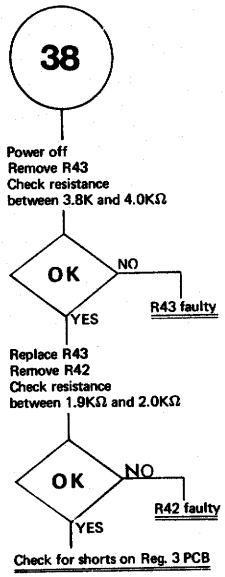
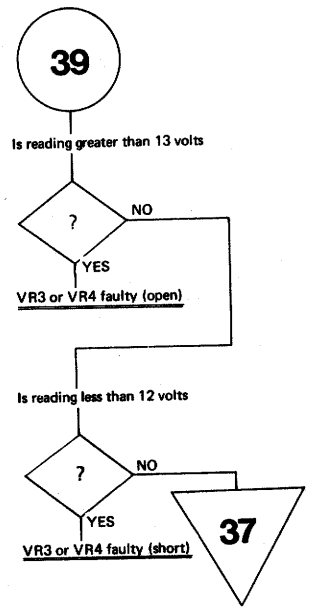
TITLE			
POWER SUPPLY (Page 5 of 11)			
ENG: JBS	DATE:	DWG NO.: 2801 8638	REV.: A
CLASSIFICATION CODE: 2-9520		RELEASED: DEC 14 1977	





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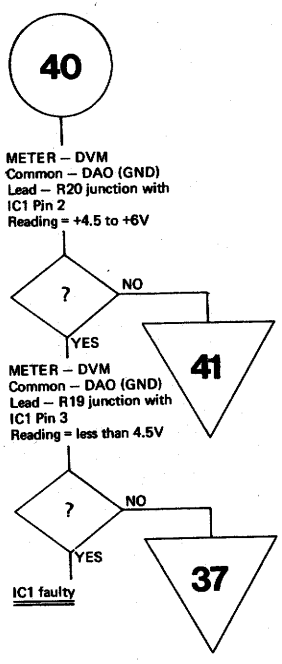
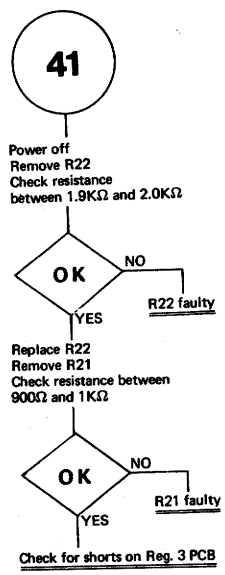
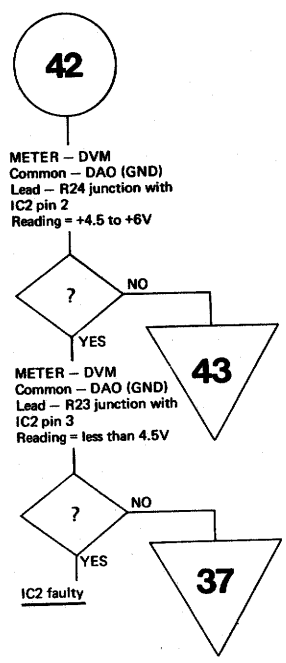
TITLE
POWER SUPPLY (Page 6 of 11)

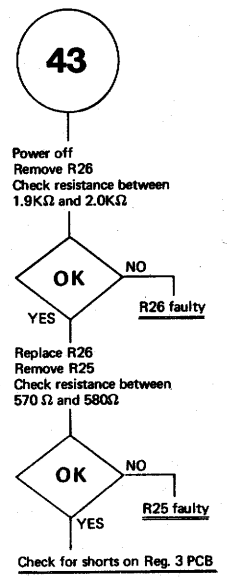
ENG	DATE	DWG NO.	REV.
JBS		2801 8638	A

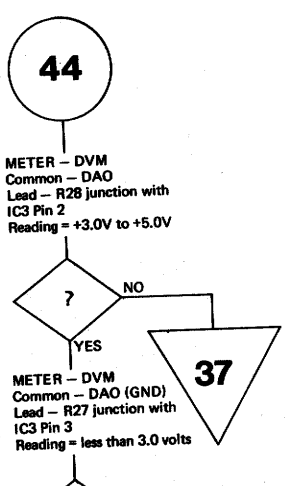
CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977

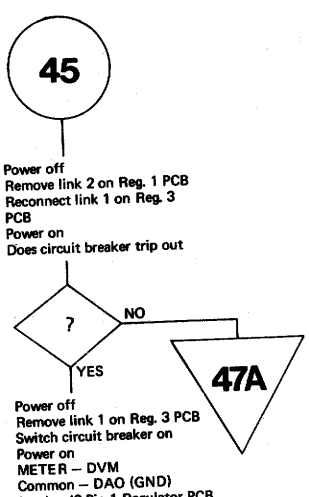


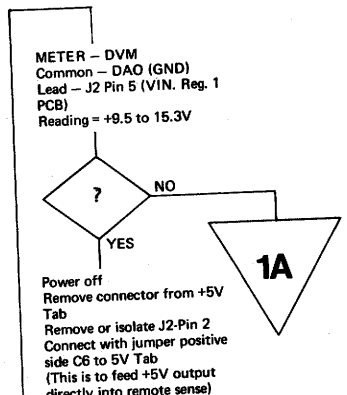


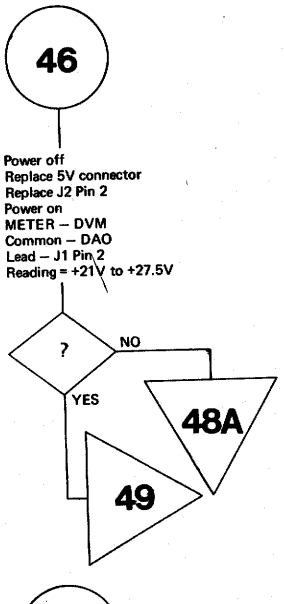


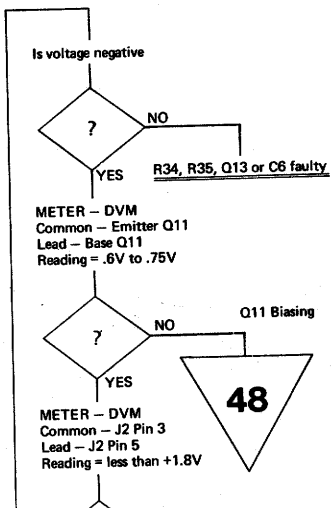












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TITLE

POWER SUPPLY (Page 7 of 11)

ENG	DATE	DWG NO.	REV.
JBS		2801 8638	A

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47

Power off
Remove connection from Tab M
METER – RESISTANCE KΩ
Common – Tab M
Lead – +5V Tab
Reading = less than .0020KΩ

? NO → R19, R20 or PCB faulty
? YES → Replace connector on Tab M
C8 or SCR Q8 faulty

47A

METER – DVM
Common – 0V Tab
Lead – +5V Tab
Reading = greater than +6.0V

? NO → Q9, R21, R22, R23, R25, CR1 or CR2 faulty
? YES → **46A**

48

METER – DVM
Common – Emitter Q11
Lead – Base Q11
Reading = less than +.6V

? NO → Q11 faulty
? YES → Q12, Q16 or Q17 faulty

48A

METER – DVM
Common – DAO (GND)
Lead – positive lead capacitor
C4 on capacitor bank
Reading = +21 to +27.5V

? NO → **50**
? YES → Harness faulty. Check continuity between C4 + and J1 Pin 2 and J4–3

49

If this is the first time you have been directed to 49 then proceed, otherwise go to 46A
Power off
Remove link 3
Remove fuse 2 (5 volt)
METER – DVM
Common – 0V Tab
Lead – Tab M
Power on
Reading = +13V to +16V

? NO →
? YES →

50

METER – VOLTS AC
Common – Terminal 4 on rectifier B2 (AC in)
Lead – Terminal 2 on rectifier B2 (AC in)
Reading = 17 to 19VAC

? NO → Transformer faulty
Check patchboard connections
? YES →

METER – DVM
Common – Terminal 3 on

51

METER – DVM
Common – DAO (GND)
Lead – J4 Pin 1 Reg. 3 PCB
Reading = +34 to +48 volts

? NO → **51A**
? YES →

METER – DVM
Common – DAO (GND)
Lead – J4 Pin 3 Reg. 3 PCB
Reading = +21V to +27.5V

? NO → Power off
Remove J4 (Reg. 3 PCB)
Power on
METER – DVM
Common – DAO (GND)
Lead – J4 Pin 3
Reading = +21V to +27.5V
? YES →

METER – DVM
Common – DAO (GND)
Lead – Base Q11
Reading = +12V to +13V

? NO → **39**
? YES →

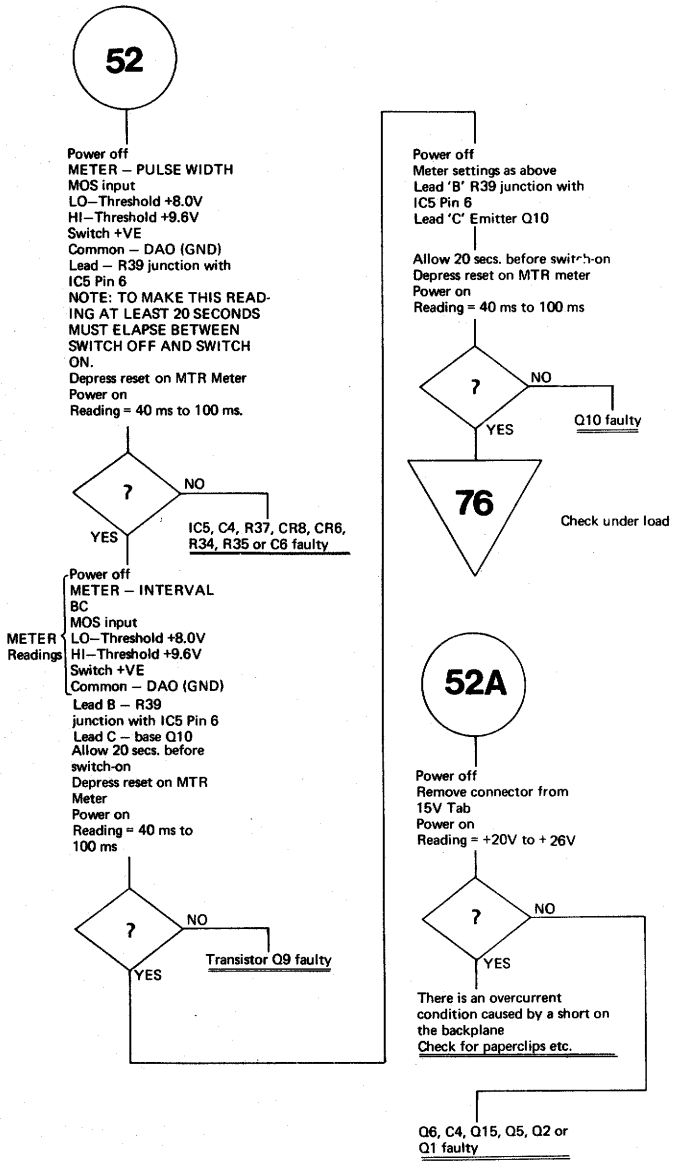
METER – DVM
Common – DAO (GND)
Lead – Emitter Q11
Reading = +11V to +13V

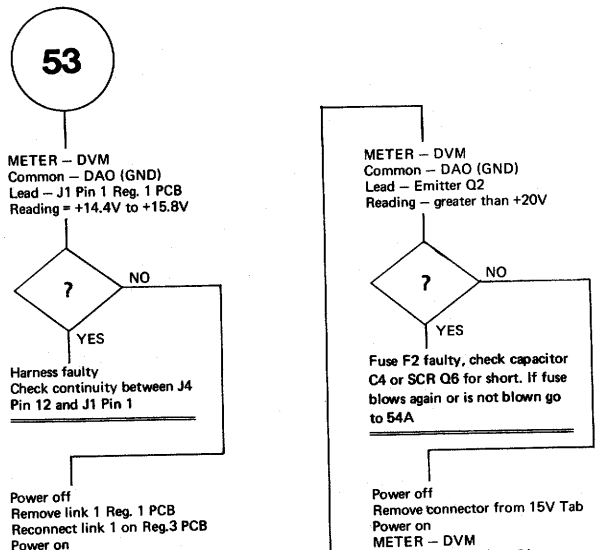
? NO → Q11 faulty
Check capacitor C7
? YES → **36**

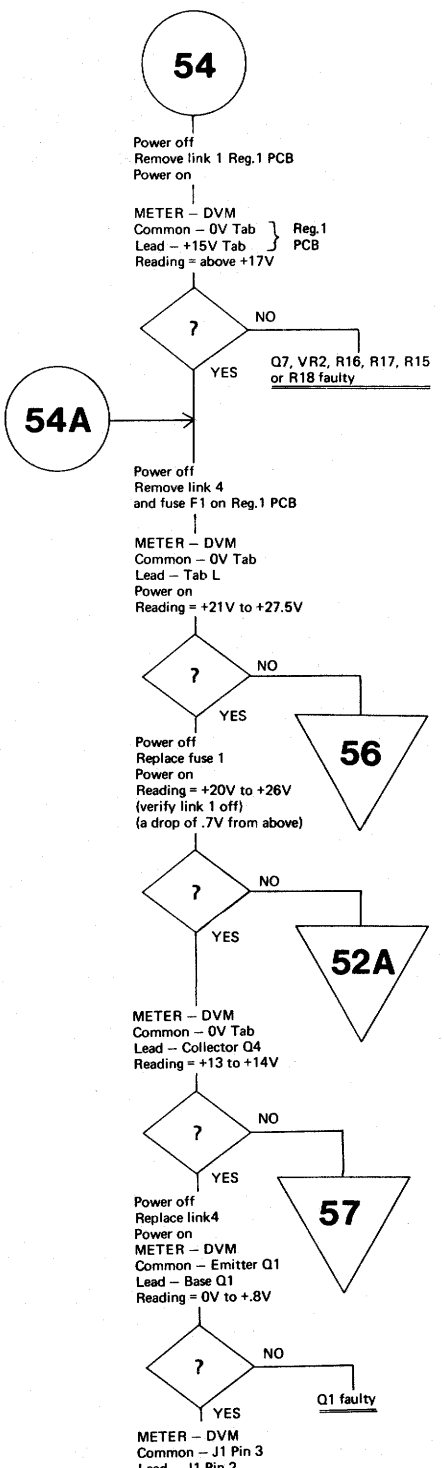
? NO → Diode CR13 faulty
? YES → **48A**

51A

METER – DVM
Common – DAO
Lead – positive side of C3 on capacitor bank
Reading = +34V to +48V







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TITLE

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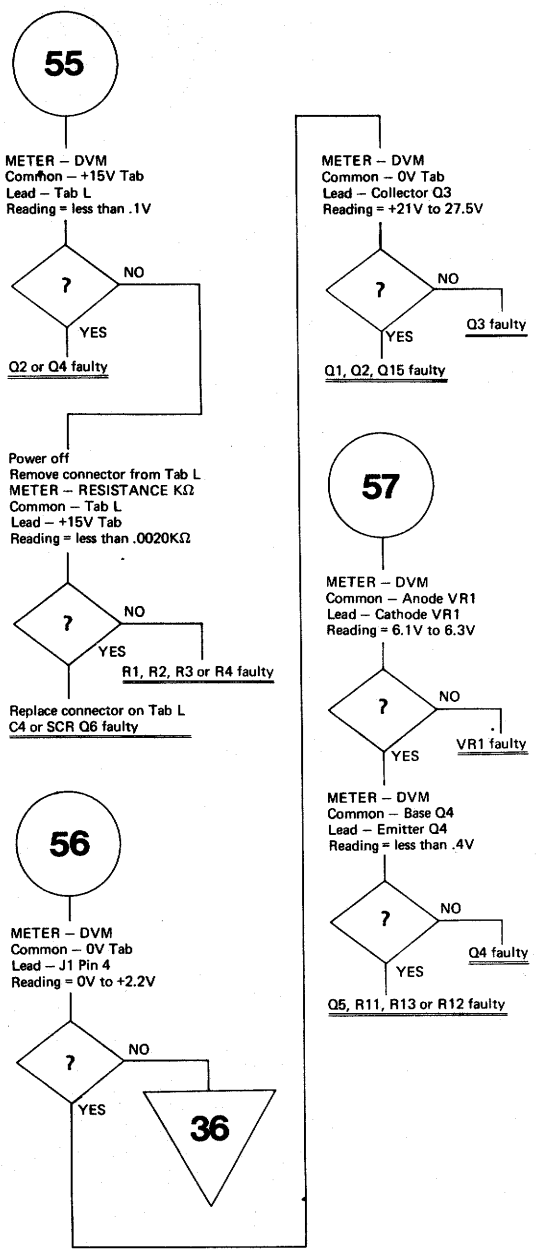
ENG	DATE	DWG NO.	REV.
JBS		2801 8638	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977



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TITLE

POWER SUPPLY (Page 9 of 11)

ENG	DATE	DWG NO.	REV.
JBS		2801 8638	A

CLASSIFICATION CODE	RELEASED
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60

METER – DVM
Common – 0V Tab
Lead – Anode CR4 (Reg.3 PCB)
Reading = 0V to +2.2V

? NO → 36
YES

METER – DVM
Common – 0V Tab
Lead – Collector Q3
Reading = +38V to +45V

? NO → Q3 faulty
YES

Q1, Q2, Q12 or Q13 faulty

61

METER – DVM
Common – Anode VR1
Lead – Cathode VR1
Reading = +6.1V to +6.3V

? NO → VR1 faulty
YES

METER – DVM
Common – Base Q5
Lead – Emitter Q5
Reading = less than .4V

? NO → Q5 faulty
YES

Q4, R14, R12 or R13 faulty

61A

METER – VAC
Common – Pin 4 rectifier B3
Lead – Pin 2 rectifier B3
Reading = 14.6 to 15.4VAC

? NO → Transformer faulty (Check patchboard connections)
YES

Rectifier B3 faulty (Check capacitor C5 for short)

62

METER – DVM
Common – 0V Tab
Lead – J3 Pin 6 Reg.2 PCB
Reading = –11.6V to –12.2V

? NO
YES → 67A

Power off
Disconnect link 1 Reg.2 PCB
Reconnect link 1 Reg.3 PCB
Power on
Does circuit breaker trip out

