ELITE ELECTRONIC ENGINEERING COMPANY
1516 CENTRE CIRCLE
DOWNERS GROVE, ILLINOIS 60515-1082

ELITE PROJECT: 11059 DATE TESTED: October 7-8, 1981

TEST PERSONNEL: E. French

TEST SPECIFICATION: FCC "Rules and Regulations" Part 15, Subpart J
Class B

ENGINEERING TEST REPORT NO. 6726

MEASUREMENT OF THE RF INTERFERENCE

FROM A TRS-80 MODEL III

HOME COMPUTER, S/N 0011814

FOR: TANDY SYSTEMS DESIGN
Fort Worth, Texas

P/O NO.: 036252

Report By: Norman W. Wehling
Norman W. Wehling
Registered Professional
Engineer of Illinois - 25008

Approved By: James C. Klouda
James C. Klouda
Registered Professional
Engineer of Illinois - 18770

ENGINEERING TEST REPORT NO. 6726
MEASUREMENT OF THE RF INTERFERENCE
FROM A TRS-80 MODEL III
HOME COMPUTER

1.0 INTRODUCTION:

1.1 Description of Test Item On October 7 and 8, 1981, conducted and radiated radio interference measurements were performed on a Tandy TRS-80 Model III Computer, S/N 0011814. This is designed for home use and is powered from 115V 60 Hz single phase power.

The tests were performed for the Tandy Corporation of Ft. Worth, Texas.

1.2 Purpose This test series was performed to demonstrate that the test item meets the conducted and radiated RF emission requirements of the FCC "Rules and Regulations", Part 15, Subpart J for Class B home use equipment.

1.3 Subcontractor Identification This series of tests was performed by the Elite Electronic Engineering Company, radio interference consultants of Downers Grove, Illinois at their open field test site (EQU/6810 4-3-0 Downers Grove II).

2.0 TEST SETUP:

The unit was mounted on a 1 meter high non-conductive stand for all tests. Input power at 115V 60 Hz was applied to the test sample through the standard power cord. The 115V power cord was connected to two line impedance stabilization networks which were located on a copper ground plane. Both networks were constructed per Figure 3 of the FCC proposed OCE Bulletin 47. Power was supplied from a 115V 60 Hz single phase power source.

The only ground supplied to the unit was through the third wire of the standard power cord. No interface systems or cables were connected during test.

The unit was operated in the "on" condition, without a program being run.

3.0 TEST EQUIPMENT:

A list of the equipment used can be found on Table I. All equipment was calibrated per the instruction manuals supplied by the manufacturer.

TABLE I - EQUIPMENT LIST

Category/ Designation	Manufacturer/ Description	Model Number	Serial Number	Freq. Range	Cal. Date
RECEIVERS:					
REC-3C	Electro-Metrics	EMC-25/Mark III	482	.01-1000MHz	4/21/81
	Programmer	ESC 125B	156	---	
	HP/X-Y Plotter	7040A	129	.01-1000MHz	
ANTENNAS:					
ANT-4	Tuned Dipole	DM-105 T/2	---	200-400MHz	I/O
ANT-5	Tuned Dipole	DM-105 T/3	---	400-1000MHz	"
ANT-16A	Fairchild/Log Sp.	LCA-25	77	200-1000MHz	"
ANT-17	Electro-Inter-National	BCA-902	---	25-370MHz	"
ANT-19E	Tensor/Biconical	4104	2014	20-200MHz	"

I/O: Initial Only

All tests were performed with an Electro-Metrics EMC-25 receiver in conjunction with a CMM-25 meter module. This allows measurements with the bandwidths specified by the FCC with either peak or quasi-peak detector functions. Receiver bandwidths were 9 kHz for the 450 to 30 MHz conducted data and 120 kHz for the 30 MHz to 1000 MHz radiated data.

