
Scott Edwards Electronics, Inc.

1999 Tech Specs and Buyer's Guide

Price/Performance Breakthrough: \$99 Serial Graphics Display

Check out our new G12032 serial graphics LCD. Multiple text sizes, downloadable screens and fonts, easy graphics commands, high-contrast LCD—all at a price comparable to text-only displays.

Net Support

When you need tech support, is your first impulse to pick up the phone? Consider using the Internet instead. Our web site, www.seetron.com, contains many megabytes of support goodies including program examples, app notes, user manuals, spec sheets, diagrams, free software, and links to information. Almost none of this valuable, helpful stuff can be conveyed over the phone.

If you have a specific question, e-mail it. The answer will come back in an hour or two (on business days, of course) and it will be considerably more detailed than anything you're likely to get from a busy tech in a room full of jangling phones! Send your inquiries to tech@seetron.com.

Need more incentive? We frequently run sales that are announced *only* through the web. Yes, this is a low-down trick to keep you coming back to our site, but the savings can be as much as 40%.

Coming Soon: Online Ordering

Although we've taken a go-slow approach to some of the glitzier aspects of the Net—our site is deliberately simple to ensure fast downloads—we're planning to add secure online ordering in Spring of 1999. In the meantime, take advantage of our Fax Express shipping deal. Order by fax and pay with a credit card, and we'll charge you just \$3 for 2-day air shipping anywhere in the continental U.S. See the order form for details.



Scott Edwards, President

ORDER FORM

Ship To

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ITEM NO.	QTY	PART NUMBER	DESCRIPTION	UNIT PRICE	TOTAL
1					
2					
3					
4					
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7					
8					
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10					
11					
12					

SUBTOTAL:

SHIPPING:

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Shipping We offer discounted, flat-rate shipping within the continental U.S.:

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Checks Checks returned for non-sufficient funds incur a \$15 penalty. We will assist authorities in prosecuting those who intentionally pass bad checks.

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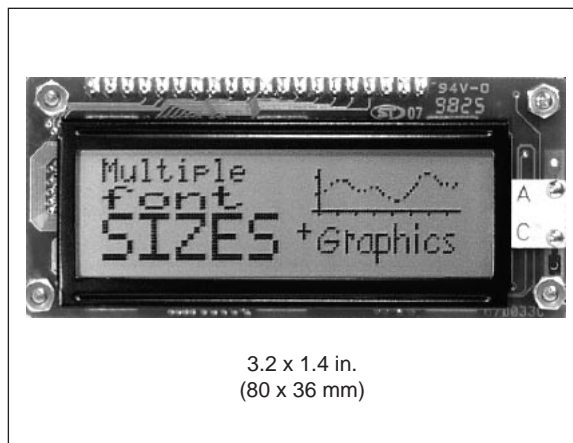
Fax us this form with your credit-card order, adding just \$3 for shipping. We'll upgrade your shipping to FEDEX 2-day service FREE! You'll receive your order in 2 to 3 business days and save \$3.

The following conditions apply for Fax Express: Minimum order: \$29. Order must be on this form, and must be complete and correct. No order confirmation will be sent. This offer is not available to net-30 buyers, or to buyers outside the continental U.S. (A \$10 shipping surcharge applies to Alaska and Hawaii.)

FAX 24HRS 520-459-0623

Serial LCD with 120x32-pixel Graphics and Four Font Sizes

The G12032 offers 120-by-32-pixel graphics and tremendous font flexibility at a bargain price. It interfaces with a computer through a 2400 or 9600-baud RS-232 serial hookup.



3.2 x 1.4 in.
(80 x 36 mm)

Mini Serial Terminal with Multiple Font Sizes

The G12032 works like a serial-receive terminal. It can display text in four different font sizes, allowing you to format the screen as 4 lines of 20 small characters or 2 lines of 10 large characters, or mix font sizes freely to achieve special effects.

The display understands common control characters like carriage returns, linefeeds, tabs, backspace, etc. Special characters allow cursor positioning and backlight control. Most text commands are the same as those for our advanced (BPP- and ILM-) text displays.

Versatile Graphics Display with Image Storage

Plotting points, drawing lines, and displaying full-screen pictures are easy with the G12032's graphics instructions. Its 4kB EEPROM, which retains data with power off, stores the text font plus six screen images. You can create or edit fonts and graphics on your PC, then download them to the G12032 using the included utility program.

A 160-character alphanumeric font and example graphics come preloaded in EEPROM. Need more characters/symbols? The G12032 lets you use part or all of its graphics memory for additional fonts, for a total of up to 640 characters.

Exceptional Value

We pulled out all the stops to make the G12032 the most versatile, economical serial display on the market. It's priced lower than some comparable alphanumeric displays. Within a minute of opening the box you can have this display running a built-in demo (9V battery or 5V supply required). The standard package includes a 3.5" disk with extensive hyperlinked HTML manual (use any web browser to view), a graphics conversion/downloading utility, and program examples.

Ordering Information

G12032 Serial Graphics LCD with manual/utilities on disk (SGX-120L)	99.00
Mounting kit for G12032 with faceplate, hardware (BEZ-120)	12.00

Figure 1. Dimensional data

A	y offset pcb edge to hole ctr	4.00
B	y pcb height	36.00
C	y hole spacing	28.00
D	y screen opening	18.50
E1	y character size (small font)	3.92
E2	y character size (large font)	7.84
F1	x character size (small font)	2.94
F2	x character size (large font)	5.88
G1	x offset pcb edge to hole ctr (btm)	2.50
G2	x offset pcb edge to hole ctr (top)	4.00
H	x screen frame	65.70
I	x screen opening	60.50
J1	x hole spacing (btm)	75.00
J2	x hole spacing (top)	72.00
K	x pcb width	80.00
L	y frame height	27.40

- All dimensions in mm.
- Tolerance for dimensions is $\pm 0.50\text{mm}$.
- Maximum depth (from front of screen frame to highest point on serial interface board) is 30mm.
- Screen is not centered on pcb. It is 2mm to the left and 2.3mm below pcb center point.
- Mounting holes appropriately sized for 2-56 mounting screws.
- NOTE: Dimensions subject to change. Critical applications should be based on *actual measurements*.

