



INSTRUCTION MANUAL

UNITYMUX 4025

MULTIPLEXER

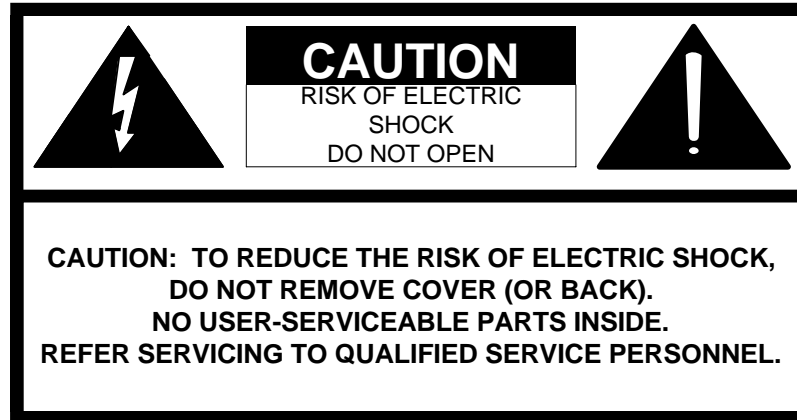
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In all correspondence with Wegener Communications, Inc., regarding this publication, please refer to UMX4025-001C.

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CAUTION

As this unit is intended to interface with other electrical/electronic systems, proper engineering practices must be adhered to during installation and check-out.

All AC power and ground must be installed in accordance with National Electric Code Standards as to conductor size and limitations (see NFPA 70, articles 200-280, as amended, if required), and lightning protection must be provided.

All RF interconnections must be properly shielded to prevent ingress or egression of potential interfering sources to existing services.

Any damage to this unit caused by improper wiring/interconnections will void any warranty extended.

WARRANTY

The following warranty applies to all Wegener Communications products.

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.

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ABOUT THIS MANUAL

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If viewing the electronic version, we recommend you safeguard the original to avoid the effects of somehow altering your master copy.

1. Cross-references

Cross-references are internally linked for easy access. If you are viewing the electronic version of this manual, and see text that is blue and underlined, such as ([TABLE OF CONTENTS](#)) you can “click” your mouse on that text and “link” to that section.

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2. Table of contents

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SECTION 1 GENERAL INFORMATION

1.1 INTRODUCTION

The purpose of this manual is to describe the proper installation and operation of the Wegener Communications Unitymux 4025 Multiplexer.

1.2 UNPACKING AND INSPECTION

Carefully unpack the unit and inspect it 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 have to return the units for repair at some later date. Packing these units in other containers in such a way that they are damaged will void your warranty.

1.3 PHYSICAL ENVIRONMENT

Mount the Unitymux 4025 in a clean, dry environment, and do not place unsupported equipment on the unit. Make sure that total rack or breaker power consumption does not exceed the limits of the AC branch circuit, and that a reliable earth safety ground is maintained. The unit will meet the full 10-40°C operating temperature specification only if adequate clearance around vent-holes is provided. The operating temperature of the Mux is +10°C to +40°C in still air with *unblocked* front, rear, and side vents. (The unit is fan-cooled.) The units may be arranged without empty space between them, so long as enough rack ventilation is provided to prevent severe heat buildup.

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

1.3.1 Elevated Operating Ambient

If equipment is installed in a closed or multi-unit rack assembly, the operating ambient of the rack may be greater than the room ambient. Therefore, considerations should be given to the TMRA, or Temperature inside the Mounting Rack, and not just inside the room.

1.3.2 Reduced Air Flow

Installation of the equipment in a rack should be such that the amount of airflow required for safe operation of the equipment is not compromised.

1.3.3 Mechanical Loading

Mounting of equipment in a rack should be such that a hazardous condition is not achieved due to uneven loading. This unit weighs almost 80 pounds. Make sure there are enough people to lift it safely into position.

1.3.4 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. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

1.3.5 Reliable Earthing

Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connection to the Branch (use of power strips).

1.3.6 Rack Installation

Because of its weight (<80 Lb.) it is essential that the unit be supported by angle brackets or cross supports. These should be screwed or bolted securely to the equipment rack, and be capable of holding 80 Lb. If you have doubts as to how to support the unit, call Wegener Communications Customer Support at the address shown in Section [1.5](#), (Page 13). If you cannot do that, consult your supervisor or other higher authority. Do NOT install the unit if you have doubts about the unit being safely supported. See the Warning Below.

There are also 4 holes in the front brackets, which are designed to accept screws for further anchoring. It is also essential that these brackets be used so the unit cannot be moved forward and fall from the rack.

For a unit of this size and weight, it is **always** best to install the angle brackets or cross-members before setting the unit in place. Then, prior to installing cables, put anchored screws or bolts and nuts into place on the front brackets. Failure to do this can lead to pushing the unit out the front of the rack in later steps.

***** WARNING *****

Properly support the unit and secure it in place. Failure to do so can lead to serious injury and damage to the unit.

1.4 CONNECTING POWER TO THE UNIT

Before connecting power to the unit, check the power selector/indicators for both power supplies. To do this, follow these instructions. Also, see Section [4.2.1](#) (Page 31).

1. Open the front panel access door.
2. Look at the red selector/indicator switch to ensure the voltage showing (115 or 230) matches the supply voltage to be connected to the unit.
3. If the two-position switch does not indicate the proper voltage, slide it to the other position. The voltage shown should then match the input voltage.
4. Check the other power supply as in Steps 2 and 3 above.

1.5 PHYSICAL SPECIFICATIONS

Table 1. Physical Specifications

Parameter	Description
Size	19" W x 8.5" H x 27" D (48.3 Cm Wide x 21.6 Cm High x 68.6 Cm Deep)
Weight	< 80 Pounds (36.4 Kg)
Operating Temperature	+5°C to +40°C in still air
Storage Temperature	- 20°C to +60°C
Altitude	Sea level to 6562 feet (2000 Meters) above sea level
Humidity	Maximum relative humidity 80% for temperatures up to 31°C, decreasing linearly to 50% at 40°C
Power Requirements	115/230VAC, 6/3.5A, 60/50Hz

1.6 TECHNICAL SUPPORT

In the event the unit fails to perform as described, contact Wegener Communications Customer Service at (770) 814-4057, FAX (678) 624-0294, or E-mail “service@wegener.com”. For a complete list of [SERVICE](#) addresses, see the back cover of this manual (Page [50](#)).

To return a product for service:

Obtain a Return Material Authorization (RMA) number by completing and faxing a copy of the [RMA REQUEST FORM](#) (Page 47) to (678) 624-0294. You may E-mail it instead to:

service@wegener.com

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.

Return the product, freight prepaid, to the address below:

Service Department RMA# _____
Wegener Communications, Inc.
11350 Technology Circle
Duluth, GA 30097

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 regarding service procedures.

1.7 MANUALS

If you have any suggestions concerning this, or any Wegener Manual, please E-mail them to manuals@wegener.com. If you would rather mail them, please do so to the address shown below.

If you have substantial or complex changes, our preference is that you copy the page(s) in question, mark it up, and fax or mail us the copy. We do appreciate constructive criticism.

Fax Number: (770) 497-0411

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

SECTION 2 SYSTEM CONFIGURATION

2.1 UNIT OVERVIEW

A block diagram of the Unitymux 4025 is shown in [Figure 1](#) (Page 16). The System Controller is a single board computer using a Pentium II MMX processor. It provides user interface and system configuration, and is referred to as the host processor. The System Controller is the primary interface to the user. The Multiplexer/Transport Output Board (MTOB) fetches data from data input boards, provides system timing, creates MPEG Transport Stream (TS) serial data signal, and outputs this signal to the associated transmission system. Multiple Audio/Synchronous/Asynchronous Boards (ASAB) are used to accept input data that are assembled into MPEG packets, which are accessed and transmitted by the MTOB. All these boards are assembled in a chassis that includes a PCI Local Bus Revision 2.1 back plane.

