BANKER ASSEMBLY MANUAL

BY

J & R ELECTRONICS
P.O. BOX 2572
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* * * CAUTION * * *

* * * READ BEFORE CONTINUING * * *

Although most SAMs(74LS785) and memory devices(41256) have built-in protection diode networks which protects the device against damage due to static electric discharge, additional precaution should be followed to assure trouble-free performance after assembly or installation.

1. Use a conductive, grounded work surface (aluminum foil works well).

2. Keep yourself at ground potential (use conductive wrist bands or keep in constant contact with aluminum foil when handling components). If you have a metal work surface ground it through a 1 Megohm resistor.

3. Don't wear nylon or other clothing which will generate a static charge. (Beware of waxed floor and nylon carpet)

4. Ground solding iron (preferably use a low-voltage type)

5. Do not insert or remove chips from sockets with power applied.

6. Metallic tools should be grounded permanently or by repeated discharge on the work surface.

7. Avoid touching the leads of static sensitive components. Leave in its conductive mount until ready to use

    J & R Electronics will not be held responsible for damage to components as a results of improper handling.

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Welcome to the world of J&R Electronics. We would like to thank
you for choosing our product. The following is a brief look at J&R
and some of our policies.

J&R products are designed, assembled and tested by Jesse
Jackson and Raymond Rowe, who are and have been dedicated CoCo
nuts since day one when the CoCo was a 4K machine selling for
approximately $350.00. Both are presently or have been co-authors
of the Dr. ASCII column as well as having published articles of
their own.

The "Banker" was designed to fit inside the CoCo I or II
which resulted in a small board with little space between IC chips
and components. This will require the assembler to be an
experienced solderer and should not be attempted by the beginner.
J&R Electronics will not be responsible for any damages to the
computer resulting from improper soldering or asmbly on the part
of the purchaser. However, it is J&R's policy that should you be
one who purchased the bare board and after inspection, feel you do
not want to attempt soldering; return the board in its orginal
condition and we will apply this amount toward an assembled board.
If a complete kit was purchased, return it in its orginal
condition and we will apply the purchased amount toward an
assembled and tested board. We want you to have a product you can
use and enjoy. In the event that you wish to return our product,
a $20.00 fee will be charged for re-stocking and testing of the
returned unit before refunding.

It is also our policy to fully support our products in the
future with product updates, new software availability, and new
products. All this will be directed to our "Banker" customers
first; by special mailing.

Enough talk, by now you have made up your mind to either send
back the board or ready to start the assembly. Before starting,
let's make sure you have the right equipment to do the job.

(✓) - Soldering iron approximately 25 Watts preferably with a
       small, round or chisel point.

(✓) - Diagonal cutters, small size not the type used by
       power line workmen.

(✓) - Longnose pliers, small size

(✓) - Wire, approximately 20 inches of 26 or 30 gauge solid
        conductor insulated (Wire wrap wire works great)

(✓) - Multimeter

(✓) - Magnifier (option1 to check for solder bridges)

OK let's see if you have all the required parts whether you
bought them locally or purchased the kit from J&R.

(✓) - 3   14 pin IC Socket

(✓) - 4   16 pin IC Socket

(✓) - 3   40 pin IC Socket (2 required if you have a CoCo II)
             The recommended socket which is to be soldered to the
             board is a machined pin, solder tail socket with a
             minimum of 0.130" from sleeve to end of pin. These
             are approximately $3.00 each, the part number and
             manufacturer are listed below:

             Precicontact #SD640T180

             Precicontract Inc.
             P.O. Box 798
             1150 Wheeler Way
             Langhorne, Pa 19047

They are available from J & R Electronics for $3.00 plus $1.50
shipping and handling.

