MULTI-SYSTEM PERSONAL COMPUTER USER'S MANUAL

BOSS-1

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INTRODUCTION

Congratulations on the purchase of your MULTI-SYSTEM PERSONAL COMPUTER. This machine is strictly quality-controlled to bring you the utmost in reliability and maintenance free operation.

YOUR MULTI-COMPUTER is unique in that it is not limited to only one or two operating systems, but has the ability to change its "personality" with a simple swap of the System Card. You may choose from any one of a number of standard operating systems or even create your own to suit your specific application.

Unique too in that you may use both 8 bit, and 16 bit programs. In fact, a great deal of software programs written for Micro-Computers may be run by simply changing its System Card to suit or loaded O.S. from Disk Drive.

And again unique in that you are not tied to any one supplier, you may choose Expansion Cards from APPLE, MICROSOFT, and ALF, to name a few. There are over 50 different expansion cards available. But of course we would like you to support your local computer dealer by asking him first, if he doesn't stock the particular Card you are looking for he will at least point you in the right direction.

Before we go any further let's now some of the terms used in this manual.

Two Type Mainboards: This computer has two type of mainboards.
TYPE A is build in single C.P.U. 6502 and 9 slots includes a system slot beside slot "7".
TYPE C is build in Dual C.P.U. 6502/ Z80 and 7 slots includes a system slot at slot "0".

Chapter 2
SETTING UP YOUR MULTI-COMPUTERS

Unpacking two cartons you will have found: See (Fig. 2-1).

SYSTEM CARD

MANUAL   FILE COVER

POWER CORD

1. The CPU Unit
2. Power Cord
3. System Card (Optional)
4. Keyboard (The Smaller Carton)
5. This manual and a File Cover.

Please check that these items are present when you receive your computer.

You will probably also have purchased a monitor, or a T.V. for visual display, and possibly some expansion cards. In the case of a colour T.V. you will also need a PAL Expansion Card (PAL SYSTEM COUNTRY ONLY), or an RF Modulator in the case of a monochrome T.V.

To permanently store any information you type in, or programs you create, you will require a disk drive and a disk drive controller card, or alternatively a cassette recorder.

With these minimum extras you can set up your system for professional and efficient operation.

Difference between Type A and C will be mentioned in later chapters.

O. S. ROM: This 4K Firmware ROM is an O. S. Monitor which allows your computer running without System-Card you may easily buy it from dealer and insert it into socket "U 24" on mainboard. Will introduce how to operate in Chapter 6.
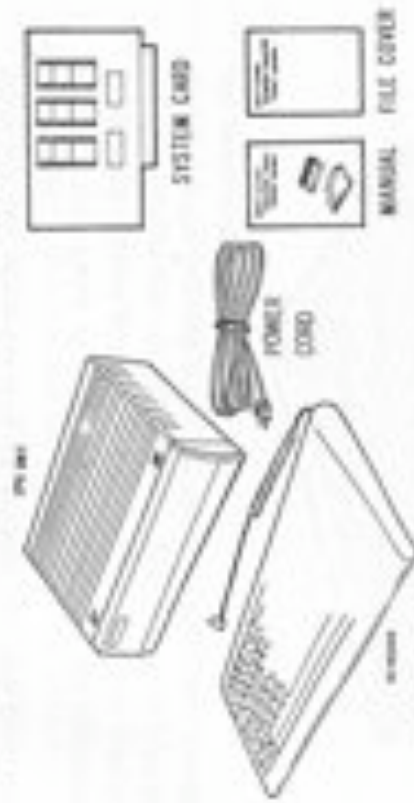
Expansion Card: This type of Card fits into one of the Expansion slots inside your machine. They do things like increase the Memory, allow you to connect Printers, display more characters across the screen, etc.

To operate your Multi-Computer the only extra piece of equipment you will need is a monochrome computer monitor. A standard colour television, black and white television; or NTSC Colour monitor can also be used.

If this is your first venture into the world of computers, don't be concerned, as YOUR MULTI-COMPUTER is easy to use and understand and is suitable for the First Time user, Educational applications, Home and Personal applications, and also the Small Business field.

2.1 LOOKING INSIDE

1. Place your computer on a flat, clean surface. Remember to allow enough space for add on devices that you may purchase later.

