

DTV744

8VSB 4-Channel Demodulator

User's Manual



WEGENER®

A proven world leader in digital video, audio & broadcast data systems, WEGENER's management system is certified to ISO 9001:2000.

Data, drawings, and other material contained herein are proprietary to Wegener Communications, Inc., and may not be reproduced or duplicated in any form without the prior written permission of Wegener Communications, Inc.

The information contained herein is subject to change without notice. Revisions may be issued to advise of such changes and/or additions.

© 2004 Wegener Communications, Inc. All rights reserved.

WEGENER[®], COMPEL CONTROL[®], and DTV744 are trademarks of WEGENER Communications, Inc. All other trademarks are the property of their respective owners.

Correspondence regarding this publication,

800050-01 Revision B
Second Edition: September 2004

should be forwarded to:

Wegener Communications, Inc.
Technology Park/Johns Creek
11350 Technology Circle
Duluth, GA 30097-1502

Phone: 770-814-4000

Fax: 770-497-0411

The Wegener DTV742 is approved under FCC Part 15B Class A, UL1950, and CSA.

Table of Contents

Chapter 1 General Information

1.1 Manual Overview	5
1.2 DTV744 Overview	6
Physical Description	6
Features	6
1.3 DTV744 Specifications	7
Table 1 Technical Specifications	7
1.4 Safety Summary	8
1.5 Glossary of Terms and Abbreviations	9
Table 2 Glossary of Terms	9

Chapter 2 Installation

2.1 Unpacking and Inspection	11
2.2 Location and Mounting	11
Rack Mounting	13
2.3 DTV744 Connections	14
Table 3 DTV744 Connector Details	15
Ethernet	16
Terminal I/O	16

Chapter 3 Operation

3.1 Operation Overview	17
3.2 Ethernet/Web Browser Setup	17
Directly connected PC	17
Table 4 DTV744 IP Setup	18
Table 5 PC IP Setup	18
LAN Connection	18
3.3 Web Browser Control	18
Getting Started	18
Control and Status Page	19
Stream Information Page	21
Q&A/Help Page	22
3.4 DTV744 Controls and Indicators	23
Liquid-crystal Display(LCD)	23
Push buttons	24
Front-panel LED Indicators	24
Table 6 LED Indicator Descriptions	25
Rear-panel Indicators	25
3.5 Front-panel Operation	26
Home screen	26
Alarms/Warnings screen	27
Clear Errored Seconds screen	27

Input Setup screen	27
Program Status screen	29
Front Panel Help Timeout screen	29
IP Setup screen	30
Reset unit screen	31
Unit Shutdown	31
3.6 Initialization	32
Software Code Structure	32
Initialization Sequence	32
Initialization Failure	32
3.7 Transport Stream Processing	33
RF Signal Reception	33
Input to Output Processing	33
PSIP Structure and Program Selection	33
3.8 Alarm/Warning System	33
Alarm conditions	33
Warning conditions	33
3.9 Software Upgrades	34
Ethernet transfer	34
Serial port transfer	35

Chapter 4 Maintenance and Troubleshooting

4.1 Maintenance	37
4.2 General Troubleshooting	37
No functions at all	37
4.3 Alarms and Warnings	38
Normal operation	38
ALARM: All inputs missing	38
ALARM: RF missing	39
ALARM: RF n PAT missing	39
WARNING: PCR missing	39
WARNING: PMT missing	40
4.4 Trouble with Browser Interface	40

Chapter 5 Customer Service

5.1 Warranty	41
5.2 Technical Support	41

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 DTV744 8 VSB 4-Channel Demodulator, referred to throughout the manual as the DTV744.

NOTE: This manual provides user interface details for application software versions 01 and 02.

The manual is divided into the following chapters:

- 1 General Information** - a description of your DTV744, its functions and specifications, and a glossary of terms
- 2 Installation** - procedures and information for the correct and safe installation of your DTV744.
- 3 Operation** - instructions on starting and operating your DTV744
- 4 Maintenance and Troubleshooting** - information on maintaining your DTV744 and resolving possible operating difficulties
- 5 Customer Service** - Our warranty and information on obtaining help

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.

Our Address:

Attn: Manuals
Wegener Communications, Inc.
Technology Park / Johns Creek
11350 Technology Circle
Duluth, GA 30097-1502

Our Fax Number:(770) 497-0411

1.2 DTV744 Overview

The DTV744 8 VSB 4-Channel Demodulator (see Figure 1.1) accepts up to four broadcast RF input signals and provides four ASI outputs suitable for use in a cable television network's advanced channel groomer.

Physical Description

The DTV744 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 **3.4 DTV744 Controls and Indicators** on page 23). The rear panel holds the ports that allow connection to power, incoming signal, and peripheral devices.



Figure 1.1 DTV744 8 VSB 4-Channel Demodulator

Features

Your DTV744 has the following features:

- Four ATSC 8VSB RF inputs (F connector),
- Four ASI MPEG transport stream outputs (BNC connector),
- Time re-stamping of PCR,
- One Ethernet TCP/IP control interface (RJ-45 connector),
- One asynchronous data input/output (DB-9 connector), and
- One expansion slot.
- SNMP control and monitoring

1.3 DTV744 Specifications

Table 1: Technical Specifications

Characteristic	Specification
ENVIROMENTAL	
Use	Indoor
Altitude	Up to 2000 meters
Temperature Range	0° C to +50° C Operating -20° C to +70° C Storage
Cooling	Internal fan
Relative Humidity (max.)	80% for temperatures up to 31° C decreasing linearly to 50% relative humidity at 40° C.
INPUT AC POWER	
Voltage	90 to 132 Vac and 175 to 264 Vac
Frequency	50/60 Hz ± 2%
Power Consumption	<43 Watt
MECHANICAL	
Height	1 std. RU (1.75 inches nominal) (44.5 mm)
Width	EIA std. 19-inch mounting (482.6 mm)
Depth	13.5 inches (342.9 mm)
Weight	10.3 lb (4.67 kg)
Expansion Module Slots	1 - 2.5"W x 1.375"H x 7"D on rear panel
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

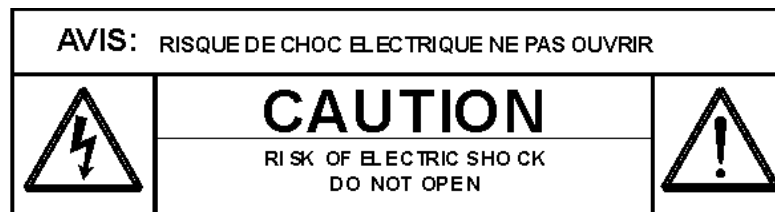
Table 1: Technical Specifications

Characteristic	Specification
ETHERNET PORT	
Physical Layer	10BaseT/100BaseT (twisted pair) on RJ-45 jack
Media Access and Link Layer	Per IEEE 802.3 (Ethernet)
SNMP 2c	MIB available (contact Customer Service, see page 41)
ALARM RELAYS	
Alarm Function	Contact closure for main power off, loss of input signal
Type	Form C, Normally Open and Normally Closed
Rating	30Vdc open circuit, 100 mA max current closed
EXPANSION MODULE SLOT	for future use

