PRELIMINARY

KOD
USER'S GUIDE

Key On Data option card

3/15/07

This Manual covers Modems with the Serial Number…….K0000 and up

Proprietary Data

GDI COMMUNICATIONS, LLC
280 I-80 West Exit 1
PO BOX 1330
Verdi, Nevada 89439
Phone: 775-345-8000
FAX: 775-345-8010
www.sgdi.com

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GLOSSARY

KOD – Key On Data is the term used to describe the process of generating a control signal (RTS) that turns on (keys) the output of a 400 series standalone modem.

DCD – Data Carrier Detect. An EIA RS-232D control signal that can be used to gate RXD to a DTE.

DCE – Data Communications Equipment. A device that converts data from a DTE to a transport stream. For example. The GDI model 400 modem is a DCE that converts RS232 data from a controller to a FSK Telco system.

DTE – Data Terminal Equipment. A device that initiates communication over RS232 lines.

CTS – Clear To Send. A EIA RS-232D control signal that can be used to gate TXD data from a DTE.

Full duplex – A communication system where data can be transmitted in both directions at the same time.

Half duplex - A communication system where data can be transmitted in only one direction at a time.

FSK – Frequency Shift Keying. Communication protocol where data is encoded into binary format and represented by different frequencies.

Host – Any DTE device.

MARK – Signal state of a FSK system that represents a logical "1" value.

Private wire – Telco communication hardware that is leased for private use.

SPACE – Signal state of a FSK system that represents a logical "0" value

0 dBm – Represents the signal level required to produce 1mw in a 600Ω load. Soft carrier

Surface mount parts – Electronic parts that are designed to be soldered to pads instead of vias.

RXD – Receive Data. An EIA RS-232D data signal that transfers information in form of binary data to a DTE.

RTS – Request To send. An EIA RS-232D control signal that can be used to gate TXD to a DTE. The DTE asserts RTS and then waits for the DCE to respond with CTS.

TXD Transmit Data. n EIA RS-232D data signal that transfers information in form of binary data from a DTE.

GENERAL DESCRIPTION

The 400 series KOD option is baud rate independent and thus can be used on any standalone modem that has the circuitry necessary for interfacing to it.

When in "INTERNAL" mode, the KOD monitors the TXD signal line. When the line becomes active with data, the KOD activates RTS

When in "EXTERNAL" mode, the KOD monitors the RXD signal line. When the line becomes active with data, the KOD activates the KOD control signal.

The KOD control signal is like the RTS signal except that it is routed to Pin 9 of the DB9 connector on the rear of the modem for external use.

GENERAL CHARACTERISTICS

Form Factor
board size:
3 x 2.5"

Connector
2x10 pin SIL, 0.100" ctr.

J1 Pin Out

J1 PIN NUMBER	FUNCTION Rev. B	FUNCTION Rev C
1	KOD-RXD	KOD-RXD
2	KOD-EN (JP5)	KOD-EN SW1.2
3	Data-In (RXD)	Data-In (RXD)
4	SW1.2	nc
5	SW1.3	SW1.3
6	SW1.4	SW1.4
7	SW1.5	SW1.5
8	SW1.6	SW1.6
9	KOD-LED	KOD-LED
10	RES#	RES#

J2 Pin Out

J2 PIN NUMBER	FUNCTION Rev. B & Rev. C
1	+5V
2	+5V
3	KOD-TXD# (OUT)
4	TXD-TTL# (IN)
5	+3.3V
6	FSK_RTS#
7	KOD_RTS
8	TXD DIR
9	GRND
10	GRND

Power Requirements
80 ma @ +12V
80 ma @ -12V
Maximum Ripple 500mV

Environmental Operating Ranges
Temperature…….-37° to 74° C
Humidity……0-95% non-condensing

Data Rate and Format
0-19200 Baud serial Asynchronous, by bit

Bit Error Rate…Less than 1 bit in 100,000 bits with a signal to noise ratio of 16 dB.

