M/A-COM Response to CRN 22278:

We believe that the FCC's fundamental concern with M/A-COM's RF Exposure submission lies in our assertion that RF leakage from components within the equipment case is a negligible contribution to the SAR. We base this belief upon the issues raised in CRN 22086 as well as the subject correspondence. We understand that this is a critical element of the numerical analyses in our submission and offer the following discussion to remedy this concern. As this discussion incorporates detailed engineering drawings, we request that those items marked proprietary be kept confidential.

RF shielding is major consideration in handheld radio design for both safety and operational considerations. The close proximity of RF and digital assemblies within the BV8P801T (see Figures 1 and 2) requires careful attention to RF shielding design to ensure proper equipment operation. This is accomplished with continuous copper ground planes within Printed Circuit Boards (PCB's) as well as individual 0.008-in thick aluminum shields. The use of these measures in combination with a solid aluminum chassis reduces the RF leakage from the equipment housing to negligible levels.

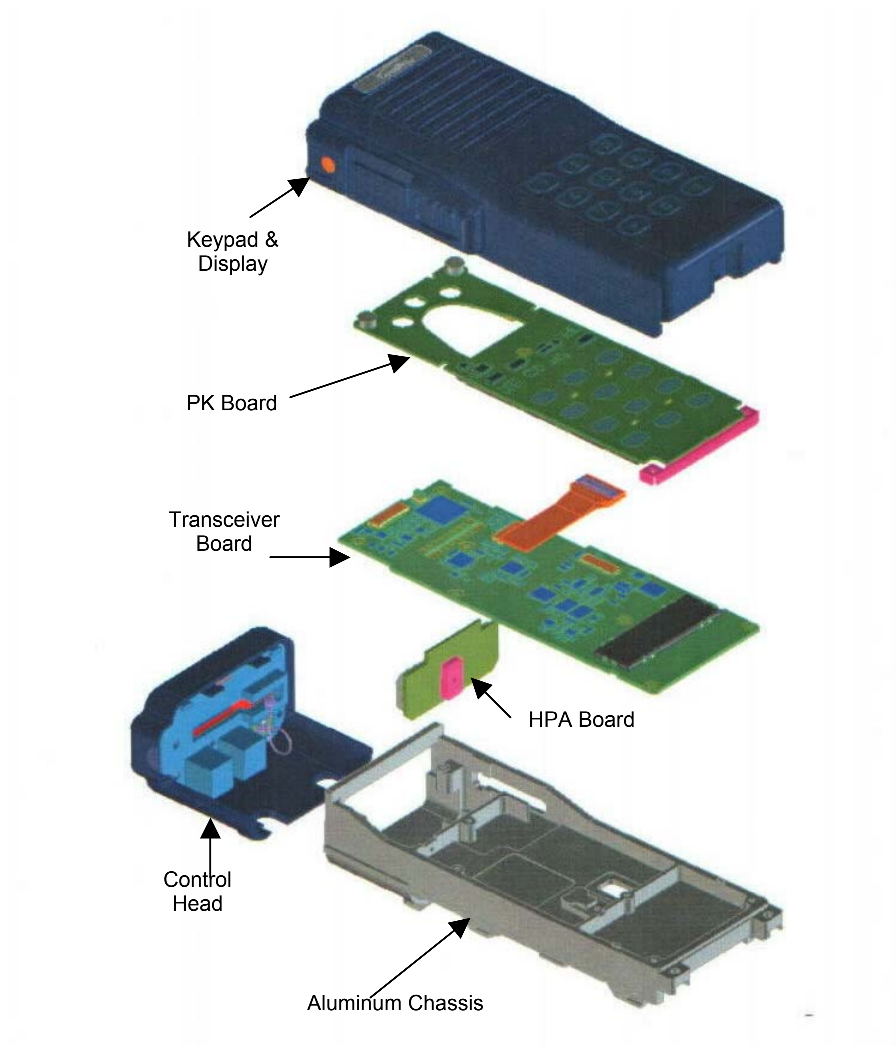

Figure 1 - BV8P801T Exploded Assembly Sketch

M/A-COM Response to CRN 22278 (continued):

