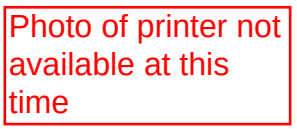
6822

Series 80-Column Printer



User's Manual

Intermec®

6822

Series 80-Column Printer

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B Bluetooth Configuration Commands and Specifications

Configuration of the Bluetooth radio and software is accomplished using the Bluetooth Configuration Commands listed in this appendix.

Using Configuration Commands

All printable characters can be entered directly via the keyboard. Any non-printable characters are entered in binary data format.

Numbers are in decimal format except numbers with:

- an h suffix are in hexadecimal
- a “0x” prefix are in hexadecimal
- a “b” suffix are in binary

Binary data format is any non seven-bit ASCII data to transmit to the module is encoded in the Internet percent notation. Any hex byte to transmit is preceded by the “%” sign and encoded in hex ASCII. To send the value 0xF5, the “%F5” bytes are transmitted. The “%”character is always transmitted as “%25”. Thus, a Bluetooth address could transmit as “%00%E0%03%45%F4%6D”.

Generic format:

```
<command character><command type><command payload><CR>
<command character> is one character from the set: [A-Z]
<command type> is one character for the set: [0-9]
<command payload> is variable in length.
<CR> is the command terminator.
```

The `<command payload>` is formed from printable ASCII characters from the code range 0x20 to 0x7E.

Codes outside of this range are escaped using the percent (%) character followed by two hexadecimal digits.

The percent character is always represented by the three characters %25.

The command terminator is character code 0x13 (carriage return), or character code 0x10 (line feed), or character codes 0x13, 0x10 (carriage return, line feed).

An example command to set the friendly name to “Len’s 100% serial module”:

```
F0Len’s 100%25 serial module<CR>
```

Character codes outside of the range of 0x20 to 0x7E are ignored.

When using percent (%) to form hexadecimal character codes there must be exactly two hex digits using characters: [0-9, A-F, a-f]. Characters outside of this range cause the command to fail.

- Commands that fail return the four character sequence NAK<CR>
- Commands that are accepted return the four character sequence ACK<CR>
- Commands that return payload data use the format:

```
<command character><command type><command payload><CR>
<command character> is one character from the set: [a-z]
<command type> is one character for the set: [0-9]
<command payload> is variable in length.
<CR> is the command terminator.
```

The command character is the lower case version of the local host command.

Operating Modes

The module interface has two modes:

- **Bluetooth Link Active State**
  In this case the Serial Interface looks like a raw serial port (TxD, RxD, CTS, etc. and GND). There is no intelligence in the Bluetooth module from the serial interface perspective. This mode does not support the command and control modes described below.
- **Bluetooth Link Inactive State**
  This mode exists when a Bluetooth link does not exist. In this case, the serial interface looks like a serial port that supports a number of command and control modes.

On reset, the unit comes up in Bluetooth Link Inactive state. After the first Bluetooth connection, the unit goes into Bluetooth Link Active state. It stays in this state until the link is lost because the Master shuts it down or there is an out-of-range condition, it then returns to the Bluetooth Link Inactive state.

Command and Control Modes

Query Mode Commands

Command	Function
?<CR>	Read ACK
?F0<CR>	Read Friendly Name
?L<CR>	Read Security Mode
?C0<CR>	Read Connectable Mode
?C1<CR>	Read Page Scan Timing
?D0<CR>	Read Discoverable Mode
?D1<CR>	Read Inquiry Scan Timing
?S1<CR>	Read Class of Device
?S2<CR>	Read Service Name
?S4<CR>	Read PIN Code
?T0<CR>	Read Shutdown Timeout in minutes
?B0<CR>	Read Bluetooth Addresses of all the paired devices

Example Commands

Command	Reply
“?<CR>“	”ACK<CR>”
“?F0<CR>”	“f0MyFriendlyName<CR>”
“?L<CR>”	“10<CR>” Turn off Encryption, Authentication, and Exclusion “11<CR>” Authentication “12<CR>” Encryption and Authentication “13<CR>” Encryption, Authentication, and Exclusive
“?C0<CR>”	”c0ON<CR>”
“?C1<CR>”	”c11024,512<CR>”
“?D0<CR>”	”d0ON<CR>”
“?D1<CR>”	”d11024,512<CR>”
“?S1<CR>”	”s1001F00<CR>”
“?S2<CR>”	”s2MyServiceName<CR>”
“?S4<CR>”	”s4MyPinCode<CR>”
“?T0<CR>”	“t0Shutdown Timer = 5 minutes<CR>”
“?B0<CR>”	“b0No Devices PairedCR>”

Note: These commands are only available over the serial link, not over the air and are not available when the device is in the "Bluetooth Link Active State."

Set Local Bluetooth Device Name

Command	F0<Device Friendly Name><CR>
Definition	"Device Name" — String up to 254 bytes long
Default	"6822-DDEEFF" where DDEEFF is from the (AABBCCDDEEFF) Bluetooth device address
Example	"F01Len's 100%25 serial module<CR>" This sets the name to "Len's 100% serial module."

Set Class of Device/Service Field

Command	S1< Class of Device/Service field >
Description	The Class of Device/Service (CoD) field is a 24-bit field defined in the Bluetooth Assigned Numbers document. This field is sent in a HEX ASCII format, most significant byte first.
Example	"S1001F00<CR>" is a common Class of Device value for a basic serial device.