2.2 CHASSIS

The chassis is an industrial grade, PCI-compatible, computer chassis. Ten PCI slots are available for add-in boards with the system processor in a separate slot.

2.2.1 Cooling Fans

The chassis also contains three cooling fans, two of which are always on. The third (center) one is coupled to an over-temperature alarm. When the temperature reaches a pre-set point, an audio alarm sounds, an LED on the front panel illuminates, and the center fan turns “ON.” See “Thermal Alarm Board” in Section [4.2.2](#) (Page 32).

If it becomes necessary to remove a fan, the main power ON/OFF switch should ALWAYS be turned to OFF (O) before unplugging it. This is because it may be possible to unplug the ground connection before the “Hot” connection. In this circumstance, harmful voltages could be present on the metal case of the fan or unit. Serious injury or damage to equipment could result.

There is a cooling fan switch located between the speaker and the fans. This switch should always be left in the ON (I) position.

***** WARNING *****

Always disconnect power to the unit before working on or removing a fan.
Hazardous voltages may cause serious injury if power is NOT disconnected.

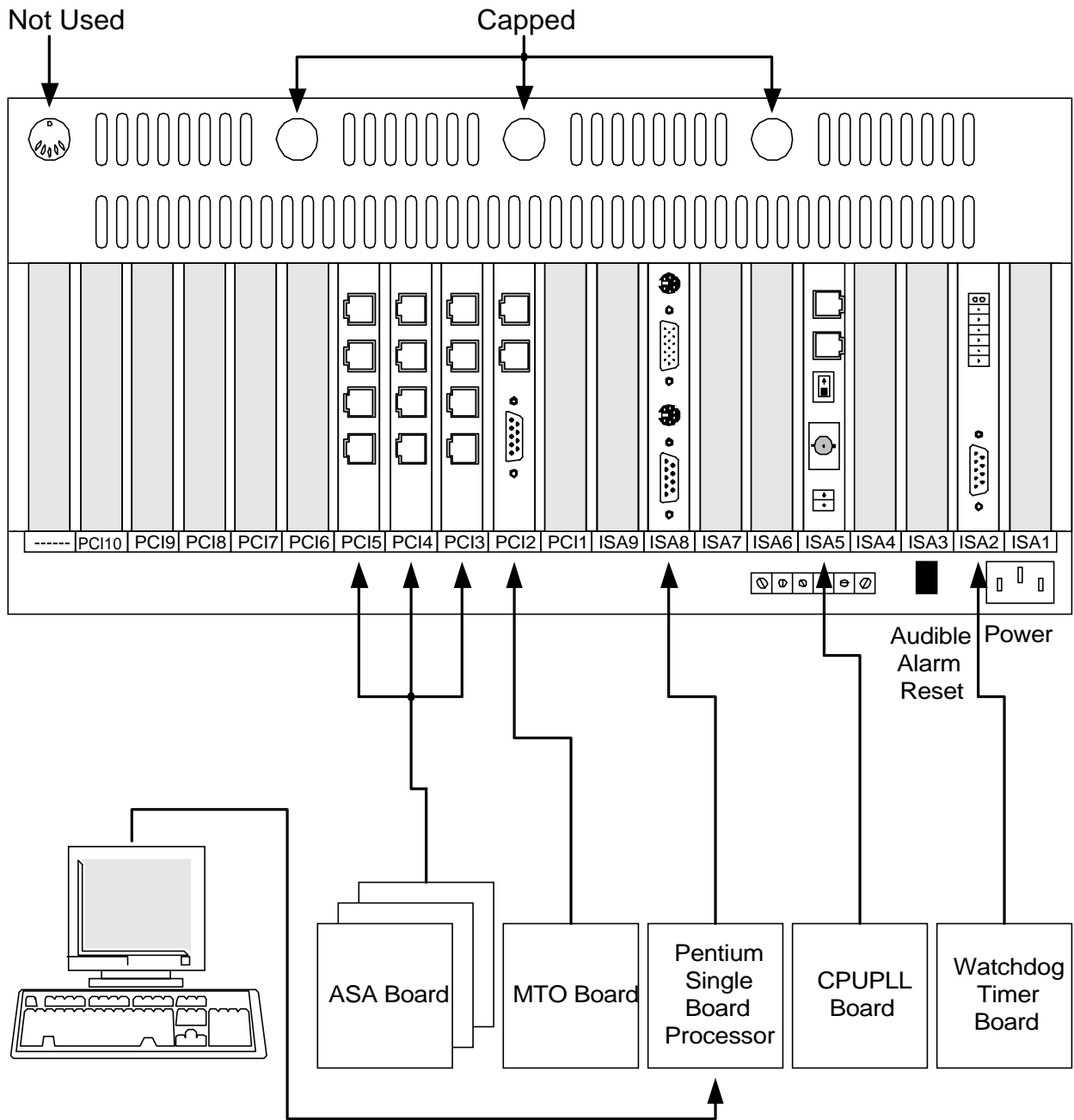


Figure 1. Unitymux 4025 Block Diagram

2.2.2 Thermal Alarm Board

Above the Power Supplies (accessible by removing the top cover) is the thermal alarm board. This board processes and controls thermal alarms. When an alarm condition occurs, this board causes one of several audio alarms to sound until the alarm condition is cleared. To reset the alarm, there is an alarm-reset switch on the front panel, behind the access panel. See Section [4.2.2](#) (Page 32).

There is also a reset switch for the Power Supply Alarm. It is located on the lower rear of the unit.

2.2.3 Power Supply

The unit also has two fully redundant power supplies. You may reach these from the front panel access door. They are hot-swap replaceable, which means that if one fails, you can unlock it, remove it from the chassis, and replace it with no mux down time.

For details on Power Supply alarms, initial Power Supply setup, and removing and replacing Power Supplies, see Section [4.2.1](#), Page 31.

*** * * CAUTION * * ***

Make sure the slide switch/indicator on both power supplies matches the input voltage before applying power. Failure to do so may cause the Power Supply fuses to “blow” and/or may cause other damage to the equipment.

2.2.4 Front Panel

Details of the Front Panel Status LED's are shown in Section [4.2.3](#), Page 33.

2.2.4.1 Hard Disk Drive Status LED's

There are also six red LED's which light to show Disk drive activity. Since there is only one Hard Disk Drive, only LED #1 lights for drive #1 activity. Disk Drive LED #6 is used to indicate that the CPUPLL card is locked to an external reference signal. See Section [2.3](#) (Page 18) for details.

Behind the front panel access door are other controls and indicators as listed below.

2.2.4.2 Alarm Reset Switch

Located behind the front access panel is an alarm-reset switch. For details about it, see Section [4.2.4](#) (Page 34).

2.2.4.3 (Unit) Reset Switch

Located just below the “Alarm Reset” Switch is the “Reset” Switch. This is a general reset for the unit, in case it “Locks up.” This initializes most unit settings. This switch should only be used if the unit fails to respond to normal keyboard and mouse commands.

2.2.4.4 Power Switch

Below the “Reset” Switch is the main “Power” Switch. Pressing this switch toggles the power to the unit. If the power was off, pressing and releasing this switch turns it on. If it was on, then this action turns it off. Turning the power off and then on initializes the unit. The power switch should only be used following the normal shutdown procedure.

