

# OP-80A

## OWNER'S MANUAL



# OAE

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PARTS LIST

OP-80A-IC1-IC9	NE555*	\$ 1.50 ea.
-IC10	SN7474	.95
-IC11	SN7437	.95
-C1, C2	.1mf 10v disc capacitors	.35
-R1	25-50K In-line Resistor* Array	2.75
-R2-R5	220 ohm, <sup>1</sup> / <sub>4</sub> watt	.20
-I1-I4	Red LED*	1.25
-S1	Precision Sensor Array*	32.00
-WW1	16 Pin Wire Wrap Socket	1.25
-WG1	1.647" Precision Wire Guide	.45
-WG2	1.000" Precision Wire Guide	.45
-24"	Fine Solder	.35
-PC1	OP-80A Printed Circuit Card	12.00
-IM	OP-80A Instruction Manual	3.50
-B1	Anodized Extruded Aluminum Box	7.50
-DIP48	DIP Connector w/48" Cable	5.00

Include \$2.50 for shipping/handling within the continental U.S.

\*  
These items are selected and matched devices.

Do not order seperately.

## OPERATION

Operation of the OP-80A Paper Tape Reader is straight forward. The paper tape to be read is inserted between the guides and pulled from left to right. Note the position of the OAE arrow " > " and the small sprocket arrow pointing to the fourth sensor from the bottom for proper tape orientation.

In order to read light weight paper tape (semi-opaque), an LED indicator has been provided to facilitate proper alignment of the light source. (Note...A great deal of feedback is utilized in the sensor design to reject the 60 cycle AC component emitted by the light source, however, fluorescent light is not recommended as a source.) To align the reader, place a low wattage incandescent lamp (15 to 60 watts recommended) over the reader and lower until the SP (Sprocket) LED comes on. The OP-80A is now ready for use.

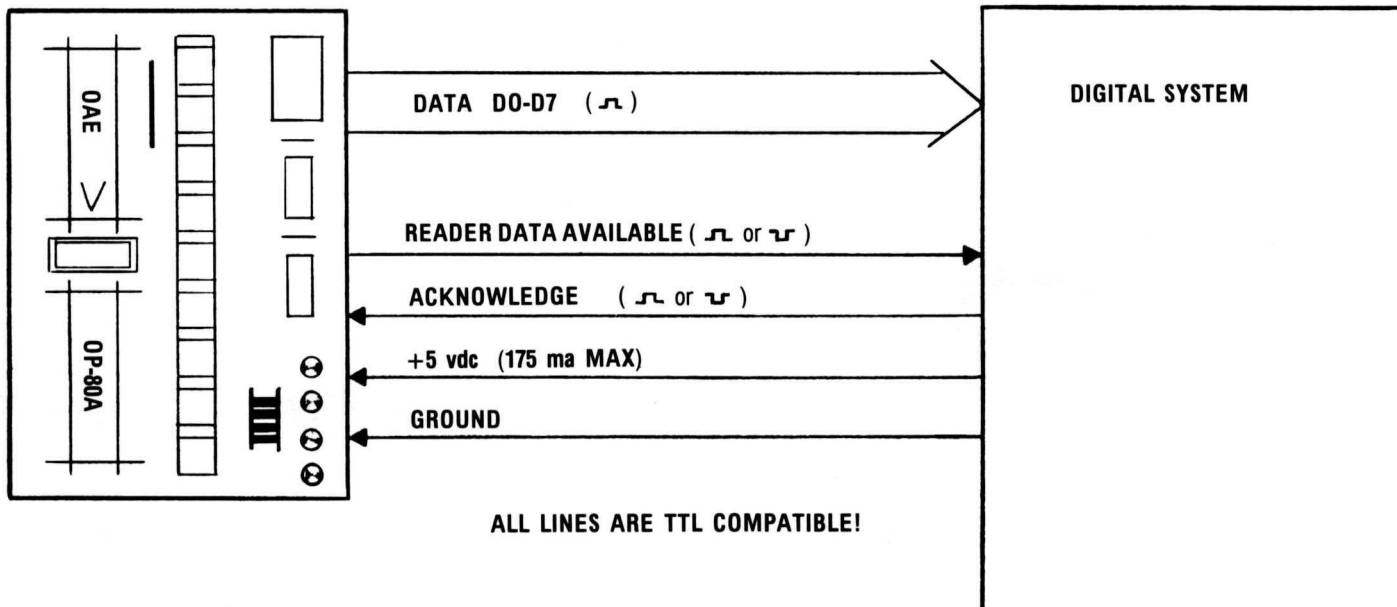
To test the reader, toggle a simple bootstrap loader program into the computer.<sup>2</sup> The program should run in a loop waiting for the RDA line to go high (or  $\overline{\text{RD}\bar{\text{A}}}$  to go low.) When the line goes high, the data should be input through the port. If an acknowledge signal is generated by the data input port, it should be sent out over ACK (or  $\overline{\text{ACK}}$ ). If no acknowledge signal is available, the program must generate one. This may be output through the same port that supplies data to S1 and S2. The program will now return to

