

OHIO SCIENTIFIC  
CA-10X/550 BOARD  
MANUAL

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## Introduction

The CA-10X board is a 16 port serial interface board available from the factory configured for two to sixteen ports. Each port is capable of supporting an RS-232 interface or an open collector TTL interface. The baud rate for each port is jumper programmable from 75 baud to 19.2 Kbaud. A 250 KHz and a 500 KHz clock are also available for fast data transfers. In addition, there are eight spare open collector TTL outputs which can be used as RTS or clock lines. Also, there are two free TTL inputs for external clocks.

Each port consists of a 6850 ACIA. This, in conjunction with programmable baud rates and spare TTL interfaces, allows the CA-10X board to be used for a variety of functions.

Specifications:

Mechanical: 8" X 10" G-10 Epoxy Double-Sided Plated Through Hole Board

Electrical: +5 Volts at 2amps  
-9 Volts at 200ma  
+12 Volts at 200ma

RS-232 Interfaces: Up to 16 ACIA based RS-232 interfaces using 1488 and 1489 RS-232 Trnasceivers. Each interface has a single crystal controlled baud rate with jumper options to individually select the baud rate for the ACIA interface. Parity and number of stop bits are internally software specified on each ACIA. All RS-232 interfaces are two wire plus common ground.

Baud Rates: 75, 150, 300, 600, 1200, 2400, 4800, 9600, 19200

Also 250 KHz and 500 KHz are available for fast path transfers

## Addressing

The addressing of the CA-10X board at the factory is normally set for  $CFXX_{16}$  with the first port at  $CF00$  unless it is a Level III system in which case it will be addressed at  $CE00$ . Each port consists of a 6850 ACIA which occupies two address locations. Each 6850 has a control, status, and data register. A write to the data register outputs a character. Reading the data register reads a character. The status register is a read only register which contains the status of the ACIA. The control register is at the same address as the status but is a write only register. The functions of these registers are covered in the documentation on the 6850.

Figure 1  
Addresses of CA-10X Ports

<u>Port</u>	<u>6850</u>	<u>Control and Status Address</u>	<u>Data Address</u>
0	U21	CF00	CF01
1	U29	CF02	CF03
2	U22	CF04	CF05
3	U30	CF06	CF07
4	U23	CF08	CF09
5	U31	CF0A	CF0B
6	U24	CF0C	CF0D
7	U32	CF0E	CF0F
8	U25	CF10	CF11
9	U33	CF12	CF13
10	U26	CF14	CF15
11	U34	CF16	CF17
12	U27	CF18	CF19
13	U35	CF1A	CF1B
14	U28	CF1C	CF1D
15	U36	CF1E	CF1F

## Circuitry

The circuitry on the 550 board consists of an address decoder, data buffers, baud rate generator, 16 identical ports, and spare open collector TTL drivers and receivers.

The address decoder is on Sheets 1 and 2 of the schematics and consists of U49 which generates the board enable and U43, a 74154, which generates the port enables for the ACIA's. These port enables, in conjunction with IA0 which is routed to all 16 ACIA's, select the proper registers. Also, on Sheet 1 of the schematics are the two 8T26's which are the data buffers.

Sheet 3 of the schematics contains all the circuitry for the baud rate generator. U48 is used to generate a 4.00 MHz clock which is divided by U40 to give outputs of 500 KHz and 250 KHz. It is also divided by U41, U42, and U44 to give outputs from 75 baud to 19.2 baud. These outputs are wire jumpered to the ACIA's TXCLK and RXCLK inputs for the desired baud rate for that port. The baud outputs are 16 times the actual baud rate and are divided by 16 in the ACIA's for the proper baud rate.

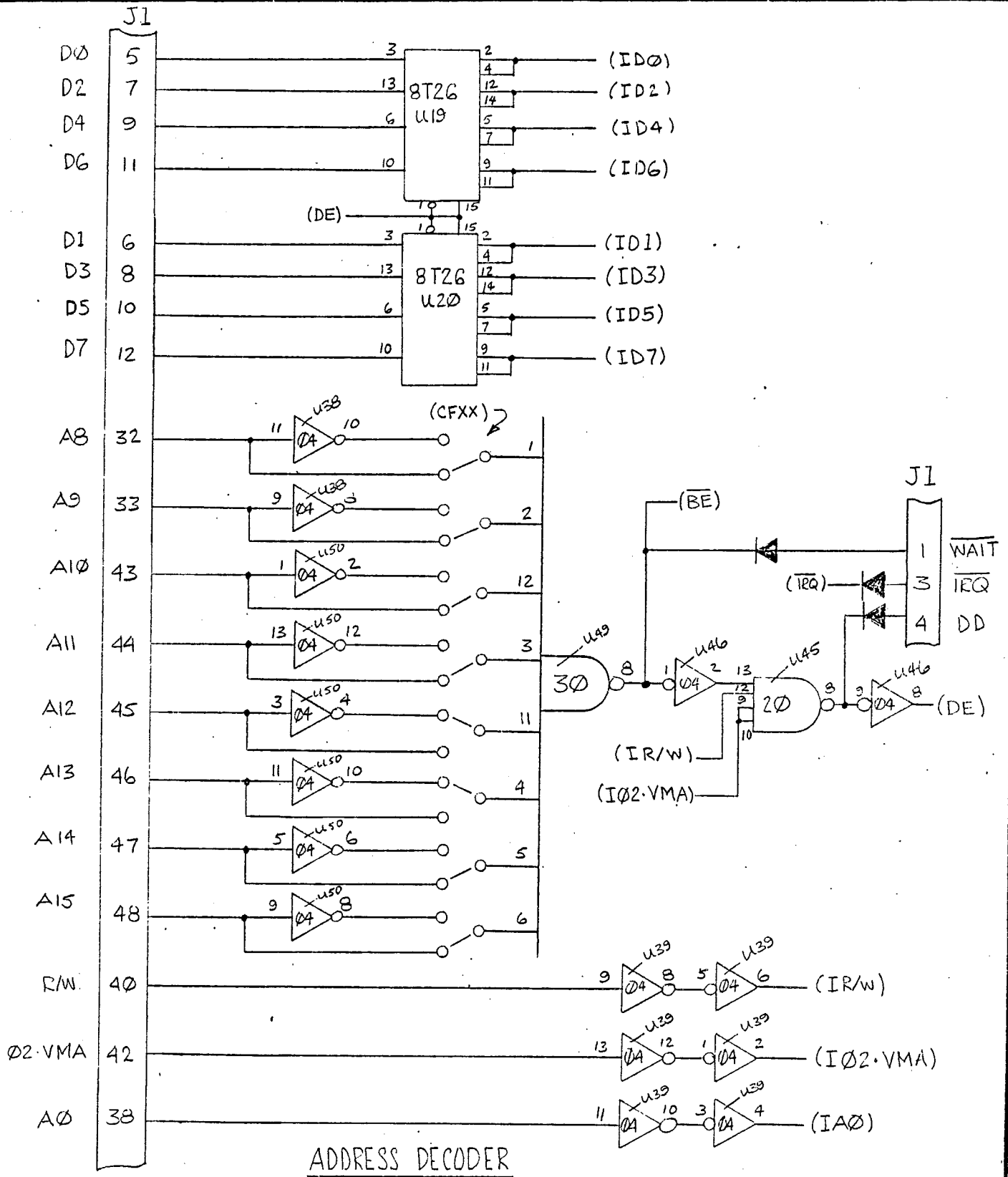
Sheet 5 of the schematics is a schematic of port 0. Ports 0 through 15 use identical circuitry, the only differences being the location of the components and the pin out of the port in and the port out signals. On all ports the ACIA is normally connected to an MCl488, which is the RS-232 output driver, and to an MCl489, which is an RS-232 receiver. The MCl488 and MCl489 are the standard ports on CA-10X boards. If a TTL interface is needed, then the appropriate 7417 driver and 7414, 7404 receiver parts must be installed on the board; the tapes .

going to the 1489 and 1488 cut; and wire jumpers from the TTL interface parts added. To select the proper baud rate, a wire jumper is added from pins 3 and 4 of the ACIA to the desired baud rate pad. These pads are labeled on the assembly drawing. Jumper pads are provided for  $\overline{\text{RTS}}$ ,  $\overline{\text{IRQ}}$ ,  $\overline{\text{CTS}}$ ,  $\overline{\text{DCD}}$ ,  $\text{RXCLK}$ , and  $\text{TXCLK}$  so that the board may be wired in a variety of configurations.

So as to accommodate these other signals, the CA-10X board has provisions for eight TTL open collector drivers and two TTL receivers as shown on Sheet 4 of the schematics. The 7417 outputs are connected to J2 pins 50 through 57 and may have the resistor networks installed if needed. Also, two receivers are connected to pins 58 and 59 of J2 with their terminating resistors. These are not normally populated on the CA-10X board and the user must install these parts if needed. All the driver inputs and receiver outputs are jumpered to the appropriate input using the free wire pads provided. Also, holes are provided for installation of a response capacitor or threshold resistor for the 1488s and 1489s if needed. These are not installed for normal RS-232 links of average lengths. See the data sheets of 1489s and 1488s for more information.

In some applications of the CA-10X board with more than eight ports installed, there may not be sufficient spare drivers or receivers connected to J2. This can be resolved by using unused TTL data drivers and receivers and routing the connecting wires directly to the respective inputs or outputs. Charts of drivers, receivers, and their associated resistors and capacitors are included in the schematics. Parts placement can be determined by using the assembly drawing.





