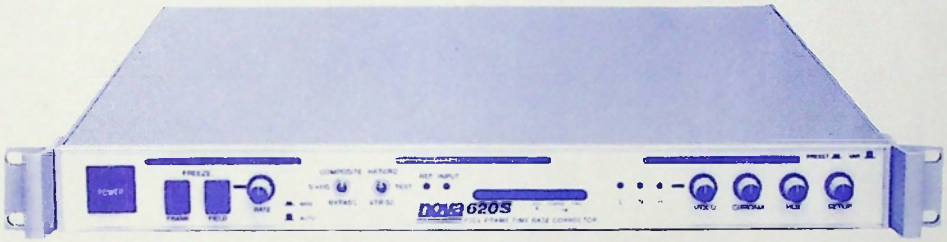
nova 620S

INSTALLATION, OPERATION AND MAINTENANCE GUIDE

INSTALLED 4 MAY 89



nova
SYSTEMS, INC.
50 Albany Turnpike, Canton, CT 06019

IMPORTANT

Warranty Card enclosed (see Section I) must be returned to Nova Systems, Inc. to ensure the following:

- Warranty Registration
- Receipt of Sections IV, V and VI of the Maintenance Guide

nova SYSTEMS, INC.

PLACE STAMP HERE

NOVA SYSTEMS, INC.
Customer Service Department
50 Albany Turnpike
Canton, CT 06019

PRODUCT WARRANTY AND REGISTRATION CARD

To ensure warranty, verification is required WITHIN 30 DAYS of receipt of product.

Product Model No. 620S Serial No. 4132
Date Product Received 4/28/89

End User's Name _____ Date _____
Title _____

Organization Name _____
Address _____
City _____ State _____ Zip _____
Telephone (____) _____ Ext _____

Product Purchased From:
Dealer Name _____
City _____ State _____ Zip _____

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SECTION I - INTRODUCTION

1.1 GENERAL

This manual provides instructions for the NOVA SYSTEMS, INC. NOVA 620S Full Frame Time Base Corrector with S-VHS processing. The system is a Time Base Corrector of broadcast quality for broadcast, industrial and educational applications. It will time base correct the output of 3/4" and 1/2" videotape recorders with or without capstan servos, i.e. the Advanced Sync signal from the NOVA 620S is not required. The NOVA 620S also provides a derived subcarrier input to VTR's which accept such a signal (VTR-SC Mode). It is not required that this subcarrier signal be used for the HETERODYNE operating mode. (See VCR Application Chart - Section 2.4c) S-VHS VTR's may be connected to the 620S via the four-pin S-VHS connector using the cable supplied with the VTR.

A. PHYSICAL DESIGN

The NOVA 620S is designed for standard 19-inch (48.3cm) electronic equipment rack mounting. The system contains integrated circuits and other solid-state devices on a single circuit board, plus a smaller full frame memory board. Internal DC power supplies are included and operate on 100-130VAC, 50/60Hz.

B. HARD WIRE BYPASS

With the POWER switch OFF or the BYPASS/S-VHS/COMPOSITE switch in the BYPASS position, video on the Input BNC will pass directly to the PROGRAM Output BNC via a low capacitance pair of relays. The 3.58MHz subcarrier feedback signal is disabled in these modes of operation. A signal on the S-VHS connector will not loop through to the PROGRAM Output BNC.

C. MONITORING PROVISIONS

In addition to the PROGRAM output, a MONITOR output provides the same corrected signal as is on the PROGRAM output. If the BYPASS/S-VHS/COMPOSITE switch is in the BYPASS position, the MONITOR output will be at color black.

D. OPERATION

The POWER switch, when lighted, provides AC power to the NOVA 620S power supplies.

The BYPASS/S-VHS/COMPOSITE switch, in the S-VHS position, enables the separate luminance and chrominance signals present at the S-VHS connector on the 620S rear panel to be time base corrected.

In the COMPOSITE position, the composite video signal present at the VIDEO IN BNC is time base corrected.

D. OPERATION (continued)

The VTR-SC/TEST/HETERO switch selects among wideband, VTR Subcarrier (SC) processing in either S-VHS or COMPOSITE modes; a full field color bar test signal in the TEST position; and heterodyne processing of either a composite or S-VHS signal in the HETERO mode. Heterodyne processing is present on all 1/2" VHS orBETA VTR's as well as 3/4" U-Matic tape recorders when a derived subcarrier signal from the TBC is not used. The VTR-SC mode should be selected when the source VTR accepts a subcarrier input from the TBC.

The FIELD FREEZE push button switch freezes one field of video. An LED in the switch indicates when this control has been activated.

The FRAME FREEZE push button switch freezes one frame of video. An LED in the switch indicates when this control has been activated.

The RATE control is activated by first selecting either FIELD FREEZE OR FRAME FREEZE then pulling out the RATE knob. Adjust the strobe rate by rotating the control. Clockwise rotation increases the strobe rate.

The VIDEO control varies the amplitude of the active portion of the video signal.

The CHROMA control varies the chrominance level of the active portion of the video signal.

The HUE control varies the chrominance phase of the active portion of the video signal.

The SETUP control varies the pedestal level of the active portion of the video signal.

The REFERENCE LED is illuminated when a reference video signal is applied to the REFERENCE BNC.

The INPUT LED is illuminated when there is an input video signal present at the INPUT BNC or the S-VHS connector.

The L, N, H LEDs indicate the maximum peak video signal.

L(ow) is illuminated if the maximum video level is less than 96 IRE.

N(ormal) is illuminated if the maximum video level is between 96 and 104 IRE.

H(igh) is illuminated if the maximum video level is greater than 104 IRE.

1.1 GENERAL (continued)

E. FRONT PANEL CONTROL SLOT

Several controls are mounted in a slot on the front panel. They are infrequently used set up functions and will be described fully in Section 2.5.

1.2 NOVA 620S SPECIFICATIONS

Performance:

Correction Range	525 lines
S/N Ratio	58dB (p-p video to RMS noise)
Differential Gain	<2% (plus quantizing effects)
Differential Phase	<2° (plus quantizing effects)
K-Factor (2T)	<2% (Direct) <3% (Process)
Bandwidth	±0.5dB to 4.2MHz (Direct)
	±1.0dB to 2.5MHz (Process w/Comb Filter)
Residual Error	±10ns. (Y), 2° (C)
Sampling Rate	14.3MHz (4 times color subcarrier)
Number of Bits	8

Video Inputs:

VTR Video	1.0 Volt p-p ±6dB into 75 Ohms. Composite video.
S-VHS	Y/C (3.58MHz)
Reference	1.0 Volt p-p ±6dB into 75 Ohms. The 620S does not require a Reference Signal for proper operation.

Video Outputs:

Program Video	Composite video, 1.0 Volt p-p nominal into 75 Ohms. Input hard wired to Program Video output if Power is OFF or when in the BYPASS mode. Time base corrected video otherwise.
Monitor Video	Same as Program Video except no output with Power OFF. Black burst in BYPASS mode.
Black Burst	Composite video signal with only setup level during the active portion of the video.

Control Inputs:

DOC	Nominally 0.5V p-p. Off-tape head RF.

1.2 NOVA 620S SPECIFICATIONS (continued)

Control Outputs:

Advanced Sync	4.0 or 0.4 Volts, nominal (jumper selectable) into 75 Ohms. 125 lines in advance of the Reference. Not required because of the full frame of memory.
VTR Subcarrier	2.0 Volts nominal into 75Ohms, 3.58MHz. Locked to Video Input horizontal rate. Active in VTR-SC mode only.

Mechanical:

Depth	20.5" (52.1cm)
Width	16.75" or 19.0" (with rack mount ears installed) (48.3cm)
Height	1.75" (4.5cm)
Weight	10.5 lbs. (4.7kg)

Electrical:

95-130VAC, 47-63Hz, 60VA

Environmental:

Operating Temperature	5°C - 40°C (40°F - 104°F)
Humidity	5% - 90% RH, no condensation

Front Panel Controls:

POWER, BYPASS/S-VHS/COMPOSITE, VTR-SC/TEST/HETERO VIDEO level, CHROMA level, HUE, FREEZE FRAME, FREEZE FIELD, RATE

Front Panel Indicators:

REFERENCE, video INPUT, video L(ow), N(orm), H(igh), FREEZE FRAME, FREEZE FIELD

1.3 WARRANTY

A warranty card with a return postcard has been included with your NOVA 620S Digital Time Base Corrector. Complete the card and return it to NOVA SYSTEMS, INC. to validate your warranty. The warranty is 30 days, UNLESS THE POSTCARD IS RETURNED.

Nova Systems, Inc. neither assumes nor authorizes any factory authorized dealer or end user to assume for it any obligation or liability, except to refer customers to this warranty. Replacement parts carry the unexpired portion of the original warranty period of the products in which they are installed. Nova Systems, Inc. reserves the right to make changes in design and improvements on its products or parts without assuming any obligation to install them in previously manufactured products.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Nova Systems, Inc. will in no event be liable for incidental, collateral, or consequential damages, or repair costs incurred without its written consent.

Warranty Period

With the warranty card on file at the factory, a FULL ONE (1) YEAR WARRANTY from the date of shipment includes, at no cost to the customer, LABOR and PARTS that may be required to adjust and/or repair any product defect. In addition, Nova Systems, Inc. may at their option, have the product returned to the factory, freight prepaid, for repair and/or adjustment. Nova Systems, Inc. will be responsible for returning the repaired and/or adjusted product to the end user with the freight prepaid.

Nova Systems, Inc. reserves the right to determine the final cause and/or existence of any defect pertaining to this warranty. The product will be accepted for "warranty service" only if it is returned under a RETURN AUTHORIZATION (RA) obtained from Nova Systems, Inc.

1.4 FACTORY SERVICE AND REPAIR

If there is any difficulty with your NOVA 620S, contact the Customer Service Department, NOVA SYSTEMS, INC., Canton, CT 06019.

Telephone: (203) 693-0238

All products returned to Nova Systems, Inc. for service, whether it be in or out of warranty, MUST be accompanied by a RETURN AUTHORIZATION (RA) NUMBER which is obtained from Nova Systems, Inc.'s Customer Service Department.

All products returned for repair and/or adjustment MUST be shipped to the attention of the CUSTOMER SERVICE DEPARTMENT and should be accompanied by a description of the problem and any other details that are relevant. Quotations will be provided upon request on all "non-warranty repairs", and work will proceed only after receiving customer authorization in written form. All unauthorized returns may be refused and returned "freight collect."

SECTION II - INSTALLATION

2.1 UNPACKING

Unpack the NOVA 620S carefully, inspecting for signs of possible damage sustained during shipment. If there is damage, file a claim immediately with the shipping carrier. Save the shipping container for later use if any further transportation is necessary. Fill out the warranty return postcard and mail it to NOVA SYSTEMS, INC. as soon as possible.

2.2 AC POWER SOURCE

The NOVA 620S has a three-conductor removable power cord that connects to a single phase source of 110-130VAC at 50 or 60Hz.

2.3 PHYSICAL INSTALLATION

The NOVA 620S is designed to be mounted in a standard 19-inch (48.3cm) electronic equipment rack. The rack mounting requires 1.75 inches (4.5cm) of front panel height and about 22 inches (56cm) of rack depth. For table mounting, rubber feet with adhesive backing have been included with the unit.

2.4 ELECTRICAL CONNECTIONS

A. POWER CORD

Connect the power cord of the unit to a source of 110-130VAC, 50/60 Hz.

B. SIGNAL CONNECTIONS

Use 75 Ohm coaxial cable with BNC connectors to the NOVA 620S (except S-VHS). Connect the source VTR Video Output to the NOVA 620S Video Input. For operation with an S-VHS VTR, simply connect the 4-pin S-VHS cable between the VTR S-VHS Out and the 620S S-VHS In connectors. Connect the NOVA 620S VTR-SC Output to the source VTR Subcarrier (SC) Input if present on VCR. If SC Input is not available on VCR, operate TBC in the HETERO mode. Connect the NOVA 620S Advanced Sync Output to the Sync Input of the source VTR (some VTR's require that Advanced Sync be applied to the Video Input of the VTR - see VTR Application Chart and Notes). Source VTR's without capstan servo capability do not require the Advanced Sync signal. If the NOVA 620S is to be incorporated into a system, black burst or other composite video source with burst should be applied to the Reference Input of the NOVA 620S. Terminate the Reference Output in 75 Ohms if it is not used.

C. Applications

The following applications charts list the popular 1/2" and 3/4" video tape recorders currently in use, and the NOVA Time Base Correctors which will work with them. In addition, specific notes are included to assist with installation of the NOVA Time Base Correctors. See Figure 2.1 for typical installation diagram.

3/4" VCR APPLICATION CHART

	VCR	501 DIR	511 DIR	511 PROC	620/620S DIR	620/620S PROC	620/620S 1 WIRE	700/S PROC	INSTALLATION NOTES
SONY	VO-2860(a)	Yes	Yes	*	Yes	*	*	Yes	Note 1
	VO-4800	No	No	Yes	No	Yes	*	Yes	
	VP-5000	No	No	Yes	No	Yes	*	Yes	
	VO-5600	No	No	Yes	No	Yes	*	Yes	
	VO-5800	Yes	Yes	*	Yes	*	*	Yes	
	VO-5800H	Yes	Yes	*	Yes	*	*	Yes	Notes 1, 2, 6
	VO-5850	Yes	Yes	*	Yes	*	*	Yes	Notes 1, 2, 9
	VO-6800	No	No	Yes	No	Yes	*	Yes	Note 1
	BVU-800/850	Yes	Yes	*	Yes	*	*	Yes	Notes 1, 2, 3
	BVU-820/870	Yes	Yes	*	Yes	*	*	Yes	
JVC	CR-850U	Yes	Yes	*	Yes	*	*	Yes	
	CR-4900U	Yes	Yes	*	Yes	*	*	Yes	
	CR-5550U	Yes	Yes	*	Yes	*	*	Yes	Note 4
	CR-6650U	Yes	Yes	*	Yes	*	*	Yes	
	CR-8250U	Yes	Yes	*	Yes	*	*	Yes	
	CR-6060U	No	No	No	No	No	Yes	Yes	Note 8
	CP-5200U	No	No	No	No	No	Yes	Yes	
PANASONIC	AV-700	Yes	Yes	*	Yes	*	*	Yes	Note 3
	AV-9200A	Yes	Yes	*	Yes	*	*	Yes	
	AV-9240	Yes	Yes	*	Yes	*	*	Yes	
	NU-9240XD	Yes	Yes	*	Yes	*	*	Yes	Note 6
	NU-9450	Yes	Yes	*	Yes	*	*	Yes	
	NU-9600	Yes	Yes	*	Yes	*	*	Yes	

* Will operate, however DIR mode is preferred

1/2" VCR APPLICATION CHART

	VCR	501 DIR	511 DIR	511 PROC	620/620S DIR	620/620S PROC	620/620S 1 WIRE	700/S PROC	INSTALLATION NOTES
SONY	SLP-300	No	No	Yes	No	Yes	*	Yes	Notes 1, 5
	SLP-305	No	No	Yes	No	Yes	*	Yes	
	SLO-320	No	No	Yes	No	Yes	*	Yes	
	SLO-323	No	No	Yes	No	Yes	*	Yes	
	SLO-323MD	No	No	Yes	No	Yes	*	Yes	
	SLO-325	No	No	Yes	No	Yes	*	Yes	
	SLO-383	No	No	Yes	No	Yes	*	Yes	
	SLO-420	No	No	Yes	No	Yes	*	Yes	Notes 1, 5, 7
JVC	BR-8600	No	No	Yes	No	Yes	*	Yes	Notes 4, 5
	BR-6400	No	No	Yes	No	Yes	*	Yes	Note 7
	BP-5300	No	No	Yes	No	Yes	*	Yes	
PANASONIC	AG-7500	Yes	Yes	Yes	Yes	Yes	*	Yes	Note 10
	AG-7400	No	No	Yes	No	Yes	*	Yes	Note 10
	AG-6500	No	No	Yes	No	Yes	*	Yes	Note 9
	AG-6300	No	No	Yes	No	Yes	*	Yes	Note 7
	AG-6300MD	No	No	Yes	No	Yes	*	Yes	
	NV-8500	No	No	Yes	No	Yes	*	Yes	
OTHER	ANY CONSUMER	No	No	No	No	No	Yes	No	Note 8

* Will operate, however operation with ADVANCED SYNC is preferred

INSTALLATION NOTES

NOTE 1 - ADVANCED SYNC:

Advanced sync is fed into the video input connector on Sony VCR's. DO NOT FORGET TO SWITCH THE VCR FRONT PANEL "Video Input" SELECTOR SWITCH TO THE PROPER INPUT. If you don't, the source machine will not get advanced sync.

