

DV6000®

Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder



Equipment Manual



ARTEL

A Division of Newfound Technology

Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder

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Revision History

Revision	Date	Reason for Change
A	4/19/04	Initial Release
B	3/21/06	Changed MASI Encoder P/N from DV61601MASI to DV61601MASI01 and Decoder from DV6102MASI to DV6102MASI01.

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Introduction

The Multi-Port DVB-ASI & SMPTE 310M line cards enable up to three DVB-ASI signals and one SMPTE 310M signal to be transported in one timeslot of any DV6000 Product Family System (DV6000, DV6400, and DV6300).

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Manual Overview

This manual covers the Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder module functionality, installation, and checkout.



Note The “01” version MASI cards are not compatible in any configurations with the non-“01” versions. This version now supports all DV6300 applications.

Part Numbers

Table 1.1 provides the part numbers for the encoder and decoder modules. The names “DV6101MASI01” and “DV6102MASI01” used throughout this section refer to the encoder and decoder respectively. “MASI” (Multi-Port ASI) will be used when referring to both modules.

Table 1.1 Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder Part Numbers

Option	Description
DV6101MASI01	Multi-Port DVB-ASI & SMPTE 310M encoder card
DV6102MASI01	Multi-Port DVB-ASI & SMPTE 310M decoder card

Document Conventions

Labels printed on Module faceplates are shown in a different typeface (for example, **ALARM**).

This manual uses the following notes, cautions, and warnings:



DANGER, Laser Radiation Invisible laser radiation is present. Do not look into the ends of any optical fiber connectors or bulkhead adapters. Use an optical power meter to identify active fibers. Do not assume that the laser power is turned off or that a fiber is disconnected at its far end.



WARNING Personal injury might result if instructions are not followed.



CAUTION Equipment damage might result if instructions are not followed.



Note Read for added information and reminders, including when a service interruption could occur.



Tip Read for helpful hints.

General Safety Precautions



CAUTION This equipment is electrostatic discharge sensitive. To prevent electrostatic discharge damage, wear a grounded wrist strap when you touch an equipment unit. Always place units on an approved, grounded, antistatic surface. Use antistatic packaging material when transporting equipment.

Statement of Compliance

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

This equipment will be tested to ensure that it will not exceed Class A limits for radio emission for digital apparatus, set out in the radio interference regulation of the authorization methods of Industry Canada. Operation in a residential area may cause unacceptable interference to TV and radio reception requiring the owner or operator to take whatever steps are necessary to correct the interference.

Standards

Table 1.2 Standards Matrix

Country	Issuing Authority	Standard
Electromagnetic Compatibility		
US	FCC	CFR 47, Part 15, Class A limits
Canada	Industry Canada	ICES-003
European Union	EU	EN 55 022:1998, Class A limits EN 300 386-2.2001 v1.3.1
Safety		
Not required. Card is considered DEL V as defined in UL/CSA 60950 and EN 60 950 and installed in shelf enclosures which have been fully safety tested and approved.		

Related Publications

Listed below are manuals that may be useful to users of this one.

Table 1.3 Related Documentation

Document Number	Title
060681-001	DV6000 Digital Video Transmission System Installation and Operation
861684	DV6408 Tributary Access System Equipment Manual
861685	DV6444 Interface Gateway System Equipment Manual
060620-001	DV6300 Single Channel Transport System Installation and Operation
060900-001	Digital Video Encoders and Decoders
1301166	DV6400 Craft Software Guide
1031165	DV6400 Tributary Access and Interface Gateway Procedures Manual
060834-001	DV6000 SMART-NETT Model #9903 User's Manual
1054575	DV6000 DAP Control Software User's Manual
1301166	DV6400 Craft Software Guide

Tools and Materials

Table 1.4 Tools and Materials Required

Tools/Materials	Required Characteristics	Uses
Tools		
Box cutter		Unpacking modules
ESD wrist strap		All procedures
ESD antistatic mat		Any procedure when module is not in the equipment shelf
Optical Power Meter		To verify active fiber optic cables
Video Generator	Rhode & Schwarz (DVG) or Tektronix (MTC200) w/SMPTE 310M Interface (Rhode & Schwarz DV-B310).	Used in troubleshooting to generate DVB-ASI and/or SMPTE 310M video signals.
Video Measurement Decoder	Rhode & Schwarz (DVMD) or Tektronix (MTD200) w/SMPTE 310M Interface (Rhode & Schwarz DV-B310).	Used in troubleshooting to measure DVB-ASI and/or SMPTE 310M video signals.
Video Monitor		Used in troubleshooting to monitor DVB-ASI and/or SMPTE 310M video signal quality.
Materials		
Blank module covers	DV6016BPV	Required for any encoder/decoder module slot not occupied by a module. Ensure proper heat dissipation and minimize EMI
Video Cable	75 ohm, Belden 8281 or equivalent.	MASI video connections

Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder Modules

This Chapter covers the physical and functional description of both Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder modules.

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Part Numbers	— page 2-15

Overview

The Multi-Port DVB-ASI & SMPTE 310M line cards enable up to three DVB-ASI signals and one SMPTE 310M signal to be transported in one timeslot of any DV6000 Product Family System (DV6000, DV6400, or DV6300).

MASI system Requirements

- VXCO DAP modules w/version 17 or higher firmware
- DV6000 Shelves require PSB Power Supplies
- Closed ring networks require double diamond (◆◆) transceivers

The DV6101MASI01 encoder has a total transport bandwidth of 126Mbps, which is divided into 12 sub-timeslots of 10.5Mbps. Each of these 12 sub-timeslots is designated by the user to one of three DVB-ASI input ports, depending upon the payload bandwidth requirements of the particular DVB-ASI signal.

The modules also have a SMPTE 310M input port, which if used, requires two sub-timeslots, leaving the remaining 10 sub-timeslots to be shared among the other three DVB-ASI ports.

DVB-ASI & SMPTE 310M Terminology

2

DVB-ASI

DVB-ASI (Digital Video Broadcast – Asynchronous Signal Interface) is a transmission scheme for MPEG-2 payloads based on the MPEG-2 video compression. DVB-ASI ports interface directly to DVB-ASI MPEG transport streams operating at bit rates of up to 270 Mbps. Developed for transmission over longer distances where higher noise levels are encountered.

SMPTE 310M

SMPTE (Society of Motion Pictures and Television Engineers) 310M is a scheme for transporting synchronous digital payloads to run in low-noise environments, at a fixed rate. The SMPTE 310M Port interfaces directly to an SMPTE 310 MPEG-2 transport stream operating at 19.39 Mbps.

Physical Description

Since the modules have port connections on the front panel and rear (accessible at the rear of the DV shelf/assembly), tables are provided for both. Physical descriptions are provided for both the encoder and decoder modules.

DV6101MASI01 Encoder

Figure 2.1 shows the DV6101MASI01 encoder module's front panel. Table 2.1 provides a description of each of the encoder modules *front panel* features, and Table 2.2 the *rear panel* connections.

Figure 2.1

DV6101MASI01
Encoder Front Panel

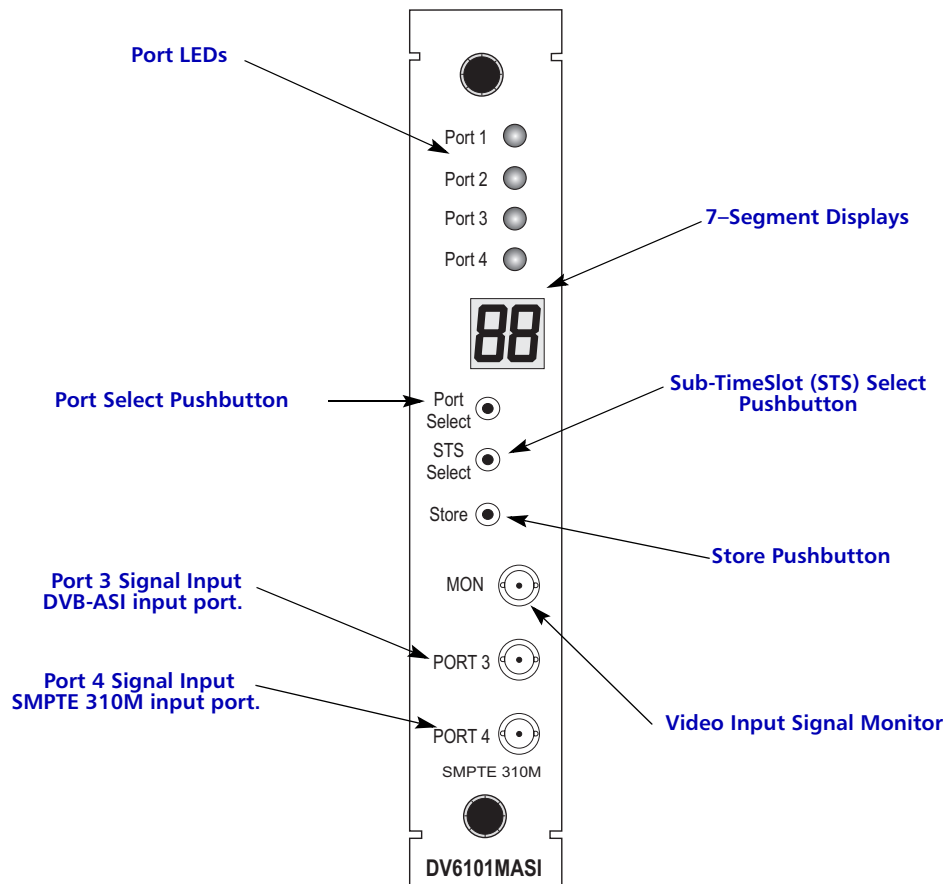


Table 2.1 DV6101MASI01 Encoder Front Panel Features


Type	Label	Description
LED (blue/green/red/unlit)	Port 1–4	<p>The Port status LEDs are multifunctional based on mode of operation (power up, programming, and normal operation).</p> <p>Blue: Indicates which port is selected.</p> <ul style="list-style-type: none"> – On initial (first time) power up, defaults to Port 1. – On subsequent power ups it will indicate the last selected port. <p>When Port Select pushbutton is pressed, the selected port LED turns blue. After 10 seconds of no front panel pushbutton activity, the LED will indicate the current status of the port.</p> <p>Depressing the Port Select pushbutton while the LED is blue, will increment the port selected (Port 4 wraps back to Port 1).</p> <p>Green: A <i>solid green</i> LED indicates normal operation. A signal is present, and no alarms.</p> <p>Amber: An amber LED indicates a buffer overflow has occurred. Not enough STSs (payload bandwidth) have been allocated to meet payload requirements.</p> <p>Red: – If the <i>7-segment display indicates rotating 0s</i> A <i>solid red</i> LED indicates that either: <ul style="list-style-type: none"> ■ STSs have been assigned to the port, but no input signal is present, or ■ no PLL lock. Input signal is not ASI compliant or Input signal corrupt (incorrect signal type). – If the <i>7-segment display indicates “88”</i> and all 4 LEDs are <i>red</i>, it indicates a loss of backplane clock.</p> <p>Unlit: Indicates no Sub-TimeSlots (STSs) have been allocated to the port.</p>
7-Segment Display		<p>Display is dependent upon mode of operation.</p> <p>Configuration Mode</p> <p>Port Select Pushbutton</p> <p>When port is selected, it will indicate the number of sub-timeslots (STSs) assigned to that port</p> <p>STS Select Pushbutton</p> <p>Will increment by one, up to the number of available (not yet assigned) STSs, then wrap back to zero.</p> <p>Monitoring Mode</p> <p>After 10 seconds of front panel pushbutton inactivity, the 7-segment display will go into “Monitoring” mode. The display will show rotating 0s.</p> 
Pushbutton Switch	Port Select	Selects Port 1, 2, 3, or 4 to be controlled from the front panel, and monitored at MON connector on the front panel.
Pushbutton Switch	STS Select	Increments the number of Sub-Time Slots (0 – 12) to be assigned to the selected port.
Pushbutton Switch	Store	If held down for at least 1 second, the number of Sub-Time Slots (STS) selected for all ports will be stored.

