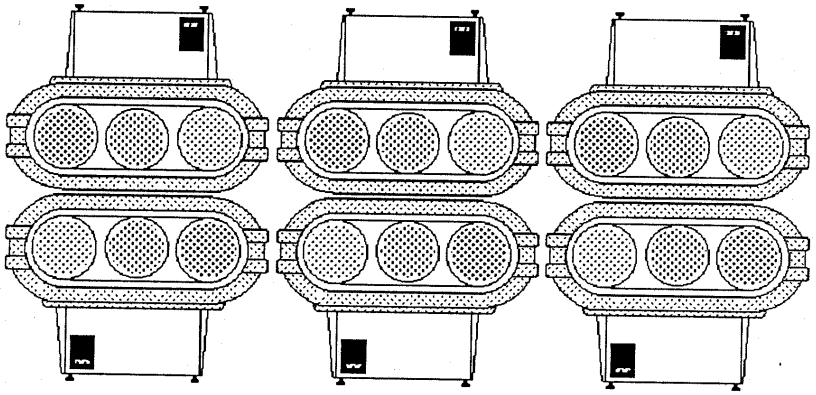
ELECTROHOME

Service Seminar

ECP 3100/4100 Series Projectors



Due to cycles of the moon, information in this manual is subject to change without notice.

Date of Birth: Sometime in March, 1991.

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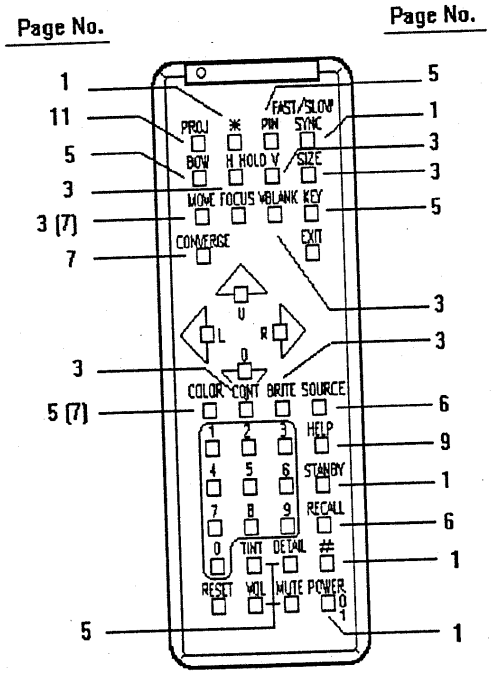
SECTION I

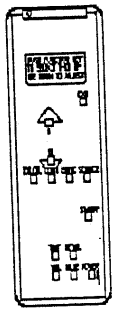
KEYPAD OPERATION GUIDE

KEYPAD OPERATION QUIDE

REMOTE CONTROL KEYPAD

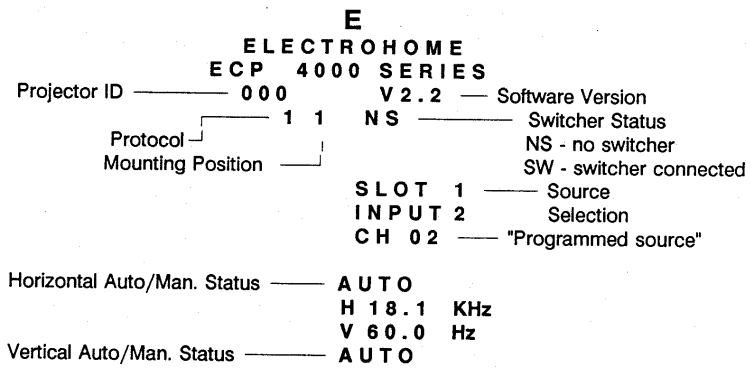


EXECUTIVE
REMOTE KEYPAD



1.1 SINGLE KEYSTROKE COMMANDS

KEY	DESCRIPTION
POWER	Press and hold until projector turns "ON" or "OFF" Toggle mode.
#	Push to toggle between crosshatch and external video. Crosshatch is frequency locked to input signal.
FAST/SLOW SYNC	Used to correct distortions at top of picture. Usually due to noisy unstable VCR/VTR tapes.
STANDBY	Press and hold until picture is blanked out. Projector is still running except the keypad will only except the; **STANDBY, EXIT or POWER** commands. It is recommended to push the **EXIT** key to bring a projector out of standby.
*	Projector status. This command is particularly useful in determining the software version of the projector, and to see if a switcher is recognized by the projector.



1.2 DOUBLE KEYSTROKE COMMANDS

CONT **U/D** Contrast adjustment to change the foreground intensity. Typical settings are 3 - 6 on the bar graph for computer signals and 5 - 8 for video.

BRITE **U/D** Brightness adjustment to change the background intensity. Usually set to 5 on bar graph.

FOCUS **U/D** Electrical focus adjustment of all three CRT's. Adjustments normally not needed. When adjustments are needed, set contrast to a normal level first.

SIZE **U/D** Vertical size with range of +/- 20%

SIZE **L/R** Horizontal size with range of +/- 10%

H HOLD **U/D** Toggles between auto and manual frequency lock.
V HOLD **U/D** LED on back of projector indicates mode of operation.
LED "ON" = manual On V1.1 software or higher, mode of operation is shown on screen.
Note: Even when using the projector in auto mode, the manual lock should still be preset, then return back to auto. This will prevent lost of hold due to accidental button pushing.

V BLANK **U/D** There are two independent TOP BLANK and BOT BLANK toggle modes. This is used only for video tapes.

V BLANK n If a number "n" is pushed after **V BLANK**, the following action occurs:

1	red on	5	green and blue on
2	green on	6	red and blue on
3	blue on	7	all blank
4	red and green on	8	all on

MOVE The **MOVE** button has 4 modes of operation. Pushing the button will advance you to the next mode.

	NO MOVE	no action
L/R	H MOVE	shifts the picture left/right only
U/D	V MOVE	shifts the picture up/down only
U/D/L/R	HV MOVE	shifts the picture up/down or left/right

1.2 DOUBLE KEYSTROKE COMMANDS

KEYS		DESCRIPTION
Use the crosshatch when making the following geometry adjustments		
BOW	**U/D**	Adjust until the center horizontal line is straight
PIN	**U/D**	Independent TOP PIN and BOT PIN adjustment are available. Push **PIN** to toggle between them.
	L/R	Side pincushion adjustment. Both left and right sides move together.
KEY	**U/D**	Adjust until both left and right side of picture is straight or parallel.

The following controls (on their own) are functional only when using the Multistandard decoder.

COLOR	**U/D**	Adjust the saturation. Nominal = 5
TINT	**U/D**	Adjust the hue. Nominal = 5
DETAIL	**U/D**	Adjust the sharpness of the image, usually set low.
VOL	**U/D**	Adjust the volume
MUTE	**U/D**	Turns the volume "on" or "off".

1.3 SOURCE/RECALL/SWITCHER

SOURCE
To change from one source to another, press: **SOURCE n m.**

where n = slot number
m = input number 1 or 2

Interface modules are installed into slot 1 or 0 on the projector, and slot 1, 2, ... 6 on the switcher. Each module has a maximum of 2 inputs.

RECALL
There are 10 memories that can be called up anytime into any source. These are known as "recall memories". They can be asscess by pressing: **SOURCE RECALL n.**

where n = 0, 1, 2, ... 9

The recall memories may be setup ahead of time for different computers.

SWITCHERS
Up to 4 switchers can be connected to the projector. A different interface module is required to do so, 38-800926-01. This interface will allow 2 switchers to be connected. Therefore 2 of these interfaces is needed for 4 switchers.

To go from one switcher to another, press **SOURCE * n**, where n is the switcher number. You can also use programmed source switching or source up/down to go from one switcher to another (as discussed in the utilities section).

The switcher that is providing the source will have its power light illuminated. The power light of the other switchers will be off. The keypad on all the switchers are always active.

1.4 CONVERGENCE

CONVERGENCE
1. **Guided Convergence**
2. **Advanced Random Access**
3. **Test Pattern**
4. **ACON: Auto-Convergence**

1. Guided convergence is useful for first time or rough convergence. Follow on screen menus.

2. Random convergence useful for touchup or fine tune convergence.
   To enter random convergence, use the following commands:
   CONVERGE ------ Enter Convergence routine.
   2 ---------- Enter Advanced Random Access.
   (CONVERGE ---- Press only on V0.9 or earlier software.)
   L, R, U or **D** -- Red static convergence.
   CONVERGE
   L, R, U or **D** -- Blue static convergence.
   CONVERGE ----- Entering dynamic convergence.
   At this point pressing _____ will have the following actions:
   MOVE L, R, U or **D** will move the convergence box.
   CONVERGE L, R, U or **D** will move or converge the lines.
   COLOR will change the colour that is being converged.
   EXIT will exit out and allow you to memorize the convergence.

3. Test pattern used for stigmatism adjustments. - see section III Service Alignment -

4. Automatic convergence. - see section VI ACON -

Press **CONVERGE *** for service tools.

The * command only works on V2.2 software. For earlier software simply push 5 or 6 after the converge command to access them.

1. **Guided Convergence**
2. **Advanced Random Access**
3. **Test Pattern**
4. **ACON: Auto-Convergence**
5. **Green Convergence**
6. **Converge on Image**
7. **Change Guided to 9X5**

1.4 CONVERGENCE

5. Green convergence to correct for minor geometry distortions. Edge matching two or more projectors. Super impose projectors. Pressing the **COLOR** button after converge 5 will allow you to green converge with your own image.

6. This is the same as advanced random access except you are converging with your own image rather than the crosshatch.

7. Changes the guided convergence routine to a 9 X 5 zone. It should normally be left in the 5 X 5 zone mode.

RESET of CONVERGENCE

The red and blue convergence can be reset by the following command: (static and dynamic convergence)

CONVERGE 2 RESET

This reset mode can be stored by pushing **EXIT** twice if you have V2.2 software. Older software does not allow the reset mode to be stored.

The green convergence can be removed or reset by the following command: (dynamic only)

CONVERGE * 5 RESET
or
CONVERGE 5 RESET V0.9 software or earlier

RECALL (on keypad)	**+ Red Button** (on remote control module)	This will reset the entire data base of the projector. Should be performed whenever software chips are changed.

1.5 UTILITIES

The utilities menu is accessed through the HELP menu, selection number 4. Selections 1, 2 and 3 of the Help menu are self explanatory. The 4th selection, UTILITIES, will be explained below:

For projectors with V2.2 software the following menu appears. For older software versions, items 6, 7 and 8 are not available.

UTILITIES
1. Source Up/Down Programming
2. Mounting Positions
3. Source Recall Memory
4. IR Keypad Protocol 1 & 2
5. Multiprojector System
6. Multiswitcher System
7. Screen Display Disable
8. Programmed Source Is: OFF

1. Source Up/Down Programming

This menu is used for two reasons; to program a projector so that sources can be changed using the SOURCE U or D keys (executive keypad), and also to assign a channel number to a source. - see item 8 - Channel selection option only on V2.2 or higher software

A new source up/down programming menu exist on the V2.2 software. It is much simpler to use because it can be cursor controlled. As an added feature it also allows the programming of recall memories and switchers. When entering this menu, via the HELP 4 utilities menu, a series of help menus will guide you step by step. If an error is made while programming, simply press the * button and that entry (only) is reset.

The use of source up/down is slightly changed in the V2.2 software. When you press SOURCE then U or D, the source indicator on the screen will change to the next source in your program. The image on the screen will not change until the U or D button is released. If the U or D button is not released, everything is frozen. This allows you to decide if you have switched to the right source or not. If it is not the correct source, then press the U or D key again and the source indicator will change to the next source in the program. This method allows you to cycle to the correct source much quicker and without having to actually view all the sources. (as was the case with earlier software).

1.5 UTILITIES

Source Up/Down Programming U12

CH	SW	SI	R#		CH	SW	SI	R#
0 1	* *	* *	* *		2 5	* *	* *	* *
0 2	* *	* *	* *		2 6	* *	* *	* *
0 3	* *	* *	* *		2 7	* *	* *	* *
0 4	* *	* *	* *		2 8	* *	* *	* *
0 5 ---	* *	* *	* *		2 9	* *	* *	* *
0 6	* *	* *	* *		3 0 ---	* *	* *	* *
0 7	* *	* *	* *	Press	3 1	* *	* *	* *
0 8	* *	* *	* *		3 2	* *	* *	* *
0 9	* *	* *	* *	EXIT	3 3	* *	* *	* *
1 0 ---	* *	* *	* *		3 4	* *	* *	* *
1 1	* *	* *	* *		3 5 ---	* *	* *	* *
1 2	* *	* *	* *	when	3 6	* *	* *	* *
1 3	* *	* *	* *		3 7	* *	* *	* *
1 4	* *	* *	* *	Done	3 8	* *	* *	* *
1 5 ---	* *	* *	* *		3 9	* *	* *	* *
1 6	* *	* *	* *		4 0 ---	* *	* *	* *
1 7	* *	* *	* *		4 1	* *	* *	* *
1 8	* *	* *	* *		4 2	* *	* *	* *
1 9	* *	* *	* *		4 3	* *	* *	* *
2 0 ---	* *	* *	* *		4 4	* *	* *	* *
2 1	* *	* *	* *		4 5 ---	* *	* *	* *
2 2	* *	* *	* *		4 6	* *	* *	* *
2 3	* *	* *	* *		4 7	* *	* *	* *
2 4	* *	* *	* *		4 8	* *	* *	* *

2. Mounting Position

Mounting Position is used to correct the arrow direction of the keypad whenever the scan is reversed.

3. Source Recall Memory

Source Recall Memory is a menu used to transfer or copy memory within a projector. The following example illustrates the steps needed to copy the setup/convergence memory form **SOURCE 1 1** to **SOURCE 1 2:**

SOURCE 1 1 --- First switch to the good memory location.
HELP 4 3 ----- Switch to the Source Recall Memory menu.
SOURCE 1 2 --- Enter the source number that you want the setup/convergence memory stored into.
Note: You can also store memory from Source to Recall memory, or from Recall to Recall, or from Recall to Source.

1.5 UTILITIES

3. Source Recall Memory

You can also copy memory from a source in one switcher to a source in another switcher with the following trick:

First copy the good memory into a recall memory. Then change to the switcher that you want the memory copied into. Now copy the recall memory into the source. An example will illustrate this procedure:

Copy the memory from SOURCE 3 1 SW 1
into SOURCE 1 1 SW 2

SOURCE * 1 ----------	switch to switcher 1
SOURCE 3 1 ----------	switch to source 3 1, the good memory
HELP 4 3 SOURCE RECALL 0 -	copy the good memory into recall 0 (the selection of 0 is arbitrary)
SOURCE * 2 ----------	switch to switcher 2 Note: at this point it does not matter what source is displaying in switcher 2
SOURCE RECALL 0 ---------	switch to the good memory
HELP 4 3 SOURCE 1 1 -----	copy recall 0, the good memory into source 1 1
SOURCE 1 1 ----------	call up the source to verify

4. IR Keypad Protocol 1 & 2

This chances the projector to listen for a Protocol 2 signal. A protocol 2 keypad is available as an option. This is useful when attempting to operate two projectors independently in one room.

5. Multiprojector System

Multiprojector system allows projectors to be numbered so that they can be accessed individually. Up to 1000 projectors are allowed. After the projector is numbered, it can be called up by pushing **PROJ** followed by its number. An **EXIT** command should be added when using CPM commands. To turn all projectors on simultaneously, push **PROJ EXIT.**

1.5 UTILITIES

6. Multiswitcher System

Multiswitcher system is a read only menu. It highlights the fact that more than one switcher can be connected to a projector (up to 4).

7. Screen Display Disable

This menu allows the bar indicators to be turned off.

8. Programmed Source

A new method to switch between sources has been added to software V2.2. A channel number can be assigned to a particular input. For example, source 1,1 can be assigned a channel number, say **01**. The status display on the screen will appear as:

SLOT 1
INPUT 1
CH 01

To assign a channel number, simply enter into the source up/down programming menu. The projector operates in one of two modes; normal and "Programmed Source" mode. To switch between modes, enter the utilities help menu and select 8. In the above example source 1 1 has been assigned the channel number 0 1. To switch to this source, simply pressed **0 1** on the keypad. Note that the SOURCE button was not pressed. By not pressing the source button, the projector knows that channel 0 1 was requested and not SOURCE 0 1.

To decide whether the projector is in the "Programmed Source" mode or not, simply push the SOURCE button. If the CH ## indicator comes up, then the projector is in the programmed source mode, eg.

SLOT 1	**SLOT 1**
INPUT 1	**INPUT 1**
	CH 01
normal mode	programmed source mode

This feature becomes most useful when multiple switchers are connected. It simplifies source switching from one switcher to another.

SECTION II

FOCUS SETUP PROCEDURE

2. FOCUS SETUP PROCEDURE

The following is a complete step-by-step procedure for optimum alignment of the ECP 3000/4000 series projector. These procedures (like every thing else) will become easier with practice. Steps 1a and 2a are not always necessary.

1. Obtain the correct throw distance from the equations given in this section.

   1a. With the contrast down, look inside the lens and check the green crosshatch to see that it is centered. Since it is not possible to reset the green dynamic convergence, the following is necessary:

PUSH	DESCRIPTION
CONVERGE * 5	Enter into green convergence routine Omit * command for V0.5, 0.9 or 1.1
CONVERGE L	Hold the **L** arrow key down until the crosshatch stops moving.

   Pick a point on the screen and mark its position with your finger.

R	Hold the **R** arrow key down until the crosshatch stops moving.

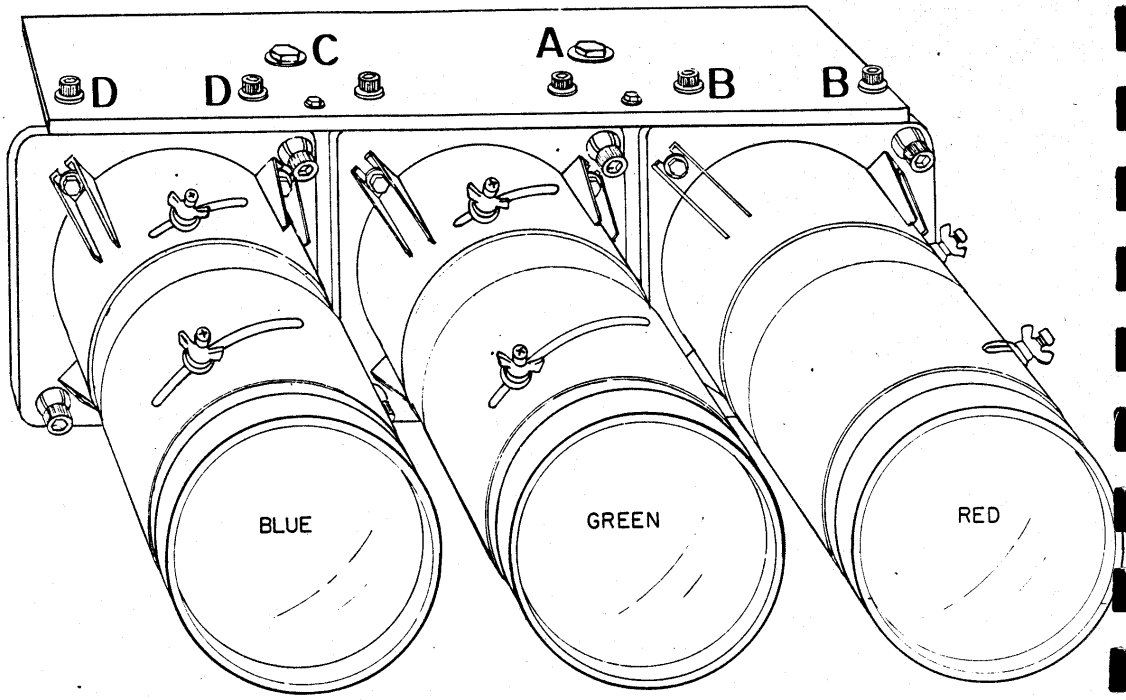
   Mark how far this point has moved to the right. A position half way between the first point and second point should be where the green crosshatch be left. This point represents no static convergence.

   Now adjust R121 on the green Power Deflection module to center the crosshatch on the CRT face.

   Exit out of green convergence and save the new values.

2. Push **CONVERGE 2 RESET.** This will reset the static and dynamic convergence of the red and blue channel. Do not **EXIT**, yet.

   2a. Look into the red lens and check that the crosshatch is horizontally centered on the CRT. If it is not in the center, then adjust R119 on the red Power Deflection module. Now push **CONVERGE** and check the blue CRT. Adjust R119 on the blue Power Deflection module if necessary.



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2. FOCUS SETUP PROCEDURE

3. Loosen bolts A BB C and DD.

4. Physically move or pivot the red lens so that the crosshatch overlaps the green crosshatch at the center of the picture. Tighten bolts BB.

5. Push **CONVERGE** and physically move or pivot the blue lens so that the crosshatch overlaps the green crosshatch at the center of the picture. Tighten bolts DD.

6. Push **EXIT 0**. This will take you out of the convergence routine and restore the old convergence values.

7. Perform a quick center and corner focus of the lens. Adjust the top/bottom and left/right focus on each of the red green and blue bluk heads as follows;

   Top/Bottom Left/Right Focus:

   The top/bottom focus can be accomplished by first focusing the center. Then slightly defocus the center. Look at the center vertical line. Adjust the top/bottom control until this line is defocused the same amount from top to bottom. It will be necessary to bring the center in and out of focus as the large top/bottom control is adjusted.
   The left/right focus is accomplished the same way, except instead of watching the center vertical line, it is the center horizontal line that is used.

   Tighten bolts A and C after all focus alignment is completed.

Note: There are no left/right adjustments on the green bulkhead.

2. FOCUS SETUP PROCEDURE

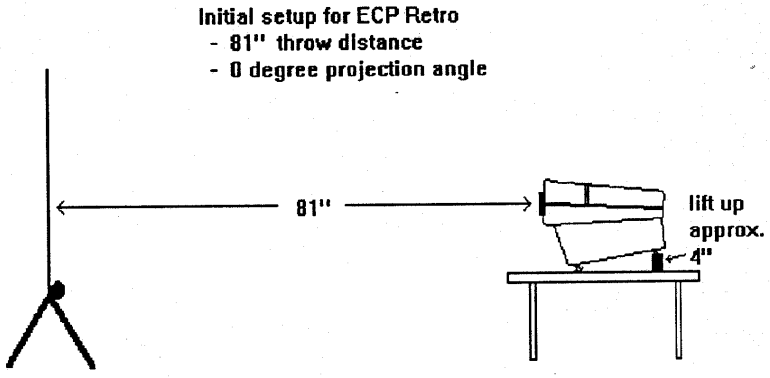
FOCUS SETUP for ECP Retro

There are two ways to setup an ECP Retro. The easy way and the hard way. The hard way is to mount the projector into the retro box and focus it in there. The easy way is to setup the projector on a front screen or wall first, then mount the projector into the reto box.

Refer to diagram below. Lift up the back of the projector so that it is shooting straight into the screen. A simple way to determine if it is shooting straight is to set the keystone to "5", then lift the back until there is no keystone distortion on the image. You will need approximately 4" of elevation in the back.

Use a throw distance of 81". Followe the step-by-step focus procedure to setup the projector. When completed the projector can then be installed into the retro box. Swing the projector on its cradle until the cross hatch is vertically centered to the screen. It will be necessary to check and readjust the len's center focus control.

Check the vertical linearity. This control is commonly missed and should be adjusted whenever the projection angle is changed.