METER – DVM
Common – 0V Tab
Lead – J3 Pin 10
Reading = –17V to –23V

? NO → 66
YES

METER – DVM
Common – 0V Tab
Lead – Emitter Q2
Reading = –17V to –23V

? NO
YES

Fuse 1 faulty. Check capacitor C4 or SCR Q6 for short.
If fuse blows again or is not blown go to 62A

63

Power off
Remove link 1 Reg.2 PCB
Power on
METER – DVM
Common – 0V Tab } Reg.2
Lead – –12V Tab } PCB
Reading = –12.8V to –15.6V

? NO → Q7, VR2, R14, R15 or R13 faulty
YES → 67

63A

Power off
Remove link 2 } Reg.2
Remove fuse 1 } PCB

METER – DVM
Common – 0V Tab
Lead – Tab N
Power on
Reading = –17V to –23V

? NO → Q1, Q2, Q3 or Q16 faulty
YES

Power off
Replace fuse 1
Power on
Reading = –16V to –22V
(verify link 1 off) (a drop of approx .7V from above)

? NO → Q6, C4, Q16, Q5, Q2, or Q3 faulty
YES

METER – DVM
Common – 0V Tab
Lead – Collector Q4
Reading = –9V to –10.6V

? NO
YES → 65

Power off
Replace link 2
Power on
METER – DVM
Common – Emitter Q3
Lead – Base Q3
Reading = 0V to –.8V

? NO → Q3 faulty
YES

METER – DVM
Common – J3 Pin 9
Lead – J3 Pin 10
Reading = less than –1.8V

? NO → Q16 faulty (on heat sink)
YES

METER – DVM
Common – –12V Tab
Lead – Base Q3
Reading = less than –2V

? NO → Q3, Q1 faulty
YES → 64

64

METER – DVM
Common – –12V Tab
Lead – Tab N
Reading = less than –.1V

65

METER – DVM
Common – Anode VR1
Lead – Cathode VR1
Reading = 6.2V

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TITLE
POWER SUPPLY (Page 10 of 11)

ENG	DATE	DWG NO.	REV.
JCS		2801 8638	A

CLASSIFICATION CODE	RELEASED
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66

METER – DVM
Common – DAO (GND)
Lead – Negative side C5
Reading = –17V to –23V

? NO / YES

Harness faulty

METER – DVM
Common – Pin 1 rectifier B3
Lead – Pin 3 rectifier B3
Reading = –17V to –23V

? NO / YES

Harness faulty

→ 61A

67

Power off
Remove link 3 Reg.2 PCB
Replace link 1 Reg.2 PCB
METER – DVM
Common – 0V Tab
Lead – –12V Tab
Reading = –11.6V to –12.2V

? NO → 63A / YES → 68

67A

METER – DVM
Common – 0V Tab } Reg.2 PCB
Lead – J3 Pin 1 }
Reading = –8.55V to –9.45V

? NO → 68 / YES

METER – DVM
Common – 0V Tab } Reg.2 PCB
Lead – J3 Pin 11 }
Reading = –2.9V to –3.4V

? NO → 70 / YES

Harness or connector faulty

67B

Power off
Remove link 3 Reg.2 PCB
Replace link 1 Reg.2 PCB
Power on
Does circuit breaker trip out

? NO / YES → 63

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TITLE

POWER SUPPLY (Page 11 of 11)

ENG	DATE	DWG NO.	REV.
JBS		2801 8638	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977

68

METER– DVM
Common – 0V Tab
Lead – J3 Pin 6
Reading = –11.6V to –12.2V

? NO → –12 volts missing → 62 / YES

Power off
Remove or isolate J3 Pin 1 Reg.2 PCB
Power on
METER – DVM
Common – 0V Tab
Lead – Emitter Q10
Reading = –8.55V to –9.45V

? NO / YES

Harness faulty or short on backplane

METER – DVM
Common – 0V Tab } Reg.2 PCB
Lead – Base Q8 }
Reading = –6.7V to –7.3V

? NO → Q8, R16, R17 or R18 faulty / YES → 69

69

METER – DVM
Common – Base Q9
Lead – Base Q8
Reading = +.05V to –.05V

? NO / YES

Q9, R20 or R31 faulty

METER – DVM
Common – Base Q10
Lead – Emitter Q10
Reading = +.6V to +.8V

? NO → C6, Q10, R19 or C5 faulty / YES

METER – DVM
Common – J3 Pin 3
Lead – collector Q10
Reading = 0V to +.05V

? NO → Q15 or R22 faulty / YES

Q10, or Q15 faulty

70

METER – DVM
Common – DAO (GND)
Lead – –3V Tab
Reading = –2.95 to –3.35V

? NO / YES

Harness faulty

METER – DVM
Common – 0V Tab } Reg.2 PCB
Lead – Cathode VR3 }
Reading = –8.55V to –9.45V

? NO / YES

71

METER – DVM
Common – 0V Tab } Reg.2 PCB
Lead – Base Q11 }
Reading = –2.1V to –2.8V

? NO → R23, R24, Q11 or R25 faulty / YES

METER – DVM
Common – Base Q12
Lead – Base Q11
Reading = +.05 to –.05V

? NO / YES

72

The reason for coming to this procedure is that the 24V supply cannot supply the specified current and thus causes an undervoltage condition. Possible causes are:–

74

The 5V supply cannot supply the specified current and thus causes an undervoltage condition. Possible causes are:–

Reg.1 PCB
1) Q17 or Q16 gone open collector
2) Q11 gone open base or open collector
3) the supply is current limiting at the incorrect value. Check R19, R20, R32 and Q12.

75

The –12V supply cannot supply the specified current and thus causes an undervoltage condition. Possible causes are:–

Note: Unless otherwise stated, Duty Cycle readings are for Positive Logic.

Column	Resistor RX	Pin JX	Transistor QX	ICY Pin Z	Backplane Pin BX	ICA Pin B	Pin C
18	R1	A	Q1	IC7 Pin 5	BF6T	IC7 Pin 8	Pin 9
17	R2	2	Q2	IC7 Pin 2	BF6U	IC7 Pin 8	Pin 9
16	R3	B	Q3	IC8 Pin 13	BF5L	IC7 Pin 8	Pin 9
15	R4	3	Q4	IC8 Pin 10	BF6K	IC7 Pin 11	Pin 12
14	R5	C	Q5	IC8 Pin 5	BF6R	IC7 Pin 8	Pin 9
13	R6	4	Q6	IC8 Pin 2	BF6S	IC7 Pin 8	Pin 9
12	R7	D	Q7	IC9 Pin 13	BF5M	IC7 Pin 8	Pin 9
11	R8	5	Q8	IC9 Pin 10	BF6L	IC7 Pin 8	Pin 9
10	R9	E	Q9	IC9 Pin 5	BF6P	IC7 Pin 8	Pin 9
9	R10	6	Q10	IC9 Pin 2	BF6Q	IC7 Pin 8	Pin 9
8	R11	F	Q11	IC10 Pin 13	BF5N	IC7 Pin 11	Pin 12
7	R12	7	Q12	IC10 Pin 10	BF6M	IC7 Pin 11	Pin 12
6	R13	H	Q13	IC10 Pin 5	BF5P	IC7 Pin 11	Pin 12
5	R14	8	Q14	IC10 Pin 2	BF6N	IC7 Pin 11	Pin 12
4	R15	J	Q15	IC6 Pin 5	BF5F	IC7 Pin 11	Pin 12
3	R16	9	Q16	IC6 Pin 13	BF6H	IC7 Pin 11	Pin 12
2	R17	K	Q17	IC6 Pin 10	BF5E	IC7 Pin 11	Pin 12
1	R18	10	Q18	IC6 Pin 2	BF6I	IC7 Pin 11	Pin 12

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TITLE **PRINTER DRIVER** (Page 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8646	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977

START

Power off
Place Printer Driver PCB on extender card
Power on
Clear twice
METER – PULSE COUNT (TTL)
Common – DAO (GND)
Lead – Front plane pin JX printer driver PCB (see table)
Press NK2, press clear
Check count = 13 (= 14 if paper space)

OK? NO → Repeat previous measurement with lead on QX collector (see table)
Check count = 13 (14 if paper space)

OK? NO → Frontplane connector or Tracks on PCB faulty

YES → METER – COINCIDENCE (TTL)
Common – DAO (GND)
Lead B – Pin BX See
Lead C – ICY Pin Z Table
Both Inputs positive logic Press, NK2, press clear
Check reading = 13–18 msec

OK? NO → 2

YES → METER – DVM
Common – BF5A (GND)
Lead – BF5C (+5V)
Check reading = +4.75 to +5.25V

OK? NO → Backplane harness or PCB track faulty

YES → Resistor RX, transistor QX, or ICY faulty

YES → METER – DUTY CYCLE (TTL)
Common – DAO (GND)
Lead – BFJ
Check reading = 64–68%

OK? NO → PSS MP

YES → METER – PULSE COUNT
Common – DAO (GND)
Lead – BF6G
Check count = 180–190 pulses in 60 sec.

PRS MP → OK? NO → Faulty harness or Mechanical Fault on Printer

YES

2

Power off
MTR mode off, ADD mode on
Power on
Clear twice
METER – PULSE COUNT (TTL)
Common – DAO (GND)
Lead – ICA Pin B on Print Drv. PCB (see table)
Press + Key
Check count = 13

OK? NO → METER – PULSE COUNT
Common – DAO (GND)
Lead – ICA Pin C Print Drv. PCB (see table)
Press + Key
Check count = 13

OK? NO → ICA is faulty (see table)

YES → 3

YES → METER – DVM
Common – DAO (GND)
Lead – BF5C
Check reading = +4.75 to +5.25V

OK? NO → Faulty harness or faulty track on PCB

YES → METER – PULSE COUNT (TTL)
Common – DAO (GND)
Lead – Pin BX (see table)
Press + Key
Check count = 3

OK? NO → PRINT LOGIC MP

YES → ICY is faulty (see Table)

3

METER – DUTY CYCLE (TTL)
Common – DAO (GND)
Lead – IC5 Pin 5 on Print. Drv. PCB
Check reading = 63–69%

OK? NO → METER – DUTY CYCLE (TTL)
Common – DAO (GND)
Lead – IC3 Pin 1 (Print Drv. PCB)
Check reading = 98–100%
Lead – IC3 Pin 4 (Print Drv. PCB)
Check reading = 98 – 100%

BOTH OK? NO → METER – DVM
Common – DAO (GND)
Lead – DJ8C
Check reading = 4.75 to 5.25V

OK? NO → Faulty harness

YES → Resistor R34 or IC3 on Print

YES → METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC5 Pin 6 on Print Drv. PCB
Check reading = 0.1 – 0.7%

OK? NO → PRS MP

YES → METER – PULSE COUNT (TTL)
Common – (DAO (GND)
Lead – IC3 Pin 13 (Print Drv. PCB)
Check count = 180 to 190 in 60 seconds

OK? NO → PRS MP

4

Power off
MTR mode off, ADD mode on
Power on
Clear twice
METER – PULSE COUNT
Common – DAO (GND)
Lead – IC3 Pin 5 on print drv. PCB
Press + key
Check count = 13

OK? NO → Power off
MTR mode on
Power on
Clear twice
METER – DVM
Common – DAO (GND)
Lead – IC3 Pin 5 on print drv. PCB
Check reading = 4.75 to 5.25v

OK? NO → Faulty tracks on PCB

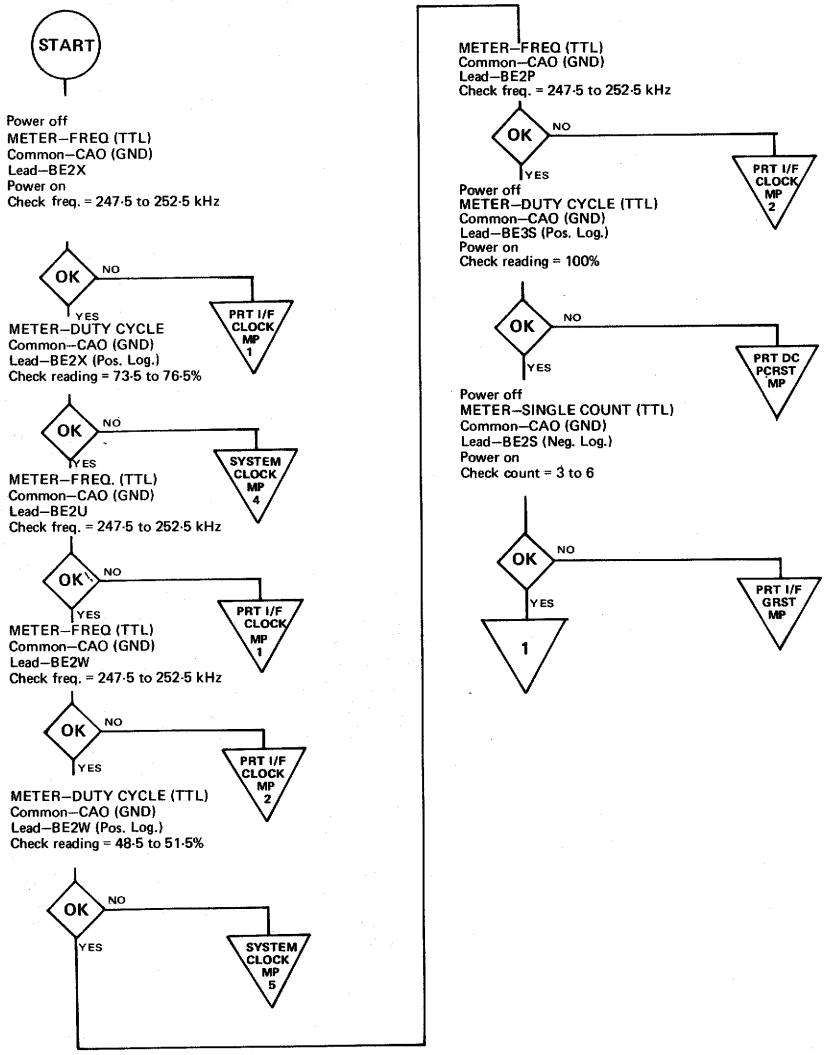
YES → METER – DVM
Common – DAO (GND)

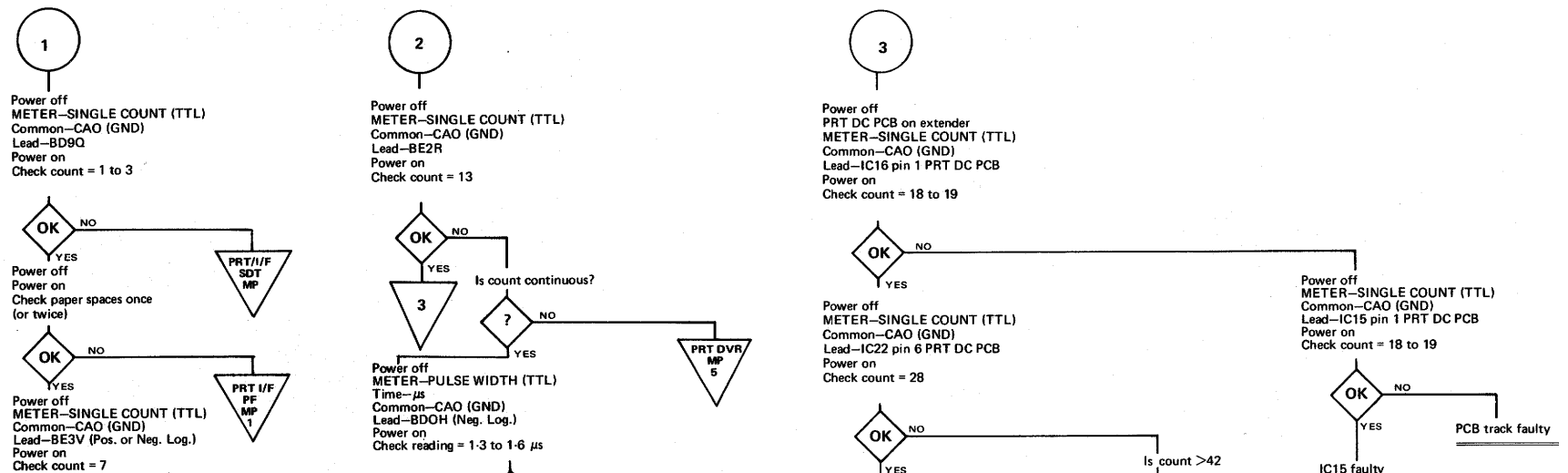
YES → Bad contact on an IC socket now OK

5

Power off
PRT Drv PCB on extender
METER–SINGLE COUNT(TTL)
Common–DAO (GND)
Lead–IC3 pin 6 (Prt. drv.)
Power on
Check count = 13

OK? NO → IC4 faulty





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NOTE 1:–

MTR METER IN COUNT MODE (SOMETIMES) REGISTERS COUNT DURING THE SWITCH ON OF THE MACHINE. HENCE TO GET THE CORRECT COUNT, THE INITIAL COUNT (COUNT DURING SWITCH ON) SHOULD BE SUBTRACTED FROM THE FINAL COUNT

PRT I/F	–TPU/PRINTER INTERFACE
PRT DC	–PRINTER DATA CONTROL
PRT DRV	–PRINTER DRIVER
M.P.	–MANUAL PROCEDURE
POS. LOG.	–POSITIVE LOGIC
NEG. LOG.	–NEGATIVE LOGIC
PCB	–PRINTED CIRCUIT BOARD

