

User's Manual

HR-2000

High Resolution Monochrome Monitor

**DAGE-MTI
701 N. Roeske Ave.
Michigan City, IN 46360
PH: 219-872-5514 FAX: 219-872-5559 info@dagemti.com**

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SECTION 1

INTRODUCTION

The HR-2000 series is a high performance, high resolution, multi-line rate monitor. It has been specifically designed for use in instrumentation applications such as medical x-ray, document viewing, military tracking systems, video microscopy and digital imaging systems.

The design incorporates the latest in solid state technology to provide a flexible, fully regulated display system that is capable of meeting the most demanding performance requirements.

MONITOR FEATURES:

- 2000+ TV Lines Resolution
- Auto-Locking Scan Rates from 15 to 37kHz
- 50 mHz Bandwidth
- Differential Input
- Video Polarity Reversal
- Variable Video Enhancement
- Selectable A-B Video Input Channel
- Separate Data Input Channel
- DC Restoration
- Variable Aspect Ratio
- Switchable Underscan with Separate Front Panel Controls for Height & Width
- Dynamic Focus

SECTION 2

INSTALLATION AND OPERATION

2.1.0 GENERAL

The best equipment available must be installed with care if it is to perform satisfactorily and give long service.

Following the recommendations outlined will help assure long quality service from your monitor.

Although these units have been designed for “industrial” use, it should be remembered that they are complex electronic instruments and should be treated accordingly.

2.2.0 MECHANICAL

The monitor is provided with rubber feet for bench mounting. A kit is available for mounting the monitor in a 19” rack, part #207297. When rack mounted, the ambient air temperature should not be allowed to exceed 50 degrees C.

When installing the monitor in any enclosure always provide adequate airflow.

WARNING: As with any monitor or television set, care should be taken to avoid hitting or scratching the picture tube. This should be kept in mind during handling, transportation and installation.

2.3.0 ELECTRICAL

2.3.1 Fusing

The monitor is fused at the power entry module with a pair of MTH 5 fuses, one in each side of the line. In addition, each power supply is fused with a 2.5 amp -250V fuse. These fuses need not be changed when changing line voltage.

2.3.2 Video and Drive Inputs

The monitor is equipped with a pair of BNC connectors for all video and drive inputs. Each BNC pair is tied together so that an input may be looped thru the monitor to another piece of equipment.

Each BNC connector is labeled “in” and “out”. These may be interchanged since the input and output connectors are looped-thru and tied directly together.

2.3.3 Termination Switch

When loop thru operation is not required or when the monitor is at the load end of a loop thru connection, it will be necessary to terminate the input. This is done by setting the “term” switch to the “in” position. This connects a 75 ohm resistor across the line. The terminate switch is used on video, drive and data inputs.

When the monitor is being looped thru, set the “term” switch to the “out” position. In this position the monitor presents an high impedance across the video input, thereby allowing loop thru without signal degradation.

2.3.4 Ground Switch

When video equipment is separated by distances of hundreds of feet, it is possible that significant AC voltage differences exist between the equipment grounds. In such cases it will be necessary to isolate the video cable shield ground from the monitor chassis ground to prevent the AC difference voltage from appearing across the video input. This is accomplished with the ground switch which is placed in the off position, thereby disconnecting the cable shield from monitor chassis ground.

2.3.5 Normal/Invert Switch

The normal/invert switch allows either polarity of drive or sync to be used. In the normal position, negative going drive and/or sync is accommodated. In the invert position, positive going sync is accommodated. Note that the drive inputs should always be terminated either at the monitor or at the load end when used in loop thru operation.

2.3.6 Data Input

The data input channel accepts TTL level video and adds this to the video signal at the CRT cathode. Inputs of +1 to 5V activate the input channel. The resulting brightness increase is factory preset and may be changed by adjusting white level control VR7 on video module.

The data input channel is typically used to add computer generated data to the video applied to channels A and B.

2.3.7 External Drive Inputs

Horizontal drive or composite sync and vertical drive inputs are enabled by the Ext/Int switch on the front panel. In the “Int” position sync is derived from the composite video input. In the “ext” position sync is derived from the external inputs.

The horizontal drive/composite input accommodates either horizontal drive or composite sync. If composite sync is used both horizontal and vertical sweep are synchronized to this input. If only horizontal drive is used then vertical drive must be applied to the vertical drive input in order to synchronize the vertical sweep. In the event composite sync and vertical drive inputs are used, vertical sync will automatically be taken from the vertical drive input. NOTE: When external composite sync is used, the vertical drive terminate switch must always be in the “in” position. This prevents spurious pickup from the external sync input from coupling into the external vertical drive input, thereby disabling vertical sync.

