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## **NOTICE:**

Because of the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the DataRemote modem are used in a normal manner with a well-constructed network, the DataRemote modem should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. DataRemote, Inc., accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the DataRemote modem, or for failure of the DataRemote modem to transmit or receive such data.

## **OVERVIEW**

This documentation describes the features, functions and the interfacing of the CDS-9060 products, to other DTE (Data Terminal Equipment) devices. This manual was written for people who have a basic understanding of DCE (Data Communications Equipment) and DTE products. Refer to the glossary for terms used in this User Guide.

## **CDS-9060 DESCRIPTION**

The CDS-9060 is a cost-effective, self-contained Cellular/PCS (Personal Communication Services) system for remote telemetry, meter reading, data communication and the basic building block for the CDS-9060 AVL (Automatic Vehicle Location) modem. The CDS-9060 is a complete digital cellular or PCS standalone modem. It operates at 800 or 1900MHz CDMA, with the option of Analog AMP's fallback, (Model CDS-9060A) to a standard analog cellular connection. The CDS-9060 series is designed to communicate with a throughput of 300 bps to a maximum of 115,200bps.

The CDS-9060 DCE functions just like a standard landline modem and is compatible with 95 percent of the host modems on the market today, since it uses IS-95A, IS-95B, IS-707, IS-683, SMS and 1XRTT (CDMA2000) CDMA (Code Division Multiple Access) data and voice standards. Using CDMA for remote wireless data retrieval applications, one will experience a much more reliable connection rate than using an analog circuit switch at faster download speeds.

The CDS-9060 is much more than just a standalone wireless modem. Integrated menu features permit configuring the unit locally or remotely. Its four programmable windows permit turning the unit off to conserve power at specified times of day. With the step-by-step menu embedded in the firmware, programming the phone/radio, and various other options can be accomplished without assistance from the cellular provider.

The CDS-9060 is a CDMA only unit with 12 logic inputs and outputs, the CDS-9060A has added features including an analog cellular modem. The CDS-9060G series has the addition of a GPS (Global Positioning System) module along with a second RS-232 port, and 512kb of memory for data logging. Since approximately 97 percent of the United States is covered by either CDMA or analog cellular, the CDS-9060 series ensures coverage in most areas.

Analog or memory/RS-232 port upgrade modules can be purchased at a later date if needed, or you can send your unit to DataRemote to get upgraded at any time for a nominal charge. If the CDMA coverage does not adequately cover the area in which the CDS-9060 will be used, you should order the CDS-9060A

tri-mode CDMA/analog modem, order the analog upgrade module, or send the CDS-9060 for an upgrade. The analog feature enables the CDS-9060A to operate in either analog or digital mode, **at the same low rates as digital service**, with most wireless providers. (Check with your wireless provider for rate structure)

For GPS-AVL applications, the CDS-9060AG provides nationwide coverage. This unit includes a CDMA modem, GPS engine and DRI DRIP Controller, with 512kb of memory for downloading and archiving data, as well as an analog modem module for tracking vehicles anywhere and at anytime, and is compatible with most tracking software. You can program up to 50 events that are trigger by Time & Distance, Input closure, fencing and much more, application notes.

## **What is CDMA?**

CDMA, or Code Division Multiple Access, is a digital alternative to the analog AMPS (Advanced Mobile Phone System). Qualcomm<sup>®</sup>, Inc. introduced CDMA three months after TDMA was accepted as a standard. After two years of testing CDMA was finally accepted as a second standard. CDMA works under a principle that has been used in military satellites for decades. Each conversation is granted a certain code. Many conversations can be sent over the same spectrum at the same time with the receiving units decoding which information is directed to them. This is often compared to discerning a conversation in one's native language in a jumble of conversations in other languages. CDMA allows 4.4 trillion of these codes, assuring that many different callers on different systems can use the same spectrum at the same time. CDMA utilizes spread-spectrum technology, meaning that conversations are spread across wide segments of the cellular broadcast spectrum. This helps avoid problems in busy areas and in hilly areas where reflected signals can cause problems.

Spread spectrum technology is also the means by which codes can be attached to the communication. Each bit is expanded into some number of "chips". Thus, data transmission requires much more bandwidth, requiring much of the available spectrum. However, many conversations can be transmitted over the same spectrum. The transmitter multiplies each bit by a "key" and transmits the multi-chip result. The receiver receives these chips as well as those of all other conversations transmitted over the spectrum. The receiver multiplies this combined signal by the appropriate key, takes the sum, and is able to determine which bit is appropriate. Because different signals can be transmitted over the same spectrum, CDMA allows 10 to 20 times as many conversations to occur on a system than AMPS. CDMA technology nearly eliminates many common cellular problems related to overcrowding, such as busy signals, dropped calls, and cross talk. Also, CDMA's voice encoding allows for the reduction of background noise. CDMA transmission occurs at power levels 1/25 to 1/1000 those of AMPS or TDMA. This allows lighter portable phones with longer battery life. CDMA's digital control channel allows the demands for mobile fax, data transmission, and caller-ID as well.

## **How the Technology Works**

### **Introduction**

CDMA is one of three 2nd generation cellular network technologies: CDMA, TDMA and GSM.

- GSM uses 200 KHz channels divided into eight time slots. A single handset uses one slot in two channels for sending and receiving.
- TDMA standard IS-136 uses 30 KHz channels, with each channel divided into six time slots. A single handset uses one time slot for sending and the other for receiving.
- CDMA uses 1.25 MHz signal bands that are shared simultaneously by all users. Power control is of paramount importance to CDMA, rather than the management of alternating time slots.

CDMA is available for both the cellular (800 MHz) and the PCS (Personal Communications Services) (1900 MHz) frequency bands in North America. Measured by cellular subscribers, analysts report that CDMA has the fastest percentage growth rate. Today, there are more than 110 million CDMA subscribers worldwide. CDMA has long term potential to change the direction of telecommunications. It is conveniently similar to the way in which data networking functions. CDMA is paving the way for the telecom industry to move toward a model in which data plays a much more significant role.

### **CDMA Network Providers in North America**

#### **Verizon Wireless®**

- Operates the largest of all digital networks
- Serves a majority of cities and communities in the US
- Provides service in all 50 states
- Approximately 24 million customers today
- Operates at both 800MHz and 1900MHz

#### **Sprint Wireless®**

- Operates at 1900MHz
- Serves over 8,000 cities and communities in the US
- Provides service in all 50 states
- Approximately 18 million customers today

#### **Alltel Wireless®**

- Operates at 800MHz CDMA and 800MHz Analog
- Serves over 1,500 cities and communities in the US

### **Equipment Manufacturers**

Qualcomm® pioneered the development of CDMA technology, and holds many of the essential patents needed to build CDMA based devices. Infrastructure equipment manufacturers that provide CDMA systems include Nortel Networks®, Lucent®, Motorola®, and Ericsson® (through its acquisition of Qualcomm's infrastructure business).

### **Data Deployment and Services**

The CDMA specifications provide for both voice and data capabilities. To date, however, the primary focus of infrastructure equipment manufacturers and service providers deploying CDMA has been to deploy voice services to improve capacity and quality for their voice subscribers. A full roll out of data deployment momentum and service availability is expected to increase significantly.

### **Data Capabilities**

CDMA specifications provide for three types of data services: short message service (SMS), circuit switched data, and packet switched data. SMS provides two-way pager-like functionality, allowing short text messages to be sent, received, and acknowledged. Circuit-switched data allows dialup modem

connections over the cellular network. Circuit-switched support will initially be available at speeds up to 14.4 Kbps. Packet-switched data will provide Internet Protocol connectivity, at speeds of 166 Kbps. As of September 1, 2001 the providers are using circuit switch data for CDMA connectivity and the Analog side of the System for Analog data. Qualcomm® states that IS-95B is backwards compliant for packet data protocol (1XRTT). In other parts of the world, including Japan, Korea, China, Australia, New Zealand, and some parts of South America, CDMA networks have been deployed. Today, these networks use the IS-95A / IS-95B protocols and CDMA2000.

### **Wireless Data Modems**

Dataremote, Inc wireless data modems will support circuit-switched data and packet-switched data as well as SMS messaging. Packet-switched connectivity will appear LAN-like: always on, always connected. Mobile and remote data communications, including Internet and intranet access, are the primary applications of wireless data modems, while voice capabilities may add some secondary utility. For more information on CDMA, visit the CDMA Development Group website at [www.cdg.org](http://www.cdg.org)

### **SAFETY PRECAUTIONS FOR THE USER**

The following notes are for OEM's who incorporate the CDS-9060 series modem and applications based on the CDS-9060 modem into their final product. These safety precautions must be incorporated into the instruction manual supplied to the end user.

#### **Electrical Safety**

The lowest input voltage that can be applied to the CDS-9060 is 10.5 VDC; the highest voltage that can be applied is 18 VDC.

#### **Aircraft Safety**

Cellular modems can interfere with an aircraft's navigation system. Use of CDS-9060 modem on board an aircraft is forbidden by federal law.

#### **Electronics in Medical Equipment**

Radio transmitters, including cellular phones, can interfere with the operation of inadequately protected medical devices. Address all questions to a physician or to the manufacturer of the medical device.

#### **Precautions in the Event of Loss/Theft of the CDS-9060**

If the CDS-9060 Modem is missing, notify the cellular network operator immediately in order to prevent misuse.

## **CDS-9060 Standard Features**

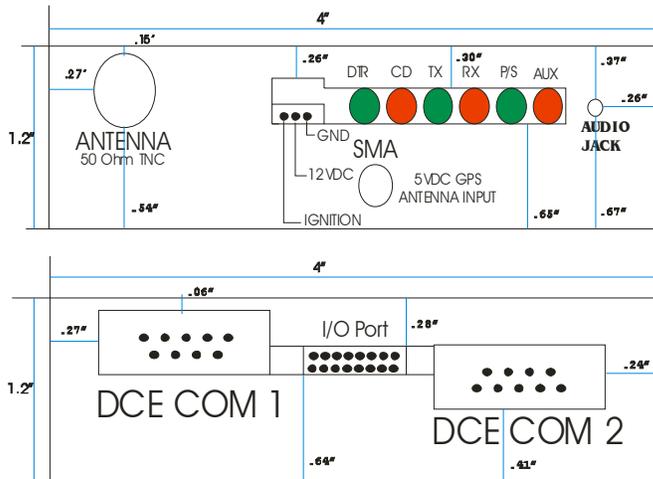
- Standard DB-9 female, RS-232C interface (DCE)
- RS-232 modem block DCE connector for wire attachment
- Auto answer/auto dial
- Real time clock (supports polling)
- User-programmable on site
- 12 control inputs and outputs
- Call progress monitor for trouble-free cellular calls
- Cellular/PCS network monitoring
- Polling windows to reduce power consumption
- Remote DCE COM settings (baud rate)
- Antenna connector: TNC style 50 Ohm female
- Hayes AT-Commands
- Reboots automatically if a problem is detected
- Remotely programmable (windows, alarm number, AT-String, NAM/phone number, baud rate and real time clock)
- 12 - 32VDC input voltage range
- Low voltage shutoff (Shuts down if voltage drops to 9.3 VDC; turns back on when voltage reaches 12 VDC.) Note: this feature is for solar/battery and telemetry applications to prevent full discharge of battery.
- SMS via AT-Commands
- TCP/PPP/UDP/POP-3 Stack

## **Optional Features**

- Analog modem module
- GPS module
- Second RS-232 port with 512kb and DRIP protocol
- Programming of I/O ports
- Antennas for various applications
- Solar panel systems
- NEMA-4x (all-weather) enclosure
- 12 VDC power supplies
- Host modems, cellular ready

## CDS-9060 Layout (Fig. 1)

### FRONT AND BACK PANEL DRAWING



### Connector Assignments

- P1 – RS-232 DB-9 female standard DCE port, (use any straight through/modem cable).
- P2 - Cry-out alarm activation input, voice dial input, Data call input and SMS or alarm input.
- P3 - Input power connector, 12 to 32VDC w/ignition switch
- P4 & P5 - Analog Modem option header
- P6 – Bus connection to radio module
- 9029 adapter pcb – 8 pos Phoenix terminal block Optional

### LED Functions

- D1 – Data Terminal Ready (DTR)
- D2 – Carrier Detect (CD)
- D3 – Transmit Data (TXD)
- D4 – Receive Data (RXD)
- D5 – Power/Status Indicates mode: digital, analog, or no signal:
- 1 blink/sec= CDMA mode with CDMA data available
  - 3 blinks/sec= Analog mode only
  - long blink (500ms) = No service detected
- D6 – Operational mode: Forced analog/Aux.

