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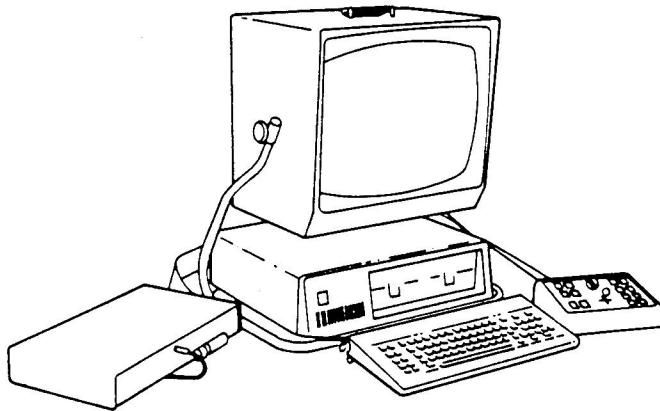
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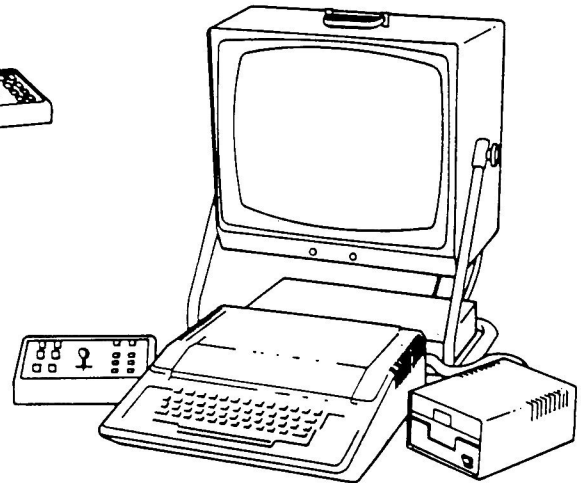
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# LARGE PRINT DISPLAY PROCESSOR USER'S MANUAL



DP-11 (IBM® PC COMPATIBLE)



DP-10 (APPLE® II COMPATIBLE)

## **VISUALTEK®**

1610 - 26th St. • Santa Monica, CA 90404  
(213) 829-6841 TWX: 910-343-6875

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Price: \$25.00

USER'S MANUAL # 4043

for the

VISUALTEK

LARGE PRINT

DISPLAY PROCESSOR

IMPORTANT NOTE: This manual is accurate and up-to-date as of this printing. However, because of the rapid pace of technological advances, slight system modifications may not be reflected in this manual. Therefore, this manual does not constitute a specification or warranty that delivered equipment will conform in every respect to the descriptions herein. Supplementary sheets will be included whenever necessary to describe changes affecting equipment operation subsequent to this printing.

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NOTE: This manual is included free with each Display Processor order. If you purchase this manual, and then purchase a Display Processor within six months, Visualtek will refund or credit what you paid for this manual, as well as provide you with an updated copy of the manual with your equipment shipment.

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## VISUALTEK® DISPLAY PROCESSOR

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### INTRODUCTION

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Section 6: MODES OF USE

Section 7: INSTRUCTIONAL CONTROL MODE (special functions provided for instruction, training, and other special purposes)

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Section 10: WARRANTY AND SERVICE

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# INTRODUCTION

WELCOME...to the world of computing with a large character display.

For persons with limited vision, including those who are legally blind, the Visualtek Large Print Display Processor (DP) offers vastly expanded horizons. Virtually any task requiring computer access can now be accomplished easily and conveniently. Computer information is displayed with letters up to 5" high, instead of the more customarily available character sizes of 1/2" or less. The exact size is selected by the user, over a wide range.

Unlike so-called large character displays available with some commercial terminals and microcomputers, Visualtek's DP does not impose any restrictions on the user, nor is special programming required to produce large characters. It's all done automatically by the DP. Whatever could have been displayed at regular size can still be displayed at regular size....but, with just the touch of a simple control, that same information can also be displayed at any of eight different sizes, from approximately 3/8" high up to 5" high (actual size also depends on the size of the display screen being used...these sizes are for a 19" diagonal display screen).

The Large Print Display Processor (referred to as DP hereafter in this manual) is available in various configurations to work with different Microcomputers. For instance, at the time this manual was printed, two models of the Display Processor were available:

Model DP-10 Display Processor for use with Apple®-IIe or Apple-II+ (optionally including Apple-supplied 80-column accessory feature);

Model DP-11 Display Processor for use with the IBM® PC.

When you receive your DP, supplementary information sheets regarding installation and usage of the particular model you have obtained will be inside the front cover of this manual. Virtually all of the control features, and modes of usage, are independent of the particular microcomputer with which your DP will be used. Therefore, unless noted otherwise, the information in this manual is applicable to all DP models.

Note carefully that the DP does not generally limit system performance. Whatever character-oriented\* tasks and functions can be performed by a fully-sighted person using your particular computer (Apple, IBM, or other models as complementary DP models are made available) can usually also be performed by a person with low vision. No special programming is required: Whatever programs exist for use by a fully-sighted person can also be used, without alteration, by a person with low vision (in conjunction with the DP). Occasionally, there may be some minor limitations on usage; some of these are discussed in Section 6 of this manual.

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\*Graphic characters are not enlarged, nor even displayed in any enlarged mode of operation, but are reproduced normally for 1:1 display (non-enlarged).

Apple® II, II+ & IIe are registered trademarks of Apple Computers, Inc.

IBM® PC is a trademark of International Business Machines, Inc.

This manual describes how to set up and use your Visualtek Display Processor. We would welcome your comments and suggestions, sent to:

Visualtek Marketing Department  
1610 - 26th Street  
Santa Monica, CA 90404.

Information regarding equipment service, in case of any malfunction, is contained later in this manual.

# Section 1

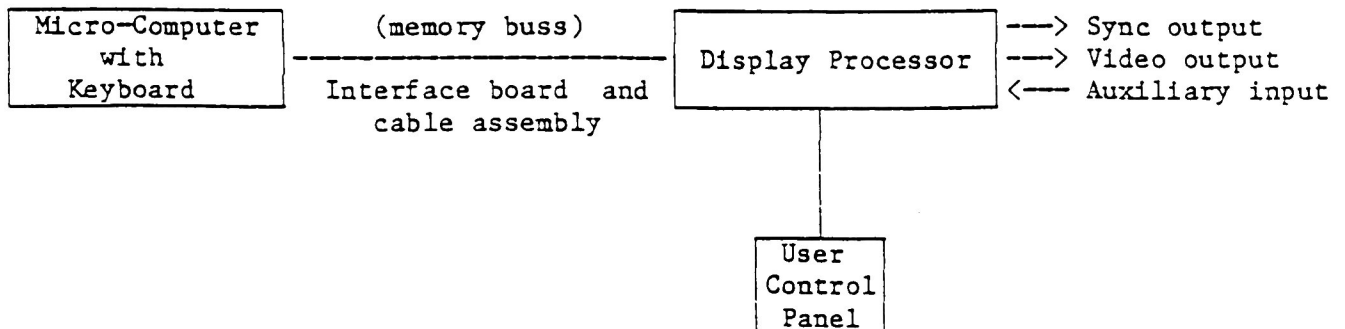
## GENERAL INFORMATION & SPECIFICATIONS

"Large Print Display Processor," "Display Processor," and "DP" are trademarks of Visualtek, Inc. Each DP contains the following items (see Figure 1-1):

1. The basic electronic display processor circuitry, which plugs into a standard wall receptacle (120 volts 60 Hz, or 220-240 volts 50 Hz).
2. A User Control Panel (UCP), which the low-vision user operates to permit easy and convenient reading of the enlarged image.
3. Interface board and cable assembly.
4. A video output cable, which can be connected to a commercial monitor or to other Visualtek reading aids for split-screen operation (see Section 3 of this manual).
5. An external sync output cable (5-conductor) for split-screen operation with other Visualtek reading systems (see Section 3 of this manual).

FIGURE 1-1

DP BLOCK DIAGRAM



Note that a monitor, or other display, is not included in the above list. Some sort of display is always required. However, it is not included in the basic equipment complement since there are situations in which the user will have an existing monitor which can be used for display purposes.

Most partially-sighted users of the DP will also want to have a regular Visualek video visual aid to help them with regular reading, including source materials used on the job. The Visualek Voyager is an example of such a video visual aid.

The Voyager includes a display screen. Since there is seldom a need for more than a single display screen, the DP is designed so that it can display its character output on the Voyager screen (or, for that matter, on the screen of any Visualek video visual aid which has external sync capability installed).

Most microcomputers for which a version of the DP is available are capable of using a standard display monitor. If a monochrome monitor is suitable for the user's purposes, there is no need to obtain a monitor with the microcomputer. Instead, the monitor which is part of the Visualek-supplied equipment can be used for this purpose. For instance, the output of an Apple-II microcomputer can be displayed on the Voyager screen, hence avoiding the need for an extra monitor as part of the system configuration. This saves space, is easier to use, and provides maximum economy.

