CERTIFICATION TEST REPORT

FOR

SMITH METER, INC.

TCP-RFT TRANSCEIVER

FCC ID NO. NQ3RFT

April 8, 1998

Prepared for:

Smith Meter, Inc.
1602 Wagner Avenue
PO Box 10428
Erie, PA 16514-0428

Measurements made
and report prepared by:

James R. Pollock

SMITH ELECTRONICS, INC.
8200 SNOWVILLE RD.
CLEVELAND, OH 44141
440/526-4386

CERTIFICATE OF COMPLIANCE

1.	Manufacturer:	Smith Meter, Inc. 1602 Wagner Avenue P.O. Box 10428 Erie, PA 16514-0428
2.	Contact:	G. Bruce Kernes Smith Meter, Inc. 814/898-5102
3.	Regulation:	CFR47-Part 15 15.207(a) 15.249
4.	Measurement Method:	ANSI C63.4-1992
5.	EUT	TCP-RFT Transceiver FCC ID: NQ3RFT
6.	Type:	Data Transceiver
7.	Tuned Frequency:	916.65 MHz
8.	Date of Test:	March 9, 10 & 31, 1998
9.	Place of Test:	Smith Electronics, Inc. Test Lab, 8200 Snowville Rd., Brecksville, OH. Open Field Site at 8200 Snowville Rd., Brecksville, OH

10. Statement of Compliance:

I hereby certify that measurements of radio frequency emissions from the Smith Meter, Inc., TCP-RFT transceiver were performed by me on March 9, 10 & 31, 1998, and that the results of the measurements confirmed that the unit tested is capable of compliance with the above regulations.

4-8-98
Date

James R. Pelick, Pres
Signature, Title

TEST REPORT

INTRODUCTION

The Smith Meter, Inc. TCP-RFT data transceiver is part of a system, intended for marketing exclusively in the petroleum custody transfer market. The object of the system is to communicate routing and collection data between a crude oil tanker truck and a dispatcher using a wireless link.

The TCP-RFT is a data transceiver that is used in conjunction with a personal computer to download routing instructions and upload collection data to and from a companion transceiver (TCP-CO) installed in the truck. The TCP-RFT connects to a PC via the comm port and typically is placed near the dispatcher's PC inside a building at a crude oil collection site. It will typically be in a line-of-sight orientation with the tanker truck.

The TCP-RFT is to be certified as an intentional radiator under part 15.249 and 15.207. Its transmission frequency is 916.65 MHz. A typical transmission schedule would be 2-3 transmissions of up to 5 second duration over a 15 minute period. There would normally be two 15 minute periods per truck per day with a maximum number of trucks per day being about ten.

As the TCP-RFT is also a digital device/computer peripheral, and a receiver, those functions have been verified to comply with the emissions requirements of 15.107 and 15.109 as required by 15.101.

MEASUREMENTS PERFORMED

RADIATED EMISSIONS

Field strength measurements were performed on the prototype transmitter to assure that the radiated emissions were capable of compliance with the requirements of 15.249.

Measurement of the fundamental frequency was performed on the Smith Electronics, Inc. open field test site located at 8200 Snowville Road, Brecksville, OH using the procedures of ANSI C63.4-1991. Site attenuation data pertinent to this site is on file with the FCC. A tuned dipole antenna was used with a receiver having quasi-peak, peak and average detectors.

The harmonic frequencies were measured in an area of the facility free of reflecting surfaces at a distance of either 1 meter or 0.5 meters. A double ridged wave guide antenna and a spectrum analyzer were used for these measurements.

For purposes of testing, an external switch was installed which controlled the operation of the transmitted signal. The test transmission consisted of a 50% duty cycle "preamble" that is normally sent prior to the information bits to bias on the discriminator circuit in the receiver. Typical data packets to be transmitted "after the preamble" have been graphically calculated by the manufacturer to have a duty cycle of no more than 0.26. Measurement of the stronger signals of the test transmission resulted in a 6 dB pk/avg. ratio as would be expected with the 50% duty cycle. Results of the measurements are found in Table 1.

Initial measurements of the transmitter signals were made with the computer attached. It was determined that the presence of the computer/cable had no effect on the transmitter emissions. The reported emissions were determined with the transmitter operating alone with no computer attached.

The receiver portion of the transceiver is an amplifier-sequenced hybrid receiver that contains no RF oscillating or regenerative circuits. No spurious emissions were detected from the receiver.

