September 5, 2000

To whom it may concern,

Vocollect devices must be worn with a special Vocollect approved belt. By using the belt, the actual antenna is located greater than 5 cm from the body. Please see attached pictures. SAR calculations for the Lucent radio were conducted with a value of 4.3 cm from the body. It is our judgement that the SAR values will be within the acceptable limits as defined by the FCC and OET Bulletin 65.

Prior test conducted on radios rated at 250mW indicated a whole body average of 0.0331 W/Kg. The limit for our device is 1.60 W/kg. The Lucent radio card is specified as 50mW maximum.

I am also attaching the prior test report from The Intertek Testing agency conducted April 21, 1999. This testing was conducted on the TT-500 terminal.

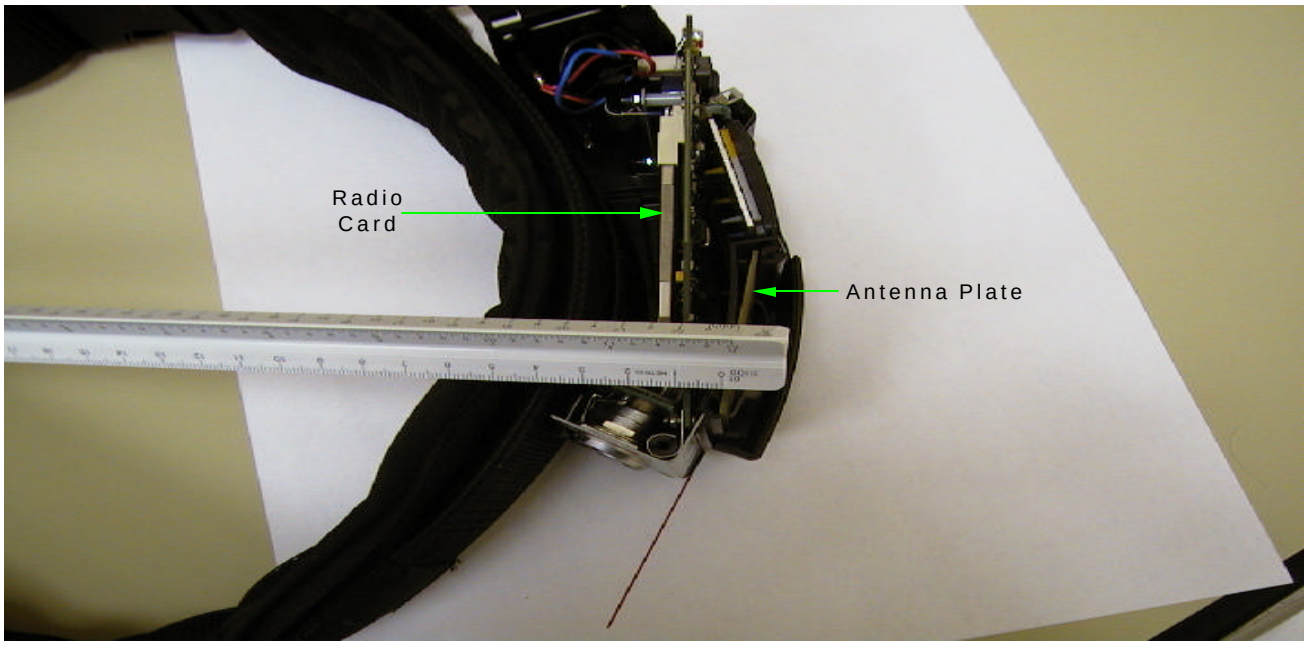
There is also specific reference in our user manual on how the units must be worn.