Initial conducted and radiated tests were performed in the peak detector function while automatically plotting the data. This was performed in a 10' x 20' x 8' high shielded enclosure. This data was used to determine the frequencies of maximum emissions. Final measurements were taken manually, at the frequencies of maximum emissions, using the quasi-peak detector. This was done in the open field.

Since the receiver was calibrated for a single frequency, meter correction factors were added to the meter readings to correct all other readings. These factors are shown on the data pages.

4.0 REQUIREMENTS, PROCEDURES AND RESULTS:

4.1 Power Line Conducted Emission

4.1.1 Requirements All radio frequency voltages on the power lines of a Class B device shall be below 250 uV over the frequency range from 0.45 to 30 MHz.

4.1.2 Procedures Each power lead was measured by connecting the measuring equipment to the meter terminal of the appropriate LISN.

4.1.3 Results The conducted voltage levels on both of the 115V power leads were measured and recorded. The results are presented on data pages 101 and 102. All levels were below the specification's requirements for Class B equipment. Data pages 101A and 102A are the preliminary test plots.

4.2 Radiated Emissions

4.2.1 Requirements All emanations from a Class B device shall be below the levels shown on Table II.

TABLE II - RADIATION LIMITS FROM CLASS B DEVICES

Freq. MHz	Distance Meters	Field Strength uV/m
30-88	3	100
88-216	3	150
216-1000	3	200

4.2.2 Procedures All measurements were made at a test distance of 3 meters. Between 30 MHz and 370 MHz, a broadband biconical antenna was used as the pick-up device. It was positioned sequentially to measure the highest of the horizontal and the vertical components. Above 370 MHz, tuned dipole antennas were used. At each frequency both the test sample and measuring antenna were oriented for a maximum meter reading.

All broadband and narrowband signals were measured and recorded.

The radiated levels from the test item are presented on data page 103. All emissions met the specification requirements. Data pages 103A and 103B show the preliminary plots taken inside of the shielded enclosure.

5.0 CONCLUSIONS:

The Tandy TRS-80 Model III Computer, S/N 0011814, did meet the conducted and radiated RF emission requirements of FCC "Rules and Regulations", Part 15, Subpart J for Class B equipment.

6.0 CERTIFICATION:

Elite Electronic Engineering Company certifies that the infor-

mation contained in this report was obtained under conditions which meet or exceed those specified in the test specification.

The data presented in this test report pertains to the test item at the test date. Any electrical or mechanical modification made to the test item subsequent to the specified test date will serve to invalidate the data and void this certification.

ETR No. 6726

DATA SHEET

MANUFACTURER : TANDY
MODEL NO. : TRS-80, MODEL III, S/N 0011814
SPECIFICATION: FCC 15J Class B
TEST : CONDUCTED EMISSION TESTS
LINE TESTED : HIGH
NOTES : MODIFIED CABLE ROUTING

Freq. MHz	Mtr Rdg dBuV	Corr Fac dB	Total dBuV	Total uV	Limit uV
0.45	35.0	2.0	37.0	70.6	250
0.50	33.0	6.5	39.5	94.5	250
0.51	35.0	6.2	41.2	115.4	250
0.60	34.0	4.1	38.1	80.5	250
0.65	35.0	3.1	38.1	80.0	250
0.69	37.0	2.3	39.3	92.0	250
0.75	37.0	1.2	38.2	81.1	250
0.80	35.0	0.3	35.3	58.4	250
0.84	34.0	-0.3	33.7	48.4	250
0.95	33.0	0.6	33.6	48.1	250
1.00	26.0	1.2	27.2	22.9	250
1.20	21.0	4.5	25.5	18.9	250
1.45	19.0	2.7	21.7	12.1	250
1.64	1.8	1.5	3.3	1.5	250
3.00	3.8	8.5	12.3	4.1	250
4.10	5.0	4.3	9.3	2.9	250
5.00	5.0	6.8	11.8	3.9	250
6.00	6.0	7.3	13.3	4.6	250
7.00	4.0	6.2	10.2	3.2	250
7.60	4.0	5.5	9.5	3.0	250
10.20	27.0	6.5	33.5	47.3	250
12.30	22.0	6.5	28.5	26.6	250
15.00	2.0	-2.1	-0.1	1.0	250
15.00	3.0	-2.1	0.9	1.1	250
16.00	2.2	-2.8	-0.6	0.9	250
16.00	24.0	-2.8	21.2	11.5	250
17.00	22.0	-3.4	18.6	8.5	250
20.50	32.0	-5.2	26.8	21.8	250
25.50	28.0	-1.7	26.3	20.6	250
28.00	25.0	-2.4	22.6	13.5	250
29.40	24.0	-3.0	21.0	11.3	250