2.2.4.5 Floppy Disk Drive

Also behind the front access door is a 3.5” floppy drive. This gives the user the ability to upload and download files and programs to the computer board.

2.2.5 System Processor

The system processor is a 233MHz Pentium MMX microprocessor. This single-board computer supports an SVGA monitor, keyboard, mouse, one parallel printer port, and two serial ports. The system controller also provides the user interface and configures the system.

2.2.6 Rear Panel

The rear panel gives access to the inputs and outputs of the printed wiring boards in the chassis.

Upon receipt, the unit will have the CPU board, one CPUPLL board, one Mux/Transport Output Board (MTOB), and one or more Audio Sync Async Boards (ASAB) in the PCI bus area. A Watchdog Timer Card is located in the ISA bus area of the chassis. Connectors on the rear of these boards show through slots in the rear of the chassis. These connectors are labeled on the areas between the slots, and the boards are labeled at the bottom of each slot. If adding new boards, be sure to properly place the label enclosed with the board.

2.3 CPU AND CPUPLL BOARDS

These boards are described together since both are needed for a working system. The CPU board is an AP-540 Single Board Computer. It has a 233 MHz Pentium MMX microprocessor, with an Intel Triton VX chipset. This board runs the PCI bus, setting interrupts and arbitrating priorities.

There are no external connections to the CPU board. All interconnections will be in place when you receive the unit and all jumpers will be set.

2.3.1 CPUPLL Board

The CPUPLL module serves as the master clock for the processor and all modules in the Unitymux 4025 chassis. It produces a 14.142857 MHz clock, which is connected to the Pentium Single Board Computer (SBC) module. The SBC then uses this input to produce a 33.0 MHz bus clock that is the source for all system timing.

The module may be either free running or locked to an external reference. If no external sources are connected, an internal VCXO provides the 14 MHz clock to within 30 parts per million. In a stand-alone system with all data sources receiving their timing clocks from the Unitymux 4025, this will provide a correctly timed MPEG signal.

When the module is placed in the chassis, all inputs are located on the rear panel of the chassis. Front panel LED 6 will illuminate to indicate an out of lock condition of the oscillator.

The normal use of the module is to provide a 14 MHz clock that is phase-locked to an external reference. The external reference may be either a T1 Nx64 kHz (RS-422) signal or a 10 MHz, 1Vpp, 50 ohm signal as provided by a GPS receiver.

The internal clock will automatically lock to either external reference. If both are present, a slide switch between the 10 MHz input coaxial connector and the RJ-45 connectors is set to indicate the priority of the sources. With the switch pushed toward the coax connector, priority is given to the 10 MHz input and when it is pushed toward the RJ-45 connectors, priority is given to the Nx64 kHz input.

2.3.1.1 10 MHz Reference

The 10 MHz signal may be provided by a GPS receiver or other source of a highly stable 10 MHz signal. A BNC T connector with a 50-ohm termination is provided with the module. If the source is routed to another chassis, place the termination on the final connection.

2.3.1.2 T1 Reference

The two RJ-45 connectors, indicated as the T1 REF LOOP, provide a high impedance loop-through of an RS-422 reference signal. The input signal may be from a T1 data source (such as a CSU) or from a DE96 Digital Audio Encoder set to internal clock. The module uses the clock signal and passes the data and clock through to the other connector. Since the connector is a loop through connector, the input signal may be placed on either RJ-45 connector and the other connector may be used to route the signal to an ASAB input data port. The module will automatically lock to any of the following clock rates: 64 kHz, 96 kHz, 128 kHz, or 192 kHz.

2.3.2 CPU Board Ports

The CPU Board has four ports on the rear, like most other PC's. These are wired in a standard fashion.

The top connector is the 15-pin video port. This should be connected to a standard VGA computer monitor (Provided in Standard Peripheral Kit).

Under the video port is a PS2 connector for a mouse (Provided in Standard Peripheral Kit).

Under the Mouse Port is a DB-9 connector for a serial port (Not used).

At the bottom of the board is the PS2 Keyboard Connector for a standard 101 keyboard (Provided in Standard Peripheral Kit).

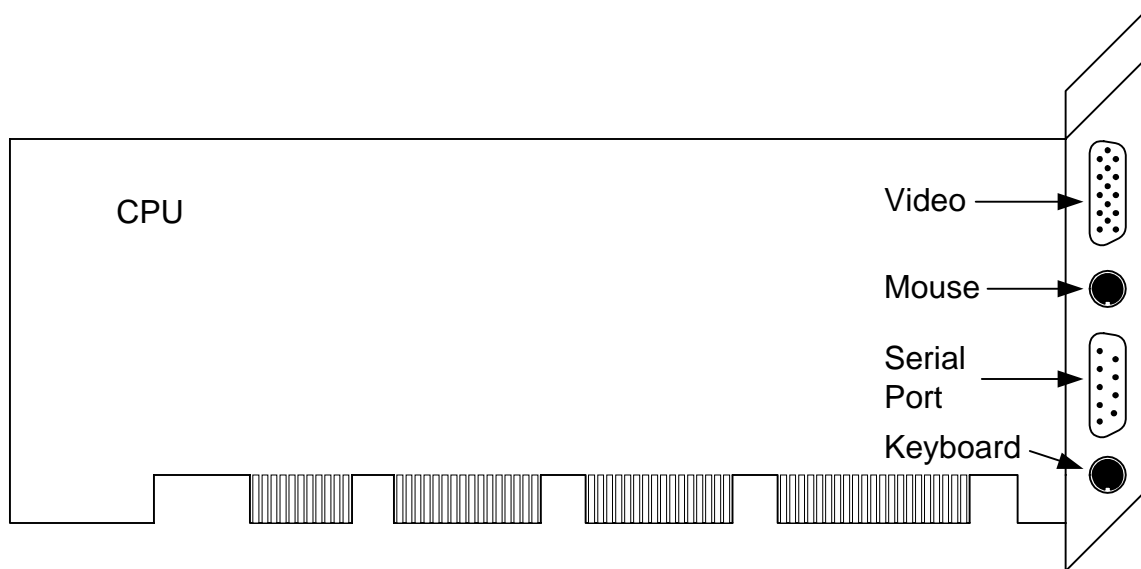


Figure 2. CPU Board Connectors

2.3.3 CPUPLL Board Connections

The CPUPLL Board has a BNC connector for the 10 MHz input reference signal and two RJ-45 connectors for the Nx64 kHz input reference signal. The RJ-45 connectors are looped together so that either may be used for the input with the other passing the input signal to other devices.

The slide switch determines which input reference has priority when both references are present. In the up position, the 10 MHz signal has priority; in the down position, the Nx64 kHz signal has priority. If only one reference is connected, it automatically becomes the reference regardless of the switch position. If neither reference is connected, the internal reference is used.

A two pin output connector provides a contact closure (optionally open based on setting of internal jumper) when the phase locked loop is locked.

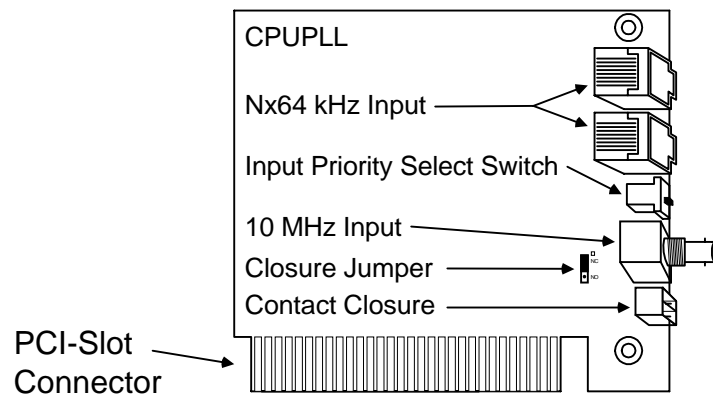


Figure 3. CPUPLL Board Connectors

2.4 MULTIPLEXER TRANSPORT OUTPUT BOARD (MTOB)

This board is properly known as the multiplexer Transport Output Board, but is most often called the MTOB. See Section [3.1.1](#) (Page 27) for Jumper Settings for the MTOB.

