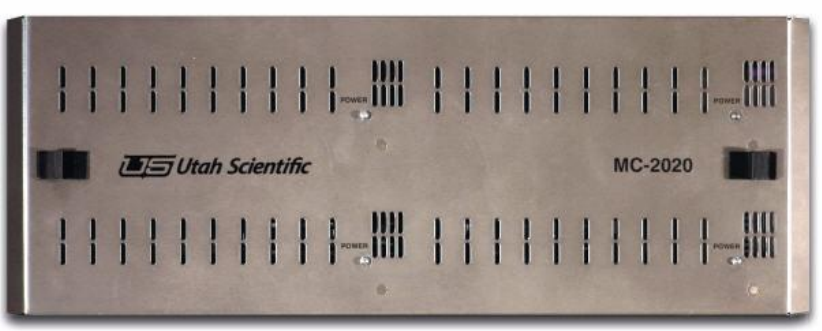
Utah Scientific

MC-2020



System Setup and Operations

The MC-2020 Operators' Manual

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This equipment has been tested and found to comply with the limits for a Class A, digital device, pursuant to Part 15, Subpart B of the FCC Rules and the Canadian EMC Requirement (ICES-003). These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case, the user will be required to correct the interference at their own expense. Shielded cables must be used to ensure compliance with the FCC Class A limits.

Declaration of Conformity

Utah Scientific, Inc.

4750 Wiley Post Way, Suite 150
Salt Lake City, Utah 84116-2878 U.S.A.

We declare our sole responsibility that the Utah-400 Digital Routing Switcher is in conformance with the following standards:

Emission

- EN55022:1994+A1&A2

Immunity

- EN55024:1998
- EN61000-3-2
- EN61000-3-3

Safety

- IEC 60950-1:2001 /EN 60950-1:2001

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- EMC Directive 89/336/EED
- Low Voltage Electrical Directive 72/23/EEC

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CE

Important Safeguards and Notices

This section provides important safety guidelines for the Operator and Service Personnel. Specific warnings and cautions are found throughout the guide where they apply, but may not appear here. Please read and follow the important safety information, specifically those instructions related to risk of fire, electric shock, or injury to persons.

Safety Symbols

- Hazardous Voltage symbol

- Caution symbol. The product is marked with this symbol when it is necessary to refer to the manual to prevent damage to the product.

Warnings

Please observe the following important warnings:

- Any instructions in this guide that require opening the chassis, changing a power supply, or removing a board, should be performed by qualified personnel only. To reduce the risk of electric shock, do not perform any service unless you are qualified to do so.
- Heed all warnings on the unit and in the operating instructions.
- Do not use this product in or near water. Disconnect AC power before installing any options or servicing the unit unless instructed to do so by this manual.

- This product is grounded through the power cord ground conductor. To avoid electric shock, plug the power cord into a properly wired receptacle before connecting the product inputs or outputs.
- Route power cords and other cables so they won't be damaged.
- The AC receptacle (socket) should be located near the equipment and be easily accessible.
- Disconnect power before cleaning. Do not use any liquid or aerosol cleaner - use only a damp cloth.

- Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch exposed conductors and components while power is on. Do not insert anything into either of the systems two-power supply cavities with power connected.
- Do not wear hand jewelry or watches when troubleshooting high current circuits, such as power supplies. During installation, do not use the door handles or front panels to lift the equipment as they may open abruptly and injure you.
- To avoid fire hazard when replacing fuses, use only the specified correct type, voltage and current rating as referenced in the appropriate parts list for this product. Always refer fuse replacement to qualified service personnel.
- Have qualified personnel perform safety checks after any service.

Cautions

Please observe the following important cautions:

- When installing this equipment do not install power cords to building surfaces. To prevent damage when replacing fuses, locate and correct the problem that caused the fuse to blow, before reconnecting power.
- Use only specified replacement parts

Notices

Please observe the following important notes:

- When the adjacent symbol is indicated on the chassis, please refer to the manual for additional information.
- For the HD-2020 Chassis and Master Control Panel, refer to “Connecting and Disconnecting Power” - Chapter 2 (Hardware Installation).

Company Information

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CHAPTER 1

Quick Start

This Chapter contains the following:

System Parts Listing

The system components you have received (or will already have) may include the following:

- Utah 200 or 400 Router
- Control Card, housed within the SC-3 or SC-4 system (external). The system is also compatible with the SC-200.
- [White] Terminator box or UNET “Y” splitter cable. This device is placed between the SC-4 (or SC-3)and the MC-2020.
- MC-2020 mainframe (processor)
- MCP-2020 panel
- Controller Terminators for the Router and SC-3 or SC-4
- Ethernet Hub
- System Installation CD (with NFS Server license)
- CAT 5 to 9-pin serial adapter for diagnostic port
- MC-2020 Breakout Panel (optional)

Connections

The MC-2020 mainframe and SC-3 or SC-4 are connected via UNET cabling. The UNET cable is attached to its corresponding port on the back of the SC-3/4 controller (see the next illustration). Since UNET must be terminated, the cable is passed through a termination box or “Y” cable prior to being connected to the MC-2020. Termination is necessary since there is no loop through capability.

Ethernet Hub

The Ethernet hub is designed to accommodate a stand-alone operation when a house network is not available. The following devices connect to this central hub:

- SC-3 or SC-4
- MCP-2020
- MC-2020
- Computer control (optional, for RMS and Telnet operations)

(see figure 1-1)

Initial Activation and Confirmation

Once all connections have been made and the system is powered up, the system will scan the network and locate the processor assigned to Channel 1, then make the necessary connections via the UNET cabling.

The MCP-2020 will complete its brief test cycle and allow you to complete takes from the panel.

The system uses an SD video signal for reference input and timing control (on HD systems use an HD video signal). This can consist of house black or color bars. Though the default system configuration is for one channel, the panel has the ability to control a minimum of eight different channels.

Channels not located will display as ‘pending’.

Default IP Configuration

The single-channel default (factory set) IP configuration is as follows:

MC-2020	192.168.5.7
MCP-2020	192.168.5.11

Multiple chassis configurations will affect these addresses. Please contact customer service for more detail.

System Set-up - Visual Guide

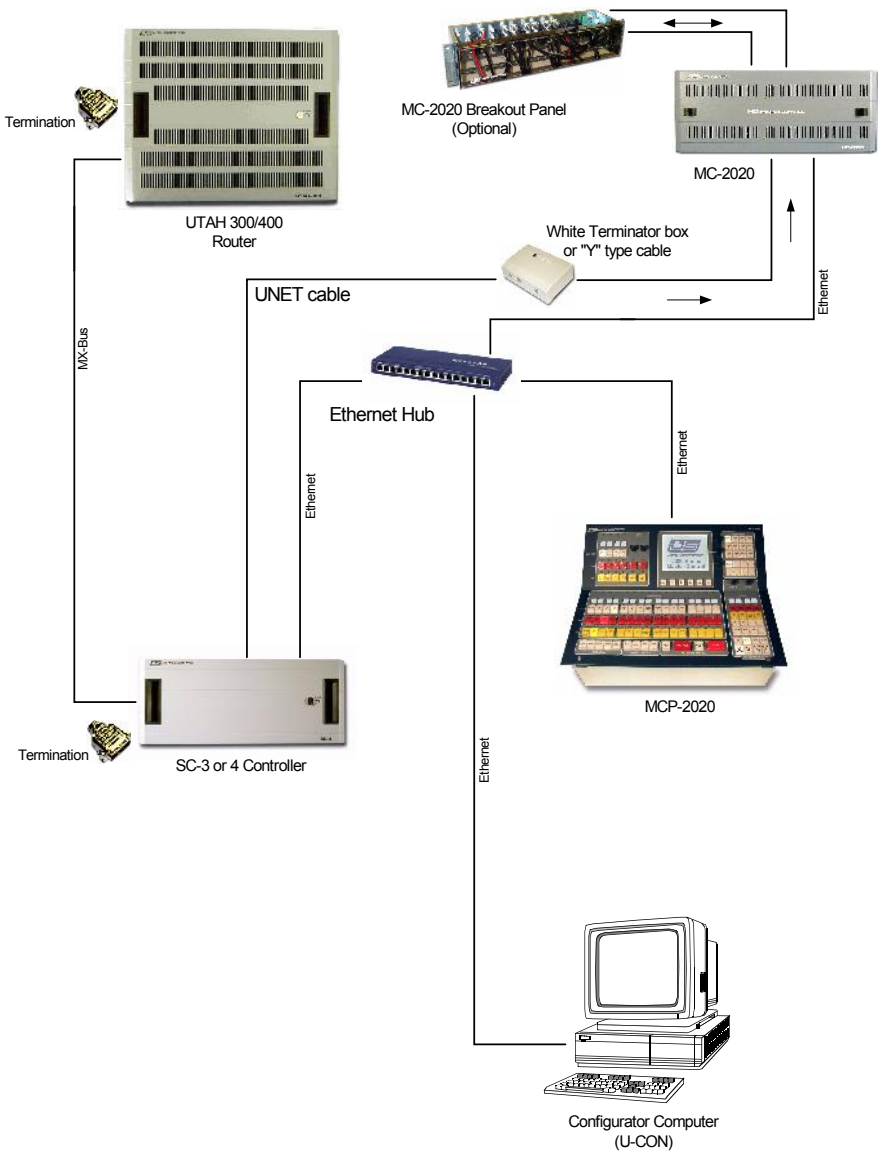


FIGURE 1-1. MC/P-2020 Basic Setup

CHAPTER 2

System Introduction

In This Chapter

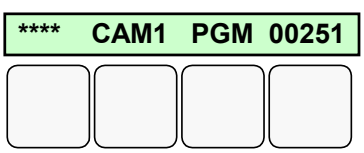
This chapter provides an overview for the operating terms and configuration within the Utah Scientific MC-2020 Digital Master Control Processor. The following topics are covered:

Conventions

The following conventions are used throughout this guide:

- Buttons, knobs, and connectors will be indicated by bold, upper case text in Arial Black font. For example:
  - Press the **PST** button **CGPGM** to…

- Upper and lower case Helvetica font will indicate displays and software instructions. For example:
  - The display above PVW keys one through four should indicate **** CAM1 PGM and 00251.



Abbreviations

The following abbreviations may be used in this guide: See Appendix A for an additional Glossary of Terms and further definitions.

TABLE 1. Common Abbreviations and Mnemonics

Abbreviation	Description
ATR	Audio Tape Recorder
AES	Audio Engineering Society
CPU	Central Processing Unit
DTR	Digital Tape Recorder
EBU	European Broadcast Union
ENET	Ethernet
HDTV	High Definition Television
I/O	Input / Output
IP	Internet Protocol
JPEG	Joint Photographic Experts Group
M-JPEG	Motion – JPEG
MPEG	Motion Picture Experts Group
MX-Bus	Utah Router Control Comm. Bus
RMS	Router Management System
RU	Rack Unit
SDI	Serial Digital Interface
U-Net	Utah Control Panel Comm. Network
UTP	Unshielded Twisted Pair
VTR	Video Tape Recorder

TABLE 2. Master Control Mnemonics

Abbreviation	Description
AUD	Audio
BRDR	Border
BACK	Background
CAM	Camera
CHAN	Channel
DEL	Delay
EMRG	Emergency
ENAB	Enable
FOR	Foreground
GND	Ground
PGM	Program
PRVW	Preview
PST	Preset
PVW	Preview
SRC	Source

Terms

The following terms are used throughout the documentation in this guide:

- "**Operator**" and "**User**" refer to the person using or operating the MC-2020 System.
- "**System**" refers to the entire interconnected MC-2020 System including control panels, routers, software, and chassis.
- "**Input**" refers to an audio or video signal source that is connected to the MC-2020.
    - One video input represents one High Definition or Serial Digital Interface video input signal.
    - One audio input represents a single monophonic track from an analog audio source.
    - One digital audio input represents two tracks (left and right channel) from a digital audio source.
- "**Source**" refers to an audio or video device whose output signals are connected to the MC-2020. Examples of audio / video sources are ATR's, VTR's, DTR's, cameras, video / audio routers, audio mixers, graphics systems, and satellite feeds.
- "**Output**" refers to the MC-2020 audio or video signals from the unit's "outputs", which are connected to the 'destination device'. This term also includes the physical output connectors on the frame.
- "**Destination**" refers to the device, which is receiving the MC-2020 output signal. This could include VTRs, monitors, satellite feeds, or video/audio routers.
- "**Signal Level**" refers to the logical level of the audio/video routers in relation to the entire connected system(s). Typically master control occupies the lowest logical level.
- "**Hot Swappable**" refers to a printed circuit board, which can be removed or replaced with system power "on".
- "**Control Panel**" refers to the physical human interface used to control the various systems in use.
- "**Display**" is the 'LCD Display' on the panels in use.
- "**Monitor**" refers to the monitor attached to the monitor matrix port of a video or audio router system.

- "**High Definition**" refers to all 720p and 1080i formats – as per SMPTE definition. The typical high definition data rate is 1.485 Gb/s and a 16:9 Aspect Ratio characterizes this technology.
- "**Serial Digital Interface**“(SDI)" refers to a serial digital video signal operating at 125 to 270 MB. Utah Scientific data rates for the serial digital router are 143, 177, 270,360 and 540 MB.

Introducing the MC-2020 Digital Master Control Processor

Utah Scientific's Master Control Processor System incorporates the latest technology and is designed to meet the most demanding user needs of the Master Control user.

The MC-2020 offers the following features:

- Control Panel is functional and flexible with software selectable keying.
    - Up to four individual keyer modules, luminescence or linear modes of operation.
    - Keyer capable of key block or fill video.
    - Squeeze Back with special effects (with optional SqueeceMAX™).
    - Logo / Bug Insertion with animation and special effects.
- Utah Scientific Router Interface.
- Video / Audio Server Interface.
- SD – 2020 Configuration
    - Operates at 270 (4:3)
    - Standard Definition SD Component Video
    - SMPTE 259 Specification
- HD – 2020 Configuration
    - 1.485 GB High Definition Serial Digital Component Video, 16:9 ratios.
    - SMPTE 292
- HD and SDI modes of operation possible in the same chassis
    - The Control Chassis is only 4 Rack Units High with Dual Channel Operation contained in a 7" by 17" chassis shell.
    - Two separate AC sources for each chassis section.
    - Redundant AC Power Supplies.
    - Two (rear-exhaust) cooling fans, removable from the back of the chassis. One fan is capable of cooling the entire chassis.
- Two Control Processor (CP-2020) slots per backplane, Four Control Processor's possible per chassis.
    - LAN Control
    - Open Automation Control – interfaces with most automation vendors.

- Machine Control for clip viewing.
- 21 On-Air / Preset tally closures
- Relay, Opto, or Opto-Relay Capable

- Video Inputs
  - Video Reference - active loop through.
  - Preset, Program, Preview
  - 4 Key Source / Fill

- AES-3 Digital Audio
  - Separate or Embedded
  - 48 KHz, 20 - 24 bit.
  - Eight (8) channels, four (4) AES Streams.
  - 8 Preset, Program, Preview Inputs
  - 8 External Audio 1, 2, 3.

- Two Ethernet Ports.
  - For remote connection of the Configuration Computer.
  - 1 port for local control panels.
  - 1 port for configuration; capable of Internet Access for remote (at home / office) use.
  - Capabilities include – hardware / software parameter setup.
  - Computer required for firmware, software updates and to enable optional features.

- One U-Net Port for Utah Scientific Router Control.

- One SMPTE Time Code Port – for real time reference (T.O.P.).

- AES Reference In.

- Four Ports each configured as RS-232 or RS-422.
  - Serial RS-422 ports – Sony / Ampex VTR Protocol.
  - RS-422 Interface to Utah Scientific Machine Control System.

- One remote Alarm Port.

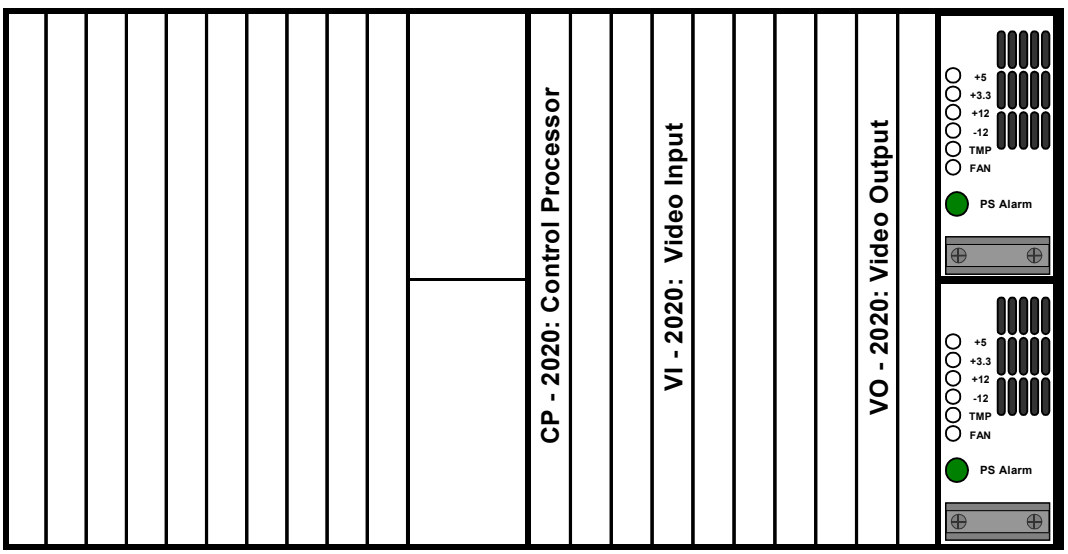
System Configurations

The dual chassis configuration for the MC-2020 Master Control has several variations. Shown in this unit are the basic configurations – variations are subject to the customer's requirements.

Sample Configurations

Several configurations are listed below – based on the minimum HD / SD to the maximum HD / SD system.

