# THE Z100

# SPEED MODULE

# $49.95

**C.D.R. Systems**
**INCORPORATED**

# ZS100 LIMITED WARRANTY

The ZS100 will work without any problems on a large percentage of the Z100 line of computers without any modifications. There will be some computers that will need to have one or more chips replaced, or an adjustment made on the floppy controller card before the ZS100 will be able to run in the fast mode (see section on trouble shooting). If it is determined that your computer falls under this category, and you decide that it is not worth the effort to add the needed parts and labor to use the ZS100 in its fast mode, (within 30 days of purchase), then the ZS100 can be returned for a refund to the seller of the ZS100. If the ZS100 is received in a defective condition, or if the ZS100 becomes defective under normal use, any time over a TWO YEAR period from the date of purchase, it can be mailed to C. D. R. Systems, and a replacement will be sent to you. If it is found that failure of the ZS100 was due to abuse by the customer, a small replacement fee will be charged, not to exceed half of the price of the ZS100.

**WARNING:** In no event will C. D. R. Systems or the seller of the ZS100, be liable for incidental or consequential damages deemed to have been incurred through the aquisition, installation or use of the ZS100.



**C.D.R. Systems**
**INCORPORATED**

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# INTRODUCTION

All computers are limited in the given amount of work that can be performed in a given length of time. If the computer can be made to perform tasks faster, then the cost effectiveness of the computer to both the business man and the hobbyist is improved. The desire to increase the speed of the ZS100 line of computers can be seen in the large number of users who have been willing to risk soldering a crystal into the 4 layer Z100 mother board, hazarding damage to the board and loss of warranty. There is a safer way to attempt to increase Z100 computer speed.

The Z100 Speed Module, (ZS100), increases the speed of the 16 bit processor in the Z100. It does this by providing an alternate Crystal Oscillator that can be switched into the CPU clock divider in place of the standard crystal. This crystal only affects the 16 bit processor in the Z100 since the 8 bit processor is controlled by a different crystal. The standard time counter and the I/O ports are not affected by this modification, but the video screen updating speed is increased since it is memory based. ZDOS and CP/M86 programs show a marked improvement in time performance since all memory and CPU activity runs 50% faster. CP/M85 also runs faster because it switches to the 16 bit processor internally to perform a lot of its work.

# PREPARE FOR INSTALLATION

The ZS100 is packaged with the following items:

1. PC Card                                                        ( )
   Soldered to the card:
   A. One 22.5000 MHZ Crystal Oscillator                          ( )
   B. One 18 Pin Socket                                           ( )
   C. One Resistor                                                ( )
   D. Two interface pin rows for an 18 pin socket                 ( )
   E. One 18" two wire cable                                      ( )
      (other end soldered to switch)

2. Switch Plate                                                   ( )
   On the Plate:
   A. The letter F stamped on the plate                           ( )
   B. One switch connected to the plate with
      two 2-56 screws and nuts                                    ( )

3. Two 4-40 screws with nuts, used to connect the
   Switch Plate to an empty Z100 DB25 slot                        ( )

If the above items are not in the ZS100 package, contact the seller of the ZS100, or C. D. R. Systems to receive the items that were left out.

To install the ZS100, a small Phillips Screwdriver, a Flat Head Screwdriver, and a 1/4 inch wrench will be useful.
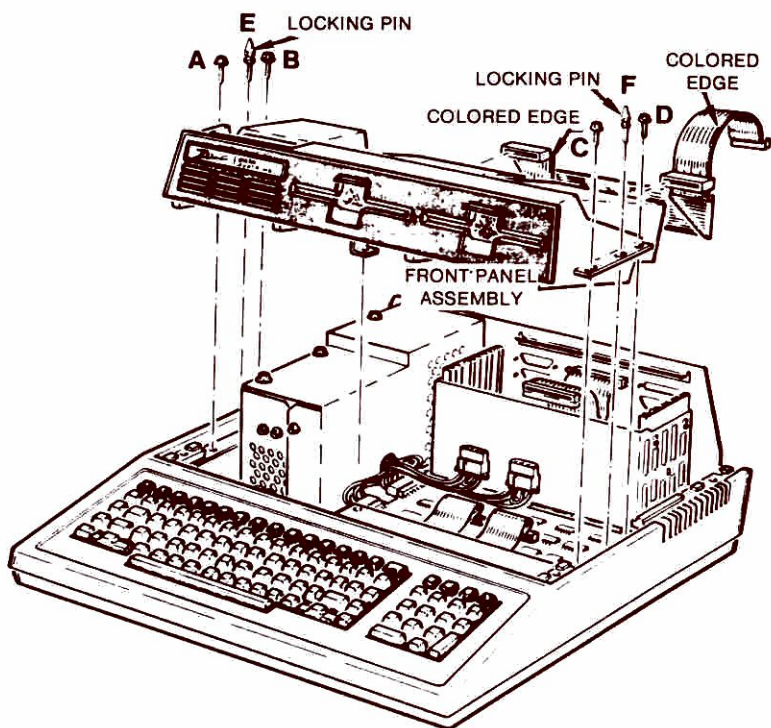
# LOW PROFILE INSTALLATION

The following are step by step instructions for installation of the ZS100 into the Low Profile models of the Z100 computer.