2.3.8 DC Restoration Switch

This switch, located on the rear panel, selects back porch or sync tip clamping for the DC restorer. The switch should normally operate in the back porch mode. Sync tip clamping is used only with non-standard video which does not have a back porch or with non-composite video which contains no sync. Note that the dynamic range of the video amplifier is reduced when operating with sync tip clamping since the amplifier must now pass the sync and video rather than video alone.

2.3.9 FRONT PANEL CONTROLS – SETUP & OPERATION

The following controls are provided on the front panel and should be set as follows.

2.4.0 Power Switch

Rotate clockwise to turn on monitor. NOTE: Anode power is applied 10 to 15 seconds after the power switch is turned to the “on” position. This allows the CRT filament to reach operating temperature before electrode voltages are applied.

2.4.1 Brightness

Clockwise rotation increases brightness. Nominal setting is at 12:00.

2.4.2 Contrast

Clockwise rotation increases contrast. Optimum setting is obtained when video level indicator is centered.

2.4.3 Video Selector Switch (Video A, Video B)

Depressing switch A or B enables the selected channel. When both switches are depressed A & B are added, however, inputs must be synchronous. Releasing A or B removes channel input.

2.4.4 Video Balance Control

The proportion of A to B channel video is controlled by the setting of the balance control. Clockwise rotation increases "B" channel video and simultaneously decreases "A" channel video. In this way the desired A to B mix can be obtained. Alternately, when only one channel is displayed the balance control can be used to increase the maximum gain of that channel.

2.4.5 "A" Polarity Switch

The switch controls the polarity of "A" channel video. In the positive position, "A" channel polarity is positive. In the negative position, A" channel's polarity is inverted (or negative). This feature allows (B + A) or (B-A) operation. The monitor is setup so that "A" channel inversion causes no change in contrast when the contrast control is set so that the level indicator is driven to mid position. If this is not done, then both contrast and brightness may need to be adjusted when switching from normal to inverted video.

2.4.6 Enhance Control

The monitor incorporates an edge enhancement circuit which sharpens or enhances horizontal edge transitions. The circuit is enabled by depressing the enhance button. The amount of enhancement is increased by rotating the enhance control clockwise.

The enhance circuit is most effective when its bandwidth is matched to a particular scan rate. The higher the rate, the higher the bandwidth. Enhance circuitry is contained in a module and listed in Table I.

BANDWIDTH	PART NUMBER
8 mHz	207269-08
16 mHz	207269-16
32 mHz	207269-32
50 mHz	207269-50

Table I - Enhance Module Assemblies

Scan Rates	BANDWIDTH REQUIRED HORIZONTAL LINES			Enhance Module Group#
	800	1000	1200	
525/60	10 mHz	12.5 mHz	15 mHz	8-16
675/60	12.5	15.6	18.7	8-16
875/60	19	23.8	28.5	16-32
1029/60	20.8	26.3	31.5	16-32
1275/60	26.4	33	39.6	32-50

Table II

Table II lists the bandwidth required for a given number of vertical and horizontal lines of resolution, and the recommended enhance module group # for the particular combination.

ENHANCE MODULE REPLACEMENT

The enhance module plugs into the video amplifier module. **NOTE: Power must be OFF** when replacing enhance module. To remove and replace, loosen the four hold down screws and unplug. Plug the replacement module in and secure with screws. No additional adjustment is necessary. Access to the video amplifier is obtained by removal or the rear panel.

2.4.7 VTR/Normal Switch

Some VCR's generate spurious signals which give rise to flagweaving, tearing and loss of vertical stability. To combat these effects the VTR/Normal switch should be in the VTR position when operating with VTR's or VCR's.

2.4.8 Ext/Int Sync Switch

When the monitor is used with non-composite video, i.e., video without sync pulses, it will be necessary to lock the horizontal and vertical scans from an external sync source. In this mode the ext/int sync switch is switched to (ext) and composite sync or horizontal and vertical drive applied to the appropriate rear panel connectors.

2.4.9 Vertical Centering

The vertical centering control allows optimum vertical centering of the raster. The control is recessed and accessible via a 1/8" blade screwdriver or alignment tool.

2.4.10 Height and Width Controls

Two sets of height and width controls are provided. A switch allows selection of either set. This feature allows two different aspect ratios to be programmed and switch selected. An overscan of +20% and underscan of 70% may be obtained with these controls. The controls are recessed and are accessible with a 1/8" blade screwdriver or alignment tool.