- **Minimum MC-2020 System**



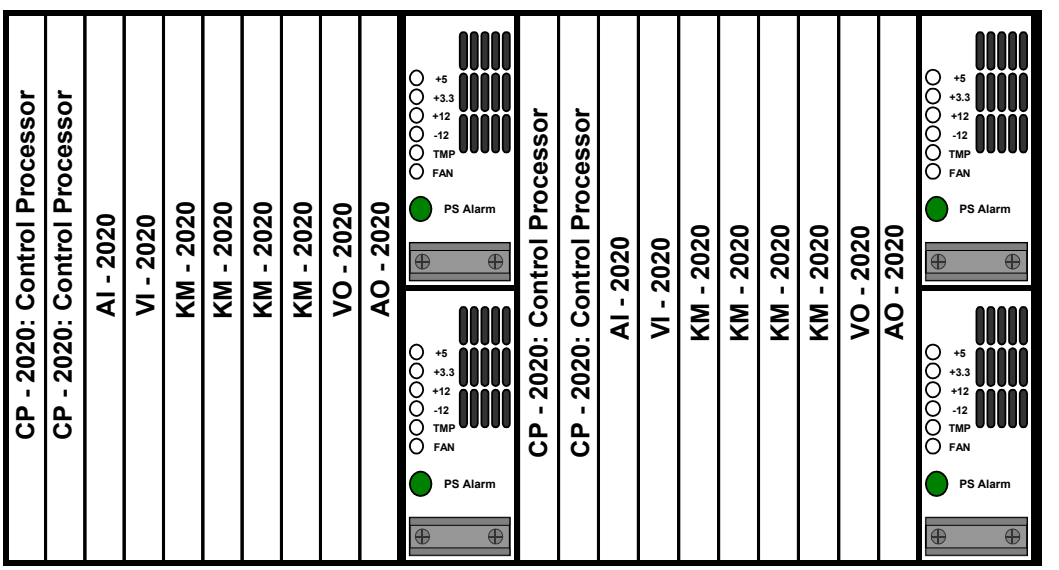
Includes:

- 1) CP-2020
- 1) VI-2020
- 1) VO-2020
- 2) Power supplies

Capabilities:

- Single Channel Operation
- Control functions
- Video Inputs: Preset, Preview, Program
- Video Outputs: Program, Monitor and Auxiliary
- Up to 21 Relays (on the CP-2020 Board)
- Can do mixing.

- **Maximum MC-2020 System**



Includes:

- 4) CP-2020 Control Boards.
- 2) Audio Input Boards
- 2) Audio Output Boards
- 2) Video Input Boards
- 2) Video Output Boards
- 8) Keyer Mixer Boards
- 4) Power Supplies
- 4) Relay Boards
- Dual Channel Operation

CHAPTER 3

Hardware Installation

In This Chapter

This chapter describes the backplane connections on the MC-2020 Control Processor. Check the system configuration that was ordered from the factory to determine which connections must be made at your facility. *Cable pin-outs are located in Appendix B of this manual.*

The following topics are discussed:

The MC-2020 Backplane

Figure 3-1, below, shows the layout of the MC-2020 backplane, the connector locations and general function of each connector group.

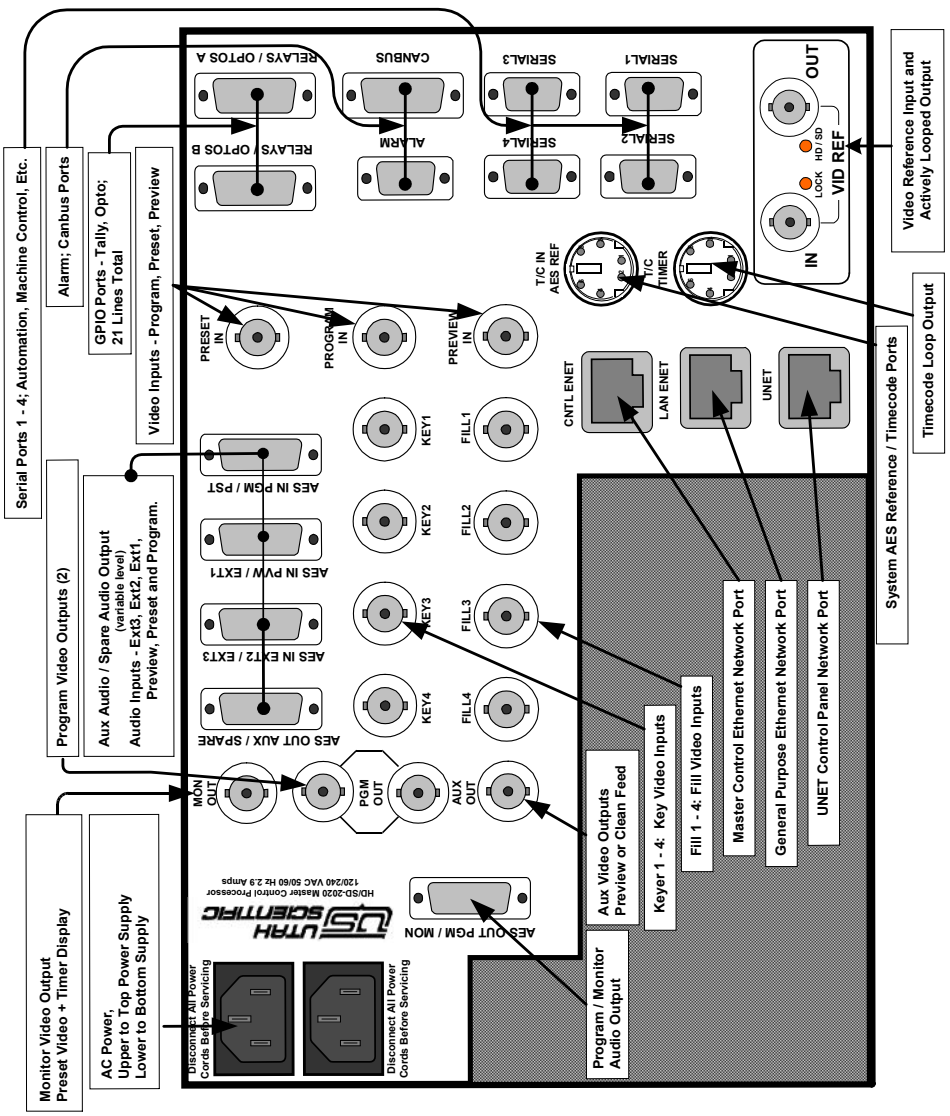


FIGURE 3-1. MC-2020 Backplane and Legends

AC Power Connections

The MC-2020 rear panel has fully redundant AC power supply connections to each chassis section.

The recommended AC power cord is USI Part Number 42490-0003; Belden 17500, 10A/ 125VAC, 1250 Watts, max voltage rating 300 VAC.

Caution: The socket outlets should be installed near the equipment and be easily accessible to the operator.

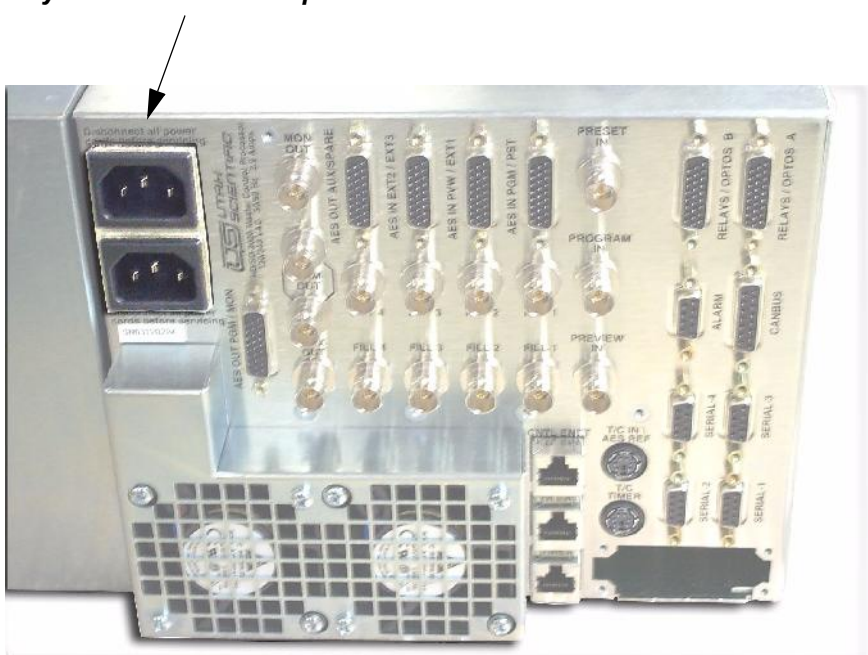


FIGURE 3-2. Power connection locations

Video Input Connections

Video Inputs

Including *Digital Black*, there are twelve video input connections in the MC-2020 chassis. The sources for the Serial Digital Video inputs must not exceed 300 Meters (1000 feet), using 8281 coaxial cable, and High Definition SDI Video must not exceed 150 Meters (500 feet) using1694A coaxial cable.

The following inputs are present on the MC-2020 backplane chassis:

- Preset in
- Program in
- Preview in
- Key inputs 1 – 4
- Fill inputs 1 – 4
- Video Reference

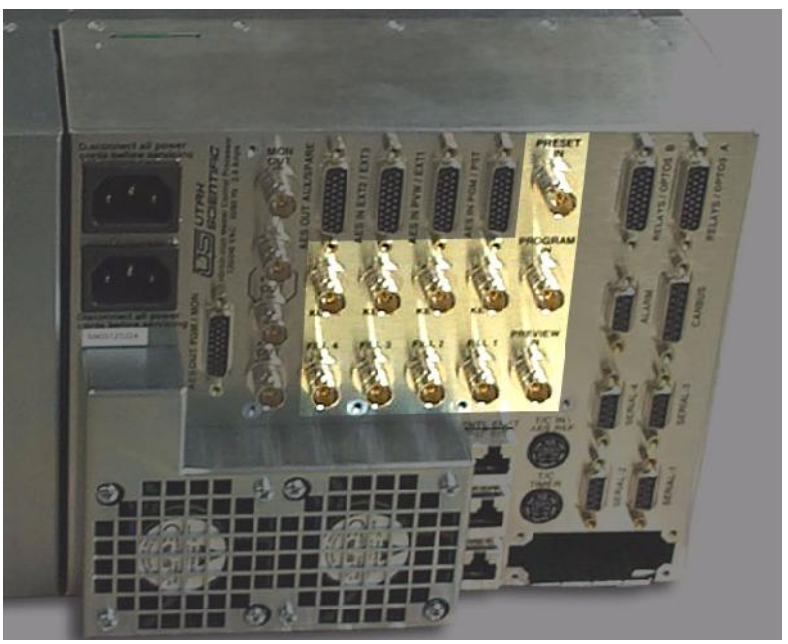


FIGURE 3-3. Video inputs

Input Definitions

Caution: Carefully route all cables to provide proper strain relief and EMI shielding.

Video Sources:

Most sources will originate from an HD or SD router on site. The outputs from these routers are assigned to the various inputs on the MC-2020 chassis. Unlike the older analogue master controls, there is no cable timing required (cutting the coax cables to a specified length) if the cables are under the specified maximum length. All sources should be within +/- ½ Line or 1 Line of the video reference signals.

Program, Preset and Preview In:

These connectors receive their inputs from three busses on the associated routing switcher. Cables should be approximately the same length. The processor's input circuitry has a correction window of ±1/2 line with respect to the reference signal; router sources must be timed to within this window for correct operation of the system

Key and Fill Inputs:

There are key and fill inputs associated with each of the four keyer card positions in the frame. In a basic system, a card is present in the KEY 1 position (the rightmost position when looking at the rear of the frame). Optional keyer cards may be present in the other card positions.

The key signal (hole-cutter) is connected to the upper connector and the associated fill signal is connected to the lower connector. The timing requirements given above apply to the key and fill signals as well. If the key signals are being fed from a router, ensure that the timing is correct through the full signal path.

Video Reference:

The system reference video signal is connected to the REF IN connector. (This can be any SMPTE 259M signal for SD or any SMPTE 292M signal for HD. **Not tri-level sync**.) An active loop-through is provided to extend the signal to other devices in the system. Indicators near the connector will show when the processor is locked to the video and will indicate whether an SD or HD signal is serving as the reference.

TABLE 3-1.

Lock	HD/SD	Mode
GRN	Flashing	No signal is sensed

The Video Reference connection block on the lower right corner of the MC-2020 Chassis rear panel provides an Input and an Output BNC connection. The Input should be connected to a Serial Digital Video Source (described above), which is IN-TIME and IN-PHASE with the HOUSE SYNC. The sync output is provided for looping reference through the MC-2020 and onto other equipment.

Note: The user must be aware that this is an "ACTIVE / RE-CLOCKED" loop through circuit. This output is re-buffered to drive a double terminated load if necessary and clock jitter may be reduced on the output because it is re-clocked.

The video reference output will go inactive if the following conditions occur:

1. Power to the chassis fails!
2. After a chassis reset where it will be inactive for approximately one second after the reset!

The user should insure that equipment downstream of the Video Reference Output would tolerate this type of interruption to the reference signal.

Video Output Connections

There are three outputs on the MC-2020 chassis, these are:

- Program Out
- Monitor Out
- Auxiliary Video Out

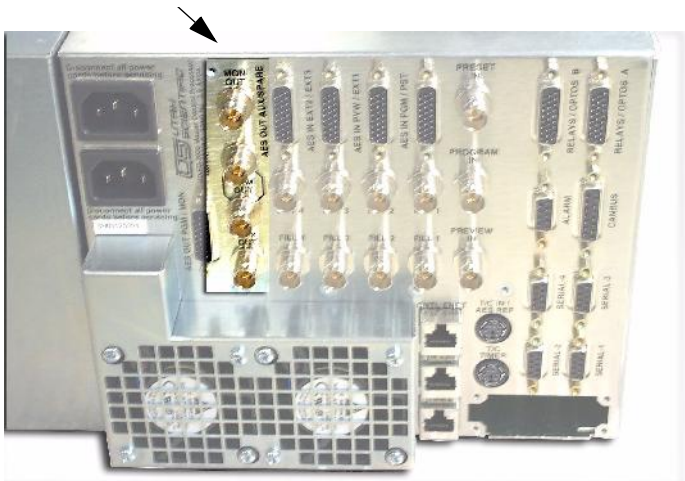


FIGURE 3-4. Video outputs

Program Out:

Two connectors are provided for connection to downstream equipment and monitoring equipment.

Monitor Out:

This connector carries a signal that consists of the switcher's Preset bus plus additional information such as clock displays, source ID information, etc. Under software control, this output can be switched to the Preview bus. (See the MCP-2020 Operations Guide for more detail.)

Auxiliary Video Out:

Depending on the system configuration, this connector carries either the Preview bus signal or a clean feed signal that is Program video without keys inserted.

Audio Connections

The basic processor frame works with audio embedded in the SDI or HD-SDI signals. Up to four embedded AES streams can be manipulated within the processor. The video outputs of the processor carry embedded audio data.

If operations with separate AES audio streams are required, the optional audio input and output cards must be installed.

The AES audio connections are supplied by a set of 26-pin D connectors. Each connector carries 8 AES signals – corresponding to four levels for each of two signal groups. For example, the first connector in the audio input section carries Program In and Preset In – each with up to four AES signal levels. Following are the signal assignments for the AES audio connectors:

AES INPUT CONNECTOR #1: Program Bus In, Preset Bus In

AES INPUT CONNECTOR #2: Preview Bus In, External Audio 1

AES INPUT CONNECTOR #3: External Audio 2, External Audio 3

AES OUTPUT CONNECTOR #1: Program Audio Out, Monitor Output (Fixed Level)

AES OUTPUT CONNECTOR #2: Auxiliary Audio Out, *Fixed Level* Spare Output (Variable Level)

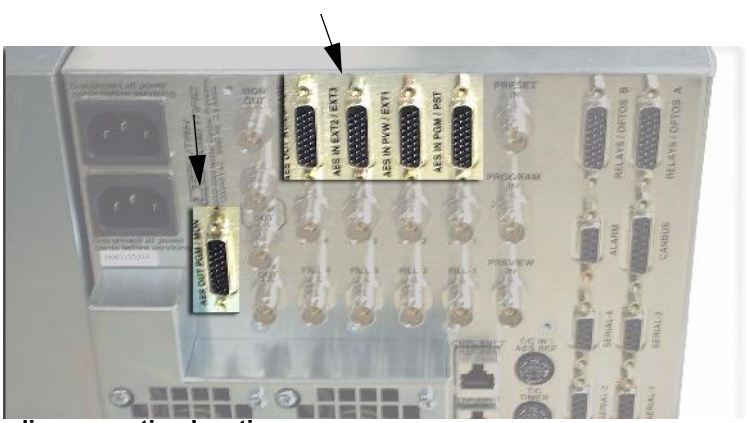


FIGURE 3-5. Audio connection locations

AES Reference Input

When the AES option boards are installed, the system can be fed with an AES reference signal that is locked to the video reference signal. AES reference is not required, but may be used to lock the phase of the MC-2020 AE's outputs to a specific AES reference.

Audio Monitoring

Previously, all audio monitoring was handled via the Audio Input card's LEDs. The upper LED indicated whether or not reference existed, while the lower LED indicated the presence of data, and whether or not this data was asynchronous. The Output card's only usable LED (for audio purposes) had been the RED reference lamp.

The Audio Output card (part #121092-1) now contains two rows of LEDs that represent each of the AES pair outputs; Program, Monitor, Auxiliary, and Spare. This is available as a means of checking the legitimacy of the audio level. Each of these LED sets are modulated to the actual program volume, and the LEDs will change color as the volume is physically adjusted.

