1. INTRODUCTORY DESCRIPTION

A. This procedure establishes the methods for testing a 531X139APM Application Card.
B. Environmental ranges: 70 +/- 10 Deg. F. with 20-75% R.H.
C. Unit warm-up/stabilization period requirement: NONE
D. Personnel using this procedure are expected to have a high degree of confidence and expertise in related testing and calibration procedures.
E. Procedures not explained here are considered to be understood as common practice.

2. TEST EQUIPMENT VERIFICATION

A. Verify the accuracy of the standard(s) used in the repair/calibration process by evidence of recent calibration labeling affixed to the test equipment.
B. All measurement standards used in this procedure shall be traceable to the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY (N.I.S.T.) and shall have the accuracy, stability, range and resolution required for the intended use.
C. Unless otherwise specified, the collective uncertainty of the Measurement Standard(s) shall not exceed twenty five percent of the acceptable tolerance for each characteristic being calibrated.
D. All deviations shall be documented.

3. EQUIPMENT CLEANING

A. All equipment clean will be performed as instructed in the GEES SOP Sec. 14.0

4. EQUIPMENT INSPECTION

A. The following criteria should be used as a guideline or basis for the inspection process of this unit:
    1. Wires broken or cracked.
    2. Terminal strips / connectors broken or cracked.
    3. Loose wires.
    4. Components visually damaged.
    5. Capacitors leaking.
    6. Solder joint, cold.
    7. Circuit board discolored or burned.
    8. Printed wire runs burned or damaged.

5. REVISION HISTORY

Revision	Date	Initials	Reason for Revision
A	5-13-98		Initial Procedure – After Verification
B	5-6-02	RKD	Incorporated info for 531X132APM
C	06/14/02	RKD	Added Initial column to section 5
D			
E			
F			
G			
H			
I			
J			
K			

6. REFERENCE DOCUMENTATION

- Reference: GEK
- Factory Procedure # _____

7. THEORY OF OPERATION

- Reference: GEK

8. TEST EQUIPMENT TO BE USED

DC 300 test fixture Asset H033766
FLUKE 85 OR EQUIVLENT

9. FINAL TEST AND OPERATION PROCESS

- XX = don't care

SETUP for most 531X139 cards				
JP1 1-2	JP18 1-2	***JP30 XX**	JP40 1-2	JP55 2-3
JP2 XX	JP19 1-2	JP30A 6-7	JP41 1-2	JP56 2-3
JP3 XX	***JP20 2-3**	JP30B 2-4	JP42 1-2	JP57 1-2
JP4 XX	JP21 1-2	JP30C 3-8	JP43 1-2	JP58 1-2
JP5 3-4	JP22 1-2	***JP31 XX**	JP44 1-2	JP59 1-2
JP6 1-2	JP23 1-2	JP31A 6-7	JP45 1-2	JP60 1-2
JP7 2-3	JP24 2-3	JP31B 2-4	JP46 1-2	
JP8 2-3	JP25 1-2	JP31C 3-8	JP47A 1-2	
JP9 1-2	JP26 2-4		JP47B 1-2	
JP10 1-2	JP27 2-4	JP32 1-2		P1 XX
JP11 1-2	JP28 1-2	JP33 1-2	JP47C open	P2 50%
JP12 1-2		JP34 1-2	JP48 2-3	P3 75%
JP13 1-2	***JP29 XX**	JP35 1-2	JP51 1-2	P4 100%
JP14 1-2	JP29A 6-7	JP36 1-2	JP52 1-2	P5 100%
JP15 1-2	JP29B 2-5	JP37 1-2	JP53 1-2	P6 50%
JP16 1-2	JP29C 3-8	JP38 1-2	JP53 1-2	P7 100%
JP17 1-2		JP39 1-2	JP54 2-3	P8 0%
Par. 014 = 128				

* SETUP for APMACM3 & APMAFM1 cards				
JP20 1-2	JP29 2-5	JP30 2-4	JP31 2-4	

SETUP for 531X132 cards				
JP1 1-2	JP2 1-2	JP3 1-2	JP4 1-2	JP5 3-4
JP6 1-2	JP7 1-2	JP8 2-3		
Par. 014 = 0				

