

DTV701

Broadcast Digital Television Processor

User's Manual



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Chapter 1 General Information

1.1 Manual Overview

This manual provides instructions and reference information for the proper installation and operation of the Wegener Model DTV701 Broadcast Digital Television Processor, referred to throughout the manual as the DTV701.

NOTE: User interface details in this manual are based on application software version 112.

The manual is divided into the following chapters:

- 1 General Information** - a description of your DTV701, its functions and specifications, and a glossary of terms
- 2 Installation** - procedures and information for the correct and safe installation of your DTV701.
- 3 Operation** - instructions on starting and operating your DTV701
- 4 Maintenance and Troubleshooting** - information on maintaining your DTV701 and resolving possible operating difficulties
- 5 Customer Service** - Our warranty and information on obtaining help

An **Index** of keywords is also provided to help you quickly locate needed information.

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1.2 DTV701 Overview

The DTV701 Broadcast Digital Television Processor (see Figure 1.1) receives VHF/UHF broadcast HDTV signals and provides an output ASI stream for connection to a cable system QAM modulator. It will accept a broadcast ATSC 8VSB signal on the tuner input and produces an ASI MPEG Transport Stream output suitable for connection to a QAM modulator (64QAM or 256QAM). Programs may be remapped or selected for removal from the output stream.

Physical Description

The DTV701 is housed in a standard, rack-mountable chassis. Its front panel provides a user interface through an LCD, eight LEDs, and six push buttons (see section **3.3 DTV701 Controls and Indicators** on page 24). The rear panel holds the ports that allow connection to power, incoming signal, and peripheral devices.



Figure 1.1 DTV701 Broadcast Digital Television Processor

Features

Your DTV701 has the following features:

- One ATSC 8VSB tuner input (F connector)
- Two duplicate ASI MPEG Transport Stream outputs (BNC connectors)
- Time re-stamping of PCR, PTS, and DTS information.
- User selection of input programs to be included in the output stream.
- One Ethernet TCP/IP control interface (RJ-45 connector)
- One asynchronous data input/output (DB-9 connector)

1.3 DTV701 Specifications

Table 1: Technical Specifications

Characteristic	Specification
AC Power	
Voltage	90 to 132 Vac or 175 to 264 Vac auto-detect/selected
Frequency	50 or 60 Hz \pm 2%
Power Consumption	< 15 Watts
RF	
Input Frequency Range	53 to 810 MHz
Symbol Rate Range	10.76 Msps
Input Data Rate	19.393 Msps
Input Signal Level	-80 to -20 dBm
Input Impedance	75 Ω , unbalanced
Input VSWR	< 3.5:1 in 75- Ω system
LO Leakage at Input	\leq -63 dBm max
SERIAL PORTS	
Standard	RS-232
Handshaking	None
Service	Software download
Baud Rates	115.2 kbps
Formatting	8 data-bits, 1 start, 1 stop-bit, no parity
ETHERNET PORT	
Physical Layer	10BaseT/100BaseT (twisted pair) on RJ-45 jack
Media Access and Link Layer	Per IEEE 802.3 (Ethernet)

Table 1: Technical Specifications

Characteristic	Specification
ALARM AND WARNING RELAYS	
Alarm Function	Contact closure for main power off, loss of input signals
Warning Function	Contact closure for poor signal quality
Type	Form A, Normally Closed (internal jumper may be set at factory for normally open)
Rating	30Vdc open circuit, 500 mA max current closed
EXPANSION MODULE SLOT	Allowable expansion modules · 8VSB tuner module
MECHANICAL	
Height	1 std. RU (1.75 inches nominal)
Width	EIA std. 19-inch mounting
Depth	~13.32 inches (back of rack ears to end of connectors)
Weight	~12 lb
Open Module Slots	2 - each 2.5"W x 1.375"H x 7"D on rear panel
Cooling	Internal fan
ENVIROMENTAL	
Location	Indoor only
Operating Temperature	+10° C to +40° C
Storage Temperature	-20° C to +70° C
Altitude	Up to 2000 meters
Humidity	Maximum relative humidity of 80% for temperatures up to 31° C decreasing linearly to 50% relative humidity at 40° C.

1.4 Safety Summary

The DTV701 is designed for safe use with few special precautions required of the user. The following items are basic precautions to use when installing and working with your DTV701:

Do not open the DTV701's chassis cover.



1.5 Glossary of Terms and Abbreviations

Table 2: Glossary of Terms

Term	Definition
AC	Alternating current
Alarm	A condition or notification of a condition that prevents your DTV701 from performing properly
Application Software	The main host software which sets up the unit hardware, runs the process of acquiring Transport Stream sources, sets up and monitors the multiplexing processes, monitors unit operations, and provides interfaces with the network and local users.
ASI (or DVB-ASI)	An "asynchronous" bit-serial physical interface for Transport Streams. Transmitting and receiving functions are designed such that the time relationships between all packets and their timing references are unchanged.
ATSC	Advanced Television Systems Committee - sets standards for standard definition and high definition television in the U.S. Sometimes used to mean the HDTV standards.
Boot loader	Software residing in non-writable zone of flash which executes at unit reset.
Carrier	An RF signal containing coded audio, video, and/or other data
DVB-ASI	see ASI
EIA	Electronic Industries Association
Ethernet	The widely-used LAN technology specified by IEEE standard 802.3
Flash memory	A memory dedicated to storing the unit's software and an image of some hardware programming code.
IEEE	Institute of Electrical and Electronics Engineers
LAN	Local area network. Your DTV701 may be connected to an Ethernet LAN.
LCD	Liquid crystal display. The front-panel text screen on your DTV701 is a liquid crystal display.
LED	Light-emitting diode. The front-panel indicator lights on your DTV701 are LEDs.
Mbps, kbps	Megabits per second or kilobits per second - units of data transport rate.
MPEG	Moving Picture Experts Group - refers to the method of video compression established by this group.
NVRAM	Non-volatile memory. A memory dedicated to storing the unit's setup parameters. This memory retains its contents through power outages.
PAT	Program Allocation Table. Master table which identifies all the Programs in the Transport Stream. It associates Program numbers to the PIDs bearing the associated Program's PMT.