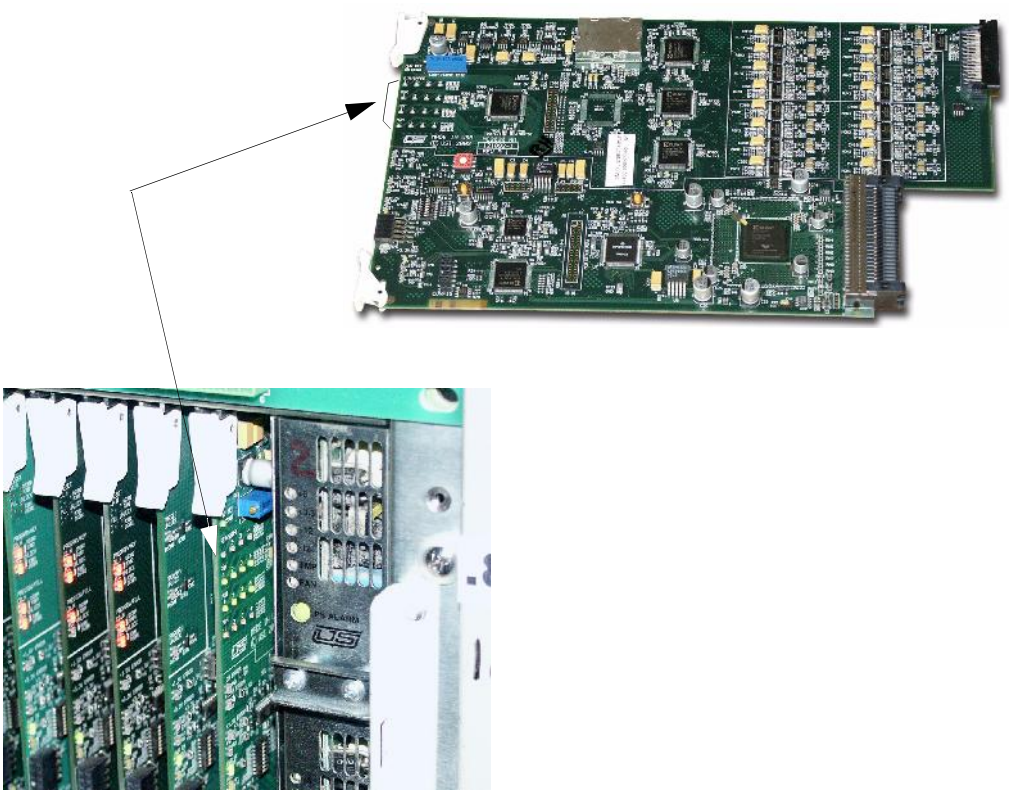


FIGURE 3-6. Audio Output card LEDs

The absence of any light indicates no audio, green indicates an appropriate level, and shades of orange to red is an alert of volume surpassing the 20dB range.

Control / Network Connections

The control / network connections consist of the following:

- The Control Ethernet (CNTL ENET) Port.
- The LAN Ethernet (LAN ENET) Port
- The UNET Control Panel Networking Port.
- Time Code Input Ports
- Serial Ports 1 – 4
- Alarm Port
- CANBUS Port
- GPI / GPO Ports

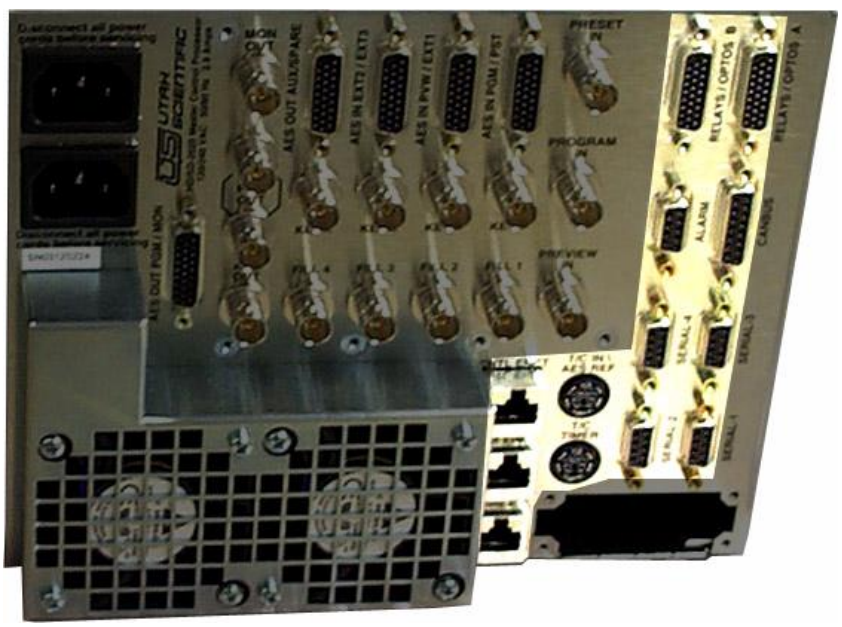


FIGURE 3-7. Control/Network connections

See Figure 1-1 for the complete block diagram of System Connections.

Port Functions

Control Ethernet Port:

The Control Ethernet Port is a 10/100 Base-T topology. Its primary purpose is attachment to a closed control Ethernet LAN, shared by other Utah Scientific devices.

The Master Control LAN is connected to this RJ-45 connector. This LAN interconnects all of the Control Panels and Processor Frames in the system. Standard wiring devices such as hubs, routers, etc. can be used as required

LAN Ethernet Port:

The LAN Ethernet Port is a 10/100 Base-T topology. This port is used to interface with a configuration terminal or computer, machine control or automation systems. Each MC-2020 chassis section has its own unique IP Address (for each Ethernet port), allowing several MC-2020 controllers to be installed on the same network.

UNET Port:

The UNET port is used with the Utah Scientific control panel network and the SC-3 or SC-4 controllers.

A mini UNET Hub is supplied with each MC-2020 Chassis. It must be connected to the MC-2020 Port with a short length (1 foot or less) of UNET cable. This is a daisy-chained network and one port of the hub must be terminated. If the UNET port is unused on the MC-2020, termination is recommended using the “Y” cable or white terminator box.

The total length of the UNET cable in this daisy chain must not exceed 300 meters (1,000 feet.).

Utah Scientific does not supply the UNET cables. They may be purchased or constructed using Category 5, UTP (unshielded twisted pair) cable with RJ-45 male connectors.

See Appendix B for the pin outs of the UNET cable.

TIMECODE INPUT PORTS

These connectors are used to bring a system clock into the system for display on the control panel.

See Appendix B for the pin outs of the Timecode port cable.

SERIAL PORTS 1 - 4

These RS-422/232 ports can be configured for communication with automation systems, for machine control, and for other communications tasks. Port protocols and settings are configured by the configuration utility.

See Appendix B for the pin outs of the Serial Ports cable.

ALARM PORT

This connector provides contact closures that correspond to the various alarms generated by the processor frame for conditions such as power supply failures, etc. Refer to the appendix of this manual for pin-out information on this port.

See Appendix B for the pin outs of the Alarm Port cable.

CANBUS PORT

This connector is not used at the present time.

See Appendix B for the pin outs of the CANBUS Port cable.

RELAYS / OPTOS: Ports A and B

These connectors carry contact closures that can be linked by the configuration utility to various functions of the master control system.

Tally closures, external device control, machine control closures, etc. can be provided by these ports. Refer to Appendix B of this manual for pin-out information on these ports.

These ports can optionally be configured to receive contact closures for remotely triggering functions of the master control system. Please contact Utah Scientific for details of this option.

A Resistor should be used within the circuit to limit current, preventing the Relays or Optos from being damaged.

Relay Optos Specification

Relay = Voltage should be less than 24 Volts, current not to exceed 1 Amp (maximum)

The use of series current limiting resistors in circuits involving relays and optos is required. A 1k current limiting resistor must be placed in line with the circuit above to prevent damage to the relay.

Optos = 10 milliamp (typical), 40 milliamp (maximum) - The voltage required to drive the opto must be between ***5 to 12 volts.***

A 1k pull up resistor must be placed in line with the circuit above to prevent damage to the Opto.

GPIO's (21)

Labeled 'Relays/Optos A and B'

'A' represents 1-10, and 'B' represents 11-21

There is a daughter card on the MC-2020 CPU card with either 21 relays or a mix of 16 relays and 5 optos. The 21 relays is for GPO's only and require a current limiting resistor of 1k to be attached in line with the external device to be triggered by the relay. The system is shipped by default with a 16/5 mixed card which provides 16 GPO's and 5 GPI's. NOTE: For GPI use, an additional 5-12 volt supply must be applied to the connection, and a 1k pull up resistor to be placed in line with this external power source. Apply the positive side of the voltage source to one side of the external GPO. Apply the other side of the external GPO to one side of the pull up resistor. Apply the other side of the pull up resistor to one of the two connections on the GPI of the MC-2020. Apply the other side of the GPI on the MC-2020 to the negative side of the power source. Additional setup must still be done in the configuration file for the MC-2020 to enable the functionality for either use.

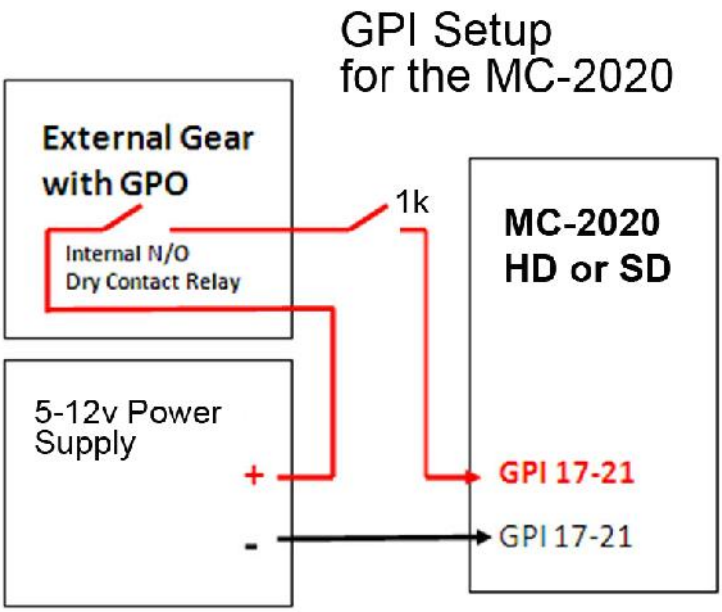


FIGURE 3-8. GPI Setup for an MC-2020

HD/SD System Connections

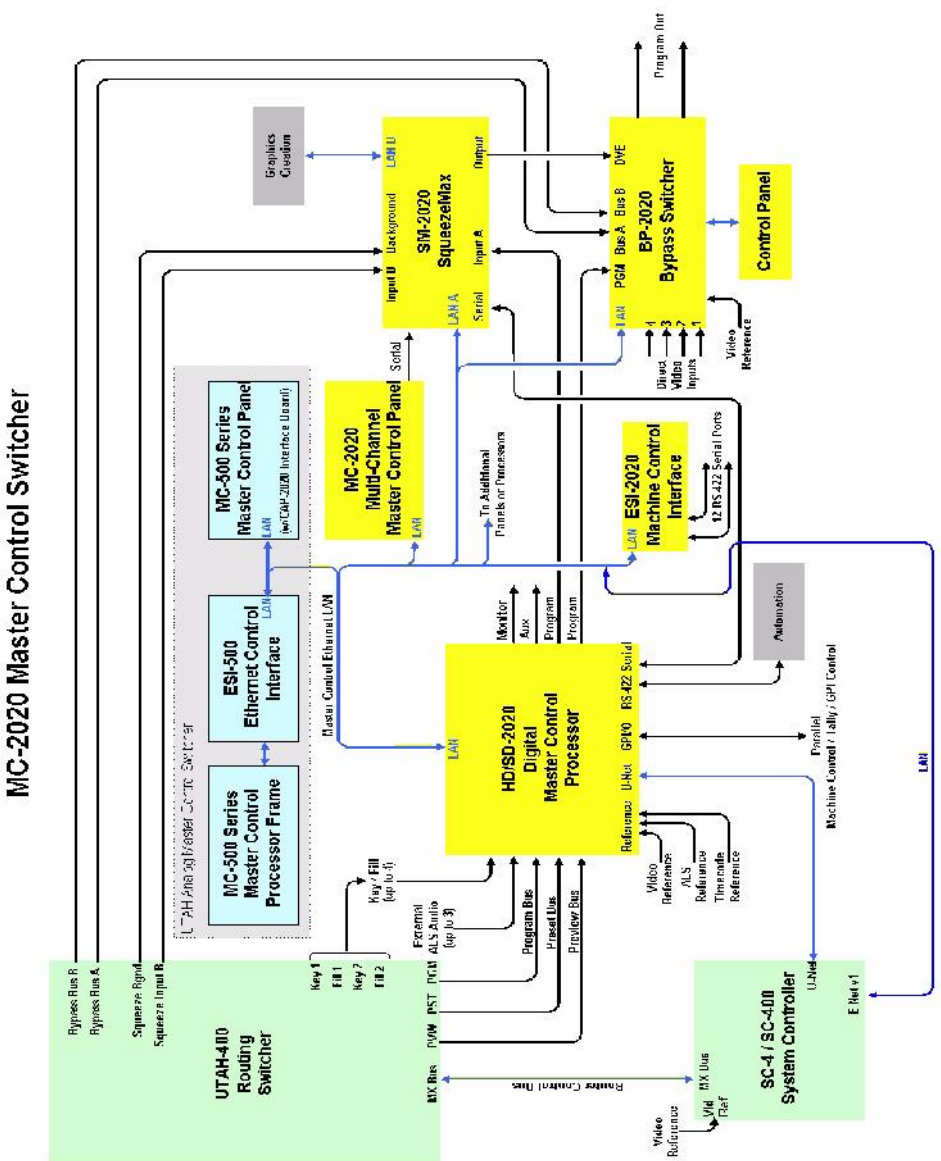


FIGURE 3-9. HD/SD System Connections

CHAPTER 4

MC-2020 System Components

In This Chapter

This chapter describes the primary board components within the MC-2020 and provides the user with a list of the features and functions for each.

The following topics are discussed:

The Control Processor Board -- MC-2020

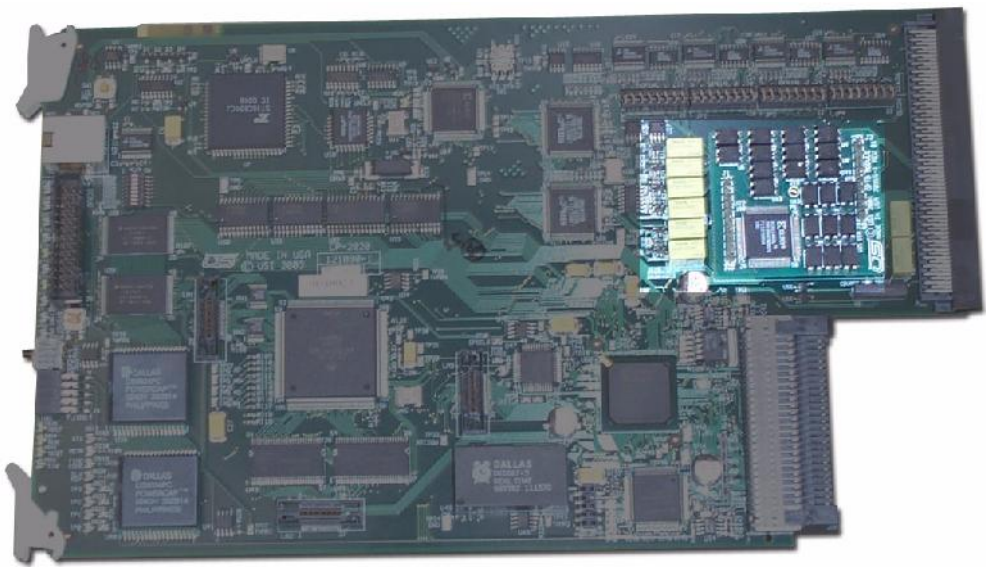


FIGURE 4-1. Control Processor Board

Part number 121090-1, the Control Processor interfaces with the control panel and all boards in the Digital Master Control Processor. Its primary function is to integrate the video, audio and machine control operations in a single unit and to provide a seamless operation of all SDI and HD video signals, making them invisible to the viewing public.

The CP or Main Processor board is the heart of the MC-2020. All controllable functions, including serial data, synchronization, alarms and time codes are integrated in the Control Processor.

The main features of the CP-2020 are:

- The Main Processor
- Communication Ports
- Alarm Circuits
- Information Display LED Indicators
- Dipswitch Functions

- Daughter Boards

Two daughter boards are available to plug onto the Control Processor Board.

- 21 Relay (part number 70954-1) *standard*
- 16 Relay - 5 Opto (part number 121087-1) *optional*

(A daughter board with a variation of both optos and relays is also available.)

Video Reference Card

Video Reference is maintained on a separate card component, rather than within the Control Processor board itself. Part number 121088-01 (60Hz) or 121088-02 (50Hz), this smaller card accepts the video reference signal and plugs directly into the backplane (I/O motherboard).

The Video Reference card contains two LED's that can be seen from the back of the chassis. They are marked as, LOCK and HD/SD. They are normally used to show the status of the video reference input. ***Do not use tri-level sync.***

LOCK = solid Red, HD/SD = not lit

No connection to the VidRef card input, or un-stable video input - VidRef card is not locked.

LOCK = solid Green, HD/SD = solid green

VidRef card is locked to HD video reference.

LOCK = solid Green, HD/SD = solid amber

VidRef card is locked to SD video reference.

LOCK = solid Green, HD/SD = blinking green

VidRef card is locked to video reference in, but reference is not HD video, or wrong HD video standard.

LOCK = solid Green, HD/SD = blinking amber

VidRef card is locked to video reference in, but reference is not SD video, or wrong SD video standard.

The MC-2020 CPB (Control Processor Board) also displays the VidRef cards reference input status. There are two LED's located at the top of the board, behind the white card extractor and just above the RJ-45 connector. They are labeled **REF LOCK** (DS1), and HD/SD (DS2). These LED's will match the displays of the VidRef card status as shown above, except for the blinking of the HD/SD LED. When the VidRef card is locked to a reference input (though the i8nput is not the correct video type or expected standard), the MC-2020 CPB's VidRef status LED's will indicate Red for the **REF LOCK** LED, while the HD/SD LED will not be let. This should indicate a problem with the reference input, which may require some attention.

The Main Processor Structure

Component	Parameter
Flash Prom	8 MB X 16
SD-RAM	32 MB
Battery Backed Ram	32 KB X 8/1 MB X 8
Redundancy	Fully Redundant
Swap	Hot Swap Capable

Communication Ports

Component	Parameter
Serial Ports	4 – RS-232 / 4 – RS-422 (individually selectable)
Ethernet Ports	2 / 1 - for configuration
UNET Ports	1 – connector loop[a]
SMPTE Alarm	2 – Relay Terminals
Time Code	1 – Input / 2 – Output
AES Audio	Sync Reference – Balanced Audio

a. Loop through accomplushed with “Y” cable or termination box.

Alarm Circuitry

Alarm	Function
Watchdog	Monitors the processor for any failures. If a failure occurs the watchdog will generate an alarm and will switch to the redundant CP board. The watchdog is also active in the slave processor, monitoring the heartbeat between the master and slave. If the heartbeat is not detected, the slave will take control from the master CP board.The watchdog will also reset the processor.
Power	Monitors the +3.3, +1.8, and +5.0 DC Voltages.
Temperature	Monitors the power supplies for any over temperature condition. Temperature monitoring takes place at other critical board locations as well.
Fans	Monitors each fan tachometer, reports a failure condition if either fan fails.
System Board	Monitors all boards installed in the system for errors.
Master / Slave	Monitors redundant Control Processor Boards. Will notify user if **Master CP** fails or if the **Slave CP** fails while in standby mode.