NOTE 2 - ADVANCED SYNC LEVEL:

VO-5850 machines require 0.4 volts of advanced sync to prevent pinning the video meter. If your machine requires 0.4 volts, there is a jumper inside the TBC that can be changed (E5). With jumper E5 in the position closest to the rear panel, advanced sync will be 0.4 volts. In the position closest to the front panel, 4.0 volts sync will be obtained. (See Figure 2.2 for the approximate location of E5).

NOTE 3 - USING NOVA TBC's WITH BVU SERIES/PANASONIC A700 VCR'S:

Some 3/4" machines perform head switching in the vertical interval. NOVA has provided a jumper inside our TBC's so that you can obtain optimum TBC operation for these VCR's, although the factory preset position need never be changed.

Jumper plug (E18). Factory setting is position closest to left panel for industrial machines (non-vertical internal head switch). Move plug to position closest to the right side panel for BVU (vertical internal head switch). See Figure 2.2 for approximate location - E18 between U101 and U102.

E18 is accessed by lifting the hinged memory board. To accomplish this, unscrew the three standoffs from the top of the memory board. Remove the black ground wires at the edge of the memory board. The memory board can now be pivoted up, revealing E18. Be sure when lowering the memory board that the 50-pin ribbon cable connector is securely in place. This jumper is not present on the NOVA 700, although the NOVA 700 will operate with the VTR's referenced above.

NOTE 4 - USING NOVA TBC'S WITH JVC 3/4" MODELS CR-5550U, CR-6650U, CR-8250U; AND VHS 1/2" MODEL BR-8600:

Sometimes the referenced VCR's will not lock to the NOVA TBC's external sync signal when the VCR's are in SHUTTLE or PAUSE. JVC has provided a simple solution -- throw a switch inside the VCR!! It will not affect operation in any way except to provide VCR lock in shuttle and pause, and therefore allow the JVC to operate properly with the NOVA TBC. Here's how to do it:

INSTALLATION NOTES (continued)

1. Remove AC line cord with no tape in the machine.
2. Remove the top cover of the VCR.
3. Looking from the front of the VCR, there are three vertical circuit boards to the right of the head wheel. The middle board has a black switch near the middle of it. (No need to remove the board). This switch is labeled "SW1". Throw this switch in the opposite direction. In 1/2" VCR's, this switch is located in the middle board behind the head wheel.

NOTE 5 - VCR WITHOUT SUBCARRIER INPUT

This model VCR does not have subcarrier input. Use NOVA 511 or 620 operating in process mode.

NOTE 6 - MONOCHROME VCR'S

High resolution monochrome VCR - no color output. Subcarrier feedback not applicable. Do not connect S/C feedback cable. SONY VO-5800H can be used with TBC only when the VTR if in the 525 line mode. NOVA TBC should be operated in the DIRECT mode (this is the only mode of operation for the NOVA 501).

NOTE 7 - ROLLING IN PAUSE OR SHUTTLE

These machines will not provide a stable picture in pause or shuttle. The VCR does not accept advanced sync in these two modes. This causes the picture to jump vertically in 32-line increments with a black bar across screen. This occurs only when in pause or shuttle.

NOTE 8 - NON-CAPSTAN SERVO VCR

Non-capstan servo'd machine. Use NOVA 620 in single wire mode.

NOTE 9 - DROP-OUT COMPENSATOR

VCR is equipped with an off-tape rf output for connection to the NOVA DOC.

NOTE 10 S-VHS VTR's

Panasonic AG-7500 and AG-7400 are S-VHS VTR's and require the 620S or 700S for operation in the S-VHS mode.

2.5 SYSTEM PHASING PROCEDURE

A. Ignore this section if the NOVA 620S is working without a REFERENCE input.

B. When a NOVA 620S is genlocked to an external sync system, the following procedure should be used:

1. Connect the cable carrying black burst or composite video to the REFERENCE input BNC.

2. Connect either a 75 ohm terminator to the REFERENCE output or a BNC cable to complete a reference loop-thru. The loop-thru should be terminated in 75 ohms at its end.

3. Refer to Figure 2.3 for the location of the system phase and subcarrier phase (SCH) controls.

   a. S5 moves the system phase in 70 ns steps. Adjust S5 until the leading edge of sync is within $\pm$ 35 ns of the desired position.

   b. Adjust R615 until burst phase is exactly in phase or 180° out of phase with the desired position. If this cannot be achieved, move S5 one position so that the leading edge of sync is still within 70 ns of the desired position. Then adjust R615 so that burst is either in phase or 180° out of phase with the desired position. If burst is 180° out of phase, change the position of S7 position 4.

   c. To position sync at its desired location, adjust S6. If there is not enough range, change the position of S7 to position 2.

2.6 REPACKING FOR SHIPMENT

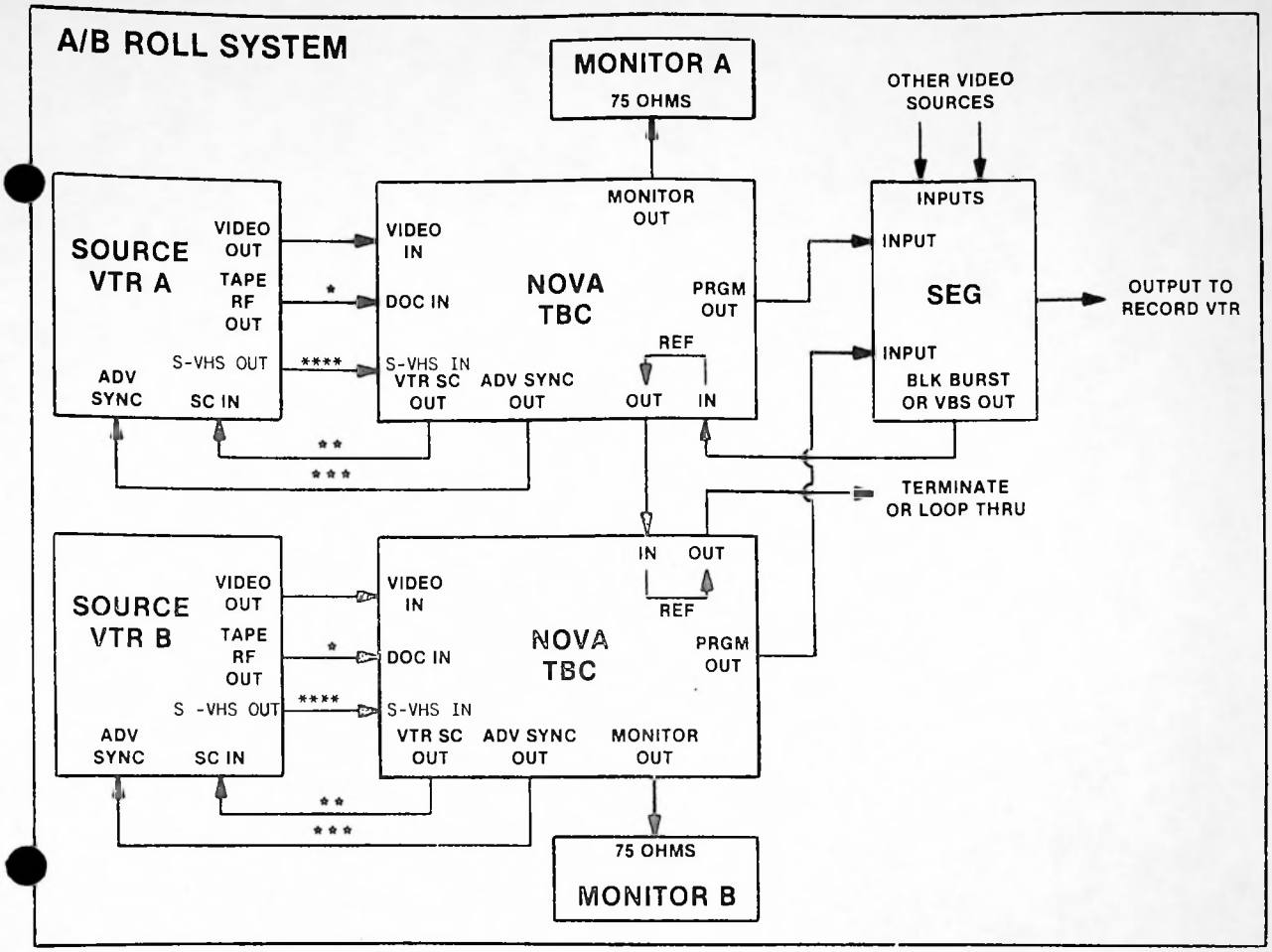
The following is a general guide for repackaging for shipment. If you have any questions, contact the NOVA SYSTEMS, INC. Customer Service Department. Try to ship the system in the original shipping container, if possible. If the original shipping container is unavailable, follow the procedure below:

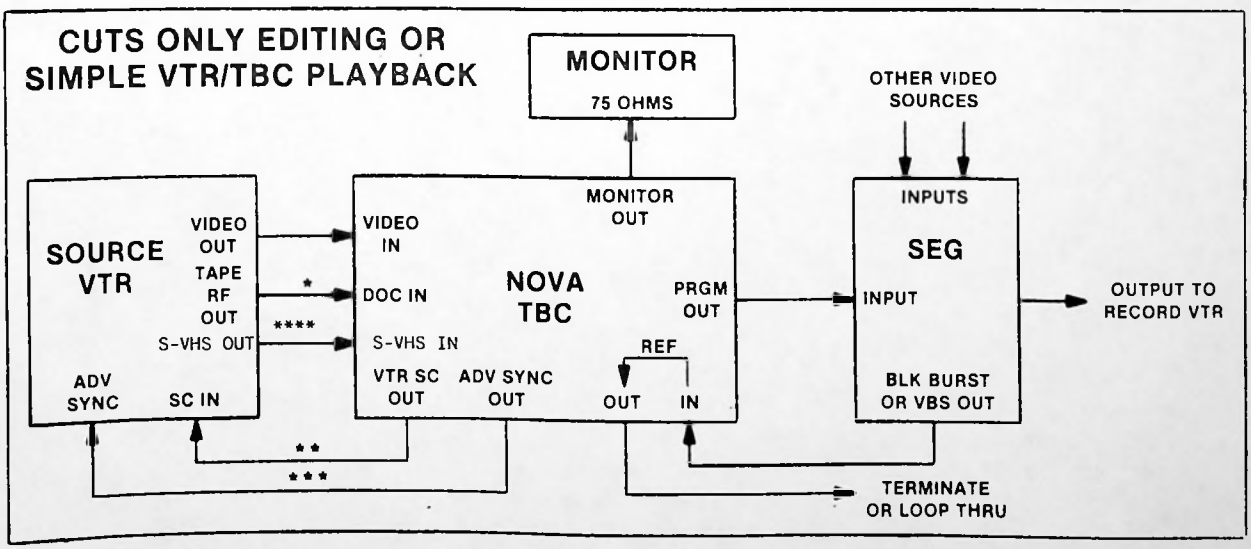
1. Wrap the equipment in plastic sheeting or enclose in a plastic bag.

2. Place the wrapped unit in a strong shipping container.

3. FILL ALL EMPTY SPACES BETWEEN THE WRAPPED UNIT AND SHIPPING CONTAINER WALLS WITH RESILIENT PACKING MATERIAL, ELIMINATING ALL MOVEMENT OF THE EQUIPMENT INSIDE THE SHIPPING CONTAINER. NO PART OF THE UNIT SHOULD BE CLOSER THAN 2 INCHES FROM ANY SURFACE OF THE SHIPPING CONTAINER.