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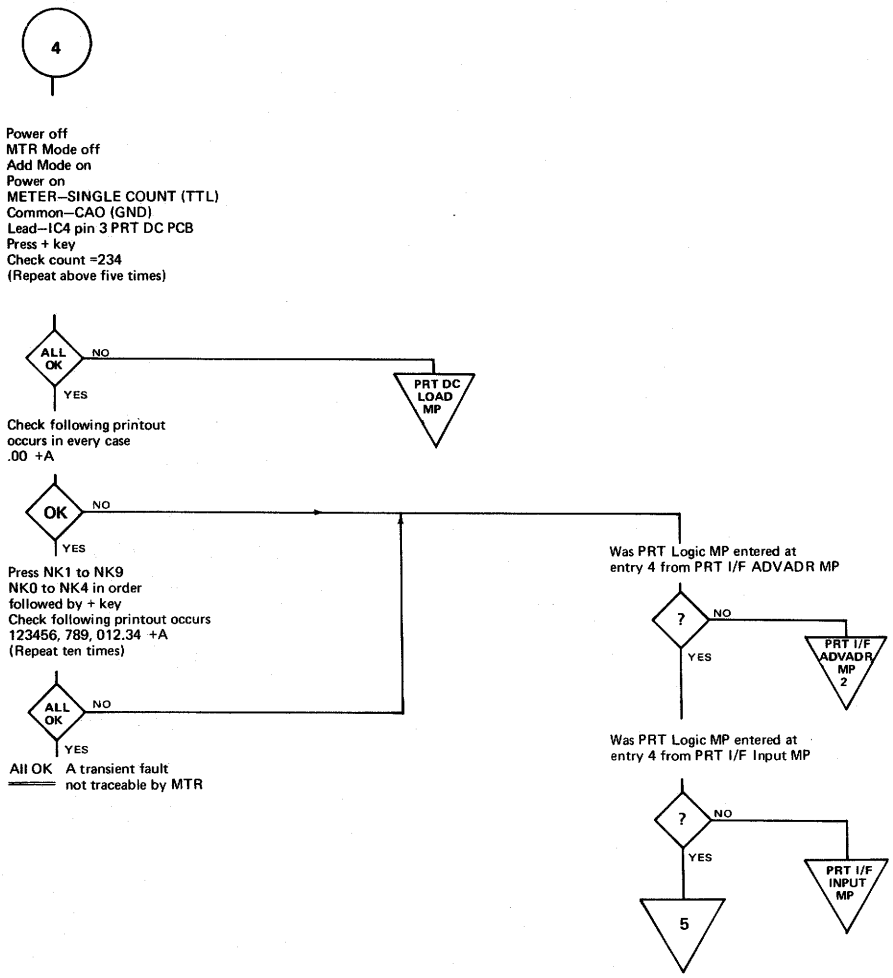
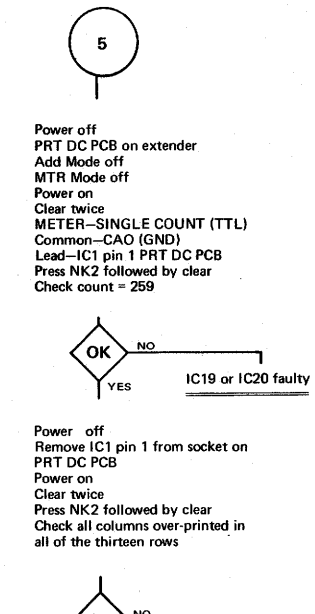
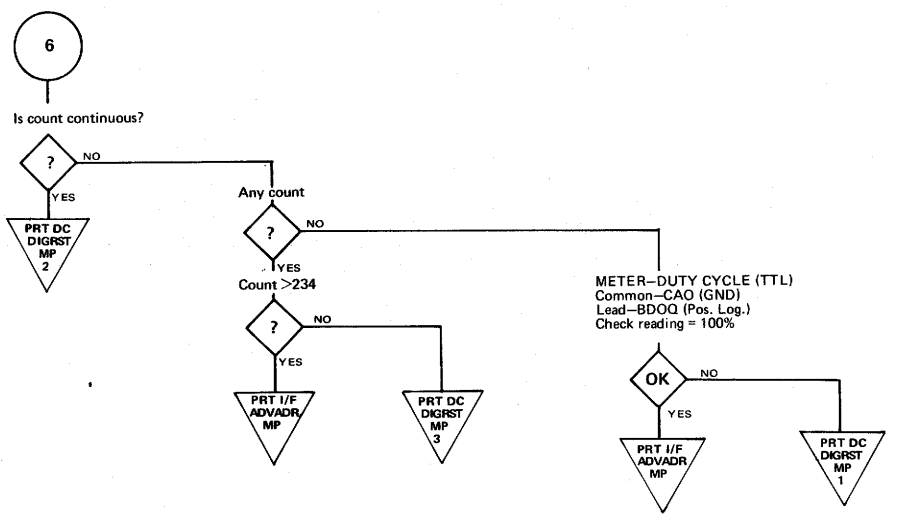
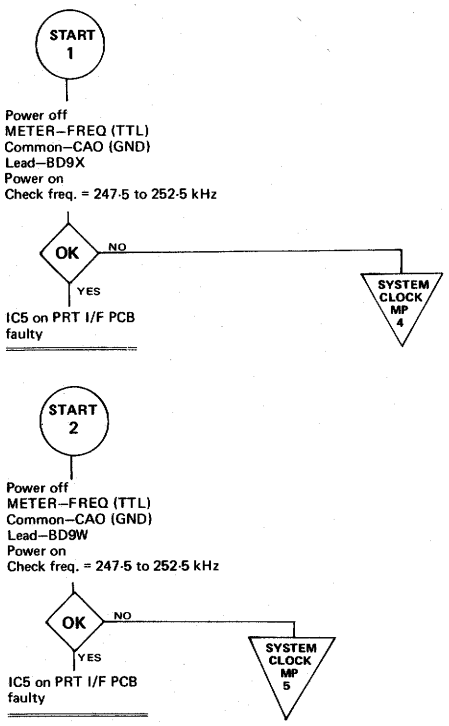






PRINTER INTERFACE CLOCK M.P.



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PRINTER INTERFACE GRST M.P.

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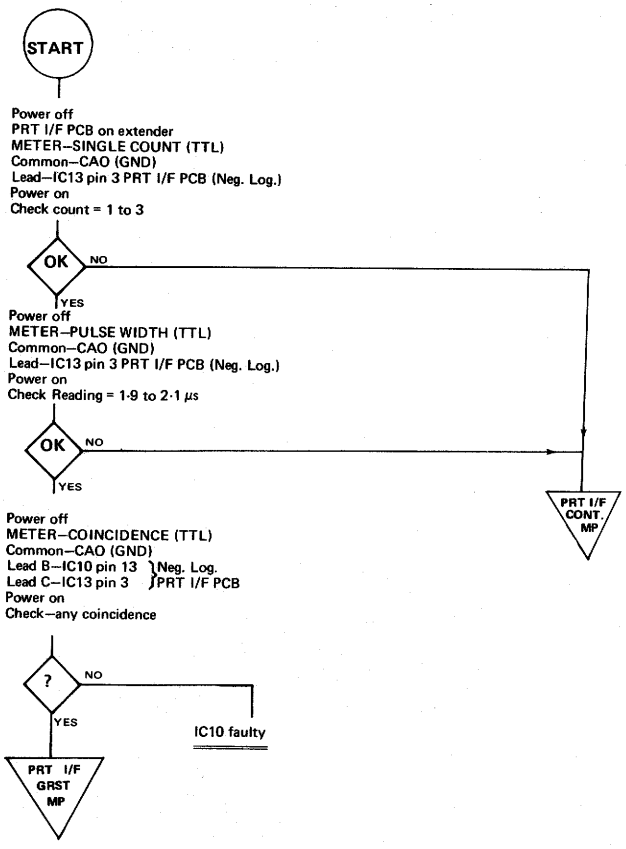
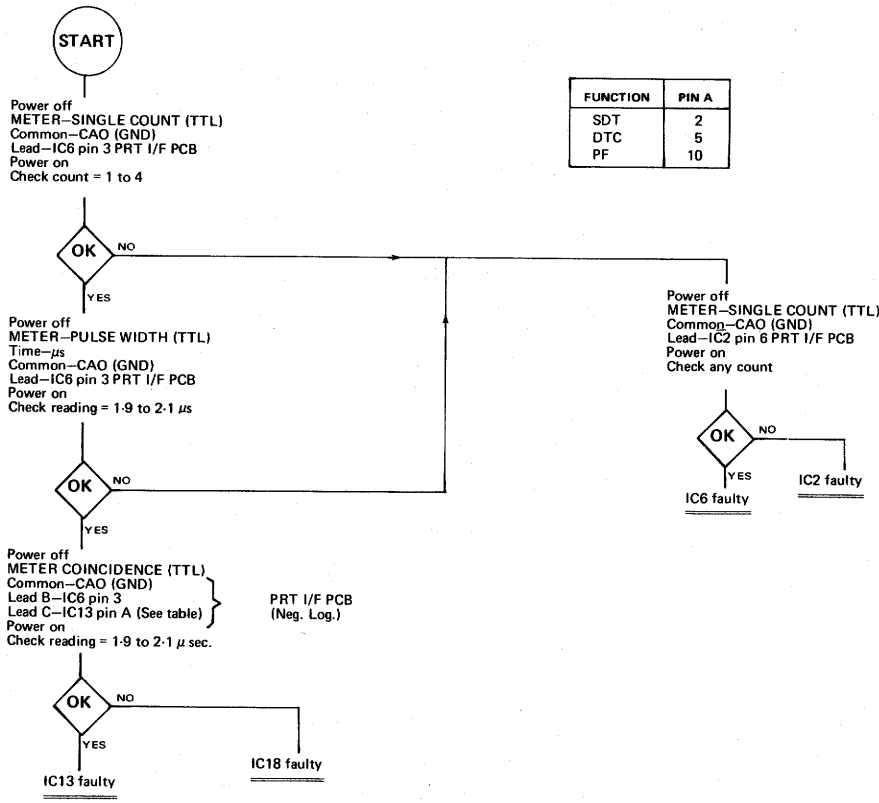
PRINTER INTERFACE SDT M.P.

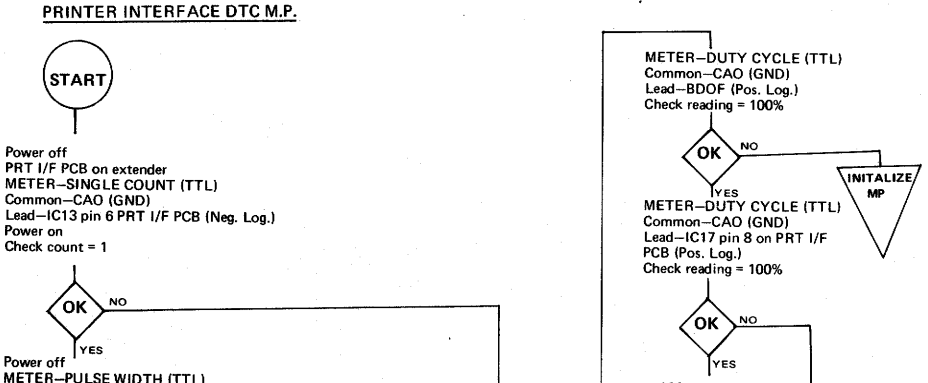


PRINTER INTERFACE CONTROL M.P.

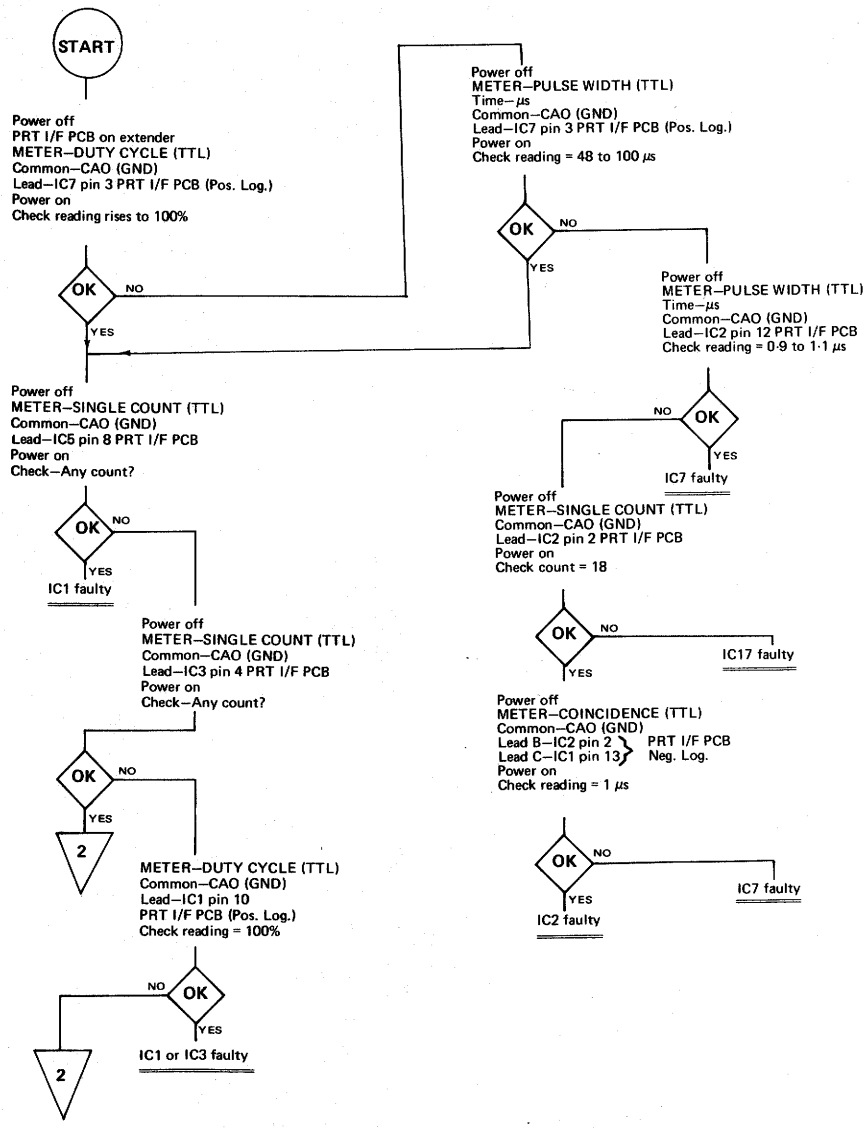


FUNCTION	PIN A
SDT	2
DTC	5
PF	10

PRINTER INTERFACE DTC M.P.



PRINTER INTERFACE ADV ADR M.P.



PIN C	COUNT C
15	22-23
1	9-10
10	6- 7
9	3- 4

Table 3

PRINTER INTERFACE INPUT M.P.

NKA	PIN A	COUNT A
1	2	5
2	3	5
3	4	6
4	5	5
5	6	5

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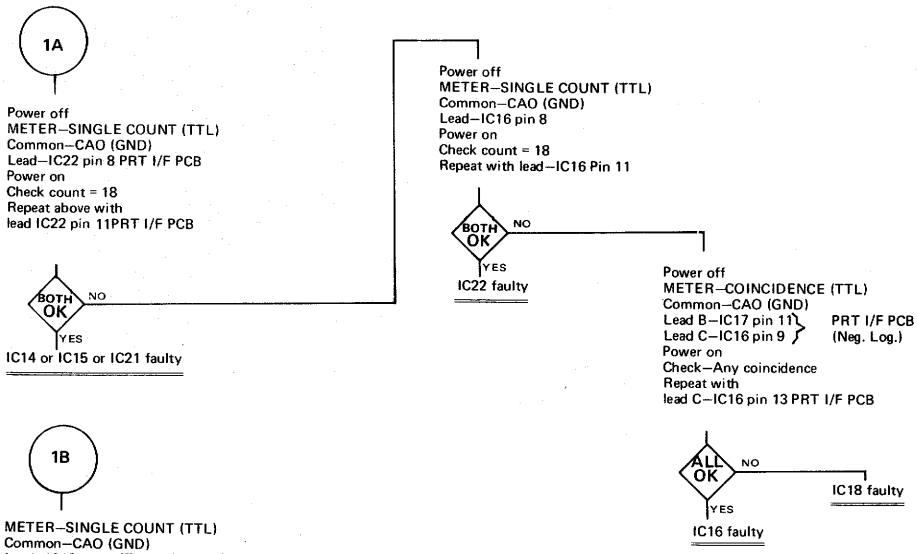

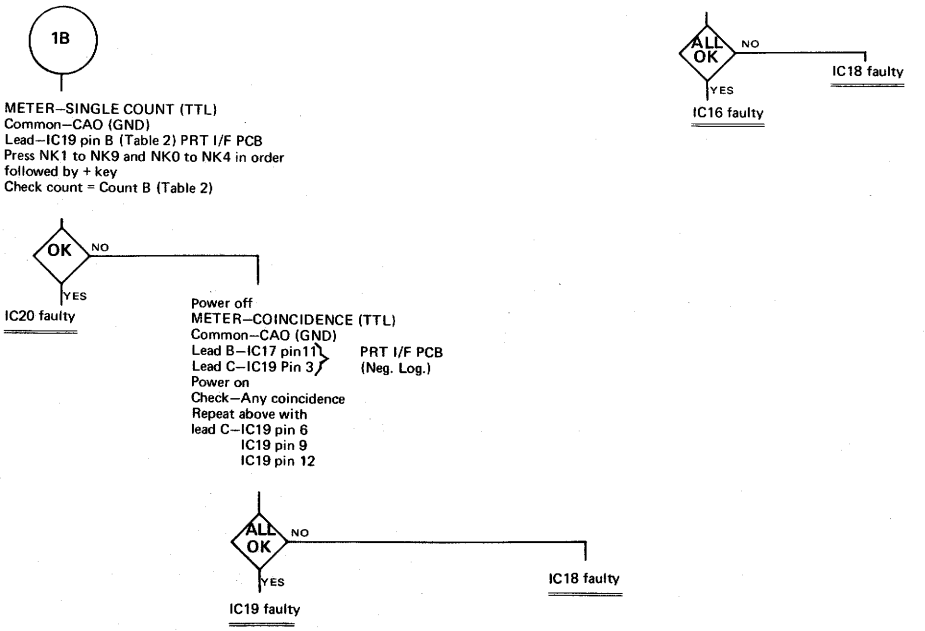

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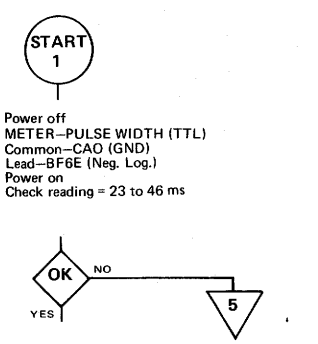
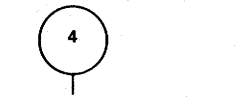
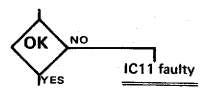
PRINTER INTERFACE PF. M.P.