Information Display LED Indicators

Indicator	Color	Location
Power On	Green	Mid-point of CP Board, above S1
Master / Slave	Green	Bottom of board, behind extractor
Communication	Amber	Control Processor Board - Indicators for UNET and Ethernet
Alarm Status	Red	Bottom of board, above extractor

LED Locations on the Control Processor Board

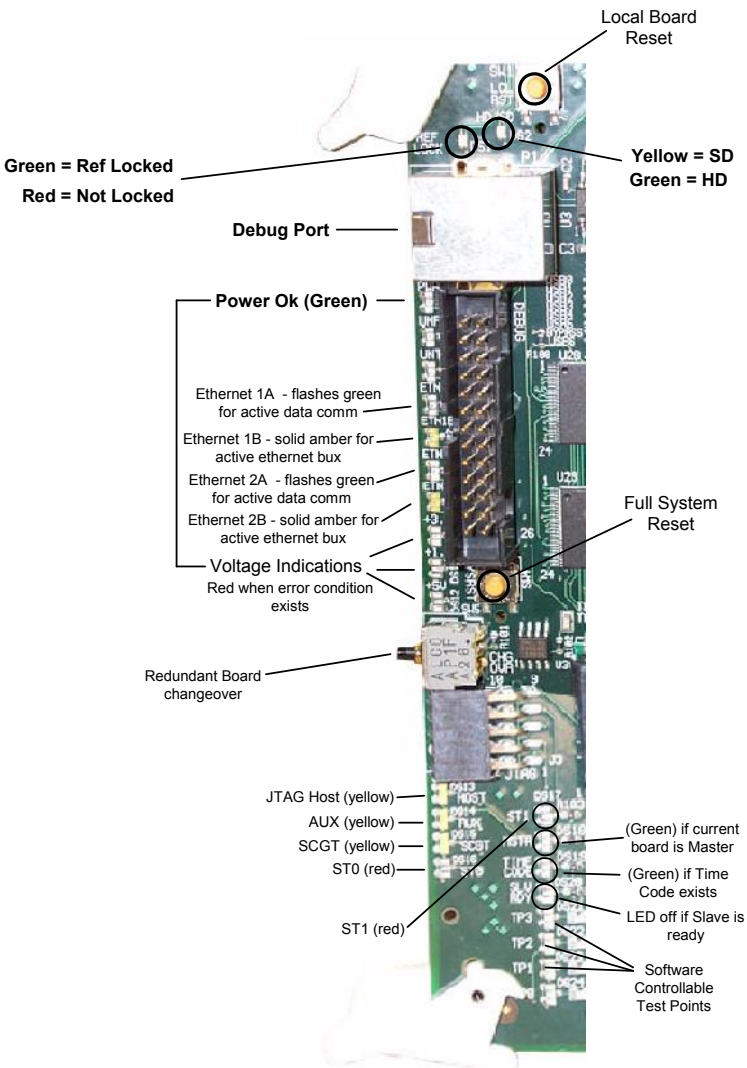


FIGURE 4-2. LED Indications for the Control Processor Board

LED Definitions (additional)

Reference Lock

The CPU card is receiving a valid reference, either SD or HD.

Power

The power LED remains green if all voltage indications are normal.

JTAG Programming

LED	Illuminated when --
Host	Plugged in to host port to program onboard JTAG
Aux	Plugged in to backplane to program onboard JTAG
Scan gate (SCGT)	Any time scan gate is accessed
ST0	Status LEDS -- turn red to indicate error condition associated with the designated scan gate device

Dipswitch Functions

The dipswitch positions are preset at the factory. Do not modify these unless instructed to do so during software updates or by Utah Scientific Customer Service personnel.

Board Resident Relay Functions

Relay	Function
K-1 / K-2	U-NET
K-3 Thru K-6	Ethernet
K-8	SMPTE Alarm

SMPTE Alarm Function

One main SMPTE alarm relay is provided with the MC-2020 Control Processor Board. If, for example, any alarm condition is sensed from the power supply, temperature, or fan, the SMPTE alarm relay contacts will close. This alarm condition is typically indicated by a custom configured LED (and/or audible alarm) in close proximity to the MC-2020. The plug-in for the SMPTE alarm is located below:

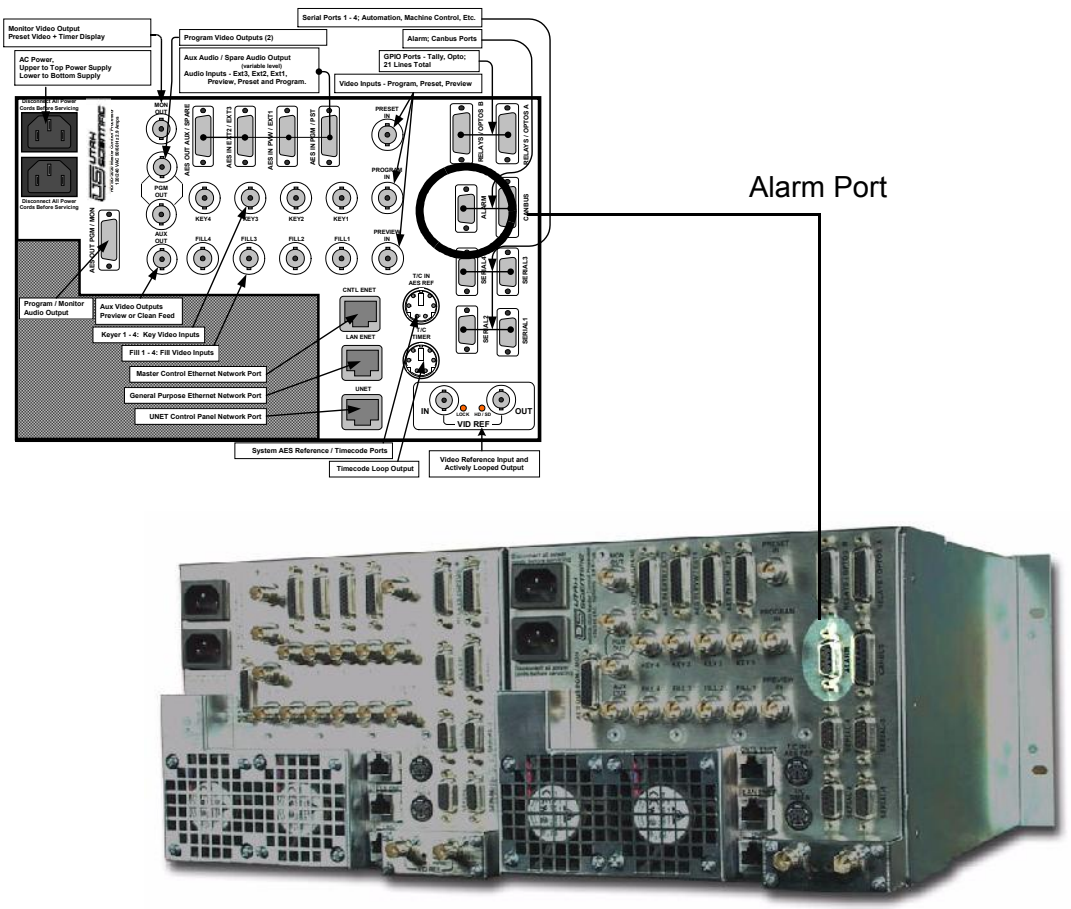


FIGURE 4-3. Alarm connection (MC-2020 rear)

Refer to Appendix B for pinout detai.

The Video Output Board

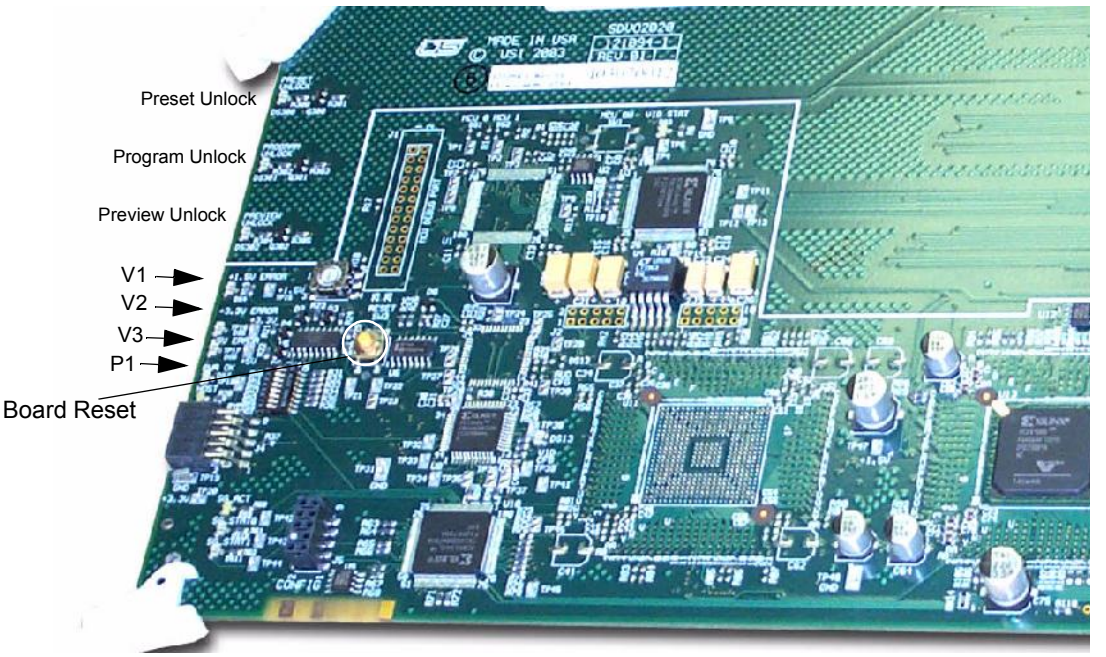


FIGURE 4-4. MC-2020 Video Output board

The top three indicators (Preset, Program, and Preview) will illuminate bright red if any one of the three signals are unlocked. The LEDs will remain off or dimmed red when locked to the external reference.

Voltage and Power Indicators

Indicator	Color	Location
Voltage Error - 1.5v	Red	V1
Voltage Error - 5v	Red	V2
Voltage Error - 3.3v	Red	V3
Power Ok	Green	P1

Video Input Board

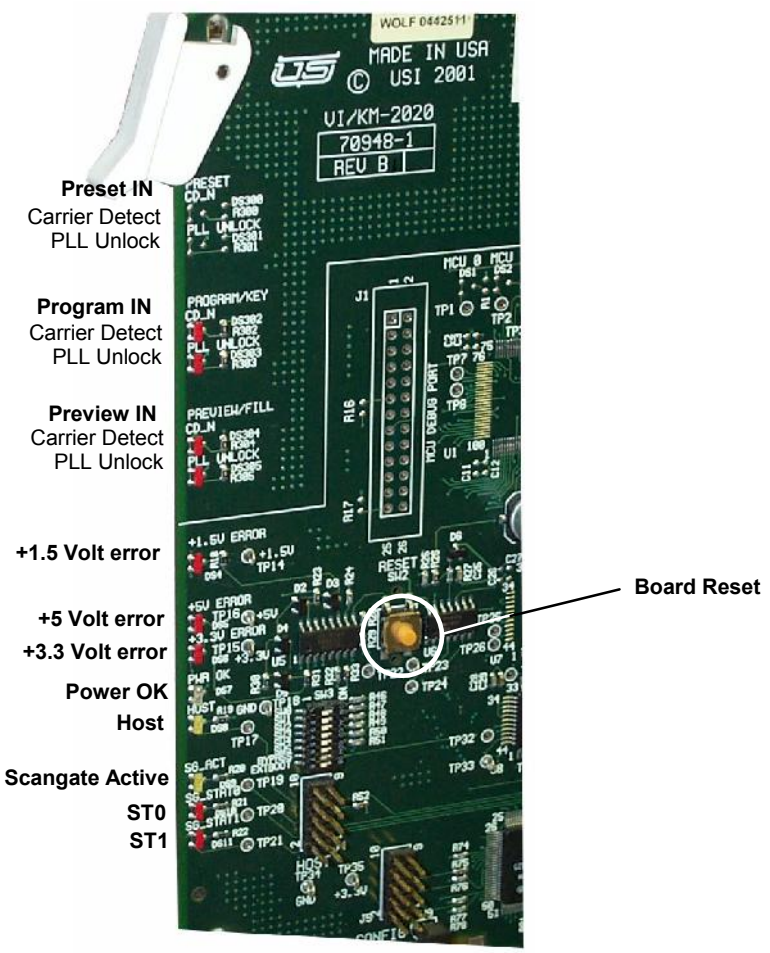


FIGURE 4-5. Video Input board indications

The PLL Unlock and Carrier Detect LEDs will be off (or dimmed red) when valid SD or HD signals are present on the input ports. The LEDs are bright red when the proper video signal is *not* sensed on the inputs.

Voltage and Power Indicators

Indicator	Color	Location
Voltage Error - 1.5v	Red	V1
Voltage Error - 5v	Red	V2
Voltage Error - 3.3v	Red	V3
Power Ok	Green	P1

APPENDIX A

Troubleshooting

In This Appendix

This Appendix is designed to help the user diagnose problems within the MC-2020 System. Since there are no repairable boards in the system, you should contact Utah Scientific Technical Services at 800-447-7204 regarding any problems you may be having. Should any printed circuit boards need repair, Technical Services can advise you on shipping and on the repair process.

Subsystem Level Troubleshooting

A switching system is typically comprised of the following subsystems:

- Video System
- Control System
- Power System

Fault finding is simplified by first isolating the problem to one of these subsystems. For example, if the audio-system is functioning normally, but there are problems with video, the problem is probably confined to the video system.

Main Troubleshooting Chart

The following table provides an indication of what subsystems should be reviewed for common problems.

Please note:

- The numbers shown in the four Subsystem Table Reference columns indicate specific troubleshooting problems that are found in the four individual Subsystem Tables.
- For example: a 1 listed under the Video column refers to problem number 1 in the "Video Subsystem Table" on the following page. Here you will find a list of specific checks that will assist in troubleshooting the problem.

TABLE A-1. Main Troubleshooting Table

	Subsystem Table Reference			
Problem	**Video**	**Audio**	**Power**	**Control**
No Video or Audio outputs	1	1	1,2	1
Video and Audio outputs are present but neither can be switched	2,3	2,3		1,2,6
No Video output, Audio functions normally	1,2,3		1	2
No Audio output, Video functions normally		1,2,3	2	2
Video switches normally but audio does not switch		2,3		2
Audio switches normally but the video does not switch	2,3			2
Flash on video when switching	4			
Cannot access expansion inputs or outputs of video level	5			
Audio signal level incorrect		4		
Video signal level incorrect	7			
Video signal anomaly	5,6,8			
Video monitor matrix not functional	9			
Audio monitor matrix not functional		5		
Control panel does not function				1,2,3
Control via serial port not functional				4
Ethernet control port not functional				5
Alarm port active			3	6
SC-3 or SC-4 Ports not "Active"			3,4	4,5
Undefined level types in SC-3 or SC-4 Controller				1,2,4

Video Subsystem Troubleshooting Table

Use the following table to troubleshoot specific video subsystem problems. The numbers in the left-hand column indicate specific references from the Video column in the **Main Troubleshooting Table**.

TABLE A-2. Video Subsystem Troubleshooting Table

Problem		Check
1	No video output	• Control cable connected, or internal controller functional? • Different input works on output bus? • Other outputs functional?
2	Unable to select a specific input	• Control panel programming correct? • Output signal level locked or protected?
3	Unable to select any input	• Control cable connected? • Control panel defective? • Controller failure?
4	Video flash when switching between inputs	• Input sources timed correctly? • Input reference signal present and timed? • Input reference correct standard? • Correct video standard jumper set on controller board?
5	Inputs / Outputs inaccessible	• Expansion matrix crosspoint cards present?
6	Sync missing on video output	• Sync present on selected input? • Normal DC level on input?
7	Video output level incorrect	• Input level correct • Output terminated at destination? • Input/output compensation jumpers correctly set?
8	Sparkles on video output (digital)	• Input signal amplitude too low? • Cable length > 300 meters on input?
9	Monitor Matrix not functional	• Selected correctly on control panel?

Power Subsystem Troubleshooting Table

Use the following table to troubleshoot specific power subsystem problems. The numbers in the left-hand column indicate specific references from the Power column in the **Main Troubleshooting Table**.

TABLE A-3. Power Subsystem Troubleshooting Table

Problem		Check
1	No video output	• Power applied to video frame? • Warning indicators on the front of each power supply? • Control cable between chassis connected?
2	No audio output	• Power applied to audio frame? • Warning indicators on the front of each power supply? • Control cable between chassis connected?
3	Alarm active	• Voltage alarm active (LED on)? • Fan alarm active (LED on)? • Temperature alarm active (LED on)?
4	Controller power	• Power applied to controller frame?

Power Supply Alarms

Power supply alarms are indicated by red LEDs on the front of each power supply module. They consist of voltage, fan, and temperature alarms.

- The voltage alarm indicates that one of the supply voltages is either too high or too low.
- The fan alarm indicates that the fan has stalled.
- The temperature alarm indicates that the temperature is elevated in the power supply. This may be caused by dirt or dust blocking the airway, a defective cooling fan, or by operation in extreme temperatures.

Note: Optional redundant power supplies may be fitted to most MC-2020 systems. In this configuration, the failure of a power supply should not affect normal system operations, but users would be unaware of the power supply failure. Thus, it is highly advisable to utilize the SMPTE alarm output provided at the rear of the chassis.

Control Subsystem Troubleshooting Table

Use the following table to troubleshoot specific control subsystem problems. The numbers in the left-hand column indicate specific references from the Control column in the **Main Troubleshooting Table**.