The MTOB has its own processor and relieves the Pentium host of any real-time responsibilities. The local processor is RAM based so that software updates are simple and straightforward. The MTOB is the real-time heart of the system and, like the Pentium host, is a PCI Bus Master. It controls the PCI bus, taking control to fetch complete MPEG transport stream packets from the various source boards. At power up the system processor passes the results of the PCI configuration process to the MTOB so that the MTOB knows the locations and mappings of all of the various source boards. Once armed with this information the MTOB performs its function without the necessity of further host processor input. This board provides the following features:

- Generates Program Clock Reference (PCR)
- Multiplexes packets from all data input boards
- Commands the PCI Bus
- Generates pad packets automatically
- Generates Transport Stream PAT (Program Association Table) and PMT (Program Map Table) packets
- Produces RS-422 MPEG Transport Stream Output

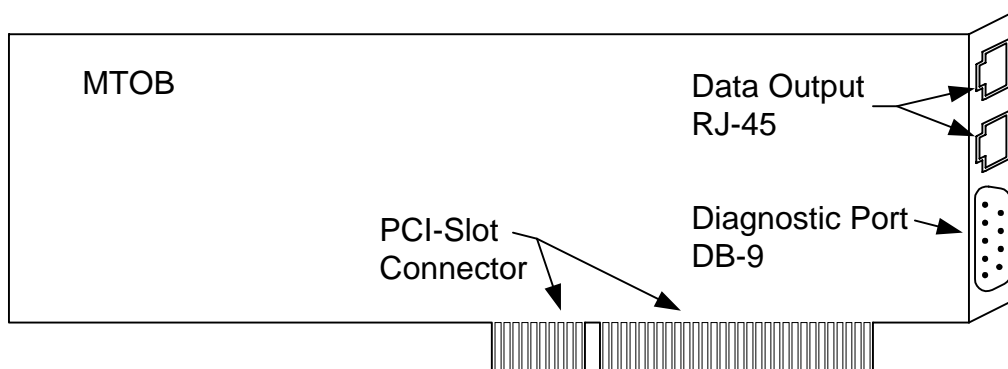


Figure 4. MTO Board Connectors

2.4.1 MTOB Interfaces

The MTOB contains the following electrical interfaces:

- 5V, 32bit, 33MHz, Version 2.1 compliant, PCI Bus Master interface
- One RS-422 multiplexed data output with two RJ-45 connectors. One of the output connectors is connected to the data transmission equipment, and the other is available for local monitoring. The module accepts or sources clock based on an internal jumper connection.
- One DB-9P RS-232 diagnostic port (factory use only).

Table 2. MTOB Serial Synchronous Data Port Details

Parameter	Specification
Signal Type	MPEG Transport Stream Serial Digital Data (1.536 Mbps to 10.000 Mbps \pm 1%)
Levels	RS-422
Format	Synchronous
Clock Direction	External clock or internal clock is selected under software control in the configuration menu.
Connector	RJ-45, Wegener standard pin-outs as follows: Pin 1 Ground Pin 2 TX DATA OUT A Pin 3 TX DATA OUT B Pin 4 TX RTS OUT A Pin 5 TX RTS OUT B Pin 6 TX CLK A Pin 7 TX CLK B Pin 8 Ground

Table 3. MTOB Serial Asynchronous Port Details

Parameter	Specification
Signal Type	Serial Digital Data (1.2 to 38.4 kbps \pm 1%)
Levels	RS-232
Format	Asynchronous
Connector	DB-9P
Pin Connections	Pin 2 RX Data (input to module) Pin 3 TX Data (output from module) Pin 5 Ground All other pins not connected

2.5 AUDIO SYNC ASYNC BOARD (ASAB)

2.5.1 ASAB Interfaces

The ASAB has four input data ports, each of which operates in the same manner. The top connector is Port A; the connector under that one is Port B, then Port C, with the bottom connector being Port D as shown in Figure 5. Each Data Input Stream to the ASAB is a serial data input that may be RS-422 MPEG elementary stream audio data, RS-422 synchronous data, or RS-232 asynchronous data. The ASAB receives the data, RTS (optional) and, when required, a clock.

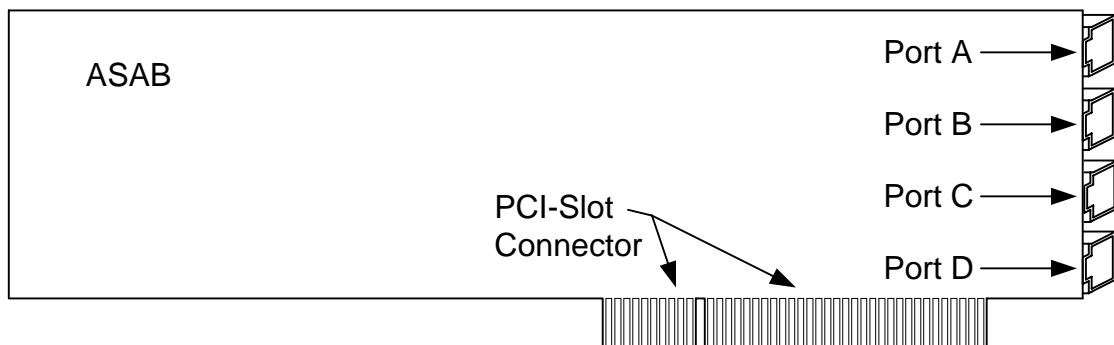


Figure 5. ASA Board Connectors

The input signal characteristics are shown in [Table 4](#) (below). The audio input is an MPEG elementary stream such as that produced by a Wegener model DE96 Digital Audio Encoder. The synchronous data transmission is not protocol specific as the data are passed transparently through the system to the receiver, which reproduces the data exactly as presented to the multiplexer. The asynchronous data are also passed through as received with the exception of data containing framing errors, which are not transmitted.

Table 4. ASAB Interfaces

TYPE INPUT	LEVEL	Tx CLOCK	DATA RATES
Audio MPEG Elementary Stream	RS-422	Int or Ext	64, 96, 112, 128, 192, 256, 384 kbps
Synchronous Data	RS-422	Int or Ext	64 to 1,536 kbps in 1 kHz steps
Asynchronous Data	RS-232	N/A	1.2 to 38.4 kbps (1200, 2400, 4800, 9600, 19,200 & 38,400 bps)

IMPORTANT NOTE

The **TYPE INPUT**, **LEVEL**, **CLOCK**, and **DATA RATE** are all software selectable.

For audio and synchronous data using an external clock, the data rate setting is the upper limit of data that the module will accept. Lower data rates are automatically detected and transmitted. Input audio and synchronous data rates that exceed the rate set in the configuration are not transmitted.

For asynchronous data, only the rate selected will be transmitted.

See Appendixes A, B, and C for information on setting the port configurations of the installed ASAB modules.

The ASAB port connector is a shielded RJ-45 with the pin-outs shown in [Table 5](#) (below).

