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August 19, 1997

Mr. Greg Czumak
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FCC-Johnson Controls Letter about vehicle certification

Re: Our File 05238/002041

Dear Greg:

This is to follow up our meeting at the FCC Labs on June 3, 1997, attended by you, Ed Gibbons, Paul Duckworth of Prince Corporation and me. The purpose of the meeting was to develop an updated test procedure for the Prince universal garage door opener (UGDO) to accommodate the various types of automobiles in which the device is now being factory-installed.

In previous correspondence, Ed set forth the basic test procedures for measuring the UGDO on an open area test site. Ed advised Prince that, historically, "in vehicle" testing for garage door openers had never been authorized by the Commission due to the wide variations in vehicle shielding and the mobility of battery-powered door openers. For this reason, Prince's UGDO was required to follow the traditional door opener test procedures notwithstanding its "fixed" location inside of vehicles. In addition, the UGDO was required to be tested with a representative wiring harness to simulate possible antenna effects.

As explained during our meeting, the UGDO, when factory-installed, is typically located in overhead consoles or vanity-pack visors which are often located high up in the vehicle's metal structure, where RF shielding is the most severe. Prince estimates that its UGDO incurs a 5 to 10 dB signal loss compared to that measured on a test site. To compensate for this attenuation, and thereby restore lost operating range, vehicle manufacturers have had to devise a number of passive enhancements to direct the UGDO's signal away from the vehicle's shielding. Such practice, however, is both time consuming and expensive for Prince as well as for the vehicle manufacturers; moreover, what it accomplishes -- restored signal strength -- could just as easily be accomplished by making a slight adjustment in the UGDO's test procedures.

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As Paul also mentioned during our meeting, the UGDO is currently featured in over 60 automobile models as original equipment or in upgrade packages. Leading garage door opener manufacturers have begun to standardize on the UGDO technology and it is now being integrated with other wireless home security offerings. For the technology to continue to be cost effective for the driving public, however, Prince must find a way to reduce the considerable expense that goes into the tailoring of custom passive designs for every vehicle installation.

You and Ed agreed that Prince's goal could be achieved without compromising the integrity of the Commission's measurement process or increasing the risk of spectrum interference. The following procedures, therefore, were agreed to by the Commission for all future certifications and permissive changes for Prince's UGDO products:

- 1 All testing is to be conducted at FCC-listed sites.
- 2 Prince will obtain a single certification for its UGDO design; all models within each vehicle manufacturer's product line will be Class I or Class II permissive changes to Prince's certified UGDO as described in the procedures that follow.
- 3 Prince currently has two board-level variations of the UGDO for which the RF sections are essentially identical; initial testing will confirm which of the two boards exhibits the "worst case"; the other board will then be considered to be a Class I permissive change:
4. a. Initial testing on the UGDO at the University of Michigan test labs will be conducted at three frequencies (low, middle and high) over the device's operating range and on three duty cycles (low, middle and high); to accommodate future Class II changes, the fundamental emissions at each tested frequency will be permitted to exceed the limits of Rule 15.231 by an amount, to be determined by Prince but estimated to be 10 dB, provided all harmonic and restricted band emissions are within FCC limits as set forth in Rule 15.231 at the selected fundamental levels; this will establish the certification "baseline" for the UGDO such that only funda-

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mental emissions testing will need to be performed in vehicles tested "on site" at an FCC-listed facility.

- b. All modifications to Prince's board design will be tested at the Michigan site under the procedures set forth above; the fundamental emission level will be adjusted so as NOT to exceed the level measured in the original "baseline" report, and Prince will ensure that all harmonics are within the Rule 15.231 limits. If all harmonics are at or below the original levels the modification will be considered a Class I change and nothing further will need to be done. However, if any harmonics are above the original "baseline" (but still within the limits), Prince will conduct an "on site" test in one vehicle and file a Class II change report to the original certification (see ¶6 below) with the FCC -- the filed test report consisting of the new "baseline" test plus the "on site" test. Testing in all vehicle models will not be required for modifications tested in this manner.
5. For each automobile manufacturer, every model in the manufacturer's product line will be tested "on site" with the UGDO installed and operating at three frequencies (low, middle and high). As used here, "on site" refers to the testing of an actual vehicle, with UGDO installed, on a turntable at a listed site; only fundamental emissions will need to be measured "on-site" since compliance of the harmonics and restricted bands has already been confirmed by open field measurements of the UGDO at the Michigan labs; in order to maximize the field strength levels outside the vehicle Prince will be allowed to adjust the fundamental level at any given duty cycle (via digital coding of the UGDO) within the duty cycle range determined in Step 4 above provided the measured fundamental level does not exceed the Rule 15.231 limits. When adjusting the UGDO fundamental level, the maximum level established in Step 4 will not be exceeded in any case.