TABLE A-4. Control Subsystem Troubleshooting Table

Problem		Check
1	No control of any level	• Internal controller operating? (see below) • External controller connected? • Control panels connected? (see below) • MX bus terminated? (see below) • U-Net terminated? (see below) • Completed controller software upgrade?
2	No control of individual signal level or levels	• MX bus cable connected ? (see below) • MX bus correctly terminated ? (see below) • Is non functional signal level address set correctly ? • Control panel programmed correctly ? (see "Operations") • Output locked or protected on that level ? (see "Operations")
3	Control panel not functional	• Panel address set to unique number? • Completed panel software upgrade?
4	Serial control port not functional	• Communications baud rate incorrect? • Serial control Protocol incorrect? • Serial control cable wired correctly?
5	Ethernet port not functional	• Ethernet option fitted? • Connected to PC directly by null cable? • Connected to network via gateway?
6	Alarm active	• Active CPU indicator extinguished? (SC-3) • Heartbeat indicator extinguished? (SC-3) • MX activity light does not flash? (SC-3)

System Controller Alarms

System controller alarms are indicated by LEDs on the front of each controller card.

- Either an active LED (DS4) or standby LED (DS5) should be lit on each controller card. If only one controller is present (non redundant system), the active LED (DS4) should be illuminated.
- The heartbeat LED (DS6) indicates that the processor is communicating with the vital parts of the system and is running the application software.
- The MX LEDs indicate communication with the crosspoint matrix. The transmit LED (DS8) will flash whenever communication is being made from the controller to the matrix. The receive LED (DS7) will flash whenever communication is being received by the controller from the matrix.
- U-Net is used for communication between the controller and the control panels. The U-Net data and U-Net transmit enable LEDs (DS9 and DS10) indicate when information is exchanged between the system controller and a control panel.
- If the active LED (DS4) is on and the U-Net transmit enable LED (DS10) is off, this indicates that a controller software upgrade has failed and the controller is waiting for a valid controller software upgrade to be uploaded.

Please note the following additional points regarding the controller:

- If used with an SC-2 or SC-3 system controller consult the appropriate controller manual for details about the controller card.
- The total MX bus cable length must be less than 300 feet and must be terminated at the last chassis.

Control Panel Troubleshooting

If your control panel does not control any of the matrix, check that power is applied to the panel.

- Panels communicate to the controller by a special network known as U-Net. Panels are connected together daisy chain style to the controller. Removing a panel physically from the network will break the chain and disconnect panels downstream from the controller.
- U-Net uses unshielded twisted pair cable. It requires two twisted pairs terminated in an RJ 45 connector. The maximum length of any segment is 1000 feet and must be terminated at the last control panel in each segment. Refer to the Appendix C "U-Net Cabling" for details.
- The panel may be communicating to the controller correctly, but the required signal level matrix may not be responding. Check the Dipswitch setting on the rear panel of the non-functional router level.

  Confirm that the control panel address is a unique number. Each panel address is set by a rear panel Dipswitch and must be a unique address. This control panel address is read when the control panel is powered up.

APPENDIX B

Hardware Specifics

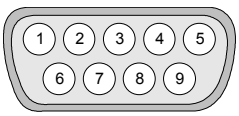
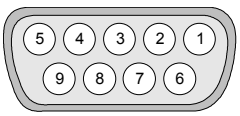
This appendix provides technical details of the connector pin outs, cables and suggestions regarding their use.

The following connectors / cabling are listed:

Alarm Port - SMPTE

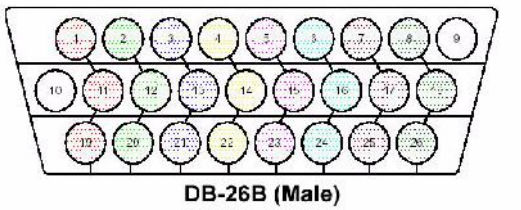
The following table lists the pinouts of the SMPTE alarm connector:

TABLE B-1. SMPTE Alarm Connector Pinouts

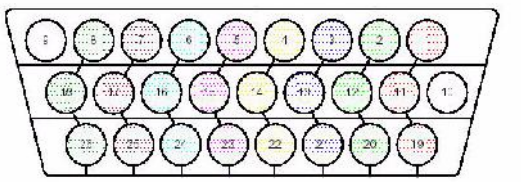
Male on Cable		**Female on Chassis**	
			
Pin #	Signal	Pin #	Signal
1	SMPTE A1	6	SMPTE A2
2	Alarm 1	7	Alarm 2
3	Alarm 3	8	Alarm 4
4	Alarm 5	9	Alarm 6
5	Alarm 7	~	~

Alarms 1 - 7 are TTL outputs, used for development purposes.

AES INPUT: Program and Preset



DB-26B (Male)



DB-26S (Female)

TABLE B-2. AES In – Program/Preset Pin Outs

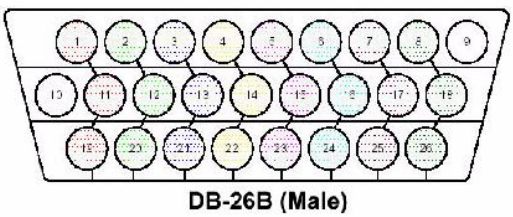
Pin #	Signal	Pin #	Signal
1	Preset 1 +	14	Preset 4 -
2	Preset 2 +	15	Program 1 -
3	Preset 3 +	16	Program 2 -
4	Preset 4 +	17	Program 3 -
5	Program 1 +	18	Program 4 -
6	Program 2 +	19	Preset 1CM*
7	Program 3 +	20	Preset 2CM*
8	Program 4 +	21	Preset 3CM*
9	N/C	22	Preset 4CM*
10	N/C	23	Program 1CM*
11	Preset 1 -	24	Program 2CM*
12	Preset 2 -	25	Program 3CM*
13	Preset 3 -	26	Program 4CM*

* CM = Common or Ground

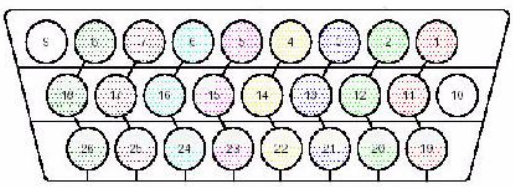
TABLE B-3. AES IN - Preset and Program Pairs

Signal	Pairs	Signal	Pairs
Preset 1	Pin 1 +	Program 1	Pin 5 +
	Pin 11 -		Pin 15 -
	Pin 19 GND		Pin 23 GND
Preset 2	Pin 2 +	Program 2	Pin 6 +
	Pin 12 -		Pin 16 -
	Pin 20 GND		Pin 24 GND
Preset 3	Pin 3 +	Program 3	Pin 7 +
	Pin 13 -		Pin 17 -
	Pin 21 GND		Pin 25 GND
Preset 4	Pin 4 +	Program 4	Pin 8 +
	Pin 14 -		Pin 18 -
	Pin 22 GND		Pin 26 GND

AES IN -- Preview and EXT 1



DB-26B (Male)



DB-26S (Female)

TABLE B-4. AES In – Preview (PVW) and EXT 1 Pin Outs

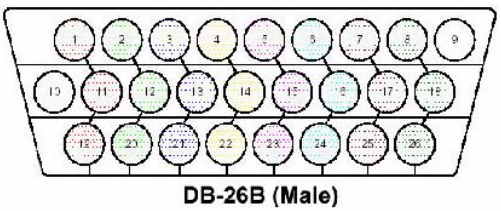
Pin #	Signal	Pin #	Signal
1	Preview 1 +	14	Preview 4 -
2	Preview 2 +	15	EXT 1: 1 -
3	Preview 3 +	16	EXT 1: 2 -
4	Preview 4 +	17	EXT 1: 3 -
5	EXT 1: 1 +	18	EXT 1: 4 -
6	EXT 1: 2 +	19	Preview 1CM*
7	EXT 1: 3 +	20	Preview 2CM*
8	EXT 1: 4 +	21	Preview 3CM*
9	N/C	22	Preview 4CM*
10	N/C	23	EXT 1: 1CM*
11	Preview 1 -	24	EXT 1: 2CM*
12	Preview 2 -	25	EXT 1: 3CM*
13	Preview 3 -	26	EXT 1: 4CM*

* CM = Common or Ground

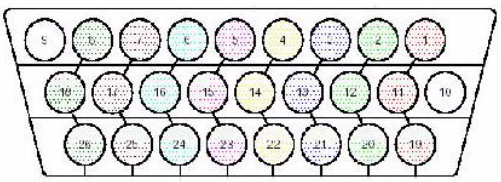
TABLE B-5. AES IN – Preview and EXT 1 Pairs

Signal	Pairs	Signal	Pairs
Preview 1	Pin 1 +	EXT 1 - 1	Pin 5 +
	Pin 11 -		Pin 15 -
	Pin 19 GND		Pin 23 GND
Preview 2	Pin 2 +	EXT 1 - 2	Pin 6 +
	Pin 12 -		Pin 16 -
	Pin 20 GND		Pin 24 GND
Preview 3	Pin 3 +	EXT 1 - 3	Pin 7 +
	Pin 13 -		Pin 17 -
	Pin 21 GND		Pin 25 GND
Preview 4	Pin 4 +	EXT 1 - 4	Pin 8 +
	Pin 14 -		Pin 18 -
	Pin 22 GND		Pin 26 GND

AES IN: EXT 2 and EXT 3



DB-26B (Male)



DB-26S (Female)

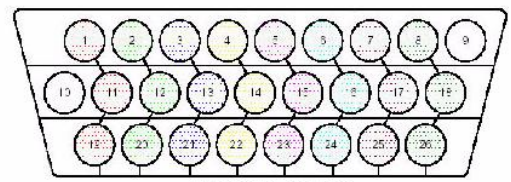
TABLE B-6. AES IN -- External 2 and External 3 Pin Outs

Pin #	Signal	Pin #	Signal
1	EXT 2: 1 +	14	EXT 2: 4 -
2	EXT 2: 2 +	15	EXT 3: 1 -
3	EXT 2: 3 +	16	EXT 3: 2 -
4	EXT 2: 4 +	17	EXT 3: 3 -
5	EXT 3: 1 +	18	EXT 3: 4 -
6	EXT 3: 2 +	19	EXT 2: 1CM*
7	EXT 3: 3 +	20	EXT 2: 2CM*
8	EXT 3: 4 +	21	EXT 2: 3CM*
9	N/C	22	EXT 2: 4CM*
10	N/C	23	EXT 3: CM*
11	EXT 2: 1 -	24	EXT 3: CM*
12	EXT 2: 2 -	25	EXT 3: CM*
13	EXT 2: 3 -	26	EXT 3: CM*

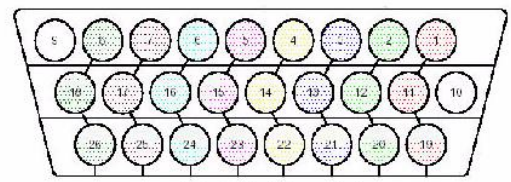
TABLE B-7. AES IN -- EXT 2 and EXT 3 Pairs

Signal	Pairs	Signal	Pairs
EXT 2 - 1	Pin 1 +	EXT 3 - 1	Pin 5 +
	PIn 11 -		PIn 15 -
	Pin 19 GND		PIn 23 GND
EXT 2 - 2	Pin 2 +	EXT 3 - 2	Pin 6 +
	Pin 12 -		Pin 16 -
	PIn 20 GND		Pin 24 GND
EXT 2 - 3	Pin 3 +	EXT 3 - 3	Pin 7 +
	Pin 13 -		Pin 17 -
	Pin 21 GND		Pin 25 GND
EXT 2 - 4	Pin 4 +	EXT 3 - 4	Pin 8 +
	Pin 14 -		Pin 18 -
	Pin 22 GND		Pin 26 GND

AES Out: AUX/Spare



DB-26B (Male)



DB-26S (Female)

TABLE B-8. AES Out -- Aux and Spare Pin Outs

Pin #	Signal	Pin #	Signal
1	AUX Out 1+	14	Aux Out 4 -
2	AUX Out 2+	15	Spare Out 1 -
3	AUX Out 3+	16	Spare Out 2 -
4	AUX Out 4+	17	Spare Out 3 -
5	Spare Out 1+	18	Spare Out 4 -
6	Spare Out 2+	19	AUX Out 1CM*
7	Spare Out 3+	20	AUX Out 2CM*
8	Spare Out 4+	21	AUX Out 3CM*
9	N/C	22	AUX Out 4CM*
10	N/C	23	Spare Out 1CM*
11	AUX Out 1-	24	Spare Out 2CM*
12	AUX Out 2-	25	Spare Out 3CM*
13	AUX Out 3-	26	Spare Out 4CM*

TABLE B-9. AES Out -- AUX and Spare Pairs

Signal	Pairs	Signal	Pairs
AUX Out 1	Pin 1 +	Spare Out 1	Pin 5 +
	PIn 11 -		PIn 15 -
	Pin 19 GND		PIn 23 GND
AUX Out 2	Pin 2 +	Spare Out 2	Pin 6 +
	Pin 12 -		Pin 16 -
	PIn 20 GND		Pin 24 GND
AUX Out 3	Pin 3 +	Spare Out 3	Pin 7 +
	Pin 13 -		Pin 17 -
	Pin 21 GND		Pin 25 GND
AUX Out 4	Pin 4 +	Spare Out 4	Pin 8 +
	Pin 14 -		Pin 18 -
	Pin 22 GND		Pin 26 GND

AES Out: Program/Monitor

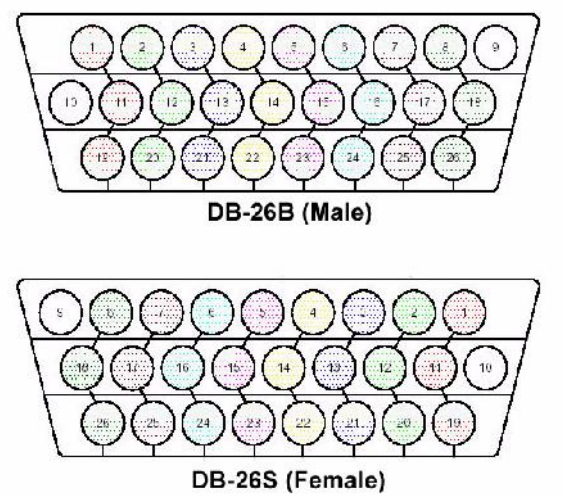


TABLE B-10. AES Out -- Program and Monitor Pin Outs

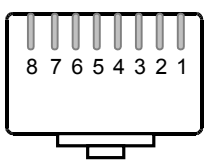
Pin #	Signal	Pin #	Signal
1	MON Out 1+	14	MON Out 4 -
2	MON Out 2+	15	Program Out 1 -
3	MON Out 3+	16	Program Out 2 -
4	MON Out 4+	17	Program Out 3 -
5	Program Out 1+	18	Program Out 4 -
6	Program Out 2+	19	MON Out 1CM*
7	Program Out 3+	20	MON Out 2CM*
8	Program Out 4+	21	MON Out 3CM*
9	N/C	22	MON Out 4CM*
10	N/C	23	Program Out 1CM*
11	MON Out 1-	24	Program Out 2CM*
12	MON Out 2-	25	Program Out 3CM*
13	MON Out 3-	26	Program Out 4CM*

TABLE B-11. AES Out -- Program and Monitor Pairs

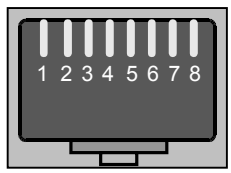
Signal	Pairs	Signal	Pairs
MON Out 1	Pin 1 +	Program Out 1	Pin 5 +
	PIn 11 -		PIn 15 -
	Pin 19 GND		PIn 23 GND
MON Out 2	Pin 2 +	Program Out 2	Pin 6 +
	Pin 12 -		Pin 16 -
	PIn 20 GND		Pin 24 GND
MON Out 3	Pin 3 +	Program Out 3	Pin 7 +
	Pin 13 -		Pin 17 -
	Pin 21 GND		Pin 25 GND
MON Out 4	Pin 4 +	Program Out 4	Pin 8 +
	Pin 14 -		Pin 18 -
	Pin 22 GND		Pin 26 GND

Ethernet Ports A and B

The following illustration contains pinouts for the RJ-45 Ethernet connector when a Network Hub is used. Both ends of the cable are wired in an identical manner.



Male on Cable

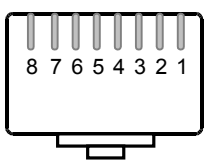


Female on Chassis

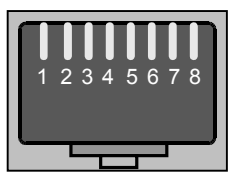
TABLE B-12. Ethernet Connector Pin Outs -- Network Hub Wiring

Pin #	Signal	Pin #	Signal
1	TX +	5	Ground
2	TX -	6	RD -
3	RD +	7	Ground
4	Ground	8	Ground

The following illustration contains pin outs for the RJ-45 Ethernet connector when Point-to-point “hub-less” wiring is used (e.g., with the MC-2020 connected directly to the PC — and no other connections). Both ends of the cable are wired differently, with the transmit and receive pairs swapped at one end.



Male on Cable



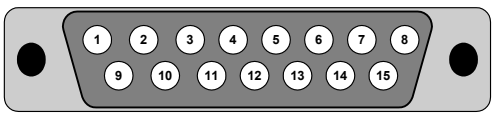
Female on Chassis

TABLE B-13. Ethernet Connector Pin Outs Point-to-point Wiring

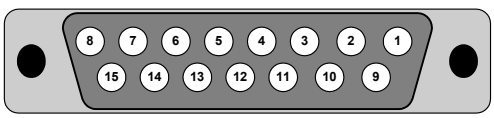
Pin #	Signal	Pin #	Signal
Cable End “A”		Cable End “B”	
1	***TX +***	1	***RD +***
2	***TX -***	2	***RD -***
3	***RD +***	3	***TX +***
4	Ground	4	Ground
5	Ground	5	Ground
6	***RD -***	6	***TX -***
7	Ground	7	Ground
8	Ground	8	Ground

Canbus Port

The following table contains the CANBUS port pin-outs.



DB-15P (Male)



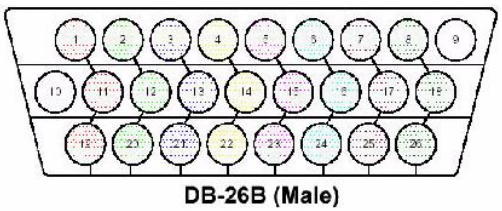
DB-15S (Female)

TABLE B-14. CANBUS Port Pin Outs

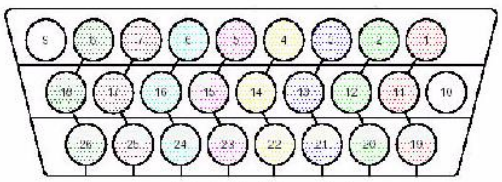
Pin #	Signal
1	Reset
2	CANH
3	Ground
4	Ground
5	TCK
6	TDO
7	Ground
8	+ 5 Volts
9	Ground
10	CANL
11	No Connection
12	nTRST
13	TMS
14	TDI
15	+ 5 Volts

Relays/Optos A (Ports 1-10)

Table 15 contains the relay port pin-outs, while Table 16 contains the relay port pairs.