### 9060 PCB Connections

- 1 – Signal Ground
- 2 – TXD (transmit)
- 3 – RXD (receive)
- 4 – RTS (ready to send)
- 5 – CTS (clear to send) 6 – DSR (data set ready)
- 7 – DTR (data terminal ready)
- 8 – CD (carrier detect)

### P3 Connections

- 1 - +12 VDC nominal
- 2 - power supply GND
- 3 - ignition switch

### Current Requirements

	Transmit (worst case)	idle	sleep mode
CDS-9060 =	800 mA	53 mA	1.2mA
CDS-9060A =	1.5 A	53 mA	1.2mA
CDS-9060 AG=	2.0 A	105 mA	1.2mA

### P2 Connections

station header for cry-out alarm and Digital inputs and outputs outbound data call input (circuit 1), outbound voice dial input (circuit 2), SMS/alarm input (circuit 3), and other programmable I/O. See Pg. 41 (CDS9026 I/O Schematic)

- Modem I/O to DTE device
- Programming input, Etc.



Main Comport >DCE0< >DCE01< Port 2 wired as a DCE\_Port control via DRIP commands.

I/O inputs and outputs  
standard ribbon cable connector "16 pin header"  
all commands to check status, turn on-off output are controlled via DRIP protocol.

# CDS-9060 SPECIFICATIONS, AVAILABLE OPTIONS AND APPLICATIONS

## GENERAL SPECIFICATIONS

<b>Power Requirements:</b>	12-32VDC @ 2A (unregulated)
<b>On-Board Backup:</b>	3.6V 200MA (CR2032) Lithium Cell
<b>Serial I/O:</b>	RS-232, Async, 2 DB-9 and 1 - 8 pos. terminal block Connectors
<b>Control I/O:</b>	16 Pos. IDC compatible header
<b>Command Protocol:</b>	AT Command Set and DataRemote, Inc (DRI) Configuration Menu
<b>LED Indicators:</b>	Power ON, Status, TXD, RXD, DCD, DTR, AUX
<b>Modem:</b>	IS-707A compatible, IS-95A/B (MDR verified on IS-95A/B networks) AMPS modem (Conexant Chipset V.32B)
<b>Vocoder:</b>	8 Kbps CELP, 13 Kbps QCELP, 8 Kbps EVRC
<b>FCC ID:</b>	QVFQCP-2235
<b>Canada ID:</b>	3572A11989

### RF SPECIFICATIONS

	<u>800 MHz</u>	<u>1900 MHz (CDMA)</u>
<b>Interface Standards:</b>	AMPS: ANSI/TIA/EAI-553 CDMA: TIA/EIA, IS-95A/B	J-STD-008
<b>Operating Frequencies:</b>	TX: 824-849 MHz RX: 869-894 MHz	TX: 1850-1910 MHz RX: 1930-1990 MHz
<b>RF Power:</b>	AMPS: 600mW (EIRP Nom.) CDMA: 600mW (EIRP Nom.)	400mW (EIRP Nom.)
<b>Maximum TX Power:</b>	AMPS: +26.7dBm Min. CDMA: +23dBm Min.	+23dBm Min.
<b>Receiver Sensitivity:</b>	AMPS: >116dBm @ 12dB Sinad CDMA: >-104dBm @ 0.5% FER	>104 dBm @ .05% FER
<b>Frequency Stability:</b>	< ± 2.5 PPM	< ± 2.5 PPM
<b>Antenna Interface:</b>	50 ohm, TNC	50 ohm, TNC

**Current** Can Vary from Network to Network Normal current draw = 53ma

### PHYSICAL SPECIFICATIONS

<b>Size:</b>	6.3"L X 4"W X 1.2" H
<b>Weight:</b>	23.0 Oz.

### ENVIRONMENTAL SPECIFICATIONS

<b>Temperature:</b>	Operating: -30° C to +60° C (-22° to 140°) Storage: -40° C to +70° C (-40° to 146°)
<b>Humidity:</b>	0-95% (non-condensing) 95° F (35° C)

### STANDARD FEATURES

- Authentication (CDMA)
- CDMA 2000 1X RTT
- Authentication analog AMPS cellular
- IS-95 Circuit Switch
- Preferred Roaming List
- IS-707A service SMS commands
- SMS via AT-Commands
- TCP/PPP/UDP/SMTP Stack
- Update PRL while unit is in the field
- DRI Config menu remotely or locally programmable
- Inputs for cry-out alarms "3 inputs, 3 DRIP inputs and 6 DRIP outputs
- Voice Communications
- Analog Modem MNP-10EC and TX-Cell error correction, V.22 to V.32Bis
- Switches from CDMA mode to analog automatically

## TYPICAL APPLICATIONS

- Automatic meter reading
- Security system monitoring via RS-232
- Slow-speed video applications
- Heavy equipment monitoring
- Traffic metering and programming highway displays
- Connects to RTU's, PLC's, Dataloggers, etc. through a DTE RS-232 port
- Flood control monitoring
- Remote equipment sensing and control
- Telematics and AVL Applications

## GETTING STARTED

Inspect shipment for damage and to be sure package was shipped complete. Please contact Dataremote, Inc. within 15 days for any damage or components that may be missing.

### **Standard Package Contents**

1. CDS-9060 CDMA modem (mounted in powder-coated box with mounting holes)
2. TNC dual band mag mount antenna
3. RS-232 programming cable
4. Modem software (Terminal Program) used for setting up configuration menu
5. User manual
6. PRL loader and DRIP software program

### *CDS-9060G*



## **CELLULAR / PCS DATA SERVICE SETUP OR DIGITAL / PCS MODEM / PHONE ACTIVATION**

**You will need to ascertain the following data prior to calling your Cellular Provider for activation:**

1. Name of the CDMA carrier in the area where the modem will be used. Verizon Wireless and Sprint PCS are the two largest CDMA carriers/providers. Both have CDMA and analog technologies on their systems and between the two, have coverage exceeding 97 percent of the United States.
2. Identify the frequency band of the chosen carrier.
3. Locate the ESN (Electronic Serial Number). This numbers will be found on the unit label. *You will need to give this information to your provider.* Each CDS modem is equip with its own unique ESN. CDS-9060 uses a Qualcomm® radio module built by Kyocera®, with the ESN prefix of 159, 179 or 254.
4. Area code desired.
5. Local prefix, to ensure that calls will not be billed at a long distance rate, even if the phone is used outside the local calling area.

### **What to Ask your Cellular Provider**

1. What is the SID (System ID) number for CDMA and Analog (if applicable)?

2. What is the system Select or preferred service? The choices being Automatic, A auto, B auto, A only, B only, and no roaming.
3. If you intend to use a pre-paid or calling card account, check with your provider to see if you will have access to "Data Only" capability, as it is required.
4. Note: DataRemote will need to load a PRL file (Preferred Roaming List) in the Modem. DataRemote does have PRL files for most major U.S. wireless providers. If you are going to be roaming, and DataRemote does not have the carriers PRL file, it's a good idea to ask your provider for their PRL file. Be sure to ask DataRemote to load the desired Wireless Carrier PRL file when ordering.

### **What to tell your Cellular Provider NOT to Activate!**

1. *No voice mail*
2. *No caller I.D.*
3. *No three-way calling*

### **CONNECTING TO THE CDS-9060 AND LOCAL CONFIGURATION MENU PROGRAMMING**

1. Plug power into P3 (12 VDC nominal. See Fig. 1, p. 9)
2. On initial power up, the CDS-9060 LED's will blink.
3. The CDS-9060 has completed the boot-up procedure (approximately 20-30 seconds) when the DTR (if DTR is active) LED is on, the blinking PWR/Status LED is flashing,
4. Turn on your computer or laptop.
5. Connect the DB-9 RS-232 cable to your computer or laptop.
6. Launch a terminal program. (Supplied terminal program or use HyperTerminal, ProComm, etc.)
7. Select the correct COM port in software (COM 1 in most settings).
8. Set baud rate to 19200 bps (default for CDS-9060 series). Note: if setting is changed, DTE must be set to same baud rate speed as the previous configuration of the CDS-9060.
9. Press CTRL-W three times quickly. (Hold down Control key and press W three times within two seconds.)
10. The Configuration Menu will display. To check for proper communication between the CDS-9060 and your host computer, type ATI3. You should see "ERROR" on the host display. If there is no response, check that the DTR LED is illuminated verifying that you are connected to the correct COM port on the host.
11. If menu still doesn't come up or you can't type AT enter go back to step 6.

**Note: Do not remove primary power while in the programming menu.**

```
***** CONFIGURATION MENU - 1X-M *****
A - Set Receive Window 1 13:30 to 13:50
B - Set Receive Window 2 14:10 to 16:00
C - Set Receive Window 3 16:20 to 23:00
D - Set Receive Window 4 08:30 to 13:00
E - Set Time:          08:27:08
F - Reprogram Telephone Information
G - Display Signal Strength
H - Remote Comms Baud Rate: 19200
I - Reprogram Alarm Information
J - Modem Init:
K - Auto Answer Mode: ON
L - Max call Time: 20
M - AUX processor Mode: DrIP:SMS
X - Exit to Terminal Mode
Battery voltage: 14.8 Phone #: 805-339-9739 CDMA SID: 2
```

## Programming the Phone Number

1. Set-up your CDS-9060 as previously described.
2. When the Configuration Menu displays, select Option “F”, Reprogram Telephone Information.
3. The Programming menu will now display. (see below)
4. Select option “A”, Mobile Phone Number and press enter.
5. Enter the phone number including area code and press enter.
6. Select option “K” to program the phone.
7. Answer, “yes” to “Are you sure”.

It will prompt you to wait for 40 seconds, after unit reboots use CTRL-W to get back into main menu.

Assure that Auto Answer Mode, option “K”, in the Configuration Menu is turned “ON” before proceeding or the CDS-9060 will not answer when called in the next section.

