

Z-2

Z-2D

Instruction Manual

Five Dollars

Z-2/Z-2D



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Cromemco
i n c o r p o r a t e d
Specialists in computers and peripherals
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Introduction And System Overview

Your Cromemco Z-2/Z-2D is a highly advanced microcomputer system. The Z-2/Z-2D is specifically designed as a powerful but economical dedicated computer for systems work. The Z-2/Z-2D is unique with a switch selectable 250 nanosecond or 500 nanosecond cycle time, a "Standard 100" computer bus that is supported with peripherals from Cromemco and over a dozen other manufacturers, an abundant power supply and a shielded motherboard. The rack-mount style construction makes the Z-2/Z-2D an extremely versatile microcomputer system.

The Z-2 in kit form consists of the following: (1) a Z-80 CPU card (model ZPU-K); (2) a full-length 21-card-slot shielded motherboard; (3) a heavy-duty power supply; (4) an all metal chassis and dust case; and (5) one card socket and card-guide set.

The Z-2D in kit form includes all of the above as well as a Wangco floppy disk, an assembled disk power supply, and a 4FDC card kit.

The assembled model of the Z-2/Z-2D (model Z-2W or Z-2DW) includes all of the above as well as: (1) all 21 sockets and card guides, and (2) a cooling fan.

Assembly of a complete Z-2 kit involves the assembly of three major components: (1) the rear panel (including the power supply), (2) the chassis, and (3) the CPU card. *The Z-2D kit involves, in addition, the assembly of a 4FDC card.* Be sure to read all assembly instructions carefully before attempting to assemble any of the components of the Z-2/Z-2D system.

NOTE: A retrofit package is available for owners wishing to upgrade their Z-2 microcomputer system to a Z-2D disk system.

Please be certain to read the warranty section and to return the registration form. A stamped envelope is included with the registration form for your convenience.

WARNING

Your Z-2/Z-2D microcomputer is a sophisticated piece of electronic equipment. Voltages hazardous to life are present inside the cabinet. Be sure to disconnect AC power before removing cabinet panels. **DO NOT LET CHILDREN HANDLE THIS EQUIPMENT WITHOUT SUPERVISION. DO NOT LEAVE PANELS OFF WHEN THE MACHINE IS PLUGGED IN. NEVER INSERT OR REMOVE CIRCUIT CARDS WITH THE AC POWER CONNECTED.**

Power Supply Specifications

LINE VOLTAGE:

100-125v/200-250v; 50/60 CYCLE

OUTPUT VOLTAGES:

+7v to +11v @ 30A (unregulated)

+15v to +21v @ 15A (unregulated)

-15v to -21v @ 15A (unregulated)

AC POWER CONSUMPTION: 600 WATTS MAX.

DC OUTPUT POWER: 450 WATTS MAX.

RFI FILTERING: UL APPROVED RFI FILTER.

Assembly Instructions

The Z-2/Z-2D Power Supply should be assembled first. All necessary parts for power supply assembly are listed at the end of this section under Power Supply and Rear Panel Assembly. Refer to the Rear Panel Assembly Drawing before beginning assembly of the power supply.

Power Supply Assembly Instructions

- 1) Install the four fuse holders at positions F1, F2,

F3, and F4 on the back panel. Place a rubber washer (supplied) on the body of each fuse holder. Install by pushing the fuse holder through the appropriately marked holes from the outside. Secure in position with a 1/2-24 hex nut.

- 2) Install the two bridge rectifiers at positions BR1 and BR2. It is important to note the orientation of the polarity marks on the rectifiers. The positive (+) side **must** face right as viewed from the inside of the back panel.

- 3) Install the Power On/Off Switch with the red lens (#21) at position S1. The switch snaps into place after insertion through the appropriate hole from the outside. The side of the switch with terminals labeled 1, 2, 3 should face left when viewed from the inside of the back panel.
- 4) Install the Reset Switch (#22) at position S2. The switch snaps into place after insertion through the appropriate hole from the outside. The side of the switch with terminals labeled 2, 3 should face the **bottom** of the cabinet when viewed from the inside of the back panel.
- 5) Install the Remote Reset Jack (#26) using a 3/8 bevel washer and a 3/8-28 hex nut. The crown of the washer should face the nut. It is important that the jack be oriented correctly. The notched corner of the jack must match the position indicated on the back panel.
- 6) Install the line filter at the position indicated in the assembly drawing. **IMPORTANT:** The **flat side** of the filter must face the **bottom** of the cabinet and the 6-32 x 3/8 screws used to install the filter must have #6 internal tooth lockwashers on the outside of the panel. It is **absolutely essential** to install the line filter with the appropriate washers or the AC line ground will not be connected to the chassis.
- 7) Install the two large capacitor clamps at positions C1 (first) and C2 (second) using 6-32 x 3/8 screws and 6-32 kep nuts. Make sure the openings in the clamps face left as shown in the assembly drawing. **Do not install the large capacitors at this time.**
- 8) Install the two small capacitor clamps at positions C3 (first) and C4 (second) using 6-32 x 3/8 screws and 6-32 kep nuts. Make sure the openings in the clamps face up and to the right as shown in the assembly drawing. Install the two 29,000 μ F capacitors (#24). Note that the positive (+) terminal **must face the right side of the back panel** when viewed from the inside of the back panel. Tighten the 6-32 x 1/2 screw and 6-32 hex nut on the side of the clamp, firmly fixing the capacitors in the clamps. All connections to all capacitors should be made using 10-32 x 3/8 fillister head screws and #10 split ring lock washers.
- 9) Install the transformer using 1/4-20 x 1/2 screws, 1/4 plain washers, 1/4 split ring lockwashers, and 1/4-20 hex nuts as indicated on the assembly drawing. The transformer **must be oriented** so that the numbers on the terminals match the numbers indicated on the back panel. If there is a problem

tightening the nuts on the transformer, just start the nuts onto the screws from the inside of the panel and complete by tightening the screws from the outside.

Wire Harness Installation Instructions

When installing the wire harness, be sure to **refer to both the power supply schematic and the harness installation drawing**. Two separate wire harnesses are included with the Z-2 kit. The AC wire harness is the smaller harness with the black and white wires. The DC harness is the larger harness with the red, orange, yellow, etc. wires.

The Z-2D kit also includes a 4 wire harness which attaches to the disk drive.

AC Harness Installation

- 1) Connect the black and white slip-on connectors to the line filter. The black wire must be connected to the terminal on the left, and the white wire must be connected to the terminal on the right (as the back panel is viewed from the inside — see legend on the line filter).
- 2) Connect the other end of the black wire (which is connected to the line filter) to the flag (top) terminal on the line fuse F1 (#30).
- 3) The three slip-on connectors which are bundled together are now connected to the power switch. **WARNING:** If you connect these incorrectly, you may blow a fuse. The green wire goes to terminal 1, the black wire goes to terminal 2, and the small blue wire goes to terminal 3.
- 4) Connect the remaining black wire with a slip on connector to the side terminal on the line fuse F1 (#30).

[If you are going to install the optional fan, attach the power cord from the fan to the transformer as shown in the schematic diagram for your line voltage. For 110 volt operation, the fan cord should be attached to terminals 4 and 6 on the transformer. Do not solder these connections yet!]