When both the regular reading aid and the DP are sharing the same display screen, the user can control how much of an image from each source is being displayed. This is called "split screen viewing." For instance, the user may wish to display source material on the top of the screen, and DP character information on the bottom portion of the screen.

Section 3 describes various equipment configurations which may be ordered from Visualek, to meet a wide variety of needs. Should you have special needs for your job, consult Visualek headquarters, or your nearby Visualek field representative, for additional assistance and advice.

## Section 2

# UNPACKING AND SETUP

### ASSISTANCE

In many cases, your local Visualek representative may be able to provide unpacking, setup, and initial checking procedures, as part of his services to you. Please contact him or her to find out whether this service can be provided at your particular installation site, and if so, to promptly arrange a date and time for this.

However, sometimes this will not be possible, and in many cases purchasers would prefer to undertake this themselves (or may be required to because of internal agency procedures); therefore, information is provided here to assist you in unpacking and setup. If any difficulty is encountered, please do not hesitate to call your local Visualek representative, or Visualek headquarters in Santa Monica, California (ask for Computer Marketing Coordinator).

### UNPACKING AND CHECKING

Unpacking the DP does not require any special tools or knowledge. Ordinary care, as would be appropriate for unpacking any appliance, is all that is required.

SAVE ALL PACKING MATERIALS, IN CASE RESHIPMENT IS EVER REQUIRED.  
THERE IS A CHARGE FOR REPLACEMENT OF PACKING MATERIALS, IF THEY ARE NEEDED.

You will find the following items all in one shipping carton.

Display Processor (optional accessories, if any, are typically installed within the DP, and will not be visible to the user).

User Control Panel (UCP).

Interconnecting cables as follows:

- a) Wide flat cable and Interface card assembly (to connect Micro-computer to DP)
- b) Video cable with UHF connectors, to connect Display Processor to monitor display.
- c) Video cable with phone-jack connector ends that connect TV output Display Processor to RF switch that connects to UHF terminals of TV (optional). (Refer to instructions for DP use with TV Receiver, page 2-3).
- d) An external sync cable (5-conductor).
- e) A copy of this manual.

If you have ordered a 19" monitor and stand with your DP, there will be one additional carton housing this item.

REMEMBER: Unique materials, parts, unpacking and setup instructions, and the like, related to the particular DP model which you have obtained, are

printed on the SUPPLEMENTARY INFORMATION SHEETS located on the inside front cover of this manual.

### MISSING ITEMS OR DAMAGED SHIPMENT

At the time you unpack the DP and its various parts, be sure that you have everything that was ordered (as shown on the Packing List enclosed with the shipment). If there are any shortages or visible damages, please immediately contact Visualtek's Shipping Manager at (213) 978-8835, and advise him of your order number (also shown on the Packing List) and the items which you believe are missing or damaged.

### SETUP

Basic setup procedures are as follows:

1. Connect the Display Processor to the Microcomputer with the 50-conductor wide flat cable and interface card provided. Special instructions describing this connection for your particular microcomputer are contained on the SUPPLEMENTARY INFORMATION SHEETS.
2. Set the User Control Panel (UCP) at some convenient location on your desk, and connect it to the DP using the blue flat cable provided. The connector should be attached to the DP in the cable-up position.

An optional UCP Foot Control is available. To install the foot control, simply plug the Foot Control cable into the sync connector on the back of the User Control Panel.

3. Connect the monitor output signal from your Microcomputer to the input labeled VIDEO-IN on the DP.
4. Using the video cable with UHF connectors on both ends, connect the VIDEO OUTPUT connector on the DP to the display monitor being used in your system. An adaptor may be necessary if the cable is not used with a Visualtek Monitor.
5. Plug the computer into the DP, letting the DP control both the DP and the microcomputer, then plug the M-19 monitor into an outlet strip.
6. Turn on the system power (master DP switch).

Connections associated with split-screen systems are described in Section 3 of this manual.

INSTRUCTIONS FOR DP USE WITH TV RECEIVER (U.S. and Canada Only)

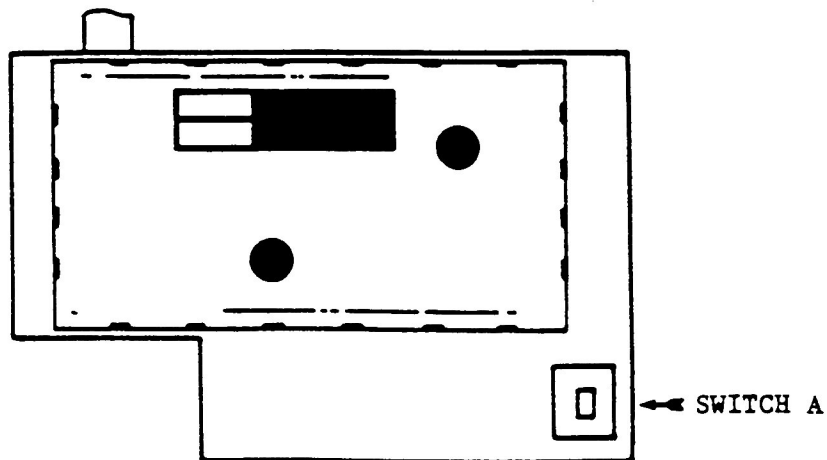
Some models of the DP are built directly for use with a home TV receiver. On other models, this capability may be installed later. In either case, this section describes how to make the necessary connection to your home TV set. Please note that the signals generated by the DP are only designed to work with TV receivers compatible with USA and Canadian broadcast standards.

If your DP is equipped with the TV Output capability, there will be an RCA Jack. It is easy to recognize a marked TV Output.

To connect the TV output to your TV receiver, remove the regular VHF antenna and replace it with the two pronged connectors from the switch box. Then, connect the original VHF antenna connection to the two screw terminals on the switch box. If there are connections to the VHF terminals, like a "Pay TV" channel hook-up, these should be removed and then attached to the switch box supplied by Visualtek. The connectors from the switch box can then be attached to the home TV set for proper operation. (See Figure 2-1).

Finally, the switch itself selects what will be displayed on your TV set. In one position it will display normal TV reception, just like the DP output wasn't even present. In the other position the signal from the DP will be displayed on your TV receiver, on Channel 3. If Channel 3 is in use by a broadcast station in your area, Channel 4 can be utilized by:

1. Removing four screws that attach the DP cover.
2. In the left rear of the DP you will find the RF converter pictured below. Move switch A to opposite position.



3. Replace cover.

You will now be able to use your DP computer on Channel 4. For best results, use your fine tuning control to sharpen image, plus your brightness and contrast controls for black and white image quality.

The image presented on Visualtek's own M-19 Display Monitor will be of the highest quality available and will permit utilization of all the features and capabilities of the DP. When used instead with your own TV set, you

may not be able to obtain as sharp or as clear an image, depending on the age and quality of your TV set, as well as certain technical limitations of TV receivers. Also, the advantages of the flexible adjustment monitor stand will typically not be available when you use your own TV set.

However, for ease and convenience, and to avoid having to transport a large display monitor, use of your own TV as a display element will often be very effective and valuable, especially for short-term or temporary use.