Table 2.1 DV6101MASI01 Encoder Front Panel Features (cont'd)

Type	Label	Description
BNC Connector	MON	Video Input Signal Monitor. Signal is post-equalized signal output from the selected input port. Port to be monitored is selected by “Port Select” pushbutton. Note: In “Configuration Mode”, the last selected port signal will be present.
BNC Connector	Port 3	Port 3 Signal Input. DVB-ASI input port.
BNC Connector	Port 4 SMPTE 310M	Port 4 Signal Input. SMPTE 310M input port.



Note When module or power is removed, the module maintains last stored configuration

Table 2.2 DV6101MASI01 Encoder Rear Panel Connections

Type	Label	Description
BNC Connector	Port 1	Port 1 Signal Input. DVB-ASI (factory default) or SMPTE 310M if encoder Port 1 internal coax is rerouted to port 4 input port. Connector is located on the rear panel of the DV shelf/assembly, (JnA , where “n” indicates the slot that the module is inserted). Refer to Table 1.3, <i>Related Documentation</i> —page 1-3 for P/Ns of related DV Manual, for physical connection location.
BNC Connector	Port 2	Port 2 Signal Input. DVB-ASI input port Connector is located on the rear panel of the DV shelf/assembly, (JnB , where “n” indicates the slot that the module is inserted). Refer to Table 1.3, <i>Related Documentation</i> —page 1-3 for P/Ns of related DV Manual, for physical connection location.

The corresponding slots rear alarm contacts are not used by this module.

DV6102MASI01 Decoder

Figure 2.2 shows the DV6102MASI01 encoder module's front panel. Table 2.3 provides a description of each of the decoder modules *front panel* features, and Table 2.4 the *rear panel* connections.

Figure 2.2

DV6102MASI01
Decoder Front Panel

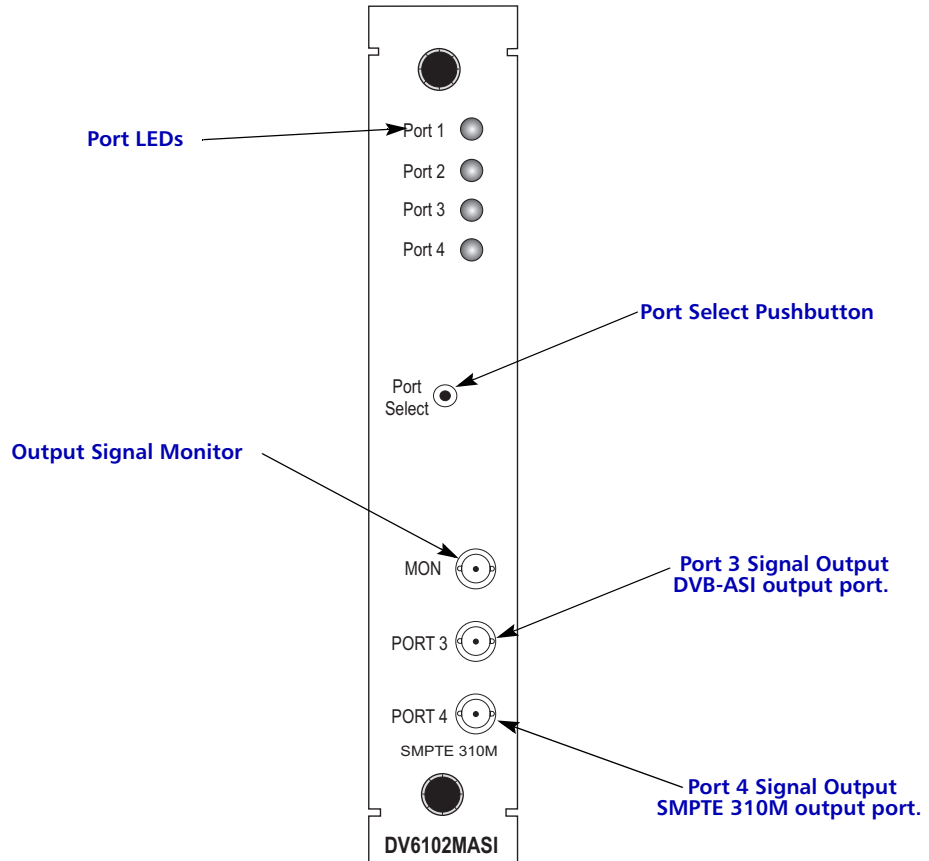
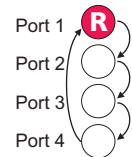


Table 2.3 DV6102MASI01 Decoder Front Panel Features

Type	Label	Description
LED (blue/green/red/unlit)	Port 1–4	<p>The Port status LEDs are multifunctional based on mode of operation (programming and normal operation).</p> <p>Blue: Indicates which port is selected.</p> <ul style="list-style-type: none"> – On initial (first time) power up, defaults to Port 1. – On subsequent power ups it will indicate the last selected port. <p>When Port Select pushbutton is pressed, the selected port LED turns blue. After 10 seconds of no front panel pushbutton activity, the LED will indicate the current status of the port (blue for approximately 1 second).</p> <p>Depressing the Port Select pushbutton while the LED is blue, will increment the port selected (Port 4 wraps back to Port 1).</p> <p>If the Encoder Store pushbutton is pressed, the Decoder LEDs will flash blue, indicating that the <i>Encoder STS</i> configuration(s) has been updated.</p> <p>Green: – A <i>solid green</i> LED indicates normal operation. A signal is present, and no alarms.</p> <ul style="list-style-type: none"> – A <i>blinking green</i> LED indicates an <i>Encoder</i> buffer overflow has occurred. Not enough STSs have been allocated by the <i>encoder</i> to meet payload requirements. <p>Red: – All 4 LEDs <i>solid red</i> indicates a loss of backplane clock.</p> <ul style="list-style-type: none"> – A blinking red LED is the initial indication that there is no PLL lock. Input signal is not ASI compliant or Input signal corrupt (incorrect signal type). After 15 seconds it will turn solid red. – A <i>solid red</i> LED indicates no PLL lock after 15 seconds. Will shut port off. – <i>Scanning red</i> LEDs indicates no DV timeslot allocated to the decoder module. <p>Unlit: Indicates no Sub-TimeSlots (STSs) have been allocated to the port.</p>
Pushbutton Switch	Port Select	Selects Port (1 – 4) to be controlled from the front panel, and monitored at MON connector on the front panel.
BNC Connector	MON	Output Signal Monitor Post-equalized video output from the selected port (50 ohm BNC connector) to be monitored. Selected by “Port Select” pushbutton.
BNC Connector	Port 3	Port 3 Signal Output DVB-ASI output port.
BNC Connector	Port 4 SMPTE 310M	Port 4 Signal Output SMPTE 310M output port.



Note When module or power is removed, the module maintains last stored configuration.

Table 2.4 DV6102MASI01 Decoder Rear Panel Connections

Type	Label	Description
BNC Connector	Port 1	Port 1 Signal Output. DVB-ASI (factory default) or SMPTE 310M if decoder Port 1 internal coax is rerouted to port 4 output port. Connector is located on the rear panel of the DV shelf/assembly, (JnA , where “n” indicates the slot that the module is inserted. Refer to Table 1.3, <i>Related Documentation</i> —page 1-3 for P/Ns of related DV Manual, for physical connection location.
BNC Connector	Port 2	Port 2 Signal Output. DVB-ASI output port. Connector is located on the rear panel of the DV shelf/assembly, (JnB , where “n” indicates the slot that the module is inserted. Refer to Table 1.3, <i>Related Documentation</i> —page 1-3 for P/Ns of related DV Manual, for physical connection location.

The corresponding slots rear alarm contacts are not used by this module.

Functional Description

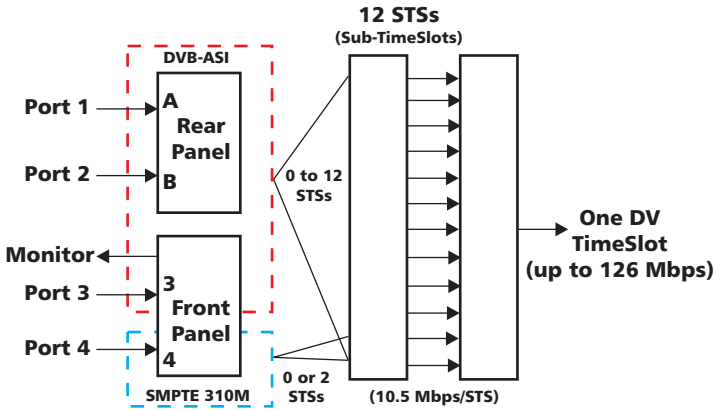
DV6101MASI01 Encoder

Features

- Encodes up to three DVB-ASI signals and one SMPTE 310M signal per *single* DV shelf slot
- Transports an aggregate of 126Mbps of MPEG-2 payload using only one DV timeslot
- Provides for user-selectable individual port bandwidths (in 10.5Mbps increments)
- Front panel pushbuttons and digital display for encoder port configurations without the use of software
- Used with DV6102MASI01 decoder module
- Plugs into DV6000, DV6408, DV6444, or DV6300 system equipment shelf

Figure 2.3 is a block diagram representation of the encoder module.

Figure 2.3
 DVB-ASI & SMPTE
 310M Multi-Port
 Encoder Block
 Diagram



Encoder Port Connections

The DV6101MASI01 encoder module can accept three (3) DVB-ASI input signals and one (1) SMPTE 310M input signal. The default configuration has the three DVB-ASI signals utilizing Ports 1–3 and the SMPTE 310M signal utilizing Port 4. Table 2.5 indicates the physical location of the respective port’s connectors.

