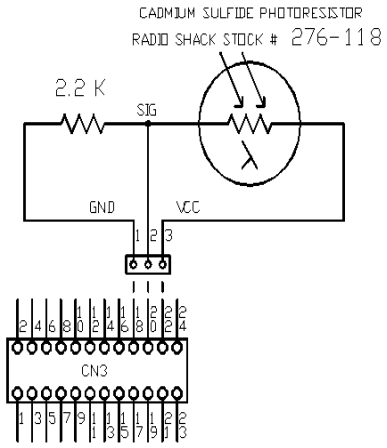
Application 4: Interfacing a Photocell

This application shows how to interface a photocell to the PRIMER Trainer and gives an example program which demonstrates its capabilities.

Start out by getting the needed parts. These parts can be obtained from Radio Shack if desired. The circuit is so simple (see diagram) that you may build it without a perfboard.

PART-NUMBER	PART-VALUE	PART-DESCRIPTION
276-118	Photocell	Cadmium sulfide
	2.2 KΩ	¼ or ⅛ W resistor

8The circuit is so simple (see diagram below) that you may build it without a perfboard. You may connect it to CN 3 by wire-wrapping, soldering, or using a female connector (be sure to disconnect power from the PRIMER first). After building the circuit and connecting it to CN3, reconnect the power and see if the board powers up correctly. If it does not, disconnect power again and check the circuit. Once the board is powered up correctly, you will want to enter the self test mode by pressing "FUNC." then "1". After the RAM diagnostics are complete, the analog to digital conversion value will be displayed on the right two displays while a proportional tone is emitted from the speaker. In normal room lighting, the number displayed should be around 20 hex, and with the photocell darkened, the number should be close to 00.



If the circuit appears to be working correctly, press reset and proceed to the next page.

The machine language for the program is listed below.

ADDRESS	DATA	DESCRIPTION	
8F01	AF	XRA	A
8F02	32	STA	8FB2
8F03	B2		
8F04	8F		
8F05	26	MVI	H,00
8F06	00		

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8F07     11      LXI     D,8FA1
8F08     A1
8F09     8F
8F0A     CD      CALL    8F8B
8F0B     8B
8F0C     8F
8F0D     3A      LDA     8FB2
8F0E     B2
8F0F     8F
8F10     16      MVI     D,07
8F11     07
8F12     47      MOV     B,A
8F13     E6      ANI     0F
8F14     0F
8F15     C6      ADI     30
8F16     30
8F17     5F      MOV     E,A
8F18     0E      MVI     C,11
8F19     11
8F1A     CD      CALL    1000
8F1B     00
8F1C     10
```

ADDRESS	DATA	DESCRIPTION	
8F1D	78	MOV	A,B
8F1E	0F	RRC	
8F1F	0F	RRC	
8F20	0F	RRC	
8F21	0F	RRC	
8F22	E6	ANI	0F
8F23	0F		
8F24	C6	ADI	30
8F25	30		
8F26	15	DCR	D
8F27	5F	MOV	E,A
8F28	0E	MVI	C,11
8F29	11		
8F2A	CD	CALL	1000
8F2B	00		
8F2C	10		
8F2D	0E	MVI	C,09
8F2E	09		
8F2F	1E	MVI	E,00
8F30	00		
8F31	CD	CALL	1000
8F32	00		
8F33	10		
8F34	7D	MOV	A,L
8F35	07	RLC	
8F36	07	RLC	

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ADDRESS	DATA	DESCRIPTION	
8F37	07	RLC	
8F38	E6	ANI	07
8F39	07		
8F3A	3C	INR	A
8F3B	4F	MOV	C,A
8F3C	3E	MVI	A,FF
8F3D	FF		
8F3E	B7	ORA	A
8F3F	1F	RAR	
8F40	0D	DCR	C

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8F41     C2     JNZ    8F3E
8F42     3E
8F43     8F
8F44     D3     OUT    40
8F45     40
8F46     01     LXI    B,8FB1
8F47     B1
8F48     8F
8F49     DB     IN     41
8F4A     41
8F4B     E6     ANI    01
8F4C     01
8F4D     C2     JNZ    8F5B
8F4E     5B
8F4F     8F
8F50     7D     MOV    A,L
8F51     02     STAX   B
8F52     11     LXI    D,8FA8
8F53     A8
8F54     8F
8F55     CD     CALL   8F8B
8F56     8B
8F57     8F
8F58     C3     JMP    8F2D
8F59     2D
8F5A     8F
8F5B     0A     LDAX   B
8F5C     C6     ADI    F6
8F5D     F6
8F5E     BD     CMP    L
8F5F     DA     JC     8F64
8F60     64
8F61     8F
8F62     26     MVI    H,01
8F63     01
8F64     0A     LDAX   B
8F65     BD     CMP    L
8F66     D2     JNC    8F78
8F67     78
8F68     8F
8F69     24     INR    H
8F6A     25     DCR    H
8F6B     CA     JZ     8F78
8F6C     78
8F6D     8F
8F6E     21     LXI    H,8FB2
8F6F     B2
8F70     8F
8F71     7E     MOV    A,M
8F72     3C     INR    A
8F73     B7     ORA    A
8F74     27     DAA
8F75     77     MOV    M,A
8F76     26     MVI    H,00
8F77     00
8F78     11     LXI    D,0000
8F79     00
8F7A     00
ADDRESS  DATA   DESCRIPTION
8F7B     24     INR    H
8F7C     25     DCR    H
8F7D     C2     JNZ    8F83
8F7E     83
8F7F     8F
8F80     11     LXI    D,0320
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8F81    20
8F82    03
8F83    0E      MVI     C,10
8F84    10
8F85    CD      CALL    1000
8F86    00
8F87    10
8F88    C3      JMP     8F07
8F89    07
8F8A    8F
8F8B    E5      PUSH    H
8F8C    C5      PUSH    B
8F8D    EB      XCHG
8F8E    46      MOV     B,M
8F8F    23      INX     H
8F90    16      MVI     D,00
8F91    00
8F92    5E      MOV     E,M
8F93    0E      MVI     C,11
8F94    11
8F95    CD      CALL    1000
8F96    00
8F97    10
8F98    14      INR     D
8F99    23      INX     H
8F9A    05      DCR     B
8F9B    C2      JNZ     8F92
8F9C    92
8F9C    8F
8F9E    C1      POP     B
8F9F    E1      POP     H
8FA0    C9      RET
8FA1    06      DATA FOR "CELL->"
8FA2    43
8FA3    45
8FA4    4C
8FA5    4C
8FA6    2D
8FA7    3E
8FA8    08      DATA FOR "--LOAD--"
8FA9    2D
8FAA    2D
8FAB    4C
8FAC    4F
8FAD    41
8FAE    44
8FAF    2D
8FB0    2D
8FB1    64      SETPOINT
8FB2    00      COUNT
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