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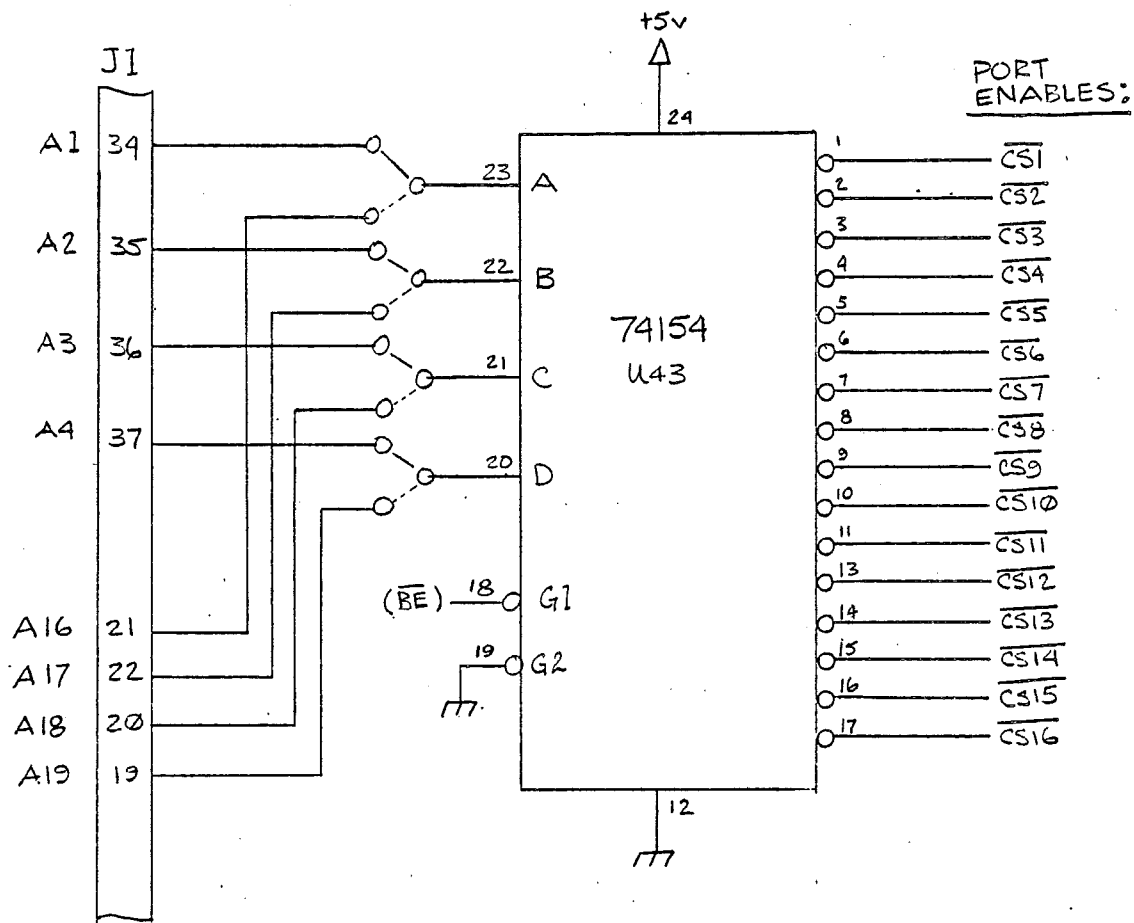
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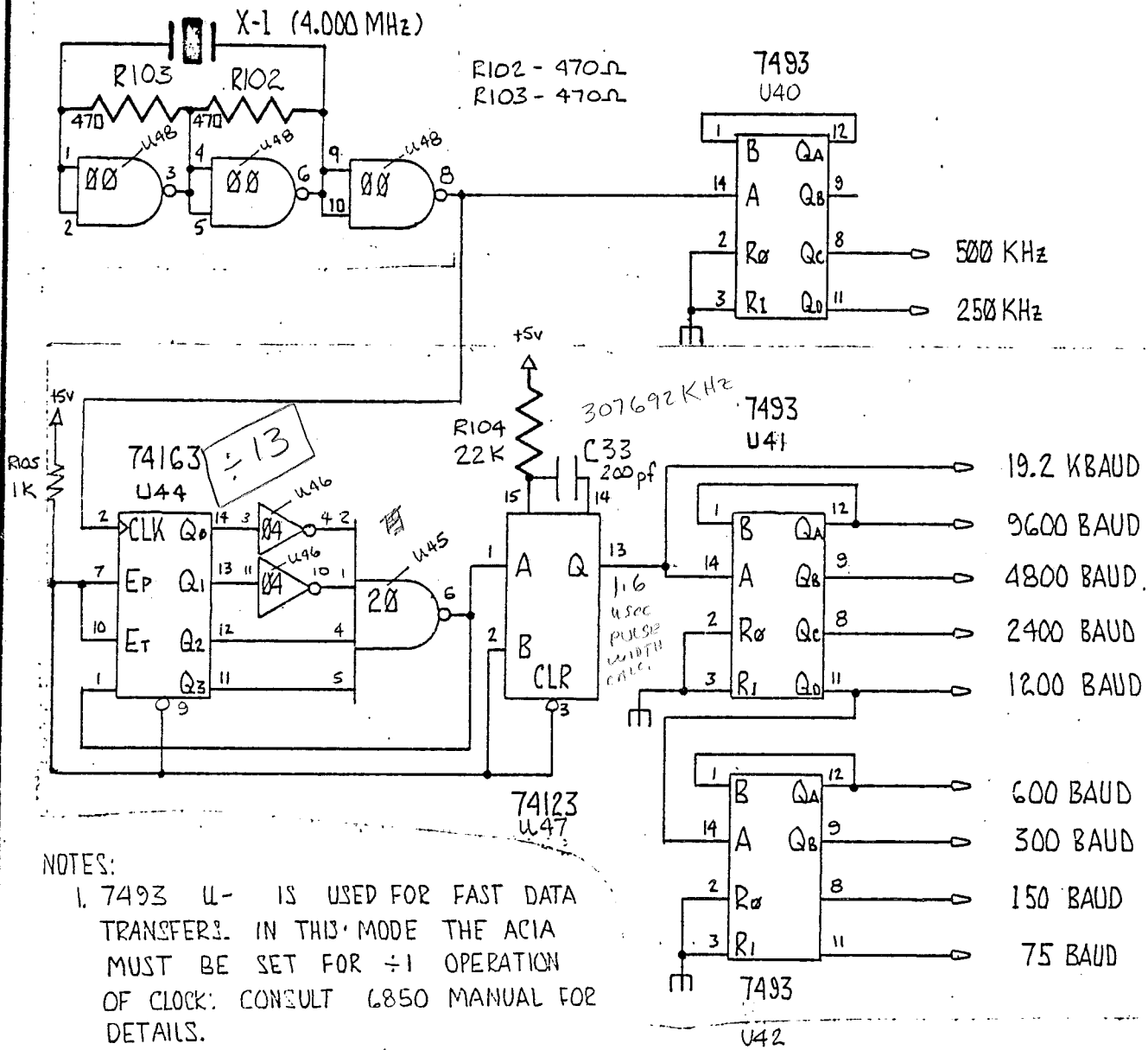
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PORT ENABLE CIRCUITRY

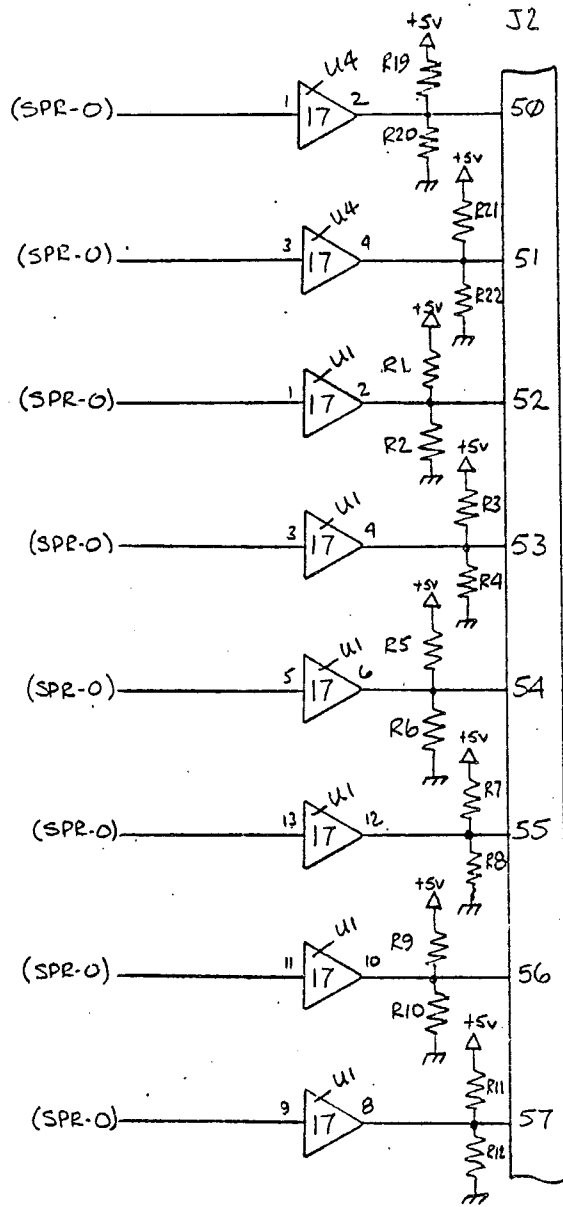
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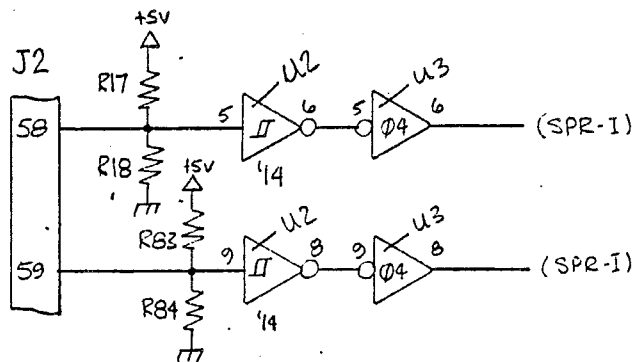
NOTES:  
 1. 7493 U- IS USED FOR FAST DATA TRANSFERS. IN THIS MODE THE ACIA MUST BE SET FOR ÷1 OPERATION OF CLOCK. CONSULT 6850 MANUAL FOR DETAILS.

**BAUD RATE GENERATOR**

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NOTE:  
 THESE MAY BE JUMPED  
 TO THE ACIA CLOCK OR  
 HANDSHAKE LINES AS  
 DESIRED.