the initial loop and wait for the next RDA change.

<sup>1</sup>A high intensity lamp with a 12v auto lamp is an excellent light source. ie., Tensor Model 6500 with bulb #1156.

<sup>2</sup>Refer to OP-80A SUPPORT SOFTWARE later in this manual.

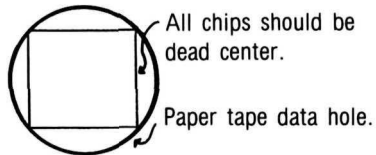
**THE OP-80A MAY BE CONNECTED TO ANY MICROPROCESSOR SYSTEM WITH A PARALLEL INTERFACE.**



## ASSEMBLY

### I. INSTALL WIRE GUIDES, SENSOR ARRAY

- A. Mount the long horizontal guides  $5/32$ " above the card. A drill makes an excellent stand-off for this operation. The horizontal guides must be mounted first!
- B. Install the short vertical guides. Use 4 to 6 layers of paper tape between the horizontal and vertical guides for proper spacing.
- C. Drop the sensor on to the card. Watch the placement of pin 1. Thread some paper tape on to the reader. Solder pin 1. With the tape pulled taut, reheat pin 1 and align the sensor as shown below.



- D. Solder all sensor leads. If the paper tape is still not properly centered over the sensor array, adjust the guides with a small pair of pliers.

II. MOUNT THE FOLLOWING PARTS IN THE ORDER LISTED

CAUTION...Almost all components used in this kit are polarity sensitive. Use care when installing the components and refer to the parts placement diagram.

- A. Mount all the resistors. Refer to the parts placement diagram. Watch the placement of Pin 1 when mounting R1.
- B. Install J1.
- C. If you plan to mount the optional light source, (OP-80A-L1), install J2.
- D. If your data input port generates a negative going data acknowledge signal ( $\overline{\text{ACK}}$ ), jumper point A to  $\overline{\text{ACK}}$ . If the acknowledge signal is positive going, jump A to ACK.
- E. Mount all ICs. Watch the placement of Pin 1.
- F. Mount the wire wrap socket. Do not cut the pins. They may be needed if additional option cards are purchased.
- G. Mount all the LEDs. Watch the placement of the cathode lead. (The LED chip is mounted to the cathode lead.)
- H. Mount the disc capacitors.

I. This completes the assembly of the printed  
Circuit card. INSPECT YOUR WORK CAREFULLY!  
It is suggested you proceed to the cable  
assembly and interface instructions before  
assembling the box.

## CHECKOUT

Connect the reader to a 5v power source and apply power. (Note; The OP-80A runs cool - if any components heat up when power is applied, remove power immediately and recheck your work).

Place the reader under a light source. The SP LED should come on. (The power led is always on, S1 and S2 will be on if left unconnected.) All data lines should be high ( $\approx 3.5v$ ).

Pass your hand over the sensor array. Data lines D0 through D7 should go off ( $\approx .04v$ ) one by one.

If any of the data lines fail to respond, recheck and solder the appropriate components.

Thousands of OP-80A's have been sold with a warranty repair rate of less than 2%. However, if you have a problem with your reader, send the unit (less the box) with a description of the problem and a check for the return shipping and handling -(\$2.50 Ground,\$3.50 Air within continental United States) to:

OLIVER AUDIO ENGINEERING, INC.