Set Service Name

Command	S2<Service Name>
Description	Sets the service friendly name to send to the remote Bluetooth device in response to a service discovery request. The length of the service name is limited to 32 bytes.
Definition	Profile Name — text name entered into the SDP record for the serial port profile
Default	"Wireless Printer"
Example	"S3Acme Printer<CR>"

Connectable On/Off

Command	C0 <ON|OFF><CR>
Description	Sets the device into "connectable" mode

Example	“C0OFF<CR>” — Become non-connectable “C0ON<CR>” — Become connectable

Specify Page Scan Timing

Command	C1<Page_Scan_Interval>,<Page_Scan_Window><CR>
Description	Sets the Page Scan timing parameters
Default	4096,18
Example	“C11024,512<CR>”

Note: To enable scanning, the values for Interval and Window must be in the range of 18 to 4096. The Window value must be less than the Interval value. Both values must be zero to disable scanning.

Note: Modifying Page Scan Timing can improve connection times, but may adversely affect battery performance.

Enable Discoverable

Command	D0 <ON|OFF><CR>
Description	Sets the device into “discoverable” mode
Example	“D0OFF<CR>” — Become non-discoverable “D0ON<CR>” — Become discoverable

Specify Inquiry Scan Timing

Command	D1<Inquiry_Scan_Interval>,<Inquiry_Scan_Window><CR>
Description	Sets the Inquiry Scan timing parameters
Default	4096,18
Example	“D11024,512<CR>“

Set Encryption/Authentication: "PIN CODE"

Command	S4<PIN code>
Description	PIN Code — Pin code can be NULL and as long as 16 characters
Default	"S4%00" NULL PIN code
Example	"S4MyPinCode <CR>"

Manage Security Modes

This command controls the security access mode and device pairing.

The modes available are:

- L0 Disable encryption, authentication and exclusion
- L1 Enable authentication
- L2 Enable encryption and authentication
- L3 Enable encryption, authentication and exclusive

Mode L0 allows any remote device to connect.

Mode L1 require the remote device to be authenticated by a PIN request.

The PIN code for the module is set to a user–specified value with the S4 command. Currently the default PIN is the NULL string.

Mode L2 adds encryption to the Bluetooth link.

Mode L3 adds exclusive connection to one specific Bluetooth device.

In this mode only connection requests from the initial device are allowed. Connections from other devices are rejected even if they supply the correct PIN code.

Device pairing and bonding are associated with this command and works as follows:

After an L command is executed the current device pairing and bonding is deleted. The next device to connect becomes paired and bonded to the module.

In Modes L1 and L2, other devices are allowed to connect but only the first device to connect is paired and bonded. Other devices are always required to supply a PIN code to complete the connection.

In Mode L3, only one device is allowed to connect. This device is paired and bonded and needs to supply the PIN code only on the initial connection.

Note: Some of the Bluetooth user interfaces cannot supply a NULL string as a PIN code. Use the S4 command to specify a PIN code that is not NULL.

Read Module Version

Command	V0<CR>
Description	Displays the firmware build version currently running
Example	"V0<CR>" Returns: "v1yyyymmddHHMM<CR>"

Note: This command responds with the requested data, only not the "ACK<CR>".

Read Local Device Address

Command	V1<CR>
Description	Displays the local device address
Returns	"v1%xx%xx%xx%xx%xx%xx<CR>"

Note: This command responds with the requested data, only not the "ACK<CR>".

Example:

```
Sent: "V1<CR>"
Received: "v1%00%2C%C6%03%45%39"
```

Set Shutdown Timing

Command	T0<Time in Minutes><CR>
Description	"Time" – Integer value – 0 implies never expire the timer
Range	0-270 minutes
Default	120
Example	"T0120<CR>" This sets the shutdown timer to 120 minutes.

Clear Link Key Table

Command	B0<CLR><CR>
Description	Clear Pair or Bonding command cleans up all of the link key and Bluetooth address combination PSKEYs.
Default	None
Example	"B0CLR<CR>" This clears all saved link keys.

Understanding Adapter States or Modes

The Bluetooth adapter connects to an internal serial port of the 6822, providing serial print data over a transparent Bluetooth link, running a Serial Port Profile (SPP).

Printing is primarily accomplished over a Bluetooth link using the SPP protocol with a 700 Series or CK60 Mobile Computer. If the relevant printer configuration allows it, a 700 Series or CK60 in a terminal holder charges normally.

The Bluetooth adapter allows for four states or modes to be available. Each state is dependent upon either the pin states on the terminal holder connector or the programming connector on the adapter described later.

Bluetooth Adapter States or Modes

State	State/mode	HHC_A/B pin	HHC_DTR pin	Comments
1	Bluetooth Printing	0	0	Bluetooth printing/Bluetooth self-test
2	Pass–through printing	0	1	Printing from 700 Series or CK60s allowed to pass through the Bluetooth adapter transparently.
3	Bluetooth Reconfiguration	1	0	Reconfiguring Bluetooth module via 700 Series or CK60s.
4	Bluetooth programming cabled	X	X	Programming Bluetooth module via programming cable

- State 1 - In addition to allowing normal Bluetooth printing, this state also allows for a 700 Series or CK60 in the terminal holder to perform a Bluetooth self-test.
- State 2 is a Transparent Pass Through mode available for all 700 Series and CK60s. During this mode, the Bluetooth module is shut down and does not communicate.
- State 3 (Bluetooth reconfiguring using a 700 Color (730, 740, 741, 750, 751, 760, 761) or CK60). This state is unavailable when a 700 Monochrome (705, 710, 720) is used, since the A/B pin is unavailable.
- State 4 allows for programming the Bluetooth module via its SPI pins. This state is also used for manufacturing tests. To be in this state, the 700 Series or CK60 must not have an open terminal holder COM port and the specially designed programming adapter must be engaged.

