To: Frank Coperich

From: Sam Dulaney

Re: AIERIT13-450, EA98126

Date: September 19, 2000

Frank:

The results for ERP differ because of the differences in measurement methods and because the radio was operating at a different power levels in the two tests.

The first set of ERP measurements was based upon the measured site attenuation of our test range and the antenna factor of the receiving antenna. You asked that the test be repeated via the substitution method. We did this and forwarded you the results. The results, as you noted, are not the same. The method of measurement is different. We have test data on our range with calibrated dipoles showing that it is within allowable error for normalized site attenuation. I am not sure why the two methods do not yield the same results. Note, however, that the differences are within the allowed tolerance of 3 meter open air test sites such as ours.

The circuitry within the radio has not been changed between the two tests. Data provided with our application for certification indicating a power output at 5.32 watts was the result of testing at the highest possible battery voltage. In practical applications, this power level could only be achieved for a matter of seconds before the battery voltage would drop to the nominal value. Subsequent transmissions would start at or near the nominal voltage. The maximum power at nominal voltage is 4 watts.

Even though our expected normal maximum is 4 watts, we would normally set the unit to 3 watts in our factory for shipment. We consider the unit a 4 watt maximum output power radio and would have no objection to revising the certification submission to reflect this level. We monitor battery voltage and have the means to restrict the power to 4 watts without changing circuitry. When you raised the RF exposure issue, we anticipated that this might be required.

The 3 watts measured on the range is simply a consequence of the fact that we set the radios to the same power as we would for our customers. We actually measured the output power into a dummy load during our latest tests. We have attached amended test data reflecting ERP extrapolated to the 4 watt conducted level. The antenna gain numbers are not affected.

I hope that this addresses your concerns.

Regards

Sam L. Dulaney
Chief Engineer
RITRON, Inc.
sdulaney@ritron.com

To: Sam Dulaney, null
From: Frank Coperich
fcoperic@fcc.gov
FCC Application Processing Branch

Re: FCC ID AIERIT13-450
Applicant: Ritron Inc
Correspondence Reference Number: 16151
731 Confirmation Number: EA98126
Date of Original E-Mail: 09/19/2000

The revised ERP results submitted on 9/13 indicates 2.95 W and 2.34 W for the two antennas. Previous data had indicated maximum ERP outputs were 1.3 W and 1.69 W for the two antennas. The new ERP data indicates conducted output is 3 W (34.8 dBm) but previous data indicated 5.32 W maximum conducted output and filing had requested for 5 W. The RF exposure info submitted earlier indicated maximum output is up to 4 W. Please clarify these discrepancies and indicate what changes have taken place that resulted in the lower conducted output.

The items indicated above must be submitted before processing can continue on the above referenced application. Failure to provide the requested information within 60 days of the original e-mail date may result in application dismissal pursuant to Section 2.917 © and forfeiture of the filing fee pursuant to section 1.1108.

DO NOT reply to this e-mail by using the Reply button. In order for your response to be processed expeditiously, you must upload your response via the Internet at www.fcc.gov, Electronic Filing, OET Equipment Authorization Electronic Filing. If the response is submitted through Add Attachments, in order to expedite processing, a message which informs the processing staff that a new exhibit has been submitted must also be submitted via Submit Correspondence. Also, please note that partial responses increase processing time and should not be submitted.

Any questions about the content of this correspondence should be directed to the e-mail address listed below the name of the sender.

TYPE OF TEST: TRANSMITTER EFFECTIVE RADIATED POWER

FCC PART: 2.993 (b)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: SST-444

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT13-450

DATE: September 13, 2000

PROCEDURE:

1. The following measurements were taken at the RITRON, Inc. 3 meter test site. Measurements were made in accordance with FCC Rules & Regulations Part 2.947, using the procedures of IEC Publication 106.

2. The SST-444 was aligned for transmitter operation on 465.0125 MHz at the 3 watt nominal output power per the tune-up procedure outlined in the Preliminary Maintenance Manual. The unit was then terminated at the antenna port with the two antennas sold for use with this product.

3. All field strength measurements were made with the Hewlett-Packard Model 8559A Spectrum Analyzer and an Electro-Metrics LP-25 Log Periodic Antenna.

4. The height and polarization of the field strength measuring antenna and orientation of the SST-444 were varied to provide maximum field strength.

5. A substitution antenna, an Electro-Metrics EM-6924 adjustable dipole, was substituted for the SST-444 at the SST-444's location. An RF signal generator was set for the frequency of the SST-444 with the level at the substitution antenna noted.

6. The polarization of the substitution antenna was adjusted for maximum signal strength at the field strength measuring antenna. The level at the field strength antenna was noted.

7. The ERP results were also extrapolated upward to reflect the 4 maximum output power expected for the SST-444.

TYPE OF TEST:	TRANSMITTER EFFECTIVE RADIATED POWER
FCC PART:	2.993 (b)
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	SST-444
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT13-450
DATE:	September 13, 2000

EQUATIONS:

The substitution antenna is specified from the manufacturer in terms of antenna factor rather than antenna gain. The conversion is:

$Ga(dBd) = 20\log f(MHz) - AF(dB) - 31.9$

The ERP is found from:

$ERP(dBm) = Pr(dBm) + Pgen(dBm) - Ps(dBm) - Ga(dBd)$

Where:

Pr is power level of radio's emission at the receiving antenna output.

Pgen is the RF signal generator level at the substitution antenna.

Ps is the power level of the substitution antenna emission at the receiving antenna output.

Ga is the gain of the substitution antenna.

The ERP is converted to watts from dBm by:

$ERP(watts) = \text{antilog}_{10}((ERP(dBm) - 30)/10)$

TYPE OF TEST: TRANSMITTER EFFECTIVE RADIATED POWER

FCC PART: 2.993 (b)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: SST-444

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT13-450

DATE: September 13, 2000

RESULTS:

Radio's Antenna	Pr (dBm)	Pgen (dBm)	Ps (dBm)	Ga (dBd)	ERP (dBm)
AF-450	6.5	0	-27.5	-0.7	34.7
AF-450-S	5.5	0	-27.5	-0.7	33.7

	ERP (watts)	ERP(4 watt conducted) (watts)
AF-450	3.0	4.0
AF-450-S	2.3	3.1

TYPE OF TEST: ANTENNA GAIN

FCC PART:

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: SST-444

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT13-450

DATE: September 13, 2000

PROCEDURE:

The antenna gain of the antennas available for this product was determined by measuring the conducted output power and the ERP measured via the substitution method.

EQUATION:

Ga (dBd) = ERP (dBm) – Po (dBm)

RESULTS:

Antenna	ERP (dBm)	Po (dBm)	Ga (dBd)
AF-450	34.7	34.8	-0.1
AF-450-S	33.7	34.8	-1.1