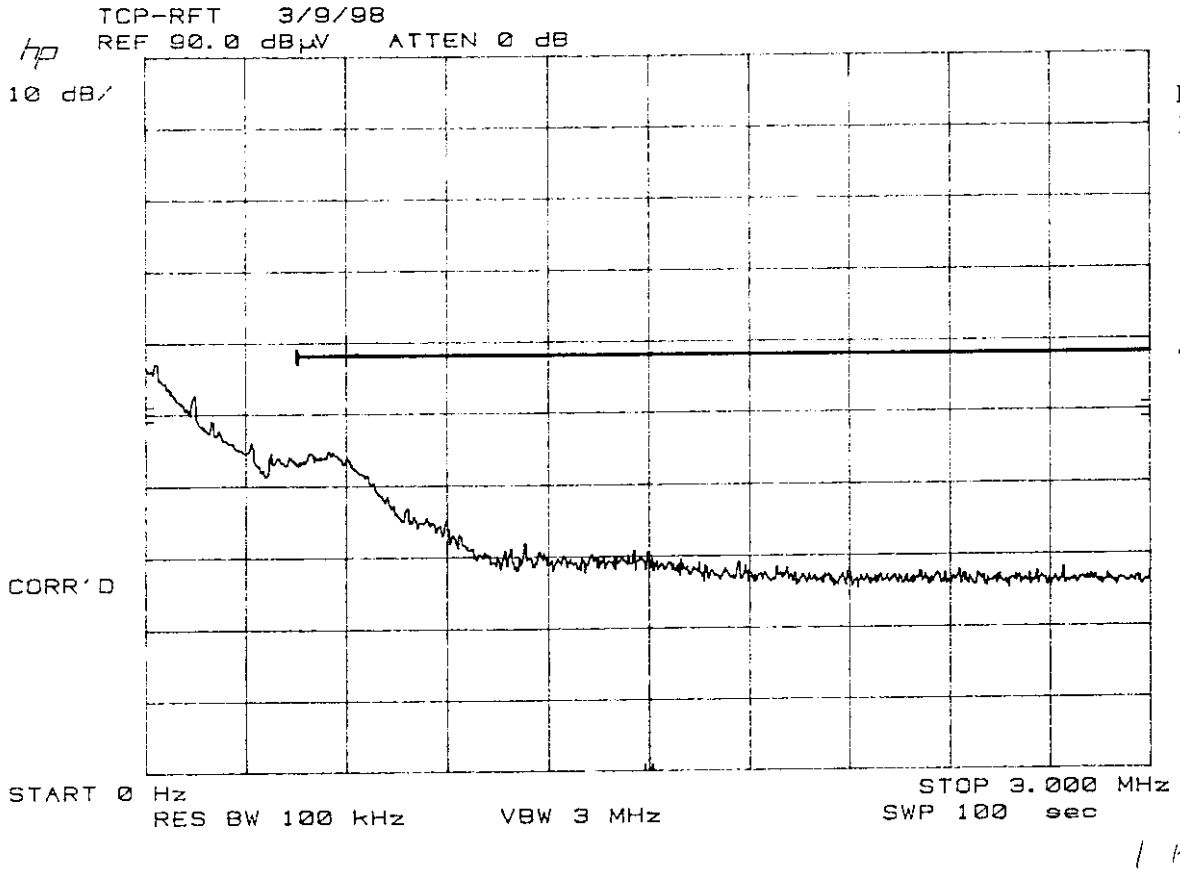
CONDUCTED EMISSIONS

The TCP-RFT is powered by a typical wall-pack DC power supply. The supply used in the testing and to be provided with the unit is a Calrad Model 45-757, 9 VDC, 300 mA unit.

Conducted emissions measurements were performed over the range of 450 kHz to 30 MHz using the procedures found in ANSI C63.4-1991. Two spectrum analyzer scans were used to cover the frequency range, one from 0 - 3 MHz and the other from 0 - 30 MHz. The results of these measurements are found in Figs. 1 & 2 with the 250 uV (48 dBuV) limit indicated. All conducted emissions were well below the limit required for intentional or Class B unintentional radiators.

CONCLUSIONS

Based upon the measurements made and reported herein, the Smith Meter Inc. model TCP-RFT radio transmitter is found to be capable of complying with the requirements of Part 15.249 and 15.207 of the FCC Rules and Regulations when operated in a manner consistent with its intended use and purpose.