2.4.11 Horizontal Phase Control

This control allows the operator to move the start of horizontal scan ahead of, coincident with or behind horizontal sync. The operation is analogous to a horizontal centering control. The control should be set so that the picture is centered horizontally.

2.4.12 Focus Control

The focus control is internally set to optimum when the outside focus pot is set to 12:00.

HR-2000 SPECIFICATIONS

ELECTRICAL

Input Voltage:	90 to 135 VAC, 50/60 Hz 180 to 250 VAC, 50/60 Hz 90 watts maximum at 120V RMS
Input Signals:	
Video Composite (Channel A or B):	1.0 Vpp nominal (.5V to 2V) Loop thru or switchable to 75 ohm termination
Video Non-composite (Channel A or B):	.7 Vpp nominal (.35V to 1.4V) Loop thru or switchable to 75 ohm termination
Digital Data (Channel C):	TTL compatible input (+1V to +5V white positive) Loop thru or switchable to 75 ohm termination. Channel C internally mixes with A & B
Sync:	1 Vpp to 8 Vpp. Sync negative or positive. Polarity selectable with rear panel switch

DIFFERENTIAL INPUT

Common Mode Rejection:	40dB @ 60 Hz to 1 KHz
Common Mode Range:	16Vpp @ 60 Hz to 1 KHz

VIDEO AMPLIFIER

Frequency Response:	± 1 dB, 30 Hz to 50 mHz at full drive ± 3 dB, 15 Hz to 65 mHz at full drive
Switchable Enhancement:	Adjustable 0 to +18dB at user specified peaking frequency Also available at 8, 16, 32 and 50 mHz
Differential Gain:	Less than 5% for luminance range of 0 to 50 fL.
Input Impedance:	15pf in parallel with 22 Kohm. Loop thru or 75 ohm termination.
Resolution:	Greater than 2000 TV lines horizontal resolution. Center to edge at 50 fL luminance
Grey Scale:	Greater than 10 shades of grey

HORIZONTAL DEFLECTION

Frequency Range:	15,000 to 37,000 Hz auto locking
Retrace Period:	5.5 μ s maximum
Overscan:	20%-front panel adjustable
Underscan:	70%-front panel adjustable

VERTICAL DEFLECTION

Frequency Range:	15 to 200 Hz auto locking
Retrace Period:	600 μ s maximum
Overscan:	20%-front panel adjustable
Underscan:	70%-front panel adjustable

Geometry:	Less than 2% raster height
Linearity:	Less than 1% raster height over full auto frequency range
Raster Size Regulation:	Less than 1% change, 0-100% APL
Power Supply Regulation:	No visible change in brightness, raster size or resolution over the range of 90V to 135V or 180V to 250V RMS line at 50/60 Hz

Temperature and Humidity:	-10°C to +50°C (32° to 95°F) with 10% to 90% relative humidity, non-condensing
Maximum Usable Brightness:	Greater than 70 fL
High Voltage Output:	18 KV nominal

MECHANICAL

Dimensions:	11-7/8" (H) x 16-7/8" (W) x 21-5/8" (L)
Weight:	50 lbs.
Connectors:	BNC type with insulated ground
CRT Size:	14" diagonal
Standard Phosphor Type:	"WA" (P4) white medium persistence

WARRANTY

The HR-2000 is warranted to be free of defects in material and workmanship in normal use for a period of one year from the original date of purchase from Dage-MTI.

This warranty does not apply to units which have been subject to abuse, neglect, accident, improper installation, or on which the serial number has been removed or damaged. Units that have been altered without the prior permission of Dage-MTI are not covered by this warranty.

LIMITATIONS

1. This warranty is valid only if the malfunctioning unit is returned to Dage-MTI service area. This warranty does not cover on-location service. If warranty work is needed, the following should be contacted:

Dage-MTI
Service Department
701 N. Roeske Ave.
Michigan City, IN 46360
PH: 219-872-5514
FAX: 219-872-5559
service@dagemti.com
2. This warranty does not cover:
 - a. Problems caused by or inflicted upon associated equipment such as digitizing systems, video tape recorders, cameras, microscopes, etc.
 - b. Damage caused by accident misuse, improper power source, fire, flood, lightning, other acts of God, war, and repair or alteration by other than a Dage-MTI authorized service organization.
 - c. Labor or incurred charges required in removing or installing the Product, down time, failure of the Product to perform properly, and any consequential damages.
 - d. Transit damage.
3. Unit must be properly packaged (in original packing, if possible) when being returned under warranty.