#### CONNECTION OF DP OUTPUT TO TV SET

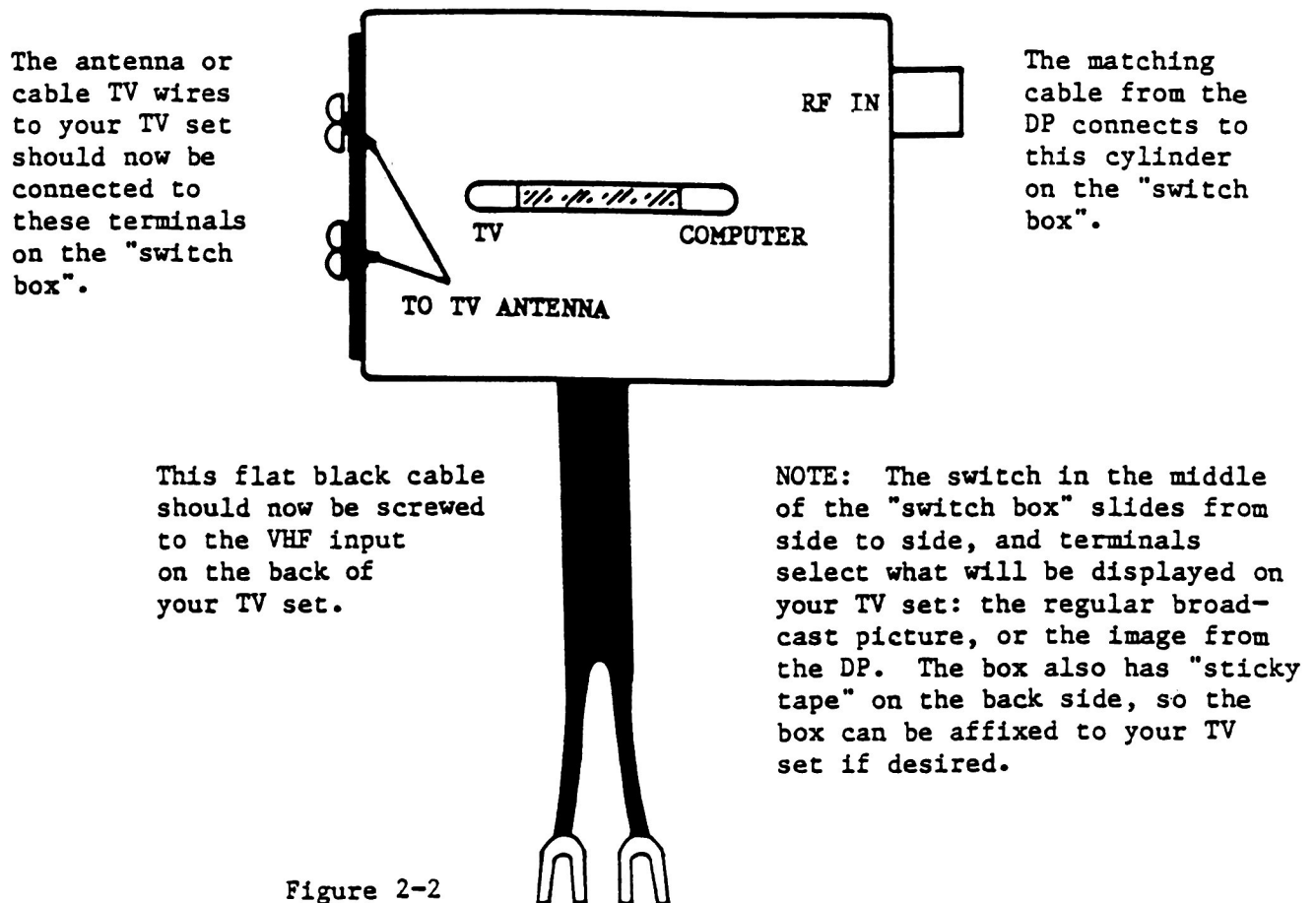


Figure 2-2

NOTE: If the picture on your TV set has a great deal of interference noise, do the following:

1. Adjust the tuning control on the set, then try the brightness, contrast, and horizontal hold (horizontal is usually on the back of the set).
2. Move the DP and computer away from the TV set; or, if possible, place it lower than the set.
3. Plug the DP and computer away from the TV set; or, if possible, place it lower than the set.
4. You may wish to try a longer (shielded) cable between the switch box and the DP to move the DP and computer still farther away from the TV.
5. Consult an experienced radio/TV repairman; your set may need adjusting.



# Section 3

## SYSTEM CONFIGURATIONS

### Standard Configurations

The DP must, of course, have a display. There are two basic choices.

1. All DP's are equipped to generate a signal which can be used by any standard television monitor. Visualtek's M-19 Display Monitor, with 19" diagonal display, is specially designed to fill this need, and provides exceptionally high brightness and contrast for the benefit of partially-sighted users. It includes a stand which permits adjustment of the viewing position and angle of the screen, which is of much benefit to many users with limited vision or visual field restrictions.
2. The DP may be optionally equipped to generate a signal which can be displayed on a television receiver; the monitor signal, as described above, is still available simultaneously. There are a number of considerations which users should be aware of before committing themselves to use of a television receiver as the only display available to them:
  - (a) Resolution, brightness, and contrast are often considerably less for commercial receivers (as compared with a high-quality monitor), which may seriously affect useability of the system by a partially sighted person.
  - (b) Typically, the physical location and viewing angle for a television receiver will be limited and inflexible. This can materially affect how easy it is for a partially sighted person to use the DP.
  - (c) If the television receiver is not dedicated solely for use with the DP, there may be competing needs for it; i.e., someone else may want to use it at the same time you do.

There can be valid uses for this capability, such as when the DP is to be used in a primary location most of the time (for example: office or school) but is occasionally used somewhere else for a short-duration. If a TV receiver is available at that secondary location, it may be more convenient to use it, than to transport a monitor from place to place along with the DP.

In either of the above cases, connection is quick and easy per instructions on Section 2, Pages 2-3 and 2-4.

## Shared Display Configurations (Split Screen)

Since the DP is designed expressly for persons with severe visual limitations, including those who are legally blind, it is logical to expect that many such users will also want to engage in regular reading and writing activities at the same location where the DP is being used. This would especially be true in the work environment, or in a school environment.

It is highly effective to use only a single display in such cases. This is economical in terms of dollars, space, and viewing ease and convenience. There are many ways in which such systems can be configured, and an evaluation of the work-site and job requirements, in which your Visualtek representative can assist you, will be very desirable to establish the best physical placement of the various system components.

Two typical configurations are described here, which are highly representative of such systems. Note that even a third image source, such as a specialized Visualtek typing aid system, or microfiche reading system, can also be added to the system, so that three types of enlarged images can share the same screen.

### Sharing with the Voyager

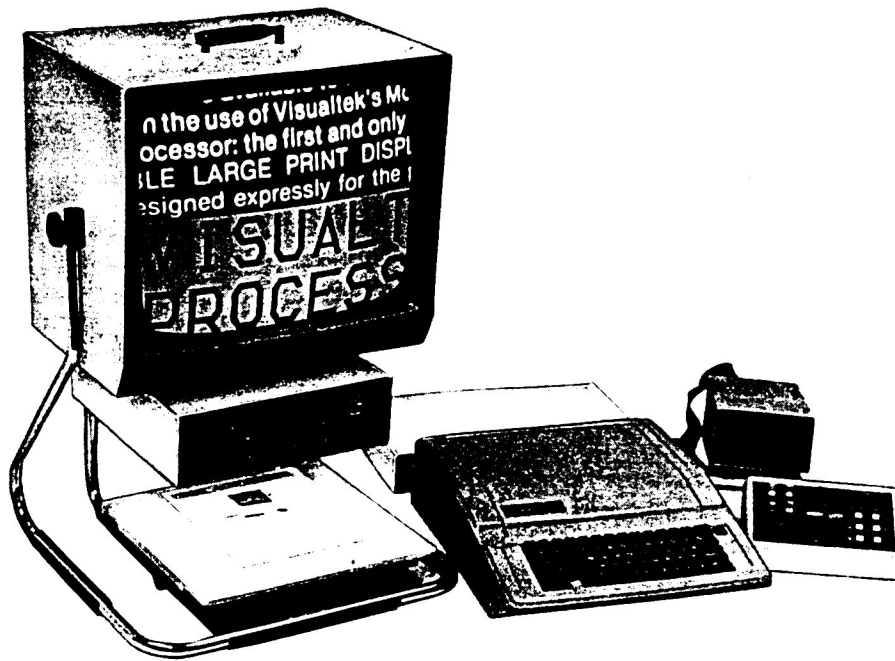
The Voyager is a one-piece electronic reading aid. It features a 12" diagonal display screen, in an attractively styled case. A closed-circuit camera, built-in illumination, a viewing table on ball-bearing slides, and many other features, are all part of that single package.

If a Voyager and the DP are both to be used by the same person at the same location, the DP output can be displayed on the Voyager's screen. The two images, from the Voyager and from the DP, can be shared (split) on that single screen, in whatever proportions are desired by the user from moment to moment. This control is accomplished simply by using the Electronic Line Marker controls on the Voyager, which double as split-screen controls.

The physical connections required are simple and straightforward:

1. The Voyager must have the External Sync option installed.
  - (a) The external sync output is standard on all DP's.
  - (b) A sync cable is provided with the DP as well. Connect the special 5-conductor sync cable between the two sync connectors on the two pieces of equipment. The cable is keyed so it cannot be inserted incorrectly, and the cable is also identical on both ends.
2. Connect the VIDEO-OUT connector on the Display Processor to the similar UHF connector on the back panel of the Voyager.

Note that if the Voyager is equipped with a utility back-panel receptacle, you may wish to plug the DP into it, to provide single-switch power control for the entire system.



Split-Screen Configuration: Voyager XL with In-Line Viewing Option and DP with Accessories

Figure 3-1



Split Screen Configuration: Voyager and DP with Accessories

Figure 3-2

### Sharing with the Voyager XL

The Voyager XL is a two-piece system. The camera, lens, illumination, viewing table, etc., are all housed in a compact single package, with a control panel identical to that of the Voyager. However, a much larger display is provided: 19" diagonal, instead of 12" diagonal as on the Voyager. This provides approximately 50% greater magnification, and 50% larger field of view.