DB-26B (Male)



DB-26S (Female)

TABLE B-15. Relay port pin-outs

Pin #	Signal	Pin #	Signal
1	T1A	14	T5B
2	T1B	15	Ground*
3	T2A	16	T6A
4	T2B	17	T6B
5	Ground*	18	Ground*
6	T3A	19	T7A
7	T3B	20	T7B
8	T4A	21	T8A
9	T4B	22	T8B
10	N/C	23	T9A
11	N/C	24	T9B
12	Ground*	25	T10A
13	T5A	26	T10B

* All Grounds are tied together.

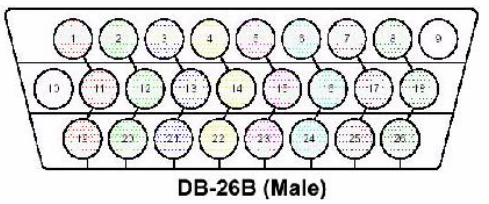
TABLE B-16. Relay Ports (1 - 10 pairs)

Signal	Pairs	Signal	Pairs
T - 1	Pin 1 A	T - 6	Pin 16 A
	Pin 2 B		Pin 17 B
T - 2	Pin 3 A	T - 7	Pin 19 A
	Pin 4 B		Pin 20 B
T - 3	Pin 6 A	T - 8	Pin 21 A
	Pin 7 B		Pin 22 B
T - 4	Pin 8 A	T - 9	Pin 23 A
	Pin 9 B		Pin 24 B
N/C	Pin 10 A	T - 10	Pin 25 A
	Pin 10 B		Pin 26 B
T - 5	Pin 13 A	Grounds*	Pins - 5, 12, 15, and 18
	Pin 14 B		

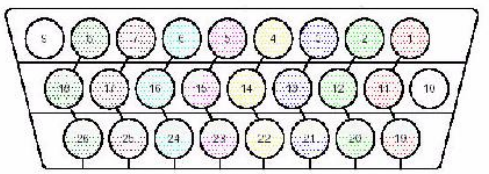
* All grounds are tied together on the Relay Port.

Relay/Optos B (ports 11 - 21)

Table B-17 contains the pinouts for relay port pinout, while table B-18 contains relay port pairs.



DB-26B (Male)



DB-26S (Female)

TABLE B-17. Relay ports 11 - 21 pin-outs

Pin #	Signal	Pin #	Signal
1	T11A	14	T16B
2	T11B	15	Ground*
3	T12A	16	T17A
4	T12B	17	T17B
5	Ground*	18	Ground*
6	T13A	19	T18A
7	T13B	20	T18B
8	T14A	21	T19A
9	T14B	22	T19B
10	T15A	23	T20A
11	T15B	24	T20B
12	Ground*	25	T21A
13	T16A	26	T21B

* All Grounds are tied together.

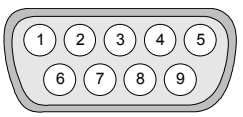
TABLE B-18. Relay ports 11 - 21 pairs

Signal	Pairs	Signal	Pairs
T - 11	Pin 1 A	T - 17	Pin 16 A
	Pin 2 B		Pin 17 B
T - 12	Pin 3 A	T - 18	Pin 19 A
	Pin 4 B		Pin 20 B
T - 13	Pin 6 A	T - 19	Pin 21 A
	Pin 7 B		Pin 22 B
T - 14	Pin 8 A	T - 20	Pin 23 A
	Pin 9 B		Pin 24 B
T - 15	Pin 10 A	T - 21	Pin 25 A
	Pin 11 B		Pin 26 B
T - 16	Pin 13 A	Grounds*	Pins - 5, 12, 15, and 18
	Pin 14 B		

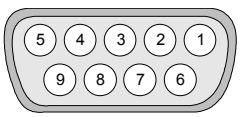
* All grounds are tied together on the Relay Port.

Serial Ports 1 - 4

The 4 serial ports can be configured as RS-232 or RS-422.



Male on Cable



Female on Chassis

TABLE B-19. RS-232 Connector Pin-outs

Pin #	Signal	Pin #	Signal
1	Carrier Detect (CD)	4	Data Term Ready (DTR)
3	Transmit (TX)	8	Clear to Send (CTS)
2	Receive (RX)	7	Request to Send (RTS)
6	Data Set Ready (DSR)	9	Ground*
5	Ground*	~	~

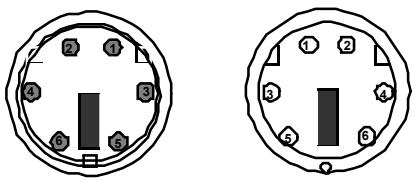
* All Grounds are tied together.

TABLE B-20. RS-422 Connector Pin-outs

Pin #	Signal	Pin #	Signal
1	Carrier Detect (CD)	4	Transmit Common*
3	Transmit (TX+)	8	Transmit (TX-)
2	Receive (RX-)	7	Receive (RX+)
6	Receive Common*	9	Ground*
5	Ground*	~	~

* Grounds and Common are tied together.

Timer 1 and Timer 2 Port



6 Pin CirDin Connector Viewed from the Front

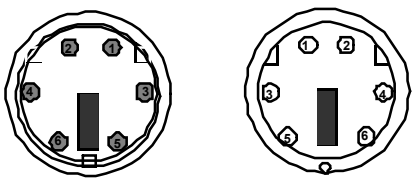
TABLE B-21. Timer 1 and 2 Connector Pin Outs

Pin #	Signal
1	Ground*
2	Ground*
3	Time Code T1 -
4	Time Code T2 -
5	Time Code T1 +
6	Time Code T2 +

* All Grounds are tied together.

Time Code IN and AES Reference Port

Table 22 lists the Time Code and Reference Pin-outs.



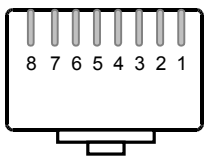
6 Pin CirDin Connector Viewed from the Front

TABLE B-22. Time Code and AES Reference Pin-outs

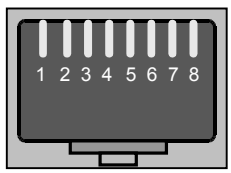
Pin #	Signal
1	Ground*
2	Ground*
3	AES Reference -
4	Time Code In -
5	AES Reference +
6	Time Code In +

* All Grounds are tied together.

U-Net Connector



Male on Cable



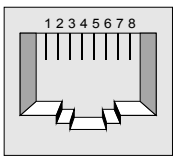
Female on Chassis

TABLE B-23. U-Net Connector Pin-outs

Pin #	Signal	Pin #	Signal
1	TE +	5	DAT +
2	TE -	6	Ground *
3	Ground *	7	Ground *
4	DAT -	8	Ground*

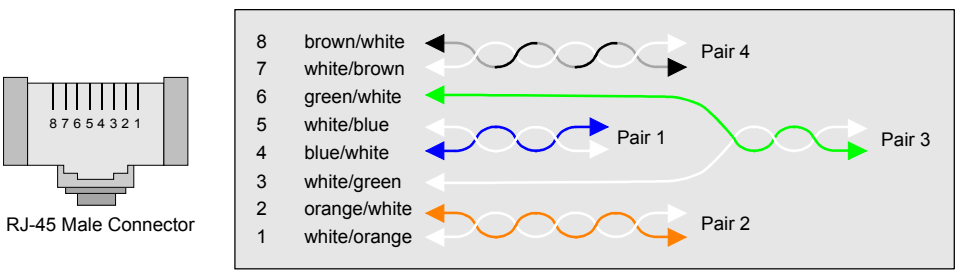
U-NET Cabling

This section provides information and specifications for U-Net cabling. The figure below illustrates an RJ-45 jack and its associated pins.



RJ-45 (U-Net) Female Connector

The figure below illustrates the typical wiring diagram for a standard “straight-through” Ethernet cable.



Standard Ethernet Cable Pairs

Important: *It is imperative that wires in each of the pairs (1 and 2) remain in that pair in order to retain the balance properties of the cable.*

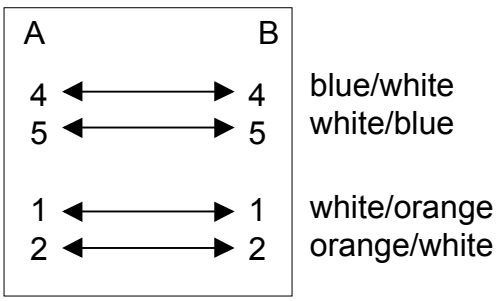
> Pair 2, which resides on pins 1 and 2 of the RJ-45 jack, should occupy the white/orange and orange/white wires of the cable.

> Pair 1, which resides on pins 4 and 5, should occupy the white/blue and blue/white wires.

Category 5 UTP *cable is the recommended grade of cable to use. All wires must be connected at both ends of the cable. Failure to adhere to these guidelines could result in faulty U-Net connections and/or communications.*

Note: *Even though the cable for Ethernet and U-Net are the same, the actual pairs that are utilized for communications are different.*

The U-Net cable utilizes pairs 1 and 2, as shown below. The pin-out is also displayed.



U-Net CAble Pairs and Pin-out

The end of the daisy-chain topology must be properly terminated.

Up to 32 control panels can be connected together in a daisy-chain topology. The maximum cable length (for the entire chain) is 1000 feet.

APPENDIX C

The MC-2020 Breakout Panel

Panel's Purpose

The MC-2020 utilizes high-density connectors as a means of accommodating two master control chassis. As a result, the MC-2020 Breakout Panel is offered as a means of allowing easier access and connectivity to the MC-2020 chassis within tight equipment spaces.[1] The Breakout Panel also provides convenient adaptability to the Micro-D connections and the GPI/O (relay-optos).

Items that are multi-plexed on common connectors on the back of the MC-2020 have been broken out into this panel.

Items that are not multi-plexed typically include the following:

- Standard serial ports –
- Ethernet
- UNET
- The actual coax BNC video connections

A BNC extractor and mini-flathead are also included to facilitate cable insertion and removal in tight spaces.

1. The Breakout Panel provides conversion to/from 110Ohm balanced, and 75 Ohm un-balanced AES audio connections.

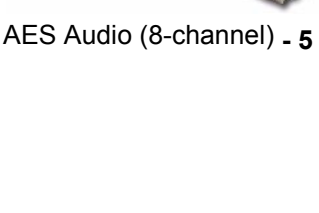
Cabling

The included kit contains a number of cables of fixed length that will connect the breakout panel to the MC-2020 chassis.

Mini DIN-6 **- 2**

9-Pin D-Sub **- 1**

HD Sub-26 **- 2**



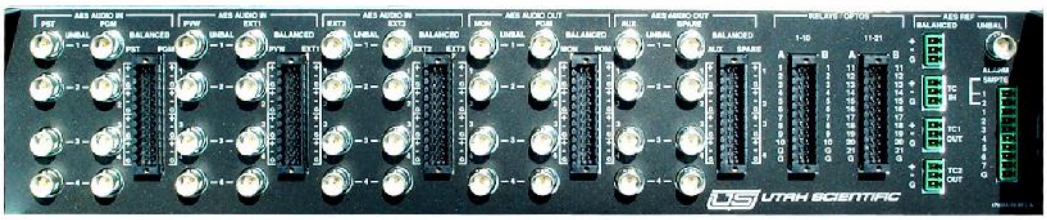
AES Audio (8-channel) **- 5**

FIGURE C-1. Breakout Panel cables (included)

Physical Layout

The panel's physical hook-up to the MC-2020 will remain constant regardless of how the jumper settings (balanced or unbalanced) are made.* The Breakout panel is typically set in the rack behind the MC-2020 chassis, but can be placed in any convenient location.

Inner Panel Connectivity

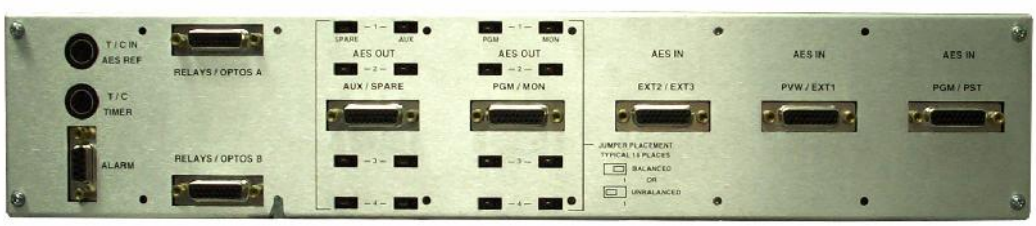


Breakout Connection Side

FIGURE C-2. Rear Layout

Breakout Rear Panel

The silkscreen on the back of the breakout panel matches the labeling on the MC-2020 rear.



Cable Connections - *TO MC-2020 Chassis*

FIGURE C-3. Breakout Panel rear

*** Balanced = 110 Ohm**
Unbalanced = 75 Ohm

Balanced and Unbalanced

Audio Output

For any given channel, the panel's AES outputs can be operated in either balanced or unbalanced mode. The jumpers on the back of the Breakout panel should be set once the balanced/unbalanced determination is made. This should be done prior to actual panel hook-up.

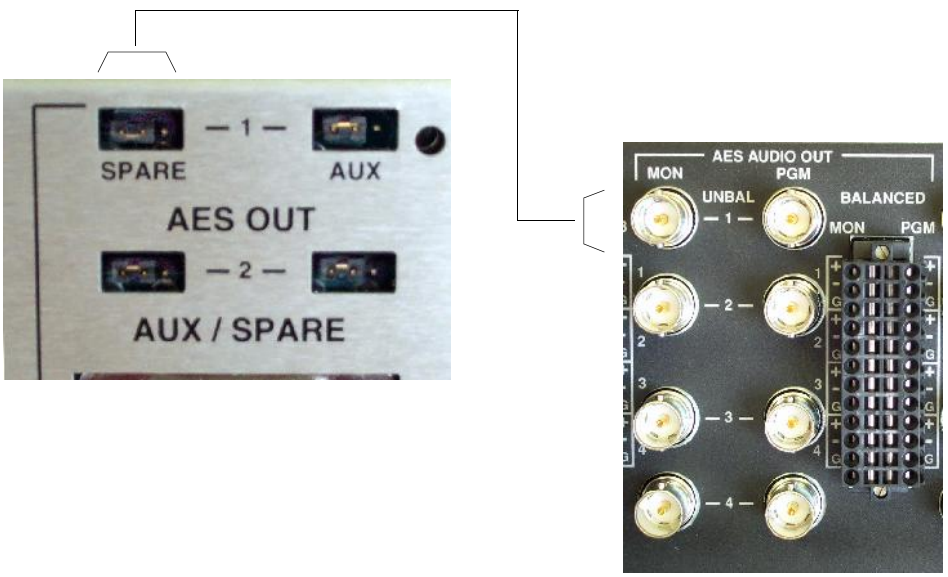


FIGURE C-4. Balanced/Unbalanced -- hookup to jumper settings

Audio Input

For each AES input, choose BALANCED or UNBALANCED -- but do not connect both.

Mixed connections (balanced v.s unbalanced) within one channel group can produce undesirable results. Though no actual damage will occur, audio degradation can take place.

Example: Acceptable; balanced on Preview 1, with Unbalanced on Preview 2.

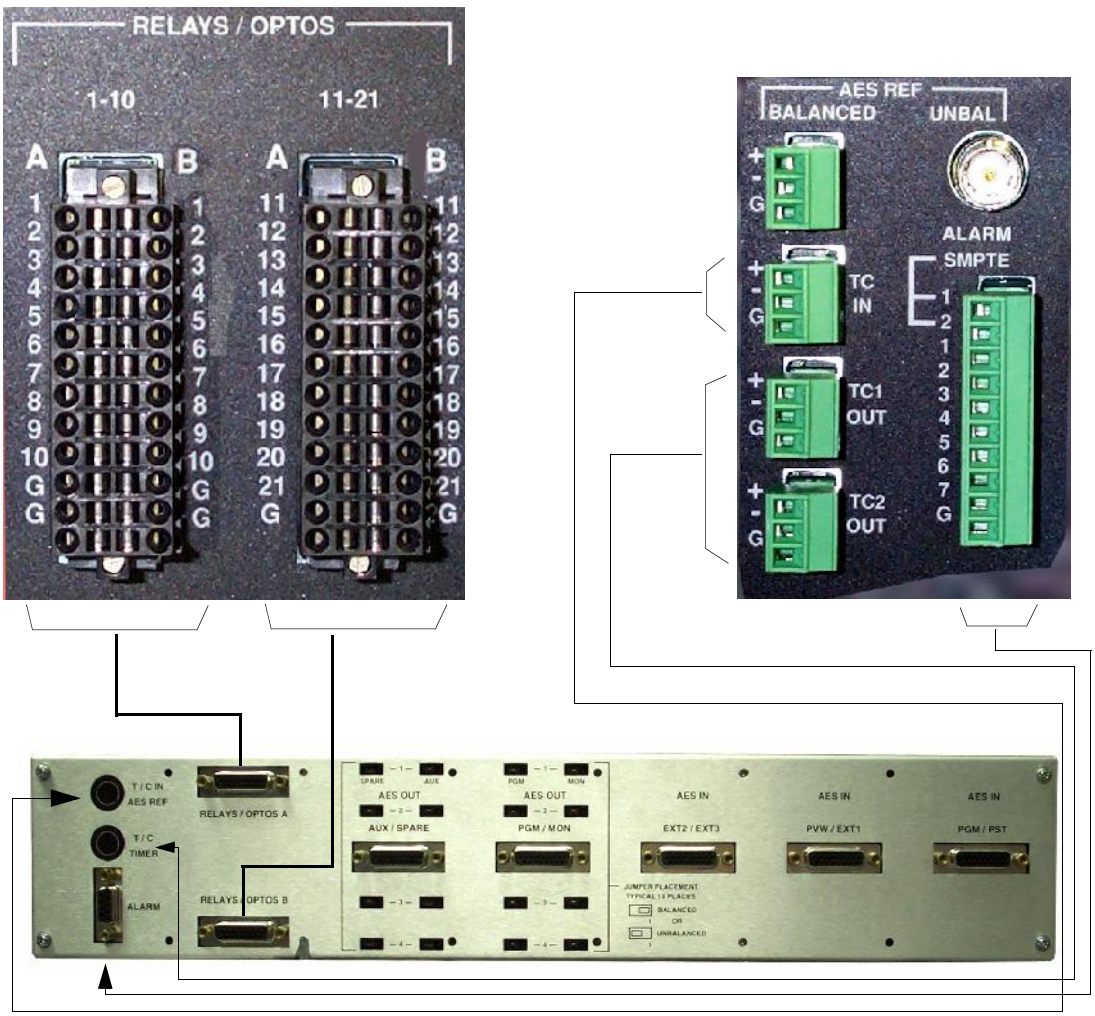
Unacceptable; both balanced and unbalanced on Preview 1.

