

## LK-204-25 with Keypad

### Theory of Operation

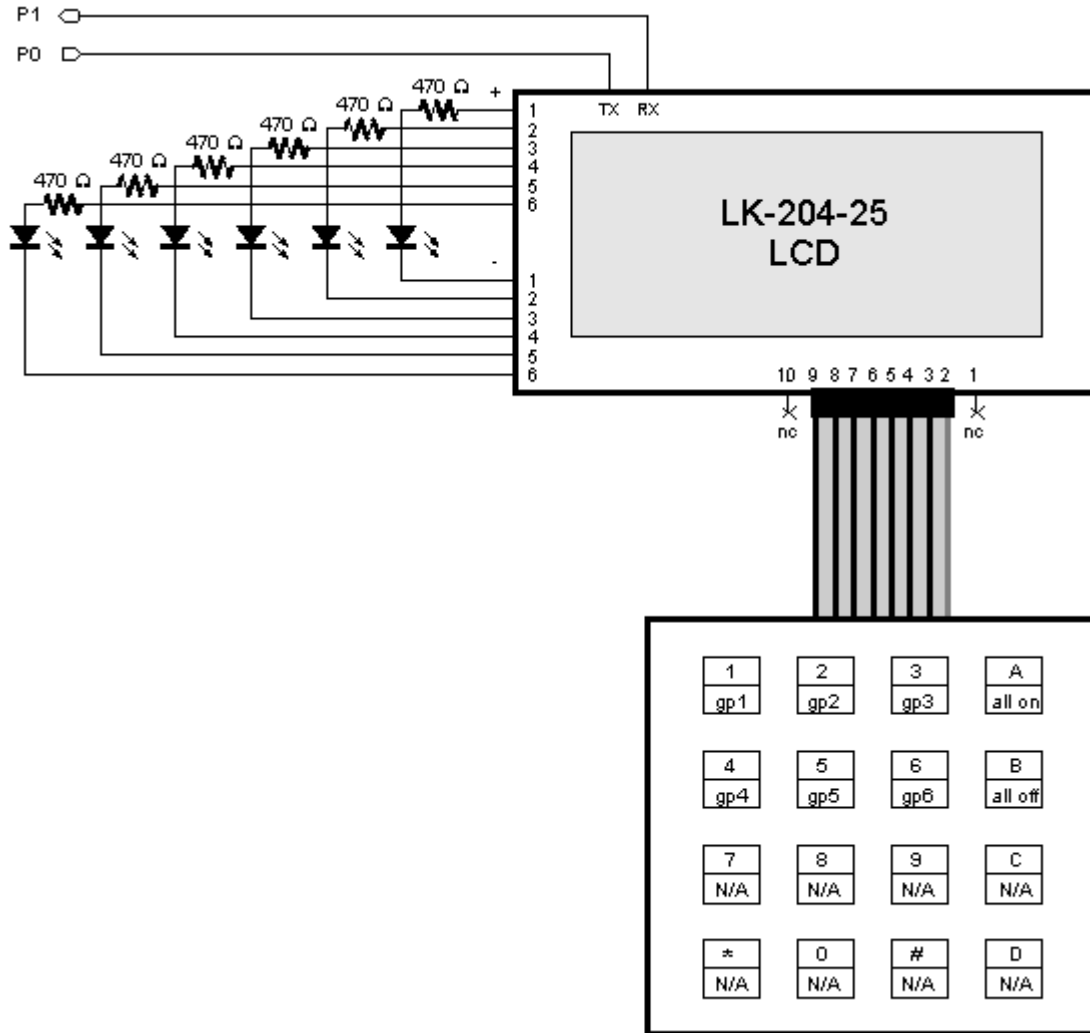
#### Description:

This shows how to wire the LK-204-25 key pad function and general purpose I/Os and control these items with the BASIC Stamp 2. The code show a simple I/O control with the keypad. The other options for the LCD are listed in the code but not used. Be sure when connecting the keypad that you do not connect to keypad header pin1 or 10.