The interfaces on the Bluetooth adapter that allow for the different modes are detailed below:

700 Series or CK60 to 6822 Pass Through

Note: Pass through printing requires shutting down the Bluetooth portion of the adapter. To reenable Bluetooth functionality after you finish pass through printing, press a button on the control panel to wake the printer.

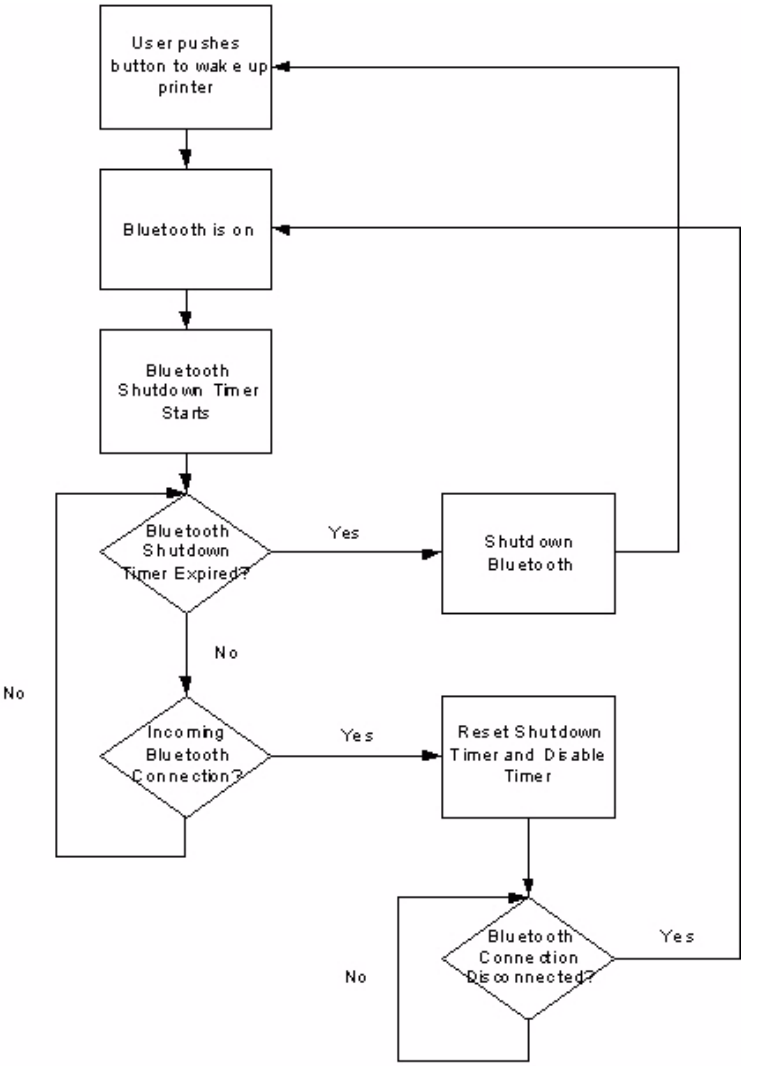
When DTR on the 700 Series or CK60 is set, the adapter board automatically opens a path between the 700 Series of CK60 and the 6822 Transition/DC Board and powers down the Bluetooth module. Testing the DSR pin to reflect DTR allows the mobile computer to differentiate between a Bluetooth-equipped terminal holder and a non-Bluetooth equipped terminal holder.

700 Series, CK60, or CN3 to Bluetooth Module Communication Interface

The Bluetooth adapter allows a 700 Series, CK60, or CN3 to communicate directly with the Bluetooth module under two circumstances.

- When the configuration settings of the Bluetooth module are to print.
- When the Bluetooth module requires reconfiguration.

Power Management Flow Diagram



Bluetooth Power Management Flow Diagram

Radio Power On/Off Mechanism

Note: The shutdown timer configuration is addressed in **Appendix A "Bluetooth Configuration Commands"**.

As stated earlier, the Bluetooth adapter, including the Bluetooth radio shuts down after a configurable time (default is two hours of idle time). To wake the Bluetooth adapter, the 6822 is powered on by any button push on the printer control panel. There are two ways to shutdown the Bluetooth module power:

- A 700 Series, CK60, or CN3 initiates a pass through mode, or
- The Bluetooth module sends a shutdown signal after a configurable amount of time. Default is two hours of idle time.

Note: The adapter complies with Bluetooth 1.1 specification, including bonding for authentication and enabling encryption.

Persistent Storage

These settings do not reset after a cold–boot is performed on the printer:

- Bluetooth Bonding Enable/Disable
- Bluetooth Encryption Enable/Disable
- Bluetooth Passkey
- Bluetooth Bonding List (Link Keys)
- Bluetooth Device Name
- Bluetooth Class of Device
- Discoverable setting
- Connectable setting
- Radio Shutdown Timer Timeout (default two hours of idle time)

System Behavior/Software Considerations

- Discoverability — The default mode is Discoverable.
  When configured to be discoverable, the adapter is discoverable at all times, except when:
  - an active Bluetooth connection exists