The size and weight of the larger monitor require that it be separately packaged, unlike the Voyager's monitor. In many cases, this can actually be quite advantageous, since it permits locating the monitor (with respect to the user) independently of the most convenient location for the viewing table. This is extremely beneficial for people who require large viewing distances.

A shared display (split screen), just as with the Voyager, is both beneficial and economical in a number of ways. The Voyager XL must be equipped with the external sync option.

1. Connect the sync cable as was done for the Voyager.
2. Attach the double-ended video cable to the monitor-out connector on the back of the DP, and the other end to the video-in connector on the back of the Voyager XL.
3. Attach video out cable from Voyager XL to the back of the UHF connector on the back of the 19" monitor.

### Use of the Split-Screen Feature

Refer to your User's Manual for the Voyager or Voyager XL for complete descriptions of how to use the Split-Screen Feature effectively. The DP is always defined as the Master in two or three image split-screen systems, while other image sources (such as the Voyager, Voyager XL, Microviewer, etc.) must be configured as Satellites.

## Section 4

# HOW THE DP FUNCTIONS

An understanding of how the DP is designed and its functions will be very helpful to most users.

The microcomputer which you will be using (Apple®, IBM®, etc.) can ordinarily display characters on a display screen (television monitor or receiver). Those characters are arranged in a fixed array, such as 24 lines of 80 characters each. Note that references in this section to 24x80 characters may be different for some microcomputers (for example, others may have 16x80, or 25x80).

The information in that character array can be system prompting information (in effect, instructions or questions from the computer to the operator), or copies of a program stored somewhere in the computer's internal memory, or character information generated by a program which is running. In all cases, the display is generated from a fixed "image area" in the computer's memory.

Regardless of what information is to be displayed, it is first moved internally to a defined area of memory. Then, a video generator creates the actual displayed image, based on the content of that defined area of memory. For convenience, let's call that area the "display image area." Some microcomputers have more than one such area; the one to be displayed at any instant is typically selected by program instructions. Unique aspects for your particular microcomputer are described on the SUPPLEMENTARY INFORMATION SHEET(S).

Basically what has been described is how this microcomputer works in terms of image display.

One of the major functions of the DP is to enlarge those characters, so that they can be viewed easily and conveniently by a partially-sighted person. But that leads to a problem: once the characters are enlarged, it is no longer possible for all 1,920 characters (24 lines of 80 characters) to be on the screen at the same time. For instance, if the user-selected magnification were about 4X, it would only be possible to display about 5 lines of 20 characters each. Not very useful, if that's all that can be seen!

The solution is to allow the user to select whatever portion of the display image area is desired for enlarged viewing. In fact, the user is provided with a flexible capability of looking all over the display image area easily and quickly. Conceptually, imagine that the display image area is a piece of paper with 24 lines of 80 characters each typed on it. Then, imagine a black piece of paper with a small rectangle cut out of it. When that "mask" is laid over the piece of paper, only a small portion of the typed letters can be seen (whatever is permitted depending on the size of the rectangle).

To examine various parts of the typed material, simply move the underlying typed page around. As it is moved, additional material will come into view

through the cut-out rectangle. The cut-out rectangle corresponds to the available viewing area on the display screen (monitor or TV set), while the much larger area of typed material corresponds to the display image area.

In essence, the DP user is given complete flexibility and control over what portion of the display image area is appearing on the screen at any one time.

This is accomplished with a joystick on the User Control Panel (see Section 5). A wide variety of reading modes are provided, for differing purposes. A number of auxiliary controls assist the user in reading quickly, whether it be continuous text or line-oriented text being read.

In summary, the DP user can function just like a fully-sighted user of the microcomputer to which the DP is connected. All the information which would be presented to a fully-sighted user, in any character-display operating mode for the computer, will also be available to the partially-sighted user through his full and flexible control over what portion of the display image area appears on the screen.

## Section 5

# THE USER CONTROL PANEL (UCP)

The User Control Panel (UCP) is a small box, connected by a 16 conductor flat cable to the Display Processor (DP). It is light enough and small enough to sit comfortably on the user's lap, or on a desk or a table next to the computer keyboard. The UCP photo is pictured in Figure 5-1, and the UCP schematic is shown in Figure 5-2. The UCP contains a variety of controls which affect the appearance and operation of the DP.

YOU CAN NOT DO ANY HARM TO THE DP CIRCUITRY BY "PLAYING WITH" THE VARIOUS CONTROLS ON THE UCP. You can't even affect the information in the microcomputer memory. Basically, all you can do with the UCP is affect the displayed image. Therefore, feel free to experiment if you wish, to see the effect on the display screen.

An optional UCP Foot Control permits foot operation of the PAUSE/REVIEW/PREVIOUS LINE and RESUME function buttons, so the user may enhance his control over the display without always taking his hands off the computer keyboard to alter the large print display.

This section describes how the various UCP controls can be used to get the maximum benefit from your Visualtek DP.

The various controls may be thought of in two groups.

### IMAGE CONTROLS

X1/ENLARGED (where the image comes from)  
SIZE (rotary selector dial)  
POS/NEG (image polarity)  
LINE MARKER (upper and lower)

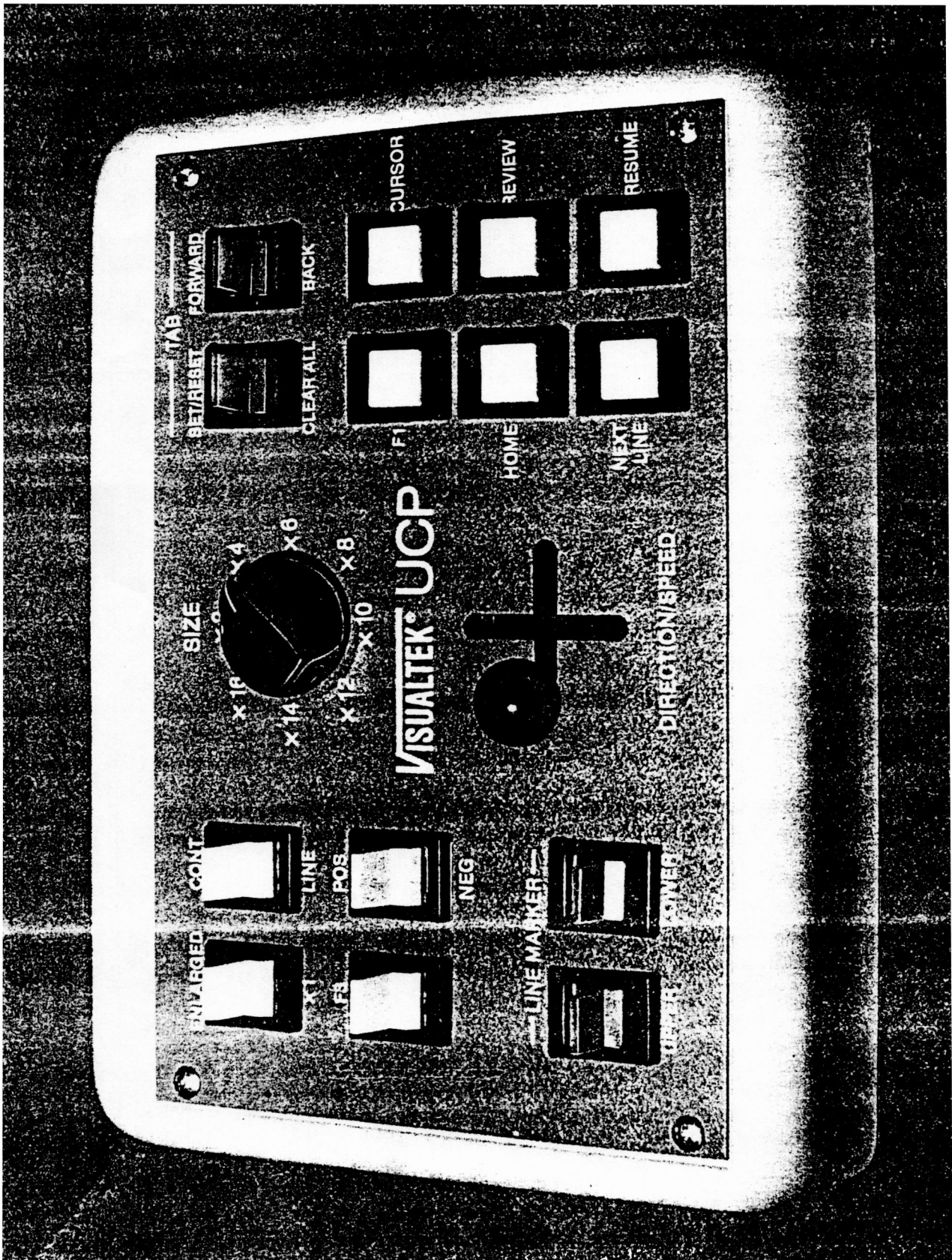
### READING MODE CONTROLS

CURSOR (brings the cursor to the screen, for data input operations)  
CONTINUOUS/LINE (basic reading mode control)  
HOME (moves display window to upper-left corner of display screen)  
TAB SET/RESET and CLEAR (relates to next item)  
TAB FORWARD/BACK (for faster formatted reading)  
REVIEW/PAUSE (reading aid)  
RESUME (related to REVIEW/PAUSE)  
NEXT LINE (reading aid)  
JOYSTICK (4-directional direction/speed control)  
F1 & F3 (undefined functions, reserved for expansion)