SPARE TTL DRIVERS/RECEIVERS

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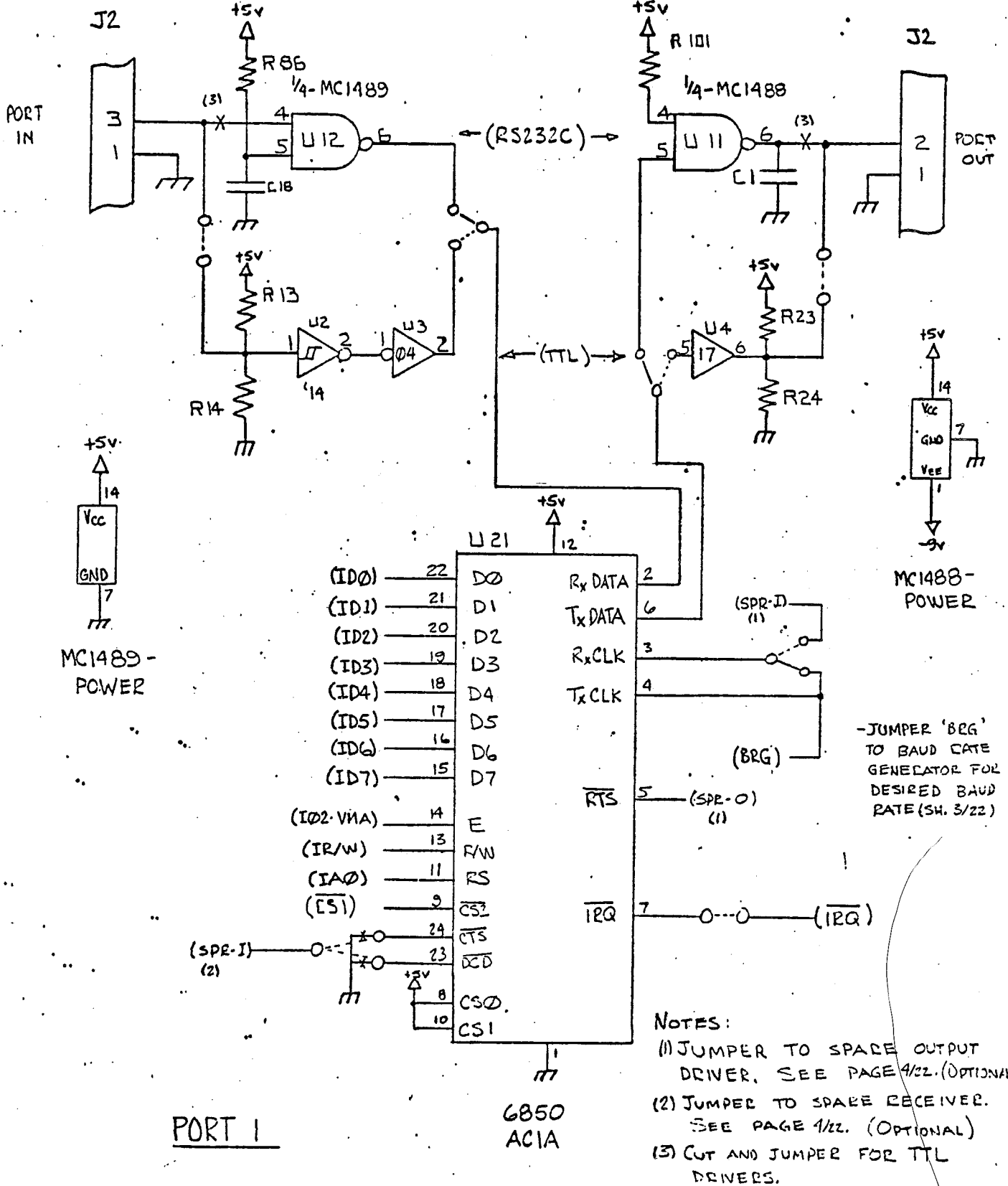
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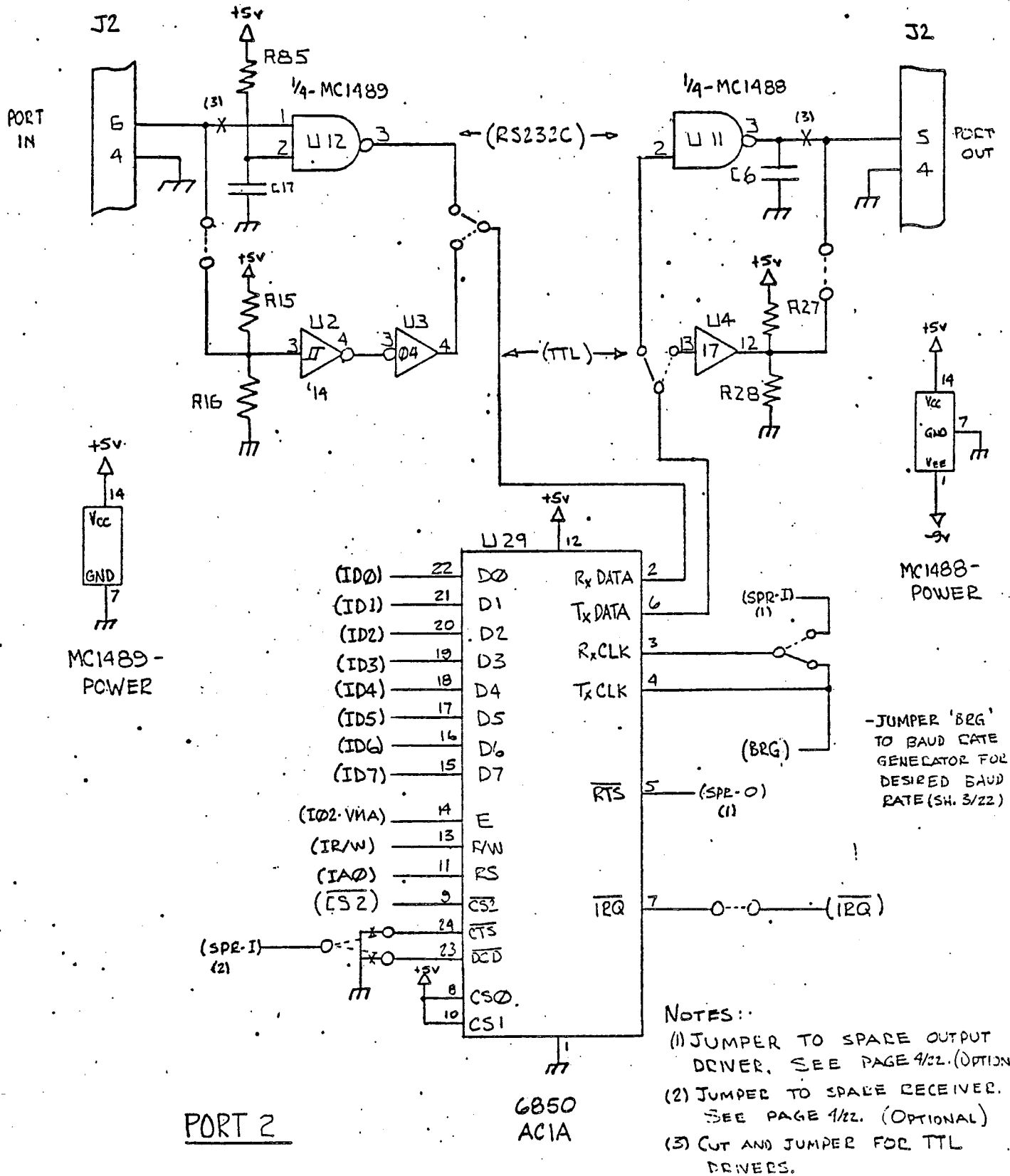
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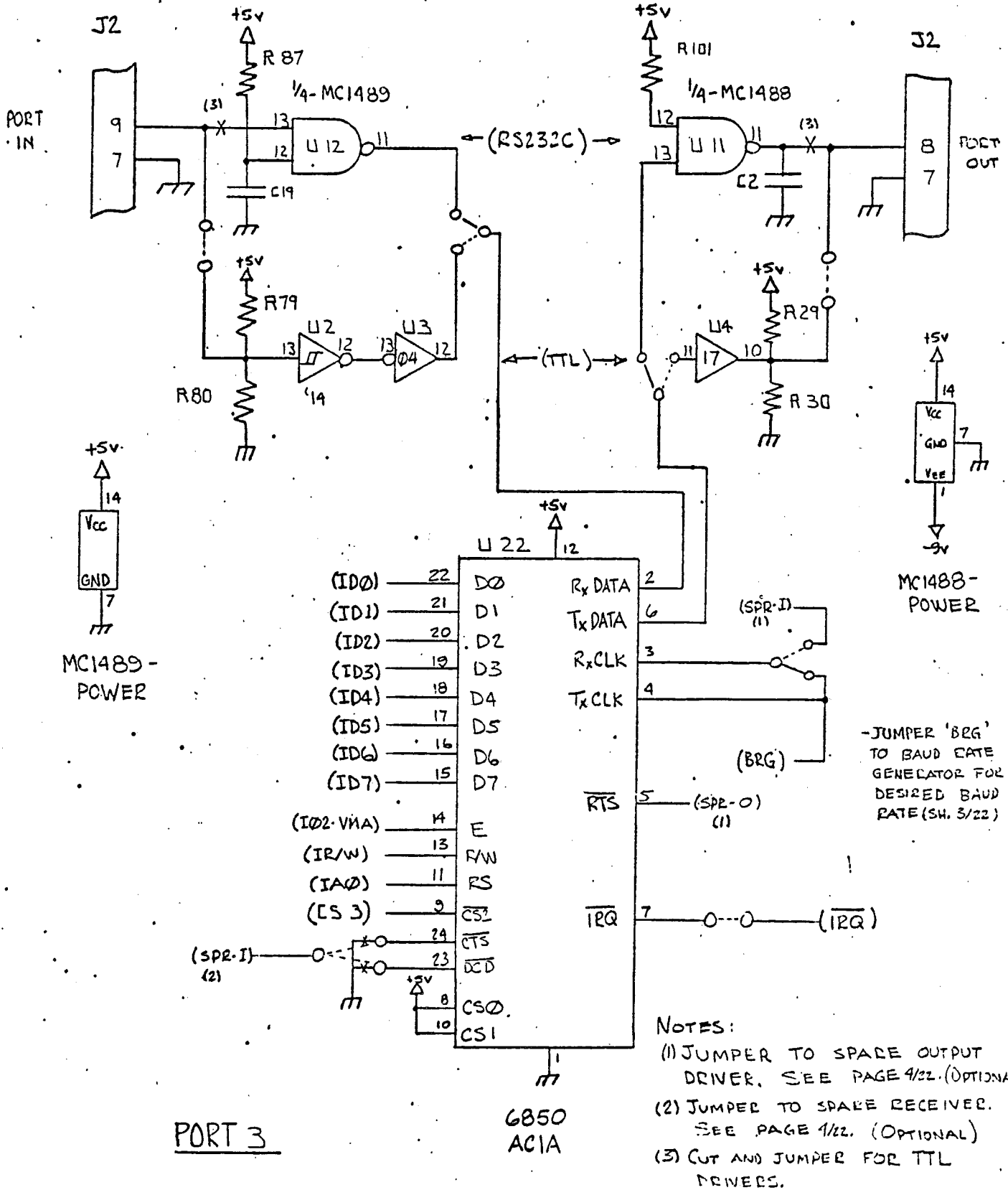
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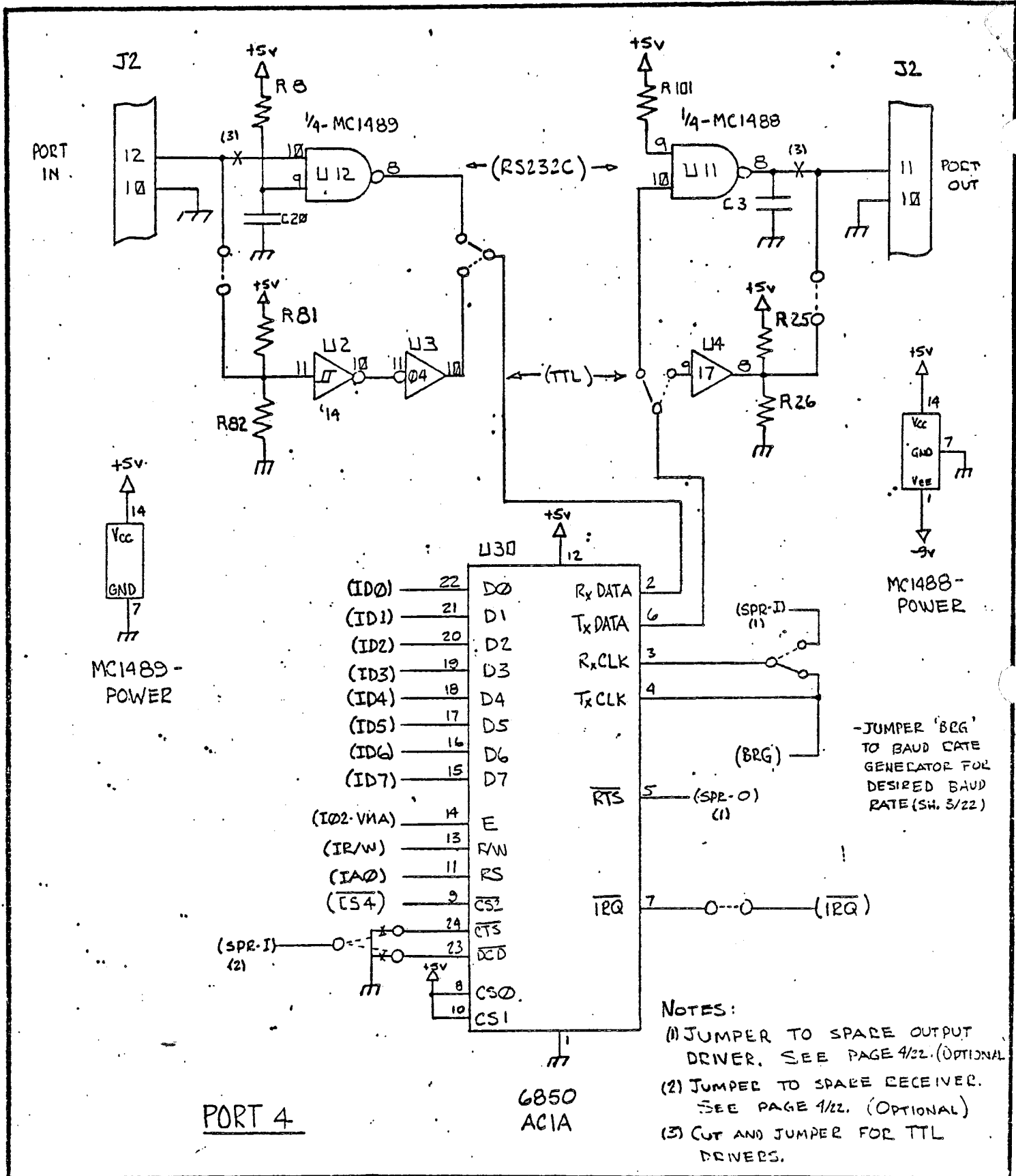