1. Unplug power line cord from AC outlet. ( )

2. If a monitor is connected to the computer, unplug it and set it aside. ( )

3. Pull metal slides on both sides all the way to the back, then push them ¼" to the front as shown below. ( )

4. Lift the top of the case straight up and set it aside. ( )
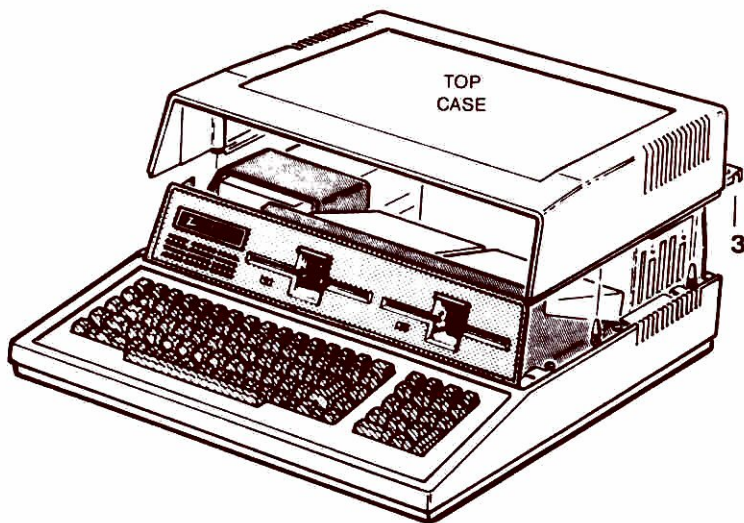
# LOW PROFILE INSTALLATION
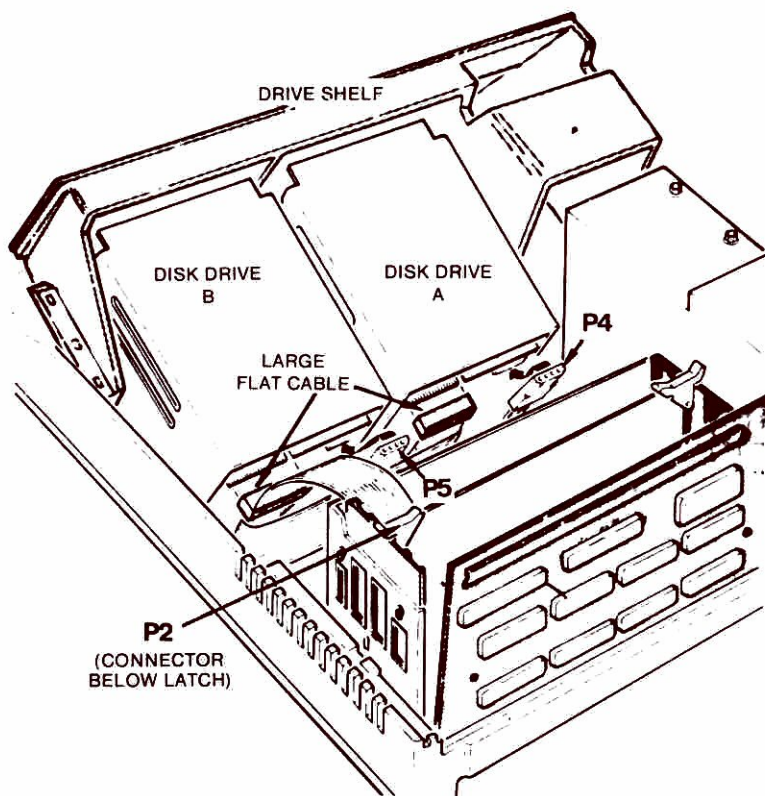## (continued)

5.  Unscrew the four screws: A, B, C, D.          ( )

6.  Unscrew the two locking pins: E, F.          ( )

# LOW PROFILE INSTALLATION
## (continued)

7.  Lift front panel assembly, and move it
    forward to reach the back connectors.     ( )

8.  Unplug connectors: P2, P4, and P5.       ( )

9.  Lift off the front panel assembly and set it
    aside.                                    ( )
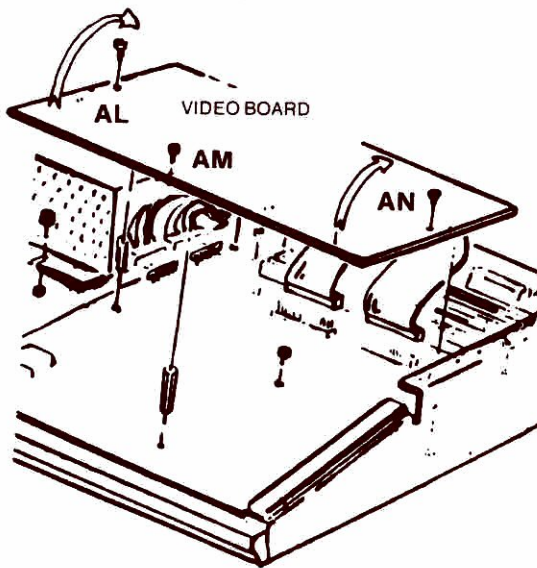
# LOW PROFILE INSTALLATION
## (continued)