AES Reference

As with Audio Input, select a balanced or unbalanced signal as reference, but not both.

Relay Optos, Time Code, and Alarm

Balanced and Unbalanced differentiation does not apply to these connections.



** Alarms 1 - 7 are currently used for engineering development only.*

FIGURE C-5. Relays/Optos, Time Code, and Alarm connections

Hardware

The front *runner bar* is provided to facilitate tie-downs and cable organization.

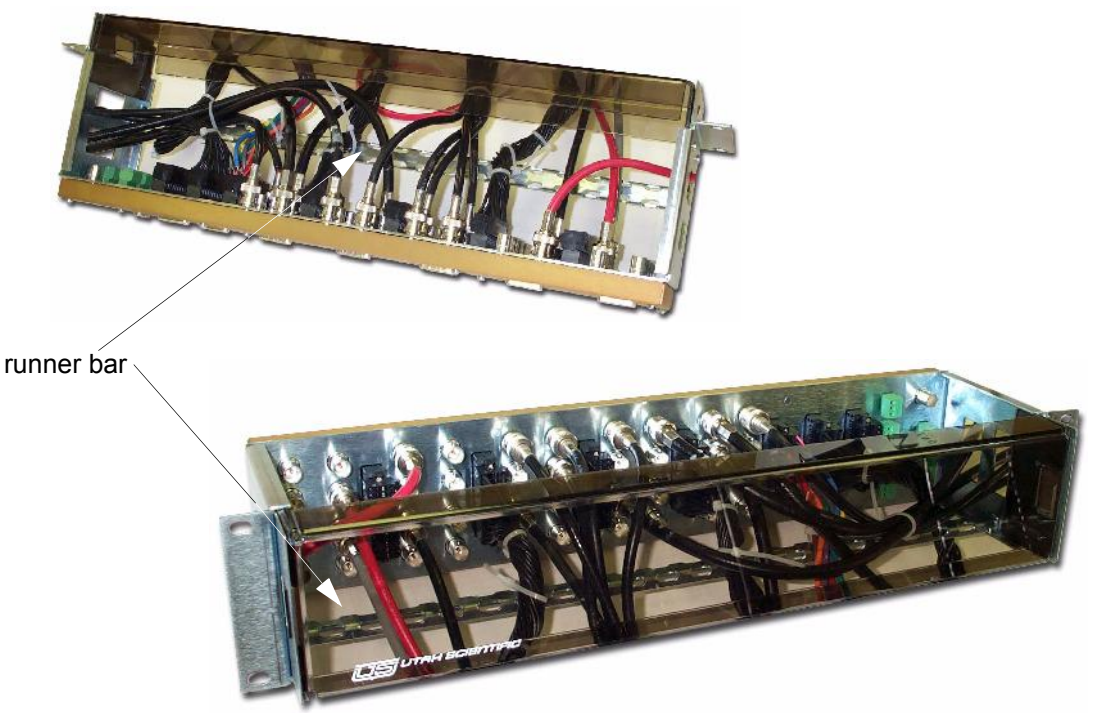


FIGURE C-6. Cabling/Tie Wrap bar

Ongoing Usage and Maintenance

The Breakout Panel's face is recessed to allow more convenient cable hook-up and disconnecting. The transparent cover should be kept in place to provide impact and debris protection. Once the cables are in place, they should be wrapped and tied down for easier handling and signal tracing.

APPENDIX D

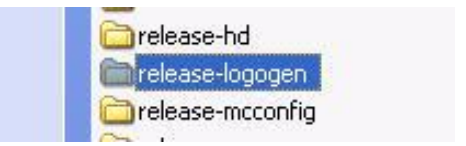
MC-Series Logo Generation Utility with Program Installation

This Appendix covers the program installation for the MC-Series Logo Generation utility. This process presumes the general system installation (described earlier in this guide) has taken place. Logo Generation will allow you to import previously created .PNG files and convert them to the file format used by the UTSCI operating system.

This Appendix includes the following:

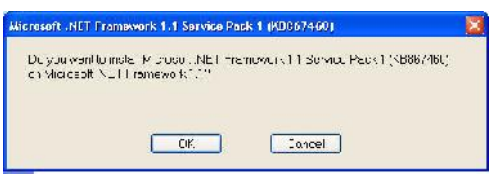
Installation of the Microsoft™ .net Framework

Locate the release-logogen directory, then open the net-1.1 directory and double-click the dotnetfx.exe application.



Depending on your equipment, this installation could take several minutes to complete. (Newer systems will allow the install to complete quickly.)

Next, launch the NDP1.1sp1-KB867460-x86.exe application by double-clicking the icon (same directory as above). This process is the Service Pack 1 installation, and will ask you to confirm and accept before continuing.[1]

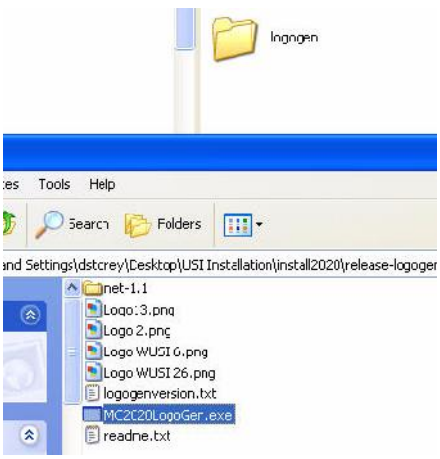


When the installation is complete, the following dialog will appear.

1. In a few isolated instances, some systems have reported the installation as “Already Complete”. This has not affected the proper installation however.

Installing the 2020 Logo Conversion Application

Create a new sub-directory within your USI directory called ‘logogen’, then copy the MC2020LogoGen.exe application, along with all other files in the original folder, to this location.



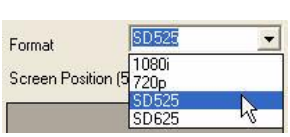
Once you have done this, make a short cut for this program to your desktop.

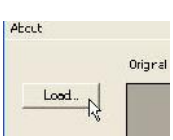
Now copy any .PNG files you have created to the new logogen directory.

Creating a USI Format Logo File

Launch the MC-2020 LogoGen utility.

Select the Video format using the format pick list. The default is SD525.



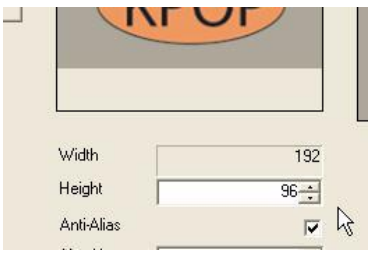


Click the **Load** button.

Now select the image you would like to read in.

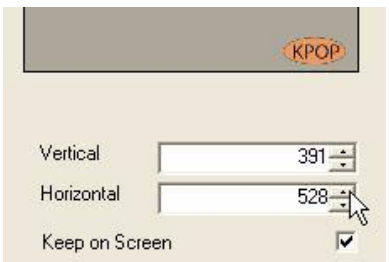
Note: This must be in the .PNG format.

Use the height control to reduce the size of the logo (if desired). The width value will adjust automatically to keep the aspect ratio correct.



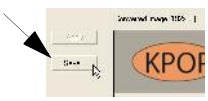
You must click the **Apply** button to see the resulting modification.

Use the vertical and horizontal adjustments to set the default location of the logo. *Note that in this case, you will not see immediate, on-the-fly changes.*



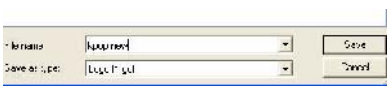
Note: This location information is used by the MC-2020 when it loads the logo from memory into 1 of the 4 keyers. If necessary, the location can be further modified using the controls on the MCP-2020 series master control panel.

Unless instructed otherwise, it is best to leave the ‘Anti-Alias’, ‘Algorithm’, and ‘Keep on Screen’ controls in their default setting.



Click the **Save** button.

Provide a filename for the save. The extension will default to .lgo.



Note: Do not change the extension name.

This completes the conversion process.

What is ‘Background On’ ?

If the logo you are converting is semi-transparent or contains transparent edges, **Background On** (when checked) will allow you to see the effects of the transparency on a patterned background.

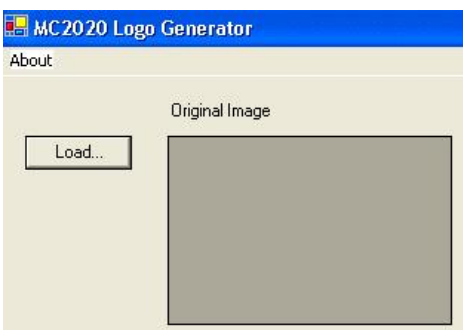
Creating PNG Files Prior to Conversion

Logogen can only convert files that have been built as png formats. The Logogen application converts the png file into an lgo format. Logogen will only resize the Logo to a maximum of 128x192 pixel size. The png file should be built as close to this size and saved as a png file prior to bringing it into the Logogen converter.

TIP: when creating the graphic for the desired Logo you should make the graphic as close to the 128x192 size as possible. You should not create a full transparent size and then add the graphic to the size you want it to be seen. If you do this then the Logogen will resize the entire file (full screen with transparent and graphic) to 128x192 which will make the graphic very small.

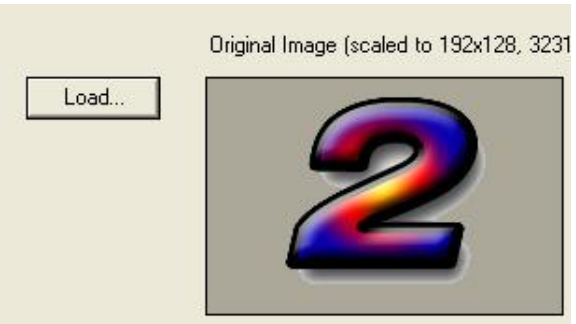
Converting PNG Files Using LogoGen

1. Launch the Logogen application from the Logogen folder found in the c:\usi folder or the shortcut you have created pointing to it by double clicking the following executable.
2. Click the Load button and search for the png file that you would like to bring in and convert.



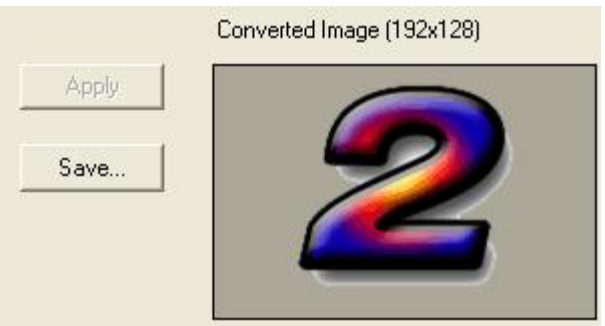
3. Drop down the format type and choose the video format that this logo will be used with.

4. The top display is how the file looks in its original raw form.



Top Left Display

5. The bottom left display is what it will look like if size changes are made below that window and applied. It will show the new numbers above the display.

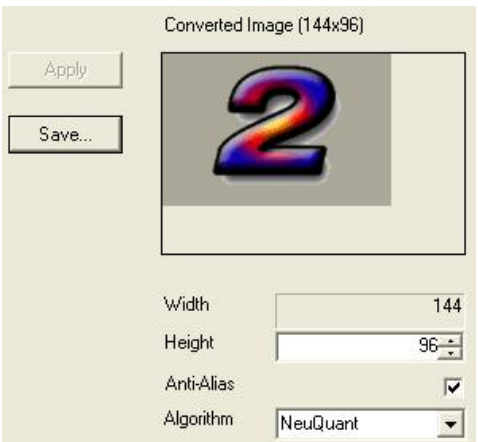


Bottom Left Display

6. The lower right display is how the logo will appear on the output of the MC when it is converted. Although the logo can be positioned and saved from the MC panel you can adjust the position of the logo in the logogen application to a permanent spot. Click on the Vertical and Horizontal arrows to move the Logo around. Leave a check mark in the Keep on Screen button to keep the logo from moving out of view.

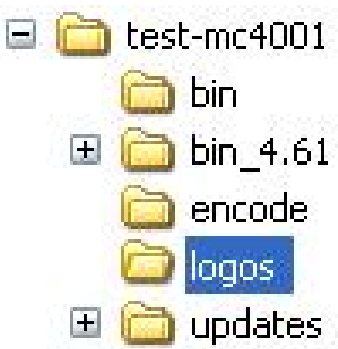
Bottom Right Display

7. To change the size of the logo use the arrows in the height window and remember that you can only go as large as 128. NOTE: if the file was made smaller than the 128 height then it will not be able to go any larger than its original creation. Click apply when you are satisfied with the size. Leave the Anti Alias button checked as this will keep crisper edges. Notice how it makes the image smaller in the display and it will also make the output display change as you watch it.



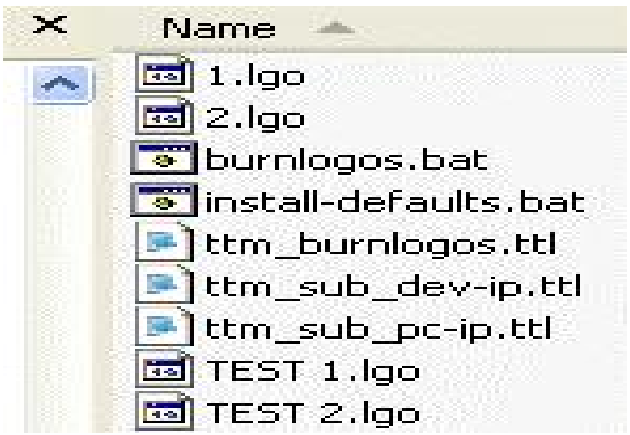
Converted Image

8. When you are satisfied then click on the Save button and then navigate to the c:\usi\folder and find the folder for the MC channel you are going to send the file to and then open the folder called logos. An example of this would be c:\usi\kusi-hd01\logos for an MC2020 or c:\usi\test-mc40001\logos for and MC400.



9. Save the file with whatever name you will remember it to be, along with the number of the Logo that you would like it to be used for. And give it the extension of lgo. An example of this would be TEST 3.lgo.

10. There are 16 logos that can be used by the MC. In order for the MC to use the new logo file it must be named using only the numbers 1-16 followed by a period and the extension of lgo. The number it is saved and burned with is the actual logo that will be shown in the MC display as 1-16. So, after you have saved the file in step 9 then go to that folder where the file has been saved. Then copy and paste the file in the same folder and then rename the copied file with the number of the logo only that will be used. So from the example in step 9 it would be renamed as 3.lgo, dropping the name TEST. The reason for both files is only to keep a file with a name that is recognized for future use. This is not required for any other reason so you could simply save all logos with just the logo number as this is how they are used. NOTE: The logos must be named with only the number in order to be burned into the master control. The picture below shows a few examples in the logos folder. It also shows the other files found in the logo folder.



Burning Logos to the MC

The MC-4000, MC-2020, and the MC400 are capable of storing a total of 16 different logos. Each logo occupies 1 of 16 storage locations inside the MC. To place a logo into a master control system it must first be converted to the USI format (.lgo) using the steps above and then burned into the MC itself. The following steps will complete the installation of a logo in the first of the 16 location within the MC-2020. (There is a working assumption here that the USI format file has already been created.)

1. Open Windows Explorer.
2. Navigate to c:\usi\[system]-name]\logos
3. Double-click burn-logos.bat and follow the on-screen prompts.
4. This process updates the MC-2020 with up to 16 new logo files that are present in the c:\usi\[system-name]\logos directory. Note: Files not present in the logos directory are not changed in the MC-2020 or MC400. And conversely all files that are in the directory will be burned even if they have not been changed. If this is not desired then the files that are not desired to be burned will need to be renamed prior to running the batch file.

Logo Operation from the Panel

From the MCP-2020 (Used with MC4000, MC2020, MC400 and MC40)

- At the MCP-2020 Master Control Panel, select the HOME button immediately below and to the left of the main LCD display.
- Select the KEY button on the LCD touch screen. This displays the key summary screen.
- Select the KEY-1 button on the LCD touch screen. This displays the logo select screen.
- Select the LOGO-1 button on the LCD touch screen. Any of the buttons can be selected if they have been loaded with a #.lgo file.
- Turn on the PST KEY button for keyer 1 in the key section on the right hand side of the MCP-2020 control panel.
- Select the LOGO key input button, located to the right of the EXT button and directly below the PST KEY button for the keyer 3. Note: The Logo button must be enabled in the MCP-2020 encoding file.
- Adjust the logo position using the bottom 2 knobs located directly to the right of the LCD display screen. The middle knob adjusts horizontal position, the bottom knob adjusts vertical position.
- The logo position can only be changed with the logo select screen displayed. When you are satisfied with the location, press the BACK button, located just below and to the right of the LCD display. If you need to make adjustments at a future time, go to the logo key select screen in the LCD and adjust the knobs as necessary. Each Logo is independently positioned. If you have a need for the same logo to be placed in 1 or more predefined positions, install the same logo in 1 or more keyer card slots and position each per your adjustments. A specific logo can actually be loaded in all the remaining keyer cards in your system. All internal logos should be displayed in the LIN MULT (or LIN) Keyer Mode.

From the MCP-400 (Used with MC400 and MC40 only)

- At the MCP-400 Master Control Panel, select the HOME button immediately below and to the left of the main LCD display.
- Select the KEYR CNTL button on the LCD touch screen. This displays the key summary screen.
- Select the LOGO KEY button on the LCD touch screen. This will not change screens but will highlight the button after it is pressed.