7330 LAUREL CANYON BLVD.

NORTH HOLLYWOOD, CALIF. 91605

We will be happy to repair and return your unit as soon as possible.

## INTERFACE

Refer to the I/O SOCKET diagram in this manual. Using the diagram, connect the reader to a parallel port in the computer. If you wish to connect the reader to a port with a serial interface already installed, refer to the OP-80A UART INTERFACE BULLETIN.

The parallel interface is very straight forward. The data lines D0 thru D7 are connected to the input port. When data is available, RDA goes HIGH AND  $\overline{\text{RDA}}$  goes LOW. Either signal may be used to flag the computer through a second input port. After the computer has input the data, it should reset the RDA latch. This may be done with a positive or negative PULSE (ACK OR  $\overline{\text{ACK}}$ ) from a computer output port. This same output port may also control the buffered status LEDES, S1 and S2.

If you do not want to use an output port to reset the RDA latch, you may obtain an ACK (or  $\overline{\text{ACK}}$ ) signal from the computer input port. This signal is usually the product of a CPU generated "IN" signal, the decoded port address, and a clock timing signal. Refer to your microprocessor manual for details.

OP-80A I/O SOCKET

D0	1		BRN	RED		16	D1
D2	2		ORG	YEL		15	D3
D4	3		GRN	BLU		14	D5
D6	4		VIO	GRY		13	D7
ACK or ACK	5		WHT	BLK		12	SPARE
RDA	6		BRN	RED		11	S2
RDA	7		ORG	YEL		10	S1
GROUND	8		GRN	BLU		9	+5vdc

D0 thru D7

DATA OUTPUT BYTE

S1 and S2

STATUS LEADS

RDA

READER DATA AVAILABLE

$\overline{\text{RDA}}$

READER DATA AVAILABLE

ACK or  $\overline{\text{ACK}}$

ACKNOWLEDGE (resets RDA and  $\overline{\text{RDA}}$ )