4. Seal the container with reinforced tape. Mark the shipping container "FRAGILE, ELECTRONIC INSTRUMENT".





* TAPE HEAD RF IF AVAILABLE
** SUBCARRIER REQUIRED WITH NOVA 501.
1/2" VTR'S DO NOT HAVE SUBCARRIER INPUT
*** ADVANCED SYNC REQUIRED WITH NOVA 501 AND 511.
REFERENCE MUST BE BLACK BURST OR VBS
**** FOR S-VHS VTR OPERATION

FIGURE 2.1

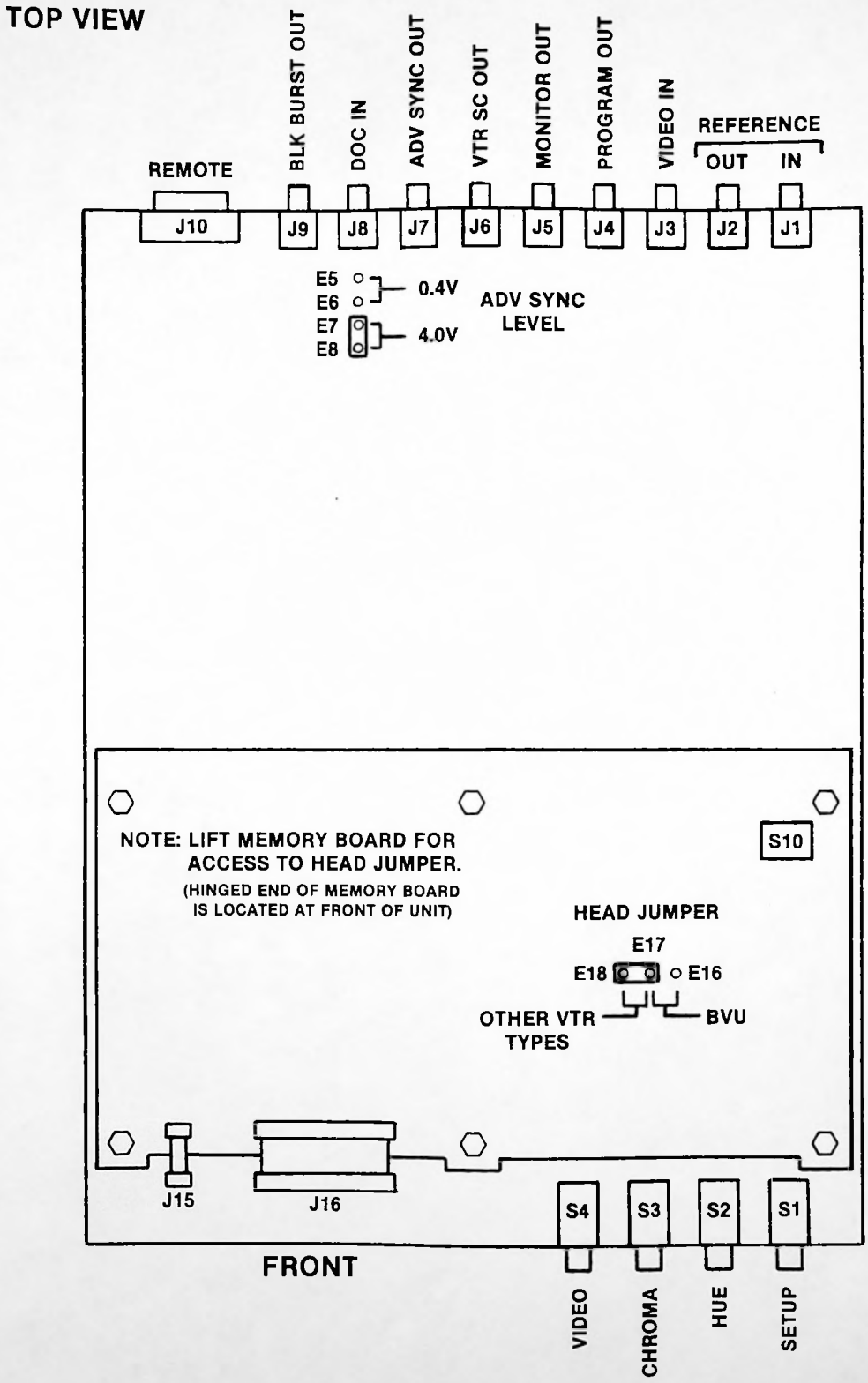

TOP VIEW
BLK BURST OUT
DOC IN
ADV SYNC OUT
VTR SC OUT
MONITOR OUT
PROGRAM OUT
VIDEO IN
REFERENCE
OUT
IN
REMOTE
J10
J9
J8
J7
J6
J5
J4
J3
J2
J1
E5
E6
E7
E8
0.4V
4.0V
ADV SYNC LEVEL
NOTE: LIFT MEMORY BOARD FOR ACCESS TO HEAD JUMPER.
(HINGED END OF MEMORY BOARD IS LOCATED AT FRONT OF UNIT)
S10
HEAD JUMPER
E17
E18
E16
OTHER VTR TYPES
BVU
J15
J16
S4
S3
S2
S1
FRONT
VIDEO
CHROMA
HUE
SETUP

FIGURE 2.2

FRONT PANEL SLOT ADJUSTMENTS

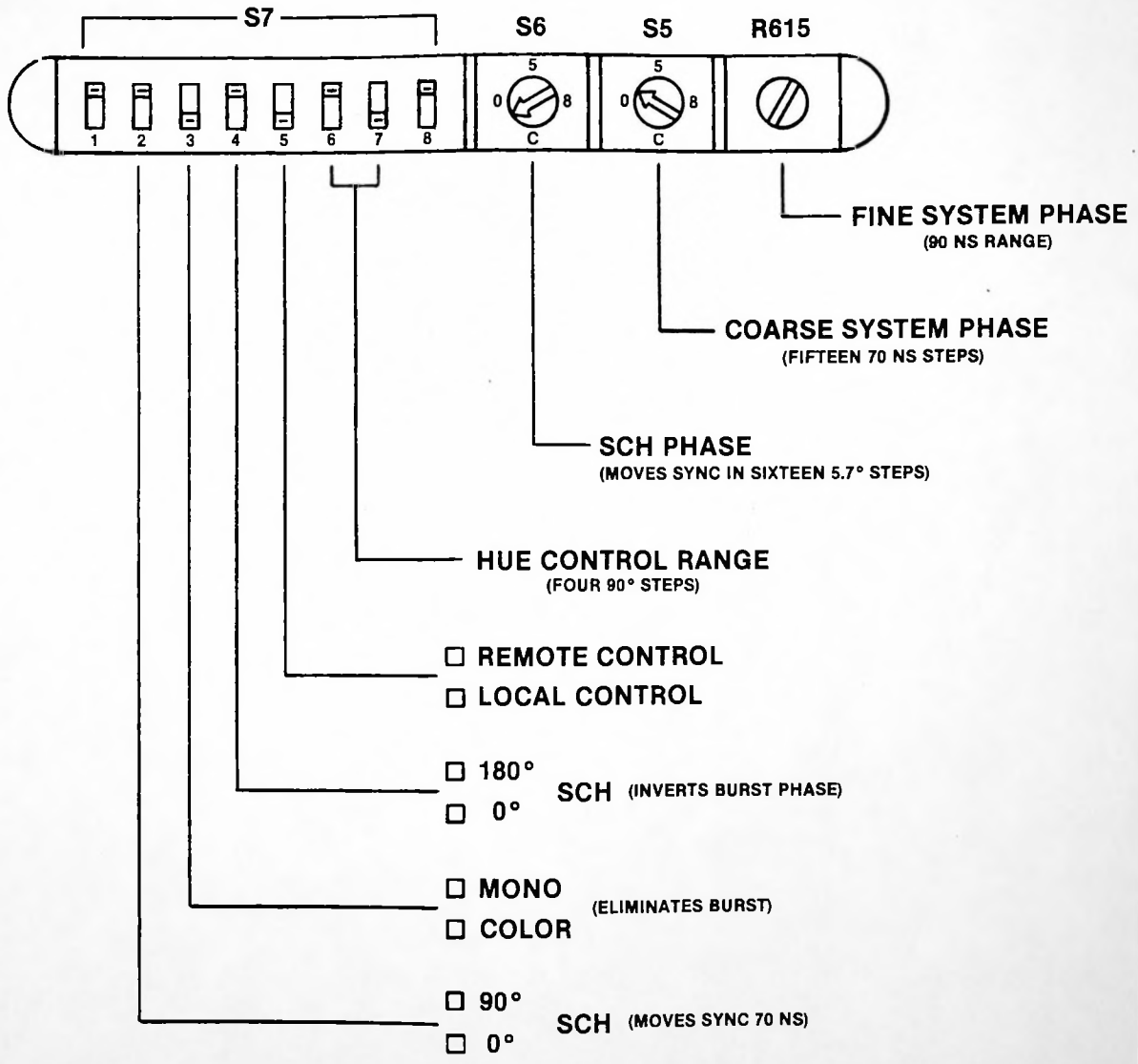


FIGURE 2.3

SECTION III - OPERATION

3.1 GENERAL

A. VIDEO INPUT LEVELS

The NOVA 620S operates with standard signal levels. For best results, the composite input signal should be 1.0 Volts, p-p ±3dB; the Y (S-VHS) signal 1.o Volts p-p; and the C (S-VHS) signal 285 mv (burst level).

B. AC POWER INPUT

The NOVA 620S has its own removable power cord and front panel POWER switch. (See Section II, INSTALLATION) Applied AC power should be 110-130VAC, 50/60Hz, single phase.

3.2 FUNCTION OF THE CONTROLS/INDICATORS

BYPASS/S-VHS/COMPOSITE Switch

In the COMPOSITE mode, the INPUT video signal will appear at the PROGRAM and MONITOR output BNCs as a stable time base corrected signal with new sync and burst added.

In the S-VHS mode, the signals at the S-VHS connector on the rear of the 620S will appear at the PROGRAM and MONITOR Outputs as a composite, stable time base corrected signal with new sync and burst added.

In the BYPASS mode, the INPUT video signal will appear unprocessed at the PROGRAM output BNC. The MONITOR output BNC will be at color black. The S-VHS input is not bypassed to the PROGRAM Output.

VTR-SC/TEST/HETERO Switch

In the VTR-SC mode, the 620S requires that subcarrier from the rear panel of the 620S be sent to the VTR source deck (see VTR Application Chart for VTR's with Subcarrier Inputs). This enables the VTR to generate a chrominance signal which is referenced to the luminance portion of the video signal from the source VTR. This applies to certain S-VHS source tape recorders as well. Luminance bandwidth in the VTR-SC mode is limited only by the bandwidth of the source VTR. In the HETERO mode, the 620S does not require that subcarrier be fed back to the source VTR.

The NOVA 620S converts the unlocked chrominance signal to one which is referenced to the luminance portion of the video signal in both COMPOSITE and S-VHS modes.

The TEST mode applies a full field color bar signal to the Program and Monitor outputs regardless of the inputs.

3.2 FUNCTION OF THE CONTROLS/INDICATORS (continued)

FIELD FREEZE Control

When activated, the LED contained within the switch will be illuminated and Field 2 of the input video signal at the time the button was depressed will be "frozen" and displayed as a full frame video signal. To de-activate, again push the Field Freeze button.

FRAME FREEZE Control

Operates in the same manner as the FIELD FREEZE control. It "freezes" one complete frame of video which, if there is motion on the incoming video, will cause a "flutter" on the display. Depressing the FIELD FREEZE control will cause only Field 2 to be displayed, eliminating the inter-field flutter.

RATE Control

When the control is pulled out, the frozen field or frame will be updated at a rate determined by the position of the RATE Control knob. Maximum clockwise position is the fastest update rate, while counter-clockwise is the slowest update rate.

VIDEO Level Control

This control adjusts the video signal level by approximately $\pm$3dB.

CHROMA Level Control

This control adjusts the chrominance level by approximately +3, -9dB.

HUE Control

This control adjusts the phase of the chrominance by approximately 100°.

SETUP Level Control

This control adjusts the black level of the video signal by $\pm$9 IRE.

REFERENCE Indicator

This is illuminated when there is a video signal applied to the REFERENCE BNC.

INPUT Indicator

This is illuminated when there is a video signal applied to the INPUT BNC or the S-VHS connector.

3.2 FUNCTION OF THE CONTROLS/INDICATORS (continued)

L Indicator

This is illuminated when the peak input video signal is less than 96 IRE.

N Indicator

This is illuminated when the peak input video signal is between 96 and 104 IRE.

H Indicator

This is illuminated when the peak input video signal is greater than 104 IRE.

Special Controls

There are several controls accessible from a slot in the front panel. Figure 2 shows these and describes their functions.

3.3 INTERNAL FUNCTIONS/CONTROLS

The following is a list of controls accessible on the NOVA 620S circuit board by removing the top cover.

Control	Type	Description
E5	Jumper	Adjusts ADVANCED SYNC LEVEL. (see Figure 2.2).
E18	Jumper	See Figure 2.2. Factory set to E17-18 position. This need not be changed. Optimum performance will be obtained from VTR's whose head switch is during the vertical interval by changing jumper position to E16-17 position, although this is not necessary.
S10	Dip Switch	Very COARSE HORIZONTAL PHASE adjustment. Positions 1, 2 and 3 adjust H phase in multiples of 1.2μ sec. steps.

The above describes the user-selectable internal controls. For other adjustments, consult Sections IV-VI of this manual, or the factory.

I M P O R T A N T

IN ORDER TO OBTAIN SECTIONS IV, V, AND VI, RETURN WARRANTY CARD TO NOVA SYSTEMS, INC. PER INSTRUCTIONS LOCATED IN SECTION I OF THIS MANUAL!

nova
SYSTEMS, INC.

Thank you for returning the warranty card for your NOVA Time Base Corrector. NOVA SYSTEMS is pleased that you have chosen our TBC for use within your organization.

Enclosed is the remainder of your manual:

Section IV - Theory of Operation

Section V - Maintenance

Section VI - Schematics

If we can be of further service to you, please do not hesitate to call us.

50 Albany Turnpike, Canton, CT 06019 (203) 693-0238

SECTION IV THEORY OF OPERATIONS
NOVA 620

Sheet 1

The front panel Hue, Chroma Level, Video Level and Setup controls and the associated preset switches are fed to analog multiplexers U123 and U124.

Front panel switches S7, position 5 selects either the local control or the remote control signals from Remote Control connector J10. The Bypass/Test/ Operate switch logic level signals pass through multiplexer U131. U123 selects either the local Process/Direct signal or the remote Process/Direct signal.

Freeze Field and Freeze Frame logic level signals from the front panel buttons pass from the Freeze Board Assembly to U130, which selects either the local or remote Freeze signals. Similarly, U123 selects either the local or remote Rate controlsignals. The Rate control and On/Off signal determine the frequency of STROBE/ pulses from the Rate Board Assembly. The DC Rate voltage is applied to amplifier U1, which has a gain of two. This varies the current through Q1, which adjusts the rate of the charge/discharge cycles of U2. U2 output sets U3, which is synchronized to the system vertical rate by the frame rate signal generated by U4.

Sheet 2

The Reference composite video signal is amplified by U1 with a gain of about 2.3. Chrominance is removed by the filter comprised of C7, C8, C10 and L4. Sync tip is clamped by U2 pin 4, and sync detected by comparator U3. This composite sync pulse is applied to vertical integrator U4, which generates a ramp whose amplitude increases during the vertical sync pulses. Comparator U3 senses when the amplitude has passed a predetermined level, between the first and second vertical sync pulses. The output of U3 triggers U7 and generates the VREF pulse, whose duration is 35 usec. The output duration of the other half of U7 is more than one field so U7 13 is high all the time that vertical pulses are present at the Reference Video input. One shots U5 and U6 generate horizontal pulse to be used in other circuitry.

Burst is separated from the Reference video by U21. This comparator accepts the band pass filtered chrominance via filter L6, C44 and C45 and, with the burst gate signal BG from U5, passes only the regenerated burst signal through low pass filters L7, C49, C50 and C51. This is used by the phase locked loop on page 3 to lock the internal sync generator to the Reference video signal.

Sheet 3

The separated burst signal from the Reference video enters phase comparator U22. Here it is compared with a 3.58 MHz signal generated from the 14.31818 MHz crystal oscillator formed by U25 and Q7. A signal representing the phase difference (error) between U22 pin 1 and pin 10 is developed at pin 12 and coupled by Q4 to switch U23. During the CLMP pulse the error voltage is clamped to ground and sampled during BG time. Capacitor C61 holds the error voltage, which is buffered and amplified by U24. The oscillator formed by U25 and crystal Y1 has its frequency controlled by the voltage on varactor diode CR3. U26 buffers the resultant 14.31818 MHz clock. This clock is divided by four at U10, and applied to one shot U9. The width of the pulse at U9 13 is controlled by the voltage at R34. U8 controls this voltage by comparing the duty cycle at U9 4 with the voltage generated by front panel H Phase control R615. U9 5 generates a 3.58 MHz square wave which is filtered by C53, C54, C56 and L8 and fed to phase comparator U22, completing the loop.