<u>Switch Label</u>	<u>Description/Functions and Usage</u>
---------------------	--

X1/ENLARGED	In the lower position, labeled X1, this switch causes the basic microcomputer image to be passed through unaltered to the display screen. There is no change in any of the characteristics of the image which the microcomputer is generating. In this position, none of the other controls on the UCP have any effect.
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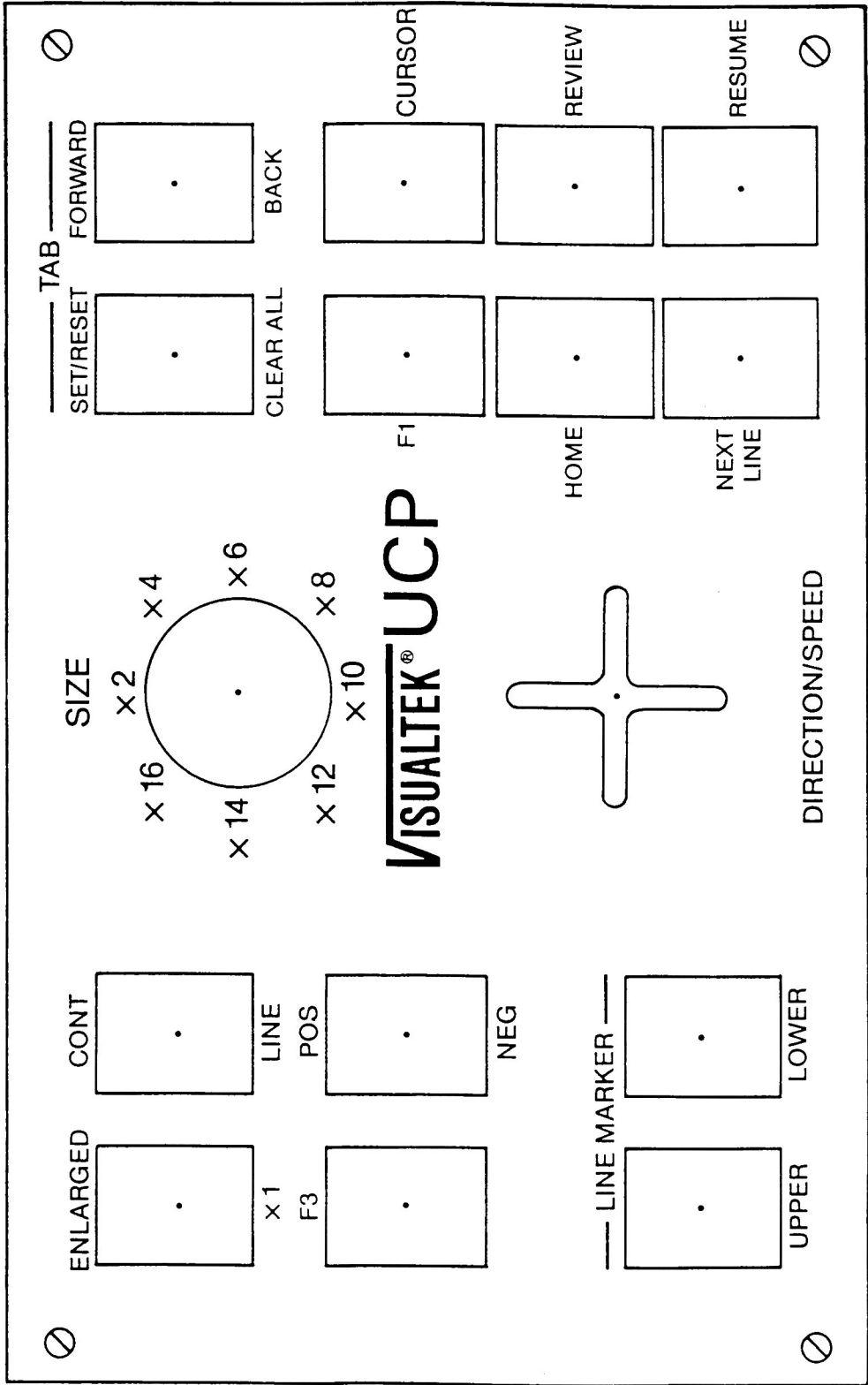




USER CONTROL PANEL (UCP)

Figure 5-1





UCP SCHEMATIC

Figure 5-2

In the upper position, labeled ENLARGED, the original microcomputer image is altered by the DP. The ways in which it is altered depends on the setting of the various other controls on the UCP.

SIZE

This rotary dial has 8 positions, labeled X2, X4, etc., through X16, which specify the relative magnification at eight different sizes. The dial can be turned past X16 to X2. The setting of this dial controls the nominal size of the displayed letters, and hence the amount of magnification. The actual size will be affected by display screen adjustments and other factors.

NOTE: This dial can be changed at any time, regardless of whatever the system may be doing.

POS/NEG

This two-position switch selects image polarity. Each user is free to select whichever image best fits his or her needs.

1. In the POS position, black letters are displayed on a white background.
2. In the NEG position, white letters are displayed on a black background.

LINE MARKER

Two switches, labeled UPPER and LOWER, control the location of an electronic window. Each switch has a center "rest" position, but can also be pressed up or down; it will spring back to the "rest" position when released.

The UPPER switch moves a blacked-out area, like a window-shade, down from the top of the screen, when it is pressed in a downward direction. This rolls down, not over, the display information thus retaining the top display line. Pressing it in an upward direction moves the shade up the screen again.

Similarly, the LOWER switch moves a blacked-out area, or shade, up from the bottom of the screen, when it is pressed in an upward direction. This rolls over the display information allowing a single display line to be isolated when used in conjunction with the UPPER line marker. Pressing it downward moves the bottom shade down the screen again.

Advantages of this feature: It is especially useful to persons who are exceptionally photosensitive, and hence want to minimize the extraneous light on the screen. It is also useful as a training tool, and for reading in the continuous display mode.

To prevent inadvertently blanking the entire screen, which might be confusing, internal circuitry prevents the unblanked (exposed) area from ever being narrower than approximately one line of characters at minimum magnification.

When the DP is used with a Visualtek Read/Write system utilizing the split-screen feature, the video display from the Read/Write system will appear in the blacked-out area of the screen created

by the line markers. This allows the user the option of using either the top or bottom position of the screen for the Read/Write display.

The various Reading Mode controls are designed to provide an extremely high degree of flexibility in allowing the user to read the contents of the micro-computer's display memory, and facilitate altering it (actual alteration is done from the microcomputer keyboard).

<u>Switch Label</u>	<u>Description/Functions and Usage</u>
---------------------	--

JOYSTICK

The heart of the reading function is the centrally-located joystick. As you move the joystick, you will find that it can move up, down, left or right, but not simultaneously.

If the joystick is in the center position, the image will not move. The image will only move when the joystick is moved away from the center position, in one of four directions. It will move in the same direction as you move the joystick. If you move the joystick up, the image on the screen will move up. If you move it down, the image will move down. And the same for left and right motions.

The amount of displacement of the joystick from its center position controls the rate of motion. The farther from the center the joystick is positioned, the faster the motion will be in that direction. In addition, this feature is size-adjusted, so that approximately the same number of characters will pass through any given point, for any particular joystick setting, even though the size may be different.

The six controls described next also affect what is displayed on the screen...but they affect the mode and location only. The rate, and direction, is established solely by what you do with the joystick.

CONTINUOUS/  
LINE

This two-position switch selects the basic reading mode.... but bear in mind that in either case it is the joystick which selects the rate and direction, as previously described. In either mode, the other controls described below may affect what happens on the screen. If they are not depressed, here is what will happen (assuming the joystick is moved to the left, which would be the case for normal left to right reading of English):

CONTINUOUS MODE: the text moves continuously from right to left, allowing the user to read a desired line. As the end of each line is reached, the computer automatically continues with the next line, but treats it as if appended to the right end of the previous line. This is just like continuous ticker tape at the stock markets, and is extremely fast and powerful for continuous reading of text information.

CONTINUOUS/  
LINE (cont.)