10.  Unscrew the two locking pins: A and B.          ( )
     and screws: C and D.

11.  Lift lower case cover and set it aside          ( )



LOCKING PIN
(ONLY IN
LOW-PROFILE
UNITS)
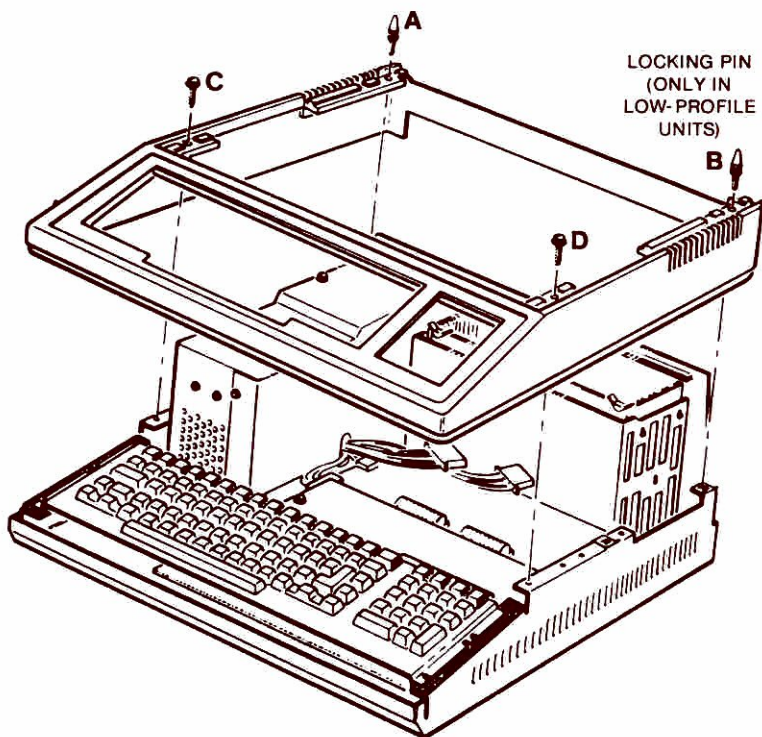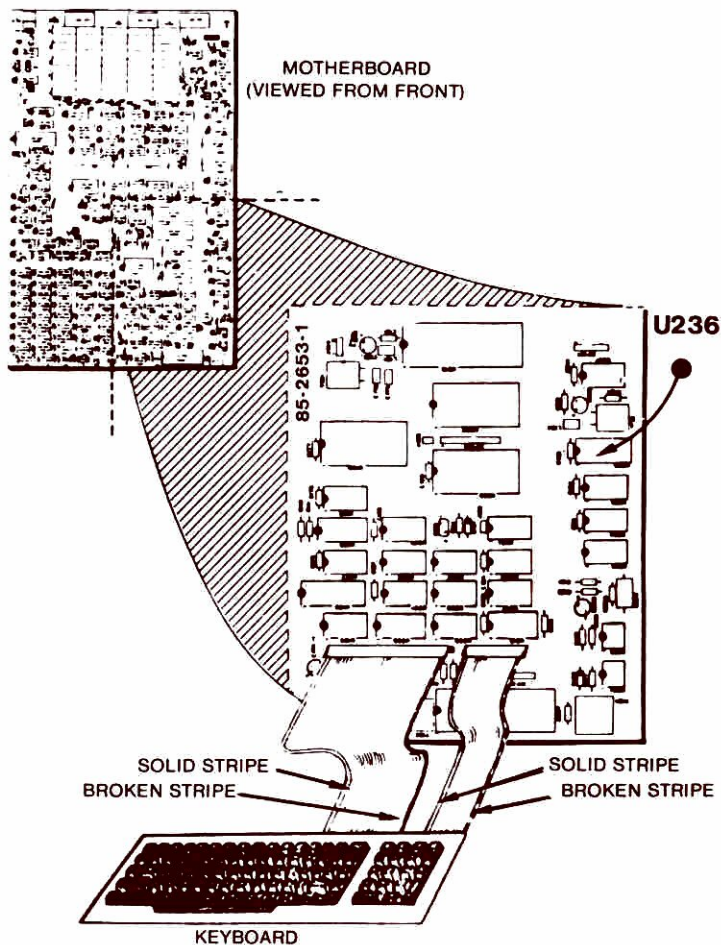
# LOW PROFILE INSTALLATION
## (continued)

12. Lift keyboard panel and move it to the front of the computer. ( )

13. Unscrew the three screws on the Video Board: AL, AM, and AN. ( )

14. Lift the front end of the Video Board and lean it back against the S100 BUS card cage. ( )



AL   VIDEO BOARD

AM

AN

# LOW PROFILE INSTALLATION
## (continued)

15.   Use a flat head screwdriver, or an IC chip
      puller to unplug the chip in socket U236 on
      the Z100 Mother Board.                              ( )

