



Issue 1

**DPS-295 COMPONENT TBC/TRANSCODER  
OPERATOR'S MANUAL**

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|   |   |   |  |  |
|---|---|---|--|--|
| <small>The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert you to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.</small> |  | <b>CAUTION</b><br><b>RISK OF ELECTRIC SHOCK</b><br><b>DO NOT OPEN</b> |  | <small>The exclamation point within an equilateral triangle is intended to alert you to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.</small> |
|---|---|---|--|--|

**CAUTION**

**TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVERS FROM THIS UNIT. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL. SEE ADDITIONAL SAFETY INSTRUCTIONS BELOW.**

**WARNING**

**TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE.**

**IMPORTANT SAFEGUARDS**

**Read Instructions** - All the safety and operating instructions should be read before this product is operated.

**Retain Instructions** - The safety and operating instructions should be retained for future reference.

**Heed Warnings** - All warnings on the product and in the operating instructions should be followed.

**Cleaning** - Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

**IMPORTANT SAFEGUARDS**  
(continued)

**Attachments** - Do not use attachments not recommended by DPS as they may cause hazards.

**Water and Moisture** - Do not use this product near water - for example, near a bath tub, wash bowl, kitchen sink, or laundry tub, in a wet basement or near a swimming pool, and the like.

**Accessories** - Do not place this product on an unstable cart, stand, bracket, or table. The product may fall, causing serious injury to a child or adult, and serious damage to this product. Use only with a cart, stand, or bracket, or table recommended by DPS. Any mounting of the product should follow the instructions, and should use a mounting accessory recommended by DPS.

**Ventilation** - Openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating, and these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided or the instructions have been adhered to.

**Power Sources** - This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your home or business, consult your appliance dealer or local power company. For products intended to operate from battery power, or other sources, refer to the operating instructions.

**Grounding** - This product is equipped with a 3-wire grounding-type plug, a plug having a third (grounding) pin. This plug will only fit into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding-type plug.

**Power-Cord Protection** - Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.

**IMPORTANT SAFEGUARDS**  
(continued)

**Lightning** - For added protection for this product during a lightning storm or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna or cable system. This will prevent damage to the product due to lightning and power-line surges.

**Overloading** - Do not overload wall outlets and extension cords as this can result in a risk of fire or electrical shock.

**Object and Liquid Entry** - Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.

**Servicing** - Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

**Damage Requiring Service** - Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

- a. When the power-supply cord or plug is damaged.
- b. If liquid has been spilled, or objects have fallen into the product.
- c. If the product does not operate normally by following the operating instructions. adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
- d. If the product has been exposed to rain or water.
- e. If the product has been dropped or the cabinet has been damaged.
- f. When the product exhibits a distinct change in performance - this indicates a need for service.

**IMPORTANT SAFEGUARDS**  
(continued)

**Replacement Parts** - When replacement parts are required, be sure the service technician has used replacement parts specified by DPS or have the same characteristics as the original part. unauthorized substitutions may result in fire, electric shock or other hazards.

**Safety Check** - Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in safe operating condition.

**WARNING**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Any changes or modifications not expressly approved by Digital Processing Systems Inc. could void the user's authority to operate this device.

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## **WARRANTY CONDITIONS**

Digital Processing Systems Inc., hereafter, DPS, warrants the purchaser that each new unit is free of defects due to faulty material and/or workmanship and that it will be the quality designated and described by DPS.

### **TERMS OF WARRANTY**

#### **COVERAGE OF WARRANTY**

Subject to the conditions set forth herein, DPS warrants that it will repair, replace or correct any part of the enclosed unit which proves defective by reason of faulty material and/or improper workmanship, or any non-conformance to the units specifications.

#### **DURATION OF WARRANTY**

The warranty for parts and labor for all defects related to component failure or workmanship is for two years from the date of shipment. No extension will be granted without a service contract between an authorized DPS repair depot and the customer.

#### **PURCHASE REQUISITE**

Original purchase must be from an authorized DPS distributor or the Company's representative. This warranty is limited to the original purchaser of the unit.

#### **NOTIFICATION OF DEFECT**

The DPS distributor or representative who supplied the unit must be notified of the defect in material or workmanship.

#### **RETURN OF UNIT**

Approval must have been obtained from DPS before return of the unit or any parts and accessories of the unit. DPS is not obligated to accept any unit or parts of the unit without prior DPS authorization.

Units sent for repair will be shipped within 14 days of arrival at the factory. If not, due to component availability or some other uncontrolled problem, the customer will be notified within 14 days.



**WARRANTY CONDITIONS**  
(continued)

**PROPER SHIPMENT**

The unit must be shipped "Freight Prepaid" or delivered to any DPS authorized service facility (or the factory), provided that the unit is packed in its original package or that of similar construction, affording an equal degree of protection. Freight expenses, custom duties and custom brokerage are costs incurred by the customer.

**UNAUTHORIZED SERVICE**

The unit must not have been altered, repaired or serviced by anyone other than an authorized DPS service facility or the warranty will be considered void.

**MISUSE, ACCIDENT, ABUSE, ETC.**

The unit must not have been subjected to change or alteration due to accident, failure caused by war or acts of God, misuse, improper maintenance, change of serial number, or operated contrary to the instructions contained in the instruction manual.

DPS reserves the right to make any improvements on its products or parts without assuming any obligation to install them in previously manufactured units. No liability is assumed by DPS for any collateral or consequential damages or losses associated with its product.

For any unit or subassembly returned for repairs under warranty conditions and found to have no fault(s), the customer will be charged for the time spent.

**SECTION 1  
GENERAL DESCRIPTION**

**1.1 Introduction:**

The DPS-295 is an infinite window multi-format transcoding TBC allowing cable, broadcast and post production facilities to eliminate timebase error while providing a single platform capable of interfacing various composite/component standards. The DPS-295 has advanced digital circuitry which includes chroma noise reduction, chroma edge enhancement, automatic adaptive 3D drop-out compensation, and an adaptive comb filter. Together, this technology insures the optimum picture quality in all operating modes. The DPS-295 also includes digital effects, a built-in 48 pattern component test signal generator, digital proc. amp. controls with non-volatile memories, and full remote control.

**1.2 Features**

- Infinite window TBC.
- Full Bandwidth (6 MHz, -3 dB) Synchronizer.
- Multi-format Transcoding.
- Inputs: NTSC, SVHS, Y/C-688, and Y/C-629.
- Outputs: NTSC, SVHS, Y/C-688, and CAV (MII or BETACAM).
- Digital Adaptive comb filter for FULL 6.0 MHz BANDWIDTH transcoding/processing in all modes.
- Automatic 3D DOC, conceals dropouts without the need for an RF interface to the playback VTR. Adaptive digital circuitry allows even 2'nd generation dropouts to be corrected.
- Chrominance noise reduction in both the spatial (COMB filtering) and temporal (adaptive inter-frame processing) domains.
- Chrominance edge enhancement.
- Built-in 48 pattern component test signal generator. Provides a complete set of true multi-format component test signals.
- Digital Effects: Posterize, Black Stretch, Sepia, and Solarize.
- Freeze: Frame, Field (selectable 1-3), and variable strobe.
- Digital Proc. Amp. controls with non-volatile memories.

### **1.2 Features (cont'ed)**

- Subcarrier Feedback for DIRECT mode TBC processing.
- Horizontal and Vertical Y/C delay adjustments.
- RS-422 ES-buss standard remote control.
- RS-232 remote control for simple PC interface.
- GPI input for remote freeze.
- Digitally synthesized waveform/vector/component parade displays (WFM option).
- Download digitized video to PC for automated signal measurement or multi-media integration (with WFM option).
- RGB outputs (optional).

### **1.3 Additional Documentation:**

A technical manual (DPS part Number 708-295) is available which contains extensive theory and maintenance information of the unit in conjunction with schematic and silkscreen diagrams of the printed circuit boards.