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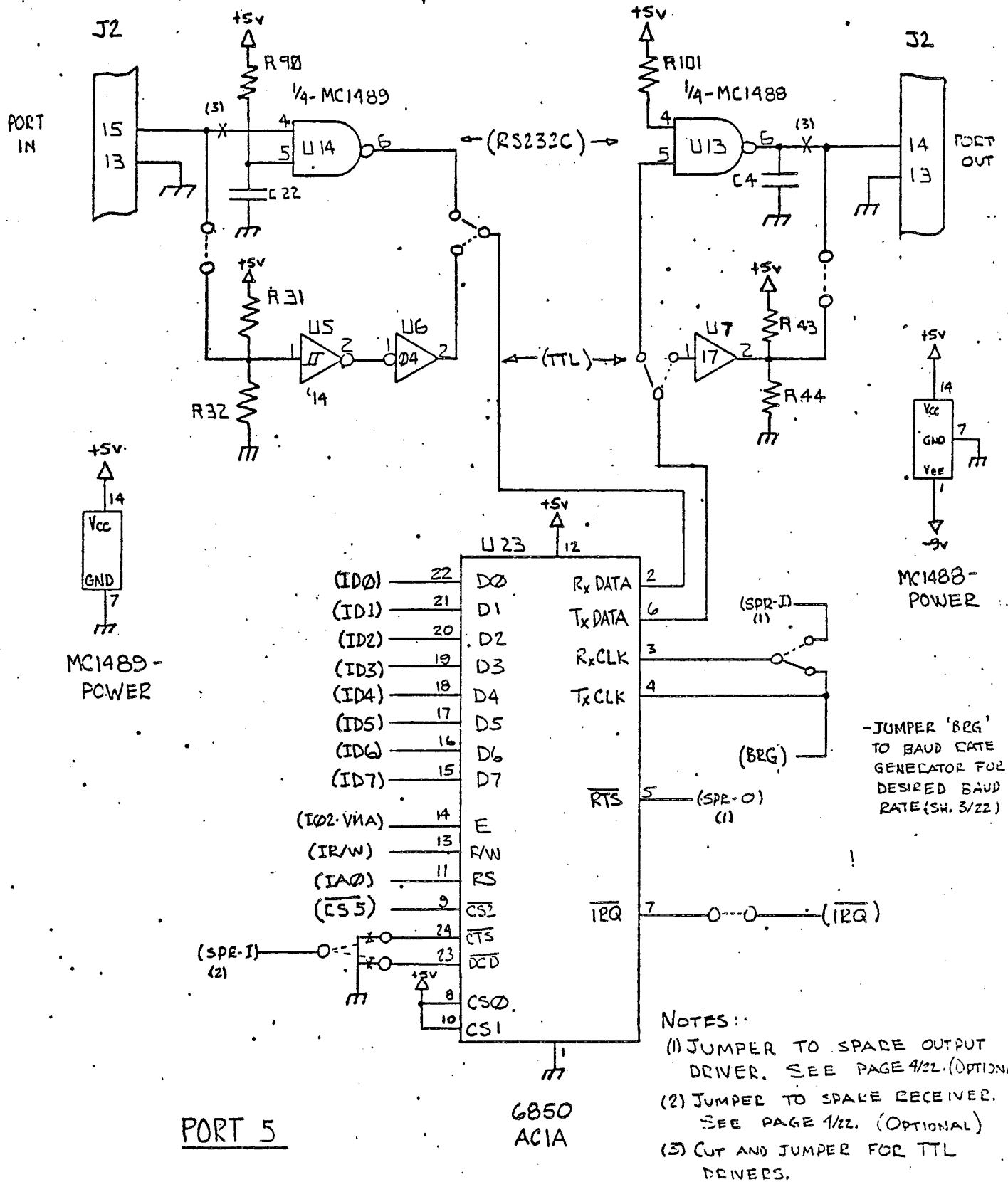
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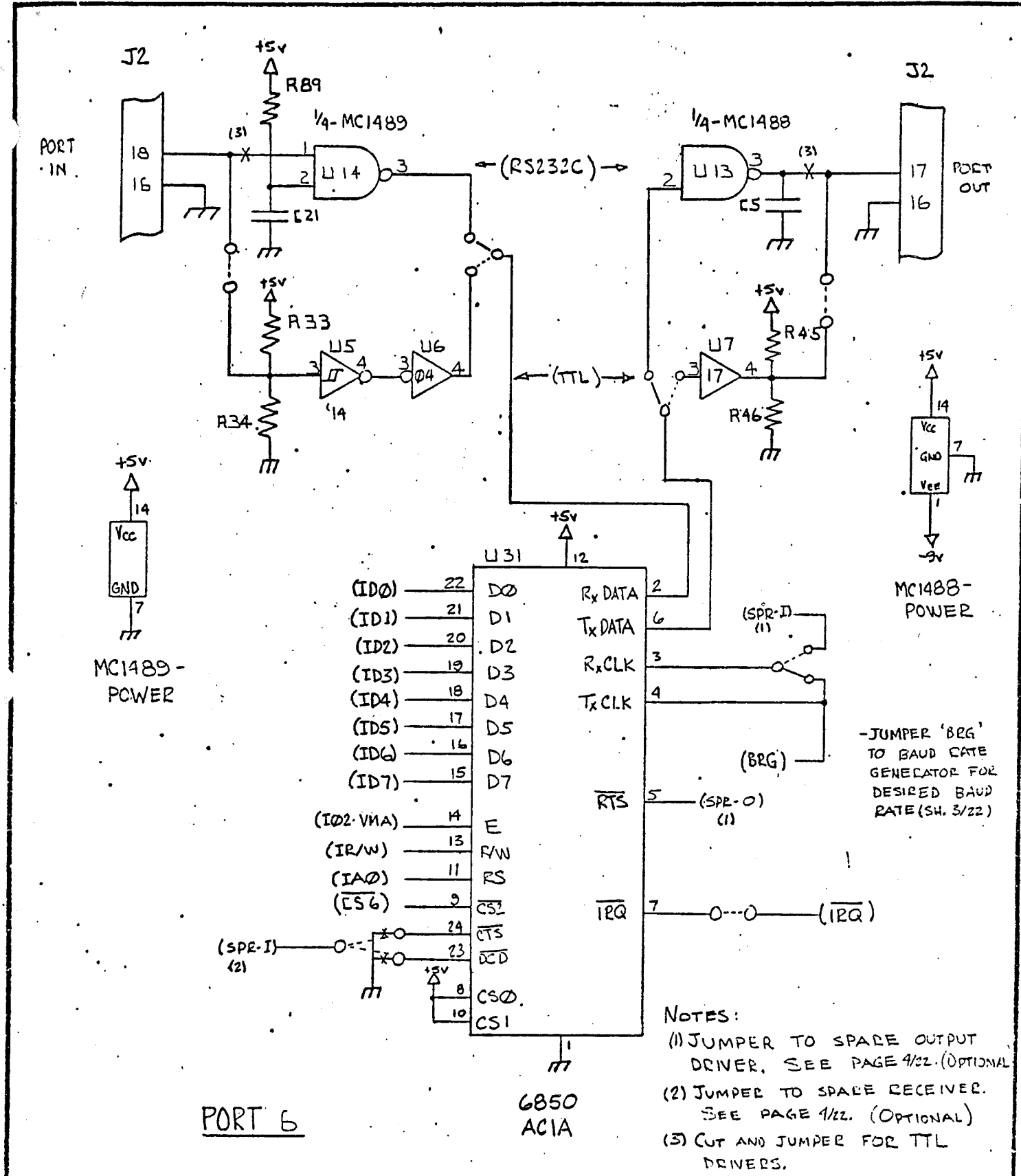
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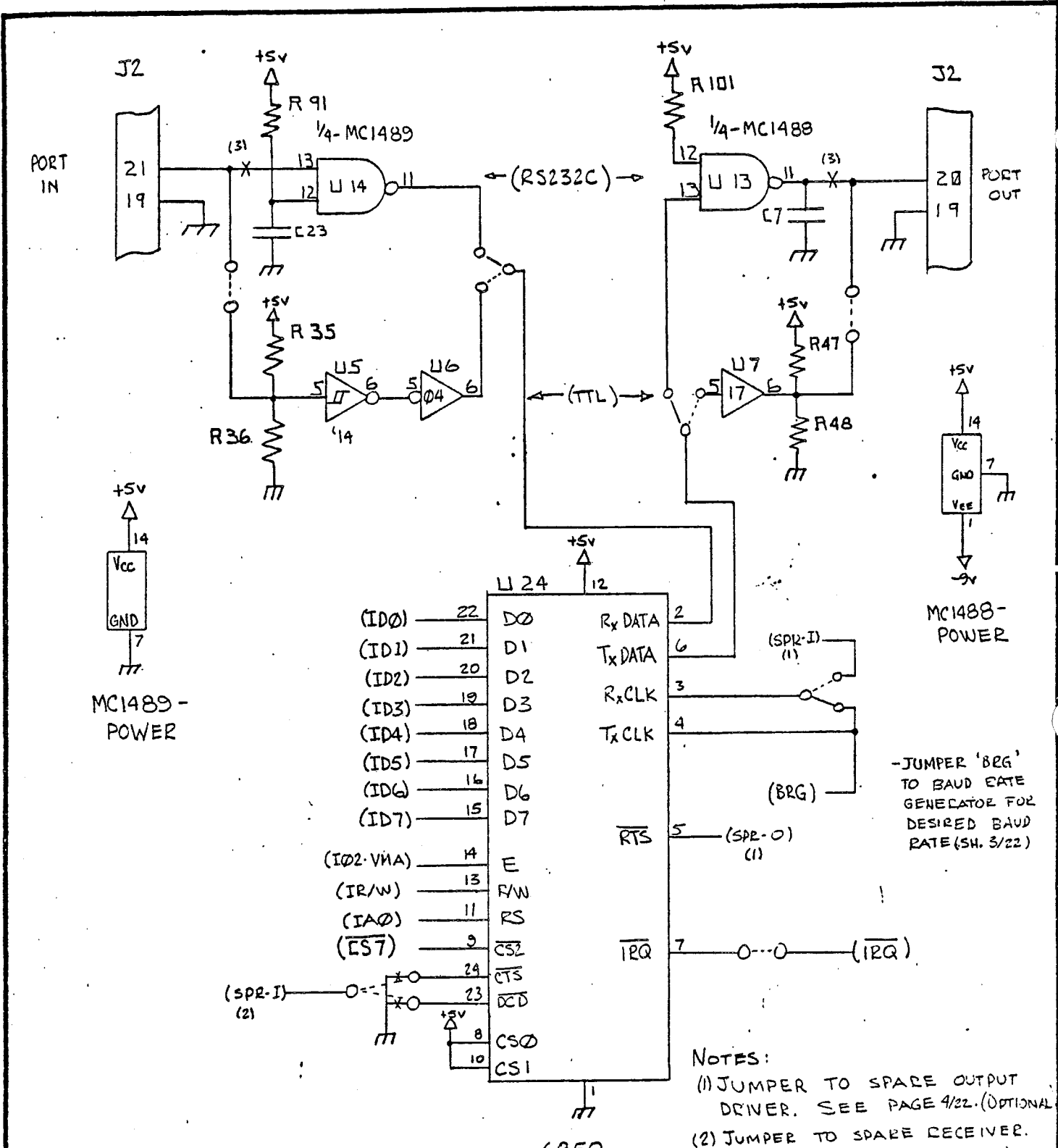
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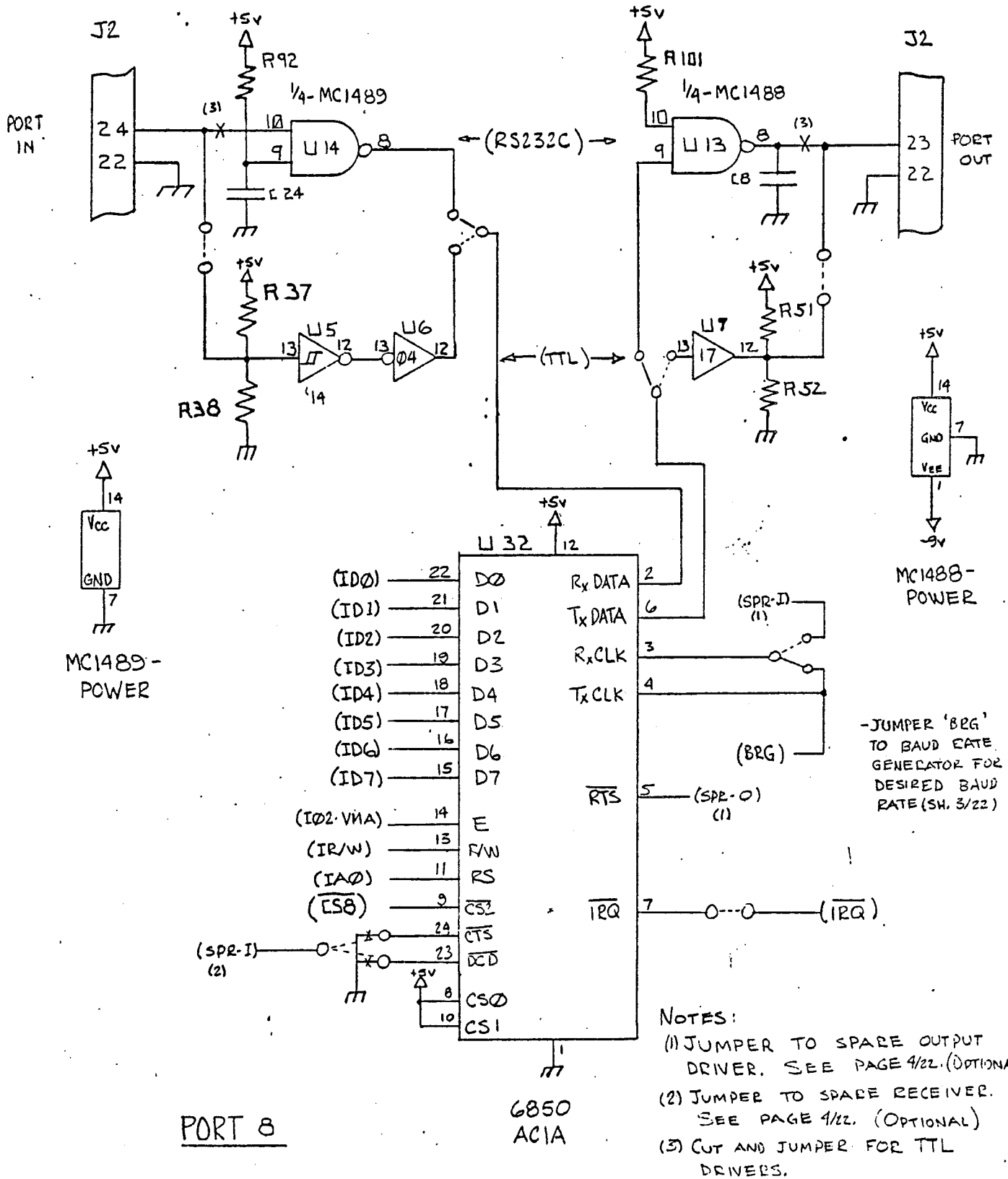
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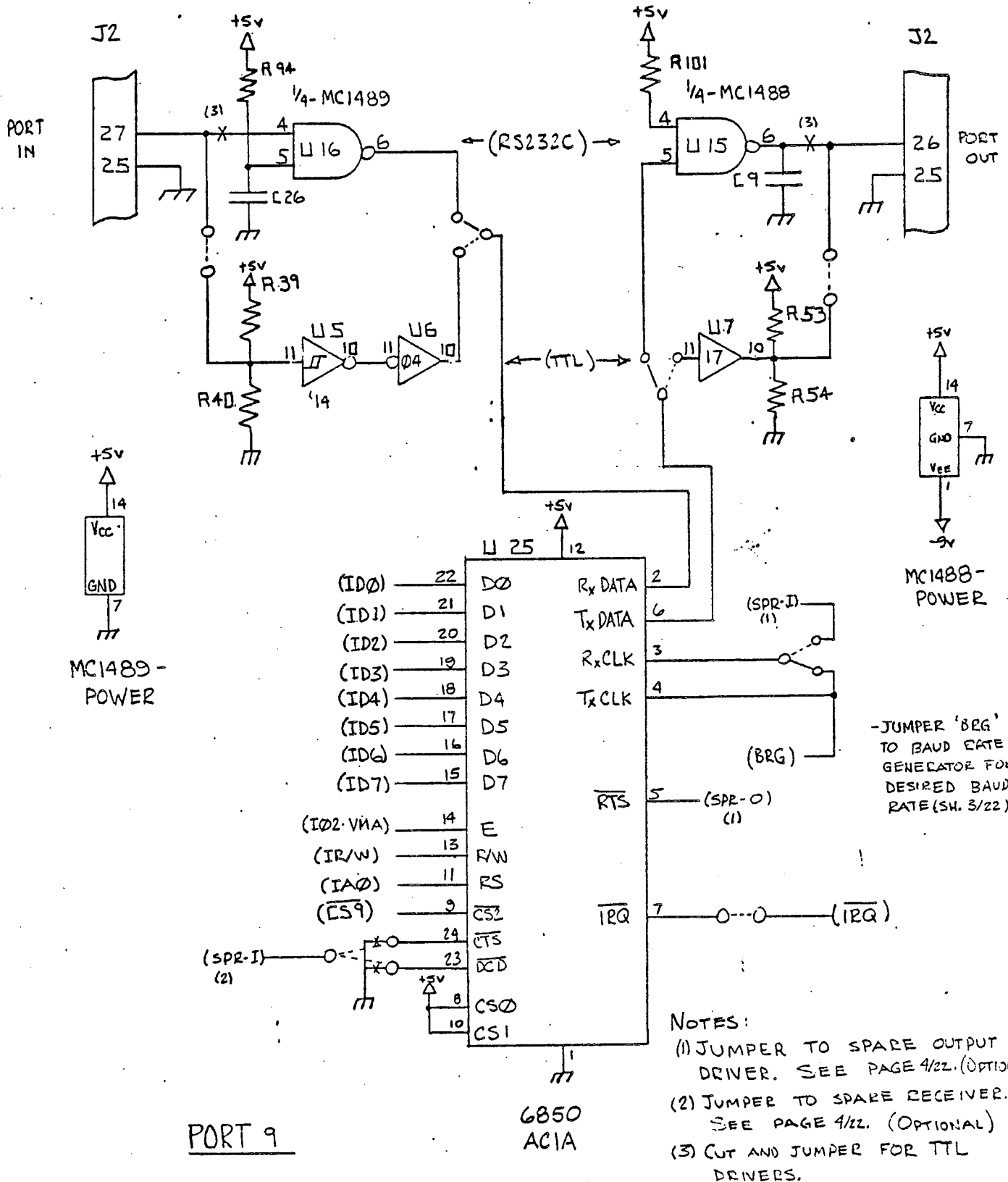