(✓) - C3   100pF Capacitor

(✓) - C2 & C4   .01uF or .1uF Capacitor

(✓) - C1   33uF or 47uF 6.3V Tantalum Capacitor

(✓) - R1   4.7K Ohm 1/4 Watt Resistor   (Yellow-Violet-Red)

(✓) - R5   330 Ohm 1/4 Watt Resistor   (Orange-Orange-Brown)

(   ) - R2, R3 & R4   33 Ohm 1/4 Watt Resistor
                       (Orange-Orange-Black)

(✓) - U1   IC 74LS785 (Not supplied, use existing 74LS783 or 6883)

(✓) - U7   IC 74LS00

(✓) - U3   IC 74LS02

(✓) - U8   IC 74LS32

(✓) - U2   IC 74LS133

(✓) - U6   IC 74LS153

(✓) - U4 & U5   IC 74LS175

(✓) - 8   IC 41256 150 ns for a 256K system or
       - 16   IC 41256 150 ns for a 512K system

(✓) - 3 pin PC board connector (male) if Memory Expansion Board
        is to be used

(   ) - cable with 3 pin female connector

NOTE: The IC 41256's are not provided with the kit from J & R
Electronics.

Alright, have everything?   Then here we go, be sure to check each
step off as it is completed.

(✓) STEP 1 READ THE INSTRUCTIONS COMPLETELY BEFORE STARTING.

(✓) STEP 2 Install the following IC Sockets: (Refer to Figure 1)

CAUTION: A "solder bridge" is when the solder, from the foil pad
on which you are soldering to, produces a bridge to an adjacent
pad or land. A solder bridge is unwanted and can sometimes be
disasterous by damaging more inside the computer than just the
chip or component which it shorts.

(✓)   40 pin IC Socket in U-1 position (do not allow a large
         amount of solder to flow up the pins as the pins must seat
         into another socket. Refer to Figure 2.)

(✓)   16 pin in location for U-4

(✓)   16 pin in location for U-6

(✓)   16 pin in location for U-5

(✓)   16 pin in location for U-2

(✓)   14 pin in location for U-3

(✓)   14 pin in location for U-7

(✓)   14 pin in location for U-8

(✓)   STEP 3 Before going any further, refer to Figure 2 and plug

the 40 pin socket into the additional socket(s) as require.   This
is to obtain the required height over the skating pin located next
to the SAM chip on the computer PC Board of the Coco I.

(√)   With the Multimeter set to the Ohms function,
         check for NO shorts between positive 5 volts
         (pin 40 of U1) and ground (pin 20 of U1) on
         the board before applying power.

(√)   Ensure that your computer's AC power switch
         is turned off and the power cord removed from
         the wall outlet.

(√)   Carefully remove the SAM chip (6883, 74LS783
         or 74LS785).

(√)   Without chips installed in "Banker", plug
         the 40 pin socket into the location where you
         removed the SAM chip.

(√)   Reconnect AC power, turn on the computer and
         using the DC Voltmeter function of the
         multimeter, check for the presence of positive
         5VDC at the following locations:

(√)   Positive lead to pin 40 of U-1 and negative
         lead to pin 20 of U-1.

(√)   Positive lead to pin 14 of U-3 and negative
         lead to pin 7 of U-3.

(√)   Repeat previous step for U-7 and U-8.

(√)   Positive lead to pin 16 of U-2 and negative
         lead to pin 8 of U-2.

(√)   Repeat previous step for U-4, U-5, and U-6.

If all voltages check, then proceed to the next step. If not, turn
off power, remove board and check soldering for bridges or
unsoldered pins.

(   )   STEP 4 Ensure AC power is off to the computer.

(√)   Install the SAM in U-1 location on the Banker
         board.

(√)   Turn power to the computer.

(√)   Computer should operate normally.

If it does not, turn off the power, remove the board and recheck

for solder bridges or unsoldered pins.

(✓) STEP 5 If it works normally, stop , take a break, wipe the perspiration off your brow and take something to relax you before continuing.

( ) STEP 6 Install and solder the following resistors in the proper locations as shown on Figure 1.