Table 2.5 DV6101MASI01/DV6102MASI01 Port Locations

Port Designator	Port Location
1	Port 1 is located on the rear of the DV shelf, labeled VIDEO IN/OUT . The bottom BNC connector (JnA) ¹
2	Port 2 is located on the rear of the DV shelf, labeled VIDEO LOOPTHRU/OUTPUT BTSC . The top BNC connector (JnB) ¹
3	Port 3 is located on the front panel of the encoder/decoder module. Labeled Port 3 .
4	Port 4 is located on the front panel of the encoder/decoder module. Labeled Port 4 SMPTE 310M .

1. The “n” signifies the physical slot location of the module in the DV shelf.

Encoder Sub-TimeSlot (STS) Allocation

STS allocation is dependent upon the input signal bandwidth requirements. Refer to Table 2.6 for a list of common MPEG-2 signal payload rates and related Multi-port module sub-timeslot allocation requirements to process them.

Table 2.6 Common MPEG-2 Data Rates vs. Sub-TimeSlot Requirements

MPEG-2 Signal/Payload Type	Payload Bit Rates (Mbps)	Required Number of Module Sub-TimeSlots ¹
NTSC QAM 64	26.97	3
NTSC QAM 256	38.8	4
PAL QAM 64	38.5	4
PAL QAM 256	51.3	5
SMPTE 310M	19.39	2

1. Module Sub-TimeSlot data rate is 10.5Mbps (payload), 12 Sub-TimeSlots available in each module.

DV6102MASI01 Decoder

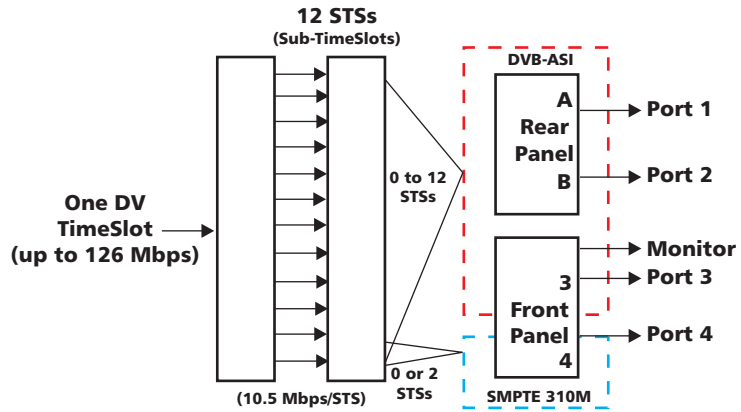
Features

- Decodes the DV timeslot back into the original three DVB-ASI signals and one SMPTE 310M signal in a single DV slot module
- Outputs the signals via the port connectors on the front and rear of the module
- Decoder port configuration is fully automatic
- Used with DV6101MASI01 encoder module
- Uses one DV interface module slot in DV6000, DV6408, DV6444, or DV6300 system equipment shelf

Figure 2.4 is a block diagram representation of the decoder module.

Figure 2.4

DVB-ASI & SMPTE 310M Multi-Port Decoder Block Diagram



Modes of Operation

Standard Mode of Operation

In the standard mode you can use any number of ports (Ports 1 – 4) as long as the maximum (aggregate) number of Sub-TimeSlots (STSs) is 12 or less. They can be allocated by the user, on a port-by-port basis, until all 12 STSs are allocated. Refer to Table 2.7 for port and STS guidelines.

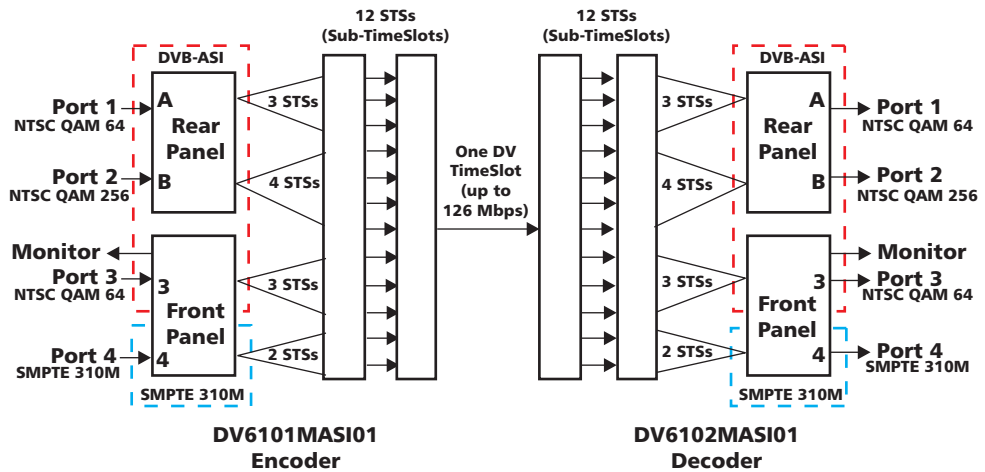
Table 2.7 STS Configuration Options When Using Port 4 (Front Panel) For SMPTE 310M

Port	Signal	Sub-TimeSlots (STS)
		Standard Mode
Port 1	DVB-ASI	0 to 12
Port 2	DVB-ASI	0 to 12
Port 3	DVB-ASI	0 to 12
Port 4	SMPTE-310M	0 or 2
Aggregate Number of STSs		12

Refer to Figure 2.5 for a sample configuration block diagram using all three DVB-ASI ports and the SMPTE 310M port.

Figure 2.5

Example: DVB-ASI & SMPTE 310M Configuration



Alternate Modes of Operation

Multi-cast Mode of Operation

If encoder DVB-ASI Port 1 is assigned all 12 STSs, then the signal from Port 1 on the encoder is *automatically* multicast to all 3 DVB-ASI ports on the decoder.

Table 2.8 Multicast Mode Configuration

Port	Signal	Sub-TimeSlots Multi-cast Mode
Port 1	DVB-ASI	12
Port 2	DVB-ASI	0
Port 3	DVB-ASI	0
Port 4	SMPTE-310M	0
Aggregate Number of STSs		12



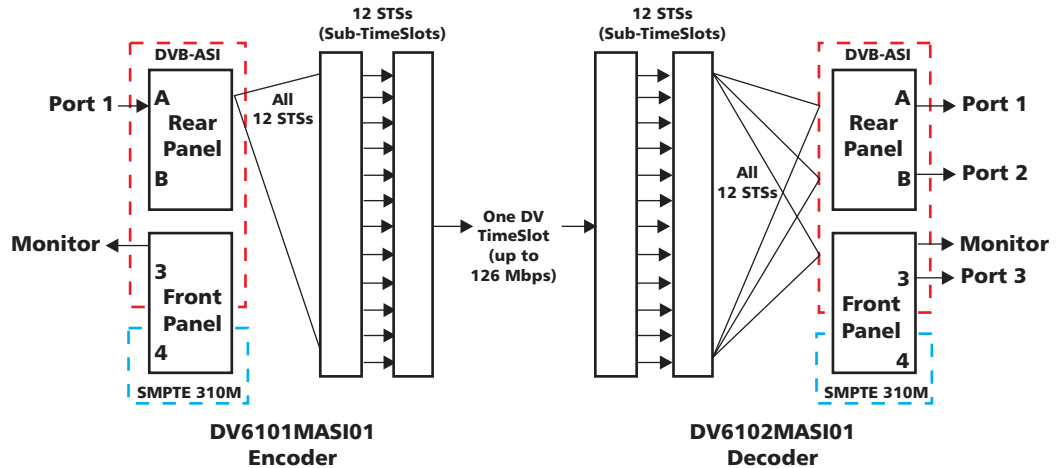
Note You cannot transport a SMPTE 310M signal when the encoder is in the multicast mode of operation (non-availability of STSs).

Note The Multi-cast mode applies only to DVB-ASI Port 1. Refer to Table 2.8, for Port and STS allocation. If Port 2 is allocated all 12 STSs, the respective decoder will indicate Port 2 active (Port 2 LED green), all other ports will be inactive (Port LEDs unlit). No multi-cast operation.

Refer to Figure 2.6 for the multicast configuration block diagram.

Figure 2.6

Example: Port 1 Multicast Configuration



SMPTE 310M Signal Connected to Port 1

If Port 1 is not being used for transport of a DVB-ASI signal, the SMPTE 310M signal can be connected to Port 1 by rerouting the SMPTE 310M signal from Port 4 internally on the module.



CAUTION When rerouting Port 4 to Port 1 it is important to note that the front panel Port 4 is still active, and connecting any other signal to that Port will corrupt both Port 1 and Port 4.



Note Rerouting Port 4 to Port 1 will leave only two ports (Port 2 and 3) for processing DVB-ASI signals.

Refer to Table 2.9. for port and STS allocation guidelines

Table 2.9 STS Configuration Options When Using Port 1 (Rear Panel) For SMPTE 310M

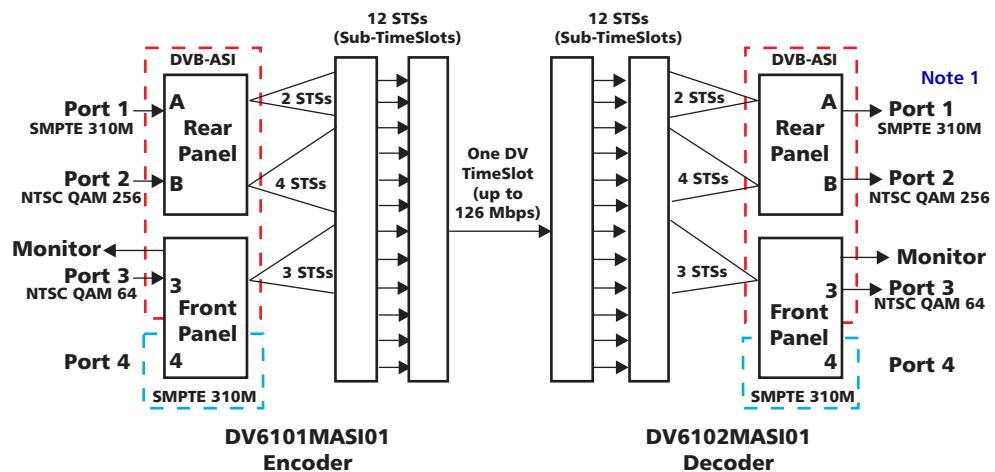
Port	Signal	Sub-TimeSlots Standard Mode
Port 1	SMPTE-310M	0 ¹
Port 2	DVB-ASI	0 to 10
Port 3	DVB-ASI	0 to 10
Port 4	none	2
Aggregate Number of STSs		12

1. You must still use Port 4 for SMPTE 310M STS allocation.

Refer to Figure 2.7 for a sample configuration block diagram utilizing Port 1 for SMPTE 310M transport.