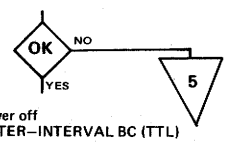


Power off
METER–PULSE WIDTH (TTL)
Common–CAO (GND)
Lead–IC2 pin 8 (PRT I/F)
NEG. Logic. Power on
Check reading >23ms

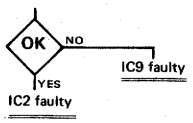
Power off
METER–DUTY CYCLE (TTL)
Common–CAO (GND)
Lead–IC11 pin 9 (PRT I/F)
Neg. Logic. Power on
Check reading = 100%



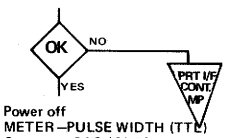
Power off
METER–DUTY CYCLE (TTL)
Common–CAO (GND)
Lead–IC11 pin 5 (PRT I/F)
Pos. Logic. Power on
Check reading rises towards 100%



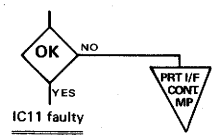
Power off
METER–INTERVAL BC (TTL)
Time–ms
Common–CAO (GND)
Lead B–IC11 pin 5 } Pos. Log.
Lead C–IC9 pin 9 } PRT I/F
Power on
Check readings = 23 to 45 ms



Power off
METER–SINGLE COUNT (TTL)
Common–CAO (GND)
Lead–IC13 pin 8 (PRT I/F)
Neg. Logic. Power on
Check count = 1



Power off
METER–PULSE WIDTH (TTL)
Common–CAO (GND)
Lead–IC13 pin 8 (PRT I/F)
Neg. Log. Power on
Check reading = 1·9 to 2·1 μs



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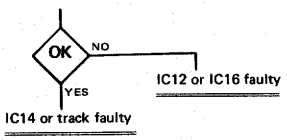
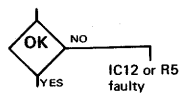
PRINTER DATA CONTROL PCRST M.P.

Power off
Printer Data Control
PCB on extender
METER–DUTY CYCLE (TTL)
Common–CAO (GND)
Lead–IC12 pin 5 (PRT DC)
Neg. Logic. Power on
Check reading = 100%

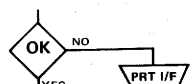


PRINTER DATA CONTROL DIGRST M.P.

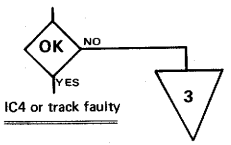
Power off
Printer Data Control
PCB on extender
Power on
METER–DUTY CYCLE (TTL)
Common–CAO (GND)
Lead–IC12 Pin 2 (PRT DC)
Pos. Logic
Check reading = 100%

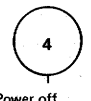


METER–DUTY CYCLE (TTL)
Common–CAO (GND)
Lead–BDOP (Pos. Log.)
Check reading = 100%



Power off
Printer Data Control
PCB on extender
METER–SINGLE COUNT (TTL)
Common–CAO (GND)
Lead–IC12 pin 2 (PRT DC)
Power on
Check count = 32 to 33





Power off

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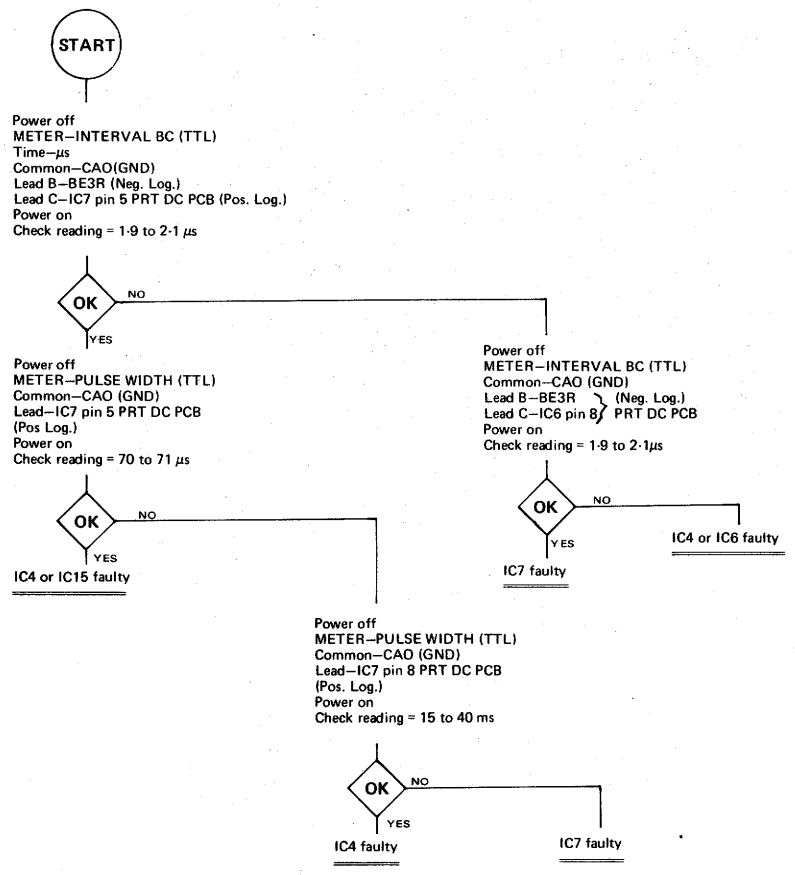
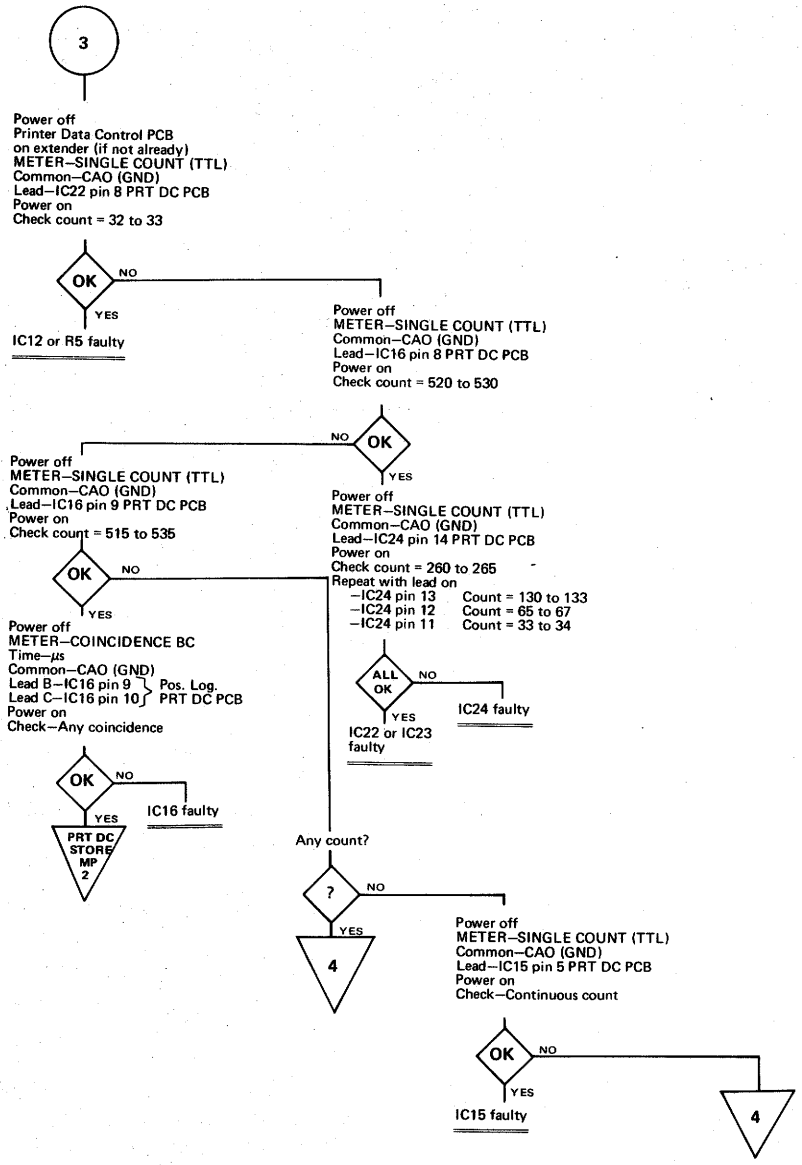
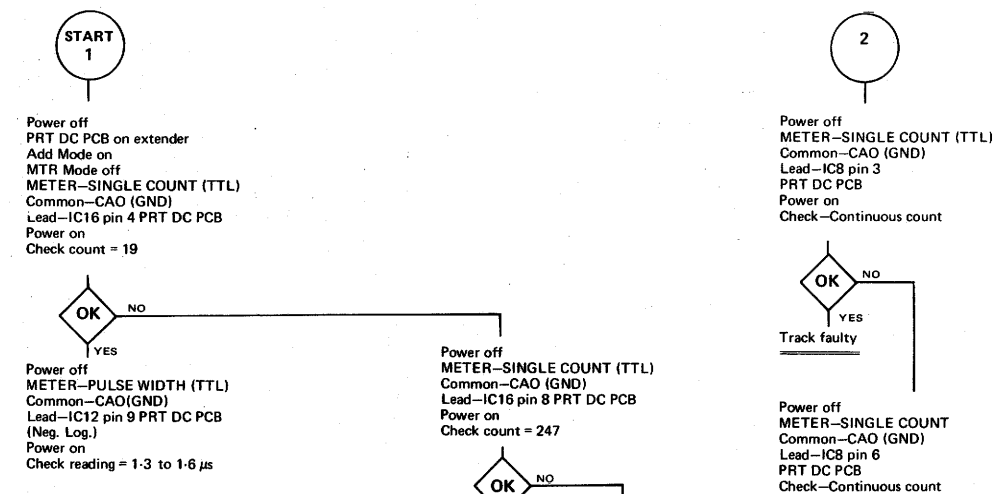
PRINTER DATA CONTROL LOAD M.P.

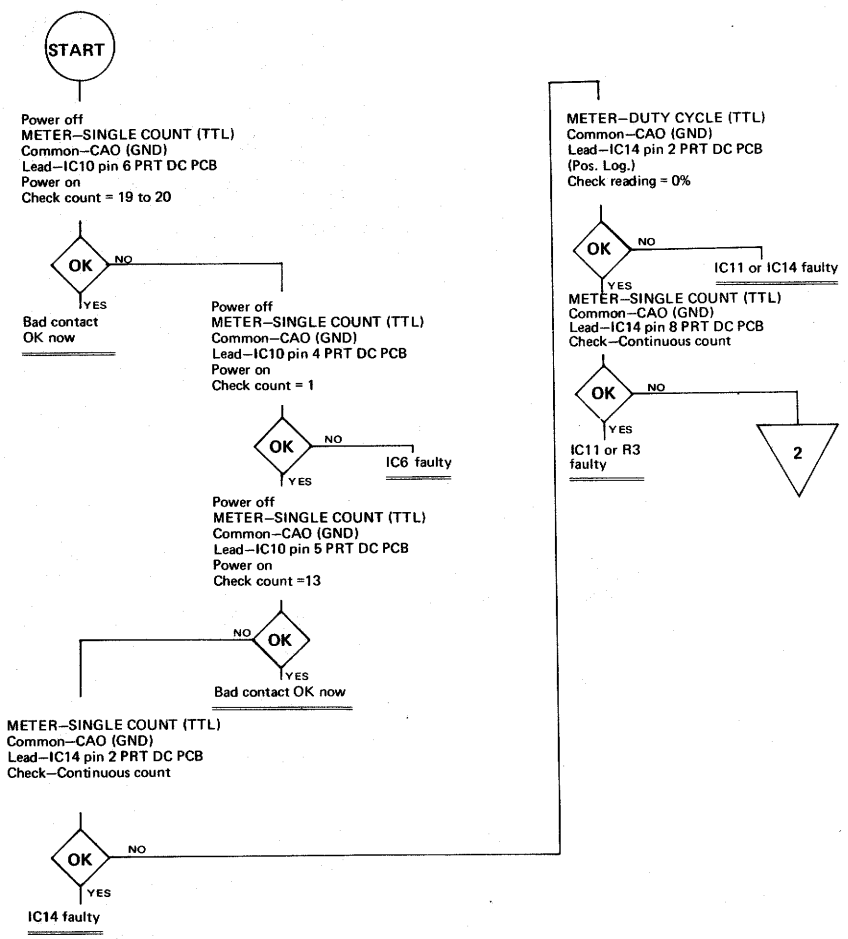


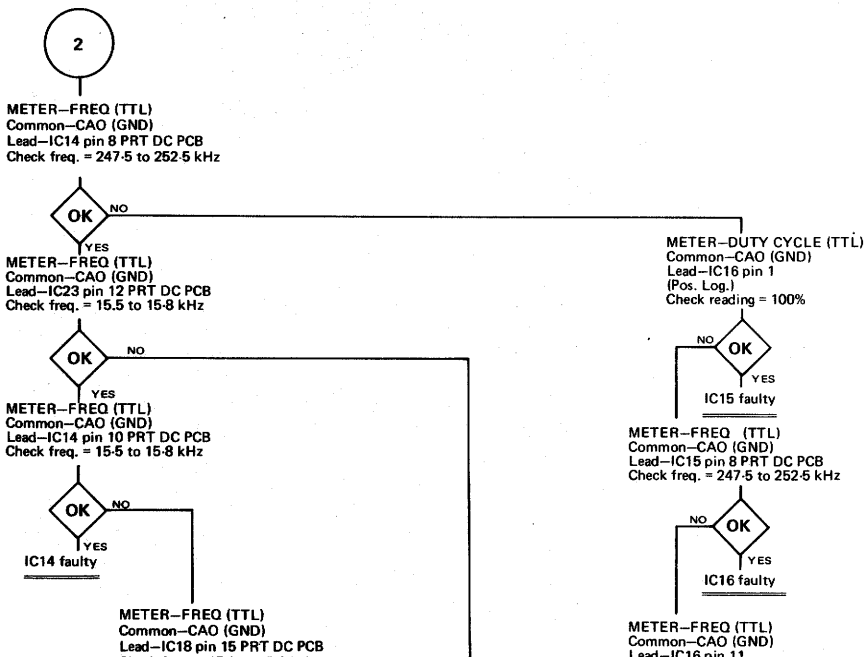
PRINTER DATA CONTROL STORE M.P.





PRINTER DATA CONTROL B FULL M.P.





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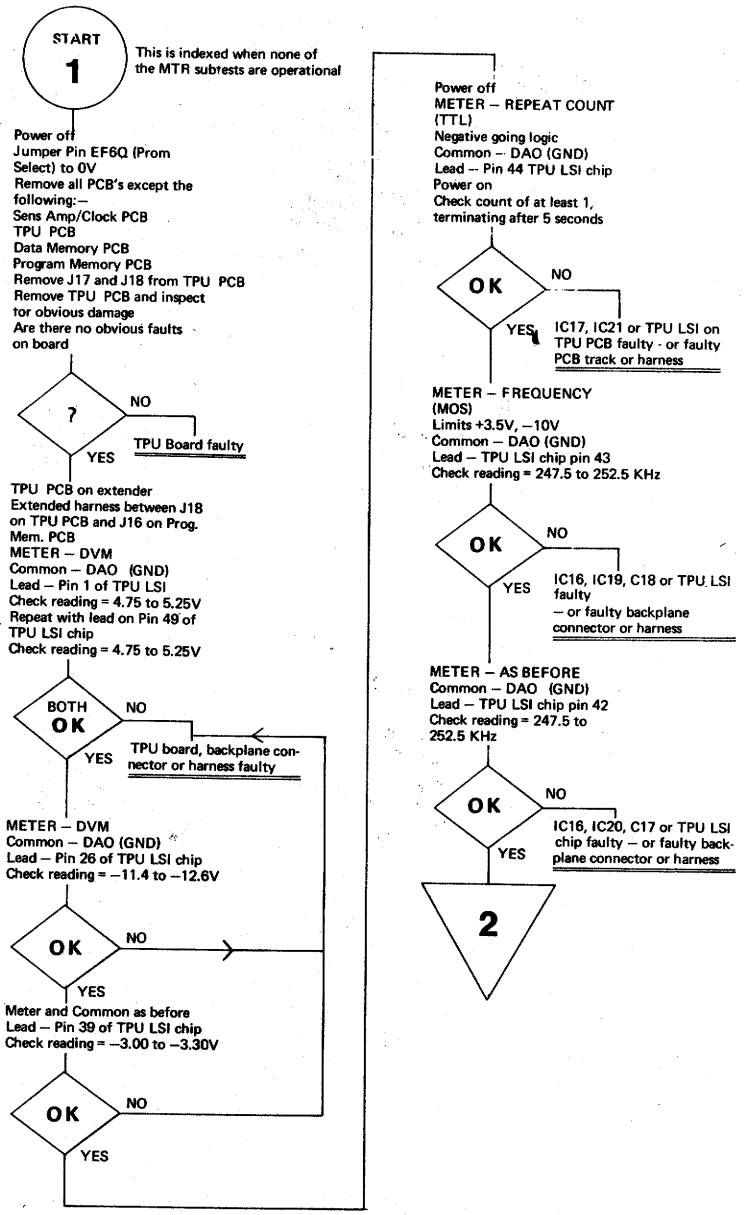

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START 9

This is indexed when a Keyboard, Switch or Indicator function is not carried out correctly.
The Program Controlling 'Core' of the machine is assumed to be operating

Ensure all PCBs are plugged into machine, and all frontplane connectors are on. Remove any test jumpers.
MTR mode on
Power on
Clear twice
Press NK4 followed by Clear
Does the following sequence of events occur after the depression of the two keys stated:
1) Amount Lamp lights
2) After about 30 seconds amount lamp goes out and Sieko Printer tallyroll advances one space, with no printout occurring.