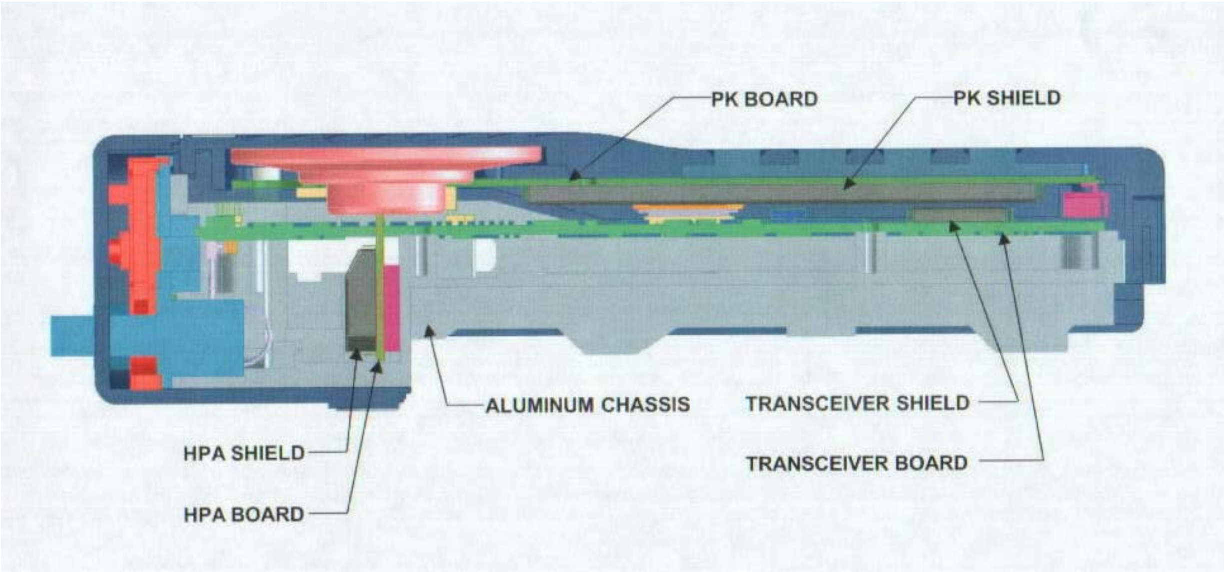

Figure 2 -BV8P801T Cross-Section Sketch

The High Power Amplifier (HPA), shown in Figure 3, is enclosed by a 0.008-in thick aluminum shield, also shown in the figure. Evaluating this shield requires recognizing that the minimum attenuation occurs at the lowest end of the operating frequency (806 MHz) and shield discontinuities will further limit the shielding effectiveness. The theoretical attenuation of the shield at 806 MHz is > 500 dB. Taking into account shield discontinuities, the minimum expected attenuation is 40 dB, corresponding to a maximum RF leakage of < -3.5 dBm (< 0.5 mW).