#### Parts list:

Description:	Part number	Quantity
Basic Stamp® 2	BS2-ic	1
4x20 Serial LCD with Keypad Interface	30058	1
Red LED	350-00006	2
Yellow LED	350-00007	2
Green LED	350-00001	2
470 ohm resistor 1/4 watt	150-04710	6
4 x 4 Matrix Keypad	27944	1
4 x 4 Matrix Keypad Cable	27943	1

### Circuit Connections



### Test code:

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'Interface the bs2 to the LK204 25
'LK_204_25_key_1_0.bs2
'{$STAMP BS2}
'{$PBASIC 2.5}

' -----[ Declarations ]-----
'LCD
'Interface
tx          PIN      0      'Transmit pin to LCD
Rx          PIN      1      'Receive pin from LCD
Baud       CON      84      'Equals baud rate of 9.6k
Int        CON      254     'place before each instruction

'Commands
Auto_Wrap_On  CON      67      'See LCD manual for more detail
Auto_Wrap_Off CON      68      'See LCD manual for more detail
Auto_Scroll_On CON      81      'See LCD manual for more detail
Auto_Scroll_Off CON     82      'See LCD manual for more detail
Cursor_pos   CON      71      'Needs Column and row
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Cur_home          CON          72      'See LCD manual for more detail
Under_Line_On     CON          74      'See LCD manual for more detail
Under_Line_Off    CON          75      'See LCD manual for more detail
Blinking_On       CON          83      'See LCD manual for more detail
Blinking_Off      CON          84      'See LCD manual for more detail
Cursor_Left       CON          76      'See LCD manual for more detail
Cursor_Right      CON          77      'See LCD manual for more detail
Clear_screen      CON          88      'See LCD manual for more detail
Contrast          CON          80      'Needs level $00 to $FF
Backlight_On      CON          66      'SET $00 = on, minute max $FF
Backlight_Off     CON          70      ''See LCD manual for more detail
GP_pin_off        CON          86      'NEEDs $01 to $06 for pin #
GP_pin_on         CON          87      'NEEDs $01 to $06 for pin #

'Key pad
Auto_repeat_on    CON          126     '$00 = resend $01 = key up/down
Auto_repeat_off   CON          96      'See LCD manual for more detail
Auto_Trans_On     CON          65      'Sends key press data immediately
Auto_Trans_Off    CON          79      'STORE 10 key presses until polled
Clear_buffer      CON          69      'See LCD manual for more detail
Poll_keypad       CON          38      'Polls LCD for last key press
Debounce_time     CON          85      'Set in 6.554ms units default 52mS

'Bar graphs
Wide_vert_bar     CON          118     'Initialize wide vertical bar
Naro_vert_bar     CON          115     'Initialize narrow vertical bar
Draw_vert_bar     CON          61      'See LCD manual for more detail
Horz_bar          CON          104     'Initialize horizontal bar
Draw_horz_bar     CON          124     'See LCD for more detail
Cusstom_char      CON          78      'See LCD for more detail
Large_dig         CON          110     'See LCD for more detail
Place_lrg_dig     CON          35      'Column $01/$12 digit $00/$09

temp              VAR          Byte     'Working variable
Key               VAR          Byte     'key storage variable
io_pin            VAR          Byte     'GP I/O variable

' -----[ Initialization ]-----
PAUSE 250          'Waits for 250ms
Initialize:        'label
SEROUT Tx,Baud,[Int,Clear_screen] 'Clears screen
SEROUT Tx,Baud,[Int,Auto_trans_off] 'Turns off buffer for key pad
'Sets up text on LCD
SEROUT Tx,Baud,["Press 1 to 6 or A to",Int,Cursor_pos,1,2,
                "turn on all leds or",
                Int,Cursor_pos,1,3,"B to turn them all",
                Int,Cursor_pos,1,4,"off."]