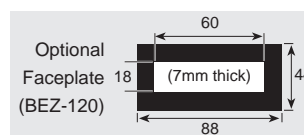
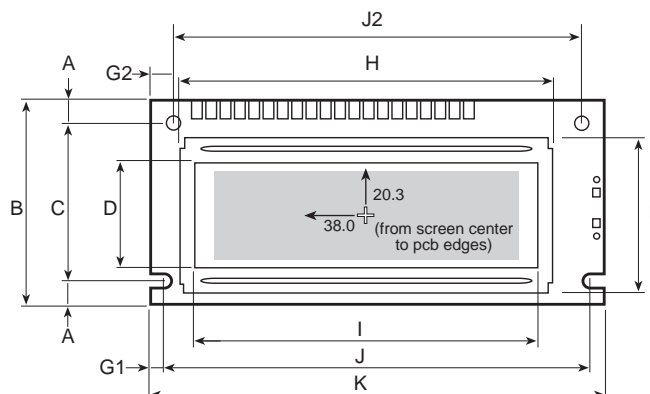


Table 1. Basic specifications

Backlight type	LED array, yellow-green
Power requirements (BL off)*	4.5 to 5.5 Vdc @ 15mA
Power requirements (BL on)*	4.5 to 5.5 Vdc @ 45mA
User connector	five 0.025" posts on 0.10" centers
Connector pinout (5-pin)	+5 GND SER GND +5
Serial input	RS-232, or inverted TTL/CMOS, 9600 or 2400, N81
Serial data rates	2400 or 9600 bps
Operating temperature	0° to 50°C (32° to 122°F)

* NOTE: Unit includes an input for 9V unregulated power; 9V battery suggested.

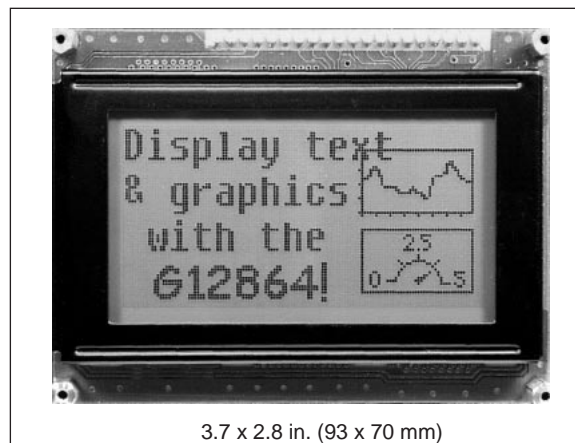
Table 2. Text control characters and graphics instructions by function

Text Control Codes			Graphics Escape Sequences	
Function	Code	ASCII	Function	Escape Sequence
Cursor home	ctrl-A	1	Set screen address for byte write	ESC A x y
Begin inverse-video text	ctrl-B	2	Write byte value n to present screen address	ESC B n
End inverse-video text	ctrl-C	3	Download full-screen graphic (480 bytes)	ESC D G
ignored	ctrl-D	4	Display EEPROM screen n (n=0—7)	ESC E n
ignored	ctrl-E	5	Set font size and EEPROM source page to n	ESC F n
ignored	ctrl-F	6	Set "ink" for points and lines to n; 1=black, 0=white	ESC I n
ignored	ctrl-G	7	Plot a line from x1 y1 to x2 y2	ESC L x1 x2 y1 y2
Backspace	ctrl-H	8	Set graphics mode to n; 0=OR, 1=XOR	ESC M n
Horizontal tab (go to next 4x column)	ctrl-I	9	Plot a point at x y	ESC P x y
Smart linefeed (go down one line)	ctrl-J	10	Reverse (invert) lines by n	ESC R n
Vertical tab (go up one line)	ctrl-K	11	Plot line from last line end to x y	ESC T x y
Formfeed (clear text screen)	ctrl-L	12	Set vertical origin to top (n=0) or bottom (n=1)	ESC V n
Carriage return	ctrl-M	13	Write startup configuration data to EEPROM	ESC W n
Backlight on	ctrl-N	14	Transfer image from graphics layer to EEPROM screen n (0—7)	ESC X n
Backlight off	ctrl-O	15		
Accept cursor-position entry	ctrl-P	16		
Accept data for right alignment	ctrl-R	18		
Escape (begin graphics instruction)	ctrl-[27		

NOTE: At startup, the screen is cleared, and all graphics settings are 0 except Ink, which is 1 (to plot dark pixels on a light background).

Serial LCD Module with 128x64-pixel Graphics plus Two Text Fonts

The G12864 makes it easy to display text and graphics on a 128-by-64-pixel LCD. It interfaces with a computer through a 2400 or 9600-baud RS-232 serial hookup.



3.7 x 2.8 in. (93 x 70 mm)

Serial Terminal with Dual Fonts

The G12864 works like a simple serial-receive terminal. It displays text in two software-selectable fonts—8x16 pixels (4 lines of 16 characters, the default) or 6x8 pixels (8 lines of 20 characters). Both fonts may be edited to include custom characters, or may be entirely redesigned to support foreign languages, symbols, or icons.

The display understands common control characters like carriage returns, linefeeds, tabs, backspace, etc. Special characters allow cursor positioning and backlight control. Most text commands are the same as those for our advanced (BPP- and ILM-) text displays.

Graphics, Plus Versatile Layering

Plotting points, drawing lines, and displaying full-screen pictures are easy with the G12864's graphics instructions. Its 16kB flash memory, which retains data with power off, stores the text font plus 14 screen images (or 2 fonts/13 screens). You can create or edit fonts and graphics on your PC, then download them to the G12864 using the included utility program.

Text and graphics are stored in separate memory layers and can be selectively turned on or off, individually cleared, or overlaid in various ways.

Convenience Features Mean a Quick Start on Your Project

A voltage regulator and standard DB9 serial-port connector are built in. Connect the display to the (included) AC adapter; plug the (included) serial cable into your PC or other computer, and you're ready to go. If that's *too* convenient, you can provide your own 5-volt supply and/or connect serial input to the 5-pin header, which matches the layout of the connector on our other serial LCDs. Current draw ranges from 15mA (typical, backlight off) to 100mA (max, LED backlight on). A new option allows brighter backlighting at 150mA.

Ordering Information

G12864 Serial Graphics LCD with AC adapter, serial cable, disk, manual (BGX-128L-I).....	199.00
G12864 Serial Graphics LCD, no accessories (BGX-128L-N).....	179.00

Figure 1. Dimensional data

A	y offset pcb edge to hole ctr	2.50
B	y pcb height	70.00
C	y hole spacing	65.00
D	y screen opening	38.80
E1	y character size* (8x16-pixel)	8.32
E2	y character size* (6x8-pixel)	4.16
F1	x character size* (8x16 pixel)	4.16
F2	x character size* (6x8 pixel)	3.12
G	x offset pcb edge to hole ctr	2.50
H	x screen frame	90.00
I	x screen opening	70.70
J	x hole spacing	88.00
K	x pcb width	93.00
L	y frame height	53.70

- All dimensions in mm.
- Worst-case tolerance for any dimension is $\pm 0.50\text{mm}$.
- Maximum depth (from front of screen frame to highest point on serial interface board) is 33mm.
- Mounting holes fitted with stainless-steel standoff posts, 2-56 female threaded for mounting screws
- NOTE: Dimensions subject to change. Critical applications should be based on *actual measurements*.