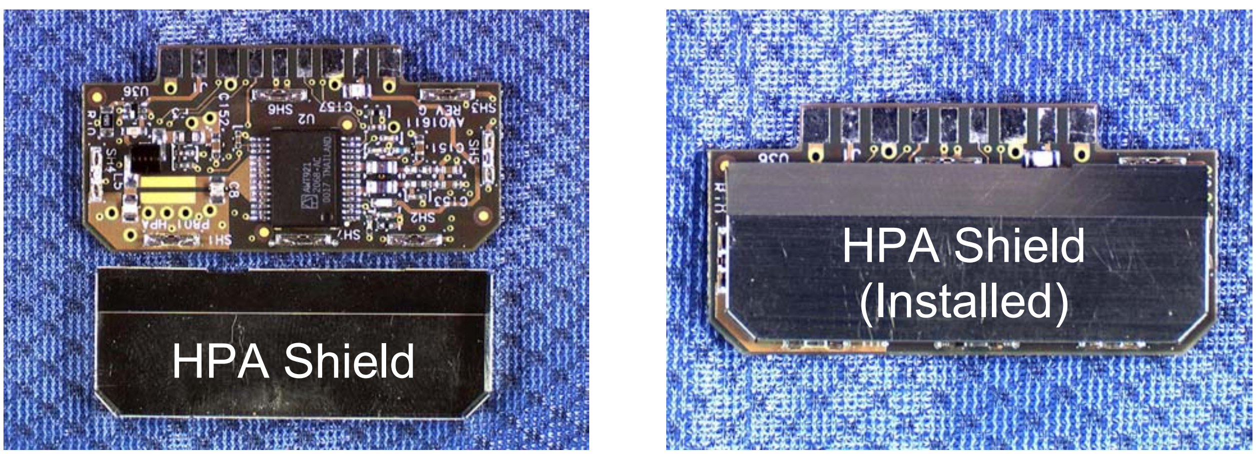

Figure 3 - HPA Board & Shield

The HPA drive circuitry is located on the lower side of the Transceiver Board (see Figure 2). The maximum drive level from this circuitry to the HPA is + 17 dBm when the amplifier is in saturation. Two 0.0015-inch thick copper ground planes within the Transceiver board provide RF shielding to minimize leakage from this circuitry (see Figures 4 and 5). The attenuation of the total 0.030-inch of copper ground plane is approximately 40 dB, making RF leakage from the HPA drive circuitry negligible.

M/A-COM Response to CRN 22278 (continued):