2. Facing Front Panel of the Computer, remove the top cover by pushing it down and backward. (See Fig. 2-2) Get into the habit of not letting the front edge of the cover drop into the area above the exposed computer board, as this could damage any expansion cards inserted there.

Fig. 2-2

3. One of the first things you will notice are the eight expansion slots located to the rear of the computer. These slots are provided for various accessories you may want to add later. Such as floppy disk controller, 80 column card, music boards, and so on. Each slot has its own number, starting from LEFT to RIGHT they are 0 to 7.

4. To the left of slot 0 you will see a red LED (light) power indicator. NEVER, NEVER, NEVER, (not even sometimes) install or remove a card or cable while this light is ON. Irreparable damage can occur both to the expansion card, and the computer if a transient power surge should occur due to a sudden removal or insertion of a card while the power is on. In fact, NEVER TOUCH THE INSIDES OF THE COMPUTER WHILE THE POWER IS ON. Talking about irreparable damage to computers, you could be in for a SHOCK yourself. (See Fig. 2-3)

5. Just to the right hand, close to the edge of the main computer board (the Mother Board), you will see a small white connector (J11) with 4 pins sticking up. This can be used as an input on an optional RF Modulator, used to send the video signals to a standard T.V. set instead of a video monitor. (See Fig. 2-3)

6. The round knob which located between RF-Modulator & speakers connector. It is the volume control for the two built-in speakers you may have noticed "inside. You can use this to control the volume of any program which produce sound effects or music. (See Fig. 2-3)

Fig. 2-3

2.2 HOW TO INSERT YOUR SYSTEM CARD

1. MAKE SURE THE POWER IS TURNED OFF.
2. Find your System Card and examine it. The card has three microchips on one side (the TOP side) and solder spots on the other (the BOTTOM side), and one edge of the card has gold coloured strips along it. This is the edge that fits into the system slot. Hold the edge of the card with the Top side facing Right and insert it firmly into the system slot.
3. Don't press too hard when inserting any card. The main computer board is made of fiberglass resin and will crack under too much pressure.
4. On setting up, if unsure of any procedure, always contact your dealer before proceeding.

NOTE: YOU MUST HAVE A SYSTEM CARD INSERTED BEFORE ADDING ANY OTHER PERIPHERALS.

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7. On the rear panel, you will see three round sockets for VIDEO OUT, CASSETTE IN, CASSETTE OUT and a 9-PIN D-CONNECTOR FOR KEYBOARD IN. Also you will see a power switch and a power Cord Socket.(See Fig. 2-4)

8. On Mainboard of type A. (Single CPU) just to the front of the expansion slots, on the right hand side, you will notice another slot labelled "SYSTEM SLOT". This is where you will plug in the SYSTEM CARD, (see figure 5) and possibly later and FORTH SYSTEM CARD, or some other operating System of your own design, or a commercially available operating System. On mainboard of type C (Dual CPU) SLOT "0" is the "System SLOT" in which you will plug "System Card" (See Fig. 2-5)

KEYBOARD IN
VIDEO IN
CASSETTE IN
CASSETTE OUT

Fig. 2-4

TYPE C

TYPE A

Fig. 2-5

2-4

Chapter 3

DISPLAY MONITORS - SOMETHING TO SEE WITH

3.1 CONNECTING A MONOCHROME VIDEO MONITOR

REQUIRED ITEMS

Monochrome monitor
Monitor cable
Power cord and outlet

1. Plug one end of the monitor cable supplied into its connector-VIDEO located on the rear right hand side of your COMPUTER.

2. Connect the other end of the monitor cable into your monitor.

3. You are now ready to POWER UP your computer for the first time. Locate the black ON/OFF switch on the outside rear of the case, and make sure it is in the OFF position. Turn on the Monitor and let it warm up. Turn on your computer. Adjust brightness and contrast on the monitor untill you can read.

M.S.P.C.

4. You may have to adjust screen controls of monitor to centre picture etc.

What happened was that your computer executed all of the initial procedures, signed on the computer's name, and then entered the cassette BASIC programming language.

You can now try out the key board now if you like, what you type in should appear on the screen.

* M.S.P.C. MEANS MULTI-SYSTEM PERSONAL COMPUTER.