- 5) The next step depends on the AC line voltage for the geographical area in which the machine is to be operated. **Check the power supply schematic for the proper wiring** for your selected voltage. After selecting your voltage, the green and white 16

gauge short wires should be cut and stripped to the appropriate length to make the jumpers required. Attach the white, green, and blue wires as required by your line voltage. Be sure to check the schematic for the correct wiring. Now solder all of the connections just made to the transformer.

DC Harness Installation

- 1) Attach the short black wire (the one banded to the two yellow wires) between the positive (+) terminal of capacitor C4 and the negative (-) terminal of capacitor C3. The harness should be positioned so that the eye lugs on the two yellow wires are near C4.
 - 2) Attach the two yellow wires (tied to the black wire) to the negative (-) terminal of C4 and attach the two orange wires to the positive (+) terminal of C3.
 - 3) Connect one of the 200 ohm bleeder resistors between the positive (+) and negative (-) terminals of C3 and the other 200 ohm bleeder resistor between the positive (+) and negative (-) terminals of C4.
 - 4) *If you are building a Z-2D disk system, attach the long black wire of the 4 wire disk power supply harness to the negative (-) terminal of C3, and attach the orange wire of the same harness to the positive (+) terminal of C3.*
 - 5) The larger slip-on connector on one of the yellow wires (which are attached to the negative (-) terminal of C4) connects to the negative (-) terminal of BR2. The other yellow wire (from the negative (-) terminal of C4) is attached to the lug on the side of fuse holder F4. The larger slip-on connector on one of the orange wires (from the positive (+) terminal of C3) connects to the positive (+) terminal of BR2. The other orange wire (from the positive (+) terminal of C3) is attached to the lug on the side of fuse holder F3.
 - 6) The long yellow wire slips on to the flag (top) terminal of F4 and the long orange wire slips on to the flag (top) terminal of F3.
 - 7) The two brown wires slip on the AC terminals of BR2 (it doesn't matter which wire goes to which terminal).
 - 8) The black wire bundled with the two brown wires goes to the negative (-) terminal of C3.
 - 9) Using 8-32 x 3/8 screws and #10 split ring lock washers, connect one of the brown wires (from BR2) to terminal 7 of the transformer and connect the other brown wire (from BR2) to terminal 9 of the transformer.
 - 10) Connect the two black wires bundled with the two brown wires to terminal 8 of the transformer using an 8-32 x 3/8 screw and (#10) split ring lock washer.
 - 11) The two short white wires slip on to the AC terminals of BR1. The other ends of these white wires connect to terminal 10 and terminal 11 of the transformer using 10-32 x 3/8 fillister head screws, 3/8 split ring lock washers, and 10-32 hex nuts.
 - 12) **Install capacitor C2 at this point**, being careful to orient the positive (+) terminal away from the transformer (as indicated on the back panel legend). Tighten the 6-32 x 1/2 screw and 6-32 hex nut on the side of the clamp, firmly fixing the capacitor in the clamp. All connections to all capacitors should be made using 10-32 x 3/8 fillister head screws and #10 split ring lock washers.
 - 13) Connect the 75 ohm bleeder resistor between the positive (+) and negative (-) terminals of C2.
 - 14) *If you are building a Z-2D disk system, attach the long red wire of the 4 wire disk power supply harness to the positive (+) terminal of C2.*
 - 15) Connect both the short black wire (the one with an eye connector on both ends) and the small gauge black wire (in the same bundle) to the negative (-) terminal of C2.
 - 16) Slip on connect the second black wire, which is bundled with the black and gray wires, to the negative (-) terminal of BR1. The short red wire that is bundled with the black wire slips on to the positive (+) terminal of BR1.
- Note: It is advisable to consult the "Harness Assembly" diagram carefully while completing the DC Harness Installation.
- 17) Connect the unstrapped end of the short red wire (which has not been connected to anything yet) to the positive (+) terminal of C2.
 - 18) Attach the end of the short red wire (which is bundled with the long red wire) to the lug on the side of fuse holder F2.

- 19) Slip-on connect the long red wire to the flag (top) terminal of fuse holder F2.
- 20) **Install capacitor C1**, being careful to orient the positive (+) terminal away from the transformer (as indicated on the back panel legend). Tighten the 6-32 x 1/2 screw and 6-32 hex nut on the side of the clamp, firmly fixing the capacitor in the clamp. All connections to all capacitors should be made using 10-32 x 3/8 fillister head screws and #10 split ring lock washers.
- 21) Connect the following **4 wires** to the negative (-) terminal of C1:
 - a) the black wire from the negative (-) terminal of C2,
 - b) the black wire from the negative (-) terminal of BR1,
 - c) the black wire from terminal 8 of the transformer,
 - d) the long black wire.
- 22) Connect the following **3 wires** to the positive (+) terminal of C1:
 - a) the red wire from the positive (+) terminal of C2,
 - b) the red wire from the positive (+) terminal of BR1,
 - c) the red wire from the side terminal of F2.
- 23) Slip-on connect the small gauge black wire to terminal 3 of reset switch S2. The short black wire is to be soldered to the corner terminal of reset jack J1. The small gauge grey wire slips on to terminal 2 of reset switch S2 and the shorter grey wire is soldered to the other terminal of reset jack J1.

Chassis Assembly Instructions

The first step in assembling the chassis is to assemble the Blitz Bus. Be sure to use high-quality, electronic grade, rosin core solder for the assembly and a fine-tipped, low-wattage soldering iron. Note also that the Z-2 kit includes only one card socket and one card-guide set. *Two sets of sockets and card guides are included as part of your Z-2D disk kit.* If a full set of card sockets and guides is desired, these should be obtained **before** beginning assembly of the Blitz Bus.

The Blitz Bus should be checked with an ohmmeter **both before and after** assembly. There is only a slight chance that the Blitz Bus was incompletely etched, leaving two traces shorted, during the manufacturing process. Nevertheless, should the bus be incompletely etched, it would be difficult to correct the problem after the sockets are soldered in position. The ohmmeter check of the bus will permit easy correction in the remote instance where such a problem exists.

To test the board, there are **two** sets of traces which should be checked with the ohmmeter to be sure there is no connection between them. First, check each trace to ground connection on the Blitz Bus. Second, check each pair of pins (i.e., pins directly opposite each other) on the connectors. If either set of traces are found to be electrically connected, inspect the board carefully to locate the short. Any incompletely etched path between two traces should be removed with a sharp knife.

Repeat the continuity check after each connector is soldered to the board. If any shorts were created during assembly, the problem should be corrected at this time. **NOTE:** In most instances, shorts created during assembly are caused by the application of too much solder. Removing the excess solder will correct the problem.

Refer to the Chassis Assembly Drawing before beginning assembly of the Blitz Bus and the case.