Serial Interface
Meets EIA RS-232D and CCITT V.24 electrically

Indicators (LED)

Switches

1……..On/Off
2……..Int/Ext
3……..1.6ms
4……..3.3ms
5……..6.6ms
6……..13.3ms
7……..KOD to pin 9
8……..Anti-Streaming Enable*

***Available on the Model 400F only.**

Jumper Options

JP1…600 or 4.75K input Impedance
JP2…Forces RTS ON all the time

Front Edge Test Points

Receive Audio In……REC IN
RS-232 Rec Data…….RXD
RS-232 Transmit data….TXD
Signal Ground…….GND

INSTALLATION

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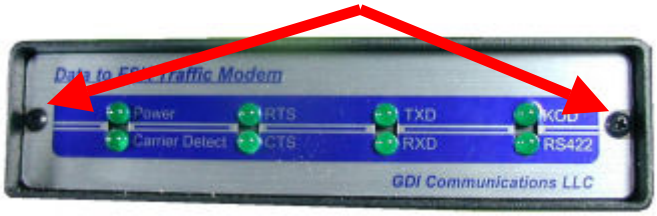
Turn off the power.
Determine the KOD mode.

Internal – (Most of the time) The device connected to the DB9 does not have RTS/CTS handshaking. The KOD will generate a RTS whenever TXD data is detected from the attached device.

External – (Rarely) The Device connected to the DB9 requires an RTS signal. The KOD generates a external RTS on pin 9 (can be switched off) of the DB9 whenever RXD data is detected from the FSK input.

Remove the two front panel screws. Remove the front panel and its shroud together as one piece (keep together as it is possible to mount the shroud upside down).

Front Panel Screws

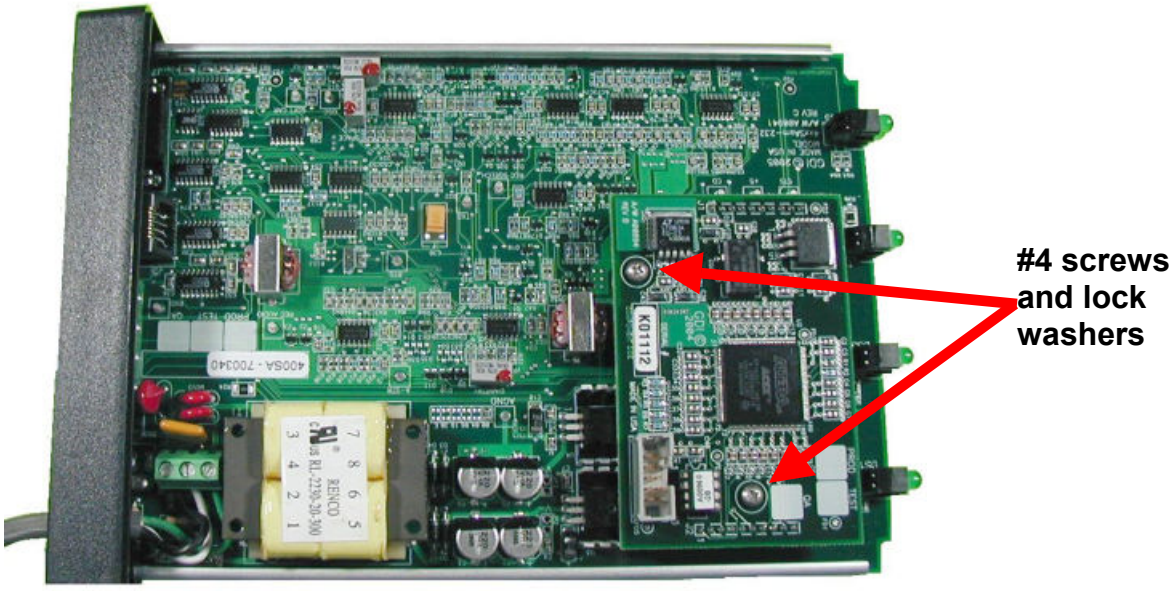


Slide the cover forward

Big IF – If the main PCB of the standalone is a revision B board there will be a jumper near the DB9 labeled JP5. If the KOD is to work in Internal mode, JP5 must be on. If the KOD is to work in External mode, JP5 must be off.

JP5 does not exist on revision C PCBs. Instead, there is a dip switch for selecting between Internal or External KOD.

