SMEX FAST
TRANSPONDER AC MAGNETIC TEST PROCEDURE

PROCEDURE # FAST-PROC-051

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Revision History

INTRODUCTION

This test measures the AC magnetic fields emitted by the FAST Transponder. The following test procedures have been designed to test the FAST Transponder using the Bench Test Equipment (BTE).

FACILITIES

This test will be performed in the magnetic test room in building 7. This facility is required due to the sensitive measurements being performed.

1.0 GENERAL

A. Before starting this procedure, fill out the Cert Log and have it approved prior to test

B. Set up a MATE/DEMATE log for the Transponder under test.

C. List of equipment

DESCRIPTION	Manufacturer and Model	NASA ID	CAL DUE
Non-magnetic Table			
Search-coil magnetometer			
Power Supply	HP6236B		
Power Supply	HP6284A		
Power Supply	Harrison Lab. 814A		
Multimeter	Fluke 8600A		
Multimeter	Fluke 8100A		
HP 3588A spectrum analyzer or equivalent			

2.0 OPERATING THE TEST CONTROLLER BOX

a) Before starting this procedure, contact any of the SMEX quality assurance personnel: Steve Manning, Terry James or Ron Kolecki.

b) Three power supplies are needed to operate the controller box. Make sure that the output voltages of the power supplies are appropriate and also the maximum currents are not exceeded.

+5.6 Vdc 500 mA

- 5.6 Vdc 100 mA
+28 Vdc 3 A

c) With the power supplies OFF, connect the power supplies to the controller box.

d) At the power connector J1 on the controller box cable to the Transponder, short pins 7 to 8, and 14 to 15. See Ref. 1.3

e) Turn ON the +28 V power supply. At the controller box panel, there is a voltage monitor for the Transponder prime power. Using the multimeter, measure this voltage.

f) Turn OFF the +28 V power supply.

g) Before mating the BTE connectors to the Transponder, short the pins to eliminate electrostatic discharge. Mate the Transponder connectors J1, J2, and J3 to the controller box.

h) Perform a visual inspection of Transponder connectors J1(Cannon 15 pin), J2 (Cannon 50 pin), J3 (Cannon 15 socket), J5 (SMA) , and J8 (SMA).

i) Install connector savers on the connectors referred above. Record on the MATE/DEMATE Log. Record one mate per each connector.

j) Connect a 50 Ohm termination to the FAST Transponder connector J8 (hand tight).

k) Connect a 50 Ohm termination to the Transponder connector J5.

l) Turn ON the +5.6 V, -5.6 V power supplies.

m) Turn the TEST SET POWER switch to ON on the BTE.

n) Turn ON the +28 V power supply.

2.0 TRANSPONDER POWER UP

a) All tests shall be performed using the frequency band, magnetometer location, levels, and measurements specified in paragraph 5.2.3.2 of FAST-SPEC-012. During all tests the magnetometer and Transponder should each be at least 1 meter away from the walls of the room.

b) Using a known source, plot the response of the search-coil magnetometer vs. frequency. This plot is the calibration for all the following testing.

c) Configure the spectrum analyzer for 1 M Ohm input and reference impedance. The search-coil magnetometer has a 20 dB pre-amplifier, so subtract 20 dB from all readings.

d) Measure the background field.

e) Align the Transponder x-axis with the magnetometer measurement axis.

f) Switch ON the TRANSPONDER PRIME POWER on the BTE.

g) Monitor the current and voltage on TRANSPONDER PRIME POWER, VOLTAGE MONITOR (J44, J45) and CURRENT MONITOR (J46, J47) respectively.

+28 V RECEIVER ONLY	
Voltage:	**Current:**

h) Command the transmitter ON by sending a command XMTR ON and pressing SEND CMD button, on the COMMAND GENERATOR, of the BTE.

i) On the TX MONITOR of the BTE, select RF POWER LEVEL TLM. With a multimeter across J42 and J43, record the voltage reading. Using Fig 1.1, convert the value to dBm.

RF POWER LEVEL TLM	
Voltage (Volts)	**Converted Value (dBm)**

j) Monitor the current and voltage on TRANSPONDER PRIME POWER, VOLTAGE MONITOR (J44, J45) and CURRENT MONITOR (J46, J47) respectively.