* = ambient level

checked by: Edward J. Sierra

Company Tandy Date Oct 81

Sheet No. 2

Test Item TRS 80 model III

Model _____ Line 115V High

S/N 0011814 Mode Run

TEST RECEIVER

FSS-250 S/N 482

Scan Speed 20 sec

Bandwidth W

Detector P

PICK-UP DEVICES

FCC LISN

_____

_____

_____

Test Spec FCC15J

Section Cond

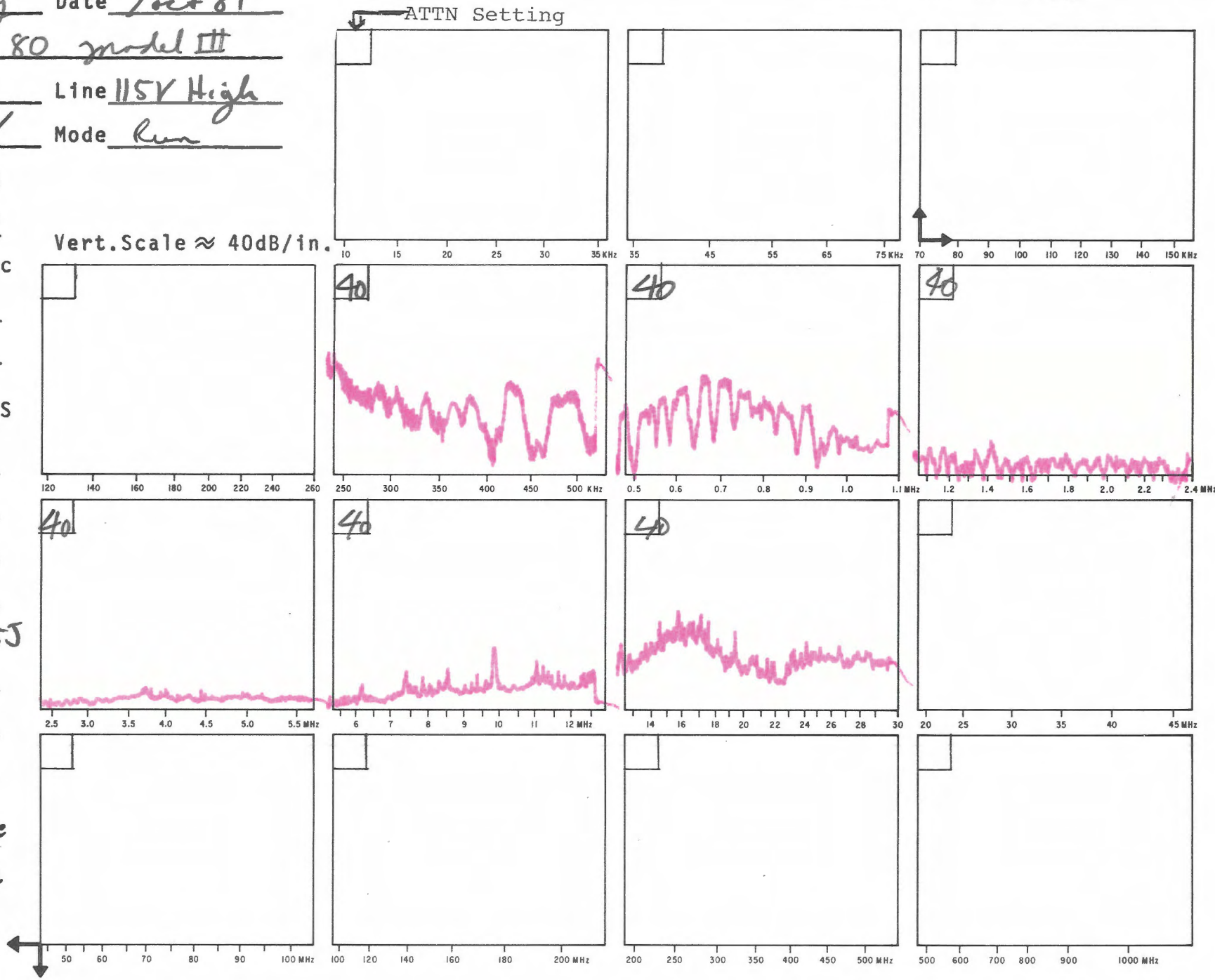
Calib. _____

Tested By ES

Elite Electronic Engineering Co.

ETR 6726

Data Page 101A



ETR No. 6726
DATA SHEET

MANUFACTURER : TANDY
MODEL NO. : TRS-80, MODEL III, S/N 0011814
SPECIFICATION: FCC 15J Class B
TEST : CONDUCTED EMISSION TESTS
LINE TESTED : LOW
NOTES : MODIFIED CABLE ROUTING

Freq. MHz	Mtr Rdg dBuV	Corr Fac dB	Total dBuV	Total uV	Limit uV
0.45	37.0	2.0	39.0	88.9	250
0.50	33.0	6.5	39.5	94.5	250
0.51	34.0	6.2	40.2	102.9	250
0.60	30.0	4.1	34.1	50.8	250