Align the pins of the KOD with the mating headers on the main board and plug it on. Secure it with two #4 screws and lock washers.



Replace the cover and front panel and secure front panel with the two black anodized screws.

Mark the "KOD Installed Yes" check box with a permanent marker.

ADJUSTMENTS

The timing adjustments for the KOD are made through the access window on the bottom of the modem. The timing sets the time between the leading edge of the RTS/KOD signal and the start of data.

And, it also sets the time between the end of data and the trailing edge of the RTS/KOD signal.

The result is that the data is framed by the RTS/KOD signal. The size of the frame is determined by the timing switch setting.

Timings for the Revision B board are as follows:

Switch	Delay
1	Off/On
2	.4ms
3	.8ms
4	1.6ms
5	6.5ms
6	13.3ms
all off	3.3ms

Timings for the Revision C board are as follows:

Switch	Delay
1	Off/On
2	Ext/Int
3	1.6ms
4	3.3ms
5	6.6ms
6	13.3ms
all off	.8ms
8	Pin 9 Off/ Pin 9 On

THEORY OF OPERATION

The 400 series KOD option is baud rate independent and thus can be used on any standalone modem that has the circuitry necessary for interfacing to it.

When in "INTERNAL" mode, the KOD monitors the TXD signal line. When the line becomes active with data, the KOD activates RTS and starts storing the data in it's First In First Out (FIFO) buffer.

This buffering of the data in a FIFO is how the KOD creates the delay between RTS and the start of data transmission. The timing switches determine the amount of delay and consequentially the amount of data that gets stored.

During this delay time between RTS and data, the MARK frequency is being transmitted on the Audio Out which is also preparing the receiver of the destination modem for data.

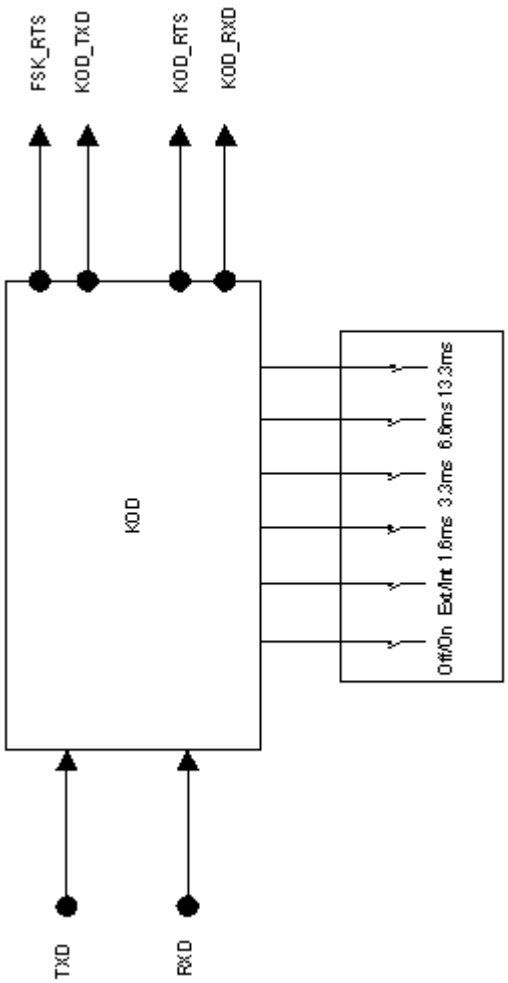
When in "EXTERNAL" mode, the KOD monitors the RXD signal line. When the line becomes active with data, the KOD activates a KOD control signal and starts storing the data in it's First In First Out (FIFO) buffer.

The KOD control signal is like the RTS signal except that it is routed to Pin 9 of the DB9 connector on the rear of the modem.

This KOD signal can be used to key another modem or device. The advantage of using the KOD over DCD is that the timing of the KOD signal can be adjusted while the DCD timing is fixed.

The routing of the KOD signal to Pin 9 is switched off by default. To use the signal externally, the switch has to be closed.

BLOCK DIAGRAM



MAINTENANCE

Preventive Maintenance

As long as the environmental, power and signal requirements are met, the KOD requires no preventative maintenance.