### Example: Programming Menu

\*\*\*\*\* PROGRAMMING MENU \*\*\*\*\*

Equipment Serial Number : 25407720311  
Preferred Roaming List # : 50085  
A - Mobile Phone Number : 8053399739  
B - MIN Number : 8053399739  
C - CDMA System ID : 2  
D - AMPS System ID : 2  
E - Slot Cycle Index : 2  
F - Preferred Mode : Digital only  
G - Preferred Service : B auto  
H - PRL enable : ON  
I - Dial \*18 every 4 hours : OFF  
J - Dumb Modem Mode : OFF  
K - Program Phone  
L - Return to Main Menu  
X - Exit to Terminal Mode

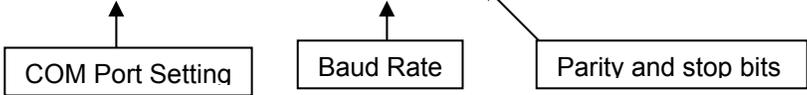
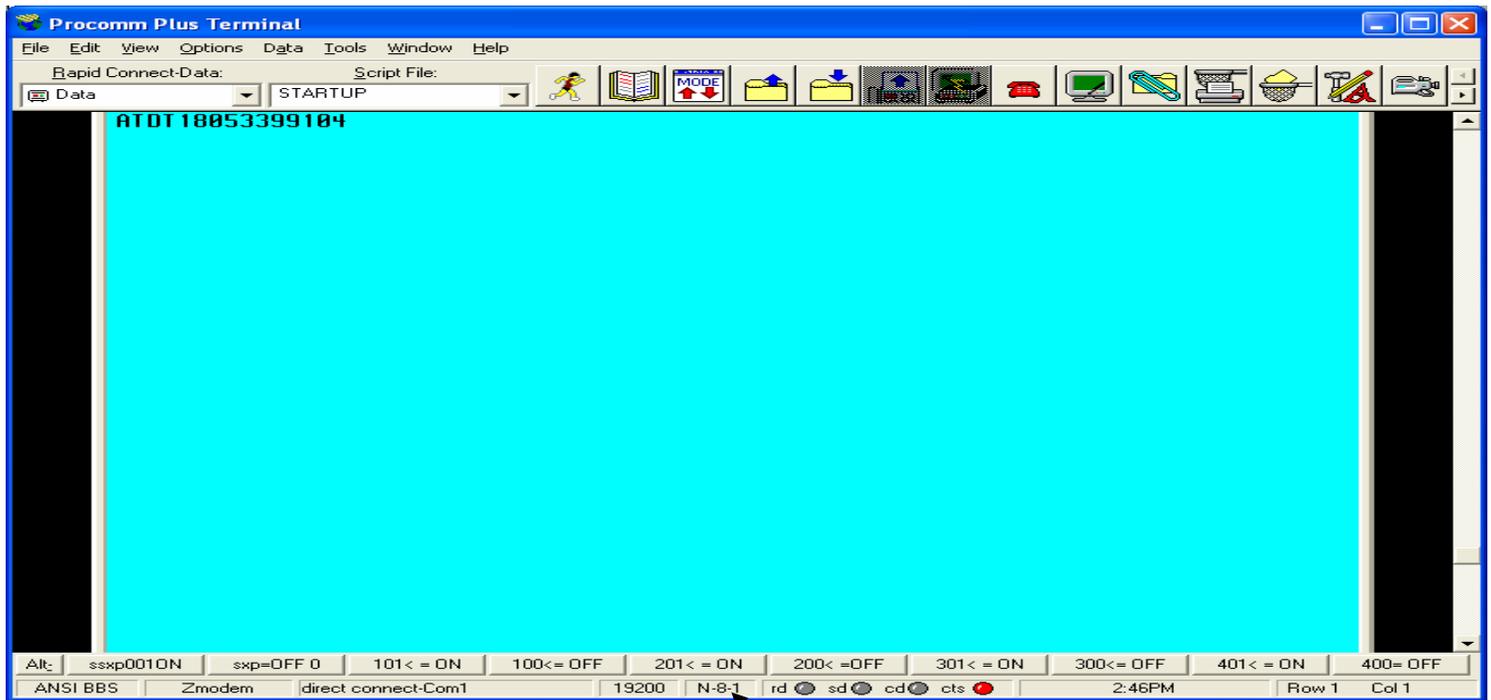
## Dialing Into the CDS-9060 Programming Menu

Note: Before dialing into the CDS-9060 programming menu, a phone number and valid system I.D. number must be programmed into the unit and your wireless provider must activate the modem.

1. Launch a Terminal Program from your host computer connected to a Hayes compatible modem.
2. Set up the terminal program to dial the CDS-9060. Set the baud rate (19,200bps default), COM port, parity (None), and flow control (8,1).
3. Type AT into the terminal software.
4. The modem will respond OK.
5. Clear the buffer in host modem before dialing “AT&F”
6. To dial into the CDS-9060, use the standard ATDT command. (ATDTXXXXXXX)  
“See trouble shooting for extended AT Commands”
7. After the CONNECT message displays or CD goes high; enter CTRL-W three times.
8. Main configuration menu will display.
10. Choose an Option or press Option “X” to exit the menu and go back to your DTE device.

Notes: While in the configuration menu, you can hit return key at any time to return to the previous page, or enter “X” to exit the Configuration Menu.

- b. Options that are changed in the Programming Menu while on-line will take effect after the call is terminated.



**Displaying Signal Strength**

*For local or remote connections, follow the steps below:*

1. Enter configuration menu locally or remotely. (See above)
2. Press Option G.
3. After a few seconds, signal strength will display on the screen. (Example: Channel #, RSSI, Time. The first reading is the channel. The maximum signal strength "RSSI" reading is 63. Signal strength of 31 or higher is functional. If the signal strength is lower than 27 unreliable communications and dropped calls may result. An optional Dataremote high gain antenna may be installed to increase the received signal strength. Visit [www.dataremote.com](http://www.dataremote.com) to view antenna options.

**Example of RSSI**

CDS-9026, Rev 4.0xx 07/17/03  
 Copyright 2000,1,2,3 Dataremote, Inc.

Received Signal Strength Indicator (RSSI)

No signal=0, Maximum signal=63  
 Channel,RSSI: 248,46 23:28:18  
 Channel,RSSI: 248,42 23:28:19  
 Channel,RSSI: 248,42 23:28:20  
 Channel,RSSI: 248,42 23:28:21  
 Channel,RSSI: 268,40 23:28:22 (Press any key to exit)

**Local COM PORT Baud Rate Setup: START HERE**

1. Enter configuration menu locally or remotely.
2. Press Option H.

**The CDS-9060 DCE speed is defaulted to 19,200 bps; therefore the (CDS-9060) DCE speed must be matched to the DTE speed (same as computers COM-PORT).**

If the DTE (Computer, Datalogger, etc) device communicates at 9600 bps, the CDS-9060's speed must be matched to the DTE and lowered to 9600 bps

**Note:** Assure that the DTE (RTU, PLC, Traffic Counter, etc.) is set to the same baud rate as that of the CDS-9060. If the baud rates do not match, the units will not be able to communicate with one another.  
**Do not change speed unless DTE and DCE baud rates are fully understood.**

**Example of Option H**

Current baud rate is: 19200  
\*\*\*\*\* Remote Communication Setting Menu \*\*\*\*\*

NOTE: Make sure the DTE is set to the same speed.  
If the speeds do not match, the units will not be able to communicate with each other.

Current baud rate is: 19200  
Enter new Baud Rate: 9600,8,N,1

When the setup option is complete, the display will return to the main menu displaying 9600. Note: if you only enter "9600" it will default to 9600,8,N,1

Using AT+IPR command, you can change the baud rate via AT+IPR the Config menu will display new baud rate.

Don't forget to change the corresponding baud rate of your DTE to match the newly programmed value.

**CHANGING DCE SPEED ON THE FLY**

By typing in a terminal mode you can change the speed without going into the config menu.

AT+IPR=9600 this will also change the baud rate in the config menu.  
OK

```
***** CONFIGURATION MENU - 1X-M *****
A - Set Receive Window 1 00:00 to 00:00
B - Set Receive Window 2 00:00 to 00:00
C - Set Receive Window 3 00:00 to 00:00
D - Set Receive Window 4 00:00 to 00:00
E - Set Time:          02:51:44
F - Reprogram Telephone Information
G - Display Signal Strength
H - Remote Comms Baud Rate: 9600 <-----
I - Reprogram Alarm Information
J - Modem Init:
K - Auto Answer Mode: ON
L - Max call Time: 20
M - AUX processor Mode: DrIP:SMS
X - Exit to Terminal Mode
Battery voltage: 12.9 Phone #: 8055551234 CDMA SID: 2
```

Select Option:

## Programming Alarm Number for CRY-OUT Alarms “Refer to CDS9026 PIO Port Schematic”

This option is for cry out alarms controlled by the CDS-9060.

\*\*\*\*\* ALARM SETUP MENU \*\*\*\*\*

A - SMS Address 1 : 8055551234  
B - SMS Address 2 : data@dataremote.com  
C - SMS Address 3 :  
D - Data Alarm Number 1 :8053399739  
E - Data Alarm Number 2 :  
F - Data Alarm Number 3 :  
G - Voice Dial Number :  
H - Alarm Message : Site 20234 Kelli Drive  
I - PPP Connect Number : #777  
J - PPP User Name : 8055551234@vzw3g.com  
K - PPP Password : vzw  
L - Return to Main Menu  
X - Exit to Terminal Mode

### Exiting From the Configuration Menu

Enter Option “X” and wait for the screen to go blank. (Entering the letter X will exit from any menu).

Hang up the Telco Line by entering +++ATH (or Drop DTR).

Note: If there is no activity in the configuration menu for five minutes, the CDS-9060 reset into Data mode/Command Mode automatically.

### CUSTOM OPTIONAL FEATURES

Dataremote digital inputs and outputs can be utilized for many different alarms\application such as send an e-mail, SMS message and TCP-IP\UDP, Alarm Cry-out and on any event via DRIP. With the **DRM-9027** adds an additional COM port and store data into memory for data logging and can trigger events. Contact Dataremote for custom application information. “see the DRIP manual”

Note: the CDS-9060G already has the DRM-9027 interface board.

### CDS-9060 MODEM INITIAL STRING SETUP

Note: *For analog connections using the CDS-9060A, please see appendix A*

### Customizing CDMA Modem Initialization String if Required “main Menu Option J”

1. IMPORTANT Test the initialization string in the terminal mode (blank screen) to check for errors prior to entering it into the configuration option “J”. This is done by typing in the desired init string while in terminal mode and pressing enter. If the init string is correct the response will be “OK”, if there is an error the response will be “ERROR”.
2. To enter configuration locally, select option “J” (Modem initialize)
3. At the prompt, enter the AT-String.
4. To correct an error in typing press ESC or ENTER and begin again.
5. Press ENTER after typing in your AT-STRING .
6. When you exit to the configuration menu, the new string will be sent to the CDMA modem.

#### Example:

1. Select Option “J”.
2. Enter the NEW modem initialization string (50 characters max): (a semicolon (;) is used after every new command in the string)
3. Press ENTER. The configuration menu will appear with the new AT-String.

**Example: this command shuts off flow control      AT+IFC=0,0**

\*\*\*\*\* CONFIGURATION MENU - 1X-M \*\*\*\*\*

A - Set Receive Window 1 00:00 to 00:00

B - Set Receive Window 2 00:00 to 00:00

C - Set Receive Window 3 00:00 to 00:00

D - Set Receive Window 4 00:00 to 00:00

E - Set Time:            02:51:44

F - Reprogram Telephone Information

G - Display Signal Strength

H - Remote Comms Baud Rate: 9600

I - Reprogram Alarm Information

**J - Modem Init:AT+IFC=0,0**

K - Auto Answer Mode: ON

L - Max call Time: 20

M - AUX processor Mode: DrIP:SMS

X - Exit to Terminal Mode

Battery voltage: 12.9    Phone #: 8055551234    CDMA SID: 2

Select Option: x

## Auto Answer Mode

Auto answer comes from the factory in the ON position. Some host software\computers prefers to answer inbound calls, if your DTE device requires the computer to answer the call this option may be turned off. When the CDS-9060 rings, the word **RING** displays on the terminal program screen.

1. Enter the configuration menu.
2. Select Option "K".
3. New Auto Answer mode is: OFF
4. At Y/N prompt, press Y to accept.

