CYB-233

and

PROTO-51 Kit

For Evaluation
and Prototyping

CYB23MAN.005 1 OCT 87 KTM MLA PRINTED IN U.S.A.

This manual contains advance
product information of which certain
details are subject to change.

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CYB-233 Prototyping Board for the CY233 Local Intelligent Network Controller

The CY233 LINC (Local Intelligent Network Controller), from Cybernetic Micro Systems, is a special integrated circuit that implements network communications functions in one chip. This part allows the user to connect many external devices to a single serial port of a host computer, and control the devices individually through the shared port. Within the CY233 are all the functions needed for network message processing, device address decoding, and local data transfers with the external devices. The settings of various CY233 control pins are used to specify operating characteristics, such as baud rate, parity, and basic message format. These options make the CY233 easily adaptable to many communications environments.

The CY233 is used to connect a serial network with external parallel hardware. This allows a serial device, normally a computer system, to control the parallel hardware through a single serial port of the system. Only a standard RS-232 port is required, with no other special communications hardware. The CY233 handles the serial communications with the host system, and decodes addresses for passing data in parallel to the appropriate local parallel hardware. The CY233, support circuits, address decoding, and parallel interface logic are implemented on and supported by the CYB-233 board.

Each CYB-233 board can support two addresses, one for handshake data transfers between the CY233 and parallel device, and one for strobed transfers between the CY233 and parallel device. The handshake interface is normally used with intelligent parallel devices that require a coordinated mechanism for reading or writing data, while the strobed interface will work with TTL buffer and latch type logic that only requires strobe pulses for reading or writing data.

Multiple CYB-233 boards may be connected to the same host serial port, in a daisy chain or ring fashion. This allows the host to control many CYB-233 boards, each with possibly unique parallel hardware, through only one serial port. The CY233 on each board handles the network communications between itself, other boards of the network, and the host computer. It recognizes when messages are meant for this board, to be transferred to the local parallel hardware, and when the messages should be passed to other boards in the network.

An alternative use of the CYB-233 is as an 8051 development board, called the PROTO-51 board. In this case, the board can support one 8051 family processor (8751, 8031, 8051, etc.) in the CYzzz location on the board. Address demultiplexing is provided through a local 74LS373, connected to the 8051 data bus. A direct serial connection to the 8051 TxD and RxD signals is also provided.

In this application, the CY233 device location may be used to add networking capabilities to the 8051 design, or a second 8051 processor could replace the CY233. This allows for a large variety of potential circuit configurations.

The CYB-233 is supplied in kit form, and comes with all necessary hardware to assemble a working board. Just add the cables and power supply to build your own low cost hardware control network.

CYB-233 Specifications

I. The CYB-233 board communicates with the host computer over a standard three-wire RS-232 interface.

II. The board can operate at standard baud rates between 300 and 19,200 baud.

III. One LED indicates when the 5V power supply is on.

IV. Compact size 100mm x 160mm (approximately 4" x 6.3") single height Eurocard format. Wire wrap area included for custom parallel hardware.

V. Power requirements:

Board voltage: +5V (400 mA max)

Optional + and - voltage connections are provided for custom circuits. RS-232 voltages are generated internally.

Tools Required

Assembly of the CYB-233 may require the following tools:

- [] A pair of needle-nose pliers
- [] A pair of small diagonal cutters
- [] A pair of wire strippers
- [] A soldering iron
- [] Some rosin core solder
- [] A Volt-Ohm-Milliamp meter for testing

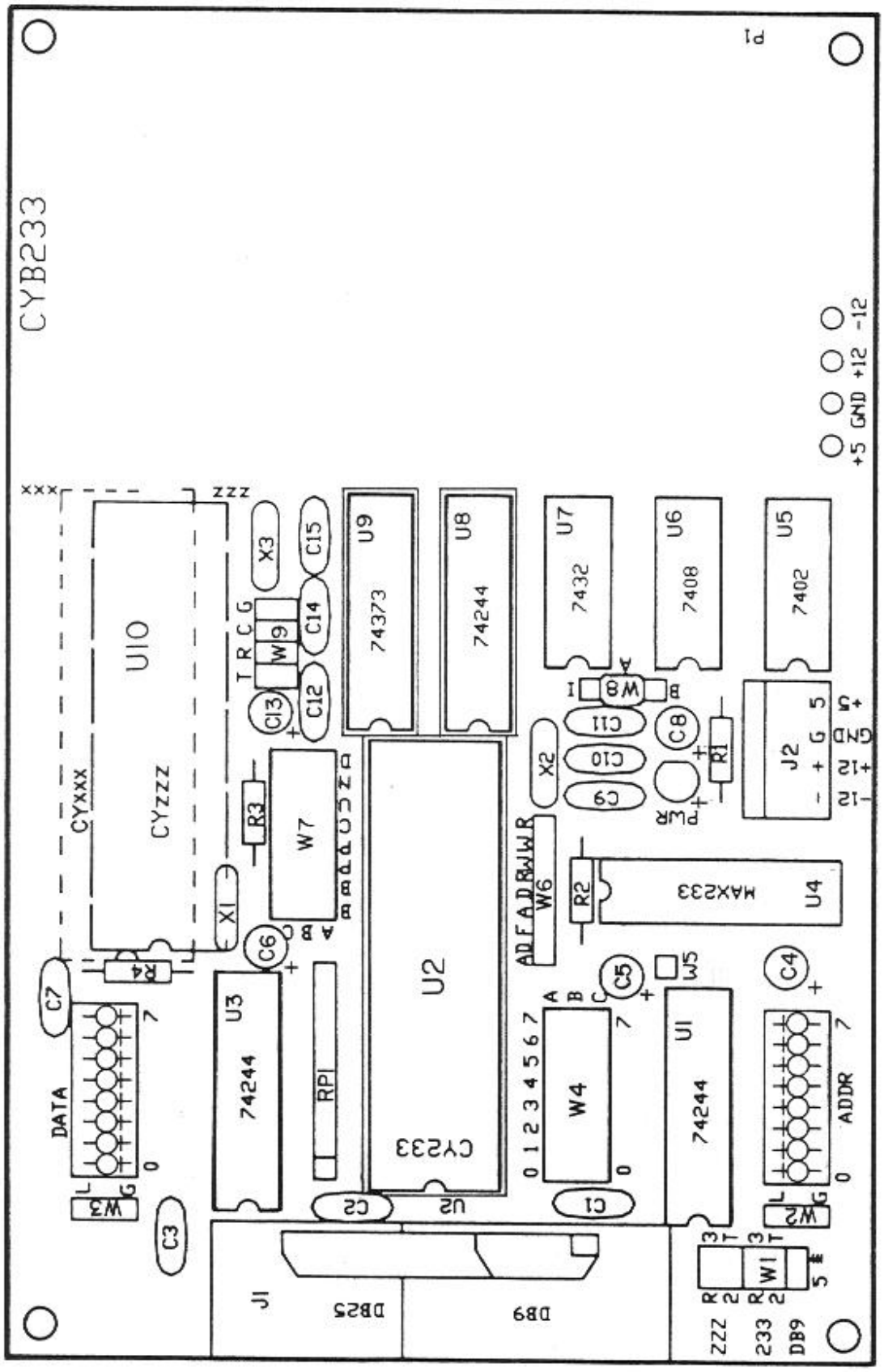
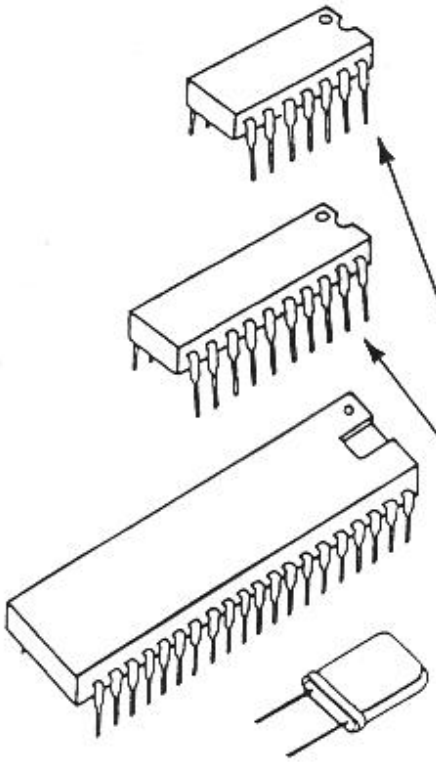


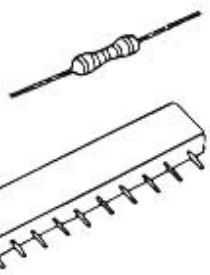
Figure 1. CYB233 Component Locations

Parts List

The following parts list describes the parts included with the CYB-233, and is organized according to kit selection, CYB-233 Board (C), Target Option (T) or PROTO-51 (P). Check the kit to be sure it is complete. The novice assembler may also use this opportunity to become more familiar with the various types of components supplied. NOTE: DO NOT REMOVE INTEGRATED CIRCUITS FROM THE CONDUCTIVE FOAM UNTIL READY TO USE.

CYB-233 Board (C)



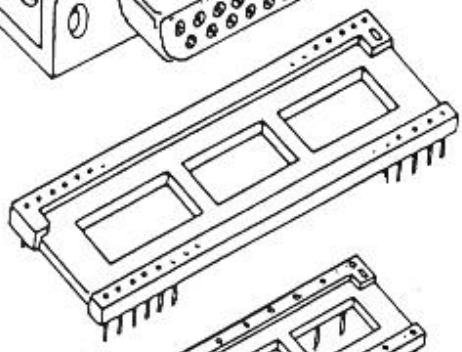


QTY	PART #	DESCRIPTION
[] 1	CYB233PWB	Printed Wiring Board
[] 1	CYB233Man	Assembly Instruction Manual
[] 1	7402	Quad 2 input NOR gate
[] 1	7408	Quad 2 input AND gate
[] 1	7432	Quad 2 input OR gate
[] 1	MAX233	RS-232 driver/receiver
[] 3	74LS244	Octal Tristate Buffer
[] 1	74LS373	Octal Latch
[] 1	CY233	Serial/Parallel Network Controller
[] 1	MP110	11 MHz Crystal
[] 5	TCD103M	0.01uF 50V ceramic disc capacitor
[] 2	CCD330	33pF ceramic disc capacitor
[] 1	513D475M063JA4	4.7uF 63V single-ended electrolytic capacitor
[] 2	513D226M025JA4	22uF 25V single-ended electrolytic capacitor
[] 1	R180 BRN-GRY-BRN-gld	180 ohm 1/4 Watt Resistor
[] 1	R10K BRN-BLK-ORG-gld	10K ohm 1/4 Watt Resistor
[] 1	CSC10A-01-10K	10K ohm Resistor Pak 10 pin SIP

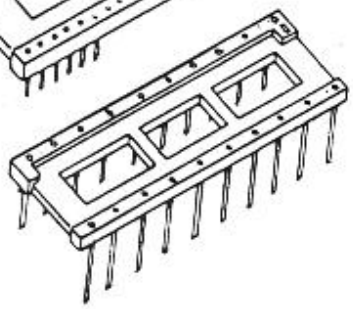
[] 1 114R Red LED. T1 3/4 Case

[] 16 HLMP-6600 Small LED

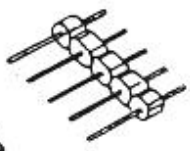
[] 1 DBP-25SCA
25 pin RS-232-C connector



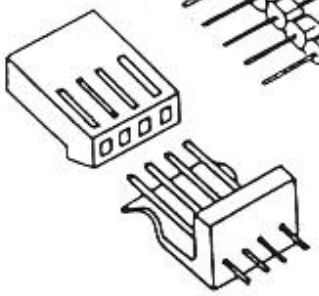
[] 1 440-AG49D
40 pin low profile IC socket



[] 2 520-AG11F
20 pin wire wrap socket



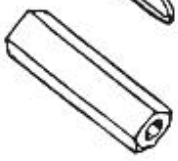
[] 2-1/3 CA-S36 SP100-230-430
84 headers, solder tail (strips)



[] 1 09-50-3041 4 pin housing, .156 centers,
with locking ramp

[] 1 09-65-1041 4 pin polarized Header,
.156 centers, .045 round post

[] 4 08-50-0106 Crimp pins for above housing



[] 4 4309 Hex Nylon threaded spacer,
.750" 4-40

[] 4 2501 Nylon Screw, binding head,
4-40 x 3/8

Note: Certain items may have other values or part numbers substituted for those indicated. These will not affect performance of your kit.