Blitz Bus™ Assembly Instructions

- 1) The Blitz Bus is supplied with one or two connectors (#14). Any additional connectors which are required should be obtained and soldered in place at this stage.
- 2) Insert the connector firmly in place. Check the solder side of the Blitz Bus to make sure that all 100 pins have come through the holes on the bus. Next, solder the two pins on each end. Check to make sure that the gap between the connector and the Blitz Bus is uniform (i.e., the Blitz Bus is not bowed or bent in any form). Solder the two pins in the center of the connector. Check again to make sure the gap is uniform across the connector. Finally, solder the remaining pins. It is important to check each connector to make sure every pin is soldered. It is easy to miss a pin. Solder each connector in place.
- 3) Attach the Blitz Bus to the bus mounting rails (#9). Bus rails are attached using nylon shoulder washers (#16) and 6-32 x 3/8 pan head screws (#17). Be sure to note the orientation of the wash-

ers. First place a nylon washer with the **flat side** against the screw head. Next, insert the screw through the appropriate mounting hole on the Blitz Bus. Then place another nylon washer on the screw so that the raised portion is inside the mounting hole on the bus. Finally, place the bus mounting rail over the screws and attach using 6-32 kep nuts (#18). It is **critical** to complete this assembly step correctly. The Blitz Bus must be insulated from the bus mounting rails by a nylon washer.

- 4) Be sure to note the orientation of the bus mounting rails. The cut-out sides of the rails should face towards the inside of the unit (i.e., towards each other). Check the chassis assembly diagram for the correct orientation. After attaching the mounting rails, set the Blitz Bus aside temporarily.
- 5) Set two of the card guide rails (#8) about 3" apart on a flat surface. Press the card-guides (#13) into place. **NOTE:** The Z-2 kit contains two card-guides. If additional sets are required, they should be obtained and assembled in place at this stage. The wider, V-shaped openings on the card-guides should all face in the same direction. Assemble the second set of card guide rails in the same manner.

Case Assembly Instructions

- 1) Place the bottom cover (#5) with the flat side down on a flat surface.
- 2) Attach the right side plate (#2) to the bottom cover using five 6-32 x 3/8 (#20) pan head screws. Note that the right side plate is identified by the four vertical slits in the side of the plate. See the chassis assembly drawing for the proper orientation of the plate.
- 3) Attach the left side plate (#1) to the bottom cover using five 6-32 x 3/8 (#20) pan head screws. **NOTE:** If you are building the Z-2D disk system, the Blitz Bus and card guide assemblies should be mounted in exactly the SAME ORIENTATION as described in paragraphs 4 through 7, BUT IN THE REARWARD SET OF HOLES in the side plates. This allows room in the front of the Z-2D case for the front panel disk drive assembly.
- 4) Install the assembled Blitz Bus using four 6-32 x 3/8 (#20) pan head screws. The open side of the edge connectors should face the front of the

machine. See the Chassis Assembly Drawing for the proper position of the Blitz Bus.

- 5) Install the two card guide assemblies next. The bottom card guide should be installed first using 6-32 x 3/8 pan head screws. The open side should face up and the wider, V-shaped openings on the card guides should face the front of the machine. Install the top card guide assembly in the same manner with the open side facing down and the wider, V-shaped openings on the card guides facing the front of the machine.
- 6) Attach the left front mounting rail (#6) to the left side plate (#1) using two 1/4-20 x 1/2 pan head screws (#19). The left front mounting rail can be identified by a notch in the rail. There is **no** notch in the right front mounting rail.
- 7) Attach the right front mounting rail (#7) to the right side plate (#2) using two 1/4-20 x 1/2 pan head screws (#19).
- 8) At this point, you are ready to attach the power supply (previously assembled) to the chassis.

Attaching Assembled Power Supply To Chassis

- 1) Place the rear panel on a flat surface, next to the rear of the Z-2/Z-2D, with the power supply components facing up. **NOTE:** The assembled unit should be placed so that it can be lifted up into place after the wires are attached.
- 2) The red wire is attached to the Blitz Bus on the solder side in the center hole at the bottom. (The center hole is the one labeled +8 on the connector side of the Blitz Bus.) Attach the wire with a 10-32 x 3/8 stainless steel fillister head screw, a 10-32 hex nut, and a #10 split ring lock washer.
- 3) The orange wire is attached to the +18 hole at the bottom of the Blitz Bus on the solder side using a 10-32 x 3/8 fillister head screw, a #10 split ring lock washer and a 10-32 hex nut. **NOTE:** It is important to be sure that the lug is not shorted to the bus mounting rail or to the foil on the Blitz Bus.
- 4) The yellow wire is attached to the -18 hole located at the bottom of the Blitz Bus. Follow the same procedure used in attaching the orange wire in Step #3. The same warning mentioned in Step #3 also applies.

- 5) The black wire is attached to the hole located at the top center position on the Blitz Bus. The wire is attached with a 10-32 x 3/8 fillister head screw, a #10 split ring lock washer, and a 10-32 hex nut. **NOTE:** Be sure the nut is not shorted to the rail.
- 6) Attach the gray wire to the hole marked "Reset" in the upper, right corner of the Blitz Bus, using a cad plated 6-32 x 3/8 pan head screw, a 6-32 split ring lock washer, and a 6-32 nut. **WARNING:** Be sure that the wire terminal and the screw head are not shorted to the ground foil around the hole. *NOTE: If you are building the Z-2D disk system, be sure to route the disk power supply harness around the Blitz Bus assembly and out towards the front of the Z-2D.*
- 7) Lift the back panel into position against the side plates and attach with four 1/4-20 x 1/2 pan head screws. *NOTE: If you are building the Z-2D disk system, mount the Serial I/O Cable (packed in the 4FDC kit) in one of the DB25 cutouts in the rear panel and route the cable around to the front of the Blitz Bus. The 4-40 screws and nuts are included in the 4FDC kit.*
- 8) Before attaching the top cover, complete the check-out procedures described on the following pages.

ASSEMBLY IS NOT COMPLETE UNTIL THE CHECK-OUT PROCEDURES HAVE BEEN COMPLETED.

Initial Check-out Procedures

Before plugging the machine into a wall socket, complete the following check-out procedures:

- 1) Connect one end of an ohmmeter to the DC ground (the black wire) and the other end to the bus mounting rail. **There should be no connection.** If there is a connection, **do not proceed until you locate the short.**

The most common reasons for a short are:

- a) The terminal lug on the ground wire on the Blitz Bus is shorted to the rail.
- b) The nylon washers on the Blitz Bus mounting screws are installed incorrectly (check Blitz Bus Assembly — Step #3).
- 2) If there is no connection, plug the line cord into

the back of the machine **but not into the wall socket.** Using an ohmmeter, check to make sure the ground pin on the plug is connected to the chassis ground. **If there is no connection,** the most common reason is that the line filter is not installed using the required lock washer (see Power Supply Assembly — Step #6).

- 3) After completing Step #2, check to be sure the power switch is in the Off position. Plug the line cord into the wall socket. The power switch should **not** light up. If the power switch does light up, pull the plug and check the wiring of the power switch. The most common problem is a power switch which has been placed upside down. **NOTE:** The numbers on the power switch should be positioned according to the corresponding numbers on the back panel.
- 4) If the power switch does not light up, turn on the power. The power switch should light up when the power is on. If the power switch does not light up, or lights up only briefly, check the AC line fuse to see if it is blown. If the fuse is blown, check for a short.

DO NOT PLUG IN CARDS BEFORE COMPLETING THE CHECK-OUT PROCEDURE IN STEP 5. CARDS CAN BE DESTROYED IF THE CHECK-OUT PROCEDURE IS NOT COMPLETED.