LINE MODE: this mode is similar, except that the continuous motion of the text will stop when the end of a line is reached (right end, if reading normally from left to right; or beginning of the line, if reading in the reverse direction). This reading mode is very powerful and useful when reading line-oriented information, such as programming code. It prevents the display from moving past a particular line until the reader is ready.

REVIEW  
(PAUSE/  
PREVIOUS  
LINE)

This momentary button in effect has a triple function. Merely pressing the button causes the system to "pause," which stops the reading rate. In effect it overrides the joystick setting. This condition continues (that is, no motion), even when the button is released, and is called the PAUSE MODE.

Holding this button down enters the REVIEW MODE, and reverses the direction of motion, but at a controlled rate. Therefore, the text moves backwards on the screen. As soon as it is released, the PAUSE MODE exists, and there is no motion on the screen.

This function allows a quick and easy review of a word, phrase, or entire sentence which the reader wishes to read again. It is also useful to stop screen motion to take notes, or simply to think about what has been displayed.

Pressing the button when the display is in the very left (beginning of the line) position causes an instant move to the previous line.

NOTE: If you reached the beginning of the line using the REVIEW button to achieve the move to the previous line, you have to release the REVIEW button and depress it again. The user can also exit the PAUSE MODE by pressing any of the reading control buttons, such as HOME, NEXT LINE or RESUME or by moving the JOYSTICK.

RESUME  
(PAUSE)

This button has two functions. First, while depressed, it causes the system to momentarily pause.

NOTE: This is not an entry to the PAUSE MODE, as occurs with the REVIEW button above; it is merely a momentary pause so long as the button is depressed.

Second, when this button is released, the joystick takes over again, and resumes rate-controlled motion in the direction specified by the joystick setting.

HOME

When this button is pressed, it momentarily causes the display to reposition itself so that character position 1 on line 1 will be displayed in the upper left-hand corner of the screen. If the system was previously set for one of the continuous-reading modes (see previous description in this section), that mode of continuous reading will continue as soon as the HOME button is

## HOME

When this button is pressed, it momentarily causes the display to reposition itself so that character position 1 on line 1 will be displayed in the upper left-hand corner of the screen. If the system was previously set for one of the continuous-reading modes (see previous description in this section), that mode of continuous reading will continue as soon as the HOME button is released. In effect, this function allows the reader to start over at the beginning of the text.

NOTE: For as long as the button is depressed, the information on the screen will pause and not move, even though it has repositioned itself to the HOME position.

## NEXT LINE

Pressing this button momentarily causes the display to move instantly to the beginning of the next line. It is usually used with the LINE mode of reading, in which the text motion stops at the end of each line. (Hence, the reader gets to the end of a line, can review it or simply think about it as desired, then presses NEXT LINE when ready to move on.) When the button is pressed, the image proceeds to the beginning of the next line...but motion does not begin until the button is released. At that time, whatever reading speed set by the joystick will take control, and the next line of text will begin to move across the screen.

## TAB SET/RESET/ CLEAR

This is a three-position switch, spring-loaded back to its center position. When pressed in the SET/RESET direction, its effect varies depending on whether or not a tab was previously set at that position.

- (a) If no tab has been previously set, it now remembers the current upper-left position on the screen, as a "tab setting" (see TAB FORWARD/BACK below to understand how this is used). Up to 16 screen settings can be remembered. If the system capacity (16) has been used, the display screen will flash on/off a number of times, to alert the user that the new tab setting will not be accepted.
- (b) If a tab has previously been set at the current position, it is cleared.

The opposite position of this switch, labeled CLEAR ALL, will clear all tab settings.

NOTE: The tab settings do not apply repeatedly to each line, as on a typewriter. The 16 tab settings relate to the screen as a whole.

## TAB FORWARD/ BACK

This is a three-position switch, spring-loaded back to its center position. When pressed, it causes the display to "jump" forward or backwards (as specified) to the nearest tab position which had been set by TAB SET/RESET (described above). This provides an extremely flexible and powerful way of moving around a formatted screen.

- NOTE: 1. Although the "tab jump" will occur immediately when the switch is pressed, motion will not resume (under joystick control), at the new tab location, until the switch is released.
2. This switch is operational and can be used in the PAUSE MODE.

Very often, reading of text will be followed by entry of new information into the display information. New information must always be entered at the cursor location. But the cursor is ordinarily controlled by the microcomputer to which the DP is connected. When the full image is being displayed (X1 display), the cursor must be somewhere on the screen. But if the user is reading at some larger size (X2 to X16), it is possible (even likely) that the cursor will not be visible on the screen at the time it is desired to enter data. The cursor control allows the user to deal with this.

#### CURSOR

Pressing this button will bring the cursor to the screen, and will keep it there. As a result, the joystick and various other UCP controls become inoperable in this mode of operation, which is designed for data entry.

- NOTE: 1. It does NOT actually change the position of the cursor in the internal memory of the microcomputer, but rather changes the portion of that memory which is being displayed so that the cursor will be in the lower right-hand position of the screen. The ability to actually change the cursor location in the microcomputer's internal memory is provided only under the control of the microcomputer itself.
2. This mode is automatically entered when power is turned on.

To exit the CURSOR mode, and resume reading (or to simply temporarily exit the CURSOR mode to check what is on some other area of the screen), simply move the JOYSTICK, or press any of the READ MODE buttons (HOME, NEW LINE, REVIEW, or RESUME). Any of these actions will return the system to the READ MODE. Press the CURSOR button again to re-enter the CURSOR MODE.

## Section 6

# MODES OF USE

As described in Section 4, the DP is, first and foremost, part of a general-purpose microcomputer system. The capability of displaying enlarged characters, while of prime importance to the partially-sighted, is a secondary capability in the sense that it does not alter the basic functions or modes of use of the particular microcomputer you are using.

Therefore, in talking about how the DP can be used, the discussion does not involve how your general-purpose microcomputer can be used. But, there are some specific modes of use which are unique to the DP, and relate to the special features provided for the partially-sighted. This list is not warranted to be complete or exclusive.

1. There may occasionally be some unique problems associated with the fact that the DP user is generally displaying enlarged characters, and hence a restricted field of view. For instance, graphic displays will tend to be ineffective, since an ability to see a substantial portion of the screen is generally necessary if graphic displays are to have any meaning. The DP character set does not at the present time include any graphics characters. If such characters appear in the microcomputer image display area, they will be correctly displayed only in the xl mode; otherwise, they will produce an unpredictable image.
2. Some microcomputers provide blinking characters, or characters which permit polarity inversion on a character-by-character basis. Such specialized display-oriented features are generally not provided for enlarged images using the DP.
3. Another example might be programs which are time-sensitive, and require the operator to respond to some prompting within a fairly short period of time. Since the prompting information might not even be on the screen, and time must be allowed for the partially-sighted user to search the screen to find the prompting information, use of such programs might require some alteration. However, it should be noted that a special method is provided on the UCP to allow the user to quickly and easily bring the cursor to the screen, hence ensuring that it can't be lost off-screen.





# Section 7

## INSTRUCTIONAL CONTROL MODE

As described in Section 4, the DP functions by creating an enlarged image of the "regular size" image which the basic microcomputer is creating. Then, the UCP (described in Section 5) allows the user to control the enlarged image, and to "move it around" as needed.

In this basic mode of operation, a partially-sighted user can function just as a fully-sighted user would. Whatever programs (operating in the microcomputer) are being used by a fully-sighted user can also be used by a partially-sighted user, without any alteration or special programming.

However, there are situations in which special programming may be justified. For instance, in a classroom or other training environment, it may be useful if the user has less control. Instead, the computer can be programmed to limit what the student can do (with the UCP), in the interests of teaching something to the student. While this capability is true, in a general sense, simply by using the generalized programming capability of the microcomputer being used, this may be inadequate for the partially-sighted user.

Therefore, to facilitate the development of specialized training and instructional programs (and for other special purposes), Visualek has provided a capability for the microcomputer to override the UCP, and exercise direct control over various large print functions and operations. It should be emphasized that there are no "standard programs" which utilize this capability, at the present time. However, Visualek intends to facilitate the transfer and sharing of such programs, as they are developed, among users. See Section 12 for more information.

### OVERRIDING THE UCP - ENTERING THE INSTRUCTIONAL CONTROL MODE

The Display Processor (DP) has two defined modes, which provide this extraordinary flexibility.

1. UCP Control Mode: This is the normal operating state, in which the UCP has the functions described in Section 5 of this manual.
2. Instructional Control Mode: This is the Microcomputer (MC) operating state. The UCP is completely disabled, and all of its functions can be implemented only under microcomputer command, as described in this section of this manual.

The microcomputer in the DP makes its decision as to which mode it is in by inspecting memory C3 and C4 (for memory locations C1 through C4 see the Supplementary Information Sheet in this manual) in its mirror memory. If both of these locations have the DEL character (hex 7F), and C2 does not have the DEL code (additional protection from accidental entry to IC code) then the Instructional Control Mode is entered. This mode is exited, and the system returns to the UCP Control Mode, when C4 or both C3 and C4 do not have DEL code in it.