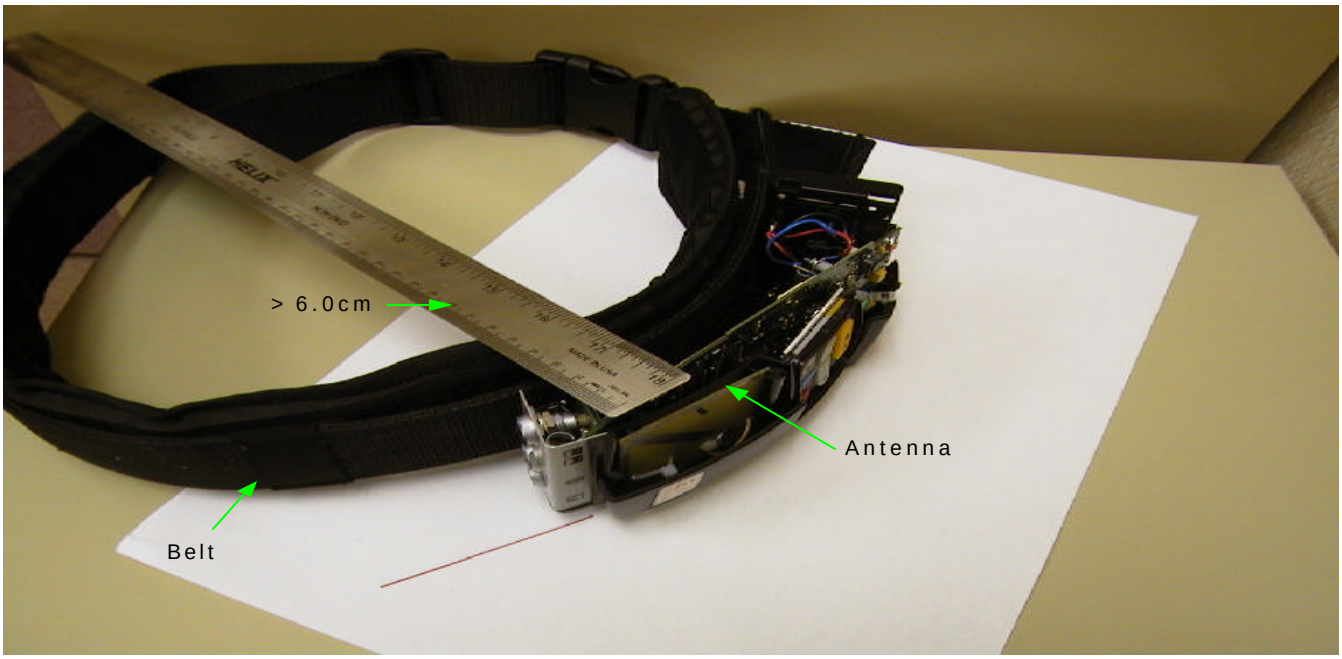
Sincerely,

Douglas M. Zatezalo
Sr. Manufacturing Engineer
Vocollect, Inc.

Vocollect

September 5, 2000





Specific Absorption Rate (SAR) Test Report
for
Vocollect, Inc
on the
2.4 GHz portable transmitter
Model: TT-500

Test Report: J99007671
Date of Report: April 21, 1999

NVLAP Laboratory Code 200201-0
Accredited for testing to FCC Parts 15

Tested by:	C. K. Li	
Reviewer:	C. K. Li	

September 5, 2000

1.4.2 Test Position

Two test configurations were used to show compliance with the FCC RF human exposure requirements:

1.4.2.1 Configuration A

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed in the curved section of the head phantom to reflect the intended use configuration. The minimum distance between the body of the user and EUT is 1.0 cm (thickness of the padded belt) in normal usage. Appendix C describes the normal EUT wearing position and distance justification. During test, the EUT was placed direct contact with the outer shell of the head phantom which simulates the sharp of a human body. The 0cm distance between the EUT and the phantom shell represents the worst case condition (belt thickness = 0 cm) in RF coupling. The EUT was shifted left and right to ensure that the whole inside area of EUT was covered during SAR tests. Please refer to figure 1a below for the positions details.