  - you have just completed a “pass-through printing” print job
  - the shutdown time has elapsed (default shutdown time is two hours).
- Connectability — The default mode is connectable.
  When configured to be connectable, the printer is connectable at all times, except when:
  - an active Bluetooth connection exists
  - you have just completed a “pass-through printing” print job
  - the shutdown time has elapsed (default is two hours).
- Link Loss — The 6822 Bluetooth adapter is able to recover from broken Bluetooth connections, including out-of-range, interference, power failure, or other conditions resulting in a broken connection. It returns to its previous Discoverable/Connectable state after a lost connection.
- Master/Slave — Printer participates in a Bluetooth connection as the slave device.
- The Class of Device is 0x040680 which translates to a Service Class of Rendering, a Major Device Class of Imaging, and a Minor Device Class of Printer.
- The 6822 Bluetooth includes an SDP record that allows the printer to report an SPP instance with a service name of Wireless Printer.
- The default Bluetooth device name is 6822-DDEEFF, where DDEEFF matches the respective portion of the Bluetooth device address (AA:BB:CC:DD:EE:FF). If the printer the adapter is connecting to is known, the service name is changed to 6822-SN, where SN is replaced with the serial number of the 6822.
- The 6822 Bluetooth adapter can save 16 link keys across cold boots. Link keys are saved in a circular list. The 17th link key replaces the first, the 18th replaces the 2nd, and so on.

Remote Configuration

You can query the following items:

- Discoverable State [Get/Set]
- Connectable State [Get/Set]

- Bondable State [Get/Set] *(*Authentication)
- Encryption State [Get/Set]
- Device Name [Get/Set]
- Device Address[Get]
- Class of Device[Get/Set]
- Service Name [Get/Set]
- Bluetooth Profile [Get]
- Bluetooth Passkey [Set] (Get the fact that it is set)
- Radio Shutdown Timeout

Bluetooth Performance

- Range — Operating range is expected to range from a minimum separation of 10 cm to over 10 m with a 700 Color or CK60.
- Link Loss can occur when going in or out of range while communicating with other Bluetooth devices.

Diagnostics Capabilities

The Bluetooth radio settings are available to a user. The 6822 Bluetooth adapter sends a printout of Bluetooth information to the printer upon receiving a message from a 700 Series or CK60 in a terminal holder. An example self-test is shown below:

```
6822 Bluetooth Adapter
Firmware:Version YYYY MMDD HHMM

Bluetooth Configuration:
   Device Address:0002371A0FD3
   Device Name:6822-9843252
   Discoverable:Yes
   Connectable:Yes
   Authentication:No
   Encryption:No
   Passkey:Not Applicable (or Key present if Authentication
is enabled)
Stored Link Keys:2 of 16

Power Management:
   Shut Off Timer:120 minutes
```

The Passkey entry either states Not Applicable or Key Present depending on the Authentication state.

Applications

A 6822 Bluetooth Information application that prints the Bluetooth self-test information on the 6822 can be installed on your 700 Series or CK60.

To use the Bluetooth Information application

1. Insert the 700 Series or CK60 in the terminal holder on the 6822.
2. Tap the **Start** > **Programs** > the **6822 BT Information** icon on your 700 Series or CK60 computer.
3. Press the **Set Page** button on the printer control panel to wake the printer.
4. From the 6822 Bluetooth Self-Test screen, tap the **Trigger Self Test** button to print the information.

System Qualification

Operation Resilience

Normal operation of the Bluetooth system is available in environments with radio backbones, including 802.11b, Spectrum 24, and OpenAir technologies.

Environmental Specifications

Temperature

Operating Temperature -20° to 60°C (-4° to 140°F)
Storage Temperature -30° to 70°C (-22° to 158°F).

Temperature Test Results

Test	Range	Comments
Operating Cold to Hot Transition	-20°C to 50°C (-4°F to 122°F)	External condensation allowed, internal prohibited
Operating Hot to Cold Transition	50°C to –20°C (122°F to -4°F)	Speed shall not degrade
Humidity		5% to 95% RH non-condensing
Operating		90% 25° to 60°C (48° to 140°F) no condensation
Storage		90% 25° to 60°C (48° to 140°F) no condensation

Altitude

-100 to 5000 meters

Vibration Test Results

Test	Comments
Quasi-Random 3 axis	12 g RMS, for 4 hours
Dynamic Induced Shock	20 g on 3 axis
Operating	1 G 5 Hz to 80 Hz
Storage	3 G 5 Hz to 80 Hz
When packed	
Frequency	5 to 55 Hz
Acceleration	2 G

Vibration Test Results (continued)

Test	Comments
Sweep	10 minutes (half cycle)
Duration	1 hour
Directions	x, y, and z

No external or internal damage should be found after the vibration test, and the unit should operate normally.

Unpackaged Drop

2 feet to concrete

Terminal Inspection

Minimum of 30,000 insertions for the terminal holder.

Safety/Regulatory/Agency Requirements

The Bluetooth adaptor must meet the electrical safety requirements for Information Technology Equipment. The test configuration must include a portable computer connected to the 6822, continuously printing the letter H. At least 6dB of margin below the relevant limits must be demonstrated.