2. FOCUS SETUP PROCEDURE

Throw Distance Calculations

	Low Band	High Band
ECP 3100 Series	15-27 KHz $C = \frac{(0.472 \times H) - 7.086}{100}$	27-55KHz $C = \frac{(0.454 \times H) - 11.04}{100}$
ECP 4100 Series	15-36 KHz $C = \frac{(0.5727 \times H) - 8.5905}{100}$	36-80 KHz $C = \frac{(0.2872 \times H) - 9.63}{100}$

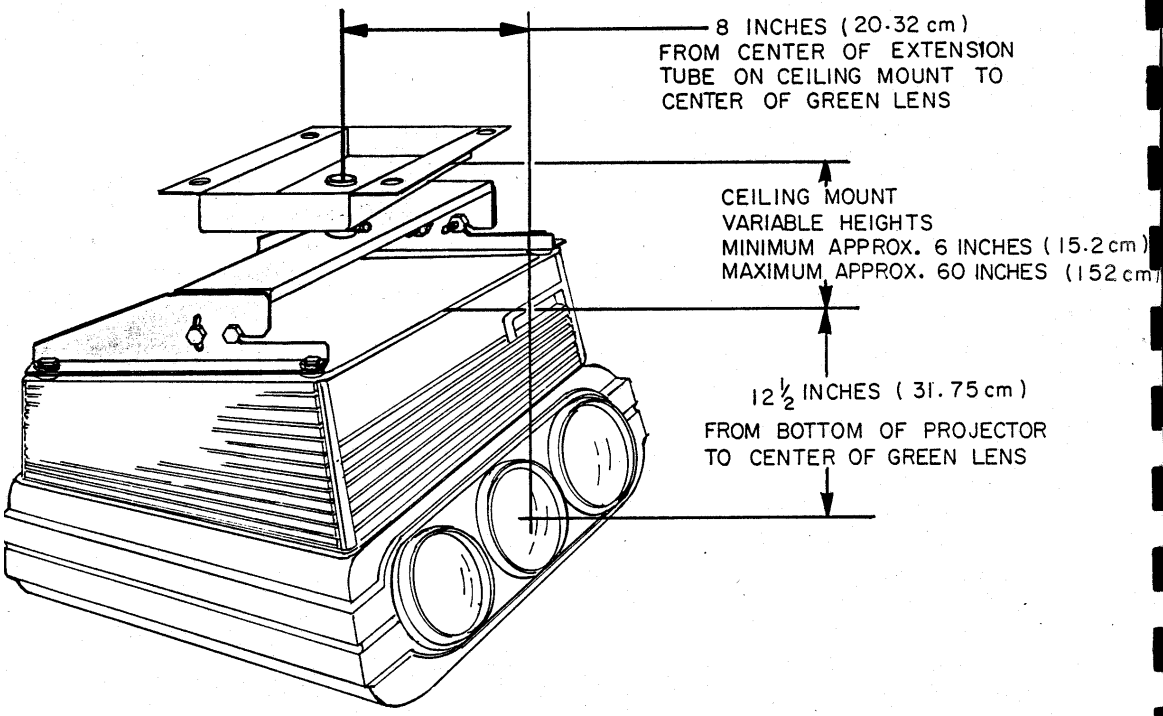
H = horizontal frequency in KHz
W = screen width

Throw Distance **D = 1.64 X W X (1+C)**

Example: for a 6 foot wide screen at VGA frequency (31 KHz) the throw distance is;

10.14' for an ECP3100 or 10.74' for an ECP4100

The throw distance chart in the User's Manual is only for quick, rough reference. They do not take into consideration of horizontal scan rates. The equations given above are more accurate. However it is not possible to predict the active line time percentage of all the computers available. Therefore the safest approach is to set up a projector with all the sources first before any mounting is done. Where there are more than one scan rate in the system, hence more than one throw distance, use the longest calculated throw distance value.


8 INCHES (20.32 cm)
FROM CENTER OF EXTENSION
TUBE ON CEILING MOUNT TO
CENTER OF GREEN LENS
CEILING MOUNT
VARIABLE HEIGHTS
MINIMUM APPROX. 6 INCHES (15.2 cm)
MAXIMUM APPROX. 60 INCHES (152 cm)
12 ½ INCHES (31.75 cm)
FROM BOTTOM OF PROJECTOR
TO CENTER OF GREEN LENS

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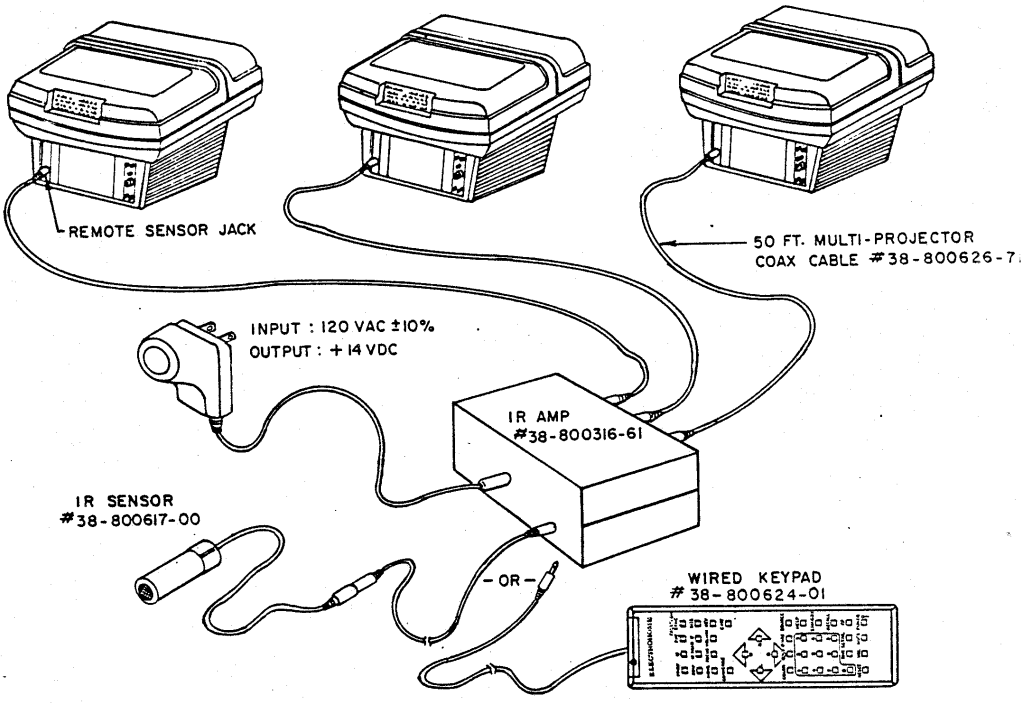
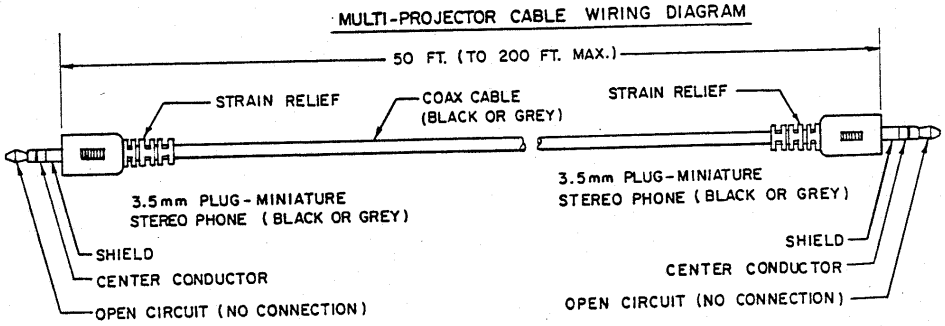
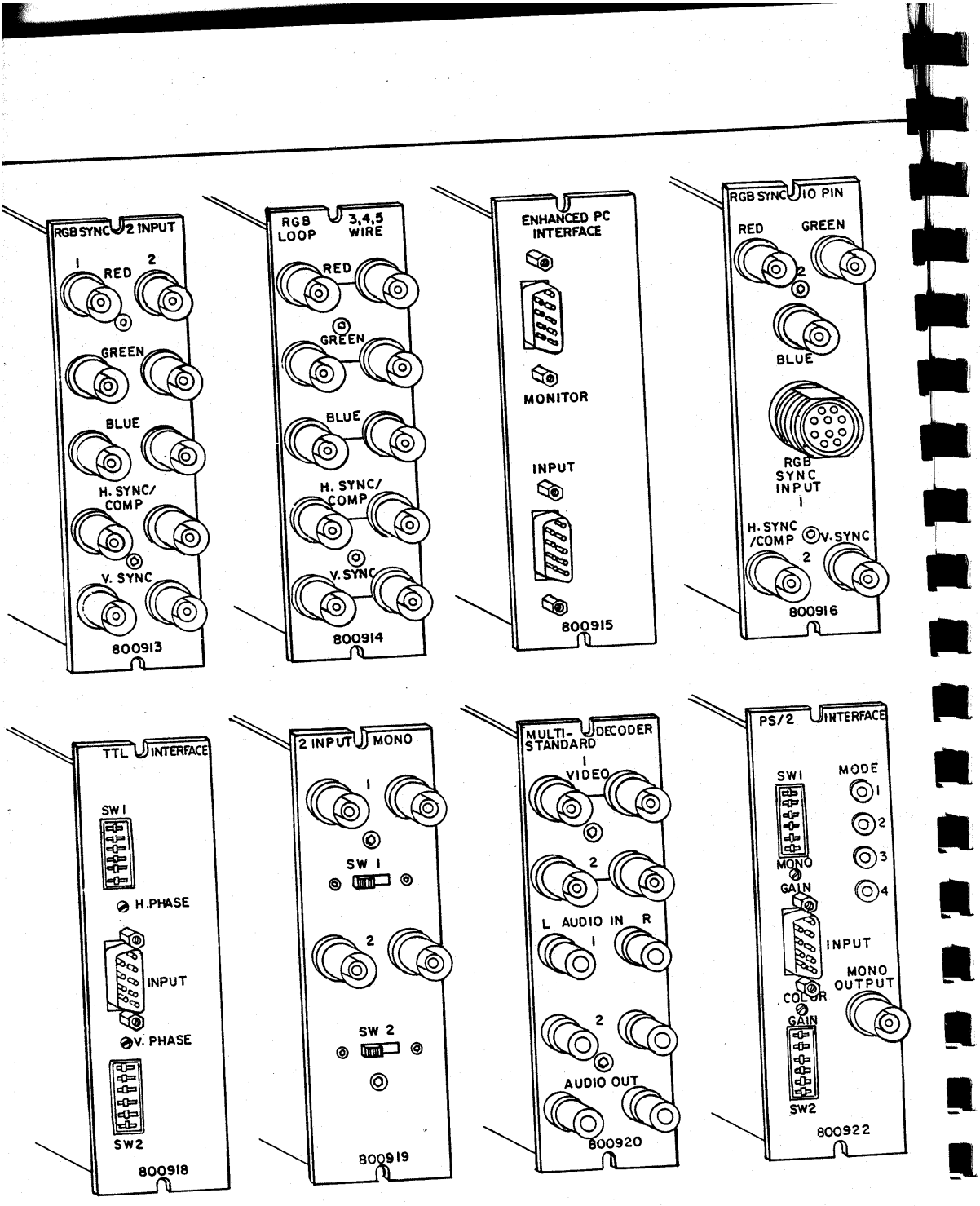


MULTI-PROJECTOR CABLE WIRING DIAGRAM




RGB SYNC 2 INPUT
1
RED
2
GREEN
BLUE
H. SYNC/
COMP
V. SYNC
800913
RGB
LOOP
3,4,5
WIRE
RED
GREEN
BLUE
H. SYNC/
COMP
V. SYNC
800914
ENHANCED PC
INTERFACE
MONITOR
INPUT
800915
RGB SYNC 10 PIN
RED
GREEN
2
BLUE
RGB
SYNC
INPUT
1
H. SYNC
/COMP
V. SYNC
2
800916
TTL INTERFACE
SW1
H.PHASE
INPUT
V. PHASE
SW2
800918
2 INPUT MONO
1
SW 1
2
SW 2
800919
MULTI-
STANDARD
DECODER
1
VIDEO
2
L AUDIO IN R
1
2
AUDIO OUT
800920
PS/2
INTERFACE
SW1
MODE
1
2
3
4
MONO
GAIN
INPUT
COLOR
GAIN
MONO
OUTPUT
SW2
800922

SECTION III

SERVICE ALIGNMENT

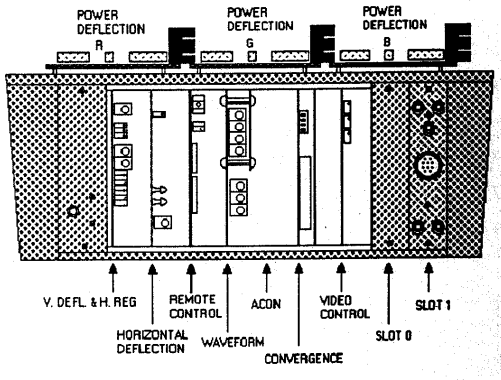
VIDEO CONTROL MODULE

NULL CONTROLS

R113 (red)

R114 (green)

R115 (blue)

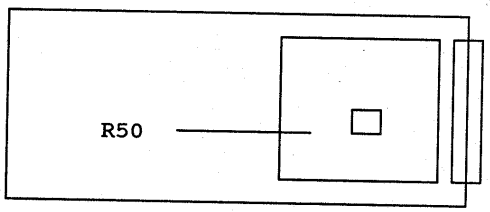


3. SERVICE ALIGNMENT

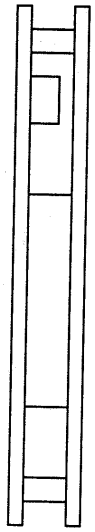
VIDEO CONTROL MODULE

Control	Procedure	Description
R113 red R114 green R115 blue	>Connect any source to the projector. >Set Brightness to 10 Contrast to 0 >Look inside the lens and adjust each control so that there is no video appearing.	These are the video null controls. They ensure that when the contrast bar graph is at "0", there should be no video on the screen.

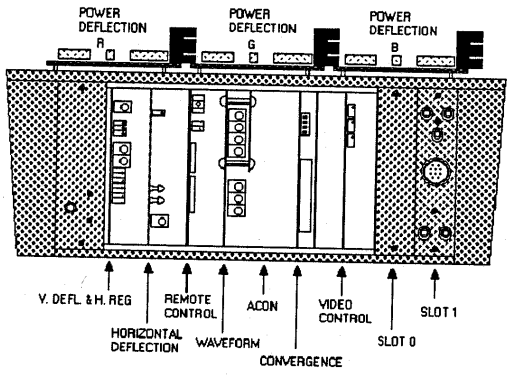
CONVERGENCEL MODULE



OLD CONVERGENCE



NEW CONVERGENCE



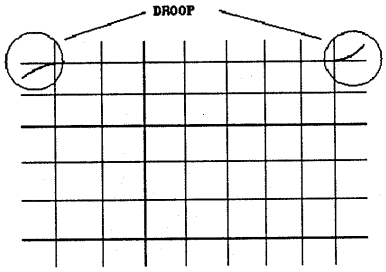
3. SERVICE ALIGNMENT

CONVERGENCE MODULE

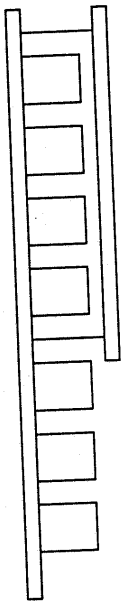
Control	Procedure	Description
R50	>Place module on extender board. >Push # for crosshatch >Adjust R50 for minimum droop as shown below.	This is like a phase control for the convergence waveform.

New convergence module with dip switches at front of module.

SW1-1	OFF --- ECP3100/3101	These dip switches serve the same function as R50 above. They are for phase control of the convergence waveform.
-2	ON	
-3	ON	
-4	OFF	
P60	JUMPER OFF or cut	
SW1-1	OFF -- ECP4100/4101	
-2	ON	
-3	OFF	
-4	OFF	
P60	JUMPER ON	



WAVEFORM MODULE



R1 (red)

R2 (green)

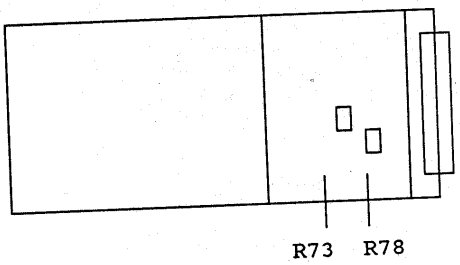
R3 (blue)

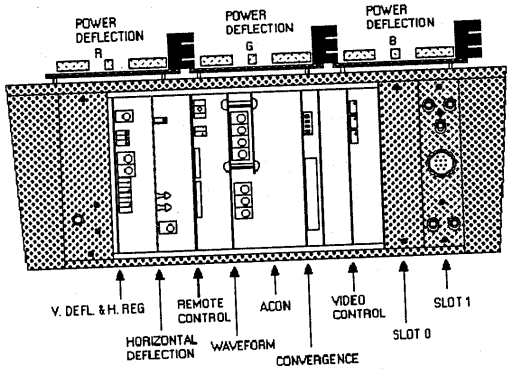
R17

R48

R51

R61



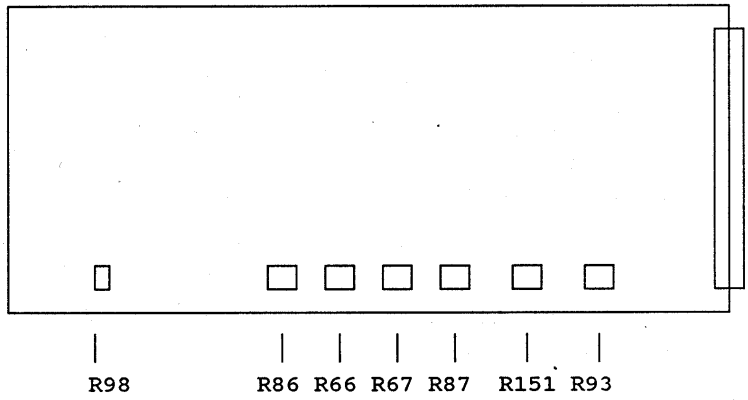


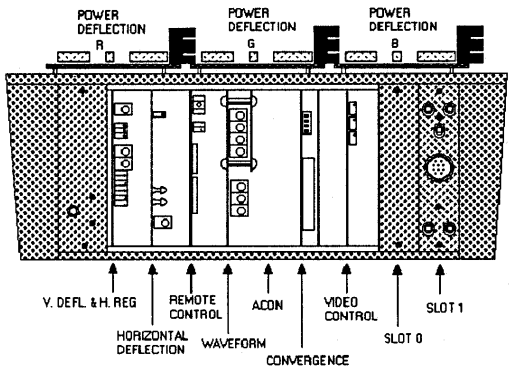
3. SERVICE ALIGNMENT

WAVEFORM MODULE

Control	Procedure	Description
R1 red R2 green R3 blue	>Connect a source with either a greyscale or large white image. >Turn all three controls fully clockwise. >Set the contrast to a normal level. >Now reduce one or two of the controls for a white image or proper gray scale.	These are the video drive controls.
R17 V R48 H	>Adjust R17 for vertical dynamic focus. >Adjust R48 for horizontal dynamic focus.	Vertical and horizontal dynamic focus.
R61	>Connect a scope to PB1-14 KEY WFM >Set **KEY** to "5" on bar indicator. >Adjust control for 0 VDC	This is the null control for the keystone circuit.
R51	>Set **KEY** to "2" on bar indicator. >Set the screen to be straight up and down. >Set the projector so that it is flat and level. >Adjust control for proper keystone, straight sides.	This is the gain control for the keystone circuit.
R73	>Connect a source in the high band range. 55KHz/ECP3100, 80KHz/4100 >Adjust R73 for straight pincushion.	This is the phase control for the pincushion waveform.
R78	>Connect a 15KHz source. >Adjust R78 for straight pincushion. >R73 and R78 are interactive repeat both adjustments.	

HORIZONTAL DEFLECTION MODULE



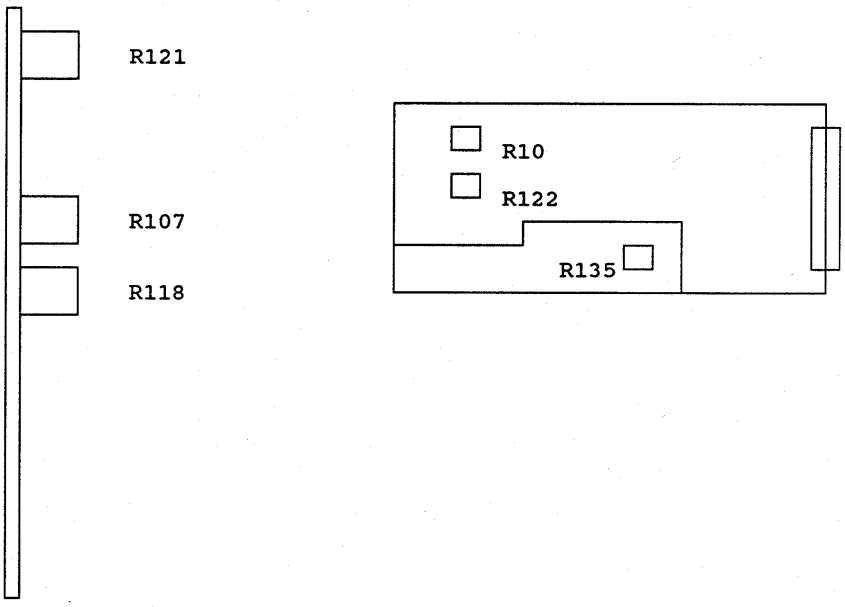


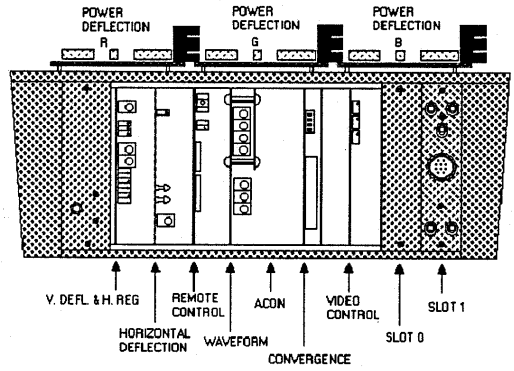
3. SERVICE ALIGNMENT

HORIZONTAL DEFLECTION MODULE

Control	Procedure	Description
Make sure projector is warmed up before making these adjustments		
R93	>Connect a meter to TP7 >Adjust control for 12VDC +/- 0.15	Setting of the onboard 12 volts regulator.
R98	The bandswitch point is: 27KHz --- ECP 3000 Series 36KHz --- ECP 4000 Series >Connect a source with the above frequency. >Adjust control so that both bandswitch LED indicator is ON.	Adjustment to set the point at which bandswitch occurs.
R87 HB LF R67 HB HF	>Connect a signal at 24 KHz --- ECP 3000 34 KHz --- ECP 4000 >Adjust R87 for lock. >Connect a signal at 55 KHz --- ECP 3000 80 KHz --- ECP 4000 >Adjust R67 for lock.	Auto lock adjustment for the highband circuits. ECP 4000 Series 34-80 KHz ECP 3000 Series 24-55 KHz
R66 LB HF R86 LB LF	>Connect a signal at 35 KHz --- ECP 3000 36 KHz --- ECP 4000 >Adjust R66 for lock. >Connect a signal at 15 KHz --- ECP 3000 15 KHz --- ECP 4000 >Adjust R86 for lock.	Autolock for lowband. ECP 3000 Series 15-35 KHz ECP 4000 Series 15-36 KHz

V DEFL & H REG MODULE



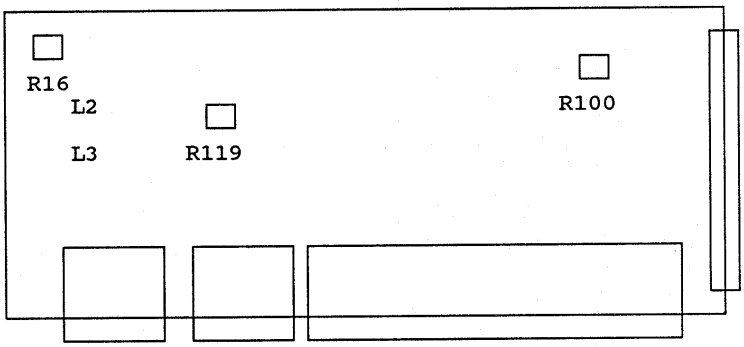


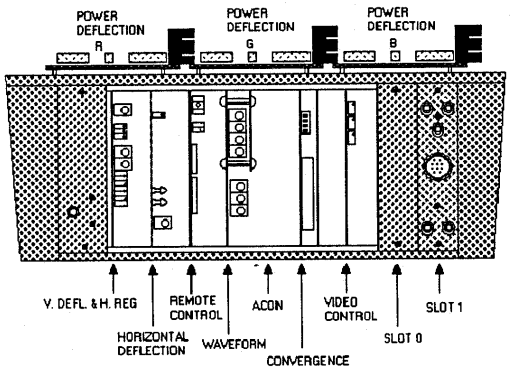
3. SERVICE ALIGNMENT

V DEFL & H REG MODULE

Control	Procedure	Description
R10 LF R122 HF	>Preset R122 at a 2/3 clockwise setting. >Connect a 45 Hz. signal >Adjust control for lock. >Connect a 120 Hz signal >Adjust control for lock.	Autolock adjustment for vertical circuits.
R118	>Preset **V SIZE** to "5" on bar indicator. >Push # for crosshatch. >Look inside CRT and adjust control so that crosshatch is approx. 1/4 inch away from the top and bottom edge of the CRT face.	Vertical size preset for all three colours.
R107 R121	>Push # for crosshatch >Adjust control so that the height of each crosshatch box is the same from top to bottom.	Vertical linearity.
R135	>Preset control fully clockwise, then backoff 1/4 of a turn. >Test this setting by adjusting the horizontal size and keystone to max. The H INHIBIT should not turn ON. If it does, slightly advance R135 clockwise and retry test.	Over current shutdown for horizontal regulator, or buck converter.

