MSZ Series Operation Description

The MSZ Series of GPS and Cellular Telephone combination products are a modification of the Uniden UH053A Cellular Telephone to allow installation in motor vehicles for vehicle recovery use and/or hands-free cellular telephone and location services.

For vehicle recovery use, the device and antenna can be hidden and used with or without the speaker and microphone, allowing vehicle tracking. This is useful in the event the vehicle is stolen, used without permission, or just for keeping track of where the vehicle may be operated.

The Call Switch, Microphone and Speaker are all optional and external to the MSZ case and connected through the Master Connector. The antennas are connected through SMA feed-through female connectors in the front panel of the main unit.

The antenna is usually located under the dash panel in the front window, well away from the driver or passengers, to stay within radiation requirements. The 8 ohm speaker and electret condenser microphone, if used, may be located within the passenger compartment as required by the user. The push-button used to place a call (if used), may be likewise located at the users convenience. This application also differs from the UH053A in that it is capable of receiving calls as well as placing calls.

The MSZ unit connects to the 12 VDC supply of the vehicle through a 1.5 Amp fuse for circuit protection and a 1N4004 diode. Although not used in the initial implementation of the MSZ series, a second 1N4004 diode and 100 ohm resistor is provided for a back-up battery (also fused) in the event the vehicle battery may be disconnected. This configuration provides a trickle charge to the back-up battery and decouples the primary circuit if the primary supply is lost.

The Power Supply Module is a pre-assembled DC to DC converter that reduces the 12 VDC of the vehicle to 6 VDC required for the UH053A to operate. This voltage is also used for the One-Shot Circuit that is used to activate the CALL function of the UH053A.

Mounting pins in the main board are used to solder the power supply module and UH053A to the main board, and the GPS module is separated from the UH053A phone board and mounted to the main board using bolts. The ribbon cable between the GPS module and UH053A phone board is the cable from the UH053A. Antenna connection to the phone board is made by removing the test jack from the phone board and soldering RG-174 cable from the antenna connection of the duplexer to the SMA female feed-through connector.

The GPS antenna is an active, approximately 30dB gain, 3.3 VDC device. The GPS engine of the UH053A is modified by removing the passive patch antenna originally used, and adding a 39 nH inductor connected to the 3.3 VDC supply on the GPS PC board to feed the active element through the RG-174 coaxial cable. The signal is fed to the GPS engine through a 100 pF capacitor added to the GPS PC board at the connection

of the coaxial lead and the inductor. The GPS engine is always active, monitoring satellite location data and making it available to the UH053A for transmission to the call center on demand.

The one-shot circuit provides a 1 to 2 second switch closure of the CALL button on the UH053A. When the external "CALL" button momentary pushbutton switch is closed, it activates the LM555 timer, taking its output high, providing current to the base of the 2N3704 transistor. This forces the transistor into saturation (the collector voltage drops to less than 0.5 VDC) for the duration of the time delay (set by the 470 K ohm resistor and 3.3 uF capacitor). The collector of the 2N3704 is connected to the CALL pushbutton switch on the UH053A by a wire soldered from the main board with the One-Shot Circuit to the UH053A phone board. The 100 K ohm resistor connected to the collector of the 2N3704 transistor normally holds the CALL switch in a high state. The activation of the one-shot effects a closure of the CALL button on the UH053A when it is forced to the low state. At the end of the time delay, the collector of the 2N3704 returns to the high state, effectively opening the CALL switch of the UH053A.

A call placed by the MSZ device will only go to a predetermined number programmed into the UH053A, as in the original application. The same commands (except for the siren which is not used in the MSZ application) are available to the MSZ device through DTMF sequences sent by the call center. Calls are normally disconnected by sending a DTMF command from the call center. The MSZ will respond by returning an appropriate DTMF response, then disconnecting. The device may also be disconnected by depressing the momentary contact External Call Switch. This has the identical effect as pressing the CALL button in the UH053A, as described above.

The MSZ may also receive calls from the cellular network. The UH053A software places the device in the receive call mode, waiting for a page from the network. While the device can receive calls from anywhere, the MDN of the device is not made available to prevent unauthorized access to the device. Disconnection is made in the same manner as described above.