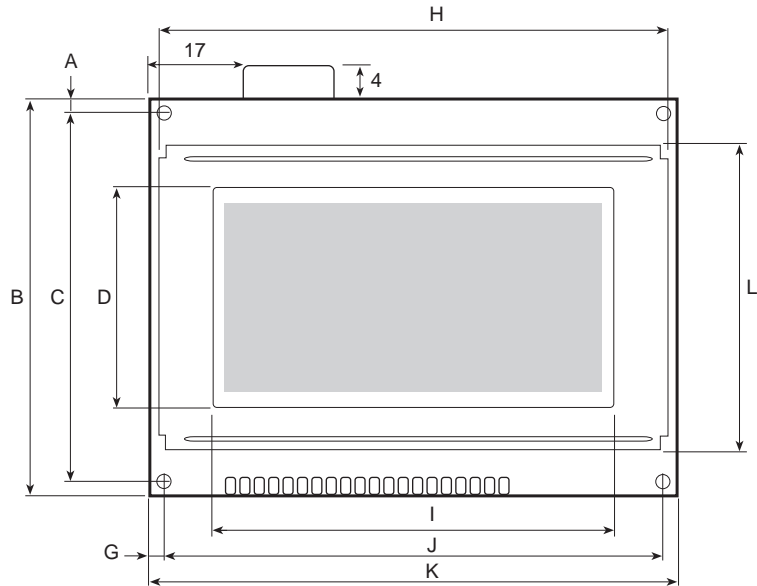


Table 1. Basic specifications

Backlight type	LED array, yellow-green
Power requirements (BL off)*	4.5 to 5.5 Vdc @ 25mA
Power requirements (BL on)*	4.5 to 5.5 Vdc @ 100mA
User connector	five 0.025" posts on 0.10" centers, or DB9 fem
Connector pinout (5-pin)	+5 GND SER GND +5
Serial input	RS-232, or inverted TTL/CMOS, 9600 or 2400, N81
Serial data rates	2400 or 9600 bps
Operating temperature	0° to 50°C (32° to 122°F)

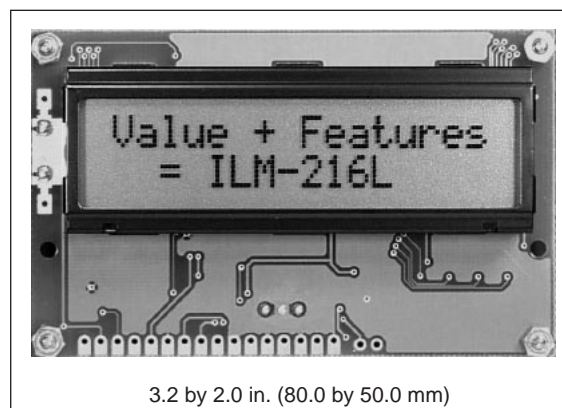
* NOTE: Unit includes a 2.1mm coax power jack for unregulated power, 9Vdc or 7Vac.
New Bright^ jumper in version 2.0+ allows brighter backlighting at 150mA current draw.

Table 2. Text control characters and graphics instructions by function

Text Control Codes			Graphics Escape Sequences	
Function	Code	ASCII	Function	Escape Sequence
Cursor home	ctrl-A	1	Set screen address for byte write	ESC A x y
Begin inverse-video text	ctrl-B	2	Write byte value n to present screen address	ESC B n
End inverse-video text	ctrl-C	3	Write byte value n to all screen addresses (n=0 to clear)	ESC C n
Hide cursor	ctrl-D	4	Download full-screen graphic (1024 bytes)	ESC D G
Show cursor	ctrl-E	5	Display EEPROM screen n on graphics layer (n=0—15)	ESC E n
Show cursor	ctrl-F	6	*Switch between default 8x16-pixel font and 6x8-pixel font	ESC F n
ignored	ctrl-G	7	Set "ink" for points and lines to n; 1=black, 0=white	ESC I n
Backspace	ctrl-H	8	Plot a line from x1 y1 to x2 y2	ESC L x1 x2 y1 y2
Horizontal tab (go to next 4x column)	ctrl-I	9	Set graphics mode to n; 0=OR, 1=XOR	ESC M n
Smart linefeed (go down one line)	ctrl-J	10	Set overlay of text/graphics layers to n; 0=OR, 1=XOR, 2=AND	ESC O n
Vertical tab (go up one line)	ctrl-K	11	Plot a point at x y	ESC P x y
Formfeed (clear text screen)	ctrl-L	12	Reverse layers by n; 0=neither, 1=graphics, 2=text, 3=both	ESC R n
Carriage return	ctrl-M	13	Plot line from last line end to x y	ESC T x y
Backlight on	ctrl-N	14	Disable layers by n; 0=neither, 1=graphics, 2=text, 3=both	ESC Y n
Backlight off	ctrl-O	15	Transfer image from graphics layer to EEPROM screen n (0—15)	ESC X n
Accept cursor-position entry	ctrl-P	16	*Zap settings to defaults; 0=neither, 1=graphics, 2=text, 3=both	ESC Z n
ignored	ctrl-Q	17	*New in version 2.0/firmware 060+	
Request buffer-depth response (">")	ctrl-R	18	NOTE: At startup, the text and graphics layers are cleared, and all graphics settings are 0 except Ink, which is 1 (to plot dark pixels on a light background).	
Escape (begin graphics instruction)	ctrl-[27		

2x16 Serial LCD Module with Integrated Microcontroller

Built-in microcontroller delivers a serial interface with deluxe features, four switch inputs, nonvolatile configuration memory.



Serial User Interface

We invented the serial-LCD concept; now we've taken it to the next level. The ILM-216 is a custom LCD module with a smart serial interface built right in. It works like a micro terminal—receiving data at 1200 to 9600 bps and displaying it in large characters on a 2-line-by-16-character screen. Advanced features include:

- Four inputs for switches/buttons that can be read via the serial connection
- EEPROM storage of settings, custom characters, and a user-defined startup screen
- Serial control of the built-in LED backlight
- Output for a piezo buzzer triggered by the ASCII BELL character
- Unique right-alignment instruction to automatically format numeric text
- Low current draw; typically 5mA with the backlight off (40mA, backlight on)

Integrating the controller into the LCD module reduces manufacturing costs and lets us offer these advanced capabilities at a price that's lower than any two-piece design.