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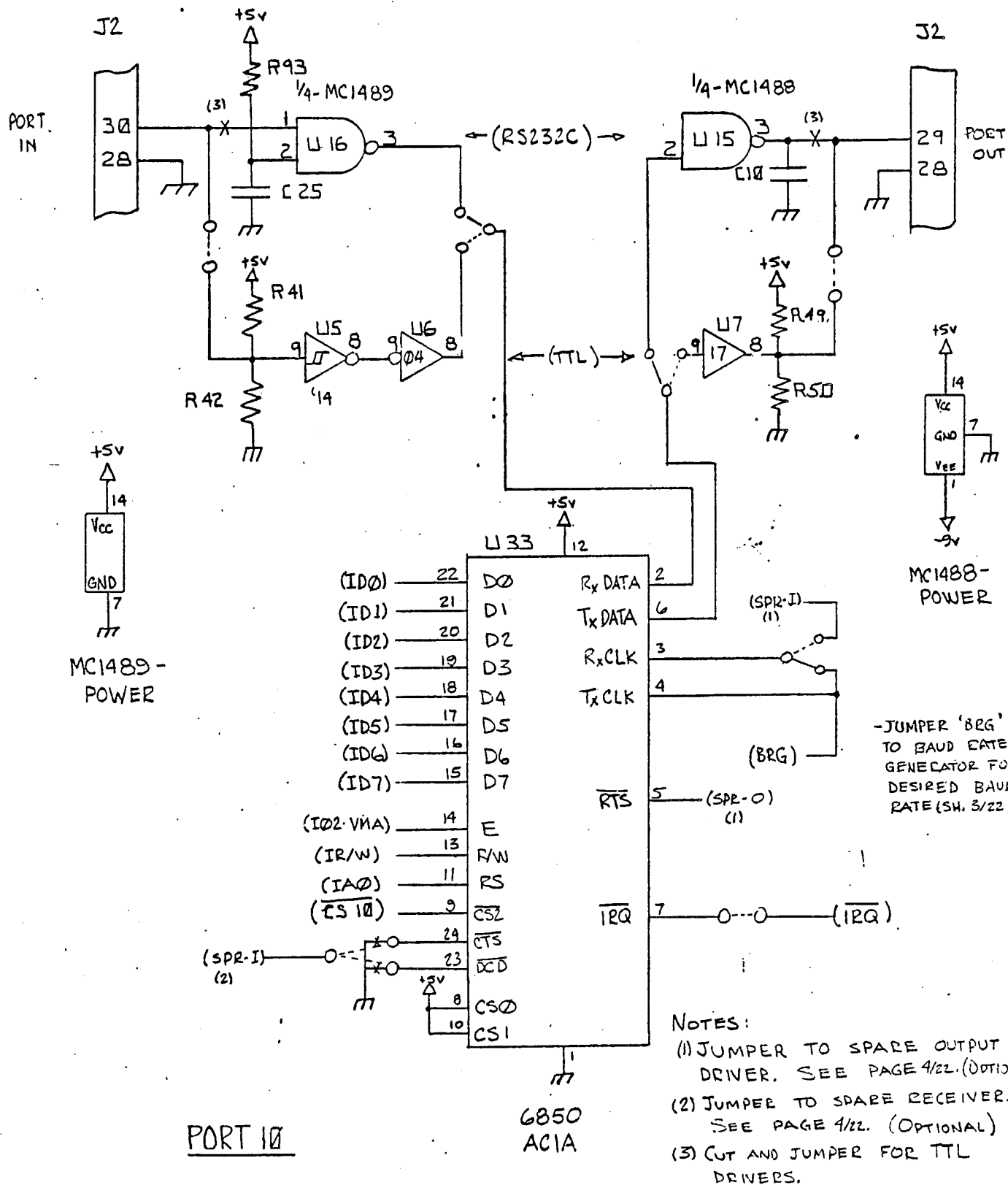
- NOTES:
- (1) JUMPER TO SPARE OUTPUT DRIVER. SEE PAGE 4/22. (OPTIONAL)
  - (2) JUMPER TO SPARE RECEIVER. SEE PAGE 4/22. (OPTIONAL)
  - (3) CUT AND JUMPER FOR TTL DRIVERS.