- **SETUP :** 20K FROM DTB1-2 TO ETB1-2 AND DTB2-5 TO ETB2-5

✍ **NOTE :** *All buttons and switches have the same name as the input and output that are being tested per the prints.*

- Pull red **E-STOP** button out (Located next to DC300 on right)
- LEDs on Main Control Card will all come on then scroll form right to left unless a fault has occurred . Reference DC300 manual for troubleshooting information
- **FCMET** meter on Control Panel will read approx. 7 VDC
- Turn all pots on Control Panel CCW
- Push **MODE 6** on Control Panel to the down pos. and XSTOP to the up pos. all other switches to middle .
- Plug HAND HELD PROGRAMMER into **18PL** on Main Control Card
- Turn RELAY SELECT to 1
- Connect a ohmmeter to the yellow and black TEST JACKS .
- Verify the following
- Turn **MSR** pot on Control Panel to MIN

SLD RELAY TEST

RELAY	MSR	POS	OHMS	MSR	POS	OHMS
SLD 0	MIN	1	OPEN	MAX	1	0
	MIN	2	0	MAX	2	OPEN
SLD 1	MIN	3	OPEN	MAX	3	0
	MIN	4	0	MAX	4	OPEN
SLD 2	MIN	5	OPEN	MAX	5	0
	MIN	6	0	MAX	6	OPEN
SLD 3	MIN	7	OPEN	MAX	7	0
	MIN	8	0	MAX	8	OPEN
SLD 4	MIN	9	OPEN	MAX	9	0
	MIN	10	0	MAX	10	OPEN

BCD INPUT TEST (16PL)

- Plug white cable for Control Panel into **16PL** on Application Card
- Set thumbwheel switch to **0000**
- Push **START** on Control Panel
- Push **MODE 0** to up pos.
- Set thumbwheel switch to **1000**
- Press **PSB** on Control Panel
- VMET meter will read 2 VDC
- Set thumbwheel switch to **2000**
- Press **PSB** on Control Panel
- VMET meter will read 4 VDC
- Set thumbwheel switch to **2750**
- Press **PSB** on Control Panel
- **VMET** meter will read 5.5 VDC
- The HAND HELD PROGRAMMER will read "A 100$ 19$"
- Press **STOP** on Control Panel
- Push **MODE 0** to down pos.
- **END OF BCD TEST**

MODE _ TEST (13PL)

- Push **START** on Control Panel
- Push **MODE 0** to up POS.
- **VMET** meter will read 5.5 VDC
- Push **MODE 1** to up pos.
- The HAND HELD PROGRAMMER will read "A 22$ 13$" and the motor will decrease in speed
- Push both **MODE 0 & 1** back to middle pos. (Motor may surge then go to zero)
- Push **MODE 2** up pos.
- **VMET** meter will read 4 VDC
- Push **MODE 2** to middle pos. (Motor will **DEC & VMET** will go to 0 V)
- Push **MODE 3** up pos.
- **VMET** meter will read 2 VDC
- Push **MODE 3** to middle pos. (Motor will **DEC & VMET** will go to 0 V)

- Push **MODE 5** up until **VMET** reads – 2 VDC then push it back to the middle pos.(This is slow to increace) (**VMET** will stay at – 2 VDC)
- Push **MODE 4** up and **VMET** will decrease to 0 VDC
- Push **MODE 4** back to middle pos.
- Press **STOP** on Control Panel
- Push **MODE 6** to the middle pos.
- LEDs 16-4-1 ***(FLT 21)*** on Main Control Card (531X300XXXX) will come on solid.
- Push **MODE 6** to the down pos.
- Press **RESET** on Control Panel
- All LEDs will come on then scroll right to left
- Push **MODE 7** to the up pos.
- LED 16 ***(FLT 16)*** on Main Control Card (531X300XXXX) will come on solid.
- Push **MODE 7** to the middle pos.
- Press **RESET** on Control Panel
- All LEDs will come on then scroll right to left
- **END OF MODE_ TEST**

✍ ***NOTE :*** *The AN1 & AN2 test is not performed on the 132 GXX or the 139 G2 cards.*

AN1 & AN2 TEST (13PL)