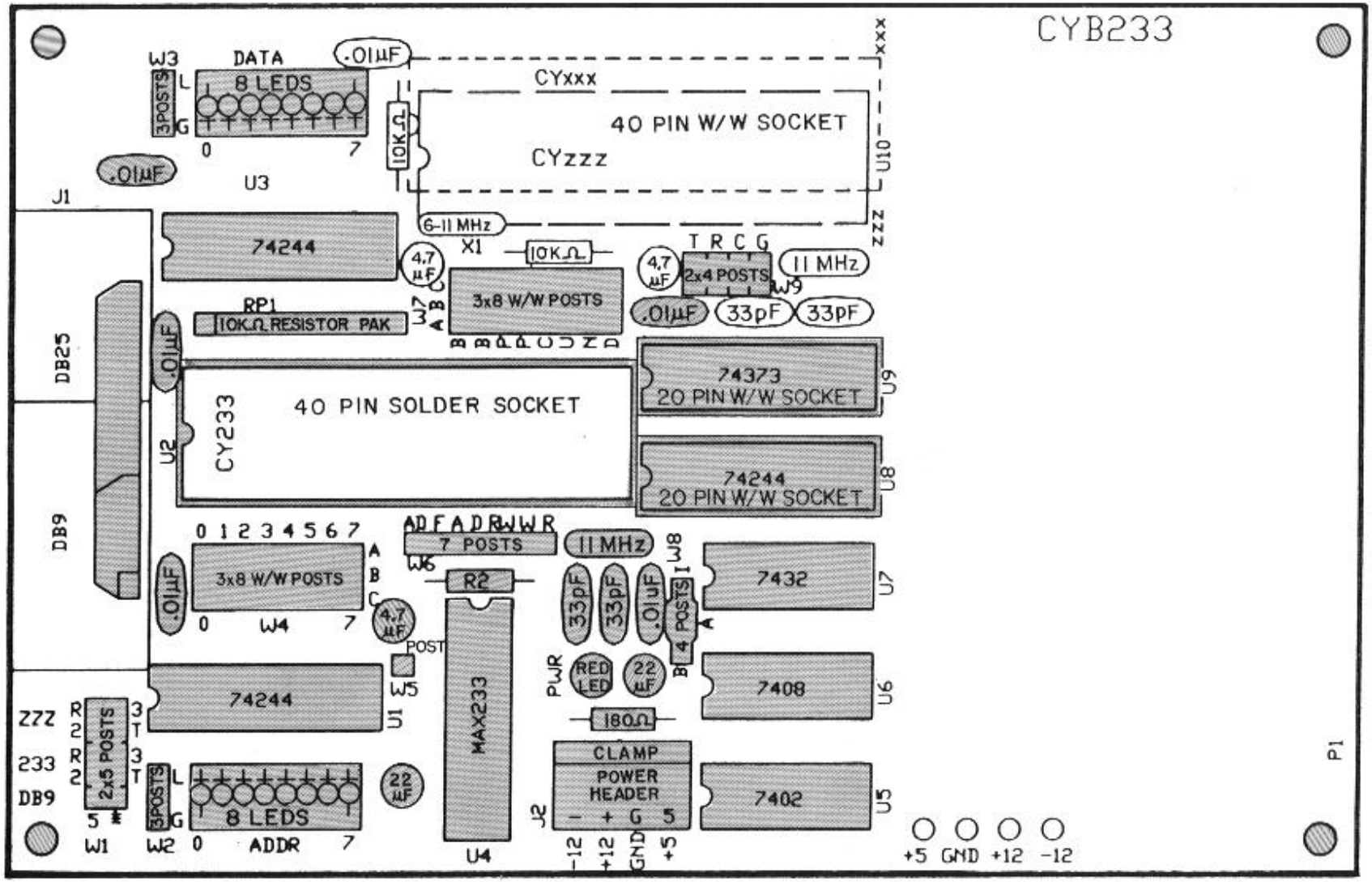


Figure 2. CYB233 Component Values

CYB-233 Board (C)

Target Option (T)

QTY	PART #	DESCRIPTION
[] 1	540-AG11F	40 pin wire wrap socket
[] 1	MP110	11 MHz Crystal (Optionally 6 MHz)
[] 1	TCD103M	0.01uF 50V ceramic disc capacitor
[] 1	513D475M063JA4	4.7uF 63V single-ended electrolytic capacitor
[] 1	R10K BRN-BLK-ORG-gld	10Kohm 1/4 Watt Resistor
[] 2	CCD330	33pF ceramic disc capacitor (Only in 8051 Target Option)

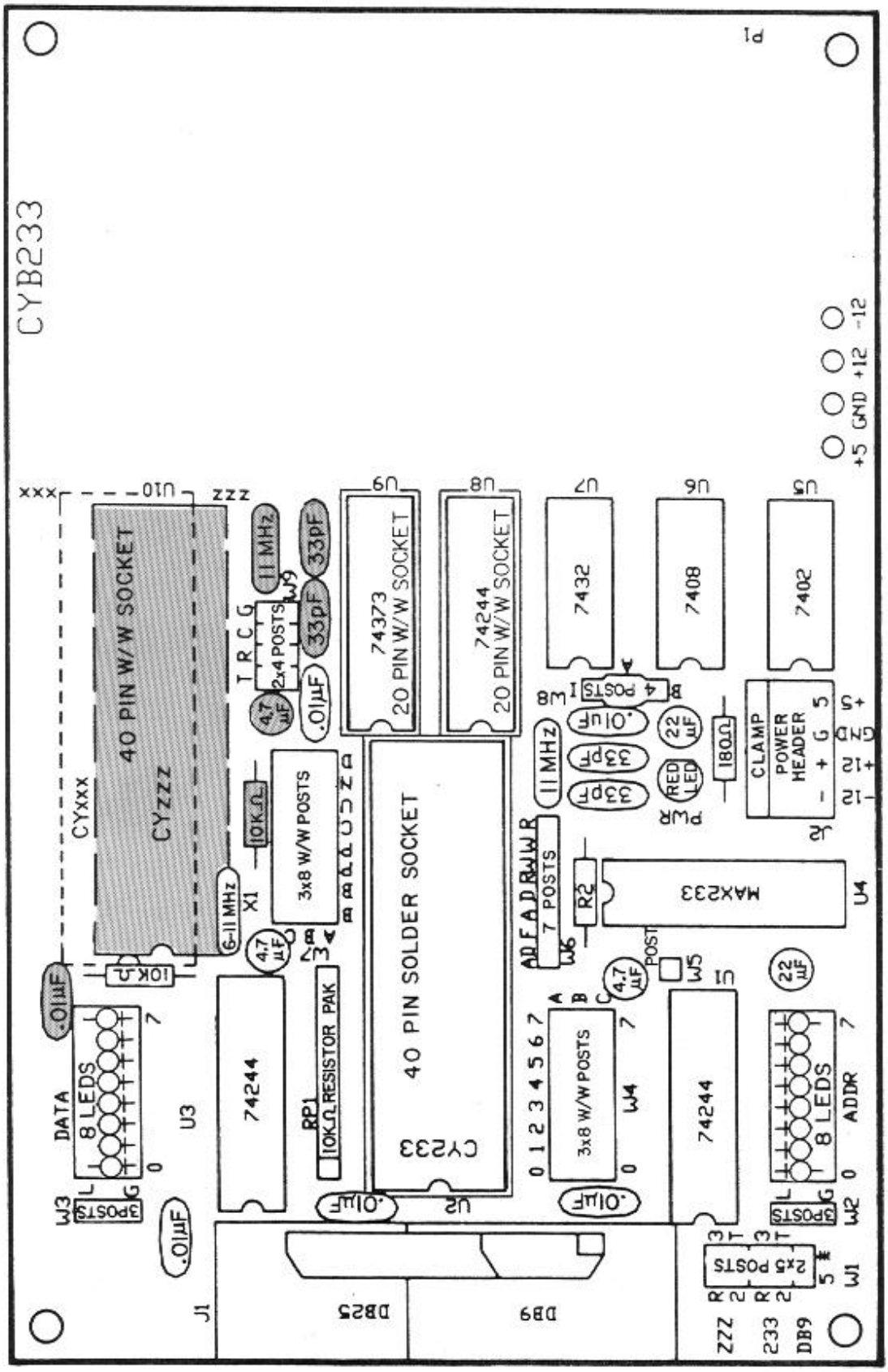
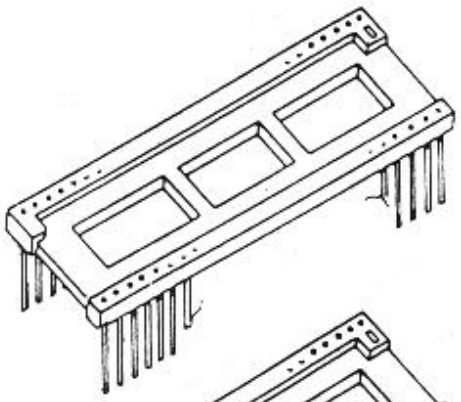


Figure 3. CYB233 Component Values

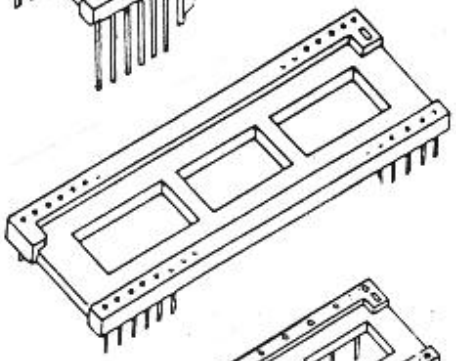
Target Option (T)

PROTO-51 (P)

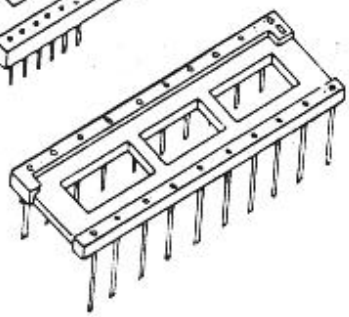
QTY	PART #	DESCRIPTION
[] 1	CYB233PWB	Printed Wiring Board
[] 1	CYB233Man	Assembly Instruction Manual
[] 1	MAX233	RS-232 driver/receiver
[] 2	74LS244	Octal Tristate Buffer
[] 1	74LS373	Octal Latch
[] 2	MP110	11 MHz Crystal
[] 5	TCD103M	0.01uF 50V ceramic disc capacitor
[] 4	CCD330	33pF ceramic disc capacitor
[] 2	513D475M063JA4	4.7uF 63V single-ended electrolytic capacitor
[] 2	513D226M025JA4	22uF 25V single-ended electrolytic capacitor
[] 1	R180 BRN-GRY-BRN-gld	180 ohm 1/4 Watt Resistor
[] 2	R10K BRN-BLK-ORG-gld	10K ohm 1/4 Watt Resistor
[] 1	CSC10A-01-10K	10K ohm Resistor Pak 10 pin SIP
[] 1	114R	Red LED. T1 3/4 Case
[] 16	HLMP-6600	Small LED
[] 1	DBP-25SCA	25 pin RS-232-C connector



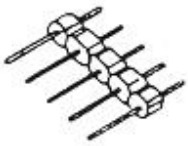
[] 1 540-AG11F
40 pin wire wrap socket



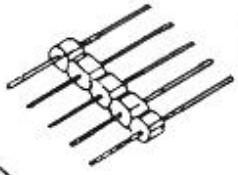
[] 1 440-AG49D
40 pin low profile IC socket



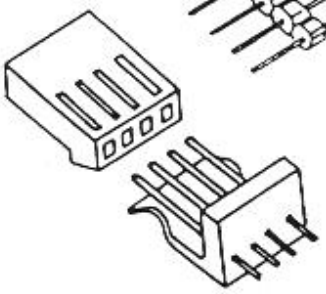
[] 1 520-AG11F
20 pin wire wrap socket



[] 1/2 CA-S36 SP100-230-430
17 headers, solder tail
(strips of 36)



[] 1 CA-S36 SP100-230-930
31 headers, wire wrap tail
(strips of 36)



[] 1 09-50-3041 4 pin housing, .156 centers,
with locking ramp

[] 1 09-65-1041 4 pin polarized Header,
.156 centers, .045 round post

[] 4 08-50-0106 Crimp pins for above housing

[] 4 4309 Hex Nylon threaded spacer,
.750" 4-40 (Used as feet
on four corners of board)

[] 4 2501 Nylon Screw, binding head,
4-40 x 3/8 (For above spacers)