0.65	32.0	3.1	35.1	56.6	250
0.69	35.0	2.3	37.3	73.1	250
0.75	34.0	1.2	35.2	57.4	250
0.80	33.0	0.3	33.3	46.4	250
0.84	30.0	-0.3	29.7	30.5	250
0.95	26.0	0.6	26.6	21.5	250
1.00	24.0	1.2	25.2	18.2	250
1.20	14.0	4.5	18.5	8.4	250
1.45	17.0	2.7	19.7	9.6	250
1.64	15.0	1.5	16.5	6.7	250
1.80	7.0	14.7	21.7	12.1	250
2.00	8.0	1.5	9.5	3.0	250
2.20	11.0	1.5	12.5	4.2	250
3.00	3.0	8.5	11.5	3.8	250
3.80	4.0	5.1	9.1	2.9	250
4.10	4.0	4.3	8.3	2.6	250
5.00	5.0	6.8	11.8	3.9	250
7.00	3.0	6.2	9.2	2.9	250
7.60	5.0	5.5	10.5	3.4	250
10.20	27.0	6.5	33.5	47.3	250
12.30	15.0	6.5	21.5	11.9	250
16.00	24.0	-2.8	21.2	11.5	250
17.00	20.0	-3.4	16.6	6.8	250
18.50	32.0	-4.5	27.5	23.7	250
20.50	31.0	-5.2	25.8	19.4	250
24.50	26.0	-2.1	23.9	15.7	250
25.50	31.0	-1.7	29.3	29.1	250
28.00	25.0	-2.4	22.6	13.5	250
29.40	34.0	-3.0	31.0	35.7	250