1.4 Safety Summary

The DTV744 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 DTV744:

Do not open the DTV744'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 DTV744 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 DTV744 may be connected to an Ethernet LAN.
LCD	Liquid crystal display; The front-panel text screen on your DTV744 is a liquid crystal display.
LED	Light-emitting diode; The front-panel indicator lights on your DTV744 are LEDs.
Mbps, kbps	Megabits per second or kilobits per second - units of data transport rate
MIB	Management Information Base - the database of object definitions
MPEG	Moving Picture Experts Group - refers to the method of video compression established by this group
NVRAM	Non-volatile memory; this memory is 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. This table 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
SNMP	Simple Network Management Protocol - A network protocol used to manage TCP/IP networks. This protocol provides functions that enable access to data objects whose definitions are located in the MIB.
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.

Chapter 2 Installation

This chapter provides instructions on unpacking, mounting, and connecting your DTV744 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 DTV744 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 DTV744.

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 DTV744 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 DTV744 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.

WARNING

Locate the DTV744 and its cables to avoid impacts, spills, and pulling cables and to ensure sufficient air flow. Failure to locate the DTV744 in a proper environment may result in damage to the equipment.

2.3 DTV744 Connections

Figure 2.1 DTV744 System Setup below shows placement of the DTV744 in a typical cable headend. Figure 2.2 DTV744 Rear Panel illustrates details of the DTV744's rear panel.

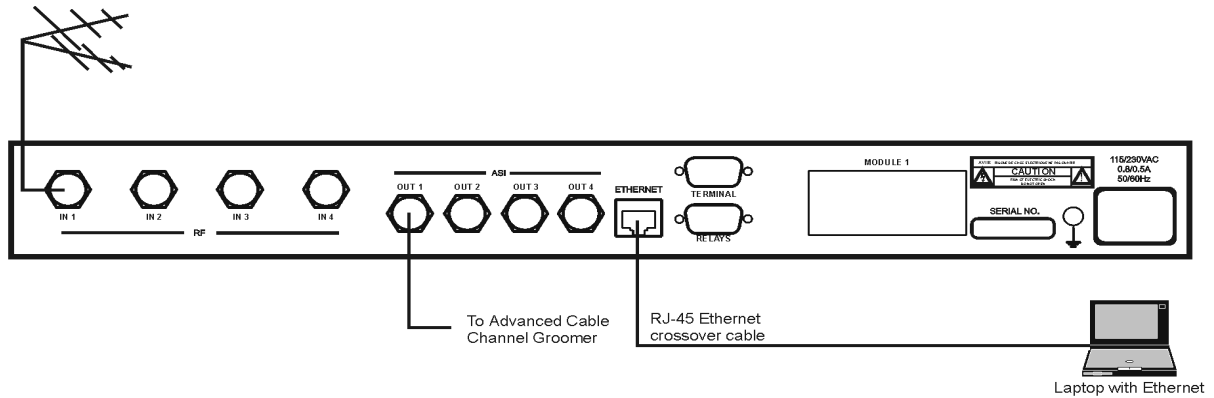


Figure 2.1 DTV744 System Setup

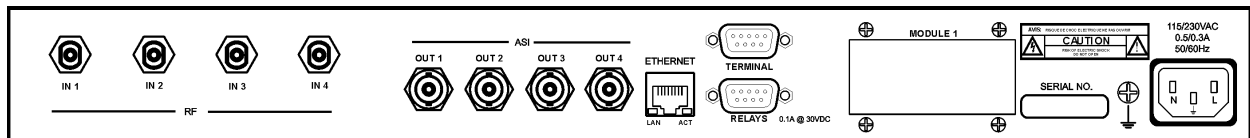


Figure 2.2 DTV744 Rear Panel

Before applying power, make the following connections to your DTV744 (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 RF signal from your antenna to one of the DTV744's RF IN ports (1, 2, 3, or 4).
- c) Connect your transmission or monitoring equipment to the ASI OUT 1, 2, 3, or 4 ports as desired.
- d) Connect your LAN line to the DTV744's Ethernet port.
- e) If desired, connect the Relays port to your equipment to provide contact closures during alarms.
- f) Finally, connect the supplied ac power cord to the DTV744's IEC receptacle and to a 90-to-132 Vac source.

Table 3: DTV744 Connector Details

Designation	Connector Type	Pin Number	Signal Name
115/230 Vac Power	Male IEC receptacle		AC LINE IN
RF In 1	female F		RF IN 1
RF In 2	female F		RF IN 2
RF In 3	female F		RF IN 3
RF In 4	female F		RF IN 4
ASI Out 1	female BNC	J4	ASI OUT 1
ASI Out 2	female BNC	J6	ASI OUT 2
ASI Out 3	female BNC	J8	ASI OUT 3
ASI Out 4	female BNC	J9	ASI OUT 4
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
Terminal	female 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)
Relays	female DB-9	1 2 3 4 5 6 7 8 9	Not used Not used WARNING COM ALARM COM GND Open on WARNING Open on ALARM Close on WARNING Close on ALARM

Ethernet An Ethernet 10BaseT/100BaseT port is included and, along with an HTML browser, is the primary user interface. The unit has an URL which is assigned via the front panel. The “home” page is then accessed by users via the Ethernet port. From this page, users can select desired channels and monitor unit status.

SNMP MIB is available. Contact Customer Service (see page 41) for assistance.

Terminal I/O The Terminal serial port is configured to 115.2k, N, 8, 1. The Terminal device is used for factory testing and debugging of the DTV744. This I/O is a basic, VT100-like emulation. User input text strings that are terminated in carriage-returns prompt all I/O. The terminal should be set to local echo ON because the DTV744 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 DTV744. The following sections address:

- Ethernet/Web Browser Setup
- DTV744 Controls and Indicators
- Front-panel Operation
- Initialization
- Transport Stream Processing
- Alarm/Warning System
- Software Upgrades

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 Setup

The DTV744'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 **Table 4: DTV744 IP Setup**). SNMP MIB is available. Contact Customer Service (see page 41) for assistance.

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 DTV744'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 DTV744 IP Setup as shown in Table 4. Addresses other than those listed may be used if they are compatible. Consult your network administrator if you have questions. Perform the PC IP Setup as shown in Table 5.