3.2 CONNECTING A COLOUR TELEVISION (PAL SYSTEM)

REQUIRED ITEMS

PAL colour television
PAL colour card and instructions
Interface cable
Power cable and outlet

1. Unpack PAL card and read instruction sheet that came with it, follow manufacturer's recommendations with regards to adjustments on card and television. Please contact your computer dealer if you have problems with the installation.

2. Turn off your "Computer" and remove cover.

3. Place television set in convenient place. Note that the maximum recommended weight of a television resting on top of your computer is 12 kg. Do not place television on top of disk drives.

4. Turn on your computer and the television and adjust as necessary. You will have to have a particular channel selected, depending on the Card. Common channels for cards are

M.S.P.C PAL Card   Channel II

STORAGE DEVICES — SOMETHING TO KEEP INFORMATION ON

4.1 CONNECTING A FLOPPY DISK DRIVE...(OR TWO)

REQUIRED ITEMS

Floppy disk drive(s) and cable(s)
Disk controller card

1. Turn off power of your computer.
2. Unpack disk drive(s) and place next to or on top of your computer whichever is more convenient, then extend disk drive cable.
3. Unpack disk drive controller card and locate two 20-pin connectors to the rear. These are marked "DRIVE 1" & "DRIVE 2".

One disk drive

If you have only one disk drive, plug in the end of the cable to the Drive 1 plug.

Two disk drives

you must decide which drive is going to be Drive 1 and which is going to be Drive 2, and then connect them accordingly. Remember that Disk Operating Systems look at Drive 1 first.

Note

When a disk controller card is inserted, control is passed straight to it when the power is turned on. This will in turn activate the master disk drive, which is Drive 1. A floppy disk inserted into that disk drive will be read and a program loaded into the computer's memory.

3.3 CONNECTING A BLACK AND WHITE TELEVISION

REQUIRED ITEMS

Black and white television
Monitor cable
Power cord and outlet
PLUS
Radio frequency (RF) Modulator and instructions
Voltage power adaptor and outlet
OR
Pal Colour Card

1. Turn off power of your computer.
2. If using an RF Modulator, follow instruction sheet supplied with it. Contact your computer dealer for help if needed.
3. Most common modulators require their own 9 volt power supply, and are turned to operate on a particular television channel, usually Channel 1.
4. You should find one power input wire, one Video Input wire, and one RF Output Socket. Video (or Modulation) input comes from the Video Out socket on the rear of your computer, and the RF Output socket is usually connected to the television via an RCA cable. Usually the modulator casing must be earthed. Remember to check instructions supplied with modulator.
5. A PAL Colour card has an RF Modulator built-in. You should be able to use it on a Black and White television with little or no adjustments necessary.

4. Locate system expansion slots. Slots are numbered 0 to 7 from left to right. Insert disk controller card into expansion slot NUMBER 6. Feed cable(s) through cutaway section on rear of case.

5. Test the installation by turning the power switch on. A red light should come on and the drive should activate. Turn the power switch off and replace the top cover.

NOW YOU ARE READY FOR OPERATION

4.2 CONNECTING A CASSETTE PLAYER

REQUIRED ITEMS

Cassette Recorder in good condition
Computer Grade cassette tape
Cassette interface cable
Power cable and outlet

1. Turn off power of your computer.
2. Locate cassette interface sockets and connect the two cables as follows:

YOUR COMPUTER		CASSETTE RECORDER
Cassette Out	to	EAR Jack
Cassette In	to	MIC Jack

3. Plug in and turn on computer and cassette recorder. Insert cassette tape into recorder.

4. You can test your installation with the following program by typing in exactly what you see below:

```
10 HOME
20 PRINT "YOUR CASSETTE RECORDER HAS READ
   IN THIS PROGRAM CORRECTLY"
30 END
```

5. Make sure the tape is well past the leader part and press the RECORD and PLAY buttons on your recorder to start the tape.

6. To save your program on the cassette tape type in:

SAVE TEST

7. Once this has been entered, and you have pressed the RETURN key on the keyboard, the square block character will disappear from the screen.

8. Once the square block character reappears, hit the STOP button on your recorder and REWIND the tape to the beginning.

9. Type in NEW and hit the RETURN key. This will delete the program you have just typed in from the computer's memory.

10. You are now ready to reload your program from the tape. Type in LOAD TEST and hit PLAY on the recorder. Quickly hit RETURN on the keyboard.

11. The square block character will disappear again. You must adjust your Volume and Tone controls to mid range so the program will load correctly. If the square block character does not reappear on the screen, adjust your recorder's tone and volume controls.