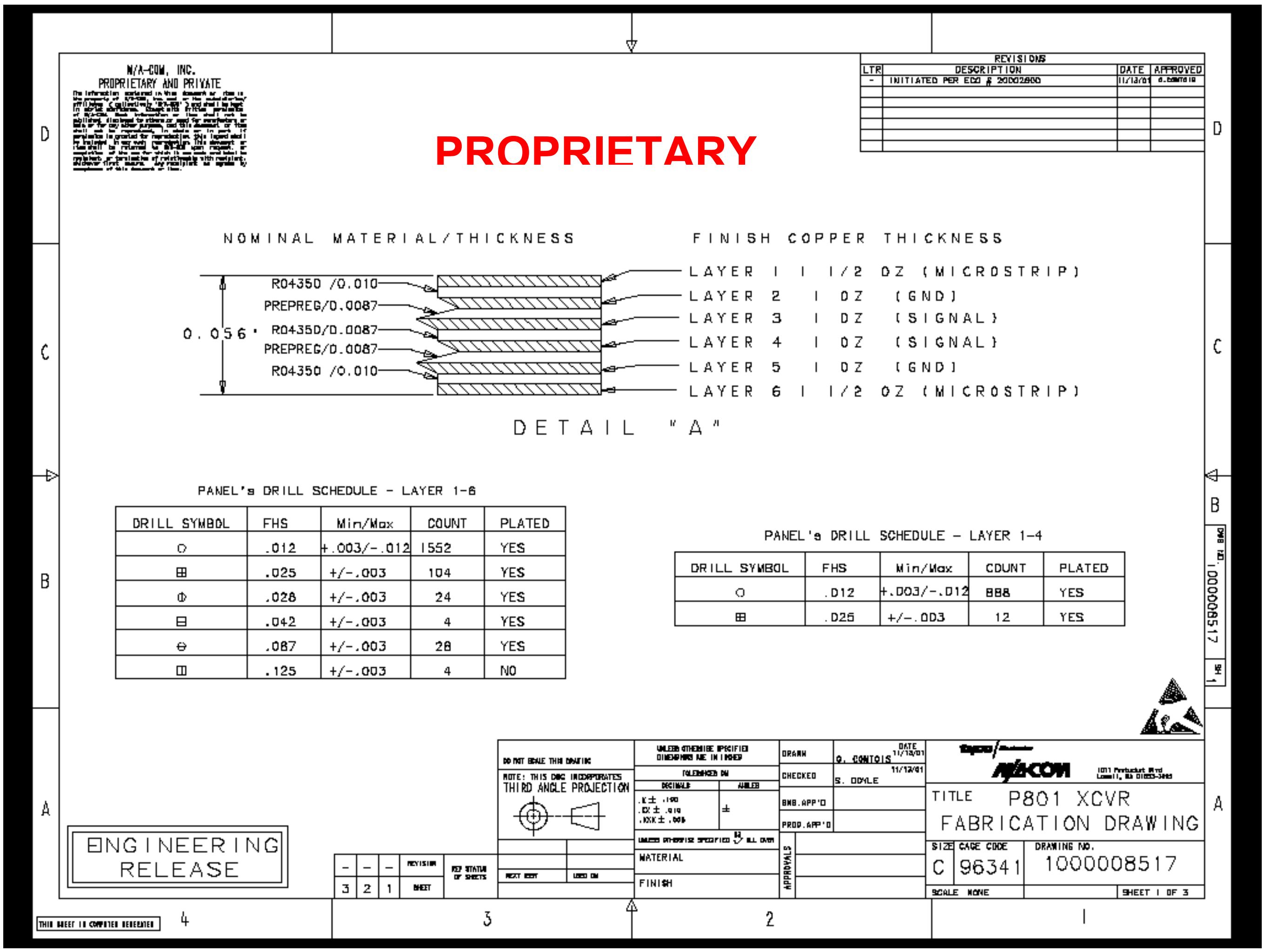

Figure 4 - Transceiver Board Fabrication Drawing - Cross-Section

M/A-COM Response to CRN 22278 (continued):

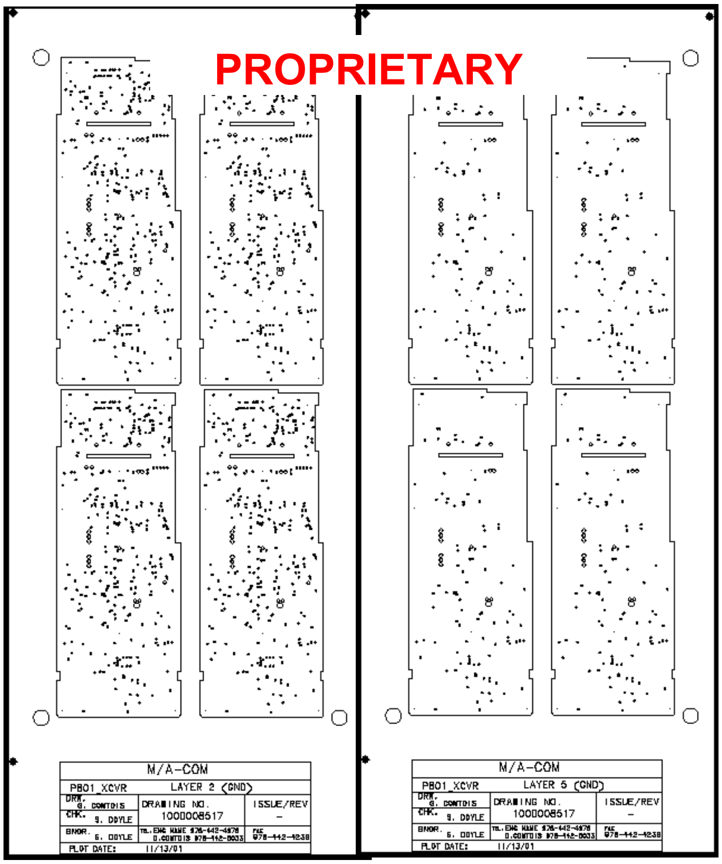

Figure 5 - Transceiver Board Artwork for Groundplanes

The upper side of the Transceiver board contains receiver circuitry which generates negligible RF power. One RF shield is installed over the receiver Local Oscillators in this circuitry (see Figure 5).