- The following actions are performed on the Handheld Programmer.
- Press "**SET**"
- Press "**DRV**"
- Press "**77**"
- Press "**ENTER**"
- The Programmer will display "***PARAMETER***"
- Press "**RESET**" one time
- The Programmer will display "***DIAGNOSTIC***"
- Press "**TEST**" (Blue letters)
- Press "**11**"
- Press "**ENTER**"
- The Programmer will display "DG 0000.0000" (Note may occasionally flicker to FFFF.FFFF)
- Push **AN1** and **AN2** to up
- The Programmer will display "DG 03Fx.03Fx" (x) = Don't care
- Push **AN1** and **AN2** to down
- The Programmer will display "DG FBEx.FBEx" (x) = Don't care
- Push **AN1** and **AN2** to the middle
- Press "**RESET**" 2 times **(Located on control panel)**
- The Programmer will display "***OPERATE***" then after a few seconds "M 00$ 00$"
- **END OF AN1 & AN2 TEST**

ANALOG INPUT TEST (13PL INPUT TO U4 MUX)

- The following actions are performed on the Handheld Programmer.
- Press "**SET**"
- Press "**DRV**"
- Press "**77**"
- Press "**ENTER**"
- The Programmer will display "***PARAMETER***"
- Press "**RESET**" one time
- The Programmer will display "***DIAGNOSTIC***"

- Press "**RAM**"
- This is the start of Analog Input test
- Press "**413**"
- The Programmer will display "413 XXX"
- Press and hold **LTA** on Control Panel
- Press "**ENTER**" on the Programmer
- The Programmer will display "413 63" approx
- Press "**RESET**" one time on Programmer
- The Programmer will display "***DIAGNOSTIC***"
- Press "**RAM**"
- Press "**459**"
- The Programmer will display "459 0"
- Press and hold **SJ1** on Control Panel
- Press "**ENTER**" on the Programmer
- The Programmer will display "459 1101" approx
- Press "**RESET**" one time on Programmer
- The Programmer will display "***DIAGNOSTIC***"
- Press "**RAM**"
- Press "**457**"
- The Programmer will display "457 0"
- Press and hold **SJ2** on Control Panel
- Press "**ENTER**" on the Programmer
- The Programmer will display "457 242" approx
- Press "**RESET**" one time on Programmer
- The Programmer will display "***DIAGNOSTIC***"
- Press "**RAM**"
- Press "**469**"
- The Programmer will display "469 0"
- Press and hold **PSREF** on Control Panel
- Press "**ENTER**" on the Programmer
- The Programmer will display "469 1016" approx
- Press "**RESET**" one time on Programmer
- The Programmer will display "DIAGNOSTIC"
- Press "**RAM**"
- Press "**380**"

- The Programmer will display "380 0"
- Press and hold **ASP1** on Control Panel
- Press "**ENTER**" on the Programmer
- The Programmer will display "380 61" approx
- Press "**RESET**" one time on Programmer
- The Programmer will display "***DIAGNOSTIC***"
- Press "**RAM**"
- Press "**461**"
- The Programmer will display "461 0"
- Press and hold **ASP2** on Control Panel
- Press "**ENTER**" on the Programmer
- The Programmer will display "461 1016" approx
- Press "**RESET**" one time on Programmer
- The Programmer will display "***DIAGNOSTIC***"
- Press "**RAM**"
- Press "**467**"
- The Programmer will display "467 0"
- Press and hold **FRA** on Control Panel
- Press "**ENTER**" on the Programmer
- The Programmer will display "467 449" approx
- Press "**RESET**" one time on Programmer
- The Programmer will display "***DIAGNOSTIC***"
- Press "**RAM**"
- Press "**414**"
- The Programmer will display "414 0"
- Press and hold **CLA** on Control Panel
- Press "**ENTER**" on the Programmer
- The Programmer will display "414 63" approx
- Press "**RESET**" two times on Programmer

ASR TEST (13PL)

- Monitor TP **ASR** on Application Card with a voltmeter
- Turn **ASR** pot on Control Panel to MAX
- Adjust **P1** on card for 4 VDC @ TP **ASR**

✍ ***NOTE :*** *The MAP INPUT test is not performed on the 132 GXX cards.* ***ETB*** *is the green terminals on application card*

MAP INPUT TEST (11PL AND 13PL)

- With a voltmeter verify the table below
- **BLACK** test lead is **COM**.
- Turn **P7** CW & P8 full CCW

MAP1 SW POS	MAP2 SW POS	MAP3 SW POS	VOLTS OUT ETB2-5	VOLTS OUT ETB2-2
UP	MID	MID	+ 3.6 V	0 V
UP	DOWN	MID	0 V	0 V
DOWN	DOWN	MID	-3.98 V	0 V
DOWN	UP	MID	0 V	0 V
MID	MID	UP	0 V	-3.5 V
MID	MID	DOWN	0 V	+3.7 V
VOLTAGE TOL. +/- .1 VDC				

NOTE : Allow five seconds for the reading to stabilize when making each of the following measurements.