New Auto Answer mode is: OFF

**Note:** The Hayes AT-COMMAND ATSO=1 does not program the CDS-9060. This command must be setup in the configuration menu as a default if auto answer is off or on. "Option K"

## Setting up Dial-Up Network 1xRTT

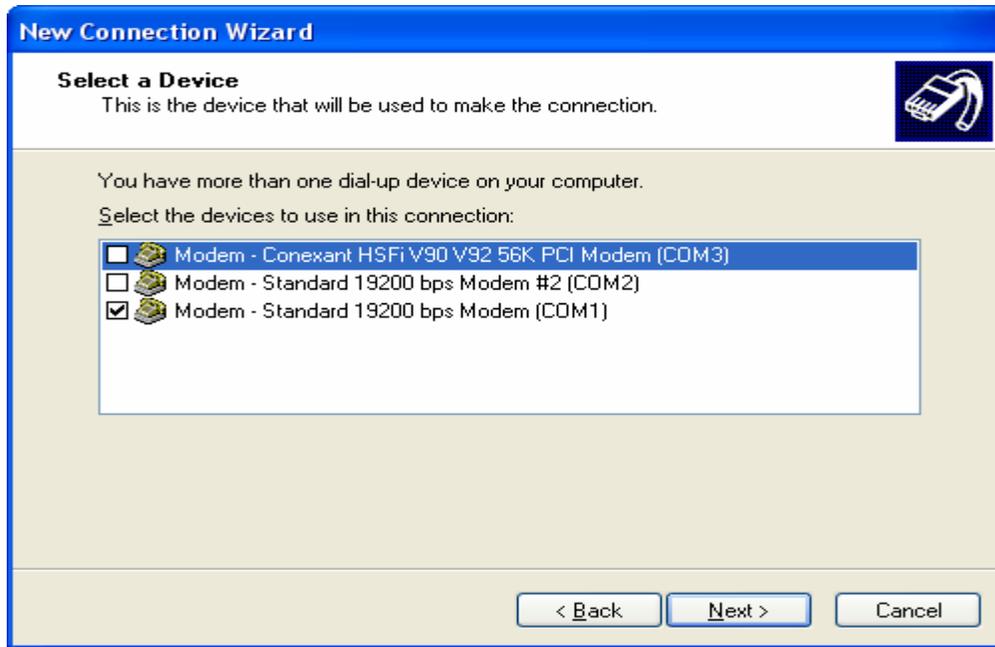
Go to Network Connections, Click on make new connection.



The screenshot shows the 'New Connection Wizard' dialog box, specifically the 'Internet Account Information' step. The title bar reads 'New Connection Wizard'. Below the title bar, the text says 'Internet Account Information' and 'You will need an account name and password to sign in to your Internet account.' There is a small icon of a mobile phone in the top right corner. The main area contains instructions: 'Type an ISP account name and password, then write down this information and store it in a safe place. (If you have forgotten an existing account name or password, contact your ISP.)' Below this are three input fields: 'User name:' with the value '8053906755@vzw3g.com', 'Password:' with three dots, and 'Confirm password:' with three dots. There are three checked checkboxes: 'Use this account name and password when anyone connects to the Internet from this computer', 'Make this the default Internet connection', and 'Turn on Internet Connection Firewall for this connection'. At the bottom, there are three buttons: '< Back', 'Next >', and 'Cancel'.

- 1) Enter the 1xRTT Access number: **#19788** (or **#777** -- depending on your carrier) and then select **Next**.
- 2) Select whether you want **all users** or just yourself to have access to this connection, and select **Next**.
- 3) Enter **1xRTT** for the name of the connection. If you want to add an icon for this connection on the desktop, check "**Add a shortcut to my desktop.**"
- 4) Select **Finish** to exit the "Network Connection Wizard."

Use the Standard 19200 bps modem and make sure it's pointed to the right Com-Port



## **CLOCK AND RECEIVE WINDOWS SETUP**

### **Why Set Up Receive Windows?**

If the CDS-9060 is running from a battery source, it is advisable to maximize the battery life. This is done by setting up Receive or Polling windows. Four individual windows are available. You can choose to set up from 0-4 time periods that the CDS-9060 can be polled. Determine the times of day when the CDS-9060 will be called, and set the polling windows to correspond with those times.

For example, if the CDS-9060 is used for billing collections and will never be polled between the hours of 11:00 A.M. and midnight, the CDS-9060 can be turned off to conserve power during this period. Thus, the CDS-9060 will only be able to receive calls between 24:01 a.m. and 10:59 a.m.

If the DTE device has the capability of dialing into the host, the CDS-9060 may call out, since it is always searching for activity on the RS-232 lines and the inputs. If an ATDT string is sent to the CDS-9060 during a power down cycle window, (sleep mode), it will activate and report the alarm or communicate its data with host.

### **Programming the Clock**

Clock must be programmed before time windows are programmed.

1. Enter the configuration menu locally or remotely.
2. Select Option "E" and follow the prompts.
3. Current time is HH:MM:SS (The current time setting will be displayed)
4. Enter new time in military time (HH:MM): Note: Time must be programmed in military time (24-hour clock).

### **Receive (Start/Stop Time) Windows Setup**

It is important to know what time the unit is to be active, since once programmed, it can only be called during the preset window time. The CDS-9060 features four start/stop windows so that more than one start/stop time can be programmed.

1. Enter the configuration menu locally or remotely.
2. Press Option A.
3. Follow the prompts.

Note: Start and stop time within the same window must not be set for the same time.

### Sample Configuration Menu:

\*\*\*\*\* CONFIGURATION MENU - 1X-M \*\*\*\*\*

- A - Set Receive Window 1 13:30 to 13:50
- B - Set Receive Window 2 14:10 to 16:00
- C - Set Receive Window 3 16:20 to 23:00
- D - Set Receive Window 4 08:30 to 13:00
- E - Set Time: 11:10:56
- F - Reprogram Telephone Information
- G - Display Signal Strength
- H - Remote Comms Baud Rate: 19200
- I - Reprogram Alarm Information
- J - Modem Init:
- K - Auto Answer Mode: ON
- L - Max call Time: 20
- M - AUX processor Mode: DrIP:SMS
- X - Exit to Terminal Mode

Battery voltage: 14.8 Phone #: 8055551234 CDMA SID: 2

Select Option:

Window 1 start time is 00:00.

Enter new time in military time (HH:MM): 23:59 (Unit activates at midnight.)

Window 1 stop time is 00:00.

Enter new time in military time (HH:MM): 11:00 (Unit shuts down at 11:00 a.m.)

### Sample Configuration Menu after Receive Window 1 change

\*\*\*\*\* CONFIGURATION MENU - 1X-M \*\*\*\*\*

- A - Set Receive Window 1 13:30 to 13:50
- B - Set Receive Window 2 14:10 to 16:00
- C - Set Receive Window 3 16:20 to 23:00
- D - Set Receive Window 4 08:30 to 13:00
- E - Set Time: 11:10:56
- F - Reprogram Telephone Information
- G - Display Signal Strength
- H - Remote Comms Baud Rate: 19200
- I - Reprogram Alarm Information
- J - Modem Init:
- K - Auto Answer Mode: ON
- L - Max call Time: 20
- M - AUX processor Mode: DrIP:SMS
- X - Exit to Terminal Mode

Battery voltage: 14.8 Phone #: 8057945819 CDMA SID: 2 Select Option:

### Remote Programming of Cellular Phone Number

Be extremely cautious when programming this option remotely. The site can be hundreds of miles from your location. **If this option is set incorrectly, someone will have to travel to the remote site to make corrections.**

### **Making the Remote Connection**

1. Enter the Terminal Program at the Host computer.
2. Enter ATDT XXXXXXX (the current phone number)
3. CONNECT 19200 will display
- 4 The Configuration Menu will display
5. Select Option "F".
6. The Reprogram Telephone Information Menu will display as shown below.

### **Program Telephone Information From Programming Menu**

\*\*\*\*\* PROGRAMMING MENU \*\*\*\*\*

Equipment Serial Number : 25407720311  
Preferred Roaming List # : 50085  
A - Mobile Phone Number : 8055551234  
B - MSID Number : 8055551234  
C - CDMA System ID : 2  
D - AMPS System ID : 2  
E - Slot Cycle Index : 2  
F - Preferred Mode : Digital only  
G - Preferred Service : B auto  
H - PRL enable : ON  
I - Dial \*18 every 4 hours : OFF  
J - Dumb Modem Mode : OFF  
K - Program Phone  
L - Return to Main Menu  
X - Exit to Terminal Mode

Select Option:

#### **To change option A: Mobile Phone Number**

1. Select option "A" to change the mobile phone number
2. At the prompt enter the new 10-digit phone number.  
If the number entered is correct, select "K" (Program Phone) NOTE: "Option K can be enter after all Parameters are set"

#### **To change options B: MSID**

The MSID is required if the directory number is different from the mobile number "YOUR PROVIDER WILL ADVISE YOU WHEN DIFFERENT". Other wise program the MSID same as the mobile phone number.

#### **To change option C and D**

1. Select option "C" and enter the CDMA SID as provided by the wireless provider.
2. Select option "D" and enter the AMPS SID as provided by the wireless provider.
3. After entries, select option "K" (Program Phone)

**NOTE: "Option K can be enter after all parameters are set"**

#### **To change option E: Slot Cycle Index**

1. Select option "E", you will be prompted to enter the new Slot Cycle 0-7
2. This option selects how often the RF transceiver communicates with the cell site to assure that the modem is able to communicate immediately when needed. 1 setting registers the ESN to the cell site

approximately every 2 seconds, 0 setting never registers, and 7 is the longest interval. Set the Slot cycle index to 0 and option "H" to ON for solar and power conserving applications.

3. After entries, select option "J" (Program Phone)

#### **To change option F: Preferred Mode**

1. Select Option "F" to change preferred mode.
2. Press "F" repeatedly until desired selection displays. Choices are; Automatic, Analog and Digital only.
3. After proper selection, select "J" (Program Phone).

#### **To change option G: Preferred Service**

1. Select Option "F" to change preferred service.
2. Press "F" repeatedly until desired selection displays. Choices are; Automatic, A auto, B auto, A only, B only, and No Roaming. Your service provider can inform you of the appropriate choice.
3. After proper selection, select "J" (Program Phone).

#### **To change option H: PRL enable NOTE: ALSO SEE PRLOADER**

1. Select option "H" to enable or disable the PRL. The selection will toggle with each press of option "H". The PRL may be disabled if the PRL file is incorrect as supplied, (You may use the DataRemote PRL Loader to install the desired PRL file, contact DataRemote technical support.) or to test inbound 800MHz analog calls, or if you are having difficulties connecting to your provider. This ability to disable the PRL is a good troubleshooting tool. Do **NOT** disable the PRL if you are using the modem in a PCS or 1900MHz environment or if the modem is in a mobile environment where it may travel out of its area.

#### **To change option I: Dial \*18 every 4 hours (Hard Register)**

1. Select option "I" to turn on or off the "Dial \*18 every 4 hours" option. The selection will toggle with each press of option "I". This option is used in place of option "E", Slot Cycle Index when the modem is used in solar applications or for power saving applications.
2. After proper selection, select "J" (Program Phone).
3. Press "L" to return to the main menu.

#### **Dumb Mode:**

Dumb Modem Mode is used when you have a DTE device that sends data to the RS-232 connection even when there is not a connection. Also sends no result codes to the DCE port "very much like ATQ0 quite mode.

#### **SMS FOR THE CDS-9060 SERIES**

To initiate from 1 to 20 SMS messages:

AT+CMGS=(enter e-mail address here), enter

This will switch the modem from data mode to SMS mode and enter the e-mail address. Note that after a 15 to 20 second pause, D6, the FAM MODE-AUX LED, will start blinking signifying that you have entered SMS mode and a > prompt will appear on the screen. At the > prompt enter the desired SMS message. The message length may be up to 170 characters/bytes long. This total includes the previously entered e-mail address.