Safety, Regulatory, Agency Requirements

Option	Requirement
Product Safety	UL Listed per UL 1950 / UL 60950 (printer and AC power supply) CSA C22.2, No. 950
	TUV/GS License per EN 60950 (printer, AC power supply) CB Report for EN 60950 covering all country deviations (Printer, ac power supply)
	UL 2089 (for cigarette lighter-style adapters)
Vehicle Power Interfaces	SAE J1113 or ISO 7637
EMC	
Digital device radiated and conducted emissions	FCC Class B (US); Industry Canada ICES-003 Class B (Canada)
	CISPR 22 Class B, including telecom port conducted (Europe)
	AS/NZS 3548 (Australia/New Zealand); CNS 13438 (Taiwan)
EN 55024 Immunity	IEC 61000-4-2Electrostatic Discharge
(Europe)	IEC 61000-4-3Radiated RF Field

Safety, Regulatory, Agency Requirements (continued)

Option	Requirement
EMC *(continued)*	IEC 61000-4-4Electrical Fast Transients
	IEC 61000-4-5Surge
	IEC 61000-4-6Conducted RF
	IEC 61000-4-8Magnetic Field
	IEC 61000-4-11Voltage Dips and Interrupts (AC printers only).
AC power supply (Europe)	IEC 61000-3-2 (per Amendment 14) Class A if under 70 Watts loaded to 90% of rated value, Class D if over 70 Watts loaded to 90% of rated value
	IEC 61000-3-3 Voltage Fluctuation and Flicker.
Radio Type Approval	Bluetooth Radio - Modular radio approval is required. BT SIG approval is not mandatory but BT SIG GAP and SPP conformance is a prerequisite.
	FCC Part 15.247 (US)
	RSS-210 (Canada - indoor operation, unlicensed. Outdoor operation IF restricted to 2.450-2.4835 GHz)
	RSS-139 (Canada - indoor/outdoor operation, licensed. 2.400-2.4835GHz)
	RSS-102 (Canada) - RF Exposure/SAR. Keep antennas more than 8 inches from operator to avoid SAR testing
	EN 300 328-1 & -2; EN 300 489-1 & 17 (Europe).
	SCT (Mexico)
Additional Approvals	IEC950 2nd Edition, 4th Amendment or IEC 60950 3rd Edition, resulting in a GS Mark and a CB Report addressing all country deviations
	S Mark for Argentina for any device connecting directly to the AC mains·
	CCIB Approval for China for any device connecting directly to the AC mains·
	Mexico NOM 19 as applicable

Default Configuration

Default Configurations

Setting	Default
Bluetooth Authentication	Off
Discoverable	True
Connectable	True
Class of Device	0x040680
Service Name	Wireless Printer
Device Name	6822-DDEEFF
Baud Rate	19,200
Data Bits	8
Stop Bits	1
Parity	None
Handshaking	Hardware
Radio Shutdown Timeout	120 minutes

C Cross-Reference Tables

A set of cross-reference tables are provided to assist you in locating control codes and escape sequences. The default settings are also included.

Control Codes and Escape Sequences

The following table contains a complete alphabetized list of control codes, including single character control codes and escape sequences, as an aid to locating the control codes defined in **Chapter 5 "Control Code Definitions"**or detailed definitions of these control codes, refer to the pages shown in the *Page* column of this table.

Control Codes and Escape Sequences Index

Control Codes and Escape Sequences Index (continued)

Description	Category	Page
Clear Vertical Tabs in Channel	Tabs and Tab Setting	<Hyper link10> page 81
Select Vertical Tab Channel	Tabs and Tab Setting	<Hyper link10> page 81
Set Vertical Tabs in Channel	Tabs and Tab Setting	<Hyper link10> page 81
Character:		
Define Intercharacter Space	Char. Style & Text Mode	<Hyper link10> page 74
Define User-Defined Characters	Char. Sets, User Defined	<Hyper link10> page 86
Disable Printing of Character Graphics	Char. Sets, User Defined	<Hyper link10> page 90
Double Byte Character Sets	Char. Sets, User Defined	<Hyper link10> page 82
Enable Printing of Character Graphics	Char. Sets, User Defined	<Hyper link10> page 89
Multi-Byte Character Sets	Char. Sets, User Defined	<Hyper link10> page 82
Print Character Graphics	Char. Sets, User Defined	<Hyper link10> page 90
Select Default Character Set	Char. Sets, User Defined	<Hyper link10> page 87
Select National Character Set	Char. Sets, User Defined	<Hyper link10> page 83
Select User-Defined Character Set	Char. Sets, User Defined	<Hyper link10> page 87

Control Codes and Escape Sequences Index (continued)

Control Codes and Escape Sequences Index (continued)

Description	Category	Page
Condensed (compressed):		
Cancel Condensed Mode	Char. Style & Text Mode	<Hyper link10> page 71
Copy ROM to RAM	Char. Sets, User Defined	<Hyper link10> page 86
Select Condensed Mode	Char. Style & Text Mode	<Hyper link10> page 71
D Default Character Set, Select	Char. Sets, User Defined	<Hyper link10> page 87
Define Intercharacter Space	Char. Style & Text Mode	<Hyper link10> page 74
Define User-Defined Characters	Char. Sets, User Defined	<Hyper link10> page 86
Delete	General Printer Control	<Hyper link10> page 63
Double:		
Cancel Double Strike Mode	Char. Style & Text Mode	<Hyper link10> page 72
Cancel Double Wide Mode	Char. Style & Text Mode	<Hyper link10> page 73
Cancel Double Wide Mode (one line only)	Char. Style & Text Mode	<Hyper link10> page 73
Double Byte Character Sets	Char. Sets, User Defined	<Hyper link10> page 82
Select Double Strike Mode	Char. Style & Text Mode	<Hyper link10> page 72

Control Codes and Escape Sequences Index (continued)

