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FROM : National Wildfire Coordinating Group
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SUBJECT : SAFETY ADVISORY : RACAL 25 POWER CONSUMPTION

IMPORTANT COMMUNICATIONS NOTICE

RACAL 25 POWER CONSUMPTION

July 20, 2004

Introduction

Power consumption by the new digital (P25) portable radios has been a major concern, and field issue, ever since their introduction into the fire community. Due to the increased amount of electronics within the radio, and the larger band spread requirements (136 – 174 MHz), a digital radio requires more current than an older analog only radio. Non-rechargeable battery technologies have just not kept up with the increased current demands like rechargeable batteries have. The manufacturer's response to their radio's increased current demands has been to build larger cell count clamshells. This, unfortunately, has not been the solution we all had hoped for.

Thales' Racal 25 Current Draw Issue

The Racal 25 radio has never been known for its battery life when operated on their 10 cell AA battery pack (clamshell). This issue has become even more prevalent with their update to the "503" and later board sets. An apparent loss of "talk time" has prompted a look into the cause, and possible, solution to the issue. The National Interagency Incident Communications Division (NIICD), in conjunction with Thales Communications, Inc., has investigated the situation and has come up with the following.

Brief History

In the early stages of testing the new digital P25 radios, it was discovered that the effective communications range of the Racal 25 could be increased if the supplied "cut-band" antenna was

replaced with the full band spread Motorola antenna. This prompted Racal to upgrade the antenna connector on their radios and to offer the Motorola antenna as an option. It has recently been discovered that the combination of the Motorola broad band antenna and the later model board sets (503 and above) has caused a significant increase in transmit current requirements.

Testing

The NIICD Engineering and Development Section and Thales Communications have recently performed numerous tests on the Racal 25 utilizing different antennas. The goal of the testing was to reduce the overall power consumption of the radio while still preserving the communications capabilities of the radios. The NIICD tests were conducted within the Division's engineering lab, on the NIFC voice check station and in the field, both portable-to-portable and through a NIFC repeater, on frequencies ranging from 154 to 174 MHz.

A technical report detailing the tests and their results can soon be found on the NIICD's hotsheet web site at www.fs.fed.us/fire/niicd/Hotsheet/Hotsheet.html.

Results and Recommendation

A significant change (reduction) in the Racal 25's transmit current requirements can be achieved by utilizing different antennas on the radio. Within the 162 to 174 MHz frequency range, a reduction of over 50% in transmit current draw can be achieved.

For radio use within the 162 – 174 MHz band, the NIICD recommends the use of a Centurion 495500, EXH-170-SF. The Centurion SXB165SF works almost as well as the Centurion EXH-170-SF. The end-user may not be able to tell any difference between the two antennas. The Centurion ¼ wave, spring base, BNC antenna (with adapter) can also be used. When fully extended, the telescoping antenna works well within this band.

PLEASE NOTE: Even though the above antennas are designed (cut) to operate in the 162 – 174 MHz band, they do operate in the 150 MHz band without a significant reduction in propagation characteristics and increase in current draw.

For the lower end of the spectrum, the Motorola wideband antenna works very well on the radio.

Additional, Future Testing

Life cycle testing of the 10 battery AA clamshell has not been done since the unit was originally accepted on the DOI Digital Radio Contract. Field testing of several prototypes of the new Hybrid Battery (Li-ion rechargeable battery/charging regulator/AA clamshell combination) was accomplished during the last two fire seasons. The prototypes of the new hybrid battery demonstrated a tremendous improvement in battery life, as well as, having the capacity to operate the radio at high wattage settings. Testing of both the AA clamshell and the hybrid battery will continue this field season. The results of the tests will be published as soon as they are completed.

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