Table 2: Glossary of Terms

Term	Definition
PCR	Program Clock Reference. Time-base signal used to synchronize transport stream data.
PID	Packet Identifier. The unique Transport Stream packet identifier assigned to each constituent data stream within the Transport Stream. Also, in this document, "PID" is used to designate the stream itself.
PMT	Program Map Table. Table for a given Program identifying all the PIDs for its PCR, video, audio, and user data streams.
Program	In the MPEG hierarchy, a grouping of related audio, video, or generic data PIDs sharing a common PCR time base and (usually) sharing a common schedule. See PMT.
PSI Tables	Program-Specific Information Tables. A group of information-bearing tables, each borne by well-known PIDs, regularly transmitted in the Transport Stream. See also "PAT" and "PMT". Also, ISO 13818-1 gives a thorough description of these and other Tables.
PSIP	Program and System Information Protocol - a method for transporting digital television system information and electronic program guide data.
RAM	Random access memory. A general term for all memory volatile memory types out of which application software executes and into which its variables, state information, and messages are stored. RAM is also used to designate the volatile storage used by the Transport Demux and decompression devices.
RF	Radio frequency
TMRA	Maximum Recommended Ambient Temperature, the highest operating temperature for which the unit is rated
Transport Stream (or MPEG Transport Stream)	A multiplex of several data streams, each of which is borne in Transport packets, 188-byte blocks containing a sync word, header information (including a PID), and payload data. This multiplex includes PSI data tables, Programs, and padding in the form of null packets.
Warning	A condition or notification of a condition that may compromise the proper performance of your DTV701.

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Chapter 2 Installation

This chapter provides instructions on unpacking, mounting, and connecting your DTV701 as well as connector information including detailed pinouts.

2.1 Unpacking and Inspection

Carefully unpack the unit and its ac power cord and inspect for obvious signs of physical damage that might have occurred during shipment. Any damage claims must be reported to the carrier immediately. Be sure to check the package contents carefully for important documents and materials.

NOTE: Please save the packing materials and original shipping containers in case you must later return the unit for repair. Packing these units in other containers in such a way that they are damaged will void your warranty.

2.2 Location and Mounting

The DTV701 should be located indoors and may be mounted in a standard, 19-inch equipment rack within one standard RU.

WARNING

This is a Class A product. In a domestic environment this product may cause radio interference for which the user may need to take mitigating action.

DANGER

To avoid damage to this and other equipment, or personal injury, the following items should be strictly observed.

Elevated Operating Ambient

When equipment is installed in a closed or multi-unit rack assembly, the operating ambient of the rack environment may be greater than the room ambient. Therefore, consideration should be given to the ambient air temperature within the rack, and not just inside the room, when deciding if the maximum recommended ambient operating temperature (TMRA) is being met or exceeded.

Reduced Air Flow

Equipment should be installed such that airflow required for safe operation of the equipment is not compromised.

Mechanical Loading

Mounting of the equipment in a rack should be such that a hazardous condition is not produced by uneven loading. This unit is not very heavy, but total rack loading must be considered. Also, do not rest any unsupported equipment on your DTV701.

Circuit Overloading

Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of circuits could have on overcurrent protection and supply wiring. Ensure that the total rack or breaker power consumption does not exceed the limits of the ac branch circuit. Appropriate consideration of equipment ratings should be used when addressing this concern.

Reliable Earthing

Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (use of power strips, chassis ground lugs, etc.).

**Rack
Mounting**

Your DTV701 is sized to fit in an EIA-standard, 19-inch-wide equipment rack.

- a) First install angle brackets or cross-supports capable of supporting both the unit and its connecting cables. Screw or bolt the supports securely to the equipment rack.
- b) Place the DTV701 on its supports and use four anchor screws or bolts and nuts to secure the unit's front brackets to the rack.
- c) Connect the chassis grounding screw to an earth ground before connecting the power cord to the unit.

WARNING

The front brackets must be secured to the rack. If front brackets are left unsecured, the unit may shift forward and fall from the rack during installation or operation. Failure to secure the front brackets may result in personal injury and/or damage to the equipment.

**Desktop
Installation**

To set up the DTV701 in a desktop environment, place the chassis on a flat surface where it will not be subject to spills or impacts. Also route cables to the unit so that they will not be hit or pulled causing damage to the connectors or to the unit itself. Ensure a sufficient flow of cool air (See "Reduced Air Flow" on page 14.) so that the unit's operating ambient temperature range is not exceeded.

WARNING

Locate the DTV701 and its cables to avoid impacts, spills, and pulling cables and to ensure sufficient air flow. Failure to locate the DTV701 in a proper environment may result in damage to the equipment.

2.3 DTV701 Connections

Figure 2.1 DTV701 System Setup shows placement of the DTV701 in a basic system setup. Figure 2.2 DTV701 Rear Panel on page 17 illustrates details of the DTV701's rear panel.

Basic System – HDTV input to ASI output

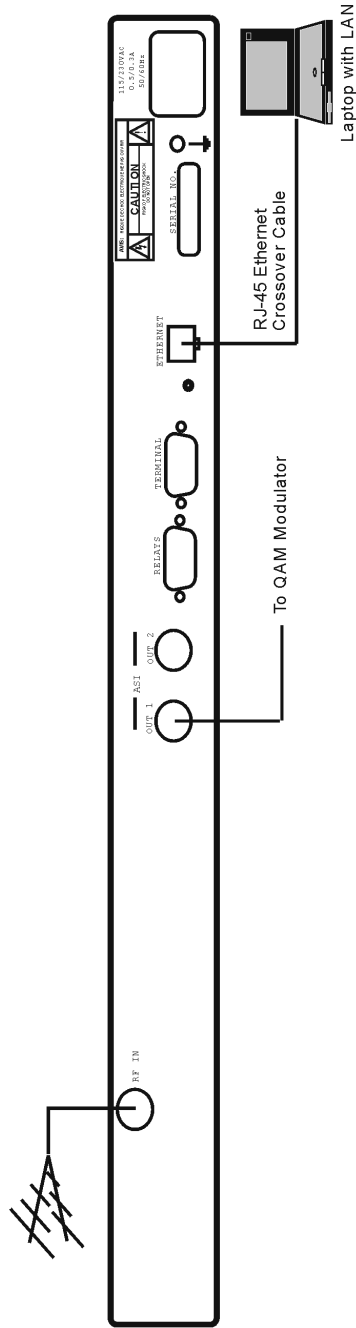


Figure 2.1 DTV701 System Setup

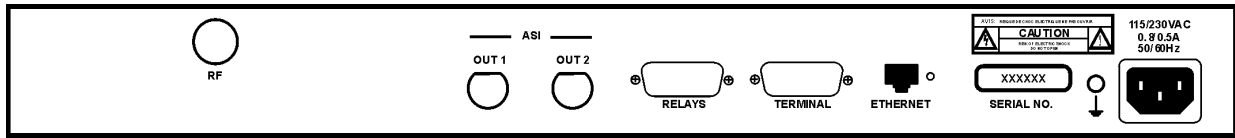


Figure 2.2 DTV701 Rear Panel

Before applying power, make the following connections to your DTV701 (refer to Table 3 for connector details):

- a) Connect the chassis grounding screw to an earth ground before connecting the power cord to the unit.
- b) Connect the ATSC 8VSB signal from your antenna to the DTV701's input RF port.
- c) Connect downstream equipment to the ASI OUT 1 and ASI OUT 2 ports as desired.
- d) Connect your LAN line to the DTV701's Ethernet port.
- e) If desired, connect the Relays port to your equipment to provide contact closures during alarms and warnings.
- f) Finally, connect the supplied ac power cord to the DTV701's IEC receptacle and to a 100-to-120 Vac source.