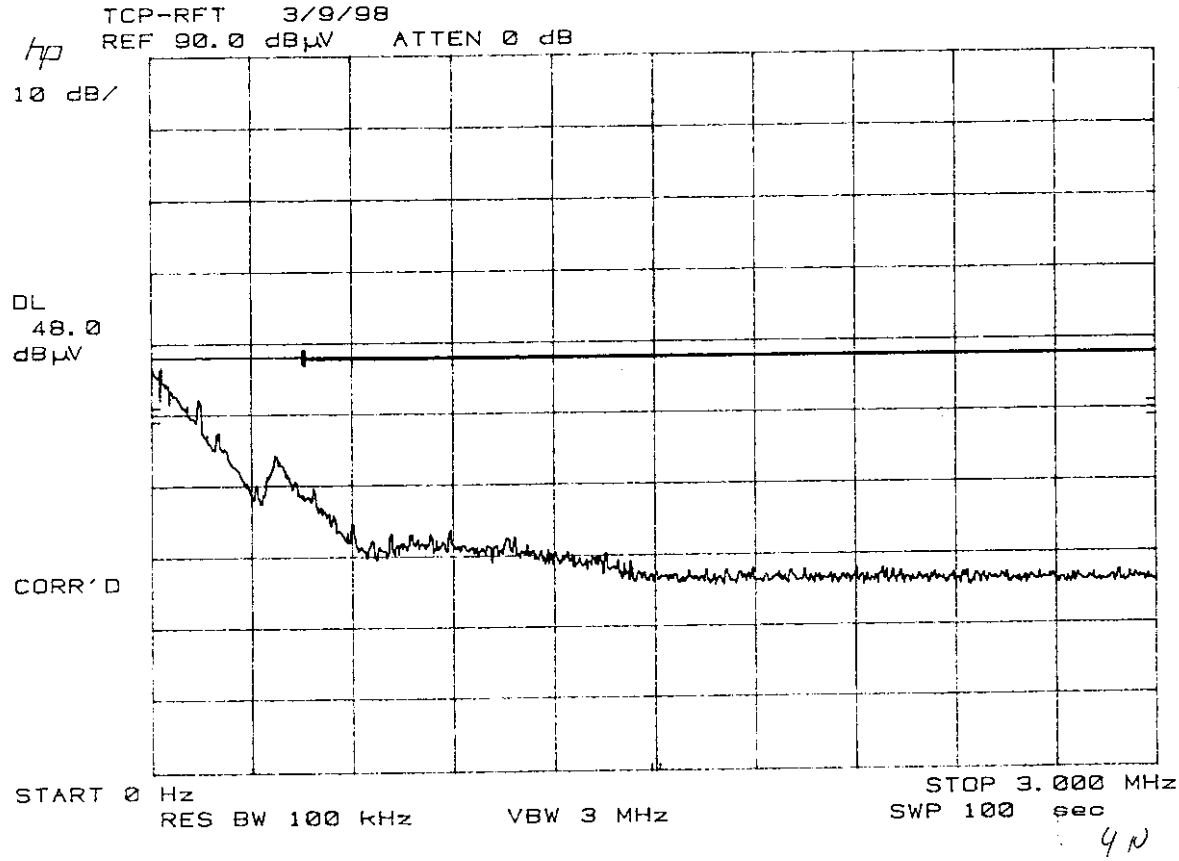
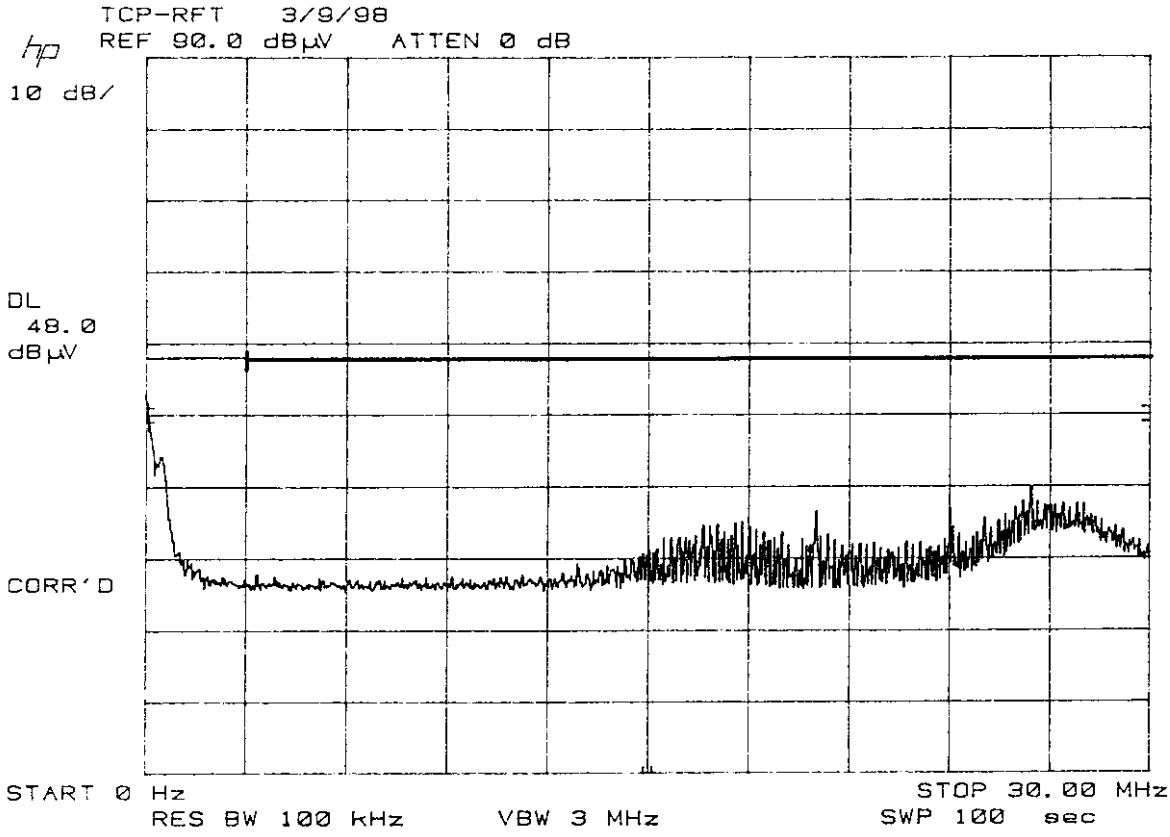