Description		Category	Page
	Select Double Wide Mode	Char. Style & Text Mode	<Hyper link10> page 73
	Select Double Wide Mode (one line only)	Char. Style & Text Mode	<Hyper link10> page 72
E	Elite Pitch, Select	Char. Style & Text Mode	<Hyper link10> page 74
	Emphasized Mode, Cancel	Char. Style & Text Mode	<Hyper link10> page 74
	Emphasized Mode, Select	Char. Style & Text Mode	<Hyper link10> page 74
	Expand:		
	Cancel Double Wide (expanded) Mode	Char. Style & Text Mode	<Hyper link10> page 73
	Cancel Double Wide Mode (one line only)	Char. Style & Text Mode	<Hyper link10> page 73
	Expand Printable Code Area	Char. Sets, User Defined	<Hyper link10> page 88
	Select Double Wide (expanded) Mode	Char. Style & Text Mode	<Hyper link10> page 73
	Select Double Wide Mode (one line only)	Char. Style & Text Mode	<Hyper link10> page 72
F	Form Feed	General Printer Control	<Hyper link10> page 64
G	General Printer Control Functions	General Printer Control	<Hyper link10> page 62
	Graphics:		

Control Codes and Escape Sequences Index (continued)

Description	Category	Page
Disable Printing of Character Graphics	Char. Sets, User Defined	<Hyper link10> page 90
Eight-Pin Graphics Modes	Graphics Functions	<Hyper link10> page 91
Reassign Graphics Mode	Graphics Functions	<Hyper link10> page 91
Select Graphics Mode	Graphics Functions	<Hyper link10> page 91
Select High-Speed Double Density Mode	Graphics Functions	<Hyper link10> page 92
Select Low-Speed Double Density Mode	Graphics Functions	<Hyper link10> page 92
Select Low-Speed Quadruple Density Mode	Graphics Functions	<Hyper link10> page 92
Select Single Density Graphics Mode	Graphics Functions	<Hyper link10> page 92
Enable Printing of Character Graphics	Char. Sets, User Defined	<Hyper link10> page 89
Nine-Pin Graphics Modes	Graphics Functions	<Hyper link10> page 93
Select 9-Pin Double Density Graphics Mode	Graphics Functions	<Hyper link10> page 93
Select 9-Pin Single Density Graphics Mode	Graphics Functions	<Hyper link10> page 93
Print Character Graphics	Char. Sets, User Defined	<Hyper link10> page 90
H Half Speed:		

Control Codes and Escape Sequences Index (continued)

Description		Category	Page
	Cancel Half-Speed Printing	General Printer Control	<Hyper link10> page 64
	Select Half-Speed Printing	General Printer Control	<Hyper link10> page 64
	Horizontal:		
	Clear Horizontal Tabs	Tabs and Tab Setting	<Hyper link10> page 79
	Perform Horizontal Tab	Tabs and Tab Setting	<Hyper link10> page 78
	Set Horizontal Tabs	Tabs and Tab Setting	<Hyper link10> page 79
I	Inactivity Time for Sleep Mode, Set	General Printer Control	<Hyper link10> page 64
	Intercharacter Space, Define	Char. Style & Text Mode	<Hyper link10> page 74
	Italic:		
	Cancel Italic Mode	Char. Style & Text Mode	<Hyper link10> page 75
	Select Italic Mode	Char. Style & Text Mode	<Hyper link10> page 75
L	Left Margin, Set	Page Formatting	<Hyper link10> page 70
	Length:		
	Set Page Length (inches)	Page Formatting	<Hyper link10> page 68
	Set Page Length (lines)	Page Formatting	<Hyper link10> page 68

Control Codes and Escape Sequences Index (continued)

Description	Category	Page
Line, Cancel	General Printer Control	<Hyper link10> page 63
Line Feed:		
Perform Line Feed	General Printer Control	<Hyper link10> page 65
Perform n/216 inch Line Feed	General Printer Control	<Hyper link10> page 65
Perform n/216 inch Reverse Line Feed	General Printer Control	<Hyper link10> page 65
Line Spacing:		
Select 1/6 inch Line Spacing	Page Formatting	<Hyper link10> page 69
Select 1/8 inch Line Spacing	Page Formatting	<Hyper link10> page 68
Select 7/72 inch Line Spacing	Page Formatting	<Hyper link10> page 69
Select n/72 inch Line Spacing	Page Formatting	<Hyper link10> page 69
Select n/216 inch Line Spacing	Page Formatting	<Hyper link10> page 69
M Margin:		
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Single Character Control Code Definitions

This table contains control codes between 00h and 7Fh, and provides definitions for the ASCII symbols as used in the table on the next page and in format definitions in Chapter 5 “Control Code Definitions”.

Single Character Control Code Definitions

Dec	Hex	ASCII	Description	Page
0	00	NUL	Used as a terminator for several escape sequences.	
1	01	SOH		
2	02	STX		
3	03	ETX		
4	04	EOT		
5	05	ENQ		
6	06	ACK		
7	07	BEL	Beeper: sounds buzzer for 1/10 of a second.	<Hyper link10> page 63

Single Character Control Code Definitions (continued)

Dec	Hex	ASCII	Description	Page
8	08	BS	Backspace: moves printhead one space to left.	<Hyper link10> page 62
9	09	HT	Horizontal Tab: moves printhead to next tab stop.	<Hyper link10> page 78
10	0A	LF	Line Feed: moves paper to next line.	<Hyper link10> page 65
11	0B	VT	Vertical Tab: moves paper to next vertical tab stop	<Hyper link10> page 79
12	0C	FF	Form Feed: advances paper to top of next page.	<Hyper link10> page 64
13	0D	CR	Carriage Return: moves printhead to left margin.	<Hyper link10> page 63
14	0E	SO	Shift Out: selects double-wide mode (one-line-only)	<Hyper link10> page 72
15	0F	SI	Shift In: selects condensed (compressed) mode	<Hyper link10> page 71
16	10	DLE		
17	11	DC1	Device Control 1: sets printer online (not currently used)	
18	12	DC2	Device Control 2: cancels condensed mode (compressed)	<Hyper link10> page 71
19	13	DC3	Device Control 3: sets printer offline (not currently used)	
20	14	DC4	Device Control 4: cancels double-wide mode (one line only)	<Hyper link10> page 73
21	15	NAK		
22	16	SYN		
23	17	ETB		
24	18	CAN	Cancel Line: clears all characters out of print buffer.	<Hyper link10> page 63