* = ambient level

checked by: Edward Hare

Company Tandy Date 7 Oct 81

Sheet No. 1

Test Item TRS-80 Model III

Model III Line 115V Low

S/N 001814 Mode Run

TEST RECEIVER

FSS-250 S/N 482

Scan Speed 20 sec

Bandwidth 10

Detector P

PICK-UP DEVICES

FCC LISN

Test Spec FCC 15J

Section Cond

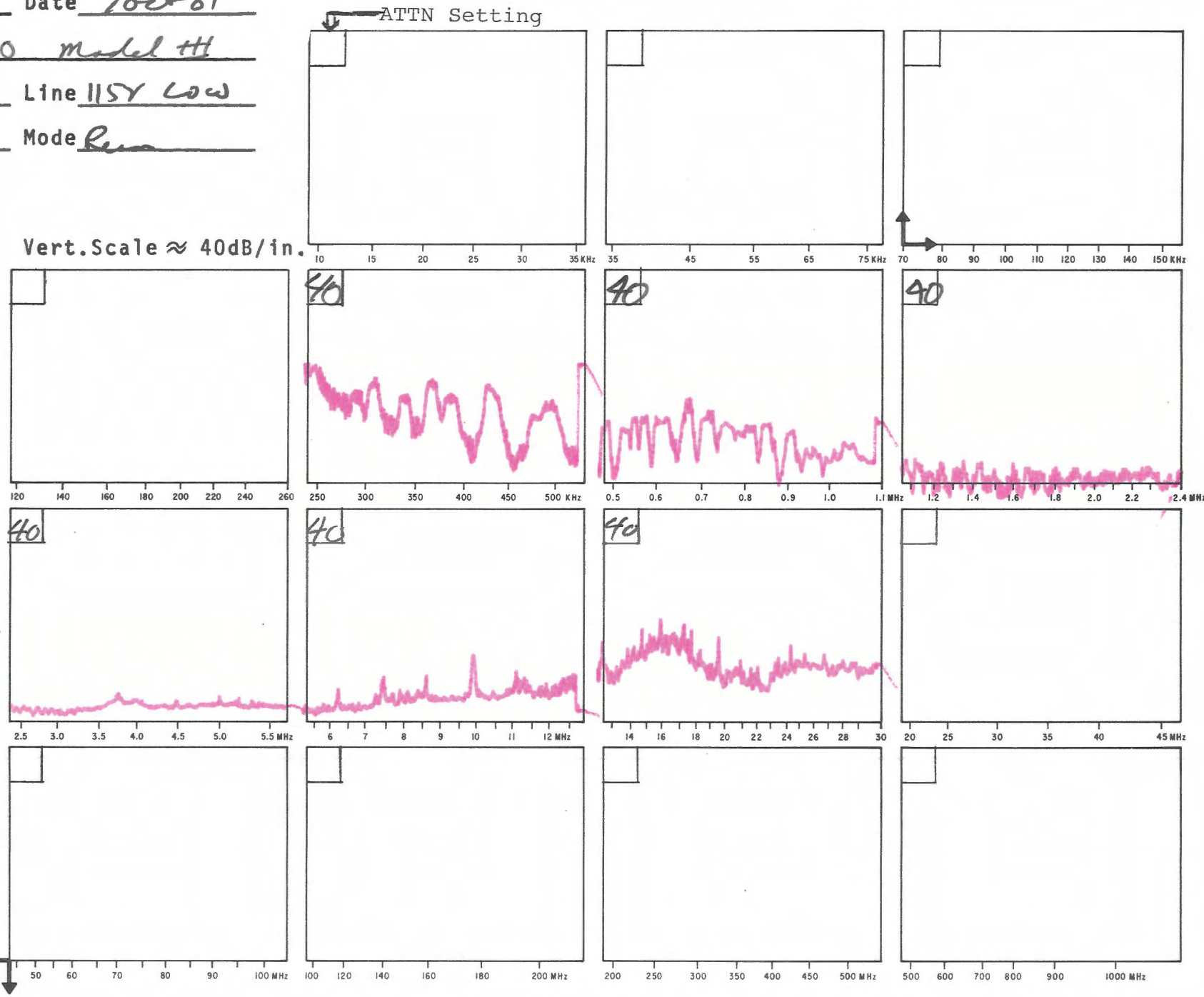
Calib.

Tested By QA

Elite Electronic Engineering Co.