POWER DEFLECTION MODULE



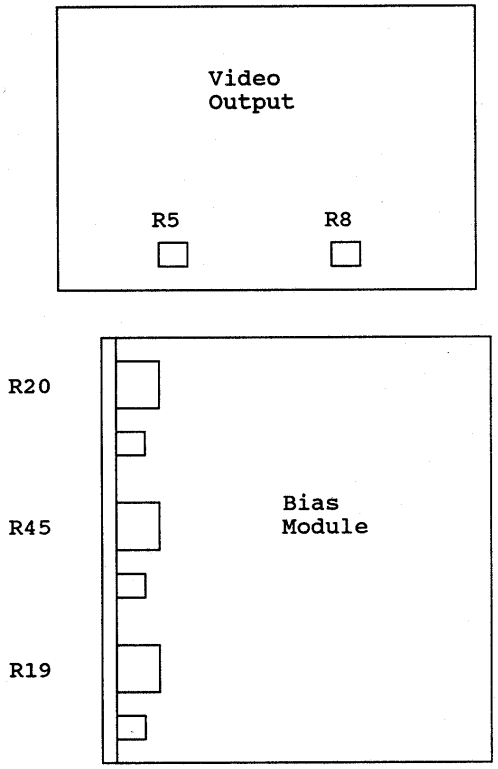


3. SERVICE ALIGNMENT

POWER DEFLECTION MODULE

Control	Procedure	Description
Adjust only the module that is off. If all three module needs adjustment, start with R100 on the green module at its mechanical center.		
R100	>Push **CONVERGE 2 RESET** >Center the crosshatch. >Adust control so that the vertical size matches near the horizontal center of the crosshatch.	First remove the convergence in the picture Now correct for the differences in vertical size.
R16 only works on the green Power Deflection channel.		
R16	>Adjust the horizontal size control to "5" on the bar indicator. >Push # for the crosshatch >Look inside CRT and adjust control so that crosshatch is approx. 1/4 inch away from the left and right edge of the CRT face.	This is the overall horizontal size preset.
The width coils must be adjusted in sequence.		
	>Push **CONVERGE 2 RESET** Note: Remember not to store this. >Connect a signal which forces the projector into highband. >Adjust L3 to match width >Connect a signal which forces the projector into lowband. >Adjust L2 to match width >Push **EXIT 0**	Width coils Suggested frequencies: 48 KHz ECP 3000 Series 55 KHz ECP 4000 Series Suggested frequencies: 18 KHz ECP 3000 Series 31 KHz ECP 4000 Series
R119	>Follow the procedures given in the FOCUS SETUP section. Steps 1a, 2 and 2a	

VIDEO OUTPUT and BIAS MODULE



3. SERVICE ALIGNMENT

VIDEO OUTPUT MODULE

Control	Procedure	Description
R5	>Set Brightness to "5" >Set Contrast to "0" >Connect a meter to "K" the cathode and ground. >Adjust control for 140VDC +/- 2.	This is the cathode DC level.
R8	>Set Brightness to "10" >Set Contrast to "0" >Adjust control for a gray raster Note: One control of the three colours should be at maximum.	Black level adjustment

BIAS MODULE

R20 R45 R19	red green blue	>Set Brightness to "5" >Set Contrast to "0" >Adjust control such that the raster is just turned on. Do this by viewing directly into the face of the CRT.	Cutoff or G2 controls.

3. SERVICE ALIGNMENT

COMPLETE VIDEO ALIGNMENT PROCEDURE

This procedure is used if a number of the video related modules have been misadjusted. If there seems to be a tracking of the colour from low to high contrast, this procedure may also help. These procedures also assumes that all the interface modules are properly aligned.

B = Brightness **C = Contrast**

1. Connect a white video source to the projector. Do not use a composite source or the Multistandard decoder module.

2. Set B=0 and C=0. Preset R8 on the Video Output Module for maximum brightness. Adjust all three modules.

3. Press the # button for crosshatch. Null the video as per the procedure in the Video Control Module in the Service Alignment Section.

4. Set B=5 and C=0. Adjust R5 on the Video Output Module for 140VDC +/-2V on the "K" cathode point. Adjust all three boards (colours).

5. Set B=5 and C=0. Perform the Bias Module Service Alignment procedure.

6. Follow the procedure for drive level adjustment on the Waveform Module.

7. Reduce the contrast to a low level. Picture should remain grey. If not, adjust the Bias Module (G2) for grey picture.

8. Set B=10 and C=0. Adjust R8 on the Video Output Module for a grey raster.

9. Return to step 4 to ensure that the "K" cathode is still at 140VDC.

3. SERVICE ALIGNMENT

STIGMATISM ALIGNMENT

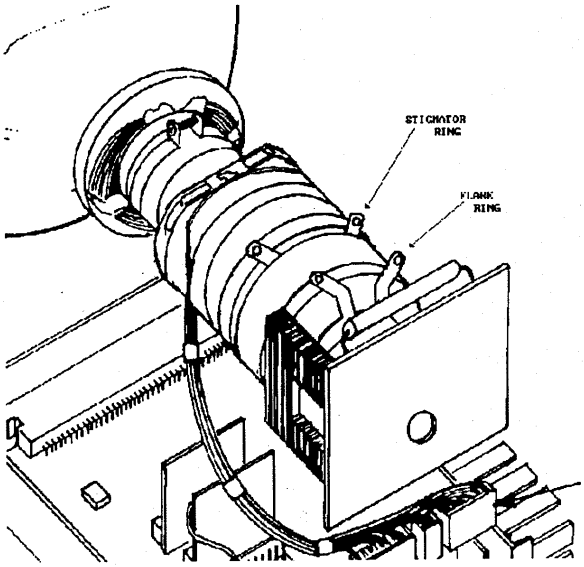
Refer to pg. 6-32 of the Service Manual for more details.

Add an extra step between 3 and 4
- adjust contrast to 10. -

The adjustment of the stigmator and flare rings are the most critical when it comes to good focus.

A proper adjustment could take up to 5 minutes per tube. It is usually easy to adjust the dots at the center to be round. The difficulty comes in adjusting until the dots in all four corners are round.

Note the position of the rings. Now display a high resolution image. Play with the rings to see if they can be improved. If not, return them to the previous noted position.



Do not forget to readjust the electrical focus on the Bias Module with the contrast set to the highest level that it will be used.

If the rings feel loose, glue them with silicone seal after adjustments are made.

3. SERVICE ALIGNMENT

INTERFACE (phase) ALIGNMENT

Each interface has horizontal and vertical phase adjustments. They can usually be jumpered in or out of the circuit. The following descripes how these jumpers are set:

RGB SYNC 10 PIN 916 **Loop thru 914** **2 input 913**
The three modules above uses the same circuit board. They differ only in the front panel layout.

Sync bypass	P14	-	Use this configuration on signals
	P15	1,2	with narrow pulse width.
	P16	2,3	Eg. IBM XGA, SUN, Silicon Graphics
	P17	1,2	
H Phase enable	P15	2,3	Adjust R139
V Phase enable	P14	1,2	Adjust R138
	P17	2,3	

Consult the service manual under the "RGB SYNC 10 PIN" section for further details.

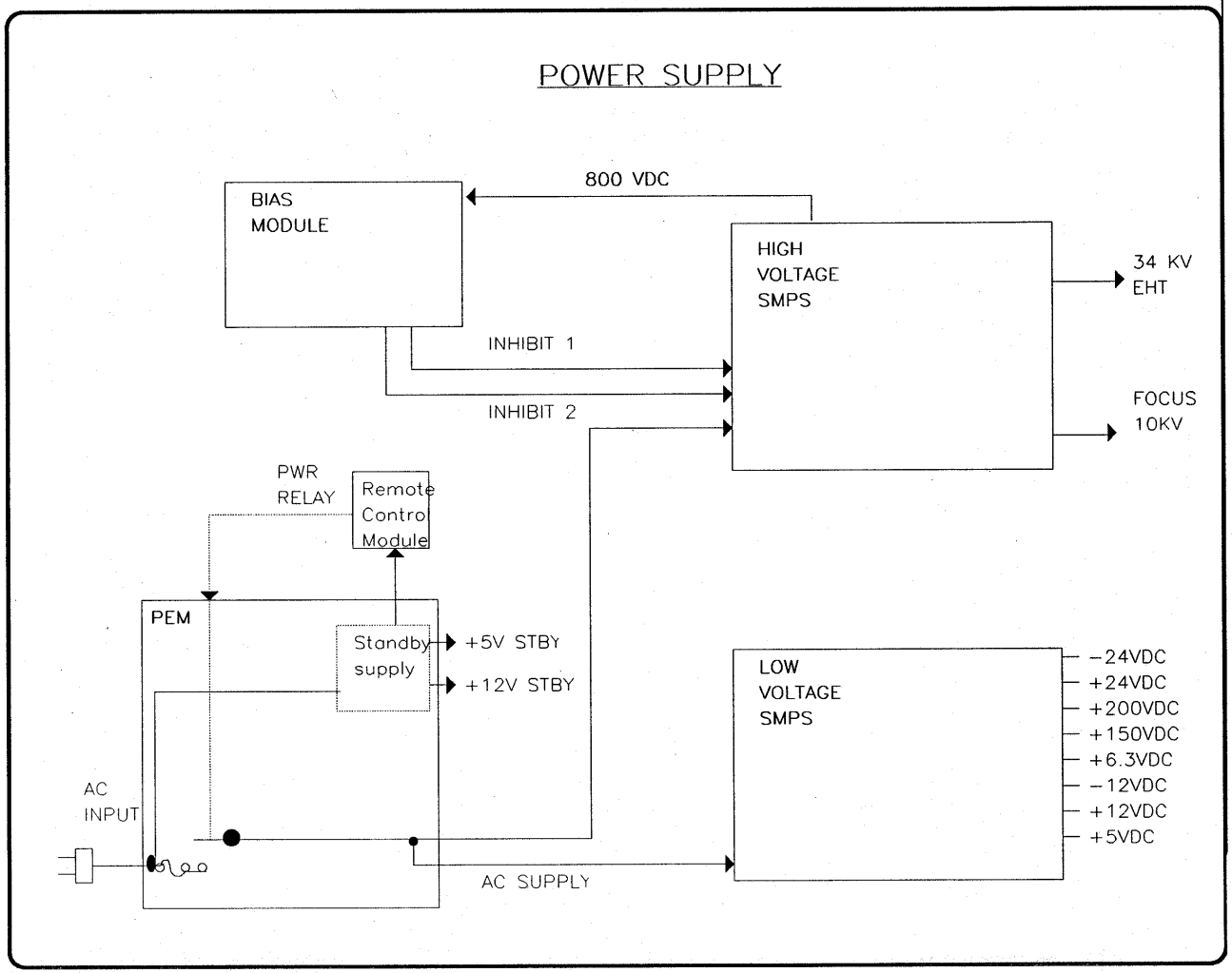
QUAD STANDARD 920
The 920 multi-standard decoder also has a horizontal phase adjustment. Set the projector to the "NO MOVE" mode first, then adjust R563 to centering the picture.

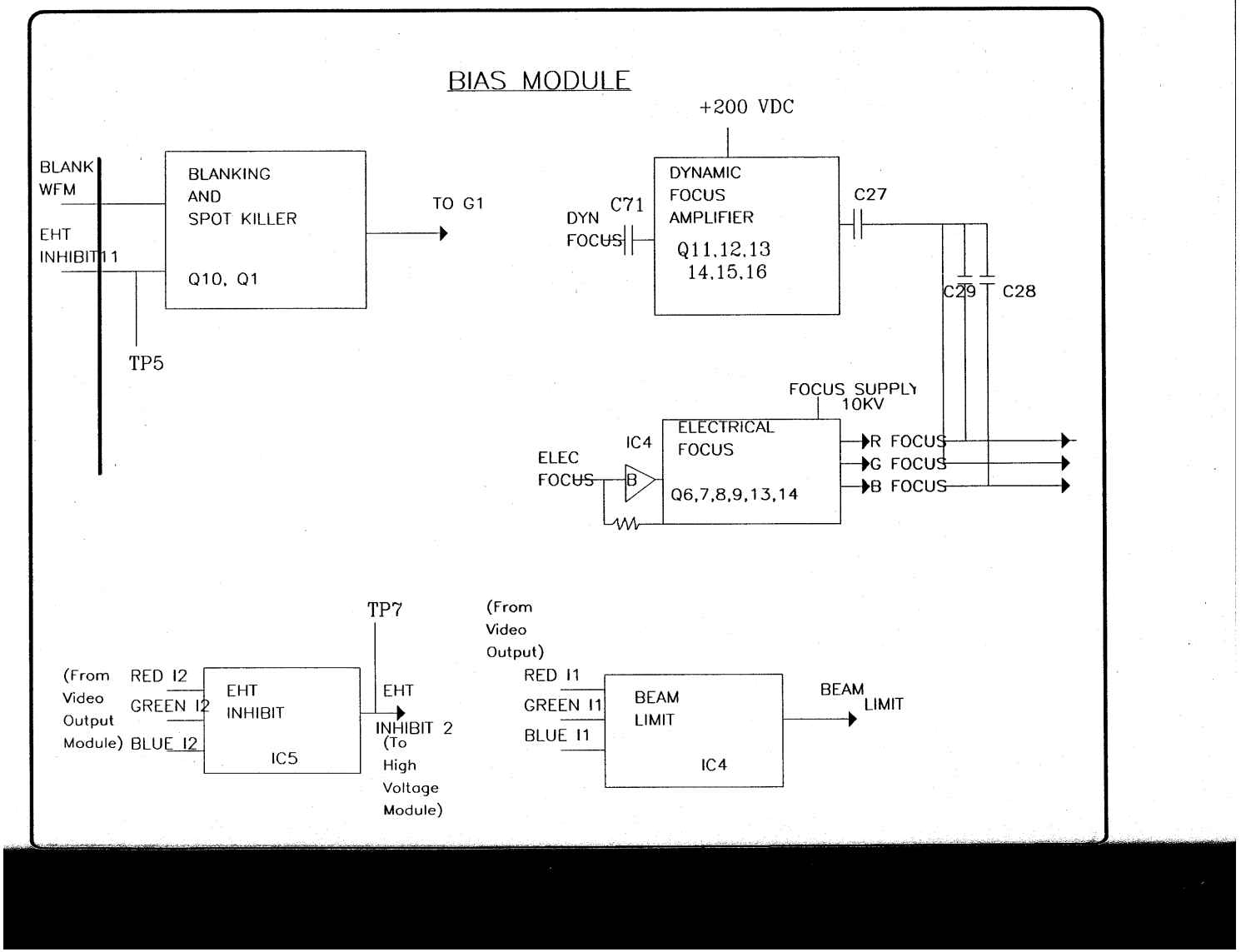
PS/2 VGA 922
The 922 PS/2 interface has two dip switches on the front panel, SW1 and SW2. SW1 is for video polarity and is rarely changed. SW2 is for phase adjustments. SW2-1, 2 and 5 have no effect as long as P4 is in he 2,3 (normal) position. This is how the module is shipped. When P4 is in the 1,2 position, horizontal phase adjustment is activated. Refer to Table 3-19b on pg. 3-19 for switch SW2-5 and SW2-2 settings. During modes 1,2 and 3 operation adjust R135. During mode 4 operation set SW2-1 down and adjust R136 for horizontal phase. For vertical phase adjustment, set P5 to 1,2 and adjust R134 for vertical centering.

SECTION IV

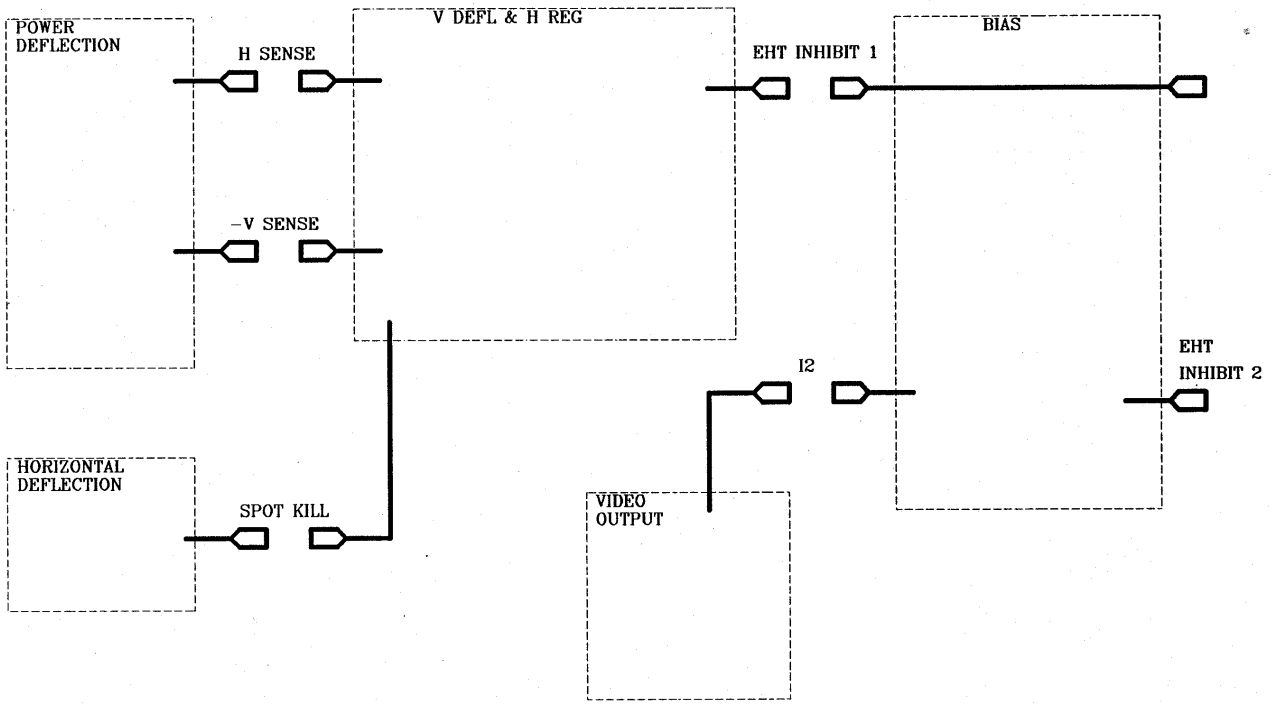
BLOCK DIAGRAMS

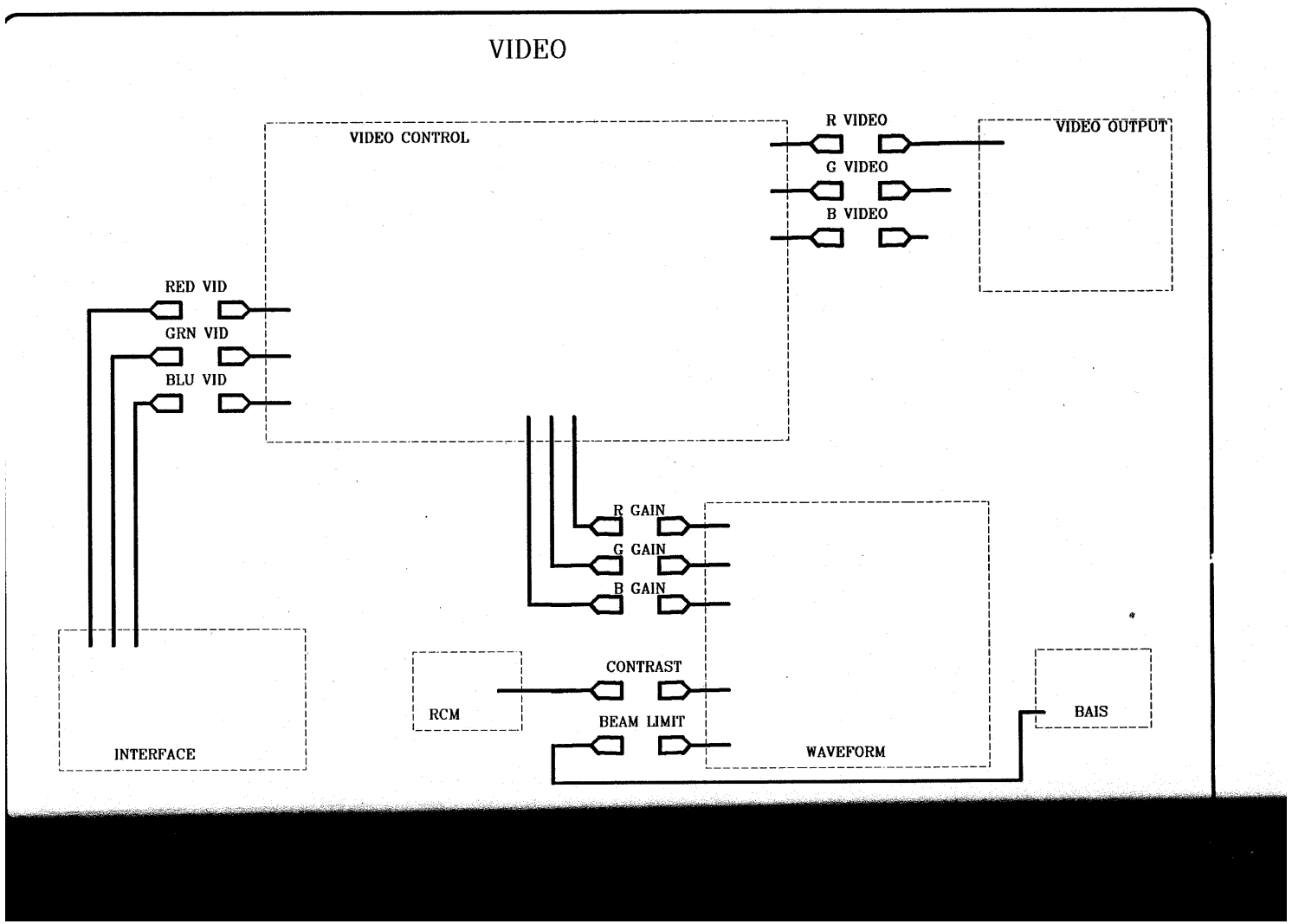
LIST OF BLOCK DIAGRAMS

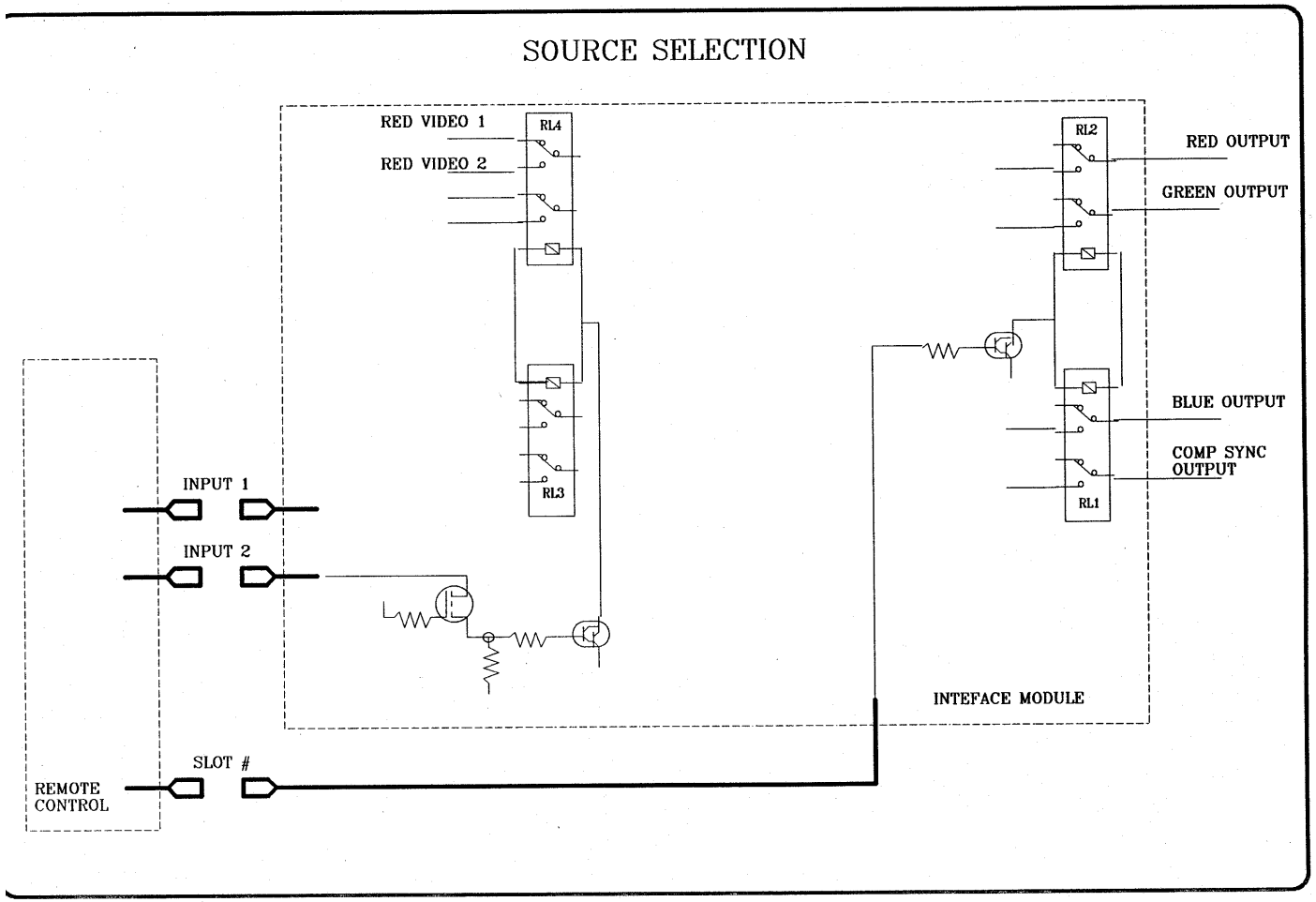

POWER SUPPLY
800 VDC
BIAS
MODULE
HIGH
VOLTAGE
SMPS
34 KV
EHT
INHIBIT 1
INHIBIT 2
FOCUS
10KV
PWR
RELAY
Remote
Contro
Module
PEM
Standby
supply
+5V STBY
+12V STBY
LOW
VOLTAGE
SMPS
-24VDC
+24VDC
+200VDC
+150VDC
+6.3VDC
-12VDC
+12VDC
+5VDC
AC
INPUT
AC SUPPLY