MOTHERBOARD
(VIEWED FROM FRONT)

85-2653-1

U236

SOLID STRIPE
BROKEN STRIPE

SOLID STRIPE
BROKEN STRIPE

KEYBOARD

# LOW PROFILE INSTALLATION
## (continued)

16.  Plug the chip into the empty socket on the
     ZS100 U236.                                            ( )

17.  Check that the notch or dot on the chip is on
     the same side as the notch in U236 on the
     ZS100.                                                 ( )

18.  Plug the ZS100 into the empty socket in
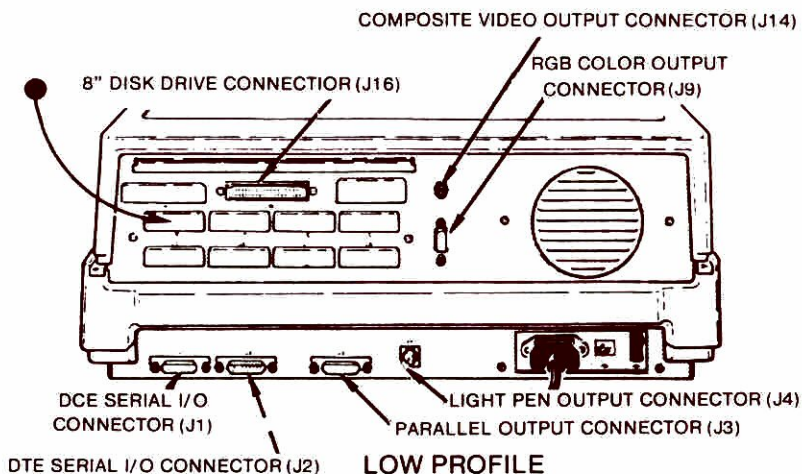     U236 on the Z100 Mother Board.                         ( )

Note: The ZS100 plugs in with the chips on the bottom and
the board on top. There is only one way that the board plugs
in. Be careful that the pins aren't bent or that the ZS100 is
not installed offset by a pin.
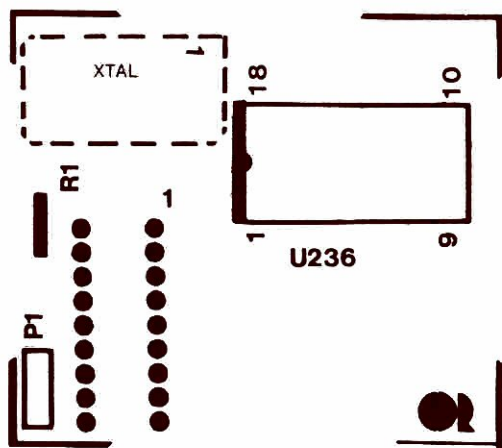
# LOW PROFILE INSTALLATION
## (continued)

19. Take one of the DB25 socket hole covers off, move the cable connected to the ZS100 along the right hand side of the ZS100 so that the switch plate lines up with the socket screw holes. ( )

20. Use the 4-40 screws and nuts to screw the switch plate into place. ( )

21. Notice the type of chip that is installed in location U211. This is the 8088 CPU chip. Remember if the chip has: Intel, NEC, or AMD written on the chip, and the Copyright date codes. ( )

22. The next step is to re-assemble the Z100 by following the above steps in reverse order. ( )
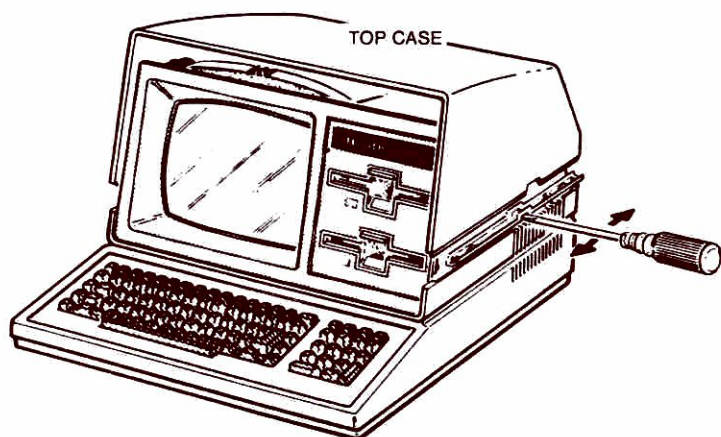
The ZS100 is now fully installed. Proceed to the operation section on page 20.