12. By the time you get this right, your tape may have passed the spot where your program is stored. If this is the case, REWIND the tape and let it PLAY again, until your volume/Tone combination is correct.

13. When square block character reappears, type in: LIST and hit RETURN, to see whether your program has loaded correctly. You should see what you had previously typed in appear on the screen.

14. To execute your program type in RUN and hit RETURN. CONGRATULATIONS YOU HAVE JUST WRITTEN A BASIC PROGRAM

Chapter 5

PRINTERS – GETTING OUT WHAT YOU PUT IN

5.1 CONNECTING A PRINTER

REQUIRED ITEMS

Printer (Dot matrix, Daisy-wheel, or Thermal)
Printer interface cable
Parallel or Serial Interface Card and Instructions
Paper and printer ribbon
Printer instruction manual
Power cord and outlet

Due to the huge range of printers and cards available, we cannot go into depth in this section. However, should you experience difficulty with this procedure, your computer dealer is there to help you. Basically, the installation would go:

1. Turn off power of your computer.
2. Install your card, following manufacturer's instructions. If using a Serial Card, pay particular note of the BAUD rate selected. The Baud Rate governs the speed of transmission of data between the computer and the printer, and both machines must have the same rate selected.
3. Install your printer, following manufacturer's instructions. Note any DIP SWITCH settings and their meanings. Most printers have a Self-Test mode, try this first to check that the printer is working correctly.
4. Power up machines and test.

COMPATIBLE PRINTERS

1. Dot matrix, daisy-wheel, and thermal.
2. Both Serial (RS-232, RS-232C) and Parallel (Centronics)
3. Recommended printers Inc.

President VSP-1	Star Gemini
Epson	C. Itoh
Toshiba	Okidata
NEC	Microline

5.2 OTHER PERIPHERAL DEVICES – EXPANDING YOUR HORIZONS

STORAGE DRIVES

1. 5.25" and 8" Floppy disk drives.
2. Winchester Hard disk drives.
3. Multi User disk system.
4. Cassette tape system.

OTHER

Modem	Graphic Tablet
Light Pen	Joystick
Robot Controller	IEEE-488
Graphics Plotter	ROM Writer
Printer Buffer	Virtual Memory Disk

SCREENS

Mono T.V.	Colour T.V.
Green Monitor	Amber Monitor
N.T.S.C. Clour Monitor	High Res. Colour Monitor
RGB Colour Monitor	

Chapter 6
"SYSTEM ROM" REPLACES "SYSTEM CARD" TO RUN YOUR COMPUTER

GETTING THE COMPUTER UP AND RUNNING (A SYSTEM ROM INSTEAD OF SYSTEM CARD)

SYSTEM ROM

In this chapter, you will make your computer run by using a "SYSTEM ROM" instead of the "SYSTEM CARD". SYSTEM ROM is a 4k byte memory built in program of "OPERATION SYSTEM" specially designed for your computer. You can buy it from dealers. (See Fig. 6-1)
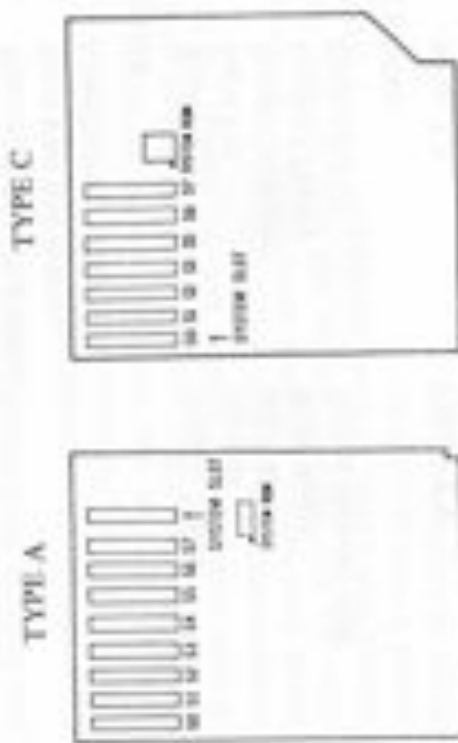
TYPE A

TYPE C

Fig. 6-1

TURNING ON (WITOUT DISK DRIVE)

First, you should have at least the following parts connected:
* Your Computer with Keyboard
* Monitor Display

Once everything is connected well, turn the computer power on, and you will hear a "beep" sound from speaker, and the screen shows as Figure 6-2.