EXTERNAL FAULT TEST

- Measure from **COM**. To **4TB** - __ and verify the chart below is true .

Values for a 139 Card		
4TB	**RESET PUSHED IN**	**RESET RELEASED**
40	+ 26.5 VDC	+ 1.25 VDC
41	+ 26.5 VDC	+ 1.25 VDC
42	+ 26.5 VDC	+ 1.25 VDC
43	+ 26.5 VDC	+ 1.25 VDC
44	+ 26.5 VDC	+ 1.25 VDC
45	+ 26.5 VDC	+ 1.25 VDC
39	+ 26.5 VDC	+ 1.25 VDC

Values for a 132 Card		
	RESET PUSHED IN	**RESET RELEASED**
B01	+ 25.7 VDC	+ 1.3 VDC
B02	+ 25.7 VDC	+ 1.3 VDC
B03	+ 25.7 VDC	+ 1.3 VDC

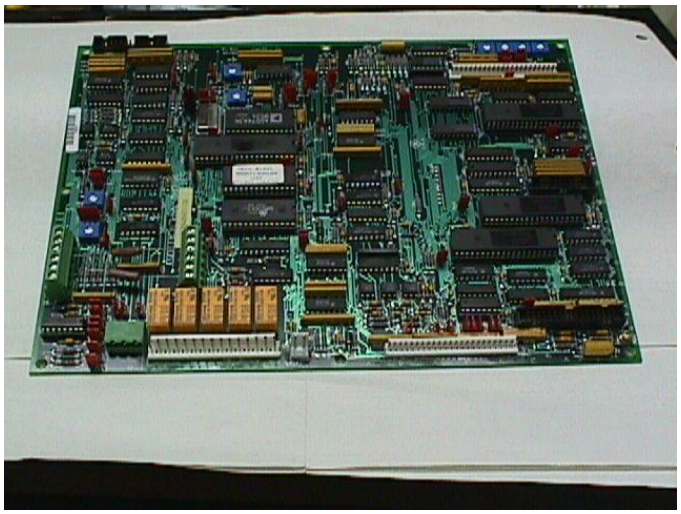
- **END OF EXTERNAL FAULT TEST**

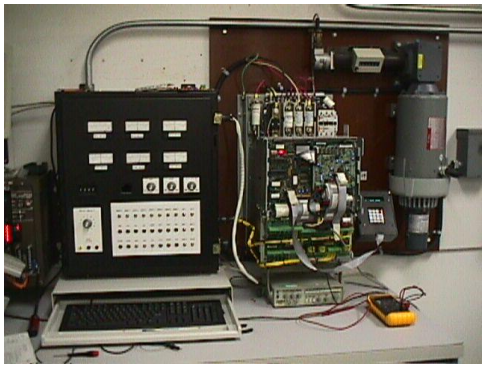
IF CARD DOES NOT HAVE AN LED SKIP REST OF TEST

ENCODER TEST (11PL)

- Verify **Red** LED is on
- Verify **MSR** is set to **Min** on Control Panel
- Press "**START**" on Control Panel
- Verify that the Freq at **JP47B** is **0 Hz**.(This can be done with DMM by selecting DC and pressing HZ on meter)
- Turn **MSR** to Max
- Verify that the Freq at **JP47B** is **15.5 KHz**.
- Turn **MSR** to **Min**
- Press "**STOP"** on Control Panel
- Set thumbwheel switch to **0000**
- **END OF ENCODER TEST**

8. SPECIAL INFORMATION





TEST WRITTEN BY: DAVID SMITH **DATE:** 5-13-98
TEST VERIFIED BY: James Archibald **DATE:** 5-06-02