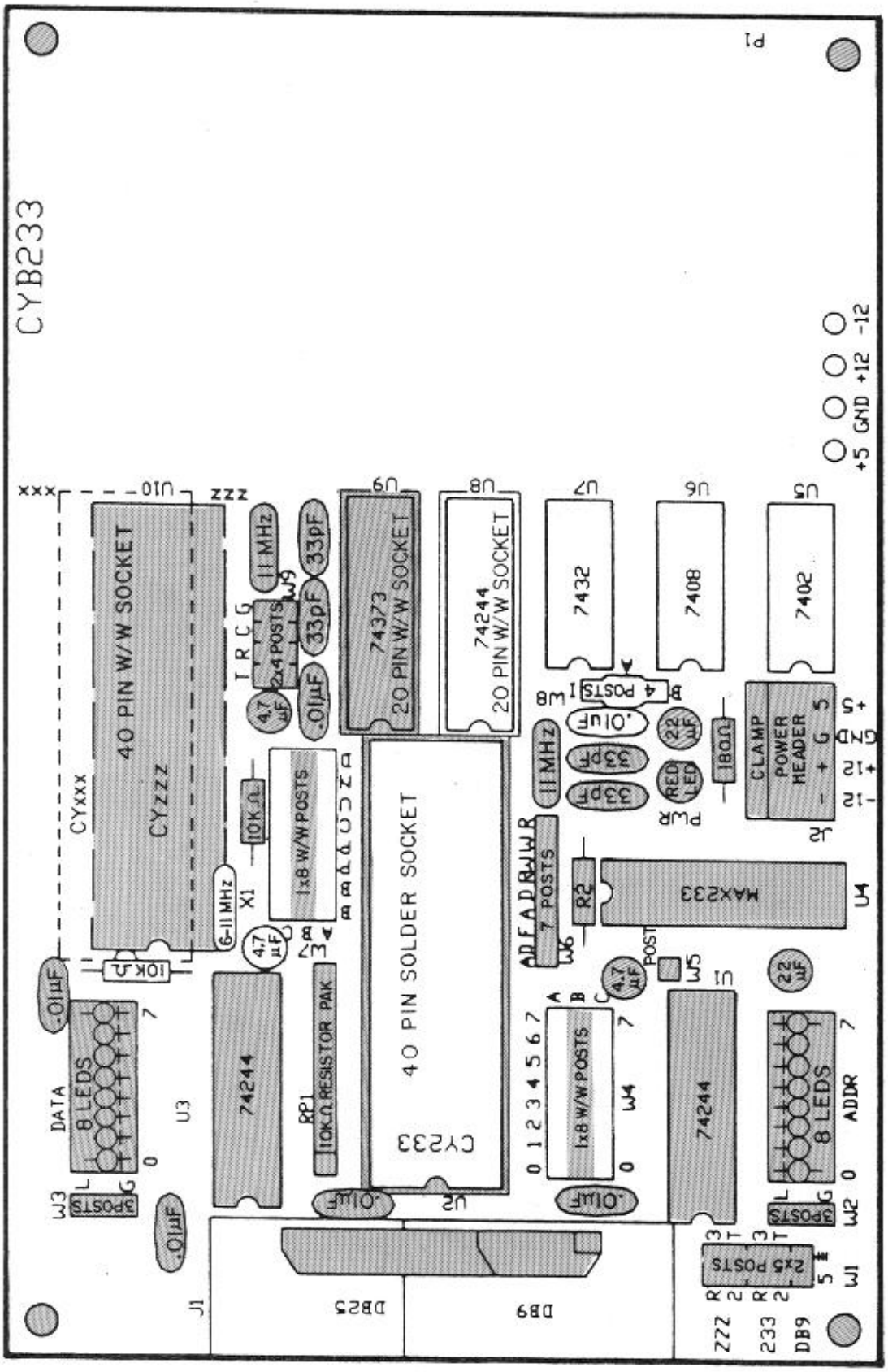


Figure 4. CYB233 Component Values

PROTO-51 (P)

Assembly Procedure

The CYB-233 will be assembled in stages, with similar components installed at the same time. Soldering technique is very important when assembling a PC board. The soldering iron tip should be kept reasonably clean during soldering. This usually requires that it be wiped on a damp sponge after every few components. While the iron is not being used, a slight residue of solder on the tip will keep it from overheating, prolonging the tip life. Components should be installed so they rest fairly close to the board surface on the component side (front side, with silk screened printing). Components with long leads (resistors, capacitors) should have the leads cut before soldering. Leads should extend between 1/8 and 1/4 inch from the solder side (back side) of the board.

To solder a component in place, install the component at the proper location on the board. This may require bending the leads of some parts. All components are installed from the component side of the board. Be sure that all leads show through the solder side before soldering, especially when installing the integrated circuits. If required, cut the leads from the solder side of the board. The component is now ready to solder in place. Heat the component lead and the board pad to which it will be soldered for one to two seconds, from the solder side. Then, with the iron still in place, apply some solder to the area. Keep the iron in place until the solder flows around the component lead and pad, then remove. The whole procedure should take from two to five seconds, depending on the size of the component and the board area to which it is attached. When properly done, solder will flow through the hole in which the component is placed, and be visible from the component side. CAUTION: DO NOT OVERHEAT THE COMPONENT DURING SOLDERING. THIS MAY DAMAGE THE PART. Also, if the parts are not heated enough, cold solder joints and connections will result. A properly soldered component will have the solder firmly and smoothly melted around both the component lead and over the pad to which it is attached. Solder should flow through the mounting hole and be visible from the component side, but the part should not be overheated and damaged in the process.

The following pages give a step-by-step procedure for assembly of the CYB-233, including photographs of the completed CYB-233 Board and the PROTO-51 at the end of the section.

A code has been used to assist you in assembling the board of your choice. The best method is to first circle in color all the boxes ([]) that are preceeded by the code or codes that apply to the board and/or options you are building. Then follow the circled instructions step by step, putting a check mark in each box as you complete each step. The codes are as follows:

C - CYB-233 Board

T - CYB-233 Target Option
(for CYxxx, 8049 or 8051 target)

P - PROTO-51 Board

Resistors

The resistors will be the first components installed on the CYB-233. To install each resistor, the leads must be bent and cut to fit. Resistors are installed as follows:

C,P [] Install the 180 ohm resistor (BRN-GRY-BRN-gld) in location R1.

C,P [] Install a 10K ohm resistor (BRN-BLK-ORG-gld) in location R2.

T [] In the Target Option, install a 10K ohm resistor in location R3 if you are using an 8051 or install the 10K ohm resistor in location R4 if you are using an 8049 or CYxxx.

P [] In the PROTO-51, install a 10K ohm resistor in location R3.

Capacitors

Capacitors will be installed next. All capacitors should fit without bending the leads. Leads should be trimmed to the proper length before soldering. The electrolytic capacitors are polarized and must be installed with the proper orientation. All polarized capacitors are noted by a "+" on the board and a "+" or "-" on the capacitor body. The capacitors are installed as follows:

C,P [] Install the 22 uF electrolytic capacitors in C4,C8.
C [] Install the 4.7 uF electrolytic cap in C5.
P [] In the PROTO-51, install the 4.7 uF electrolytic caps in C5 and C13.
C,P [] Install the 33 pF ceramic discs in C9,C10.
C [] Install the 0.01 uF ceramic discs in locations C1,C2,C3, C11, C12.
T [] In the Target Option, install a 0.01 uF ceramic disc in location C7 if you are using an 8051, 8049, or CYxxx.
P [] In the PROTO-51, install the 0.01 uF ceramic discs in locations C1, C2, C3, C7 and C12.
T [] In the Target Option, install the 4.7 uF electrolytic cap in C13 if you are using an 8051 or install the 4.7 uF electrolytic cap in C6 if you are using an 8049 or CYxxx.
T,P [] For an 8051 Target or for the PROTO-51, install the 33 pF ceramic discs in locations C14 and C15.

Diodes

There is one light emitting diode (LED) indicating power is on the CYB-233. The LEDs are polarized and must be installed properly to work. A square pad on the CYB-233 indicates the negative (cathode) side of the power diode and corresponds to the flat side of the LED package, while the round pad indicates the positive supply (anode) side of the diode. The silk screen also has a flat section that matches the LED package. There are 16 miniature LEDs to be arranged in rows of 8 each. The cathode side is indicated by a bar across the lead. This cathode side should face into the board, while the other lead faces out and is connected to +5 volts.

C,P [] Install the large LED in location PWR.

C,P [] Install 8 small LEDs in location DATA.
C,P [] Install 8 small LEDs in location ADDR.

Crystals

There are two crystals on the CYB-233. An 11 MHz is provided for the CY233 and the target option is provided at 11 MHz, but your target application may require a different value, such as 6 MHz. The crystals are installed standing up, to minimize occupied board space.

C [] Install an 11 MHz crystal in location X2.
T [] Install an 11 MHz crystal in X3 for the 8051 or in X1 for an 8049 or CYxxx.
P [] Install an 11 MHz crystal in X2 and X3.

Strip Line Headers

The wire wrap posts are provided in single-row strips which are broken into the appropriate lengths and soldered into the jumper pads, designated as W1 to W9. Jumpers are then wired together by wrapping a short piece of wire wrap wire between the appropriate posts or by using shorting plugs, as discussed later in this manual (see Jumper Functions). Solder tail posts, which have one section slightly longer than the other, are used on both the CYB-233 and the PROTO-51 boards. The solder tail posts should be inserted with the short, solder tails protruding through the board to the solder side. This leaves the slightly longer section of the post available on the component side for attaching the jumper wires. Wire wrap posts , which have one section much longer than the other, are also used on the PROTO-51 board. These posts should be inserted with the longer wire wrap tails protruding through the solder side of the board. Connections from these jumpers will be wired from the solder side.

C [] Install solder tail posts in jumpers W1 to W9.
P [] Install solder tail posts in jumpers W1, W2, W3 and W5. Install wire wrap posts in W6, W9 and the center row B of W4 and W7.

Connectors

The CYB-233 is supplied with a female RS-232 board connector and a power connector. The header half of the power connector is installed on the board, and the connector housing and crimp pins are for fabricating a connection to your power supply.

C,P [] Install the DB25 RS232 connector in location J1.
NOTE: You may optionally install a DB9 connecter at J1.
C,P [] Install the 4 pin power header in location J2. The polarizing clip should be oriented next to the R1 resistor. The connection pins should face the edge of the board.

Integrated Circuit Sockets

A solder tail socket is provided for the CY233. Two 20 pin wire wrap sockets are provided for accessing the data bus on the 74LS373 and adjacent 74LS244. An optional 40 pin wire wrap socket may be used in the Target location. The sockets have a notch or other marking to designate the pin 1 side, and should be installed to match the patterns of the CYB-233 silkscreen.

C,P [] Install the 40 pin solder tail socket in location U2 for the CY233.
T [] Install the 40 pin wire wrap socket in location U10. If using an 8049 or CYxxx, the socket should match the xxx pattern nearer to the edge of the board. If using an 8051, the socket should match the zzz pattern closer to the xtal.
P [] Install the 40 pin wire wrap socket in location U10, matching the zzz pattern closer to the xtal.
C [] Install the 20 pin wire wrap sockets in locations U8,U9.
P [] Install the 20 pin wire wrap socket in location U9.

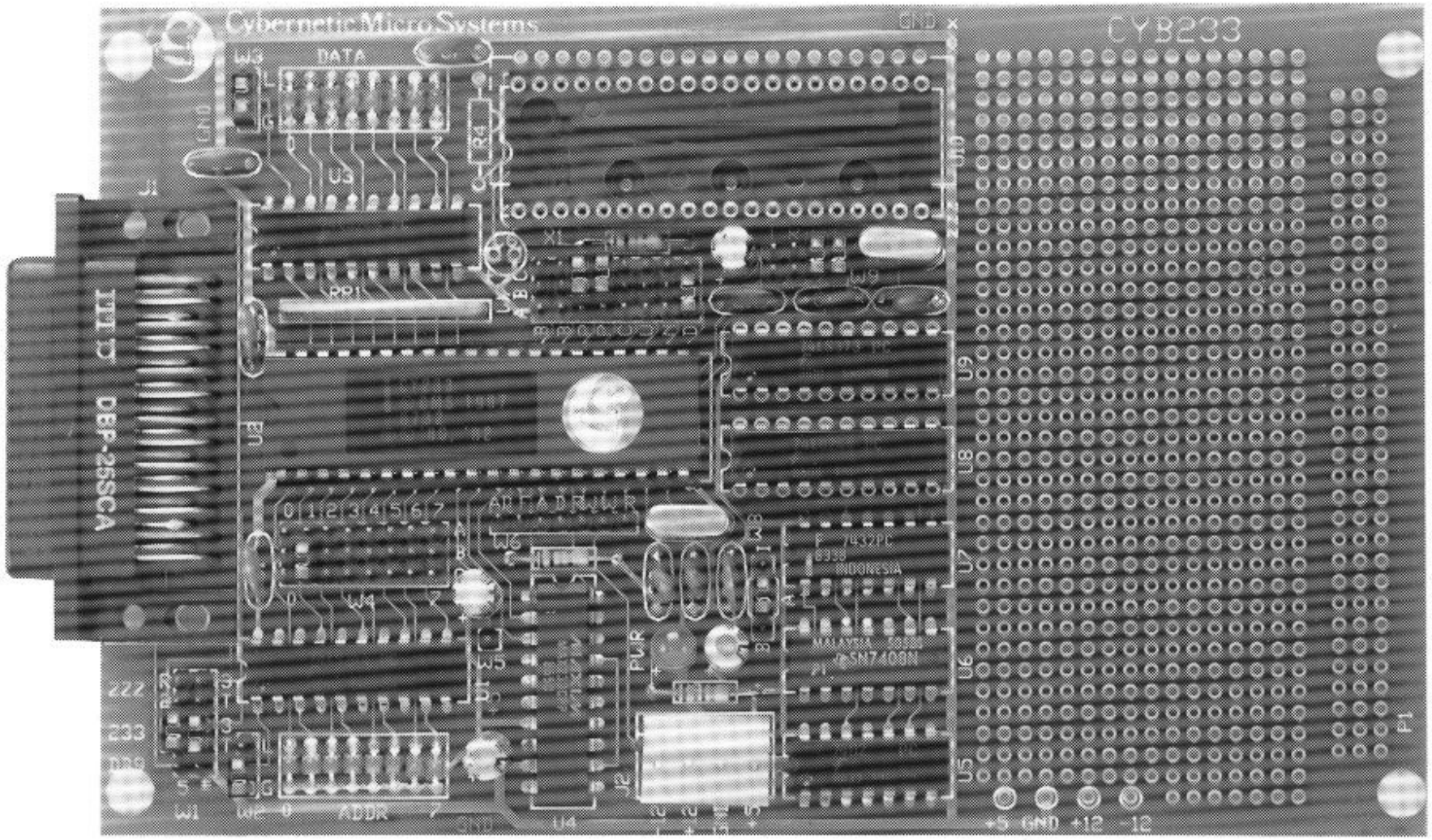
Integrated Circuits

The Integrated Circuits (ICs) are the last components to be installed. They are also the most sensitive to damage from static electricity and overheating during soldering. When handling the ICs, touch the pins as little as possible. Keep them in the conductive foam until ready to install. In order to fit the pins into the hole patterns, it may be necessary to bend them in slightly, so they are perpendicular to the IC package. This is most easily accomplished by laying the IC on its side on the work surface and pushing on the body until the pins are straight. This procedure should be repeated for each side. The ICs must be properly oriented when installed. Any part installed backwards will be damaged when power is applied to the CYB-233. Each IC package has a notch or dot on one end, which corresponds to the pin 1 side of the IC, and should be installed to match the notched pattern of the silk screen. Before soldering the IC in place, be sure every pin is through the proper hole in the pattern. It is very difficult to remove and correct a pin problem once the IC is soldered. Finally, during soldering, heat the pins just enough to make a good solder bond. If the ICs are overheated during soldering, they may be damaged. Be sure to solder each pin and be careful to not leave any solder bridges between the pins.