Table 5. ASAB Data Port Pin-Outs

Pin	Wire Color	Signal Name (Audio and Sync Data)	Signal Name (Async Data)
1	(Blue)	GND	GND
2	(Orange)	TXDATIN(X)A	TXDATIN(X)
3	(Black)	TXDATIN(X)B	N/A
4	(Red)	TXRTSIN(X)A (optional)	TXRTSIN(X) (optional)
5	(Green)	TXRTSIN(X)B (optional)	N/A
6	(Yellow)	TXCLK(X)A	N/A
7	(Brown)	TXCLK(X)B	N/A
8	(White)	GND	GND
Where (X) is the Port designator. For example, for Port C data, the Signal on Pin 5 will be "TXRTSIN(C)B." For Port B data, the signal on Pin 5 will be "TXRTSIN(B)B."			

SECTION 3 SYSTEM OPERATION

3.1 UNITYMUX 4025 SYSTEM OPERATION

A typical Unitymux 4025 system includes a single MTOB and several ASAB modules. When the equipment is ordered, the Wegener Salesman will have the required information put on a new Configuration Sheet. A copy of that sheet will be included with the unit at shipment time. The user should retain this sheet as a reference when corresponding with Wegener Sales or Customer Service, or for general knowledge, etc. If changes are made to the unit, such as upgraded software, additions of cards, etc., the Configuration Sheet should be updated. See [Appendix A](#) (Page 37) for an example of a configuration sheet.

3.1.1 System Turn On

1. Before turning the system on, verify that all modules are set to their desired configuration. This is done by means of a text file, “unitymux.conf”. **Always keep a copy of the current configuration for backup purposes.** See [Appendix B](#) (Page 39) for a description of the configuration menu.
2. Place the modules in their designated slots in the chassis.
3. Connect the external wiring to the chassis.
 - a. Connect the input data signals to the ASAB modules.
 - b. Connect the MTOB output data signal from either of the RJ-45 connectors to the modulator or next multiplexer. If desired, connect the second MTOB output data signal to a monitoring device that accepts serial RS-422 MPEG Transport Stream inputs.
 - c. For alarm monitoring the system has three alarm outputs, which are over-temperature, watchdog timer, and module failure.

For details on alarms and alarm monitoring, see [SECTION 4](#) (Page 31).

- d. The over temperature alarm is located on the barrier strip on the lower rear panel of the chassis. Its connections are listed below. Also, see Section [4.3.1](#) (Page 34).

Chassis Barrier Strip

Pin 1: Not Used

Pin 2: Closure to ground when over-temperature alarm occurs

Pin 3: Ground

Pin 4: Not Used

- e. The watchdog timer and the module failure alarm are located on a connector on the PC Watchdog module. See [Figure 6](#) (Page 28). The PC Watchdog module has two red LEDs visible on the rear panel. The top (left side) LED blinks at a 0.5-second rate to indicate it is armed. When the watchdog is within 10 seconds of resetting the PC, it will blink at a 0.1-second rate. If the watchdog times out (20 seconds without an arm signal), it will reset the PC and pulse at a 1-second rate until it is rearmed, at which time it will return to a 0.5-second blink rate. When the watchdog resets the PC, it will also turn on the bottom (right side) LED. To clear this LED, cycle power on the PC or press the front panel reset button. The watchdog relay (relay 1) is energized when the watchdog timer has not received an arm signal for 20 seconds. When this happens, the NO (Normally Open) contact is closed to the C(ommon) contact. The module alarm relay (relay 2) is energized when the system is operating normally without a major alarm. When a major alarm occurs, the relay is de-energized. The X menu has an option to clear the module alarm. If the alarm condition still is present, the relay will be immediately de-energized. When the user restarts the system, the module alarm relay will be automatically cleared if all major alarms have been cleared.

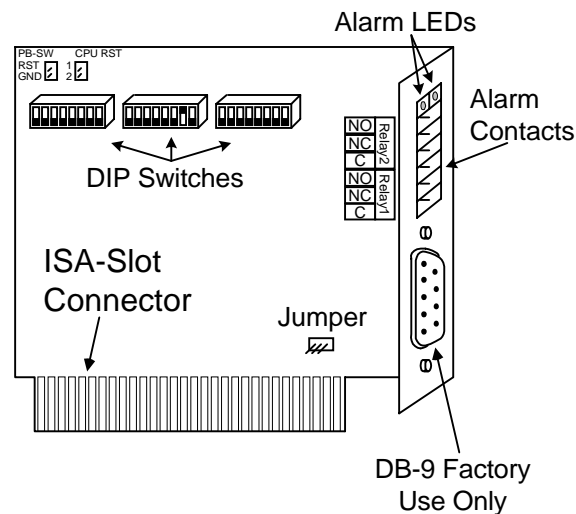


Figure 6. Watchdog Timer Board

Additional information about the watchdog timer and module failure alarm can be found in Section [4.2.5](#) (Page 34). The timer connections are shown in [Table 8](#) (Page 35).

- f. Connect the Alarm Relay module to the alarm monitoring system as desired.
4. Turn on the system by pressing the front panel power button. The system will then run with no further user intervention. The actual sequence is given below.
- a. Pentium BIOS automatically searches PCI bus, identifies installed modules, and assigns memory addresses, I/O addresses, and interrupts.

- b. Linux OS is invoked, which automatically runs application program.
 - c. MTOB and ASAB operating software are taken from disk and loaded onto each of the modules.
5. The modules begin execution, and all input data are multiplexed and sent to the output port for transmission.

3.1.2 System Configuration and Status Monitoring

The Unitymux 4025 Graphical User Interface allows the user to configure the modules in a system, perform system maintenance, and view the status of the system.

An X-windows screen is displayed when the left mouse is pressed on any blank area of the screen. This screen contains the following items. Status, Configuration, Restart, Clock, Floppy operations, and Shut down System.

Operating status of the system and the included modules is shown on the status screen. To view this screen, click with the left mouse button on a blank area of the screen. Select ***Mux Status*** from the selection box to display the Status screen. On the right side of the screen, select ***Mux Status***, ***Mux Log***, ***System Messages***, ***Memory Status***, or ***Harddisk Usage***.

The ***Mux Status*** screen displays the status of the PCI modules installed in the system and indicates any minor or major alarms. A major alarm (such as module failure to respond) will cause the Mux Status bar to turn red and will actuate the alarm relay. A minor alarm (such as no incoming data on an enabled port) will only indicate this condition with no relay closure.

The ***Mux Log*** screen logs events that occur in initiating the system and is useful for troubleshooting any problems.

The ***System Messages*** are primarily operating system configuration messages and are useful for troubleshooting any problems.

Memory Status and ***Harddisk Usage*** show the use of these resources.

The Configuration menu allows the user to set both hardware and service information configurations for a system. For details, see Section [3.1.2](#) (above) and [Appendix B](#) (Page 37).

The restart selection causes the mux to reload the unitymux.conf file and restart the system.

The Clock selection brings up a calendar and clock. The user may set the correct date and time from this selection.

The Floppy operations menu allows the user to copy the unitymux.conf file and the firmware files to and from a floppy disk. The unitymux.conf file contains the operational configuration of the system. The firmware files (mtob_n_n.bin and asab_n_n.bin) contain the operational firmware for the MTOB and ASAB processors.

The Shutsoqn System selection provides an orderly shutdown of the system. When the “System Halted” message appears, power may be turned off for the system. If power is not turned off, the system will automatically restart within 20 seconds when the watchdog timer activates.

3.1.3 Changing the Configuration

Hardware configuration changes, and all service information changes, are performed with the unit under power. However, in order for the change to take effect, the unit must be restarted, which will result in interruption of all output from the unit for a few seconds.

To change the configuration, perform the following steps.