M.S.P.C. VER. 4.1

Figure 6-2

Right now, at this condition, you can start to check or list (by "CALL-151") your monitor program of computer. "#" is a sign of monitor mark; meanwhile you can also verify your keyboard is in good condition.

APPLE II PLUS OR ROM CARD SYSTEM MASTER

■

Now you can program Apple BASIC or other Apple Type Software you need to run.

If you need to run CP/M type software, first make sure your computer is type A or type C. For type A, you shall plug in Z-80 card at Slot 2 or Slot 4 (check if power is off before plug-in), then you can put CP/M type software into Drive one (or A), turn on the power, you will see screen shown as Figure 6-3. Select No. 2 (by press Key "2"), after few seconds, your screen will change as following:

```
XXXX CP/M
56K VER. 2.20
(C) 1980 MICROSOFT

A >
```

For type C, you need not plug in Z80 card anyway.

O.K.! Now you can enjoy your program according to the CP/M manual.

TURNING ON WITH FLOPPY DISK DRIVE

REQUIRED ITEMS

Computer with Keyboard
Monitor Display
One or Two Floppy Disk Drive and One Controller Card

When you wap-up above parts and turn on the power, you still can hear "beep" sound from speaker, and the screen shown as follow:

```
M.S.P.C. VAR 4.1

1) FP BASIC
2) Z-80 CP/M

(1/2)?■
```

Figure 6-3

If need to run Apple Type Software, you need Apple DOS to load Apple Basic to your computer. Then you can run Apple Type Software, after you put Apple DOS into Disk Drive, type key "1" and your drive will start to load Apple BASIC into your computer. Few second later, you will see your monitor screen shown as Figure 6-4:

DISKETTE CARE & HANDLING

To get best performance from your diskette, and to provide the best protection to the information you put on them, we recommend that you note these few Diskette Do's and Don'ts:

1. Whenever handling your diskettes, DON'T ever touch the diskette recording surface. Handle your diskettes only on the jacket area.

2. After you have finished using a diskette, DO put it back in its protective envelope immediately. If you leave a diskette exposed, dust, debris, cigarette smoke and other environmental hazards will quickly cause damage to your data.

3. When writing on your diskette ID label, DON'T use a ball-point pen, fountain pen, pencil or other hard marker. Use only a felt tip pen. Hard markers can make an impression on your diskette, causing data loss.

4. Diskettes work at best temperatures between 50F and 125F. Temperatures above 125F can occur easily in an automobile, or in front of a window pane. DON'T store your diskettes in areas of extreme temperature. To keep them working best, keep them where the temperature is comfortable.

5. DON'T let a magnet or magnetized object get near your diskette. That little magnet that keeps all your phone messages in place could cause your diskette to lose all its information.

6. DON'T ever fold, bend or crease your diskette. Handle your diskette carefully, so it will always be in good shape to make contact with the read/write header in the disk drive properly.

7. DON'T use erasers on the diskette ID label. You could get debris in the diskette, and that's a lot worse than having a messy ID label.

8. Do gently load your diskette in your disk drive. If you don't it may bend or center improperly. That causes the diskette to rotate in an elliptic orbit, missing data.

BACK UP YOUR IMPORT INFORMATION

Anytime you find yourself with information on a diskette that you simply can't lose, you're open for trouble. Why? Because you could accidentally lose it. Think of all the time you put into creating a specific program, or worse yet, the money you spent buying one. In a case like this value of a back-up diskette can't be overemphasised. In some instances, it may be advisable to have two back-ups. Make sure you store your back-up data in a well-protected, safe place and use the silver write protect labels to stop accidental erasure.

PROTECT YOUR DATA WITH WRITE PROTECT LABELS

Most blank disks that you purchase for use with your TPC, have a small square notch cut into the upper right hard side of the diskette. To "Write Protect" data on your disks, the write protect notch must be covered up with one of the foil labels supplied. With one of these silver labels in place you cannot accidentally write over or destroy the information contained on the diskette. To write on a disk, uncover the notch. REMEMBER to put the write protect label on the disk AFTER you have stored all the information you want on it. Your TPC can still READ & WRITE protected disk, but it cannot WRITE on to it.