Once in the Instructional Control Mode, the UCP is disabled, and the various functions of the UCP are under program control. This program control is communicated through locations C1 and C2 of the mirror memory in the DP. The particular functions which can be performed are described in Table 7-1, based on the characters which appear in locations C1 and C2 of the mirror memory.

The normal programming sequence would be as follows:

POKE C1, N1	N1 and N2 designate the numbers chosen from Table 7-1
POKE C2, N2	
POKE C3, 127	127 is the numerical equivalent for the DEL character
POKE C4, 127	

In the example above, C1, C2, C3, and C4 stand for the four microcomputer memory locations which correspond to the appropriate four locations in the DP's mirror memory. These will vary, depending on the particular microcomputer.

Thereafter, two instructions (POKE) are required to change the parameter-defining locations C1 and C2 in the main memory. It is possible for the DP to inspect the two corresponding locations in its mirror memory between the two instructions, which can produce peculiar results. Because C4 remains with the DEL code, the Instructional Control Mode is not exited. Therefore, a recommended programming technique is to remove the DEL character in C3 before changing C1 and C2, then POKE it back after changing them, like this:

POKE C3, 32	32 is the numerical equivalent for "blank" character
POKE C1, N1	
POKE C2, N2	
POKE C3, 127	DEL code re-POKE'd into C3.

The DP examines these cells in the mirror memory only once during each video refresh cycle (every 16.7 or 20 milliseconds). Therefore, any sequence intended to perform any of these functions should not be executed more frequently than every 20 milliseconds. In addition, to avoid the possibility of erroneous results, the first POKE above should also be followed by a 20 millisecond wait, to ensure that the DP properly drops out of the Instructional Control Mode before locations C1 or C2 are changed.

This extremely powerful capability permits the system programmer to implement a wide variety of specialized functions for training, education, and related purposes (even including specialized data entry routines to be used by the partially sighted). As a result, the power and value of the DP are enhanced manifold.

This capability can be exercised directly by the programmer operating in the DP. But, since such a program can readily be designed to respond to commands communicated by a remote host computer, it is also accurate to say that this capability can be exercised equally well by such a host.

It is, of course, theoretically possible for a normal operating program to put two DEL codes into locations C3 and C4 without any intention of triggering this Instructional Control Mode. However, this is so remote and unusual that it is considered highly unlikely for this ever to happen in an unplanned manner.

TABLE 7-1

CHARACTER CODES FOR IMAGE DISPLAY POSITIONS C1 & C2 (see text)  
 (interpreted when both C2 & C3 contain DEL = 127)  
 (For C positions, see the Supplementary Information Sheet)

N1 and N2 to be POKE'd into positions C1 and C2. Only the upper four bits of each of the two numbers are actually used.

<u>N1</u>	<u>N2</u>	<u>FUNCTION</u>	<u>COMMENT</u>
100	K	Set Size (K = 0 to 8)	Magnification setting, where second number is 0 through 8. Magnification is set at x1, x2, x4, x6, ... x14, x16 respectively.
101	K	Set Upper Line Marker	Second number (K) from 0 to 255 sets upper line marker at any of 255 positions from top to bottom of screen. And the size of the (K=0 to visible portion of the screen (the position of the lower line marker calculated from the position of the upper line marker). The visible portion cannot be set for less than 17 video lines, but there is no prohibition against very low setting of the upper line marker which would blank the whole screen. The upper line marker setting (code 101) has priority over visible portion setting (code 102).
102	K	Set Visible Portion  255)	
103	0	Set positive image	
103	1	Set negative image	
103	2	Set Line Read Mode	
103	3	Set Continuous Read Mode	
103	4	Set Cursor ON (Input)	
103	5	Set Cursor OFF	

104	K	Set displ row position	The second character (K) specifies the row and column which are to appear in the upper left-hand corner of the actual display screen. These commands permit the duplication of any function which could be accomplished from the UCP using the various image control switches, such as REVIEW, RESUME, NEXT LINE, and HOME, as well as the function and operation of the joystick. Note that this function merely sets a position; the rate of motion, starting from there, is set by a separate command.
105	K	Set displ col position  (K = 1 to 80 or 1 to 40)	
106	0	Clear all tabs	Clears all 16 stored screen tab settings.
106	K	Select tab number  (K = 1 to 16)	This specifies a particular tab storage location (corresponding to tab settings 1 to 16) to which the next two commands apply. That location can then be loaded with a tab row and column setting.  NOTE: 1. There is no need to control the tab forward/backward function on the UCP, since its effect can be exactly duplicated by the "set display position" functions.  2. Tab selection should be in chronological order from top to bottom on screen face.
107	K	Set tab row position	This specifies the row/col tab setting, for the particular screen tab location specified by the "select tab number" function above. K=0 has the effect of resetting the tab currently selected. It will generally be desirable for the microcomputer to maintain a copy of the tab settings it has specified to the DP.
108	K	Set tab col position  (K = 1 to 80 or 1 to 40)	
109	K	Set speed UP	These four commands duplicate the function of the joystick, by specifying the direction of motion and the rate of motion (corresponding to the displacement of the joystick). Each of these commands supercede any prior command in the same "family".
110	K	Set speed DOWN	
111	K	Set speed LEFT	
112	K	Set speed RIGHT  (K = 0 to 31)	

## Section 8

# ALTERNATE CHARACTER SET

The characters displayed by the DP are, in essence, determined by the characters the microcomputer wishes to display. The microcomputer can also display graphic characters (all numbers 128 and above). However, there is no display of enlarged graphics characters. When the graphics codes are used, the screen will generally display a blank, although exact results are not specified for all such codes. (For IBM, see Supplementary Information Sheet.)

Although the enlarged characters are determined by what the microcomputer displays, the actual shape of those characters is determined by a PROM (Programmable Read-Only Memory) in the DP, using a proprietary Visualtek method. Therefore, alternate characters can be displayed, corresponding to what the microcomputer displays, simply by changing the content of this PROM in the DP.

Examples of when such alternate character sets might be particularly useful: Foreign language differences, including specialized punctuation or diacritical marks; specialized technical symbology in a particular scientific discipline; an educational environment for young children, where extensive letter recognition is not yet feasible, and replacing some letters with simple symbols might be a valuable instructional tool.

Visualtek would be pleased to provide a quotation to you for a "custom PROM" to display whatever characters you might require. Such quotations can be provided only from Visualtek's home office in Santa Monica, California.

The method used by Visualtek, to define the shapes of enlarged characters, permits substantial detail, as can be seen by carefully inspecting the appearance of enlarged characters on the DP. In particular, examine the ampersand, the "at" symbol, and the percent sign, to get a better feel for the amount of detail which is possible.

To initiate discussion as to specialized characters to meet your particular needs, make a copy of the character table in the Microcomputer User's Manual. Mark the characters you wish to change. On separate sheets of paper, draw as carefully as possible the enlarged shapes you wish to see; make them as large as you wish, since there is no need to attempt to sketch them at the same small sizes shown in the character table. Within a few weeks, you will be contacted by a member of Visualtek's staff. He or she will advise you as to whether there are any problems with the particular character changes you've requested, and will provide an approximate or exact quotation of cost, depending on the circumstances. If you wish further work at that time, to complete and install the requested alternate character set, a purchase order or other formal authorization will be required. Also, during the course of preparing the replacement PROM, you will again be contacted to confirm that the specific character appearance meets your needs.

NOTE: At the time this manual was printed, standard alternate character sets are available in German (seven substituted characters) and for use in the United Kingdom and other countries requiring substitution of the pound sign for the dollar sign.

## Section 9

# OPERATION AT 50 Hz 220-240 V

The DP is also available for use in countries where primary power (mains) is at 50 Hz, rather than at the 60 Hz standard in North America, and also at 220-240 vac, rather than 117 vac as in most of North America. The specifications and performance of the DP are essentially unchanged, when operating at various voltages and frequencies, except that the Screen refresh rate will correspond to the primary power frequency (hence, 50 Hz or 60 Hz depending on the country).

In many such countries, the DP is available directly from a local Visualtek distributor. All necessary adjustments and adaptations to ensure that your Visualtek DP functions properly and effectively will have been made.

In those countries where Visualtek does not presently have a local dealer or distributor, it is generally possible to obtain a complete DP system directly from the factory. The necessary accommodations for primary power frequency and voltage will be made at the factory, and will be fully tested prior to shipment. However, it may be necessary for the recipient to change the primary power plug (or provide an adapter), to permit use with local-standard power receptacles.

All necessary alterations with respect to primary power frequency and voltage are made internal to the equipment; there is no requirement for external transformers or the like.