1. Click with the left mouse button on a blank area of the screen.
2. On the floating selection box select the Configuration Editor.
3. Open the '**unitymux.conf**' file.
4. Using the configuration sheet and the data included in [Appendix B](#) (Page 39) and [Appendix C](#) (Page 43), edit the desired configuration data.
5. Save (write) the '**unitymux.conf**' file back to the disk.
6. Close the Configuration Editor.
7. Click with the left mouse button on the screen.
8. On the floating selection box select the **Restart Mux** command.
9. The mux will now restart using the edited '**unitymux.conf**' file.

3.1.4 System Turn Off

To turn the system off, follow the steps below.

1. Place the cursor on a blank area of the screen and click the left mouse button.
2. From the popup menu, select Shutdown System.
3. Select the response **!Yes, Really Shutdown** to shut down the system.
4. When the message **System Halted** is displayed on the screen, it is safe to turn off power.

3.1.5 System Re-Installation

High voltage pulses on the power supply input cables may corrupt data on the hard disk drive and result in the unit not being able to reboot correctly.

If this occurs, the system will have to be reinstalled. To do this, place the installation CDROM in the CDROM drive and reset the system by pressing the reset button or by cycling main power. When prompted to do so, type "install". When asked if you wish to load the configuration file from a floppy disk, answer yes or no depending on whether you have a floppy disk available with the correct configuration on it. If you select no, a default configuration will then be loaded on the system, which must be changed to the correct configuration when the system completes the installation process. As the installation is completed, the unitymux program will run and the system will initialize and automatically begin multiplexing data without further intervention.

SECTION 4

UNITYMUX 4025 ALARMS

4.1 INTRODUCTION

The purpose of this section is to describe the operation of the Wegener Communications Unitymux 4025 Multiplexer Alarm System. The system has two levels of alarms – Chassis Alarms and a Watchdog Module. The Chassis Alarm system monitors and alarms power supply status, cooling fan status, and over-temperature conditions. The Watchdog Module monitors and alarms software errors. This section will discuss the Chassis Alarms, the Watchdog Module Alarms, and the Alarm Contact Closure signals, which are located on the rear panel of the chassis.

4.2 CHASSIS ALARMS

The chassis contains two power supplies and three chassis cooling fans. The power supplies are hot swappable, while power should be removed from the fans for their removal or replacement. There is also a heat-sink-mounted fan on the Pentium processor chip.

4.2.1 Power Supply Alarm

The chassis has two fully redundant power supplies. Prior to applying power to the unit, make sure the slide switch/indicators on BOTH power supplies are set to match the local power. If the power to the unit is 115 VAC, slide the switch so that “115” shows on the red switch. If the power is 230 VAC, slide the switch so that “230” shows. See the caution below.

*** * * CAUTION * * ***

Make sure the slide switch/indicator on both power supplies matches the input voltage before applying power. Failure to do so may cause the Power Supply fuses to “blow” and/or may cause other damage to the equipment.

If one of the power supplies malfunctions, an audible alarm will sound and the PWR1 or PWR2 LED on the front panel will flash. Open the front access panel and see which Power Supply LED is “OFF.”

At this point you may reset the alarm by pressing the reset button located on the lower right hand side of the chassis rear panel.

Using the power supply key, unlock the failed supply (this will also remove AC power from this power supply) and remove it from the chassis by pulling firmly on the handle. The remaining power supply should keep the unit running normally.

Install the replacement power supply and lock it in place (this will return AC power to this power supply). No alarm condition should occur. The LED in the replacement unit should be “ON” and the corresponding chassis LED should be “ON” and not flashing.

Before closing the front access panel, fold the Power Supply handle into its storage position. See the other Power Supply if there is any doubt. This will allow the panel to close and will avoid damage to it.

There is no contact closure for a single power supply failure.

4.2.2 Thermal Alarm Board

Above the Power Supplies (accessible by removing the top cover) is a thermal alarm board. This board processes and controls thermal alarms. The alarm board monitors two temperature sensors inside the chassis near the top of the rear panel. It also monitors the activity of the Pentium heat sink fan.

Two of the three chassis fans are normally on. If the temperature rises above 40 degrees C, the third (center) fan is automatically turned on and the temperature LED is illuminated. If the over-temperature condition persists for more than eight minutes, the alarm will sound.

If the Pentium heat sink cooling fan fails, the Fan 1 indicator will go off and the alarm will sound.

When either of these alarm conditions occurs, an audible alarm will sound until the alarm condition is cleared. To reset the alarm, there is an alarm-reset switch on the front panel, behind the access panel.

The over-temperature alarm will cause a contact closure on the rear of the chassis.

4.2.2.1 Replacing Cooling Fans

To replace a fan, the unit should be powered down. See Section [3.1.3](#) (Page 30) for system turn off instructions.

In the event one of the three main cooling fans fails, it may be replaced by following these instructions.

1. Power down the unit. For best protection, unplug the power cord.
2. If you have to remove the unit from the rack, make sure the cables are labeled, or write down the interconnections. The unit weighs nearly 80 pounds. Make sure there are enough people to lift the unit safely.
3. Remove the top cover.
4. Loosen the thumbscrew on top of the fan. If the screw is too tight, use a common screwdriver to loosen it.
5. Insert a finger through the pull-ring, and pull the fan sharply upward.
6. To install the new fan, guide it into place, ensuring the wires are not pinched. Make sure the two pins slide into their sockets easily, and push the fan in place. Most questions can be answered by observing the other fans and their positions.

7. You may need to move the fan slightly to get the “ears” on the rear corners to seat in their slots.
8. Tighten the thumbscrew “finger tight.” Do NOT use a screwdriver. It should turn readily.

*** * * CAUTION * * ***

Do NOT force the unit during any of these steps, as this may damage the unit or the fan.

9. After installation, pivot the pull-ring to the rear, so it encircles the thumbscrew. This will allow the cover to fit correctly.
10. Return the unit to normal operation.

4.2.3 Front Panel

The front panel has an assortment of status LED’s visible through a fold-down access panel. The six green LED’s on the left show the following:

Table 6. Front-Panel LED Functions

LED LABEL	FUNCTION (LIGHTS WHEN)
Power	Main power is “ON”
Fan 1	CPU cooling fan is “ON” (Samples under- and over-current)
Fan 2	Not used
Temp	Over-temperature point is reached. Center cooling fan is “ON”. (This is a Green LED even though it is an alarm.)
PWR 1	Power Supply 1 is “ON” and sampled voltages are correct. Flashes when alarm condition is present.
PWR 2	Power Supply 2 is “ON” and sampled voltages are correct. Flashes when alarm condition is present.
6	CPU Clock is NOT locked to external frequency reference.

4.2.4 Alarm Reset Switch

When an alarm condition is present, the alarm board causes an audio alarm to sound, as well as causing an LED to illuminate. For most of these conditions, pressing and releasing the “Alarm Reset” switch (located behind the front access panel) will clear the alarm. Note that the alarm condition still may exist, but the alarm speaker will stop annoying you. Depending on the chassis model, this reset switch may be either a large momentary toggle switch above the chassis reset switch or a small recessed push button switch next to the alarm LEDs.

4.2.5 Watchdog Module Alarms

A PC Watchdog module is installed in ISA slot 2. After a power on delay of 2.5 minutes, this module begins its internal watchdog timer. If the operating software does not send an arm signal to the timer every 20 seconds, the module will automatically restart the PC. Relay 1 on the module is controlled by the watchdog trip.

Additional protection is provided by use of Relay 2 on the module. This relay is under operating system control. Detection of a major alarm on any of the modules will cause Relay 2 to activate. See Section [4.3](#) (below) on the rear panel connections for suggested wiring to external alarm monitoring systems.