' -----[ Main Routine ]-----

In_Put:           'Label
GOSUB key_pad     'Jumps to key pad polling routine
  IF key = "#" THEN I_O_On 'compares key and jumps if true
  IF key = "*" THEN I_O_Off 'compares key and jumps if true
GOTO In_Put      'Jumps to listed label

' -----[ Subroutines ]-----
I_O_Off:         'Label

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'Sends text to LCD
SEROUT Tx,Baud,[Int,Clear_screen,"I/O pin ",DEC io_pin,Int,Cursor_pos,1,2,
                "Is now turned off. "]
SEROUT Tx,Baud,[Int,GP_Pin_Off,io_pin] 'SetS I/O pin to off
PAUSE 2000                             'PAUse for 2000ms
GOTO Initialize                          'JUmps to listed label

I_O_On:                                  'Label
'Sends text to LCD
SEROUT Tx,Baud,[Int,Clear_screen,"I/O pin ",DEC io_pin,Int,Cursor_pos,1,2,
                "Is now turned on. "]
SEROUT Tx,Baud,[Int,GP_Pin_On,io_pin]   'listed I/O pin to on
PAUSE 2000                             'Pause for 2000ms
GOTO Initialize                          'Jumps to listed label

key_pad:                                  'Label
SEROUT Tx,Baud,[Int,Poll_keypad]         'Request last key press from LCD
SERIN Rx,Baud,[temp]                    'Store key press in temp
  IF temp = 0 THEN key_pad               'coMPares key and jumps if true
  GOSUB Convert                          'JumP to listed label
  IF temp = "A" THEN All_On              'coMPares key and jumps if true
  IF temp = "B" THEN All_Off            'coMPares key and jumps if true
  IF temp > 54 OR temp < 49 THEN Error   'coMPares key and jumps if true
'Displays in ASCll

io_pin = temp - 48                       'Converts ASCll to decimal
SEROUT Tx,Baud,[Int,Clear_screen,"Please press an * to",Int,Cursor_pos,1,2,
                "turn off Pin ",DEC io_pin," or #",Int,Cursor_pos,1,3,
                "to turn it on."]

Wait_For_key:                             'Label
'Displays character typed in ASCll

SEROUT Tx,Baud,[Int,Poll_keypad]         'Request last key press from LCD
SERIN Rx,Baud,[temp]                    'Store key press in temp
IF temp = 0 THEN Wait_For_key            'If no key Press jump to label
  GOSUB Convert                          'Jump to listed label
  key = temp                              'StorES temp in to key variable
RETURN                                   'Jump to next line UNDER last gosub

Convert:                                  'Label
'Table to convert variable
LOOKDOWN temp,[66,67,68,69,71,72,73,74,76,77,78,79,81,82,83,84],temp
'Table to convert variable
LOOKUP temp,["D","#", "0", "*", "C", "9", "8", "7", "B", "6", "5", "4", "A", "3",
            "2", "1"],temp
RETURN                                   'Jump to next line UNDER last gosub

All_On:                                   'Label
SEROUT Tx,Baud,["All on"]                'Displays text
FOR io_pin = 1 TO 6                      'CyCLEs io_pin variable fro 1 to 6
  SEROUT Tx,Baud,[Int,GP_Pin_On,io_pin]  'SETs listed I/O pin to on
NEXT                                     'cycles until io_pin = 6
PAUSE 1000                               'Pauses for 1000 ms or 1 second
GOTO Initialize                          'Jumps to listed label

All_Off:                                  'Label
SEROUT Tx,Baud,["All Off"]               'Displays text
FOR io_pin = 1 TO 6                      'CYCles io_pin variable fro 1 to 6
  SEROUT Tx,Baud,[Int,GP_Pin_Off,io_pin]'Sets listed I/O pin to off
NEXT                                     'cycles until io_pin = 6

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```
PAUSE 1000           'Pauses for 1000 ms or 1 second
GOTO Initialize      'Jumps to listed label

Error:               'Label
  SEROUT Tx,Baud,[Int,Clear_screen] 'Clears screen
'Displays text
  SEROUT Tx,Baud,["          ERORR          "]
  PAUSE 1000         'Pauses for 1000 ms or 1 second
GOTO Initialize      'Jumps to listed label
```