Table 4: DTV744 IP Setup

Parameter	Setting
IP Address	172.016.100.020
Netmask	255.255.000.000
Gateway	000.000.000.000

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 DTV744's Ethernet port to the LAN using a normal RJ-45 cable (8 pins). Set the DTV744 IP Address, Netmask, and Gateway as directed by your network administrator. Use any PC on the LAN to connect to the DTV744 using the web browser instructions below.

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

3.3 Web Browser Control

Getting Started

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 DTV744.
- 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 DTV744's front-panel, IP Address screen).

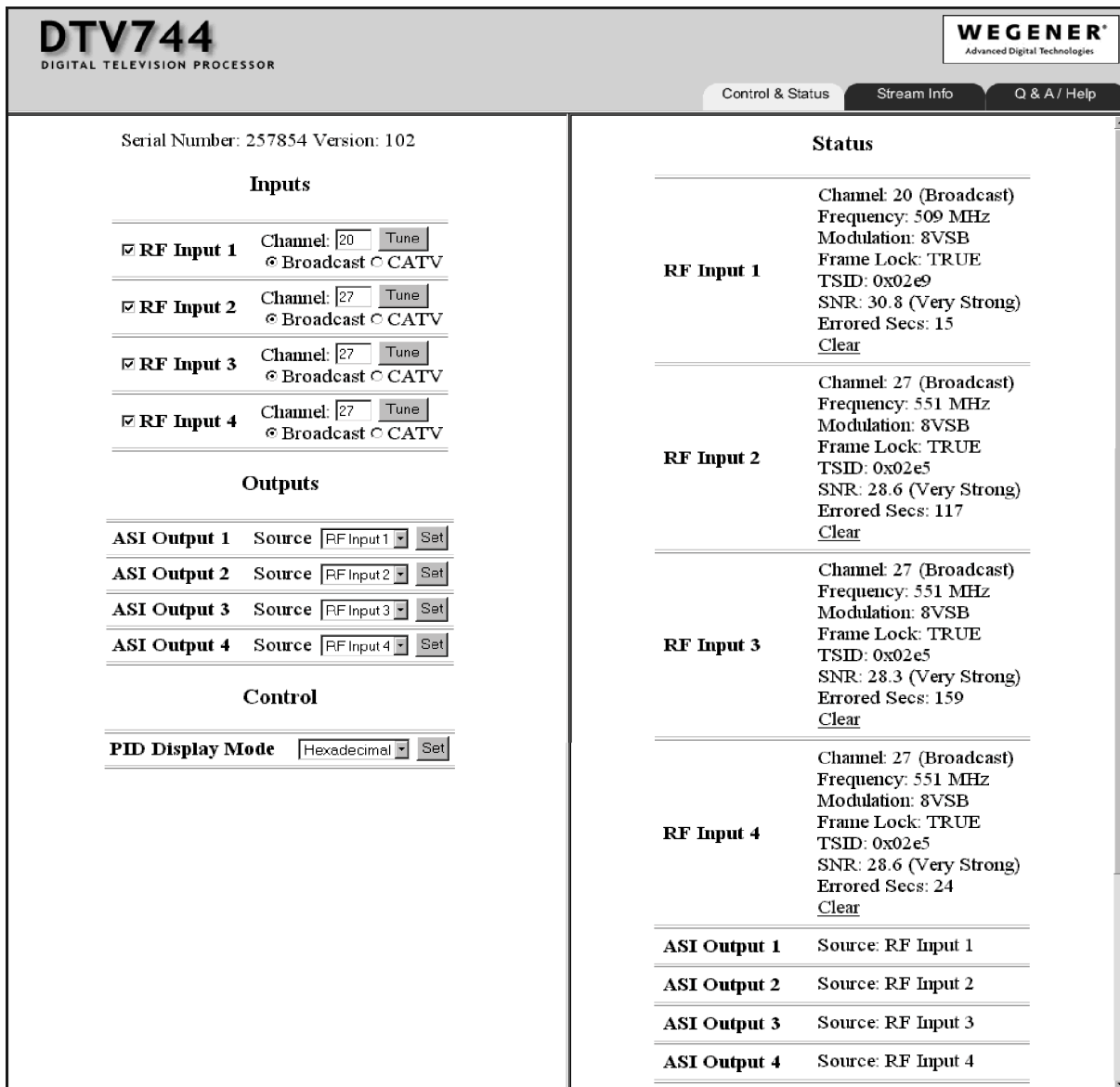
NOTE: For IP addresses which include subfields with leading zeros, you must omit those zeros when entering the address in your browser. For example, IP address 128.092.050.004 must be entered as 128.92.50.4.

The DTV744 Control and Status screen will appear. You may select either the Stream Info or Q&A/Help pages at any time by clicking their respective tabs at the top of the screen. Normally you will first select the Control & Status screen to select the input channels and the source for each output. Then select the Stream Info screen to verify data on all input and output streams.

Control and Status Page

Under the Inputs heading of the Control & Status page (in Figure 3.1 below), you may select the desired RF input video channels. Select the Broadcast radio button for off-air signals or the Cable radio button for cable television signals. Enter the channel number and click Tune. Under Outputs, you may select which RF input source supplies the stream for each ASI output. Choose the desired RF input from the drop down menu and click Set. Also on the left side of the page (under Control), you may select either Hexadecimal or Decimal Display Mode from the drop down menu and click Set to confirm.

The serial number of the DTV744 unit and the version number of the application software installed in the unit are shown at top left.



DTV744
DIGITAL TELEVISION PROCESSOR

Serial Number: 257854 Version: 102

Inputs

RF Input 1 Channel: 20 Tune
 Broadcast CATV

RF Input 2 Channel: 27 Tune
 Broadcast CATV

RF Input 3 Channel: 27 Tune
 Broadcast CATV

RF Input 4 Channel: 27 Tune
 Broadcast CATV

Outputs

ASI Output 1 Source RF Input 1 Set

ASI Output 2 Source RF Input 2 Set

ASI Output 3 Source RF Input 3 Set

ASI Output 4 Source RF Input 4 Set

Control

PID Display Mode Hexadecimal Set

Status

RF Input 1
 Channel: 20 (Broadcast)
 Frequency: 509 MHz
 Modulation: 8VSB
 Frame Lock: TRUE
 TSID: 0x02e9
 SNR: 30.8 (Very Strong)
 Errored Secs: 15
[Clear](#)

RF Input 2
 Channel: 27 (Broadcast)
 Frequency: 551 MHz
 Modulation: 8VSB
 Frame Lock: TRUE
 TSID: 0x02e5
 SNR: 28.6 (Very Strong)
 Errored Secs: 117
[Clear](#)