Table 3: DTV701 Connector Details

Designation	Connector Type	Pin Number	Signal Name
115/230 Vac Power	Male IEC receptacle		AC LINE IN
RF Input	female Type F		RF IN
ASI Out 1	female BNC		ASI OUT 1
ASI Out 2	female BNC		ASI OUT 2

Table 3: DTV701 Connector Details

Designation	Connector Type	Pin Number	Signal Name
Ethernet LAN	female RJ-45	1 2 3 4 5 6 7 8	EN OUT + EN OUT - EN IN + NC NC EN IN - NC NC
Serial Async I/O	DB-9	1 2 3 4 5 6 7 8 9	DCD (+5V, 4.7 k Ω) RxD (output) TxD (input) NC GND DSR (+5V, 4.7 k Ω) NC CTS (+5V, 4.7 k Ω) RI (+5V, 33 Ω)
Alarm/Warning Relays	male DB-9	1 2 3 4 5 6 7 8 9	Not used Not used WARNING COM ALARM COM NC Not used Not used WARNING + ALARM +

Ethernet An Ethernet 10BaseT/100BaseT port is included and is the primary user interface using an HTML browser based interface. The unit has a URL which is assigned via the front panel. The “home” page is then accessed by users via the Ethernet port. From this page, the desired channel selections may be performed and status monitored.

Terminal I/O The Terminal serial port is configured to 115.2k, N, 8, 1. The Terminal device is used for command and control of the DTV701. This I/O is a basic VT100-like emulation. User input text strings terminated in carriage-returns prompt all I/O. The terminal should be set to local echo ON because the DTV701 only echoes a carriage-return/linefeed and then a ‘>’ prompt after entry of a command-line terminated in carriage-return.

Chapter 3 Operation

3.1 Operation Overview

This chapter contains detailed operating instructions for your DTV701. The following sections address:

- Ethernet/Web Browser Control
- DTV701 Controls and Indicators
- Front-panel Operation
- Initialization
- Transport Stream Processing
- Alarm/Warning System
- Software Downloads

Local user control is from a LAN via RJ-45 Ethernet or the front-panel LCD/keypad. All settings may be presumed to be retained through power cycling unless otherwise specified. This means that they are still in effect through resets, whether by power outage, commanded reset, or failure-recovery resets.

3.2 Ethernet/Web Browser Control

The DTV701's primary user interface is from a web browser using the rear-panel Ethernet LAN connection. An HTML script interface allows a user to control and monitor the unit using a standard web browser. Each unit contains a user-defined quad URL address, subnet mask, and gateway address (See DTV701 IP Setup).

There are two basic methods of using the Ethernet connection – with a directly connected PC or with a PC connected through a LAN.

Directly connected PC

For control from a local PC, attach the DTV701's Ethernet port to the Ethernet network connector on the PC using a crossover RJ-45 cable (8 pins).

Before using this Ethernet connection, the appropriate IP address, netmask, and gateway must be selected via the front-panel interface.

Perform the DTV701 IP Setup as shown in Table 4. Other addresses than those shown may be used if they are compatible. If you have any questions, ask your network administrator.

Table 4: DTV701 IP Setup

Parameter	Setting
IP Address	172.016.100.020
Netmask	255.255.000.000
Gateway	000.000.000.000

Perform the PC IP Setup as shown in Table 5:

Table 5: PC IP Setup

Parameter	Setting
IP Address	172.016.100.001
Subnet Mask	255.255.000.000

LAN Connection

For LAN connection, attach the DTV701's Ethernet port to the LAN using a normal RJ-45 cable (8 pins). Set the DTV701 IP Address, Netmask, and Gateway as directed by your network administrator. Use any PC on the LAN to connect to the DTV701 using the web browser instructions below.

NOTE: Each unit on the network must have a unique address.

Using the Web Browser

To begin monitor and control functions from a PC or LAN connection:

- a) Open the current internet browser of your choice from the local PC or computer on the LAN attached to your DTV701.
- b) Set the browser's address field to `http://nnn.nnn.nnn.nnn` where `nnn.nnn.nnn.nnn` is the IP address of the unit to be controlled (set from the DTV701's front-panel, IP Address screen).

NOTE: For IP addresses which include subfields with leading zeros, you must omit those zeros when entering the address in your browser. For example, IP address 128.092.050.004 must be entered as 128.92.50.4.

The DTV701 Control and Status page will appear. You may select either the Stream Information or Q&A/Help pages at any time by clicking on their respective tabs at the top of the screen.

Control and Status Page

The Control and Status page (see **Figure 3.1 Control and Status Page** on page 22) allows you to select the off-air channel number for the HDTV input. The status section provides signal status.

The RF Input Control is used to select the video channel. Select the Broadcast radio button for off-air signals or the Cable radio button for cable television signals. The user enters the desired channel number and clicks the Tune button.

The unit then tunes to the desired channel and sends back the status information via the Status frame on the right side of the web page. The unit then periodically updates the page with ongoing status reports.

Acquiring Broadcast ATSC Signals

As with the traditional television broadcast, you will need a good-quality outdoor antenna pointed toward the transmitter. With the antenna correctly positioned and the cable connected to the DTV700's RF input, select the channel number on the front panel or via the web interface. Note that this is the ATSC RF channel number (not the broadcaster's legacy analog channel).

Weak Signal - If you're within reception range you should see an SNR between 20 dB and 35 dB with no errored seconds. An SNR less than 20 dB with accumulating errored seconds indicates a weak signal condition that results in impaired video and audio. Check antenna pointing for maximum signal (higher SNR). If this is not successful, you may need a line amplifier or a higher gain antenna.

Multipath - If you have video problems and the SNR shows wide fluctuations, you could be experiencing multipath reception which is the reception of the direct signal and a strong reflection. Rotating the antenna away from the interfering signal may solve this problem.