- 5) Use a DC voltmeter. Connect the ground side of the voltmeter to the ground terminal screw on the Blitz Bus and verify that Pins 1 and 51 have approximately +10V DC, that Pin 52 has approximately -21V DC and that Pin 2 has approximately +21V DC. **If the pins are not correct, recheck the connection of the wire harness to the Blitz Bus (see Schematic).** Do not plug in any cards until you have verified the voltages.
- 6) Install the top cover (#4) using ten 6-32 x 3/8 screws.
- 7) If you are building a Z-2 system, install the front panel and see the "Final Check-out Procedures" section.

Attaching The Disk Drive (Z-2D Only)

- 1) Attach DPS-1 power supply board to the rear of the disk mounting bracket with two 6-32 x 3/8 screws and kep nuts. The DPS-1 board should be positioned toward the bottom of the "U" bracket with the four-wire Amp connector on the open end of the bracket (see drawing).

- 2) Mount disk bracket in left position on Z-2D front panel with four 1/4 x 20 flat head screws, placing four 1/4" lock washers between the bracket and the front panel.
- 3) Carefully unpack the Wangco disk drive and make the following modifications to it (see drawing).
 - a) Cut wire labeled "MUX."
 - b) Cut wire with crimped on terminal screwed to rear of disk frame.
 - c) Set jumper plug for drive "A" select (see 4FDC manual).
- 4) Insert disk drive from the outside of cabinet through left slot in front panel so that the P.C. board on the disk drive faces left. Attach drive to mounting bracket with four 6-32 x 3/8 screws.
- 5) Plug four-wire Amp connector from DPS-1 board into mating plug on rear of disk drive.
- 6) Plug one Molex connector from disk power supply harness onto J1 in center of DPS-1 board (key forces connector to go only one way).
- 7) Plug 34 pin edge connector of disk signal cable assembly onto P.C. board on rear of disk drive. (The darker cable stripe should face the outside of the disk drive.)
- 8) If a second drive is to be installed, proceed in a manner similar to Steps 9 through 15 above, installing the drive in the right-hand position and using the remaining connectors on the signal cable and power cable assemblies. Either connector may go on either drive.
- 9) If only one drive will be used initially, place the matching cover plate over the right-hand slot in the front panel. Slide the steel cover retaining plate over the threaded studs on the cover plate from the inside of the front panel and secure with two 6-32 kep nuts. This assembly should then be aligned and secured with four 1/4-20 black flat head screws, lock washers, and hex nuts.
- 10) Assemble the ZPU and 4FDC kits as described in their respective manuals, and set switches as described in the 4FDC manual.
- 11) Install the front panel and see "Final Check-out Procedures."

Final Check-Out Procedures

The construction and check-out of your Z-2/Z-2D chassis should be completed at this point. Your ZPU card (and 4FDC card — if you are building the Z-2D disk system) should be fully assembled with ICs installed and carefully inspected for soldering faults and bent IC pins.

Check-out procedures for the disk drive are included in the 4FDC manual. The following check-out procedure is intended for builders of both the Z-2 and the Z-2D kits.

In order to fully test your Z-2 microcomputer, you will need one of each of the following:

- 1) ROM (read-only memory) circuit card (Cromemco's 8K BYTESAVER™ or 16K PROM card recommended),
- 2) Z-80 Monitor Program in ROM or PROM (Cromemco's Z-80 Monitor in 2708 recommended),
- 3) RAM (random access memory) circuit card (Cromemco's 4KZ or 16KZ recommended),
- 4) I/O INTERFACE card (Cromemco's TU-ART

or 4FDC recommended), and

- 5) CRT terminal or teletype or equivalent.

The four circuit cards should be inserted into the connectors installed in the Blitz Bus. **CAUTION: NEVER INSERT OR REMOVE CIRCUIT CARDS WHILE POWER TO THE Z-2/Z-2D IS TURNED ON.** The terminal should be connected to the I/O interface card as described in the interface card manual.

The ROM board should be addressed at location Hex E000 (A₁₅=H, A₁₄=H, A₁₃=H). The Z-80 Monitor ROM should be placed in position "0". The ZPU power-on jump must be enabled and the ZPU DIP switch should be adjusted for Hex E000 (A₁₅=1, A₁₄=1, A₁₃=1, A₁₂=0).

Once interconnected with the terminal, the AC power should be applied.

To activate the terminal, depress the carriage return key until the monitor welcoming message is typed as described in the monitor manual. The Z-80 monitor program automatically sets the baud rate of the TU-ART or 4FDC to the baud rate of the terminal you are using. You should refer to the monitor manual at this

point and you are encouraged to try all the monitor commands.

Construction of your Z-2/Z-2D microcomputer system is now complete. The Z-2/Z-2D is a versatile system and can be configured to meet your needs. In addition to the CPU card which comes with the system, applications typically require additional memory and interface cards. A wide variety of peripherals are available from Cromemco to meet your specific requirements.

NOTE: Unless you are using the Z-2/Z-2D with its full capacity of 21 cards, Cromemco recommends using fuses with a smaller amperage rating than those supplied. As a rule of thumb, fuses with a capacity 50% greater than the total current drawn by all cards combined are recommended for the +8volt(F2), +8volt(F3), and -18volt(F4) outputs. IN NO CASE SHOULD THE FUSES USED EXCEED THE CURRENT RATING PRINTED ON THE BACK PANEL OF THE Z-2/Z-2D.

Installation Of A Second Disk Drive

- 1) Remove cover plate from right-hand slot in the Z-2D front panel.
- 2) Attach DPS-1 power supply board to the rear of the disk mounting bracket with two 6-32 x 3/8 screws and 6-32 kep nuts. The DPS-1 board should be positioned toward the bottom of the "U" bracket with the four-wire Amp connector on the open end of the bracket (see drawing).
- 3) Mount disk bracket in right position on Z-2D front panel with four 1/4 x 20 flat head screws, placing four 1/4" lock washers between the bracket and the front panel.
- 4) Carefully unpack the Wangco disk drive and make the following modifications to it (see drawing).
 - a) Cut wire labeled "MUX."
 - b) Cut wire with crimped on terminal screwed to rear of disk frame.
 - c) Set jumper plug for drive "B" select (see 4FDC manual).
- 5) Insert disk drive from the outside of cabinet through right slot in front panel so that the P.C. board on the disk drive faces left. Attach drive to mounting bracket with four 6-32 x 3/8 screws.
- 6) Plug four-wire Amp connector from DPS-1 board into mating plug on rear of disk drive.
- 7) Plug the remaining Molex connector from disk power supply harness onto J1 in center of DPS-1 board (key forces connector to go only one way).
- 8) Plug the remaining 34 pin edge connector of disk signal cable assembly onto P.C. board on rear of disk drive. (The darker cable stripe should face the outside of the disk drive.)
- 9) Perform system check-out as described in the 4FDC manual.

About Assembly Diagrams And Parts Lists

Your Z-2/Z-2D kit contains three separate categories of parts. These include parts for (1) the Z-2 rear panel and the BLITZ BUS^(TM) wiring, (2) the Z-2 chassis, and (3) the ZPU card. In addition, if you have a Z-2D disk kit, there is the disk assembly and a 4FDC card. The ZPU and 4FDC parts lists are included in

separate manuals. Parts associated with all other categories are listed under the category name.