OPTIONAL SYSTEM AND EXPANSION CARDS AVAILABLE

ALF AD8088 CARD

Uses the Intel 8088, 16 bit CPU, allowing your computer to run faster and handle more complex programming tasks. The 8088 is the same process or used in the Columbia MPC and IBM PC. On your computer this card operates a 5MHZ, four times faster than the standard 6502, 8 bit CPU. The 8088 card supports the CP/M-86 operating system, opening up even more software programs that may be utilized.

6809 CPU CARD

The 6809 CPU matches well with your computer, and allows the use of software designed for the 6809.

FP CARD

FP BASIC and operating system are compatible with your computer.

CREATING YOUR OWN OPERATING SYSTEM

We suggest that you fully understand the standard operating system of the computer first, before trying to design your own.

1. Study one or more languages thoroughly such as C, Assembler Code, or a high level Machine Language.
2. Study computer design theory.
3. Study computer projects from the abundance of available literature.
4. Familiarize yourself with the functions of an EPROM WRITER so that you are able to transfer any machine language you create into the DEMO OS Card. Howevever, we do recommend the DEMO OS Card be kept strictly for personal use.
5. Plug in your developed OS Card and test your personal OS System.
6. We appreciate that writing your own operating system is most suitable for students in programming and computer study.

Chapter 10
KEYBOARD

The keyboard operation manual of your computer is seperately packed from this manual and put it into the carton of keyboard.

Chapter 11
EXPANSION SLOTS

In your computer, there is a ninth slot off-set which we call the Systems Slot which can be used to create a language or for an operating system.

With the other expansion slots you can add expansion Cards, peripheral Cards, and certain operating system cards, such as:

80 Column Card
Printer Card
PAL Colour Card
Communication Card
Robot Controller Card
Disk Controller Card
Forth Card
RS-232 Card
Chinese Character Interface Card
Replica Interface Card
ALF Card (8088 CPU)
Z-80 Card

More than 50 other expansion cards are available to increase your computer versatility.

Chapter 12
SPECIFICATION SUMMARY

This computer has no ROMs or fixed Language. This allows the user to plug in his or her own Operating System or Monitor Program.

EXPANSION SLOTS

Multi-System Personal Computer has 6 to 8 Expansion Slots and 1 System Slot.

SOUND

Your computer has two speakers with a volume control to regulate the sound to full volume or no sound at all.

TEXT DISPLAY

40 Column, 80 column. (Optional)

LED REMINDER LAMP

Located on the left of slot '0' there is a Red L.E.D. which reminds the user that the computer is either ON or OFF. Never plug in any cards into the system board with the power on, as this may DAMAGE the computer.

OTHER FEATURES BUILT IN TO YOUR COMPUTER

JOYSTICK I/O

There is A Joystick I/O located on the right side of mainboard.

TECHNICAL

Microprocessor

Type A	6502 CPU
Type C	Z80/6502 CPU
Clock Frequency (Apple mode)	1.02 MHZ
Word Size	8 bits
Address Size	16 bits
Keyboard controller	8049

Memory

Type and Size	48/64 Kilobytes of RAM

Text

40 chars per line x
20 lines (80 char opt)
Normal, Inverse and
Flashing characters
Upper/Lower case display (opt)

I/O

Cassette interface
Joystick/Paddle connector
8 peripheral board slots
1 system board slot
RF Modulator interface
Video interface Monochrome &
NTSC Colour

Colour Graphics

40 horiz. x 48 vert. resolution
40 horiz. x 40 vert. resolution
with 4 lines of text
16 colours

Special

Power warning light
on main board

CASSETTE I/O

These I/O ports allow the user to save his or her software or
data on to tape for permanent storage.

TV RF-MODULATOR I/O

This RF I/O port allows the user to connect the computer to
a standard television set.

The Mother board has been designed for ease of component
replacement by plug-in chips and has a logical functional layout,
and has been made of fiberglass for years of trouble free main-
tenance.