COMPOSITE VIDEO OUTPUT CONNECTOR (J14)

RGB COLOR OUTPUT CONNECTOR (J9)

8" DISK DRIVE CONNECTIOR (J16)

DCE SERIAL I/O CONNECTOR (J1)

LIGHT PEN OUTPUT CONNECTOR (J4)

PARALLEL OUTPUT CONNECTOR (J3)

DTE SERIAL I/O CONNECTOR (J2)

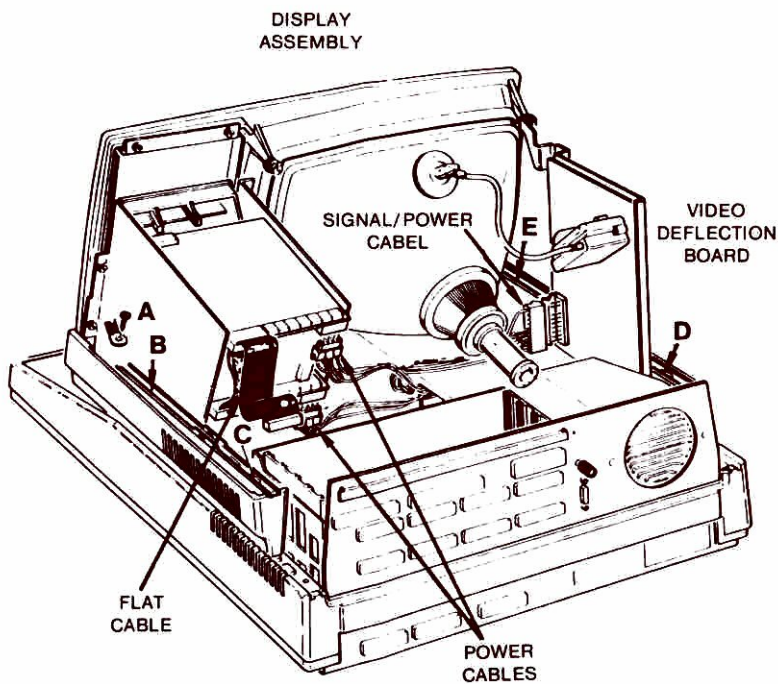LOW PROFILE

# ALL-IN-ONE INSTALLATION

The following are step by step instructions for installation of the ZS100 into the ALL-IN-ONE models of the Z100 computer.

1.  Unplug power line cord from AC outlet.              ( )

2.  If an external monitor is connected to the computer, unplug it and set it aside.              ( )

3.  Use a small flat head screwdriver and move the metal slides all the way to the front, then ¼" to the back as shown below. Both sides have a slide.              ( )

