

**BANK-1 Interface Unit**

IC Engineering, Inc.

Beltsville, Md.





# BANK-1 Interface Unit

INSTRUCTION MANUAL



# 1. Introduction

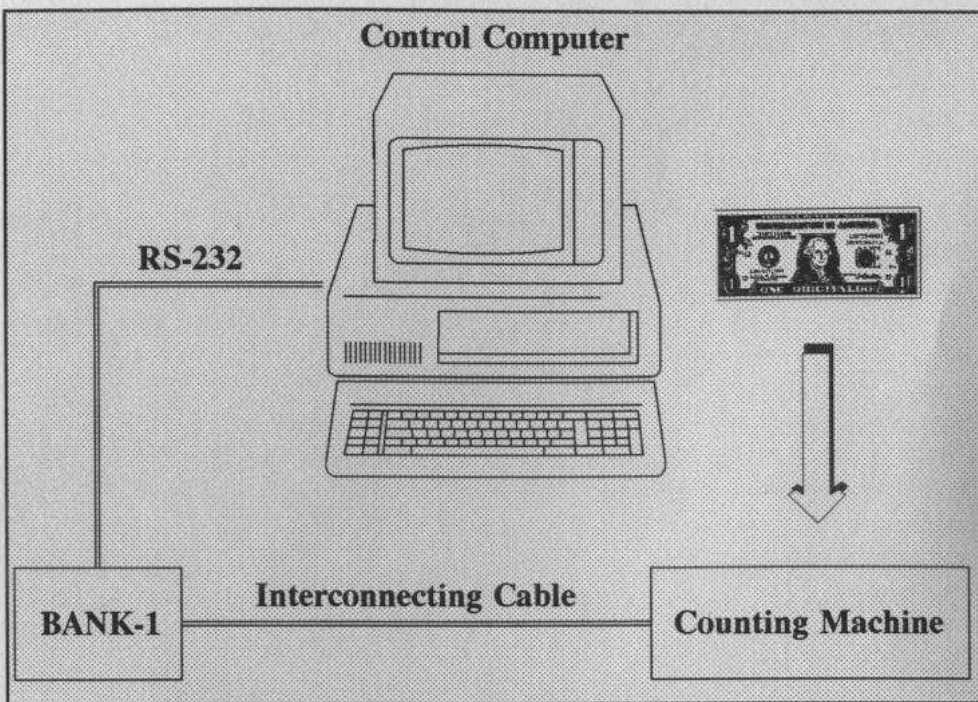
The **BANK-1 INTERFACE UNIT** is used to connect *Glory* and *Brandt* banknote counting machines with a PC, minicomputer, or mainframe via a standard RS-232 serial communications data line. The controlling computer can be used to replace dedicated cash settlement systems in order to permit custom applications software to drive one or more counting machines. The overall system can be as simple as a PC driving a single machine, using the PC's keyboard and video display for operator usage. Information collected can be stored on disk, creating a database which interacts with financial accounting systems. A more sophisticated system can be implemented using a minicomputer controlling many counting machines, with a video terminal allocated to each counting station.

A cable specific to the brand of counting machine is used between the BANK-1 and the counter. The BANK-1 connects with the computer via a female DB-25 connector. The BANK-1 is configured as Data Terminating Equipment (DTE); the computer is hooked up as if it is connected to a terminal. Pins 1, 2, 3, 7, and 20 are used. The DTR output (pin 20) is always active. Communications protocol is asynchronous ASCII, 7 data bits + even parity, 1 or 2 stop bits, at RS-232 voltage levels. Baud rate options are 9600 and 1200 bps, selected by a shorting clip within the unit. The BANK-1 does not echo characters received by it back to the computer.

All commands sent to the unit, and responses generated by it, terminate with a carriage return ({cr}, ASCII decimal 13). Commands may be sent in either upper or lower case. Invalid commands generate a ? after the {cr} is received.

The only unsolicited alert is **RESULT{cr}**. This indicates that a count operation has completed, with no errors and a nonzero count. This alert is repeated every 10 seconds until a **CLEAR** command is received. The 10 second timer is reset whenever a character is received.

... if the cable is changed to another type, or the power must be cycled off and on, or the DVI connector used.



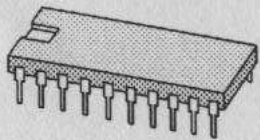
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## 2. Operation

Normal operation proceeds as follows (refer to section 4, *Commands*). The operator places the items to be counted into the machine, which proceeds to count them. Upon completion, the BANK-1 generates the **RESULT** alert message. The computer responds with **STATUS** and reads the count. If desired, the computer can repeat this last step to verify that no communications transmission error has occurred. The computer then sends **CLEAR** which readies the BANK-1 to receive the next count sequence from the counting machine.