**SECTION 2  
SPECIFICATIONS**

**2.1 Inputs:**

NTSC Input #1.....1V p-p 75 Ohms  
NTSC Input #2.....1V p-p 75 Ohms  
SVHS Input (4-pin).....Y/C-3.58 Input  
                                  Y-1V p-p, 75 Ohms  
                                  C-286mv burst, 75 Ohms  
DUB Input (7-pin).....1V p-p Luminance, 75 Ohms  
                                  Chroma derived from NTSC In #2.  
Ref. Video.....1V Hi impedance Loop Through

**2.2 Outputs:**

NTSC Output #1.....1V p-p, 75 Ohms  
NTSC Output #2.....1V p-p, 75 Ohms  
SVHS Output (4-pin).....Y/C-3.58 Output  
                                  Y-1V p-p, 75 Ohms  
                                  C-286mv burst, 75 Ohms  
DUB Output (7-pin).....1V p-p Luminance, 75 Ohms  
                                  C-688Khz 230mv burst, 75 Ohms  
CAV Outputs (Y,R-Y,B-Y).....MII or Betacam Levels  
                                  Switch selectable

## 2.2 Outputs (cont'ed)

Subcarrier Output.....3.58Mhz subcarrier feedback  
2V p-p, 75 Ohms

Advanced Sync Output.....32 Line advanced sync.  
4V p-p, 75 Ohms

RGB Outputs.....714mv RGB with 286mv sync's  
(optional)

## 2.3 Test Signal Generator:

| Number | Test Signal   |
|--------|---|
| 0      | SMPTE Bars  |
| 1      | EIA Bars  |
| 2      | Full Field Bars   |
| 3      | Bars/Luma bars  |
| 4      | Bars/Red  |
| 5      | Bars/Revesre Bars   |
| 6      | Bars/Timing (20T modulated pulses)  |
| 7      | Luma Bars   |
| 8      | Multi-Burst 60IRE 0.5/1/2/3/3.58/4.2 MHz                                  |
| 9      | FCC Multi-Burst 100IRE 0.5/1.25/2/3/3.58/4.1 MHz                          |
| 10     | Luma Line Sweep with markers 0-5.5 MHz<br>Markers at 1,2,3,4,5 Mhz        |
| 11     | Chroma Sweep with markers 0-1.0 MHz<br>Markers at 100,200,300,....900 KHz |
| 12     | Pulse & Bar with Window   |
| 13     | Convergence Grid  |
| 14     | Super Black 0 IRE   |
| 15     | Black 7.5 IRE   |
| 16     | Gray 50 IRE   |
| 17     | White 100 IRE   |
| 18     | Red Field   |
| 19     | Luma 5-Step   |
| 20     | Modulated 5-Step  |
| 21     | Luma 10-Step  |
| 22     | Modulated 10-Step   |
| 23     | Luma Ramp 0-100 IRE   |
| 24     | Modulated Ramp  |
| 25     | Demodulator Alignment Multi Ramp  |
| 26     | FCC Composite   |
| 27     | NTC-7 Combination   |
| 28     | Multi-Pulse   |
| 29     | Sin(X)/X  |
| 30     | Timing Bowtie Markers at 0,+/-50,+/-100...+/-250nsec                      |
| 31     | Matrix-1 Pulse & Bar, Bars, Modulated Ramp                                |
| 32     | Matrix-2 FCC Composite, Bars, NTC-7 Combination                           |
| 33-40  | Bounce 10/90  |
| 41-48  | Bounce 0/100  |

**2.3 Test Signal Generator (cont'ed):**

**TSG Specifications:**

Frequency Response.....+/- 0.1 dB (FCC Multi-burst)  
Diff. Phase.....< 0.25 Deg.  
Diff Gain.....< 0.25 %  
Luma Non-linearity.....< 1% (5-Step)  
Chroma Non-linearity.....< 0.25 %, < 1 Deg. (NTC-7)  
Y/C Delay.....< 5 nsec.  
K-Factor (2T).....< 0.25 %  
S/N Luma weighted.....> 70 dB

**2.4 Process Mode SVHS, DUB Input:**

Sampling.....8 Bit, 14.318 MHz, Component  
Frequency Response.....+/- 0.25 dB (FCC Multi-burst)  
6 MHz (-3 dB)  
Diff. Phase.....< 1 Deg.  
Diff. Gain.....< 1 %  
K-Factor.....< 0.5 %  
S/N Luma weighted.....> 58 dB

**2.5 Process Mode NTSC Input:**

Sampling.....8 Bit, 14.318 MHz, Component  
Frequency Response.....+/- 0.5 dB (FCC Multi-burst)  
6 MHz (-3 dB)  
Diff. Phase.....< 2 Deg.  
Diff. Gain.....< 2 %  
K-Factor.....< 1 %  
S/N Luma weighted.....> 58 dB

Synchronizing Range.....Infinite  
Residual Timebase Error.....<15 nsec.

**2.6 Proc. Amps:**

Luminance Gain.....+6,-40 dB  
Set-up.....+/- 20 IRE  
Chroma Gain.....+6,-40 dB  
Hue.....+/- 60 Deg.  
Y/C Delay Horizontal.....+/- 1 usec.  
Y/C Delay Vertical.....+1,-2 Lines  
System Phase.....+/- 17 usec

**2.7 Effects:**

Posterization.....16 Levels  
Black Stretch.....16 Levels  
Solarization.....16 Levels  
Cepia.....16 Levels  
Strobe.....0-100 Frames

**2.8 Power Requirements:**

Input Voltage.....85-132 VAC  
Input Power.....100 Watts

**WARNING**

This unit must be connected to earth ground in order to ensure compliance with FCC and EMI safety regulations. Also, this unit contains voltages dangerous to life and must only be serviced by qualified personnel.

**2.9 Physical Characteristics:**

Dimensions.....17 in. (43.2 cm) wide by  
1-3/4 in. (4.4 cm) high by  
20 in. (50.8 cm) deep.  
Operating Environment.....0 to 40 Degrees C.  
Spec Temperature.....10 to 40 Degrees C.  
Storage Temperature.....-40 to 75 Degrees C.

**SECTION 3  
INSTALLATION**

**3.1 Unpacking and Inspection:**

Upon receipt of the DPS-295 component TBC/Transcoder, carefully inspect the unit for any signs of damage to the outer chassis. Also compare the shipping receipt with the contents received.

This unit has been thoroughly calibrated and inspected, both electrically and mechanically, to meet the specifications listed.

NOTE: Retain all packing material in case reshipping becomes necessary.

**3.2 Mounting:**

The DPS-295 is 1.75" H x 17" W x 20" D allowing it to fit into most standard consoles or 19" racks. For rack mounting rack SLIDES or TRAYS MUST BE USED to support the unit. Care must be taken, however, to select a dry, well ventilated location with a minimum of dust and vibration to install the unit. Also, leave sufficient clearance between the units rear panel and any obstacle or wall to allow proper air circulation in and around the unit, and to provide for connection of the input, output and power cables.

Allow at least 30 minutes after the unit is removed from the packing material before installing in a rack or console, and applying power, to eliminate unwanted condensation due to a sudden temperature change.



### **3.3 Input/Output Connections:**

Input and output connections are made at the rear of the unit and are summarized below.

#### **NTSC-1 Input:**

Composite NTSC-1 input. Nominally 1V p-p, with 75 ohm termination. This input may be a monochrome, direct color, or heterodyne color signal. If a heterodyne (VTR playback without a TBC) signal is used, then the front panel input mode must be set to HET mode. If the signal is a direct color (RS-170A) signal, with a coherent SCH relationship, then the front panel input mode may be set to SYNC mode. If the signal is a direct color type from a VTR using the DPS-295 subcarrier feedback output, then the front panel input mode must be set to the DIRECT mode.

#### **NTSC-2/DUB-C Input:**

Composite NTSC-2 input and DUB chroma input. This input may either be used as a second NTSC input, or as the chroma source when using the DUB input mode. When used as a second NTSC source, see NTSC-1 input for details on selecting the correct input mode.

When used as a DUB chroma input, this signal should be connected to the NTSC output of the playback VTR in addition to the connection made via the 7-pin DUB-Y input. If the subcarrier feedback is NOT being used, the input mode should be set to HET. If the subcarrier feedback is to be used, then the input mode MUST BE set to DIRECT.

#### **SVHS 4-pin Input:**

Separate Y/C-3.58 SVHS type video input. This input is used with SVHS type playback VTR's or other SVHS based equipment using the 4-pin SVHS standard interface cable. When using the SVHS input, the subcarrier feedback should not be used, and the input mode should be set to HET.

#### **DUB-Y 7-pin Input:**

Separate luminance input used in conjunction with the DUB-C input. To operate the DPS-295 in the DUB input mode, this connector must be cabled to the playback VTR's DUB output using a 7-pin DUB cable. Additionally, the NTSC output from the playback VTR must be connected to the NTSC-2/DUB-C input of the DPS-295.

**Ref. Video Loop-through:**

Composite color black loop through input. This signal is used to genlock the DPS-295. The signal should always be terminated with 75 ohms. If stand-alone operation is desired, the genlock/crystal ref. DIP switch should be set to the crystal position (see section 4.2). When a ref. video signal is NOT properly connected to the DPS-295, the front panel TIMING-SYSTEM LED will flash.

**NTSC-1 Output:**

Composite NTSC output. Nominally 1V p-p, 75 ohms. Normally contains the timebase corrected version of the selected video input. Can be switched to the test pattern generator by selecting TEST at the front panel function key.

**NTSC-2 Output:**

Composite NTSC output. Nominally 1V p-p, 75 ohms. Normally contains the timebase corrected version of the selected video input. Can be switched to the test pattern generator by selecting TEST at the front panel function key. When the optional waveform monitor board is installed, this output can be jumpered (internal jumper GHE9) to provide a full time waveform/vector display without selecting WFM at the front panel function key.

**SVHS 4-pin Output:**

Separate Y/C-3.58 MHz signal conforming to the SVHS standard. Used to interface with other SVHS type equipment via a 4-pin SVHS type cable.

**DUB 7-pin Output:**

Separate Y/C-688 KHz signal conforming to the U-matic DUB format. When using a U-matic type record VTR, this signal may be connected to the VTR DUB input, allowing the VTR to operate in a component input mode.

**CAV Y/R-Y/B-Y Outputs:**

Component CAV type outputs for use with Betacam or MII type equipment. The signal levels (either Betacam or MII) or selected via an internal DIP switch (see section 4.2).

Note: An optional card is available which converts these outputs to RGB (with sync's) for use in RGB applications. When installed, these CAV outputs can be selected as either Y/R-Y/B-Y, or RGB. Also, an internal jumper allows the advanced sync to be used for RGB-S type applications which required RGB with separate sync's (ie 4-wire RGBS).

**Advanced Sync Output:**

Composite sync signal (4V p-p, 75 Ohms) advanced 32 lines with respect to the output video. When using a playback VTR with an external sync input, this signal may be connected to the VTR Ext. Sync input. When connected, and Ext. Sync mode is selected on the playback VTR, this signal forces the playback VTR to operate at the correct average playback speed. This is most useful when performing time code editing, or when audio/video delay is critical.

**Subcarrier Output:**

Subcarrier output for use with playback VTR's which have a subcarrier feedback input. This signal is a 3.58 MHz subcarrier which is generated from the input video signal. When connected to an appropriately equipped VTR, this signal establishes a coherency between the luminance and chrominance which reduces artifacts that can be introduced during the timebase correction process. Use of this signal is most significant when either the NTSC or DUB inputs of the DPS-295 are used. When connected, the DPS-295 input mode MUST BE set to DIRECT.

**Remote/GPI Port:**

RS-232/RS-422/GPI remote control port. See section 5 for details.

**Fuse:** 3-amp slow-blow, 125 VAC.

**AC Power Input:** 117 VAC, 60 Hz.

## SECTION 4 OPERATION

### 4.1 FRONT PANEL CONTROLS AND INDICATORS

#### Proc Amp/Effects Section

The Proc Amp/Effects section of the front panel has three main functions as selected by the MODE key. When in the Proc Amp mode, the traditional Proc Amp functions are controlled. When the Effects mode is selected, the special effects can be adjusted, and when the Waveform mode is selected (provided the optional WFM board is installed), the parameters of the waveform monitor display are effected.

#### Proc Amp Controls

The Proc Amp controls become active when the Proc Amp/Effects mode is in the Proc Amp position.

##### Y/POSTER key (Proc Amp Mode):

Enables the luminance level of the video signal to be adjusted by rotation of the control wheel.  
Adjustment Range is approx. +6/-40 dB.  
Display reads +128 to -127

##### B/STRETCH key (Proc Amp Mode):

Enables the set-up or black level to be adjusted by rotation of the control wheel.  
Adjustment range is approx. +/- 20 IRE.  
Display reads +128 to -127

##### C/SOLAR key (Proc Amp Mode):

Enables the chrominance level to be adjusted by rotation of the control wheel.  
Adjustment range is approx. +/- 6 dB.  
Display reads +128 to -127

**HUE/CEPIA key (Proc Amp Mode):**

Enables the hue to be adjusted by rotation of the control wheel.  
Adjustment range is approx. +/- 60 Deg.  
Display reads +128 to -127

**Special Effects Controls:**

The special effects controls become active when the Proc Amp/Effects mode is in the Effects position.

**Y/POSTER key (Effects Mode):**

Enables the luminance posterization effect to be adjusted by rotation of the control wheel.  
Display reads 0 to 15. 0 corresponds to no posterization, 15 corresponds to maximum posterization. Note, the posterization effect cannot be used at the same time as the black stretch effect. If this effect is selected when the black stretch effect is already ON, then as soon as the control wheel is moved, the black stretch will be automatically switched OFF, and the posterization will be turned ON.

**B/STRETCH key (Effects Mode):**

Enables the black stretch effect to be adjusted by rotation of the control wheel.  
Display reads 0 to 15. 0 corresponds to no black stretch, 15 corresponds to maximum black stretch. The black stretch cannot be used at the same time as the posterization effect. If this effect is selected when the posterization is already ON, then as soon as the control wheel is moved, the posterization will be automatically switched OFF, and the black stretch will be turned ON.

**C/SOLAR key (Effects Mode):**

Enables the solarization effect to be adjusted by rotation of the control wheel.  
Display reads 0 to 15. 0 corresponds to no solarization, 15 corresponds to maximum solarization. This effect cannot be used at the same time as the cepia effect. If this effect is selected when the cepia effect is already ON, then as soon as the control wheel is moved, the cepia effect will be automatically switched OFF, and the solarization will be switched ON.

**HUE/CEPIA key (Effects Mode):**

Enables the cepia effect to be adjusted by rotation of the control wheel.  
Display reads 0 to 15. 0 corresponds to no cepia, 15 corresponds to maximum cepia effect. This effect cannot be used at the same time as the solarization effect. If this effect is selected when the solarization effect is already ON, then as soon as the control wheel is moved, the solarization effect will be automatically switched OFF, and the cepia effect will be switched ON.

**Proc amp/Effects MODE key:**

This key determines the mode of operation for the four main proc amp/effects keys listed above. When operated the mode is toggled between proc amp and effects mode as indicated by the associated LED's.  
If any special effect is turned on, (ie; set to a non-zero value) then when the proc amp/effects mode is set to proc amp, the effects LED will flash as a reminder that one or more special effects are engaged.  
When the optional waveform board is installed, this key is also used to select WFM mode. When selected, the four main proc amp/effects keys are inoperative, and the control wheel is used in conjunction with the RCL/ENTER and STR/EXIT keys to control the on-screen waveform control menus (See appendix A).

**Proc amp/Effects TIMING key:**

This key is used to select one of three timing parameters for adjustment via the control wheel as listed below:

YC HORZ: Enables the Y/C horizontal delay to be adjusted. Adjustment range is approx +/- 1 usec.

YC VERT: Enables the Y/C vertical delay to be adjusted. Adjustment range is +2, -1 lines.

SYSTEM: Enables the system phase to be adjusted by rotation of the control wheel. This control changes the horizontal timing of the output video with respect to the ref. video feed, and is normally used to establish correct timing for a switcher. Note that the SCH phasing at the DPS-295 output is fixed at 0 Deg. This control moves both H-sync, and subcarrier while maintaining proper SCH. Normally a waveform monitor is used to set the H-sync timing as close as possible, and then a vector scope is used to insure subcarrier timing is correct. Adjustment range is approx. +/- 17 usec. Note: If a ref. video feed is NOT connected to the ref. video input, the SYSTEM LED will FLASH to indicate operation in non-genlock mode. The flashing can be suppressed by selecting free-running mode via the internal DIP switches (see section 4.2).

**Proc amp/Effects STR/EXIT key:**

Enables the current proc. amp. settings (as listed above) to be saved in the memory location selected using the control wheel. Valid STORE locations are 1-9 and 'P' (location 0 is reserved for factory presets). Locations 1-9 are for general purposed storage of proc amp/effects settings. Location 'P' is a special location (accessed by rotating the control wheel past 9) which is described later. Use of locations 1-9 are described first. The proc amp memories store the four proc amp levels, the four effects settings, YC delay horizontal, and YC delay vertical. The system phase is always stored, but is NOT normally effected by a recall operation (usually a single system phase setting is desirable). If multiple system phase settings are required, then the internal DIP switches may be used to enable system phase updating on proc amp recall operations.

**Proc amp/Effects STR/EXIT key (cont'ed):**

Example: To store the current proc. amp. settings into memory location 5. Press STR/EXIT (Display now shows 'SN', where N is the current memory location). Rotate the control wheel to select memory location 5 (Display shows 'S5'). Press STORE again to complete the operation. Use any of the other proc. amp. control buttons to abort the STORE operation before completion.

Note: The STORE operation cannot be performed if the internal memory protect DIP switch is set. (See section 4-2).

Settings stored in the 'P' location will be automatically re-loaded whenever the current input source (ie; NTSC-1, NTSC-2, SVHS or DUB) is selected (provided the proc amp auto-load is enabled via the internal DIP switch, see section 4.2). This feature allows a unity configuration to be established for each of the four input sources connected to the DPS-295. Then, as the input select key is operated (selecting different input sources) these unity settings are automatically recalled.

Example: Assume that two NTSC type playback VTR's are connected to the DPS-295 video inputs NTSC-1 and NTSC-2, and that the proc amp auto-load feature is enabled (DIP switch 7, Bank 1 UP). If NTSC-1 is selected, and a test tape is played on VTR-1, the proc amp controls on the DPS-295 are used to establish correct video levels. The STR/EXIT key is then pushed, causing the display to flash. The control wheel is then used to select location 'P', and the STR/EXIT key is again pushed to complete the operation. Next, NTSC-2 is selected, and the procedure is repeated while playing a test tape on VTR-2. Now, as the input select key is operated to select between NTSC-1 and NTSC-2 the unity settings are automatically recalled.

When the optional waveform board is installed, and the proc amp/effects mode is set to WFM, the STR/EXIT key is used to 'EXIT' from on-screen menus (see appendix A).

**Proc amp/Effects RCL/ENTER key:**

Enables previously stored proc. amp. settings to be recalled.

Example: To recall the proc. amp. settings stored in memory location 5. Press RECALL (display now shows 'L0'). Rotate the control wheel to select memory location 5 (display shows 'L5'). Press RECALL again to complete the operation.

Use any other proc. amp. control button to abort the recall operation before completion.

To recall the factory presets (always stored in memory location 0). Press RECALL RECALL.



**Proc amp/Effects RCL/ENTER key:**

The RECALL key is also used to display/change the remote control address (see section 5.4).

When the optional waveform board is installed, and the proc amp/effects mode is set to WFM, the RCL/ENTER key is used to 'ENTER' on-screen menus (see appendix A).

**INPUT SECTION**

**Input SELECT key::**

Allows selection of NTSC-1, NTSC-2, SVHS, or DUB inputs for the unit. Also causes the proc amp/effects to be reloaded with settings previously stored using the STORE 'P' operation (if the proc amp auto-load feature is enabled).

**Input MODE key:**

This key is used to select the processing mode for the selected input signal.

**HET:** This mode is used for all TBC applications when the DPS-295 subcarrier feedback is NOT used. The HET mode may also be used in synchronizer applications.

**DIRECT:** This mode is used ONLY in TBC applications when the subcarrier feedback from the DPS-295 is connected to the playback VTR.

**SYNC:** This is used for synchronizer applications, when the signal being processed DOES NOT require timebase correction.

**Note:** For synchronizer applications, when the remote feed does not require timebase correction, either the HET or SYNC mode can be used. Use of the SYNC mode will provide better stability (particularly when processing nosily signals), and yields better Y/C separation.

**FREEZE SECTION:**

**Freeze MODE key:**

This key is used to select the type of freeze that will occur when the freeze function is activated (either via the FREEZE key, or the remote GPI input).

- FRAME: Selects freeze frame mode. A complete frame will be displayed in freeze mode.
- FIELD: Selects freeze field mode. A single field will be displayed in freeze mode. The control wheel can be used to select 1 of the 3 fields captured when the freeze function was activated.
- STROBE: Selects the strobe mode. The strobe rate can be adjusted via the control wheel when the freeze is activated.

**Freeze FREEZE key:**

This key toggles the freeze function between live and freeze modes. When the freeze function is activated, the freeze LED will flash to indicate that the control wheel is now manipulating the freeze function (ex; freeze field select, or strobe rate). If the proc amp/effects section is then selected by pushing the proc amp/effects mode key (ie; to engage a special effect while in freeze mode) then the freeze LED will stop flashing (remaining ON) and the desired effect may be adjusted via the control wheel. Pushing the freeze-freeze key once again will return the control wheel to the freeze function, and cause the freeze LED to once again flash.

Pressing the freeze-freeze key when the freeze LED is flashing will release the freeze function, returning the unit to live mode.

**AUTO-DOC SECTION:**

**Auto-DOC SELECT key:**

This key selects the processing mode for the automatic dropout compensator. This circuit analyzes the signal using a three dimensional DPS algorithm, and replaces suspected dropouts automatically, without the traditional VTR RF connection.

OFF: The auto-DOC is disabled.

NORM: The auto-DOC is enabled, with normal sensitivity.

HIGH: The auto-DOC is enabled, with high sensitivity.

Note: In order to reduce artifacts, the high sensitivity mode should only be used on tapes where dropouts are particularly bad.

**CONTROL SECTION**

**Control SELECT key:**

Allows the unit to be toggled between local and remote control. When the unit is in remote control, this is the only front panel key which will function, and the REMOTE LED will flash.

**CHROMA SECTION**

**Chroma SELECT key:**

This key toggles the chroma noise reduction and edge enhancement ON and OFF as indicated by the N/R and EDGE LED's. When using the DPS-295 in multiple generation applications (ie; when it is known that the signal will be processed by the unit more than once) the chroma N/R processing should be left OFF until the final pass through the unit.

**FUNCTION SECTION**

**Function SELECT key:**

This key toggles the unit between TBC and test signal generator modes. When in the TBC mode, the selected video input signal will be processed, and appear at the units video outputs.

**Function SELECT key (cont'ed):**

When in TSG mode, the internal component test signal generator will be engaged. The control wheel can then be used to select one of the 48 internally generated patterns.

When the optional waveform board is installed, the WFM function may also be selected via this key. When selected, the synthesized waveform display will become keyed over the main video outputs from the unit. Note: These synthesized displays are always available at the NTSC-2 output when the internal NTSC-2 mode jumper is configured for WFM operation.

#### 4.2 INTERNAL DIP SWITCHES

The internal DIP switches on the DPS-295 are located behind the front panel. To access the DIP switches, remove the front panel using the three screws on the top and bottom of the unit, located on the lip of the front panel.

Note: The factory default for ALL DIP switches is the 'UP' position as indicated in the following tables.

Figure 4.2-1 shows the location of the switches when viewed from the front of the unit.

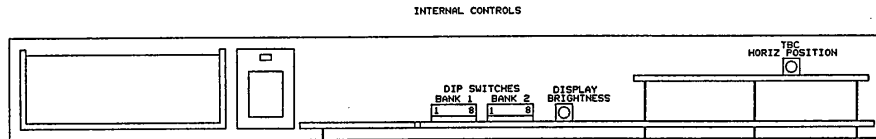


FIGURE 4.2-1

**Bank 1 Switch 1:**

This switch selects the signal levels for the CAV (Y/R-Y/B-Y) outputs:

UP.....BETACAM CAV Levels.  
Y = 714mv black/white  
R-Y/B-Y = 700mv for 75% Color Bars

DOWN.....MII CAV Levels.  
Y = 700mv black/white  
R-Y/B-Y = 486mv for 75% Color Bars

**Bank 1 Switch 2:**

This switch sets the width of vertical blanking inserted by the DPS-295.

UP.....Narrow Blanking.  
Active video begins on line 10 (field 1).  
Active video begins on line 9 (field 2).

DOWN.....Wide Blanking.  
Active video begins on line 22 (field 1).  
Active video begins on line 21 (field 2).

**Bank 1 Switch 4 & 3:**

These switches control the output burst.

4 3  
-----  
UP...UP...Output has burst if input has burst.  
DOWN...UP...Output always has burst.  
UP...DOWN..Output never has burst.  
DOWN..DOWN..Not Allowed.

**Bank 1 Switch 6 & 5:**

These switches control the hot switch mode.

| 6    | 5    |  |
|------|------|--|
| UP   | UP   | Disabled.  |
| DOWN | UP   | Disabled.  |
| UP   | DOWN | Enabled, freeze last good field.                 |
| DOWN | DOWN | Enabled, freeze last field 1 sec, drop to black. |

**Bank 1 Switch 7:**

Proc amp auto-load control. The proc amp auto-load feature allows previously stored settings to be automatically re-loaded, whenever the input select key is toggled.

|      |                              |
|------|------------------------------|
| UP   | Proc Amp auto-load Enabled.  |
| DOWN | Proc Amp auto-load Disabled. |

**Bank 1 Switch 8:**

This switch controls the proc amp non-volatile memory protection feature. When the memory protection is enabled, the front panel STR/EXIT key will not function, disabling overwriting of the currently stored proc amp settings.

|      |                        |
|------|------------------------|
| UP   | Memory Protection OFF. |
| DOWN | Memory Protection ON.  |

**Bank 2 Switch 1:**

This switch enables/disables the internal luminance black clipper circuit. When enabled, the luminance signal is clipped at 0 IRE. When disabled, the luminance dynamic range extends down to -10 IRE.

|      |                         |
|------|-------------------------|
| UP   | Black Clipper Disabled. |
| DOWN | Black Clipper Enabled.  |

**Bank 2 Switch 2:**

This switch enables/disables the internal luminance white clipper circuit. When enabled, the luminance signal is clipped at 100 IRE. When disabled, the luminance dynamic range extends up to 120 IRE.

UP.....White Clipper Disabled.

DOWN.....White Clipper Enabled.

**Bank 2 Switch 3:**

This switch selects either genlock or free-running (crystal ref.) mode of operation. When the genlock mode is selected, and a ref. video signal is NOT connected to the unit, the front panel SYSTEM LED will flash to indicate that the unit has reverted to internal crystal ref. mode. Selecting the free-running mode will suppress this flashing.

UP.....Genlock Mode.

DOWN.....Free-running (crystal ref) mode.

**Bank 2 Switch 4:**

This switch selects the BAUD rate for the remote control port, and enables/disables the ES-buss protocol.

UP.....9600 BPS, ES-Buss Disabled.

DOWN.....38.4 KBPS, ES-buss Enabled.

**Bank 2 Switch 5:**

This switch determines if the system phase setting is effected by a proc amp memory recall operation. Normally, a single system phase setting is desirable for a given application, in which case the system phase update should be disabled. Under some conditions, (say when the output of the unit goes to two different switchers, or subsystems which require different system timing) then the system phase update can be enabled, allowing the different system timing requirements to be stored in the proc amp memories, and recalled as required.

UP.....System Phase NOT effected by RECALL.

DOWN.....System Phase IS effected by RECALL.



**Bank 2 Switch 6:**

This switch enables/disables the digital adaptive comb filter which processes the NTSC and DUB input signals.

UP.....COMB Filter ON.

DOWN.....COMB Filter OFF (Trap mode).

**Bank 2 Switch 7:**

This switch enables/disables the remote GPI input located on the rear panel 9-pin 'D' connector. When enabled, the GPI input will toggle the unit between live and freeze modes whenever it is brought low.

UP.....GPI input Disabled.

DOWN.....GPI input Enabled.

**Bank 2 Switch 8:**

This switch determines if the serial remote control interface uses a parity bit. The even parity mode MUST BE used when the ES-buss protocol is enabled.

UP.....No Parity bit used.

DOWN.....Even Parity bit used (ES-Buss standard).

## SECTION 5 REMOTE CONTROL

### 5.1 Introduction

The DPS-295 supports three types of remote control. The unit can be controlled by an ES-buss controller using the ES-buss protocol operating at 38.4 KBPS using an RS422 electrical interface. The remote port can also be configured to run at 9600 BPS using an RS232 electrical interface. In this mode the ES-buss protocol overhead is disabled. Finally, a GPI input is provided to allow remote operation of the freeze function. Each of the three type of remote operation are described in detail below.

### 5.2 GPI Interface

The GPI interface provides the simplest method for remote control of the DPS-295. It allows only the freeze function of the unit to be toggled. In order to use the GPI interface the GPI enable DIP switch (Switch 7, Bank 2) must be placed in the 'DOWN' position. The GPI input contains an internal pull-up resistor of 4700 Ohms. The freeze function will be toggled from on to off, or off to on each time the GPI input is brought low. This can be done by either a TTL type device, or a relay. The GPI connection is made at pin 5 of the rear panel 9-pin 'D' connector.

### 5.3 RS-232 Interface

The RS-232 remote operation allows all of the front panel controls on the DPS-295 to be remotied. Electrical connection to the unit is made using the 9-pin 'D' connector on the rear panel according to the following pinout:

| PIN | SIGNAL                     |
|-----|----------------------------|
| 1   | Ground                     |
| 4   | DPS-295 Transmit Data out. |
| 9   | DPS-295 Receive Data in.   |

The port must also be placed into the RS-232 mode by moving the internal jumpers JHE4, JHE5, and JHE7 (located on the main PCB near the rear panel 9-pin 'D' connector) to their respective RS-232 positions. Also, the internal DIP switches should be used to select 9600 BPS with ES-bus protocol disabled (Bank 2 Switch 4 = UP), and remote parity disabled (Bank 2 Switch 8 = UP).

The RS-232 electrical connection allows for one controller to control one DPS-295. If it is desired to control many DPS-295's from a single controller, then see the section on RS-422 control. In any of the remote control modes, the DPS-295 has the ability to respond to addressed commands. This feature is normally only used when the RS-422 electrical interface is used, but can be used with the RS-232 interface. To disable this addressing feature, the remote address of the DPS-295 should be set to 0 (see next section on setting the remote address). Setting the remote address to 0 will cause the DPS-295 to respond to all incoming commands (even if the commands contain an address). Setting the remote address to anything else (ie; 1-127), will cause the DPS-295 to respond ONLY to commands which contain an address field which matches the address setting.

Note that the addressing feature functions differently when the ES-buss protocol is enabled. Under these conditions, addressing is accomplished according to the ES-buss standard (see SMPTE recommend practice RP 133-1983).

The format of the commands recognized by the DPS-295 is described in section 5.5 'Basic Command Format'.

#### 5.4 SETTING THE REMOTE ADDRESS

The DPS-295 contains a remote control address stored in its internal non-volatile memory. In order to view or change the current setting of this address press and hold the RECALL button for approx. 2 seconds. This causes the current setting of the remote control address to be displayed (blinking) on the front panel display. In order to change the setting, rotate the front panel control wheel. When the desired setting is obtained, press the STORE button. In order to view the address without changing it, press and hold the RECALL button until the address is displayed, then press any other proc. amp. control button to resume normal operation. The valid range for the remote address is 0 to 127. Setting the remote address to 0 (factory default) will cause the DPS-295 to respond to ALL incoming commands, ignoring the command address field (if it is present). This setting is normally used when the RS-232 electrical interface is used (because of the one-to-one nature of RS-232 software addressing is not required). If the remote address is set to anything else (1-127) then the DPS-295 will only respond to commands which have an address field that matches this address. This is normally done when using the RS-422 interface as it allows one controller (or host) to communicate with multiple DPS-295's over a single electrical link.

When the ES-buss protocol is enabled (DIP Switch 4, Bank 2 'DOWN'), the actual ES-buss address is related to the DPS-295 displayed address according to the table 5.4-1. Note that when the ES-buss protocol is enabled, the addressing function is provided by the ES-buss protocol structure (see SMPTE recommended practice RP 133-1983) and the address field described in the basic command format should NOT be transmitted.

TABLE 5.4-1  
ES-Buss Address Mapping

| DPS-265 ADDRESS | SELECT ADDRESS | POLL ADDRESS | DPS-265 ADDRESS | SELECT ADDRESS | POLL ADDRESS |
|-----------------|----------------|--------------|-----------------|----------------|--------------|
| 0               | E1 80          | E1 81        | 64              | F1 80          | F1 81        |
| 1               | E1 82          | E1 83        | 65              | F1 82          | F1 83        |
| 2               | E1 84          | E1 85        | 66              | F1 84          | F1 85        |
| 3               | E1 86          | E1 87        | 67              | F1 86          | F1 87        |
| 4               | E1 88          | E1 89        | 68              | F1 88          | F1 89        |
| 5               | E1 8A          | E1 8B        | 69              | F1 8A          | F1 8B        |
| 6               | E1 8C          | E1 8D        | 70              | F1 8C          | F1 8D        |
| 7               | E1 8E          | E1 8F        | 71              | F1 8E          | F1 8F        |
| 8               | E1 90          | E1 91        | 72              | F1 90          | F1 91        |
| 9               | E1 92          | E1 93        | 73              | F1 92          | F1 93        |
| 10              | E1 94          | E1 95        | 74              | F1 94          | F1 95        |
| 11              | E1 96          | E1 97        | 75              | F1 96          | F1 97        |
| 12              | E1 98          | E1 99        | 76              | F1 98          | F1 99        |
| 13              | E1 9A          | E1 9B        | 77              | F1 9A          | F1 9B        |
| 14              | E1 9C          | E1 9D        | 78              | F1 9C          | F1 9D        |
| 15              | E1 9E          | E1 9F        | 79              | F1 9E          | F1 9F        |
| 16              | E1 A0          | E1 A1        | 80              | F1 A0          | F1 A1        |
| 17              | E1 A2          | E1 A3        | 81              | F1 A2          | F1 A3        |
| 18              | E1 A4          | E1 A5        | 82              | F1 A4          | F1 A5        |
| 19              | E1 A6          | E1 A7        | 83              | F1 A6          | F1 A7        |
| 20              | E1 A8          | E1 A9        | 84              | F1 A8          | F1 A9        |
| 21              | E1 AA          | E1 AB        | 85              | F1 AA          | F1 AB        |
| 22              | E1 AC          | E1 AD        | 86              | F1 AC          | F1 AD        |
| 23              | E1 AE          | E1 AF        | 87              | F1 AE          | F1 AF        |
| 24              | E1 B0          | E1 B1        | 88              | F1 B0          | F1 B1        |
| 25              | E1 B2          | E1 B3        | 89              | F1 B2          | F1 B3        |
| 26              | E1 B4          | E1 B5        | 90              | F1 B4          | F1 B5        |
| 27              | E1 B6          | E1 B7        | 91              | F1 B6          | F1 B7        |
| 28              | E1 B8          | E1 B9        | 92              | F1 B8          | F1 B9        |
| 29              | E1 BA          | E1 BB        | 93              | F1 BA          | F1 BB        |
| 30              | E1 BC          | E1 BD        | 94              | F1 BC          | F1 BD        |
| 31              | E1 BE          | E1 BF        | 95              | F1 BE          | F1 BF        |
| 32              | E1 C0          | E1 C1        | 96              | F1 C0          | F1 C1        |
| 33              | E1 C2          | E1 C3        | 97              | F1 C2          | F1 C3        |
| 34              | E1 C4          | E1 C5        | 98              | F1 C4          | F1 C5        |
| 35              | E1 C6          | E1 C7        | 99              | F1 C6          | F1 C7        |
| 36              | E1 C8          | E1 C9        | 100             | F1 C8          | F1 C9        |
| 37              | E1 CA          | E1 CB        | 101             | F1 CA          | F1 CB        |
| 38              | E1 CC          | E1 CD        | 102             | F1 CC          | F1 CD        |
| 39              | E1 CE          | E1 CF        | 103             | F1 CE          | F1 CF        |
| 40              | E1 D0          | E1 D1        | 104             | F1 D0          | F1 D1        |
| 41              | E1 D2          | E1 D3        | 105             | F1 D2          | F1 D3        |
| 42              | E1 D4          | E1 D5        | 106             | F1 D4          | F1 D5        |
| 43              | E1 D6          | E1 D7        | 107             | F1 D6          | F1 D7        |
| 44              | E1 D8          | E1 D9        | 108             | F1 D8          | F1 D9        |
| 45              | E1 DA          | E1 DB        | 109             | F1 DA          | F1 DB        |
| 46              | E1 DC          | E1 DD        | 110             | F1 DC          | F1 DD        |
| 47              | E1 DE          | E1 DF        | 111             | F1 DE          | F1 DF        |
| 48              | E1 E0          | E1 E1        | 112             | F1 E0          | F1 E1        |
| 49              | E1 E2          | E1 E3        | 113             | F1 E2          | F1 E3        |
| 50              | E1 E4          | E1 E5        | 114             | F1 E4          | F1 E5        |
| 51              | E1 E6          | E1 E7        | 115             | F1 E6          | F1 E7        |
| 52              | E1 E8          | E1 E9        | 116             | F1 E8          | F1 E9        |
| 53              | E1 EA          | E1 EB        | 117             | F1 EA          | F1 EB        |
| 54              | E1 EC          | E1 ED        | 118             | F1 EC          | F1 ED        |
| 55              | E1 EE          | E1 EF        | 119             | F1 EE          | F1 EF        |
| 56              | E1 F0          | E1 F1        | 120             | F1 F0          | F1 F1        |
| 57              | E1 F2          | E1 F3        | 121             | F1 F2          | F1 F3        |
| 58              | E1 F4          | E1 F5        | 122             | F1 F4          | F1 F5        |
| 59              | E1 F6          | E1 F7        | 123             | F1 F6          | F1 F7        |
| 60              | E1 F8          | E1 F9        | 124             | F1 F8          | F1 F9        |
| 61              | E1 FA          | E1 FB        | 125             | F1 FA          | F1 FB        |
| 62              | E1 FC          | E1 FD        | 126             | F1 FC          | F1 FD        |
| 63              | E1 FE          | E1 FF        | 127             | F1 FE          | F1 FF        |

### 5.5 Basic Command Format

The following is the command format used by the DPS-295 for remote control in both the RS-232 and RS-422 modes. Note that the address field should NOT be used if the ES-buss protocol is enabled.

.,Addr(M),Addr(L),X1,X2,...,XN,<CR>

The data above represents a series of characters which would be sent to the DPS-295 in order to execute a typical command. The first three characters ".,Addr(M),Addr(L)" are the optional address field. This address field may be used to allow multiple DPS-295's to be controlled over a single electrical link, as described below. The first character "." (=2E Hex) indicates that this is an addressed command. The second and third characters are the unit address sent as two hex characters (ei, for address 100 decimal = 64 Hex would be sent as ".64" or 2E 64 34 hex). The next series of characters X1,X2,...,XN are the actual command. A list of commands supported by the DPS-295 is given below.

The final byte <CR> is an ASCII carriage return (ASCII 0Dh) which marks the end of all commands.

If the optional address field (first 3 characters) are not used, then the remote control address of the DPS-295 MUST BE set to 0 (see section 5.4).

The following is a list of the commands recognized by the DPS-295 in both the RS-232 and RS-422 modes. These are also the commands which are recognized when the ES-buss protocol is used, and the escape to non-standard communications is executed. In each case, the command string represents a string of characters which is transmitted to the DPS-295 followed by a carriage return

#### DPS-295 REMOTE CONTROL COMMAND LIST

| Cmd String (Hex)   | Description                                      |
|--------------------|--|
| F,F,A,0,0,X,X..... | Selects test pattern XX.<br>Where XX = 00 to 2F. |
| F,F,A,0,2,0,0..... | Set Function to TBC mode.                        |
| F,F,A,0,2,0,1..... | Set Function to TSG mode.                        |
| F,F,A,0,2,0,2..... | Set Function to WFM mode.                        |
| F,F,A,0,3,0,0..... | Chroma N/R OFF, Edge Enh OFF.                    |
| F,F,A,0,3,0,1..... | Chroma N/R ON, Edge Enh. OFF.                    |
| F,F,A,0,3,0,2..... | Chroma N/R ON, Edge Enh. ON.                     |
| F,F,A,0,3,0,3..... | Chroma N/R OFF, Edge Enh. ON.                    |
| F,F,A,0,4,0,0..... | Auto-DOC OFF.                                    |
| F,F,A,0,4,0,1..... | Auto-DOC NORM sensitivity mode.                  |

DPS-295 REMOTE CONTROL COMMAND LIST

| Cmd String (Hex)   | Description   |
|--------------------|---|
| F,F,A,0,4,0,2..... | Auto-DOC HIGH sensitivity mode.   |
| F,F,A,0,5,0,0..... | Freeze mode to FRAME.   |
| F,F,A,0,5,0,1..... | Freeze mode to FIELD.   |
| F,F,A,0,5,0,2..... | Freeze mode to STROBE.  |
| F,F,A,0,6,X,X..... | Set STROBE rate to XX.<br>Where XX=00 to 7F hex.  |
| F,F,A,0,8,0,0..... | Select NTSC-1 Input signal.   |
| F,F,A,0,8,0,1..... | Select NTSC-2 Input signal.   |
| F,F,A,0,8,0,2..... | Select SVHS Input signal.   |
| F,F,A,0,8,0,3..... | Select DUB Input signal.  |
| F,F,A,0,9,0,0..... | Select HET input mode.  |
| F,F,A,0,9,0,1..... | Select DIRECT input mode.   |
| F,F,A,0,9,0,2..... | Select SYNC input mode.   |
| F,F,A,A,0,0,0..... | Set Proc Amp mode to PROC AMP.  |
| F,F,A,A,0,0,1..... | Set Proc Amp mode to EFFECTS.   |
| F,F,A,A,0,0,2..... | Set Proc Amp mode to WFM.   |
| F,F,A,A,1,X,X..... | Set Proc Amp Adjust/Display to XX.<br>XX = 00 for LUMA level.<br>= 01 for Black level.<br>= 02 for Chroma level.<br>= 03 for Hue level.<br>= 04 for YC horizontal.<br>= 05 for YC vertical.<br>= 06 for System Phase. |
| F,F,A,A,2,X,X..... | Set Effects Adjust/Display to XX.<br>XX = 00 for Posterization level.<br>= 01 for Black Stretch level.<br>= 02 for Solarization level.<br>= 03 for Cepia level.   |
| F,F,A,A,3,X,X..... | Set Luminance level to XX.<br>Where XX = 00 to FFh.   |
| F,F,A,A,4,X,X..... | Set Black level to XX.<br>Where XX = 00 to FFh.   |
| F,F,A,A,5,X,X..... | Set Chroma level to XX.<br>Where XX = 00 to FFh.  |
| F,F,A,A,6,X,X..... | Set Hue level to XX.<br>Where XX = 00 to FFh.   |
| F,F,A,A,7,X,X..... | Set posterization level to XX.<br>Where XX = 00 to 0Fh. (0=OFF)   |
| F,F,A,A,8,X,X..... | Set Black Stretch to XX.<br>Where XX = 00 to 0Fh. (0=OFF)   |
| F,F,A,A,9,X,X..... | Set Solarization level to XX.<br>Where XX = 00 to 0Fh. (0=OFF)  |

**DPS-295 REMOTE CONTROL COMMAND LIST**

| Cmd String (Hex)   | Description  |
|--------------------|--|
| F,F,A,A,A,X,X..... | Set CEPIA level to XX.<br>Where XX = 00 to 0Fh. (0=OFF)              |
| F,F,A,A,B,X,X..... | Set Y/C Delay Horizontal to XX.<br>Where XX = 00 to 0Fh. (7=nominal) |
| F,F,A,A,C,X,X..... | Set Y/C Delay Vertical to XX.<br>Where XX = 00 to 03h. (1=nominal)   |
| F,F,A,A,E,X,X..... | Set System Phase coarse to XX.<br>Where XX = 00 to FFh.              |
| F,F,A,A,F,X,X..... | Set System Phase fine to XX.<br>Where XX = 00 to FFh.                |
| E,5,2,0,0.....     | Assign 7-seg. display to Proc amp/Effects.                           |
| E,5,2,0,1.....     | Assign 7-seg. display to FREEZE.                                     |
| E,5,2,0,2.....     | Assign 7-seg. display to TSG.  |
| E,2,F,0,0.....     | Go to LIVE mode.   |
| E,2,F,0,1.....     | Go to FREEZE mode.   |
| E,2,A,X,X.....     | Freeze field select XX.<br>XX = 00 to 03 Field select                |
| R,0.....           | Select LOCAL control mode.   |
| R,1.....           | Select REMOTE control mode.  |

Note: The last two entries in the above table are the ONLY two commands which can be used when the DPS-295 is in LOCAL mode.

The above listed commands may also be used to obtain status information from the DPS-295. For all of the listed commands, if the '?' character (ASCII 3F hex) is added to the beginning of the command, and the last two characters of the command are NOT transmitted.

For example; to set the test signal generator to pattern # 7, the command would be:

F,F,A,0,0,0,7,<CR>

To read the current test signal generator setting, the command would become:

?,F,F,A,0,0,<CR>

Upon reception of this command, the DPS-295 would transmit the current setting (one byte as a single character value 00-2F Hex), and then the normal acknowledge byte.



Each of the commands listed above must be transmitted to the DPS-295 followed by a carriage return (ASCII 0D hex) which marks the end of a command. When a command is received correctly by the DPS-295, it responds by transmitting the ">" character (ASCII 3E hex).

When a command is received by the DPS-295 which is not understood or if the DPS-295 is in local mode then the result depends on the setting of the internal remote address and on whether or not the ES-buss protocol is enabled.

When the ES-buss protocol is DISABLED, and the remote address is set to 0 (addressing disabled) then the DPS-295 will respond to not understood commands with the '?' character (ASCII 3F hex), and will respond to (though not execute) commands when in the local mode with the "\*" character (ASCII 2A hex).

When the ES-buss protocol is DISABLED, and the remote address is set NOT EQUAL to 0 (ie; 1-127) then the DPS-295 will NOT respond to not understood commands, and will respond to (though not execute) commands when in the local mode (provided the address is correct) with the "\*" character (ASCII 2A hex).

When the ES-buss protocol is enabled, the DPS-295 will confirm its local/remote status when addressed with its POLL address (BSY 06h for local mode, ACK 04h for remote). The unit will respond to not understood commands (after an escape to non-standard communications) with the '?' character (ASCII 3F hex).

If, in the above examples, the addressing feature was to be used, (in a non ES-buss mode application) then each of the commands would have had to have the address field appended to them. Assume that the remote DPS-295 has had its address set to 110 (= 6E [hex]), then in order to select test pattern # 7, the new addressed command sequence would become:

.,6,E,F,F,A,A,0,0,7,<CR>

## 5.6 RS-422 (ES-buss) Interface

The RS-422 electrical interface is made at the DPS-295 rear panel 9-pin 'D' connector. To operate the DPS-295 serial remote port in RS-422 mode, the internal jumpers JHE4, JHE5 and JHE7 (located on the main PCB, near the 9-pin 'D' connector) must be moved to their respective RS-422 positions.

When using the RS-422 electrical interface, each DPS-295 only enables its transmitter when it is required to respond to a command. This allows many units to share the same electrical connection and reduces wiring.

The pin-out for the 9-pin 'D' connector when used in RS-422 mode is as follows:

| PIN | FUNCTION                              |
|-----|---------------------------------------|
| 1   | Ground                                |
| 2   | DPS-295 Transmit data (inverted).     |
| 3   | DPS-295 Receive data (non-inverted).  |
| 4   | Ground                                |
| 5   | N.C.                                  |
| 6   | Ground                                |
| 7   | DPS-295 Transmit data (non-inverted). |
| 8   | DPS-295 Receive data (inverted).      |
| 9   | Ground                                |

The RS-422 interface can operate under the ES-buss software protocol (when enabled via DIP switch 4 bank 2), and is electrically compatibly with this standard. The RS-422 interface can also operate under the basic command language software protocol (described in section 5.5) without the ES-buss protocol overhead. The two modes of operation are described below.

### RS-422 non ES-buss Operation:

To operate with the RS-422 electrical interface, but without the ES-buss protocol overhead, the following DIP switch settings should be used:

| Switch | Bank | Setting | Function                          |
|--------|------|---------|-----------------------------------|
| 4      | 2    | UP      | 9600 BPS/Disable ES-buss protocol |
| 8      | 2    | UP      | Parity = none                     |

When this mode is used, and it is required to connect more than one unit to a single controller, the optional address fields (described in section 5.5) must be used. Also, the address of each DPS-295 on the buss must be set to a distinct, non-zero number.

**RS-422 ES-buss Operation:**

To operate the DPS-295 with an ES-buss controller the following DIP switch settings should be used:

| Switch | Bank | Setting | Function                          |
|--------|------|---------|-----------------------------------|
| 4      | 2    | DOWN    | 38.4 KBPS/Enable ES-buss protocol |
| 8      | 2    | DOWN    | Parity = even                     |

When the ES-buss protocol is enabled, the addressing is performed within the ES-buss protocol, and the optional command address field (see section 5.5) should NOT be used. Also, the actual ES-buss address will be related to the DPS-295 displayed address as detailed in table 5.4-1. The DPS-295 does NOT support group addressing on the E-buss. Control of the unit in ES-buss mode is accomplished by using the escape to non-standard communications feature of the ES-buss protocol (see SMPTE recommended practice RP 113-1983). Once in non-standard communications mode, the unit is controlled as described in section 5.5.

## APPENDIX A

### Waveform Board Option

#### A.1 Installation

- 1) Remove the power cord from the DPS-295.
- 2) Disconnect all input and output connections from the rear panel of the DPS-295.
- 3) Remove the top cover of the DPS-295.
- 4) Connect the WFM board to the DPS-295 main board via the 50-pin ribbon cable P4 on the DPS-295 main PCB.
- 5) Mount the WFM board and supplied carrier plate on the four standoffs using the four screws provided.
- 6) If a dedicated full-time waveform display output is desired, then move jumper GHE9 (located on the main PCB near the NTSC-2 output BNC) to the WFM position. This will dedicate the NTSC-2 output to the waveform/vector display mode.
- 7) Replace the DPS-295 top cover.

#### A.2 Operation

The waveform option board for the DPS-295 allows the unit to function as a waveform monitor, vector scope, or component parade display device. The video output from the waveform board can be switched onto the DPS-295's main outputs by selecting the WFM function with the function key, or may be made available full-time by moving jumper GHE9 on the DPS-295 main board to the WFM position. When connecting the DPS-295 output to a video monitor for the purpose of displaying the waveform board output, either a monochrome or SVHS type monitor will provide the best results. If using a color NTSC monitor, switch the monitor to monochrome mode to obtain better quality.

Controlling the various features of the waveform board is accomplished via the front panel control wheel and the RCL/ENTER and STR/EXIT keys. To enable control of the waveform board, the proc amp/effects mode must be set to WFM mode.

Each screen on the WFM output contains a menu line across the top. This menu line contains several entries. A particular entry is selected by moving the WFM cursor "[ ]", using the control wheel, and then pressing the RCL/ENTER key. Some menu entries are simple toggles (ie; AVG ON/OFF) and are toggled by hitting the RCL/ENTER key when the WFM cursor is over that item.

Some other menu items become active (inverse video) when selected, (ie; LINE SELECT) once active, the control wheel is used to modify the parameter. When the desired setting is obtained, the STR/EXIT key is used to deactivate the entry. Some of the menus contain a "NEXT" item. If this item is selected, then a new set of menu items may be obtained. If the STR/EXIT key is used when NO menu item is active (inverse video), then the menu will 'back-up' one level. Example: If the "NTSC-WFM" item is selected from the main menu, then a full screen NTSC waveform is displayed, along with a new menu line. If the STR/EXIT key is then pressed, the screen will revert to quad display mode, and the main or top level menu will be restored.

The waveform board acts like a conventional waveform monitor/vector scope would if it were connected to the DPS-295 output. This allows it to be used to obtain correct proc amp settings when processing a video signal through the DPS-295. The DPS-295 waveform option board differs from a conventional waveform monitor in the following ways:

- 1) The unit DOES NOT display the horizontal blanking (sync and burst) portion of the signal (because the DPS-295 inserts sync and burst, this display would not be significant).
- 2) The unit will display only one video line at a time (as selected via the LINE menu item).
- 3) The first video line which can be displayed is line 10. Lines below 10 are regenerated by the DPS-295, making their display not significant.

The following is a detailed description of each of the menu items and their functions.

#### MAIN MENU:

This is the menu displayed when the waveform board is initialized, or on power-up. Below the menu, the screen consists of four quarter sized displays including an NTSC waveform monitor, an NTSC vector scope, a Luminance only waveform and a color difference R-Y, B-Y parade. The menu items, from left to right are as follows:

NTSC-WFM Selects a full screen NTSC waveform monitor.

NTSC-VEC Selects a full screen NTSC vector scope.

LUMA-WFM Selects a full screen Luminance waveform.  
CHRM-WFM Selects a full screen R-Y/B-Y parade.  
AVG-[ON/OFF] Toggles the signal averaging feature ON and OFF.  
The average ON mode is useful when displaying a  
noise signal.  
LINE-XXX Line select.  
FIELD-X Field 1/2 select.

When either the full screen NTSC or Luminance waveform monitor  
modes are selected, the following menu will be displayed:

Hpos=[CAL/VAR] In variable mode, the horizontal position is  
modified using the control wheel.  
Hmag=[xX] Changes the Horizontal expansion factor.  
[x1,x2,x5,x10,x25 or x50]  
Vpos=[VAR/CAL] In variable mode, the vertical position is  
modified using the control wheel.  
Vmag=[xX] Changes the vertical expansion factor.  
[x1,x2 or x5]  
NEXT >> Enables the TIME/VOLTS cursors menu

NOTE: When using the Hpos, Hmag, Vpos or Vmag the proc  
amp/effects TIMING key may pressed to restore ALL  
magnification/position settings to there CAL or x1 values.

TIME/VOLTS cursors menu:

TIME/VOLTS Toggles cursors between TIME and VOLTAGE mode.  
M-LEFT/TOP Moves LEFT (time mode) or TOP (voltage mode)  
cursor.  
M-RIGHT/BOTTOM Moves RIGHT (time mode) or BOTTOM (voltage mode)  
cursor.  
M-BOTH Moves BOTH measurement cursors.

### A.3 Downloading Video Data

When the WFM option board is installed in the DPS-295 it is possible to download the digitized video data via the remote control port to a host computer. This feature is intended for automated signal monitoring/measurement or image capture for multi-media integration. In order to connect a computer to the DPS-295 remote control port, see section 5 of this manual.

In order to execute the commands required to download video data, the DPS-295 must be in REMOTE control mode. This can be done either by pressing the front panel control key, or sending the go to REMOTE control command listed in section 5. When data is transferred from the DPS-295 to the host computer, the data is in component form, (ie; separate luminance and chrominance). If it is desired to capture a complete color frame or field of data, then the DPS-295 should be placed into the freeze (frame or field) mode before the transfer commands are given. Placing the DPS-295 into freeze mode can also be performed via the remote control interface (see section 5).

The following examples show the command sequence required to perform several different types of video image download functions.

**Example-1:** Capturing a single video line of luminance data without interrupting the DPS-295 processing.

This mode is useful for automated monitoring/measurement of the video signal being processed by the DPS-295.

```
HOST      -> R,1,<CR>          ;Put DPS-295 into remote mode
DPS-295   -> <3E>             ;DPS-295 ACK

HOST      -> B,<CR>           ;Grab Y Frame to WFM frame buffer
DPS-295   -> <3E>             ;DPS-295 ACK

HOST      -> D,11,fd,<CR>      ;Transfer line 11 of field fd
DPS-295   -> <3E>,d0,d1,...,d767 ;DPS-295 ACK + 768 data bytes
```

In the example above, each command consists of a list of characters sent by the host to the DPS-295 using the serial interface. For the transfer command (ie; D,11,fd,<CR>) the host would send the actual video line number minus 10 in place of the two '11' characters. For example, to transfer video line number 100 the '11' characters would be 100-10=90 or 5,A hex. The fd character (field select) should be set to "0"=30 hex for field 1, or "1"=31 hex for field 2.

After the DPS-295 receives the transfer command, it responds with its normal acknowledge byte, followed by the 768 data bytes for the requested video line. For the 8-bit luminance data, 40 Hex = black, and E0 hex = White.

**Example-2:** Capturing a single video line of chrominance data without interrupting the DPS-295 processing.

This mode is useful for automated monitoring/measurement of the video signal being processed by the DPS-295.

```
HOST    -> R,1,<CR>          ;Put DPS-295 into remote mode
DPS-295 -> <3E>             ;DPS-295 ACK

HOST    -> C,<CR>           ;Grab C Frame to WFM frame buffer
DPS-295 -> <3E>             ;DPS-295 ACK

HOST    -> D,11,fd,<CR>      ;Transfer line 11 of field fd
DPS-295 -> <3E>,d0,d1,...,d767 ;DPS-295 ACK + 768 data bytes
```

This example is similar the the previous example for capturing luminance data. In this case, the second command (ie; C,<CR>) is used to cause the WFM board to capture a frame of chrominance data instead of luminance. Also, when the transfer command is received, the DPS-295 returns a multiplexed stream of B-Y and R-Y data as follows:

B-Y(0),R-Y(0),B-Y(1),R-Y(1),...,B-Y(383),R-Y(383)

For the 8-bit chrominance data, the B-Y range is +/- 3D hex for 75% color bars, and the R-Y range is +/- 55 Hex for 75% color bars. Also, zero chroma = 80 hex.

**Example-3:** Capturing 1 field of luminance data.

This mode will allow an entire video field 240 line by 768 samples of luminance data to be captured.

```
HOST    -> R,1,<CR>          ;Put DPS-295 into REMOTE mode
DPS-295 -> <3E>             ;DPS-295 ACK

HOST    -> F,F,A,0,5,0,1,<CR>;Select Freeze FIELD mode
DPS-295 -> <3E>             ;DPS-295 ACK

HOST    -> E,2,F,0,1,<CR>    ;Activate FREEZE on DPS-295
DPS-295 -> <3E>             ;DPS-295 ACK

HOST    -> B,<CR>           ;Grab Y Frame to WFM frame buffer
DPS-295 -> <3E>             ;DPS-295 ACK
```



```
for ll=12 to 251           ;All active video lines
    HOST    -> D,ll,fd,<CR>      ;Transfer line ll of field fd
    DPS-295 -> <3E>,d0,d1,...,d767 ;DPS-295 ACK + 768 data bytes
next ll
```

In this example, the luminance data for a complete field of video is downloaded from the DPS-295. Note that the DPS-295 DOSE NOT have to be placed in freeze for this operation (as was done in the example), unless the color information for this same field is going to also be required. If the color information is required, then the same sequence of command can be used, with the B,<CR> command (Grab Y) changed to C,<CR> (Grab C).