RF Input 3
 Channel: 27 (Broadcast)
 Frequency: 551 MHz
 Modulation: 8VSB
 Frame Lock: TRUE
 TSID: 0x02e5
 SNR: 28.3 (Very Strong)
 Errored Secs: 159
[Clear](#)

RF Input 4
 Channel: 27 (Broadcast)
 Frequency: 551 MHz
 Modulation: 8VSB
 Frame Lock: TRUE
 TSID: 0x02e5
 SNR: 28.6 (Very Strong)
 Errored Secs: 24
[Clear](#)

ASI Output 1 Source: RF Input 1

ASI Output 2 Source: RF Input 2

ASI Output 3 Source: RF Input 3

ASI Output 4 Source: RF Input 4

Figure 3.1 Control & Status Page

The Status section on the right side of the page provides the status of each input and output signal. The status information is periodically updated automatically. Received signal parameters are labeled RF Input 1 through RF Input 4. These reports include frame lock status (true or false), signal-to-noise ratio (SNR in dB), errored seconds, and signal strength quality. ASI Output 1 through ASI Output 4 show which tuner is present on each of the ASI outputs. Any active alarms or warnings are displayed in red text beneath the status of the affected RF input.

Acquiring Broadcast ATSC Signals

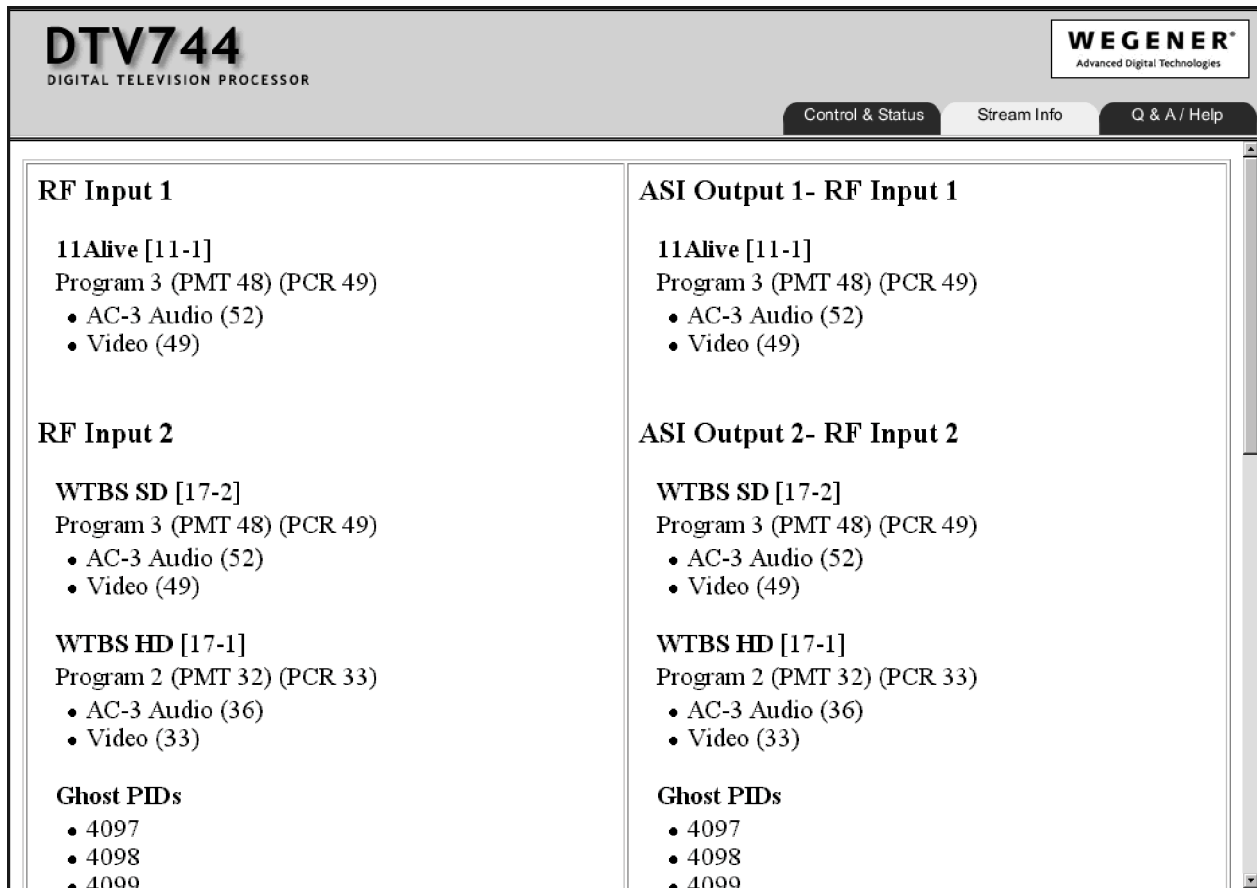
As with the traditional television broadcast, you will need a good-quality outdoor antenna pointed toward the transmitter. With the antenna correctly positioned and the cable connected to the DTV744's RF input, select the channel number on the front panel or via the web interface. Note that this is the 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. Adjust 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 may be experiencing multipath reception which is the reception of the direct signal plus a strong reflection. Rotating the antenna away from the interfering signal may solve this problem.

Stream Information Page

The Stream Info screen (Figure 3.2 below) displays complete data on each input and output stream. The left side shows the program streams contained in each RF input. The first item shown for each input is the short name and the major and minor channel numbers of the signal. Because a transport stream signal may contain more than one program, information on all programs in each RF input is given. The program number and the PID numbers of the PMT and PCR is shown for each program. This is followed by the PID numbers of all video, audio, and data PIDs in the stream. PIDs that are not included in the PMT are listed as Ghost PIDs. Note that channel and program numbers are always in decimal notation while PID numbers are shown either as decimal or hexadecimal depending on your selection on the Control & Status page. Decimal numbers are indicated as 123 while hexadecimal numbers are indicated as 0x123. The right side of the page shows the programs contained in each of the ASI output streams.