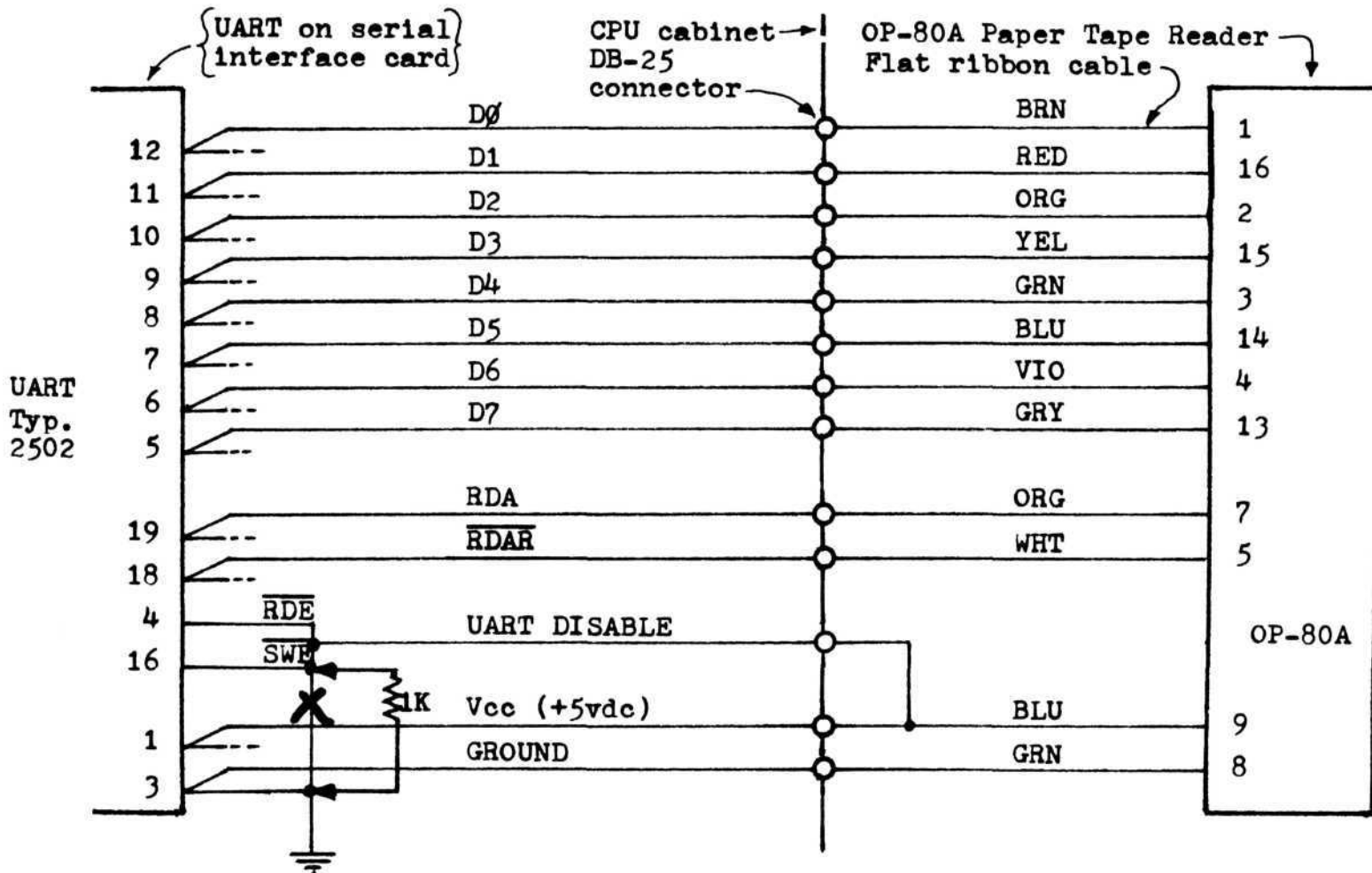
POWER

+5vdc @ 175ma MAXIMUM

By using the circuit shown below, the OP-80A can be connected directly to the terminal I/O (Input/Output) port in your computer - thus allowing you to load paper tapes at high speed without software modifications.

Advantages: Software may be loaded with the OP-80A using the existing terminal software routines. This may be helpful if your I/O routines are in ROM.

Disadvantages: Requires hardware modifications of the serial interface card.





After connecting the reader to your computer, toggle in the "8080 BINARY LOADER" (or its equivalent if you are using a different processor) and single step through the program to test your interface.

If you encounter difficulty when interfacing the reader, use a logic probe to follow the data and handshake signals as they proceed through the parallel interface circuitry. If a logic probe is not available, STATUS LEDS S1 and S2 may be used. Note that you will not be able to see fast, low repetition pulses; the same applies to a scope.

ASSM 0000 2000

```

0000      0010 *   DATE:  12-01-76           OLIVER AUDIO ENGINEERING
0000      0020 *   TIME:  1400 HRS          NORTH HOLLYWOOD, CALIF.
0000      0030 *
0000      0040 ***** 8080 BINARY PAPER TAPE LOADER *****
0000      0050 *
0000      0060 *   THIS LOADER PLACES BINARY DATA FROM THE OP-80A
0000      0070 *   IN MEMORY BEGINNING AT THE 'STARTING ADDRESS'.
0000      0080 *   NOTE:  YOU MAY HAVE TO PATCH (MODIFY) THE INPUT
0000      0090 *           PORT NUMBERS AND THE BIT MASK (NOW 80H)
0000      0100 *           TO CORRESPOND TO YOUR HARDWARE CONNECTIONS.
0000      0110 *
0000 21 00 00 0120      LXI   H,0000H      STARTING ADDRESS
0003 DB 00      0130 STBY   IN    0        INPUT READER STATUS BIT (RDA)
0005 E6 80      0140      ANI   80H        DROP (MASK) ALL BUT RDA STATUS BIT
0007 CA 03 00   0150      JZ    STBY       WAIT FOR FIRST DATA BYTE
000A DB 01      0160      IN    1        INPUT DATA BYTE
000C B7         0170      ORA   A         SET ACCUM STATUS FLAGS
000D CA 03 00   0180      JZ    STBY       WAIT FOR FIRST NON-ZERO DATA BYTE
0010 77         0190 STUFF  MOV    M,A       STORE DATA AT LOCATION HL
0011 23         0200      INX   H         INCREMENT MEMORY POINTER
0012 DB 00      0210 WAIT   IN    0        INPUT READER STATUS BIT (RDA)
0014 E6 80      0220      ANI   80H        DROP ALL BUT STATUS BIT
0016 CA 12 00   0230      JZ    WAIT       WAIT FOR DATA
0019           0240 *****
0019           0250 *   THE FOLLOWING ROUTINE IS NOT REQUIRED IF THE
0019           0260 *   INTERFACE GENERATES AN ACKNOWLEDGE SIGNAL.
0019 3E 80      0270      MVI   A,80H       SET ACKNOWLEDGE BIT HIGH
001B D3 02      0280      OUT   2        OUTPUT ACK SIGNAL
001D 2F         0290      CMA
001E D3 02      0300      OUT   2        REMOVE ACK SIGNAL
0020           0310 *****
0020 DB 01      0320      IN    1        INPUT READER DATA
0022 C3 10 00   0330      JMP   STUFF
  