Figure 2.7

Example: SMPTE 310M Connected to Port 1 Configuration



Note 1: Configuration shown shows the encoder SMPTE 310M signal output connected to Port 1. The output can be connected to either Port 1 or Port 4.

Part Numbers

Table 2.10 provides the part numbers for the encoder and decoder modules.

Table 2.10 Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder Part Numbers

Option	Description
DV6101MASI01	Multi-Port DVB-ASI & SMPTE 310M encoder card
DV6102MASI01	Multi-Port DVB-ASI & SMPTE 310M decoder card

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MASI Installation and Configuration

This Chapter covers the installation and checkout procedures for the Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder.

Introduction—page 3-1

Installation and Configuration Procedures—page 3-2

Unpacking Equipment and Inspecting for Damage—page 3-2

Rerouting SMPTE 310M Signal to Port 1 (Optional)—page 3-3

Installing MASI Encoder/Decoder Modules in an Equipment Shelf—page 3-4

Installing Blank Panels in the Equipment Shelf—page 3-5

Connecting MASI Encoder/Decoder Signals—page 3-6

Configuring DV6101MASI01 Encoder Modules—page 3-8

Verifying Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder LED Indicators—page 3-10

Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder Fault Analysis—page 3-12

Introduction

This section presents the procedures for installation of the Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder modules in a DV6000, DV6300, or DV6400 shelf, and for initial turn-on and checkout of the installed product.



WARNING To prevent electrical shock, never install electrical equipment in a wet location or during a lightning storm.



CAUTION This equipment generates, uses, and can radiate radio frequency energy. If it is not installed and used in accordance with the instruction manual, it may cause interference to radio communications. It has been tested and found to comply with limits for a Class A digital device pursuant to Subpart B of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference from equipment operated in a commercial environment. Operation of this equipment in a residential area may cause interference to TV and radio reception, in which case the user, at his own expense, must take whatever measures may be required to correct the interference.

Installation and Configuration Procedures

The following installation and checkout procedures are placed in a logical order for a new site installation. However, they can be used independently for specific requirements.

Unpacking Equipment and Inspecting for Damage

This procedure is used to inspect and open the shipping boxes, to verify that all parts have been received, and to verify that no shipping damage has occurred.

▶ **Obtain the following tools and equipment to unpack the equipment:**

- ✓ ESD Wrist band
- ✓ Box cutter



Note Electronic equipment can be damaged by static electrical discharge. Before handling any units, Electrostatic Discharge (ESD) protection practices must always be used. To prevent ESD damage, always place the unit on an approved, electrically grounded, anti-static mat.

▶ **Unpacking Modules**

1. Place the ESD wrist band on your wrist and snap the ground wire to the wrist band. Plug the ground plug into a grounded ESD jack.
2. Examine the outside of the shipping carton for tears, dents, punctures, etc., that would indicate possible shipping damage. *Note any container damage.*
3. Open the shipping cartons and carefully unpack the equipment. *Do not discard packing materials at this time.*
4. Check each component against the packing list to verify that the correct catalog numbers and quantities were received. *Note any discrepancies.*
5. Carefully inspect each item for damage. Check for broken or bent parts, damaged connectors, bent connector pins, and other physical damage to the modules.
6. Report shipping damage by filing a claim with the commercial carrier. Refer to *Contacting Artel* on page -iii if there are any problems with the equipment.
7. If the product is undamaged and all components are accounted for, discard packing material if desired. However, all components must remain in antistatic packaging until installation.

Rerouting SMPTE 310M Signal to Port 1 (Optional)

Prior to inserting the encoder or decoder modules into the shelf, use the Site Plan to determine if the module will process an SMPTE 310M signal from Port 1, instead of Port 4. If yes, perform this procedure.



Note It is not necessary that both the encoder and the decoder be rerouted. This feature is used to assist cable management.

➤ **Obtain the following tools and equipment:**

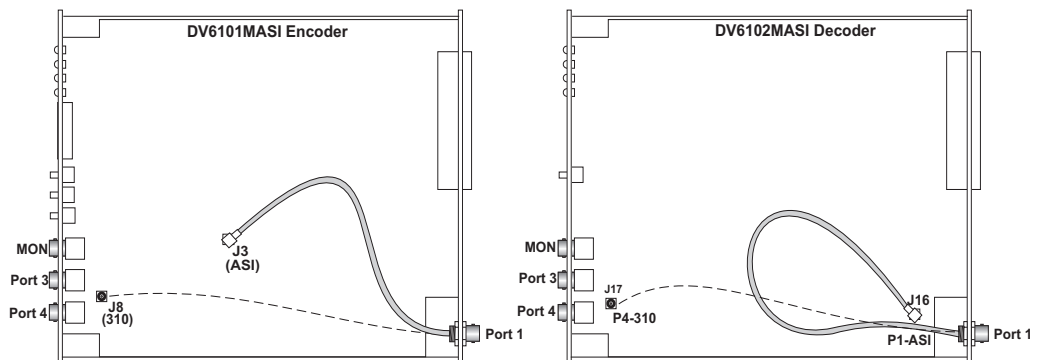
- ✓ ESD Wrist band

➤ **Installing MASI Modules**

1. If not already performed, place an ESD wrist band on your wrist and snap the ground wire to the wrist band. Plug the ground plug into a grounded ESD jack.
2. Carefully remove the module to be installed from its antistatic packaging.
3. To reconfigure module to accept SMPTE 310M signal in Port 1 (refer to Figure 3.1).
4. On the *encoder* card (DV6101MASI01), disconnect coax cable from J3 and reconnect to J8 (dotted line).
5. On the *decoder* card (DV6102MASI01), disconnect coax cable from J16 and reconnect to J17 (dotted line).
6. When complete, proceed to *Installing MASI Encoder/Decoder Modules in an Equipment Shelf* on page 3-4.

Figure 3.1

SMPTE 310M Port 4 to Port 1 Coax Cable Rerouting



Installing MASI Encoder/Decoder Modules in an Equipment Shelf

Use this procedure to install a MASI module in a DV6000 shelf. Modules can be installed in the following DV6000 shelves slots:

- DV6000, Digital Video Transport System
- DV6300, Single Channel Digital Transport System
- DV6408, Tributary Access System
- DV6444, Interface Gateway System

➤ **Obtain the following tools and equipment:**

- ✓ ESD Wrist band

➤ **Installing MASI Encoder/Decoder Modules**

1. If not already performed, place an ESD wrist band on your wrist and snap the ground wire to the wrist band. Plug the ground plug into a grounded ESD jack.
2. Carefully remove the module to be installed from its antistatic packaging.



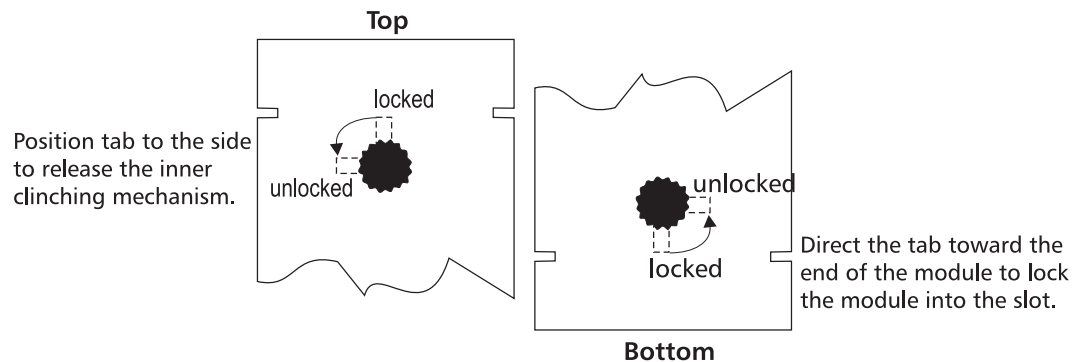
Note The "01" version MASI cards are not compatible in any configurations with the non-"01" versions. This version now supports all DV6300 applications.

3. Observe the position of the captive screw latch directly behind the face plate, by looking at the top or bottom edge of the module while turning the captive screw. The latch should be in the unlocked position as shown in Figure 3.2
4. Turn the captive screw so the internal latch is facing to the side, so that it will not impede insertion of the module:
 - Top to the left
 - Bottom to the right

Observe the position of the latch directly behind the face plate, by looking at the top or bottom edge of the module while turning the captive screw

Figure 3.2

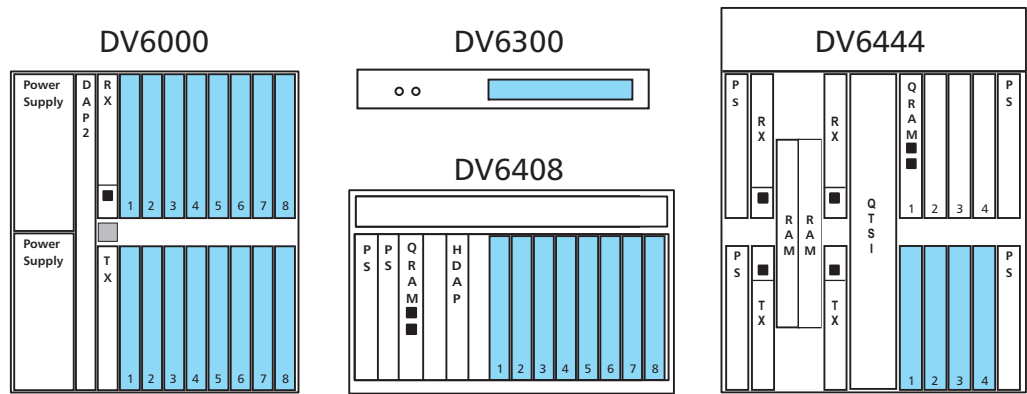
Module Locking Latches



- The MASI encoder/decoder can be installed in any empty slot. Refer to Figure 3.3 for location of slots (shown shaded) in the various shelves.

Figure 3.3

MA SI Slot Locations



- Slide the module into its equipment slot until the rear board edge connectors contact the motherboard connectors in the shelf backplane.
 - Firmly press the module fully into its slot in the equipment shelf until its connector mates with the connector in the shelf slot.
 - Tighten the captive screw until snug. The latch will turn simultaneously with the captive screw until it is in position, and then tighten down. **Do not over tighten.**
- If additional MASI encoder/decoder modules are to be installed, repeat above steps.
- When complete, proceed to *Installing Blank Panels in the Equipment Shelf*.

Installing Blank Panels in the Equipment Shelf



Note A blank panel must cover each empty equipment shelf slot. This is required to direct the flow of cooling air through the shelf and assist in EMI control.

➤ **Obtain the following tools and equipment:**

- ✓ Encoder/Decoder Blank Panels, P/N DV6016BPV

➤ **Installing MASI Encoder/Decoder Modules**

- Install a blank panel in any empty encoder/decoder slots in the shelf.
- Install using the same procedure as for the encoder/decoder modules shown in *Installing MASI Encoder/Decoder Modules in an Equipment Shelf* above.
- When complete, proceed to *Connecting MASI Encoder/Decoder Signals* on page 3-6, to install cabling.