4.  Lift the top of the case straight up and set it aside.              ( )



TOP CASE

# ALL-IN-ONE INSTALLATION (continued)

5.    Unscrew the five screws: A, B, C, D, and E.    ( )

DISPLAY
ASSEMBLY

SIGNAL/POWER
CABEL

VIDEO
DEFLECTION
BOARD

A
B
C
D
E

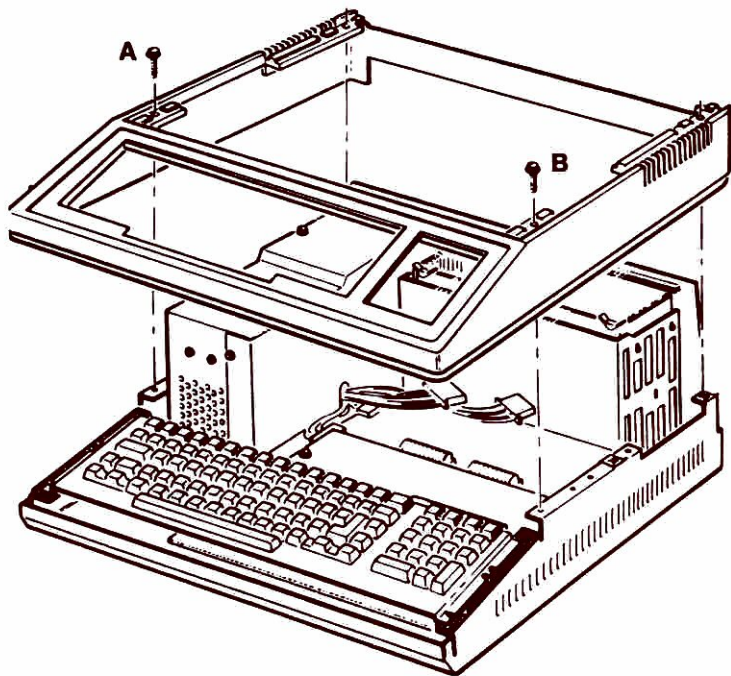FLAT
CABLE

POWER
CABLES

## ALL-IN-ONE INSTALLATION
### (continued)

6.  Unplug connectors: P2, P4, and P5.            ( )

7.  Lift off the front panel assembly, which
    includes drives and monitor, and set it aside      ( )

VIDEO
DRIVER
BOARD

P4

P5

P2

CONTROLLER
CARD
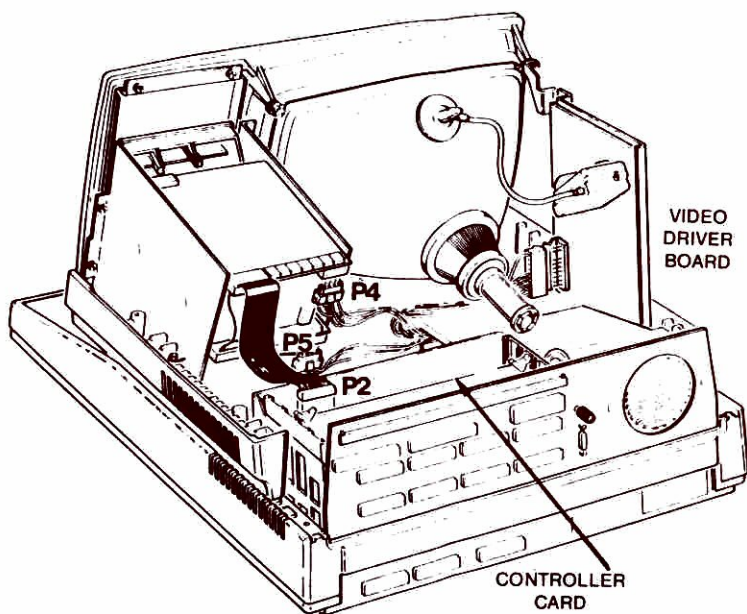
## ALL-IN-ONE INSTALLATION
## (continued)

8.    Unscrew the two screws: A and B.       ( )

9.    Lift lower case cover and set it aside.     ( )

## ALL-IN-ONE INSTALLATION
### (continued)
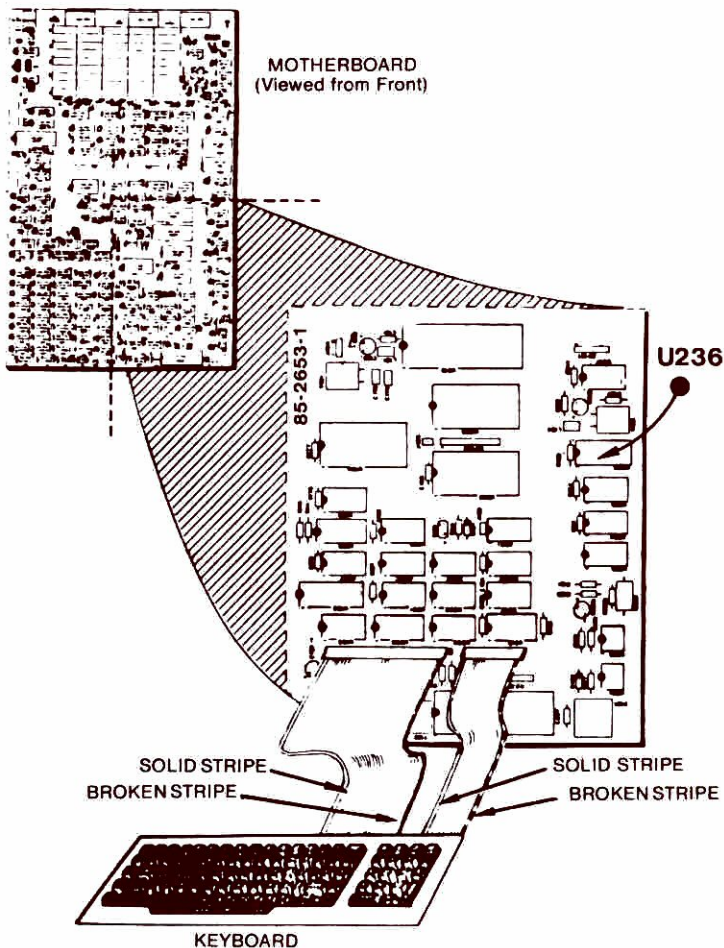
10. Lift keyboard panel and move it to the front of the computer.                    ( )

11. Unscrew the three screws on the video board: AL, AM, AN.                    ( )

12. Lift the front end of the video board, and lean it back against the S100 BUS card cage.    ( )
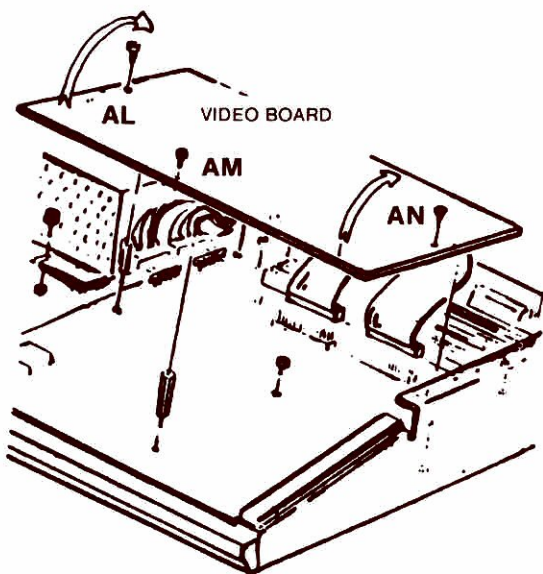
# ALL-IN-ONE INSTALLATION
## (continued)

13.    Use a flat head screwdriver or an IC chip puller to unplug the chip in socket U236 on the Z100 Mother Board.   ( )