ETR 6726

Data Page 10ZA



ETR No. 6726
DATA SHEET

MANUFACTURER : TANDY
MODEL NO. : TRS-80 MODEL III, S/N 0011814
SPECIFICATION: FCC 15J Class B
TEST : RADIATED EMISSION TESTS AT 3 meters
NOTES : MODIFIED CABLE ROUTING
ALL READINGS CORRECTED TO 3 METERS

Freq. MHz	Mtr Rdg dBuV	Mtr Corr dB	Ant Fac dB	Dist Fac dB	Total dBuV/m	Total uV/m	Limit uV/m
31	3.0	2.6	14.3	0	19.9	9.9	100
31	9.0	2.6	14.3	0	25.9	19.8	100
33	6.0	1.9	13.9	0	21.8	12.3	100
33	10.0	1.9	13.9	0	25.8	19.5	100
35	4.0	1.2	13.5	0	18.7	8.6	100
35	10.0	1.2	13.5	0	24.7	17.3	100
37	2.0	1.5	13.2	0	16.7	6.9	100
37	10.0	1.5	13.2	0	24.7	17.2	100
39	8.0	1.8	12.9	0	22.7	13.7	100
39	9.0	1.8	12.9	0	23.7	15.3	100
42	8.0	2.0	12.4	0	22.4	13.2	100
42	8.0	2.0	12.4	0	22.4	13.2	100
45	7.0	2.0	12.0	0	21.0	11.3	100
45	8.0	2.0	12.0	0	22.0	12.7	100
51	14.0	-4.7	11.3	0	20.6	10.7	100
65	12.0	1.5	9.7	0	23.2	14.5	100
72	15.0	1.8	10.0	0	26.7	21.7	100
72	15.0	1.8	10.0	0	26.7	21.7	100
75	7.0	0.7	10.1	0	17.8	7.7	100
85	14.0	-0.2	10.4	0	24.1	16.1	100
87	5.0	0.1	10.4	0	15.5	6.0	100
115	5.0	3.9	11.1	0	20.0	10.0	150
115	4.0*	3.9	11.1	0	19.0	8.9	150
128	4.0	4.0	11.4	0	19.4	9.4	150
128	4.0*	4.0	11.4	0	19.4	9.4	150
143	10.0	4.5	11.7	0	26.1	20.3	150
143	11.0	4.5	11.7	0	27.1	22.8	150
163	13.0	4.2	12.0	0	29.2	28.9	150
163	14.0	4.2	12.0	0	30.2	32.4	150
194	7.0	4.7	15.7	0	27.4	23.6	150
250	1.0*	7.5	18.8	0	27.2	23.0	200
300	1.0*	-2.4	22.8	0	21.5	11.8	200
350	1.0*	2.0	26.3	0	29.2	28.9	200
400	1.0*	7.3	29.2	0	37.6	75.6	200
600	5.0*	6.1	28.0	0	39.1	90.5	200
800	4.0*	9.0	30.8	0	43.8	155.4	200

* = ambient

checked by Edward Stencil

Company Tandy Date Jan 81

Test Item TRS 80 Computer

Model III Line

S/N 0011814 Mode Run

TEST RECEIVER

FSS-250 S/N 482

Scan Speed 20 sec

Bandwidth W

Detector P

PICK-UP DEVICES

BCA461 Horn @ 1M

Test Spec FCC 15J

Section Rad @ 1M

Calib.

Tested By

Elite Electronic Engineering Co.