Fig. 1
CONDUCTED EMISSIONS
SMITH METER, INC.
TCP-RFT TRANSCEIVER
450 kHz - 3.0 MHz



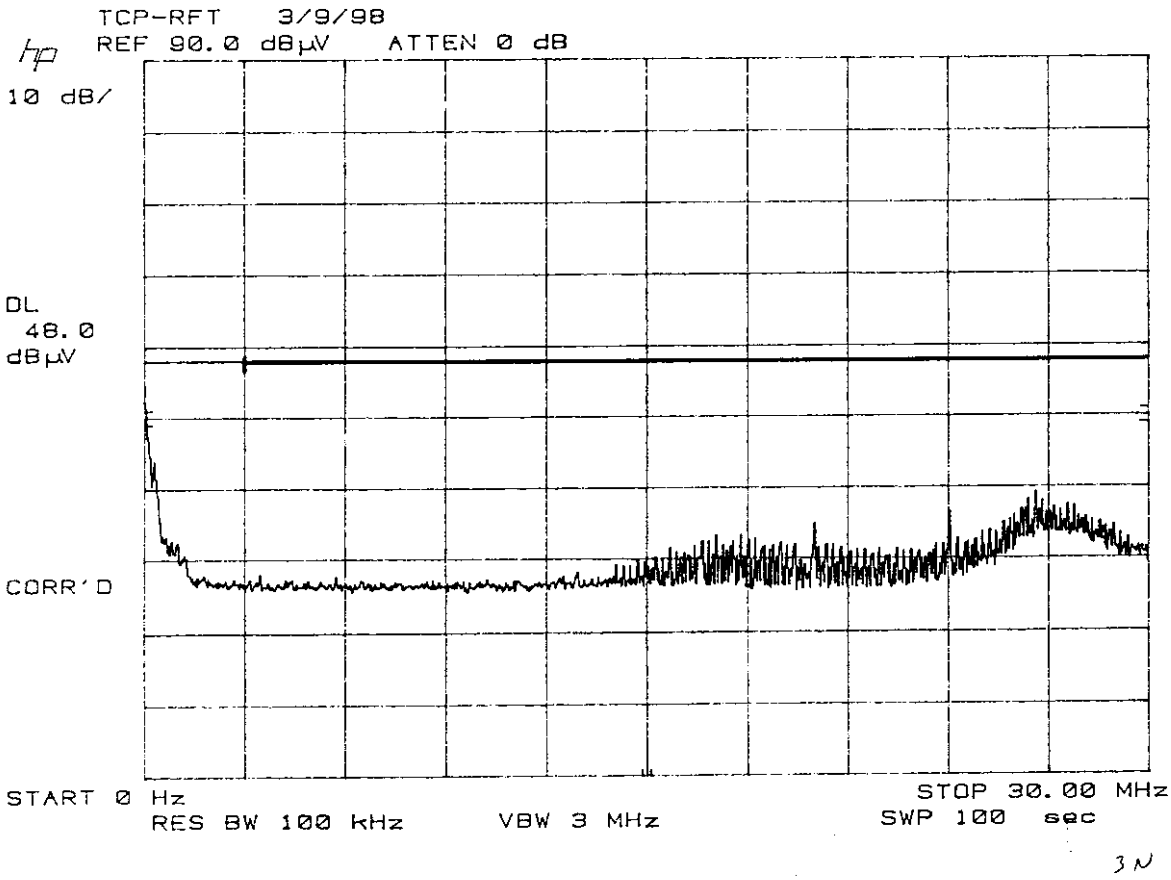


Fig. 2
CONDUCTED EMISSIONS
SMITH METER, INC.
TCP-RFT TRANSCEIVER
3 MHz - 30 MHz

TABLE 1

FUNDAMENTAL AND SPURIOUS EMISSIONS

TCP-RFT TRANSMITTER

Freq. (MHz)	Value (dBuV)	AF (dB)	CL (db)	Field Strength (dBuV/m)	(uV/m)	Limit (uV/m)
*916.65	60 @3m	29.1	1.7	90.8	34,700	50,000
1833.3	33.7 @1m	28.0	0.3	62.0	1,259	1,500
2749.95	21.2 @1m	30.0	0.4	51.6	380	1,500
3666.6	28.8 @1m	33.0	0.4	62.2	1,288	1,500
4583.25	28.6 @1m	33.0	0.5	62.1	1,274	1,500
5499.9	26.9 @1m	36.0	0.6	63.4	1,496	1,500
6416.55	24.8 @1m	36.0	0.7	61.5	1,189	1,500
7333.2	<24.5 @0.5m	37.0	0.8	62.3	1,303	3,000
8249.85	26.2 @0.5m	38.0	0.8	65.0	1,778	3,000
9166.5	<23.4 @0.5m	38.0	1.0	62.4	1,318	3,000

* = Fundamental Frequency

AF = Antenna Factor

CL = Coax Loss Factor

Measured values reported above are average values. The fundamental value was determined using the FI detector of the receiver, while the harmonic values used a 10 Hz VBW setting on the spectrum analyzer. All harmonic measurements used a BW value of 1 MHz. Linear extrapolation was used for converting 3 m limits to the measurement distance.

Peak measurements were also made. With sufficiently strong signals, peak/average values were typically about 6 dB. When the signal was close to the noise floor, the maximum peak/average value was about 10 dB.