    ( ) 33 Ohm 1/4 Watt Resistor (not required if using Memory Expansion Board)

    (✓) 4.7K Ohm 1/4 Watt Resistor

    (✓) 330 Ohm 1/4 Watt Resistor

(✓) STEP 7 Install the 33uF or 47uF capacitor in the proper location. Position the capacitor's positive lead so that it is connected to pin 1 of U-5.

(✓) STEP 8 Install and solder the .01uF OR .1uF and the 100pF capacitors as shown on Figure 1.

(✓) STEP 9 If using the Memory Expansion Board, install the connector in the three holes closest to the board's edge instead of the 33 Ohm resistor.

(✓) STEP 10 At this time you can decide if you want to install the disable switch, and if so whether it would be mounted internally on the board, or externally, or not installed at all. This switch is not furnished with the kit or completed board. We know that there are programs presently available for the 64K CoCo, which will not run properly with the "Banker". Installing the switch will enable you to return your CoCo to the standard 64K machine without removing the "Banker" board. Refer to Figure 1 for location of switch connections (labeled S1). The switch can be mounted on the CoCo case at the user's preference. A solderless switch is available from J & R Electronics at $5.00 each. J & R Electronics highly recommends installation of this switch.

( ) STEP 11 Re-check your soldering once more, then install the IC chips in their proper sockets.

CAUTION: DO NOT BEND THE PINS WHEN YOU INSERT THEM IN THE SOCKETS AND BE SURE THAT PIN ONE IS POSITIONED CORRECTLY IN THE SOCKET.

    (✓) U-1 - SAM

    (✓) U-2 - 74LS133

(✓)   U-3 - 74LS02

(✓)   U-4 - 74LS175

(✓)   U-5 - 74LS175

(✓)   U-6 - 74LS153

(✓)   U-7 - 74LS00

(✓)   U-8 - 74LS32

If you're using the Memory Expansion Board, skip Steps 11 and 12.

( )   STEP 11   If 512K go to Step 12.   Preparing the memory chips
for a 256K system prior to installation.   Please read the CAUTION
page at the beginning of this manual.   Refer to Figure 3.

    ( )   Carefully bend pin 1 of each 41256 chip straight out.

    ( )   Place chips with approximately 3/4 inch between each
        pin one in a single row on a piece of conductive
        material.   This will act as a jig and make it easier
        during solder.

NOTE: If you have the new CoCo II catalog number 26-3134/3136
which has been upgraded to 64K or purchased the 26-3127B, you will
require a longer wire between two of the chips in order to connect
between the two rows as well as removing the crystal and laying it
flat after extending the leads.   It will be better to make the
wire between chips 4 and 5 approximately 2 to 2 1/2 inches long.

    ( )   Connect each pin 1 to the next pin 1 with
        approximately 1 inch of insulated wire as
        shown in Figure 3.   Do not hold the soldering iron
        on the pins very long as it will damage the chips.
        Use only enough heat to produce a good solder joint.

    ( )   After connecting all the pin 1's of the 41256 chips
        together, solder approximately a 5 to 6 inch length
        of wire to the pin 1 of the fourth chip.   See Figure
        3.

    ( )   Remove the present memory chips.

    ( )   Carefully install the new memory chips without
        breaking the wires connecting the pin 1's together.

    ( )   At this time you have three ways in which to connect
        the memory chips to the "Banker".

        A.   Place the unterminated end of the 6 inch wire

through the hole labeled A8 on the board and
solder it.

B. Install the board in place then solder the 6 inch
wire to the 33 Ohm resistor lead on top of the
board which connects to the pad.

C. Purchase a small IC clip and solder it to the end
of 6 inch wire and after the "Banker" is in place,
attach the clip to the resistor lead.

If you are sure you have performed all the steps correctly,
reconnect power to the computer and the computer will come up as
it did before the modification. If it does not, go back and check
for mistakes.

Refer to your USER MANUAL for included software to test your
memory chips and other programs for use with the BANKER.