Single Character Control Code Definitions (continued)

Dec	Hex	ASCII	Description	Page
25	19	EM		
26	1A	SUB		
27	1B	ESC	Escape: defines start of escape sequence.	
28	1C	FS		
29	1D	GS		
30	1E	RS		
31	1F	US		
32	20	SP	Space Character	
127	7F	DEL	Delete: deletes last character in print buffer.	<Hyperlink10> page 63

Escape Sequence Quick Reference

The following table is a quick reference between the escape sequences listed in ascending order, according to numeric values. For detailed definitions, see Chapter 5 "Control Code Definitions".

Escape Sequence Quick Reference

Decimal	Description
ESC SO	Select Double-Wide (expanded) Mode *(one line only)*
ESC SI	Select Condensed Mode (compressed)
ESC US (0)	Select Top-Down Printing
ESC US (1)	Select Bottom-Up Printing
ESC SP n	Define Inter-Character Space
ESC "!" n	Master Select
ESC "$" n1 n2	Set Print Position (absolute)
ESC "%" (0)	Select Default Character Set
ESC "%" (1)	Select User-Defined Character Set
ESC "&" NUL k1 k2 s1 d1...d11	Define User-Defined Characters
ESC "*" m n1 n2	Select Graphics Mode
ESC "+" n d1...dn	Print Character Graphics
ESC "-" 0*	Cancel Underline Mode
ESC "-" 1*	Select Underline Mode
ESC "/" c	Select Vertical Tab Channel
ESC "0"	Select 1/8 inch Line Spacing
ESC "1"	Select 7/72 inch Line Spacing
ESC "2"	Select 1/6 inch Line Spacing
ESC "3" n	Select n/216 inch Line Spacing
ESC "4"	Select Italic Mode
ESC "5"	Cancel Italic Mode
ESC "6"	Enable Printing of Codes 128-255
ESC "7"	Disable Printing of Codes 128-255
ESC "<"	Select Unidirectional Printing *(one line only)*
ESC ":" NUL NUL NUL	Copy ROM to RAM
ESC "?" s n	Reassign Graphics Mode

Escape Sequence Quick Reference (continued)

Decimal	Description
ESC “@”	Perform Master Reset
ESC “A” n	Select n/72 inch Line Spacing
ESC “B” NUL	Clear Vertical Tabs
ESC “B” n1 n2 ... nk NUL	Set Vertical Tabs
ESC “C” n	Set Page Length (lines)
ESC “C” NUL n	Set Page Length (inches)
ESC “D” NUL	Clear Horizontal Tabs
ESC “D” n1 n2 ... nk NUL	Set Horizontal Tabs
ESC “E”	Select Emphasized Mode
ESC “F”	Cancel Emphasized Mode
ESC “G”	Select Double-Strike Mode
ESC “H”	Cancel Double-Strike Mode
ESC “I” n	Expand Printable Code Area
ESC “J” n	Perform n/216 inch Line Feed
ESC “K” n1 n2	Select Single-Density Graphics Mode
ESC “L” n1 n2	Select Low-Speed Double-Density Graphics Mode
ESC “M”	Select Elite Pitch
ESC “N” n	Set Skip Over Perforation
ESC “O”	Cancel Skip Over Perforation
ESC “P”	Select Pica Pitch
ESC “Q” n	Set Right Margin
ESC “R” n0 n1 n2	Code page Selection
ESC “R” n	Select National Character Set
ESC “S” 0*	Select Superscript Mode
ESC “S” 1*	Select Subscript Mode
ESC “T”	Cancel Superscript/Subscript Mode
ESC “U” 0*	Cancel Unidirectional Printing
ESC “U” 1*	Select Unidirectional Printing
ESC “W” 0*	Cancel Double-Wide (expanded) Mode
ESC “W” 1*	Select Double-Wide (expanded) Mode
ESC “Y” n1 n2	Select High-Speed Double-Density Graphics Mode
ESC “Z” n1 n2	Select Low-Speed Quadruple-Density Graphics Mode

Escape Sequence Quick Reference (continued)

Decimal	Description
ESC "^" (0) n1 n2	Select 9-pin Single Density Graphics Mode
ESC "^" (1) n1 n2	Select 9-pin Double Density Graphics Mode
ESC "b" c NUL	Clear Vertical Tab Channel
ESC "b" c n1 n2 ... nk NUL	Set Vertical Tabs in Channel
ESC "j" n	Perform n/216 inch Reverse Line Feed
ESC "l" n	Set Left Margin
ESC "s" 0*	Cancel Half-Speed Printing
ESC "s" 1*	Select Half-Speed Printing
ESC "t" (0)	Disable Printing of Character Graphics
ESC "t" (1)	Enable Printing of Character Graphics
ESC "z" n	Set Inactivity Time for Sleep Mode
ESC "\" n1 n2	Set Print Position (relative)

Factory-Installed Printer Defaults

Factory-Installed Printer Defaults

Function	Default Value
Carriage position	At left margin
Character set	Normal (not user defined)
Code page	0
Codes 128-255	Disabled
Condensed (compressed)	Disabled
Double-Strike	Disabled
Double-Wide	Disabled
Emphasized	Disabled
Graphics mode	Not selected
Half-Speed printing	Disabled
Intercharacter space	Zero (0)
International character sets	Disabled
Italic	Disabled
Justification	Left justification