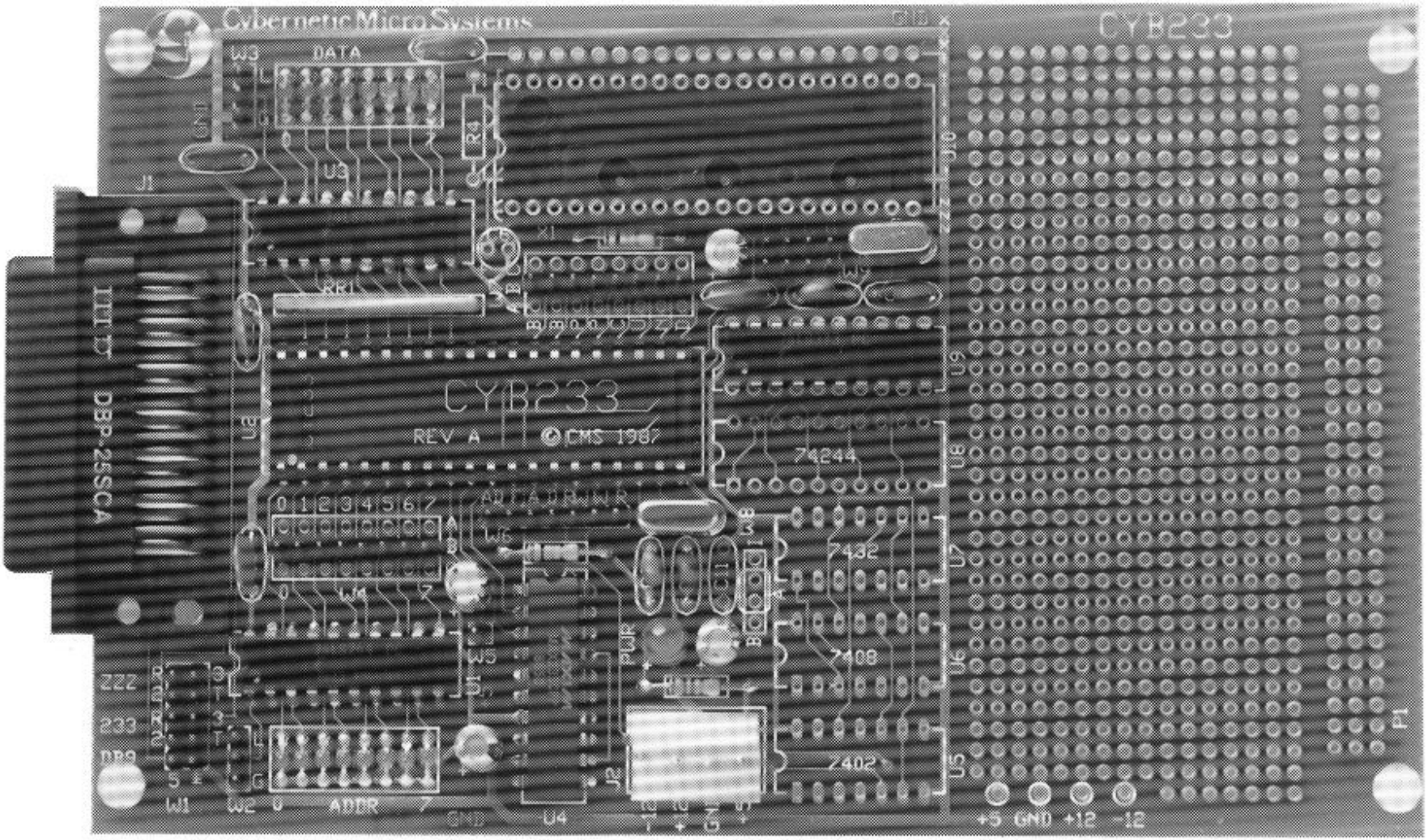
C,P [] Install two 74LS244s in locations U1 and U3.
C [] Insert a 74LS244 into socket U8.
C,P [] Install the 74LS373 in location U9.
C,P [] Install the MAX233 in location U4.
C [] Install the 7402 in Location U5.
C [] Install the 7408 in location U6.
C [] Install the 7432 in location U7.
C,P [] Install the Resistor Pak in location RP1.

When all the parts have been installed, the board should be cleaned to remove the solder flux residue which results from the soldering operation. It is only necessary to clean the solder side of the board. The board should be cleaned with rubbing alcohol, which does not leave a residue. It is often helpful to use a toothbrush or similar device to help scrub the board. Once the flux has been removed, the solder side may be scrubbed with a mild soap and water solution, then rinsed with clean water. Do not immerse the board, as this may damage some components. Rather, rinse the solder side of the board gently under running water. The board should be reasonably clean and free of flux when this operation is complete. Dry the board gently to remove all water. Do not apply power to the board until it is completely dry.

This completes the main assembly procedure. The following sections explain the theory of operation, which must be understood to determine the proper jumper connections. Then the jumper options are explained and the connector pinouts are listed. This will allow the user to make the cables necessary to connect the board to the local computer, the power supply, and other parts of the system, as required.



Assembled CYB-233 with Target Option



Assembled PROTO-51

CYB-233 Theory of Operation

The CYB-233 is a relatively simple design. Major sections of the board are the CY233, the RS-232 serial interface, the parallel address decoding logic, the eight TTL inputs and outputs, and the CYxxx target device socket. The schematic for the CYB-233 is included in this section and is the basis for this discussion.

The CY233

The CY233 is the major component of the CYB-233 board. It is described in detail in the CY233 User Manual, so the information will not be repeated here. Note that the CYB-233 can use the device in the Network mode, with address support and message based serial communications, or in the UART mode, with simple serial to parallel data transfers. The CYB-233-LAN board, another board design, is available from Cybernetics for using the CY233 in the special LAN (Local Area Network) mode.

Support circuits for the CY233 include an 11 MHz crystal circuit, for generating basic timing and baud rate functions, and a 4.7 uF capacitor and resistor, which provide an automatic reset when power is applied to the board. The Restart signal is also available at a jumper post, for connection to a switch or other reset logic.

The eight CY233 mode control signals are brought to jumper area W7, where they may be left open (floating), tied to +5 volts, or tied to ground. These connections determine the basic operating characteristics of the CY233, and should be connected as required by the application. See Jumper Functions for details.

The CY233 data bus connects the CY233 to the local parallel logic on the board. Included in the design are a 74LS244 TTL level input buffer, a 74LS373 TTL level output latch, the CYxxx socket for Cybernetic intelligent controller devices, and a pull-up resistor pack. In addition, eight LEDs are buffered by another 74LS244, and indicate signal levels on the bus. Each LED will turn on when the corresponding data bus line is low. To minimize power consumption, the driver output for the LEDs may be controlled by jumper settings on W2 and W3.

The address lines of the CY233 are connected to the address decoding logic, which is described later in this section. Another group of eight LEDs are buffered by a 74LS244, and indicate signal levels on the address lines. Each LED turns on when the corresponding address line is low. The driver outputs for this group of LEDs may also be controlled through jumper settings, when minimum power consumption is desired.

Finally, the data transfer control signals are brought to their own jumper area, for connection to the parallel logic. Some signals are also used by the address decoding logic.

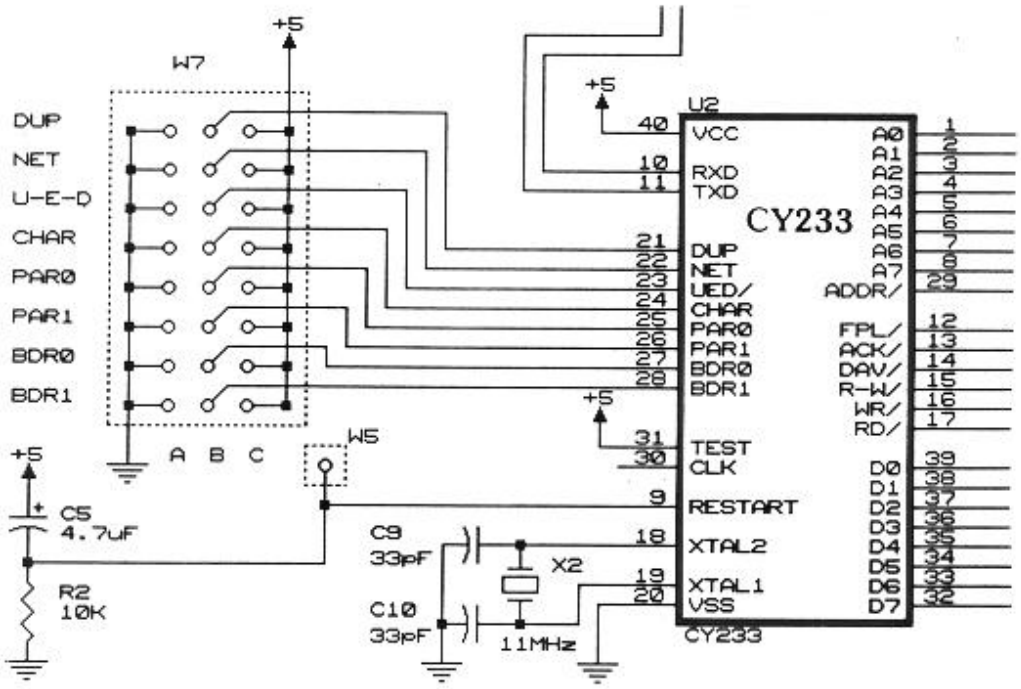


Figure 5. The CY233 portion of the CYB-233.