MOTHERBOARD
(Viewed from Front)

85-2653-1

U236

SOLID STRIPE
BROKEN STRIPE

SOLID STRIPE
BROKEN STRIPE

KEYBOARD

# ALL-IN-ONE INSTALLATION
## (continued)

14. Plug the chip into the empty socket on the ZS100 U236.    ( )

15. Check that the notch or dot on the chip is on the same side as the notch in U236 on the ZS100.    ( )

16. Plug the ZS100 into the empty socket in U236 on the Z100 Mother Board.    ( )
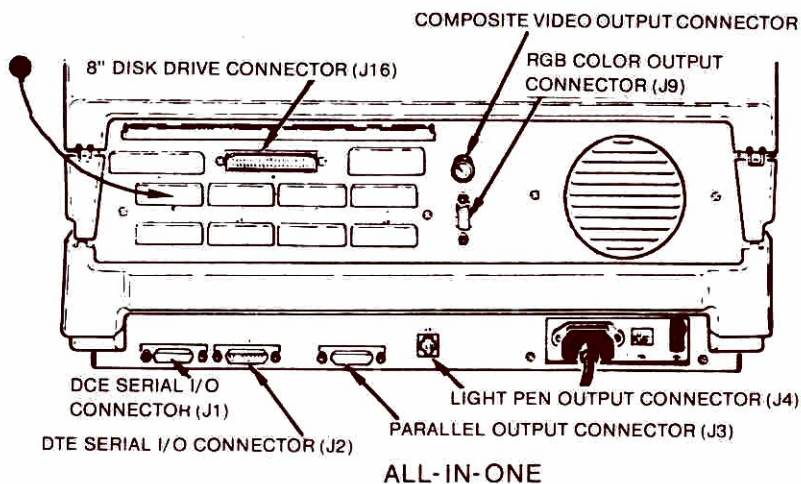
Note: The ZS100 plugs in with the chips on the bottom and the board on top. There is only one way that the board plugs in. Be careful that the pins aren't bent, or that the ZS100 is not installed offset by a pin.
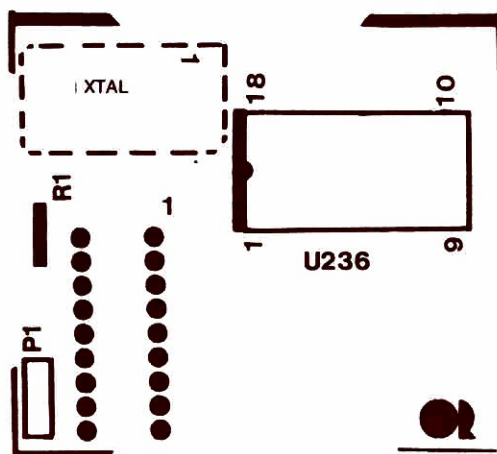
# ALL-IN-ONE INSTALLATION
## (continued)

17.  Take one of the DB25 socket hole covers
     off, move the cable connected to the ZS100
     along the right hand side of the ZS100 so
     that the switch plate lines up with the socket
     screw holes.                                        ( )

18.  Use the 4-40 screws and nuts to screw the
     switch plate into place.                            ( )

19.  Notice the type of chip that is installed in
     location U211. This is the 8088 CPU chip.
     Remember if the chip has: Intel, NEC, or
     AMD written on the chip, and the copyright
     date codes.                                         ( )

20.  The next step is to re-assemble the Z100 by
     following the above steps in reverse order.         ( )

The ZS100 is now fully installed. Proceed to the operation
section on page 20.

COMPOSITE VIDEO OUTPUT CONNECTOR

8" DISK DRIVE CONNECTOR (J16)

RGB COLOR OUTPUT
CONNECTOR (J9)

DCE SERIAL I/O
CONNECTOR (J1)

LIGHT PEN OUTPUT CONNECTOR (J4)

DTE SERIAL I/O CONNECTOR (J2)

PARALLEL OUTPUT CONNECTOR (J3)

ALL-IN-ONE

# OPERATION

Once the ZS100 is installed, before turning power on for the first time, notice that the switch plate for the switch has the letter 'F' on it. This represents the fast mode side of the switch. To be sure that the ZS100 is installed correctly, first set the switch away from the 'F', then turn power on. The computer should function in this mode in exactly the same fashion as prior to installing the ZS100. This verifies that the ZS100 was installed correctly.

Now turn the computer off, then switch to the fast mode by moving the switch towards the letter 'F'. Turn the computer on and try to run the computer in this mode. If the computer has any trouble in performing all Z100 functions, then see the section on trouble shooting. If the computer functions properly in this mode then there should be a noticable change in the speed of the computer.

Congratulations! You have just installed the ZS100 and tested it in both Slow and Fast modes. Here is one last WARNING before resuming normal work at a faster speed. Before switching between Fast and Slow modes, turn off the computer. The 16 bit processor doesn't like it when it is switched in speed while running.

# TROUBLE SHOOTING

This section is for the percentage of Z100 computers that do not function properly with the ZS100 installed.