+28 V TRANSMITTER AND RECEIVER ON	
Voltage:	**Current:**

k) Measure the radiated magnetic field.

l) Turn the transmitter OFF by sending a command XMTR OFF and pressing SEND CMD button.

m) On the TX MONITOR of the BTE, Turn the knob to XMTR ON/OFF TLM.

n) Using a voltmeter through J42, J43 on the BTE , verify that the transmitter is OFF (0 to .5 V).

o) Switch OFF the TRANSPONDER PRIME POWER on the BTE.

p) Align the Transponder y-axis with the magnetometer measurement axis.

q) Switch ON the TRANSPONDER PRIME POWER on the BTE.

r) Monitor the current and voltage on TRANSPONDER PRIME POWER, VOLTAGE MONITOR (J44, J45) and CURRENT MONITOR (J46, J47) respectively.

+28 V RECEIVER ONLY	
Voltage:	**Current:**

s) Command the transmitter ON by sending a command XMTR ON and pressing SEND CMD button, on the COMMAND GENERATOR, of the BTE.

t) Monitor the current and voltage on TRANSPONDER PRIME POWER, VOLTAGE MONITOR (J44, J45) and CURRENT MONITOR (J46, J47) respectively.

+28 V TRANSMITTER AND RECEIVER ON	
Voltage:	**Current:**

u) Measure the radiated magnetic field.

v) Turn the transmitter OFF by sending a command XMTR OFF and pressing SEND CMD button.

w) On the TX MONITOR of the BTE, Turn the knob to XMTR ON/OFF TLM.

x) Using a voltmeter through J42, J43 on the BTE , verify that the transmitter is OFF (0 to .5 V).

y) Switch OFF the TRANSPONDER PRIME POWER on the BTE.

z) Align the Transponder z-axis with the magnetometer measurement axis.

aa) Switch ON the TRANSPONDER PRIME POWER on the BTE.

bb) Monitor the current and voltage on TRANSPONDER PRIME POWER, VOLTAGE MONITOR (J44, J45) and CURRENT MONITOR (J46, J47) respectively.

+28 V RECEIVER ONLY	
Voltage:	**Current:**

cc) Command the transmitter ON by sending a command XMTR ON and pressing SEND CMD button, on the COMMAND GENERATOR, of the BTE.

dd) Monitor the current and voltage on TRANSPONDER PRIME POWER, VOLTAGE MONITOR (J44, J45) and CURRENT MONITOR (J46, J47) respectively.

+28 V TRANSMITTER AND RECEIVER ON	
Voltage:	**Current:**

ee) Measure the radiated magnetic field.

ff) Turn the transmitter OFF by sending a command XMTR OFF and pressing SEND CMD button.

gg) On the TX MONITOR of the BTE, Turn the knob to XMTR ON/OFF TLM.

hh) Using a voltmeter through J42, J43 on the BTE , verify that the transmitter is OFF (0 to .5 V).

ii) Switch OFF the TRANSPONDER PRIME POWER on the BTE.

3.0 SYSTEM TURN OFF

a) On the BTE switch the Transponder prime power to OFF. Then Turn off the power supply (28 V).

b) Turn off the 5.6 and -5.6 Volts power supplies, one at the time.

c) Disconnect all the cables to the Transponder.

d) QA personnel to perform Inspection and Data Review.

e) Place the Transponder on the ESD safe container and store.

f) This concludes the procedure.