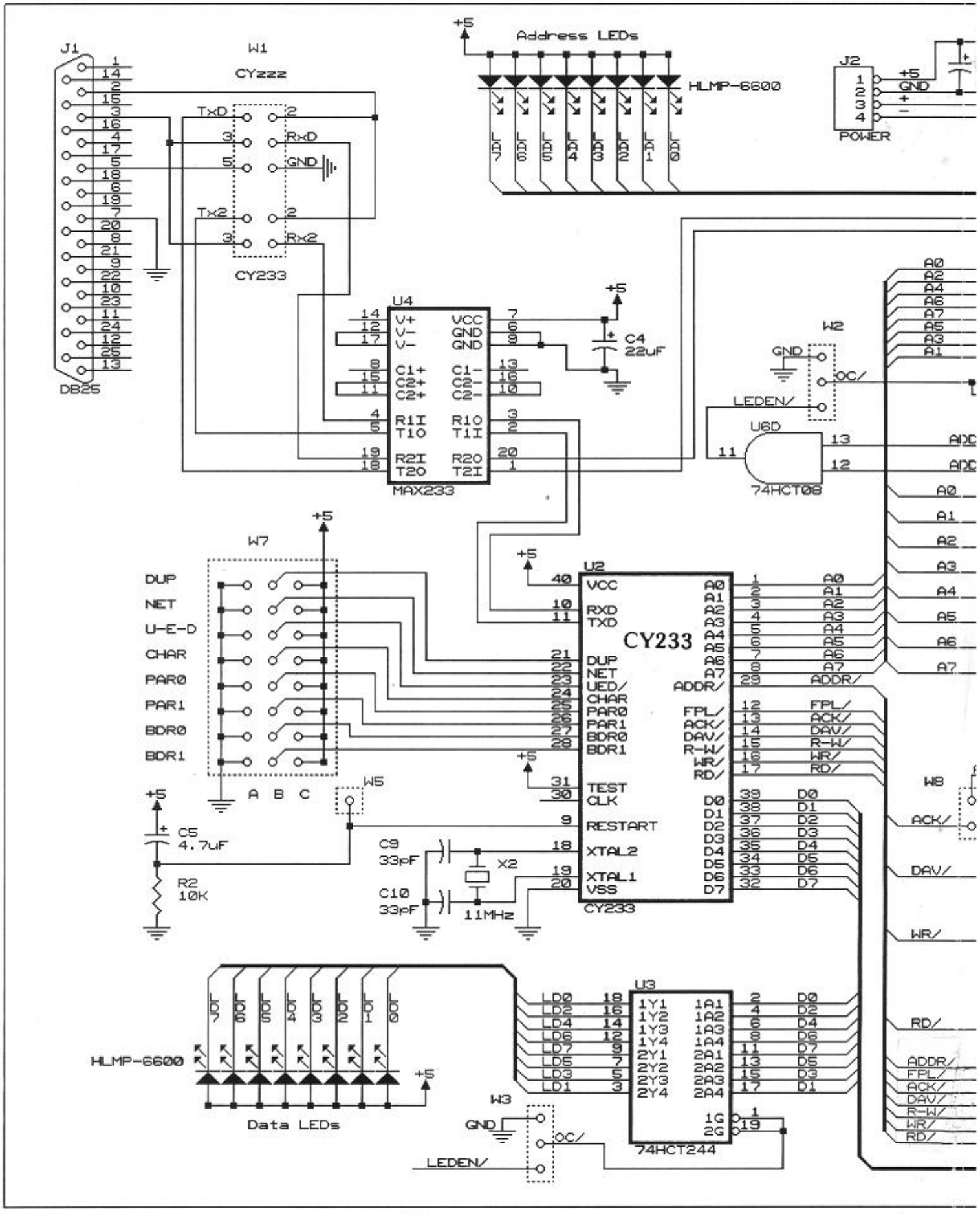
The Serial Driver/Receiver

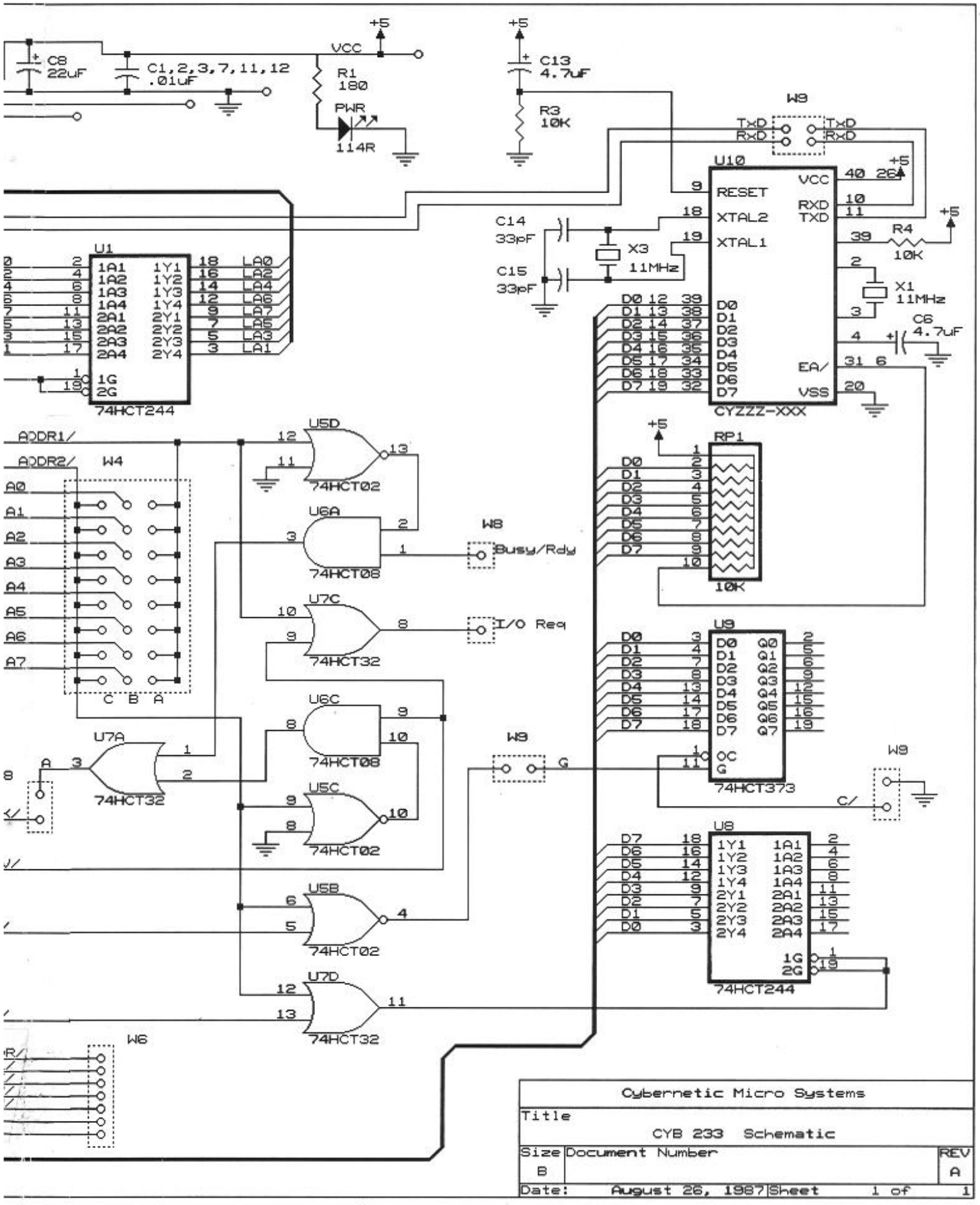
The CY233 serial data lines connect to the RS-232 interface, consisting of a driver/receiver device, jumper section, and DB-25 connector. The signals from the serial lines of the CY233 are all at TTL levels, so the drivers and receivers are required to translate the TTL levels of the CY233 into the RS-232-C levels required between boards and the host controller system.

A MAX233 integrated circuit implements the level translation in one chip. It contains two drivers, two receivers, and a voltage converter for generating +/- 10 volts from the single +5 volt supply input.

One driver and one receiver are used for the network connection with the CY233, while the other driver and receiver are available for use by the CYxxx device, if it can support direct serial connections of its own.

Note that CY233 communications require only transmitted data and received data. Modem status signals are not needed or supported by the design. If the local system requires additional connections, these must be explicitly wired into the local DB25 connector. V+ and V- supply connections from the MAX233 could be used to generate any additional signals required.


J1
DB25
W1
CYzzz
TxD
RxD
GND
Tx2
Rx2
CY233
+5
Address LEDs
HLMP-6600
J2
POWER
U4
MAX233
C4
22uF
W2
GND
OC/
LEDEN/
U6D
74HCT08
A0
A1
A2
A3
A4
A5
A6
A7
W7
DUP
NET
U-E-D
CHAR
PAR0
PAR1
BDR0
BDR1
A B C
U2
CY233
VCC
RXD
TXD
DUP
NET
UED/
CHAR
PAR0
PAR1
BDR0
BDR1
TEST
CLK
RESTART
XTAL2
XTAL1
VSS
ADDR/
FPL/
ACK/
DAV/
R-W/
WR/
RD/
D0
D1
D2
D3
D4
D5
D6
D7
W5
C5
4.7uF
R2
10K
C9
33pF
C10
33pF
X2
11MHz
W8
HLMP-6600
Data LEDs
U3
74HCT244
W3
LEDEN/


C8
22uF
C1,2,3,7,11,12
.01uF
VCC
R1
180
PWR
114R
+5
C13
4.7uF
R3
10K
W9
TxD
RxD
U10
RESET
XTAL2
XTAL1
C14
33pF
C15
33pF
X3
11MHz
RXD
TXD
R4
10K
X1
11MHz
C6
4.7uF
EA/
VSS
CYZZZ-XXX
U1
1A1
1A2
1A3
1A4
2A1
2A2
2A3
2A4
1G
2G
74HCT244
ADDR1/
ADDR2/
W4
A0
A1
A2
A3
A4
A5
A6
A7
C B A
U5D
74HCT02
U6A
74HCT08
W8
Busy/Rdy
U7C
74HCT32
I/O Req
U6C
74HCT08
U7A
74HCT32
U5C
74HCT02
W9
G
U5B
74HCT02
U7D
74HCT32
W6
RP1
10K
U9
OC
G
74HCT373
C/
U8
74HCT244
Cybernetic Micro Systems
Title
CYB 233 Schematic
Size
B
Document Number
REV
A
Date: August 26, 1987
Sheet 1 of 1

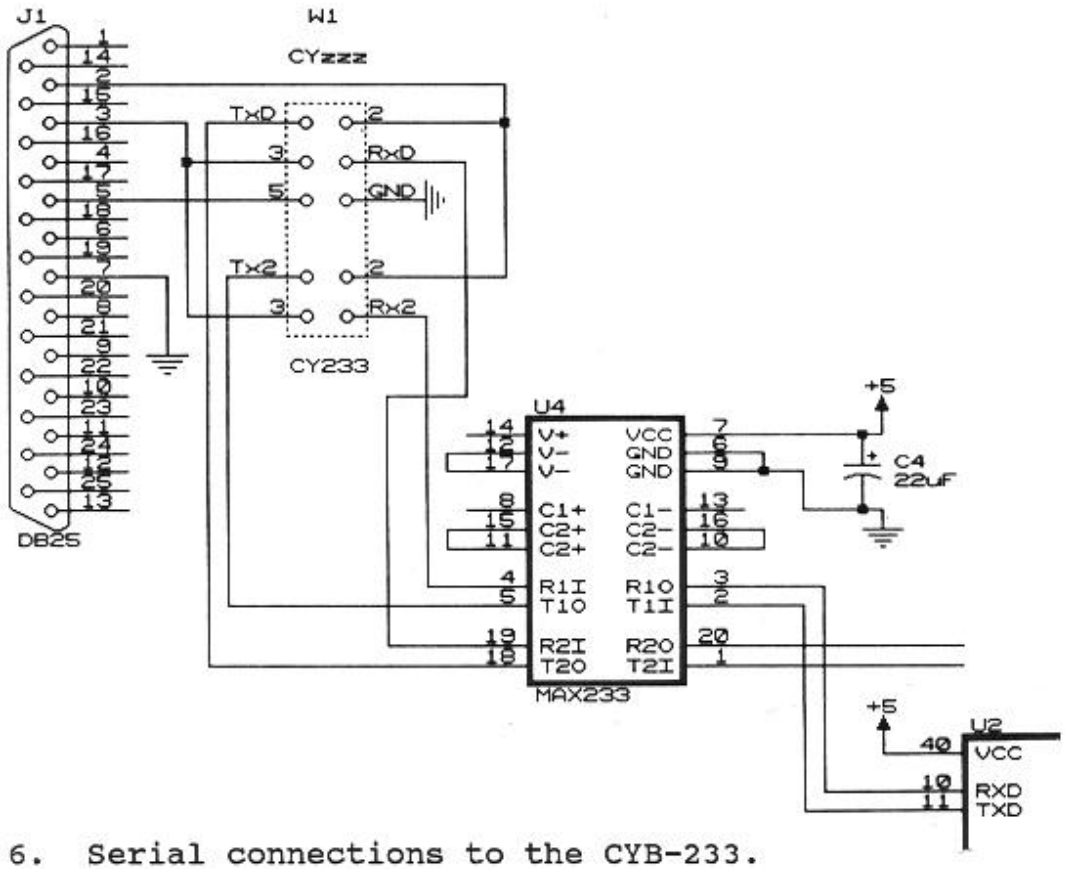


Figure 6. Serial connections to the CYB-233.

The serial drivers and receivers from the MAX233 are connected to jumper blocks, and through these blocks to the DB25 socket sight on the board. The W1 jumper block associated with the DB25 connector makes it easier to match the functions of the pins to those of any existing cables and systems. Received and transmitted data may be connected to either pin 2 or pin 3 of the DB25 connector, and signal ground is connected to pin 7. Note that a DB9 connector could be used in place of the DB25, if desired, by connecting pin 5 to ground on W1.

Address Decoding

The parallel device address decoding is implemented through jumper W4, and the 74LS02, 74LS08, and 74LS32 devices. The circuit is designed to function with the CY233 in the decoded address mode, where only one address line goes low at a time. This limits the possible addresses to eight, and with two addresses per board, it limits the number of boards in a network to four (if both addresses are used).

When larger networks are required, custom address decoding logic may be added between the CY233 address lines and the two decoded address signals, ADDR1/ and ADDR2/. In the decoded address mode, only one address line goes low at a time, so the CY233 automatically generates the individual decoded signals. In the

encoded address mode, all eight address lines are used to select one of 255 possible values, and the user supplied circuitry must compare these values for a desired address. When the desired address occurs, an active low signal should be generated, and used to drive the ADDR1/ or ADDR2/ lines.

With custom address decoding logic, up to 127 CYB-233 boards could be connected into one network, with each board supporting two device addresses. The functions of the remaining decoding logic would still be preserved in this scheme, but more boards could be addressed.

For the standard decoded address mode, the addressing logic starts at jumper W4. The middle row of the jumper block connects directly to the CY233 address lines, and to the address LED circuitry. All row C pins of W4 connect together, forming decoded address signal ADDR2/, while all row A pins connect together, and form signal ADDR1/. By connecting one of the CY233 address lines to row A, and another to row C, two specific addresses are selected.

Each of the two address selections controls a different data transfer mechanism between the CY233 and the parallel logic. ADDR1/ is used for handshake transfers, while ADDR2/ is used for strobed transfers.