Trouble Analysis

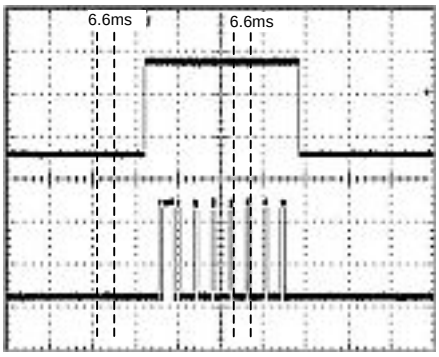
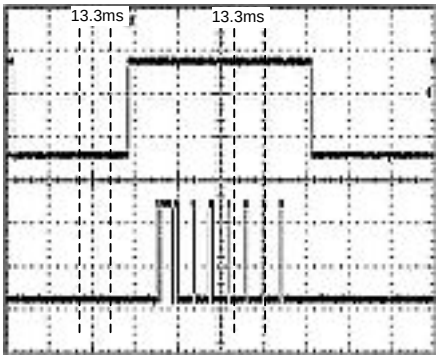
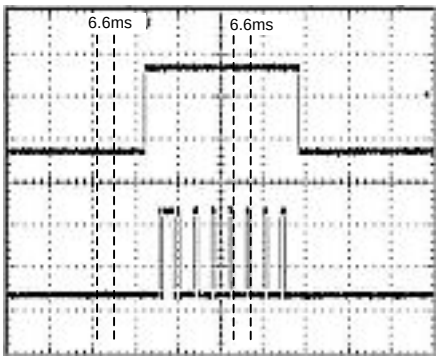
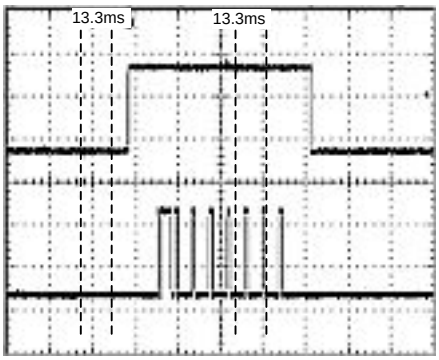
The KOD is a integrated design that takes advantage of modern FPGA technology. While this provides for a lot of functionality in a small package, it precludes traditional trouble shooting methods. The majority of the circuitry is contained inside the 144 pin fine pitch surface mount FPGA which is programmed when the power is turned on from the PROM. On the other hand it is constructed with top quality parts and so you will not experience many failures.

The following chart along with the waveforms will help find some problems if you decide to fix the KOD yourself.

Trouble Shooting Sequence Chart

PROBLEM	CAUSE
The board is non-functioning	Check power coming into the board (J2 Pin 1/2 & J2 Pin5) Check connectors. Check OSC1 Pin3 for 19.66Mhz.
KOD is not generating RTS..	Check J2 pin 4/3 for TXD in/out or J1 pin 3/1 for RXD in/out.
Communications to receiving device not working.	Verify that the timing switches are setup properly. Verify that the mod switch is set properly for Int. or Ext. KOD.

Wave Forms

Signal	Characteristic	Waveform
Internal Mode FSK_RTS# to KOD-TXD# Timing	Configuration switch set to 6.6ms	
Internal Mode FSK_RTS# to KOD-TXD# Timing	Configuration switch set to 13ms	
External Mode KOD_RTS to KOD-RXD Timing	Configuration switch set to 6.6ms	
External Mode KOD_RTS to KOD-RXD Timing	Configuration switch set to 13ms	

Voltage Measurements

TP	Measurement	tolerance
J2 Pin 1	5vdc	±..6vdc
J2 Pin 5	-3.3vdc	±..1vdc

The voltages are supplied from the main board.

Alignment Procedures

The KOD itself does not have any alignment controls.

GDI COMMUNICATIONS, L.L.C.

TRAFFIC EQUIPMENT MANUFACTURER ♦ SPECIALIZING IN COMMUNICATIONS

280 I-80 WEST EXIT 1
P.O. BOX 1330
VERDI, NEVADA 89439
TELEPHONE: 775-345-8000 FAX: 775-345-8010