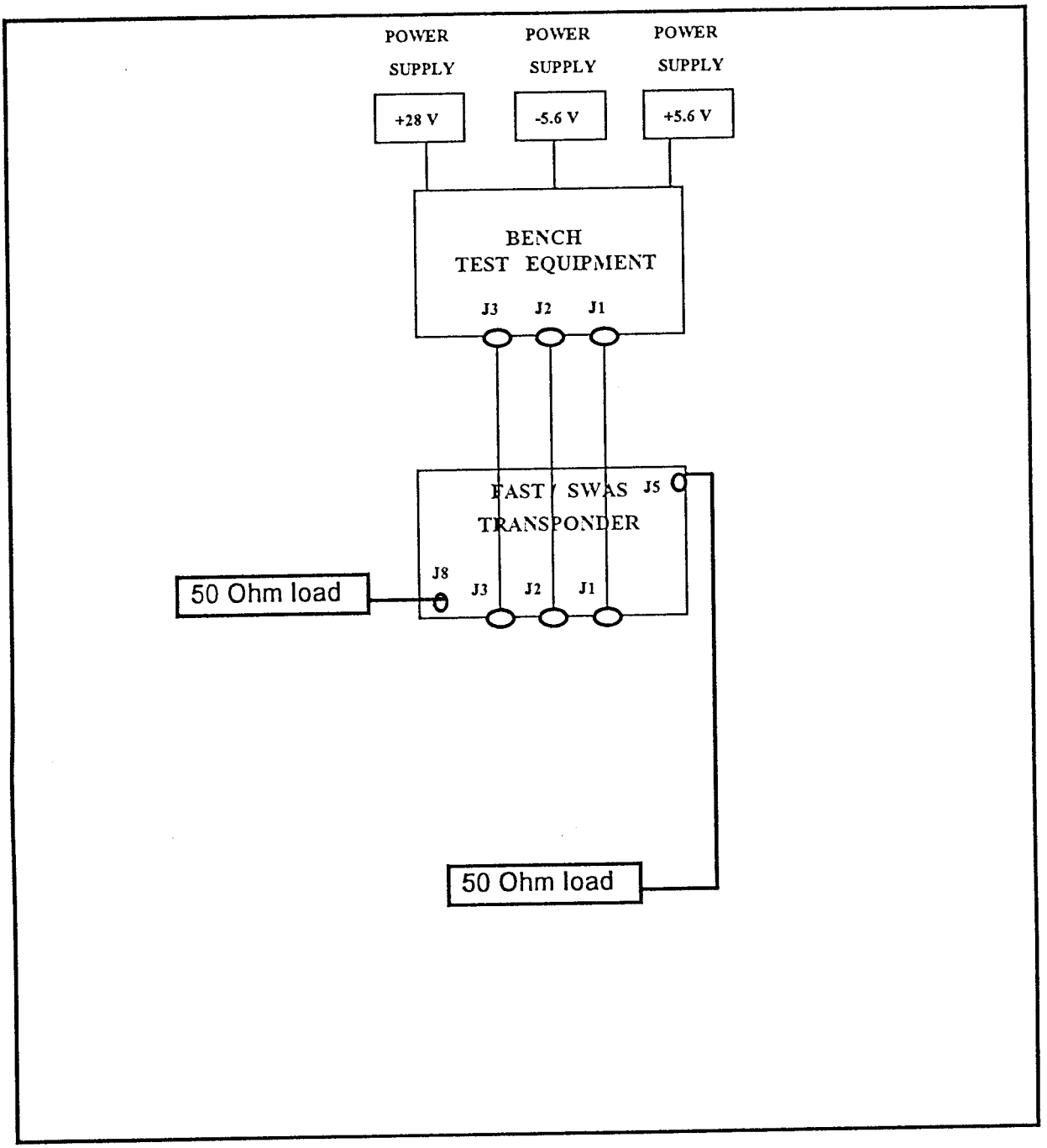
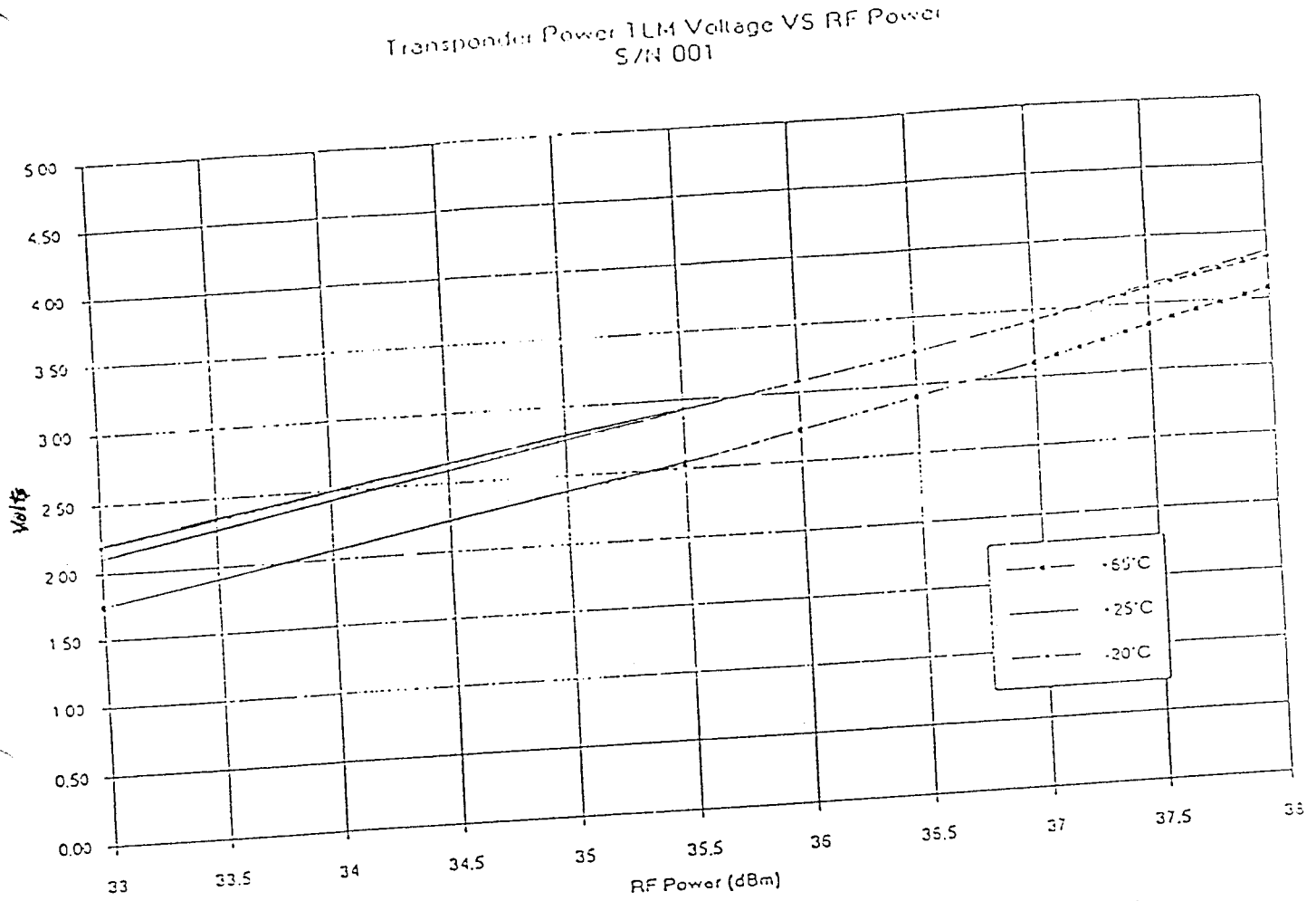