When the ADDR1/ signal is low, it is gated with the CY233 DAV/ signal to provide a decoded handshake Data Available signal, labeled I/O Req on the schematic. This signal is normally connected to the CYxxx socket, since the Cybernetic intelligent controllers use a handshake data transfer. It could also be used with custom parallel logic that requires such a handshake.

A second signal, labeled Busy/Rdy, must be driven by the parallel logic to acknowledge when the transfer is complete. This signal is also gated with the ADDR1/ signal, and the combination drives the ACK/ line of the CY233. The Busy/Rdy signal is also supported by the CYxxx devices.

Other CY233 control signals, such as R-W/ and FPL/, may be connected directly from the CY233. These lines are involved in the data transfers, and may be needed by some parallel logic, but decoding is not required on them, since the actual transfers are always timed by DAV/ and ACK/.

The second form of data transfer uses the ADDR2/ signal. When this line is low, the CY233 strobe signals, RD/ and WR/ are gated to the 74LS244 and 74LS373 respectively. The decoding logic also enables a gated version of DAV/ to drive ACK/, producing an automatic handshake. This transfer uses only the strobe signals to actually perform the transfer, since the 244 and 373 devices are fast enough to work without the handshake. With the automatic handshake, the CY233 will transfer data as fast as possible, since the transfer acknowledge is returned immediately by the decoding logic.

The decoded RD/ and WR/ strobe signals associated with ADDR2/, are directly connected to the 74LS244 and 74LS373. The 244 device is used to buffer TTL level input signals, while the 373 device latches TTL level outputs.

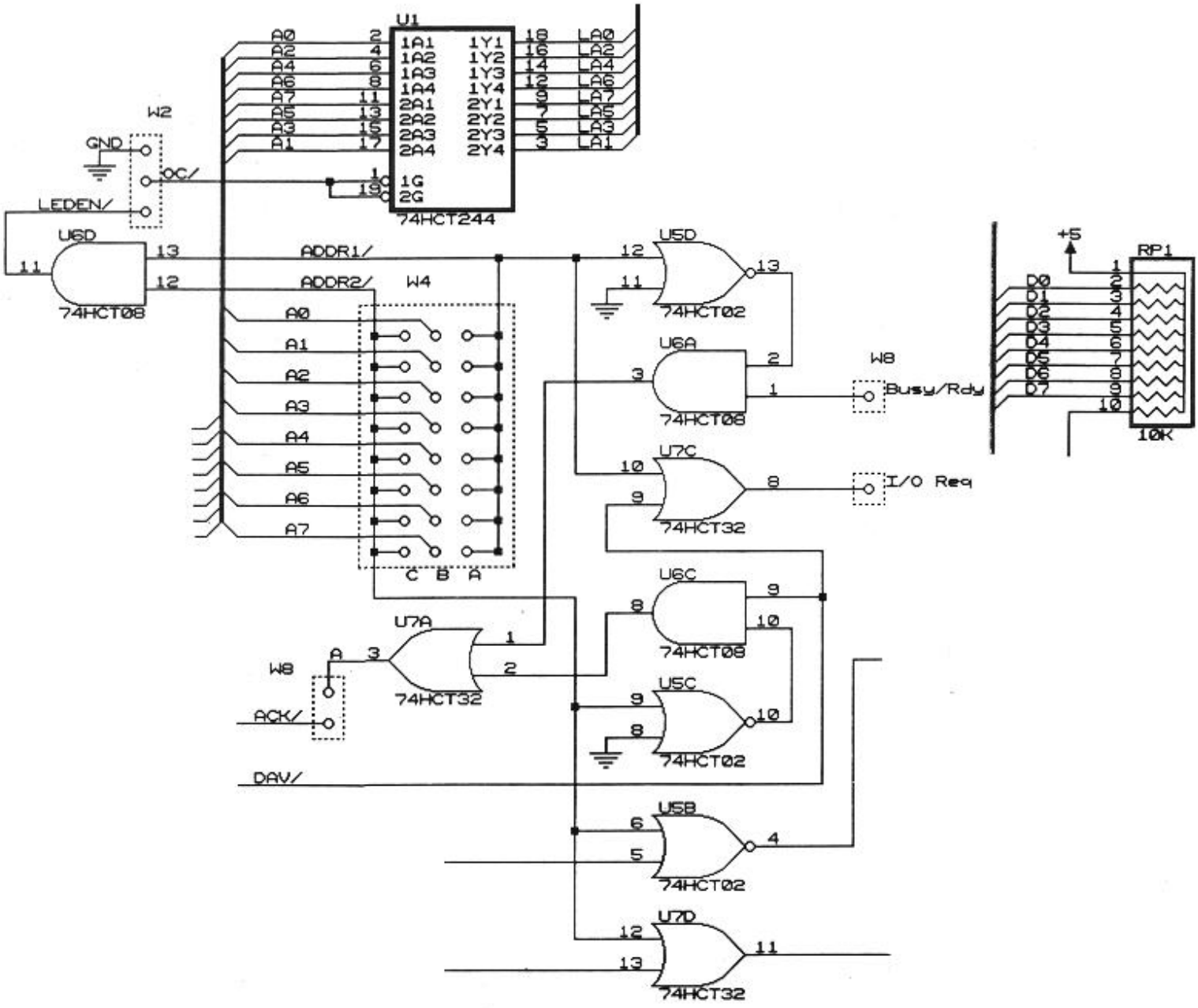


Figure 7. CYB-233 Address decoding logic.

TTL Level I/O

TTL type I/O signals are supported on the CYB-233 through one octal latch, for outputs, and one octal buffer, for inputs. The octal latch is a 74LS373 device, and data bytes are transferred from the CY233 to the 373 by write operations, with the selected address driving the ADDR2/ line low. The 74LS373 will always latch the last value written to it. This value is made available at the 373 outputs, for use in any custom logic on the board.

The 74LS373 has tri-state type outputs, with pairs C and G of jumper W9 connected to always enable them. If they must be selectively controlled by other logic, jumper W9 should be left open, with the special logic driving the 373 output control as required.

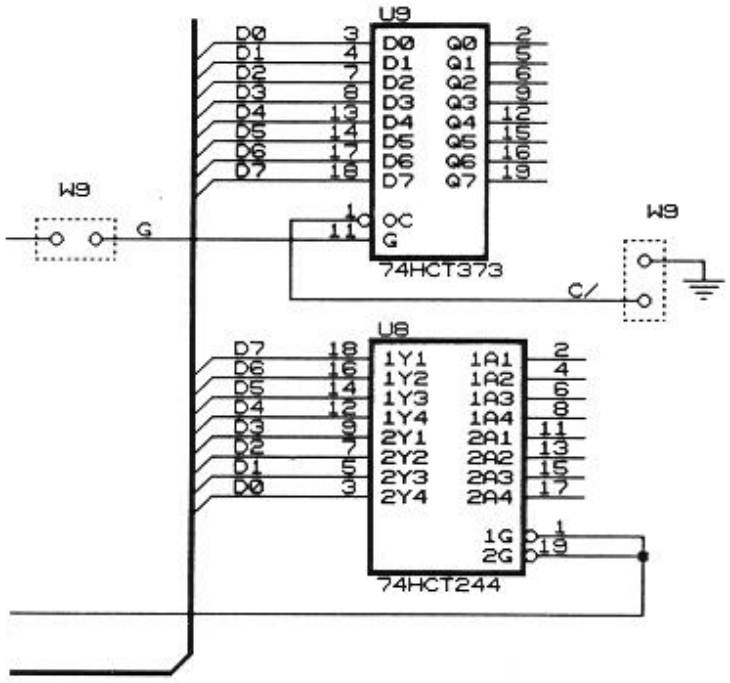


Figure 8. One input and output port are provided for TTL I/O.

The input buffer for the CYB-233 is a 74LS244 octal buffer. The inputs to the buffer may be connected to any TTL level signals the user wishes to monitor. The buffer outputs are connected to the CY233 data bus. They are normally tri-state, and are activated when the CY233 performs read operations from the address selected for ADDR2/.

The CYxxx Controller

The CYxxx socket of the CYB-233 board is designed to accept special controller ICs from Cybernetic Micro Systems. Prewired connections include the power supply pins, crystal circuits, reset circuits, and data bus. Decoded control signals that combine the CY233 DAV/ and ACK/ signals with gating logic from the ADDR1/ signal, are available at jumper block W8. These signals are labeled I/O Req and Busy/Rdy, and should be connected to the corresponding pins of the CYxxx device placed in the socket. Any other signals that might be required, such as R-W/ or FPL/ can also be connected through jumper W6.

Any special applications circuits, such as power drivers or input converters must be added to the CYxxx device, using the wire wrap area of the CYB-233 board. These are not included in the basic design.

Communications with the CYxxx device are enabled when the CY233 performs read or write operations, using the address selected for ADDR1/. The handshake protocol required to transfer bytes between the parts is fully supported by the CY233 signals and the address decoding logic, making data transfers between the devices very easy.

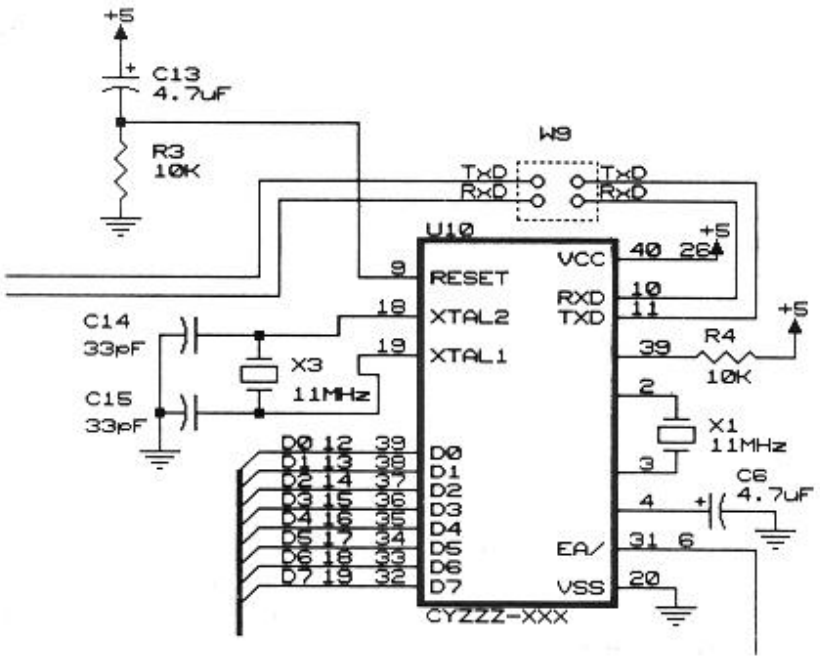


Figure 9. CYxxx support on the CYB-233.

The combination of a CYxxx device and the CYB-233 board makes a very powerful distributed system. The CY233 provides the serial communications link and network protocol that allows the system to be tied together, while the CYxxx device provides the local intelligence and specific control functions required by the application. One serial port on the host computer is all that is required to control the whole system.

Using the CYB-233 as a PROTO-51 Board

Several of the previously described sections may be combined in a different manner for use as an 8051 development board. In this application, the CYxxx controller location becomes the central part of the design, with the CYzzz pinout option used for the 8051 processor. Note that any member of the family, including the 8751, 8031, and 8051 may be used in this design. Also, the CY8051 device of the Cybernetic Micro Systems dICE-51 development package may be plugged into this location, allowing the PROTO-51 board to act as the external hardware for that package.

A crystal and power-on reset circuit are provided to the CYzzz device. The data bus is also connected to other devices on the board, while the remaining I/O ports may be used as required.

Jumper W9 is very important to the 8051 design. First, it provides the direct serial connections, through the second driver and receiver circuits of the MAX233. When jumpered in proper combination with the W1 options, these signals allow the 8051 to directly send and receive serial data through connector J1.

In addition, jumper W9 allows the 74LS373 to be used as the address demultiplexer of the 8051, when some external memory is required. The 74LS373 is already connected to the 8051 data bus. Jumper W9 also makes the gate and output control available. For use as an address demultiplexer, the 74LS373 gate signal should be connected to the ALE signal of the 8051. The output control may be always on, or selectively set by another 8051 signal. The 74LS373 outputs now hold the lower byte of the address, generated by an 8051 external memory access. Note that the memory or memory mapped I/O circuits must be added in the wire wrap area.

The data LEDs remain connected to the data bus in the PROTO-51, so they may still be used to monitor data bus activity. However, the eight address LEDs, which normally connect to the address port of the CY233, are now available as general indicators. Any signal from the 8051 may be connected to an "address" LED, through the middle row (B) of jumper W4.

Other portions of the CYB-233 board, including the CY233, address decoding logic, and 74LS244 data buffer are not required by a basic 8051 design. However, a CY233 could still be used, if the application required a network controller as a "front end" to the 8051. For this application, the board is used as described in the previous sections.

Also, since the CY233 is pin compatible to the 8051, a second 8051 processor could replace the CY233. This allows the PROTO-51 board to be used with two processors in a very general application. Only the data buses are connected between the devices, with all other port lines available to the application.