DTV744
DIGITAL TELEVISION PROCESSOR

WEGENER
Advanced Digital Technologies

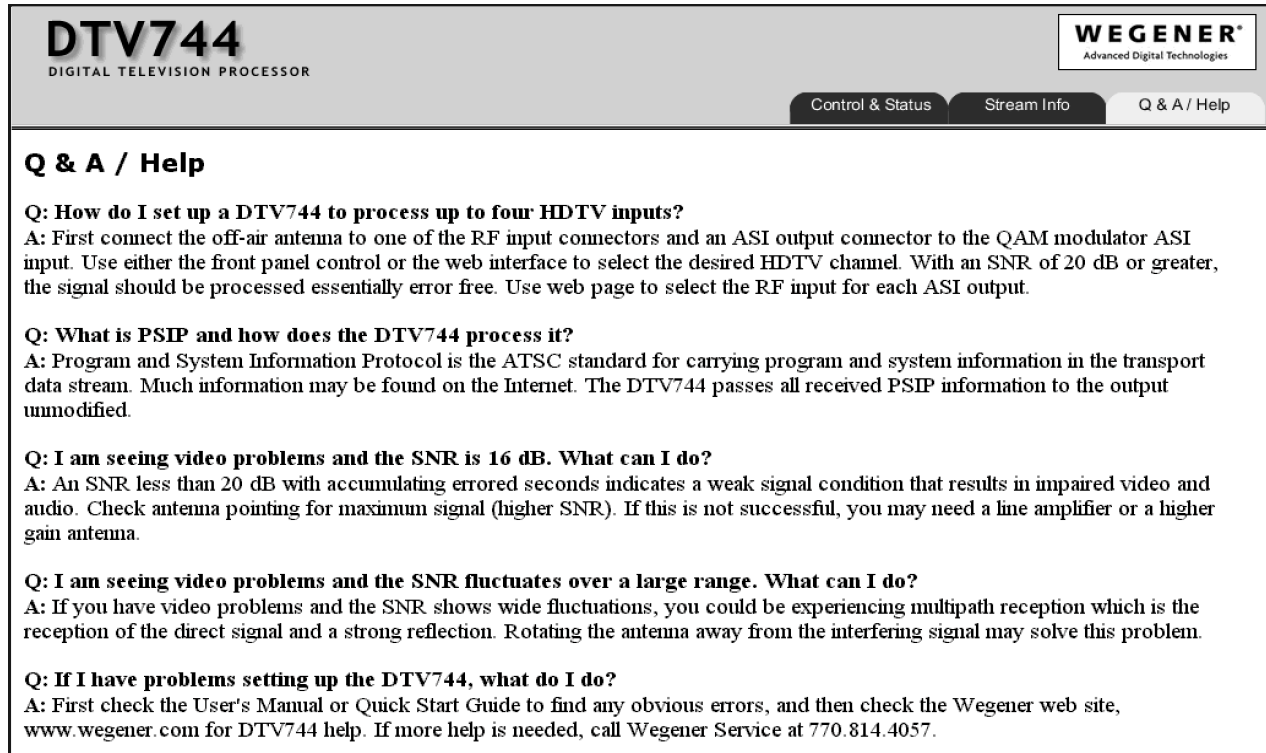
Control & Status Stream Info Q & A / Help

RF Input 1	ASI Output 1- RF Input 1
11Alive [11-1] Program 3 (PMT 48) (PCR 49) <ul style="list-style-type: none"> • AC-3 Audio (52) • Video (49) 	11Alive [11-1] Program 3 (PMT 48) (PCR 49) <ul style="list-style-type: none"> • AC-3 Audio (52) • Video (49)
RF Input 2	ASI Output 2- RF Input 2
WTBS SD [17-2] Program 3 (PMT 48) (PCR 49) <ul style="list-style-type: none"> • AC-3 Audio (52) • Video (49) 	WTBS SD [17-2] Program 3 (PMT 48) (PCR 49) <ul style="list-style-type: none"> • AC-3 Audio (52) • Video (49)
WTBS HD [17-1] Program 2 (PMT 32) (PCR 33) <ul style="list-style-type: none"> • AC-3 Audio (36) • Video (33) 	WTBS HD [17-1] Program 2 (PMT 32) (PCR 33) <ul style="list-style-type: none"> • AC-3 Audio (36) • Video (33)
Ghost PIDs <ul style="list-style-type: none"> • 4097 • 4098 • 4099 	Ghost PIDs <ul style="list-style-type: none"> • 4097 • 4098 • 4099

Figure 3.2 Stream Info Page

**Q&A/Help
Page**

A list of questions and answers about operating your DTV744 is available on the Q&A/Help page (Figure 3.3 below). Click the Q&A/Help tab to display this page.



The screenshot shows the DTV744 web interface. At the top left, it says "DTV744 DIGITAL TELEVISION PROCESSOR". At the top right, there is a "WEGENER" logo with "Advanced Digital Technologies" underneath. Below the logo are three tabs: "Control & Status", "Stream Info", and "Q & A / Help", with the last one being selected. The main content area is titled "Q & A / Help" and contains several Q&A pairs:

Q: How do I set up a DTV744 to process up to four HDTV inputs?
A: First connect the off-air antenna to one of the RF input connectors and an ASI output connector to the QAM modulator ASI input. Use either the front panel control or the web interface to select the desired HDTV channel. With an SNR of 20 dB or greater, the signal should be processed essentially error free. Use web page to select the RF input for each ASI output.

Q: What is PSIP and how does the DTV744 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. The DTV744 passes all received PSIP information to the output unmodified.

Q: I am seeing video problems and the SNR is 16 dB. What can I do?
A: 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.

Q: I am seeing video problems and the SNR fluctuates over a large range. What can I do?
A: 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.

Q: If I have problems setting up the DTV744, what do I do?
A: First check the User's Manual or Quick Start Guide to find any obvious errors, and then check the Wegener web site, www.wegener.com for DTV744 help. If more help is needed, call Wegener Service at 770.814.4057.

Figure 3.3 Q&A/Help Page

3.4 DTV744 Controls and Indicators

There are three major parts of your DTV744'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 through the front panel (shown below in Figure 3.4).

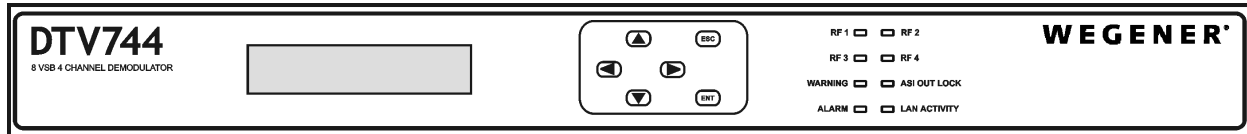


Figure 3.4 DTV744 Front Panel

Liquid-crystal Display(LCD)

The DTV744's 2-line by 20-character LCD indicates unit status and prompts for and reflects user input. Here, you will see the DTV744's "home screen" (the default LCD screen, see Figure 3.5 below) which rotates through data from each of the four RF inputs. The channel number, modulation type (8VSB, 64QAM, or 256QAM), signal-to-noise ratio, and errored seconds are displayed for each input.

No matter which LCD screen is currently displayed, after five minutes with no front-panel key presses, the LCD reverts to this "home screen". Pressing the **ESC** button repeatedly also returns the display to the home screen from any place in the screen hierarchy. From the 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 DTV744's various screens and edit input fields (see **3.5 Front-panel Operation** on page 26).

```
RF3 CHAN:20  8VSB
SNR21.5 ErrSec:0002
```

Figure 3.5 Home Screen Example

Push buttons The six push buttons (shown below in Figure 3.6) are your means of commanding the DTV744 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 DTV744. 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.