At bottom left, PSIP may be enabled or disabled by selecting On or Off. Enable PSIP in order to change output channel numbers and channel short name.

The received signal parameters are labeled RF Input. This section includes frame lock status (true or false), signal-to-noise ratio (in dB), errored seconds, and signal strength quality. The ASI Output section lists the output stream data transport rate as well as the output lock status. (The QAM modulator associated with the data rate is shown after the data rate, 64 QAM for 26.97 Mbps or 256 QAM for 38.81 Mbps.)



Figure 3.1 Control and Status Page

Stream Information Page

The Stream Information page shown in Figure 3.2 below displays input and output status. The input side lists the program streams included in the input (both standard definition and high definition signals in this example). The output side displays the programs contained in the ASI output stream.

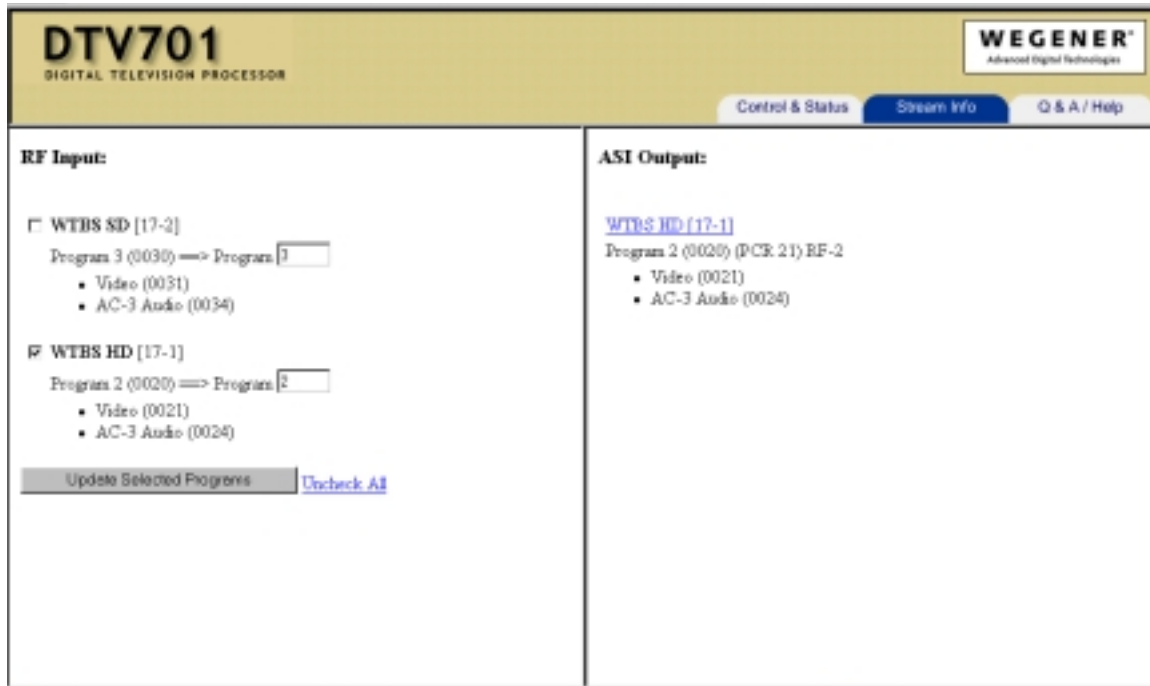
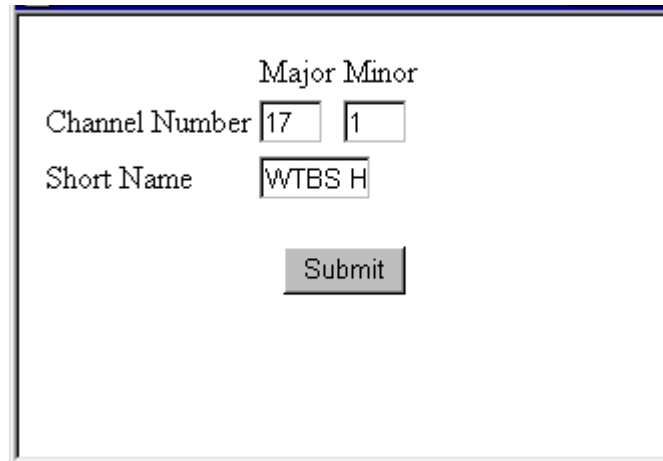


Figure 3.2 Stream Information Page

NOTE: If PSIP is turned off on the Control Page, the check boxes do not appear and the ability to change program or channel numbers is disabled.

To change major and minor channel numbers and the channel short name, click the highlighted channel name and number. The following window will appear:



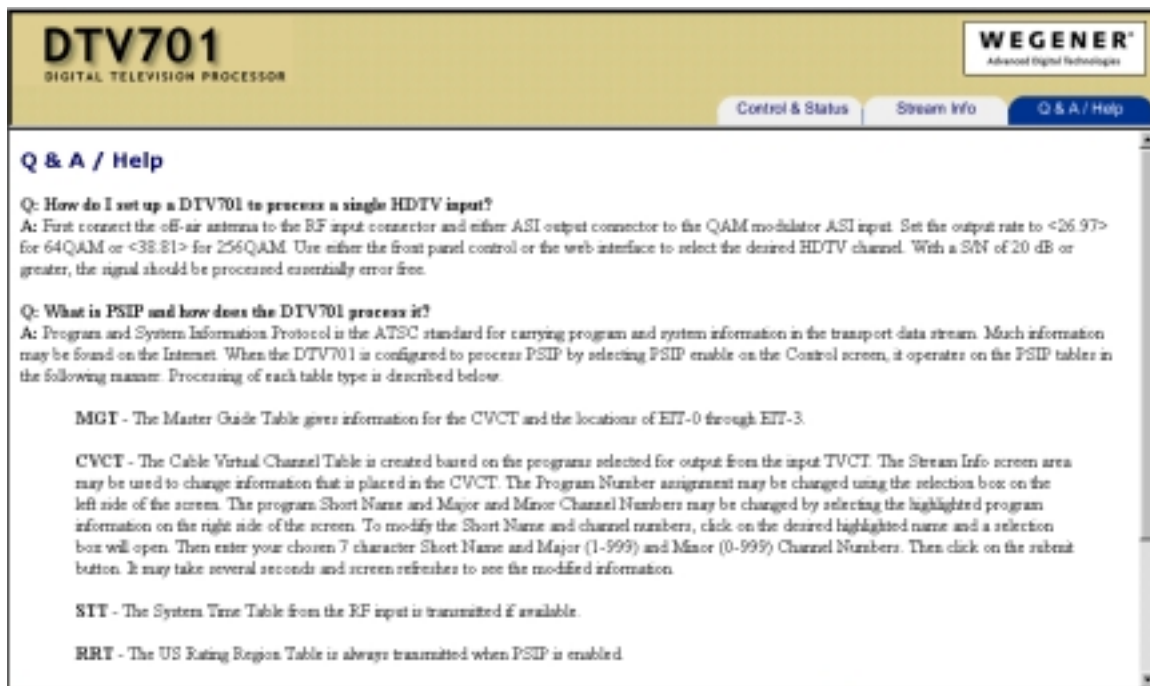
The screenshot shows a window with the following fields and buttons:

- Major Minor: Two input boxes, the first containing '17' and the second containing '1'.
- Channel Number: A label to the left of the Major Minor input boxes.
- Short Name: A label to the left of an input box containing 'WTBS H'.
- Submit: A button centered below the input fields.