Power and I/O Options

The final section of the CYB-233 board shows the power supply connections and possible I/O options. When the board is used in an RS-232 based system, only +5 volts is required for the board. The RS-232 drivers and receivers contain a voltage converter that generates the required voltages for these functions, so additional supplies are not required in the standard design.

The RS-232 level signals are applied at J1, a DB-25 connector. Alternatively, a DB-9 connector could be used in the same pattern. Jumper area W1 controls the connection of signals between the DB-25 socket and the CYB-233 internal signals, allowing the signals to match to existing cables.

The power connector is J2, and it uses a four pin, polarized connector that is supplied with the board. For a 5 volt only system, only pins 1 and 2 of the connector are used, for +5 volts and signal ground. An indicator LED is provided on the 5 volt supply. It will be on when power is applied to the board.

If other voltages are required by the application, they may use the additional power input pins. Pin 3 of J4 should be used if an additional positive supply is required, and pin 4 of J4 should be used for a negative supply. The supplies are avaliable at the bottom of the wire wrap area and power capacitors should be added in the wire wrap section.

The wire wrap area of the board could then be used to implement any special circuits required, including additional address decoding or custom applications logic.

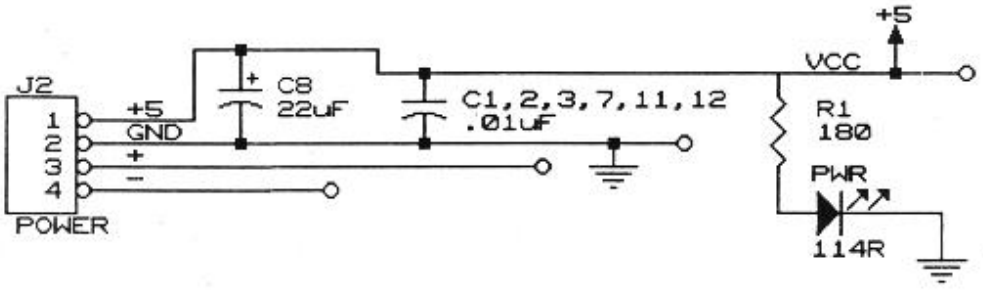


Figure 10. Power and I/O signals for the CYB-233 board.

Jumper Functions

Various options on the CYB-233 circuit design are selected by connecting the appropriate jumper pads together. Each jumper group is indicated by a Wx jumper number, with individual jumper pads in each group designated by unique labels. Small wire wrap posts are provided in a strip with the CYB-233. These posts may be broken to the appropriate length and soldered into the jumper pads. Jumpers may then be connected by shortng plugs or wire wrap wires between the pads involved.

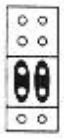
The following sections describe each jumper and discuss the possible connection options. All jumpers are also shown on the CYB-233 schematic.

W1 RS-232-C Connections to J1

Jumper W1 is used to connect the serial line driver and receiver to the appropriate pins of the J1 DB25 connector. Since what line is used for transmitting and receiving information depends on whether the CYB-233 is acting as data communications equipment or data terminal equipment, this jumper allows pins 2 and 3 of the connector to be set as required. The jumper also allows the signal ground to be connected to pin 5 of J1 (if a DB9 connector is used). When a DB25 connector is used, ground is normally on pin 7 and pin 5 is left disconnected.

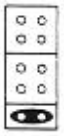
In addition, this jumper allows serial signals from the CYxxx socket to be optionally connected to J1. The pairs T and R on Jumper W9 must also be connected to fully enable this option. Note that these connections would be used if the CYxxx device were connected directly to a serial host, bypassing the CY233 network functions. PROTO-51 would normally use this bypass connection.

The jumper labels fall into two groups. The pins labeled as RxD, TxD, and GND indicate the functions of those lines from the internal board circuits, while the pins labeled numerically, as 2, 3, and 5, correspond to the pin numbers of the DB connector.

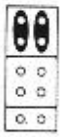


To connect the CYB-233 as data communications equip
2 - RxD DB25S pin 2 to CY233 RxD
3 - TxD DB25S pin 3 to CY233 TxD

To connect the CYB-233 as data terminal equipment
2 - TxD DB25S pin 2 to CY233 TxD
3 - RxD DB25S pin 3 to CY233 RxD



To connect signal ground to DB9
5 - GND DB9S pin 5 to Signal Ground



To connect the CYzzz device as data communications equip
2 - Rx2 DB25S pin 2 to CYxxx RxD
3 - Tx2 DB25S pin 3 to CYxxx TxD

To connect the CYzzz device as data terminal equipment
2 - Tx2 DB25S pin 2 to CYxxx TxD
3 - Rx2 DB25S pin 3 to CYxxx RxD

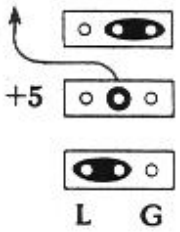
Note that the function of RxD is to receive data into the CYB-233 board, while TxD transmits data from the board. Also, the IBM PC uses the same pins as data terminal equipment (a CRT) when communication is through the COM1 channel, so the CYB-233 board should be set up as data communications equipment when connected to an IBM PC (first example).

W2 Address LED Driver Enable

W3 Data LED Driver Enable

The LEDs that indicate the status of the address and data lines from the CY233 are driven by 74LS244 buffers. These buffers have output control signals that allow them to be tri-stated, which will disable the LED drivers and turn off the lamps. For normal prototyping applications, the drivers may be enabled at all times, by connecting the buffer output controls to ground. With this selection, the LEDs will always indicate the status of the address and data signals.

If CMOS components are used to replace the 74xxx components on the CYB233, then the Board becomes a lower power system. In this case the LEDs would use more power (when they are on) than any other component on the board, jumpers W2 and W3 have been provided to control the power consumption. If the CYB-233 is used in the field, with battery operated or weaker power supplies, the LEDs can be turned off permanently by connecting the 244 output controls to a logic high. Also, a jumper selection allows you to drive the LEDs only when the board is selected, by having one of its address control signals, ADDR1/ or ADDR2/ low.



OC - GND LEDs always enabled

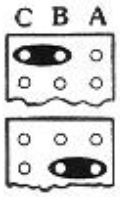
OC - +5 LEDs always disabled

OC - LEDEN/ LEDs enabled only while ADDR1/ or ADDR2/ are active for CY233 message processing

W4 Board Address Selection

Jumper W4 contains the eight address lines from the CY233 in row B of the jumper group. Row C has all lines tied together to form the signal ADDR2/, which is used by the address decoding logic to enable transfers between the CY233 and the 74LS373 and 74LS244 devices. Row A has all lines tied together to form ADDR1/, used by the address decoding logic to enable transfers between the CY233 and the CYxxx device, using the data transfer handshake signals. The two center posts of jumper W8 must also be connected to enable the address decoding logic to drive the ACK/ line of the CY233.

By connecting one jumper from row A to row B, and another jumper from row C to row B, two unique addresses are chosen for the parallel devices supported by the CYB-233 board. These connections require the CY233 to operate in the decoded address mode. If encoded mode must be used, additional decoding logic must be added to the board, and connections must be made from the row B address lines of the CY233 to this logic. The output of the additional comparator logic could then be wired back to row A or row C of this jumper group.



Cx - Bx Select address 0 to 7 for ADDR2/, the address used for the 74LS373 and 74LS244

Ax - Bx Select address 0 to 7 for ADDR1/, the address used for the CYxxx device

W5 CY233 Restart

The Restart signal from the CY233 has been brought to a single post at jumper W5. Normally, the capacitor and resistor provide an automatic reset to the CY233 when power is applied to the board. However, if a reset switch or other reset logic is required, it may be placed in the wire wrap area and connected to jumper W5.

W5 CY233 RESTART signal

W6 CY233 Control Signals

Handshake and strobe control signals are brought to jumper W6 for connection to the parallel logic. Each signal is available on a single pin of the jumper, and must be connected as required by the application. Any signals not required may simply be left open.

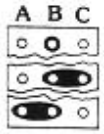
ADDR/	CY233 ADDR/ address strobe
FPL/	CY233 FPL/ forced parallel load
ACK/	CY233 ACK/ acknowledge
DAV/	CY233 DAV/ data available
R-W/	CY233 R-W/ read write
WR/	CY233 WR/ write strobe
RD/	CY233 RD/ read strobe

Since all CY233 control signals are connected at W6, the address decoding logic could be bypassed entirely, if an application required its own logic. With jumpers W4 and the two center posts of W8 open, the logic on the CYB-233 design may be completely disconnected.

W7 Mode Control for the CY233

Jumper W7 defines the operating modes to the CY233 of the CYB-233. This includes baud rate, parity, character type, address type, and communications modes.

The labels next to the jumper pins indicate which lines of the CY233 are set by that pin connection. The possible settings are summarized in this section. More detailed explanations are available in the CY233 Users Manual. Each CY233 signal can be in one of three states, floating (F), tied high (1), or tied low (0), depending on the jumper connections as follows:



Bx open	Selected pin is floating (F)
Bx - Cx	Selected pin is tied high (1)
Bx - Ax	Selected pin is tied low (0)

The first two pins specify the desired serial baud rate to the CY233, with nine possible choices:

BDR1	BDR0	Baud Rate
F	F	Self Adaptive
F	1	57600
F	0	19200
1	F	9600
1	1	4800
1	0	2400
0	F	1200
0	1	600
0	0	300

When the Self Adaptive mode is used, two carriage return characters must be sent to the CY233 before any other communication occurs. With the fixed rates, the CY233 is ready for messages when power is applied and the device has been properly reset.

The next two pins of the jumpers specify the desired parity and character length options:

PAR1	PAR0	Parity	Data Length	Total Character Length
F	F	Mark	7	10
F	1	Even	7	10
F	0	Odd	7	10
1	F	Space	7	10
1	1	None	8	10
1	0	Space	8	11
0	F	Mark	8	11
0	1	Even	8	11
0	0	Odd	8	11

The total character length includes start bit, data bits, parity (if used), and a stop bit. In the 7 data bit selections, the most significant data bit of the parallel transfers will be zero when written, and ignored when read by the CY233. Thus, a 7 bit format can successfully be translated into an 8 bit character, with the most significant bit always zero, but an 8 bit character can only be translated to 7 bits if the 8 bit format does not use the upper bit. Otherwise, two different 8 bit values would be translated into the same 7 bit code.

The next pin selects the character format used by the CY233:

CHAR	Selection
F	ASCII Character
1	ASCII HEX
0	Binary

Most general networks will operate in the ASCII Character mode, which enables all CY233 commands and message options. The other two selections might be appropriate in special cases.

Binary mode could be used if the shorter message structure of this mode is required. Note that all messages in binary mode are assumed to be write messages, and care must be taken if the terminator character, 0FFh, is to be used as data.

The ASCII HEX mode could also be used, since it allows any single data value to be expressed using two serial ASCII HEX characters. The only penalty for this mode is the longer serial messages required to express the same data values.

The next pin selects the address decoding scheme used by the CY233:

U-E-D	Selection
1	Uncoded UART mode, addresses not used
F	Encoded Address mode, binary address values
0	Decoded Address mode, negative true 1 of 8

When the CY233 is operated in the UART mode, address decoding is not used, and the address decoding logic may be bypassed. Control signals may be taken directly from jumper W6 for data transfers in this case. In general, only one CYB-233 board can be connected to a serial computer port if the UART mode is used.

The default operating mode for the CYB-233 is the decoded address mode, allowing up to 8 possible address selections. As discussed in the Theory of Operations section, if more addresses are desired, encoded address mode may be used, but additional address decoding logic must be added to the board.

The final two lines of the jumpers select the echo modes for the CY233, and are shown below:

NET	DUP	Echo	Mode
F	F	None	Slave
F	1	All	Slave
F	0	Invalid	Slave
1	F	Valid	Slave
1	1	Valid	Slave
1	0	Valid	Master
0	F	None	Master
0	1	All	Master
0	0	Invalid	Master

With a Ring Network architecture and RS-232 connections, the best choices are Echo Invalid or Echo All. When only one CYB-233 board is used, any choice may be selected.

W8 Address Decoding to CY233 ACK/

The two center pins on jumper W8 are normally connected, and enable the output of the address decoding logic to drive the CY233 ACK/ line. When the ADDR1/ selected address is used, ACK/ will reflect the level on the Busy/Rdy signal. When the ADDR2/ address is selected, ACK/ will be connected with DAV/, and an automatic handshake will be provided. If any other address is tested, ADDR1/ and ADDR2/ will both be high, and ACK/ will be driven low, indicating an invalid address.

If custom address decoding logic is used, the two center posts on jumper W8 may be left open, so the on-board logic does not drive the ACK/ line. This allows you to add any address decoding scheme desired to the CYB-233 board.

ACK/ - A Address logic output drives ACK/

W8 CYxxx Handshake Signals

Jumper W8 also contains the two decoded handshake signals used by the CYxxx controller. These signals are only enabled when ADDR1/ is low, providing a decoded handshake. I/O Request is used to signal that data is available, while Busy/Ready acknowledges the transfer. These signals should be connected to the appropriate pins of the CYxxx device.