The following parts lists include Cromemco parts numbers, item numbers, a description of the item, and quantities. Item numbers listed with each part match the corresponding number on the assembly diagram.

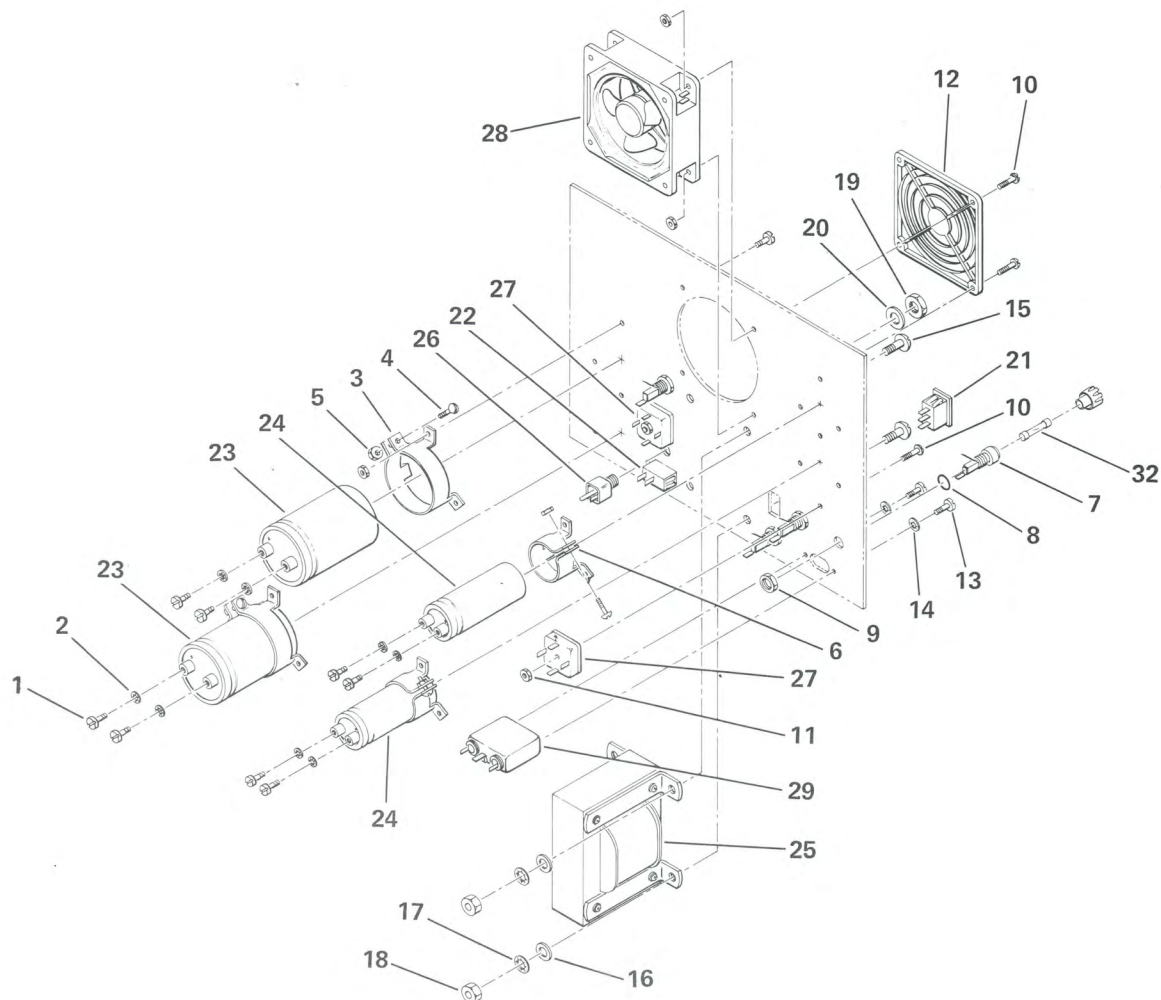
Item	Part No.	Description	Qty	Item	Part No.	Description	Qty
1	016-0004	LEFT SIDE PLATE	1	11	016-0006	REAR PANEL	1
2	016-0005	RIGHT SIDE PLATE	1	12	015-0011	CAPTIVE SCREW (BLK)	4
3	016-0018	CARD LOCK ASSEMBLY	1	13	021-0007	CARD GUIDE (42 POSSIBLE)	2
4	016-0008	TOP PANEL	1	14	017-0020	CARD EDGE CONNECTOR (21 POSSIBLE)	1
5	016-0007	BOTTOM PANEL	1	15	020-0000	BLITZ BUS™ P.C. BOARD	1
6	016-0019	LEFT FRONT PANEL MOUNT	1	16	015-0024	NYLON SHOULDER WASHER	44
7	016-0020	RIGHT FRONT PANEL MOUNT	1	17	015-0006	6-32 x 3/8 PAN HEAD SCREW (CAD)	23
8	016-0021	CARD GUIDE RAIL	4	18	015-0016	6-32 KEP NUT	23
9	016-0022	BUS MOUNTING RAIL	2	19	015-0010	1/4-20 x 1/2 PAN HEAD SCREW (BLK)	8
10	016-0003	FRONT PANEL	1	20	015-0008	6-32 x 3/8 PAN HEAD SCREW (BLK)	32

NOTE: Please see the "Case Assembly Instructions" for Z-2D disk chassis differences.

This exploded view diagram illustrates the assembly of a computer case. The components are numbered as follows: 1. Main chassis plate; 2. Front panel; 3. Internal support rail; 4. Top cover; 5. Bottom cover; 6. Side panel; 7. Side panel bracket; 8. Drive sleds; 9. Drive sled bracket; 10. Front panel bracket; 11. Rear panel; 12. Front panel screw; 13. Drive sled bracket; 14. Drive sled bracket; 15. Drive sled bracket; 16. Drive sled bracket; 17. Drive sled bracket; 18. Drive sled bracket; 19. Rear panel screw; 20. Front panel screw.