After delivery of the SMS message you will see the prompt:

+CMGS:11  
OK

To send more messages re-enter:

AT+CMGS=<enter e-mail address or phone number here>  
<enter>

You can deliver up to 20 SMS messages in one session without going back to data mode. After prolonged inactivity of approximately 120 seconds, the modem will automatically switch back to data mode. This transition normally takes about 20 seconds.

To leave the SMS mode and return to data mode, enter

AT, <enter>

There will be a 20 second delay during mode reset before you return to data mode and receive the OK prompt.

The following are the commands that may be used in conjunction with SMS. They are based on the standard GSM command set.

+CMGD Delete message from storage

AT+CMGD=<index><CR>

This command deletes the stored message at location <index>. Note that the index values change whenever a new message is received, sent or deleted. A valid way to perform a series of deletes is to delete the highest numbered index first.

+CMGL Read several messages from storage

AT+CMGL=<stat><CR>

+CMGL: <index>,<stat>,<oa/da>,,<scts><CR><LF>  
<data><CR><LF>[...]

This command will read back all messages in storage that match the <stat> parameter. Response will be generated for each stored message.

+CMGR Read a single message from storage

AT+CMGR=<index><CR>

+CMGR: <index>,<stat>,<oa/da>,,<scts><CR><LF><data><CR><LF>

This command reads back the message at location <index>.

+CMGS Send a message (directly)

AT+CMGS=<da><CR>  
><data><^Z/ESC>

This command sends the message <data> to the telephone number or URL <da>.

+CMGW Write a message to storage

AT+CMGW<CR>  
><data><^Z/ESC>

+CMGW:<index>

This command stores the message <data>. No address <da> information is saved with the message.

+CMSS Send a message from storage

AT+CMSS=<index>,<da><CR>

This command sends the message stored at location <index> to the telephone number or URL <da>.

+CMGQ Checks for unread messages: True=unread messages, False=none

## SMS SYMBOLS

<index> Storage location (1-30)  
1-10: REC UNREAD and RED READ messages  
11-20: STO SENT messages  
21-30: STO UNSENT messages

<da> Destination address  
Either a telephone number or internet URL

<oa> Origin address  
Either a telephone number or internet URL

<scts> Service center time stamp  
TIME/DATE

<data> Message text content  
ASCII content terminated with any control character

CMGL

<stat> "REC UNREAD" (Received unread message)  
"REC READ" (Received read message)  
"STO UNSENT" (Stored unsent message)  
"STO SENT" (Stored sent message)  
"ALL" (All messages)

## "FORCED" SMS MESSAGING / CRY-OUT ALARMS

To enter SMS data for remote “forced” message transmission follow the following procedure:

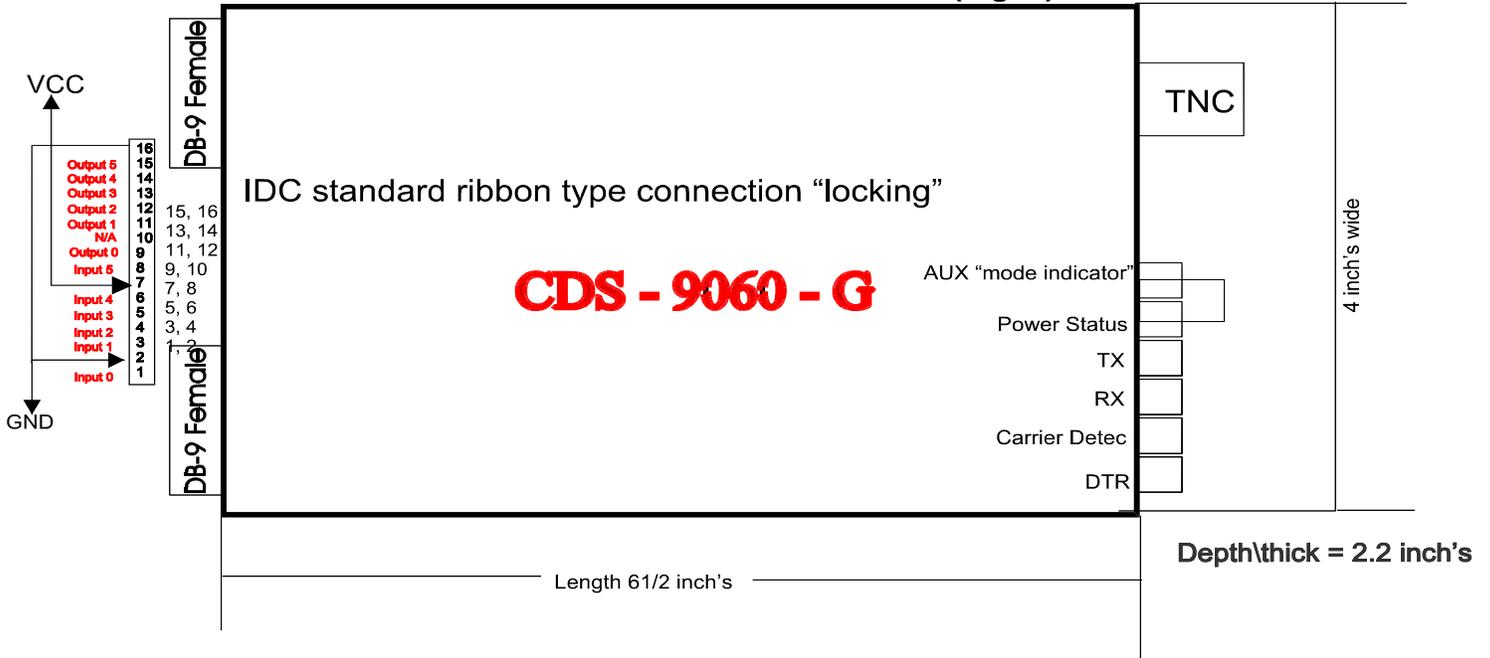
- Enter the configuration menu (Type control-WWW within 2 seconds)
- Select option “I” (Program Alarm Number)
- Enter “0” to disable the alarm
- Enter the new alarm number: (the e-mail address) (up to 58 characters maximum)
- Select option “K” (Site Name)
- Enter SMS message (up to 74 characters maximum)
- Enter option “X” to exit the terminal mode

When P2, the I/O connector, circuit “3” is momentarily shorted for at least 1 seconds, the modem automatically switches to SMS mode and delivers the message, and then switches back to data mode. Please note that there are time durations of approximately 20 seconds that occur while switching from data to SMS modes and back again.

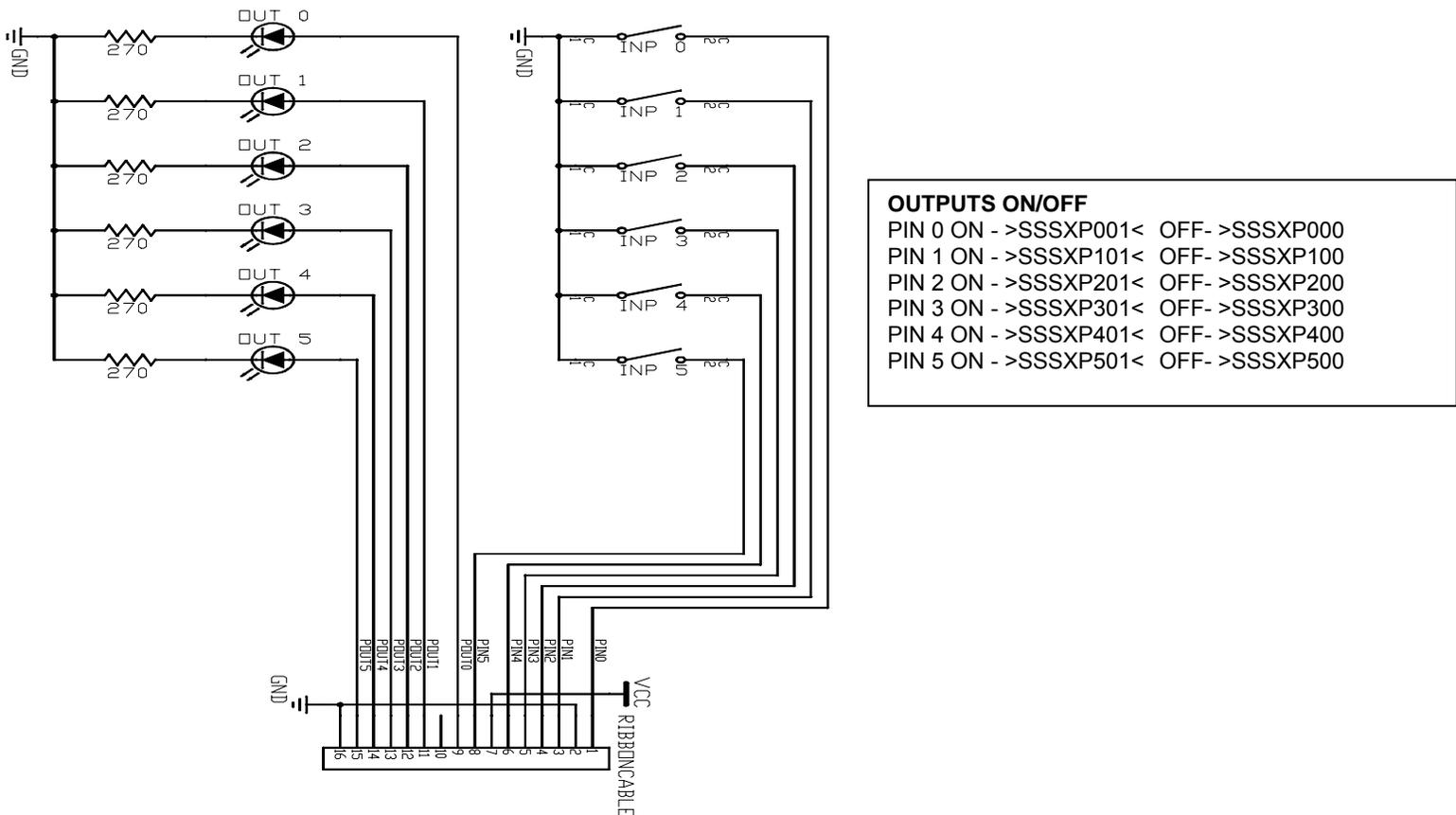
## RS-232 SETUP

For information about RS-232 characteristics, see RS-232 Signals Functional Description, pg. 35