Connecting MASI Encoder/Decoder Signals

This procedure guides the connection of signals to the DV6101MASI01 Encoder and/or the DV6102MASI01 Decoder modules. Connecting cables to either the encoder or decoder are basically the same. Table 3.1 provides port location information.

Table 3.1 DV6101MASI01/DV6102MASI01 Port Locations

Port Designator	Port Location
1	Port 1 is located on the rear of the DV shelf, labeled VIDEO IN/OUT . The bottom BNC connector (JnA) ¹
2	Port 2 is located on the rear of the DV shelf, labeled VIDEO LOOPTHRU/OUTPUT BTSC . The top BNC connector (JnB) ¹
3	Port 3 is located on the front panel of the encoder/decoder module. Labeled Port 3 .
4	Port 4 is located on the front panel of the encoder/decoder module. Labeled Port 4 SMPTE 310M .

1. The “n” signifies the physical slot location of the module in the shelf.



Note Refer to Appendix C for appropriate DV Shelf module and backplane connector locations.



CAUTION Electronic equipment can be damaged by static electrical discharge. When handling DV6100BTE2 modules, always follow Electrostatic Discharge (ESD) protection practices. Wear a grounded wrist strap when you touch a unit.

► Obtain the following tools and equipment:

- ✓ ESD Wrist band
- ✓ 75 ohm BNC cable, Belden 8281 (or equivalent).

► Connecting Video Coax Cables

1. Prior to connecting cables to the encoder or decoder, refer to site planning records to determine module configuration:
 - Signal type (DVB-ASI and/or SMPTE 310M)
 - Port assignments



Note It is important that the input cable(s) to the encoder are properly marked to ensure proper port connection and STS allocation.

2. Mark each cable as to signal type and selected port.

3. Based on module type:
 - a. For DV6101MASI01 encoder, attach encoder input signal cables to assigned ports (Ports 1, 2, 3, and/or 4).
 - b. For DV6102MASI01 decoder, attach decoder output signal cables to assigned ports (Ports 1, 2, 3, and/or 4).



Note Use 75 S cable, example: Belden 8281 (or equivalent) cable for signal testing and connection. Combined loss shall not exceed that of 300m (984 feet) of Belden 8281 cable.

Note If the upstream encoder has SMPTE 310M connected to Port 1 (rear of the DV Shelf) the decoder output can be connected to either Port 1 or Port 4.

Note If the upstream encoder is configured for multicast operation (refer to Figure 2.6 on page 2-13), the output is routed to decoder Ports 1, 2, and 3.

4. Repeat above procedure for any additional encoder and/or decoders.
5. When complete:
 - If DV6102MASI01 decoder cards are installed in the shelf, proceed to *Configuring DV6101MASI01 Encoder Modules* instructions below.
 - If **no** DV6101MASI01 encoder cards are installed in this shelf, proceed to instructions for *Verifying Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder LED Indicators* on page 3-10.



Note The DV6102MASI01 decoder will automatically configure itself for STS allocation based on the configuration of the upstream encoder. No Configuration Required.

Note With power applied to the shelf, and no upstream encoder present, the decoder will indicate that there is no signal present (**Port** LED is unlit).

Configuring DV6101MASI01 Encoder Modules

For detailed information on the module functionality, refer to the Encoder sections of this manual.

- For front panel controls/indicators:
DV6101MASI01 Encoder, Table 2.1 on page 2-4
DV6102MASI01 Decoder, Table 2.3 on page 2-7
- For Port selection, Table 2.5 on page 2-10
- For Sub-TimeSlot (STS) allocation, and *Modes of Operation* on page 2-12.




Note On first power up (received from factory) the module defaults are:

- Port Select is Port 1
- Sub-TimeSlot (STS) allocation is:
 - Port 1, 4 sub-timeslots (payload 42.0 Mbps)
 - Port 2, 4 sub-timeslots (payload 42.0 Mbps)
 - Port 3, 4 sub-timeslots (payload 42.0 Mbps)
 - Port 4, 0 sub-timeslots

Note If power is removed from the shelf, the encoder will retain the last user-defined STS allocation and port selection.

Note The encoder can be configured with or without a signal applied.

1. If not already present, turn on DV shelf power (refer to appropriate DV manual for directions). If power has just been applied, wait 10 seconds until the encoder goes into its “monitoring mode”. The 7-segment displays will present a rotating Os pattern. 
2. When the module is in the “monitoring mode”, press the **Port Select** pushbutton to enter the “configuration” mode. The last selected **Port** LED will turn *blue*, and the 7-segment display will indicate the number of STSs allocated to that port.
3. To select a port, press the **Port Select** pushbutton until the **Port** LED you want to access is *blue*.



CAUTION If you have rerouting Port 4 to Port 1, you must still allocate its STSs through Port 4. Port 1 should have zero (0) STSs allocated.



Note As you press the **Port Select** pushbutton, the selected **Port** LED will turn blue and the 7-segment display will indicate the number of STSs assigned to that port. The selected **Port** LED will remain blue until either:

- The **Port Select** pushbutton is again pressed. After Port 4 it will wrap back around to Port 1.
- OR
- 10 seconds of no front panel pushbutton activity has elapsed. At which time the Port LEDs will indicate the status of each port, and the 7-segment display will go into “monitoring mode” (rotating zero display pattern).

4. To reallocate the port STSs, press the **STS Select** pushbutton until the 7-segment display indicates the number of STSs that you want to allocate to that port.
 - To **increase** the number of STSs allocated to the selected port, press the **STS Select** pushbutton until the 7-segment display indicates the number of STSs you want.



Note If all 12 STSs are already allocated, and you want to increase the STS to a port (or add another port input) **you must first make STSs available**. That is, you must decrease (free-up) the number of STSs from the existing configuration.

Example: Port 1, 2, and 3 have 4 STSs assigned to each port (aggregate of 12). To add Port 4 (requires 2 STSs) you must reduce the number of STSs from Port 1, 2, and/or 3 first, by 2 STSs. Then once those STSs are available, they can be allocated to Port 4.

- To **decrease** the number of STSs assigned to the selected port, you must increase the STS number until the 7-segment display wraps back to zero, and then increment to the number you want.



Note Each time the STS pushbutton is pressed, it will increment by one, up to the number of available (not yet assigned) STSs, then wrap back to zero.

5. Repeat these instructions for any additional port STS reallocation.
6. When complete (all required ports allocated), press *and hold* the **Store** pushbutton for 1 second. This will allocate the number of STSs selected for *all* the ports.
7. When complete, proceed to *Verifying Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder LED Indicators*.

Configuring DV Timeslot Assignments

Using appropriate Craft or Element Management software to configure encoder (add) and decoder (drop) to the appropriate DV time slot.










Verifying Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder LED Indicators

Verifying **normal** operation will consist of verifying the front panel LEDs on the encoder and its associated decoder. Monitoring signal input/outputs are not required unless there is a fault condition. Use appropriate encoder/decoder section:

- DV6101MASI01 Encoder, Step 1.
- DV6102MASI01 Decoder, Step 5.

Table 3.2 is a legend defining the LED color and state, and 7–segment display modes.

Table 3.2 LED/7–Segment Display Legend

LED	Indication	LED	Indication	7–Segment Display	Indication
	Solid Red		Blinking Red		Monitoring Mode Port LEDs will display module status
	Solid Green		Blinking Green		
	Solid Amber		Unlit		Configuration Mode Will display Port selected (Port Select pushbutton pressed or Port STS allocation (STS Selected pushbutton pressed))
	Solid Blue				

DV6101MASI01 Encoder

1. Verify that the active **Port** LEDs are green, and the 7–segment display is in the Monitoring Mode, indicating that a signal is present (normal operation):



Note The 7–segment display should be in the Monitoring Mode 10 seconds after power is applied to the module.

- If **Yes**, go to DV6102MASI01 Decoder, Step 5.
 - If **No**, proceed to Step 2.
2. Press the **Port Select** pushbutton until you have selected the faulty port.
 3. Refer to Table 3.4, *Multi–Port Encoder LED Analysis Table*—page 3-13 for **Port** LED fault patterns and fault analysis.
 - If LEDs indicate Encoder **normal operation**, proceed to Step 4.
 - If LEDs indicate Encoder **fault condition**, use table to troubleshoot and correct problem. Proceed to Step 4 after the problem has been cleared.
 4. To ensure that signals reach their proper destination, and decoder is operational, contact decoder site to verify decoder operation. Proceed to Step 5.

DV6102MASI01 Decoder

5. Verify that the **Port** LEDs for active ports are *green*, indicating that a signal is present:
 - If active **Port** LED(s) is *solid green*, go to DV6102MASI01 Decoder, Step 8.
 - If an active **Port** LED *is not green*, proceed to the next step.
6. Press the **Port Select** pushbutton until you have selected the faulty port.
7. Refer to Table 3.5, *Multi-Port Decoder LED Analysis Table*—page 3-16 for **Port** LED fault patterns and fault analysis.
 - If LEDs indicate decoder *normal operation*, proceed to Step 8.
 - If LEDs indicate decoder *fault condition*, use table to troubleshoot and correct problem. Proceed to Step 8 after the problem has been cleared.
8. Verify that decoder Port video output signals are received downstream and are of the desired quality.
 - If **OK**, installation complete.
 - If **not received** or **degraded**, use Appendix D, *Checking DVB-ASI & SMPTE 310M Signal Transmission*.

Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder Fault Analysis










Fault analysis of the DV6101MASI01 modules will consist of verifying the front panel LEDs status/pattern (Encoder and Decoder modules) and the 7–segment display (Encoder module).

The tables provide each of the probable LED/7–segment display patterns, possible causes, and then corrective action for each of the modules. If the LED/7–segment display pattern is not shown, or the corrective action does not alleviate the problem, call Artel Technical Support for direction (refer to *Contacting Artel*—page -iii for contact details).

To use these tables, locate the LED and 7–segment display pattern that corresponds to the encoder display, and then proceed with the corrective action.

Table 3.3 is a legend defining the LED color and state, and 7–segment display modes.

Table 3.3 LED/7–Segment Display Legend

LED	Indication	LED	Indication	7–Segment Display	Indication
	Solid Red		Blinking Red		Monitoring Mode Port LEDs will display module status
	Solid Green		Blinking Green		
	Solid Amber		Unlit		Configuration Mode Will display Port selected (Port Select pushbutton pressed) or Port STS allocation (STS Selected pushbutton pressed)
	Solid Blue				

For fault analysis of the:

DV6101MASI01 Encoder Module, use Table 3.4 on page 3-13

DV6102MASI01 Decoder Module, use Table 3.5 on page 3-16

In most cases, the encoder and decoder will be at different sites. It will therefore be necessary to establish communications between the sites for effective fault analysis.