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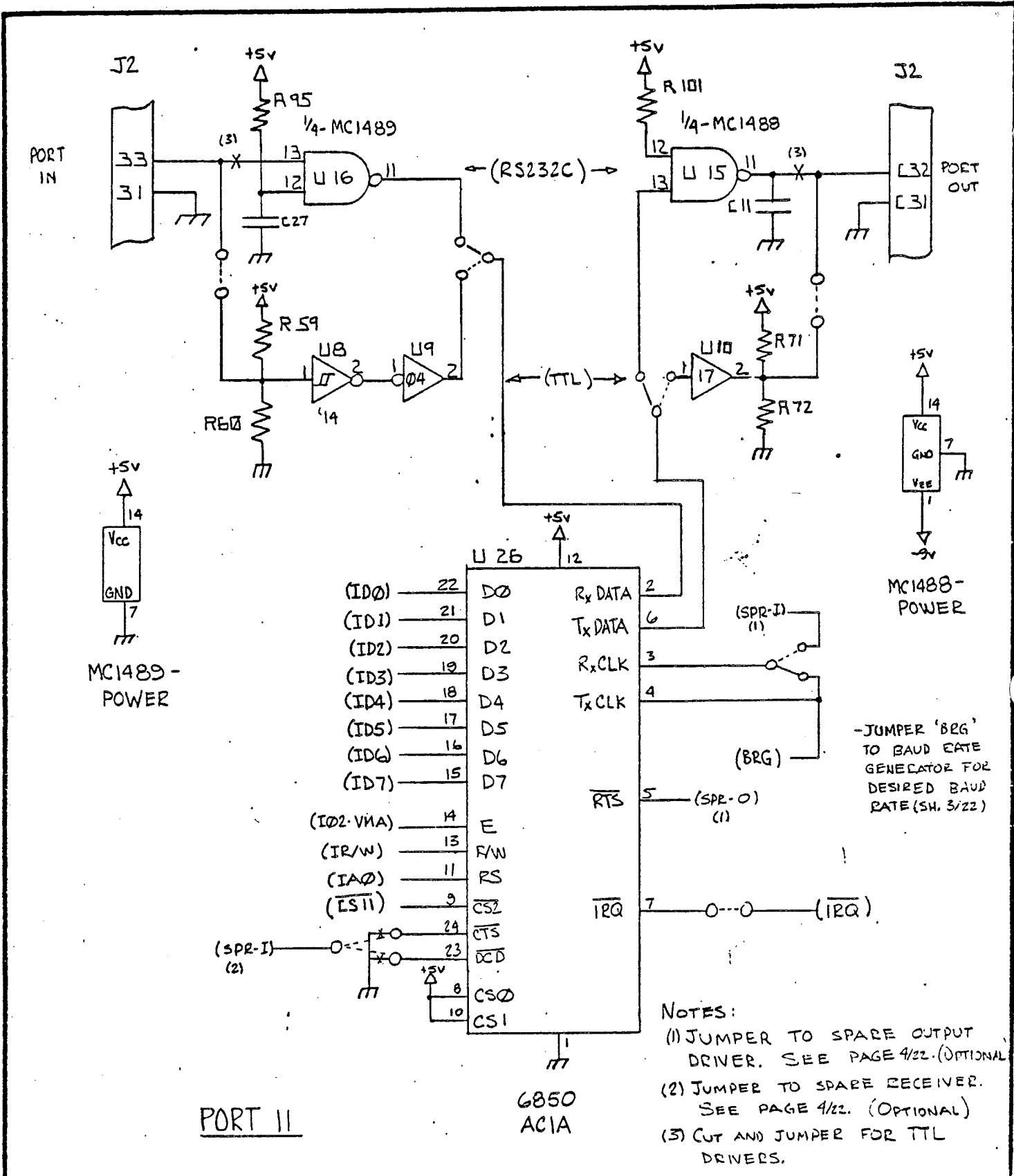
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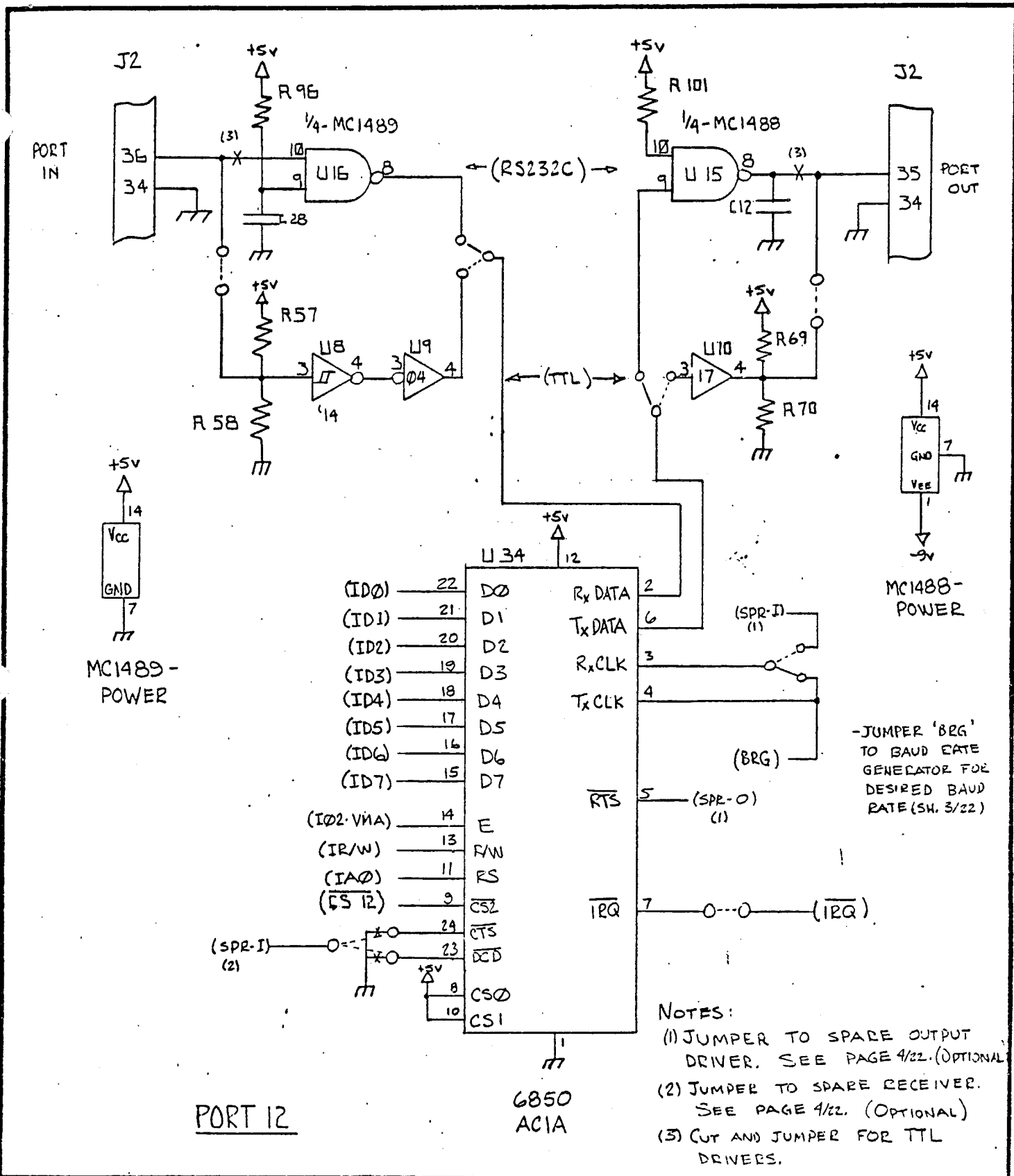
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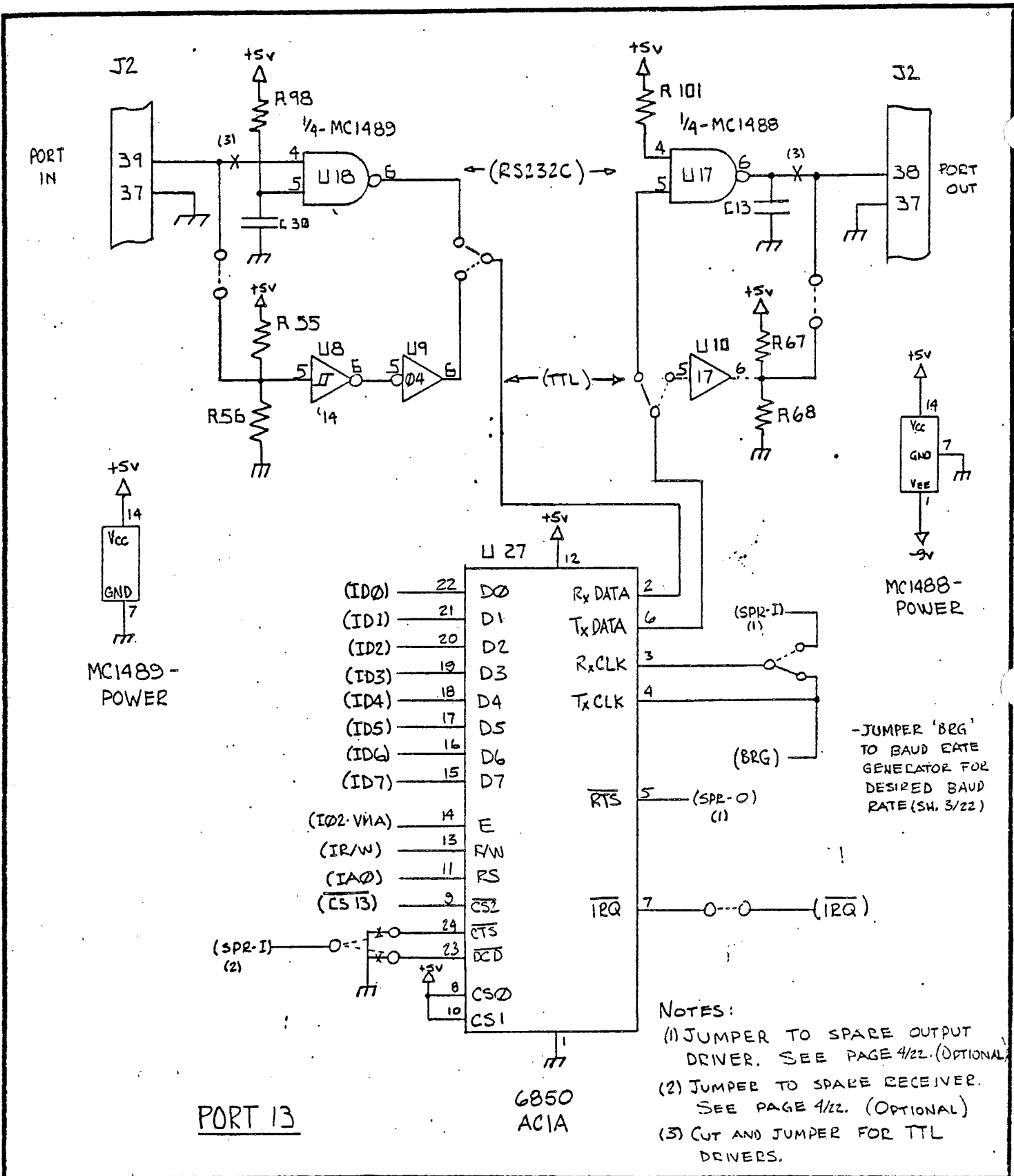