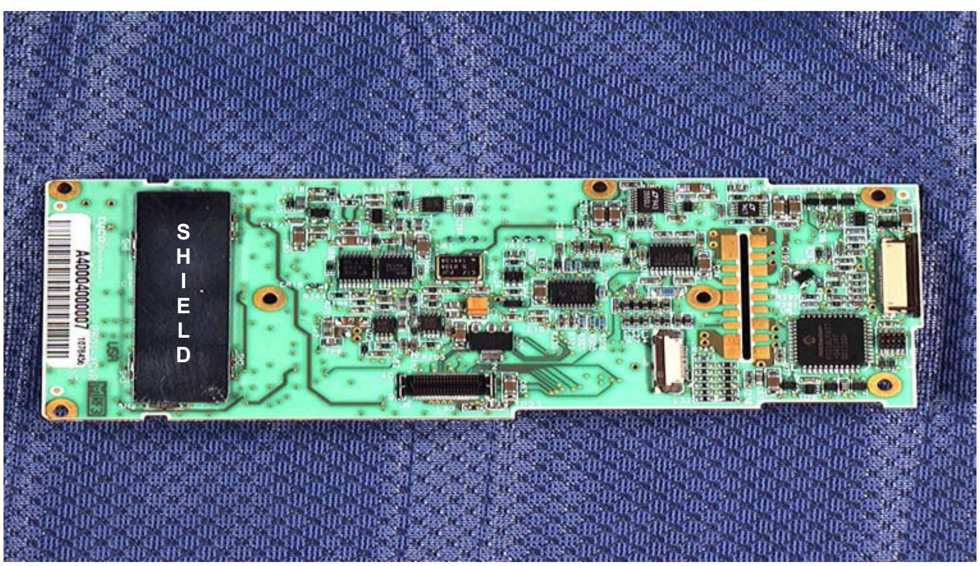

Figure 6 - Transceiver Board with Shield Installed

M/A-COM Response to CRN 22278 (continued):

The PK Board (see Figure 6) located above the Transceiver also incorporates a ground plane (0.0007-inch copper) and an aluminum shield. This shielding further limits RF leakage from circuitry located below it.

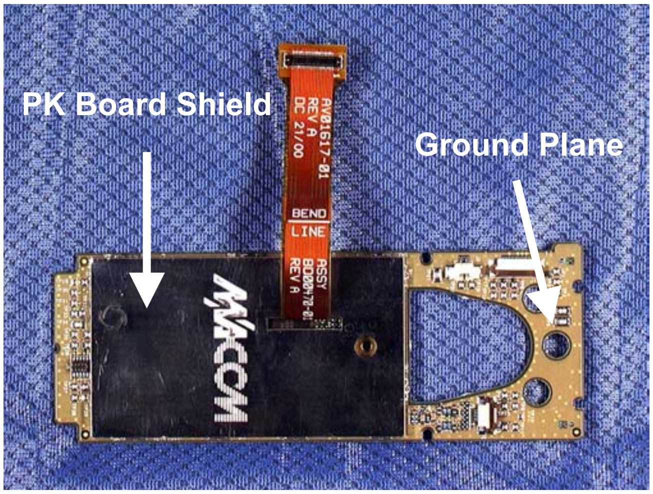

Figure 6a - Transceiver Side

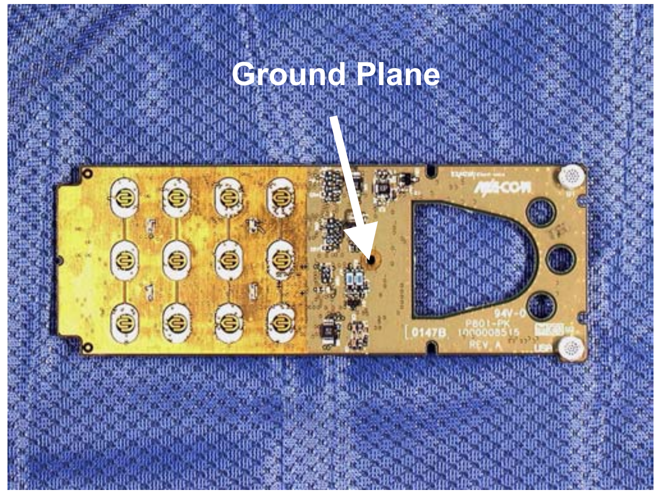

Figure 6b - Keypad Side

Figure 6 - PK Board

The BV8P801T assembly includes a solid aluminum chassis which provides complete shielding of RF leakage from the bottom of the radio. Figure 7 shows a cut-away of a BV8P801T that