SYNC GENERATOR

U118 is an NTSC sync generator which takes a reset pulse, RST/ from page 4, and synchronizes U118 with the Reference input. U117 buffers these Reference sync pulses.

Sheet 4

ANTI CYCLE HOP CIRCUIT

U95 is toggled every horizontal line by U107. This causes a constant phase of the 3.58 MHz Reference signal to be applied to U95 11. The pulse generated by U19 pin 12 allows U95 8 to be cleared when U19 12 is low. This enables U16 to set on the trailing edge of U19 12, turning Q83 off, and letting Q82 charge up C413. The next rising edge of the 3.58 MHz signal at U95 11 sets U95 8, clearing U16 6, allowing Q87 to discharge C413. If the charge time is long enough, U15 will be triggered, allowing U95 9 rising edge to set U16. If U16 were set each line, amplifier U17 6 would be at +12 volts, reducing U12 19 width to a minimum 300ns. If U16 were not set each line, U17 6 would be at 4.3 volts, and U12 19 width would be at 700ns. This circuit therefore tracks the change in the sync to subcarrier relationship of the Reference video, since U19 12 is generated by the Reference horizontal sync signal while 3.58 is generated by the burst phase locked loop. If the SCH change causes the voltage at U17 6 to be higher than +9.4 volts or lower than 4.7 volts, U18 is triggered and U19 pulses once per field. This pulse reverses the phase of the U95 flip flop and thereby causes the pulse width of U19 12 to shift by 140ns. The pulse from U95 9 resets counter U13 and U14 once per line. The setting of S5 and S10 determine how many clock pulses will be counted before RST/ is generated. RST/ is generated during the one line per frame when VREF is high. This signal resets the sync generator IC, and locks the internal sync generator to the Reference Video Input.

Sheet 5

PROGRAM VIDEO PROCESSING

The Video Input signal passes through relay K2 and to the PROGRAM video out BNC via K3 if power is off or the BYPASS/ signal is activated. If the relays are energized, the Video Input signal passes to amplifier U27, which has a gain of 2.3. At the same time, Q90 Q94 separates sync from the incoming video signal and generates a back porch clamp pulse to FET Q14. The DC level of back porch is sampled and held by C764. The difference in voltage between the U29 pin 2 voltage and the U29 pin 3 voltage develops a DC voltage at U29 pin 6, which adjusts the back porch level to be at approximately .8 volts. The clamped video is buffered by Q13, and either the Processed Video from the heterodyne processor or the wideband clamped video is passed through switch U48, dependent upon the state of the PROCESS signal. When high, U48 3 passes to U48 4.

Sheet 6

The video level is controlled by buffering and amplifying the VIDEO LEVEL signal from the front panel via U61. The light dependent resistor U60 has two sections, one of which is fed back to U61 to stabilize the resistors. The other half acts as a variable attenuator with R702 to vary the video level. R380 allows the Video Level to be calibrated.

The chroma level is controlled by amplifier U63 and the CHROMA LEVEL signal from the front panel. Multiplier U62 accepts a control signal from U63 and varies the chroma level at pins 9 and 12. The resultant current change is added to the video signal in the amplifier formed by Q51 Q54. This signal is passed through a low pass filter, and buffer transistor Q55, to the A/D converter U176.

The back porch level at U176 is stabilized by the DIGCLMP feedback signal at U48. This voltage is sampled by U64 and C272 during burst time of the active picture, and controls the DC voltage of back porch at the A/D. This is approximately 0.5 volts at U76 pin 21.

Sheet 7

The digital data from the A/D, B0 B7, is latched by U77. The resultant signal, and the signal two clock pulses later at U79, are added by U83 and U84. The resultant sum is applied to PROM U91, which develops the previously described DIGCLMP signal, as well as BLKCLIP/ and two signals which are active if the video is above 10QIRE, or betwen 97 and 103 IRE. The latter two signals are latched at U89, and, via U93, applied to latch U94. Once per field, U94 is latched by the Input vertical pulse. These then illuminate one of the L N H LED's on the front panel.

The buffered video at U80 is transmitted to the memory as AD0 AD7. Should the luminance level go below binary number 60,1k the BLKCLIP/ signal is activated. This causes PROM U86 to disable the output of U80, and enable U81, which presents a level of 60 to the memory regardless of what level the original level was. The other inputs to the PROM controls the PROM outputs so that the appropriate levels are presented to the memory board for other control conditions.

DROPOUT DETECTOR

The off tape RF signal is amplified by Q46, and rectified by CR19. When a dropout occurs, the level at U55 pin 5 changes abruptly causing U58 8 to go positive, triggering U59. When the signal at U59 is applied to U86, the AD0 AD7 lines are forced to be all 1's. This is carried through the memory and decoded as the dropout signal.

Sheet 8

Input video from the imput amplifier is applied to the sync stripper formed by U49 and U36. One shot U33 is triggered by the stripped sync signal to develop clamp pulses during sync tip and back porch. The video at U49 10 has sync tip clamped to ground, while the video at U49 13 has back porch clamped to ground.

The resultant signal has a half sync amplitude at 0 volts. This is amplified by U49, and triggers U50, whose output is stripped sync. U51, U52, U82 and U87 separate vertical sync from the signal in a manner identical to the vertical sync separators in the Refernce circuitry.

U42 generates a window pulse which is clocked by the trailing edge of the sync pulse at U40 pin 11. If the sync pulse is not of the proper width, there will be no pulse to U43. The output of U43, on pin 5, generates a sample pulse to the horizontal phase locked loop, while IBG/ is utilized to clamp the other parts of the system circuitry.

Sheet 9

The SAMPLE signal closes switch U35, which samples the ramp signal generated by U34 and switch U35 via signal RAMPEN/. The sampled voltage is held by U233 and amplified by U78. The voltage at U78 pin 7 is applied to varactor diode CR33, which changes the frequency of the oscillator formed by Q61 and Q62.

The Advanced Sync pulse is developed when a control signal from the memory board triggers U59, which presets sync generator IC U56. This results in a sync waveform which is half a field advanced with respect to the Reference Sync (16 lines for the nova 501 and nova 511). Q32 Q34 develops the 4 volt advanced sync waveform. Jumper E5 E8 selects either 4 volts or .04 volts of sync.

Sheet 10

Counters U96 U98 count clock pulse and is reset once per line. The counter outputs feed PROM U103 which develops the IHEN and RAMPEN/ pulses which are used by the phase locked loop and memory to control the clock frequency and also allow data entry to the memory.

The IHEN signal clocks counters U99, U100 and U105. These count vertical lines, and feed PROM U106. The PROM outputs generate the vertical timing pulse L10 20/, IWRST/ and the sample inhibit pulses INHSMPL/ and JSMPL/.

The input frame pulse is generated by U110 which latches the H/2 pulse from U110 5 with the L10 20/ signal.

The subcarrier which demodulates the chrominance signal and generates the VTR subcarrier signal is developed by selecting one of four quadrature 3.58 MHz signals via U108, as determined by the position of front panel switch S7 position 6 and 7. The selected subcarrier signal triggers U54, whose pulse width at pin 13 is controlled by the voltage at U55 pin 1. As the HUE control voltage from the front panel is varied, U55 amplifies it. The voltage is stabilized by sampling the duty cycle at U54 4 and comparing it with the HUE control voltage at U55 3. The 3.58 MHz pulse train triggers U54, which distributes the signal to the chroma modulator as MODSC, and VTR SC Out on the rear panel, via driver Q31.

Sheet 11

The digital data from the memory is latched by U133, and sent to adder U125, U132. The other adder input comes from the SETUP circuitry. The setup word is generated by digitizing the analog setup voltage from the front panel. Four bits from A/D U145 go to the adder, with the most significant bit becoming the sign bit. If the setup word plus the video word exceeds the all 1's condition, U136 is set, and U138 is disabled, U139 enabled. U139's input is set to all 1's to keep the video clamped to peak white. Similarly, if the setup level causes the video level to go below all 0's, the level is clamped to 0 and U139.

The horizontal blanking signal is generated in PROM U115, fed by counter U126 U128, which is reset every line. In addition U115 and PROM U113 generate the color bar test signal. When the front panel TEST/ signal is active low, U113's output is applied to the input of latch U133 and becomes the signal which goes to the D/A converter.

Sync and burst are generated digitally. This is accomplished as follows:

A burst gate signal, BBG, allows counter U147, U148 to count, feeding PROM U141. This PROM develops the burst signal, which is applied to latch U140. U141 is enabled only during burst gate time, by BBG/. At the same time, sync PROM U142 is disabled. This PROM accepts as its input five successive composite sync signals, each delayed by one clock pulse by U132. Switch S6 allows 16 different positions of the sync to appear at the output of U142. Thus the relationship between the sync and burst signal is changed in 5.7 degree steps. The output of U140 is wire or'ed with the output of U138 and U139. Only one of the three is enabled at a time. The output of the latches then goes to the D/A converter on page 12.

Sheet 12

DIGITAL TO ANALOG CONVERSION

D/A Converter U68 converts the digital video/sync/burst signal to an analog signal at U68 pin 16. Amplifier U67 increase the signal gain from the D/A by a factor of 2.5. The filter consisting of L49, L50 and the associated capacitors eliminates any 14.3 MHz components in the signal. The video passes through buffer Q64 and switch U70 to the output amplifier formed by U69, U62 and their associated resistors and capacitors. Gain of this stage is 2.7. R414 and R415 provide a 75 ohm termination and isolate the Program Video Output from the Monitor Output.

BLACK BURST OUTPUT

The composite blanking signal from U116 pins 6 and 8 switches the blanked portion of the video from U69 with the setup level determined by R412/413. Q48 buffers the black burst signal.

OUTPUT CLAMP

The back porch DC level is sampled by U65 pins 8 and 9 when the NBG signal closes the U65 switch. The level is held in C302, and an error voltage is developed in U66. The error voltage maintains the DC level of back porch at approximately 0 volts by changing the offset feeding back to U67.

FREEZE MODE CONTROL

PROM U135 accepts control inputs NHB/, HB/, FREEZE/ and RVD/ and provides control signals to FET switch U70. The control signals select either the normal video (pins 8 9), FRZVID, which is the video from the freeze processing circuits on p15 (pins 11 16) or blanking level set by R783/784 (U70 pins 4 3).

Sheet 13

INPUT VIDEO PROCESSING

Wideband video from the input (Y+C) is low pass filtered by the circuit formed by L18 L20 and its associated capacitors to a 2.5 MHz bandwidth. Q20 and Q21 provide delay equalization for the filtered luminance. U30 amplifies the signal by 1.5 and passes it on to U32. The luminance signal is buffered by Q26, delayed by 300ns in DL3, buffered by Q23, and sent to amplifier U47 on sheet 14.

The bandpass filter formed by L16, L17, L716, L717 and associated components eliminates the low frequency components of the video signal, and passes this to U32 pin 12. This signal also passes through 1 line delay DL2 to U31 where it is subtracted from the un delayed signal from R127. The resulting signal represents the comb filtered chrominance component of the video. This is passed to U32 pin 13. Switch U32 selects either the comb filtered chrominance (pin 13 14) or the bandpass filtered chrominance (pins 12 14) to be passed through by U32, buffered by Q27 and passed on to the chroma demodulator (p14). The low pass filtered luminance is always passed to Q26, as described above.

Sheet 14

HETERODYNE PROCESS

The separated chrominance signal DEMOD CHROMA is applied to chroma demodulator IC U44. This IC locks to burst on the input signal and provides R Y and B Y outputs. These are low pass filtered to eliminate 7.16 MHz components. Back porch is clamped to ground by Q57 and Q85 and applied to modulator IC's U45 and U46.

These balanced modulator IC's phase modulate quadrature 3.58 MHz signals at pin 10 of U45 and U46 to provide a re modulated chrominance signal at U45 12 and U46 6. Balance potentiometers R263 and R264 null out any residual subcarrier. Q42 Buffers the chrominance signal and applies it to amplifier U47. As previously described (page 13) the luminance is added back at this point to become the composite video signal PROC.VIDEO which is further processed on p5.

Sheet 15

FREEZE DEMOD/REMOD

The video from the memory is unchanged during "Freeze" operations. Therefore, the phase of the chrominance must be inverted every other frame to maintain the proper chrominance subcarrier relationship. This is accomplished as follows:

The wideband D/A video is low pass filtered and equalized by L48, L53, L54, Q66, Q68, DL 4 and associated components, and applied to amplifier U71. The D/A video is also bandpass filtered by L55/C341, buffered by Q67 and Q69 and fed to demodulators U72 and U73. Quadrature subcarrier signals formed by Q71, Q72 and Q73 demodulate the chrominance signal to baseband R Y and B Y. This subcarrier is inverted every other frame to maintain proper R Y and B Y phases. The R Y and B Y signals are filtered and clamped before being applied to modulators U74 and U75. The modulating subcarrier is formed by Q78, Q79 and Q80. Modulated R Y and B Y signals are added at U74 12 and U75 6, buffered by Q70 and fed to amplifier U71, where it is added to the luminance signal. U64 pins 5, 6 and 7 compare the back porch levels of the normal video and the FRZVID video and maintain the FRZ VID at the same level as the normal (unfrozen) video.

525L MEMORY
Sheet 1

MEMORY ARRAY

The 2 field memory consists of U36 U41 and U52 U57. These memories write data to the I0A,B,C I7A,B,C input ports and read data from the O0A,B,C O7A,B,C ports. The memory control signals are generated from the control PROM's on sheets 2, 3 and 4.

MEMORY INPUT

The 8 bit digital data stream from the A/D converter, AD0 AD7, are applied to FIFO U8 via terminating resistors RN1. The FIFO is controlled by input and output clocks derived from the input and reference oscillators on the system mother board. ICK4 is differentiated by C57/R9 and applied to the FIFO input clock. Reference clock CK9/ is gated on by ALIN and sent to the FIFO output clock port. The FIFO data output is shifted through registers U19, U20 and U21 where it is split into three phases and applied to the memory array.

The memory output is converted from a three phase parallel output to a serial output in the eight shift registers U1 U7 and U22. U35 decodes the output all 1's state, and latches it in U10. This indicates a dropout had occurred at the input.

Sheet 2

MEMORY CONTROL READ

The memory control signals are generated by PROM's. The PROM's which control the read functions are U31 and U33. These accept inputs from the horizontal counters U15 U17 and, via latches U30 and U32, send control signals to the memory array.

The memory read side line counter, U73 and U75, feed address MPX/ drivers U68 U71 with the read line count (one of 256 lines per field). The write address lines come from memory schematic sheet 3 (WA0 WA15). The write control signal comes from PROM U28 on page 3 and are "wire or ed" with the read PROM output on U31. The address MPX/drivers are controlled by PROM U31 and U28.