(   ) STEP 12   Preparing the memory chips for a 512K system prior
to installation. Please read the CAUTION page at
the beginning of this manual. Refer to Figure 4.

(   ) Carefully bend pin 1 and pin 15 of each 41256 chip
straight out.

(   ) Position two (2) chips as shown in Figure 4 and care-
fully solder the pins together as shown. You will
need eight (8) sets. BE EXTRA CAREFUL WHEN PERFORMING
THIS STEP.

(   ) Place chips approximately one (1) inch between each
pin one in a single row on a piece of conductive
material. This will act as a jig and make it easier
during solder.

(   ) Connect each pin 1 to the next pin 1 with approxi-
mately 1 1/2 inch of insulated wire as shown in
Figure 4. Do not hold the soldering iron on the pins
very long as it will damage the chips. Use only
enough heat to produce a good solder joint.

(   ) Perform previous step for pin 15's of the bottom row
of chips and then for the top row of pin 15's. See
Figure 4.

(   ) Install a jumper between pin 1 of the top row and
pin 1 of the bottom row. See Figure 4.

(   ) Solder approximately a 5 to 6 inch length of wire to
pin 1 of the fourth 41256 chip of the top row.

(   ) Solder approximately a 5 to 6 inch length of wire to

pin 15 of the fourth 41256 chip of the bottom row.

( ) Solder approximately a 5 to 6 inch length of wire to pin 15 of the top row as in the previous step.

( ) Carefully install the new memory chips without breaking the wires connecting the pins together.

( ) At this time you have three ways in which to connect the memory chips to the "Banker".

    A.   Place the unterminated ends of the 6 inch wires through the proper holes on the board and solder them.

    B.   Install the board in place then solder the wires to the 33 ohm resistor leads on top of the board which connect to the pads.

    C.   Purchase three micro test clips (Radio Shack part number 270-370) and solder them to end of the wires and after the "Banker" is in place, attach the clips to the resistor leads.

( ) Using one of the methods suggested above, connect the following:

    ( ) Wire from pin 1 to pad labeled A8.

    ( ) Wire from pin 15 bottom row to pad labeled A0.

    ( ) Wire from pin 15 top row to pad labeled A1.

    ( ) Carefully install the new memory chips without breaking the wire connnecting the pins together.

( ) Install the "Banker" in the Sam socket.

NOTE: Some models of the COCO may require additional 40 pin sockets in order to raise the Banker above the memory chips.

(✓) At this time, turn on power and the computer should display the normal logo.

    ( ) If it does not, go back and check wiring, look for shorts, or bent pins. Then follow troubleshooting procedures.

    ( ) If computer comes up normally, refer to USER MANUAL and run memory test.

    ( ) Refer to USER MANUAL for other programs.

TROUBLESHOOTING PROCEDURES

I. Inoperable Computer

    A. Symptoms: System hangs up at power-on or garbage on screen

    B. Possible Cause:
        1. Faulty connection to SAM socket
        2. Faulty wiring to memory chips
        3. Bad SAM or memory chips

    C. Procedure: (Turn off power when handling the circuitry)
        1. Remove A8 wire between Banker and pin 1 of memory
            and ground pin 1 of memory chips.

            If the computer is now operable, the problem is in
            the memory or the A8 wire or A8 circuitry on Banker.

            If not operable, procede to step 2.

        2. Remove the Banker. Remove the SAM from the Banker
            and place it in the SAM socket of the computer.

            If the computer is now operable, problem is in the
            Banker board. Visually inspect the board for
            unsoldered connections, solder splashes, bent pins on
            bottom socket, etc.

            If not operable, procede to step 3.

        3. Remove the ground from pin 1 of the memory chips and
            tie it to +5V. Repeat step 2.

            If the computer is now operable the problem is in the
            memory chips.

            If not operable and you 512K, procede to Step 4. If
            you have 256K, the SAM is probably bad.

        4. Swap A0 & A1.

            If operable, the problem is in the memory.
            If not operable, the SAM is probably bad.