Rear Panel Assembly Diagram And Parts List

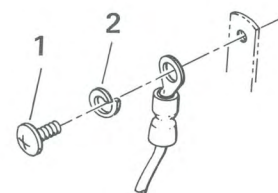
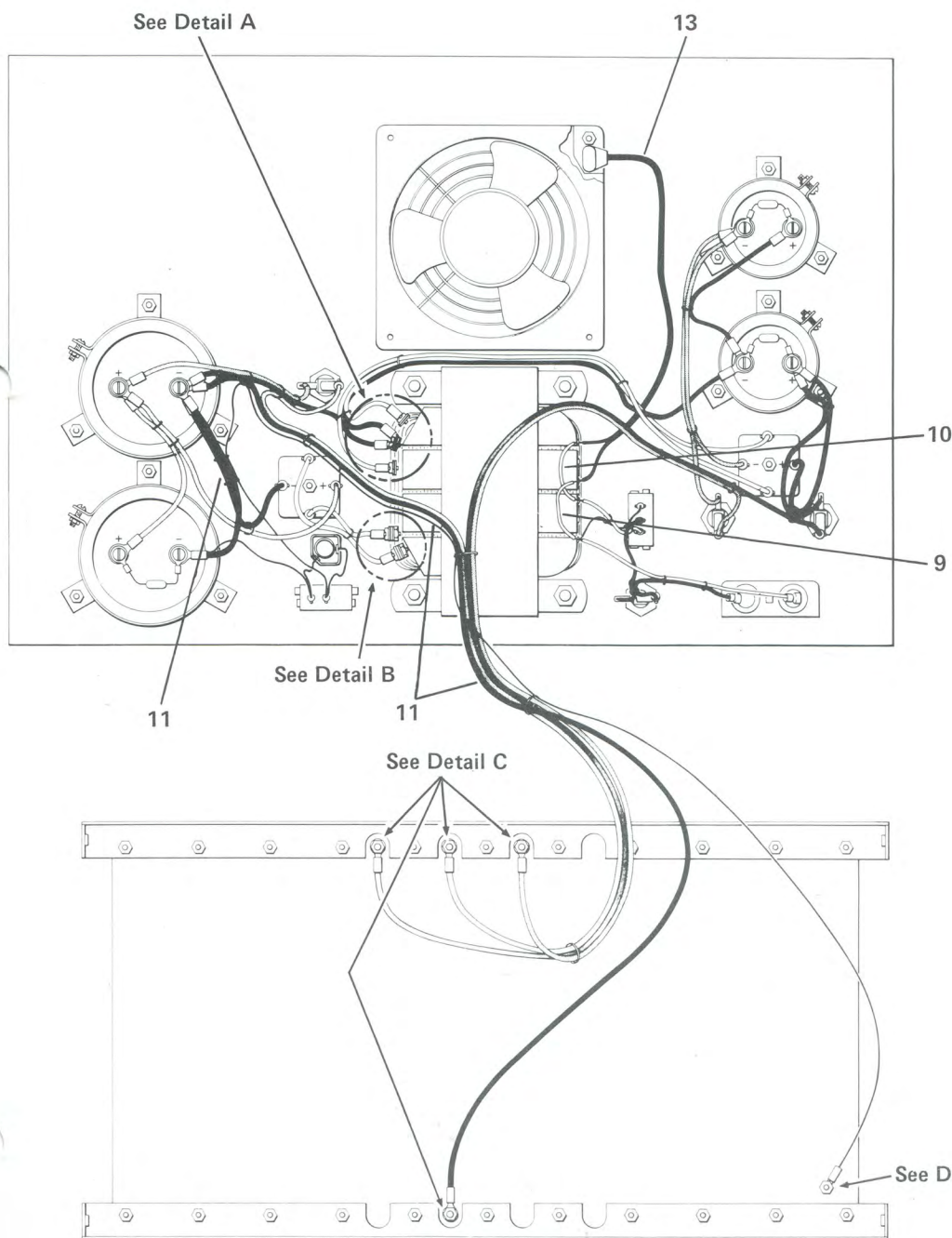
Item	Part No.	Description	Qty	Item	Part No.	Description	Qty
1	015-0004	10-32 x 3/8 FILLISTER HEAD SCREW	8	17	015-0022	1/4 SPLIT RING LOCK WASHER	4
2	015-0018	#10 SPLIT RING LOCK WASHER	8	18	015-0017	1/4-20 HEX NUT	4
3	015-0026	3 INCH CAPACITOR CLAMP	2	19	017-0019	3/8-28 HEX NUT	1
4	015-0007	6-32 x 5/8 PAN HEAD SCREW (CAD)	4	20	017-0019	3/8 BEVEL WASHER	1
5	015-0013	6-32 HEX NUT	4	21	013-0007	S1, LIGHTED ROCKER POWER SWITCH	1
6	015-0027	2 INCH CAPACITOR CLAMP	2	22	015-0008	S2, ROCKER RESET SWITCH	1
7	018-0000	FUSE HOLDER	4	23	004-0029	C1, C2, 130,000 μ FD/15V CAPACITOR	2
8	018-0000	1/2 RUBBER WASHER	4	24	004-0016	C3, C4, 29,000 μ FD/25V CAPACITOR	2
9	018-0000	1/2-24 HEX NUT	4	25	014-0000	T1, TRANSFORMER	1
10	015-0009	6-32 x 7/8 PAN HEAD SCREW (BLK)	6	26	017-0019	J1, 1/4 PHONE JACK WITH HARDWARE	1
11	015-0016	6-32 KEP NUT	18	27	008-0021	BR1, BR2, BRIDGE RECTIFIER	2
12	021-0000	FAN GRILL	1	28	021-0000	WHISPER FAN (OPTIONAL)	1
13	015-0008	6-32 x 3/8 PAN HEAD SCREW (BLK)	14	29	007-0001	LF1, AC LINE FILTER, 250 VAC, 7A	1
14	015-0021	#6 INTERNAL TOOTH LOCK WASHER	2	30	018-0002	F1, FUSE, 5A	1
15	015-0010	1/4-20 x 1/2 PAN HEAD SCREW (BLK)	4	31	018-0005	F2, FUSE, 30A	1
16	015-0023	1/4 FLAT WASHER	4	32	018-0003	F3, FUSE, 15A	2



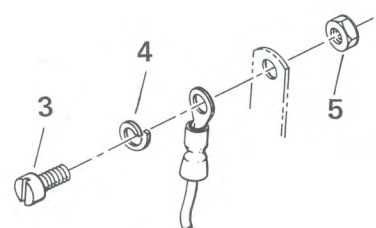
Harness Assembly Diagram And Parts List

Item	Part No.	Description	Qty
1	15-0005	8-32 x 1/4 SCREW	3
2	015-0018	#10 SPLIT RING LOCK WASHER	3
3	015-0004	10-32 x 3/8 FILLISTER HEAD SCREW	6
4	015-0018	#10 SPLIT RING LOCK WASHER	6
5	015-0015	10-32 HEX NUT	6
6	015-0006	6-32 x 3/8 PAN HEAD SCREW	1
7	015-0020	#6 SPLIT RING LOCK WASHER	1

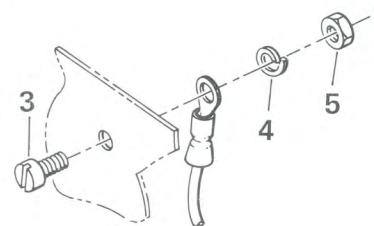
Item	Part No.	Description	Qty
8	015-0016	6-32 HEX NUT	1
9	019-0013	3 INCH WHITE JUMPER WIRE (#16)	1
10	019-0014	3 INCH GREEN JUMPER WIRE (#16)	1
11	099-0004	DC HARNESS	1
12	099-0005	AC HARNESS	1
13	019-0003	FAN CORD (OPTIONAL)	1
	019-0002	POWER CORD	1