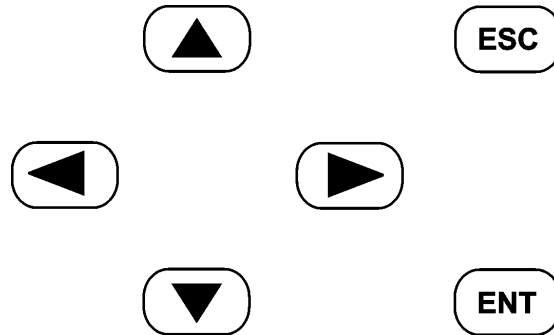


Figure 3.6 DTV744 Push Buttons

Front-panel LED Indicators

Figure 3.7 below shows the eight light-emitting diodes (LEDs) that provide status information about your DTV744 and its processes. **Table 6: LED Indicator Descriptions** on page 25 provides the meaning of the color and state of each LED.

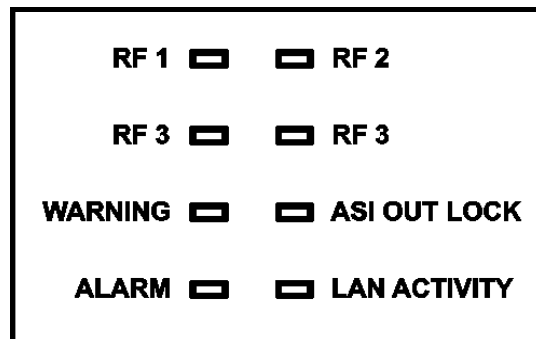


Figure 3.7 DTV744 LED Indicators

Table 6: LED Indicator Descriptions

Indicator Label and Color	Indicator State	Indicator Meaning
RF IN 1	Constant	RF input 1 locked
GREEN	Off	RF input 1 not locked
RF IN 2	Constant	RF input 2 locked
GREEN	Off	RF input 2 not locked
RF IN 3	Constant	RF input 3 locked
GREEN	Off	RF input 3 not locked
RF IN 4	Constant	RF input 4 locked
GREEN	Off	RF input 4 not locked
WARNING	Constant	Warning condition(s) exists
YELLOW	Off	No Warning condition exists
ASI OUTPUT	Constant	ASI Output is active
GREEN	Off	ASI Output is inactive
ALARM	Constant	Alarm condition(s) exists
RED	Off	No Alarm condition exists
LAN ACTIVITY	Flash	LAN activity present. Only lights when unit receives parameter-change commands. This is not a continuous monitor of LAN communications.
GREEN	Off	Not receiving parameter-change commands

Rear-panel Indicators

Two LED indicators on the rear panel give Ethernet status:

ACT – Amber LED: flashes to indicate LAN activity.

LAN – Green LED: ON for 100baseT, OFF for 10baseT.

3.5 Front-panel Operation

The DTV744 may be set up and controlled from the front panel as follows:

NOTE: From any screen, pressing the **ESC** key twice will return you to the Home Screen.

Home screen The Home screen alternates between the following four screens every four seconds:

(A)

```
RF1 CHAN:39 8VSB
SNR28.4 ErrSec:0008
```

(B)

```
RF2 CHAN:43 8VSB
SNR23.6 ErrSec:0038
```

(C)

```
RF3 CHAN:27 8VSB
SNR25.1 ErrSec:0005
```

(D)

```
RF4 CHAN:19 8VSB
SNR27.7 ErrSec:0002
```

For disabled RF inputs (RF 2 in this example), the home screen will appear as follows:

```
RF2 Disabled
```

Press the **ENT** key to view the unit's serial number and software version.
Press the right arrow key (▶) to go to the Alarms/Warning screen.

Second-level Screen

```
S/N: XXXXXX
VER: YYY
```

Where **XXXXXX** is the unit's six-digit serial number and **YYY** is the version number of the unit's currently installed application software.

Press the **ESC** key to return to the Home Screen.

Alarms/ Warnings screen

View Alarms/Warnings

Press the **ENT** key to view any active alarms or warnings on the second-level Alarms/Warnings Message screen.

Press the **▶** key to go to Clear Errored Seconds (if counter is non-zero) or Program Setup.

Press the **ESC** key to go to the Home Screen.

Second-level Screen

Alarms/Warnings Message Screen

No Alarms or Warning

Any active alarms or warnings are described here.

Press the **▶** key to view the next alarm or warning (if more than one).

Press the **ESC** key to return to the Alarms/Warnings screen.

Clear Errored Seconds screen

Clear Errored Secs
Press<ENT>

This screen only appears if the errored seconds counter is non-zero. Otherwise the next screen, Program Setup is displayed.

Press the **ENT** to clear the errored seconds counter.

Press the **▶** key to go to the Input Setup screen.

Press the **◀** key to go to Alarms/Warnings.

Press the **ESC** key to go to the Home Screen.

Input Setup screen

Input Setup...

Press the **ENT** key to go to the second-level RF Input screens.

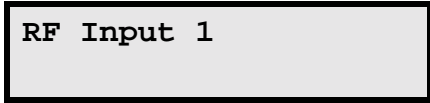
Press the **▶** key to go to the Program Status Screen.

Press the **◀** key to go to Clear Errored Seconds.

Press the **ESC** key to go to the Home Screen.

Second-level screens

2nd-level RF Input Screen



RF Input 1

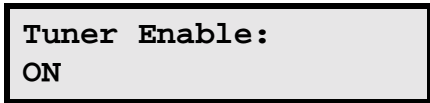
Press **ENT** to go to the three 3rd-level input setup screens: Tuner Enable (set to ON or OFF), Channel Number (set number), and RF Standard (set to Cable or Broadcast).

Press the **▶** key to go to the next RF Input.

Press the **ESC** key to return to the Input Setup screen.

Third-level screens

3rd-level Tuner Enable Screen



Tuner Enable:
ON

Press **ENT** to enable or disable the RF tuner by selecting ON or OFF.

Press the **▶** key to go to the Channel Number screen.

Press the **ESC** key to return to the second-level Input Setup screen.

3rd-level Channel Number Selection Screen



Channel Number : 27

Press **ENT** to enter the edit mode and change the channel number.

Press the **ENT** key to confirm your entry or **ESC** to cancel changes.

Press the **▶** key to go to the RF Standard screen.

Press the **◀** key to go to Tuner Enable.

Press the **ESC** key to return to the second-level Input Setup screen.

3rd-level RF Standard Screen



RF Standard:
Broadcast

Press the **ENT** key and then the **▲** or **▼** key to select Broadcast or Cable.