Table 3.4 Multi-Port Encoder LED Analysis Table










Item	LED Indication	Possible Cause	Corrective Action
1	<p>Port LED is green</p>  <p>7-Segment Display</p> 	<p>Normal Operation</p> <p>Correct STS allocation has been made, and a valid signal is present.</p>	<p>This is a normal operating condition. No corrective action required.</p>
2	<p>ONLY Port 1 LED is green</p>  <p>Port 2, 3, and 4 LEDs are unlit</p>  <p>7-Segment Display</p> 	<p>Normal Multicast Operation</p> <p>All 12 STSs have been allocated to Port 1, and a valid signal is present.</p> <p>Note: Decoder Port LEDs 1, 2, and 3 are green, and Port 4 LED is unlit.</p>	<p>This is a normal operating condition when in multicast mode of operation. No corrective action required.</p>
3	<p>Port LED is Unlit</p>  <p>7-Segment Display</p> 	<p>Normal Condition:</p> <ul style="list-style-type: none"> Press STS Select pushbutton. 7-segment display should indicate no Sub-TimeSlots (STSs) have been allocated (0) to the selected port. 	<p>If No STSs have been allocated, the encoder Port LEDs will be <i>Unlit</i>. This is normal operation. To allocate ports refer to <i>Configuring DV6101MASI01 Encoder Modules</i>—page 3-8</p>
4	<p>Port LED is Unlit</p>  <p>7-Segment Display</p> 	<p>Fault Condition:</p> <ul style="list-style-type: none"> Press STS Select pushbutton. 7-segment display indicates Sub-TimeSlots (STSs) have been allocated (1–12) to the selected port, but selected port LED is unlit. <p>Possible causes:</p> <ul style="list-style-type: none"> Defective LED. Faulty encoder board, not processing allocated STSs. 	<p>If STSs have been allocated and it is known that signals should be present:</p> <p>Verify encoder LED is functional</p> <ol style="list-style-type: none"> Unseat and reseat the encoder module. When resealed, verify that the LED in question illuminates. <ul style="list-style-type: none"> If No, suspect defective LED. call Artel Technical Support for direction. If Yes, suspect defective encoder circuitry, call Artel Technical Support for direction

Table 3.4 Multi-Port Encoder LED Analysis Table (cont'd)







Item	LED Indication	Possible Cause	Corrective Action
5	<p>Port LED is red</p>  <p>7-Segment Display</p> 	<p>Fault Condition: Loss of signal.</p> <p>Possible causes:</p> <ul style="list-style-type: none"> Input signal not connected. Faulty module. 	<ol style="list-style-type: none"> Is the Port Input coax cable connected, and to the proper port? <ul style="list-style-type: none"> If Yes, proceed to the next step. If No, reconnect the input cable to the proper port. Return to the procedure that brought you here. Verify that a signal is received at the encoder by verifying the signal at the MON connector on the front panel of the module. Connect cable from the MON connector to the test equipment to verify DVB-ASI/SMPTE signal is present? <ul style="list-style-type: none"> If No, proceed to the next step. If Yes, go to Step 4. Disconnect the Port input cable from the module and attach it directly to the test equipment to verify DVB-ASI/SMPTE signal is present? <ul style="list-style-type: none"> If No, correct signal source. Return to the procedure that brought you here. If Yes, proceed to the next step. Using Appendix D, <i>Checking DVB-ASI & SMPTE 310M Signal Transmission</i> test procedures to verify operational status of the encoder. <ul style="list-style-type: none"> If OK, suspect corrupt input signal, call Artel Technical Support for direction. If Defective, faulty module, call Artel Technical Support for direction.
6	<p>All 4 Port LEDs are red</p>  <p>7-Segment Display</p> 	<p>Fault Condition: Loss of backplane clock.</p> <p>Possible causes:</p> <ul style="list-style-type: none"> DV Control card (DAP/RAM). 	<ol style="list-style-type: none"> Refer to appropriate DV Shelf manual for troubleshooting directions (see <i>Related Publications</i> on page 1-3 for manual part numbers). When complete, return to the procedure that brought you here.
	<p>Port LED is blinking red</p>  <p>7-Segment Display</p> 	<p>Fault Condition: No PLL lock. Will turn solid red after 15 seconds, then shut the port off.</p> <p>Possible causes:</p> <ul style="list-style-type: none"> Input signal not ASI compliant. Input signal corrupt. 	<ol style="list-style-type: none"> Fault indication lasts for 15 seconds, then LED will turn red and shut the port off. Refer to appropriate DV Shelf manual for troubleshooting directions (see <i>Related Publications</i> on page 1-3 for manual part numbers). When complete, return to the procedure that brought you here.

Table 3.4 Multi-Port Encoder LED Analysis Table (cont'd)




Item	LED Indication	Possible Cause	Corrective Action
7	<p>Port LED is amber</p>  <p>7-Segment Display</p> 	<p>Fault Condition: Buffer overflow has occurred.</p> <p>Possible causes:</p> <ul style="list-style-type: none"> Not enough STSs have been allocated to meet payload (bandwidth) requirements. 	<ol style="list-style-type: none"> Verify that the correct cable has been connected to the port. <ul style="list-style-type: none"> If Yes, go to Step 3. If No, disconnect and reconnect proper cable to the port. Proceed to the next step. Did the port LED turn green? <ul style="list-style-type: none"> If Yes, return to the procedure that brought you here. If No, proceed to the next step. Increase STS allocation until the port LED turns <i>green</i>. <ul style="list-style-type: none"> If Yes, return to the procedure that brought you here. If No, suspect faulty encoder module fault detection circuitry. Call Artel Technical Support for direction.
8	<p>Port LED remains blue after 10 seconds of no front panel pushbutton activity</p> 	<p>Fault Condition, possible cause:</p> <ul style="list-style-type: none"> Circuitry fault. 	<p>Remove and reseal the module.</p> <ul style="list-style-type: none"> If problem is cleared, return to the procedure that brought you here. If problem is not cleared, suspect faulty encoder circuitry, call Artel Technical Support for direction.

Table 3.5 Multi-Port Decoder LED Analysis Table





Item	LED Indication	Possible Cause	Corrective Action
1	<p>Port LED is green</p> 	<p>Normal Operation</p> <p>Correct STS allocation has been made at the encoder, and a valid signal is being received by the decoder.</p> <hr/> <p>Possible Fault Condition</p> <p>If downstream video not being received from the decoder output.</p> <p>Possible causes:</p> <ul style="list-style-type: none"> Decoder output cable not connected or defective. Faulty downstream modules. 	<p>This is a normal operating condition. No corrective action required.</p> <hr/> <p>Fault Condition—Decoder Output Cable</p> <p>Note If the decoder output cable is not connected or defective, all module indications will be normal, but the output signal will not be received at its downstream destination.</p> <ol style="list-style-type: none"> Verify that the Port output cable is connected. <ul style="list-style-type: none"> If No, reconnect and return to the procedure that brought you here. If Yes, proceed to the next step. Check to see if an output signal is present at the module port. Disconnect cable from the module port. Connect MPEG-2 Monitor to module port. Is the signal present? <ul style="list-style-type: none"> If No, suspect faulty decoder module. Call Artel Technical Support for direction. If Yes, check for defective output cable. Proceed to the next step. Reconnect cable to module port. At downstream site, disconnect cable from input source. Connect MPEG-2 Monitor to module port. Is the signal present? <ul style="list-style-type: none"> If Yes, suspect downstream equipment. Replace and return to the procedure that brought you here. If No, suspect defective cable. Replace cable to correct problem. Return to the procedure that brought you here.
2	<p>Port LED turns blue for 1 second</p> 	<p>Normal Operation:</p> <p>STS allocation was changed at the Encoder.</p>	<p>A change to the Encoder STS allocation was just made. Normal Operation.</p>
3	<p>Port LED remains blue after 10 seconds of front panel pushbutton inactivity</p> 	<p>Fault Condition, possible cause:</p> <ul style="list-style-type: none"> Circuitry fault. 	<p>Remove and reseal the module.</p> <ul style="list-style-type: none"> If problem is cleared, return to the procedure that brought you here. If problem is not cleared, suspect faulty decoder circuitry. Call Artel Technical Support for direction.
4	<p>Port LED is Unlit</p> 	<p>Normal Condition:</p> <ul style="list-style-type: none"> If no Sub-TimeSlots (STSs) have been allocated to the port by the encoder. 	<p>If No STSs have been allocated, the decoder Port LEDs will be <i>Unlit</i>. This is normal operation.</p>

Table 3.5 Multi-Port Decoder LED Analysis Table (cont'd)


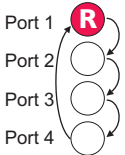


Item	LED Indication	Possible Cause	Corrective Action
		<p>Fault Condition: If STSs <i>have been allocated</i>, and LED is still Unlit.</p> <p>Possible causes:</p> <ul style="list-style-type: none"> Defective LED. Faulty encoder board, not transmitting allocated STSs. 	<p>If it is known that signals should be present:</p> <p>Verify encoder LED is functional</p> <p>Unseat and reseat the decoder module. When resealed, verify that the LED in question illuminates.</p> <ul style="list-style-type: none"> If No, suspect defective LED. call Artel Technical Support for direction. If Yes, suspect defective encoder circuitry, call Artel Technical Support for direction
5	<p>All 4 Port LEDs are <i>red</i></p> 	<p>Fault Condition: Loss of backplane clock.</p> <p>Possible causes:</p> <ul style="list-style-type: none"> DV Control card (DAP/RAM). 	<p>1. Verify that the MASI Decoder has been assigned the proper DV timeslot.</p> <ul style="list-style-type: none"> If No, proceed to the next step. If Yes, call Artel Technical Support for direction. <p>2. Assigned the proper DV timeslot to the MASI Decoder. Return to the procedure that brought you here.</p>
6	<p>Port 1, 2, 3, and 4 LEDs will illuminate <i>red</i> in turn (scan)</p> 	<p>Fault Condition: No DV timeslot allocated to the decoder.</p>	<p>Using appropriate DV network software, verify that a DV timeslot is allocated to the DV6102MASI01 decoder.</p> <ul style="list-style-type: none"> If No, allocate timeslot. Return to the procedure that brought you here. If Yes, suspect defective decoder circuitry, call Artel Technical Support for direction
7	<p>Port LED is <i>blinking red</i></p> 	<p>Fault Condition: No PLL lock (upstream signal from encoder).</p> <p>Possible causes:</p> <ul style="list-style-type: none"> DV Controller failure. 	<p>After a loss of signal the decoder will exhibit this alarm. This alarm will remain for 15 seconds, then start blinking.</p> <ol style="list-style-type: none"> Verify that the upstream encoder port status is green, the correct cable input is connected, and has the correct STS allocation is assigned.? <ul style="list-style-type: none"> If No, troubleshoot encoder module. If Yes, proceed to the next step. Check to see if an output signal is present at the port. Connect cable from the MON connector to the test equipment to verify a DVB-ASI/SMPTE signal is present? <ul style="list-style-type: none"> If No, call Artel Technical Support for direction. If Yes, proceed to the next step. Using Appendix D, Checking MASI DVB-ASI & SMPTE 310M Signal Transmission test procedures to verify operational status of the encoder. <ul style="list-style-type: none"> If OK, Call Artel Technical Support for direction. If Defective, suspect faulty encoder module. Call Artel Artel Technical Support for direction.