If an error occurs which halts the count operation, the BANK-1 ignores the entire preceding count sequence, as the items must be recounted. The operators should be instructed to clear the error message and resubmit the entire batch to be recounted. If a jam has occurred, the operator will also have to clear the paper path.

The **STATUS**, **COUNT**, and **MAX{cr}** commands always return a 3-digit count total. If for some reason the count exceeds a value of 989, the **STATUS** (and **COUNT**) commands return a value of 999 indicating overflow has occurred. The computer should instruct the machine operator to resubmit the last batch in smaller groups.

If a **STATUS** command is issued when a **RESULT** alert has not been sent, one of several responses may be generated. If the machine is not counting, the BANK-1 will indicate this idle state with a response of 000. (Under normal operation, 000 is never returned, because if a count operation results in no items counted, the BANK-1 will not generate a **RESULT** alert.) If the counting machine is presently counting, a response of 997 is returned. If the counting machine is presently counting, and it missed the beginning of the count sequence due to a late response from the computer (only possible with the Glory counting machines), a response of 996 is returned.

The **COUNT** command can be used to read the count received when an underflow is possible (Glory machines only). This is used as follows: if a **STATUS** command returns 998, **COUNT** is sent to determine the number of items received by the BANK-1. Possibly the computer can inquire of the operator if this count is correct, or even to enter the value received. It may be simpler to instruct the operator to resubmit the batch for counting.

The **COUNT** command can also be used to read the number of items counted while the counting machine is in the process of counting. This is not recommended procedure, however. *NOTE: any communications with the BANK-1 while a counting operation is underway may result in the loss of one or more counts from the machine. This is more likely under 1200 bps operation, but is possible even at 9600 bps.*

The **MAX** command is used to implement batch operation. Upon initialization, the **MAXIMUM COUNT** is set to 000. This value disables batch operation. To enable batching in groups of 75, the command **MAX075{cr}** is issued, setting **MAXIMUM COUNT** to 75. Three digits must always be specified. The **MAXIMUM COUNT** can be set to any value in the range of 1-989 to enable batching; any other value inhibits batch operation. With batching enabled, the BANK-1 automatically commands the counting machine to stop counting when the **MAXIMUM COUNT** is reached. A **RESULT** alert is sent, and operation is the same as for non-batch handling.

Once the **MAXIMUM COUNT** is set with a **MAX** command, it remains the same until modified with another **MAX** command, unless: the BANK-1 is powered down and up; an **INIT** command is sent; or a **STOP** command is sent. The current **MAXIMUM COUNT** setting can be read with the **MAX{cr}** command.

The **TYPE** command is used to determine the counting machine's manufacturer. The response is either **Glory{cr}** or **Brandt{cr}**. The cable interconnecting the counting machine and the BANK-1 determines the machine type, and is read upon powerup of the BANK-1. It must be plugged in prior to applying power to the unit. If the cable is changed to another type, either the power must be cycled off and on, or the **INIT** command issued.



The **START** command performs the same operation as depressing the *Start* button on the counting machine. It only has effect when the BANK-1 is in the idle state (not counting and cleared). It has no effect on the Brandt machine (which is handled in a different fashion).

The **STOP** command stops the machine from counting if counting is in progress; Glory machines are halted after the next document goes through; Brandt machines are halted after five documents go through (to give time to slow the unit down prior to stopping). The **MAXIMUM COUNT** is overwritten. After counting is stopped, a **RESULT** message is sent; the **MAXIMUM COUNT** can be restored after this alert is received. The **STOP** command has no effect if a count is complete but not cleared. If the BANK-1 is idle, future counting is inhibited for Brandt machines; Glory machines are not affected.

The **INIT** command initializes the BANK-1 the same as if the unit were powered down and up. The interconnection cable is read to determine the type of machine, and batch operation is inhibited.

The **TEST** command tests the program contents of the BANK-1; the **LOOP** command tests the I/O wiring of the BANK-1 box. Prior to executing the **LOOP** command, the DB-25 connected to the counting machine must be removed, and a test plug attached in its place. The test plug has pins 3 and 20 shorted, and pins 2, 6, and 22 shorted together. **LOOP** also performs a **CLEAR** operation. The **BLINK** command blinks the two LED's inside the box, and toggles the DTR output for test purposes. It halts after 30 seconds, and also performs a **CLEAR** operation.

**Indicator Lamps**

Two indicator lamps are provided internal to the BANK-1 for debugging purposes. To gain access to the lamps, the rear of the top cover should be gently lifted and slid back. The green LED flashes when a character is received from the control computer. The red LED indicates the state of the count operation. If the units are idle, it is off. If a count is in progress, it is on. When a count is completed, and before the computer issues the **CLEAR** command, it flashes.