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

Press the **◀** key to go to Channel Number.

Press the **ESC** key to return to the second-level Input Setup screen.

Program Status screen

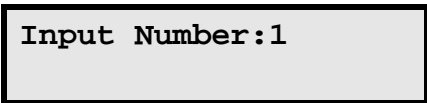


Program Status...

Press the **ENT** key to view the second-level program status screens.
 Press the **▶** key to go to Panel Help Timeout.
 Press the **◀** key to go to Program Setup.
 Press the **ESC** key to go to the Home Screen.

Second-level screens

2nd-level Program Status Screen

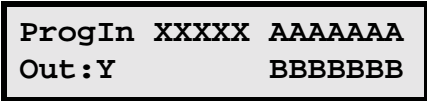


Input Number:1

Press the **ENT** key to view the third-level program status screen.
 Press the **▶** key to go to the next input.
 Press the **ESC** key to return to the Program Status screen.

Third-level screens

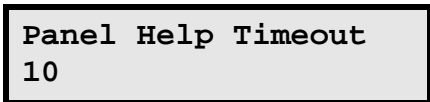
3rd-level Program Status Screen



ProgIn XXXXX AAAAAAA
 Out:Y BBBBBBB

where **XXXXX** is the program number at input, **AAAAAAA** is the service descriptor for the program, **Y** is the ASI output port, and **BBBBBBB** is the available audio on the input for the program (AC-3, MPEG, or MPG/AC3).
 Press the **ESC** key to return to the Program Status screen.


Front Panel Help Timeout screen



Panel Help Timeout
 10

Press the **ENT** key and then the **▲** or **▼** key to select the front-panel help message timeout. Values of **3**, **5**, **10**, **30**, or **60** seconds, or **No Timeout** may be selected.
 Press the **ENT** key to confirm the selection or **ESC** to cancel changes.
 Press the **▶** key to go to IP Setup.
 Press the **◀** key to go to Program Status.
 Press the **ESC** key to go to the Home Screen.

IP Setup screen




```
IP Setup...
Select? Press<ENT>
```

Press the **ENT** key to go to IP Address Selection.
Press the **▶** key to go to Reset Unit Screen.
Press the **◀** key to go to Front Panel Timeout.
Press the **ESC** key to go to the Home Screen.

Second-level screens

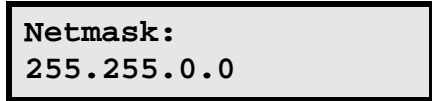
IP Address Selection Screen



```
IP Address:
0.0.0.0
```

Press the **ENT** key and then press the arrow keys to change the IP address.
Press the **ENT** key to confirm the selection or **ESC** to cancel changes.
Press the **▶** key to go to Netmask Selection.
Press the **ESC** key to go to IP Setup.


Netmask Selection Screen



```
Netmask:
255.255.0.0
```

Press the **ENT** key and then press the arrow keys to change the Netmask.
Press the **ENT** key to confirm the selection or **ESC** to cancel changes.
Press the **▶** key to go to Gateway Selection.
Press the **◀** key to go to IP Address Select.
Press the **ESC** key to go to IP Setup.

Gateway Selection Screen



```
Gateway:
0.0.0.0
```

Press the **ENT** key and then press the arrow keys to change the Gateway.
Press the **ENT** key to confirm the selection or **ESC** to cancel changes.
Press the **◀** key to go to Netmask Selection.
Press the **ESC** key to go to IP Setup.

Reset unit screen



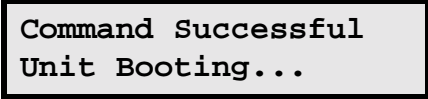
Reset Unit...

Press the **ENT** key to reset the unit and start the boot loader.

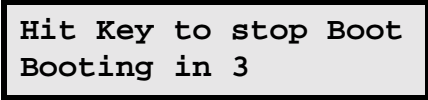
Press the **◀** key to go to IP Setup.

Press the **ESC** key or **▶** to go to the Home Screen.

If **ENT** is pressed, the following screens appear:

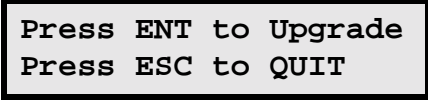


Command Successful
Unit Booting...



Hit Key to stop Boot
Booting in 3

Allow the unit to boot or press the **▼** key to stop the boot process for a software upgrade (see **3.9 Software Upgrades** on page 34) and the following screen appears:



Press **ENT** to Upgrade
Press **ESC** to QUIT

Press **ENT** to enable a TFTP through Ethernet software upgrade.

Press **ESC** to quit and continue booting.

Unit Shutdown

Simply remove power to the unit to shut down your DTV744. No special procedure is required.

3.6 Initialization

Software Code Structure The DTV744 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.

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 **3.9 Software Upgrades** on page 34 for instructions on putting the DTV744 into serial command mode.) During boot-up, the following screens appear in sequence on the LCD:

FPCon v001	All front-panel LEDs light are OFF during boot process.
Hit key to stop boot Booting in 2	
Booting System... Bootloader Ver 103	
Done Booting Bootloader Ver 103	

Following normal boot-up, the "home" screen will appear as described in section **3.5 Front-panel Operation** on page 26 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. Call Wegener Customer Service.

3.7 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 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 DTV744 has four RF ATSC inputs which the unit processes. Programs are passed through to the selected ASI output. An RF input may be routed to one or more ASI outputs. However, an ASI output may only receive signals from a single RF input.

PSIP Structure and Program Selection

Within the transport stream there are PIDs carrying tabular information on that stream. The PAT describes all the programs available. A 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 circuit then extracts the PAT and PMT information and provides this information to the user via the Stream Info page of the web interface. All PIDs (including PSIP information) on the carrier are passed through to the ASI output.

3.8 Alarm/Warning System

The alarm and warning system is intended to provide indications to the local user of a critical failure or imminent failure. See **Table 6: LED Indicator Descriptions** on page 25 for actual indications.

Alarm conditions

Generally, if the unit is unable (or presumed to be unable) to present output from a 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. All inputs missing - no RF input signal detected.
2. RF missing - no RF signal at one or more enabled inputs.
3. RF n PAT missing - PAT missing in a specific RF input stream (RF input port **n**).

Warning conditions

The DTV744 presents the following warnings when an input transport stream is missing needed information.

1. PCR missing – An input transport stream does not include a PCR (program clock reference).
2. PMT missing - An input transport stream does not include a PMT (program map table).

3.9 Software Upgrades

You may upload application software upgrades to your DTV744 in the field using either of the Ethernet or serial ports. Follow the respective procedure below.