Compatibility, OEM Applications

The ILM-216 uses a superset of the control codes for our 4x20 and 4x40 LCDs, making it an easy transition from one display to another. Got an OEM front-panel application? The ILM-216 uses a flash microcontroller (PIC16F84) that can be reprogrammed to meet your needs; grab the OEM documentation from our web site (www.seetron.com).

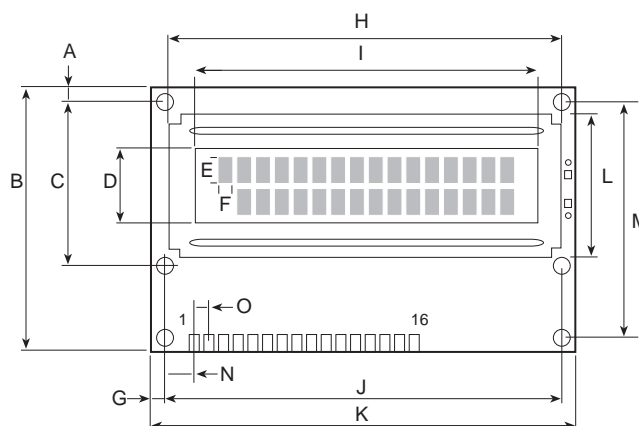
Ordering Information

Integrated 2x16 Serial LCD with LED backlight (ILM-216L)	quantity 1—9	49.00
	quantity 10—49	44.00
	quantity 50—99	39.00
	quantity 100+.....	32.00
Mounting kit w/faceplate, insulated hardware (BEZ-216I).....		6.00

Figure 1. Dimensional data

	Dim.
A y offset edge to hole ctr (top & btm)	2.50
B y pcb height	50.00
C y hole spacing (inside pair)	31.00
D y screen opening	16.20
E y character size	5.94
F x character size	2.95
G x offset pcb edge to hole ctr	2.50
H x screen frame	71.00
I x screen opening	66.00
J x hole spacing	75.00
K x pcb width	80.00
L y frame height	25.00
M y hole spacing (outside pair)	45.00
N x offset hole ctr to pin 1	5.50
O x offset between pads	2.54
- mounting hole diameter	2.50
- frame depth, LED-backlit	8.50

- All dimensions in mm.
- Worst-case tolerance for any dimension is ± 0.50 mm.
- Maximum depth (from front of screen frame to highest point on pcb) is 15mm



Optional Faceplate
(BEZ-216I; sold
separately)

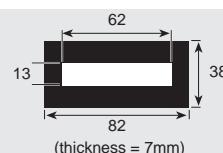


Table 1. Basic specifications

Power requirements.....	4.8 to 5.5 Vdc @ 5 mA (40 mA, backlit)
User connector.....	16 pads on 0.10" centers, 0.040" holes
Connector pinout.....	see table 1
Serial input	RS-232, or inverted TTL/CMOS, 1200—9600, N81
Buffer depth.....	16 bytes
Operating temperature.....	0° to 50°C (32° to 122°F)
Storage temperature.....	-10° to 60°C (14° to 140°F)
LCD type	Supertwist (STN), yellow-green
Optimum viewing direction.....	6 o'clock

Table 2. Control characters by function

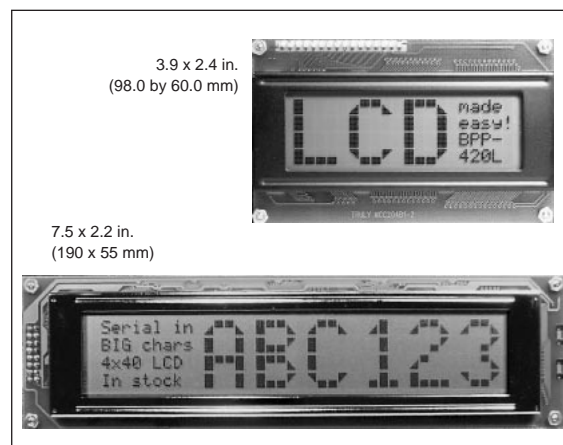
Null (ignored prior to buffer)	ctrl-@	0
Cursor home	ctrl-A	1
Hide cursor	ctrl-D	4
Show underline cursor	ctrl-E	5
Show blinking-block cursor	ctrl-F	6
Bell (pulse piezo-buzzer output)	ctrl-G	7
Backspace*	ctrl-H	8
Horizontal tab (cursor to next multiple-of-4 column)*	ctrl-I	9
Smart linefeed (cursor down one line)	ctrl-J	10
Vertical tab (cursor up one line)	ctrl-K	11
Formfeed (clear screen)	ctrl-L	12
Carriage return*	ctrl-M	13
Backlight on	ctrl-N	14
Backlight off	ctrl-O	15
Accept cursor-position entry	ctrl-P	16
Format right-aligned text	ctrl-R	18
Escape (ESC; start multipart instruction)	ctrl-[27

- Define graphics character: *ESC D n B0 B1 B2 B3 B4 B5 B6 B7*
where *n* is the character number (0—7) and B0—B7 are bytes mapping the pixels
- Transfer data from EEPROM to display: *ESC E n*
where *n* is "0" or "1" with 0 meaning text screen and 1 meaning symbols
- Read the keys (S1—S4) and report serially: *ESC K n*
where *n* sets format—0 = single byte, bits 0—3 correspond to S1—S4 and 1 = four bytes consisting of text characters "0" and "1" (a "1" means switch closed)

Preview complete
instruction manuals
via Internet—
www.seetron.com

4-line Serial LCDs with Terminal Features, Big- Character Mode

*Supertwist 4x20 and 4x40 alphanumeric LCDs
with a serial interface (up to 9600 bps) for
1-wire interfacing to computers and controllers.
Both with LED backlighting.*



Easy-to-use Data Displays

The BPP-420 and -440 work like a simple serial-receive terminals. They display text in a 4-line format on a high-contrast, supertwist LCD module. They understand common control characters like carriage returns, linefeeds, tabs, backspace, etc. Special characters allow cursor positioning, backlight control, and the unique “big-character” mode shown above. The displays will even drive a (customer-provided) piezo buzzer for audio alerts.

Interfacing is easy—just connect +5V, ground, and serial data (RS-232 or inverted TTL level, no parity, 8 data bits, 1 stop bit). The 4x20 display supports data rates of 2400 and 9600 bps; the 4x40 accepts 1200, 2400, 4800, and 9600 bps. Data rates are set by configuration switches.

