

OVERVIEW

The KMC is a robust, vehicle mounted, mobile communications controller and GPS tracking device. It provides position reporting and waypoint processing functionality with the optional ability to control a conventional mobile radio. The KMC seamlessly integrates with the Kupe position monitoring and vehicle management system to provide a complete end-to-end vehicle tracking solution.

FUNCTIONS

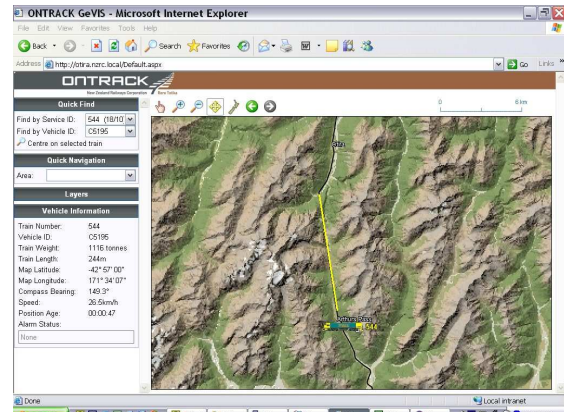
Position Reporting

The KMC can trigger a position report through any combination of elapsed time, distance travelled, waypoint reached or external event detected. It is possible to configure the KMC to send position reports via the GSM cellular phone network and/or an optional mobile voice radio. The combination of these two mechanisms can be used to effectively provide nationwide coverage beyond that provided by traditional cellular only solutions.

Waypoint Processing

The KMC can compare its current location against up to 500 user configurable waypoints. Waypoints are a combination of location, direction and speed and can trigger several different actions, including:

- Sending a position report
- Changing radio channel
- Playing an audible message



GeVis user-interface to the Kupe position reporting and vehicle management system in use by ONTRACK Limited at the National Train Control Centre in Wellington, New Zealand. (Image kindly reproduced by permission of ONTRACK Limited)

Mobile Radio Control

The KMC can control an external mobile radio, providing automated channel change, regular selective calling (Selcall) functions plus 'Extended Selcall' for position reporting outside areas of cellular network coverage.

Kupe Integration

The KMC is fully compatible with the Kupe management system and can be automatically updated or modified over the cellular network. Updates can be applied selectively to individual units, groups of units or globally. This mechanism enables different users to run different configurations to suit their individual needs from the same central management system.

Annunciation of Audible Messages

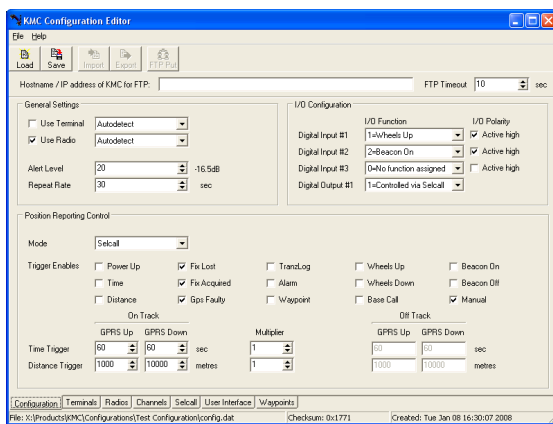
The KMC can store a large number of sound files (managed by Kupe), which can be triggered to play under various operating conditions (e.g. power-up, arrived at waypoint, input detected). The KMC has an integral 3W amplifier and provides a connection point for an external speaker.

Event Logging

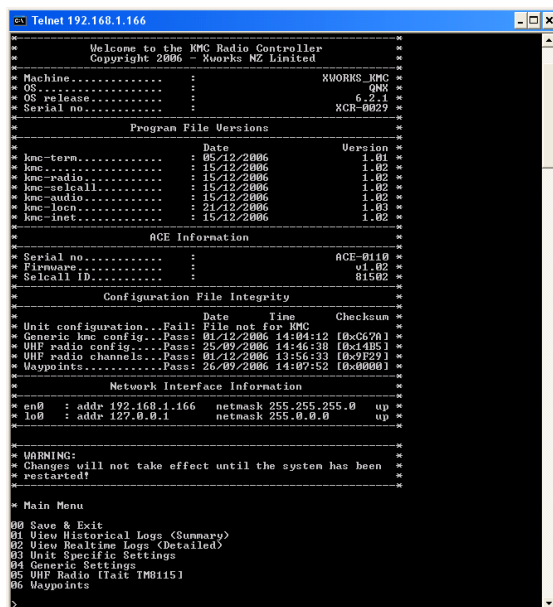
The KMC provides extensive on-board logging of operational events to non-volatile memory to facilitate diagnostic monitoring and fault identification by maintenance staff.

CONFIGURATION

The KMC utilises a set of configuration files to tailor operation to specific user requirements. Configurable parameters include position reporting rate and triggers, radio type and setup, radio channel definitions and waypoint tables. A dedicated Microsoft Windows GUI application is used for building and modifying the configuration files. Each file includes creation date and checksum information to prevent accidental use of invalid configurations.