Click the Submit button after making your changes and the new information will appear on the Status Page. Note that the major and minor channel numbers are limited to three characters and the short name to seven characters.

Q&A/Help Page

A list of questions and answers about operating your DTV701 is available on the Q&A/Help page shown below in Figure 3.3. Click the Q&A/Help tab to display this page.



The screenshot shows the DTV701 DIGITAL TELEVISION PROCESSOR interface. The top navigation bar includes 'Control & Status', 'Stream Info', and 'Q & A / Help' (which is selected). The main content area is titled 'Q & A / Help' and contains the following text:

Q: How do I set up a DTV701 to process a single HDTV input?
A: First connect the off-air antenna to the RF input connector and either ASI output connector to the QAM modulator ASI input. Set the output rate to <26.97> for 64QAM or <38.81> for 256QAM. Use either the front panel control or the web interface to select the desired HDTV channel. With a SN of 20 dB or greater, the signal should be processed essentially error free.

Q: What is PSIP and how does the DTV701 process it?
A: Program and System Information Protocol is the ATSC standard for carrying program and system information in the transport data stream. Much information may be found on the Internet. When the DTV701 is configured to process PSIP by selecting PSIP enable on the Control screen, it operates on the PSIP tables in the following manner: Processing of each table type is described below.

MGT - The Master Guide Table gives information for the CVCT and the locations of EIT-0 through EIT-3.

CVCT - The Cable Virtual Channel Table is created based on the programs selected for output from the input TVCT. The Stream Info screen area may be used to change information that is placed in the CVCT. The Program Number assignment may be changed using the selection box on the left side of the screen. The program Short Name and Major and Minor Channel Numbers may be changed by selecting the highlighted program information on the right side of the screen. To modify the Short Name and channel numbers, click on the desired highlighted name and a selection box will open. Then enter your chosen 7 character Short Name and Major (1-999) and Minor (0-999) Channel Numbers. Then click on the submit button. It may take several seconds and screen refreshes to see the modified information.

STT - The System Time Table from the RF input is transmitted if available.

RRT - The US Rating Region Table is always transmitted when PSIP is enabled.

Figure 3.3 Q&A/Help Page

3.3 DTV701 Controls and Indicators

There are three major parts of your DTV701's front-panel controls and indicators: the liquid-crystal display (LCD), the six push buttons, and the eight LED indicators. Essentially all control available through the terminal is also available via the front panel (shown below in Figure 3.4).

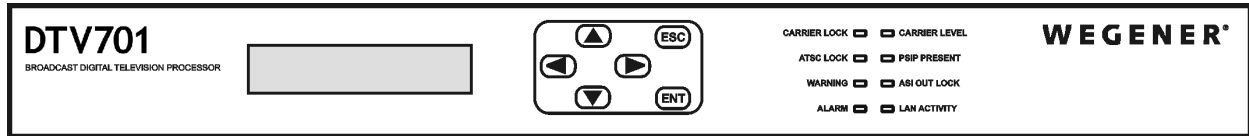
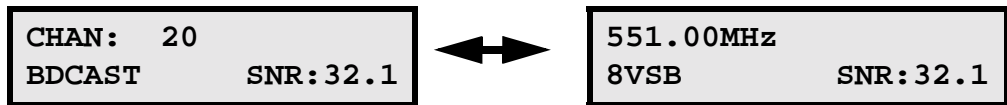


Figure 3.4 DTV701 Front Panel

Liquid-crystal Display(LCD)

The DTV701's 2x20-character LCD indicates unit status and prompts for and reflects user input. Here, you will see your DTV701's "home screen" which alternates between showing the channel number and the RF downlink frequency on the left and continuously shows the signal-to-noise ratio in the lower right. No matter which LCD screen is currently shown, pressing the ESC button repeatedly returns the display to the home screen. From this home screen, press the ENT button to display the unit's serial number and the application software version number. Using the adjacent push buttons, you can navigate the DTV701's various screens and edit input fields (see section **3.4 Front-panel Operation** on page 27).



The default LCD screen is this "home screen". No matter where a user may be in the LCD screen hierarchy, if no front-panel key press is made for more than five minutes, then the LCD menu reverts to the "home screen".

Push buttons These six push buttons (shown below in Figure 3.5) are your means of commanding the DTV701 from the front panel. The four arrow buttons allow navigation through the menu screens and character selection when editing user-input fields. The Enter (**ENT**) button serves to select menu options (downward navigation), to open user-input fields, or to commit user input to the DTV701. The Escape (**ESC**) button allows exit from user-input fields without saving the entry or selection. **ESC** also provides upward navigation through the menu structure to the home screen. The arrow buttons also provide navigation through user-input screens and switching between user-selectable options.

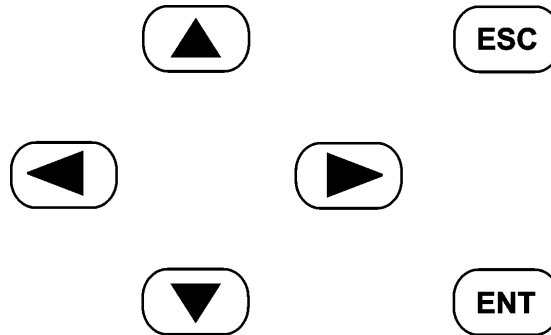


Figure 3.5 DTV701 Push Buttons

**Front-panel
LED
Indicators**

Figure 3.6 below shows the eight light-emitting diodes (LEDs) that provide status information about your DTV701 and its processes. **Table 6: LED Indicator Descriptions** on page 26 provides the meaning of the color and state of each LED.