You already know how to program for these displays, since they understand a sensible subset of the ASCII control characters. The manuals include program examples for the BASIC Stamps® I and II, plus PC BASIC.

Compatibility and New Features

The BPP-420 and BPP-440 use identical sets of control characters, making the transition from one display to another a snap. They're also compatible with the text-mode instructions for our graphics displays. And the BPP-420 can emulate our simpler LCD Serial Backpack® interface for compatibility with our older 4x20 displays.

New features in the current release (rev 3.0 or higher) of these products include big-alpha capability (letters A—Z added to large-character mode), a right-alignment instruction for easy data-field formatting, and a larger serial buffer.

Ordering Information

4x20 Serial LCD Module with LED backlight (BPP-420L)	79.00
Mounting kit for 4x20 with faceplate, hardware (BEZ-420)	12.00
4x40 Serial LCD Module with LED backlight (BPP-440L)	159.00
Quick-Start for PC users (5V power supply, 9-pin serial adapter, disk; BPX-QUIK)	29.00

Figure 1. Dimensional data

We use 4x20 and 4x40 LCD modules from three manufacturers: Powertip (PT), Truly, and DataVision (DV). The table below summarizes the major dimensions of each combination of display and manufacturer that we carry.

	4 x 40		4 x 20	
	PT	DV	Truly	PT
A y offset pcb edge to hole ctr	3.50	3.50	2.50	2.50
B y pcb height	54.00	54.00	60.00	60.00
C y hole spacing	47.00	47.00	55.00	55.00
D y screen opening	29.50	29.50	25.20	25.20
E y character size	4.89	4.89	4.75	4.75
F x character size	2.78	3.53	2.95	2.95
G x offset pcb edge to hole ctr	3.50	3.50	2.50	2.50
H x screen frame	166.30	170.00	98.00	98.00
I x screen opening	147.00	147.00	76.00	76.00
J x hole spacing	183.00	183.00	93.00	93.00
K x pcb width	190.00	190.00	98.00	98.00
L y frame height	41.20	42.70	38.40	42.00
- mounting hole diameter	3.50	3.50	2.50	2.50
- frame depth, LED-backlit	9.10	9.50	8.50	9.40

- All dimensions in mm.
- Worst-case tolerance is ± 0.50 mm.
- Maximum depth (from front of screen frame to tips of interface header posts) is 26mm.
- NOTE: Dimensions subject to change. Critical applications should be based on actual measurements.

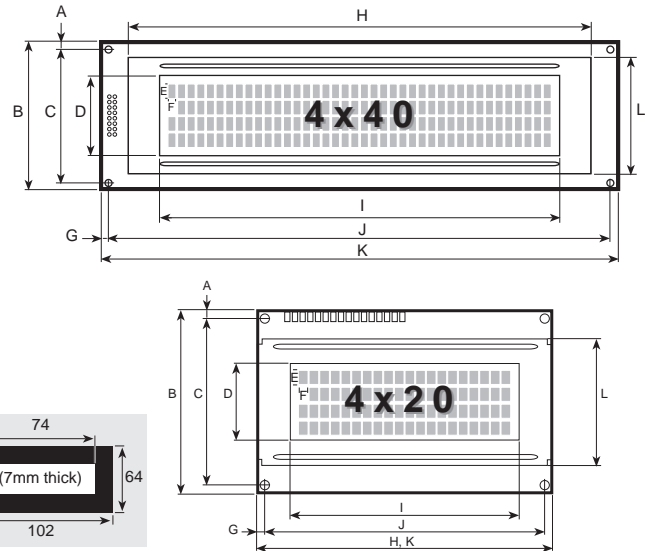
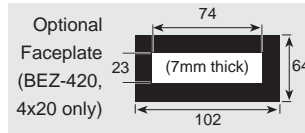


Table 1. Basic specifications

Power requirements (BL off)	4.8 to 5.5 Vdc @ 10mA
Power requirements (BL on)	4.8 to 5.5 Vdc @ 100mA
User connector	5-pin header; 0.025" posts on 0.10" centers
Connector pinout	+5 GND SER GND +5
Serial input	RS-232, or inverted TTL/CMOS, 9600 or 2400, N81
Buzzer output	5V @ 25mA max; pulses approx. 100ms for BELL
Operating temperature	0° to 50°C (32° to 122°F)
Serial data rates (4x20)	2400 or 9600 bps
Serial data rates (4x40)	1200, 2400, 4800, or 9600 bps

Table 2. Control characters by function

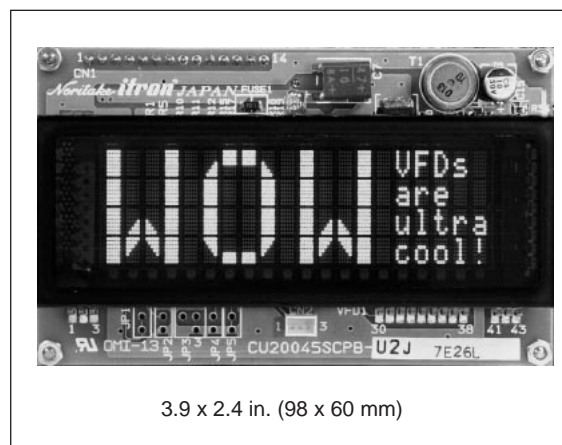
*These entries match like-named keys on standard keyboard (backspace, tab, return)

Cursor home	ctrl-A
Begin big-character mode	ctrl-B
Hide cursor	ctrl-D
Show underline cursor	ctrl-E
Show blinking-block cursor	ctrl-F
Bell (pulse piezo-buzzer output)	ctrl-G
Backspace*	ctrl-H
Horizontal tab (cursor to next multiple-of-4 column)*	ctrl-I
Smart linefeed (cursor down one line)	ctrl-J
Vertical tab (cursor up one line)	ctrl-K
Formfeed (clear screen)	ctrl-L
Carriage return*	ctrl-M
Backlight on	ctrl-N
Backlight off	ctrl-O
Accept cursor-position entry	ctrl-P
Clear column	ctrl-Q
Accept right-alignment data	ctrl-R

Preview complete instruction manuals via Internet—
www.seetron.com

4x20 Serial VFD Offers Dazzling Brightness, Easy Interface

If you require a bright, eye-catching display, vacuum-fluorescents (VFDs) are the technology of choice. Bright, blue-green characters say "high-tech;" our interface says "easy."



3.9 x 2.4 in. (98 x 60 mm)

Familiar Interface plus Sharp, Bright VFD

The VFD-420 combines a convenient serial interface with a 4x20 vacuum-fluorescent display. Its serial interface understands common control characters like carriage returns, linefeeds, tabs, backspace, etc. Special characters allow cursor positioning, backlight control, and the unique "big-character" mode shown above. The interface will even drive a (customer-provided) piezo buzzer for audio alerts.