### CDS-9060 DB-9 Female to Terminal Block Connections and I/O(Fig. 3)

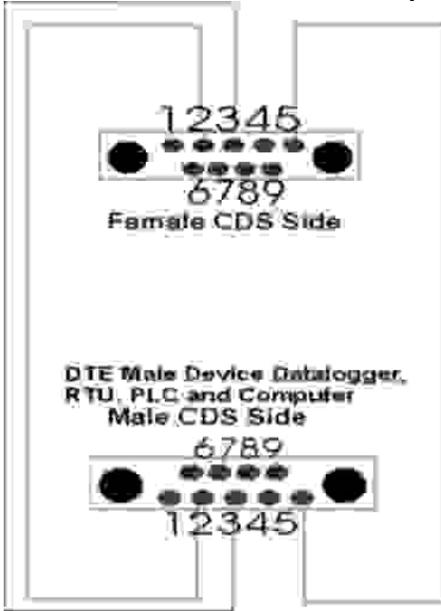


## Pin outs for the CDS-9060 I/O connector



## Pin outs for the CDS-9060 I/O connector "6 inputs and 6 outputs"

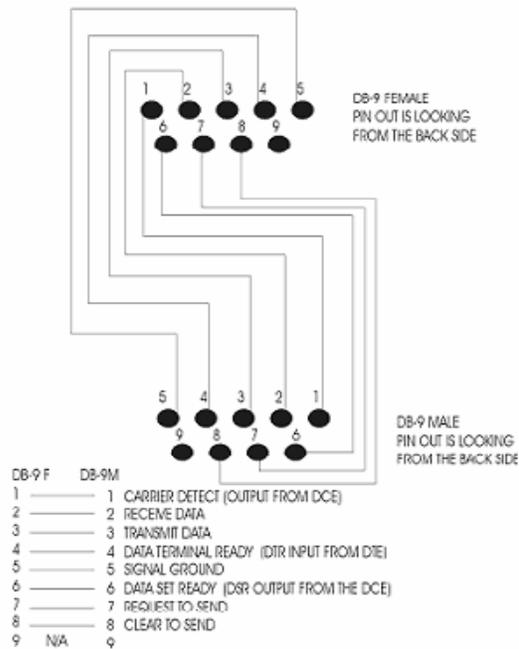
### 3-Wire RS-232 Connection (FIG. 4)



Default Com 1 and Port 2  
 DO NOT PUT JUMPERS IN CONNECTION. If you're having Connection problems make sure your RS-232 cable is a straight through "NO DSR to DTR, RTS to CTS, etc." type of jumpering cables

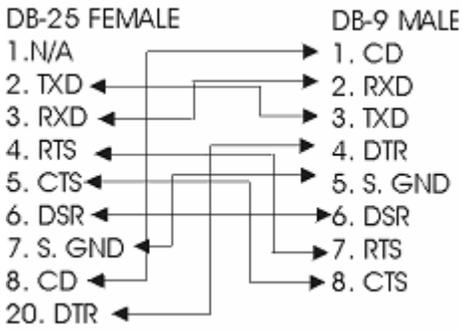
Note: CDS line all train for 3 wires connections NO AT-Commands or Jumpers.

### CDS-9060 Programming & Modem Cable (FIG. 5)

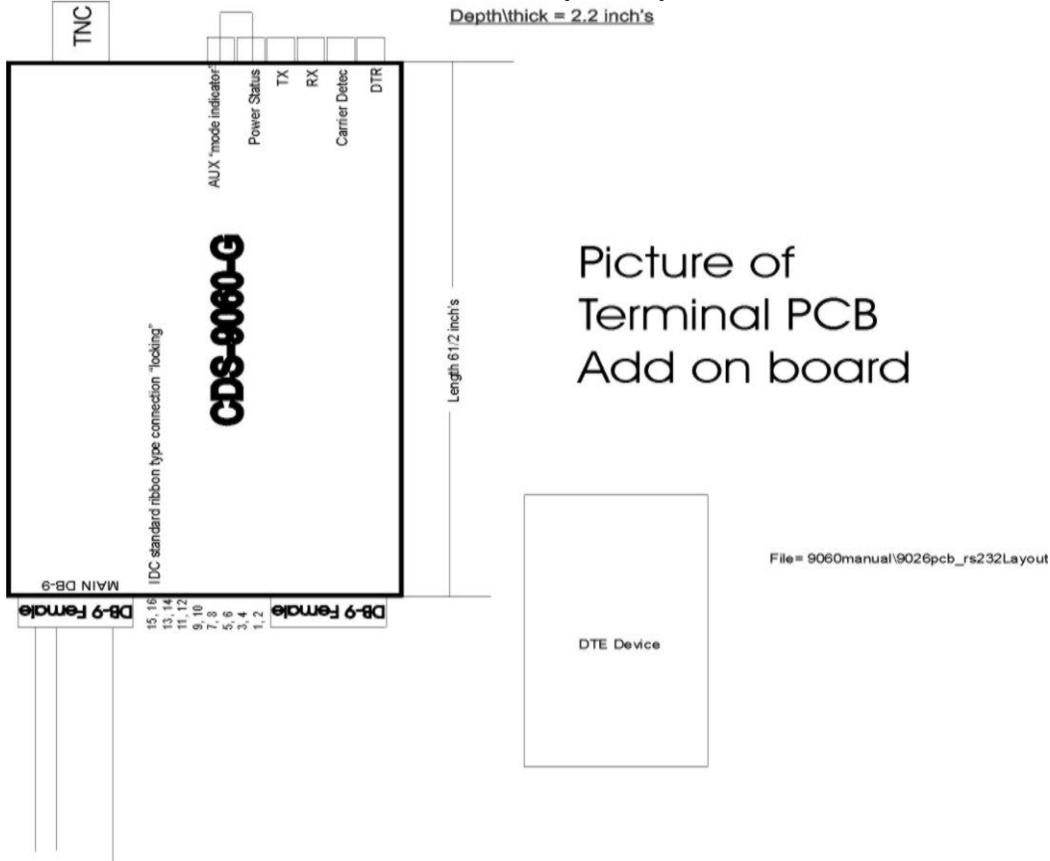


### OPTIONAL TERMBLOCK CONNECTIONS

**CDS-9060 DB-9 to DB-25 Female (FIG. 6)**



**CDS-9060 Terminal Block to DB-25 Female (FIG. 7)**



## **HOST PC MODEM SETUP FOR A IS-95 CIRCUIT SWITCH CONNECTION**

The CDS-9060 is a V.32 bis modem. (V.32 bis range is 1200 bps to 14,400 bps.) The host modem must be forced down to V.32 bis.

Although there many modem manufacturers, there are only a few modem chipset manufacturers. Many indicate they are Hayes compatible, but the same command from a USB<sup>®</sup> modem, for example, may have a different result when used on a ZOOM<sup>®</sup> modem.

Setting DTE speed to 14,400 bps may not be sufficient to force a V.90 modem to V.32 bis mode. The AT-Strings section of the manufacturer's manual will indicate how to force the modem to search/carrier for a v.32 bis mode only. This makes for a faster handshake and a much more reliable connection.

### **Generic AT-Strings for Host Modem**

The following procedure may not be necessary, but may make for a more reliable connection. The standard modem setup is usually sufficient. However, if the area that the unit is on fringe of the provider's coverage or the communication software package communicates remotely with meters or a DTE device, the following procedure must be added to the host modem setup procedure.

Courier V-Everything<sup>®</sup>, USB<sup>®</sup> models

```
AT&F1S54=192S56=192S58=33S34=7s27=16&W&W1
```

Rockwell<sup>®</sup> or Conexant<sup>®</sup> chipsets (Zoom<sup>®</sup>, Best Data<sup>®</sup>, Diamond<sup>®</sup> and most WIN modems)

```
AT&F;+MS=V32b,1,4600,14400,9600,14400;\N2;&W
```

Some newer modems you need to enter these commands separately or after each command enter (;)

Example: AT&W;+MS=V32,1,4600,14400,9600,14400;\N2;&W

See your host modem manual.

For older Rockwell<sup>®</sup> chipsets use

```
AT&F+MS=9,1,4600,14400\N2&W
```

### **Host Modem Manufacturers**

All modems sold in the U.S. are required to have an FCC I.D. number, and it is stamped somewhere on the modem. To find the FCC I.D. on an internal modem, open the CPU and remove the modem card. There may be additional markings or a model number to indicate the identity of the manufacturer.

After finding the FCC I.D. number, access the FCC website ([www.fcc.gov](http://www.fcc.gov)) and enter the first three characters of the I.D. number to find the manufacturer.

Example: To find the manufacturer of the LT WinModem<sup>®</sup> in the IBM<sup>®</sup> Aptiva (2140-L61):

1. Turn off power.
2. Unplug AC cord.
3. Open cover.
3. Remove phone cable.
4. Remove screw holding modem card.
5. Remove modem card. On the back of the modem is an FCC I.D. sticker, which reads: DK4TAI-24427-

M5-E.

6. Enter DK4 in first search field.
7. Manufacturer information received: GVC Corp.<sup>®</sup> Taiwan
8. Additional information found:
  - DF-1156HV/R2B (GVC's model number and board revision number on component side).
  - LUCENT<sup>®</sup> 1643 (Apollo) chip.
  - 3Com/USR<sup>®</sup> Courier's FCC I.D. number begins with CJE. FCC query returned manufacturer's name: US Robotics Access Corp.<sup>®</sup>

## **COMMAND REFERENCE**

### **Introduction to AT- Commands**

The modem functions of the CDS-9060 are controlled using the same industry standard AT commands as those used to control landline modems. Knowledge of these commands is not required by most users, but is provided here for reference.

The parameters set by the various AT commands are remembered by the CDS-9060, and are transmitted to the modem at the carrier's site each time a call is made. Settings will continue until the unit is powered down, and then are lost on power down.

The modem has two operational states:

- Command state (when accepting industry standard AT commands)
- Online state (when instructed to dial out or answer a data call)

The "Asynchronous mode" is used to transfer information between two computers.

## CDS-9060 Cellular and PCS CDMA AT-Commands

(QUALCOMM® PROPRIETARY COMMANDS)

### Default AT-String Profile:

AT&V

&C: 2; &D: 2; &F: 0; E: 1; L: 0; M: 0; Q: 0; V: 1; X: 4; Z: 0; S0: 0  
S10: 14; S11: 95; S3: 13; S4: 10; S5: 8; S6: 2; S7: 50; S8: 2; S9: 6  
+FCLASS: 0; +CFG: ""; +FCC: 0,1,0,0,0,0,0; +FIS: 0,1,0,0,0,0,0  
+CDR: 0; +CDS: 0,1,2048,6; +CFC: 0; +CQD: 10; +CRC: 0; +CRM: 0; +CTA: 0  
+CXT: 0; +DR: 0; +DS: 3,0,2048,6; +EB: 1,0,30; +EFCS:1; +ER: 0  
+ES: 3,0,2; +ESR: 1; +ETBM: 1,1,20; +FAA: 0; +FAP: 0,0,0; +FBO:0  
+FBU: 0; +FCQ: 1,0; +FCR: 0; +FCT: 1E; +FEA: 0; +FFC: 0,0,0,0; +FHS: 0  
+FIE: 0; +FIP: 0; +FLI: ""; +FLO: 1; +FLP: 0; +FMS: 0; +FNR: 0,0,0,0  
+FNS: ""; +FPA: ""; +FPI: ""; +FPP: 0; +FPR: 8; +FPS: 1; +FPW: ""  
+FRQ: 0,0; +FRY: 0; +FSA: ""; +FSP: 0; +ICF: 3,3; +IFC: 2,2; +ILRR: 0

## CDS-9060A AT-Commands for Analog Data Calls

### Default AT-String Profile for Analog Modem:

\*ATI3 (Note: the (\*) command is an extended AT-COMMAND. For more information about AT-COMMANDS for the CDS-9060A Dual Mode Modem, see the CDS-9060A user guide.

V3.500-V34\_2M\_DLP

OK

at&v

ACTIVE PROFILE:

B1 E1 L1 M1 N0 Q0 T V1 W0 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q5 &R1 &S0 &T5 &X0 &Y0  
S00:000 S01:000 S02:043 S03:013 S04:010 S05:008 S06:002 S07:050 S08:002 S09:006  
S10:014 S11:095 S12:050 S18:000 S25:005 S26:001 S36:007 S38:020 S46:138 S48:007  
S95:000

STORED PROFILE 0:

B1 E1 L1 M1 N0 Q0 T V1 W0 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q5 &R1 &S0 &T5 &X0  
S00:000 S02:043 S06:002 S07:050 S08:002 S09:006 S10:014 S11:095 S12:050 S18:000  
S36:007 S40:104 S41:195 S46:138 S95:000

STORED PROFILE 1:

B1 E1 L1 M1 N0 Q0 T V1 W0 X4 Y0 &C1 &D2 &G3 &J0 &K3 &Q5 &R1 &S0 &T4 &X0  
S00:000 S02:043 S06:002 S07:050 S08:002 S09:006 S10:014 S11:095 S12:050 S18:000  
S36:007 S40:168 S41:195 S46:138 S95:000

TELEPHONE NUMBERS:

0= 1=  
2= 3=

## Qualcomm® Proprietary Commands

### Command:

### Description:

\$QCQNC=<value>

Packet call behavior:

0: Enable IS-707 packet data.