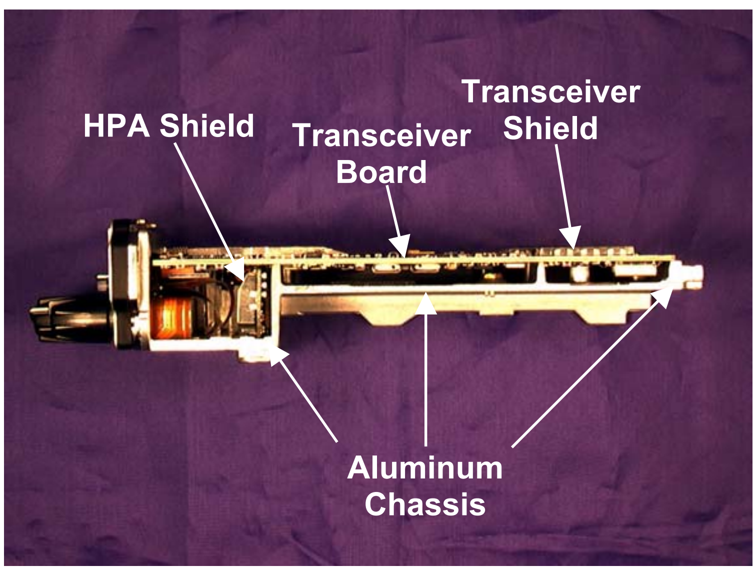

Figure 7 - BV8P801T Cross-Section Photograph (Keypad and PK Board Removed)

clearly demonstrates the total shielded enclosure of the RF circuitry within the equipment. Figure 8 provides a close-up view of the HPA Board mounting where the HPA Shield, the aluminum chassis and the Transceiver board with its imbedded ground planes provide multiple layers of shielding of the HPA.

M/A-COM Response to CRN 22278 (continued):

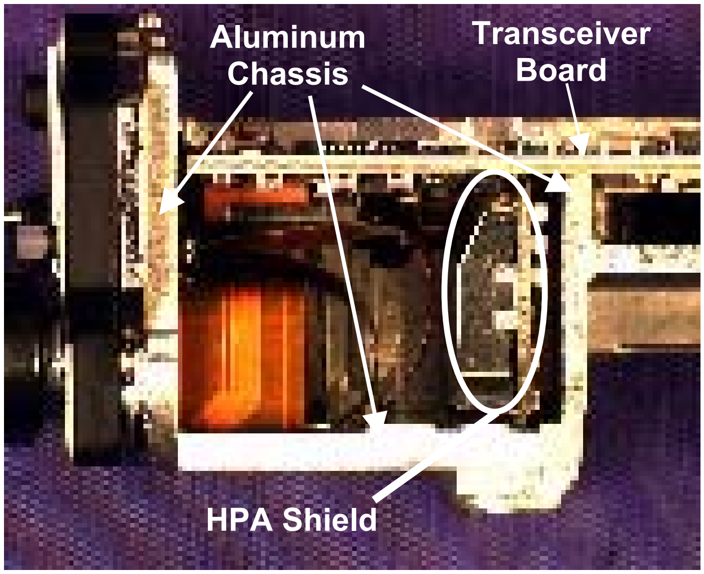

Figure 8 - BV8P801T Close-up Cross-Section Photograph - HPA Board Shielding

In summary, all circuitry carrying high RF currents within the BV8P801T is enclosed by substantial shielding. The following table summarizes the major elements of this shielding:

RF Circuitry	Major Shielding Elements
HPA (HPA Board)	• 0.008-inch Aluminum shield • Aluminum chassis (5 sides) • (2) X 0.0015-inch Copper Ground Planes (Transceiver Board)
HPA Drive Circuitry (Transceiver Board)	• Aluminum chassis (5 sides) • (2) X 0.0015-inch Copper Ground Planes (Transceiver Board) • 0.0007-inch Copper Ground Plane (PK Board) • 0.008-inch Aluminum Shield (PK Board)

Based upon a conservative evaluation of the RF attenuation of these shielding structures the maximum RF power leaking out of the BV8P801T case will not exceed 0.5 mW

To eliminate the possibility of an unforeseen source of RF leakage, we evaluated the field strength at the carrier frequency of a BV8P801T at Parker-Chomerics, our EMI/EMC test house. Measurements were made at a distance of 3 meters from the equipment while it was transmitting at full power into a 50-ohm load. We calculated the highest power into an isotropic radiator that could produce the maximum measured field strength of 0.042 V/m as 0.52 mW. Because the power radiated as leakage fields are non-isotropic, this result overestimates the actual RF leakage power. Even at an overstated level, the indicated leakage power is more than 1000 times less than the power radiated by antenna. Details of the measurement and calculations are provided in Appendix 1.

In addition to the preceding discussion, we provide a summary of the RF shielding considerations for the BV8P-801T, a previous model of this equipment, in Appendix 2 for reference. This equipment received an FCC Equipment Authorization Grant in 2001.