Interfacing is easy—just connect +5V, ground, and serial data (RS-232 or inverted TTL level, no parity, 8 data bits, 1 stop bit) at 2400 or 9600 baud. Data rates are set by configuration switches.

You already know how to program for this display, since it understands a sensible subset of the ASCII control characters. The manuals include program examples for the BASIC Stamps® I and II, plus PC BASIC.

Similarities and Differences

The VFD-420 has all the great features of our 4x20 serial LCD (BPP-420L), including big-character mode for 1" tall letters and numbers, and our unique right-alignment instruction for spreadsheet-perfect data display. It also has VFD-specific features like low-power sleep mode to reduce current draw and avoid phosphor burn-in effects. VFD-420 is a drop-in replacement for BPP-420L, provided that your 5V supply can source at least 500mA.

Ordering Information

4x20 Serial VFD Module (VFD-420)	159.00
Mounting kit for 4x20 with faceplate, hardware (BEZ-420)	12.00

Figure 1. Dimensional data

In most significant dimensions, the VFD is identical to standard 4x20 LCDs, making it a perfect drop-in upgrade.

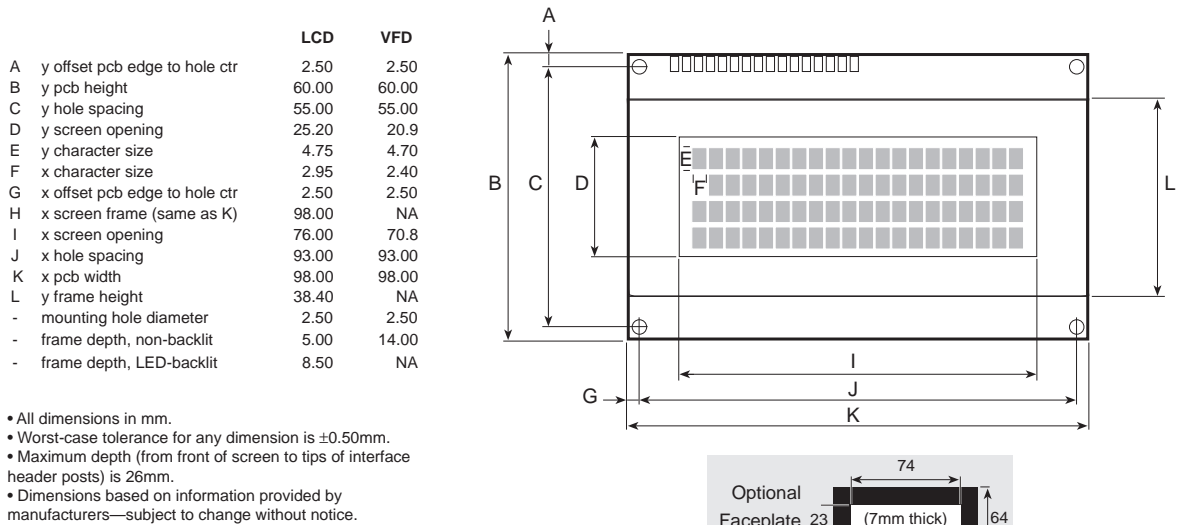


Table 1. Basic specifications

Power requirements (operating*)	4.8 to 5.25 Vdc @ 350 mA (max)
User connector	5-pin header; 0.025" posts on 0.10" centers
Connector pinout	+5 GND SER GND +5
Serial input	RS-232, or inverted TTL/CMOS, 9600 or 2400, N81
Operating temperature	-20° to 70°C (-4° to 158°F)
Operating humidity	20 to 80% RH (non-condensing)
*Note: the VFD manufacturer recommends that the power supply be rated for 500 mA minimum due to startup current requirements. Typical operating current is much lower.	

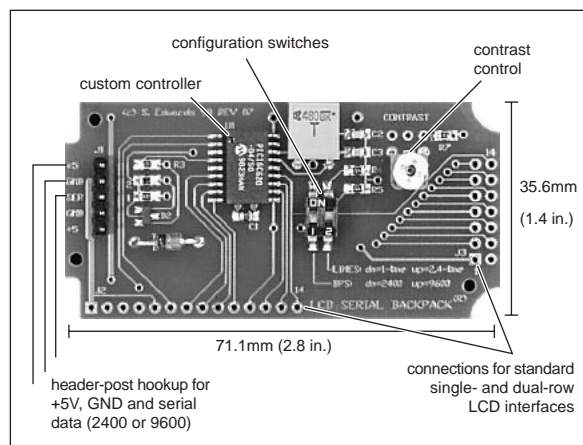
Table 2. Control characters by function

*These entries match like-named keys on standard keyboard (backspace, tab, return)

Cursor home	ctrl-A
Begin big-character (0-9, A-Z) mode	ctrl-B
End big-character mode	ctrl-C
Hide cursor	ctrl-D
Show blinking-block cursor	ctrl-F
Bell (pulse piezo-buzzer output)	ctrl-G
Backspace*	ctrl-H
Horizontal tab (cursor to next multiple-of-4 column)*	ctrl-I
Smart linefeed (cursor down one line)	ctrl-J
Vertical tab (cursor up one line)	ctrl-K
Formfeed (clear screen)	ctrl-L
Carriage return*	ctrl-M
Restore screen after ctrl-O	ctrl-N
Blank screen and power-down to 10 mA	ctrl-O
Accept cursor-position entry	ctrl-P
Clear column	ctrl-Q
Accept right-alignment data	ctrl-R

Low-cost Serial Interface for Alphanumeric LCDs

The LCD Serial Backpack® gives common alphanumeric LCDs a serial interface (2400 or 9600 bps) for convenient 1-wire connection to computers and controllers.



Simplified Interface

Virtually all of the alphanumeric LCDs on the market today use an HD44780/KS0066 controller. These LCDs need a bus connection of 6 to 11 input/output lines and firmware to initialize and drive them. The LCD Serial Backpack converts this interface to simple 2400 or 9600-baud serial (RS-232 or inverted TTL level, no parity, 8 data bits, 1 stop bit). Attach our Backpack to an LCD, connect +5V power, ground and serial data, and you're ready to go. Send text to the Backpack and it appears on the screen—it's that simple.

The Backpack is compatible with LCDs with up to 80 on-screen characters (e.g., 2x40 or 4x20). It provides easy access to all LCD features; just preface any instruction with ASCII 254 (0FE hex). For example, the clear-screen code is 1. To clear the screen, send two bytes: <254><1>. The manual includes a listing of LCD instructions, examples, and tips.

