IDENTIFICATION

PRODUCT CODE: AC-F642A-MC

PRODUCT NAME: CKKFBA0 11/44 CNS ROM DIAG

DATE CREATED: APRIL 1979

MAINTAINER: DIAGNOSTIC ENGINEERING

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OVERVIEW: THE MFM CONSOLE LOGIC CAN BE TESTED BY USINC
THE FOLLOWING METHODS:

1. 'T' CONSOLE SELF TEST COMMAND
2. 'T/E' CONSOLE EXTENSIVE TESTING
3. SLU-LTC MACRO DIAGNOSTIC

THESE THREE METHODS RESULT IN THE FOLLOWING
LOGIC COVERAGE OF THE MFM MODULE:

METHOD	% COVERAGE
SLU DIAGNOSTIC	50% UARTS,LINE TIME CLOCK
'T' SELF TEST	25%
'T/E' MANUAL TEST	25%

CONSOLE SELF TEST- 'T'

THE MULTI-FUNCTION MODULE SELF TEST IS DESIGNED TO
TEST THE HARDWARE ASSOCIATED WITH THE 8085
USED TO IMPLIMENT THE CONSOLE FUNCTIONS ON THE 11/44.
THE SELF TEST IS RUN FROM THE CONSOLE BY TYPING A
T COMMAND. THE T (TEST) COMMAND IS A TEST
OF THE 8085 ROM AND RAM. THIS COMMAND DOES NOT
INTERFERE WITH THE STATE OF THE CPU OR OF MEMORY.
'T' UTILIZES PROGRESS AND ERROR REPORTING. PROGRESS IS
REPORTED AT COMPLETION OF EACH TEST BY OUTPUTTING
''CONSOLE'' TO THE CONSOLE TERMINAL FOR T.
UPON ERROR AN ERROR CODE WILL BE TYPED TO THE CONSOLE
(SEE MIDRANGE SYSTEMS CONSOLE LANGUAGE SPEC.). IN THE
SITUATION WHERE THE ERROR MESSAGE
IS INHIBITED, NOTING THE PROGRESS REPORT WILL INDICATE
WHAT TESTS HAVE BEEN COMPLETED (SEE SECT. 4.0)
IN ADDITION, A LIGHT ON THE MFM MODULE WILL BE TURNED ON
AT THE BEGINNING OF 'T' AND EXTINGUISHED AT THE SUCCESSFUL
COMPLETION OF 'T'.

THE FAILING TEST WILL BE LOOPED ON UNCONDITIONALLY,
EXIT FROM LOOP IS BY CONTROL C (^C).

2.0 PROGRAMMING CONVENTIONS

2.1 IMPLIMENTATION LANGUAGE

THE MFM SELFTEST IS WRITTEN IN THE INTEL 8085
ASSEMBLY LANGUAGE.

3. DESIGN DESCRIPTION

THE MFM SELF TEST IS EXECUTED FROM THE CONSOLE USING THE T COMMAND. THE T OR TEST COMMAND CHECKS BOTH THE 8085 ROM AND RAM MEMORY. THE TEST SEQUENCE IS:

A. ROM CHECKSUM TEST
B. RAM DATA TEST
C. RAM ADDRESS TEST

THE ROM TESTS CHECKS THE CONTENTS OF EACH MFM ROM INDIVIDUALLY TO ISOLATE ANY PROBLEMS TO THE FAILING ROM AND ITS ASSOCIATED HARDWARE. THE RAM TEST FIRST CHECKS EACH LOCATION BY WRITING AND READING A ONE-ZERO PATTERN THEN IT CHECKS THE ADDRESS LINE USING A GALLOPING PATTERN. THE TEST COMMAND CAN BE EXECUTED ANY TIME FROM CONSOLE MODE WITHOUT INTERFERING WITH THE OPERATION OF THE 11/44 CPU. THE TEST COMMAND IS EXECUTED:

1. WHENEVER A CPU HALT IS INCURRED IN ALL CASES OTHER THAN A 'HALT COMMAND' ISSUED FROM THE CONSOLE
2. UPON FIRST ENTERING THE CONSOLE FROM A ^P COMMAND. (NOTE: ONCE IN CONSOLE, SUBSEQUENT ^P COMMANDS WILL NOT ACTIVATE T)

THE FOLLOWING IS AN EXAMPLE OF SELF TEST SYNTAX:

```
T<CR>
```

AND WHEN SELF TEST IS RUN IT LOOKS LIKE THIS:

```
>>>T<CR>
CONSOLE
>>>
```

AN ERROR WOULD RESULT IN:

```
>>>T<CR>
CON
?81
^C
>>>
```

THE CONTROL C EXITS THE ERROR LOOP.