525L MEMORY
Sheet 3

MEMORY CONTROL WRITE

Counters U12 and U13 count write memory cycles per line (256) and increment line counters U45 and U59 once per line. The write memory address lines go to the address multiplexer described on page 2. Write position counters U11, U14 and U47 are applied to PROM U28 and provide memory control signals as described on the previous page.

DROPOUT MEMORY

U25 is a 2k x 8 Random Access Memory which normally has written to it the data from the memory array via U24. When the DO signal is active, U25 reads from it the data written to it previously. This data repeats every two lines. Therefore, the data read from the memory was written there two lines earlier, when the chroma phase was correct. The output of the dropout memory on U24 is buffered by U23 and passed onto the motherboard and then the D/A converters.

Sheet 4

FREEZE PROCESSOR

The front panel (or optional remote control panel) freeze field/freeze frame buttons are buffered by U64 or U48 and distributed to the memory board. When in the freeze mode, these pulses inhibit the action of certain circuits to maintain proper chroma phase.

FRAME COMPARISON

The input and reference frames are compared by U50, U63 and U66. The resultant relative position of the input and reference are compared by PROM U34, and control the read or write position of the video (RVSHFT or IVSHFT) and the horizontal 2 clock pulse shift of the active picture when input and reference frames cross.

The input and reference frames are compared by U62 and set U81 when the input and reference frames cross.

SECTION V - MAINTENANCE

NOVA 511/620 TIME BASE CORRECTORS

EQUIPMENT REQUIRED:

OSCILLOSCOPE - 40 MHz min. Bandwidth
VECTORSCOPE
SIGNAL GENERATOR - Color Bars (Split Field)
- Ramp with/without Modulation
- Sin2 2T Pulse and Bar
- White Field with Bounce

DIGITAL VOLTMETER

---

1. Check and adjust power supply voltages at the input power connector as follows:

+ 5:	+ 5.05	±	.02	_____ Volts
+12:	+12.00	±	.2	_____ Volts*
-12:	-12.00	±	.1	_____ Volts

*Fixed, not adjustable.

---

2. Page 2
   Trigger: V
   Signal: Color Bars
   Probe: U3-13, 12
   Procedure: Adjust R-16 so leading edge of negative pulse on U3-12 falls between the bottom and first small step on the ramp of U3-13 _____ OK

---

3. Page 2
   Trigger: NA
   Signal: NA
   Probe: NA
   Procedure: Verify REFERENCE PRESENT LED goes on with the reference present and off with the reference removed _____ OK

---

4. Page 3
   Trigger: H, 50ns/div.
   Signal: None
   Probe: U24-7
   Procedure:
   a. Turn R62 until U24-7 voltage is 1.8 ± .2v _____ OK
   b. Adjust C67 until U117-8 waveform is nearly synchronous with trigger _____ OK
   c. C67 adjustment must make U117-8 go both left and right. If not, readjust R62 _____ OK

---

5. Page 11
   Trigger: V, 2us/div.
   Signal: Color Bars
   Probe: NA
   Procedure: a. Push SETUP control in. Adjust R595 (U144) for zero setup _____ OK
   b. Pull SETUP control out. The setup levels at both extremes should be symmetric about black with 15 steps on either side of 0 _____ OK

6. Page 8
   Trigger: H, 2us/div. x10
   Signal: Color Bars
   Probe: U40-11, 12
   Procedure: Center positive going edge of pin 11 on scope graticule. With probe on pin 12, adjust R196 and R198 so pulse overlaps pin 11 by +1us and -1us _____ OK

7. Page 8
   Trigger: V, 50us/div. x10 (200mv/div.)
   Signal: Color Bars
   Probe: U52-5, 6
   Procedure: Adjust R317 so leading edge of negative pulse on U52-5 falls between the third and fourth small "steps" on the ramp of U52-6. This will be approximately 105us from the beginning of the ramp _____ OK

8. Page 8
   Trigger: V, 50ms/div. x10
   Signal: Color Bars
   Probe: U82-12, Output of TBC
   Procedure: Adjust R775 so that the positive edge of U82-12 occurs 5us before the end of the last broad pulse _____ OK

9. Page 9
   Trigger: V, 2ms/div.
   Signal: TP2 (U152)
   Procedure: Adjust R792 to mid-range. BYPASS/OPERATE switch in OPERATE: Adjust L719 for a voltage of -5.0 volts $\pm$ 1.0 volts _____ OK

10. Page 6
    Trigger: H, 5us/div.
    Signal: Color Bars
    Probe: NA
    Procedure:
    a. In OPERATE mode with all front panel switches pushed in, adjust R381 until peak chroma level is at the Y bar level _____ OK
    b. Adjust R380 until chroma vectors fall in boxes on vectorscope. "N" front panel LED should be on. If not, a slight adjustment of R427 may be necessary. _____ OK

11. Page 9
    Trigger: H, 2us/div. x10
    Signal: Color Bars
    Probe: NA
    Procedure: Turn R788 cw until left edge of picture does not move. Adjust R788 ccw until left edge lines up with left edge of signal in BYPASS mode. Edge should move by at least 100ns _____ OK

12. Page 6, 12
    Trigger: H, 10us/div.
    Signal: Multiburst/sweep
    Probe: NA
    Procedure:
    a. Adjust C530 (U62) for least sweep roll off at Program Output BNC _____ OK
    b. Adjust C322 (U67) for least sweep roll off at Program Output BNC _____ OK

13. Page 7
    Trigger: NA
    Signal: NA
    Probe: NA
    Procedure:
    a. Remove input, see that INPUT LED goes off _____ OK
    b. LOW-NORM-HIGH LEDs go on _____ OK

14. Page 10
    Trigger: H, 2us/div. x10
    Signal: Color Bars
    Probe: NA
    Procedure: Check subcarrier on rear panel (VTR SC), BNC terminated with 75 ohms:
    a. Should be sine wave with little distortion _____ OK
    b. Amplitude should be between 1.8 and 2.5 volts p-p _____ OK

15. Page 9
Trigger: V, 2ms/div. x10
Signal: Color Bars
Probe: ADV SYNC BNC (terminated in 75 ohms)
Procedure:
a. output signal should be 9ms in advance of the REFERENCE SIGNAL (620 only) _____ ms
b. with E5 in forward position, amplitude should be 4.5 volts ± .3V _____ V
c. with E5 in rear position, amplitude should be 420mV ± 50mV _____ mV
d. return E5 jumper to forward position _____ OK
e. output signal should be 1ms in advance of the REFERENCE SIGNAL (511 only) _____ ms

16. VTR OPERATION
Trigger: V, 2us/div.
Signal: Color Bars from VTR
Probe: TP2
Procedure: Connect VTR with VTR SC, ADV SYNC, VIDEO INPUT. Play back color bars.
a. Adjust R226 to mid-range. Adjust S7 - 6 and 7 until hue is as close to correct as possible. Adjust R226 for correct hue. Pull HUE control out and verify that range is ± 50 degrees min. _____ OK
b. Put VTR in reverse shuttle with scope at 5v/div. vertical. DC level should be no higher than -3 volts _____ OK
c. Put VTR in forward shuttle. DC level should be no lower than -8 volts _____ OK
d. Color bars should remain stable throughout picture _____ OK

17. Page (511 only)
Trigger: Ch 2 - Video Input, Vertical
Signal: "Live" action video from VTR, wrong field section
Probe: Ch 1 - U82 pin 12
Procedure: Adjust 32L memory VR1 until positive edge of U82 pin 12 is 5us in advance of the end of the fifth broad pulse. _____ OK

DOC TEST

1. Page 2
   Trigger: Channel 1, .2us/div., 200mv/div.
   Signal: Color Bars and DOC from VTR
   Probe: Q46-collector
   Procedure: Adjust R763 so Q46 collector just starts to limit (at approximately 1V p-p) _____ OK

2. Page 2
   Trigger: V, 2ms/div.
   Signal: Color Bars and DOC from VTR
   Probe: U58-6, U58-5
   Procedure: Verify U58-6 is 250mv more positive than peak of U58-6 signal. If not, adjust R357. _____ OK

NOVA 511/620 TESTS

1. Comb Filter
   Page 13
   Trigger: H, 10us/div.
   Signal: Multiburst (not sweep)
   Probe: Q15 base
   Procedure: Adjust C100 for equal amplitude on either side of 3.58 MHz. 3.58 amplitude approx. 250mV p-p _____ OK

2. Page 13
   Trigger: H, 10us/div.
   Signal: Multiburst
   Probe: U31-7 (AC coupled)
   Procedure: Adjust R127 for minimum 3.58 MHz amplitude
   Adjust L65, L68 for minimum 3.58 MHz amplitude
   Adjust R127 again
   3.58 MHz should go through a minimum _____ OK

3. Page 14
   Trigger: H, 5us/div.
   Signal: 2T Pulse and Bar
   Probe: U48-3
   Procedure: Adjust R147 (near U30) for optimum 2T response _____ OK

4. Page 14
   Trigger: H, 5us/div.
   Signal: Color Bars
   Probe: NA
   Procedure: Observe center dot with vectorscope at max gain. Adjust R263, R264 for minimum residual subcarrier (i.e., vectorscope dot centered). Recalibrate vectorscope _____ OK

5. Page 14
   Trigger: H, 5us/div.
   Signal: Color Bars
   Probe: Vectorscope, U44-12, 13
   Procedure:
   a. Short U46-1 to ground. Adjust vectorscope so color dots are vertical. Remove short. Short U45-1 to ground. Adjust R280 until color dots are horizontal _____ OK
   b. Adjust C200 for maximum chroma amplitude _____ OK
   c. Adjust R232 for proper R-Y output on U44-13 _____ OK
   d. Adjust R231 and R249 for correct position of color bar vectors _____ OK
   e. Adjust R226 for proper hue (S7 position 6, 7 if needed) _____ OK
   f. Adjust R276 for proper chroma amplitude _____ OK

6. Trigger: H, 10us/div.
   Signal: Color Bars
   Probe: Program Output
   Procedure: Check gain in Process and Direct modes. They should be nearly equal. _____ OK

7. Page 14, 13
   Trigger: NA
   Signal: Color Bars from VTR
   Probe: Oscilloscope
   Procedure: Connect L20 (side closest to front panel) to U44 pin 5 with a 470 ohm resistor and 200pf capacitor in series. Adjust C500 for minimum circle diameter _____ OK

NOVA 620 TESTS

1. Page 1
   Trigger: NA
   Signal: None
   Probe: U154-7
   Procedure: With Rate Pot CW, adjust R810 for +4 volts on U154-7 _____ OK
   Turn Rate Pot CCW. U154-7 voltage should be approx. 10.5v _____ OK

2. Page 15
   Trigger: H, 10us/div.
   Signal: Multiburst (only)
   Probe: U72-1
   Procedure: Observe for proper roll off _____ OK

3. Page 15
   Trigger: H, 10us/div.
   Signal: Pulse and Bar
   Probe: None
   Procedure: Adjust R461 for best combination of pulse response and minimum luminance displacement in Freeze mode. _____ OK

4. Page 15
   Trigger: H, 10us/div.
   Signal: Color Bars
   Probe: Vectorscope/None
   Procedure: In Freeze:
   a. Short U75-1 to ground. Adjust vectorscope so color dots are vertical. Remove short. Short U74-1 to ground. Adjust R544 until color dots are horizontal. _____ OK
   b. Adjust C377 for maximum chroma amplitude _____ OK
   c. Adjust R515, R516 to approximately center of range _____ OK
   d. Adjust R477 to approximately normal chrom level _____ OK
   e. Select SAT capacitors (approx. 100pf-250pf) C784, C786 for approximately correct hue _____ OK
   f. Adjust R521, R526 for minimum residual subcarrier _____ OK
   g. Adjust R515, R516, R477 for proper freeze output (change C784, C786 if needed) _____ OK

5. Page 15, 1
   Trigger: H
   Signal: VTR
   Probe: None
   Procedure: Observe tape with no Sync to VTR.
   Put in Freeze Frame mode, strobe on.
   Strobe rate is from approximately 2 per second to 1 every three seconds _____ OK
   Quality of freeze, resolution, etc. good _____ OK

"S" BOARD TEST PROCEDURE

1. Trigger: H
   Signal: Color Bars / "S" and Composite 1
   Probe: None
   Procedure:
   a. In direct mode, adjust R3 for equal video level in "S" and composite _____ OK
   b. In direct mode, adjust R22 for equal chroma level in "S" and composite _____ OK
   c. In hetero mode, adjust R14 for equal video level in "S" and composite _____ OK

(FP) HUE — S2 10K — R573 51K — R572 4.7K — $-V_E$
(FP) CHROMA — S3 10K — R575 51K — R574 20K — $-V_E$
(FP) VIDEO — S4 10K — R578 10 — R579 51K — R577 50K — $-V_E$
(FP) SETUP — S1 10K — R571 51K — R570 10K — $-V_E$
(FP) REMOTE — S7 — LOCAL
+5V — RP4 4.7K
(SH3) $+V_{3A}$ — C469 .1
U124 CD4053 — C470 .1 — -12V
$+V_{3A}$ — C468 .1
U123 CD4053 — C471 .1 — -12V
+5V — U122 — LS00
2X1 MULTIPLEX SWITCH

SETUP — A — SH11
VIDEO LEVEL — B — SH6
CHROMA LEVEL — C — SH6
HUE — D — SH10
HETERO — E — SH5,10

+5V — RP5 4.7K
(FP) HETERO TEST VTR SC — S8 — W O T V

FREEZE BOARD ASSY — J12
S18 10K — RATE SW — BLU VIO YEL ORN GRN — R606 51K — R609 10K — $+V_E$ $-V_E$
(FP) RATE

S11 — DN — RED WHT BLK — R608 4.7K — R612 240 — +5V
S12 — BRN GRY — R607 4.7K — R611 240
(FP) FREEZE FRAME
(FP) FREEZE FIELD

U154 TL082 — R813 51K — C810 .1 — R814 1K — R815 5K — C811 .1 — -12V
+12V — C809 .1 — R809 51K — R811 100K — R812 100K — R810 10K — -12V — RATE CAL.
+5V — R816 5.1K
+12V — R818 51K — Q98 — R817 100 — R819 10K — C812 22UF
+5V — C813 .1 — U155 NE555
+5V — U156 LS74 — +5V — U154 LS74 — STROBE/ — J16 20 — TO 525L MEMORY
+5V — U134 LS74 — +5V
RATE CONTROL

J16 — 1 2 3 4 5 — TO 525L MEMORY

R773 240 — J14 4 — J13 4 — RFRMLED — J10 21
R774 240 — J14 2 — J13 2 — RFLDLED — J10 23

U130 LS157 — U131 LS157
U88 LS04 — U151 S32 — U151 S32
J10 — +12V 2 15 — -12V 1 14 — GND 12 24 — REMOTE

FRZFRAME/ — J16 18 — TO 525L MEMORY
FRZFIELD/ — J16 19 — TO 525L MEMORY
BYPASS/ — F — SH5,10
PTEST/ — G — SH7
COMPOSITE/ — BV — SH5
U111 — LS00 — S-VHS/ — S-VHS E15 OPT

J15 — +5V 1 — GND 2 3 — TO 525L MEMORY

FROM 525L MEMORY — J16 — 38 FRZFRMLED/ — 37 FRZFLDLED/
SH10 — AY — IHZE9
SH8 — AR — IVB/

*NOTE: S9 = 2 POS SW ON 620
S9 = 3 POS SW ON 620S OPTION

+5V — RP5 4.7K
(FP) COMPOSITE S-VHS BYPASS — *S9

FROM REMOTE — J10 — 5 RSETUP — 4 RVIDLVL — 3 RCHLVL — 17 RHUE — 19 RPROC — 18 RRATE — 16 RRATEON — 22 RFRZFRM/ — 20 RFRZFLD/ — 6 RBYPASS — 7 RCOMP — 13 RVTRSC
J13 — 11 10 9 7 5 6 8 3 1 15 12
J14 — 11 10 9 7 5 6 8 3 1 15 12

L63 22UH — +12V — C453 22UF — C452 .1 — $+V_E$ (SH3)
L64 22UH — -12V — C454 22UF — C451 .1 — $-V_E$

FOR GENERAL NOTES SEE SHEET 2

nova — 50 Albany Tpk. Canton, CT 06019
SCALE — DATE 2-3-87 — APPROVED BY — DRAWN BY MBA
SCHEMATIC DIA — NOVA 620/620S
REV B 11-18-87 — DRAWING NUMBER

BD REV J & UP

SHEET 1 OF 15

DIETZGEN MASTER FORM MF 139

(RP) REFERENCE IN

(RP) REFERENCE OUT

J1

J2

C2 100UF

C1 100UF

R1 470K

R2 51K

U1 CA3046

R4 5.1K

C3 .1

R37 4.3K

R3 3.3K

R6 1K

R5 5.1K

CR2 1N5231

R7 1K

C7 50

C8 10

L4 120 UH

C10 120

U2 CA3096

C11 2.2 UF

R8 10K

R12 2.0K

C12 .1

U3 TL514

C15 .1

CR1 1N5234

R13 5.1K

C14 .1

R9 270K

-12

CA3096 U2

R11 10K

R10 120

C13 .1

REF SYNC STRIPPER

CA3096 U4

R24 3K

R23 5.1K

R22 5.1K

R17 5.1K

C16 .047 UF

R15 5.1K

R18 6.8K

R19 5.1K

R20 5.1K

C17 .1

VERTICAL INTEGRATOR

R14 5.6K

VERT INT. CAL.

R16 100

R769 100

R770 10K

U3 TL514

C20 .1

C26 1000

U7 LS123

R29 47K

R31 100K

C28 .68UF

R30 5.1K

Q1

R32 240

DS5

+5V

(FP) REF.

J10 25

TO REMOTE

REFLED

REFPRSNT

VREF H SH4

VREF/BW J SH4

HREF K SH4

C27 .1

U5 LS221

U6 LS221

R26 62K

R27 51K

C22 1000

C23 120

R21 300

R25 39K

R28 30K

C19 100

C25 120

C18 300

C21 .1

C24 .1

CLMP L SH3

BG M SH3

BURST N SH3

R33 39 1/2W

Q2 78L05

C30 .33 UF

C29 .1

L3 22 UH

C6 22UF

C9 .1

L2 22 UH

C5 22UF

C4 .1

+12V

-12V

BURST SEPARATOR

C47 .1

R38 510

C44 200

C45 20

L6 47UH

R39 1K

U21 TL514

C51 8.2

L7 24UH

R41 510

C49 100

C48 .1

C50 100

R40 510

L700 22UH

C46 .1

SH3 Y RVD/

J11

1 -12 VOLTS -12V

2 +5 VOLTS +5V

3 +12 VOLTS +12V

4 GND

5

FROM POWER SUPPLIES

C705 22UF

C703 100UF

C704 22UF

C519 22UF

* .1 (TYP)

* C234, 238, 241, 242, 391, 394-396, 398-401, 417, 423, 427, 428, 430, 432, 438, 441, 445, 448, 449, 455-457, 464, 465, 472, 473-477, 479, 481-487, 490, 510, 515, 521-524, 527, 528, 532, 533

S-VHS OPT

+12V OE4

-12V OE3

+5V OE8

GND OE9

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) ALL RESISTOR VALUES ARE IN OHMS, 1/4W, ± 5%
   b) ALL CAPACITOR VALUES ARE IN PICOFARADS (PF) EXCEPT .1 CAPS WHICH ARE IN MICROFARADS (UF)
   c) ALL NPN TRANSISTORS ARE 2N3904
   d) ALL PNP TRANSISTORS ARE 2N3906
   e) ALL DIODES ARE IN4148
   f) ALL INDUCTOR VALUES ARE IN MICROHENRIES

nova 50 Albany Tpk. Canton, CT 06019

SCALE

DATE 2-3-87

APPROVED

DRAWN BY UBA

SCHEMATIC DIA - NOVA 501/511/620/620S

REV B 11-18-87

DRAWING NUMBER

8D REV J E UP

SHEET 2 OF 15

SH2 (M) BG
SH2 (L) CLMP
SH2 (N) BURST

PHASE COMPARATOR

ERROR VOLTAGE CAL.

REFERENCE OSCILLATOR 14.31818 MHz

FREQ CAL.

(FP) H PHASE (FINE)

SYNC GENERATOR

SQ CLOCK PHASE SELECT

TO FAN

SH4 (AB) RST/

CK2/ (Q) SH11
CK3/ J16 16 TO MEMORY
CK4/
CK5 (P) SH4
CK6/ (R) SH7,9
3.58 (S) SH4
3.58 (T) SH13
3.58/ (U) SH4

HD/ (V) SH4
RCS/ (W) SH11, 15
RBG (X) SH11
RVD/ (Y) SH2,4,11,12,9
RVD/ J16 21 TO MEMORY
ODD J16 14 TO 32L MEMORY
EVEN 33
RHD/ 35 TO MEMORY
RHD/ (Z) SH9,11
EVEN (AA) SH15

nova SYSTEMS, INC.	50 Albany Tpk. Canton, CT 06019
SCALE	APPROVED BY
DATE 2-3-87	DRAWN BY
SCHEMATIC DIA - NOVA 501/511/620/620S	
REV C 10-6-88	DRAWING NUMBER

BD REV L & UP

H PHASE - COARSE

H PHASE - VERY COARSE

H PHASE

SH3 P CKS

SH2 H VREF

SH3 Y RVD/

SH3 U 3.58/

SH3 V HD/

SH3 S 3.58

SH2 J REFPRSNT

SH2 K HREF

2H BV SH9

RST/ AB SH3

H/2 AC SH11

REFRAME J16 13 TO MEMORY

FOR S11 ONLY

ANTI CYCLE HOP CIRCUITRY

nova SYSTEMS INC.	50 Albany Tpk. Canton, CT 06019
SCALE	APPROVED BY
DATE 2-3-87	DRAWN BY NBA
SCHMATIC DIA-NOVA 501/511/620/620S	
REV C 10-6-88	DRAWING NUMBER

BD REV L & UP

SHEET 4 OF 15

SH1 (E) HETERO

SH14 (BS) PROC. VIDEO

SH12 (BM) PRGM VIDEO OUT

SH1 (F) BYPASS/

SH1 (AV) COMPOSITE/

(RP) VIDEO IN J3

J4 (RP) PROGRAM OUT

K3 -12V C762 .1

K2 -12V

+5V R204 10K R205 20K Q10 R203 3.9K Q9 R206 6.2K R202 6.2K -12V

C79 100UF C80 100UF R81 75 1%

U27 CA3042 R84 51K R83 2K -Vs

R82 680 R87 680 Q11 R85 120 C85 22UF U27

R92 680 Q13 R91 1K R90 1K -Vs CR7 R88 2.7K

R120 1K U27 -Vs

R101 2K R89 470 C87 33 L12 56UH

Q14 2N5555 TP1 Q92 R112 2K -12V

C90 150 +Vs C88 .1 C764 .47UF (C764 .012UF IN S-VHS)

U29 CA3140 R111 470K -Vs C95 .1 -Vs R100 27K R102 470K C89 .1

S-VHS OPT CV IN E13 E14 CLAMP VID

NOTE: REMOVE FOR S-VHS

R105 (S-VHS) 5.6K (ONLY)

INPUT CLAMP

S-VHS OPT Y+C IN E12 E11 Y+C OUT

*NOTE: REMOVE COAX FOR S-VHS OPT

U48 CD1053 +V7 (SH14) Q43 R296 510 R292 1K -V7 (SH14)

Y+C AD SH13

SYNC SEP VIDEO AE SH8

MOD VIDEO AF SH6

R109 1K R110 33K C91 200 R616 3.9K -12V

INSYNC AG SH8

+12V L13 22UH +Vs (SH13) C83 22UF C82 .1

-12V L11 22UH -Vs (SH13) C81 22UF C94 .1

+12V C505 .1 R97 10K Q90 C498 .47UF L14 2.2UH C497 1000 R106 1.8K -12V R98 100K -12V

+12V R104 1.8K CR6 Q93 Q94 R99 12K -12V

R103 560 C499 1500 Q91 R107 1K R108 1K Q12 R114 5.1K R113 5.1K -12V C92 .1

COARSE SYNC STRIPPER

nova 50 Albany Tpk. Canton, CT 06019		
SCALE	APPROVED BY	DRAWN BY
DATE 2-3-87		DBA
SCHEMATIC DIA-NOVA 501/511/620/620S		
REV B 11-18-87		DRAWING NUMBER

DIETZGEN MASTER FORM MF 136

SH10 (BA) JSMPL/

SH8 (AN) IBG/

SH7 (AJ) DIGCLMP

(SH13) +Vc

U48 CD4053

R703 2K

C220 .1

+Vc

+VB

R393 100K

C269 .1

R396 20K

U64 TL082

C270 .1

C272 47UF

R397 4.7M

C273 .1

-VB

(SH14) -V7

C219 .1

DIGITAL A/D CLAMP

+12V

R363 20

Q50

C258 22 UF

C259 .1

SH1 (B) VIDEO LEVEL

VIDEO LEVEL CAL.

R380 10K

R383 100K

R377 100K

C267 .1

C266 .1

R379 100K

U61 TL082

R382 33K

R376 100K

U61 TL082

C260 .1

R364 2K

CR223

R375 470

R365 100K

C261 .1

R366 3.3K

U60 VTL5C4/2

VIDEO LEVEL

SH5 (AF) MOD VIDEO

R702 1K

R369 1K

C263 22UF

R370 1K

R371 51

Q51

R391 680

C268 62

L43 33UH

R389 4.7K

C514 100UF

R708 47

U62 MC1495

R395 270

R384 10K

R394 1K

R367 470

R368 100

C262 22UF

Q53

Q54

Q52

CR224

R372 12K

R373 1K

R374 2K

C264 .1

R399 360

C279 68

C280 50

L44 8.2UH

C281 150

FREQ RESPONSE ADJ

C530 8-25

C282 39

L45 8.2UH

C283 68

R400 360

R403 510

Q55

R401 300

A/D FILTER

R378 22K

R392 5.6K

C765 .1

C271 .1

CHROMA LEVEL

CHROMA LEVEL CAL.

R381 10K

R385 51K

C274 .1

R386 6.2K

SH1 (C) CHROMA LEVEL

R388 51K

C275 .1

U63 TL082

R387 5.1K

C278 .1

R390 51K

U63 TL082

C276 .1

R398 1K

C277 .1

R618 51K

SH9 (AT) ICK3/

U151 S32

U151 S32

U88 LS04

(+5V)

C284 .1

C285 22UF

Q58 7805

R407 39 1/2W

+12V

C287 .33 UF

C937

C777 .1

C776 .1

+5V

C525 .1

R404 200

U76 UVC3100 A/D

B0-B7

SH7

C536

C530

R408 39 1/2W

-12V

Q60 7905

(-5V)

C520 22UF

C292 .33 UF

C293 .1

C289 .1

Q59 78L05

R406 39 1/2W

+12V

C288 .1

A/D CONVERSION

L68 22uH

+12V

+VB

C257 22UF

C255 .1

L71 22uH

-12V

-VB

C517 22UF

C516 .1

nova 50 Albany Tpk. Canton, CT 06019

SCALE

DATE 2-3-87

APPROVED BY

DRAWN BY NGA

SCHEMATIC DIA-NOVA 501/511/620/620S

REV B 11-18-87

DRAWING NUMBER

BD REV J & UP

SHEET 6 OF 15

SH8 (AQ) IV/

SH9 (AW) ICK7/

SH8 (AP) INPRSNT

U85 S374 — U84 256x4 — U92 S374 — VIDEO LEVEL / A/D CLAMP PROM

U83 LS283 — U84 LS283 — CHROMINANCE FILTER

U90 ALS30 — "F F" DETECT

U93 LS00 — U89 LS74 — U94 LS174

DIGCLMP — (AJ) SH6

J14 J13 J10 — RHIGH RNORM RLOW — TO REMOTE

DS1 DS2 DS3 — (FP) H (FP) N (FP) L — R585 240

J16 — AD0 AD1 AD2 AD3 AD4 AD5 AD6 AD7 — TO MEMORY

SH6 (AH) B0 - B7

U77 ALS374 — U78 LS374 — U79 LS374 — U80 S374

U119 LS00

U86 27S19 32x8 PROM — U81 S374

BLKLVL/ — (AK) SH11

BLKCLIP/ — INH/ — AD0 AD7

U88 LS04

DATA JAM

SH9 (AV) ICK6/

SH12 (BJ) FREEZE/

SH1 (G) PTEST/ — TEST/ — (AL) SH11

SH3 (R) CK6/

(RP) J8 DOC — DOC IN

L40 470UH — R347 3K — C245 — R344 510 — C243 — R343 75 — Q46 — C244 — R346 2K — R345 51 — R763 1K — RF GAIN ADJ

R353 100 — Q45 — CR19 — R355 30K — R354 1.5K — C246 500

DROPOUT RF AMPLIFIER

U88 TL514 — C247 — R357 100 — R356 3K — DROPOUT LEVEL ADJ — R358 5.1K — CR22 IN5234B

R764 220 — R765 1.5K — C772 500 — C249 250 — R359 10K — U59 LS123

nova 50 Albany Tpk. Canton, CT 06019

SCALE — DATE: 2-3-87 — APPROVED BY — DRAWN BY: NBA

SCHEMATIC DIA-NOVA 501/511/620/620S

REV B 11-18-87

AD REV J & UP

SH10 (BB) INHSMPL/

SH5 (AE) SYNC SEP VIDEO

L712 100UH

C757 200

C758 330

U36 TL082

C135 .22UF

C143 .1

C136 .1

+V9

-V9

+V8B

C134 .22UF

U35 CD4066

C225 .22UF

U36 TL082

U35 CD4066

BPC

S-VHS OPT E16

SH5 (AG) INSYNC

R167 12K

Q25

R168 7.5K

R169 3.6K

C122 100

U33 LS221

C123 .1

C124 250

C126 250

R170 8.2K

R171 15K

R777 2K

C125 .33 UF

+V5A

+12V

L38 .22UH

C226 22UF

C225 .1

R299 6.8K

C221 .1

U49 CA3046

R306 1K

R297 3.9K

R309 3.9K

R303 1K

R302 3.6K

R298 1.3K

R300 2.4K

CR31

CR30

CR29

R704 2.4K

R305 1K

R307 3.9K

R308 3.9K

R304 1K

L26 22UH

C192 100

SYNC STRIPPER

(SH9) +V9

C229 .1

C230 .1

R311 91

U50 NE529

C228 .1

U41 LS02

WINDOW ADJUST

C154 .1

R197 10K

R198 2.2K

C435 1000

R196 10K

R199 5.1K

C434 1000

U42 LS221

C233 .1

U40 LS74

U41 LS02

C444 2200

R201 33K

C442 .1

U43 LS221

C443 47

R200 4.2K

C767 750

U87 LS123

R762 5.1K

SAMPLE (AM) SH9

IBG/ (AN) SH6,13,14

HORIZONTAL SAMPLE

VERT. INT. ADJ

R320 3.6K

R319 5.1K

R321 5.1K

R316 5.1K

R312 5.1K

R824 2.2K

C815 33

U51 CA3096

C231 .047UF

R317 10K

R318 5.1K

R705 33K

C814 100

R770 820

U52 TL514

C232 .1

C787 330

CR32 IN5234B

C233 .1

R314 5.1K

R315 5.1K

R313 8.2K

R322 5.1K

VERTICAL INTEGRATOR

R775 10K

INPUT VERT ADJ

R586 7.5K

C236 6800

U82 LS221

C239 .68UF

R588 100K

R590 24K

CR33

C237 22UF

U87 LS123

R591 5.1K

Q81

R592 240

DS4

(FP) INPUT

RINLED J10 11 TO REMOTE

INPRSNT (AP) SH7

INPRSNT J16 12 TO 525L MEMORY

IV/ (AQ) SH7,10

IV/B J16 9 TO 32L MEMORY

IVB/ (AR) SH1

CK3SYNC (AS) SH14

R781 62

+8VB

R780 75

R179 24 1/2W

Q29 78L08

CR61 IN5225B

C790 22UF

C150 .33 UF

+VSA (SH9)

FROM 32L MEMORY J16 22 R3-2

DIETZGEN MASTER FORM MF 139

NOVA SYSTEMS INC.	50 Albany Tpk. Canton, CT 06019	
SCALE	APPROVED BY	DRAWN BY
DATE 2-3-87		WAA
SCHEMATIC DIA- NOVA 501/511/620/620S		
REV C 10-6-88		DRAWING NUMBER

BD REV L & UP

SHEET 8 OF 15

SH8 (AM) SAMPLE

RAMP GENERATOR

SH10 (AT) RAMPEN/

RAMP GENERATOR

VOLTAGE CONTROLLED OSCILLATOR

ERROR VOLTAGE ADJ

GAIN ADJ

FREQ ADJ

SYNC LEVEL
4.0 VOLTS 0.4 VOLTS

ADVANCED SYNC GEN

SH4 (BV) 2H

SH3 (Y) RVD/

SH3 (Z) RHD/

SH3 (R) CKG/

SH12 (AX) DACLK

J7. (EP) ADV. SYNC OUT

ADV/ J16 6 TO 32L MEMORY

ICK5A/ N/C

ICK3/ (AT) SH6

ICK4 J16 34 TO MEMORY

ICK5/ (AU) SH10

ICK6/ (AV) SH7

ICK7A/ N/C

ICK7/ (AW) SH7

nova 50 Albany Tpk. Canton, CT 06019

SCALE

DATE 2-3-87

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DRAWN BY LMA

SCHEMATIC DIA-NOVA 501/511/620/620S

REV C 10-6-88

DRAWING NUMBER

BD REV L & UP

SHEET 9 OF 15

SH8 (AQ) IV/

U99 LS163 · U100 LS163 · U105 LS109 · U111 LS00

IHEN

R772 680

VERTICAL POSITION COUNTER

U106 PROM 256x4 · RP7 4.7K

VERT. PROM

U96 ALS163 · U97 LS163 · U98 LS163 · U111 LS00

ICKS/

HORIZONTAL POSITION COUNTER

U103 PROM 256x4 · RP7 4.7K

HORIZ. PROM

U104 LS374

E16 E17 E18

IHSE9 → J16 10 TO 32L MEMORY

AY SH1

RAMPEN/ AZ SH9

IHEN → J16 32 TO MEMORY

JSMPL/ RA SH6

INHSMPL/ BB SH8

LI0-20/ → J16 8 TO 32L MEMORY

BC SH13

IVRST/ → J16 31 TO MEMORY

SH9 (AU) ICKS/

U120 LS109

SH1 (E) HETERO

FROM 32L MEMORY J16 Ø3.5B 7

U102 LS86 · U110 LS74 · U119 LS00

INPUT FRAME DETECT

U109 LS174 · U108 LS153

RP7 4.7K · RP4 4.7K

HUE RANGE

(FP) S7

SH1 (D) HUE

SH1 (F) BYPASS/

R217 5.1K

HUE CALIBRATE

R226 10K · R224 51K · R223 51K · R221 51K · R229 10K · C170 .1 · C166 .1 · C167 .1 · C168 .1

U55 TL082

U54 LS123 · R216 5.1K · R218 1K · R215 10K · C164 20 · C165 .1 · C163 20 · R213 7.5K

HUE CONTROL

INFRAME → J16 11 TO MEMORY

MODSC BD SH14

U53 LS00 · R214 1K · C171 100

R211 5.1K · R212 360 · C161 .1 · C162 100 · L32 22UH · C160 8.2 · C159 100 · C158 22UF · R208 300 · R209 360 · R210 10K · Q51 · +12V · -12V

R207 62 · C157 .1 · E10 · J6 (RP) VTR SC OUT

nova 50 Albany Tpk. Canton, CT 06019

SCALE · DATE 2-3-87 · APPROVED BY · DRAWN BY NBA

SCHEMATIC DIA-NOVA 501/511/620/620S

REV B 11-18-87 · DRAWING NUMBER

DIETZGEN MASTER FORM MF 139

BD REV J & UP

SHEET 10 OF 15

FROM MEMORY
J16 MØ 46 M1 45 M2 44 M3 43 M4 42 M5 41 M6 40 M7 39
U133 ALS374
CK2/
SETUP ADDER
U132 LS283
U125 LS283
SUBT
SUØ SU3
LSB6
U136 LS74
CK2/
LCB/
LS00 U129 LS00
U138 ALS374
SIA SBA
DAØ DA7
DAØ-DA7 8E SH12
HB/ BF SH12
TEST J16 15 TO MEMORY
U126 ALS163
U127 ALS163
U128 ALS163
RHD/
CK2/
RAØ RA3 RA4 RA7 RA8 RA9
U115 PROM 256x4
U114 LS374
U113 PROM 32x8
RA2
RA1
VERT
LCB/
MØ M7
U122 LS00
SH12 BL CB/
SH4 AC H/2
SH15 BT DEMOD FRZ SC
SH7 AL TEST/
SH1 A SETUP
SH3 W RCS/
U116 LS86
COLOR BAR GENERATOR
SH3 Y RVD/
SH3 Z RHD/
SH7 AK BLKLVL/
SH12 BK CB
SH3 X BBG
SH3 Q CK2/
U121 LS163
U88 LS04
C780 100
C779 100
U136 LS74
BBG/
BBG
U144 TL082
R597 100K
C403 .1
R600 100K
C404 .1
R596 100K
R595 10K
SETUP CAL.
R601 1K
R603 1K
R602 51K
C406 .1
C408 .1
C407 .1
R605 10
R604 3.3K
C410 22 UF
C409 .1
C411 .1
CR34
CR52
U145 NE5037 A/D
RVD/
RHD/
VERT
SETUP A/D
RP6 4.7K
RP4 4.7K
RP5 4.7K
U137 LS157
S7 (FP) SCH 0-90°
S6 (FP) SCH FINE ADJ
U139 LS374
U140 ALS374
U142 PROM 512x8
SYNC PROM
U143 ALS374
U147 ALS163
U148 ALS163
CA87 .1
U141 PROM 512x8
H/2
BBG/
BURST PROM
DMFRESC BG SH15
U120 LS109
NBG BH SH12,15
RP4 4.7K
S7 (FP) 0-180° MONO

nova DATA 50 Albany Tpk. Canton, CT 06019
SCALE
DATE 2-3-87
APPROVED BY
DRAWN BY NB4
SCHEMATIC DIA-NOVA 501/511/620/620S
REV B 11-18-87
DRAWING NUMBER
BD REV J & UP
SHEET 11 OF 15

SH3 (Y) RVD/

FROM 525L MEMORY J16 49 NHB/

SH11 (BF) HB/

FROM 525L MEMORY J16 47 FREEZE/

SH15 (BU) FREVID

SH9 (AX) DACLK

SH11 (BE) DAØ – DA7

FREEZE/ (BJ) SH7

CB (BK) SH11

CB/ (BL) SH11

J9 (RP) BLK BURST OUT

J5 (RP) MONITOR OUT

PRGM VIDEO OUT (BM) SH5

BUF D/A VIDEO (BN) SH15

D/A VIDEO (BP) SH15

SH11 (BH) NBG

FREQ RESPONSE ADJ

OUTPUT AMPLIFIER

D/A GAIN ADJ

D/A CONVERTER

LOW PASS FILTER

SIN X/X ADJ

BACK PORCH CLAMP

SCALE	
DATE 2-3-87	APPROVED BY
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SCHEMATIC DIAGRAM-NOVA 620/620S	
REV B 11-18-87	DRAWING NUMBER
BD REV J & UP	SHEET 12 OF 15

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DIETZGEN MASTER FORM MF 139

SH10 (BC) L10-20/

SH8 (AU) IBG/

SH5 (AD) Y+C

LUMINANCE FILTER

3.58 TRAP ADJ

DELAY EQUALIZATION

(R147) K FACTOR ADJ

COMB FILTER ON/OFF

S-VHS OPT

CHROMA FILTER RESPONSE ADJ

CHROMINANCE FILTER

DELAY NULL ADJ

DELAY NULL ADJ

DEPTH OF COMB ADJ

COMB FILTER

* NOTE: REMOVE COAX FOR S-VHS OPT

LUMA (BQ) SH14

C OUT (BR) SH14

nova SYSTEMS INC. 50 Albany Tpk. Canton, CT 06019

SCALE

DATE 2-3-87

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SCHEMATIC DIAGRAM - NOVA 511/620/620S

REV B 11-18-87

DRAWING NUMBER

BD REV J & UP

SHEET 13 OF 15

SH10 (BD) MODSC
R290 510
C785 .33UF
C216 8.2
L67 24UH
CR57 CR58
C215 100
C214 100
R287 100
R288 510
+V7 C508 .1
Q41
R277 2K
C509 .1
-V7
MODULATING SC
R278 2K
C206 .1
R279 220
Q39
C208 220
-V7
QUADRATURE ADJ
R281 2K
C210 .1
C211 .01UF
R280 1K
L97 10UH
Q40
-V7
SH8 (AN) IBG/
C186 100
R245 2K
R242 1K
R243 5.1K
Q35
SH13 (BR) C OUT
C184 200
+12V
R227 10
C174 22UF
C175 .1
R229 220K
R228 470K
C177 1000
C187 100
R239 100
L34 22UH
C188 1000
C501 1000
R246 51
Q36
C192 .47UF
R247 2K
R251 5.1K
-V7
R259 100
Q37
R234 8.2K
R232 1K
R233 3K
DEMOD HUE ADJ
C181 1UF
C185 500
C182 1UF
R244 18K
C183 47 UF
R236 1.8M
C176 .1
R235 1K
Y2 3.58 MHz
C179 12
C178 .1
C180 .1
U44 TDA3333
R-Y
B-Y
CHROMA DEMODULATOR
C190 100
L35 22UH
C189 1000
C191 1000
R240 100
R250 510
R249 1K
Q85
C195 .47UF
R256 5.1K
-V7
R230 100K
+V7
R231 10K
QUADRATURE ADJ
L33 22UH
+12V
C506 22UF
C507 .1
+V7 (SH5)
L15 22UH
-12V
C172 22UF
C173 .1
-V7 (SH5,6)
C196 100
R258 1K
R257 10K
-V7
SH8 (AS) CKSYNC
SH9 (BQ) LUMA
R271 5.1K
R269 150
R270 3K
C205 .1
R262 1K
+V7
U45 MC1496
C199 .1
-V7
R261 5.1K
R260 5.1K
R272 5.1K
R273 3K
R267 150
C209 .1
U46 MC1496
C207 .1
-V7
R247 5.1K
R266 3.9K
R268 1K
+V7
C198 .1
MODULATED CHROMA GAIN ADJ
R276 10K
Q42
R275 100
C204 .47 UF
R276 3.9K
C203 20
C200 8-25
L36 82UH
C202 .1
C201 22UF
R274 1K
CHROMA GAIN ADJ
R-Y BAL ADJ
R253 2K
R252 240
C194 .1
B-Y BAL ADJ
R263 100
R264 100
R254 240
C193 .1
R255 2K
C197 .1
R265 100
C219 22UF
R285 1.8K
R284 2K
-V7
+V7 C217 .1
R286 1.8K
U47 CA3046
CA3046
CA3046
C218 .1
-V7
R283 2K
C212 .1
-V7
R282 2K
Y/C ADDITION
R294 1.0 K
PROC. VIDEO (BS) SH5
R291 4.3K
R293 2K
-V7

Nova Systems Inc.	50 Albany Tpk. Canton, CT 06019
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DATE 2-3-87	DRAWN BY NBA
SCHEMATIC DIAGRAM – NOVA 511/620/6205	
REV B 11-18-87	DRAWING NUMBER

SHEET 14 OF 15

SH3 (AA) EVEN

FROM SZSL MEMORY J16 17 FREESTR/

SH3 (T) 8.58

DEMOD FRZ SC (BT) SH11

SH11 (BG) DMFREESC

FREEZE DEMODULATING SC

FREEZE REMODULATED SC

QUADRATURE ADJ

CHROMINANCE FILTER

DEMODULATOR

R-Y BAL ADJ

B-Y BAL ADJ

FREEZE CHROMA LEVEL ADJ

CHROMA GAIN ADJ

Y/C ADDITION

FREQ RESPONSE ADJ

K FACTOR ADJ

B-Y LEVEL ADJ

LUMINANCE FILTER

MODULATOR

FREVID (BU) SH12

SH12 (BP) D/A VIDEO

(SH12) +V10

(SH12) -V10

SH3 (W) RCS/

SH12 (BN) BUF D/A VIDEO

SH11 (BH) NBG

U72 MC1496

U73 MC1496

U74 MC1496

U75 MC1496

U20 LS74

U102 LS86

U122 LS00

U71 CA3046

DL4 (350NS)