For LCDs that work more like a terminal with tabs, returns, linefeeds, etc. see our ILM, 4x20, 4x40, and graphics models. Note that adding a Backpack to a 4x20 display will *not* provide the advanced features of our BPP-420. That product uses an advanced interface that is not sold separately.

Smart, Proven Design

The LCD Serial Backpack is based on a custom microcontroller running tight code at just 480kHz. In typical applications, it draws less than 1mA. Minimal parts count and sensible design make it rugged and reliable. Those same virtues have made the controller IC popular with OEMs; place our chip on your circuit board and the LCD interface is done.

We offer LCDs with the Backpack installed; see the 2x16 Serial LCD datasheet for details.

Ordering Information

Backpack w/instructions and installation kit (BPK-000)	29.00
Backpack controller IC (PIC16C54), specify DIP or SOIC (BPK-DIP or BPK-SOI).....	9.00
Quantity purchases.....	call or e-mail for quote

Figure 1. LCD connector styles that work best with the LCD Serial Backpack

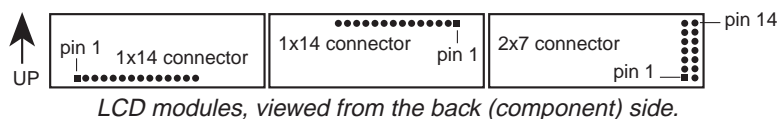


Figure 2. Standard LCD pinouts supported by the LCD Serial Backpack

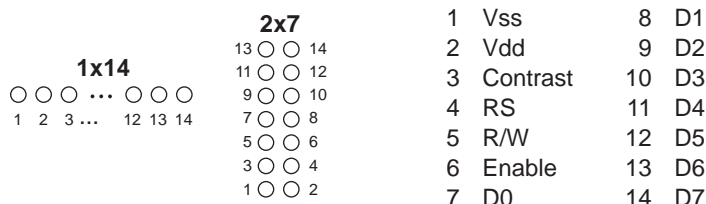


Table 1. Basic specifications

Power requirements.....	4.8 to 5.5 Vdc @ 3mA (incl. LCD)
User connector	5-pin header; 0.025" posts on 0.10" centers
Connector pinout.....	+5 GND SER GND +5
Serial input.....	RS-232, or inverted TTL/CMOS, 9600 or 2400, N81
LCD output.....	HD44780, KS0066 (or equiv.)
LCDs supported.....	1x8 to 4x20 (lines x characters)
Contrast voltage.....	adjustable 0 to 1.7V
Operating temperature.....	0° to 50°C (32° to 122°F)
Initialization	Switches LCD power, performs soft init
Instruction prefix	ASCII 254 (0FE hex)
LINES configuration	switch down for 1-line, up for 2 or 4 lines
BPS configuration	switch down for 2400, up for 9600

Table 2. Commonly used LCD instructions by code

Clear screen.....	1
Home (undo scrolling of DD RAM).....	2
Blank display (retaining data).....	8
Hide cursor	12
Show underline cursor	14
Move cursor one character left.....	16
Move cursor one character right	20
Scroll display one character left	24
Scroll display one character right	28
Set DD RAM address (position cursor).....	128+addr
Move to first character of first line	128
Move to <i>n</i> th character of first line	128+ <i>n</i>
Move to first character of second line	192
Move to <i>n</i> th character of second line	192+ <i>n</i>
Set CG RAM address (for custom characters)	64+addr

Preview complete
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Internet—
www.seetron.com

2x16 Serial LCD Module with Supertwist Display

Inexpensive, high-quality displays equipped with the LCD Serial Backpack® interface (2400 or 9600 bps) for convenient 1-wire connection to computers and controllers.



3.2 x 1.4 in. (80 x 36 mm)

Simplified Interface

Why hassle with parallel-bus LCDs? These 2x16 serial LCDs use our Backpack interface to accept simple 2400 or 9600-baud serial (RS-232 or inverted TTL level, no parity, 8 data bits, 1 stop bit). Connect +5V power, ground and serial data, and you're ready to go. Send text to the Backpack and it appears on the screen—it's that simple.

The Backpack provides easy access to all LCD features; just preface any instruction with ASCII 254 (0FE hex). For example, the clear-screen code is 1. To clear the screen, send two bytes: <254><1>. The manual includes a listing of LCD instructions, examples, and tips.

For LCDs that work more like a terminal with tabs, returns, linefeeds, etc. see our ILM, 4x20, 4x40, and graphics models.

Smart, Proven Design

The LCD Serial Backpack is based on a custom microcontroller running tight code at just 480kHz. In typical applications, it draws less than 3mA including the LCD. Minimal parts count and sensible design make it rugged and reliable. Those same virtues have made the controller IC popular with OEMs; place our chip on your circuit board and the LCD interface is done.

Ordering Information

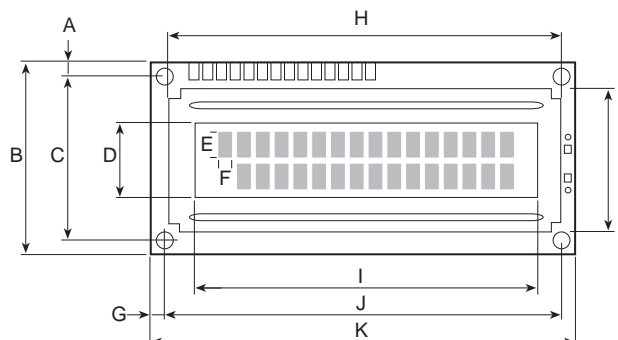
2x16 serial LCD module, non-backlit (BPK-216N)	45.00
2x16 serial LCD module, LED-backlit (BPK-216L)	55.00
Mounting kit w/faceplate, hardware (BEZ-216)	6.00
Quick-Start for PC users (5V power supply, 9-pin serial adapter, disk; BPX-QUIK)	29.00
Backpack w/instructions and installation kit, no LCD (BPK-000)	29.00
Backpack controller IC (PIC16C54), specify DIP or SOIC (BPK-DIP or BPK-SOI)	9.00
Quantity purchases	call or e-mail for quote

Figure 1. Dimensional data

We currently use 2x16 LCD modules from Powertip (PT). Some of our older modules were made by DataVision (DV). All critical dimensions are the same, but the newer PT units have larger characters.