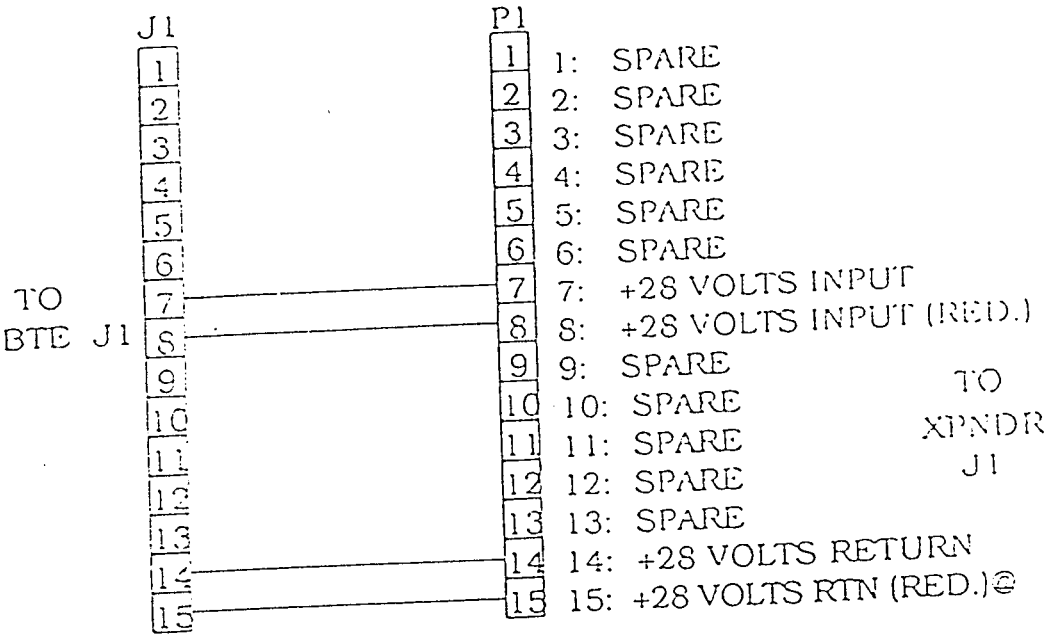
Fig. 1.0 Transponder test set block diagram



2.11	33
2.917	35.5
3.0990	36
3.264	36.5
3.429	37
3.4629	37.0952
3.5	37.1904
3.558	37.2975
3.632	37.4046
3.6485	37.5
3.698	37.61
3.731	37.7142
3.764	37.81
3.7970	37.9165
3.863	38
4.158	39

Fig. 1.1 RF Power Level calibration curve

TRANSPONDER INTERCONNECT CABLES



Ref 1.2 Transponder interconnect cables