The Z100 computer should run correctly in Slow mode, since the ZS100 in Slow mode is transparent to the computer. If it does not run correctly in slow mode then it is possibly one of the following problems:

1.    The ZS100 was installed with a pin bent or broken, or installed with an offset in the pin position.

2.    The chip at U236 has a bent pin on the ZS100, or the chip is in upside down.

3.    The drive or video connectors are not plugged in all of the way.

4.    The ZS100 is not functioning properly and needs to be replaced.

All other problems are concerned with the ability of the particular Z100 computer to handle running at a faster pace. These problems are described starting with the next page.


```
              TECHNICAL ASSISTANCE
                1:30 - 3:30 P.M.
                  PACIFIC TIME
```

# TROUBLE SHOOTING
## (continued)

Below are symptoms and possible causes for problems with running the ZS100 in fast mode:

| SYMPTOM | POSSIBLE CAUSE |
|---|---|
| A. When the Z100 is turned on in the fast mode, and there is no BEEP, | 1. Slow 8088 (U211). May need to get an 8 MHZ version of the chip.<br>2. Bad ZS100 crystal oscillator. See the ZS100 warranty policy on the inside front cover. |
| B. When the Z100 is turned on in the fast mode, and the BEEP stays on constantly. | 1. Slow 8088 (U211). May need to get an 8 MHZ version of the chip.<br>2. Slow 68A21 chip. May have to switch to a faster chip (68B21) in (U114).<br>3. Slow 8253 (U160). May need to get an 8254 chip. |
| C. When the computer gives the correct number of BEEPS but there is no screen prompt (screen displays tearing). | Turn up the screen brightness. If the raster is rolling up or down, or tearing horizontally, then: slow 68A21 in (U114) or (U345). May need to get a 68B21 chip. |

# TROUBLE SHOOTING
## (continued)

D. The Z100 produces correct BEEPS and shows a correct prompt, but won't boot the floppy disk correctly, or displays "default device error" message.

1. The WD1797 (U22) floppy controller can be too slow. Another one should work.
2. The 74LS374 (U35) or the 74LS244 (U36) or the 74LS244 (U34) data, address buffers may be marginal on the controller board. Switching to 74S374, and 74S244 chips may make the difference.

E. The Z100 produces correct BEEPS and shows a correct prompt, but won't boot on the hard disk consistently.

The 6116-4 RAM (U39) on the Z-217 hard disk controller card is too slow. Switch to the 6116-2 chip.

The above trouble shooting information describes problems that were encountered in tests made on a number of computers. The possible causes are listed in order of their frequency of occurrence to date.

The trouble shooting section will be expanded, as information is recieved from the field about the changes that some Z100 computers needed to be able to run in the fast mode of the ZS100.

# TROUBLE SHOOTING ADDENDA #1
## THE 16 BIT PROCESSOR

Intel 8088's with a copyright date '78 must be replaced. If the copyright date is '78-'81 then it should function correctly. NEC 8088's must also be replaced. NEC used the earlier version Intel mask. AMD 8088-2 chips are rated for 8 MHZ and should function correctly.

## RAM MEMORY

150NS and 200NS 4164 ram chips should function correctly. Some 74LS244 buffers have affected the ram operation, and a few reports have been that all of one or the other ram type should be used on a system. Memory errors in main ram may also be an indication of a marginal 8088. Slow video ram can cause strange patterns of dots to be displayed (this problem may be intermittant). If an S100 bus memory card is installed in the system and the system does not operate correctly in fast mode, unplug the memory card from the system and then turn the system on. If the system operates correctly in fast mode without the card then some answers might be found below.

# TROUBLE SHOOTING ADDENDA #1
## (continued)
### S100 RAM CARDS

Problems with fast mode on S100 Bus Ram Boards may be attributed to the S100 bus drivers. The 74LS373's and 74LS244's may need to be replaced with 74S373's and 74S244's. The Z205 ram board may need to have one wait state added for proper operation. If adding a wait state does not work, the S100 bus drivers might be affecting proper operation.

WARNING: There was a notice from Zenith that there is a batch of ram chips on the market that are unreliable. TI 4164 chips with numbers from 8146 to 8236 will show random problems at 5MHZ and show more problems at 8MHZ.

## MATH COPROCESSORS

To run the Math Coprocessor instructions in the fast mode the 8088 and the 8087 must be the 8 MHZ version. If the program that is being used does not access the 8087 then it can be used in fast mode, then when running programs that use the 8087 the ZS100 must be in slow mode (if the 8087 is a 5MHZ type). Customers are currently using this method to be able to get speed from both the D. E. L. 2 + 2 board and the ZS100.

## CONTROLLER CARDS

As with the S100 ram cards, problems may be attributed to the 74LS373 and 74LS244 bus chips. (See S100 bus ram cards). A few hard disk controllers show faulty functioning in the ZS100 fast mode. We are currently looking into this matter.

# ACKNOWLEDGMENTS

The Installation sections of this manual are a condensed and modified representation of information provided in the Technical and Service Manuals Prepared by:

# NOTES: