

DTV700

Broadcast Digital Television Processor

User's Manual



WEGENER

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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 DTV700 Broadcast Digital Television Processor, referred to throughout the manual as the DTV700.

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 DTV700, its functions and specifications, and a glossary of terms
- 2 Installation** - procedures and information for the correct and safe installation of your DTV700.
- 3 Operation** - instructions on starting and operating your DTV700
- 4 Maintenance and Troubleshooting** - information on maintaining your DTV700 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.

Please E-mail any suggestions or comments concerning this manual to manuals@wegener.com. If you prefer to post them through the mail, please send your comments to the address below. If you have substantial or complex changes to recommend, our preference is that you copy the page(s) in question, mark your changes on that copy, and fax or mail us the copy. We always appreciate constructive criticism.

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1.2 DTV700 Overview

The DTV700 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 which may be multiplexed with an ASI input to produce 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 DTV700 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 **DTV700 Controls and Indicators** on page 25). The rear panel holds the ports that allow connection to power, incoming signal, and peripheral devices.



Figure 1.1 DTV700 Broadcast Digital Television Processor

Features

Your DTV700 has the following features:

- One ATSC 8VSB tuner input (F connector)
- One ASI MPEG Transport Stream input selected from two inputs (BNC connectors)
- Two duplicate ASI MPEG Transport Stream outputs (BNC connectors)
- Time re-stamping of PCR, PTS, and DTS information.
- Automatic PID conflict resolution from the two input streams.
- 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 DTV700 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 loss of single input, poor signal quality, and oversubscription of output data rate
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 DTV700 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 DTV700:

Do not open the DTV700'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 DTV700 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 DTV700 may be connected to an Ethernet LAN.
LCD	Liquid crystal display. The front-panel text screen on your DTV700 is a liquid crystal display.
LED	Light-emitting diode. The front-panel indicator lights on your DTV700 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 DTV700.

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Chapter 2 Installation

This chapter provides instructions on unpacking, mounting, and connecting your DTV700 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 DTV700 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 DTV700.

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 DTV700 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 DTV700 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 DTV700 in a desktop environment, place the DTV700 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.

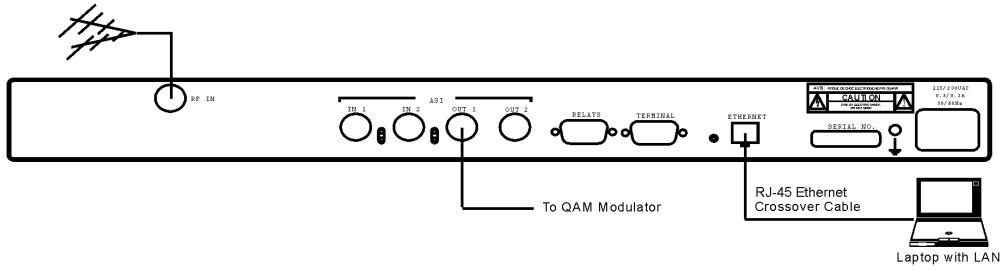
WARNING

Locate the DTV700 and its cables to avoid impacts, spills, and pulling cables and to ensure sufficient air flow. Failure to locate the DTV700 in a proper environment may result in damage to the equipment.

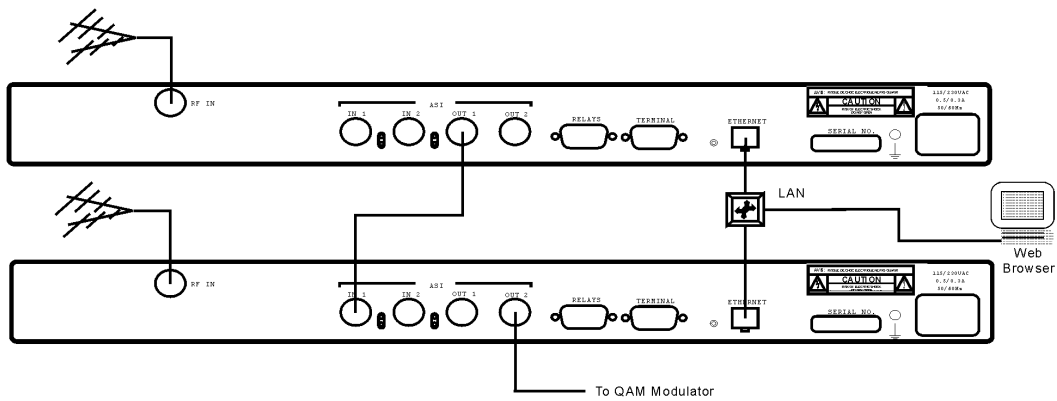
2.3 DTV700 Connections

Figure 2.1 DTV700 System Setups shows placement of the DTV700 in various system setups. Figure 2.2 DTV700 Rear Panel on page 17 illustrates details of the DTV700's rear panel.

Basic System – One HDTV to ASI output



Basic Multiplex System – Two HDTVs multiplexed to ASI output



Full Multiplex System – Two HDTVs plus satellite channels multiplexed to ASI output

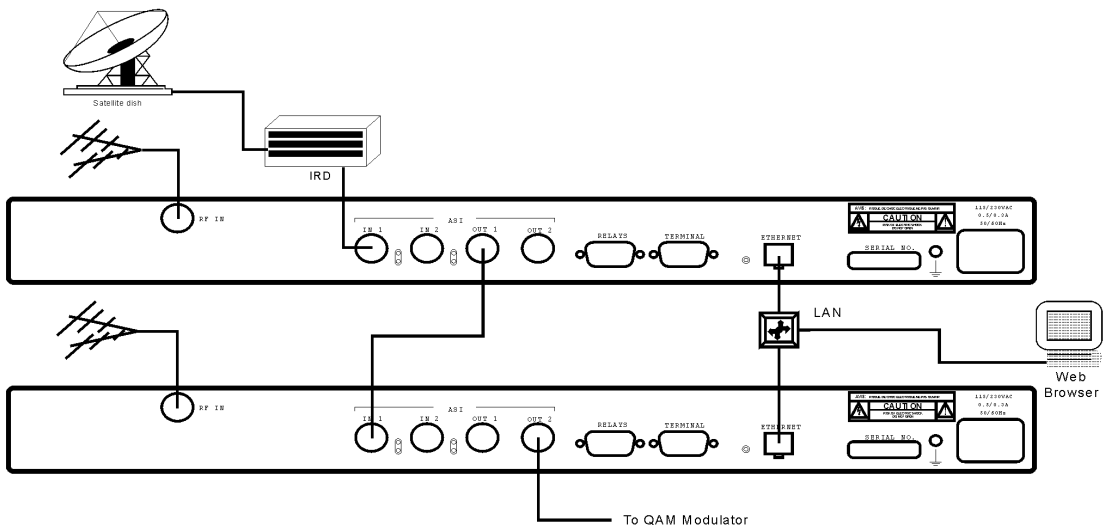


Figure 2.1 DTV700 System Setups

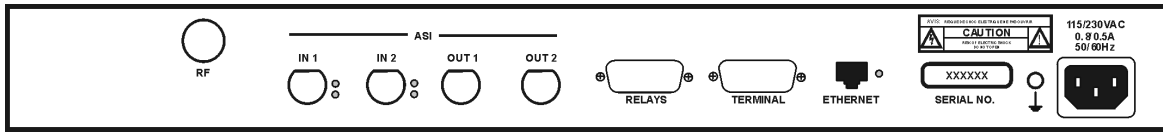


Figure 2.2 DTV700 Rear Panel

Before applying power, make the following connections to your DTV700 (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 DTV700's input RF port and/or ASI inputs to ASI IN 1 and ASI IN 2 ports.
- c) Connect downstream equipment to the ASI OUT 1 and ASI OUT 2 ports as desired.
- d) Connect your LAN line to the DTV700'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 DTV700's IEC receptacle and to a 100-to-120 Vac source.

Table 3: DTV700 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 In 1	female BNC		ASI IN 1
ASI In 2	female BNC		ASI IN 2
ASI Out 1	female BNC		ASI OUT 1
ASI Out 2	female BNC		ASI OUT 2

Table 3: DTV700 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 DTV700. 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 DTV700 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 DTV700. The following sections address:

- Ethernet/Web Browser Control
- DTV700 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 DTV700'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 DTV700 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 DTV700'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 DTV700 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: DTV700 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 DTV700's Ethernet port to the LAN using a normal RJ-45 cable (8 pins). Set the DTV700 IP Address, Netmask, and Gateway as directed by your network administrator. Use any PC on the LAN to connect to the DTV700 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 DTV700.
- 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 DTV700'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 DTV700 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 (**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 on the right side (Status side) of the tab. The unit then periodically updates this status information on an ongoing basis.

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.

Use the ASI Input drop-down list to select the desired ASI input port and then click the Select button. Enable or disable PSIP by selecting On or Off from the PSIP Enable drop-down list. Enable PSIP in order to change output channel numbers and channel short name.

The received signal parameters are labeled RF Input. This part of the Status side includes frame lock status (true or false), signal-to-noise ratio (in dB), errored seconds, and signal strength quality. The ASI Input part of Status shows the ASI input port in use and indicates the presence or lack of an ASI input signal. ASI Output lists the output stream's 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.)

DTV700

DIGITAL TELEVISION PROCESSOR

Advanced Digital Technology

Control & Status
Stream Info
Q & A / Help

Control

DTV700 S/N: 16776960
Version 110

RF INPUT Channel:
Ⓜ Broadcast Ⓞ Cable

ASI Input

ASI Output

PSIP Enable

Status

RF Input Channel: 27
Type: Broadcast
Frame Lock: TRUE
SNR: 28.3
Errored Secs: 0
Signal Status: Very Strong

ASI Input ASI 1
ASI Input Locked

ASI Output 38.81 Mbps (256QAM)
ASI Output Locked

Figure 3.1 Control and Status Page

Stream Information Page

The Stream Information page shown in Figure 3.2 below allows additional control and monitoring of the input and output streams. The input side allows you to select the program streams that you wish to include in the output. Click the box to the left of a program to check that program and add it to the output and then click the Update Selected Programs bar. Click the Uncheck All hyper-link if you wish to remove checks from all input check boxes.

Program numbers may be changed by entering the desired values in the program number boxes before clicking on the Update Selected Programs box.

NOTE: Program numbers must be unique. If you attempt to assign the same program number to more than one program, an error message will appear and no change will be made.

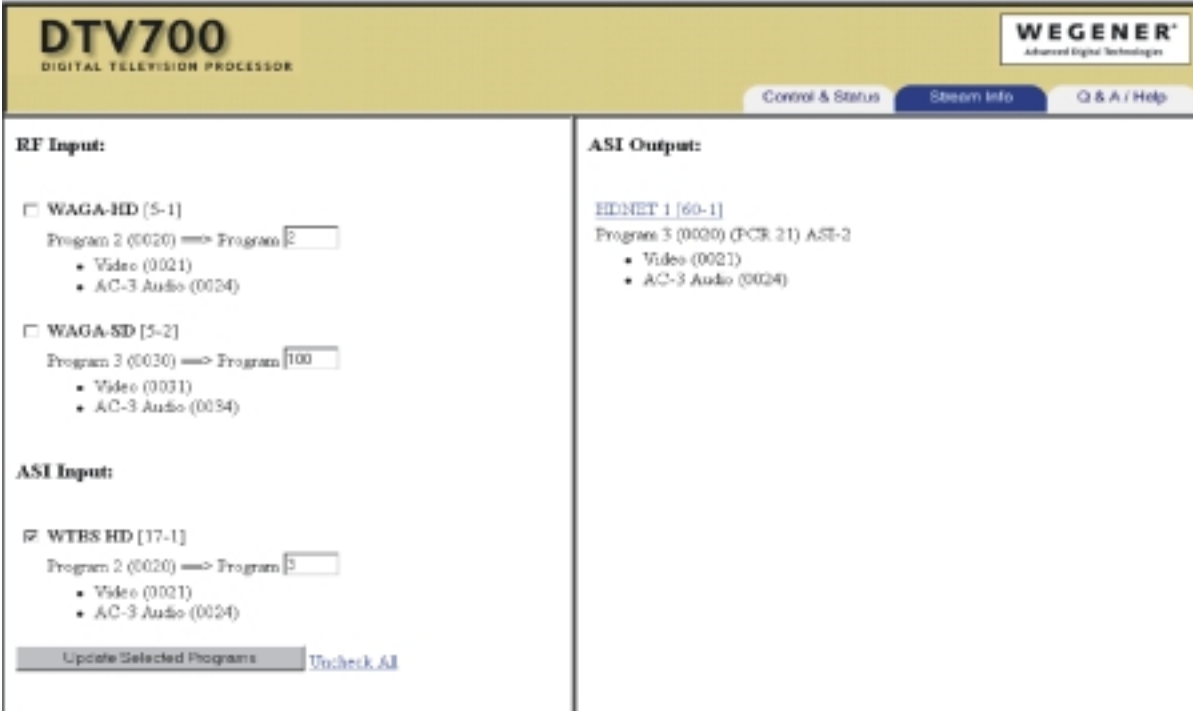


Figure 3.2 Stream Information Page

NOTE: If OFF was selected under ASI input (see the **Control and Status Page**), you will not be able to select programs or change program numbers. With ASI input disabled, all tuner programs are passed to the output without modification.

NOTE: If PSIP was turned off on the Control and Status Page, 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:

Major Minor

Channel Number

Short Name

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 DTV700 is available on the Q&A/Help page. Click the Q&A/Help tab to display this page as shown in Figure 3.3 below.

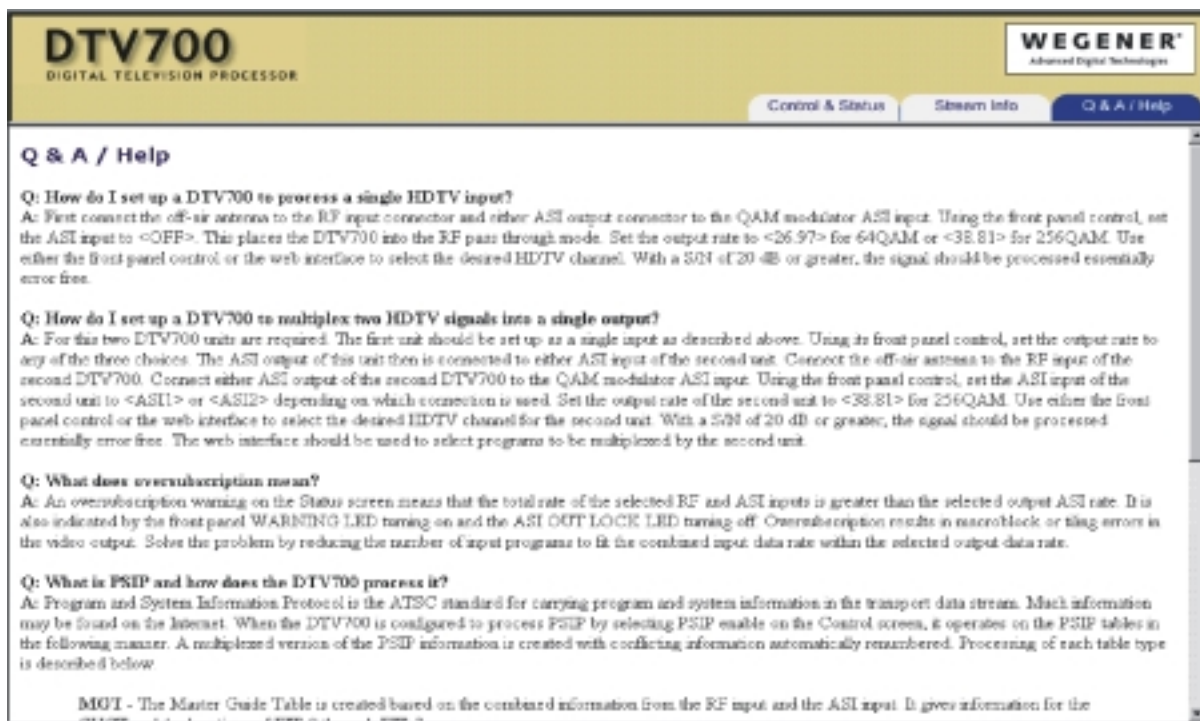


Figure 3.3 Q&A/Help Page

3.3 DTV700 Controls and Indicators

There are three major parts of your DTV700'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).

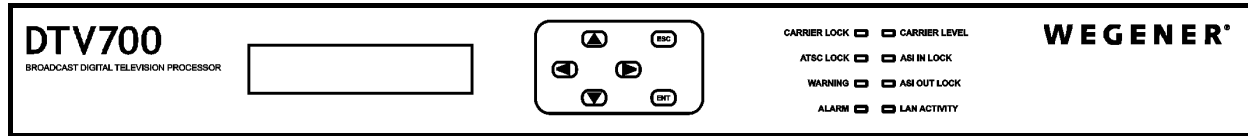
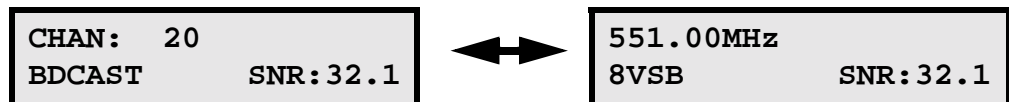


Figure 3.4 DTV700 Front Panel

Liquid-crystal Display(LCD)

The DTV700's 2x20-character LCD indicates unit status and prompts for and reflects user input. Here, you will see your DTV700'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. Using the adjacent push buttons, you can navigate the DTV700's various screens and edit input fields (see section **3.4 Front-panel Operation** on page 28).



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 DTV700 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 DTV700. 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.

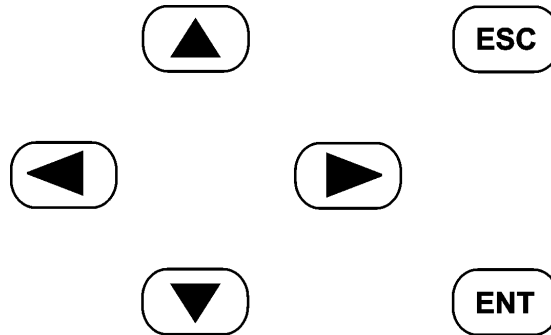


Figure 3.5 DTV700 Push Buttons

Front-panel LED Indicators

Figure 3.6 below shows the eight light-emitting diodes (LEDs) that provide status information about your DTV700 and its processes. **Table 6: LED Indicator Descriptions** on page 27 provides the meaning of the color and state of each LED.

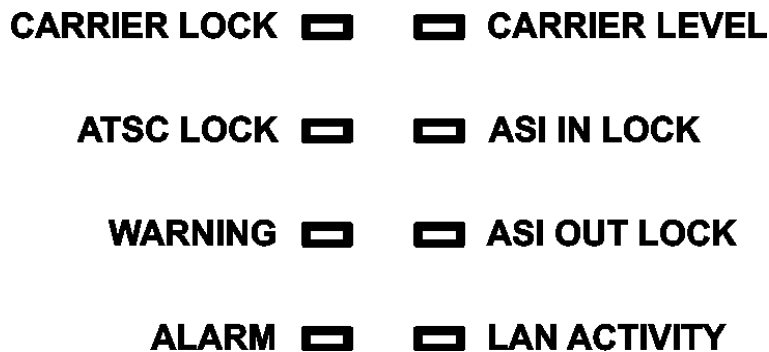


Figure 3.6 DTV700 LED Indicators

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
ASI IN LOCK GREEN	Constant	ASI input has Transport Stream synchronization present
	Off	ASI input does not have Transport Stream synchronization present
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 DTV700. This is not a continuous monitor of LAN communications.
	Off	No LAN activity transferring data to the unit

Rear-panel indicators

Two LED indicators on the rear panel give Ethernet and ASI Input status:

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

ASI Input – Red/Green LED: OFF for not selected, RED for no input signal, GREEN for input signal detected

3.4 Front-panel Operation

The DTV700 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 and application software version number.

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

Serial Number Screen

```

S/N: xxxxxxxx
Version: 110
    
```

Press the ESC key to return to the Home Screen.

2. Input Setup

```

Input Setup...
    
```

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

Press the ► key to go to Output Rate Select (7).

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 the ASI Input Select (5)

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

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

5. ASI Selection



ASI Input:
ASI 1

Press the ENT key and then the ▲ or ▼ key to select ASI OFF, ASI 1, or ASI 2. Press ENT to confirm the selection or ESC to cancel changes.

Press the ► key to go to the RF Input Enable Selection (6).

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

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

6. RF Input Enable Selection

RF Input :
ENABLED

Press the ENT key and then the ▲ or ▼ key to select ENABLED or DISABLED.

Press the ENT key to confirm the selection.

Press the ◀ key to go to ASI Selection (5).

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

7. 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 (8).

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

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

8. IP Setup

IP Setup...

Press the ENT key to go to IP Address Select (9).

Press the ◀ key to go to Output Rate Select (7).

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

9. 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 (10).

Press the ESC key to go to IP Setup (8).

10. 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 (11).

Press the ◀ key to go to IP Address Select (9).

Press the ESC key to go to IP Setup (8).

11. 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 (10).

Press the ESC key to go to IP Setup (8).

Unit Shutdown

Simply remove power to the unit to shut down your DTV700. No special procedure is required.

3.5 Initialization

Software Code Structure

The DTV700 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 33 for instructions on putting the DTV700 into serial command mode.) During boot-up, the following screens appear on the LCD:

```

FPCon                v001
    
```

```

Checking Current
Application . . .
    
```

```

Loading Application
102
    
```

All LEDs light at this stage.

```

Wegener DTV700
    
```

Following normal boot-up, the "home" screen will appear as described in section **3.4 Front-panel Operation** on page 28 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 basic DTV700 has an RF ATSC input, an ASI input, and an ASI output. The unit processes each of the inputs, selects programs based on user input, and provides a multiplexed output signal on the ASI output. The processing includes PSIP changes as required. The unit accepts input from the ATSC port and the ASI input. 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. The user may then select programs to be included in the ASI output as described in section **3.2 Ethernet/Web Browser Control**.

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 27 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 32).

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 DTV700 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 (DTV700_nnn.DL where nnn is the revision number) should be located on the PC used to connect to the DTV700. 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 DTV700 using a 9-pin extender cable.

1. Place the DTV700 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.
6. 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
    
```

7. 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
>
    
```

8. 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>
    
```

9. Type "DLAPP A F" to download (force to flash A) the latest .DL application file to the DTV700. (To download to flash B, type "DLAPP B F".)

10. On the terminal program, send the desired application (DTV700_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.

11. 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).
12. 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.
13. Type RESET to restart the unit.
14. As the unit restarts, verify from the front panel (should display as shown below) that the desired application is being initiated.

```
Loading Application  
NNN
```

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Chapter 4 Maintenance and Troubleshooting

4.1 Maintenance

Maintenance of the DTV700 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 DTV700 incorporates security labels over some of the screws. There are no user-serviceable components within the DTV700. 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 43, with any problems you cannot resolve independently.

If you are experiencing any difficulties, first check the LCD and LED indicators on the DTV700 to determine if any warnings or alarms are active. See **Table 6: LED Indicator Descriptions** on page 27 for descriptions of LED states. If operating over the Ethernet interface, check the Control and Status tab on your browser for Warning messages.

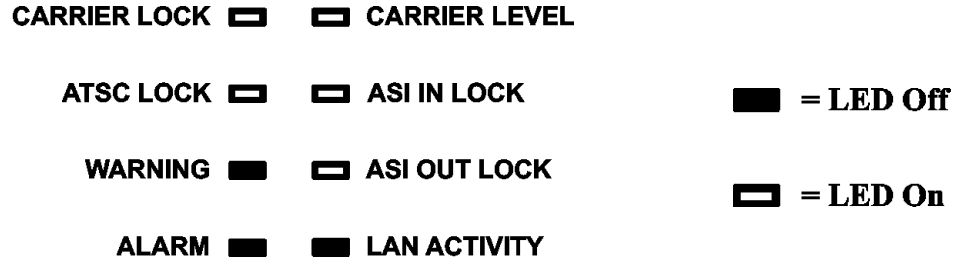
No functions at all

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 DTV700 in normal operation with no Alarms or Warnings:

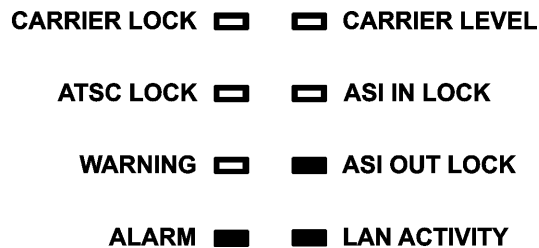


4.3 Warnings

WARNING
Oversubscription

An oversubscription warning on the status screen means that the total rate of the selected RF and ASI inputs is greater than the selected output ASI rate. A corrupt signal is output from the DTV700. Oversubscription results in macroblock or tiling errors in the video output.

On the front panel, this is indicated by a lit WARNING LED and an inactive (or unlit) ASI OUT LOCK LED (shown below). Solve the problem by reducing the number of input programs to fit the combined input data rate within the selected output data rate.



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.

CARRIER LOCK   **CARRIER LEVEL**

ATSC LOCK   **ASI IN LOCK**

WARNING   **ASI OUT LOCK**

ALARM   **LAN ACTIVITY**

WARNING
loss of RF
input signal

Video is lost when the incoming signal is lost. When the WARNING LED lights and the CARRIER LOCK LED is inactive or unlit (shown below), no RF input signal is being tracked by the DTV700. The WARNING LED lights if both RF and ASI input are selected and ASI input lock remains. Try repositioning the antenna and retuning to correct the problem.

NOTE: Always re-select and update programs after retuning

CARRIER LOCK   **CARRIER LEVEL**

ATSC LOCK   **ASI IN LOCK**


WARNING   **ASI OUT LOCK**

ALARM   **LAN ACTIVITY**

WARNING
loss of ASI
input signal

Video is lost when the incoming signal is lost. When the ASI IN LOCK LED is inactive or unlit (shown below), the ASI transport stream sync has been lost. The WARNING LED will light if both ASI input (1 or 2) and RF input are selected and RF CARRIER LOCK remains. Check ASI source and input connection.

CARRIER LOCK   **CARRIER LEVEL**

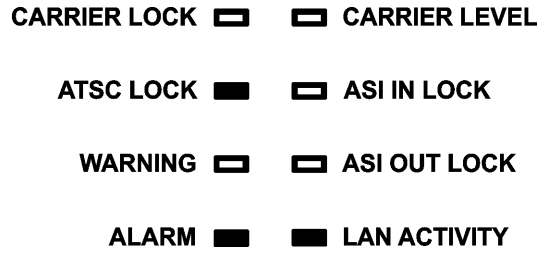
ATSC LOCK   **ASI IN LOCK**

WARNING   **ASI OUT LOCK**

ALARM   **LAN ACTIVITY**

**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).

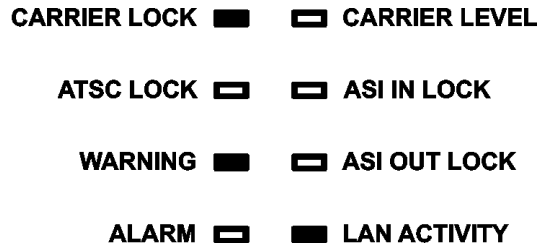


4.4 Alarms

**ALARM loss
of RF input
signal**

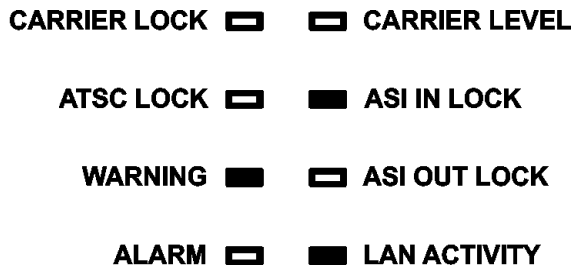
Video is lost when the incoming signal is lost. When the CARRIER LOCK LED is inactive or unlit (shown below), no RF input signal is being tracked by the DTV700. The ALARM LED lights if RF input is selected and ASI input is OFF. Check RF connections and try repositioning the antenna and retuning to correct the problem.

NOTE: Always re-select and update programs after retuning.



**ALARM loss
of ASI input
signal**


Video is lost when the incoming signal is lost. When the ASI IN LOCK LED is inactive or unlit (shown below), the ASI transport stream sync has been lost. The ALARM LED will also light if ASI input (1 or 2) is selected and RF input is disabled. Check ASI input connections and source.



**ALARM no
input signal**

If neither RF CARRIER LOCK nor ASI IN LOCK are present and either RF is enabled or ASI input (1 or 2) has been selected, the ALARM LED will light. The ASI OUT LOCK LED will be unlit. Check ASI input connections and source. Check RF connections and try repositioning the antenna and retuning.

NOTE: Always re-select and update programs after retuning.

CARRIER LOCK   **CARRIER LEVEL**

ATSC LOCK   **ASI IN LOCK**

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 DTV700 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 DTV700, 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 DTV700.

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