M/A-COM Response to CRN 22278 (continued):

In conclusion, we have presented our rationale for modeling the BV8P801T portable radio case with negligible RF energy leakage for SAR evaluation purposes. The predicted leakage power is lower than the power radiated by the antenna by a factor greater than 1000. As there are no differences between the BV8P801T and the BV8P-801T external to the cases, we submit that the RF Exposure exhibits presented for this filing are in accord with FCC requirements.

M/A-COM Response to CRN 22278 (continued):
APPENDIX 1 - RF Leakage Field Strength Evaluation

An evaluation of the RF leakage field strength of the BV8P801T was conducted at Parker-Chomerics, our EMI/EMC test house. The equipment under test was operated at full power, transmitting into a 50-ohm load. A search was done in azimuth and elevation for maximum field strength at the carrier frequency in both horizontal and vertical polarization's. Tests were conducted at the frequencies at the upper and lower ends of the band, as well as mid-band (see Figure A1-1 for the test geometry).

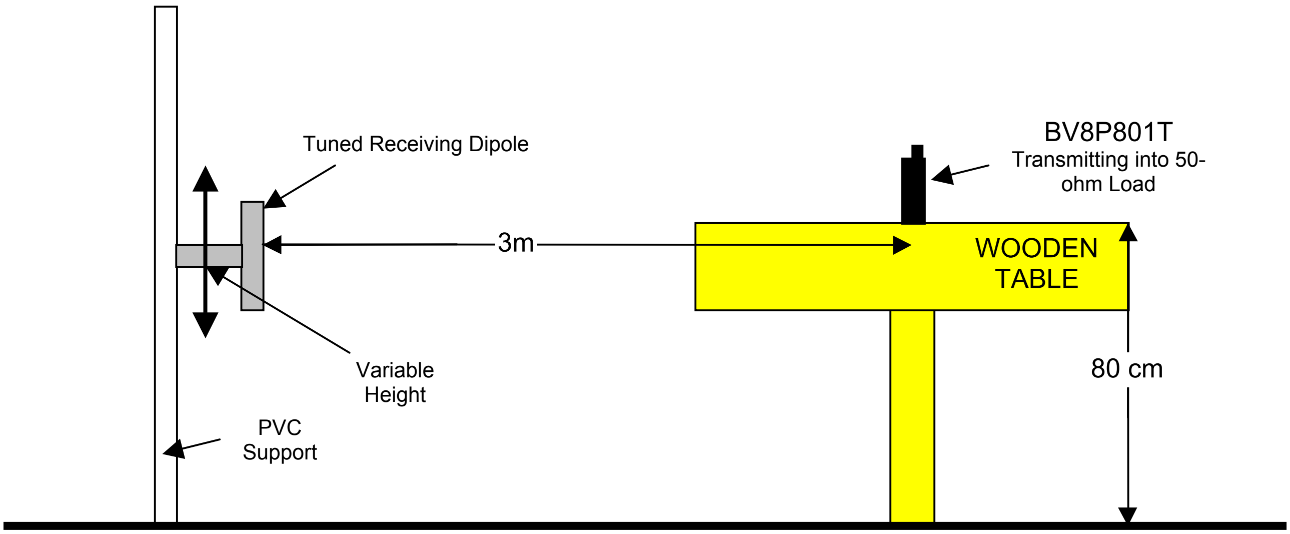

Figure A1-1 - Leakage Field Test Geometry

A calculation was made to determine maximum power into an isotropic radiator that would produce the same field strengths as those measured according to the following equation:

$$P_t = \frac{4\pi R^2 E^2}{377}$$

As the leakage fields are non-isotropic, this calculation does overestimate the radiated power. The following table provides the results of this measurement and associated calculations:

Frequency	Antenna Distance	Voltage	Antenna Height	Polarization	Antenna Factor + Cable Loss	Field Level	Field Level	Isotropic Power	Isotropic Power
(MHz)	(m)	(dBμV)	(in)		(dB)	(dBμV/m)	(V/m)	(mW)	(dBm)
806.0125	3	54.5	58	Vertical	31.4	85.9	0.0197	0.117	-9.3
823.9875	3	55.5	54.5	Vertical	31.4	86.9	0.0221	0.147	-8.3
816.3625	3	61	55	Vertical	31.4	92.4	0.0417	0.521	-2.8
806.0125	3	48.5	56	Horizontal	31.4	79.9	0.0099	0.029	-15.3
816.3625	3	52	54	Horizontal	31.4	83.4	0.0148	0.066	-11.8
823.9875	3	47	53.5	Horizontal	31.4	78.4	0.0083	0.021	-16.8

The maximum leakage power calculated from this model was 0.52 mW, or nearly - 3dBm. This result indicates that no unforeseen sources of RF leakage through the case of the BV8P801T are present.

M/A-COM Response to CRN 22278 (continued):
APPENDIX 2 - BV8P-801T RF Shielding

This appendix provides a brief summary of the RF shielding considerations for the BV8P-801T, an earlier model of the equipment which is the subject of the current filing. The BV8P-801T received and FCC Equipment Authorization Grant in February 2001 and this information is being provided for reference only.

The BV8P-801T assembly is shown in cross-section in Figure A2-1. In addition to a 0.008-inch aluminum shield, the HPA is also shielded by the solid aluminum chassis and the overlying Transceiver board. The Transceiver board incorporates two continuous, 0.001-inch copper ground planes. These ground planes isolate all HPA drive circuitry radiation to the cavity below the board. The PK board, with its 0.008-inch aluminum shield and 0.0007-inch copper ground plane lies above the Transceiver board, providing additional shielding of the RF generating circuitry on the underlying boards.

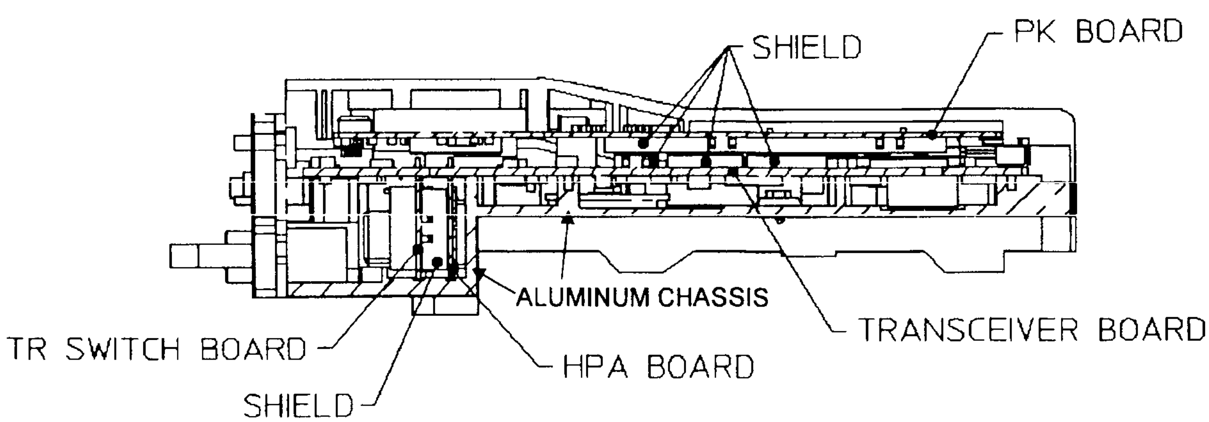

Figure A2-1 - BV8P-801T Cross-Section Sketch

Differences which may be noted between the BV8P-801T and the BV8P801T are given in the table below:

BV8P-801T Feature	BV8P801T Feature	Comments
TR Switch Board	No TR Switch Board Used	No effect on RF Leakage
Three Transceiver Board Shields	One Transceiver Board Shield	Shields used on receiver circuitry - No effect on RF Leakage

The BV8P-801T included the same solid aluminum chassis as the BV8P801T. Figure A2-2 shows a cut-away of the BV8P-801T demonstrating the total shielded enclosure of the RF circuitry within the equipment. Figure A2-3 provides a close-up view of the HPA Board mounting.

M/A-COM Response to CRN 22278 (continued):
APPENDIX 2 - BV8P-801T RF Shielding (continued)

In summary, the BV8P-801T employed all of the major elements of RF shielding currently in place in the BV8P801T.