# Card-Display™ Protocol
## Credit / Debit Card Serial Port Interface
**For Transmitting Value And Text Data To IDX Display-Timers**
Rev. 3/2008

## General Description
The IDX Card-Display Protocol is designed to facilitate the interoperability of credit / debit card systems with IDX Display-Timer products via an RS-232 serial port and the protocol detailed herein. Provisions are made for communication of the value received and the processing of messages the card system wishes to have displayed. Compatibility with IDX products will include the Little Two Timer, Big Time, Jumbo Time, and GigaTime. Firmware updates for existing products and products already in the field will be made available in due course.

## Certification Testing
IDX will provide a PC based software application called DisplaySim.exe for use by manufacturers during development of their card based systems to verify their interface is compatible with IDX Display-Timers. When the manufacturer is satisfied, a system is provided to IDX for Certification Testing. The system is returned to the manufacturer on test completion. If the test is passed, IDX will issue a License Certificate to the manufacturer which will require use of the Card-Display Logo shown to the right on literature referencing compatibility with IDX products. We will also post a list of all IDX Card-Display compatible products on our Web site with an optional link to the product's page.
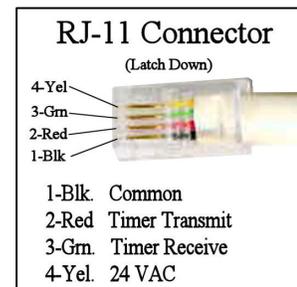
## RS-232 Interface
**Data Rate:** 1200,N,8,1 For backward compatibility with existing products.

**Connector1:** RJ-11 as shown to the right for IDX Display-Timers. Note 24VAC wire should be disconnected in this application.

**Connector2:** During certification testing the card system end of the connecting cable will be documented.

**RJ-11 Connector**
(Latch Down)
4-Yel
3-Grn
2-Red
1-Blk

1-Blk. Common
2-Red Timer Transmit
3-Grn. Timer Receive
4-Yel. 24 VAC

## Card-Display Protocol Logistics
**Transmission Integrity:** The protocol includes an echo of each character sent. As the data is not terribly critical, the bit rate low, and the cable length short, there has been no further provision made for data transmission integrity, such as a message checksum or a request for re-transmission. However, the card system may monitor the character echo from each of its byte transmissions and implement a corrective re-transmission strategy should the system detect an echo error worthy of correction.

**ASCII Hexadecimal Data:** All data bytes are sent in ASCII Hexadecimal format with most significant nyble first, thus occupying two transmission bytes each.

**Message Start & End:** The IDX Display-Timers implement numerous data reporting and configuration protocols which must be distinguished from one another. The Card-Display Protocol commands are identified with the "!" character as a prefix, and end with the "." character as a terminating suffix. The prefix and suffix may optionally surround a group of commands. Note: The "^" command for retrieving the display-time status is an exception and does not require this prefix and suffix.

**Display-Timer Busy:** If the display-timer is busy and unable to execute a command, the command character will be replaced by an "x" in the echo. For example, the "!U." command is unavailable if there is any credit/time remaining, so it will be echoed as "!x." to indicate that it will not be executed.

**Communication Sync:** IDX recommends the following practice for ensuring communication synchronization with display-timers. To establish sync, send just the command prefix and suffix characters "!." and verify their return. While communicating, verify at least the echo of the prefix or suffix characters with each command string to verify sync existed at least someplace in each command. For the "^" command, verify that bit-6 of the return byte is indeed always set.


## Card-Display Protocol Commands
(Note: The d1 and r1 following a command letter indicate the transmitted or received byte count for the command.)

