VERSA REMOTE™

FULL FEATURED REMOTE CONTROL SYSTEM

OPERATIONS AND INSTALLATION MANUAL

[redacted]

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DESCRIPTION:

KAR-TECH's VERSA REMOTE is a state of the art microprocessor based Radio Frequency (RF) and Controller Area Network (CAN) remote control system designed to provide the machine operator with the ability to remotely operate equipment. The machine operator is still required to follow OSHA and other applicable standards when operating the equipment.

This system is designed with Frequency Hopping Spread Spectrum (FHSS) Technology and Frequency Lock feature to eliminate the RF interference problem in Radio remote products.

The control system consists of two major modules: the remote station (RF transmitter), and the Remote Receivers (Digital Controllers).

Each transmitter is preprogrammed with a special radio ID code. The receiver is programmed to respond only to the transmitter with the ID code for which it is set. This feature allows the equipment to work in wireless mode in close vicinity of each other without interfering with each other. In the event that a transmitter becomes damaged and a new one is needed, the receiver can be reprogrammed to respond to the new transmitter. Please refer to TRANSMITTER AND RECEIVER ID CODE PROGRAMING section of this manual for additional information.

The remote station has two LED indicators, the BATTERY and TRANSMIT indicators. The red BATTERY indicator starts blinking when the battery voltage drops below 9 volts and blinking speed increases while the voltage is decreasing. The transmitter is powered by a rechargeable battery and can be recharged by the +12 volt electrical system of the machine when connected to the machine by the CAN/charger cable or charger cable. An optional AC charger can be used to charge the battery.

Both frequency and duration of use determine the operation time of the battery. Power is being used any time the transmitter power is on. To turn transmitter power off, turn off the power switch on the transmitter. To prolong the battery life and efficiency, the pendant should not

be left on charge for a long period of time and should be discharged periodically. A complete charge can be achieved in 8 hour.

To save battery life, the transmitter is designed with an auto shut down feature. This feature turns transmitter off when none of the switches or buttons is used for specified period. To turn transmitter on again, toggle the power switch to off, then on position.

The transmitter is also able to communicate with the receiver via CAN (Controller Area Network) protocol. This is done by connecting the CAN cable to the transmitter. This feature is designed to allow the user to operate the machine in case of radio interference or discharged transmitter battery.

OUTPUTS:

There are sourcing on/off outputs and proportional outputs on the receiver module. Each output is designed with built in short circuit and overload protection. The on/off outputs are also designed with no load or broken wire status. These statuses are reported to the machine operator via the error code display in the receiver. Refer to the error code chart for a list of error codes.

The Proportional outputs are current regulated and the minimum and maximum requited current as well as ramp for the proportional output is calibrated using a Palm Pilot^{tm}. Each function is programmed for preset factory settings when shipped from Kar-Tech. Refer to factory setting table at the end of this manual.

DISPLAY:

The receiver is designed with an integrated 4-character alpha-numeric red LED Intelligent Display. This display is used to report the status of the outputs, radio communication, etc. to the machine operator. For additional information on error codes refer error code chart of this manual.

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INSTALLATION:

1.Refer to the wiring chart for wiring connections.

2.The receiver should be mounted on shock absorbing mounts. The receiver is best mounted in a protected location.

3.When installing the unit, the main power should run from the battery, through a 20 amps fast blow fuse, to a power switch or relay; then into the receiver unit. For best results connect the receiver main power connections to the auxiliary terminal of the ignition switch, PTO switch, or ignition relay. Use 18 gauge or heavier wire.

4.All connections must be properly insulated to protect against shorts.

5.Seal all connections with a non-conductive silicone grease to prevent against corrosion.

BEFORE APPLYING POWER:

1.Check power and ground polarity.

2.Check wiring harness for possible shorts before connecting remote control to output devices (i.e., valves, relays) by checking each mating pin terminal.

3.Read the rest of this manual.

TRANSMITTER AND RECEIVER ID CODE PROGRAMMING:

Each transmitter is preprogrammed with a special radio ID code. The user can change the ID code by the following procedure.

1. Press the switch down (off)
2. Move the switch.

In this state, both LEDs on the remote start toggling until the user operates a function switch on the remote. After the lights stop flashing, a new ID has been chosen.

The receiver is programmed to respond only to the transmitter with the ID code for which it is set. This feature allows the equipment to work in wireless mode in close vicinity of each other without interfering with each other. In the event that a transmitter becomes damaged and a new one is needed, the receiver can be reprogrammed to respond to the new transmitter ID. A code reset is done by connecting power to the programming pin or installing the mate to the 2 pin WeatherPack connector provided on harnesses (short 2 ft. cable) to short power to program pin. This

connector must be removed after programming ID code is set to prevent from reprogramming ID codes.

