

IDENTIFICATION

PRODUCT CODE: MAINDEC-08,0HKPA-000
PRODUCT NAME: KPSE POWER FAIL/AUTO RESTART TEST
DATE REVISED: APRIL 6, 1973
MAINTAINER: DIAGNOSTIC GROUP
AUTHOR: W. HEAVEY

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MAYNARD, MASS.

1: ABSTRACT

THIS DIAGNOSTIC IS A COMPLETE TEST OF THE PDPS-7 POWER FAIL OPTION WITH THE INTERVENTION OF THE OPERATOR.

2: REQUIREMENTS

PDPS-7
K902 POWER FAIL OPTION

STORAGE

THE MAIN PROGRAM OCCUPIES THE FIRST THREE PAGES IN CORE.
ONE BUFFER WHICH CONTAINS IOT CHAIN STARTING AT LOCATION 1000
TWO ADDITIONAL BUFFERS OF 2000 WORDS EACH

2000 TO 3777 LOWER BUFFER

4000 TO 5777 HIGH BUFFER

3: LOADING PROCEDURE

THE PROCEDURE FOR NORMAL BINARY TAPES SHOULD BE EXERCISED.

4: STARTING PROCEDURE

CONTROL SWITCHES

BITS 0-3 ARE USED FOR TEST SELECTION

0	1	2	3	TEST NUMBER
0	0	0	0	TEST 1
0	0	0	1	TEST 2
0	0	1	0	TEST 3
0	0	1	1	TEST 4

TEST 1

TEST 2

TEST 3

TEST 4

STARTING ADDRESS

THE STARTING ADDRESS FOR ALL TESTS IS LOCATION 200

PROGRAM AND OPERATION ACTION

A. SET SWITCH REGISTER TO 200

B. DEPRESS LOAD ADDRESS

C. SET CONTROL SWITCH TO SELECT DESIRED TEST;
IF A TEST IS NOT SELECTED PROGRAM WILL HALT;
USER MAY THEN SELECT TEST AND PRESS CONTINUE

D. DEPRESS CLEAR AND THEN DEPRESS CONTINUE

E. THE OPERATOR MUST NOW CAUSE POWER TO FAIL, EITHER BY
DIRECTLY TURNING THE POWER KEY OFF AND/OR BY THE USE
OF A POWER INTERRUPTER.

F. WHEN THIS DIAGNOSTIC IS USED ON THE IN HOUSE ACT-8E
SYSTEM, POWER OFF/ON INTERVENTION WILL NOT BE REQUIRED
BY THE OPERATOR SINCE AN IOT HAS BEEN PROVIDED TO
CAUSE POWER TO FAIL.

OPERATING PROCEDURE

A METHOD OF RUNNING THE TESTS IN NUMERICAL ORDER IS SUGGESTED;

IF A TEST IS NOT SELECTED, PROGRAM WILL HALT;
USER MAY THEN SELECT TEST AND PRESS CONTINUE

TEST 1

TEST 1 CONTAINS TWO TESTS OF THE INTERRUPT AND SKIP CAPABILITY
OF THE OPTION WHEN OPERATIVE POWER IS LOST.

A. NON-RESTART TEST

1. TURN POWER KEY OFF
2. SWITCH ON POWER FAIL/AUTO RESTART MODULE
SHOULD BE DOWN.
3. TURN POWER KEY ON.
4. EXAMINE LOCATION 0 FOR A HLT.

B. RESTART TEST

1. TURN POWER KEY OFF.
2. SWITCH ON POWER FAIL/AUTO RESTART MODULE
SHOULD BE UP.
3. TURN POWER KEY ON.
4. MACHINE HALTS AT LOCATION 0

TEST 2

TEST 2 IS A TEST TO EVALUATE THE TIME WHICH THE MACHINE HAS TO STORE ITS ACTIVE REGISTERS. THIS TIME IS DEFINED AS 1 MS 20% TOLERANCE FOR THE POPBE

- A. TURN POWER KEY OFF.
- B. SWITCH ON POWER FAIL/AUTO RESTART MODULE
B SHOULD BE IN RESTART POSITION-(UP).
- C. TURN POWER KEY ON.
- D. TEST 2 HAS PASSED IF PROGRAM HALTS AT LOCATION 464.
WITH THE A.C. 5777.
- E. PRESS CONTINUE AFTER HALT AT LOCATION 464 TO RECYCLE TEST 2;