1: Enable Quick Net Connect packet data.

\$QCPKND=<value>

Packet Auto Detect Behavior:

0: Do not bring up packet calls unless preceded by ATDT #777.

1: Bring up packet calls upon detection of a PPP packet.

\$QCCA

Instructs phone to answer current call in voice mode.

\$QCVAD=<value>

Pre-Arrangement Setting:

0: No effect

1. Instructs phone to answer next incoming call in asynchronous mode.

2. Instructs phone to answer all subsequent calls in asynchronous mode.

### Basic AT Parameters

These commands control the basic configuration of the modem. The parameters can only be read back by the &V command when in command state.

#### Parameter: Description:

E0	Do not echo commands in command state or online command state.
E1	Echo commands in command state or online command state.
L0	Low speaker volume.
L1	Low speaker volume.
L2	Medium speaker volume.
L3	High speaker volume.
M0	Speaker off.
M1	Speaker on until carrier reported. (Support of this feature is optional.)
M2	Speaker on. (Support of this feature is optional.)
Q0	Return result codes.
Q1	Do not return result codes. <b><u>NOT SUPPORTED SET 9060 to DUMB MODE</u></b>
V0	Display result codes as numbers.
V1	Display result codes as words.
X1	Enable additional result code CONNECT <rate>. Disable dial tone. Disable busy detection.
X2	Enable additional result codes CONNECT <rate> and NO dial tone. Disable busy detection. Enable dial tone detection.
X3	Enable additional result codes CONNECT <rate> and BUSY. Enable busy detection. Disable dial tone detection.
X4	Enable additional result codes CONNECT <rate>, BUSY and NO dial tone. Enable busy detection. Enable dial tone detection.
Z0	Reset to default configuration.
&C1	Circuit 109 (CF) ON in accordance with the specified service.
&D1	Enter online command state following ON to OFF transition of circuit 108/2.
&D2	Enter command state following ON to OFF transition of circuit 108/2.
T	Select tone dialing.
P	Select pulse dialing.

### S-Registers

The value of an S-register may be set by using the syntax Sn=xxx where n is the register number and xxx is a decimal value. For example, to set the register SO to 3, use the command SO=3. r1b reads register SO, therefore the command SO? is used.

	Register:	Value:
	<b>Description:</b>	
SO	0	Disable automatic answering. <b><u>NOT USED</u></b>
	[1 to 255]	Enable automatic answering after <i>After what?</i>
S3	13	Carriage Return character.
S4	10	Line Feed character.
S5	8	Backspace character.
S6	2 to 10	Pause before blind dialing.

	2	
S7	1 to 255 [50]	Number of seconds to establish end-to-end data connection.
S8	0 to 255	Number of seconds to pause when “,” is encountered.
[S9]	2 0 to 255	Carrier detect threshold in increments of 0.1 seconds.
S10	6 1 to 254 [14]	Number of tenths of a second from carrier loss to disconnect.
[S11]	50 to 255 [95]	DTMF tone duration and spacing in milliseconds.

### Basic Action Commands

Command:	Description:
A	Go off hook. Answer any incoming call.
D <dial string>	Dial. Dial string may contain the following characters: digits 0 to 9, *, #, A, B, C and D. Dial string may contain the following modifiers:
T	Tone dialing.
P	Pulse dialing.
,	Pause during dialing.
W	Wait for dial tone.
@	Wait for quiet answer.
!	Hook flash.
\$	Wait for billing tone (for credit card calls).
;	After dialing, phone remains in command state.
H0	Disconnect and return to command state.
00	Return to online data state from

## CDMA AT Parameter Commands

Command:	Description:
+CXT=<value>	Cellular Extension. 0 Do not pass unrecognized commands to the IWF. 1 When detecting an unrecognized AT command, open transport layer connection and pass unrecognized command to the IWF.
+CFG="<string>"	Configuration String. The string (up to and including the termination character) will be stored by the MT2 and sent to the base station prior to dialing. Each transmission of an AT+CFG command from the TE2 replaces the contents of the previous string. The string may contain up to 248 characters.
+CAD?	Query Analog or Digital Service. 0: if no service available. 1: if CDMA digital service available. 2: if TDMA digital service available. 3: if Analog service available. (Values 4-255 reserved.)
+CDR	Um Interface Data Compression Reporting. This extended format numeric parameter controls whether or not the extended format "+CDR:" intermediate result code is transmitted by the MT2. The result code is the same as for the TIA/EIA/IS-131 +DR: result code.
+CBIP?	Base station IP Address. Read-only. Returns the base station's IP address.
+CSS?	Serving System. Read-only. Returns <AB>, <SID>. AB: A: Mobile station is registered with an A-band system. B: Mobile station is registered with a B-band system. Z: Mobile station is not registered. SID: 0-16383: Mobile station is registered with the system indicated. 99999: Mobile station is not registered.
+CSQ?	Query Received Signal Quality. Returns the Signal Quality Measure <SQM> and the Frame Error Rate as follows: Signal Quality Measure <SQM>: 0-31 Signal Quality Measurement 99SQM is not known or is not detectable. All other values are reserved. Frame Error Rate: 0<0.01% 10.01% to less than 0.1% 20.1% to less than 0.5% 30.5% to less than 1.0% 41.0% to less than 2.0% 52.0% to less than 4.0% 64.0% to less than 8.0% 7?8.0% 99 <FER> is not known or is not detectable.

## Cellular AT-Commands for Packet Data Services

**Command:**

+CTA=<value>

**Description:**

Set/Read/Test Um packet data inactivity timer.

0: Traffic Channel not released during inactivity periods.

1-255 Release the Traffic Channel after <value> one-second intervals have elapsed since last sending or receiving RLP data frames on the Um interface.

20 (default)

+CPTC =<value>

0: Release Traffic Channel

1: Originate Traffic Channel

**CDMA AT-Command for DTE devices that will not handle packet data**

AT+DS=0,1,512,6

## **RS-232 signals functional description**

The first letter of the EIA signal name categorizes the signal into one of five groups, each representing a different “circuit”:

- A: Ground
- B: Data
- C: Control
- D: Timing
- E: Secondary channel

### **Pin 1. Protective Ground:**

Name: AA  
Direction: --  
CCITT: 101

This pin is usually connected to the frame of one of the devices, either the DCE or the DTE, which is properly grounded. The sole purpose of the connection is to protect against accidental electric shock and usually this pin should not be tied to the Signal Ground.

This pin should connect the chassis (shields) of the two devices, but this connection is made only when the common connection of both chassis grounds is safe and is considered optional.

Ground loops are low impedance closed electric loops composed of ground conductors. When two grounded devices are connected, for example by a RS-232 cable, the difference of potential of alternating current on the devices may induce an electric potential across the ends of the grounding conductor of the cable, either the Protective Ground or Signal Ground conductor, resulting in electric current flow across this line between the two pieces of equipment.

Since the loop's impedance is low, this current can be quite high and easily burn out circuitry. Electrical storms can also cause a burst of destructive current across such a loop. Therefore, connection of the Protective Ground pin at both ends is potentially hazardous. Furthermore, not all signal grounds are necessarily isolated from the chassis ground, and using this ground path in an RS-232 interface, especially across a long distance, is unreliable and could be hazardous. Thirty meters is considered the maximum distance at which the grounding signals can be connected safely.

### **Pin 2. Transmit Data:**

Name: BA  
Direction: DTE → DCE  
CCITT: 103

Serial data (primary) are sent on this line from the DTE to the DCE. The DTE holds this line at logic “1” when no data are being transmitted. A logic “0” condition must be present on the following signals, where implemented, before data can be transmitted on this line: CA (Request to Send), CB (Clear to Send), CC (Data Set Ready) and CD (Data Terminal Ready).

### **Pin 3. Receive Data:**

Name: BB  
Direction: DTE ← DCE  
CCITT: 104

Serial data (primary) are sent on this line from the DCE to the DTE. This pin is held at logic 1 (Mark) when no data are being transmitted, and is held OFF for a brief interval after an ON to OFF transition on the Request to Send line, in order to allow the transmission to complete.

### **Pin 4. Request to Send:**

Name: CA  
Direction: DTE → DCE  
CCITT: 105

Enables transmission circuits. The DTE uses this signal when it wants to transmit to the DCE. This signal, in combination with the Clear to Send signal, coordinates data transmission between the DTE and the DCE.

A logic 0 on this line keeps the DCE in transmit mode. The DCE will receive data from the DTE and transmit it on to the communication link.

The Request to Send and Clear to Send signals relate to a half-duplex telephone line, which is capable of carrying signals on both directions, but only one at a time. When the DTE has data to send, it raises Request to Send, then waits until the DCE changes from receive to transmit mode. This ON to OFF transition instructs the DCE to move to transmit mode. When a transmission is possible, the DCE sets Clear to Send and transmission can begin.

On a full duplex line, such as a hard-wired connection where transmission and reception can occur simultaneously, the Clear to Send and Request to Send signals are held to a constant ON level.

An ON to OFF transition on this line instructs the DCE to complete the transmission of data that is in progress, and to move to a receive (or no transmission) mode.

#### **Pin 5. Clear to Send:**

Name: CB  
Direction: DTE ← DCE  
CCITT: 106

An answer signal to the DTE. When this signal is active, it tells the DTE that it can now begin transmitting (on Transmitted Data line). When this signal is ON and the Request to Send, Data Set Ready and Data Terminal Ready are all ON, the DTE is assured that its data will be sent to the communications link. When OFF, it is an indication to the DTE that the DCE is not ready, therefore data should not be sent.

When the Data Set Ready and Data Terminal Ready signals are not implemented in a local connection, which does not involve the telephone network, the Clear to Send and Request to Send signals are sufficient to control data transmission.

**Pin 6. Data Set Ready:**

Name: CC  
 Direction: DTE ← DCE  
 CCITT: 107

On this line, the DCE tells the DTE that the communication channel is available. That is, in an automatic calling system, the DCE (modem) is not in the dial, test, or talk modes, and therefore is available for transmission or reception. This line reflects the status of the local data set and does not indicate that an actual link has been established with any remote data equipment.

**Pin 7. Signal Ground:**

Name: AB  
 Direction: --  
 CCITT: 102

This pin is the reference ground for all of the other signals, data and control.

**Pin 8. Receive Line Signal Detect or Data Carrier Detect:**

Name: CF  
 Direction: DTE ← DCE  
 CCITT: 109

The DCE uses this line to tell the DTE that a good signal is being received. Good signal means a good analog carrier, one that can ensure demodulation of received data.

**Signal Travel Direction**

The pin names are the same for the DCE and the DTE. Transmit Data (pin no. 2) is a transmit line on the DTE and a receive line on the DCE. Data Set Ready (pin no. 6) is a receive line on the DTE and a transmit line on the DCE. (See directional arrows, for each pin, above.)