High Resolution Graphics

280 horiz. x 192 vert. resolution
280 horiz. x 160 vert. resolution
with 4 lines of text
6 colour

Dimensions

Power

323mm (D) x 420mm (W) x 114mm (H) 200VAC - 260VAC

Full Load Power Output

Temperature

+5V at 4 amp   0 - 50 deg. C
-5V at 300 mamp
+12V at 2 amp
-12V at 300 mamp

System Card

Modes

System Card   **Dos**
FORTH System Card   Forth DOS
FP System Card   Franklin DOS (opt)
                     CP/M (opt)
                     MS-DOS (opt)

PERIPHERALS

FAN
JOYSTICK
GRAPHICS TABLET
12" GREEN MONITOR, AMBER MONITOR
LIGHT PEN
192 KILOBYTE VIRTUAL MEMORY CARD
Z80 CARD
80 COLUMN CARD
PARALLEL PRINTER CARD
SERIAL RS232 CARD
PAL COLOUR CARD

CASSETTE DRIVE
FLOPPY DISK DRIVE
DISK DRIVES
RAM EXPANSION CARD
EPROM WRITER

Appendix A
TEST AND TROUBLE SHOOTING

How to test your computer

(a) Turn the monitor's power on.

(b) Turn on the computer's power.

(c) Monitor should display "M.S.P.S." and you can hear "beep" sound, the "beep" sound just tells your computer is ready.

(d) Key in PRINT FRE (0) statement, then press RETURN, the screen will display-18435.

(e) CTRL-G command will let speaker sound a "beep" sound.

(f) Key in "RETURN" the screen will display "? SYNTAX ERROR".

(g) Key in "INVERSE", then press "RETURN", the prompt character "]" will inverse.

(h) Key in PRINT "ABCDE", then press "RETURN", the screen will display "ABCDE" in inverse form, the background is white and character is black.

(i) Key in "NORMAL" then press "RETURN", the prompt character will back to normal display, the background is black and character is white.

(j) Key in "FLASH", press "RETURN", the prompt character will flash.

(k) Key in PRINT "ABCDE" statement, then press RETURN THE SCREEN WILL DISPLAY ABCDE in flash mode.

(l) Key in "NORMAL" then press "RETURN", the prompt character should go back to normal.

(m) Key in "GR" statement, then "RETURN" the screen will be cleared.

(n) Press CTRL-RESET, the screen will back to TEXT mode and three fourth of the screen will display inverse it.

(o) Turn off the power and on again, the screen should display "M.S.P.S." and a sound "beep".

14-1

After these testing, and your computer is still O.K., then your computer is in normal and good condition!

Trouble shooting

(a) Dead computer. No speaker beep. No video indications at all, or just a flicker on the screen when the power switch is turned on. Power light on keyboard is on.
Check: U53, U55, U67, U75, U79, U82.

(b) No video indications at all, or just a flicker of the screen when the power switch is turned on. Speaker does beep. Power light on keyboard is on.
Check: U45, U51, U64~U72, U74, U82, U89.

(c) Screen comes to life but no cursor prompt. Screen may be filled with different characters which may or may not change when computer is turned off then back on. Speaker does not beep or may have a raspy sound when power switch is turned on. Power light on keyboard is on. (Note: this problem is the most common in the computer.)
Check: U6, U11, U19, U20, U21, U22, U26, U31~U46, U47, U48, U49, U50, U53, U55~U57, U67, U76, U84, U85, U88.

(d) Screen comes on with wired looking graphic characters, but no words. Speaker beeps.
Check: U60, U61, U65, U66, U75.

(e) No color, everything else works normally.
Check: U82, U83, U93.

(f) Screen rolls vertically with or without stopping.
Check: U71, U72, U77, U92, U93.

(g) Screen characters look like they are crunched, and everything is slanted grossly on the screen. (This is horizontal failure.)
Check: U71, U72, U78, U92, U93.

(h) Graphic problems. Text mode works fine. All else is normal.
Check: U18, U26, U30~U38, U46, U47, U50, U52, U54~U58, U64, U65, U66, U74, U82, U83, U92.

(i) Wrong or deformed characters on screen.
Check: U47, U48, U49, U50, U60, U61.

(j) Abnormal Cursor. All else normal.
Check: U60, U75, U82, U84, U85.

(k) Speaker doesn't work. All else normal.
Check: U5, U40.

(l) Keyboard not working properly, swapping keyboard does not fix problem.
Check: U40, U48, U51, U68, U73.

(m) Add on board won't work in one slot. Or works in one slot, but won't work in a different slot.
Check: U11~U25.