Table 3.5 Multi-Port Decoder LED Analysis Table (cont'd)

Item	LED Indication	Possible Cause	Corrective Action
8	<p>Port LED is <i>blinking green</i></p> 	<p>Fault Condition: Encoder buffer overflow has occurred.</p> <p>Possible encoder causes:</p> <ul style="list-style-type: none"> ■ Not enough STSs have been allocated to meet payload requirements. ■ Wrong signal has been connected to the port. 	<p>This will have to be corrected at the DV6101MASI01 encoder. Use Table 3.4, <i>Multi-Port Encoder LED Analysis Table</i>, Item 7 on page 3-15 for corrective action.</p>

Specifications

Specifications listed here are current as of the date of publication of this manual. Artel reserves the right to change specifications without prior notice. You may verify the product specifications by contacting Artel Technical Support for direction.

Table A.1 Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder Specifications

Characteristic	Specification
Physical	
Dimensions (HxWxD)	8.75 inch x 1.25 inch x 9.5 inch (22.23 cm x 3.18 cm x 24.13 cm)
Weight	<5lbs (2.24kg) max.
Power	
Maximum Power Dissipation:	
Encoder	<10 Watts
Decoder	<10 Watts
Voltage Requirements	+5V, -5V, +12V, and -12V.
Environmental	
Temperature:	
Operating	0°C to 50°C (external ambient temperature)
Storage	-20°C to 70°C
Cooling	As required by the DV shelf or assembly that it is installed
Relative Humidity (non condensing)	
Operating	10% to 90%
Storage	0% to 95%
DV6101MASI01 Encoder	
Signal Input Format	DVB-ASI (Ports 1, 2, 3) or SMPTE 310M (Port 4)
Interface Standards	DVB-ASI inputs, EN50 083-9:1997, annex B.3.1.1; SMPTE 310M
Number of ports	5 (3 DVB-ASI, 1 SMPTE 310M, and 1 Monitor port)
Aggregate Module Bit Rate	Up to 126Mbps
Number of Sub-timeslots	12
Net MPEG-2 Bit Rate per Sub-timeslot	10.5Mbps
Input Impedance	75 ohms, ±5%, unbalanced
Connectors	BNC
Return Loss	> 15dB @ 10 to 270MHz
Input Cable	Belden 8281(or equivalent)
Input Cable Length	0-300meters (0-30dB attenuation @ 135 MHz)

Table A.1 Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder Specifications (cont'd)

Characteristic	Specification
DV6102MASI01 Decoder	
Signal Output Format	DVB-ASI (Ports 1, 2, 3) or SMPTE 310M (Port 4)
Number of ports	4 (3 DVB-ASI, 1 SMPTE 310M)
Bit Rate	Matches input bit rate
Output level	800mV \pm 10%
DC Offset	< \pm 0.5V
Output Impedance	75 ohms, \pm 5%, unbalanced
Connectors	BNC
Return Loss	> 15dB @ 5 to 270MHz
Output Jitter	< 450ps, p-p
Additive Output Jitter	
Cable	Belden 8281(or equivalent)

A

Default Settings

Default settings listed here are current as of the date of publication of this manual. Artel reserves the right to change default specifications without prior notice. You may verify the product specifications by contacting Artel Technical Support.

DV6101MASI01 Encoder Module Default Settings

Table B.1 DV6101MASI01 Encoder Module Default Settings

Characteristic	Range	Default Setting
Port Selected	Port 1 to Port 4	Port 1
Sub-TimeSlot (STS) Allocation		
Port 1	0 to 12	4 Sub-TimeSlots (STs), payload of 42.0 Mbps
Port 2	0 to 12	4 Sub-TimeSlots (STs), payload of 42.0 Mbps
Port 3	0 to 12	4 Sub-TimeSlots (STs), payload of 42.0 Mbps
Port 4	0 or 2	0 Sub-TimeSlots (STs)

B

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DV Shelf MASI Connector Locations

This Appendix provides shelf/enclosure locations of Multi-Port DVB-ASI & SMPTE 310M Encoder/Decoder Ports 1 and 2.

MASI Port 1 and 2 Connector Locations

DV6000 Shelf, Figure C.1 on page C-1

DV6408 Shelf, Figure C.2 on page C-2

DV6444 Shelf, Figure C.3 on page C-2

DV6300 Enclosure, Figure C.4 on page C-3

Figure C.1

DV6000 Shelf Port 1 and Port 2 MASI Connector Locations

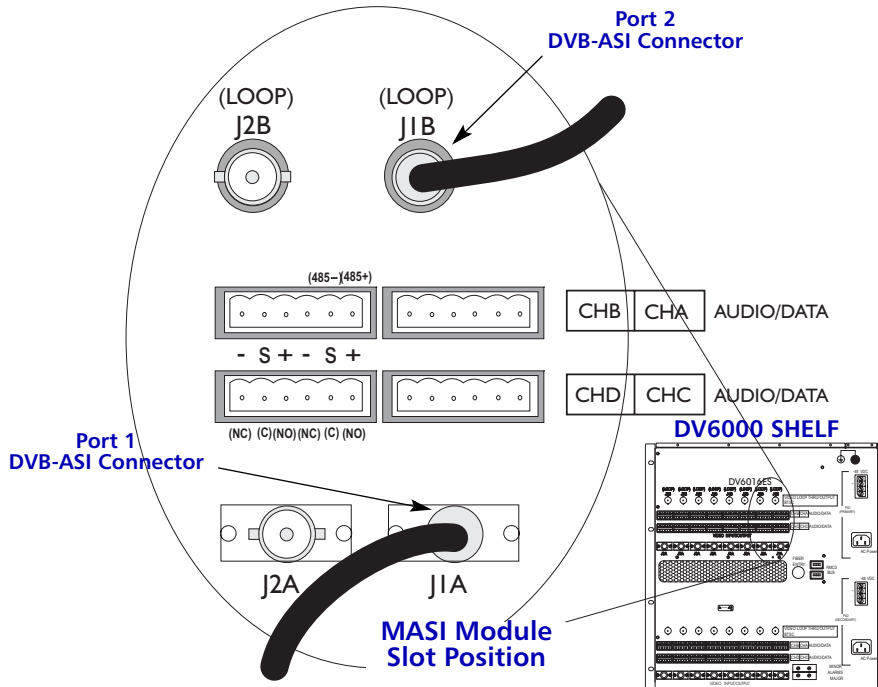


Figure C.2

DV6408 Shelf Port 1 and Port 2 MASI Connector Locations

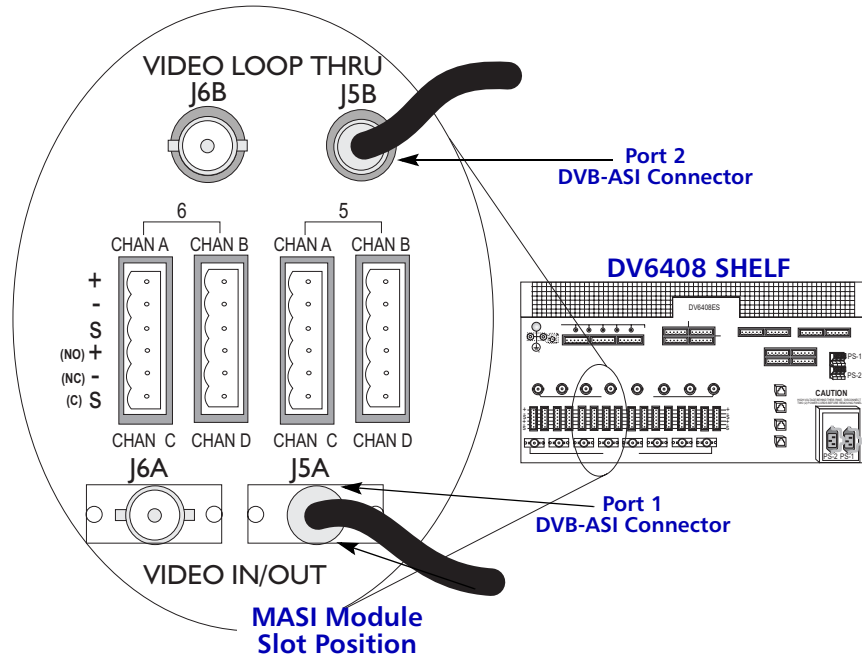


Figure C.3

DV6444 Shelf Port 1 and Port 2 MASI Connector Locations

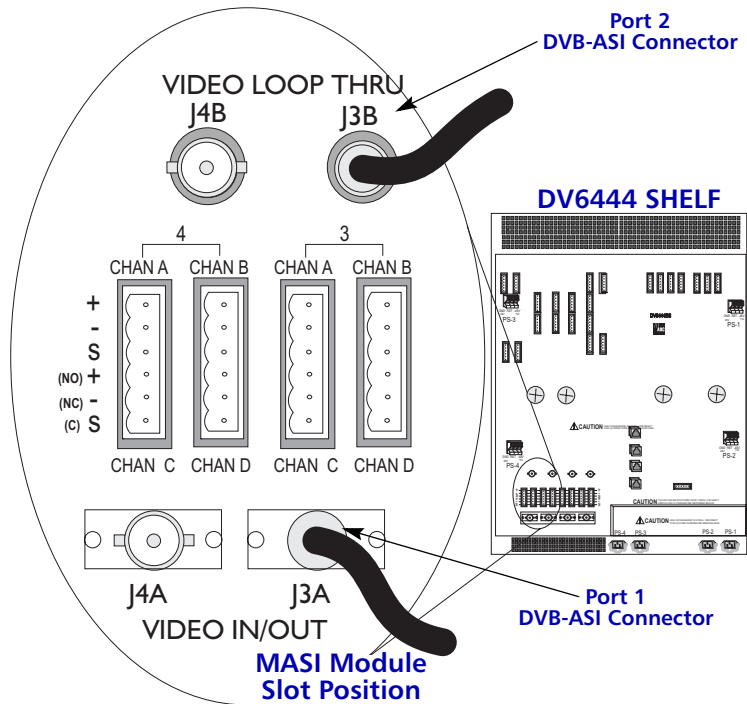
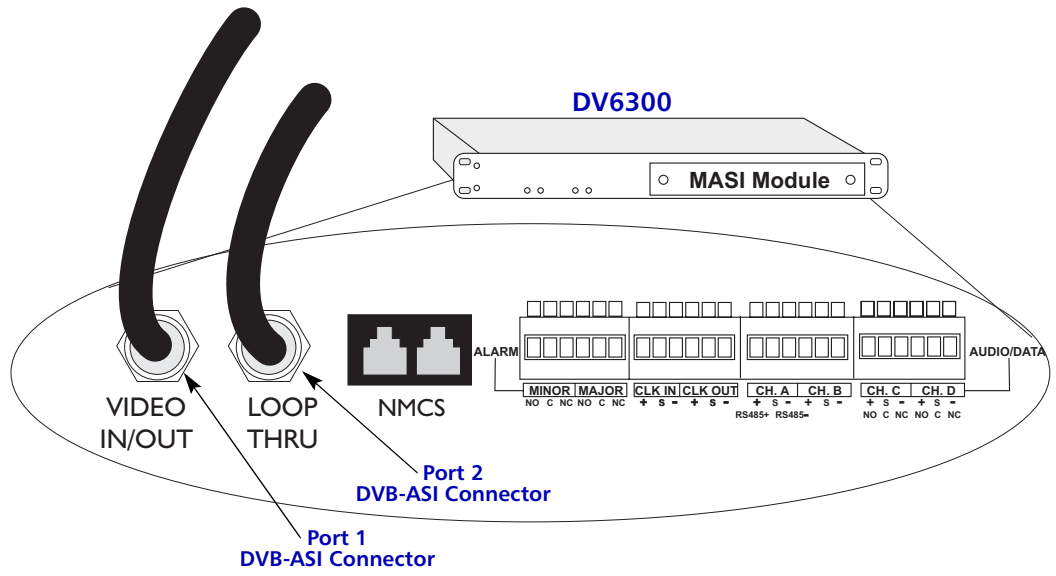