**Electrical Signal Characteristics**

Voltage Levels as Defined in the Standard:

Data signals:	"0", "Space"	"1", "Mark"
Driver (required)	5 to 15	-5 to -1 Volts
Terminator (expected)	3 to 25	-3 to -2 Volts
Control signals:	"Off"	"On"
Driver (required)	-5 to -15	5 to 1 Volts
Terminator (expected)	-3 to -25	3 to 2 Volts

## **TROUBLESHOOTING TIPS AND FAQ'S**

### **If the signal is weak, will data transmission slow down?**

Generally, the speed at which data moves is not affected by signal strength. However, there may be times when signal interference requires data to be re-sent, which will increase overall transfer time. Data transmission at the highest signal strength levels will be no faster than at lower levels.

### **How strong of a signal do I need to use CDS-9060 Modem?**

A signal strength of 15 or greater will usually allow satisfactory communications and data transfer. (Refer to Signal Strength Measurement on Pg. 15)

### **How can I tell what's going on with my connection while my modem is operating?**

LED diagnostic indicators are provided for visual diagnostics and connection information with both the host and the wireless network. Refer to Pg. 9, LED functions.

### **Why will my computer say 'Connected at 19200 bps' when the CDS-9060 is only capable of 14400 bps?**

When your computer reports a speed of 19200 bps, it is referring to the speed across the cable that connects your computer, data logger, RTU, DTE, etc. with your CDS-9060 (DCE). The speed between your CDS-9060 and the Nationwide CDMA Network, and thus the overall system speed, is limited to 14400 bps.

### **When I type an AT-STRING using a Terminal program, the AT-STRING does not display after the unit is powered down then powered back up. Why?**

The CDS-9060 will only store an AT-string using the Config Menu option "J" (Modem Init). You can input up to 50 characters. Every time the unit powers up it sends this command to MSM3000 chip and in turn tells the IWF. If you're running the CDS-9060A Analog modem, it also gets updated.

### **Why do current requirements vary at different times and with different connections?**

Several factors can affect current requirements. Low signal strength will increase your current requirements because your modem must use more power to transmit and receive signals. Also, transmitting data uses more power than receiving data.

### **What are the current considerations for Solar Applications?**

The CDS-9060 series modem will not exceed 53ma during idle time, (waiting for a call). The current requirements during normal data communications are 300ma to 2A.

### **The CDS-9060 does not seem to be making or receiving calls. What should I do?**

Make sure you have adequate signal strength. Double check that auto-answer is ON in the Configuration Menu. Check the phone number settings. Call the wireless provider to make sure the phone number is active. Ask them to check the ESN to make sure it matches yours, and also get the System ID Number and make sure it is entered in the configuration menu correctly. Verify that the CDS-9060 can dial-out by calling a phone number to see if it rings. (Use the ATDT command from a terminal program). If all of the above fail, refer to the AT commands below.

## **Other Tips – AT Commands for Trouble Shooting**

### **Type AT Command:**

**AT+CAD?** = 1 unit is registered to a CDMA provider

**AT+CAD?** = 3 unit is registered on a Analog Signal

**AT+CAD?** = 0 unit is out of range of provider or unit is not programmed correctly

**AT+CSS?**

+CSS: 1,B,2

1 = Index slot 1 – 800MHz

B = Analog provider side

2 = What System ID you are roaming on or your SID.

**AT+CSS?**

+CSS: 1,A,27

1 = Index slot 1 – 800MHz

A = Analog provider side (A = NON-WIRELINE IN MOST PARTS OF THE WORLD)

2 = What System ID you are roaming on or your SID.

**For PCS System Analog Side Not Activated On System****Example of an Activated PCS on 1900MHz HOME System****AT+CSS?**

+CSS: 2,A,4145

1 = Index slot 1 – 800MHz Dual mode goes into analog mode 800MHz (slot = 1)

A = Analog provider side (A = NON-WIRELINE IN MOST PARTS OF THE WORLD)

2 = What System ID your roaming on or your SID. (System ID it's roaming on)

**Example of an Activated PCS on a 800MHz Provider****AT+CSS?**

+CSS: 1,B,2

(Check with your Wireless Provider if you are Roaming on another system.)

**Example of a Non-Activated PCS on 1900MHz HOME System****AT+CSS?**

+CSS: 1,Z,99999

1 = Index slot 1 – 800MHz Dual mode goes into analog mode 800MHz (slot = 1)

A = Analog provider side (A = NON-WIRELINE IN MOST PARTS OF THE WORLD)

2 = What System ID your roaming on or your SID. (System ID it's roaming on)

99999 = The mobile station is not registered

99 = SQM is not known or is not detectable

Z = The Wireless provider is not recognizing you in the Switch

**AT+CSS?**

+CSS: 0,Z,99999

1 = Index slot 1 – 800MHz Dual mode goes into analog mode 800MHz (slot = 1)

In Most Countries the 800 Index = 1. In the PCS/1900MHz = 1 to 9

A = Analog provider side (A = NON-WIRELINE IN MOST PARTS OF THE WORLD)

B = Wireline wireless network

2 = What System ID you are roaming on or your HOME SID. (System ID it's roaming on)

999999 = Not Activated

Note: WHEN INDEX SLOT is 0, you are not picking up any Wireless provider. Three things can cause this:

- PRL file is wrong or not disabled in the PROGRAMMING MENU. If the unit is not going to be roaming on other Wireless Providers, it should not care about the PRL. (This is up to the Wireless

Provider. Some providers set their switch so that you have to have the correct file). Call Dataremote, Inc. We do have couple of good contacts that may help if you are having problems activating. Please feel free to call Dataremote for help.

- If the computer reports a speed of 19,200 bps, it is referring to the speed across the cable that connects the computer, data logger, RTU or other device with the CDS-9060. The speed between the CDS-9060 and the Nationwide CDMA Network (thus the overall system speed) is limited to 14,400 bps.
- The CDS-9060 will store AT-Strings using configuration menu Option "J". Up to 50 characters can be entered at one time. Each time the unit powers up it sends this command to the MSM3000 chip.

### **CDS-9060 DIAL-UP NETWORK Using the IS-95 Circuit switch data call**

1. In Windows 98, Me, 2000, or XP, go to the Network Connections Wizard.
2. Select "Connect to the Internet", and "Next".
3. Select "Set up my connection manually", and "Next".
4. Select "Connect using a dial-up modem", and "Next".
5. Select "Modem-Standard 19200 bps Modem (COM X)" (the modem you are using for this connection), and "Next". Make sure you select the correct COM port, the same one you set-up in your modem configuration. This is very important so TAPI standard, a Microsoft Modem standard, will work correctly.
6. Enter the name of your wireless provider for this connection in the text box provided and "Next".
7. Enter a user name and password. For Verizon Wireless, Alltel and Sprint Wireless the user name is "qnc" and the password is also "qnc". You may want to add a shortcut to your desktop in this window. Select "next" and "finish".
8. The new connection phone numbers will be "#777" for Verizon Wireless and Alltel, and "#WEB" for Sprint Wireless.

## ITU-T DATA TRANSFER RATE DEFINITIONS (TABLE 2)

Standard	Definition
V.22	Provides 1200 bits per second at 600 <b>baud</b> (state changes per second)
V.22bis	The first true world standard, it allows 2400 bits per second at 600 baud
V.32	Provides 4800 and 9600 bits per second at 2400 baud
V.32bis	Provides 14,400 bits per second or fallback to 12,000, 9600, 7200, and 4800 bits per second
V.32turbo	Provides 19,200 bits per second or fallback to 12,000, 9600, 7200, and 4800 bits per second; can operate at higher data rates with compression; was not a CCITT/ITU standard
V.34	Provides 28,800 bits per second or fallback to 24,000 and 19,200 bits per second and backwards capability with V.32 and V.32bis
V.34bis	Provides up to 33,600 bits per second or fallback to 31,200 or V.34 transfer rates
V.35	The trunk interface between a network access device and a packet network at data rates greater than 19.2 Kbps. V.35 may use the bandwidths of several telephone circuits as a group. There are V.35 Gender Changers and Adapters.
V.42	Same transfer rate as V.32, V.32bis, and other standards but with better error correction and therefore more reliable
V.90	Provides up to 56,000 bits per second downstream (but in practice somewhat less). Derived from the <b>x2</b> technology of 3Com (US Robotics) and Rockwell's <b>K56flex</b>

## GLOSSARY OF WIRELESS TERMS

### A

Actual Traffic Channels	Effective traffic channels plus soft handoff channels
ACCOLC	ACCess Overload Classes
AMPS	Advanced Mobile Phone Service
AVL	GPS \ Automatic Vehicle Location

### B

Baud	state changes per second
bis	Modem handshaking protocol
bps	DTE\DCE data Rate (bits per second)
BSS	Base Station System
BTS	Base Transceiver System

### C

CDG	CDMA Development Group
CDMA	Code Division Multiple Access
CDPD	Cellular Digital Packet Data
CELP	Code Excited Linear Predictive
C/I	Carrier to Interface ratio
CODEC	Coder-decoder. An electronic device that converts analog signals, such as video and voice signals, into digital form, and then compresses them to conserve bandwidth on a transmission
CTS	Clear To Send

### D

DCE	Data Communications Equipment
DS CDMA	Direct Sequence CDMA
DSR	Data Set Ready
DTE	Data Terminal Equipment

### E

Eb/No	Energy to bit Noise ratio
Effective Traffic Channels	Number of traffic-carrying channels less soft handoff channels. Equivalent to an FDMA or TDMA traffic channel.
EIA	Electronics Industry Association
EVRC	Enhanced Variable Rate Coder

### F

FDMA	Frequency Division Multiple Access
FER	Frame Erasure Rate

**G**

GPS Global Positioning System  
 GSM Global System for Mobile communication

**I**

IS Interface Standard  
 IS-54 TIA TDMA air Interface Standard  
 IS-95 TIA spread-spectrum digital cellular standard IS-95B, which is a packet-based network that combines 8 channels and is expected to offer data transmission rates up to 64 kbps.  
 ITU International Telecommunications Union  
 IS-131  
 IS-687 TIA CDMA data standard  
 IS-707 IS-95\I95A  
 IWU Inter-Working Unit

**K**

kbps kilobits per second

**M**

MCC Multi-Channel CDMA Controller card  
 MOS Mean Opinion Scores  
 MS Mobile Station  
 MSC Mobile Switching Center  
 MTBF Mean Time Between Failures

**N**

NAM Number Analog Mobile Number  
 NAMPS Narrowband AMPS  
 NCSA National Center for Supercomputing Applications

**O**

Overhead Channels Sync, paging and access channels

**P**

PCM Pulse Code Modulation  
 PCS Personal Communications Services  
 PDC Personal Digital Cellular  
 Physical Channel Total number of traffic elements; actual traffic channels plus overhead channels  
 PM Pulse Modulation  
 PN Pseudorandom Noise  
 PSTN Public Switched Telephone Network  
 PW Pulse Width

**Q**  
QPSK                      Quadrature Phase Shift Keying

**R**  
RF                         Radio Frequency  
RLP                      Radio Link Protocol  
RSSI                     Received Signal Strength Indication  
RTS                      Request to send  
RX                        Receive  
RXD                      Receive

**S**  
SAC                      Subscriber Access Control (CDMA)  
SMS                      Short Message Service

**T**  
TACS                     Total Access Communications system  
TCH                      Traffic CHannel  
TDMA                    Time Division Multiple Access  
TIA                      Telecommunications Industry Association  
TTL                      5 VDC signal true or false  
TRU                      Cellular or PCS Radio  
TX                        Transmit  
TXD                      Transmit

**U**  
UARTS                    COM Port Integrated Circuit Technology

**V**  
VDC                      Volts Direct Current

**W**  
WiLL                      Motorola's Wireless Local Loop system for fixed wireless applications

**X**  
XCVR                     Transceiver