OK? NO → YES → START 10

Power off
Replace the following ICs on the Data Memory board in turn:—
IC15, 16, 17, 18, 21, 22, 23, 24.
After each replacement power off and repeat previous test

OK? NO → YES → Replaced IC faulty

START 10

This is indexed when a Print, Panaplex or Encode function is not carried out

Power off
Set up PCBs as described in START 1
METER – REPEAT COUNT (TTL)
Common – DAO (GND)
Lead to the following points on TPU PCB in turn:—
IC9, pins 7, 9, 11
IC18, pins 12, 13, 14, 15
Was a count observed at all of these points

? NO → YES → IC9, 18, 19 or 20 on TPU PCB faulty

Meter and Common as before
Repeat previous test with lead on the following points:—
IC20, pins 2 and 4
IC14, Pin 4

OK? NO → YES → IC14 or IC20 faulty

Repeat test with lead on the following points:—
IC18, pin 12
IC19, Pins 8 and 10

OK? NO → YES → IC18, 19 or 20 faulty

11

11

Repeat previous test with lead on the following points:—
IC1, pins 4 and 8

OK? NO → YES → IC1 or IC7 faulty

Repeat previous test with lead on the following points:—
IC3, pins 4 and 8

OK? NO → YES → Has TPU LSI already been replaced during this call

? NO → YES → Repeat previous procedure replacing TPU LSI

NOW OK? NO → YES → Replaced IC faulty

5

Repeat previous test with lead on pins 2, 4, 6, 8, 10 and 12 of ICs 14, 19, 20 in turn (except IC14 pin 8, and IC19 pin 10)

OK? NO → YES → 6

Power off
Replace IC(s) on which test failed
Repeat test

OK? NO → YES → Replaced IC(s) faulty

Replace in turn IC9, IC12, * IC13, IC14, repeating test each time

OK? NO → YES → Replaced IC faulty

Replace IC15 to 18 and 21 to 24 in turn, repeating test after each replacement

OK? NO → YES → Replaced IC faulty

IC10 or IC11 (if inserted) faulty

6

Meter and Common as before
Lead on Pin 11 of ICs 15 to 18 and 21 to 24 in turn
Check a count occurs on each pin

OK? NO → YES → 7

See Table 1 for possible faulty chips corresponding to each output (ignore any chips which have already been replaced

Table 1

Faulty Output	Data Memory	* TPU Board
IC15 Pin 11	ICs 5, 6, 7, 8, 1, 15	ICs 3, 7, 4, 6, 19, TPU LSI
IC16 Pin 11	ICs 5, 6, 7, 8, 1, 16	ICs 2, 7, 4, 6, 19, TPU LSI
IC17 Pin 11	ICs 2, 3, 4, 1, 27	ICs 1, 7, 4, 6, 19, TPU LSI
IC18 Pin 11	ICs 2, 3, 4, 8, 1, 18	ICs 5, 7, 4, 6, 19, TPU LSI
IC21 Pin 11	ICs 5, 7, 6, 8, 1, 21	ICs 3, 7, 4, 6, 19, TPU LSI
IC22 Pin 11	ICs 5, 6, 7, 8, 1, 22	ICs 2, 7, 4, 6, 19, TPU LSI
IC23 Pin 11	ICs 2, 3, 4, 1, 23	ICs 1, 7, 4, 6, 19, TPU LSI
IC24 Pin 11	ICs 2, 3, 4, 8, 1, 24	ICs 5, 7, 4, 6, 19, TPU LSI

* If not previously replaced

7

Meter and Common as before
Lead — Plug J18 (TPU PCB) pins 24 & 25
Check that a count occurs on both pins

OK? NO → YES → 9

Power off
Replace, in turn, the following ICs in the TPU PCB, powering up the machine and repeating the test after each insertion:—
ICs 21, 22, 17, 6

OK? NO → YES → Replaced IC faulty

This is indexed when a Program Memory failure is detected

START 8

Reinsert Program Memory PCB and ensure harness from J16 to J18 is in place
Does any Program routine operate in either MTR or normal mode

? NO → YES → Replace the following ICs on the Prog. Mem. PCB.
After each replacement power up the machine and repeat the test which led to START 8.
ICs: 10, 11, 13, 14, 15, 12

TEST OK? NO → YES → Replaced IC faulty

Do all MTR subtests operate OK

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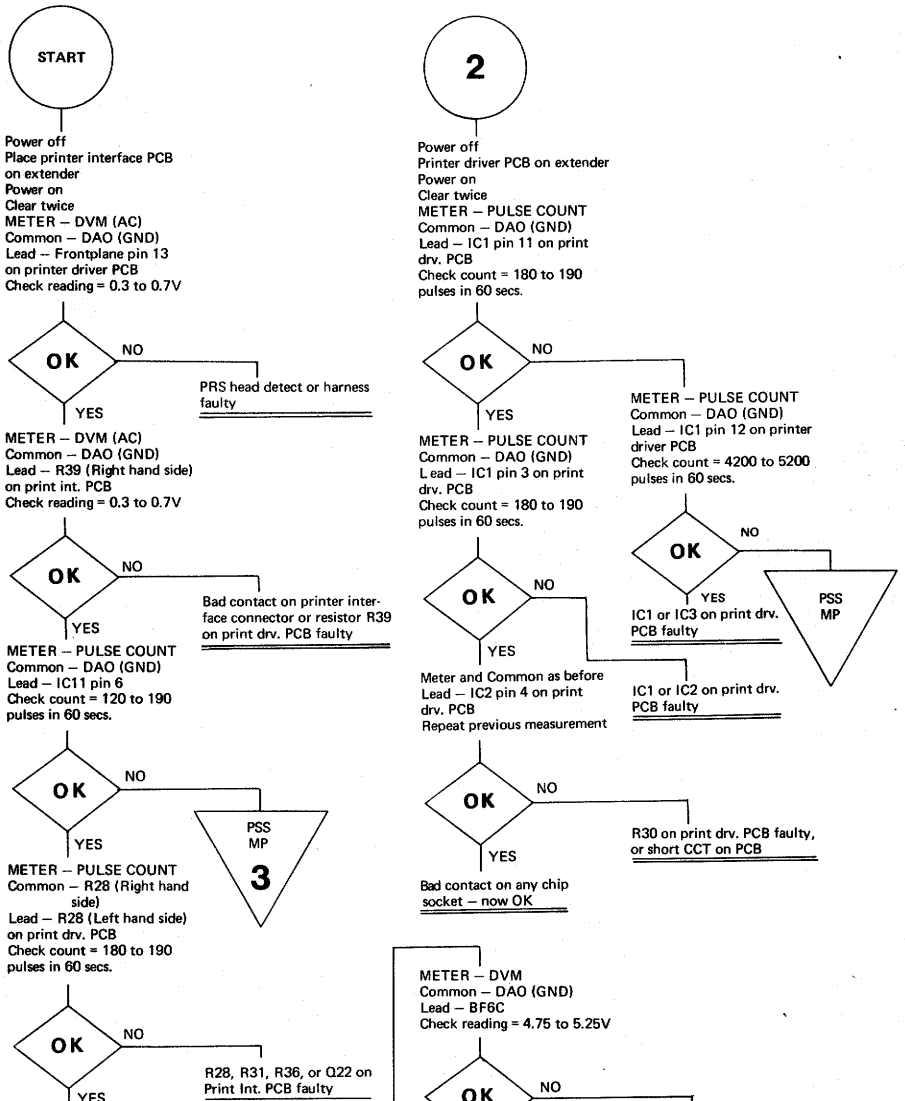

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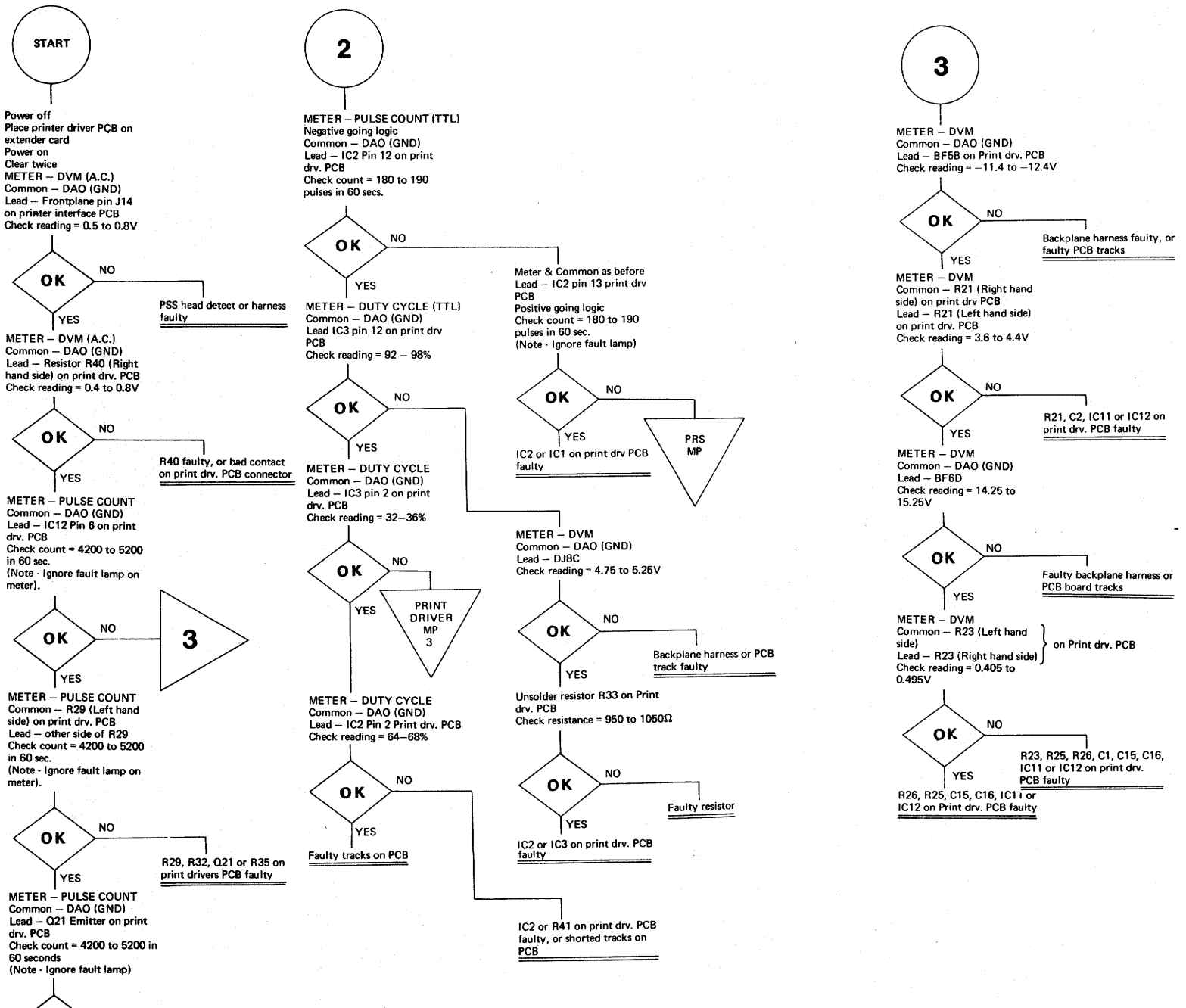

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ENG JBS	DATE
DWG NO. 2801 8695	REV. A
CLASSIFICATION CODE 2-9520	RELEASED DEC 14 1977

START A

Ribbon motor does not run at correct speed

METER—DC volts
Common—Motor Control PCB pad 3
Lead—Motor Control PCB Q1 collector
Make measurements actually on PCB, do not trust connectors.
Power on
Is the voltage between +17·5v and +18·4v?

? NO → METER—DC volts
Common—Motor Control PCB pad 3
Lead—Motor Control PCB Q5 base
Is voltage between +18·2v and +19·0v?

? NO → R9, VR1, VR2, VR3 or Q5 faulty

? YES → Q5 is faulty. Do not repair until it is verified that another fault was not the cause of Q5 failure
Power off
Remove Q5 from PCB
METER—RESISTANCE KΩ
Common—Motor Control PCB pad 3
Lead—Q1 collector
Is resistance greater than 0·5 KΩ?

? NO → C2, Q1, Q2, Q3 or Q4 faulty
Check each individually

? YES → Replace Q5

METER—DC volts
Common—Motor Control PCB pad 3
Lead—Motor Control PCB pad 5
Make measurements actually on PCB, do not trust connectors
Is the voltage between +24v and +26v?

? NO → 5

? YES →

METER—DC volts
Common—Motor Control PCB pad 3
Lead—Motor Control PCB pad 1
Clear twice
Depress NK7
Is voltage greater than +20v?

? NO → 4

? YES →

Is the motor running at all?
(Note: Motor may start and run for about 1 sec. after NK7 is depressed, ignore this)

? NO → 3

? YES →

Is the motor running faster than the correct speed?

? NO → 2

? YES → 1

1

Is it possible to vary the speed by adjusting R1?

? NO → R1, C1, Q3 or Q4 faulty

? YES →

Press clear. Power off
Switch to normal mode. Power on.
Encode a document with at least 11 characters, ensuring that the ribbon cartridge contains less than 10% ribbon. Is the ribbon spacing between the 9th and 10th characters 0·030" ±0·010"?

Is it possible to adjust R7 to get the ribbon spacing between 1st and 2nd characters 0·040" +0·020" −0·000?
(Turn R7 anticlockwise to decrease)

? NO →

? YES → Adjust R7

METER—DC volts
Common—Motor Control PCB pad 3
Lead—Negative terminal capacitor C1 on Motor Control PCB
Does voltage momentarily go more than +3v when pad 1 is connected to pad 5 by a jumper?

? NO → C1 or CR1 faulty

? YES →

2

Is it possible to vary the speed by adjusting R1?

? NO → R1 or Q4 faulty

? YES →

Press clear. Power off
Switch to normal mode. Power on
Encode a document with at least 11 characters, ensuring that the ribbon cartridge contains less than 10% ribbon. Can R1 be adjusted so that the ribbon spacing between the 9th and 10th characters is 0·030" ±0·010"?

? NO → Q4 faulty

? YES → Adjust R1

Power off
Remove one of the motor leads from the tags on the board
Power on. Clear twice. Depress NK7
METER—DC volts
Common—Q1 base
Lead—Q1 collector
Is the voltage greater than +5v?

3

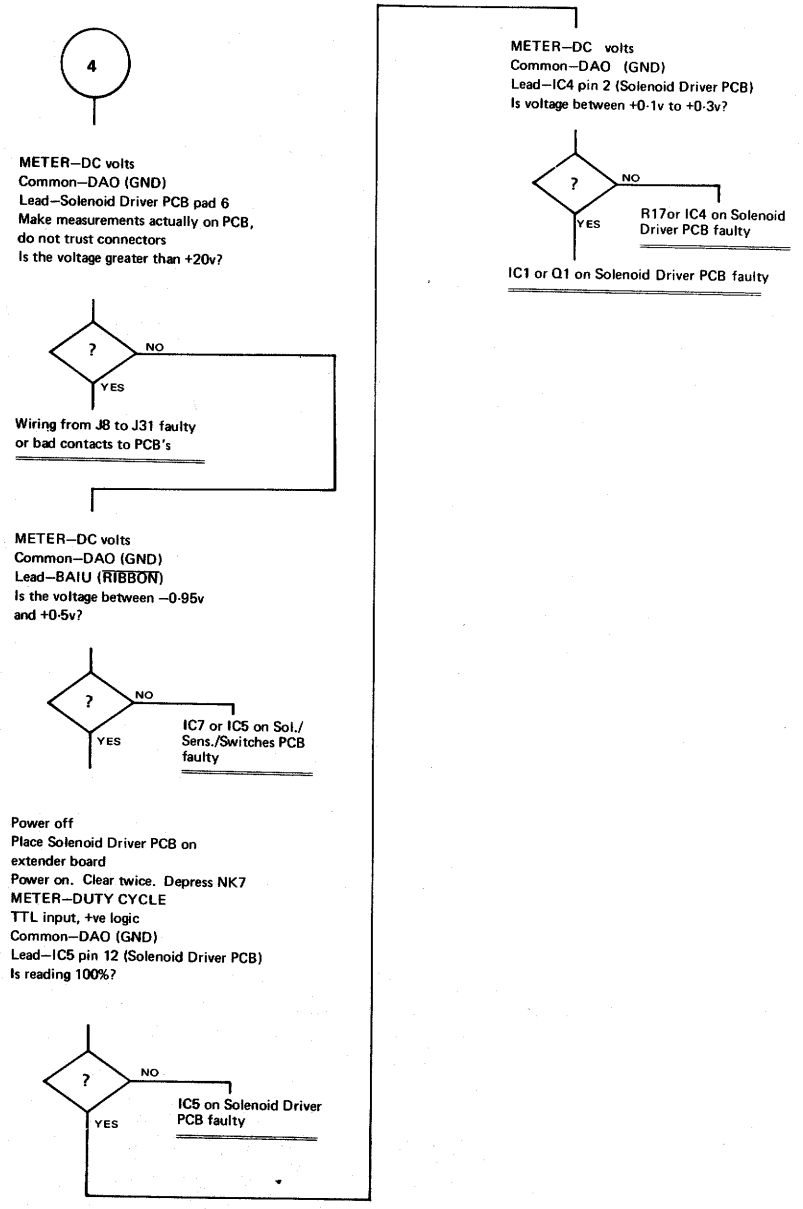
METER—DC volts
Common—Motor Control PCB pad 3
Lead—Q2 collector
Is the voltage between 0v and +0·4v?

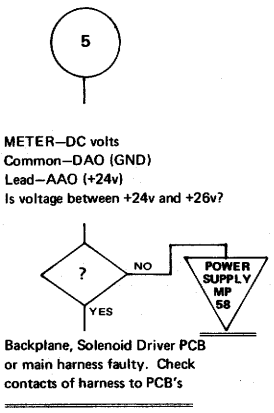
? NO →

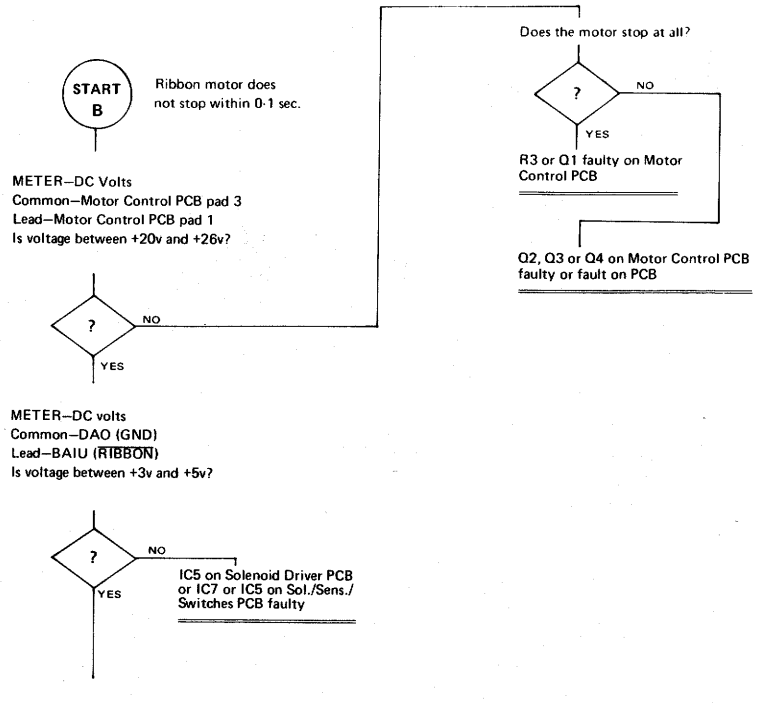
? YES → METER—DC volts
Common—Q1 base
Lead—Q1 collector
Is the voltage greater than +0·5v?