II. Operable Computer - Can't switch BANKS

    A. Possible Cause:

        1. 64K switch ON
   2. A8 line from Banker tied to +5V or ground

(On most computers, pin 1 MUST NOT be re-inserted in the
   memory socket)
3.   Electrolytic capacitor installed backwards (33uf or
     47uf).
4.   Unsoldered connections on Banker board or solder
     splashes shorting traces.

NOTE: J&R repair policy — minimum $20 service charge plus $3.00
shipping and handling charge and actual cost of parts for repairs
not covered under warranty.

COMPONENT LAYOUT
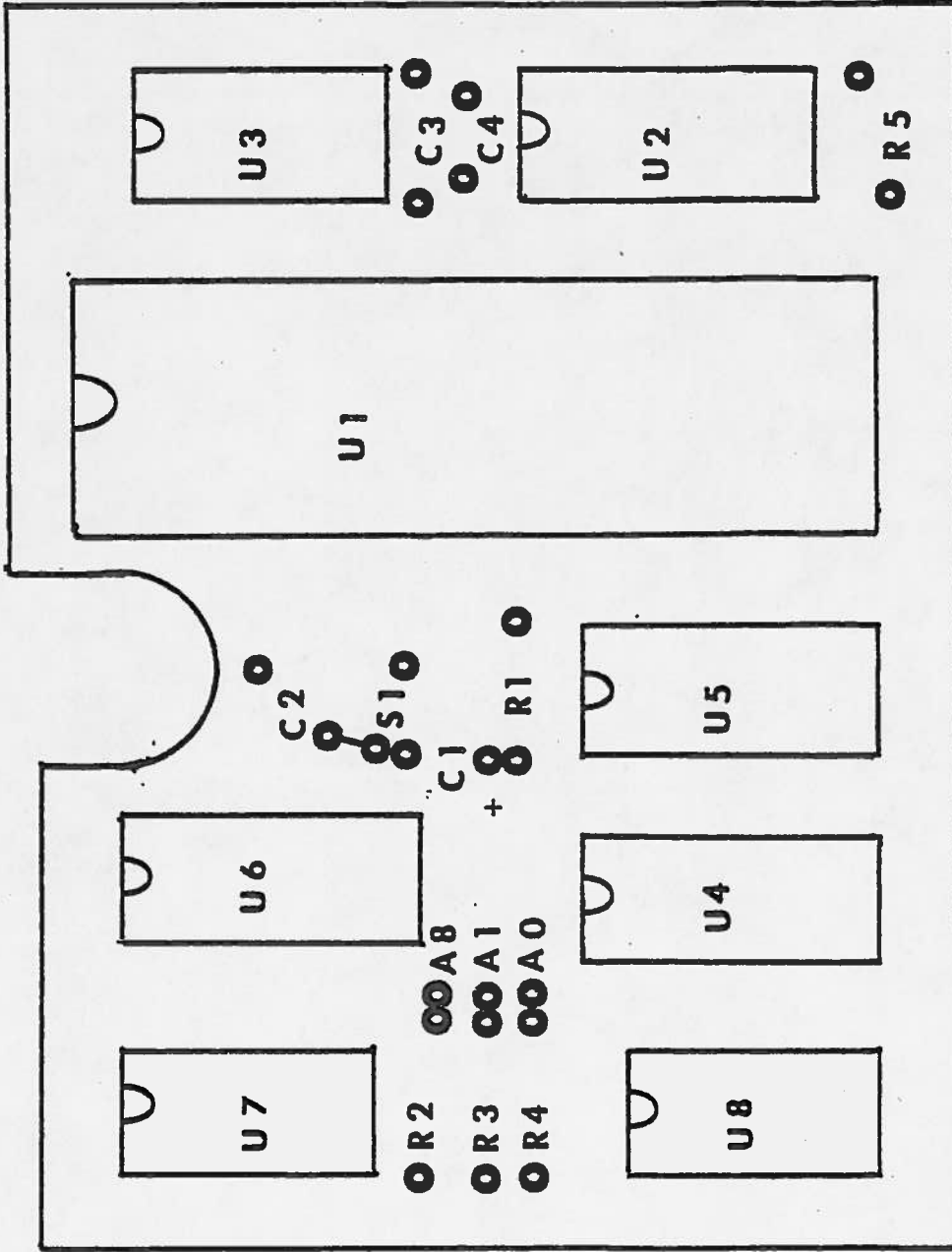
U1-IC 74LS785
U2-IC 74LS133
U3-IC 74LS02
U4-IC 74LS175
U5-IC 74LS175
U6-IC 74LS153
U7-IC 74LS00
U8-IC 74LS32
R1-4.7K Ohm Resistor
R2-33 Ohm Resistor
R3-33 Ohm Resistor
R4-33 Ohm Resistor
R5-330 Ohm Resistor
C1-33uF or 47uF Capacitor
C2-.01uF or .1uF Capacitor