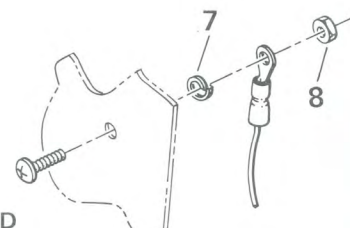
Detail A



Detail B

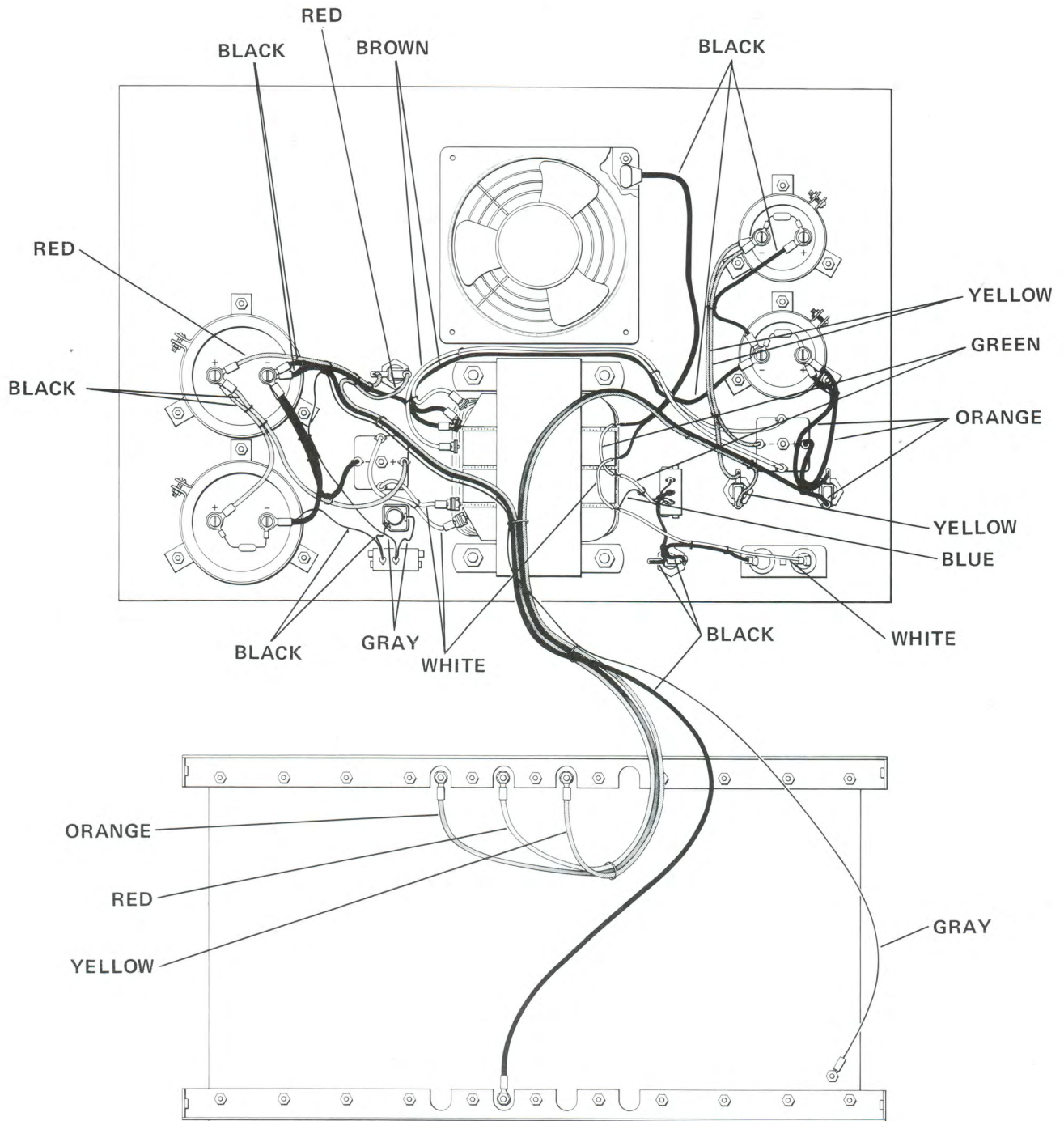


Detail C

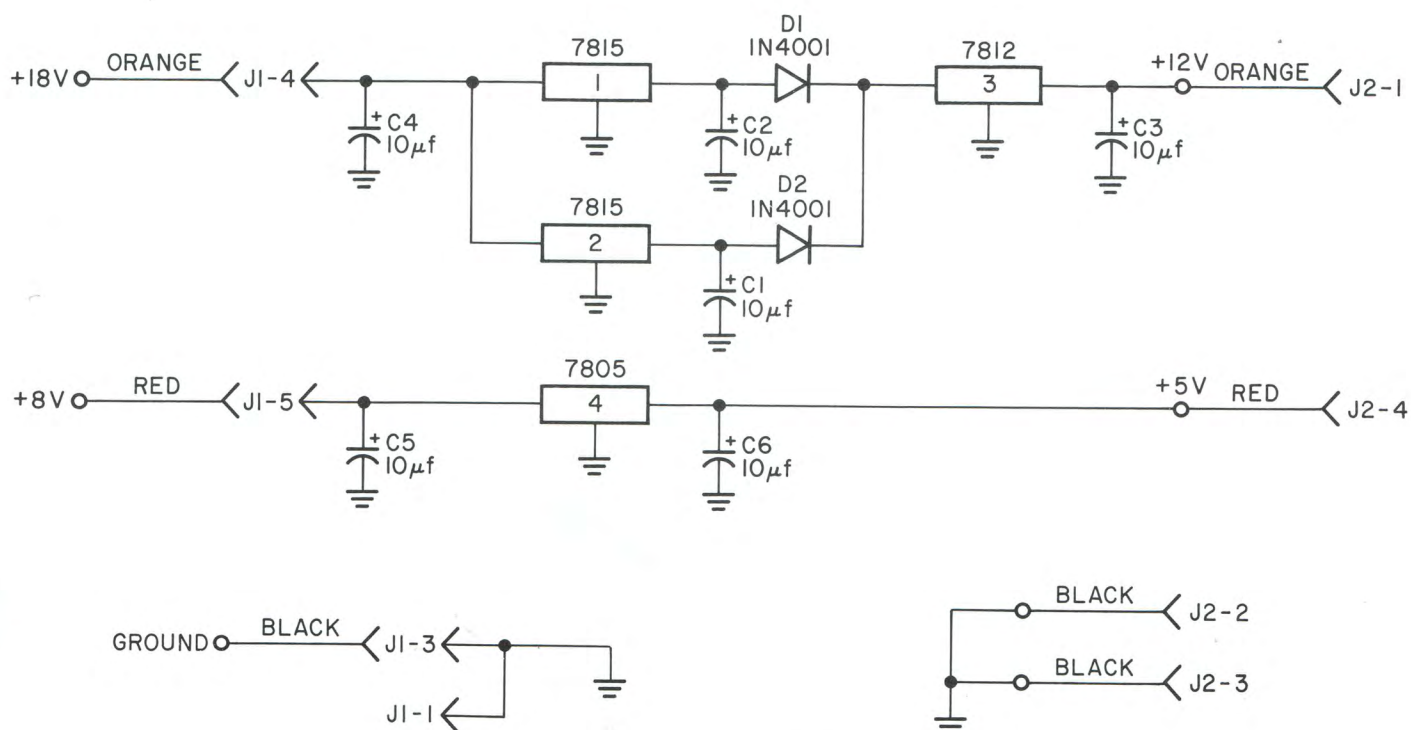
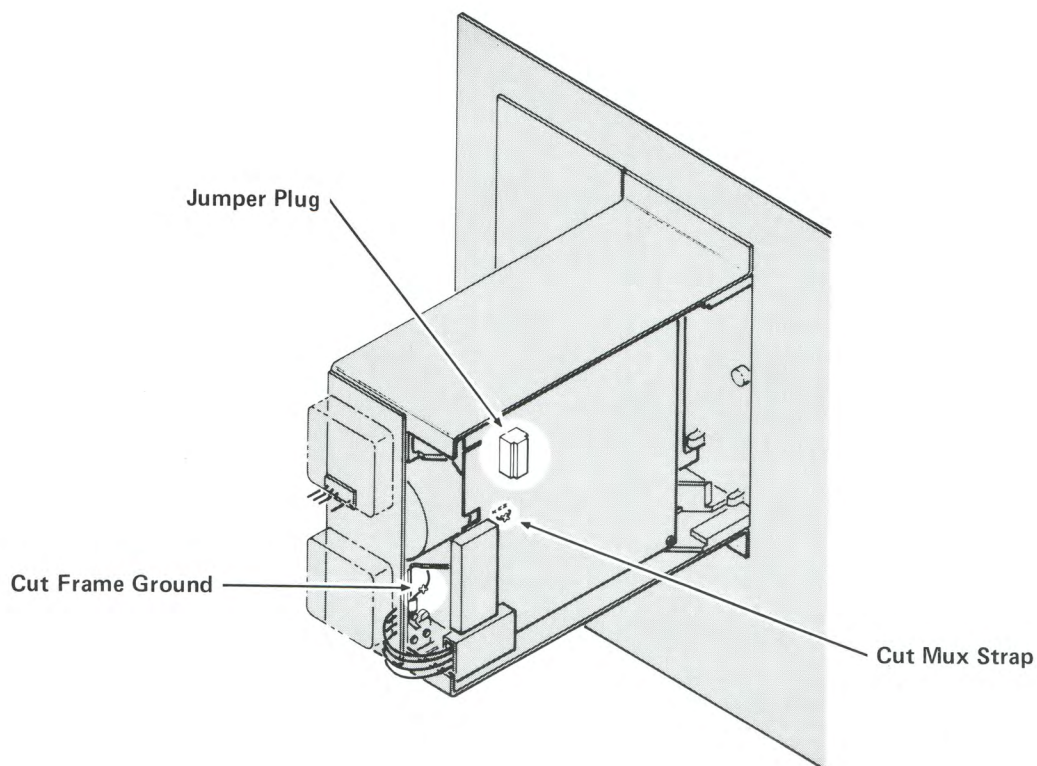