? NO → R1 or Q1 faulty

? YES → Power off
Remove one of the motor leads from the tags on the board
Power on. Clear twice. Depress NK7
METER—DC volts
Common—Q1 base
Lead—Q1 collector
Is the voltage greater than +5v?







Burroughs

BURROUGHS MACHINES LIMITED
CUMBERNAULD, SCOTLAND, U.K.

TITLE

RIBBON DRIVE (Page 2 of 2)

ENG	DATE	DWG NO.	REV.
JBS		2801 8695	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977

Burroughs

BURROUGHS MACHINES LIMITED
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TITLE

RIBBON LAMP (Page 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8703	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977

NOTE: UNLESS OTHERWISE STATED, DUTY CYCLE MEASUREMENTS ARE FOR POSITIVE LOGIC

START A — Lamp fails to light

Power off
Remove lamp L15 from indicator PCB
Check lamp for continuity
Resistance = 20Ω approx.

OK? NO → Lamp faulty
YES

Replace lamp
Power on
Lamp lit ?

OK? NO
YES → Faulty connection between lamp and PCB

NO →

METER – DUTY CYCLE
Common – DAO (GND)
Lead – EC7I
Positive logic
Reading = 45 to 55%

OK? NO
YES

METER – DUTY CYCLE
Common – DAO (GND)
Lead – EC7G
Positive logic
Reading = 0 to 2%

OK? NO
YES

Power off
Lamp driver PCB on extender
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC2 Pin 2 (Lamp drv PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO → IC3, IC1, IC2, IC4 or IC5 on lamp driver PCB faulty
YES

METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC2 Pin 1 (Lamp drv PCB)
Positive logic
Reading = 45 to 55%

OK? NO → IC2 on lamp drv. PCB faulty
YES

Q6, R6, on lamp drv. PCB or harness faulty

NO →

Power off
Reinsert lamp driver PCB
KSI PCB on extender
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC11 Pin 13 (KSI PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO
YES → IC11 on KSI PCB or IC3 on lamp driver PCB faulty

NO → 1

1

Power off
Replace IC11 and IC10 on KSI PCB
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC11 Pin 13 (KSI PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO
YES → Replaced IC10 or IC11 on KSI PCB faulty

NO → KSI LOGIC MP 2

NO →

Power off
Reinsert lamp driver PCB
KSI PCB on extender
METER – DUTY CYCLE
Common – DAO (GND)
Lead – IC12 Pin 13 (KSI PCB)
Positive logic
Power on
Reading = 45 to 55%

OK? NO
YES → IC12 on KSI PCB or IC2 on lamp driver PCB faulty

NO →

Power off
Replace IC12 and IC10 on KSI PCB
Power on
Repeat previous duty cycle measurement
Reading = 45 to 55%

OK? NO → KSI LOGIC MP 3
YES

Replaced IC12 or IC10 on KSI PCB faulty

START B — Lamp fails to extinguish

Power off
Lamp Driver PCB on extender
Power on
Short IC1 Pin 1 to DAO (GND) and remove short
Did lamp extinguish when pin was shorted

? NO → Q6 on lamp driver PCB faulty
YES

METER – DUTY CYCLE (TTL)
Common – DAO (GND)
Lead – IC2 Pin 1
Check reading = 45 to 55%

OK? NO →
YES

Meter and Common as before
Lead – IC2 Pin 2
Check reading = 45 to 55%

OK? NO → IC3, IC2, IC1, IC4 or IC5 on lamp driver PCB faulty
YES

Power off
Reinsert lamp driver PCB
KSI PCB on extender
Power on
Meter and Common as before
Lead – IC2 Pin 2
Check reading = 0 to 0.3%

OK? NO → IC2 on Lamp driver PCB faulty
YES

Meter and Common as before
Lead – EC7G
Check reading = 0 to 0.3%

OK? NO → IC2 on lamp driver PCB faulty
YES

Power off
Reinsert lamp driver PCB
KSI PCB on extender
Power on
Meter and Common as before
Lead – IC12 Pin 13
Check reading = 98 to 100%

OK? NO →
YES

Meter and Common as before
Lead – ED9T
Check reading = 0 to 0.3%

OK? NO → IC12 on KSI PCB or IC2 on lamp driver PCB faulty
YES

Faulty harness

2

Meter and Common as before
Lead – EC7I
Check reading = 45 to 55%

OK? NO
YES → IC3, IC2, IC1, IC4 or IC5 on lamp driver PCB faulty

Power off
Reinsert lamp driver PCB
KSI PCB on extender

3

Power off
Reinsert lamp driver PCB
KSI PCB on extender
Power on
Meter and Common as before
Lead – IC12 Pin 13
Check reading = 45 to 55%

OK? NO →
YES

IC12 KSI PCB or IC2 lamp driver PCB or harness faulty

Burroughs

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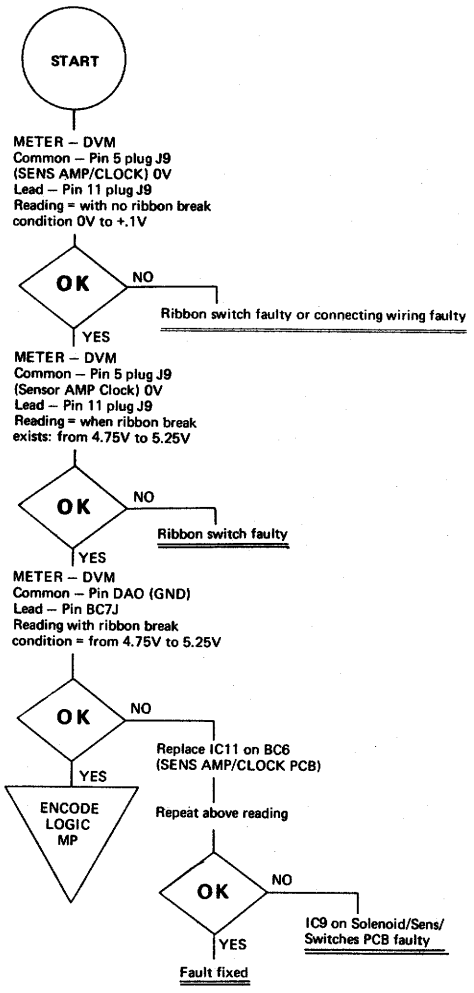
CUMBERNAULD, SCOTLAND, U.K.

TITLE

RIBBON SWITCH (Page 1 of 1)

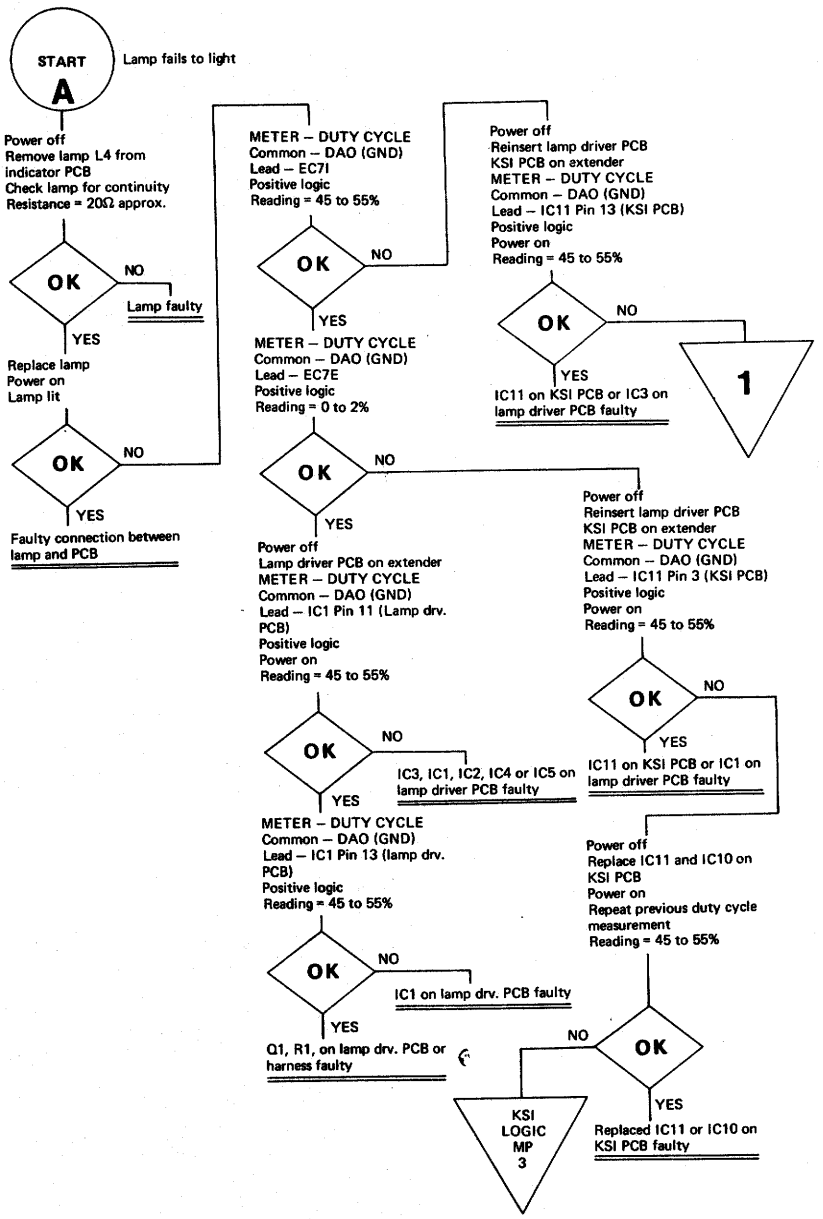
ENG	DATE	DWG NO.	REV.
JBS		2801 8711	A

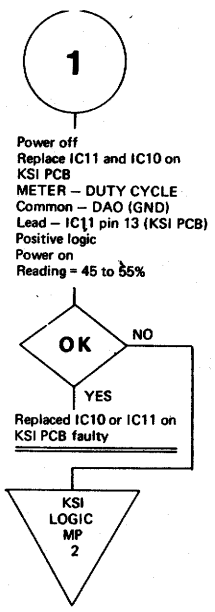
CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977

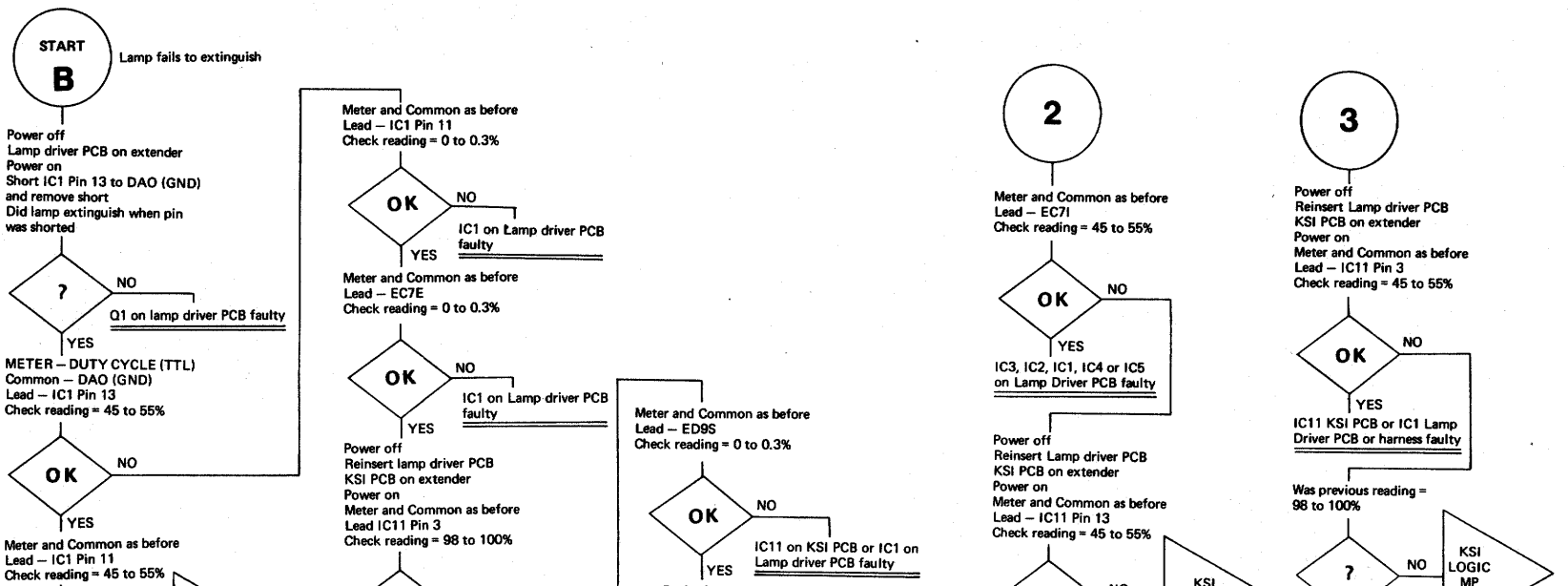


Burroughs	
BURROUGHS MACHINES LIMITED CUMBERNAULD, SCOTLAND, U.K.	
TITLE: **RT. & TRAN. LAMP** (Page 1 of 1)	
ENG: JBS	DATE:
DWG NO.: 2801 8729	REV.: A
CLASSIFICATION CODE: 2-9520	RELEASED: DEC 14 1977

NOTE: UNLESS OTHERWISE STATED, DUTY CYCLE READINGS ARE FOR POSITIVE LOGIC







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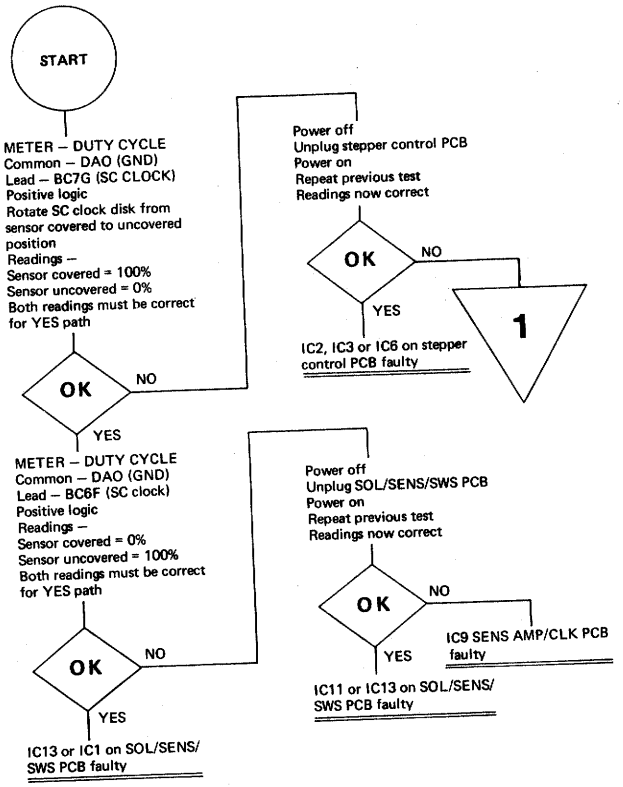
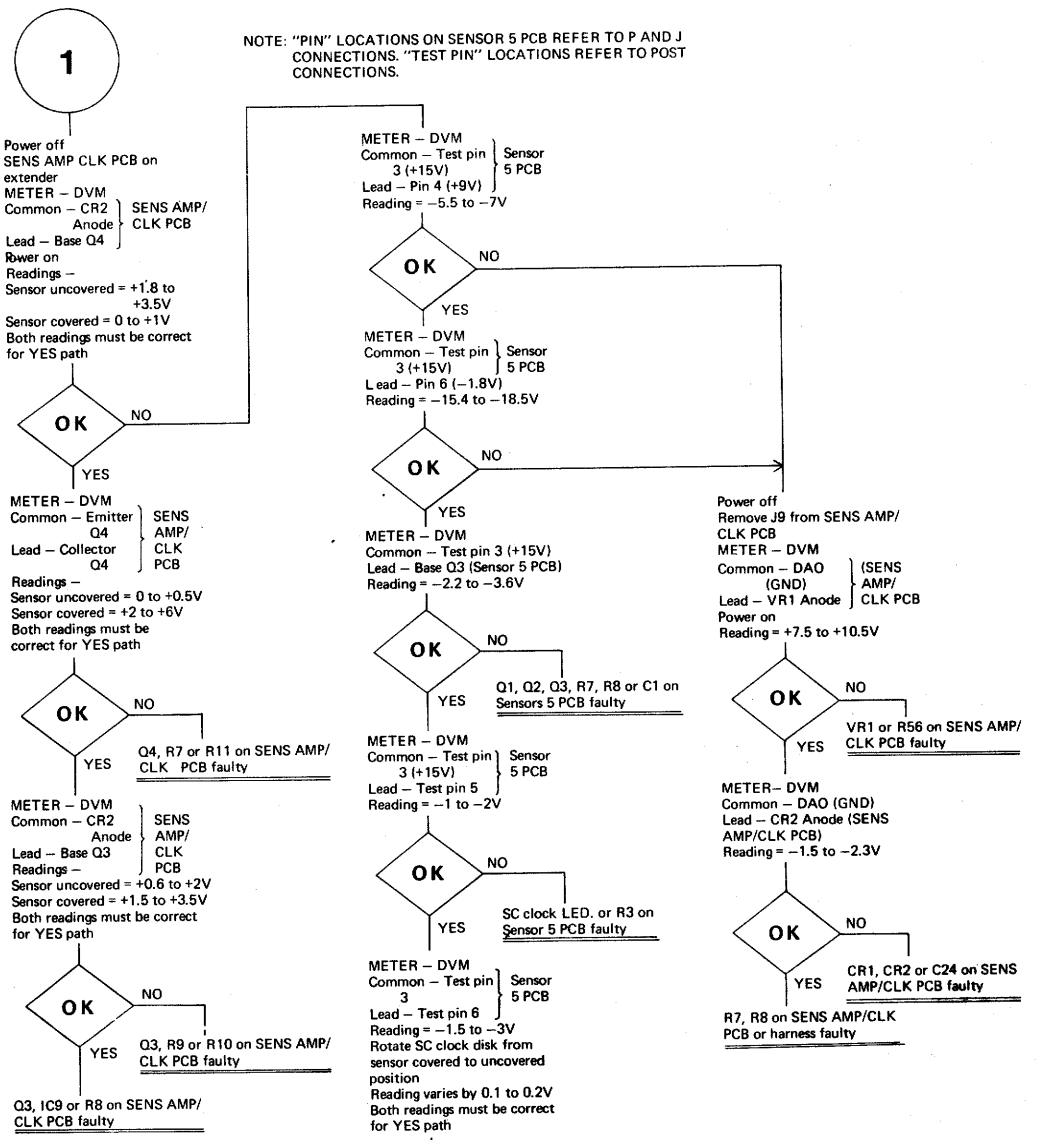
TITLE