```

```

2000      0000 * DATE: 12-01-76
2000      0010 * TIME: 1200 HRS
2000      0020 *
2000      0030 * THIS IS THE INTEL FORMAT PAPER TAPE LOADER.
2000      0040 * YOU MAY NEED TO PATCH THE STACK POINTER
2000      0050 * AND TTYIN LOCATIONS FOR YOUR SYSTEM.
2000      0060 *
2000      0070 * INITIALIZE THE STACK POINTER
2000 31 00 4D 0080          LXI   SP 4D00H
2003 CD 06 20 0090          CALL  READ
2006      0100 * INPUT BLOCK LENGTH AND ADDRESS
2006 CD 45 20 0110 READ    CALL  TTYIN
2009 FE 3A      0120          CPI
200B C2 06 20 0130          JNZ   READ
200E CD 2A 20 0140          CALL  CHAR
2011 57          0150          MOV   D,A
2012 C8          0160          RZ
2013 CD 2A 20 0170          CALL  CHAR
2016 67          0180          MOV   H,A
2017 CD 2A 20 0190          CALL  CHAR
201A 6F          0200          MOV   L,A
201B CD 2A 20 0210          CALL  CHAR
201E      0220 * INPUT BLOCK OF DATA
201E CD 2A 20 0230 LOOP    CALL  CHAR
2021 77          0240          MOV   M,A
2022 23          0250          INX   H
2023 15          0260          DCR   D
2024 C2 1E 20 0270          JNZ   LOOP
2027 C3 06 20 0280          JMP   READ
202A      0290 * CONVERT ASCII TO BINARY
202A CD 45 20 0300 CHAR    CALL  TTYIN
202D CD 3D 20 0310          CALL  HEX
2030 07          0320          RLC
2031 17          0330          RAL
2032 17          0340          RAL
2033 17          0350          RAL
2034 5F          0360          MOV   E,A
2035 CD 45 20 0370          CALL  TTYIN
2038 CD 3D 20 0380          CALL  HEX
203B 83          0390          ADD   E
203C C9          0400          RET
203D      0410 * CONVERT HEX (A-F) TO BINARY
203D D6 30      0420 HEX    SUI   30H
203F FE 0A      0430          CPI   0AH
2041 D8          0440          RC
2042 D6 07      0450          SUI   07H
2044 C9          0460          RET
2045      0470 * INPUT HEX FORMATTED DATA FROM OP-80A
2045      0480 * AND ECHO TO TERMINAL. (DELETE THE OUT COMMAND
2045      0490 * IF YOU WISH TO LOAD TAPE AT HIGH SPEED!)
2045 DB 00      0500 TTYIN  IN    0
2047 E6 80      0510          ANI   80H
2049 CA 45 20 0520          JZ    TTYIN
204C DB 01      0530          IN    1
204E D3 01      0540          OUT   1
2050 E6 7F      0550          ANI   7FH
2052 C9          0560          RET

```

DO NOT CUT GUIDES  
ON I/O SOCKET!