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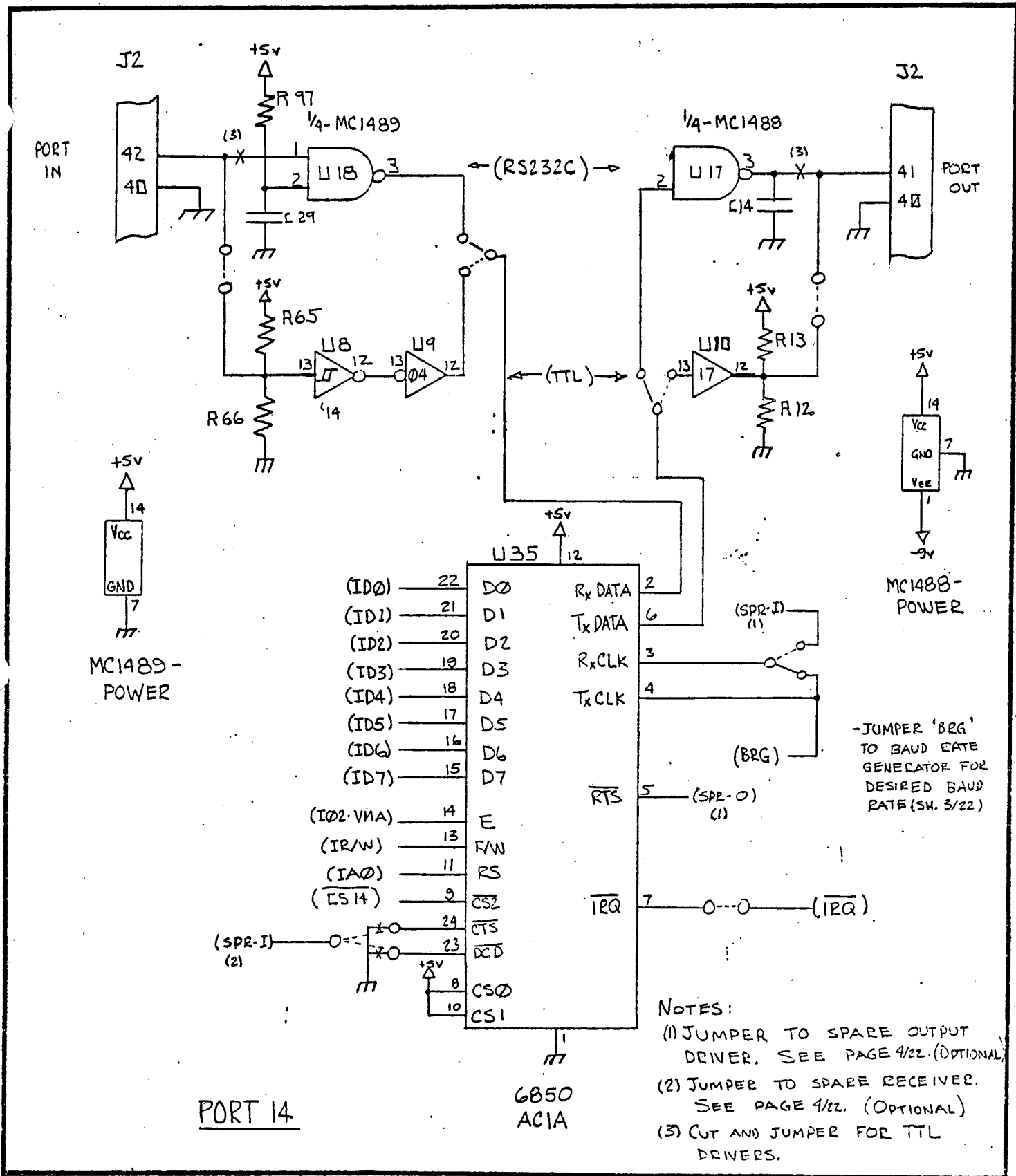
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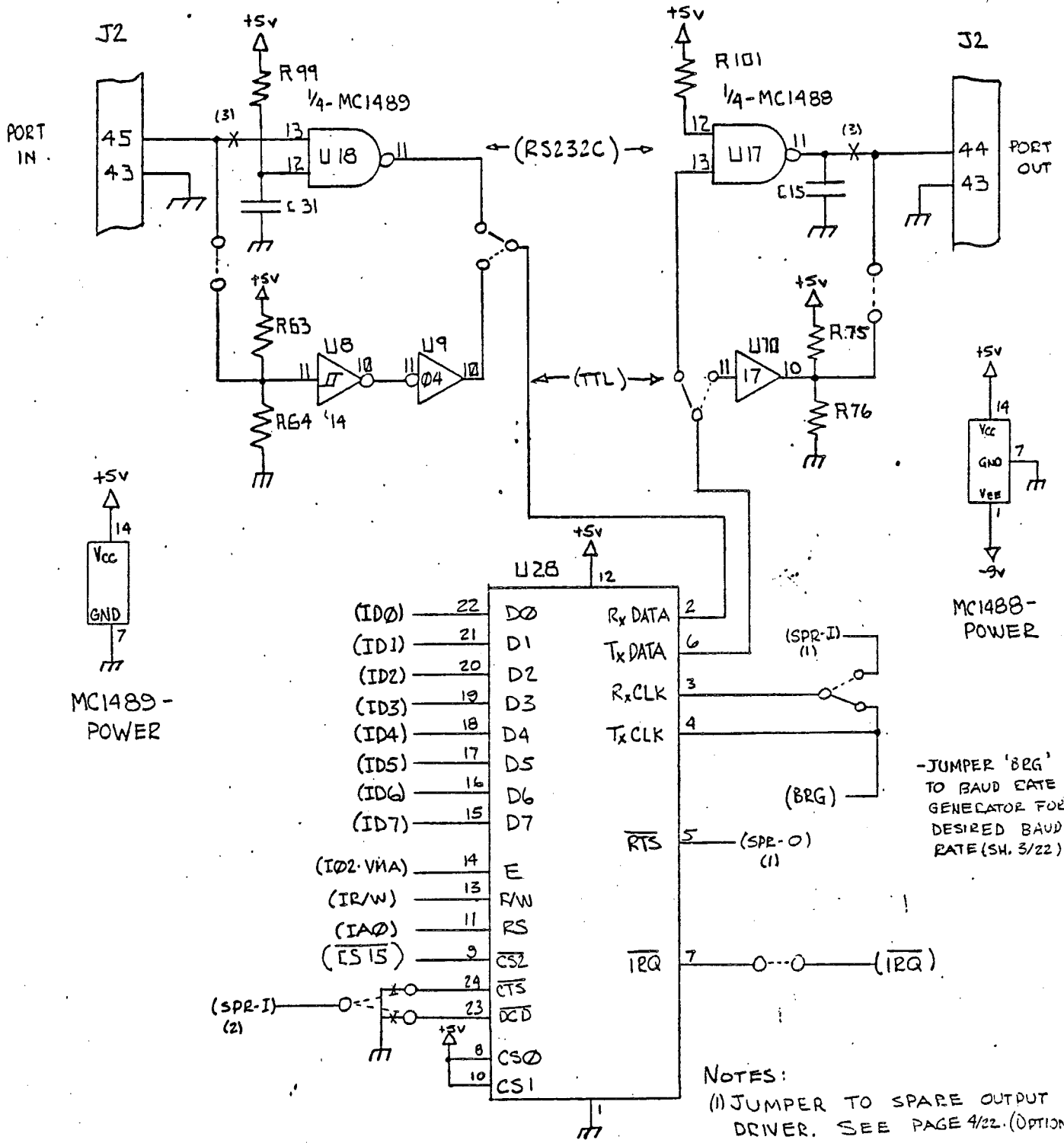
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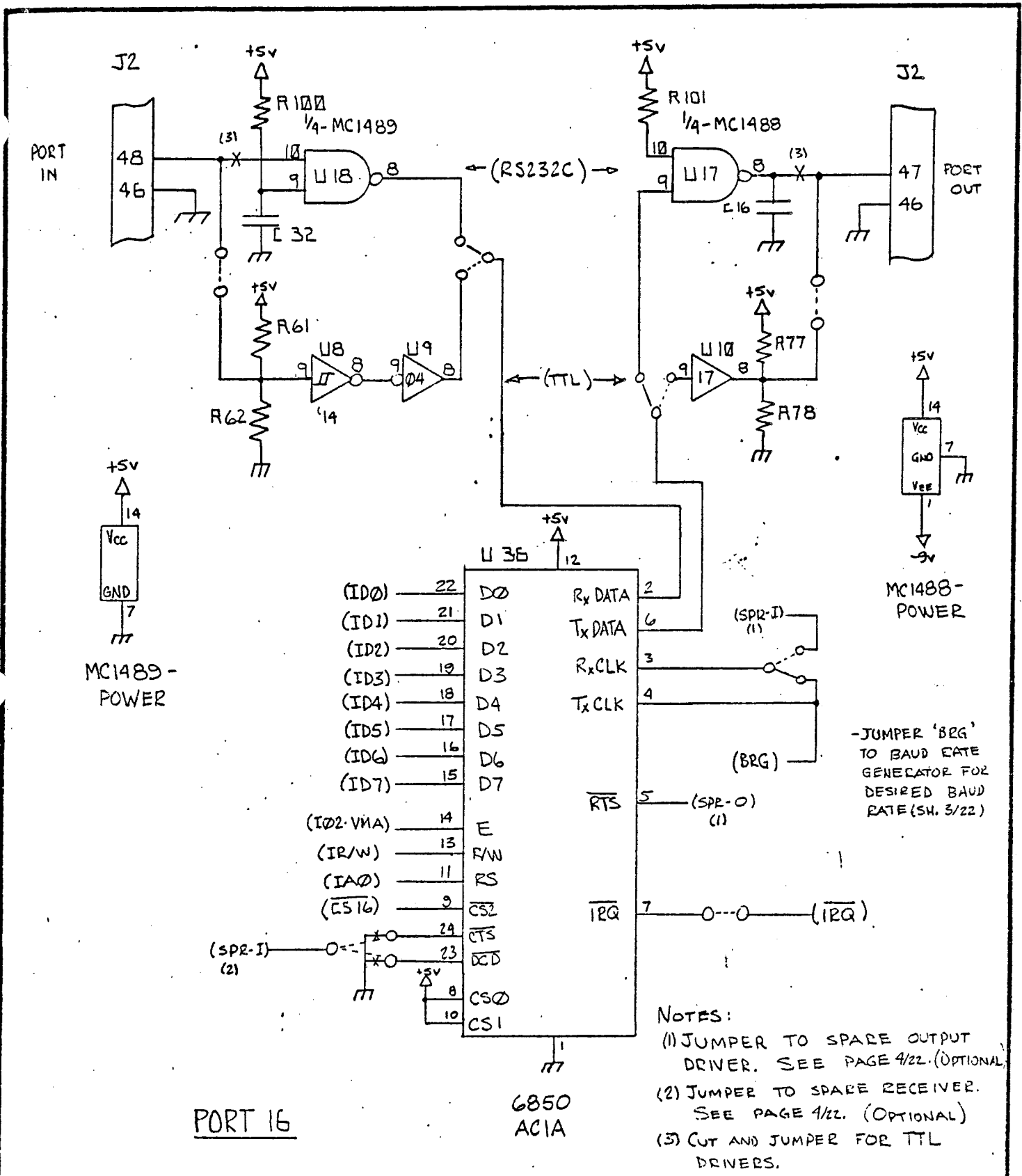
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RS232 RECEIVERS (MC1489)