Factory-Installed Printer Defaults (continued)

Function	Default Value
Keyboard, printer	Enabled
Language	USA
Line Spacing	1/6 inch
Margin, left	0
Margin, right	80
MSB control	Disabled
NLQ	Disabled
Page length	11 inch (66 lines with Pica pitch)
Paper end sensor	Enabled
Pitch	Pica (10 characters per inch)
Power off sleep timer	10 seconds
Printer Code Area Expansion	Disabled
Printing direction	Top-down, bidirectional
Redefinition of graphic modes	Disabled
Skip over perforation	Disabled
Subscript/Superscript	Disabled
Tabs, horizontal	Set to default tabs (every 8 column)
Tabs, vertical	1 line feed each tab, channel = 0
Top of form	Set to current line
Underline	Disabled
Unidirectional printing	Disabled (bidirectional)
User defined character set	Removed

The settings in the previous table are installed in the printer at the factory. To restore the printer to these defaults, see Reset Button on page 4 for instructions.

The default settings listed below can be restored to the printer, as described in **Chapter 4 "Using the 6820 Printer Configuration Utility"**.

Printer Default Settings

Function	Default Value
Zero print option	Zeros are printed with a slash
Autofeed configuration	CR (carriage return added at end of line without line feed)
Protocol	NPCP (NORAND Portable Communications Protocol)
Parity	N/A (for NPCP)
Bit Rate	19.2K

D Printer Font Test Jobs

This appendix contains a sample print job for each font available on your 6822 printer.

About the Printer Font Jobs

You can perform these tests yourselves. Load the font of choice from the Toolkit CD into flash memory. After downloading the desired font, use any of the sample print jobs to reveal the character locations within the printer memory. The sample test print jobs are formatted as a memory mapped and could be referenced to select a desired character.

These test print jobs originated from running a “C” program by a person with specific knowledge of how to generate such a report (print job). The “C” program demonstrates how a programmer could access the printer font modules within flash memory to select desired character.

You do not need more than one font module loaded. Any ONE of: nft00932.mod, nft00936.mod, nft00949.mod, or even nft00950.mod Asian fonts can be used. These are distributed via the NPTK6822 toolkit (including the source code).

These print jobs are in this appendix:

- “BIG5.C” which creates “BIG5950.TXT”
- “CHINA.C” which creates “GB2312.TXT”
- “IBM437.C” which creates “IBM437.TXT”
- “JAPAN.C” which creates “JIS932.TXT”
- “KOREA.C” which creates “KOREA.TXT”
- “NATION.C” which creates “NATION.TXT”

Big 5 Traditional Chinese Character Set

This program generates a text file, big5950.txt, to copy to a 6822. The text file illustrates the use of the BIG 5 traditional Chinese character set. Install the BIG 5 character font (nft00950.mod) using the Printer Configuration Utility.

To have big5950.txt print correctly

1. Use the Microsoft C version 7.00 compiler.

```
cl big5.c /link slibce graphics
```

2. Run big5.exe to create big5950.txt.
3. Copy this text file to the appropriate printer port.

Simplified Chinese Character Set

This program generates a text file, gb2312.txt, that to copy to a 6822. The text file illustrates the use of the Simplified Chinese character set. Install the Simplified Chinese character font (nft00936.mod) using the Printer Configuration Utility.

To have gb2312.txt print correctly

1. Use the Microsoft C version 7.00 compiler.

```
cl china.c /link slibce graphics
```

2. Run china.exe to create gb2312.txt.
3. Copy this text file to the appropriate printer port.

IBM 437 Code Page Character Set

This program generates a text file, ibm437.txt, to copy to a 6822. The text file illustrates the use of the IBM 437 code page character set. Install the IBM 437 character font (nft00437.mod) using the Printer Configuration Utility.

To have ibm437.txt print correctly

1. Use the Microsoft C version 7.00 compiler.

```
cl ibm437.c /link slibce graphics
```

2. Run ibm437.exe to create ibm437.txt.
3. Copy this text file to the appropriate printer port.

Japanese (Shift JIS) Character Set

This program generates a text file, jis932.txt, to copy to a 6822. The text file illustrates the use of the JIS character set. Install the JIS character font (nft00932.mod) using the Printer Configuration Utility.

To have jis932.txt print correctly

1. Use the Microsoft C version 7.00 compiler.

```
cl japan.c /link slibce graphics
```

2. Run japan.exe to create jis932.txt.

3 Copy this text file to the appropriate printer port.

Korean Character Set

This program generates a text file, korea.txt, to copy to a 6822. The text file illustrates the use of the KSC5601 character set. Install the KSC5601 character font (nft00949.mod) using the Printer Configuration Utility.

To have korea.txt print correctly

1 Use the Microsoft C version 7.00 compiler.

```
cl korea.c /link slibce graphics
```

2 Run korea.exe to create korea.txt.

3 Copy this text file to the appropriate printer port.

International Character Set

This program generates a text file, nation.txt, to copy to a 6822. The text file illustrates the international character sets available for use in the default character set. Install the default character set font (nft00000.mod) using the Printer Configuration Utility.

To have nation.txt print correctly

1 Use the Microsoft C version 7.00 compiler.

```
cl nation.c /link slibce graphics
```

2 Run nation.exe to create nation.txt.

3 Copy this text file to the appropriate printer port.

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6822 Series 80-Column Printer User's Guide

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