SC CLOCK (Page 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8737	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977





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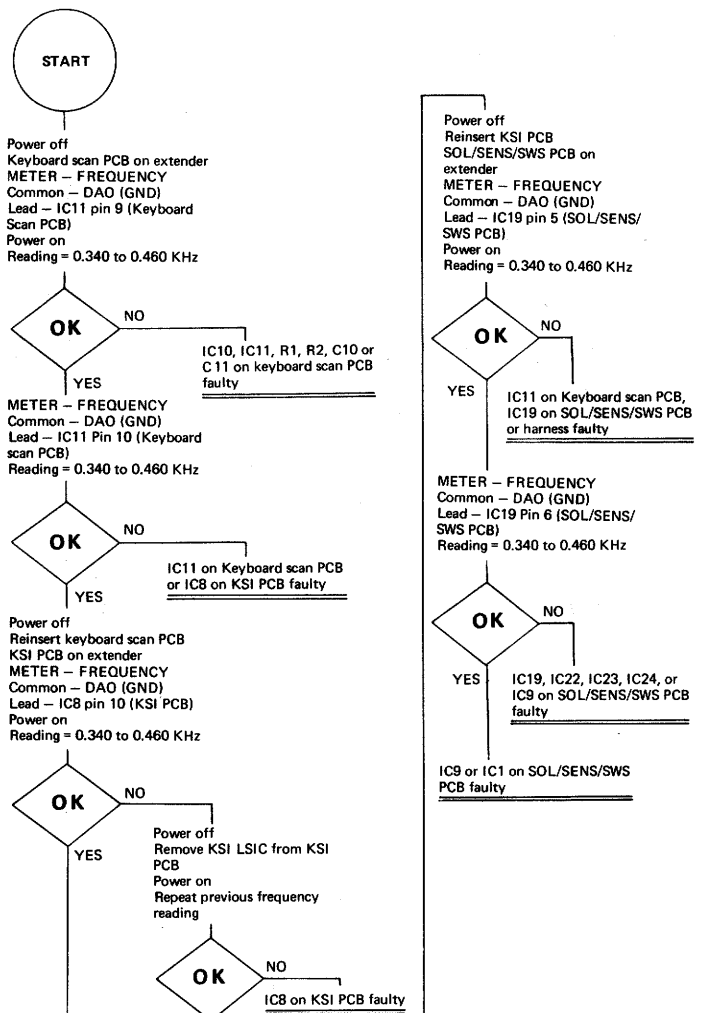
TITLE

SLOW CLOCK (Page 1 of 1)

ENG	DATE	DWG NO.	REV.
JBS		2801 8745	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977



Burroughs	
BURROUGHS MACHINES LIMITED CUMBERNAULD, SCOTLAND, U.K.	
TITLE	**STEPPER MOTOR** (Page 1 of 3)
ENG: JBS	DATE:
DWG NO.: 2801 8752	REV.: A
CLASSIFICATION CODE: 2-9520	RELEASED: DEC 14 1977

START A — Stepper Motor fails to synchronise

Jumper–BAIL to DAO (GND)
Jumper–BAOU to DAO (GND)
Remove this jumper as soon as Detent Solenoid picks
Does Detent Solenoid remain picked?

? — NO → DETENT MP; YES

Remove jumper between
BAIL and DAO
METER–PULSE COUNT (TTL)
Common–DAO
Lead–BAOU
Repeat test which originally led to this MP
Count of at least 1

OK — NO → ENCODE LOGIC MP 9A; YES

METER–AS BEFORE
Lead–BAIL
Repeat original test again
Count of at least 1

OK — NO → ENCODE LOGIC MP 9B; YES → B

START B — Document Misencode

Jumper BAIL to DAO (GND)
Jumper BAOU to DAO (GND)
Remove this jumper as soon as Detent Solenoid picks
Does Detent Solenoid remain picked?

? — NO → DETENT MP; YES

Remove jumper between
BAIL and DAO
METER–PULSE COUNT (TTL)
Common–DAO
Lead BAOU
Encode a document with 123
Count = at least 6

OK — NO → ENCODE LOGIC MP 10A; YES

METER–AS BEFORE
Lead–BAIL
Repeat encode test
Count = at least 6

OK — NO → ENCODE LOGIC MP 10B; YES → B

6

Attach jumper to BA1Q
Momentarily touch jumper to Ground
Are 4 and 5 now facing you

OK — NO → 10; YES

Attach jumper to BA1P
Momentarily touch jumper to ground
are 5 and 6 now facing you

OK — NO → 8; YES

Power off. Using figure 1,
Remove wire on pin 5 (SC clock)
Power on
Clear twice
Depress NK7
METER – REPEAT COUNT
TTL input switch +ve
Common – DAO (GND)
Lead – BA1P (SMC A)
Count = 680 to 730 in 15 seconds

6A

6A

OK — NO → ENCODE LOGIC MP 9C; YES → 7

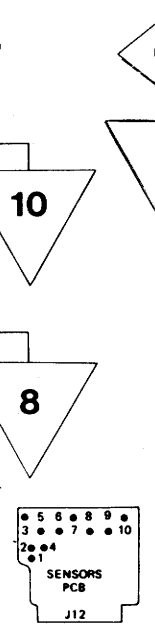


Figure 1

2

Try to move encode wheel
Can you move it

AGREE — NO → 13; YES

METER – DVM
Common – DAO (GND)
Lead – Cathode CR1
Reading = –.5V to +.5V

OK — NO → Remove connector J14 to protect stepper motor → 3; YES

Manually turn encode wheel home (2 and 3 facing you)
Attach jumper to BA1M.
Momentarily touch jumper to ground (DAO)
Are 3 and 4 now facing you

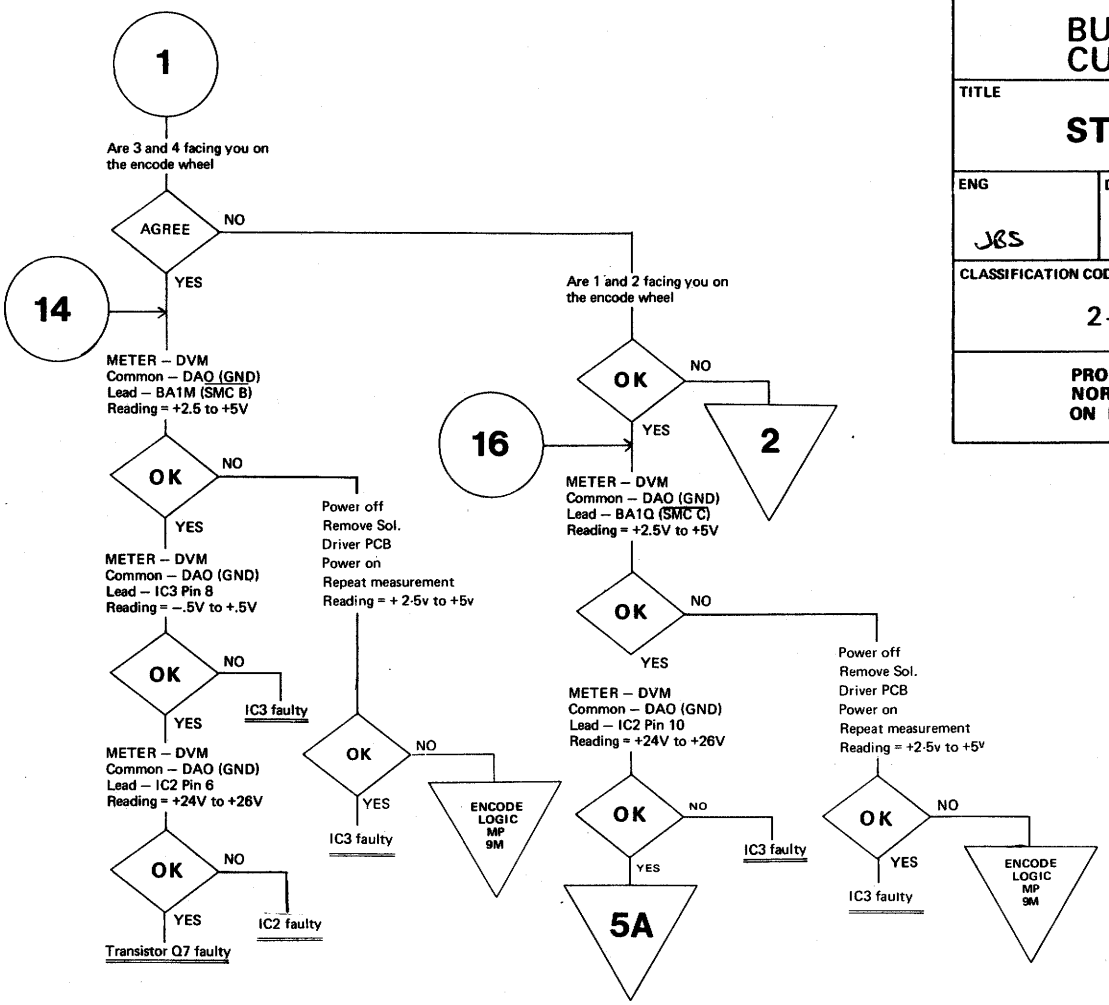
AGREE — NO → 9; YES → 6

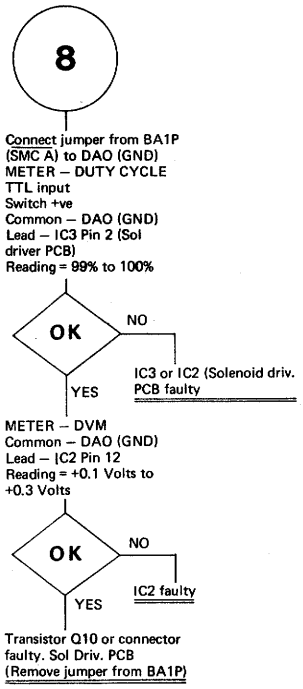
B

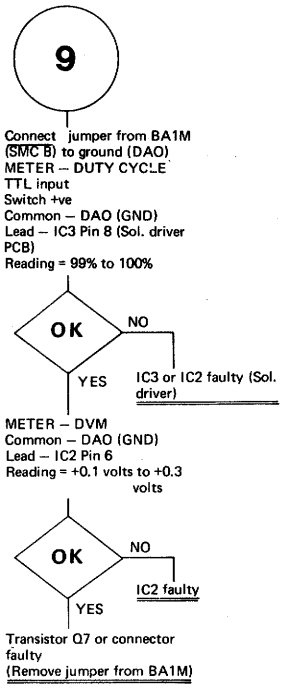
Power off
Remove J8 solenoid driver PCB
METER – RESISTANCE
Common – J8 pin 11
Lead – as per chart
Reading = 20Ω (approx.)

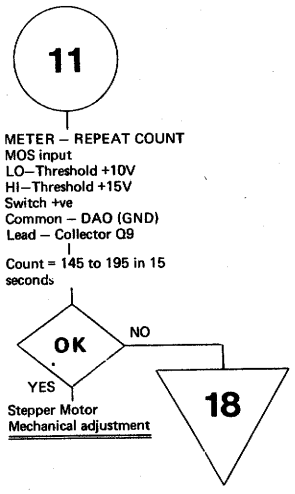
OK — NO

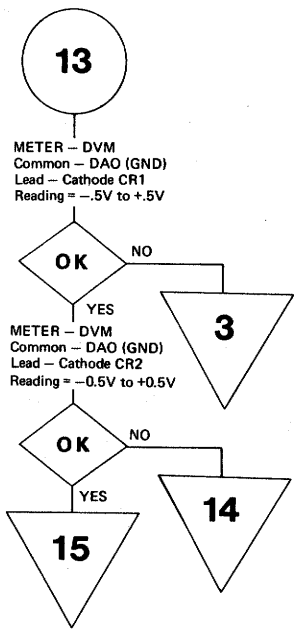
Burroughs	BURROUGHS MACHINES LIMITED CUMBERNAULD, SCOTLAND, U.K.
TITLE	**STEPPER MOTOR** (Page 2 of 3)
ENG: JBS / DATE:	DWG NO.: 2801 8752 / REV.: A
CLASSIFICATION CODE: 2-9520	RELEASED: DEC 14 1977

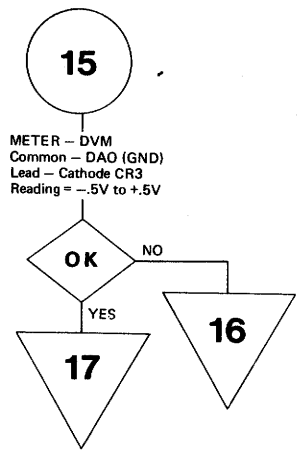


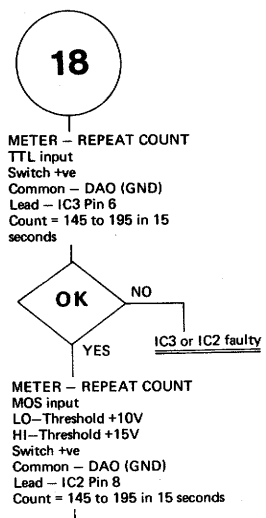












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TITLE: **STEPPER MOTOR** (Page 3 of 3)			
ENG: JBS	DATE:	DWG NO.: 2801 8752	REV.: A
CLASSIFICATION CODE: 2-9520		RELEASED: DEC 14 1977	

Burroughs

BURROUGHS MACHINES LIMITED
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TITLE

SYSTEMS CLOCK (Page 1 of 2)

ENG	DATE	DWG NO.	REV.
JBS		2801 8760	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977

START 1 This is entered when Ø1 frequency is not to specification

Power off
Sensor AMP/CLOCK PCB on extender
Remove all other PCBs
Power on
METER – FREQUENCY
Common – DAO (GND)
Lead – BF5X
Check frequency = 247.5 to 252.5 KHz

OK? NO → Power off, Replace all PCB's, Power on, METER – FREQUENCY, Common – DAO (GND), Lead – IC2 Pin 5 on SENS. AMP PCB, Check frequency = 247.5 to 252.5 KHz

OK? NO → METER – DVM, Common – DAO (GND), Lead – IC3 Pin 13 on SENS. AMP. PCB, Check reading = 4.75 to 5.25V, Repeat test with lead on IC3 Pin 10

BOTH OK? NO → R49 or IC3 on SENS. AMP PCB faulty, or faulty harness or PCB track

BOTH OK? YES → METER – FREQUENCY, Common – DAO (GND), Lead – IC3 Pin 9 on SENS. AMP PCB, Check frequency = 3960 to 4040 KHz

OK? NO → METER – FREQUENCY, Common – DAO (GND), Lead – IC3 Pin 8 on SENS. AMP. PCB, Check frequency = 247.5 to 252.5 KHz

OK? NO → METER – FREQUENCY

OK? YES → IC2 or IC3 faulty

OK? YES → **3A**

3A

Power off
Replace PCB's and plugs one at a time
Power on
Repeat previous test

OK? YES → **3A**

OK? NO → Using Table 1 find the faulty component on replaced PCBs

TABLE 1

PCB	Ø1	Ø2
Endorse Cont.	–	IC9
Panaplex Int.	IC13	IC9
TPU	IC19	IC20
Data Memory	IC9	–
Keyboard Scan	IC11	IC11
Sol/Sens/Sw	IC19	–

2

METER – DVM
Common – DAO (GND)
Lead – IC3 Pins 1 + 3 + 4 + 5 + 6 + 7 + 9 + 10 (in turn) on Sensor AMP clock PCB
All reading = 4.5 to 5.25V

OK? NO → Resistor R60 or IC8 or tracks on PCB faulty

OK? YES → METER – FREQUENCY, Common – DAO (GND), Lead – IC8 Pin 14, Check frequency = 1980 to 2020 KHz or Lead – IC8 Pin 13, Check frequency = 990 to 1010 KHz

BOTH OK? NO → IC8 or IC7 faulty

BOTH OK? YES → METER – FREQUENCY, Common – DAO (GND), Lead – IC8 Pin 12 on Sensor AMP/CLOCK PCB, Check frequency = 495 to 505 KHz

OK? NO → IC4, IC7 or IC8 faulty

OK? YES → METER – FREQUENCY, Common – DAO (GND), Lead – IC8 Pin 11 on Sensor AMP/CLOCK PCB, Check frequency = 247.5 to 252.5 KHz