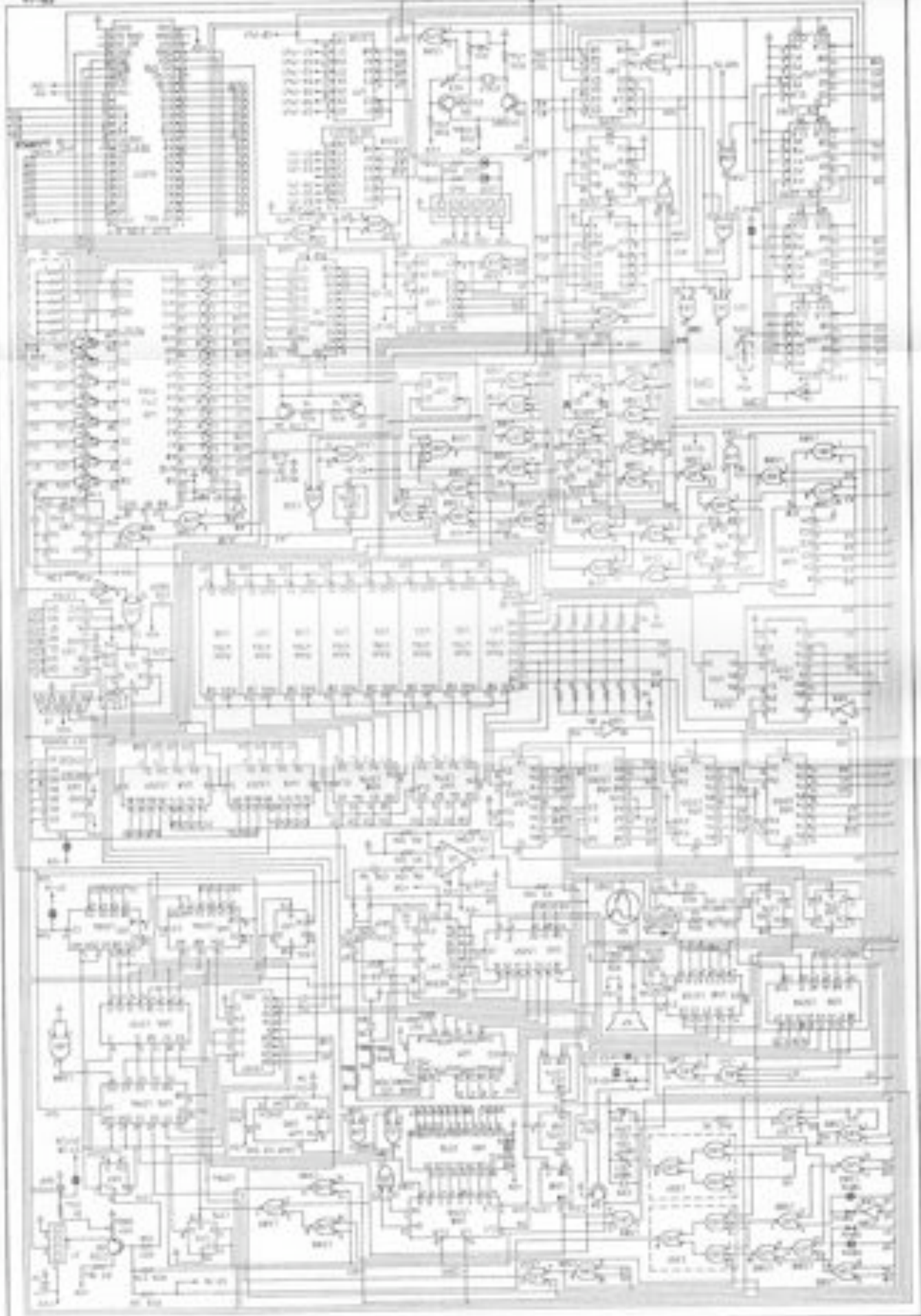(n) Game paddle problem.
Check: U40, U41, U42.

(o) Cassette problem.
Check: U5, U40.

(p) Computer has memory retention problem.
General Memory problems may also be caused from:
Check: U30, U31~U38, U45, U47, U50, U53~U58, U67, U68, U80.

MULTI-SYSTEM PERSONAL COMPUTER CIRCUIT DIAGRAM TYPE A

MULTI-SYSTEM PERSONAL COMPUTER CIRCUIT DIAGRAM TYPE C