Ethernet transfer

- a) Connect the PC holding the software upgrade directly to the DTV744 using a LAN crossover cable. (Do not connect over your network.)
- b) Set the PC's IP address to 172.16.90.201 and the subnet mask to 255.255.0.0. (Go to the PC's Control Panel and select the Network icon. Then select the configuration tab and TCP/IP Properties. Under Properties, choose "specify an IP address" and set the addresses indicated above.)
- c) Place the new application code (dtv744.cf) in a separate folder specifically for this purpose. (Note that only one copy of the DTV744.cf file is allowed in this directory. If you have a new code revision, DTV744_102.cf for example, first delete the current copy of DTV744.cf. Then make a copy DTV744_102.cf in the same folder. The copy will be named "copy of DTV744_102.cf". Rename the copy "DTV744.cf". This is the file that will be loaded into the DTV744 unit.)
- d) Start and setup the TFTP32.exe program on the PC (TFTP32.exe is available at www.tftpd32.jounin.net).

1. Run TFTP32.exe

2. When the window opens, set the indicated items as follows:

Current Directory: (Set to the directory where you placed the application code DTV744.cf in step c. above.)

Server interfaces: 172.16.90.201

Settings:

Global settings: TFTP Server on, TFTP Client off, Syslog Server on, DHCP Server on

TFTP Security: Standard

TFTP Configuration: Timeout 3, Max Retransmit 6, Tftp port 69

Advanced TFTP Options: Option negotiation on, Show Progress bar on, others off

DHCP server tab: (Press Save after each selection)

IP pool starting address: 172.16.90.202

Size of pool: 52

Boot File: dtv744.cf

WINS/DNS Server: 0.0.0.0

Default router: 0.0.0.0

Mask: 172.16.0.0

- c) Power up (or select Reset Unit from the front panel) the DTV744 and press and hold the down arrow (▼) *immediately* to interrupt the Boot Loader (see **Reset unit screen** on page 31 for front-panel details).
- d) Press **ENT** to upgrade or **ESC** to quit and boot with existing application.
- e) Watch progress of file transfer by selecting the Tftp server tab on TFTP32. (The DTV744 will automatically restart when the transfer is completed.)

Serial port transfer

To perform a serial download via the DTV744 bootloader, perform the following steps:

- a) Connect an RS-232 serial cable from your PC's COM1 port to the top DB-9 connector on the rear panel of the DTV744.
- b) Set up the serial console on the PC to connect to the COM port at 115,200 bps. (The console must be able to send binary files. Some versions of Hyperterminal will not send binary files. A program named Tera Term will send the binary files and is available at no charge on the Internet.)
- c) Power on DTV744 and press any key on your PC to stop the autoboot when prompted. (You should see the DTV744 > prompt on your PC. If this prompt is not seen, check your connections and the serial console settings.)
- d) Type 'loadr' to load an image file.
- e) Have the serial console send the image across as binary text (not a file transfer such as X-Modem). If using Tera Term, select send file and check the binary checkbox.
- f) The file to send is the latest version of the DTV744.cf file. (Using serial port transfer, you may select the DTV744_XXX.cf file without renaming it to DTV744.cf.)
- g) After the file transfer completes, type 'imcopy f0040000' to copy the image into flash. (Be sure to type numerical zeros and not the letter O for this command.)
- h) Type 'bootm' to boot the machine. The image is in flash and the DTV744 will autoboot from now on with the new image.
- i) You may now remove the cable from the DTV744 serial port.

This page intentionally blank

Chapter 4 Maintenance and Troubleshooting

4.1 Maintenance

Maintenance of the DTV744 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 DTV744 incorporates security labels over some of the screws. There are no user-serviceable components within the DTV744. 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 41, with any problems you cannot resolve independently.

If you are experiencing any difficulties, first check the LCD and LED indicators on the DTV744 to determine if any warnings or alarms are active. See **Table 6: LED Indicator Descriptions** on page 25 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.

4.3 Alarms and Warnings

In the following sections, LEDs are illustrated as black (off) or white (on) to represent actual LED appearance.

 = LED Off

 = LED On

Alarms and warnings may also be viewed on the front-panel LCD and through the web interface (see **3.3 Web Browser Control** and **3.5 Front-panel Operation** in Chapter 3 of this manual).

Normal operation

RF Input and ASI Output Locked - The LEDs are shown here reflecting the DTV744 in normal operation with no Alarms (more than one RF input may be locked):

RF 1   RF 2

RF 3   RF 4


WARNING   ASI OUT LOCK

ALARM   LAN ACTIVITY

ALARM: All inputs missing

Video is lost when incoming signal is lost. The ALARM LED lights if all RF inputs are missing. When no RF LEDs are active (unlit as shown below), all RF input has been lost. Check antenna and RF input connections.

RF 1   RF 2

RF 3   RF 4

WARNING   ASI OUT LOCK

ALARM   LAN ACTIVITY

**ALARM:
RF missing**

The ALARM LED lights if input from any enabled RF input is missing. When the RF LED for one or more enabled input ports are inactive (for example, the RF 2 LED is unlit when all four RF inputs are enabled), an RF input is missing. Verify whether or not the affected port should be enabled and check antenna and RF input connections for the affected port.

RF 1   RF 2

RF 3   RF 4

WARNING   ASI OUT LOCK

ALARM   LAN ACTIVITY

**ALARM:
RF n PAT
missing**

Video and audio may be faulty or missing when the incoming signal is missing the PAT. The ALARM LED lights when the PAT is missing from the transport stream at RF input *n* (where *n* is the RF input port number). Check with the service provider to ensure that the source is correct.

RF 1   RF 2

RF 3   RF 4

WARNING   ASI OUT LOCK

ALARM   LAN ACTIVITY

**WARNING:
PCR missing**

Video/audio timing is lost when the incoming signal is missing the PCR. When the WARNING LED is lit and at least one RF Lock and the ASI OUT LOCK LEDs are lit, then the transport stream does not have sufficient PSI information included. Check with the service provider to ensure that the source is correct.

RF 1   RF 2

RF 3   RF 4

WARNING   ASI OUT LOCK

ALARM   LAN ACTIVITY

WARNING: Video and audio may be faulty or missing when the incoming signal is missing the PMT. When the **WARNING LED** is lit and at least one **RF Lock** and the **ASI OUT LOCK LEDs** are lit, then the transport stream does not have sufficient PSI information included. Check with the service provider to ensure that the source is correct.

RF 1   **RF 2**

RF 3   **RF 4**

WARNING   **ASI OUT LOCK**

ALARM   **LAN ACTIVITY**

4.4 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 Setup” on page 17.)

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.

Chapter 5 Customer Service

5.1 Warranty

The following warranty applies to all Wegener Communications products including the DTV744 8 VSB 4-Channel Demodulator:

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 DTV744, 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 DTV744.

This page intentionally blank