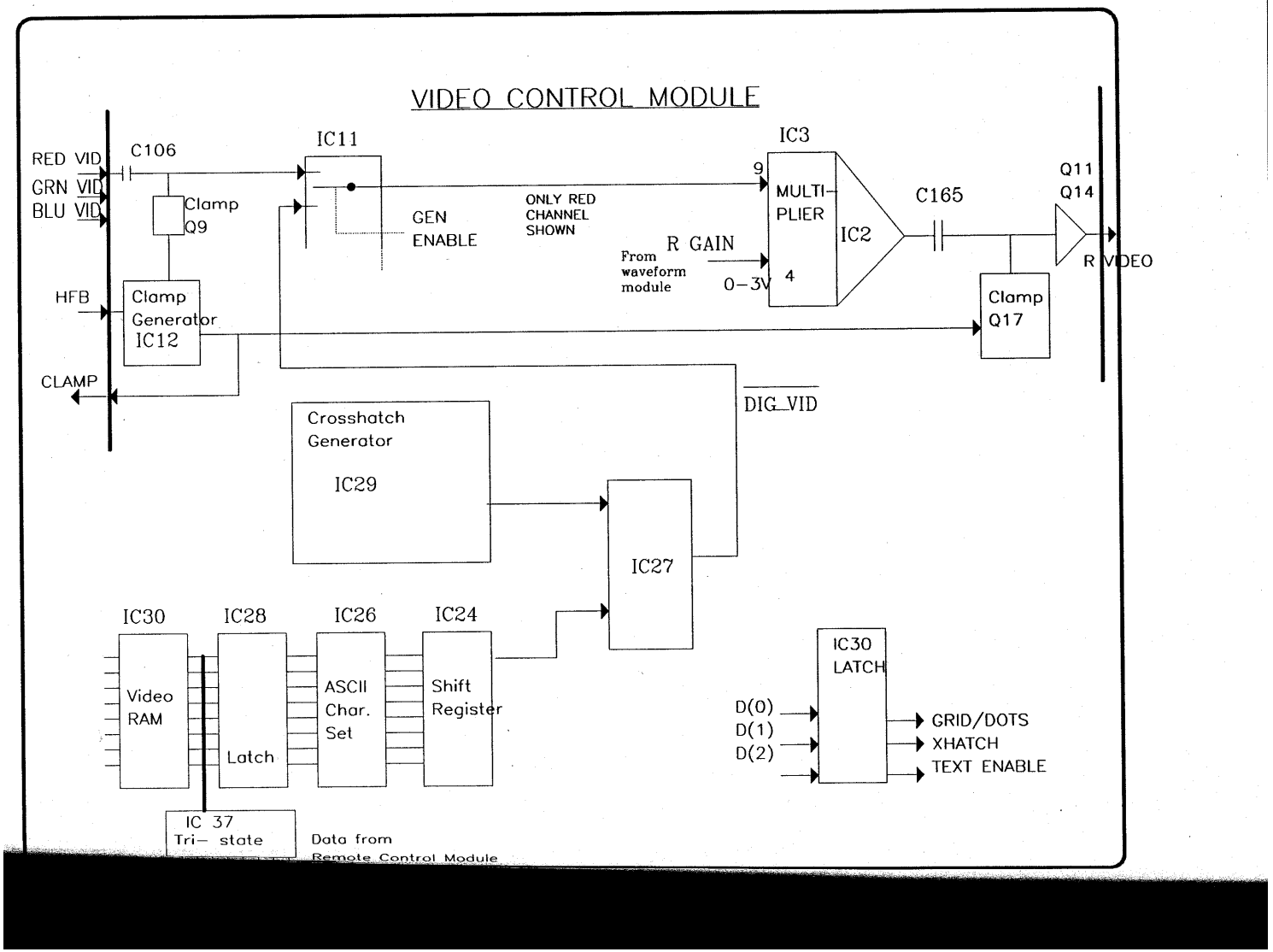

BIAS MODULE
+200 VDC
BLANK
WFM
EHT
INHIBIT 1
BLANKING
AND
SPOT KILLER
Q10, Q1
TO G1
TP5
DYN
FOCUS
C71
DYNAMIC
FOCUS
AMPLIFIER
Q11,12,13
14,15,16
C27
C29
C28
FOCUS SUPPLY
10KV
ELEC
FOCUS
IC4
ELECTRICAL
FOCUS
Q6,7,8,9,13,14
R FOCUS
G FOCUS
B FOCUS
TP7
(From
Video
Output
Module)
RED I2
GREEN I2
BLUE I2
EHT
INHIBIT
IC5
EHT
INHIBIT 2
(To
High
Voltage
Module)
(From
Video
Output)
RED I1
GREEN I1
BLUE I1
BEAM
LIMIT
IC4
BEAM
LIMIT

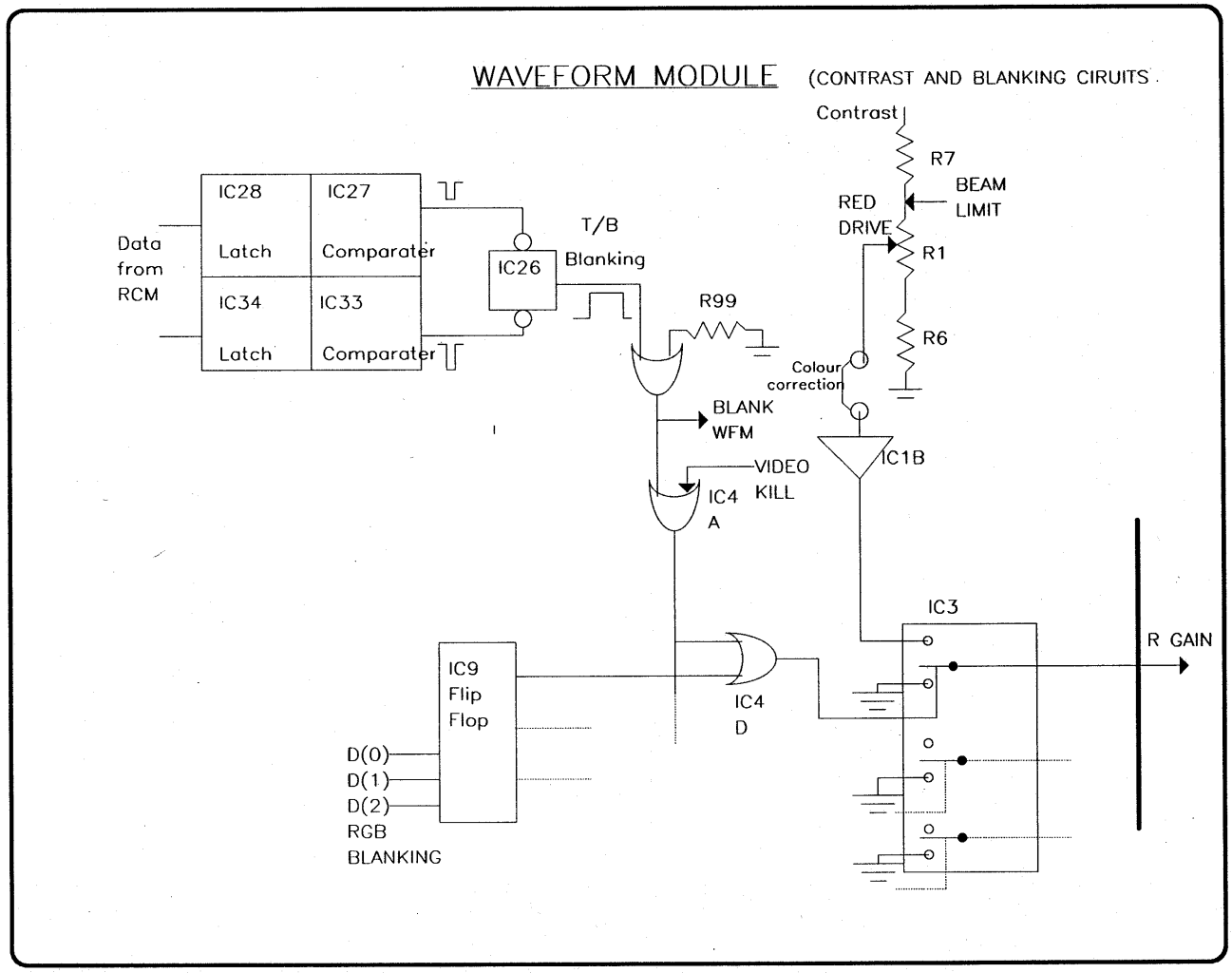
INHIBIT (shut–down) CIRCUIT

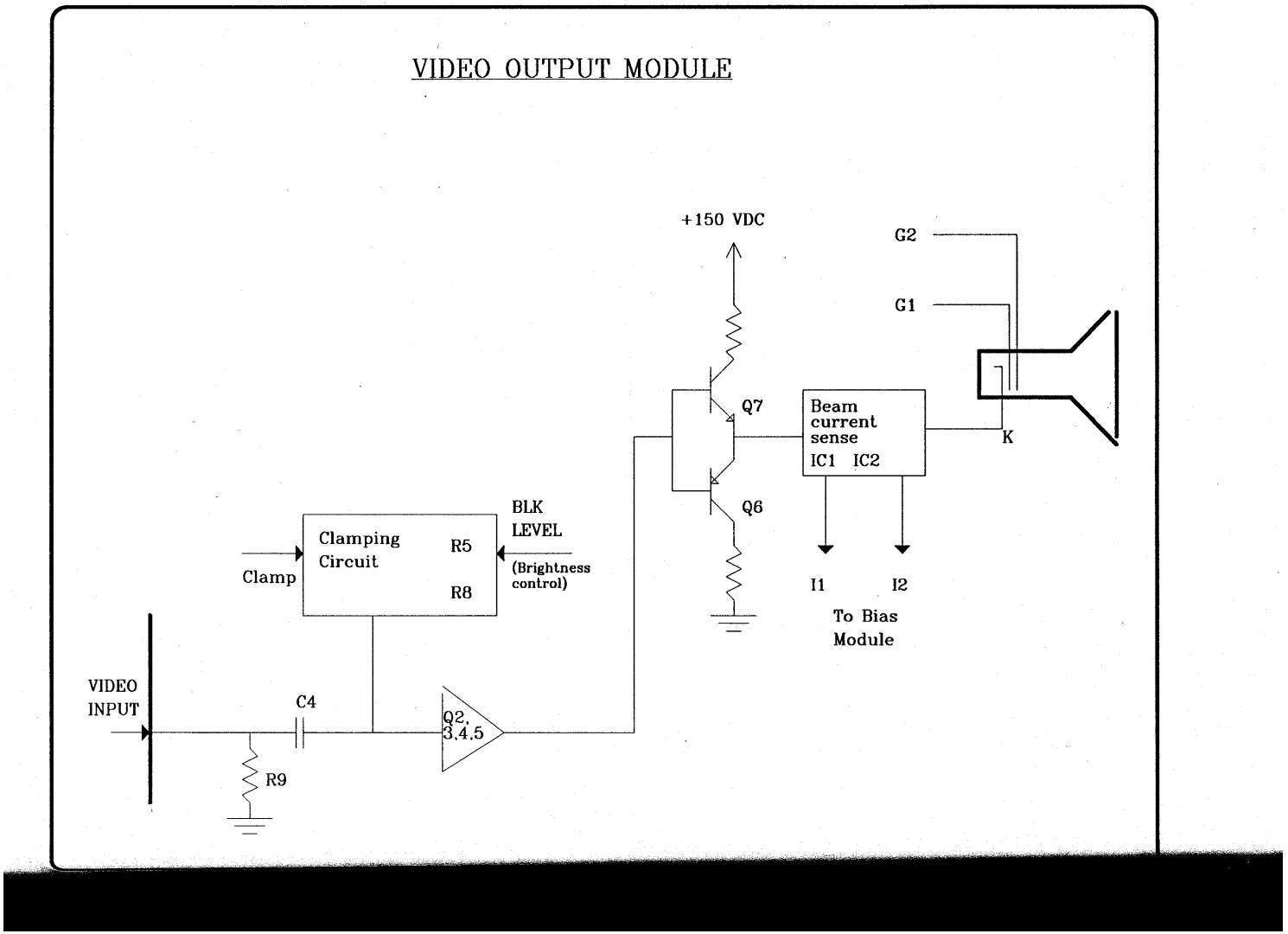



VIDEO
VIDEO CONTROL
R VIDEO
G VIDEO
B VIDEO
VIDEO OUTPUT
RED VID
GRN VID
BLU VID
R GAIN
G GAIN
B GAIN
CONTRAST
BEAM LIMIT
RCM
INTERFACE
WAVEFORM
BAIS

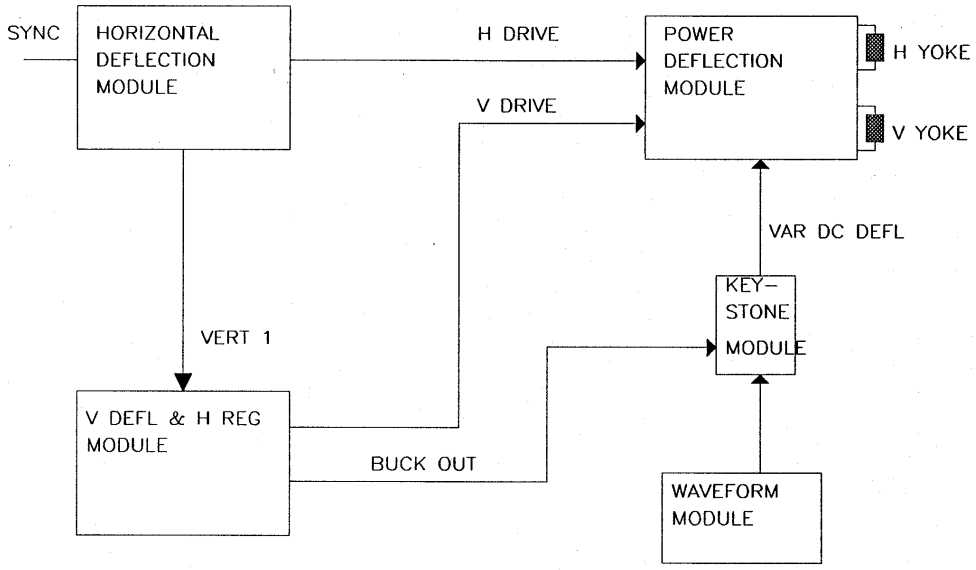

SOURCE SELECTION
RED VIDEO 1
RED VIDEO 2
RL4
RL3
RL2
RL1
RED OUTPUT
GREEN OUTPUT
BLUE OUTPUT
COMP SYNC OUTPUT
INPUT 1
INPUT 2
SLOT #
REMOTE CONTROL
INTEFACE MODULE

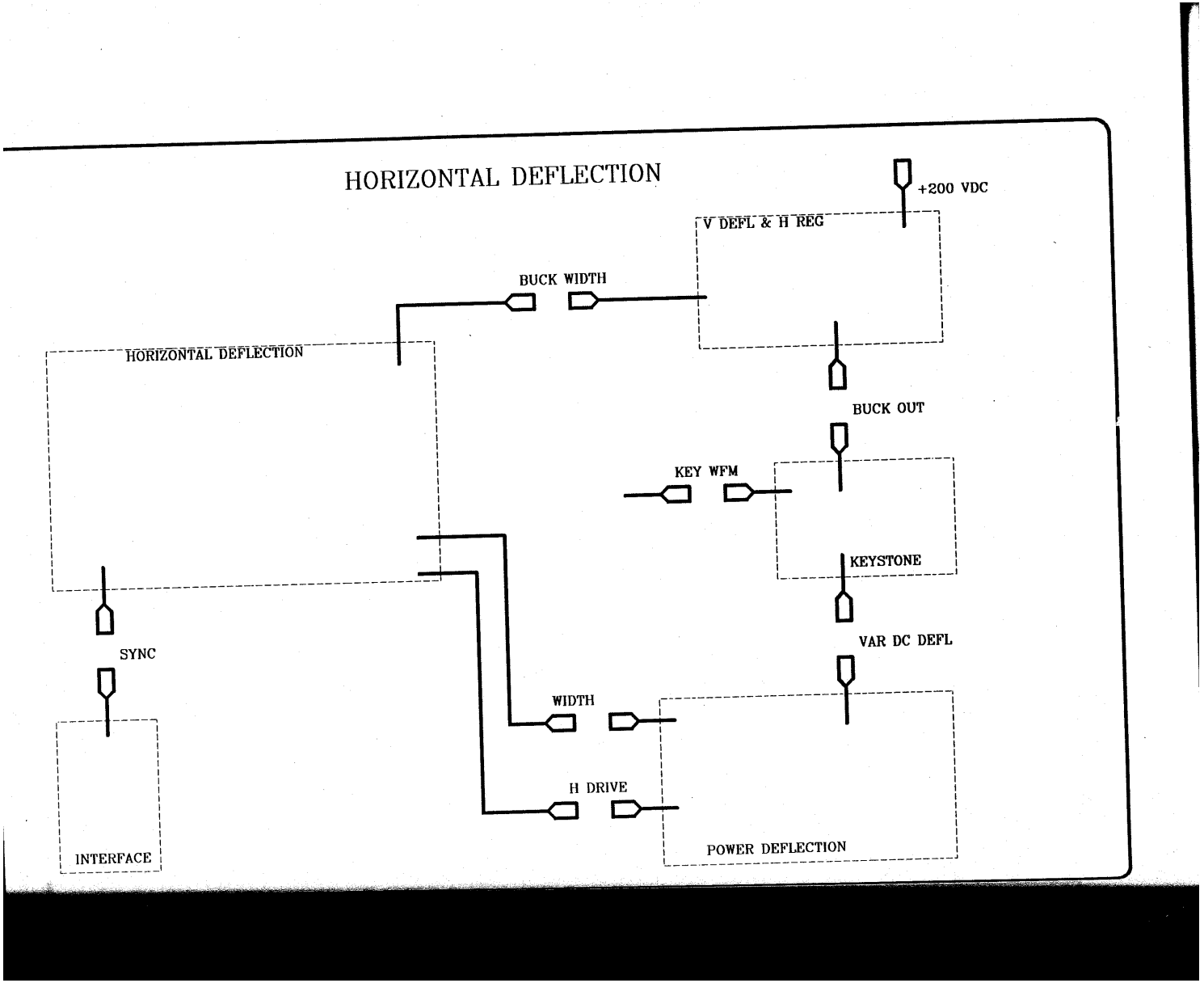

VIDEO CONTROL MODULE
RED VID
GRN VID
BLU VID
C106
Clamp
Q9
IC11
GEN
ENABLE
ONLY RED
CHANNEL
SHOWN
IC3
9
MULTI-
PLIER
IC2
C165
Q11
Q14
R VIDEO
R GAIN
From
waveform
module
0-3V
4
HFB
Clamp
Generator
IC12
Clamp
Q17
CLAMP
DIG_VID
Crosshatch
Generator
IC29
IC27
IC30
IC28
IC26
IC24
Video
RAM
Latch
ASCII
Char.
Set
Shift
Register
IC30
LATCH
D(0)
D(1)
D(2)
GRID/DOTS
XHATCH
TEXT ENABLE
IC 37
Tri- state
Data from
Remote Control Module

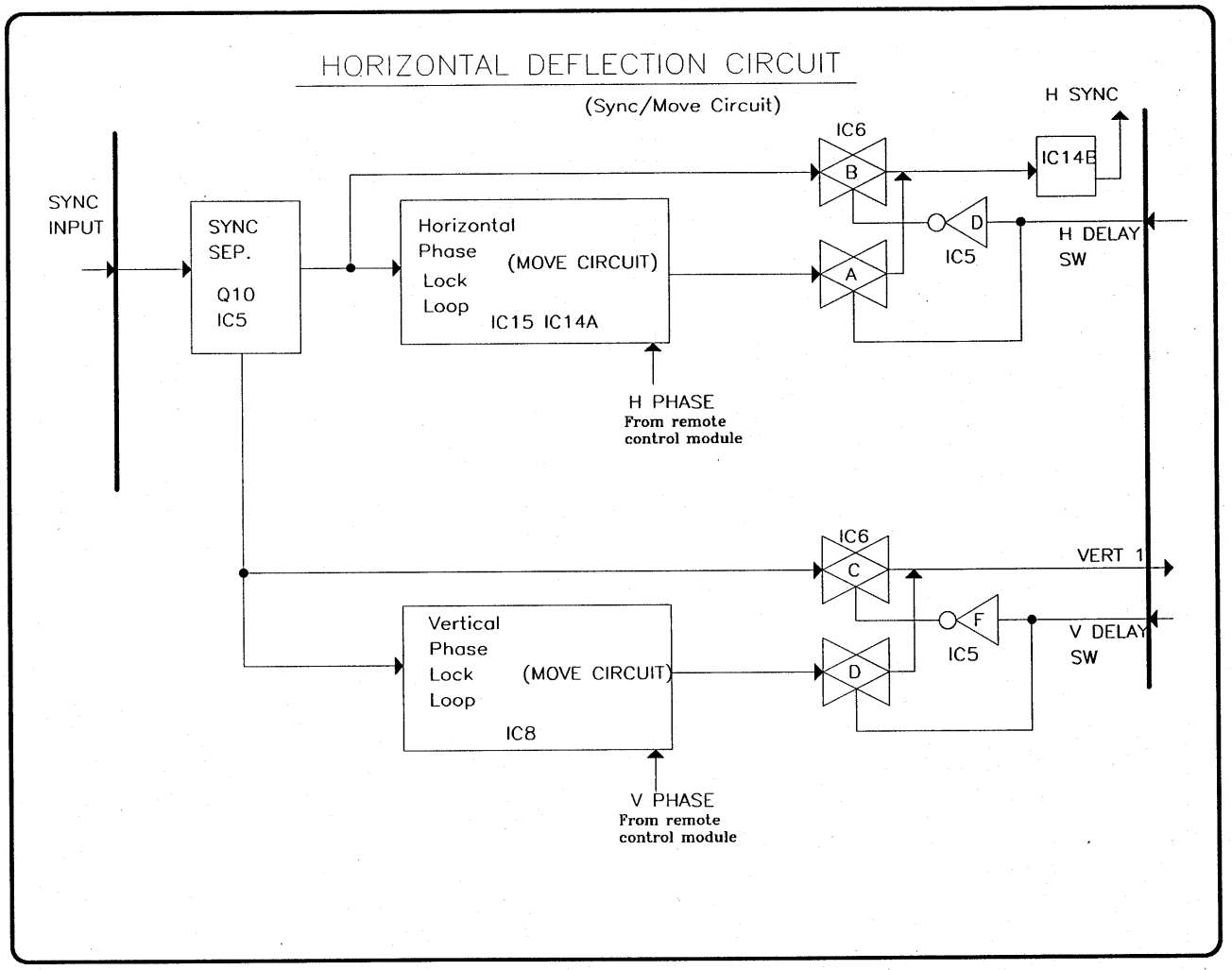

WAVEFORM MODULE (CONTRAST AND BLANKING CIRUITS
Contrast
R7
BEAM
LIMIT
RED
DRIVE
R1
R6
IC28
IC27
Data
from
RCM
Latch
Comparater
IC34
IC33
Latch
Comparater
IC26
T/B
Blanking
R99
Colour
correction
BLANK
WFM
VIDEO
KILL
IC4
A
IC1B
IC3
R GAIN
IC9
Flip
Flop
IC4
D
D(0)
D(1)
D(2)
RGB
BLANKING