U70 CD4066

U65 CD4066

U64 TL082

nova
50 Albany Tpk.
Canton, CT 06019

SCALE

DATE 2-3-87

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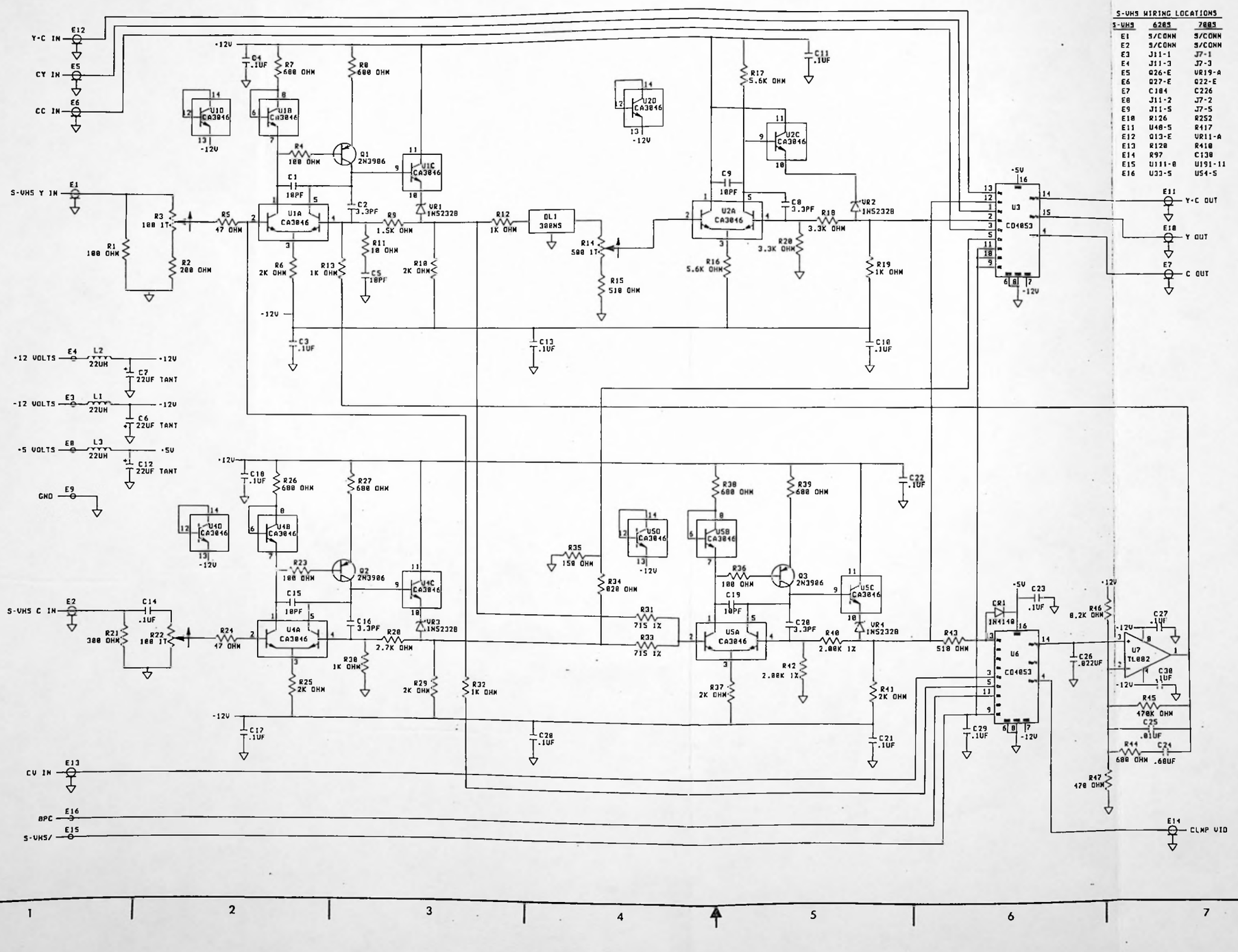
SCHEMATIC DIAGRAM - NOVA C20/C20S

REV B 11-18-87

DRAWING NUMBER

BD REV J & UP

SHEET 15 OF 15



S-VHS WIRING LOCATIONS

S-VHS	6285	7885
E1	S/CONN	S/CONN
E2	S/CONN	S/CONN
E3	J11-1	J7-1
E4	J11-3	J7-3
E5	Q26-E	VR19-A
E6	Q27-E	Q22-E
E7	C184	C226
E8	J11-2	J7-2
E9	J11-5	J7-5
E10	R126	R252
E11	U48-5	R417
E12	Q13-E	VR11-A
E13	R128	R418
E14	R97	C130
E15	U111-8	U191-11
E16	U33-5	U54-5

REV.	DATE	DESCRIPTION

Third Angle Projection	DO NOT SCALE DRAWING
Next Assy	Used On
APPLICATION	

Drawn	IL-13-87	UNLESS OTHERWISE SPECIFIED Surfaces To Be Free Of Scratches, Burrs, & Dents Dimensions Are Inches (Millimeters) Surface Roughness To Be ____ Break Edges TOLERANCES 3 Place Decimals ± 2 Place Decimals ± Angles ±
Checked		
Approved		
Material		
Finish		

nova SYSTEMS INC

Title: SCHEMATIC S-VHS PCB

Size	Drawing No.	Rev.
D	9220-S	A

Scale | Sheet 1 Of 1

SH2 T SC2
SH4 AR SOE1/
SH2 H OE/
SH2 P WE1/
SH2 L CAS/
SH2 J RAS2/
SH2 F A0 - A7
SH2 U SC1
SH4 AQ SOE2/
SH2 N WE2/
SH2 K RAS1/

U41 D41264 — I0A I0B I0C I1A — O0A O0B O0C O1A
U40 D41264 — I1B I1C I2A I2B — O1B O1C O2A O2B
U39 D41264 — I2C I3A I3B I3C — O2C O3A O3B O3C
U38 D41264 — I4A I4B I4C I5A — O4A O4B O4C O5A
U37 D41264 — I5B I5C I6A I6B — O5B O5C O6A O6B
U36 D41264 — I6C I7A I7B I7C — O6C O7A O7B O7C
U57 D41264 — I0A I0B I0C I1A — O0A O0B O0C O1A
U56 D41264 — I1B I1C I2A I2B — O1B O1C O2A O2B
U55 D41264 — I2C I3A I3B I3C — O2C O3A O3B O3C
U54 D41264 — I4A I4B I4C I5A — O4A O4B O4C O5A
U53 D41264 — I5B I5C I6A I6B — O5B O5C O6A O6B
U52 D41264 — I6C I7A I7B I7C — O6C O7A O7B O7C
(all: A0 = 8, A1 = 18, A2 = 7, A3 = 4, A4 = 21, A5 = 1; A0 = 17, A1 = 16, A2 = 15, A3 = 14, A4 = 11, A5 = 10, A6 = 9, A7 = 13)

SH2 S SRLD/
SH4 AP ORC

J1
23 AD0
24 AD1
25 AD2
26 AD3
27 AD4
28 AD5
29 AD6
30 AD7
RN1 390
C47 10
C48 10
C49 10
C50 10
C51 10
C52 10
C53 10
C54 10
R11 1K +5V
U8 TDC1030
U21 LS374 — I0A I0B I1A I1B I1C I2A I2B
U20 LS374 — I2B I3A I3B I4A I4B I4C I5A
U19 LS374 — I5A I5B I6A I6B I6C I7A I7B
RN4 51 — I0A I0B I0C I1A I1B I1C I2A I2B
RN3 51 — I2C I3A I3B I3C I4A I4B I4C I5A
RN2 51 — I5B I5C I6A I6B E6C I7A I7B I7C

SH3 AA RSTFIFO/
SH3 AC BIHEN/
SH3 Y ICK4
U79 U60 LS00 C76 75 C57 75 R9 620

SH2 Q ALIN
SH4 AM CK4/
U43 ALS00 ×3

U7 LS195 — O0A O0B O0C — OM0
U22 LS195 — O1A O1B O1C — OM1
U5 LS195 — O2A O2B O2C — OM2
U6 LS195 — O3A O3B O3C — OM3
U4 LS195 — O4A O4B O4C — OM4
U3 LS195 — O5A O5B O5C — OM5
U1 LS195 — O6A O6B O6C — OM6
U2 LS195 — O7A O7B O7C — OM7
(all: A = 9, B = 4, C = 5, D = 6, QA = 7; CLR = 10, LD = 2, ENP = 3, ENT = 1, +5V = 15, GND = 8, QB = 14, QC = 13, QD = 12)

OM0 OM1 OM2 OM3 OM4 OM5 OM6 OM7 — U35 ALS30 — U10 LS74 (+5V)
8/ OM0-OM7 (A) SH3
DO/ (B) SH3
DO (C) SH3

FOR GENERAL NOTES SEE SHEET 2.

NOVA — 50 Albany Tpk. Canton, CT 06019
SCALE
DATE 2-3-87
APPROVED BY
DRAWN BY NOA
SCHEMATIC DIAGRAM - 525L MEMORY
REV A ECN # 20 12-30-87
DRAWING NUMBER
REV G & UP
SHEET 1 OF 4

SH4 (AS) FREEZE

J1 55 ← RHD/

SH4 (AK) HSFFT

SH4 (AN) BC3

SH3 (X) WAØ - WA15

SH3 (AB) MC1 - MC6

U18 LS74 ×2 (+5V)

U15 ALS163, U16 ALS163, U17 ALS163 (RAØ, RA3, RA4, RA7, RA8, RA9)

U71 ALS153, U70 ALS153, U68 ALS153, U69 ALS153

RN2 5I

AØ - A7 → (F) SH1

RHD/ (D) SH4

DRHD/ (E) SH3

J2
2 ← +5VOLTS
1 ← GND
3 ←
C9 100UF, * .1 (TYP), +5V

+5V — C19 100UF, ** .33 (TYP) — VCC TO MEMORY

J1
1
2 ← TP1
3 ← TP2
4 ← TP3
5 ← TP4, TP5

* C1-3, 5-8, 10-14, 16-18, 26-28, 30, 37-39, 41, 42, 44, 61-75

** C4, 15, 20-25, 31-36, 43

U31 PROM 1K×8, U33 PROM 1K×8 (RA9, RAØ)

R6 3K

U30 S374, U32 S374

C55 1000

RAØ - RA9 (G) SH3

RA17 → J1 50

U79 LS32

OE/ (H) SH1

RAS2/ (J) SH1

RAS1/ (K) SH1

CAS/ (L) SH1

C59 20

WRT (M) SH3

WE2/ (N) SH1

WE1/ (P) SH1

ALIN (Q) SH1

BUSY (R) SH3

SRLD/ (S) SH1

NHB/ → J1 49

SC2 (T) SH1

SC1 (U) SH1

DRVD (V) SH4

DRVD/ (W) SH4

SH3 (AD) STP/

NOTES:
1. UNLESS OTHERWISE SPECIFIED
   A) ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5%
   B) ALL CAPACITOR VALUES ARE IN PICOFARADS

SH4 (AH) RVSHFT

J1 ← RVD/

U72 LS74, LS86 U67

U73 ALS163, U75 ALS163 (RAØ, RA13, RA14, RA17)

SH4 (AF) IODD

SH4 (AG) IEVEN

SH4 (AR) SOE1/

SH4 (AQ) SOE2/

nova 50 Albany Tpk. Canton, CT 06019

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SCHEMATIC DIAGRAM - 525L MEMORY

REV A 12-30-87 | DRAWING NUMBER

REV G & UP

SHEET 2 OF 4

SH4 (AJ) IVSHFT
SH4 (AE) IVRST/
SH2 (M) WRT
SH4 (AL) BFREEZE/
SH4 (AM) CK4/
SH4 (AN) BC3
SH2 (R) BUSY
SH2 (E) DRHD/
SH2 (G) RA0 - RA9
SH1 (B) DO/
SH1 (C) DO
SH1 (A) OM0 - OM7
J1 34 ICK4
J1 32 IHEN
J1 15 TEST
U26 LS109
U12 LS163
U13 LS163
U46 ALS08
U45 LS163
U59 LS163
U74 LS00
U44 S174
U42 LS109
U11 ALS163
U14 ALS163
U47 ALS163
U10 LS174
U27 LS32
U25 RAM 2K×8
U24 S374
U23 ALS374
U28 PROM 1K×8
WA0 - WA15
ICK4 (Y) SH1
IHEN/ (Z) SH4
RSTFIFO/ (AA) SH1
MC1 - MC6 (AB) SH2
BIHEN/ (AC) SH1
STP/ (AD) SH2
J1 M0 → 46
M1 → 45
M2 → 44
M3 → 43
M4 → 42
M5 → 41
M6 → 40
M7 → 39
R7 3K
R4 3K
CSB 200
+5V

nova systems inc. 50 Albany Tpk. Canton, CT 06019

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DATE 2-3-87		NBA

SCHEMATIC DIAGRAM- 525L MEMORY

REV A 12-30-87 | DRAWING NUMBER

REV G & UP

J1 31 ← IVRST/
J1 12 ← INPRSNT
J1 11 ← INFRAME
SH3 (Z) IHEN/
J1 13 ← REFRAME
SH2 (D) RHD/
J1 16 ← CK3/
J1 33 ← EVEN
SH2 (V) DRVD
J1 19 ← FRZFIELD/
J1 18 ← FRZFRAME/
SH2 (W) DRVD/
J1 20 ← STROBE/

U51 LS00 · U58 LS174 · U67 LS86 · U66 LS174 · U50 ALS374 · U34 PROM 512×8 · U63 LS174 · U80 LS86 · U64 LS174 · U65 LS00 · U48 LS174 · U49 LS04 · U82 LS174 · U81 LS174 · U62 LS86 · U1 LS195 · U60 LS00 · U79 LS32 · U78 LS174 · U72 LS174 · U74 LS00 · U76 LS174 · U77 LS04 · +5V · C40 200 · C45 200 · C46 200 · C29 22UF · R8 10K · R10 1K · CR1 IN4148

IVRST/ (AE) SH3
IODD (AF) SH2
IEVEN (AG) SH2
RVSHFT (AH) SH2
IVSHFT (AJ) SH3
HSFFT (AK) SH2
BFREEZE/ (AL) SH3
CK4/ (AM) SH1,3
BC3 (AN) SH2,3
ORC (AP) SH1
SOE2/ → J1 48
SOE2/ (AQ) SH1,2
SOE1/ (AR) SH1,2
FREEZE/ → J1 47
FREEBE (AS) SH2
FRZ FRM LED/ → J1 38
FRZ FLD LED/ → J1 37
FRZSTR/ → J1 17

DATA I/O 50 Albany Tpk. Canton, CT 06019
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SCHEMATIC DIAGRAM - 525L MEMORY
REV A 12-30-87 · DRAWING NUMBER
REV G & UP
SHEET 4 OF 4