TEST 3

TEST 3 IS A TEST TO EVALUATE THE ABILITY OF THE MACHINE TO EXECUTE IOT'S DURING A POWER FAILURE WITHOUT DESTROYING CORE;

- A. TURN POWER KEY OFF.
- B. SWITCH ON POWER FAIL/AUTO RESTART MODULE
B SHOULD BE IN RESTART POSITION-(UP).
- C. TURN POWER KEY ON.
- D. THIS TEST WILL RECYCLE AND HLT ON ERROR.

TEST 4

TEST 4 IS A TEST TO STORE THE ACTIVE REGISTERS (PO,AC, LINK AND MQ) WHEN POWER FAILS AND RESTORES THEM WHEN POWER BECOMES OPERATIVE.

- A. TURN POWER KEY OFF.
- B. SWITCH ON POWER FAIL/AUTO RESTART MODULE
B SHOULD BE IN RESTART POSITION-(UP).
- C. TURN POWER KEY ON.
- D. THIS TEST WILL RECYCLE AND HLT ON ERROR.

BACKGROUND TEST

DURING TESTS, A MEMORY POWER ON/OFF TEST IS BEING EXECUTED. THIS TEST COMPARES TWO BUFFERS WHICH SHOULD BE THE COMPLEMENT OF EACH OTHER.

6:

ERRORS

*IF PROGRAM HALTS AT LOCATION 384, THIS INDICATES AN ILLEGAL
SPL INTERRUPT OCCURED.

TEST 1 ERRORS

A: NON-RESTART CONDITION

LOCATION B CONTAINS ALL ONE'S

SHOULD CONTAIN A HALT

REASON; NO INTERRUPT

1: MALFUNCTION OF POWER FAIL/AUTO RESTART
MODULE.

B: RESTART CONDITION

THE ABOVE CONDITIONS FOR NON-RESTART STILL PREVAIL FOR A
RESTART CONDITION.

TEST 2 ERRORS

IF TEST 2 DOES NOT HALT AT LOCATION 464, 0 THE MACHINE
HALTED IN LOCATION B1 INDICATES THE 1 MS DELAY IN THE POWER
FAIL OPTION IS NOT PROPERLY SET. (LESS THAN 1 MS.)

TEST 3 ERRORS

ERROR HALTS WILL OCCUR IN TEST 3 WHEN A LOCATION IN THE 10Y
CHAIN HAS BEEN ALTERED; THE FIRST HALT THE AC CONTAINS THE
LOCATION OF THE ERROR; DEPRESS CONTINUE AND THE SECOND HALT
WILL OCCUR. THE AC NOW CONTAINS THE WORD IN ERROR; DEPRESS
CONTINUE AGAIN AND THE NEXT WORD WILL BE COMPARED.

TEST 4 ERRORS

ERROR HALTS WILL OCCUR WHEN AN INCORRECT MEMORY COMPARISON IS
MADE; THE DATA FROM THE LOWER BUFFER WILL BE DISPLAYED IN THE
AC; DEPRESS CONTINUE AND THE UPPER BUFFER WILL BE DISPLAYED
DEPRESS CONTINUE AGAIN AND THE NEXT COMPARISON WILL TAKE PLACE;

ANOTHER ERROR HALT WILL OCCUR WHEN AN INCORRECT COMPARISON
TAKES PLACE WITH THE HQ. BY DEPRESSING CONTINUE, THE PROGRAM
WILL RECOVER.

7. RESTRICTIONS

8. MISCELLANEOUS

IF COMPARISON ERRORS OCCUR FREQUENTLY IN TEST 3 BETWEEN BUFFERS,
IT IS SUGGESTED THAT THE OPERATOR REFER TO MEMORY POWER
ON/OFF TEST.

9. PROGRAM DESCRIPTION

DUE TO THE FUNCTION OF THE POWER FAIL OPTION, IT BECOMES
NECESSARY FOR THE OPERATOR TO TAKE AN ACTIVE PART IN
DIAGNOSING THE ERROR IN THE PROGRAM. THE PROGRAM HAS A
TWO-FOLD PURPOSE.

FIRST TO TEST THE ABILITY OF THE K90E TO ENABLE THE PROCESSOR
TO STORE ITS ACTIVE REGISTERS DURING POWER DOWN. THEN THE
ABILITY TO RESTART CORRECTLY.

THE SECOND PURPOSE IS TO VERIFY THE FACT THAT MEMORY HAS
UNDISTURBED DURING POWER ON/OFF.

10. LISTING

/POPS-E POWER FAIL/AUTO RESTART TEST
/MAINDEC-00-DHKPA-00
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/INSTRUCTION EQUALITIES

6182	SPL06102	/SKIP ON LOW POWER
7481	HOL07481	/LOAD AC INTO HQ
7581	HQAD7581	/READ HQ INTO AC
6807	CAP06807	/CLEAR ALL FLAGS

0000	0000	INT,	00	/CHECK FLAGS FOR INTERRUPT
0001	0001	JMP,	0002	
0002	0002		0003	
0003	0003			

/CONSTANTS AND REGISTERS

0020	0020	SAV,	0	JMP I ER
0021	1000	K1000,	1000	JMP I CLFL
0022	2000	K2000,	2000	JMP I COU
0023	4000	K4000,	4000	JMP I C
0024	5282	K5282,	5282	JMP I XPF
0025	6000	K6000,	6000	JMP I RES
0026	0000	COUNT1,	0	RESTOR
0027	0000	COUNT2,	0	COUNT
0030	1777	LSUF,	1777	C1,
0031	3777	USUF,	3777	C2,
0032	0000	SAV1,	0	C,
0033	5400	SAV2,	0	STOR1,
0034	5456	SAV3,	0	STOR2,
0035	5442	PNT1A,	0	LINK,
0036	5443	PNT1B,	0	AC,
0037	5463	PNT1C,	0	PC,
0040	5441	PNT2,	0	MO,
0041	0425	RES,	0	HALT,
0042	0447	COU,	0	TIME,
0043	5252	C1,	5252	/TAGS
0044	2525	C2,	2525	CLPL,
0045	0534	C,	CR	
0046	0000	STOR1,	0	
0047	0000	STOR2,	0	
0050	0000	LINK,	0	
0051	0000	AC,	0	
0052	0000	PC,	0	
0053	0000	MO,	0	
0054	7482	HALT,	HLT	
0055	7370	TIME,	7370	
0056	0382	/TAGS		
		CLPL,	CLF	

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0057 0467 TYPEL TYPE
0060 0463 ER, EM
0061 0207 BELL, 0207 START
0062 0200 RESTART, PF
0063 0312 XPF,
0064 0400 K0400, 0400
0065 6771 XIOT, 6771
0066 0400 SET, SETUP
0067 0777 IOBUF, 0777
0070 3000 PONT, DCA INT
0071 5421 PNT10, JMP I K1000
0072 7443 M334, 7443
0073 1074 PNT2AL, TAD PNT2A
0074 5475 PNT2A, JMP I IIOYL
0075 0501 TIOIL, TIOI
0076 0000 TSY4, 0
0077 7200 ACL, CLA

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0200 4466 JMS I SET
0201 7240 CLA CHA
0202 3000 DCA INT
0203 1094 TAD HALT
0204 3304 DCA PNT1
0205 7300 CLA CLL
0206 3027 DCA COUNT2
0207 3076 DCA TST4
0210 1034 TAD SAV3
0211 3001 DCA INT+1
0212 6002 IOF,
0213 7004 LAS
0214 3000 DCA SAV
0215 1020 AND K0400
0216 0004 SAV
0217 7640 TAD SAV
0220 5326 SEA CLA
0221 1020 JMP TEST1
0222 0021 TAD SAV
0223 7640 AND K1000
0224 5333 SEA CLA
0225 1020 JMP TEST2
0226 0022 TAD SAV
0227 7640 AND K2000
0230 5340 SEA CLA
0231 1020 JMP TEST3
0232 0023 TAD SAV
0233 7640 AND K4000
0234 5237 SEA CLA
0235 7402 JMP TEST4
0236 5200 HLT
0237 1037 JMP PNT1C
0240 3304 DCA PNT1
0241 7200 CLA

*200
START,
TEST1,

```

/SETUP FOR MEMORY

/TRAP FOR ILLEGAL SPL IOT
/STORE INTO INTERRUPT ROUTINE

/SETUP TEST 1

/SETUP TEST 2

/SETUP TEST 3

/SETUP TEST 4
/A TEST WAS NOT SELECTED
/SELECT TEST AND HIT CONTINUE

0242	1024	TAD K5252	
0243	7040	CHA	
0244	3024	DCA K5252	
0245	1024	TAD K5252	
0246	7421	HQL	/LOAD EAE
0247	6001	ION	
0250	1025	TAD K6000	/2000 LOC
0251	3026	DCA COUNT1	
0252	1030	TAD LBUF	/LOWER LIMIT
0253	3010	DCA 10	/AUTO INDEX
0254	1031	TAD UBUF	/UPPER LIMIT
0255	3011	DCA 11	/AUTO INDEX
0256	1410	TAD I 10	
0257	3046	DCA STOR1	
0260	1411	TAD I 11	
0261	3047	DCA STOR2	
0262	1446	TAD I STOR1	/LOWER ADDRESS
0263	1447	TAD I STOR2	/UPPER ADDRESS
0264	7040	CHA	
0265	7440	SEA	
0266	5272	JMP I+4	/ERROR
0267	2026	ISE COUNT1	
0270	5256	JMP PT1	
0271	5777	JMP PHRIOT	/ISSUE IN HOUSE 107
0272	7200	CLA I STOR1	
0273	1446	HLI	
0274	7402	CLA I STOR2	
0275	7200	HLI	
0276	1447	TAD I STOR2	
0277	7402	HLI	
0300	7200	CLA	
0301	5267	JMP PT2	

/POWER FAIL ROUTINE TO SERVICE
/SPL AND GO INTO ONE OF THE FOUR TEST
/SERVICE ROUTINES WHILE POWER IS GOING DOWN.

0302	6102	CLF	SPL	/SKIP ON POWER LOW
0303	7410		SKP	
0304	7402	PNT1	HLT	/HLT SHOULD GET MODIFIED BY TEST SERVICE ROUTINES
0305	6032		KCC	/CLEAR KEYBOARD FLAG
0306	6042		TCF	/CLEAR TELEPRINTER FLAG
0307	6001		ION	
0310	7300		CLA CLL	
0311	5200		JMP START	

/TEST 4 SERVICE ROUTINE1 AFTER SPL INTERRUPT
/STORE ACTIVE REGISTERS AS POWER FAILS.

0312	3051	PF	DCA AC	/STORE AC
0313	7010		RAR	
0314	3000		DCA LINK	/STORE LINK

0315	1000	TAD INT	
0316	3002	DCA PC	/STORE PC
0317	7001	HQA HQ	/LOAD AC WITH HQ
0320	3003	DCA HQ	
0321	1040	TAD PNT2	/JMP RSTORE
0322	3000	DCA INT	
0323	7000	CLA	
0324	7040	CHA	/SET AC EQUAL TO MINUS ONE
0325	7402	HLT	

0326	6001	/SETUP FOR TEST 1	
0327	7300	/CHECK FOR INTERRUPT AND SKIP CAPABILITY	
0330	1036	TEST1,	
0331	3304	ION	CLA CLL
0332	5200	TAD PNT1B	TAD PNT1B
		DCA PNT1	DCA PNT1
		JMP PT	JMP PT

0333	6001	/SETUP FOR TEST 2	
0334	7300	/ROUTINE TO DETERMINE THE LENGTH OF TIME BEFORE POWER IS INOPERATIVE.	
0335	1039	TEST2,	
0336	3304	ION	CLA CLL
0337	5200	TAD PNT1A	TAD PNT1A
		DCA PNT1	DCA PNT1
		JMP PT	JMP PT

0340	6001	/SET UP FOR TEST 3	
0341	1072	/LOT CHAIN	
0342	3026	TEST3,	
0343	1067	ION	TAD M334
0344	3010	DCA COUNT1	DCA COUNT1
0345	1077	TAD IOBUF	TAD IOBUF
0346	3410	DCA 10	DCA 10
0347	1073	TAD ACLA	TAD ACLA
0350	3410	DCA I 10	DCA I 10
0351	1070	TAD PNT2AL	TAD PNT2AL
0352	3410	DCA I 10	DCA I 10
0353	1065	TAD PONT	TAD PONT
0354	3410	DCA I 10	DCA I 10
0355	2026	TAD X10T	TAD X10T
0356	5303	DCA I 10	DCA I 10
0357	1094	ISE COUNT1	ISE COUNT1
0360	3410	JMP 103	JMP 103
0361	1071	TAD HALT	TAD HALT
0362	3304	DCA I 10	DCA I 10
0363	5200	TAD PNT1D	TAD PNT1D
0377	0540	DCA PNT1	DCA PNT1
	0400	JMP PT	JMP PT

0400	0000	*400 FOR MEMORY TEST	
0401	7300	/SETUP,	
0402	1025	0	0
0403	3026	CLA CLL	CLA CLL
		TAD K6000	TAD K6000
		DCA COUNT1	DCA COUNT1
			/2000 LOC

/LOWER BUFFER
/PATTERN 1

/2000 LOC
/HIGHER BUFFER
/PATTERN 2

/CONTINUE

/ROUTINE TO RESTORE ACTIVE
/REGISTERS
/CLEAR ALL FLAGS
/RESTORE LINK

/INCORRECT MO

/RESTORE MO
/LOAD MO FROM AC
/RESTORE PC
/RESTORE AC

/TEST 2 SERVICE ROUTINE
/ROTATE TO DETERMINE LENGTH
/OF OPERATIVE POWER

/STORE PC

/ONE MILLISECOND

/STORE JMP MESSAGE

TAD LBUF
DCA 10
TAD C1
DCA I 10
ISE COUNT1
JMP 103
CLA CLL
TAD K6000
DCA COUNT1
TAD UBUF
DCA 10
TAD C2
DCA I 10
ISE COUNT1
JMP 103
CLA CLL
JMP I SETUP

RESTOR, CAP TAD LINK
RAL
CLA
TAD HQ
CIA
TAD K5252
SEA
HLT
CLA
TAD HQ
HQL
TAD PC
DCA INT
TAD AC
ISE TST4
ION
JMP I INT

COUNT, CLA CLL
TAD PC
DCA PC
TAD HALT
DCA INT
TAD TIME
DCA SAV1
ISE SAV1
JMP 103
DCA INT

0404 1030
0405 3010
0406 1043
0407 3410
0410 2026
0411 5206
0412 7300
0413 1025
0414 3026
0415 1031
0416 3010
0417 1044
0420 3410
0421 2026
0422 5217
0423 7300
0424 5600

0425 6007
0426 1050
0427 7004
0430 7200
0431 1053
0432 7041
0433 1024
0434 7440
0435 7402
0436 7200
0437 1053
0440 7421
0441 1032
0442 3000
0443 1031
0444 2076
0445 6001
0446 5400

0447 7300
0450 1052
0451 3052
0452 1054
0453 3000
0454 1055
0455 3032
0456 2032
0457 5256
0460 1033
0461 3000

0462 7402

HLI

/RETURN HERE AND HLT IF TEST2 HAS PASSED ONE MILLISECOND DELAY
/HLT CONTINUE TO RESTART TESTS
EM,
CLA CMA
HLT
CLA CLL
JMP I RESTART

0463 7240
0464 7402
0465 7300
0466 5462

/RETURN HLT TO INDICATE TEST 2 HAS PASSED

/HLT CONTINUE TO RESTART

/
/ERROR REPORT PRINT OUT
/ROUTINE

/CLEAR TELEPRINTER FLAG

/YES
/LOAD WORD

TYPE, 0
CLA
TAD I 13
SNA
JMP I TYPE
TIS
TSF
JMP I=1
TCP
JMP TYPE+1

0467 0000
0470 7200
0471 1413
0472 7450
0473 5667
0474 6046
0475 6041
0476 5275
0477 6042
0500 5270

/ROUTINE TO CHECK IOT CHAIN
/APIER POWER FAILURE

T101,
CLA CLL
TAD I0BUF
IAG
IAG
DCA I0
TAD M334
DCA COUNT1
CLA
TAD I 10
DCA AC
TAD AC
CIA
TAD XIOT
SZA CLA
JMP I=4
ISE COUNT1
JMP T101
JMP I RESTART
CLA CMA
TAD I0
HLT
CLA
TAD AC

0501 7300
0502 1067
0503 7001
0504 7001
0505 7001
0506 3010
0507 1072
0510 3026
0511 7200
0512 1410
0513 3051
0514 1051
0515 7041
0516 1065
0517 7640
0520 5324
0521 2026
0522 5311
0523 5402
0524 7240
0525 1010
0526 7402
0527 7200
0530 1051/ADDRESS OF IOT CHAIN
/I=1/I=1
/STORE ADDRESS
/I OF IOTS
/STORE WORD

/FETCH IOT

/ERROR

/EXIT

/FETCH ADDRESS OF ERROR
/DISPLAY IN AC
/DISPLAY WORD

0531	7402	HLT	
0532	7200	CLA	
0533	5321	JMP	T10T2
		/TEST & SERVICE ROUTINE	
		CR,	
0534	7300	CLA	CLL
0535	1054	TAD	HALT
0536	3000	DCA	INT
0537	7402	HLT	
		/ZETCH HALT	
		/IN HOUSE POWER ON/OFF IOY	
0540	7300	PRIOT,	CLA CLL
0541	1076	TAD	TST4
0542	7440	SZA	I RESTART
0543	5402	JMP	I RESTART
0544	7200	CLA	COUNT2
0545	1027	TAD	COUNT2
0546	7450	SNA	
0547	7000	NOP	
0550	2027	ISE	COUNT2
0551	5353	JMP	RESET
0552	5462	JMP	I RESTART
0553	4200	JMP	SETUP
0554	5777	JMP	PT
		RESET,	
		S	
0577	0250		

0000	11110000	00000000	11111111	00000000	11111111	00000000	11111111	00000000	11111111
0100	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
0200	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0300	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0400	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0500	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111

0600
0700

1000
1100
1200
1300
1400
1500
1600
1700

2000
2100
2200
2300
2400
2500
2600
2700

3000
3100
3200
3300
3400
3500
3600
3700

4000
4100

4200
4300

4400
4500

4600
4700

5000
5100

5200
5300

5400
5500

5600
5700

6000
6100

6200
6300

6400
6500

6600
6700

7000
7100

7200
7300

7400
7500

7600
7700

AC	0051	SAV1	0032
ACLA	0077	SAV2	0033
BELL	0061	SAV3	0034
C	0045	SET	0066
C1	0043	SETUP	0400
C2	0044	SPL	6102
CAF	6007	START	0200
CLF	0302	STOR1	0046
CLFL	0056	STOR2	0047
COU	0042	TEST1	0326
COUNT	0447	TEST2	0333
COUNT1	0026	TEST3	0340
COUNT2	0027	TEST4	0237
CR	0534	TIME	0055
EM	0443	TIOT	0501
EM1	0464	TIOT1	0511
ER	0060	TIOT2	0521
HALT	0054	TIOTL	0075
INT	0000	TST4	0076
IOBUF	0067	TYPE	0467
K0400	0064	TYPEL	0057
K1000	0021	UBUF	0031
K2000	0022	XIOT	0065
K4000	0023	XPF	0063
K5252	0024		
K6000	0025		
LBUF	0030		
LINK	0050		
M334	0072		
MQ	0053		
MQA	7501		
MQL	7421		
PC	0052		
PF	0312		
PNT1	0304		
PNT1A	0035		
PNT1B	0036		
PNT1C	0037		
PNT1D	0071		
PNT2	0040		
PNT2A	0074		
PNT2AL	0073		
PONT	0070		
PT	0250		
PT1	0256		
PT2	0267		
PWRIOT	0540		
RES	0041		
RESET	0553		
RESTAR	0062		
RESTOR	0425		
SAV	0020		

/PDP8-E POWER FAIL/AUTO RESTART TEST PAL10 V142 6-APR-73 16141 PAGE 1-10

ERRORS DETECTED: 0

LINKS GENERATED: 2

RUN-TIME: 3 SECONDS

2K CORE USED