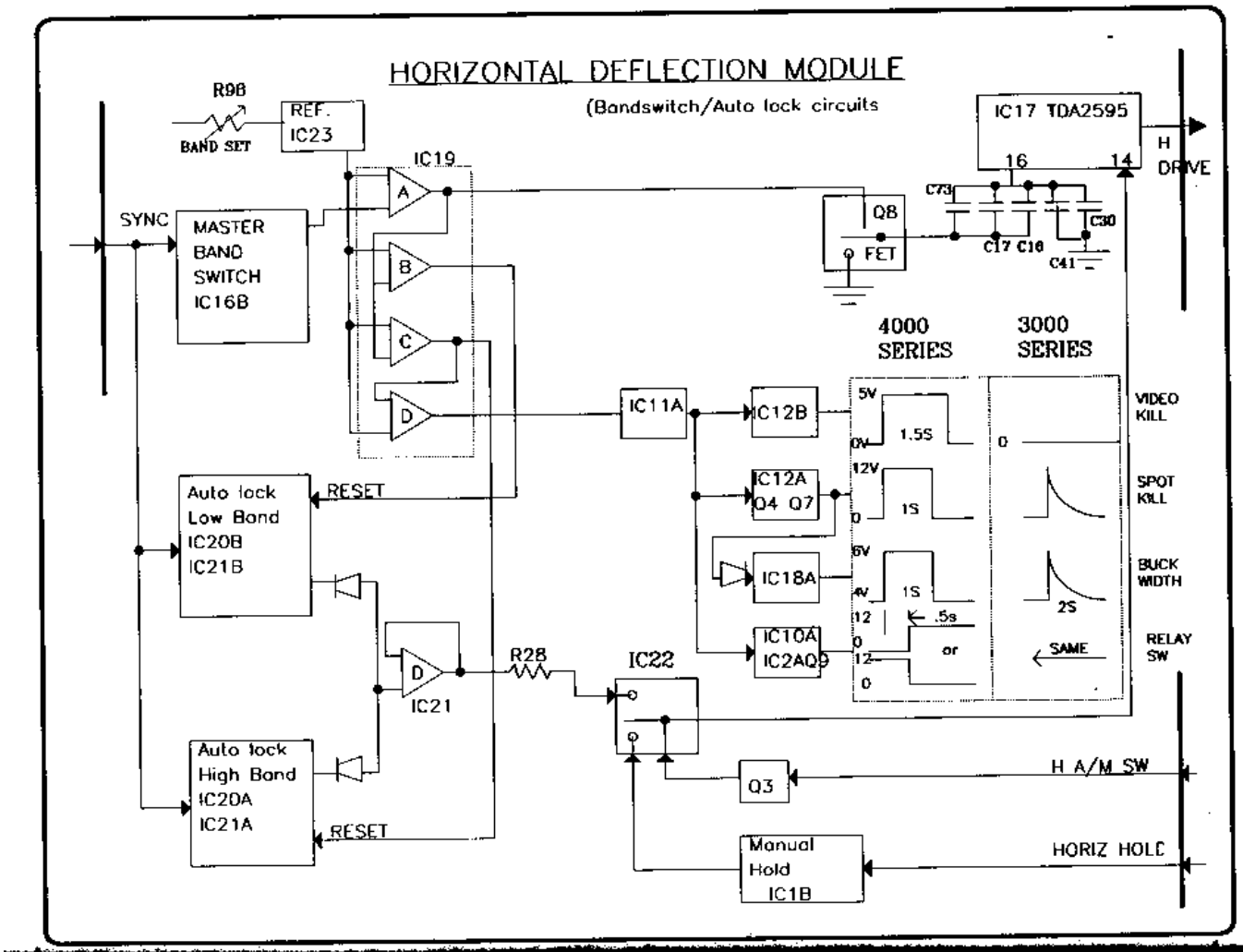

VIDEO OUTPUT MODULE
+150 VDC
G2
G1
Q7
Beam
current
sense
IC1 IC2
K
Q6
BLK
LEVEL
Clamping
Circuit
R5
R8
(Brightness
control)
Clamp
I1
I2
To Bias
Module
VIDEO
INPUT
C4
Q2,
3,4,5
R9

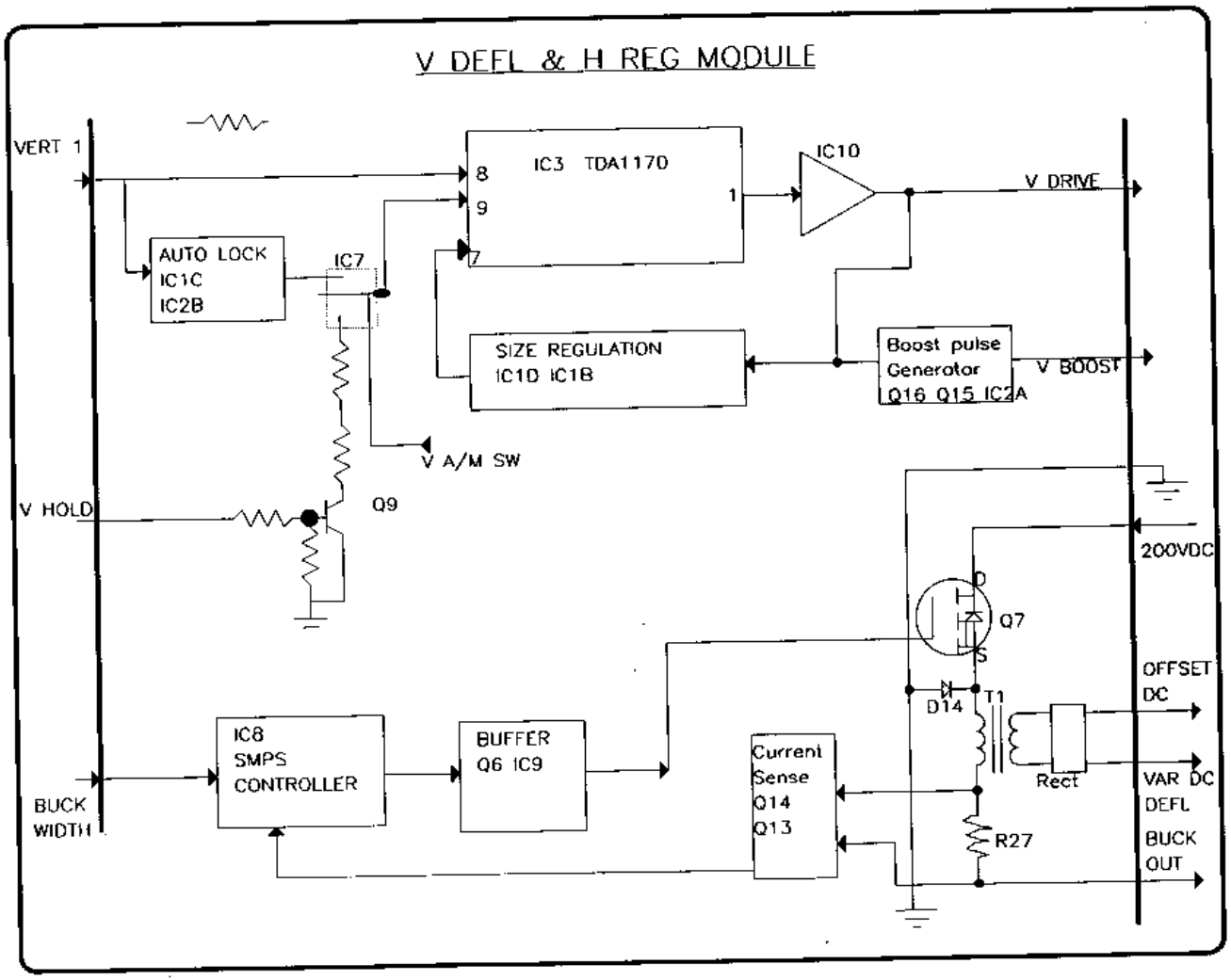
DEFLECTION

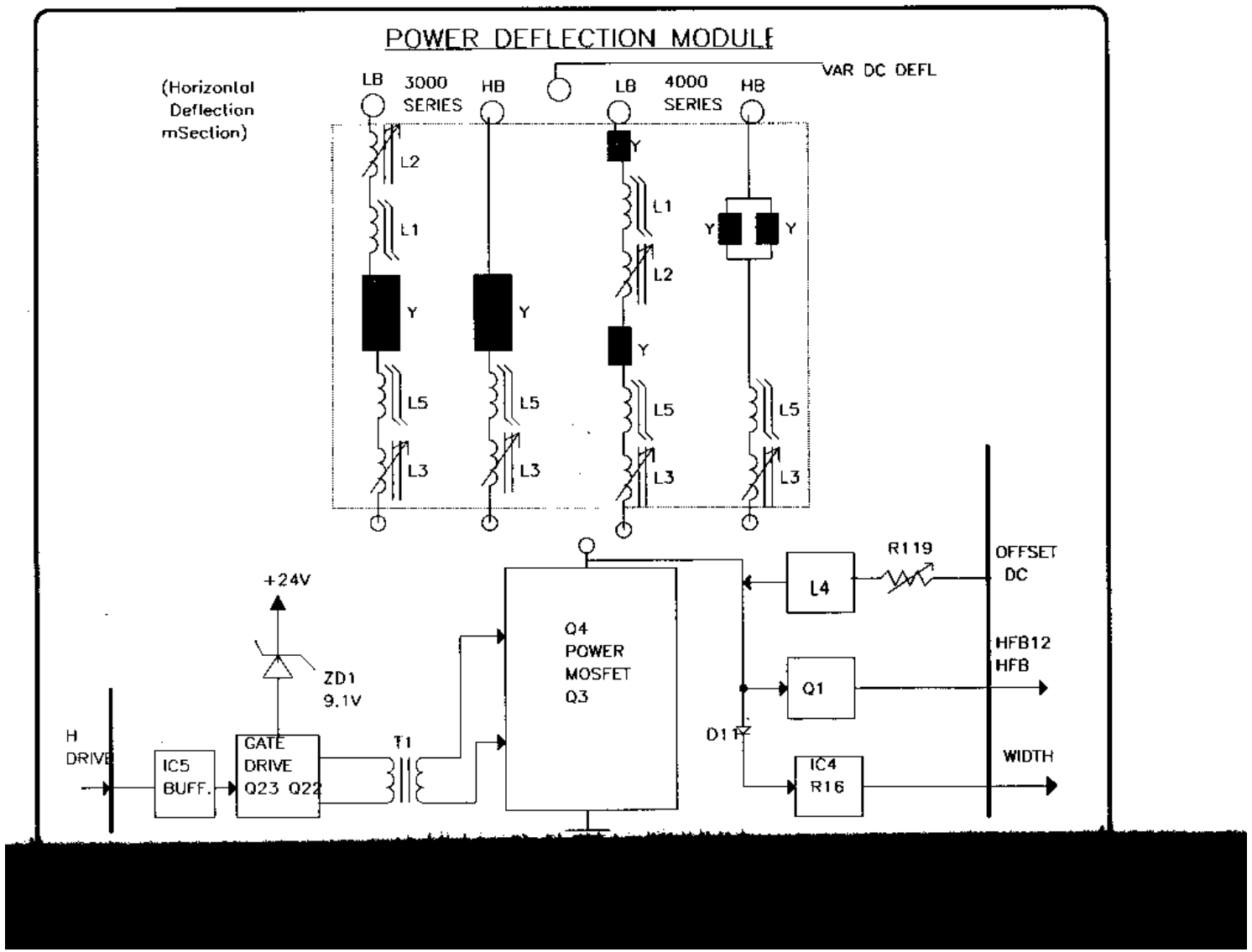

SYNC
HORIZONTAL DEFLECTION MODULE
H DRIVE
V DRIVE
POWER DEFLECTION MODULE
H YOKE
V YOKE
VAR DC DEFL
KEY-STONE MODULE
VERT 1
V DEFL & H REG MODULE
BUCK OUT
WAVEFORM MODULE

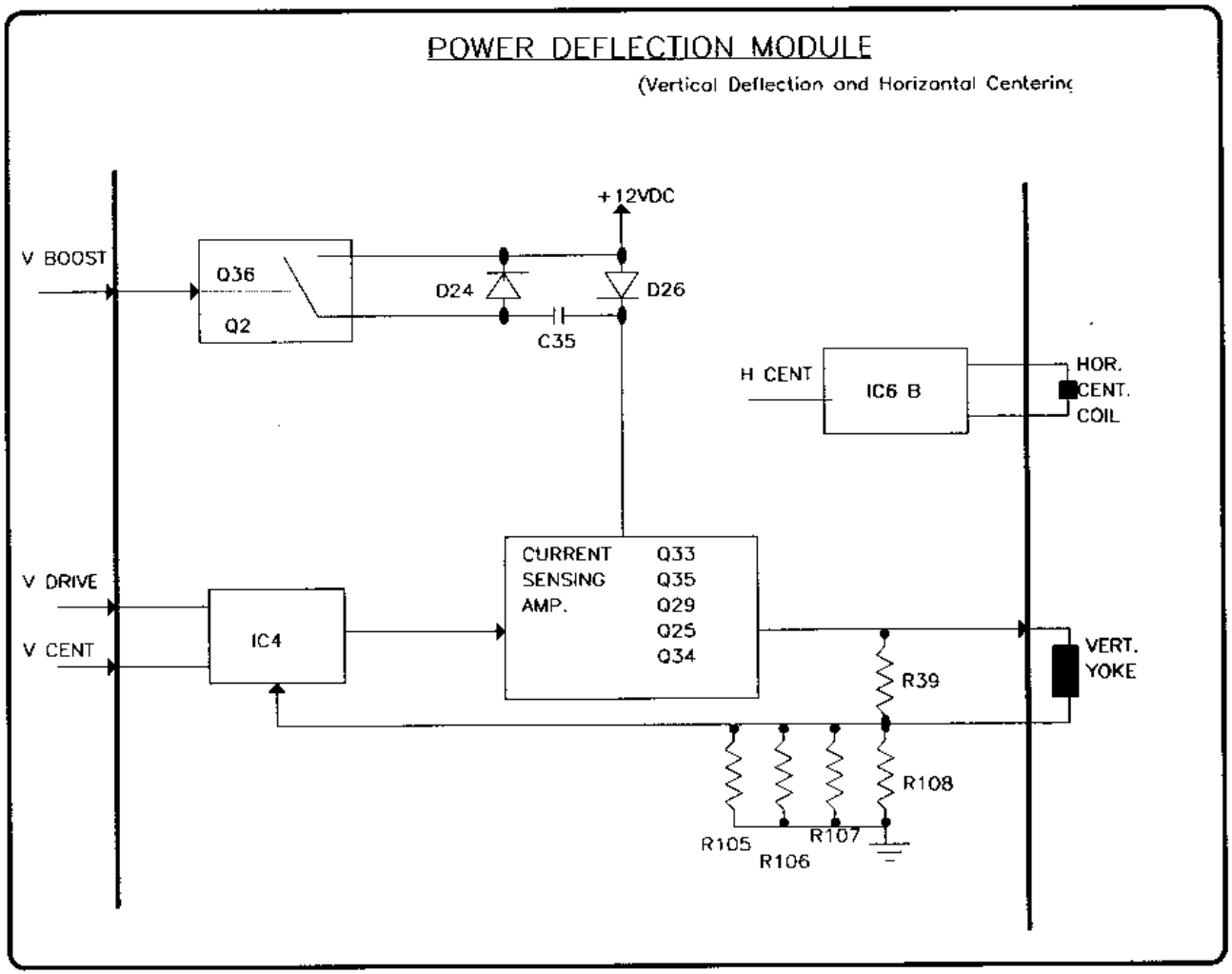

HORIZONTAL DEFLECTION
+200 VDC
V DEFL & H REG
BUCK WIDTH
HORIZONTAL DEFLECTION
BUCK OUT
KEY WFM
KEYSTONE
SYNC
VAR DC DEFL
WIDTH
H DRIVE
INTERFACE
POWER DEFLECTION

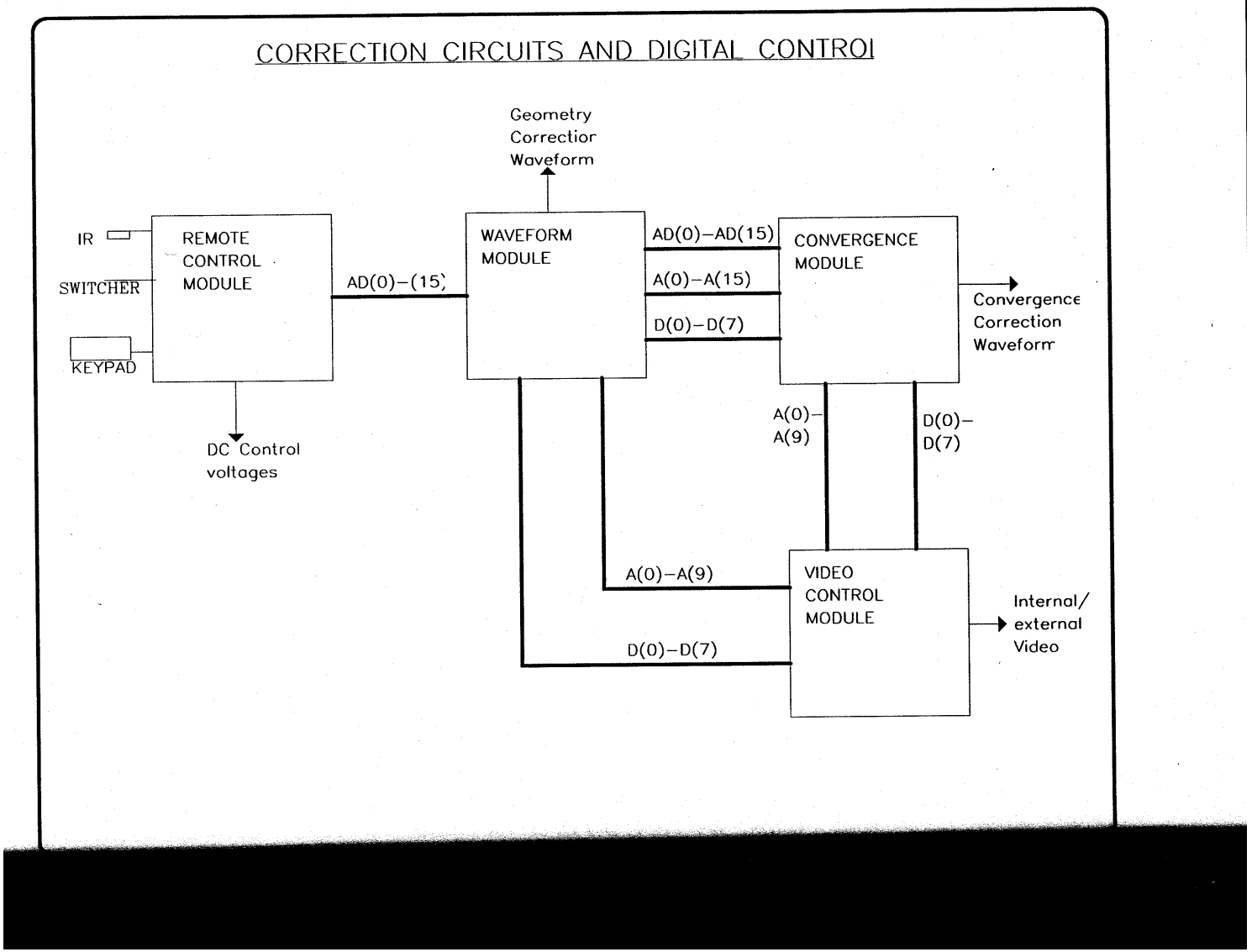

HORIZONTAL DEFLECTION CIRCUIT
(Sync/Move Circuit)
H SYNC
IC6
B
IC14B
SYNC
INPUT
SYNC
SEP.
Q10
IC5
Horizontal
Phase
Lock
Loop
(MOVE CIRCUIT)
IC15 IC14A
D
IC5
H DELAY
SW
A
H PHASE
From remote
control module
IC6
C
VERT 1
F
IC5
V DELAY
SW
Vertical
Phase
Lock
Loop
(MOVE CIRCUIT)
IC8
D
V PHASE
From remote
control module