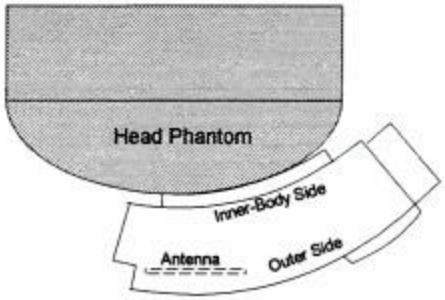


Figure 1a: Test Configuration A (Intended use position)

1.4.3 Test Condition

During tests, the worst case data (max. RF coupling) was determined with following conditions:

EUT Antenna	Fixed, Internal	Orientation	N/A
Usage	Body worn	Distance between antenna axis and the liquid surface:	Configuration A: 4.5 cm Configuration B: 1.7 cm
Simulating human hand	Not Used	EUT Battery	Fully Charged
Power output	240 mW (Maximum)		

The spatial peak SAR values were accessed for lowest, middle and highest operating channels defined by the manufacturer.

Antenna port power measurement was performed, with the HP 435A power meter, before and after the SAR tests to ensure that the EUT operated at the highest power level.

1.5 Modifications required for compliance

No modifications were implemented by Intertek Testing Services.

1.6 Additions, deviations and exclusions from standards

Due to the unavailability of suitable body simulation tissue at 2.4 GHz, tests were performed using 1.8 GHz Brian simulation tissue. Using the Sensitivity factor S(x) given by test equipment manufacturer, the percentage change in SAR per percent change in the controlling parameter is calculated :

$$S(x) = \frac{\partial SAR / SAR}{\partial x / x}$$

Where the controlling parameters x are:

- S(x): SAR Sensitivities (given by equipment manufacturer)
- ε: Permitivity
- σ: Conductivity
- ρ: Brian density (= one over integration volume)
- d: Distance of radiator from the liquid surface

Measured SAR values at 2.4 GHz are approximately to be 20 % higher.

Results:

2.5 Test Results

The results on the following page(s) were obtained when the device was tested in the condition described in this report. Detail measurement data and plots which reveal information about the location of the maximum SAR with respect to the device, are reported in Appendix A.

Trade Name:	Talkman	**Model No.:**	TT-500
Serial No.:	Not Labeled	**Test Engineer:**	CK

TEST CONDITIONS			
Ambient Temperature	22.6 °C	Relative Humidity	52 %
Test Signal Source	Test Mode	Signal Modulation	CW
Output Power Before SAR Test	240 mW	Output Power After SAR Test	240 mW
Test Duration	25 Min.	Number of Battery Change	1

Configuration A: Intended Use Position [a)]				
Channel	Operating Mode	Duty Cycle ratio	Antenna Position	Measured SAR_{1g} (mW/g)
2450 MHz	CW	1	4.3 cm from antenna to inside of EUT case	0.0331

Configuration B: 10 cm between EUT and Phantom				
Channel	Operating Mode	Duty Cycle ratio	Antenna Position	Measured SAR_{1g} (mW/g)
2402 MHz	CW	1	1.5 cm from antenna to inside of EUT case	0.688
2450 MHz	CW	1	1.5 cm from antenna to inside of EUT case	0.775
2480 MHz	CW	1	1.5 cm from antenna to inside of EUT case	0.619

Note: a) Worst case data were reported
b) Duty cycle factor included in the measured SAR data
c) Measured results are approximately 20% higher

2 SAR EVALUATION

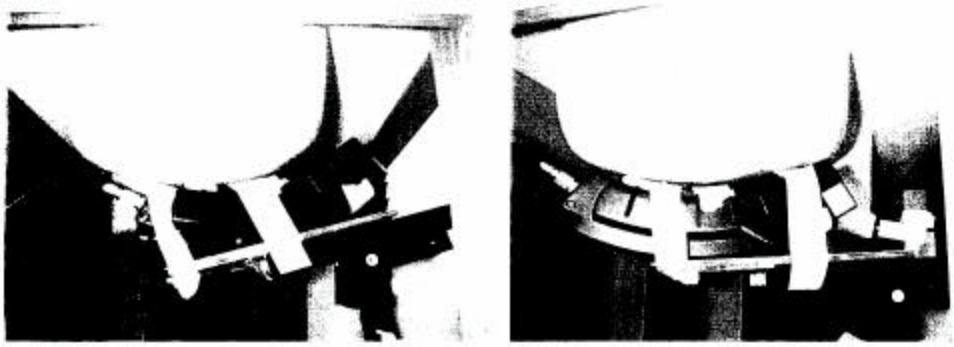
2.1 SAR Limits

The following FCC limits for SAR apply to devices operate in General Population/Uncontrolled Exposure environment:

EXPOSURE (General Population/Uncontrolled Exposure environment)	SAR (W/kg)
Average over the whole body	0.08
Spatial Peak (1g)	1.60
Spatial Peak for hands, wrists, feet and ankles (10g)	4.00

2.2 Configuration Photographs

at 2450 MHz



Configuration A: Intended Usage

Configuration B: 10 mm between outer case of EUT and Phantom

Vocollect

September 5, 2000

Vocollect
Verbal Computing Systems™

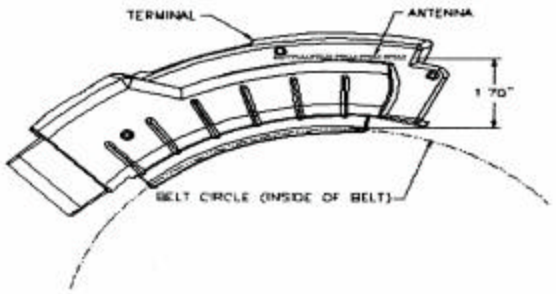
Wearing a Talkman and Heads

The following is the recommended method of wearing the Talkman and heads
headset cord, and therefore damage to equipment or user.

- Wear the Talkman with the connectors facing backward and the battery facing for
  should be routed up the user's back to keep it out of the way.
- Trap the headset cord behind the Talkman mounting "tongue" on the belt.
- Use one clip to attach the headset cord to the user's clothing or the Talkman belt
  clip to attach the headset cord at shoulder level.
- The pronounced cord loop behind the Talkman is there to show the correct routin
  Talkman properly, this loop should be minimized.

Vocollect

September 5, 2000



Vocollect

September 5, 2000

Vocollect, Inc.
701 Rodi Road, Pittsburgh, PA 15235
412-829-8145 FAX 412-829-0972

February 22, 1999

Mr. Bill DeRouchey
Symbol Technologies, Inc.
2145 Hamilton Avenue
San Jose, CA 95125

H9PLA3020

Dear Bill:

1) Vocollect requests SAR testing for our Talkman Open product with the Symbol LA-3020-500 PC card radio.

2) We have added the Symbol radio to our BOM.

3) The measured distance from the skin to the antenna is at minimum 2.1 inches. The distance from the antenna to the inside of the case is 1.70 inches, and the product is mounted on a padded belt of at least 0.40 inch thickness (0.45+ inches typical). A second strap on the outside of padded belt secures the unit, so the full padding width (and probably more) is between the antenna and the skin.

4) We have added a sketch of the antenna orientation inside the Talkman Open.

5) Our human duty cycle is nominally 7 hours of operation per 24 hours, but is sometimes nominally worn for 8 hours per 24 hours (some workers don't remove the belt during breaks and lunch). Normal workweek is 40 or 44 hours per 7 days. Warehouse order pickers normally get a ½ hour lunch and two ¼ hour breaks. Per my email, we are interested in knowing how the sporadic nature of spread spectrum traffic, which is different than telephone protocols like CDMA and TDMA, is accounted for in the SAR measurement tests. Can we account in the tests that the level of transmitted traffic in our typical applications is far less than the level of transmitted traffic in other applications even on spread spectrum, such as voice over IP phones? i.e. Is the transmitter loaded using ping, or some other application? How often do transmissions occur? What size packets? Or is a carrier wave used?

6) Per our conversation, we have a customer expressing interest in Vocollect supporting a Symbol network. If these talks continue, we may at the last minute switch the SAR test to the 1 Mbps radio, to avoid any doubt we can support a Spring protocol network. You are now checking to see if you can supply us with the Spring protocol firmware now for the 2 Mbps radios, to mitigate this concern.

7) Since the SAR requirements are new, I am very interested in observing the tests and getting direct feedback from the testing organization.

Sincerely yours,

Jim Logan
Director, New Products