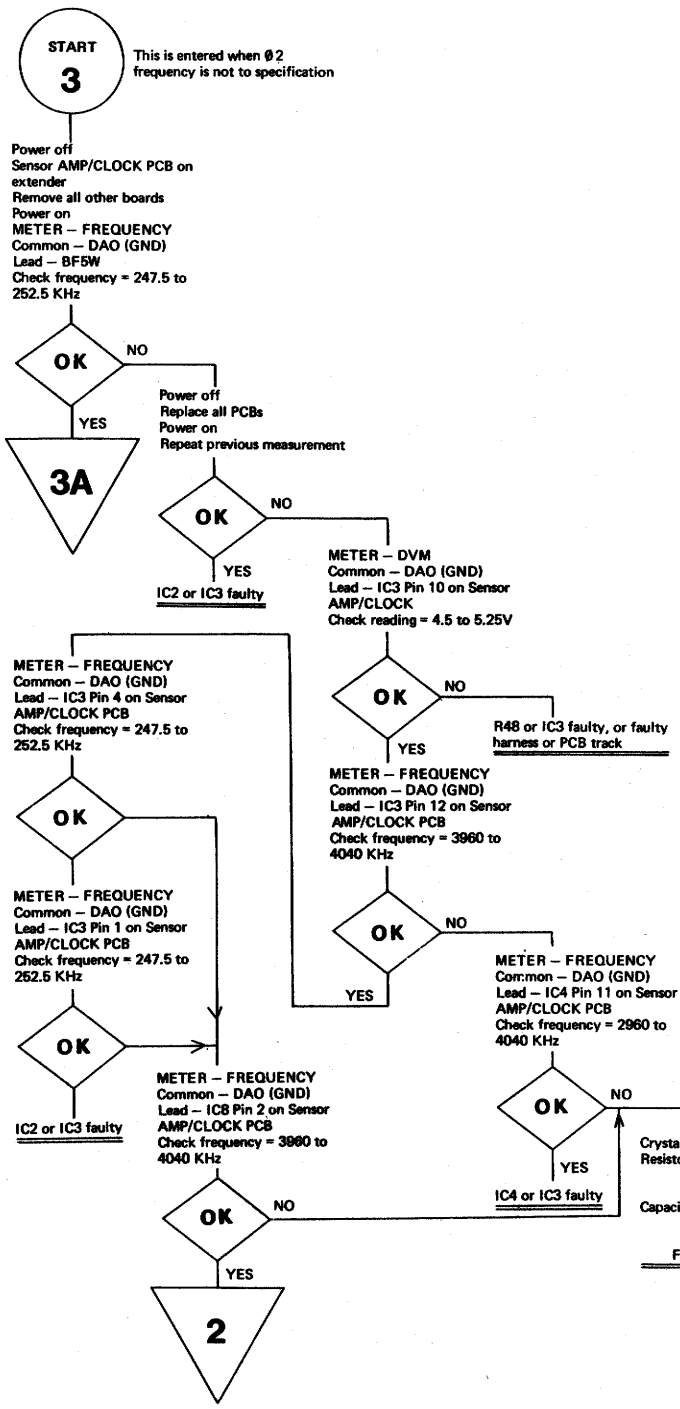
OK? NO → IC3, IC4, IC7 or IC8 faulty

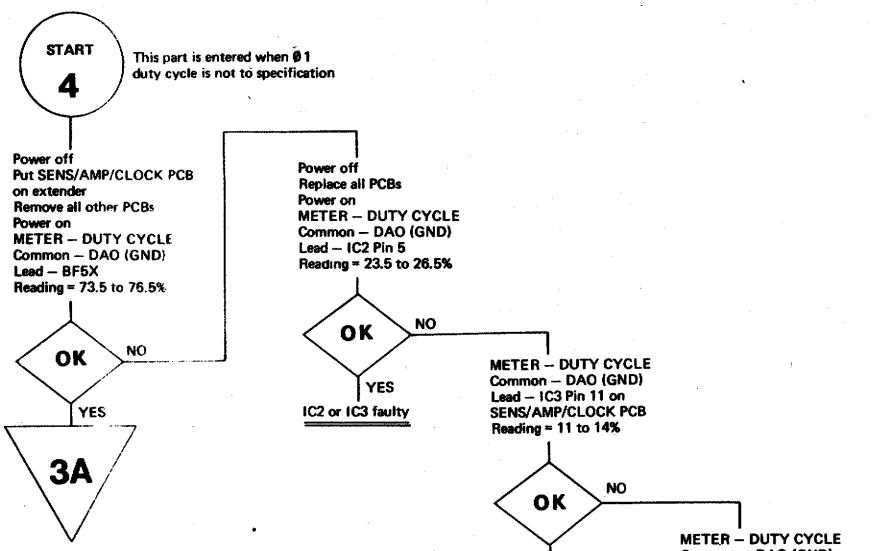
Burroughs
BURROUGHS MACHINES LIMITED CUMBERNAULD, SCOTLAND, U.K.
TITLE **SYSTEMS CLOCK** (Page 2 of 2)

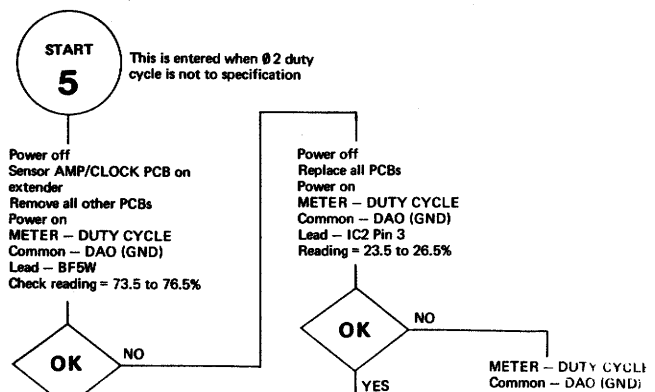
ENG	DATE	DWG NO.	REV.
JRS		2801 8760	A

CLASSIFICATION CODE	RELEASED
2-9520	DEC 14 1977

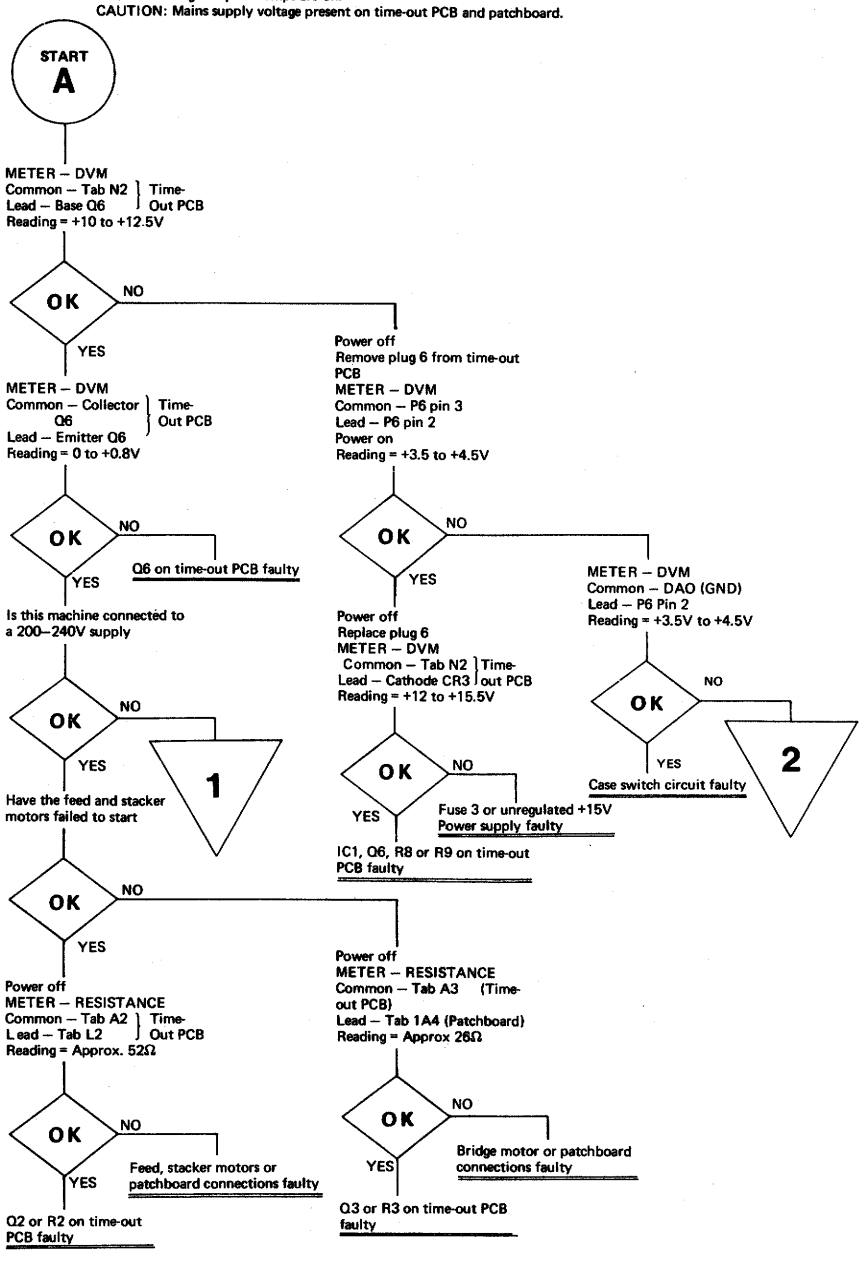
NOTE: DUTY CYCLE READINGS ARE FOR POSITIVE LOGIC

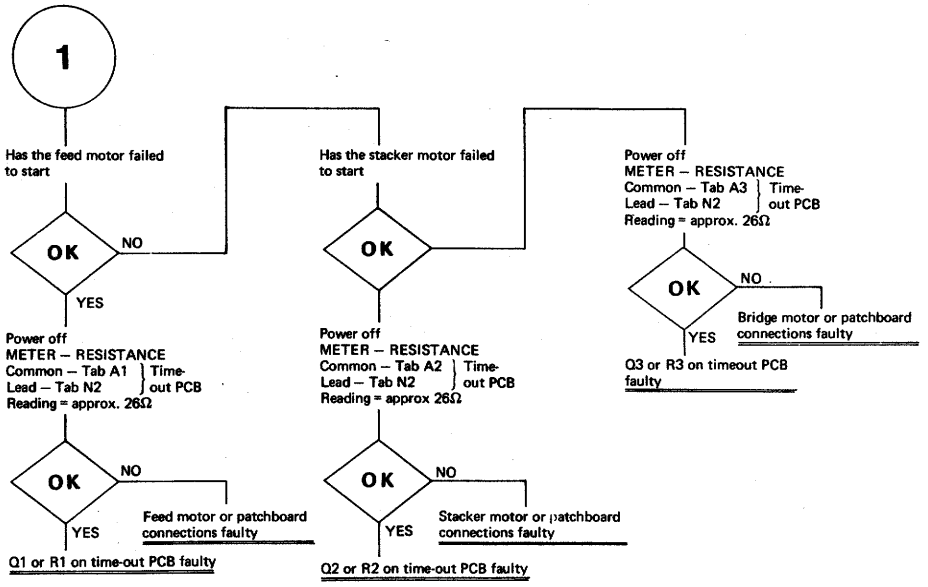






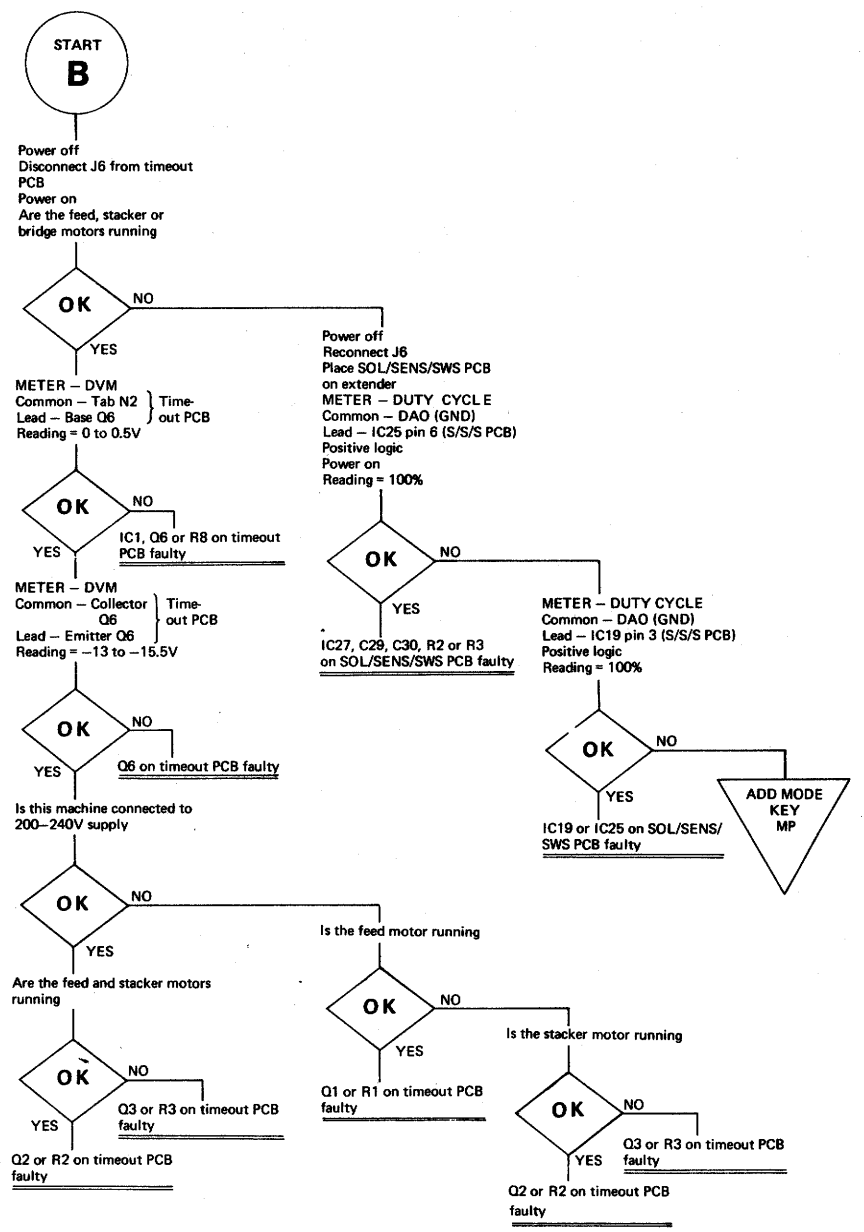
This procedure is entered when transport and/or stacker and/or bridge motors fail to start when add mode is off and indexing in progress and/or indexing complete lamps are on.
CAUTION: Mains supply voltage present on time-out PCB and patchboard.



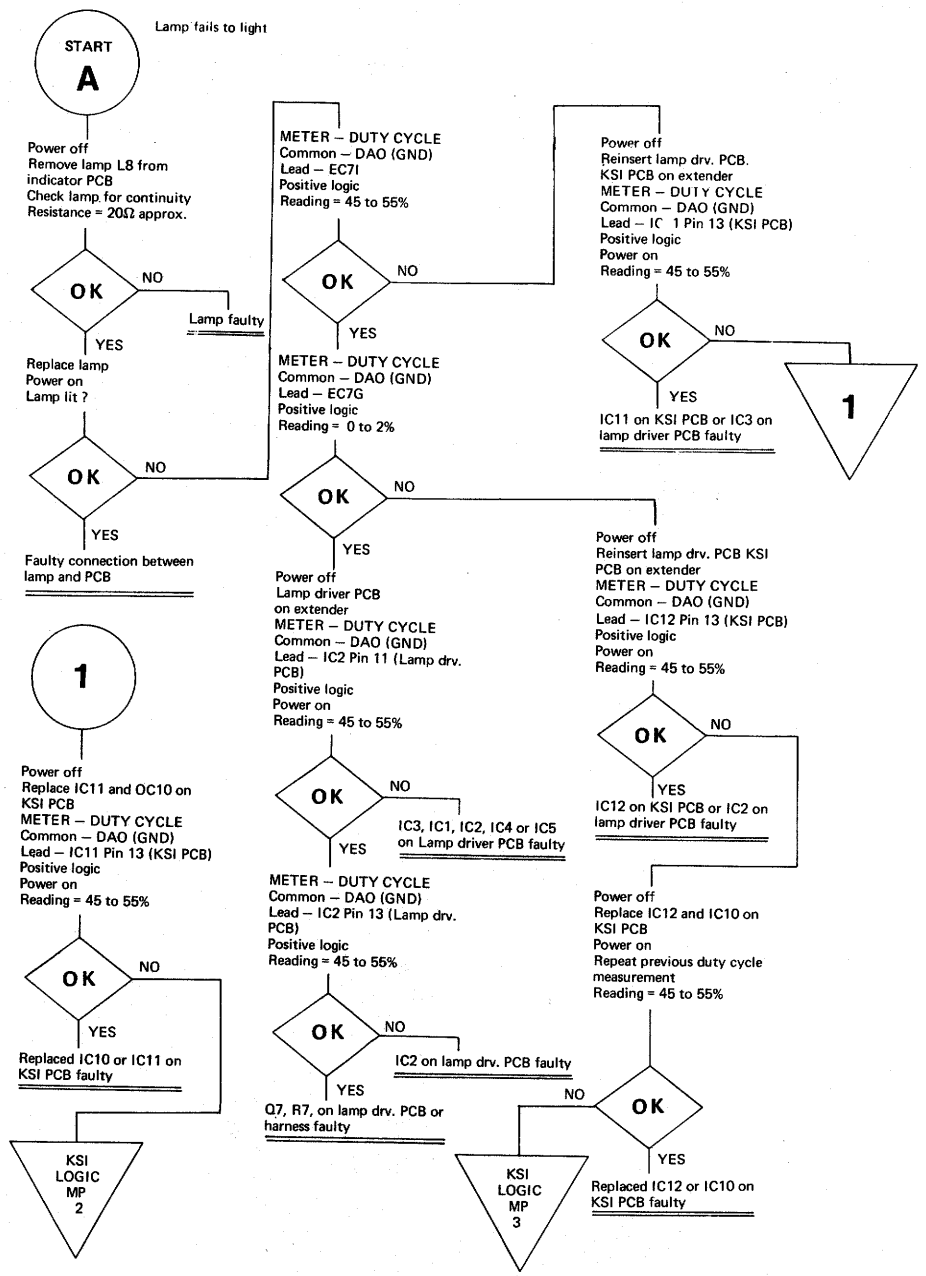


Burroughs
BURROUGHS MACHINES LIMITED CUMBERNAULD, SCOTLAND, U.K.
TITLE: **TIME OUT** (Page 1 of 1)
ENG: JBS / DATE: / DWG NO.: 2801 8778 / REV.: A
CLASSIFICATION CODE: 2-9520 / RELEASED: DEC 14 1977

This procedure is entered when the feed and/or stacker and/or bridge motors fail to time out when the machine is in add mode.
CAUTION: Mains supply voltage present on time out PCB



This procedure is entered when the feed and/or stacker and/or bridge motors fail to time out when both the indexing in progress and indexing complete lamps are extinguished.



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CUMBERNAULD, SCOTLAND, U.K.

TITLE			
TRAN. CODE LAMP (Page 1 of 1)			
ENG: JBS	DATE:	DWG NO.: **2801 8786**	REV.: **A**
CLASSIFICATION CODE: 2-9520		RELEASED: DEC 14 1977	

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TITLE			
VERTICAL DRIVE (Page 1 of 1)			
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CLASSIFICATION CODE: 2-9520		RELEASED: DEC 14 1977