The PC Watchdog module has two red LEDs visible on the rear panel. The top (left side) LED blinks at a 0.5-second rate to indicate it is armed. When the watchdog is within 10 seconds of resetting the PC, it will blink at a 0.1-second rate. If the watchdog times out (20 seconds without an arm signal), it will reset the PC and pulse at a 1 second rate until it is rearmed; at which time it will return to a 0.5 second blink rate. When the watchdog resets the PC, it will also turn on the bottom (right side) LED. Cycling power on the PC or pressing the front panel reset button may clear this LED.

4.2.6 CPUPLL Board Alarms

The CPUPLL board has a single alarm output – the PLL unlocked signal. It is present as a contact closure on the connector at the bottom of the board. A jumper on the board may be set to cause the contact to open when the unlock condition occurs. LED 6 on the front panel will illuminate when the clock is not locked to an external reference.

4.3 REAR PANEL CONNECTIONS

The rear panel provides access to the outputs of the alarm signals. There are two sources of alarm signals – the over-temperature alarm and the PC Watchdog alarms.

4.3.1 Over Temperature Alarm

The over temperature alarm is located on the barrier strip on the lower rear panel of the chassis. Its connections are listed below. Note that pin 4 is the pin nearest the AC power input cable and that the pins are numbered from left to right when looking at the rear of the chassis.

Table 7. Chassis Barrier Strip

Pin Number	Function
Pin 1:	Not Used
Pin 2:	Closure to ground when over-temperature alarm occurs
Pin 3:	Ground
Pin 4:	Not Used

4.3.2 PC Watchdog Alarm

The PC Watchdog module in ISA slot 2 has two relays with contact outputs on the screw terminal block. The operation of the relays is described as follows.

The watchdog relay (relay 1) is energized when the watchdog timer has not received an arm signal for 20 seconds. When this happens, the NO contact is closed to the C contact. The connections are indicated on the list below.

The module alarm relay (relay 2) is energized when the system is operating normally without a major alarm. When a major alarm occurs, the relay is de-energized. The X menu has an option to clear the module alarm. If the alarm condition still is present, the relay will be immediately de-energized. When the user restarts the system, the module alarm relay will be automatically cleared if all major alarms have been cleared. The connections are indicated on the list below.

Table 8. PC Watchdog Terminal Strip Connector

Relay #	Pin #	Type	Description
Relay 2	Pin 1*	NO	Closure to common for normal operation
	Pin 2	NC	Closure to common for module alarm or power off
	Pin 3	C	Common relay contact
Relay 1	Pin 4	NO	Closure to common for watchdog trip
	Pin 5	NC	Closure to common for normal operation
	Pin 6	C	Common relay contact

* Top is Pin 1

The user may apply these closures as desired depending on the associated alarm protection system requirements.

In a typical system, a contact closure is used to indicate an alarm condition. This allows several alarm outputs to be connected in parallel with a single closure signaling an alarm. In a system like this, pins 3 and 6 would be connected to the alarm system common or ground input. Pins 2 and 4 would be connected to the alarm system alarm closure input.

NOTE: Connector J5, the DB-9 connector, is for factory use only and must NEVER be connected to user equipment.

APPENDIX A CONFIGURATION SHEET

Series UMX4025 MPEG Multiplexer Configuration Sheet

Rev E- 2/7/00

(WCI must receive this information at least two weeks before delivery to avoid additional processing charges to the customer.)

Model Number: Unity Mux 4025-1-001 **Config.Rev.:** A **Revision Date:** 01/01/00
Customer: George P. Burdell **Sales Order No.:** 00-000000000 **Date:** 01/01/00
Cust. Contact: George P. Burdell **Salesman:** Willie Lomax
Cust. Approval: George P. Burdell **Date:** _____ **Prod. Approval:** _____ **Date:** _____
Special Instructions or Clarifications: _____

Hardware Configuration

Item	WCI Model Number	DESCRIPTION	Serial Number	Notes
System	UMX4025-1-001	Unity Mux 4025 w/ dual PS		Includes Shipping Box
Standard Peripherals	18391-01	17" monitor, keyboard, & mouse		Includes Shipping Box
Monitor	24311-07	17" SVGA Display		
Keyboard	24344-12	HP Keyboard		
Mouse	24311-02	PS2 Mouse		

ISA Card Configuration

ISA Slot	WCI Model Number	Module Description	Module Serial Number	Notes
1				Reserved for LAN module
2	24454	PC ISA Watchdog/relay		Always included with Basic System
3				
4				
5	18441	UMX4025 CPU PLL Module		Always included with Basic System
6				
7				
8	24457	Pentium 233 MHz SBC w/32M RAM		Always included with Basic System
9				

Series UMX4025 MPEG Multiplexer Configuration Sheet (Continued)

Model Number: UnityMux4025-1-001 **Sales Order No.:** 00-000000000 **Date:** 01/01/00

PCI Card:	1	2	3	4	5	6	7	8	9	10
Segment/Slot:	0/20	0/17	1/4	1/5	1/6	1/7	2/0	2/1	2/2	2/3
	/Wegener/firmware/mtob n_n.bin									
	/Wegener/firmware/asab n_n.bin									

PCI Card Configuration

PCI Card Number	Module Type	Serial Number	Sig. Type (Aud/Sync/Async)	I/O Level (422/232)	Clock (Int/Ext)	Data Rate (kbps)	Async Only		Stream Name	PID Assigned Dec [Hex]	Stream Type Aud:4 Data:128	ISO639 Desc.	Program Name (PMT)
							Bits	Par (O,E,N)					
1	Not used												
2	18304	MTOB	122	422	Int	3072			PCR	8190 [1FEE]			
									PMT	2000 [7D0]			SatNet
3A	Not used												
B													
C													
D													
4A	18306	ASAB	144	422	Int	192			RocknRoll	401 [191]	4	RNR	SatNet
			Audio	422	Int	192			CountryFavs	402 [192]	4	CTR	SatNet
B			Audio	422	Int	192			Classiclite	403 [193]	4	CLL	SatNet
C			Audio	422	Int	192			Religious	404 [194]	4	REL	SatNet
D			Audio	422	Int	192							
5A	Not used												
B													
C													
D													
6A	18306	ASAB	126	422	Int	192			News	601 [259]	4	NEW	SatNet
			Audio	422	Int	192			TechTalk	602 [25A]	4	TLK	SatNet
B			Audio	422	Int	192			Sparel	603 [25B]	4	SP1	SatNet
C			Audio	422	Int	192			CompelData	4134 [1026]	128		SatNet
D			Async	232		19.2	8	N					
7A	Not used												
B													
C													
D													
8A	Not used												
B													
C													
D													
9A	Not used												
B													
C													
D													
10A	Not used												
B													
C													
D													

APPENDIX B CONFIGURATION MENU

The configuration menu is basically a text-based editor, which saves the configuration information for both the hardware and the service information. The operating software then uses this information to operate the modules and output the desired MPEG Transport Stream.

The left side of the screen has the section information. Six basic sections are defined with two used for hardware configuration and four for service information. These sections are:

- a. Hardware – Computer and Card
- b. Service Information – Aggregate, PCR, Stream, and Program

Each section has parameters specific to that section. They are edited using the right hand side of the menu screen. The parameters are described in the Hardware Configuration Table and the Service Information Configuration Table.