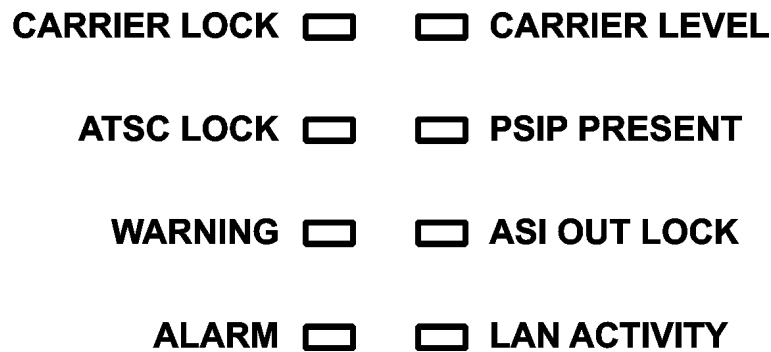


Figure 3.6 DTV701 LED Indicators

Table 6: LED Indicator Descriptions

Indicator Label and Color	Indicator State	Indicator Meaning
CARRIER LOCK GREEN	Constant	RF receiver board is tracking a carrier
	Off	RF receiver board is not tracking a carrier
CARRIER LEVEL GREEN	Constant	RF receiver board is tracking a carrier and RF level is OK
	Off	RF level is not correct
ATSC LOCK GREEN	Constant	ATSC input has Transport Stream synchronization present
	Off	ATSC input does not have Transport Stream synchronization present
PSIP PRESENT GREEN	Constant	Program and System Information Protocol is enabled
	Off	Program and System Information Protocol is not enabled
WARNING YELLOW	Constant	Warning condition(s) exists
	Off	No Warning condition exists
ASI OUT LOCK GREEN	Constant	ASI Output is active
	Off	ASI Output is inactive
ALARM RED	Constant	Alarm condition(s) exists
	Off	No Alarm condition exists
LAN ACTIVITY GREEN	Flash	LAN activity present. Only lights when data is transferred to the DTV701. This is not a continuous monitor of LAN communications.
	Off	No LAN activity transferring data to the unit

Rear-panel indicator

The LED indicator on the rear panel gives Ethernet status.

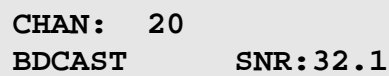
Green Ethernet LED: OFF for no signal, ON for input signal detected

3.4 Front-panel Operation

The DTV701 may be set up and controlled from the front panel as follows:


1. Home Screen (alternates between screens every 4 seconds.)

First Screen



```
CHAN: 20
BDCAST      SNR: 32.1
```

Second Screen



```
551.00MHz
8VSB      SNR: 32.1
```

Press the ENT key to view the unit's serial number.

Press the ► key to go to Input Setup (step 2).

2. Input Setup



```
Input Setup...
```

Press the ENT key to go to Channel Selection (3).

Press the ► key to go to Output Rate Select (6).

Press the ESC key to go to the Home Screen (1)

3. Channel Selection

CHANNEL:
20

Press the ENT key and then the ▲ or ▼ key to change the selected channel number. Press ENT to confirm the selection or ESC to cancel changes.

Press the ► key to go to the RF Standard screen (4).

Press the ESC key to go to Input Setup (2).

4. RF Standard Selection

RF Standard:
BROADCAST

Press the ENT key and then the ▲ or ▼ key to select BROADCAST or CATV. Press ENT to confirm the selection or ESC to cancel changes.

Press the ► key to go to MPEG Select (5)

Press the ◀ key to go to Channel Selection (3)

Press the ESC key to go to Input Setup (2)

5. MPEG Selection

MPEG Select:
SELECT

Press the ENT key and then the ▲ or ▼ key to select ALL or SELECT.


Press ENT to confirm the selection or ESC to cancel a change.

Press the ◀ key to go to RF Standard (4).

Press the ESC key to go to Input Setup (2).

Choosing ALL prevents changes to program numbers or stream content. The received MPEG stream is passed through to the output unchanged. Choosing SELECT allows the user to change program and channel numbers (and channel short name) as well as to exclude program streams from the output.

6. Output Rate Selection



Output rate:
38.81 Mbps

Press the ENT key and then the ▲ or ▼ key to select 19.39 Mbps, 26.97 Mbps, or 38.81 Mbps.

Press ENT to confirm the selection or ESC to cancel changes.

Press the ► key to go to IP Setup (7).

Press the ◀ key to go to Input Setup (2).

Press the ESC key to go to the Home Screen (1).

7. IP Setup



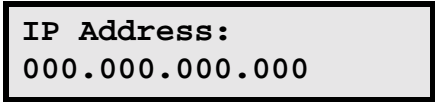
IP Setup...

Press the ENT key to go to IP Address Select (8).

Press the ◀ key to go to Output Rate Select (6).

Press the ESC key to go to the Home Screen (1).

8. IP Address Selection



IP Address:
000.000.000.000

Press the ENT key and then press the arrow keys to change the IP address.

Press ENT to confirm the address or ESC to cancel changes.

Press the ► key to go to Netmask Select (9).

Press the ESC key to go to IP Setup (7).

9. Netmask Selection

Netmask: 255.255.0.0

Press the ENT key and then press the arrow keys to change the Netmask. Press ENT to confirm the Netmask or ESC to cancel changes. Press the ► key to go to Gateway Select (10). Press the ◀ key to go to IP Address Select (8). Press the ESC key to go to IP Setup (7).

10. Gateway Selection

Gateway: 0.0.0.0

Press the ENT key and then press the arrow keys to change the Gateway. Press ENT to confirm the Gateway or ESC to cancel changes. Press the ◀ key to go to Netmask Select (9). Press the ESC key to go to IP Setup (7).

Unit Shutdown Simply remove power to the unit to shut down your DTV701. No special procedure is required.

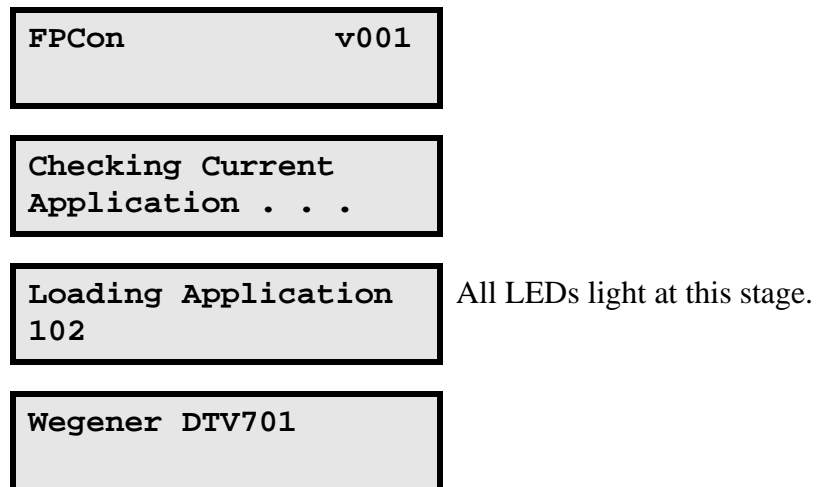
3.5 Initialization

Software Code Structure The DTV701 Processor contains the following unit software: A boot loader and one version of operating application software. Before power-up, these components are stored in non-volatile memory. The boot loader resides in a portion of the memory that may only be written at the factory while the application is stored in a portion of memory that *can* be over-written with downloads of new software. The boot code has the responsibility of deciding if the resident application software image should be allowed to execute.

Software Code Swapping In the situation where a newly downloaded application fails a quality self-test, a running application will automatically pass control to its backup application.

Initialization Sequence At power up, the boot loader software executes first. It performs a test of RAM and then relocates itself for further execution from there. (See **3.8 Software**

Downloads on page 32 for instructions on putting the DTV701 into serial command mode.) During boot-up, the following screens appear on the LCD:



Following normal boot-up, the "home" screen will appear as described in section **3.4 Front-panel Operation** on page 27 and the LEDs reflect the actual state of the unit.

Initialization Failure

When in Initialization Failure mode, the unit is essentially dead. There is no ASI output, the alarm relay is de-energized (alarm state), the alarm LED is ON, the general purpose relays are all open, and the unit does not attempt acquisition of input streams.

3.6 Transport Stream Processing

Refer to ISO 13818-1 for supporting details on the structure of MPEG Transport Streams.

RF Signal Reception

The channel number or the carrier frequency must be supplied to the tuner in order for the unit to derive its Transport Stream from the RF input. This data is used to set up the tuner module. If carrier acquisition is successful, then the Transport Stream borne in the carrier will be passed to the ASI output.

Input to Output Processing

The DTV701 has an RF ATSC input which the unit processes. Programs are passed through to the ASI output. Processing includes PSIP changes as required. The unit accepts input from the ATSC port and based on user selection, certain PIDs may be dropped or remapped and then passed to the ASI output with time stamping updated.

PSIP Structure and Program Selection

Within the transport stream are PIDs carrying tabular information on that stream. The PAT describes all the programs available. The program number identifies each program in the transport stream. When a source of data is acquired, the stream is passed to the internal transport demultiplexer. This cir-

cuit then extracts the PAT and PMT information and provides this information to the user via the Stream Information page of the web interface.

3.7 Alarm/Warning System

The alarm and warning system is intended to provide indications to local user of a critical failure or imminent failure. See **Table 6: LED Indicator Descriptions** on page 26 for actual indications.

Alarm Conditions

Generally, if the unit is unable (or presumed to be unable) to present output from a selected transport stream, then that is an alarm state. The following list defines all alarms during normal operation (also see **Initialization Failure** on page 31).

1. RF receiver card run-time failure
2. Eb/No below alarm level while tracking RF carrier
3. Failure of various outputs (see **Warning Conditions** below)

Warning Conditions

Generally, the unit presents warnings when an alarm condition may be imminent from unit stress or poor signal conditions.

3.8 Software Downloads

Download via Serial Port procedure

The DTV701 must be placed in the application download mode in order to place new application software in the unit via the rear-panel terminal port. The new application (DTV701_nnn.DL where nnn is the revision number) should be located on the PC used to connect to the DTV701. The PC runs a terminal emulator program (such as Hyper Terminal) set to 115.2 kbps, no parity, 8 data bits, and one stop bit. The terminal must be set up to echo typed characters (ASCII setup). The PC is connected to the DTV701 using a 9-pin extender cable.

1. Place the DTV701 in the download mode by using the following steps:

NOTE: This procedure must be followed carefully and executed quickly, closely following the LED cues. The process will not succeed if keystrokes are delayed or performed incorrectly.

- a) While holding the front panel left and right arrow keys down, power on the unit.
- b) When the red alarm LED goes on, release the right arrow key.
- c) When the yellow alarm LED goes on, release the left arrow key.

- d) When the red alarm LED goes on again, push the right arrow key.
 - e) The unit should now be in upload mode and accessible via the terminal.
2. The front panel should indicate Boot Loader Mode and show the time remaining to initiate the upload. The front-panel warning and alarm LEDs are flashing. If the download is not initiated within five minutes, the unit automatically restarts and runs the current application.

```

Boot Loader Mode
Terminal Time: 04:54

```

3. The terminal screen will show the following message (note that the version may differ from that indicated below).

```

Entering Terminal Mode.
Mode will timeout after approx. 5 min. of inactivity.

```

```

Wegener Communications Copyright 2002
DTV700 Boot Loader Version 100

```

```

Type H for a list of terminal commands
>

```

4. After typing "H" you will receive the following output.

```

SETBAUD baud_rate Set terminal rate (9600, 19200, 38400,
                    57600, 115200)
DLAPP [A | B] [F] Download over bad app in flash (.DL file)
                   A | B Download to flash A or B (A is
                   default)
                   F Force download even if app is good
GOAPP [F] Starts the current application ('F' forces
           app. load)
RESET Resets the unit
APPSTAT [Q] Reports application info. ('Q' performs
            quick check)
SWITCH [A | B] Switches app A or B. If no arg, switch to
              backup.

OK>

```

5. Type "DLAPP A F" to download (force to flash A) the latest .DL application file to the DTV701. (To download to flash B, type "DLAPP B F".)
6. On the terminal program, send the desired application (DTV701_nnn.DL) by entering send file using the XMODEM 1K protocol. (Only the

XMODEM 1K protocol may be used.) The following will appear on the front-panel LCD:

```

DOWNLOADING:
APP CODE (FLASH x)
    
```

Where x is either A or B, representing the two possible application code storage spaces in the Flash memory.

7. When the terminal indicates that the file transfer is complete, type "APPSTAT" to verify that the application loaded correctly. (This takes approximately four minutes to complete.) An asterisk is shown beside the current application (A or B).
8. If the current application is not the desired one, use the SWITCH command to make another application the current one. Type "SWITCH A" to switch to application A or "SWITCH B" to change to application B.
9. Type RESET to restart the unit.
10. As the unit restarts, verify from the front panel (should display as shown below) that the desired application is being initiated.

```

Loading Application
NNN
    
```

Chapter 4 Maintenance and Troubleshooting

4.1 Maintenance

Maintenance of the DTV701 is limited to keeping the chassis clean and ensuring that cables remain firmly connected. Occasionally wipe the exterior with a soft, damp cloth to remove any accumulated dust and dirt and check that cables are securely attached.



The DTV701 incorporates security labels over some of the screws. There are no user-serviceable components within the DTV701. Tampering with the security labels or opening the unit will void your warranty. If you have any questions, contact Wegener's Customer Service Department at the address or numbers listed under Customer Service.

4.2 General Troubleshooting

This section is not intended as an exhaustive list of all possible situations. Please contact us as directed in **Chapter 5 Customer Service** on page 39, with any problems you cannot resolve independently.

If you are experiencing any difficulties, first check the LCD and LED indicators on the DTV701 to determine if any warnings or alarms are active. See **Table 6: LED Indicator Descriptions** on page 26 for descriptions of LED states. If operating over the Ethernet interface, check the Control and Status tab on your browser for Warning messages.

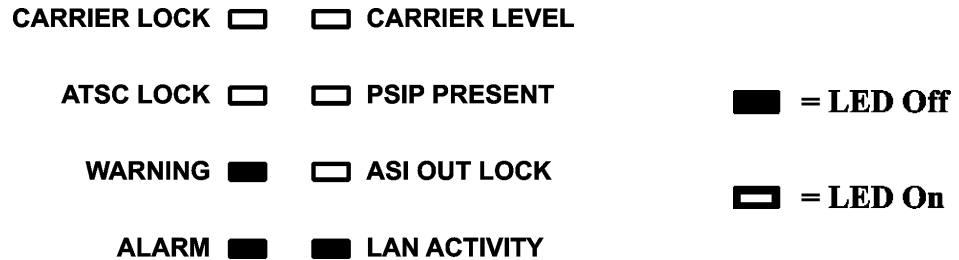
No functions at all

If the unit is not functioning at all and neither the LCD nor any LEDs are active, there may be a loss of ac power. Do the following:

- a) Check that ac power cord is firmly connected at both ends.
- b) Check that your ac power source is supplying ac power.

LED indicators

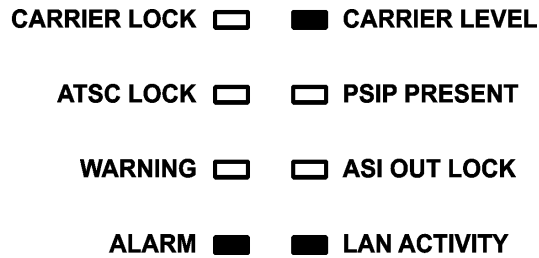
In the following sections, LEDs are illustrated as black (off) or white (on) to represent actual LED appearance. The LEDs are shown here reflecting the DTV701 in normal operation with no Alarms or Warnings:



4.3 Warnings

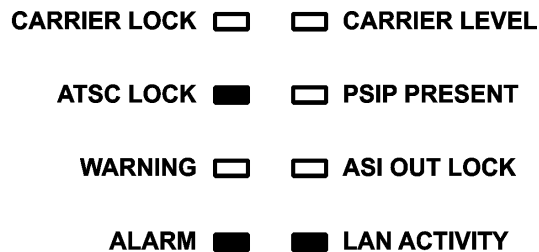
**WARNING
Carrier level
out of range**

Video may be garbled or lost when the RF carrier level is out of range. If the carrier level is too high or too low, the WARNING LED will be lit and the CARRIER LEVEL LED will be off (as shown below). Some means of amplifying or attenuating the signal should be attempted to bring the carrier level into range.



**WARNING
no ATSC
stream
synchronization**

If ATSC stream synchronization is not present, video quality may be diminished. This condition is indicated when the ATSC LOCK LED is inactive or unlit (as shown below).



4.4 Alarms

ALARM loss of RF input signal

Video is lost when the incoming signal is lost. When the CARRIER LOCK LED is inactive or unlit (shown below), no RF input signal is being tracked by the DTV701. The ALARM LED lights and the ATSC LOCK, PSIP PRESENT, and ASI OUT LOCK LEDS will be unlit. Check RF connections and try repositioning the antenna and retuning to correct the problem..

CARRIER LOCK   CARRIER LEVEL

ATSC LOCK   PSIP PRESENT

WARNING   ASI OUT LOCK

ALARM   LAN ACTIVITY

4.5 Trouble with Browser Interface

If the unit appears to be functioning normally with no alarm or warning conditions, but you cannot use the web browser interface, first check the LED on the rear panel next to the Ethernet connector. It will illuminate and blink as LAN data are detected. If this LED is off check the cabling to the LAN. If the LED remains off after verifying the LAN connection, contact Customer Service. If the Ethernet LED is illuminated, check that you are using the correct IP address. (See “Ethernet/Web Browser Control” on page 19.)

If the address is correct, but the interface still does not function, check your computer's IP settings and consult your network administrator for additional help.

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Chapter 5 Customer Service

5.1 Warranty

The following warranty applies to all Wegener Communications products including the DTV701 Broadcast Digital Television Processor:

All Wegener Communications products are warranted against defective materials and workmanship for a period of one year after shipment to customer. Wegener Communications' obligation under this warranty is limited to repairing or, at Wegener Communications' option, replacing parts, subassemblies, or entire assemblies. Wegener Communications shall not be liable for any special, indirect, or consequential damages. This warranty does not cover parts or equipment which have been subject to misuse, negligence, or accident by the customer during use. All shipping costs for warranty repairs will be prepaid by the customer. There are no other warranties, express or implied, except as stated herein.

5.2 Technical Support

In the event that the unit should fail to perform as described, or if you need help resolving problems with your DTV701, contact Wegener Communications Customer Service at (770) 814-4057, FAX (678) 624-0294, or E-mail service@wegener.com.

To return a product for service:

- a) Obtain a Return Material Authorization (RMA) number by completing and faxing a copy of the RMA Request Form to (678) 624-0294. You may E-mail the same information instead to: **service@wegener.com**
- b) To help us identify and control returned units, plainly write the RMA number on the outside of the product-shipping container. This will help us return your unit to you as quickly as possible.
- c) Return the product, freight prepaid, to the address below:

Service Department RMA# _____
Wegener Communications, Inc.
359 Curie Drive
Alpharetta, GA 30005

NOTE:All returned material must be shipped freight prepaid. C.O.D. Shipments will not be accepted.

Please contact Customer Service at the number above if you have any questions about obtaining service for your DTV701.

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