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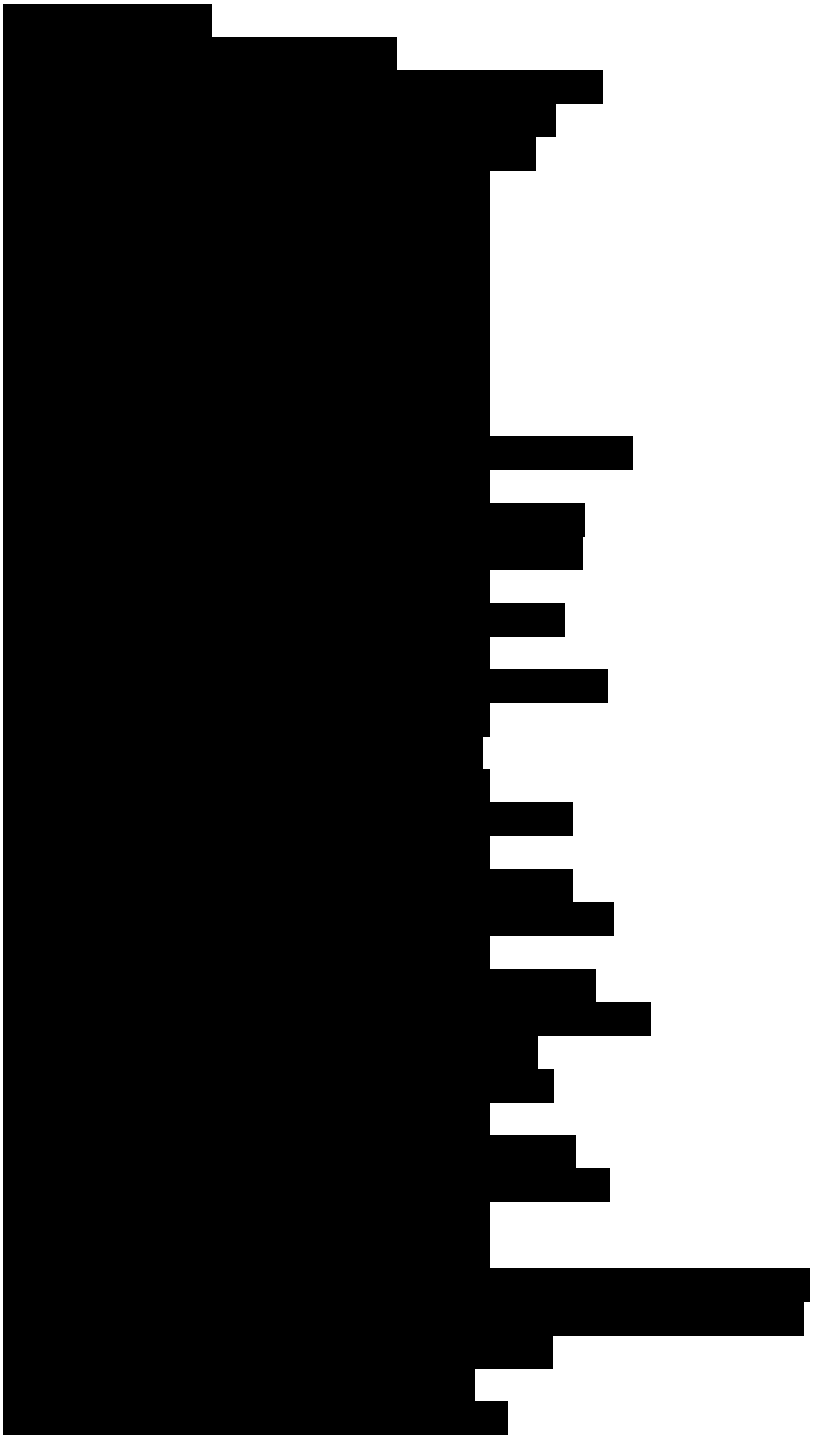
WIRING CHART