	DV	PT
A y offset pcb edge to hole ctr	2.50	2.50
B y pcb height	36.00	36.00
C y hole spacing	31.00	31.00
D y screen opening	16.10	16.20
E y character size	4.89	5.94
F x character size	2.78	2.95
G x offset pcb edge to hole ctr	2.50	2.50
H x screen frame	71.20	71.00
I x screen opening	62.50	66.00
J x hole spacing	75.00	75.00
K x pcb width	80.00	80.00
L y frame height	26.20	25.00
- mounting hole diameter	2.50	2.50
- frame depth, non-backlit	4.70	5.00
- frame depth, LED-backlit	9.40	8.50

- All dimensions in mm.
- Worst-case tolerance for any dimension is $\pm 0.50\text{mm}$.
- Maximum depth (from front of screen frame to tips of interface header posts) is 26mm.
- Dimensions based on information provided by manufacturers—subject to change without notice.



Optional Faceplate
(BEZ-216; sold
separately)

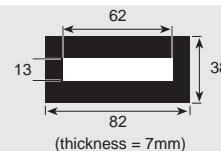


Table 1. Basic specifications

Power requirements.....	4.8 to 5.5 Vdc @ 3mA (incl. LCD)
User connector	5-pin header; 0.025" posts on 0.10" centers
Connector pinout.....	+5 GND SER GND +5
Serial input.....	RS-232, or inverted TTL/CMOS, 9600 or 2400, N81
Operating temperature.....	0° to 50°C (32° to 122°F)
Initialization	Switches LCD power, performs soft init
Instruction prefix	ASCII 254 (0FE hex)
LINES configuration	switch down for 1-line, up for 2 or 4 lines
BPS configuration	switch down for 2400, up for 9600

Table 2. Commonly used LCD instructions by code

Clear screen.....	1
Home (undo scrolling of DD RAM).....	2
Blank display (retaining data).....	8
Hide cursor.....	12
Show underline cursor	14
Move cursor one character left.....	16
Move cursor one character right	20
Scroll display one character left	24
Scroll display one character right	28
Set DD RAM address (position cursor).....	128+addr
Move to first character of first line	128
Move to <i>n</i> th character of first line	128+ <i>n</i>
Move to first character of second line	192
Move to <i>n</i> th character of second line	192+ <i>n</i>
Set CG RAM address (for custom characters)	64+addr

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Internet—
www.seetron.com

Serial Servo Controller (SSC): Computer Interface for R/C Servos

Use a computer's serial port to control standard R/C servos for robotics, automation, or animatronics. The Mini SSC II accepts serial input at 2400 or 9600 bps and outputs eight channels of servo control. Up to 32 Mini SSCs can be connected in party-line fashion to a single serial port to control up to 255 servos. For full specs, tech data, and links to third-party software developers for the Mini SSC, visit www.seetron.com/ssc.htm.

Ordering Information

Mini SSC II (assembled module, SSC-ASD2)	44.00
PC (DB9) serial-port cable (SSC-CBL)	6.00

Stamp®-compatible Controllers Run BASIC Programs

We offer kit versions of the famous Parallax BASIC Stamp® computers that we call *Counterfeit* controllers. They're the real deal, though, with genuine Parallax PBASIC chips and smart, easy-to-assemble printed circuit boards. (All kits require soldering/assembly.)

Since our serial LCDs are such popular add-ons for the Stamp, we also offer the BS1/LCD, which combines a Stamp controller and 2x16 alphanumeric serial LCD into a single kit/module.

For more information and technical specs, visit www.seetron.com/cft.htm.

Ordering Information

Counterfeit Controller Kit (CFT-KIT)	29.00
2x Turbo Option (not for BS1/LCD) (CFT-T2X)	2.00
4x Turbo Option (not for BS1/LCD) (CFT-T4X)	4.00
BS1/LCD Kit with non-backlit 2x16 LCD (BS1-216N)	59.00
BS1/LCD Kit with LED-backlit 2x16 LCD (BS1-216L)	69.00
Counterfeit Development System (with one CFT-KIT—CFT-DEV)	69.00
Counterfeit Development System (with one BS1-216N—CDV-216N)	99.00
Counterfeit Development System (with one BS1-216L—CDV-216L)	109.00

Data Collection Proto Board for BASIC Stamp® II

The BASIC Stamp II (BS2) is an excellent starting point for a data logger. Our Data Collection Proto Board (DCPB) is a BS2 carrier board with support for up to 32kB of EEPROM data storage; a real-time clock; 2-channel, 12-bit ADC; and peripheral power supply.

For more information and technical specs, visit www.seetron.com/cft.htm.

Ordering Information

DCPB, bare board (no components) w/manual, disk (DCP-PCB-I)	49.00
DCPB, kit w/manual, disk, 0kB EEPROM (DCP-KIT-I)	79.00
DCPB, assembled w/manual, disk, 0kB EEPROM (DCP-ASD-I)	119.00
<i>(Subtract \$20 for packages above without manual, disk; change -I to -N in part no.)</i>	
8kB EEPROM memory for above (EEP-08K)	15.00
16kB EEPROM memory for above (EEP-16K)	25.00
32kB EEPROM memory for above (EEP-32K)	45.00

App Kits: Essential Information for Designers Working with Stamps/Counterfeits or PICs

Interfacing a variety of peripheral chip to the BASIC Stamp 1 (BS1), BS2, or Counterfeit controller (our BS1 kit) is easy with app kits. These contain a chip, complete documentation, and example programs in PBASIC-1, PBASIC-2, and the Parallax/Tech Tools dialect of PIC assembly language (for PIC -5x parts). (They do not contain a circuit board or other components.) For more information on app kits, visit www.seetron.com/ak.htm.

Parallax has licensed our app kits and expanded the line to include more devices. If you're looking for a part that's not listed here, drop by www.parallaxinc.com.

Ordering Information

X25640 8kB Serial EEPROM App Kit (AKT-X25)	25.00
DS1620 Digital Thermometer App Kit (AKT-DS1)	25.00
LTC1298 12-bit, 2-channel ADC App Kit (AKT-LTC).....	25.00
MAX7219 LED Driver App Kit (AKT-MA7)	25.00
TSM6755 4-digit, 0.5-inch LED Module App Kit (AKT-TS6)	30.00

Connectamundos![™]

Missing Link for Prototyping with Headers

Many electronic gizmos (serial LCDs, microcontrollers, servo controllers, etc.) use square header posts to connect to the outside world. These posts are inexpensive and versatile—you can wire-wrap them, solder them, or fashion custom cable harnesses that plug right onto them. But when you're prototyping, any of those options may be just too much bother. That's where Connectamundos come in. They're short lengths of flexible jumper wire with a header socket on each end. Slip them over header posts to make a fast, secure connection.

Ordering Information

Connectamundos, package of 10 (five each 4" and 8"; CNX-010).....	6.00
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