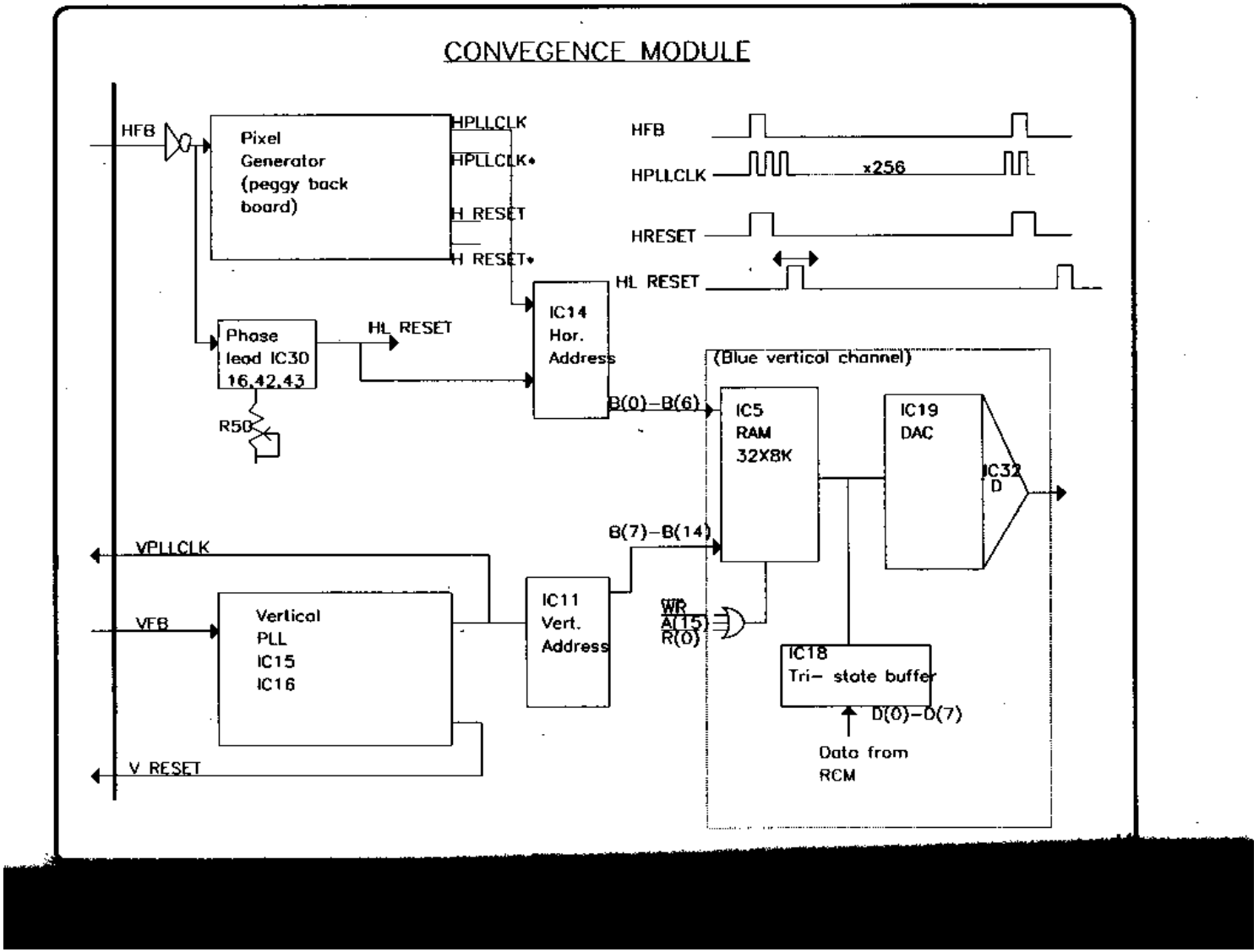

HORIZONTAL DEFLECTION MODULE
(Bandswitch/Auto lock circuits
R98
BAND SET
REF.
IC23
IC19
A
B
C
D
SYNC
MASTER
BAND
SWITCH
IC16B
IC17 TDA2595
16
14
H
DRIVE
C73
C30
C17 C16
C41
Q8
FET
4000
SERIES
3000
SERIES
IC11A
IC12B
5V
0V
1.5S
0
VIDEO
KILL
IC12A
Q4 Q7
12V
0
1S
SPOT
KILL
IC18A
6V
4V
1S
2S
BUCK
WIDTH
IC10A
IC2AQ9
12
0
.5s
or
SAME
RELAY
SW
Auto lock
Low Band
IC20B
IC21B
RESET
Auto lock
High Band
IC20A
IC21A
RESET
IC21
R28
IC22
Q3
H A/M SW
Manual
Hold
IC1B
HORIZ HOLD

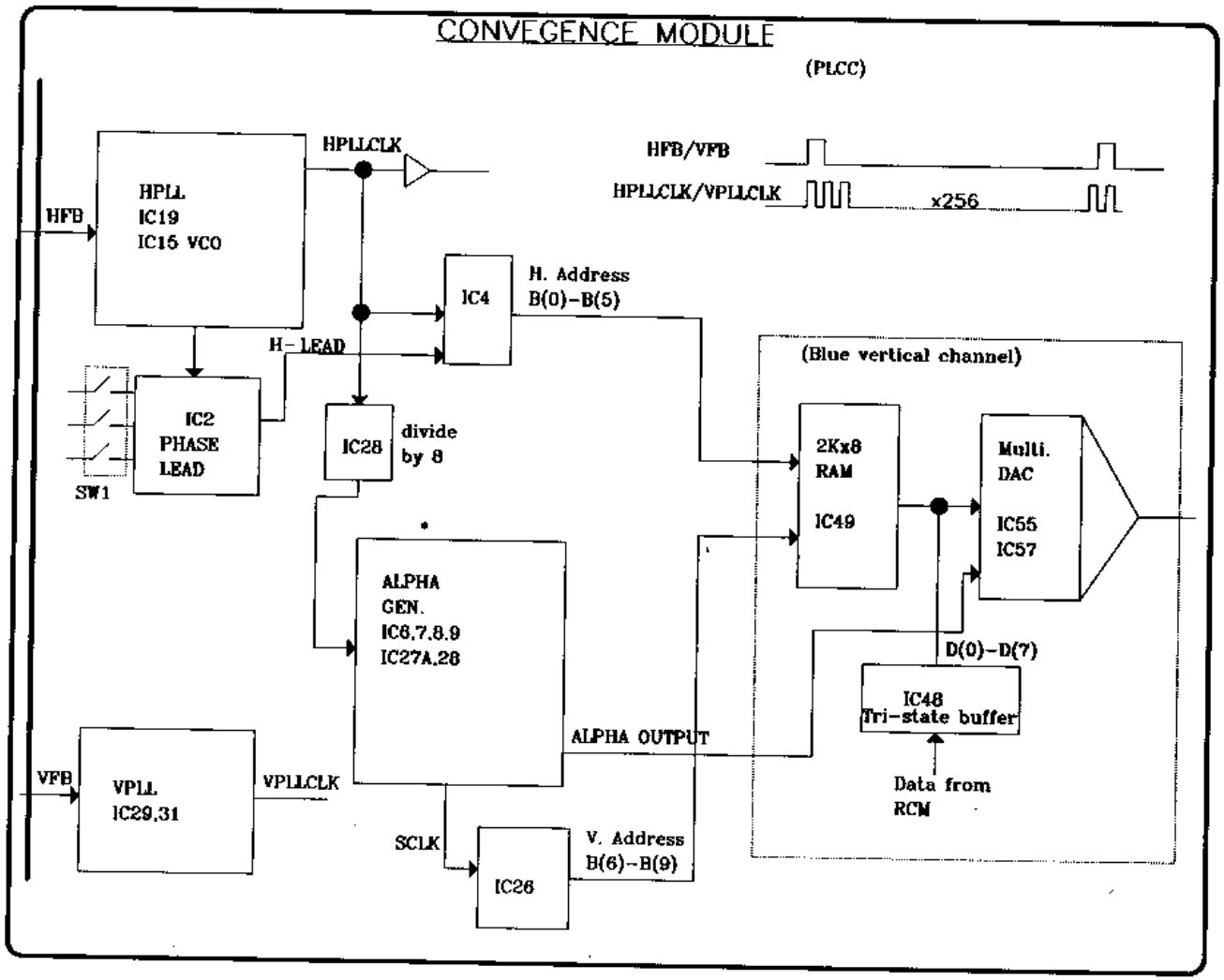

V DEFL & H REG MODULE
VERT 1
IC3 TDA1170
8
9
7
1
IC10
V DRIVE
AUTO LOCK
IC1C
IC2B
IC7
SIZE REGULATION
IC1D IC1B
Boost pulse
Generator
Q16 Q15 IC2A
V BOOST
V A/M SW
V HOLD
Q9
200VDC
D
Q7
S
OFFSET
DC
D14
T1
Rect
IC8
SMPS
CONTROLLER
BUFFER
Q6 IC9
Current
Sense
Q14
Q13
R27
VAR DC
DEFL
BUCK
OUT
BUCK
WIDTH

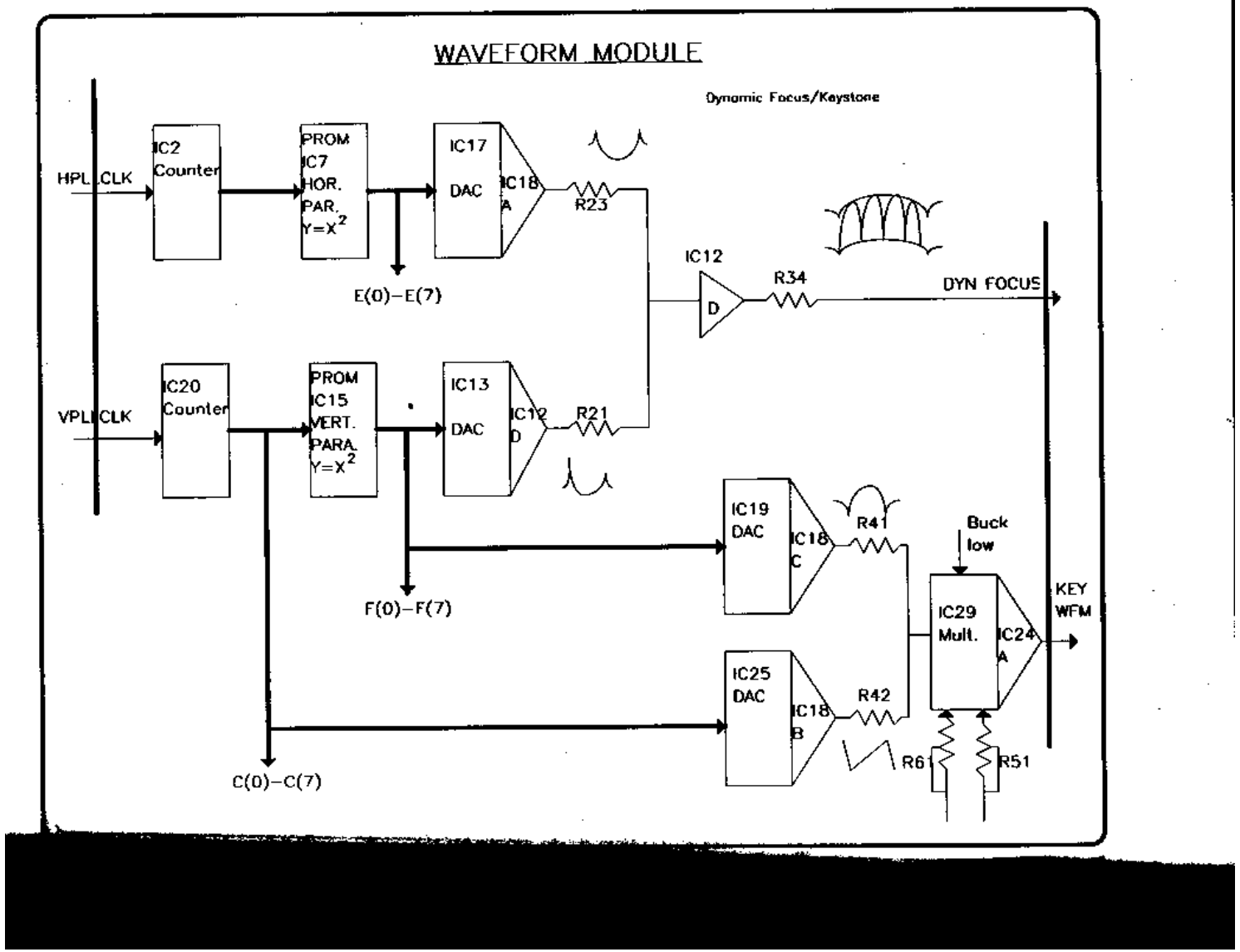

POWER DEFLECTION MODULE
(Horizontal Deflection mSection)
LB
3000 SERIES
HB
LB
4000 SERIES
HB
VAR DC DEFL
L2
L1
Y
L5
L3
L1
L2
L5
L3
+24V
ZD1
9.1V
H DRIVE
IC5 BUFF.
GATE DRIVE Q23 Q22
T1
Q4 POWER MOSFET Q3
L4
R119
OFFSET DC
Q1
HFB12 HFB
D11
IC4 R16
WIDTH

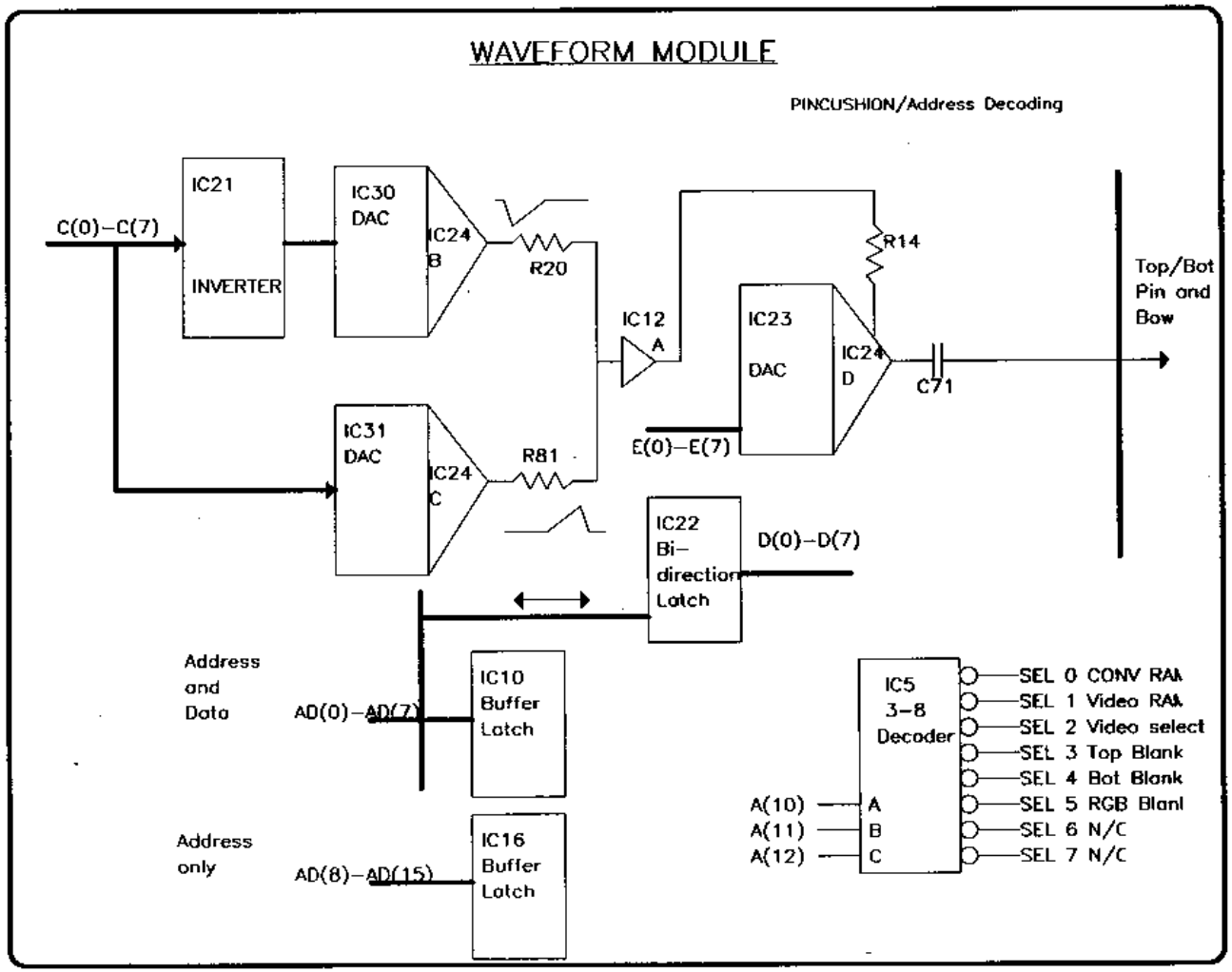

POWER DEFLECTION MODULE
(Vertical Deflection and Horizontal Centering
+12VDC
V BOOST
Q36
Q2
D24
D26
C35
H CENT
IC6 B
HOR.
CENT.
COIL
V DRIVE
V CENT
IC4
CURRENT
SENSING
AMP.
Q33
Q35
Q29
Q25
Q34
R39
VERT.
YOKE
R108
R105
R107
R106

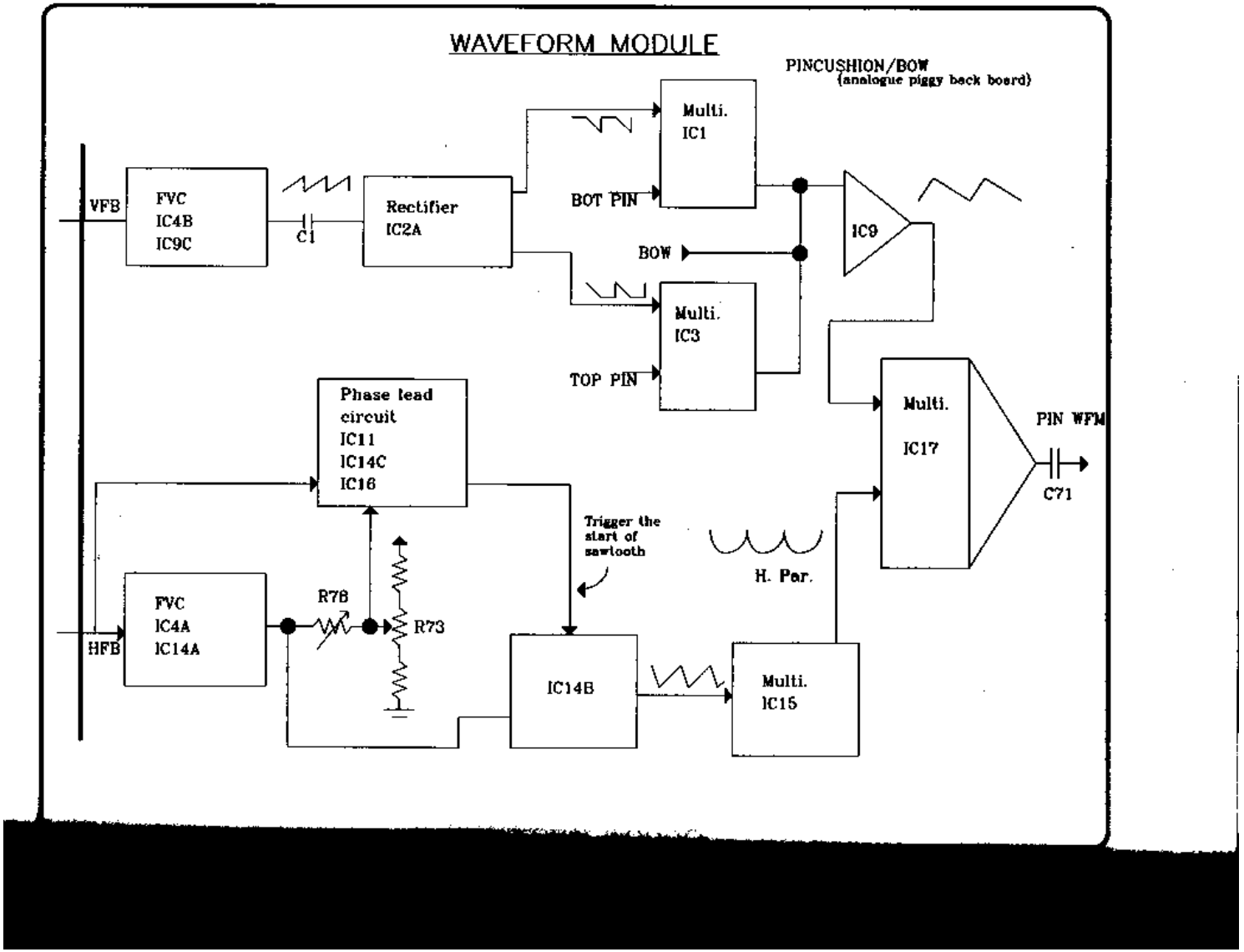

CORRECTION CIRCUITS AND DIGITAL CONTROl
Geometry
Correctior
Waveform
IR
SWITCHER
KEYPAD
REMOTE
CONTROL
MODULE
AD(0)–(15)
WAVEFORM
MODULE
AD(0)–AD(15)
A(0)–A(15)
D(0)–D(7)
CONVERGENCE
MODULE
Convergence
Correction
Waveform
DC Control
voltages
A(0)–
A(9)
D(0)–
D(7)
A(0)–A(9)
D(0)–D(7)
VIDEO
CONTROL
MODULE
Internal/
external
Video

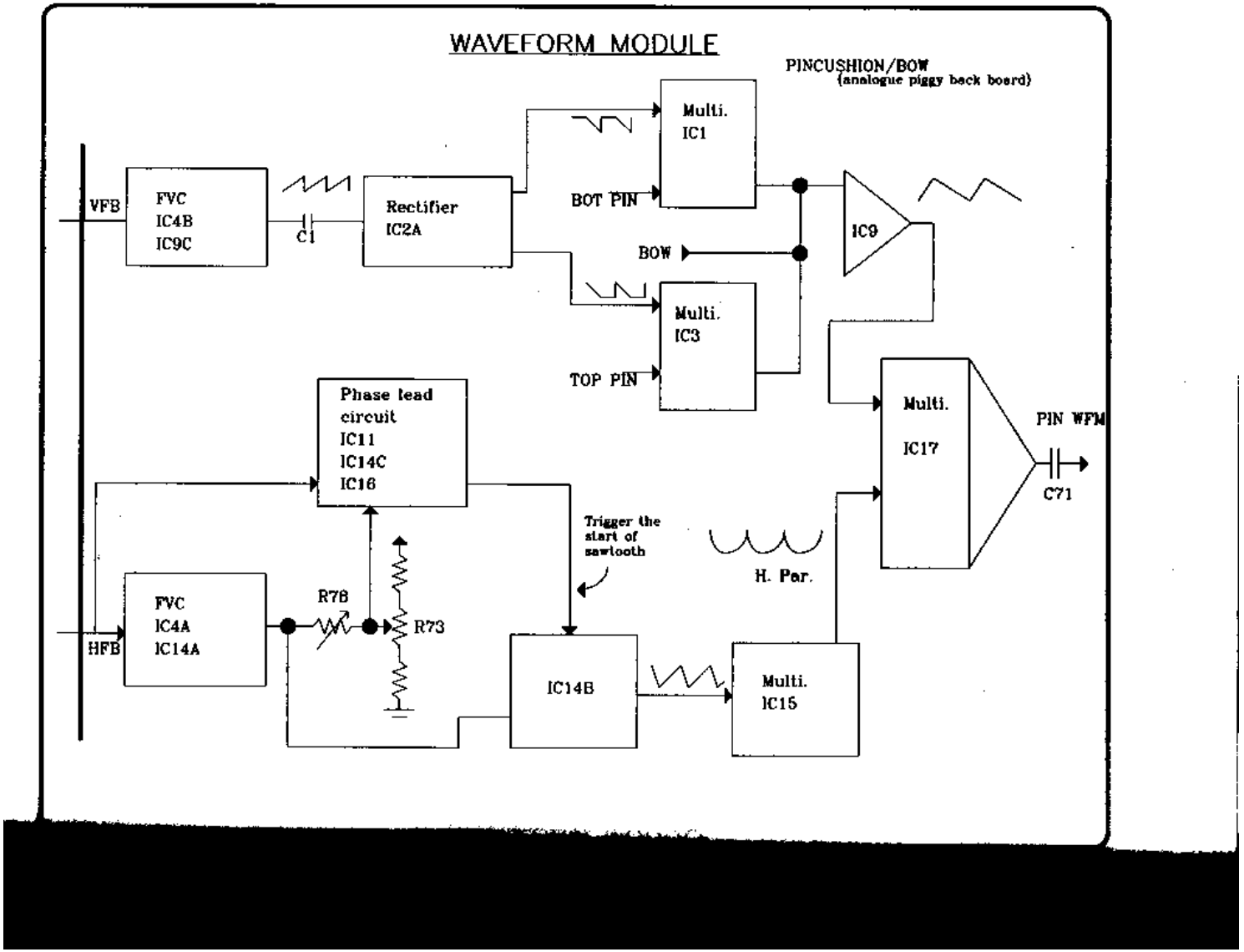

CONVEGENCE MODULE
HFB
Pixel
Generator
(peggy back
board)
HPLLCLK
HPLLCLK*
H RESET
H RESET*
HFB
HPLLCLK
x256
HRESET
HL RESET
IC14
Hor.
Address
Phase
lead IC30
16,42,43
HL RESET
R50
(Blue vertical channel)
B(0)-B(6)
IC5
RAM
32X8K
IC19
DAC
IC32
D
B(7)-B(14)
VPLLCLK
VFB
Vertical
PLL
IC15
IC16
IC11
Vert.
Address
WR
A(15)
R(0)
IC18
Tri- state buffer
D(0)-D(7)
Data from
RCM
V RESET


CONVEGENCE MODULE
(PLCC)
HFB/VFB
HPLLCLK/VPLLCLK
x256
HFB
HPLL
IC19
IC15 VCO
HPLLCLK
IC4
H. Address
B(0)-B(5)
H- LEAD
(Blue vertical channel)
IC2
PHASE
LEAD
SW1
IC28
divide
by 8
2Kx8
RAM
IC49
Multi.
DAC
IC55
IC57
ALPHA
GEN.
IC6,7,8,9
IC27A,28
D(0)-D(7)
IC48
Tri-state buffer
ALPHA OUTPUT
Data from
RCM
VFB
VPLL
IC29,31
VPLLCLK
SCLK
IC26
V. Address
B(6)-B(9)