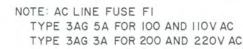
Detail D

Harness Assembly Diagram (Color Codes)



Disk Assembly Diagram And Power Supply Schematic





System Bus Structure

1	+8v
2	+18v
3	XRDY
4	VI0
5	VI1
6	VI2
7	VI3
8	VI4
9	VI5
10	VI6
11	VI7
12	NMI
13	
14	
15	
16	
17	
18	STAT DISABLE
19	C/C DISABLE
20	UNPROTECT
21	SS
22	ADDR DSDL
23	DO DSDL
24	02
25	01

26	PHLDA
27	PWAIT
28	PINTE
29	A5
30	A4
31	A3
32	A15
33	A12
34	A9
35	DO1
36	DO0
37	A10
38	DO4
39	DO5
40	DO6
41	DI2
42	DI3
43	DI7
44	SMI
45	SOUT
46	SINP
47	SMEMR
48	SHLTA
49	CLOCK (2 MHz)
50	GND

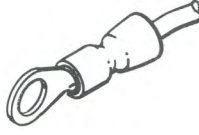
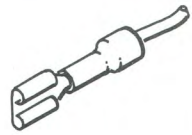
51	+8v	A
52	-18v	B
	SSW DSS	C
54	EXT CLR	D
55		E
56		F
57		H
58		J
59		K
60		L
61		M
62		N
63		P
64		R
65	MREQ	S
66	RFSH	T
67	MDSBL	U
68	MWRITE	V
69	PS	W
70	PROTECT	X
71	RUN	Y
72	PRDY	Z
73	PINT	a
74	PHOLD	b
75	PRESET	c

76	PSYNC	d
77	PWR	e
78	PDBIN	f
79	A0	h
80	A1	j
81	A2	k
82	A6	l
83	A7	m
84	A8	n
85	A13	p
86	A14	r
87	A11	s
88	DO2	t
89	DO3	u
90	DO7	v
91	DI4	w
92	DI5	x
93	DI6	y
94	DI1	z
95	DI0	AA
96	SINTA	AB
97	SWO	AC
98	4MHz	AD
99	POC	AE
100	GND	AF

Component Side of Board

Solder Side of Board

Assembly Hardware

					
1/4-20 x 1/2 Pan Head Screw	Fillister Head Screw	6-32 x 1/4 Pan Head Screw	6-32 x 3/8 Pan Head Screw	6-32 x 5/8 Pan Head Screw	6-32 x 7/8 Pan Head Screw
					
1/4\" Flat Washer	1/4\" Split Ring Lock Washer	#10 Split Ring Lock Washer	#6 Split Ring Lock Washer	#8 Internal Tooth Lock Washer	#6 Internal Tooth Lock Washer
					
1/4-20 Hex Nut	10-32 Hex Nut	6-32 Hex Nut	6-32 Kep Nut	Eye Connector	Slip on Connector

Warranty

I. FACTORY ASSEMBLED PRODUCTS

A factory assembled Z-2/Z-2D microcomputer (model Z-2W or Z-2DW) is warranted against defects in materials and workmanship for a period of 90 days from the date of delivery. The registration form must be completed and returned in order to validate the warranty. We will repair or replace products which prove to be defective during the warranty period provided that they are returned to Cromemco. No other warranty is expressed or implied. We are not liable for consequential damages.

II. KIT PRODUCTS

Should your assembled Z-2/Z-2D kit (model Z-2K or Z-2DK) fail to operate properly, it will be repaired for a fixed fee provided that it is returned to Cromemco. We reserve the right to refuse to repair any unit that has not been built in a workmanlike manner or that has been subject to abnormal electrical or mechanical abuse. The fixed service fee is currently \$95 and is subject to change. (The \$95 fee covers the Z-2/Z-2D chassis, power supply, ZPU card and disk drive; the fixed service fee for the ZPU or 4FDC card if returned separately is currently \$35.) If the Z-2/Z-2D computer is returned with additional Cromemco cards or other Cromemco products installed, the fixed service fee for each of these products must be added to the total service charge. We do not service cards or products produced by other manufacturers nor do we guarantee system compatibility with cards or products produced by other manufacturers.

After-Warranty Service

(The \$95 fee covers the Z-2/Z-2D chassis, power supply, ZPU card and the Z-2D disk drive; the fixed service fee for the ZPU or 4FDC card if returned separately is currently \$35). If the Z-2/Z-2D computer is returned with additional Cromemco cards or other Cromemco products installed, the fixed service fee for each of these products must be added to the total service charge. We do not service cards or components produced by other manufacturers nor do we guarantee system compatibility with cards or products produced by other manufacturers.