4.0 MEANING OF PROGRESS REPORTING

THE PROGRESS REPORTS ARE AS FOLLOWS WITH EACH LETTER INDICATING THE START OF THE GIVEN TEST

"C" - 0 TO 2K CHECKSUM TEST
"D" - 2 TO 4K CHECKSUM TEST
"N" - PRINTED AT THE SAME TIME AS S AND O BELOW
"S" - PRINTED AT THE SAME TIME AS O BELOW
"O" - CONSOLE RAM DATA TEST

'2' - PRINTED AT THE SAME TIME AS E BELOW
'E' - TESTING DONE

SEQ 0004

MFM CONSOLE TESTING OF T/E (TEST EXTENSIVE)

T/E WILL TEST THE FOLLOWING LOGIC ON THE MFM.

A. CONSOLE'S ABILITY TO HALT AND CONTINUE
B. CONSOLE PAX DATA LINES
C. CONSOLE PAX ADDR. LINES
D. CONSOLE SWITCH REGISTER

THE "T" CONSOLE TEST IS ALSO EXECUTED ALONG WITH T/E.

ASSUMPTIONS: 'T' CONSOLE SELF TEST RUNS SUCCESSFULLY

MEANING OF PROGRESS REPORTING

THE PROGRESS REPORTS ARE AS FOLLOWS WITH EACH LETTER INDICATING THE START OF THE GIVEN TEST

"-" - HALT CONTINUE TEST
"T" - DATA BUS TEST
"%" - PAX ADDRESS TEST
"%" - SWITCH REGISTER TEST
"T" - TEST COMPLETE

NOTE: AN ADDITIONAL PROGRESS REPORT OF "B" IS ADDED IF T/E IS BEING RUN AS T/A IN THE APT ENVIRONMENT. THIS ALSO LEAVES THE CPU IN A RUN STATE BUT DESTROYS MEMORY LOCATIONS AND SHOULD NOT BE USED FOR ANY OTHER PERPOSE BUT "APT"

A SIMPLE T/E RUN WOULD LOOK LIKE THIS:

```
>>>T/E
   ---
CONSOLE-TEST
>>>
```

THE FOLLOWING IS A MANUAL SCRIPT THAT MAY ALSO BE USED TO VERIFY THAT THE CONSOLE IS OPERATING SUCCESSFULLY

NOTE: USER INPUT IS UNDERLINED

INITIALIZATION

```
1.  ^P<CR>                          ;ENTER CONSOLE
    ------

    >>> 'UNDETERMINED'               ;IGNORE CONSOLE RESPONSE
```

.	>>> T<CR>	;RUN 'T' CONSOLE SELF TEST
	>>>CONSOLE	;CONSOLE TYPEOUT;'T' TEST RAN SUCCESSFULLY
3.	>>> H<CR>	;HALT THE BASE CPU
	>>> 'UNDETERMINED'	;THE RESPONSE OF THE CONSOLE IS
4.	>>>I<CR>	;INITIALIZE BASE CPU

MANUAL TESTING OF T/E

SWITCH REGISTER TESTING

5.	>>>D SW 52525<CR>	;LOAD SWITCH REGISTER WITH PATTERN
6.	>>> E SW<CR>	;EXAMINE SWITCH REGISTER CONTENTS
	>>>17777570 052525	;CONSOLE TYPEOUT
7.	>>>D SW 127272<CR>	;LOAD SWITCH REGISTER WITH PATTERN
9.	>>>E SW<CR>	,EXAMINE SWITCH REGISTER CONTENTS
	>>>17777570 125252	;CONSOLE TYPEOUT

PAX DATA TESTING

10.	>>>D 0 52525<CR>	;LOAD ADDRESS 0 WITH PATTERN
11.	>>>E 0<CR>	;EXAMINE ADDRESS 0
	>>>00000000 052525	;CONSOLE RESPONSE
12.	>>>D 0 125252<CR>	;LOAD ADDRESS 0 WITH PATTERN
13.	>>>E 0<CR>	;EXAMINE ADDRESS 0
	>>>00000000 125252	;CONSOLE RESPONSE

PAX ADDRESS TESTING (UP TO 16K)

14. >>>D 0 0<CR> ;LOAD ADDR. 0 WITH 0'S DATA

15. >>>D/N:20000 2 177777<CR> ;DEPOSIT DATA 177777 INTO ADDRESS
;LOCATIONS 2 THRU 40000. THIS INSTRUCTION
;TAKES APPROX. 30 SEC. TO COMPLETE.

16. >>>E 0<CR>

>>>00000000 000000 ;

VERIFY START COMMAND
VERIFY SINGLE STEP COMMAND

17. >>>D/N:3 0 0<CR> ;LOAD ADDRESS LOCATIONS 0 THRU
;4 WITH HALT INSTRUCTIONS

18. >>>S 0<CR> ;START CPU AT ADDR 0

CONSOLE
>>>17777707 2 ;CONSOLE TYPEOUT;CPU HALTS

19. >>>N<CR> ;SINGLE STEP CPU

>>>17777707 4 ;CONSOLE TYPEOUT;CPU HALTS