I/O Req Decoded ADDR1/ and DAV/ used by the CYxxx

Busy/Rdy Decoded ADDR1/ and ACK/ used by the CYxxx

W9 CYzzz Serial Connections

Jumper W9 is provided to connect the CYzzz device serial lines of location U10 to the second driver/receiver pair of the MAX233. This jumper is connected when the CYzzz direct serial interface is used.

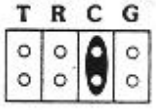
When the jumper pins are open, CYzzz devices that do not support direct serial connections may be used, and the device pins that provide serial transmit and receive functions on some parts may still be used for their other specific applications in these devices. Opening the jumper insures no interference between the MAX233 and the CYzzz device.

Use of the direct serial connection bypasses the CY233, and also requires proper connections at jumper W1.

TxD - TxD Connect CYzzz TxD to MAX233
RxD - RxD Connect CYzzz RxD to MAX233

W9 74LS373 Output Enable

The latch outputs from the 74LS373 may be controlled through jumper W9. Normally this jumper is connected, so the output control is grounded, and the latch outputs are always enabled. However, if the application requires selective activation of the outputs, special circuits could be used to drive the 373 output control. When the 373 output control line is high, the outputs are tri-state.



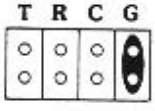
OC - GND Enable 74LS373 output drivers

W9 74LS373 Gate Enable

When the 74LS373 is used as a data output latch in the CYB-233, these pins are normally connected. This allows the 7402 to drive the 373 gate signal, to latch data into the 373 when the CY233 performs a write operation with ADDR2/ active. The 74LS373 acts as a holding latch for the last written data in this application.

If the CYB-233 board is used as a PROTO-51 design board, the 74LS373 may be used as the address demultiplexor for the 8051 processor. This makes the addition of external memory to the 8051 much easier, since the address demultiplexing is already included in the basic circuit design of the board. Only the specific external memory devices need to be added to the wire wrap area.

When used for demultiplexing functions, the 74LS373 gate signal should be connected to the ALE signal of the 8051 device.



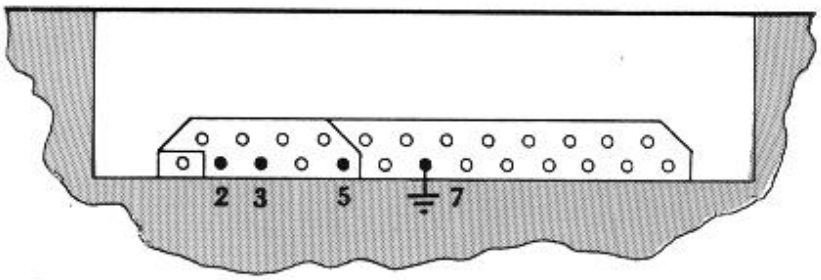
G - 7402 Output Normal CYB233 operation
G - ALE PROTO-51 addr demultiplexing function

Connector Pinouts

The serial connector J1 is a DB-25S connector site, used for the RS-232-C interface to the CYB-233. Only four signals are used on the connector, with jumper W1 defining the functions of the data signals. This connector implements a standard three line RS-232-C connection. Note that a DB-9S connector could be used if desired, so long as pin 1 of the DB-9 matches to pin 1 of the DB-25 layout.

Serial Connector Pinouts

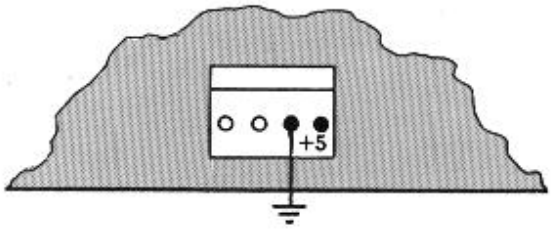
2	Serial Data Input or Serial Data Output
3	Serial Data Output or Serial Data Input
5	Signal Ground (DB-9)
7	Signal Ground (DB-25)



Connector J2 is used to bring power to the CYB-233 circuits. It is a standard 4 pin header, with pins on 0.156" centers. The mating connector is also supplied with the CYB-233 standard board. Pin 1, the +5 volt input, is physically closest to the wirewrap area while pin 4, the negative voltage input, is closest to the J1 connector side of the CYB233 Board.

J2 Power Connector

1	+5 volts
2	Ground
3	+ alternate voltage
4	- alternate voltage



Note that the standard CYB-233 board only requires the +5 volt supply, so pins 3 and 4 of the power connector may be unused. These supply inputs are provided to support custom circuits, as required by the application.

Final Assembly and Checkout

This section will discuss the completion of the CYB-233 board and initial operation. The remaining tasks are concerned mainly with connections between the board and the rest of the system, whether it be a terminal or computer. The user must decide, based on the specific requirements, which jumpers will be used. The appropriate jumper pads for the various options must then be connected together.

[] Install jumpers as required.

Next, cables must be made for any applications circuits, connecting the data interface, and the power supplies. See the listing of connector pinouts for the appropriate signal, those lines which are not used may be left disconnected. They do not require any special terminations.

[] Construct connection cables as required.

Before the board is connected to the power supply, perform a careful visual inspection to insure that all parts have been placed in the right locations and that LEDs, electrolytic capacitors, and ICs observe the proper polarities. This is very important for proper operation of the board.

[] Perform visual inspection for correct part placement.

[] Install board standoffs at the four corners.

[] Connect the +5 volt logic supply and turn it on.

Now, use a VOM to see that +5 volts can be measured at various points on the board. In particular, +5 volts should be across C8, and at the power supply pins of all the ICs. No part on the board should be hot from applications of power.

[] Check for +5 volts to various components on board.

[] Turn off power supply.

NOTE: NEVER LEAVE THE POWER SUPPLIES ON WHEN CHANGING CONNECTIONS OR ADDING PARTS TO THE BOARD.

When the board checks out satisfactorily, the CY233 may be installed into the 40 pin socket at location U2. Be sure to observe proper polarity when installing this part. The notch on the pin 1 side should face the DB25 connector. Install the part by starting the pins on one side into the socket, without pushing them completely into the socket. Then do the same on the other side. Once all the pins have been started, gently push the entire part into the socket until the pins are well seated. Be sure that none of the pins are bent or go under the part. They should all fit smoothly into the socket.

[] Insert a CY233 into socket U2.

[] Connect the serial cable to J1.

[] Turn on power.

The capacitors on the Restart lines of the CY233s should provide an automatic reset on power up.

CYB-233 Debugging

The following section explains a check-out procedure for the CYB-233 board.

In case of difficulty with one of the steps above, be sure that the parts have been installed correctly (especially those with fixed polarity), jumpers are connected properly, and cables are wired according to the connector pinouts listed.

This check-out of the CYB-233 board will require at least a serial terminal. A computer with a terminal emulator program will also work well. The only requirements are the ability to control transmitted characters and the ability to display received characters. A BASIC language driver that performs this function on an IBM-PC class computer is provided in the CY233 Users Manual.

We will assume this CYB-233 board is set for address 01 in describing the following tests. If you use a different address, substitute your selected address for that shown. When an invalid address is needed, be sure to use an address different from the one(s) selected for your board. This address will control transfers between the CY233 and the 74LS373/74LS244 devices.

[] Set the CY233 for ASCII Character mode and Echo Invalid. Choose parity, baud rate, and other functions to match those of your serial test system.

[] Connect your test terminal to J1, the serial network connector.

[] Reset the CY233 by cycling the power supply or touching the Restart Post at W5 to +5 volts.

[] Send an invalid message to the CY233:
W 03 Test <cr>

Spaces are shown for clarity, but should not be included with the message, so you actually send:
W03Test<cr> where "<cr>" is the carriage return character.

[] The CY233 should echo back:
W03Test<cr>

The echo will start after the W command and 03 address have been received. If the echo is correct, the CY233 is functioning, with baud rates, parity, etc. matching those selected for your terminal.

If no echo occurs, be sure to verify the jumper settings at W1 and W7.

[] Now send to the CY233:
W 01 To Local Device<cr>

[] Since this is a valid message, the CY233 will not echo it, but after the W and 01 are received, address LED 1 should stay on, and then the data LEDs should flash as each data character is written out. The 373 latch will hold the value of each character as it is written.

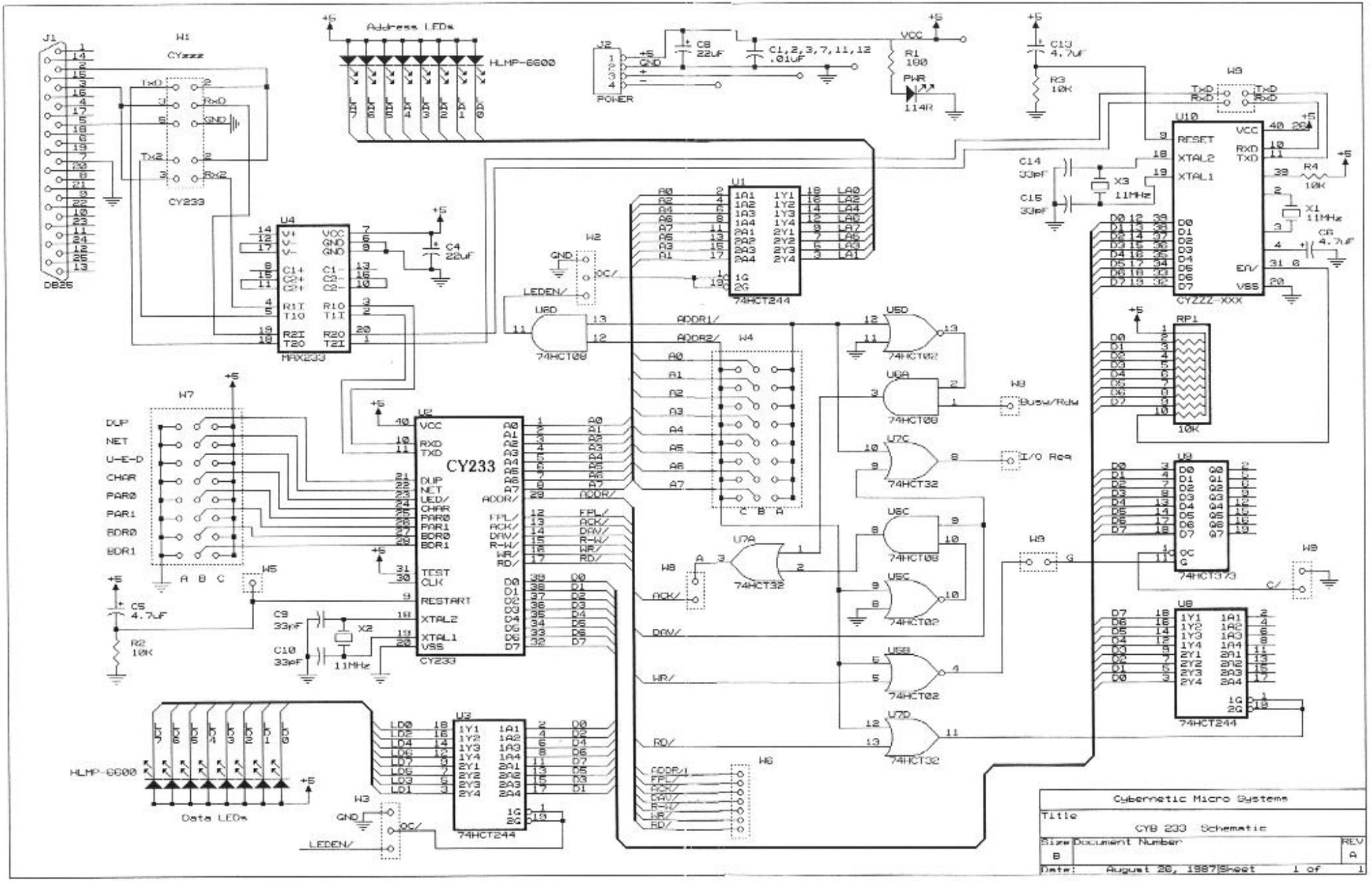
[] Now send to the CY233:
R 01 <cr>

[] The CY233 should respond by reading the value from the 74LS244 buffer, and sending a reply message:
R01x<cr> where "x" is the value read from the 244

[] Repeat the tests for the CYxxx device address. If no CYxxx device is used, connect I/O Req to Busy/Rdy on W8 to get an automatic handshake, or leave them open to see what happens when a handshake timeout error occurs. The query command, Q01<cr>, could be used to query the CY233 for its error status.

This completes the test of the CYB-233 board. The CY233 has been checked, and messages have been passed between it and the local parallel devices. If the above tests failed, be sure to carefully check the assembly of the board and all jumper connections. Try to verify that serial data is getting to the RxD signals at jumper W1 when your terminal is transmitting, and that the data reaches the CY233 at its RxD pin, pin 10. You can also check if the CY233 is alive, by seeing that the Restart line, pin 9, is low during normal operation, and that a 1.8 MHz clock is being generated from the CLK line, pin 30.

If the above tests do not resolve the problem, contact Cybernetic Micro Systems.


Address LEDs
HLMP-6600
POWER
CY233
MAX233
74HCT244
74HCT08
74HCT32
74HCT02
74HCT373
CYZZZ-XXX
RP1
10K
Data LEDs
Cybernetic Micro Systems
Title
CYB 233 Schematic
Size B
Document Number
REV A
Date: August 26, 1987
Sheet 1 of 1