# Section 10

## WARRANTY AND SERVICE

### VISUALTEK LIMITED WARRANTY, INCLUDING EXTENSIONS AND EQUIPMENT REPLACEMENT OPTION

All Visualtek video visual aids, display processors, and braille printers, are guaranteed by Visualtek, to the original purchaser, to be free from defects in material or workmanship. The duration of the guaranty may vary from product to product, and is defined in product literature for each product or series of products. This warranty excludes fuses, bulbs, and similar replaceable items, and does not cover incidental or consequential damages. In the case of any agency, organization, or institution purchasing Visualtek equipment, the warranty is for the benefit of any client or student of the purchasing organization, even if title to the equipment has technically been transferred.

This warranty does not cover damage caused by improper use of Visualtek products, for purposes for which the product was not designed, nor damage caused by fire, accident, neglect, water damage, or other cause not relating to Visualtek's design or production of the product.

Unless otherwise agreed in writing, this warranty is a "FACTORY WARRANTY," which requires that defective items must be returned to Visualtek's factory, or to the nearest authorized service center, with transportation charges prepaid by the user. However, users are encouraged to contact Visualtek or their nearest service center by mail or paid phone call prior to returning equipment for repair, since many apparent defects may be solely the result of improper adjustment, and repair or readjustment may be possible without return to the service center.

Items returned for repair must be packed securely, and should be insured by the user against damage in transit. Visualtek does not assume responsibility for damage occurring in transit. It is your responsibility to pack equipment securely. Visualtek will provide extra sets of original packing materials on request, subject to a modest charge.

For some products, Visualtek also offers an "extended warranty" or "extended service agreement," which would be described using those words on an invoice. Any such agreement also refers to this warranty statement, and simply extends the duration of the warranty; all the terms and provisions of this statement continue to apply.

For some products, Visualtek also offers a "guaranteed 24-hour replacement policy," which would be described using those words on an invoice. Any such agreement provides that Visualtek will ship a replacement part, or the entire product if Visualtek deems that necessary to properly meet your needs, by the end of the next business day following notification to Visualtek, all charges paid by Visualtek. In such a case, the replacement part or product which you receive is yours to keep (it may be a rebuilt used part or product). As soon as you receive it and verify that everything is working OK, you must return the original defective part or product to Visualtek at your expense.

## Service

Users are encouraged to contact Visualtek by mail or paid phone call prior to returning equipment for repair, since many apparent defects may be solely the result of improper use or adjustment of the equipment. In that case, repairs or readjustment may be accomplished without return to the factory.

The address and phone number for service-related inquiries, whether equipment is in or out of warranty, is:

Visualtek Service Department  
4955 West 145th Street  
Hawthorne, CA 90250  
(213) 978-8835

SERVICE HOTLINE:  
(213) 644-1724

Please note that this address is different from the one in Santa Monica for marketing and administrative matters. Sending items to the wrong address will affect the time it takes for repair and return to you.

Items returned for repair must be packed securely, and should be insured by the user against damage in transit. Visualtek does not assume responsibility for damage occurring in transit. It is your responsibility to pack equipment securely; we will provide assistance and advice by phone, or through our local representative, as required. Visualtek will provide extra sets of original packing materials on request, subject to a modest charge.



## Appendix A: UCP Schematic and Interface

On the next page is a schematic diagram of the User Control Panel. Note that it contains only passive components (no active circuits). It is basically a multiplexed switch box, except for the joystick potentiometers. The DP sends out timed non-simultaneous pulse signals over the signalling lines labeled A, B, C, and D, and examines the 8 multiplexed data lines (labeled 0 to 7) to determine which switches are open and which closed, in groups of eight. Diodes are used to separate the three different groupings.

Visualtek expects to make available a limited-function foot-controlled UCP. This will facilitate use in situations where the users want to scan the image quickly and easily, but keep their hands free for other functions such keyboard entry, copying information, or the like. Ask your local Visualtek representative, or the factory, for information as to the availability of this item.

This information about the interface and the connector is provided so that users may develop their own specialized UCP's if they wish to do so. Of course, such specialized UCP's cannot implement new functions not already provided in the DP. They may, however, provide different ways of implementing existing functions, such as providing for control of various UCP functions by foot, breath, very light contact, etc.

### Technical information:

Recommended diode type: 75 volts 0.3 amps (1N4148 or 1N914)

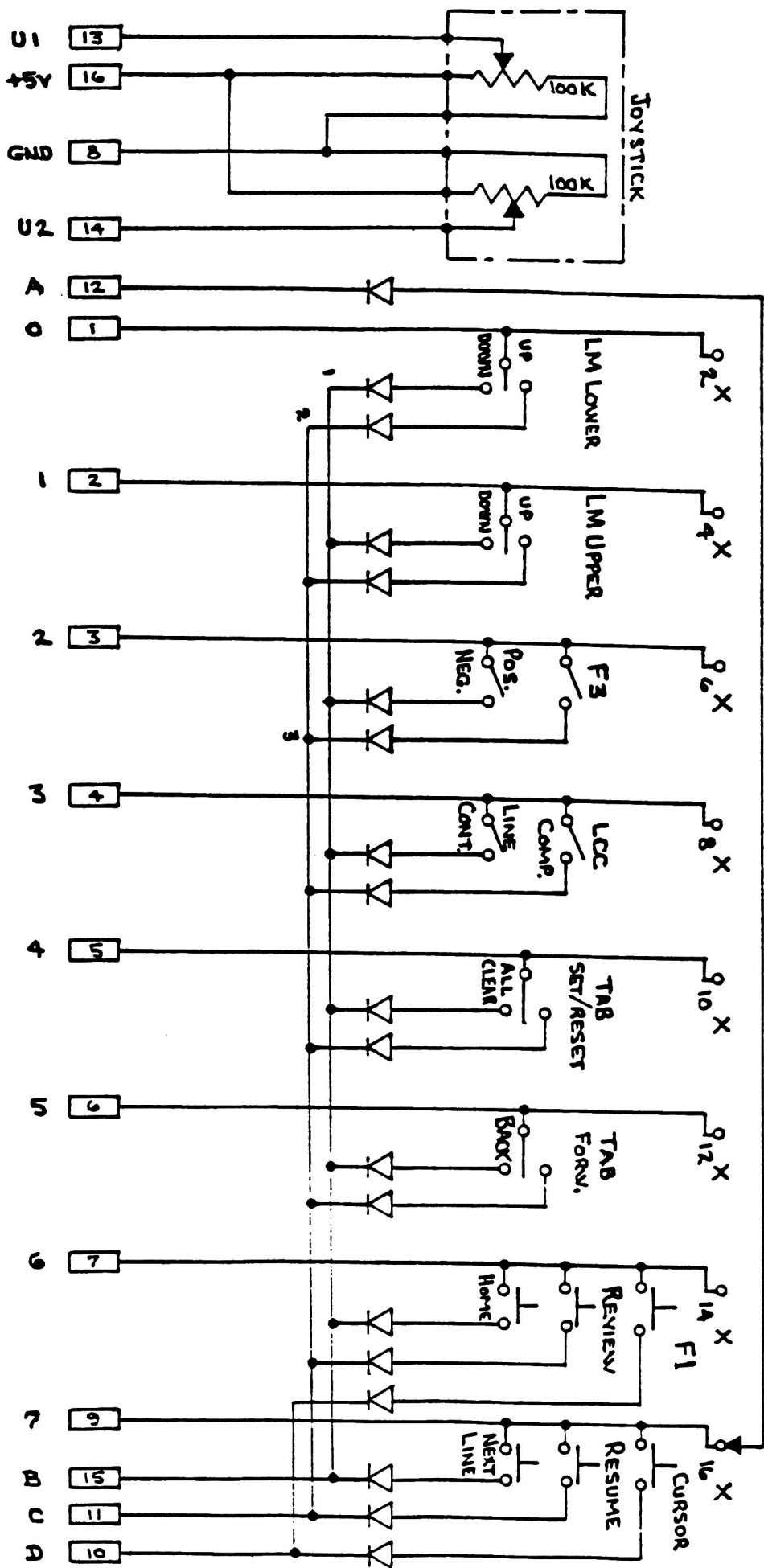
Interconnecting cable type: 16-conductor ribbon cable with standard 16-pin edge connector at one end (connection to DP)

Cable available from: Most electronics parts supply distributors such as Radio Shack, etc.

Maximum recommended cable length from DP to UCP is 10 feet.

It is technically feasible to have the standard UCP operate in parallel with a specialized UCP, rather than disconnection and reconnection, so long as it is recognized that the DP could receive conflicting information if a user tried to operate the two UCP's simultaneously. DP response is unpredictable in such a case.

If there is no UCP connected to the DP, it automatically reverts to x1 magnification (pass-through of original microcomputer signal), and all other UCP functions are inoperative.



UCP

R-3-R3