WAVEFORM MODULE
Dynamic Focus/Keystone
HPL CLK
IC2 Counter
PROM IC7 HOR. PAR. Y=X2
IC17 DAC
IC18 A
R23
E(0)–E(7)
IC12 D
R34
DYN FOCUS
VPL CLK
IC20 Counter
PROM IC15 VERT. PARA. Y=X2
IC13 DAC
IC12 D
R21
F(0)–F(7)
IC19 DAC
IC18 C
R41
Buck low
IC29 Mult.
IC24 A
KEY WFM
IC25 DAC
IC18 B
R42
R6
R51
C(0)–C(7)


WAVEFORM MODULE
PINCUSHION/Address Decoding
C(0)–C(7)
IC21
INVERTER
IC30
DAC
IC24
B
R20
IC12
A
R14
IC23
DAC
IC24
D
C71
Top/Bot
Pin and
Bow
E(0)–E(7)
IC31
DAC
IC24
C
R81
IC22
Bi–
direction
Latch
D(0)–D(7)
Address
and
Data
AD(0)–AD(7)
IC10
Buffer
Latch
Address
only
AD(8)–AD(15)
IC16
Buffer
Latch
IC5
3–8
Decoder
A(10)
A(11)
A(12)
A
B
C
SEL 0 CONV RAM
SEL 1 Video RAM
SEL 2 Video select
SEL 3 Top Blank
SEL 4 Bot Blank
SEL 5 RGB Blanl
SEL 6 N/C
SEL 7 N/C

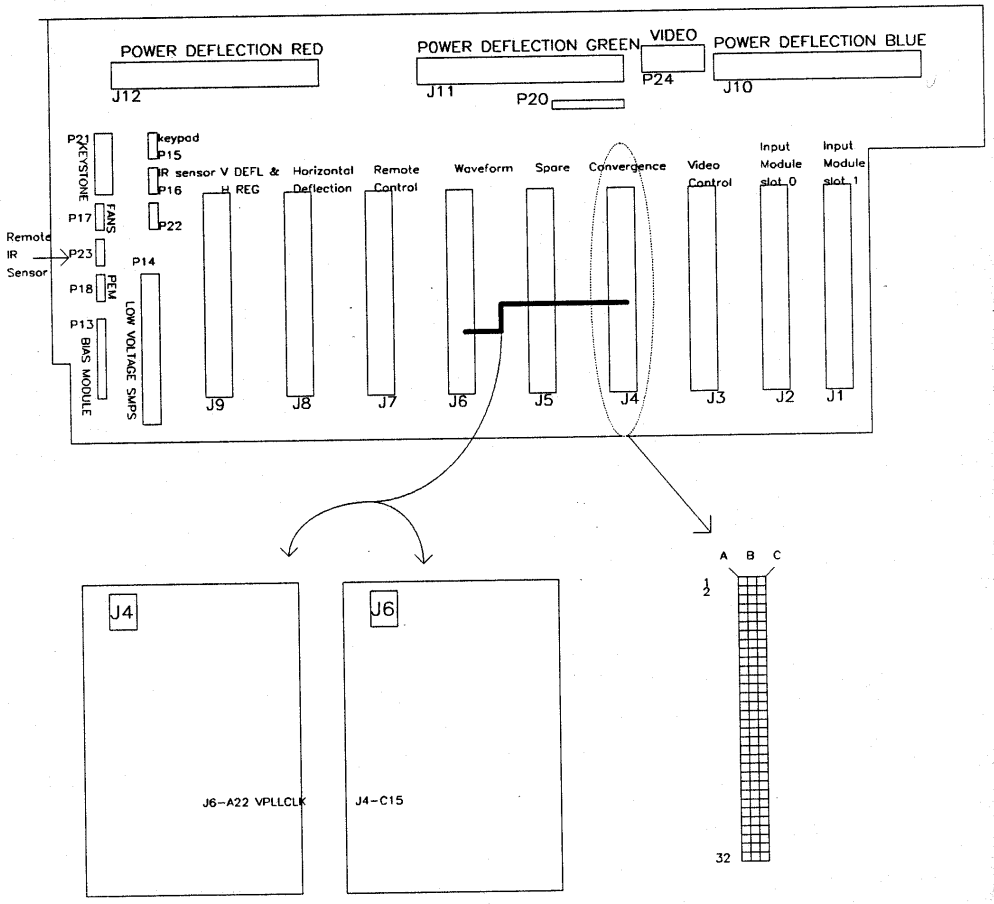

WAVEFORM MODULE
PINCUSHION/BOW
(analogue piggy back board)
Multi.
IC1
VFB
FVC
IC4B
IC9C
C1
Rectifier
IC2A
BOT PIN
BOW
IC9
Multi.
IC3
TOP PIN
Phase lead
circuit
IC11
IC14C
IC16
Multi.
IC17
PIN WFM
C71
Trigger the
start of
sawtooth
H. Par.
FVC
IC4A
IC14A
HFB
R78
R73
IC14B
Multi.
IC15


WAVEFORM MODULE
PINCUSHION/BOW
(analogue piggy back board)
Multi.
IC1
VFB
FVC
IC4B
IC9C
C1
Rectifier
IC2A
BOT PIN
BOW
IC9
Multi.
IC3
TOP PIN
Phase lead
circuit
IC11
IC14C
IC16
Multi.
IC17
PIN WFM
C71
Trigger the
start of
sawtooth
H. Par.
FVC
IC4A
IC14A
HFB
R78
R73
IC14B
Multi.
IC15

SECTION V

MIC LIST

The following is a complete listing of the connections existing on the motherboard. The illustration below shows an example of how the signal VPLLCLK is connected on the motherboard and where to find it on the MIC List.



Mother board Internal Connection LIST

PLUG J1 — **INTERFACE SLOT 1** —

(* signals indicates that it originates from this module)

PIN	ROW A		ROW B	ROW C	PIN
1	P14 GROUND	GND		CONNECTED TO A	1
2	J2-A2, J3-C4	*RED VID		CONNECTED TO A	2
3	P14 GROUND	GND		CONNECTED TO A	3
4	J2-A4, J3-C6	*GRN VID		CONNECTED TO A	4
5	P14 GROUND	GND		CONNECTED TO A	5
6	J2-A6, J3-C8	*BLU VID		CONNECTED TO A	6
7	P14 GROUND	GND		CONNECTED TO A	7
8	J2-A8, J8-C8	*SYNC		CONNECTED TO A	8
9	P14 GROUND	GND		CONNECTED TO A	9
10	J7-C10	SLOT 1		LED 1	10
11					11
12	J2-A12, J7-C1	COLOR		CONNECTED TO A	12
13	J2-A13, J7-C2	TINT		CONNECTED TO A	13
14	J2-A14, J7-C3	DETAIL		CONNECTED TO A	14
15	J2-A15, J7-C26	VOLUME		CONNECTED TO A	15
16	J2-A16, J7-C15	A MUTE		CONNECTED TO A	16
17	J2-A17, J7-C17	MSDEC		CONNECTED TO A	17
18	P18-2	+5V STBY		CONNECTED TO A	18
19	J2-A19, J7-C11	INPUT I		CONNECTED TO A	19
20	J2-A20, J7-C12	INPUT II		CONNECTED TO A	20
21	J2-A21, J7-C13	INPUT III		CONNECTED TO A	21
22	J2-A22, J7-C14	INPUT IV		CONNECTED TO A	22
23					23
24	J2-A24, J7-A20	COMM A		CONNECTED TO A	24
25	J2-A25, J7-A21	COMM B		CONNECTED TO A	25
26					26
27	P14-8	-12 VDC		CONNECTED TO A	27
28	P14-9	+12 VDC		CONNECTED TO A	28
29	P14-10,11,12	+5 VDC		CONNECTED TO A	29
30				CONNECTED TO A	30
31	P14-13,14,15,16,17,18	GND		CONNECTED TO A	31
32				CONNECTED TO A	32

Mother board Internal Connection LIST

PLUG J2 — INTERFACE SLOT 0 —

(* signals indicates that it originates from this module)

PIN	ROW A	ROW B	ROW C	PIN
1	P14 GROUND	GND	CONNECTED TO A	1
2	J1-A2, J3-C4	*RED VID	CONNECTED TO A	2
3	P14 GROUND	GND	CONNECTED TO A	3
4	J1-A4, J3-C6	*GRN VID	CONNECTED TO A	4
5	P14 GROUND	GND	CONNECTED TO A	5
6	J1-A6, J3-C8	*BLU VID	CONNECTED TO A	6
7	P14 GROUND	GND	CONNECTED TO A	7
8	J1-A8, J8-C8	*SYNC	CONNECTED TO A	8
9	P14 GROUND	GND	CONNECTED TO A	9
10	J7-C10	SLOT 0	LED 0	10
11				11
12	J1-A12, J7-C1	COLOR	CONNECTED TO A	12
13	J1-A13, J7-C2	TINT	CONNECTED TO A	13
14	J1-A14, J7-C3	DETAIL	CONNECTED TO A	14
15	J1-A15, J7-C26	VOLUME	CONNECTED TO A	15
16	J1-A16, J7-C15	A MUTE	CONNECTED TO A	16
17	J1-A17, J7-C17	MSDEC	CONNECTED TO A	17
18	P18-2	+5V STBY	CONNECTED TO A	18
19	J1-A19, J7-C11	INPUT I	CONNECTED TO A	19
20	J1-A20, J7-C12	INPUT II	CONNECTED TO A	20
21	J1-A21, J7-C13	INPUT III	CONNECTED TO A	21
22	J1-A22, J7-C14	INPUT IV	CONNECTED TO A	22
23				23
24	J1-A24, J7-A20	COMM A	CONNECTED TO A	24
25	J1-A25, J7-A21	COMM B	CONNECTED TO A	25
26				26
27	P14-8	-12 VDC	CONNECTED TO A	27
28	P14-9	+12 VDC	CONNECTED TO A	28
29	P14-10,11,12	+5 VDC	CONNECTED TO A	29
30			CONNECTED TO A	30
31	P14-13,14,15,16,17,18	GND	CONNECTED TO A	31
32			CONNECTED TO A	32

Mother board Internal Connection LIST

PLUG J3 — VIDEO CONTROL MODULE —

(* signals indicates that it originates from this module)

PIN	A	B	C	PIN
1		P19-4 *G VIDEO	P14 GROUND GND	1
2	P14 GROUND GND		P19-6 *R VIDEO	2
3		P19-2 *B VIDEO	P14 GROUND GND	3
4	P14 GROUND GND		J1-A2, J2-A2 RED VID	4
5			P14 GROUND GND	5
6			J1-A4, J2-A4 GRN VID	6
7	J8-C13, P13-9 *CLAMP		P14 GROUND GND	7
8			J1-A6, J2-A6 BLU VID	8
9	J4-A1, J5-A1, J6-C1 A(0)		P14 GROUND GND	9
10	J4-A2, J5-A2, J6-C2 A(1)		J4-C9, J5-C24, J6-A25, J7-A23, J11-A1 VFB	10
11	J4-A3, J5-A3, J6-C3 A(2)		J6-B21 R GAIN	11
12	J4-A4, J5-A4, J6-C4 A(3)		J6-B23 B GAIN	12
13	J4-A5, J5-A5, J6-C5 A(4)		J6-B22 G GAIN	13
14	J4-A6, J5-A6, J6-C6 A(5)			14
15	J4-A7, J5-A7, J6-C7 A(6)			15
16	J4-A8, J5-A8, J6-C8 A(7)			16
17	J4-A9, J5-A9, J6-C9 A(8)		J6-B2 $\overline{\text{SEL1}}$	17
18	J4-A10, J5-A10, J6-C10 A(9)			18
19	J4-A17, J5-A17, J6-C17 D(0)			19
20	J4-A18, J5-A18, J6-C18 D(1)			20
21	J4-A19, J5-A19, J6-C19 D(2)		J4-C10, J6-A24, J7-A22, J11-A14 $\overline{\text{HFB}}$	21
22	J4-A20, J5-A20, J6-C20 D(3)		J4-C12, J5-C18, J6-A17, J7-B17 $\overline{\text{RD}}$	22
23	J4-A21, J5-A21, J6-C21 D(4)		J6-B3 $\overline{\text{SEL2}}$	23
24	J4-A22, J5-A22, J6-C22 D(5)		J4-C11, J5-C19, J6-A18, J7-B18 $\overline{\text{WR}}$	24
25	J4-A23, J5-A23, J6-C23 D(6)		J4-C14, J5-C20, J6-A20 HPLLCLK	25
26	J4-A24, J5-A24, J6-C24 D(7)		J4-C16 H RESET	26
27	P14-8 -12 VDC		CONNECTED TO A	27
28	P14-9 +12 VDC		CONNECTED TO A	28
29	P14-10,11,12 +5 VDC		CONNECTED TO A	29
30			CONNECTED TO A	30
31	P14-13,14,15,16,17,18 GND		CONNECTED TO A	31
32			CONNECTED TO A	32

Mother board Internal Connection LIST

PLUG J4 — CONVERGENCE MODULE —

(* signals indicates that it originates from this module)

PIN	ROW A	ROW B	ROW C	PIN
1	J3-A9, J5-A1 J6-C1 A(0)		J10-A18 * BV CONV	1
2	J3-A10, J5-A2 J6-C2 A(1)		J10-A19 * BH CONV	2
3	J3-A11, J5-A3 J6-C3 A(2)		J11-A18 * GV CONV	3
4	J3-A12, J5-A4 J6-C4 A(3)		J11-A19 * GH CONV	4
5	J3-A13, J5-A5 J6-C5 A(4)		J12-A18 * RV CONV	5
6	J3-A14, J5-A6 J6-C6 A(5)		J12-A19 * RH CONV	6
7	J3-A15, J5-A7 J6-C7 A(6)		J9-C14 FBK V SIZE	7
8	J3-A16, J5-A8 J6-C8 A(7)		J7-C18, J8-C18 H SIZE	8
9	J3-A17, J5-A9 J6-C9 A(8)	J3-C10,	J5-C24, J6-A25, J7-A23, J11-A1 VFB	9
10	J3-A18, J5-A10, J6-C10 A(9)		J3-C21, J6-A24, J7-A22, J11,A14 HFB	10
11	J5-A11, J6-C11 A(10)		J3-C24, J5-C19, J6-A18, J7-B18 WR	11
12	J5-A12, J6-C12 A(11)		J3-C22, J5-C18, J6-A17, J7-B17 RD	12
13	J5-A13, J6-C13 A(12)		J6-B1 SELO	13
14	J5-A14, J6-C14 A(13)		J3-C25, J5-C20, J6-A20 * HPLLCLK	14
15	J5-A15, J6-C15 A(14)		J5-C15, J6-A22 * VPLLCLK	15
16	J5-A16, J6-C16 A(15)		J3-C26, * H RESET	16
17	J3-A19, J5-A17, J6-C17 D(0)		J5-C23, J6-A23 * V RESET	17
18	J3-A20, J5-A18, J6-C18 D(1)			18
19	J3-A21, J5-A19, J6-C19 D(2)			19
20	J3-A22, J5-A20, J6-C20 D(3)			20
21	J3-A23, J5-A21, J6-C21 D(4)		J5-C21, J6-A21 * HPLLRST	21
22	J3-A24, J5-A22, J6-C22 D(5)			22
23	J3-A25, J5-A23, J6-C23 D(6)			23
24	J3-A26, J5-A24, J6-C24 D(7)			24
25			J8-C19 HPLL BS	25
26				26
27	P14-8 -12 VDC		CONNECTED TO A	27
28	P14-9 +12 VDC		CONNECTED TO A	28
29	P14-10,11,12 +5 VDC		CONNECTED TO A	29
30			CONNECTED TO A	30
31	P14-13,14,15,16,17,18 GND		CONNECTED TO A	31
32			CONNECTED TO A	32

Mother board Internal Connection LIST

PLUG J5 — **SPARE (ACON)** —

(* signals indicates that it originates from this module)

PIN	ROW A			ROW B	ROW C		PIN
1	J4-A1	J6-C1	A(0)		P20-1	S1	1
2	J4-A2	J6-C2	A(1)		P20-2	S2	2
3	J4-A3	J6-C3	A(2)		P20-3	S3	3
4	J4-A4	J6-C4	A(3)		P20-4	S4	4
5	J4-A5	J6-C5	A(4)		P20-5	S5	5
6	J4-A6	J6-C6	A(5)		P20-6	S6	6
7	J4-A7	J6-C7	A(6)		P20-7	S7	7
8	J4-A8	J6-C8	A(7)		P20-8	S8	8
9	J4-A9	J6-C9	A(8)		P20-9	S9	9
10	J4-A10	J6-C10	A(9)		P20-10	S10	10
11	J4-A11	J6-C11	A(10)		P20-11	S11	11
12	J4-A12	J6-C12	A(11)		P20-12	S12	12
13	J4-A13	J6-C13	A(12)		P20-13	S13	13
14	J4-A14	J6-C14	A(13)		P20-14	S14	14
15	J4-A15	J6-C15	A(14)		P20-15	S15	15
16	J4-A16	J6-C16	A(15)		P20-16	S16	16
17	J4-A17	J6-C17	D(0)			$\overline{\text{S16}}$	17
18	J4-A18	J6-C18	D(1)	J3-C22, J4-C12, J6-A17, J7-B17		$\overline{\text{RD}}$	18
19	J4-A19	J6-C19	D(2)	J3-C24, J4-C11, J6-A18, J7-B18,		WR	19
20	J4-A20	J6-C20	D(3)	J3-C25, J4-C14, J6-A20		HPLLCLK	20
21	J4-A21	J6-C21	D(4)		J4-C21, J6-A21	HPLLRST	21
22	J4-A22	J6-C22	D(5)		J4-C15, J6-A22,	VPLLCLK	22
23	J4-A23	J6-C23	D(6)		J4-C17, J6-A23	V RESET	23
24	J4-A24	J6-C24	$\underline{\text{D(7)}}$	J3-C10, J4-C9,	J6-A25, J7-A23, J11-A1	VFB	24
25	J6-B7		$\underline{\text{SEL6}}$				25
26	J6-B8		SEL7				26
27	P14-8		-12 VDC		CONNECTED TO A		27
28	P14-9		+12 VDC		CONNECTED TO A		28
29	P14-10,11,12		+5 VDC		CONNECTED TO A		29
30					CONNECTED TO A		30
31	P14-13,14,15,16,17,18		GND		CONNECTED TO A		31
32					CONNECTED TO A		32

Mother board Internal Connection LIST

PLUG J6 — **WAVEFORM MODULE** — Page 6 of 13

(* signals indicates that it originates from this module)

PIN	ROW A	ROW B	ROW C	PIN
1	J7-B1 AD(0)	J4-C13 *$\overline{\text{SEL0}}$	J3-A9, J4-A1, J5-A1 A(0)	1
2	J7-B2 AD(1)	J3-C17 *$\overline{\text{SEL1}}$	J3-A10, J4-A2, J5-A2 A(1)	2
3	J7-B3 AD(2)	J3-C23 *$\overline{\text{SEL2}}$	J3-A11, J4-A3, J5-A3 A(2)	3
4	J7-B4 AD(3)	NOT USED *$\overline{\text{SEL3}}$	J3-A12, J4-A4, J5-A4 A(3)	4
5	J7-B5 AD(4)	NOT USED *$\overline{\text{SEL4}}$	J3-A13, J4-A5, J5-A5 A(4)	5
6	J7-B6 AD(5)	NOT USED *$\overline{\text{SEL5}}$	J3-A14, J4-A6, J5-A6 A(5)	6
7	J7-B7 AD(6)	J5-A25 *$\overline{\text{SEL6}}$	J3-A15, J4-A7, J5-A7 A(6)	7
8	J7-B8 AD(7)	J5-A26 *SEL7	J3-A16, J4-A8, J5-A8 A(7)	8
9	J7-B9 AD(8)	P13-14 *DYN FOCUS	J3-A17, J4-A9, J5-A9 A(8)	9
10	J7-B10 AD(9)		J3-A18, J4-A10, J5-A10 A(9)	10
11	J7-B11 AD(10)	J9-C11 V LIN WFM	J4-A11, J5-A11 A(10)	11
12	J7-B12 AD(11)	J7-A13 KEYSTONE	J4-A12, J5-A12 A(11)	12
13	J7-B13 AD(12)	J7-C22 PIN SIDE	J4-A13, J5-A13 A(12)	13
14	J7-B14 AD(13)	P21-6 *KEY WFM	J4-A14, J5-A14 A(13)	14
15	J7-B15 AD(14)	J8-C6 VIDEO KILL	J4-A15, J5-A15 A(14)	15
16	J7-B16 AD(15)	J7-C20 PIN TOP	J4-A16, J5-A16 A(15)	16
17	J3-C22, J4-C12, J5-C18, J7-B17 $\overline{\text{RD}}$	J10-A17, J11-A17, J12-A17 *PIN WFM	J3-A19, J4-A17, J5-A17 D(0)	17
18	J3-C24, J4-C11, J5-C19, J7-B18 WR	J7-C21 PIN BOT	J3-A20, J4-A18, J5-A18 D(1)	18
19	J7-B19 ALE	P13-15 *BLANK WFM	J3-A21, J4-A19, J5-A19 D(2)	19
20	J3-C20, J4-C14, J5-C20 HPLLCLK	P21-4 BUCK LOW	J3-A22, J4-A20, J5-A20 D(3)	20
21	J4-C21, J5-C21 HPLLRST	J3-C11 *R GAIN	J3-A23, J4-A21, J5-A21 D(4)	21
22	J4-C15, J5-C22 VPLLCLK	J3-C13 *G GAIN	J3-A24, J4-A22, J5-A22 D(5)	22
23	J4-C17, J5-C23 V RESET	J3-C12 *B GAIN	J3-A25, J4-A23, J5-A23 D(6)	23
24	J3-C21, J4-C10, J7-A22, J11-A14 HFB	J7-B24 REV SCAN	J3-A26, J4-A24, J5-A24 D(7)	24
25	J3-C10, J4-C9, J5-C24 VFB	J7-C23 BOW		25
25	J7-A23, J11-A1			25
26	P7-C24 CONTRAST	P13-16 BEAM LIMIT		26
27	P14-8 -12 VDC	CONNECTED TO A AND C	CONNECTED TO A AND B	27
28	P14-9 +12 VDC	CONNECTED TO A AND C	CONNECTED TO A AND B	28
29	P14-10,11,12 +5 VDC	CONNECTED TO A AND C	CONNECTED TO A AND B	29
30		CONNECTED TO A AND C	CONNECTED TO A AND B	30
31	P14-13,14,15,16,17,18 GND	CONNECTED TO A AND C	CONNECTED TO A AND B	31
32		CONNECTED TO A AND C	CONNECTED TO A AND B	32

Mother board Internal Connection LIST

PLUG J7 — **REMOTE CONTROL MODULE** —

(* signals indicates that it originates from this module)