Table 9. Hardware Configuration Table

Section	Parameter	Description	Available Entries	Examples
Computer1	Name	Network name of host (Pentium) processor	Unitymux	Unitymux
	Min	Lowest slot assigned to Computer1	1 – 20	1
	Max	Highest slot assigned to Computer1	1 – 20	10
Card n Where n is the PCI slot number of the card	Type	Type card installed	MTOB, ASAB, CPU, NONE	ASAB
	Bus	Bus card installed in	CPU, ISA, PCI	PCI
	Segment	Segment of PCI bus	0, 1, 2	1
	Slot	PCI Slot number on the segment (Note: This is not the same as the card location shown on the rear panel. See the configuration sheet in Appendix A (Page 37) for correspondence of segment and slot to card location.)	1 – 20	6
	Serial_number	Serial number of card	1 – 99,999	108
	Software	Card operating program file name	Full address string on HDD	/Wegener/asab_1_0.bin

Table 9. Hardware Configuration Table (Continued)

Section	Parameter	Description	Available Entries	Examples
Card <i>n</i> Where <i>n</i> is the PCI slot number of the card	Clock	Output data clock (MTOB only)	Int, Ext	
	Rate	Output data rate in kHz (MTOB only)	1,536 – 10,000	
	PAT_enable	Enables transmission of PAT in output Transport Stream	True, False	True
	Parameters below ASAB-only with <i>x</i> = A, B, C, D			
	Portx_enable	Enables operation of this port	True, False	True
	Portx_clock	Input data clock (ASAB only)	Int, Ext	Ext
	Portx_rate	Input data rate in kHz	Audio: 64-384 Sync: 64-1,536 Async: 1.2-38.4	64,000
	Portx_io	Signal level	RS-232, RS-422	RS-422
	Portx_type	Signal type	Audio, Sync, Async	Sync
	Portx_data	Number of async data bits	7 – 8	
	Portx_parity	Data parity, None, Odd, or Even	N, O, E	
Portx_stream	Name of stream	Alphanumeric	Cosmicdata	

Table 10. Service Information Configuration Table

Section	Parameter	Description	Available Entries	Examples
Aggregate	Transport_ stream_id	MPEG stream id number	1 – 65,535	1
	Version_number	Version of PAT	0 – 31	1
	Start_time	Start time for PCR	0 – 8,589,934,591	0
	PSI_rate	Transmit rate of PAT and PMT in Hz	DVB rec. \geq 10Hz	10
PCR	PCR_PID	PID location of PCR	32 – 8190 (Std. Practice = 8190)	8190
	PCR_rate	Transmit rate of PCR	DVB rec. \geq 10Hz	10
Stream_ <i>stream_name</i> Where <i>stream_name</i> is a name specified by an ASAB input port Ex. Stream_Cosmicdata	Program	Name of program to which this stream is assigned	Alphanumeric string	AudioNet
	Stream_type	Description of stream	Audio = 4, data = 128	128
	Elementary_PID	PID address for this stream	32 – 8190	1000
	ISO_639_language_ _descriptor	If audio, descriptor code	3 character alphanumeric	A01
Program_program_ name Where program_name is a name specified in a stream_name section Ex. Program_AudioNet	Program_enable	Enables transmission of PMT	True, False	True
	Program_number	Program number to list in PAT	1 – 65,535	1
	Version_number	Version of program	0 – 31	1
	Program_map_ PID	PID address of PMT	32 – 8190	40
	PCR_PID	Location of PCR for this program	32 – 8190 (Std. Practice = 8190)	8190

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APPENDIX C SAMPLE CONFIGURATION FILE

```

;*****section COMPUTER1*****
[COMPUTER1]
name = unitymux
min = 1
max = 99
;*****section CARD2*****
[CARD2]
type = MTOB
bus = PCI
segment = 0
slot = 17
serial_number = 122
software = /wegener/firmware/mtob_1_1.bin
rate = 3072
clock = INT
pat_enable = TRUE
;*****section CARD4*****
[CARD4]
type = ASAB
bus = PCI
segment = 1
slot = 5
serial_number = 144
software = /wegener/firmware/asab_1_1.bin
portA_enable = TRUE
portA_clock = INT
portA_rate = 192
portA_io = RS422
portA_type = AUDIO
portA_stream = RocknRoll
portB_enable = TRUE
portB_clock = INT
portB_rate = 192
portB_io = RS422
portB_type = AUDIO
portB_stream = CountryFavs
portC_enable = TRUE
portC_clock = INT
portC_rate = 192
portC_io = RS422
portC_type = AUDIO
portC_stream = ClassicLite
portD_enable = TRUE
portD_clock = INT
portD_rate = 192
portD_io = RS422
portD_type = AUDIO
portD_stream = Religious
;*****section CARD6*****

```

```

[CARD6]
type = ASAB
bus = PCI
segment = 1
slot = 7
serial_number = 126
software = /wegener/firmware/asab_1_1.bin
portA_enable = TRUE
portA_clock = INT
portA_rate = 192
portA_io = RS422
portA_type = AUDIO
portA_stream = News
portB_enable = TRUE
portB_clock = INT
portB_rate = 192
portB_io = RS422
portB_type = AUDIO
portB_stream = Techtalk
portC_enable = TRUE
portC_clock = INT
portC_rate = 192
portC_io = RS422
portC_type = AUDIO
portC_stream = Spare1
portD_enable = TRUE
portD_rate = 19.2
portD_io = RS232
portD_type = ASYNC
portD_data = 8
portD_parity = N
portD_stream = CompelData
;*****section AGGREGATE*****
[AGGREGATE]
transport_stream_id = 1
version_number = 1
start_time = 0
psi_rate = 20
;*****section PCR*****
[PCR]
PCR_PID = 8190
PCR_rate = 20
;*****section PROGRAM_SatNet*****
[PROGRAM_SatNet]
program_enable = TRUE
program_number = 1
version_number = 1
program_map_PID = 2000
PCR_PID = 8190
;*****section STREAM_RocknRoll*****
[STREAM_RocknRoll]
stream_type = 4
elementary_PID = 401
ISO_639_language_descriptor = RNR
program = SatNet
;*****section STREAM_CountryFavs*****
[STREAM_CountryFavs]

```

```

stream_type = 4
elementary_PID = 402
ISO_639_language_descriptor = CTR
program = SatNet
;*****section STREAM_ClassicLite*****
[STREAM_ClassicLite]
stream_type = 4
elementary_PID = 403
ISO_639_language_descriptor = CLL
program = SatNet
;*****section STREAM_Religious*****
[STREAM_Religious]
stream_type = 4
elementary_PID = 404
ISO_639_language_descriptor = REL
program = SatNet
;*****section STREAM_News*****
[STREAM_News]
stream_type = 4
elementary_PID = 601
ISO_639_language_descriptor = NEW
program = SatNet
;*****section STREAM_Techtalk*****
[STREAM_Techtalk]
stream_type = 4
elementary_PID = 602
ISO_639_language_descriptor = TLK
program = SatNet
;*****section STREAM_Spare1*****
[STREAM_Spare1]
stream_type = 4
elementary_PID = 603
ISO_639_language_descriptor = SP1
program = SatNet
;*****section STREAM_CompelData*****
[STREAM_CompelData]
stream_type = 128
elementary_PID = 4134
program = SatNet
;*****End of File*****

```

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APPENDIX D RMA REQUEST FORM

service@wegener.com

Fax (770) 232-0621

Company Name:	
Bill-To Address:	
Ship-To Address:	
Contact Name:	
Phone # () -	Fax #: () -
Complete Model #:	
Serial #:	
In Warranty: Yes	<input type="checkbox"/>
No	<input type="checkbox"/>
Problem:	
Additional Comments:	

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SERVICE RETURN ADDRESS

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

SERVICE CONTACT NUMBERS AND E-MAIL ADDRESS

Voice: (770) 814-4057
FAX: (678) 624-0294
E-mail: **service@wegener.com**