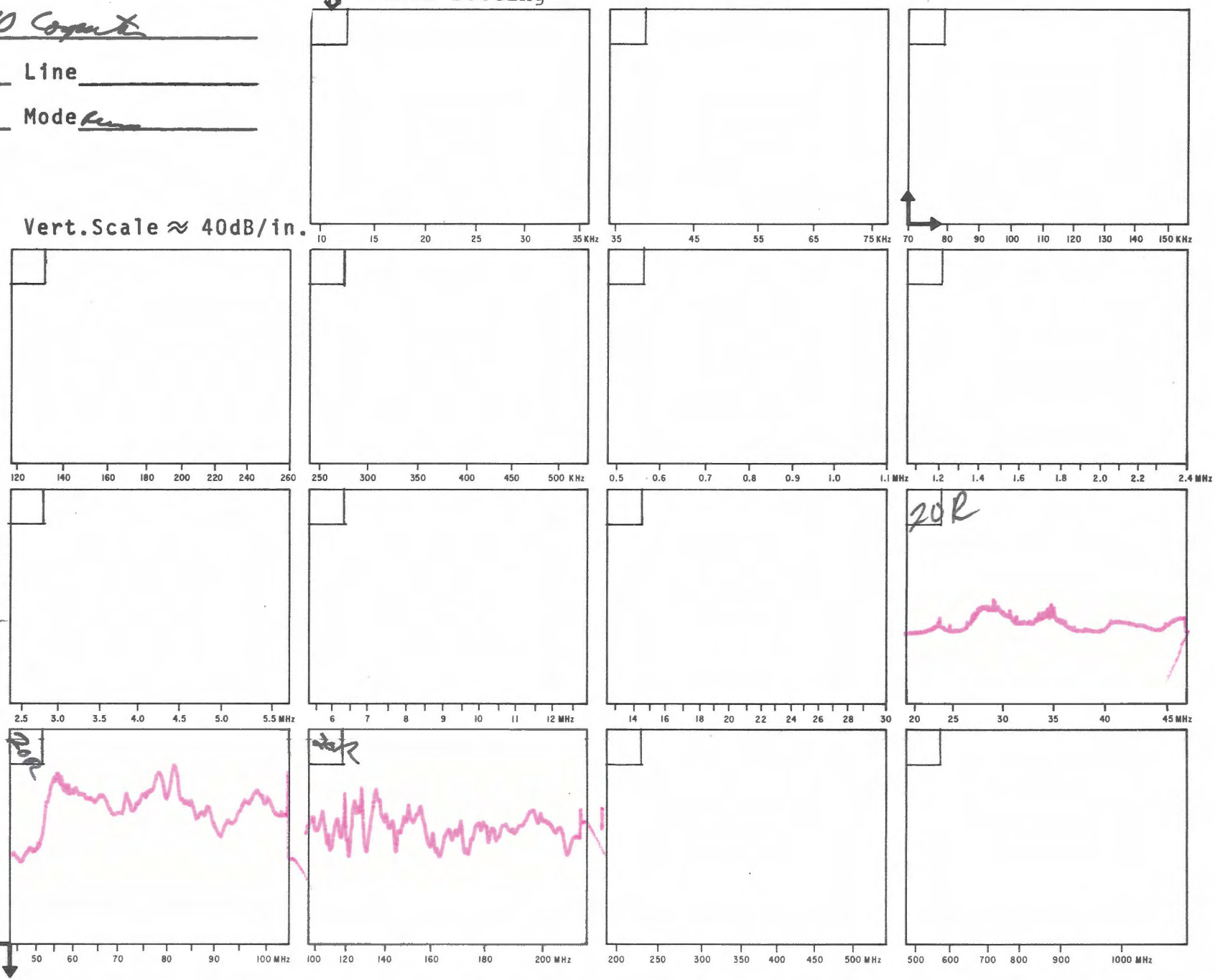
ETR 6726

Data Page 103A

Sheet No. 4

ATTN Setting

Vert. Scale ≈ 40dB/in.



Modified wire Layout

Company Tandy Date 7 Oct 81

Sheet No. 3

Test Item TRS-80 Computer

Model III Line

S/N 0011814 Mode Run

TEST RECEIVER

FSS-250 S/N 482

Scan Speed 3 sec

Bandwidth W

Detector P

PICK-UP DEVICES

BCA 461 Vert

Tenna 4104 S/N 2012

@ 1M

Test Spec FCC 15J

Section Rad @ 1m

Calib.

Tested By

Elite Electronic Engineering Co.

ETR 6726

Data Page 103B