PIN	ROW A	ROW B	ROW C	PIN
1	J8-C1 *H HOLD	J6-A1 AD(0)	J1-A12, J2-A12 *COLOR	1
2	J9-C2 *V HOLD	J6-A2 AD(1)	J1-A13, J2-A13 *TINT	2
3	J10-A21 *BV CENT	J6-A3 AD(2)	J1-A14, J2-A14 *DETAIL	3
4	J10-A5 *BH CENT	J6-A4 AD(3)		4
5	J12-A21 *RV CENT	J6-A5 AD(4)		5
6	J12-A5 *RH CENT	J6-A6 AD(5)		6
7	J11-A21 *GV CENT	J6-A7 AD(6)		7
8	J11-A5 *GH CENT	J6-A8 AD(7)		8
9	J8-C9 *H PHASE	J6-A9 AD(8)	J1-A10 SLOT 1	9
10	J8-C10 *V PHASE	J6-A10 AD(9)	J2-A10 SLOT 0	10
11	P13-11 *ELEC FOCUS	J6-A11 AD(10)	J1-A19, J2-A19 INPUT I	11
12	NOT USED BEEPER	J6-A12 AD(11)	J1-A20, J2-A20 INPUT II	12
13	J6-B12 *KEYSTONE	J6-A13 AD(12)	J1-A21, J2-A21 INPUT III	13
14	J8-C14 *H A/M SW	J6-A14 AD(13)	J1-A22, J2-A22 INPUT IV	14
15	J9-C15 *V A/M SW	J6-A15 AD(14)	J1-A16, J2-A16 A MUTE	15
16	J8-C16 *VCR SW	J6-A16 AD(15)	STBY SW	16
17	P18-4 *PWR RELAY	J3-C22, J4-C12, J5-C18, J6-A17 *RD	J1-A17, J2-A17 MSDEC	17
18	P15-2 KEYPAD	J3-C24, J4-C11, J5-C19, J6-A18 *WR	J4-C8, J8-C18 *H SIZE	18
19	P23-2 IR	J6-A19 *ALE	J9-C19 *V SIZE	19
20	J1-A24,J2-A24 *COMM A	NOT USED *PSE	J6-B16 *PIN TOP	20
21	J1-A25,J2-A25 *COMM B	NOT USED *RST	J6-B18 *PIN BOT	21
22	J3-C21,J4-C10,J6-A24,J11-A14 HFB	P22-1 CRT LIMIT	J6-B13 *PIN SIDE	22
23	J3-C10,J4-C9, J5-C24 VFB	P22-3 CAB LIMIT	J6-B25 *BOW	23
23	J6-A25, J11-A1			23
24	NOT USED *DACOUT1	J6-B24 *REV SCAN	J6-A26 *CONTRAST	24
25	J8-C20 H DELAY SW	P14-1 PWR FAIL	P13-12 *BRIGHT	25
26	J8-C21 V DELAY SW	NOT USED 7/9 SENSE	J1-A15, J2-A15 *VOLUME	26
27	P14-8 -12 VDC	CONNECTED TO A AND C	CONNECTED TO A AND B	27
28	P14-9 +12 VDC	CONNECTED TO A AND C	CONNECTED TO A AND B	28
29	CONNECTED TO C	P14-10,11,12 +5 VDC	CONNECTED TO A	29
30	P18-2 +5V STBY		CONNECTED TO B	30
31	P14-13,14,15,16,17,18 GND	CONNECTED TO A AND C	CONNECTED TO A AND B	31
32		CONNECTED TO A AND C	CONNECTED TO A AND B	32

Mother board Internal Connection LIST

PLUG J8 — **HORIZONTAL DEFL. MODULE** —

(* signals indicates that it originates from this module)

PIN	A	B	C	PIN
1			J7-A1 H HOLD	1
2				2
3				3
4			H F/V CONV	4
5			J9-C5 *SPOT KILL	5
6			J6-B15 *VIDEO KILL	6
7				7
8			J1-A8, J2-A8 SYNC	8
9	J11-A6 WIDTH		J7-A9 H PHASE	9
10	J9-C1ϕ *VERT1		J7-A10 V PHASE	10
11				11
12	J9-C12 *VERT2			12
13			J3-A7, P13-9 CLAMP	13
14	J1ϕ-A24,J11-A24,J12-A24 *H DRIVE		J7-A14 H A/M SW	14
15	J11-A15 HFB12			15
16			J7-A16 VCR SW	16
17	J10-A4, J11-A4, J12-A4 *ADJ BIAS		PIX BLANK	17
18	J9-A18 *BUCK WIDTH		J4-C8, J7-C18 H SIZE	18
19	J1ϕ-A3, J11-A3, J12-A3 *RELAY SW		J4-C25 *HPLL BS	19
20			J7-A25 H DELAY SW	20
21			J7-A26 V DELAY SW	21
22				22
23				23
24				24
25	P14-2 -24 VDC		CONNECTED TO A	25
26	P14-3 +24 VDC		CONNECTED TO A	26
27	P14-8 -12 VDC		CONNECTED TO A	27
28	P14-9 +12 VDC		CONNECTED TO A	28
29	P14-10,11,12 +5 VDC		CONNECTED TO A	29
30			CONNECTED TO A	30
31	P14-13,14,15,16,17,18 GND		CONNECTED TO A	31
32			CONNECTED TO A	32

Mother board Internal Connection LIST

PLUG J9 — V DEFL & H REG MODULE —

(* signals indicates that it originates from this module)

PIN	A	B	C	PIN
1				1
2	J12-A22 -V SENSE R		J7-A2 V HOLD	2
3	J10-A22 -V SENSE B		P13-10 *EHT INHIBIT 1	3
4	J10-A20, J11-A20, J12-A20 *V DRIVE			4
5	J11-A22 -V SENSE G		J8-C5 SPOT KILL	5
6	J10-A9, J11-A9, J12-A9 *V BOOST			6
7			CONNECTED TO A	7
8	J10-A12, J11-A12, J12-A12 *OFFSET DC		CONNECTED TO A	8
9	J10,11,12-A2 P21-2 VAR DC DEFL			9
10			J8-A10 VERT1	10
11			J6-B11 V LIN WFM	11
12			J8-A12 VERT2	12
13			J6-B11 V LIN DC	13
14			J4-C7 *FBK V SIZE	14
15			J7-A15 V A/M SW	15
16				16
17	P14-5 +150 VDC		CONNECTED TO A	17
18	J8-A18 BUCK WIDTH			18
19			J7-C19 V SIZE	19
20	J10-A7 H SENSE B			20
21	J4-C8, J11-A7 H SENSE G			21
22	J12-A7 H SENSE R			22
23	P21-1 *BUCK OUT		CONNECTED TO A	23
24	P14-4 +200 VDC		CONNECTED TO A	24
25	P14-2 -24 VDC		CONNECTED TO A	25
26	P14-3 +24 VDC		CONNECTED TO A	26
27	P14-8 -12 VDC		CONNECTED TO A	27
28	P14-9 +12 VDC		CONNECTED TO A	28
29	P14-10,11,12 +5 VDC		CONNECTED TO A	29
30			CONNECTED TO A	30
31	P14-13,14,15,16,17,18 GND		CONNECTED TO A	31
32			CONNECTED TO A	32

Mother board Internal Connection LIST

PLUG J10 — **POWER DEFLECTION MODULE (blue)** —

(* signals indicates that it originates from this module)

PIN	ROW A	ROW B	ROW C	PIN
		ROW B NOT USED		ALL PINS CONNECTED TO ROW A
1	NOT USED		VFB B	
2	J11,12-A2 J9-A8 P21-2		VAR DC DEFL	
3	J8-A19, J11-A3, J12-A3		RELAY SW	
4	J8-A17, J11-A4, J12-A4		ADJ BIAS	
5	J7-A4		BH CENT	
6	NOT USED		WIDTH B	
7	J9-A2ϕ		*H SENSE B	
8				
9	J9-A5, J11-A9, J12-A9		V BOOST	
10				
11	P14-5		+150 VDC	
12	J9-A7		OFFSET DC	
13				
14	NOT USED		HFB B	
15	NOT USED		HFB12 B	
16				
17	J6-B17, J11-A17, J12-A17		PIN WFM	
18	J4-C1		BV CONV	
19	J4-C2		BH CONV	
20	J9-A3, J11-A20, J12-A20		V DRIVE	
21	J7-A3		BV CENT	
22	J9-A2		*-V SENSE B	
23				
24	J8-A14, J11-A24, J12-A24		H DRIVE	
25	P14-2		-24 VDC	
26	P14-3		+24 VDC	
27	P14-8		-12 VDC	
28	P14-9		+12 VDC	
29	P14-10,11,12		+5 VDC	
30				
31	P14-13,14,15,16,17,18		GND	
32				

Mother board Internal Connection LIST

PLUG J11 — **POWER DEFLECTION MODULE (green)** — Page 11 of 13

(* signals indicates that it originates from this module)

PIN	A	B	C	PIN
		ROW B NOT USED		ALL PINS CONNECTED TO ROW A
1	NOT USED		VFB	
2	J11,12-A2 J9-A8 P21-2		VAR DC DEFL	
3	J8-A19, J11-A3, J12-A3		RELAY SW	
4	J8-A17, J11-A4, J12-A4		ADJ BIAS	
5	J7-A4		BH CENT	
6	NOT USED		*WIDTH	
7	J9-A2ϕ		*H SENSE G	
8				
9	J9-A5, J11-A9, J12-A9		V BOOST	
10				
11	P14-5		+150 VDC	
12	J9-A7		OFFSET DC	
13				
14	NOT USED		*HFB	
15	NOT USED		HFB12	
16				
17	J6-B17, J11-A17, J12-A17		PIN WFM	
18	J4-C1		BV CONV	
19	J4-C2		BH CONV	
20	J9-A3, J11-A20, J12-A20		V DRIVE	
21	J7-A3		BV CENT	
22	J9-A2		*-V SENSE G	
23				
24	J8-A14, J11-A24, J12-A24		H DRIVE	
25	P14-2		-24 VDC	
26	P14-3		+24 VDC	
27	P14-8		-12 VDC	
28	P14-9		+12 VDC	
29	P14-10,11,12		+5 VDC	
30				
31	P14-13,14,15,16,17,18		GND	
32				

Connected together: CONV.

Connected together: VERT. DEFL.

Connected together: HOR. DEFL.

YOKE PLUGS

P7-1	H. CENT +	
-2	-	
-3	V. CONV +	
-4	-	
-5	H. CONV +	
-6	-	
P8-1	V. DEFL +	
-2	-	

	series	parll.	
P6-1		-	-
-2	-	-	
-3			
-4	+24V INTERLOCK		
-5	+24V INTERLOCK		
-6			
-7		+	
-8	+	+	+
	4000 Series		3000 Series

Mother board Internal Connection LIST

PLUG J12 — **POWER DEFLECTION MODULE (red)** —

(* signals indicates that it originates from this module)

PIN	ROW A	ROW B	ROW C	PIN
		ROW B NOT USED		ALL PINS CONNECTED TO ROW A
1	NOT USED		VFB R	
2	J11,12-A2 J9-A8 P21-2		VAR DC DEFL	
3	J8-A19, J11-A3, J12-A3		RELAY SW	
4	J8-A17, J11-A4, J12-A4		ADJ BIAS	
5	J7-A4		BH CENT	
6	NOT USED		WIDTH R	
7	J9-A2ϕ		*H SENSE R	
8				
9	J9-A5, J11-A9, J12-A9		V BOOST	
10				
11	P14-5		+150 VDC	
12	J9-A7		OFFSET DC	
13				
14	NOT USED		HFB R	
15	NOT USED		HFB12 R	
16				
17	J6-B17, J11-A17, J12-A17		PIN WFM	
18	J4-C1		BV CONV	
19	J4-C2		BH CONV	
20	J9-A3, J11-A20, J12-A20		V DRIVE	
21	J7-A3		BV CENT	
22	J9-A2		*-V SENSE R	
23				
24	J8-A14, J11-A24, J12-A24		H DRIVE	
25	P14-2		-24 VDC	
26	P14-3		+24 VDC	
27	P14-8		-12 VDC	
28	P14-9		+12 VDC	
29	P14-10,11,12		+5 VDC	
30				
31	P14-13,14,15,16,17,18		GND	
32				

Mother board Internal Connection LIST

PIN P13 BIAS MODULE

PIN		
1	P14-4	+200 VDC
2	P14-5	+150 VDC
3		
4	P14-7	+6.3 VDC
5	P14-8	-12 VDC
6	P14-9	+12 VDC
7	P14-13 TO 18	GND
8		
9	J3-A7 J8-C13	CLAMP
10	J9-C3	EHT INHIBIT 1
11	J7-A11	ELEC FOCUS
12	J7-C25	BRIGHT
13		
14	J6-B9	DYN FOCUS
15	J6-B19	BLANK WFM
16	J6-B26	BEAM LIMIT

PIN P14 LOW VOLTAGE SMPS MODULE

PIN		
1	J7-B25	PWR FAIL
2		-24 VDC
3		+24 VDC
4		+200 VDC
5		+150 VDC
6		
7		+6.3 VDC
8		-12 VDC
9		+12 VDC
10		+5 VDC
11		+5 VDC
12		+5 VDC
13		GND
14		GND
15		GND
16		GND
17		GND
18		GND

PIN P15 KEYPAD

PIN		
1	P16-1 P18-6 P23-1	+12V STBY
2	J7-A18	KEYPAD
3	P14-13 TO 18	GND
4		

PIN P16 IR SENSOR

PIN		
1	P15-1 P18-6 P23-1	+12V STBY
2	P23-3	IR OUT
3	P14-13 TO 18	GND
4		

PIN P17 FANS

PIN		
1	P14-8	-12 VDC
2		
3	P14-13 TO 18	GND
4		

PIN P18 STANDBY

PIN		
1	J7-A17	PWR RELAY
2	P14-13 TO 18	GND
3	J7-A30	+5V STBY
4	J7-C16	STBY SW
5		
6	P15-1 P16-1 P23-1	+12V STBY

PIN P19 VIDEO

PIN		
1	P14-13 TO 18	GND
2	J3-A3	B VIDEO
3	P14-13 TO 18	GND
4	J3-A1	G VIDEO
5	P14-13 TO 18	GND
6	J3-C2	R VIDEO

PIN P20 SPARE MODULE

PIN P21 KEYSTONE MODULE

PIN		
1	J9-A23	BUCK OUT
2	J10-A2,J11-A2,J12-A2	VAR DC DEFL
3	P14-13 TO 18	GND
4	J6-B20	BUCK LOW
5	P14-3	+24 VDC
6	J6-B14	KEY WFM

PIN P22 THERMAL SENSORS

PIN		
1	J7-B22	CRT LIMIT
2		
3	J7-B23	CAB LIMIT
4		

PIN P23 REMOTE SENSOR

PIN		
1	P15-1 P16-1 P18-6	+12V STBY
2	J7-A19	IR
3	P16-2	IR OUT
4	P14-13 TO 18	GND

SECTION VI

ACON AUTOMATIC CONVERGENCE

ACON

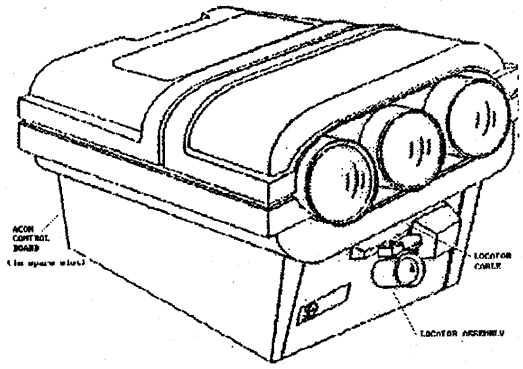
Automatic CONvergence

Acon is made up of three parts:

- Locator Assembly
- Locator Cable
- Acon control Board

All three parts are included on the 3101 and 4101 projectors.

For the 3100 and 4100 projectors, the "locator cable" is already installed. The "locator assembly" and "Acon control board" are purchased separately as an ACON option. 38-800800-AC



Locator Assembly

- rigid metal casting
- 2 stepper motors X and Y direction
- sensor/lens
- amplifiers

The acrylic lens focus light from the screen onto a photodiode sensor. The photodiode outputs a voltage which is amplified. Behind the sensor sits the amplifiers which amplifies the micro voltages from the photodiode.

Two stepper motors direct the lens/sensor assembly to the proper place. The motors are controlled by signals from the ACON control Board. During the start of each acon operation, the motors are forced to their home location. This gives the motors a reference point to start from. This is the rattling sound heard during the start of each ACON operation.

Locator Cable

The locator cable is a grey cable protruding from the bottom of the green lens. It connects to the locator assembly via a D-shell connector. The other end of the cable connects to the motherboard. The cable already exist on 3100 and 4100 projectors.

The locator cable transmits motor drive signals from the acon control board to the locator assembly. It also feeds information from the photodiode back to the acon control board.

Acon control board

The acon control board contains its own microprocessor 80C154. This micro takes information from the photodiode sensors after they are converted and processed in a digital form. It also communicates with the projectors remote control module.

A DC to DC converter also resides on the acon control board. It converts 5V to 14V for the motor drive circuits.

This control board slides into the spare slot of the projector.

To operate ACON

The "mounting configuration" (found in the Help Utilities menu) of the projector must be correctly set for acon to operate. If it is not, acon will return with an error message, "cannot converge center".

The operation of acon is menu driven. After converge is pushed, select "4" ACON Auto Convergence. You now have 4 more choices.

1. Full Convergence
2. Touch up
3. Center only (static)
4. Learn screen

A learn screen must be performed whenever the projector or screen is moved, even if the size of the picture has not been changed. In "Learn screen", acon determines where the edges of the screen are by detecting rapid chances in light reflections. Learn screen is automatically performed if the "mounting configuration" has been changed.

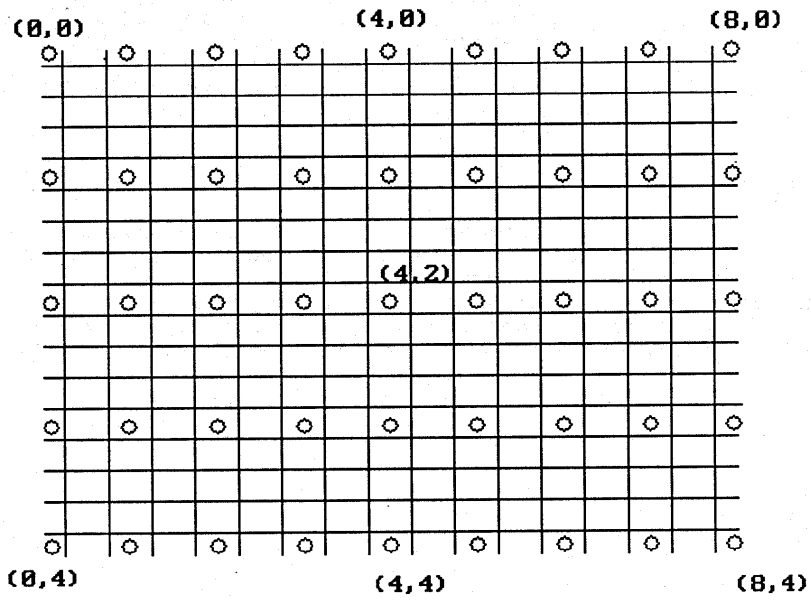
The difference between Full screen and Touch up is the number of zones used and the amount of checking that acon performs. This usually translates into a difference in convergence time and accuracy.

Theory of operation

The control of acon is performed from instructions stored in the PROM of the projector's remote control module (IC24). The screen is divided into 45 zones. Nine zones across and five zones down. (See drawing below) During an acon operation, each of these zones goes through a software subroutine. This subroutine is as follows:

The green CRT will project a small rectangular target. The sensor searches for this target. Then the red CRT will flash a similar target. The sensor detects the position of the red target. From knowledge of both the green and red target position, the convergence module will move the red on top of the green target, therby convergeing the zone.

This entire operation repeats for the blue, and the rest of the 44 zones. The order that the zones are converged is pregrogrammed. This order is similar to that found in the "guided" (9X5) convergence routine.



DO's and DON'Ts

The following are precautions that anyone selling or installing an ACON system must be aware of. The most important concept to remember about ACON is that it reads the visible light output from the screen. This light may come either from the front or the back of the screen. If the ACON locator assembly connot see the screen due to physical obstructions or lack of (target) light reflecting back, then ACON will not be successful.

Ambient light

Keep ambient light to a minimum. Avoid light sources which are directly focused onto the screen. Acon's photodiode sensors are sensitive to infrared light.

As ambient light increases, the ability of ACON to detect its target reduces, thereby increasing acon's convergence time. A greater chance of error or less accuracy could also result.

Screens

Acon works best with low gain front screens. High gain front flat screens have hot spots which will result in longer convergence time. Acon has also been successfully tested on 6 foot curved screens. The use of ACON on rear screen will depend on the screen material and the room light environment. The best way to determine if it will work on a given screen/room is to try it.

Offscreen points

When the cross hatch or raster is bigger then the screen itself, Acon will automatically ignore the points that are off the screen. However this extends the convergence time. If the edge of the screen occurs at one of the convergence zones, this greatly increases the chance of convergence error. Whenever possible keep the crosshatch/raster inside the screen.

Signal sources

Acon is not dependent on the scan frequency of the source. It is however dependent on its stability. An unstable or noisy source will also cause acon to be unstable, resulting in poor accuracy.

As with any setup, convergence should be the last step performed. Make sure the projector has been warmed up. Set all other parameters such as size, geometry, keystone, focus, etc. first before using acon.

Projector precautions

The most basic rule to remember is that acon cannot converge a picture which is not manually convergeable.

Make certain that the projector is properly aligned before attempting to use acon. You may want to check the alignment by manually converging the center and corners of the screen.

Make sure that the stigmatism of the pixels are correct. Acon automatically adjusts the contrast of the projector during its operation. Under high ambient light conditions the contrast may be set to a fairly high level. If the projector's stigmatism is misadjusted, high contrast could cause asymmetric flaring of its pixels. Check the pixels for correct stigmatism by manually adjusting the contrast to a high level, then see if excessive flaring occurs in one direction. If this happens, check the stigmatism and flare rings and adjust them as per the service manual.

Installing the locator assembly

In normal operation, the locator assembly sits below the green lens. The only other position that the locator may be mounted is above the green lens. A special bracket is needed for this. The top mount configuration was designed to accommodate the ECP Retro. Due to the light path of the mirror system inside the retro cabinet the locator must be mounted on top in order for light from the screen to reflect back to its sensor.

Another reason why the locator assembly might be mounted above the green lens is if the bottom half of the projector is hidden inside the ceiling.

The decision to mount the locator above or below the lens depends only on physical obstructions. If the sensor cannot see the screen due to an obstacle below the projector, then mount the locator above the lens and vice versa. The sensor/lens housing is balanced independent of gravity. Therefore the projector can be mounted at any angle of projection.

Mirrors

When designing a rear projection system with mirrors, the addition of acon's locator assembly must be considered. The vertical height of the mirror must be large enough to reflect light from the screen back to the sensor. The greatest distance between the lens and the locator is 8" (20cm). This is when the locator is mounted below the lens. If light path drawings are made, it can be shown that the larger the mirror used, the less this additional mirror height is needed. Therefore an addition of 8" (20cm) to the mirror's vertical size will accommodate almost all applications. Ofcourse light path drawings will still have to be made in order to determine the position of the mirror.

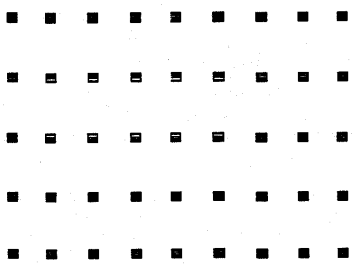
ACON Service Tool

(Please read this entire section while using an ACON projector,from start to finish)

To access the ACON service tool, press the follow key sequence:

CONVERGE	enter into convergence
4	selection of ACON
*****	display (ACON) service tool selection
5	enter into (ACON) service tool

The projector will now home its stepper motors and finish by displaying the 45 (green) targets on the screen, as shown below.



ACON SCREEN CONVERGENCE POINTS

you can colour these green if you are bored

You can now ask the projector to go directly to any one of the 45 zones. To do this, push the **MOVE** button. The following message will appear:

Search for a Target
Enter X coordinate:

The projector is now asking for an X and Y coordinate. For example, if you wanted to go to the target on the upper left hand corner, press **0, 0**. The center target would be 4, 2. (see diagram under Theory of Operation) After the two digits are entered, the locator assembly will search for that target and a series of data, about that target, will be displayed on the screen. For example;

Q1 4A0	**Q2 44D**	**CX +001**	**MX +440**
Q4 3B1	**Q3 502**	**CY +002**	**MY +3BB**

All of the numbers displayed are in hexadecimal values.

Q1, Q2, Q3 and Q4 represents the amount of light detected by the locator assembly's photodiode.

CX and CY represents the center of the target with respect to the photodiode's own center or centroid.

MX and MY are the stepper motor's horizontal and vertical coordinates respectively.

By pushing the **COLOR** button, the red or blue targets will appear. By pushing the **CONVERGE** button, the projector will attempt to converge that target. Once completed, all three colours will be displayed. You can push **MOVE** again and select another target (zone). If the target does not converge, check the Q numbers, they should be higher than 050. In most applications they will be ten times this value, or more.

The above procedure is useful in determining if there is a screen problem.

Low readings are typically caused by incompatable rear screen applications. To verify that it is a screen problem, place a white piece of paper onto the back of the screen. This will increase the light reflecting back to the sensor. The Q numbers should now increase. Push the **CONVERGE** button again and see if ACON performs better.