| Command | Description |
|---|---|
| **B $d_1$** | BILL validated. Data $d_1$ is the integer value in dollars (or Euros etc.) received. |
| **C $d_1$** | CREDIT card received. Data $d_1$ is the integer value in dollars (or Euros etc.) received. |
| **D $d_1$** | DEBIT card received. Data $d_1$ is the integer value in dollars (or Euros etc.) received. |
| **G $d_1$** | GIFT card/coupon received. The timer will turn on for the period of time provided by its Coins-To-Start / Service Time settings. Data $d_1$ determines which services will be enabled according to the following: If $d_1 = 0$, then only economy services are enabled based the time/value of a service being less than or equal to the average for all services. If $d_1 > 0$, then all services are enabled. For IDX Two-Timer products, $d_1 = 0$ corresponds to "A" mode coins-to-start and services only, while $d_1 > 0$ corresponds to "B" mode coins-to-start and allows services of either "A" or "B" modes. |
| **H $r_1$** | HEALTH report request. Data $r_1$ is returned form the display-timer. The data bits are as follows: $b_0$ = idle/off and no money, $b_1$ = idle/off and insufficient money, $b_2$ = timer on, $b_3$ = out of service. |
| **M $d_1$-$d_{38}$** | MESSAGE to display. Data $d_1$ = number of times to scroll the message. Data $d_2$ determines the number of short beeps the timer should sound at the start of the message. Data $d_3$ – $d_{38}$ is the 36 character string to display as the scrolling message. For messages shorter than 36 characters, set the remaining characters to the "space character" (20 Hex). The length of the displayed message will self limit when two sequential space characters are detected. During the period of time this message is being displayed, the timer will pause its countdown if it is on. |
| **Q $d_1$** | Quarter (or other virtual coin). Data $d_1$ is the integer value of virtual coins to be transmitted to the display-timer. The coin value setting of an IDX display-timer is typically $.25 in North American markets, but may be set to $.20 in other markets such as in Europe, Australian and New Zealand. **( rev. 10/2007 – BT6G)** |
| **T $d_1$** | TIME to set. Data $d_1$ sets the number of minutes for which the timer will be turned on. If $d_1 = 0$, then the timer will always be turned off and cleared of any remaining time. If the timer is already turned on, $d_1$ minutes will be added to the time currently remaining. If $d_1 = 255$ (FF Hex), then the time value will be the period of time provided by its Coins-To-Start / Service Time settings. |
| **U** | UP-COUNT. Turn on the timer and start the time display from zero, counting up. This is used for a card system using one swipe to turn on the display-timer and one swipe to later turn it back off, where billing to the card is in proportion to the timer used. See also the X command. |
| **X** | TERMINATE the Up-Count mode and scroll the timer's pre-programmed "Thank You" message. |
| **!** | Prefix for any command or string of commands. Required to set the timer-display protocol mode. |
| **.** | Suffix for any command or string of commands. Releases timer-display protocol mode. |
| **^ $r_1$** | HEALTH report request not requiring the above prefix and suffix causing an interruption in the current displayed message or time. Data r1 is returned form the display-timer as a single binary byte, as opposed to the hexadecimal format used for the other commands. The data bits are as follows: $b_0$ = idle/off and no money, $b_1$ = idle/off and insufficient money, $b_2$ = timer on, $b_3$ = out of service, $b_4$ = gift command output active, $b_5$ = count up output active, $b_6$ = 1 always in order to make response always legible on a dumb terminal. The purpose of $b_4$ and $b_5$ is so that one can know ahead of time not to debit a card when these functions are active, as opposed to receiving the "x" echo for a command such as "B01" when in one of these states.<br><br>**(Note: rev. 10/2007 – BT6G/H) Note that a BT6G/H Display Timer will respond in about 1ms, so that you will receive the completed byte response about 17ms after the you started the ^ transmission since there are two characters to serially transmit at 1200 baud as well. The DisplaySim simulator will have about 60ms total in a Win2K system and about 45ms total in a WinXP system with faster system interrupts.** |

## Licensing Notes

IDX intends this Card-Display protocol to be freely used by card system manufacturers in the industry, limited to the following conditions: 1.) To ensure compatibility between our products for our mutual end customers, all card systems must pass Certification Testing. 2.) To ensure that the end customer knows which products have installed features conforming to the Card-Display Protocol, all conforming products must have the Card-Display Logo sticker applied to its enclosure. IDX will make these stickers available at a nominal charge. 3.) To ensure that the end customer knows that a product conforms, the Card-Display Logo must be prominently displayed on its literature.

Permission to use the Card-Display Protocol or Card-Display Logo trademarks is expressly prohibited without completion of Certification Testing and obtaining a signed license agreement.