C3-100pF Capacitor
C4-.01uF or .1uF Capacitor
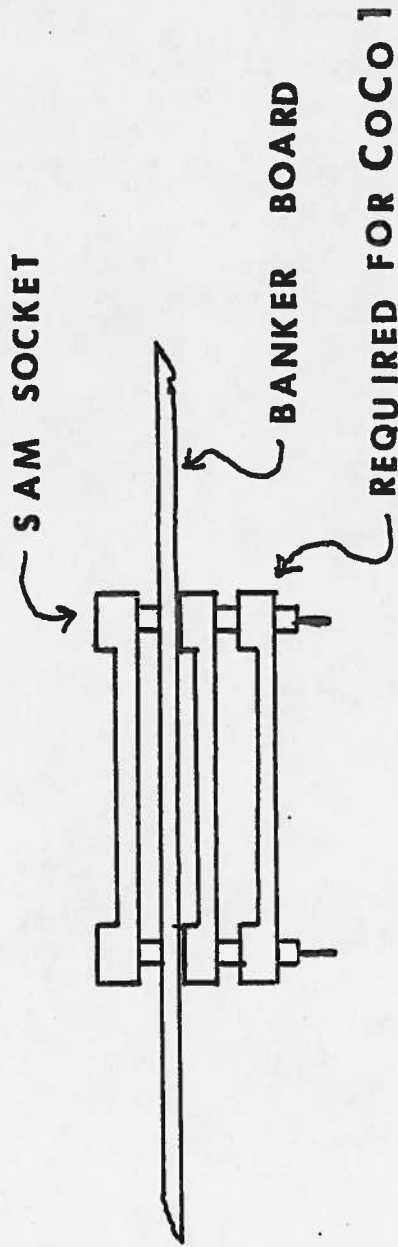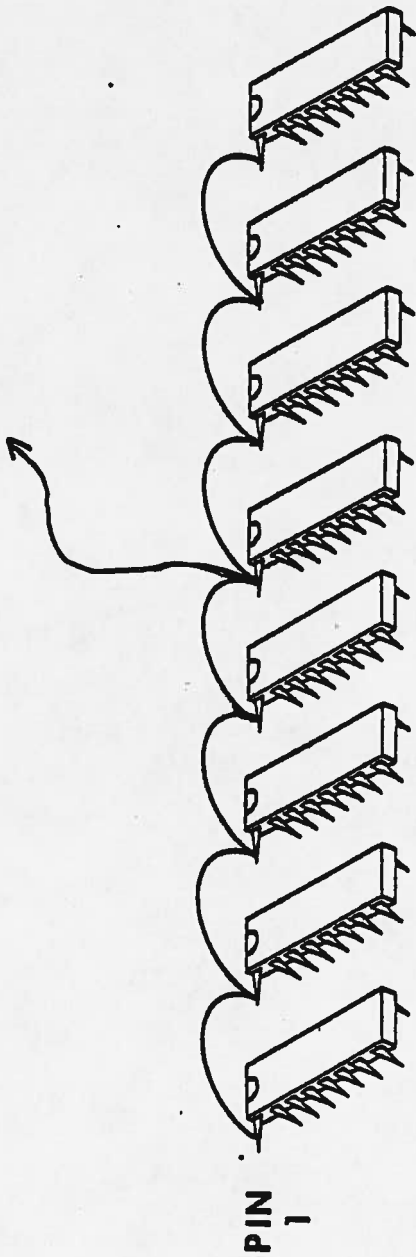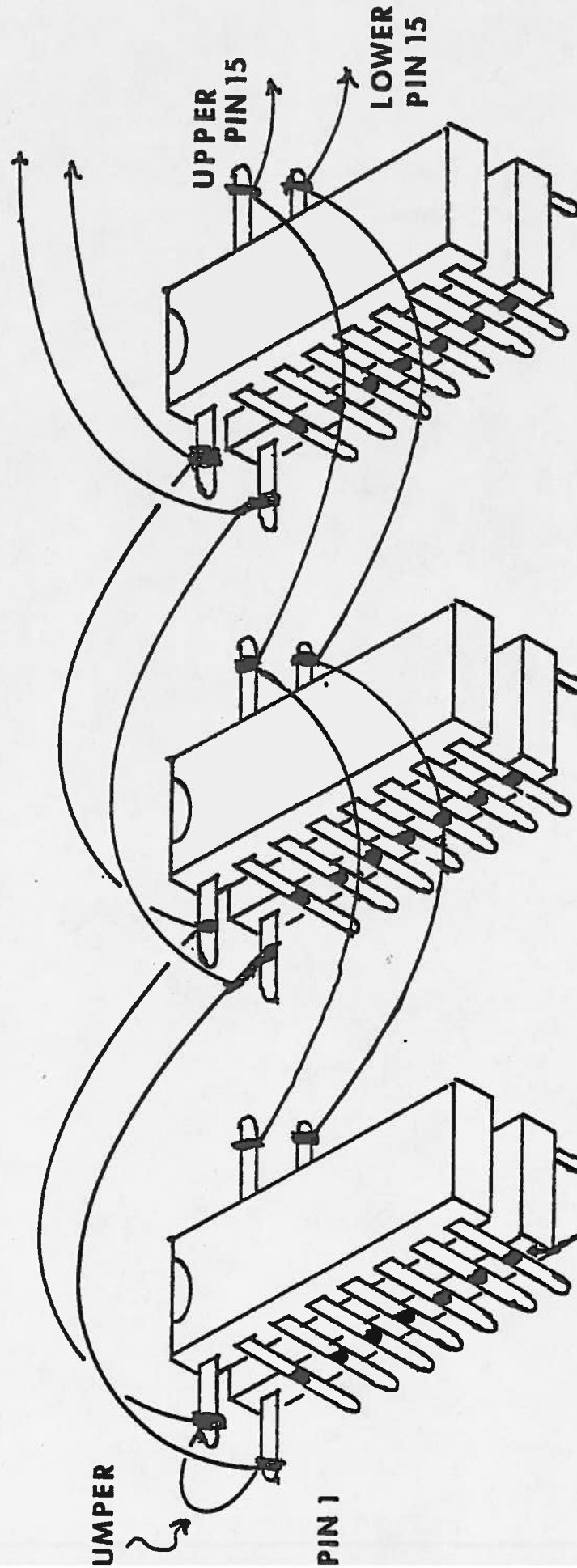S1 - See Text

FIGURE 1

SOCKET ASSEMBLY

SAM SOCKET

BANKER BOARD

REQUIRED FOR CoCo 1

FIGURE 2

256K SYSTEM

PIN 1

TO A8

FIGURE 3

512K SYSTEM

TO OTHER
5 CHIPS

UPPER
PIN 15

LOWER
PIN 15

UMPER

PIN 1

SOLDER
POINT

16 – 41256 CHIPS REQUIRED

FIGURE 4