TEST INFORMATION

SUMMARY

The prototype model of the Smith Meter, TCP-RFT transmitter has been shown to be capable of complying with those requirements of the Federal Communications Commission for a certified intentional radiator under Part 15.249 and 15.207. It also meets those requirements for a receiver and, as covered in a separate report, a Class A digital device.

EQUIPMENT UNDER TEST	TCP-RFT Transmitter FCC ID: NQ3RFT
MANUFACTURER	Smith Meter, Inc. 1602 Wagner Avenue P.O. Box 10428 Erie, PA 16514-0428
TEST DATES	March 9, 10 & 31, 1998
TEST LABORATORY	Smith Electronics, Inc. 8200 Snowville Road Cleveland, OH 44141 (440) 526-4386
MEASUREMENT EQUIPMENT	Hewlett-Packard Spectrum Analyzer Type 8568B with 8560A RF Section S/N 2216A02120 85662A Display Section S/N 2152A03686 85650A Quasi-Peak Adapter S/N 2043A00350 Calibrated 5/97 Singer Stoddart EMI Field Intensity Meter Model NM 37/57 S/N 0366-06168 Calibrated 5/97 Hewlett-Packard Spectrum Analyzer Model 8593EM, S/N 3536A00147 Calibrated 8/97

ANTENNAS	EMCO Biconical Antenna Model 3104 Freq. Range 20 - 200 MHz
	EMCO Log-Periodic Antenna Model 3146 Freq. Range 200 - 1000 MHz
	Stoddart Tuned Dipole Antenna Model 91598-2 Freq. Range 400 - 1000 MHz
	EMCO Double Ridged Guide Horn Model 3115 Freq. Range 1 - 18 GHz
MISCELLANEOUS	Hewlett-Packard Preamplifier Model 8447D S/N 1725A01282
	12.2 m RG-214/U coaxial cable
	0.6 m RG-214/U coaxial cable