Embedded within the KMC is a simple application for viewing the current device configuration from a telnet terminal session via the integrated LAN interface.



INTERFACES

Mobile Radio

A dedicated DB15 socket is provided for connection to an external mobile radio. The interface includes audio, serial data and mute/key. Additional control lines are provided to suit specific interfacing needs.

Data Terminal

A dedicated XLR socket is provided for future connection of a mobile data terminal.

GSM Modem

An integrated GSM cellular modem provides wireless transfer of GPRS packet data via standard protocols. A BNC socket enables the GSM antenna to be installed in an optimum position for cellular reception.

GPS

The KMC includes a serial interface with 12Vdc power supply for fitment of a standard GPS receiver (e.g. Garmin GPS16HVS) with NMEA 0183 protocol output.

Digital Inputs

Three opto-isolated inputs are provided for detection of vehicle operational state (e.g. rail wheel position). These may be configured to modify KMC operation (e.g. alter position reporting rate) or force a status report to be sent to the central Kupe management system.

Digital Outputs

A single relay output is provided for control of external equipment (e.g. emergency beacon or alert sounder).

Identity Module

A two-wire interface is provided for connection of an external identity module (supplied separately). This provides a unique 5-digit registration number for the Kupe system and may be used as the Selcall ID to be applied to the connected radio. The dedicated identity module allows for the KMC or connected radio to be swapped for maintenance purposes without affecting the settings applicable to the vehicle. The Kupe system will automatically reconfigure the new equipment based on the registration number.

CONSTRUCTION

The KMC enclosure is precision milled from hard aluminium alloy, providing an exact fit for all components and exceptional toughness for installation in harsh operating environments. All connectors are attached directly to the PCB and are securely captivated within the case, thus eliminating internal wiring harnesses and providing sufficient strain relief to guarantee operational reliability. Individual connectors are provided for each peripheral device and all connectors use different pin and socket configurations to reduce confusion during installation.



SPECIFICATIONS

Processing Core	
Microprocessor	200MHz Intel PXA255, 32-bit RISC (Xscale), 300MIPS
RAM	64MB SDRAM, 32-bit 2MB SRAM, 32-bit, battery backed
ROM	32MB Flash, 32-bit
Operating System	QNX Neutrino 6.2 RTOS
Filing System	30MB, non-volatile, POSIX compatible with wear levelling
Real Time Clock	Non-volatile clock/calendar
Power Supply	
Connector	3-pin Male XLR Socket
Input Voltage	12Vdc (10V to 15V dc)
Physical & Environmental	
Style	Milled aluminium enclosure with integral mounting tabs
Weight	1.273kg
Dimensions	188mm x 127mm x 55mm (L x W x H)

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Ethernet Interface	
Connector	1 x RJ45
Interface	10BaseT, magnetically isolated to 1500V
Wireless Interface	
Modem	Quad band (900/1800MHz and 850/1900MHz) GSM/GPRS
SIM Card	Internal socket
Aerial Connector	Female BNC Socket
GPS Interface	
Connector	4-pin Female XLR Socket
Interface	3-wire RS232 (TXD, RXD, GND)
Protocol	NMEA 0183 (GPRMC, GPGGA)
Auxiliary Power	1 x 12Vdc output
Radio Interface	
Connector	DB15 Male Socket
Audio Connection	2-wire single ended
Audio Input Level	1Vpp
Audio Output Level	1Vpp
Frequency Response	300Hz – 3kHz
Pre & De-emphasis	Individually on/off selectable at 6db/octave over voice band
Selcall Encode/Decode	User selectable tone set with programmable tone period, lead-in and lead-out delays
E-Input Lead (Mute)	0-15V active-low pull-down
M-Output Lead (Key)	Open-drain pull-down
Press to Talk Input (PTT)	0-15V active low pull-down
Digital Inputs	2 x 0-15V active-low pull-down
Digital Outputs	2 x open-drain pull-down
Serial Communication	3-wire (TXD/RXD/GND) TTL (programmable active high or low) 1200 - 115200 baud
Terminal Interface	
Connector	4-pin Male XLR Socket
Interface	3-wire (TXD/RXD/GND) RS232
Auxiliary Power	1 x 12Vdc output
Identity Module	
Connector	3-pin Female XLR Socket
Interface	2-wire
SCADA I/O	
Connector	5-pin Female XLR Socket
Digital Inputs	3 x Opto-Isolated, 6-30Vdc, fused at 200mA
Digital Outputs	1 x Relay pull-down
Audio Processing	
Codec	AC97
Amplifier	3W Mono (Speaker) + 0.5W Mono (Buzzer)
Speaker Connector	5-pin Male XLR socket
Selcall Decoder	90mV rms minimum input level
Debug Serial Interface	
Connector	DB9 Male Socket
Interface	Full featured RS232 115200 baud