**Options**

After the top cover is removed, two shorting clip options are accessible. The clip closest to the side of the box connects signal ground to case ground (pins 1 and 7 of the DB-25 connector) when it is positioned to the back of the unit.

The other shorting clip selects the baud rate. With the clip positioned towards the rear, 9600 bps operation is selected; positioned towards the front, 1200 bps operation is selected.

### 3. Machine Differences

The Glory and Brandt counting machines behave somewhat differently under certain circumstances. This section details the specifics for each type.

#### Glory Machines

Counting cannot be inhibited on these machines. As a result, if the computer is sluggish in reading and clearing the count, and the operator begins a new count operation before CLEAR has been received, it is possible that some of the count will be lost. When this new count operation is completed, this situation is noted by eliciting an underflow response from the STATUS query (998). The computer should instruct the machine operator to repeat the last batch.

Under batch operation, if the machine is misaligned it is possible that the MAXIMUM COUNT will be exceeded. The actual count received is greater than the MAXIMUM COUNT setting in these instances.

The counting machine does not notify the BANK-1 when a counterfeit bill has been detected. If the counterfeit circuit is activated, the machine stops counting upon detection of an invalid note. This does not stop the count sequence as far as the BANK-1 is concerned. The operator has two options at this point. If the CE button is depressed, the count operation is ended; the BANK-1 will notify the computer of the count received. The operator must indicate to the computer directly that the count included a counterfeit bill. The computer may then instruct the operator to resubmit the entire batch, and ignore the last count received. Alternately, the operator may depress the Start button, which proceeds counting the rest of the incoming stack. Upon completion, the BANK-1 will notify the computer of the entire total of the count sequence.

#### Brandt Machines

These machines must be placed into remote operation before the computer can control the units through BANK-1 interface devices. The counting machines permit counting to be inhibited. Counting is enabled when the BANK-1 is idle; once a count has been received, and the RESULT alert sent, further counting is automatically inhibited until a CLEAR command is received. As a result, it is not possible for an underflow to occur (STATUS responses 996 and 998).

If counting is to be inhibited when the units are idle, the STOP command is sent. This causes an immediate RESULT alert to be sent, even though no count was actually received. The STATUS command returns a count of 000. Counting is inhibited until a CLEAR command is sent. While inhibited, the RESULT alert is repeated every 10 seconds (as usual).

If the counting machine is not in remote operation, the count inhibits operate in the opposite sense. Therefore, if the BANK-1 is idle, the machine is inhibited from counting in local mode. To permit local usage, the procedure described in the preceding paragraph to inhibit operation in remote mode can be used.



## 4. Commands

Command	Response	Notes
STATUS{cr}	000{cr}	Idle
	001-989{cr}	Count completed
	990-995{cr}	Reserved for error types
	996{cr}	Presently counting with underflow
	997{cr}	Presently counting
	998{cr}	Count complete, underflow possible
	999{cr}	Count complete, overflow (count > 989)
COUNT{cr}	000-989{cr}	Present or completed count
	990-998{cr}	Reserved
	999{cr}	Overflow (count > 989)
CLEAR{cr}	OK{cr}	Go to Idle state
MAX{cr}	000-999{cr}	Current MAXIMUM COUNT setting
MAXxxx{cr}	OK{cr}	xxxx = 000-999
TYPE{cr}	Glory{cr}	Glory machine
	Brandt{cr}	Brandt machine
START{cr}	OK{cr}	Start the counter
STOP{cr}	OK{cr}	Stop the counter
INIT{cr}	-No Response-	Initialize the unit
TEST{cr}	OK{cr}	Program code is OK
	BAD{cr}	Program code is bad
LOOP{cr}	OK{cr}	I/O is OK
	BAD{cr}	I/O is bad
BLINK{cr}	Flash LED's and toggle DTR for 30 seconds	

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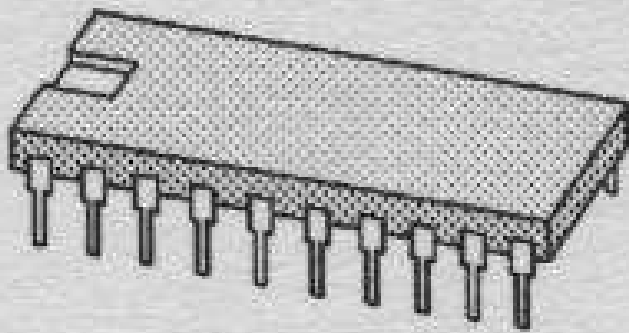
**WARNING:** This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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