ACIA #	RCVR IC#	Input pin	Output pin	RESISTOR/CAPACITOR	CONNECTOR
U21	U12	4	6	R86/C18	AX5
U29	U12	1	3	R85/C17	AX6
U22	U12	13	11	R87/C19	AX9
U30	U12	10	8	R88/C20	AX12
U23	U14	4	6	R90/C22	AX15
U31	U14	1	3	R89/C21	AX18
U24	U14	13	11	R91/C23	AX21
U32	U14	10	8	R92/C24	AX24
U25	U16	4	6	R94/C26	AX27
U33	U16	1	3	R93/C25	AX30
U26	U16	13	11	R95/C27	AX33
U34	U16	10	8	R96/C28	AX36
U27	U18	4	6	R98/C30	AX39
U35	U18	1	3	R97/C29	AX42
U28	U18	13	11	R99/C31	AX45
U36	U18	10	8	R100/C32	AX48

NOTE: PINS 2,5,9,12 ON EACH PACKAGE ARE RESPONSE CONTROL PINS<sup>2</sup> CONNECTED TO THE R-C NETWORK.

# FAST TRANSFER / CLOCK DRIVERS

	IC#	Input pin	Output pin	RESISTOR/ RESISTOR	CONNECTOR	FUNCTION
	U1	1	2	R1/R2	AX52	CLOCK
	U1	3	4	R3/R4	AX53	
	U1	5	6	R5/R6	AX54	
	U1	13	12	R7/R8	AX55	↓
	U1	11	10	R9/R10	AX56	
	U1	9	8	R11/R12	AX57	
	U4	1	2	R19/R20	AX58	↓
	U4	3	4	R21/R22	AX51	
	U4	5	6	R23/R24	—	
PORT 1	U4	13	12	R27/R28	/	FAST DATA (JUMPER)
2	U4	11	10	R29/R30		
3	U4	9	8	R25/R26		
4	U4	9	8	R25/R26		
5	U7	1	2	R43/R44		
6	U7	3	4	R45/R46		
7	U7	5	6	R47/R48		
8	U7	13	12	R51/R52		
9	U7	11	10	R53/R54		
10	U7	9	8	R49/R50		
11	U10	1	2	R71/R72		
12	U10	3	4	R69/R70		
13	U10	5	6	R67/R68		
14	U10	13	12	R73/R74		↓
15	U10	11	10	R75/R76		
PORT 16	U10	9	8	R77/R78		

## NOTES:

1. Jumper 'INPUT PIN' to 'Tx DATA' of desired ACIA, Jumper 'OUTPUT PIN' to desired output connector point.
2. AX49 and AX60 are GND. AX58 and AX59 are jumperable.

# FAST TRANSFER/CLOCK RECEIVERS

	IC#/ Input pin	IC#/ Output pin	RESISTOR/ RESISTOR	CONNECTOR	FUNCTION
PORT 1	U2/5	U3/6	R17/R18	AX58	CLOCK
	U2/9	U3/8	R83/R84	AX59	"
	U2/1	U3/2	R13/R14	—	FAST TRANSFER
2	U2/3	U3/4	R15/R16	/	(JUMPER)
3	U2/13	U3/12	R73/R80		
4	U2/11	U3/10	R81/R82		
5	U5/1	U6/2	R31/R32		
6	U5/3	U6/4	R33/R34		
7	U5/5	U6/6	R35/R36		
8	U5/13	U6/12	R37/R38		
9	U5/11	U6/10	R39/R40		
10	U5/9	U6/8	R41/R42		
11	U8/1	U9/2	R53/R60		
12	U8/3	U9/4	R57/R58		
13	U8/5	U9/6	R55/R56		
14	U8/13	U9/12	R65/R66		
15	U8/11	U9/10	R63/R64		
PORT 16	U8/9	U9/8	R61/R62		

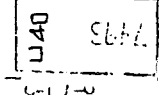
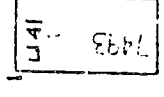
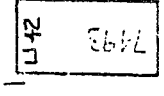
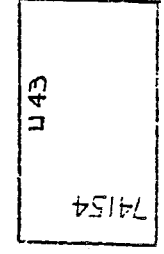
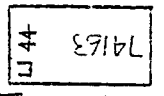
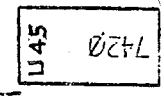
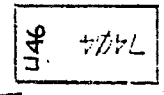
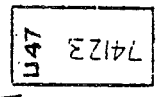
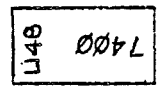
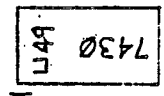
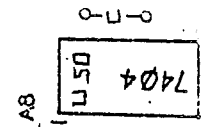
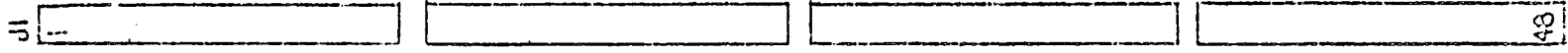
NOTE: 'IC#/INPUT PIN' refers to a 7414 IC.  
 'IC#/OUTPUT PIN' refers to a 7474 IC.

R3232 DRIVERS (MC1488)

ACIA #	DRIVER IC #	Input pin	Output pin	CAPACITOR	CONNECTOR
U21	U11	5	6	C1	AX2
U29	U11	2	3	C6	AX5
U22	U11	13	11	C2	AX8
U30	U11	9	8	C3	AX11
U23	U13	5	6	C4	AX14
U31	U13	2	3	C5	AX17
U24	U13	13	11	C7	AX20
U32	U13	9	8	C8	AX23
U25	U15	5	6	C9	AX26
U33	U15	2	3	C10	AX29
U26	U15	13	11	C11	AX32
U34	U15	9	8	C12	AX35
U27	U17	5	6	C13	AX38
U35	U17	2	3	C14	AX41
U28	U17	13	11	C15	AX44
U36	U17	9	8	C16	AX47

NOTE: PINS 4, 10, 12 ARE PULLED UP ON EACH PACKAGE VIA R101.

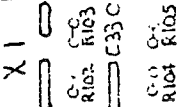




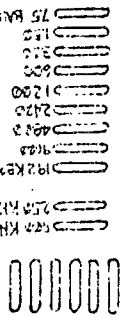
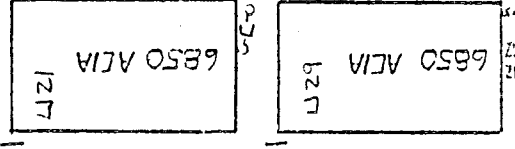
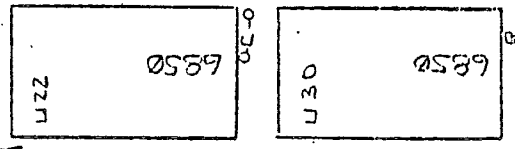
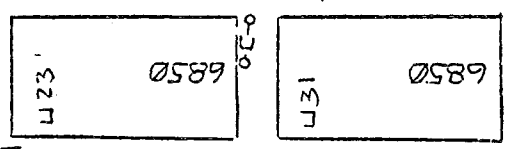
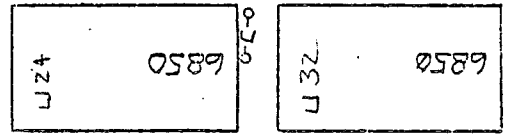
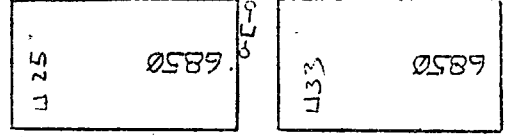
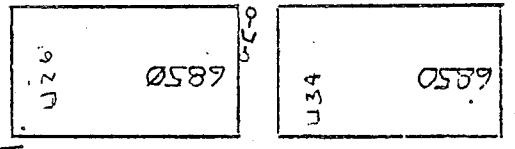
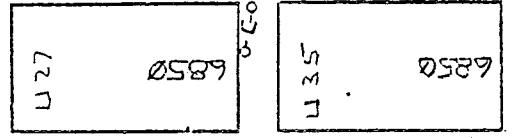
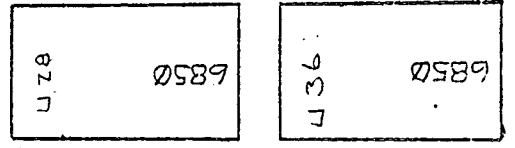
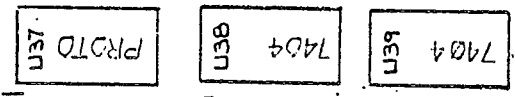
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