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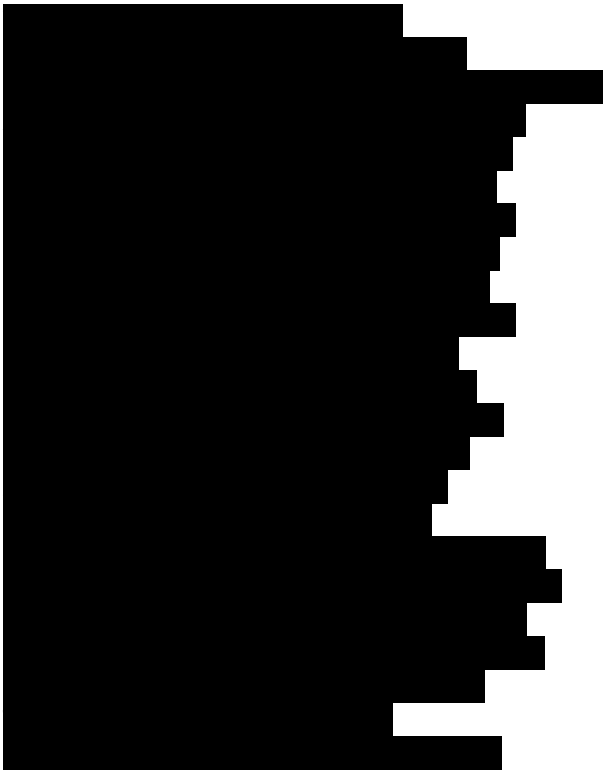

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ROUTINE MAINTENANCE:

1. Clean transmitter and receiver regularly with a damp cloth and mild detergent.

2. Periodically check receiver antenna for tightness.

3. Inspect electrical wiring for wear points or other damage. Repair as required.

4. Inspect all connections for looseness or corrosion. Tighten and/or "seal" as necessary.

MAINTENANCE PRECAUTIONS:

When performing any inspection or maintenance work on the VERSA REMOTE system, always exercise care to prevent injury to yourself and others or damage to the equipment. The following are general precautions that should be closely followed in carrying out any maintenance work.

1. Do not have hydraulic power available to the valves when performing electrical tests or downloading programs.

2. Never operate or test any function if any person is in an area where they could be hurt by being hit or squeezed by the hydraulic equipment.

3. Turn power off before connecting or disconnecting valve coils or other electrical loads.

TROUBLESHOOTING:

This section provides basic operator level troubleshooting for the VERSA REMOTE system. If, after following these instructions, the system still does not function, check the hydraulic system then contact your KAR-TECH representative for further instructions or servicing.

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TROUBLE SHOOTING CHART

PROBLEM	SOLUTION
1. No operation of all functions when a function switch is activated.	1. Check to see if the selector switch is in the proper position. 2. Check that transmitter power is on. 3. Check that receiver power switch is on. 4. Check vehicle wiring for power into the system. 5. Check LED status display for system status. 6. Check for proper grounding of vehicle's electrical circuit. 7. Check vehicle's hydraulic system
2. Certain functions do not work	1. Check the wiring connection from the system to the valve coil or the output function that does not work. 2. Check LED status display for system status. 3. Use frequency lock and lock to a good channel. 4. Check vehicle's hydraulic system 5. Check vehicle's electrical system
3. Function operates intermittently.	1. Check for loose connections. 2. Check LED status display for system status. 3. Check receiver antenna for any damage and proper connection. 4. Use frequency lock and lock to a good channel. 5. Check vehicle's hydraulic system

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ERROR CODE CHART

SPECIFICATIONS

TRANSMITTER

Power supply ..... 9.6 Volt Rechargeable, NIMH battery.

Operating temperature - Radio ..... -30˚C to +70˚C

Storage temperature..... -40˚C to +100˚C

Frequency ..... 902-928 MHz

Transmit power ..... 1 mW

Vibration ..... 3G to 200Hz

Shock 50G

RECEIVER

Power supply voltage ..... 12V nominal, 9V to 35V transient

Operating temperature - Radio ..... -30˚C to +70˚C

Storage temperature..... -40˚C to +100˚C

Frequency ..... 902-928 MHz

On/Off outputs ..... 5.0 Amp. (Protected)

Proportional outputs Frequency ..... 200 Hz

Vibration ..... 3G to 200Hz

Shock 100G

NEMA 12/13

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There are no user-serviceable parts inside the Transmitter or the Receiver. Return the units to the KAR-TECH for service.

Note: For operation with negative ground vehicles only.

WARNING:

The **KAR-TECH** VERSA REMOTE must be operated in compliance with all applicable safety regulations, rules, and practices. Failure to follow required safety practices may result in death or serious injury.

The information, specifications, and illustrations in this manual are those in effect at the time of printing. **KAR-TECH** reserves the right to change specifications or design at any time without notice.

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INSTRUCTION TO THE USER:

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

* Reorient or relocate the receiving antenna.

* Increase the separation between the equipment and receiver.

* Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

* Consult the dealer or an experienced radio/TV technician for help.

This equipment has been certified to comply with the limits for a class B computing device, pursuant to FCC Rules. In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

The term "IC:" before the certification/registration number only signifies that the Industry Canada technical specifications were met.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.