Figure C.4

DV6101MASI01 or
DV6102MASI01 in
DV6300 Assembly



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Checking DVB-ASI & SMPTE 310M Signal Transmission

This procedure will verify proper operation of the MASI modules that process both DVB-ASI and SMPTE 310M signals.



CAUTION *Electronic modules can be damaged by static electrical discharge. Before handling modules, wear an anti-static discharge wrist strap to prevent damage to electronic components. Place modules in anti-static packing material when transporting or storing. When working on modules, always place them on an approved anti-static mat that is electrically grounded.*

► **Obtain the following tools and equipment:**

- ✓ ESD wrist strap
- ✓ Known good DV6101MASI01 encoder or DV6102MASI01 decoder as required
- ✓ Optical Power Meter
- ✓ MPEG-2 Digital Video Generator: Rohde & Schwarz Model DVG, or Tektronix Model MTG200 (or equivalent)
- ✓ MPEG-2 Digital Video Measurement Decoder: Rohde & Schwarz Model DVMD, or Tektronix Model MTD200 (or equivalent)
- ✓ Rohde & Schwarz Model DV-B310, SMPTE 310M interface for DVG/DVDM/DVRM/DVG (replaces an ASI interface)
- ✓ TV Monitor
- ✓ Belden 1505A coaxial cable (75 ohm), or cable with equivalent or better pulse shape preservation over distance, and control of roll off at high frequency.



CAUTION *Use only the recommended test equipment and cables.*

► **Checking MASI Signal Transmission**

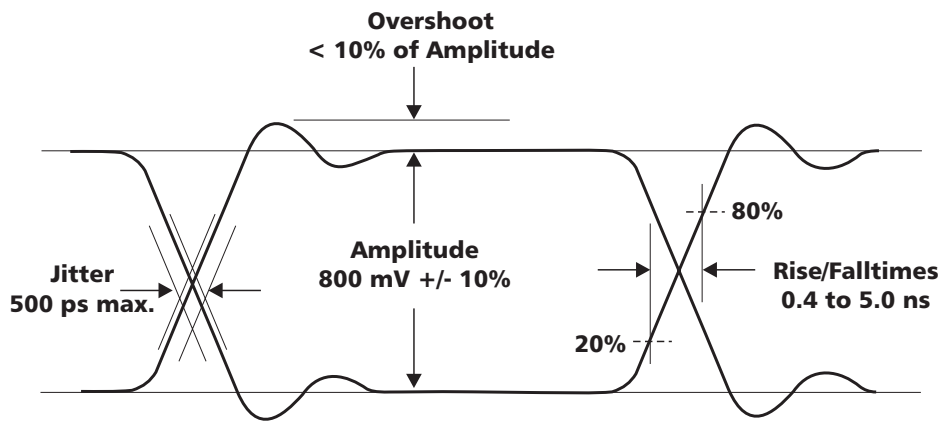
1. Place the ESD wrist strap on your wrist and snap the ground wire to the wrist strap. Plug the ground plug into a grounded ESD jack.
2. Make sure the equipment shelf is properly grounded. Be aware that:

Signal Characteristics

Signal characteristics

Figure E.1

SMPTE 310M Eye Pattern



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E

List of Common Acronyms and Abbreviations

The acronyms and abbreviations used in this manual are defined below.

A/B	Primary/Secondary (switching)	CSMA/CD	Carrier Sequence Multiple Access/Collision Detection (ethernet)
AC	Alternating Current	CSO	Composite Second Order Beat
ACO	Alarm Cut Off	CTB	Composite Triple Beat
AGC	Automatic Gain Control	D1	ITU-BT-601 Serial Digital Video
ALM	Alarm	DAP	Drop/Add/Pass
AM	Amplitude Modulation	DC	Direct Current
ANSI	American National Standards Institute	DEM0D	Demodulator
APD	Avalanche Photodiode	DEM0X	Demultiplexer
ASCII	American Standard Code for Information Interchange	DFB	Distributed Feedback (a type of laser)
ASI	Asynchronous Serial Interface	DMUX	Demultiplexer
ATM	Asynchronous Transfer Mode	DS0	Digital Signal Zero
AWG	American Wire Gauge	DS1	Digital Signal, Level 1 (1.544 Mbps)
B8ZS	Bipolar with 8-Zero Substitution	DS3	Digital Signal, Level 3 (44.736 Mbps)
BER	Bit Error Rate (Ratio)	DVB	Digital Video Broadcast
BIST	Built In Self Test	DVM	Digital Volt Meter
BMD	Background Module Debugger (Mfg use)	DWDM	Dense Wave Division Multiplexing
BNC	Bayonet Neill-Concelman (type of coaxial connector)	E1	European equivalent to T1 (2.048MHz)
bps	Bits per second	EEPROM	Electrically Erasable Programmable Read Only Memory
BTSC	Broadcast Television Steering Committee (audio signal standard for television)	EMI	ElectroMagnetic Interference
BITS	Building Integrated Timing Supply	ESD	ElectroStatic Discharge
CAM	Content Addressable Memory (ethernet)	F	type of coaxial connector
CATV	Community Access (Antenna) Television	FAST	Fully Automated Synchronized Timing
CLI	Command Line Interface	FC	type of optical connector
CPLD	Complex Programmable Logic Device	FCC	Federal Communications Commission
CLK	Clock	FCS	Frame Check Sequence (ethernet)
CNR	Carrier-to-Noise Ratio	FDL	Facility Data Link
COAX	Co-axial	FP	doped Fabry-Perot (type of laser)
CPE	Customer Premise Equipment	FPGA	Field Programmable Gate Array
CPU	Central Processing Unit	Gb/s	gigabits per second
CRC	Cyclic Redundancy Check	GND	Ground
		GPS	Global Positioning System
		HDAP	Half Drop-Add-Pass
		HDT	Host Digital Terminal
		HE	Head End
		HFC	Hybrid Fiber Coax

HSTSS	High Speed Time Slot Switch	P/N	Part Number
IBIST	Initiated Built In Self Test	PRS	Primary Reference Source
IF	Intermediate Frequency	PS	Power Supply
IMI	Information and Monitoring Interface	PTE	Path Terminating Equipment
InGaP	Indium Galium Phosphorus (a laser device)	QAM	Quadrature Amplitude Modulation
IPD	Photodiode current	QRAM	Quarter Ring Access Module
IRE	Institute of Radio Engineers 1 IRE = 1/140V p-p	QTSI	Quarter Time Slot Interchange module
ISDN	Integrated Services Digital Network	RAM	Ring Access Module, or Random Access Memory
JTAG	Joint Task Action Group (Mfg use)	RF	Radio Frequency
kHz	Kilo (10 ⁺³) Hertz	RU	Rack Unit (1 RU = 1.75 inch or 4.45 cm.)
LED	Light-Emitting Diode	RX	Receiver, receive
LIU	Line Interface Unit	SA	ethernet Source Address
LOL	Loss of Lock	SAS	Switch and Synchronizer
LSTSS	Low Speed Time Slot Switch	SC	Type of optical connector
MAC	Media Access Control (ethernet)	SDH	Synchronous Digital Hierarchy
MASI	Multi-Port Asynchronous Serial Interface	SDI	Serial Digital Interface
Mbps	Million bits per second	SDRAM	Synchronized Dynamic Random Access Memory
MDI	Menu Driven Interface	SDTI	Serial Digital Transport Interface
MHz	Mega (10 ⁺⁶) Hertz	SDV	Serial Digital Video
MISU	Multi-subscriber ISU	SMB	Type of coaxial connector
MON	Monitor	SMPTE	Society of Motion Pictures and Television Engineers
MPEG	Moving Picture Experts Group	S/N	Signal-to-Noise (ratio)
MSO	Multiple System Operator	SNR	Signal-to-Noise Ratio
MUX	Multiplexer	SONET	Synchronous Optical Network
N	type of coaxial connector	SRAM	Static Random Access Memory
NC	Normally Closed (relay contacts)	STS	Sub-TimeSlot
NEID	Network Element IDentification	T1	24-channel, time-division, pulse-code-modulation voice carrier
nm	Nanometer (10 ⁻⁹)	TP	Testpoint
NO	Normally Open (relay contacts)	TV	Television
NTSC	National Television Standards Committee (video signal standard used in United States)	TX	Transmitter, transmit
NVRAM	Non-Volatile Random Access Memory	UI	Unit Interval
OC	Optical Carrier (SONET)	UPSR	Unidirectional Path-Switched Ring
OPT	Optical, Optional	VRMS	Root-Mean-Square Voltage
OSI	Open System Interconnection	VSB	Vestigial Sideband
OSS	Operations Support System	VTSI	Video Time Slot Interchange module
PAL	Phase Alternation Line (video signal standard used in much of Western Europe)	WDM	Wave Division Multiplexing
PBIST	Power-on Built In Self Test	WTR	Wait To Restore (timer)
PC	Personal Computer	XMT	Transmit
PED	Pseudo-Encoder/Decoder (Test Card)		
PLD	Programmable Logic Device		
PLL	Phase Locked Loop		
PM	Performance Monitoring		

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