- Select the LIN KEY button on the LCD touch screen. This will not change screens but will highlight the button after it is pressed.
- Select the LOGO SEL button on the LCD touch screen. This will go to the Logo 1-8 screen. Select the desired Logo by pressing it on the screen. To see Logo 9-16 press the physical button labeled down which is located to the left of the LCD display.
- At this point you should see the Key on the Video Preset Monitor.
- Select the physical button labeled BACK just to the left of the LCD display until you get back to the key summary screen.
- Select the LOGO POS button on the LCD touch screen and you will see 4 direction arrows and a course and fine adjust button.
- Touch each of the arrows to move the Logo to the desired position on the monitor and turn on the course or fine adjust and then the arrows as needed.
- When you are satisfied with the position of the Logo and wish for it to go to the same location the next time it is selected then press the SAVE button on the LCD Touch screen.
- From here you can either press the take button which will transition the Logo to the Program bus or you can press the PGM/PST Toggle button just below the LCD display and then go through the steps above to select the Logo manually and put it on the Program bus.
- Each Logo is independently positioned. If you have a need for the same logo to be placed in 1 or more predefined positions, install the same logo in 1 or more keyer card slots and position each per your adjustments. A specific logo can actually be loaded in all the remaining keyer cards in your system.
- All internal logos should be displayed in the LIN MULT (or LIN) Keyer Mode.

Clearing Existing Logos

This must be completed from the diagnostics port either using a serial connection to the card or by telnetting into the IP address of the card. (Refer to Appendix D in the system installation guide). This will erase all logos at one time, and not individually. After all are removed, re-send wanted logos back to the card.

Type the following at the prompt once you have established a connection:

mem (lower case and then press return)

r 6e0000 (these are zeros -- pressing return displays the current logos) ef 6e0000 (these are zeros -- pressing return erases all logos in flash).

The following is an example of what is displayed after these commands are typed. You should see the actual name of the logos in each location at the end of the line in table one (below).

This was extracted from a 2020, and as you can see, there are two logos enabled. The second table shows the table with all ffff, indicating the address showing logos is empty.

```
/> mem

*****************************************
*           Utah Scientific             *
*         Hardware Test Utility         *
*                                       *
* Use "?" for help                      *
* Motorola M5307C3 boot Version: V1.1   *
*****************************************
>>r 6e0000
006e0000: face0001 000000ff 00010800 20050412
006e0010: 00000164 0000026d 00000000 deaddead       d   m
006e0020: 00000100 00000001 00000000 deaddead
006e0030: deaddead deaddead deaddead deaddead
006e0040: 77757369 362e6c67 6f000000 00000000     wusi6.lgo
006e0050: 00000000 00000000 00000000 00000000
006e0060: 00000000 00000000 00000000 00000000
006e0070: 00000000 00000000 00000000 00000000
006e0080: 4c6f676f 20362057 55534920 636f7079     Logo 6 WUSI copy
006e0090: 2e706e67 00000000 00000000 00000000     .png
006e00a0: 00000000 00000000 00000000 00000000
006e00b0: 00000000 00000000 00000000 00000000
006e00c0: deaddead deaddead deaddead deaddead
006e00d0: deaddead deaddead deaddead deaddead
006e00e0: deaddead deaddead deaddead deaddead
006e00f0: deaddead deaddead deaddead deaddead
>>
```

```
>>ef 6e0000
Man id: 1, dev id: 22d7
>>r 6e0000
006e0000: ffffffff ffffffff ffffffff ffffffff
006e0010: ffffffff ffffffff ffffffff ffffffff
006e0020: ffffffff ffffffff ffffffff ffffffff
006e0030: ffffffff ffffffff ffffffff ffffffff
006e0040: ffffffff ffffffff ffffffff ffffffff
006e0050: ffffffff ffffffff ffffffff ffffffff
006e0060: ffffffff ffffffff ffffffff ffffffff
006e0070: ffffffff ffffffff ffffffff ffffffff
006e0080: ffffffff ffffffff ffffffff ffffffff
006e0090: ffffffff ffffffff ffffffff ffffffff
006e00a0: ffffffff ffffffff ffffffff ffffffff
006e00b0: ffffffff ffffffff ffffffff ffffffff
006e00c0: ffffffff ffffffff ffffffff ffffffff
006e00d0: ffffffff ffffffff ffffffff ffffffff
006e00e0: ffffffff ffffffff ffffffff ffffffff
006e00f0: ffffffff ffffffff ffffffff ffffffff
>>
```

APPENDIX E A Discussion About Timing

TIMING SOURCES INTO THE MC-2020

It is very important that all sources that pass through the 2020 are in sync with the reference that comes into the reference port located in the lower right corner of the 2020 chassis.

The reference for the SD-2020 must be an SDI source that is constant such as SD black or color bars. The reference for the HD-2020 must be an HD source that is constant such as HD black or color bars. We recommend that this source comes from the generated house sync of which all sources are also in sync with.

The 2020 has a timing utility that is very useful. Its purpose is to compare the source that is currently in use on any of the three busses (PGM, PST, PVW) with the video reference and display the difference between the two in both vertical lines and horizontal pixels.

There are two ways to view this. One is serially using the diagnostics port located on the front of the 2020 CPU card or with a telnet connection using the CPU's IP address. The second way is via the LCD utility on the MCP-2020 control panel using the menu icon called Src Status located on the Maint button.

Note: The program will display the vertical and horizontal difference for all three busses when viewing it from the diagnostics or telnet ports and only the PGM and PST busses when viewing it using the MCP-2020 LCD utility menu.

HOW TO USE THE TIMING UTILITY

2020Timing Utility DEFINITIONS:

Good Video [G] is a video source that complies with SMPTE standards for signal integrity (levels, jitter, clock rate all comply with SMPTE tolerances) from which the MC2020 Video receivers can reliably recover clock and data information.

Asynchronous Video [A] is a “good” video source with sync timing that drifts relative to the video reference input sync timing. This signal is NOT GenLocked. For this reason, the video source will drift in and out of the +/- 1 HLINE “Timed Video” window. Video Status will be erratic. Embedded Audio (for now) will be noise or sputtering sounds.

Un-timed Video [U] is a “good” video source that is GenLocked (not drifting) with sync timing that falls outside the +/- 1 HLINE “Timed Video” window relative to the video reference input sync timing. Video Status is stable. Embedded Audio (for now) may include noise or sputtering sounds.

Timed Video [T] is a “good” video source that is GenLocked (not drifting) with sync timing that falls within the +/- 1 HLINE “Timed Video” window relative to the video reference input sync timing. Video Status is stable. Audio is embedded without errors.

Usage and Display Format: (Defaults to slot 3 (VI), but can monitor Slots 4-7 (KM). Just state slot number after command. For Example, type: 2020timing 5 for slot 5.

Video Status Flags appear in order (GAUT). Lower case ‘x’ means not active.

PST does not give any status on KM Cards; PGM = KEY, PVW=FILL

Positive V & H #s mean the source is ahead of reference, Negative values mean behind.

Type CTL-C to exit the utility.

Connecting Via Serial

1.Plug the serial adapter (pn# 140100-2 supplied by Utah Scientific) into the COM port of the config pc. If you are unable to locate this adapter it can be easily built using the following pin out.

RJ459pin

1 - 2

3 - 3

4 - 5

5 - 8

7 - 7

2.Attach a standard CAT5 cable (straight through) between the adapter and the RJ45 connector located on the front of the 2020 CPU card. (This card is installed in the far left slot of the 2020 chassis)

3.Run the TeraTerm terminal program (supplied by Utah Scientific on the system CD in the directory called PC Prep) or other desired program such as Hyper Term. In TeraTerm select serial and choose the pc COM port you are using. Set baud rate to 19200 and parity to 8N1 in the serial port settings.

4.Hit the return key and you should get a prompt that looks like this />. At the prompt type 2020timing (case sensitive) to start the program.

Connecting Via Telnet

(To use telnet the 2020 CPU must be on the same subnet as the computer)

1.Run the TeraTerm terminal program (supplied by Utah Scientific on the system CD in the directory called PC Prep) or other desired program such as Hyper Term. If using another program, make sure it can work with TCP/IP sessions. In TeraTerm select TCP/IP and enter the IP address of the 2020 CPU card.

2.Hit the return key and you should get a prompt that looks like this />. At the prompt type 2020timing (case sensitive) to start the program.

Using LCD on MCP-2020 Panel

Note: (Note: timing displayed using this method is not updated instantly. There is a delay)

1.Push the Home button located just below the LCD.

2.Push the Maint button located on the LCD.

3.Push the Src Select button located on the LCD.

4.This is the utility and will only display the source in use on the PGM and PST busses. The PVW section will not display here but only using the serial or telnet method.

Adjusting Timing

(Recommended method is using serial or telnet as these will update in real time)

1. In most cases each source device from frame syncs to servers to DTR's will have some form of adjustments for the V (vertical) and H (horizontal) timing. You will need to refer to each device manual to find this procedure.
2. Push the source that you want to look at on any of the three busses (PGM, PST, PVW) and look at the terminal. You will see the V displayed in lines and the H displayed in pixels for that source.
3. Adjust the V and H for that device while watching the terminal. The closer you bring the V and H to zero the better the 2020 will operate. The spec is + or – one horizontal line which means that you must have the V at 000 but the H can be anywhere from 0000 to + or – 858 pixels for SD, + or – 2200 for 1080i HD and + or – 1650 for 720p HD.

Timing for Systems Using SqueezeMAX

Although the spec for the sources coming into the 2020 is + or – one horizontal line and is very forgiving, the SqueezeMax is not and the timing must be very tight. This timing is still done using the procedure above and had to do with the sources coming into the 2020 and not the SqueezeMax.

Symptoms of untimed sources through the SQM may be broken up video, glitches or slight bumps in the video as well as loss of or distorted closed caption.

SD SqueezeMAX Timing Upstream

In this application the SQM would connect into the 2020 through one of the keyers. Sources must be timed coming into the SD-2020 using the timing procedure and must be less than ½ of a horizontal line. This would mean that the V is 000 and the H is + or – 500 pixels. We recommend that the sources be adjusted to as close to zero as possible when using SQM.

SD SqueezeMAX Timing Downstream

In this application the input of the SQM would connect to the PGM output of the 2020. It still requires a reference source of SD black or color bars and all sources must still be timed the same into the 2020 as in upstream mode using the following procedure. This would mean that the V is 000 and the H is + or – 500 pixels. We recommend that the sources be adjusted to as close to zero as possible when using SQM.

HD SqueezeMAX Downstream

The HD SqueezeMax does not use an external reference. There are only two connections to be made. One is the video input and the other is the video output. It gets the reference from the video input. There is a delay of 7 frames through the HD SQM and for this reason it is recommended that it be used in the downstream mode only. In order to use it upstream the PGM bus input to the 2020 must also be delayed by 7 frames. We recommend that the sources be adjusted to as close to zero as possible when using SQM.

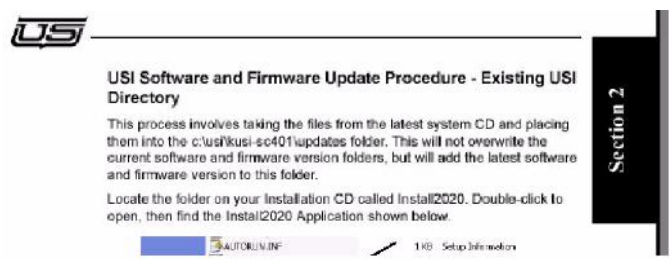
APPENDIX F The MC-2020 EAS Upgrade

MC-2020 EAS Upgrade

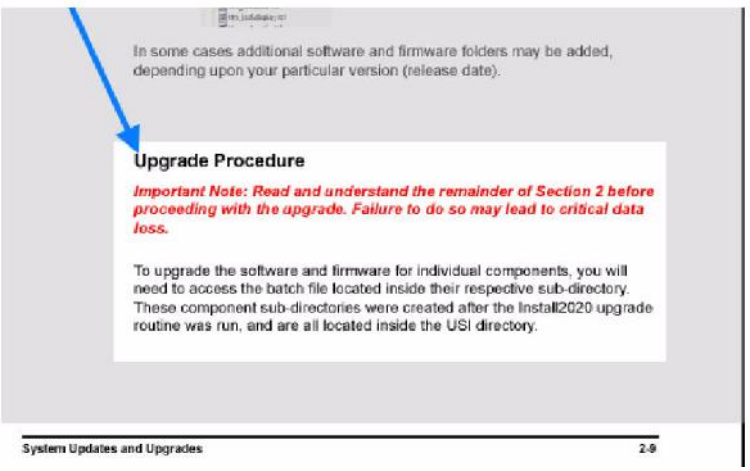
(This is to be used for upgrading the MC-2020 and MCP-2020 to enable EAS functionality for serial interface and audio Macro play out)

1. Unzip your new CD 3.XX (must be 3.41 or newer) files to C:\USI
2. Go to section 2 of your System Installation Guide

located on this CD for the USI file upgrade procedure.

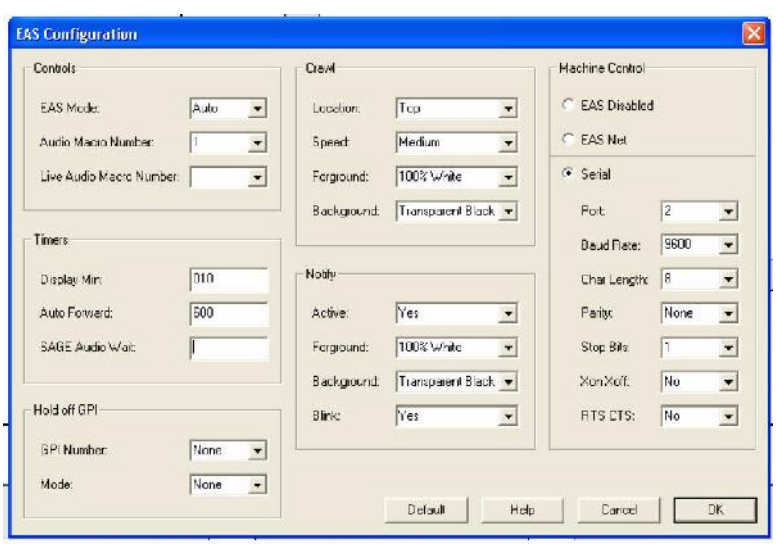


Once you have read through and followed the procedure leading to the Software and Firmware Update Procedure of section 2,



follow these instructions to configure your system.

Configuring System using MCConfig Application (for TFT, Sage and Dasdec TFT)



Click on ‘EAS’ in the top menu selection in MCConfig. Set all settings like these for TFT, Sage and Dasdec TFT.

EAS CONFIGURATION (set the following)

1. EAS MODE selects the mode for EAS operations. AUTO means we automatically forward an EAS Alert - MANUAL means we wait for operator command before we process - OFF means we ignore all inbound EAS commands/actions from the EAS device. Drop down menu and select mode.
2. Audio Macro Number selects the macro number for the audio to run when the EAS comes down. Default setting is 1. Drop down menu to choose correct one.
3. Live Audio Macro Number is used for National Alerts and unless your system runs this it is left at none.
4. DISPLAY MIN sets the minimum time an alert is displayed. Value is in seconds - Valid range is: 10 to 900. Usually a 10. Enter desired value in box.
5. AUTO FORWARD sets the max amount of time that will expire before the MC forces the EAS alert to be played. Valid range is: 10 to 900. Usually set to 600. Enter desired value in box.
6. SAGE AUDIO WAIT sets the max amount of time that will expire before the MC forces the EAS alert to be played. Valid range is: 5 to 900. Enter desired value in the box. This is generally unused and defaults to none.
7. GPI NUMBER is set to the MISC RELAY FUNCTION number encoded to control the relay attached to the HOLDOFF Function of the EAS device. Drop down menu and select relay number. This is generally unused and defaults to none.
8. GPI MODE Selects the type of HOLDOFF action used for the EAS device. The options are @, @NONE, @ACTIVE_CLOSED, @ACTIVE_OPEN. ACTIVE_OPEN means when we want to hold off the EAS device we OPEN a relay. ACTIVE_CLOSED means when we want to hold off the EAS device we CLOSE a relay. Drop down menu and select. This is generally unused and defaults to none.

SERIAL PORT SETUP (set the following – see figure above)

Select Serial button and then drop down and select each item for that port including the port number 1-4 on the MCP400 panel. Baud rate for TFT and SAGE is 9600 and is configurable for the Dasdec for desired setting. Default port is 2.

EAS CRAWL AND NOTIFY (set the following – see figure above)

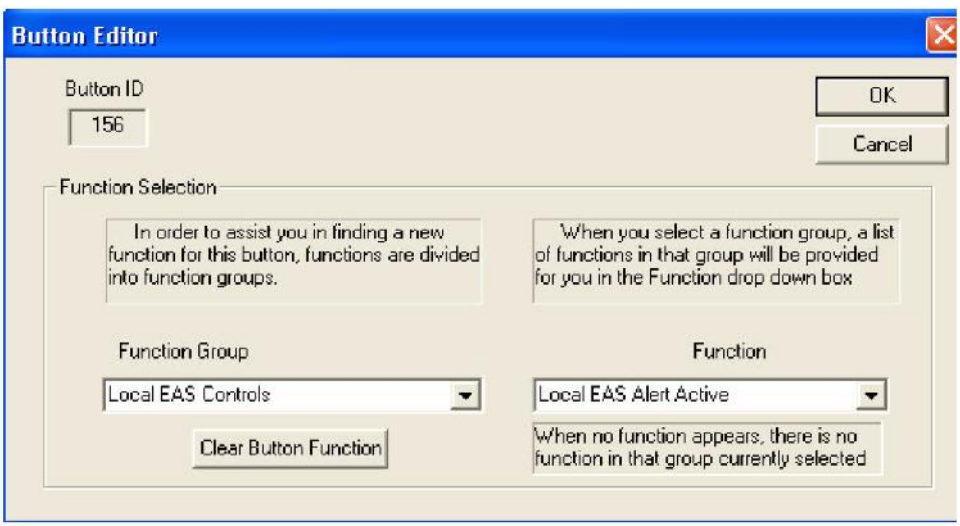
NOTE: This is only used in Manual Mode setup.

Default settings for position, speed, foreground and background can be changed by dropping down menu items and selecting new entry.

The dropdown selection for ‘Blink’ allows the options of yes and no to be selected. This is whether or not you want the message that appears on the Preset monitor to blink continuously with the message “EAS ALERT COMING DOWN” or not.

In order to use this function you must set up a button in the MCP400 or MCP2020 control panel that can be pressed to run the crawl manually.

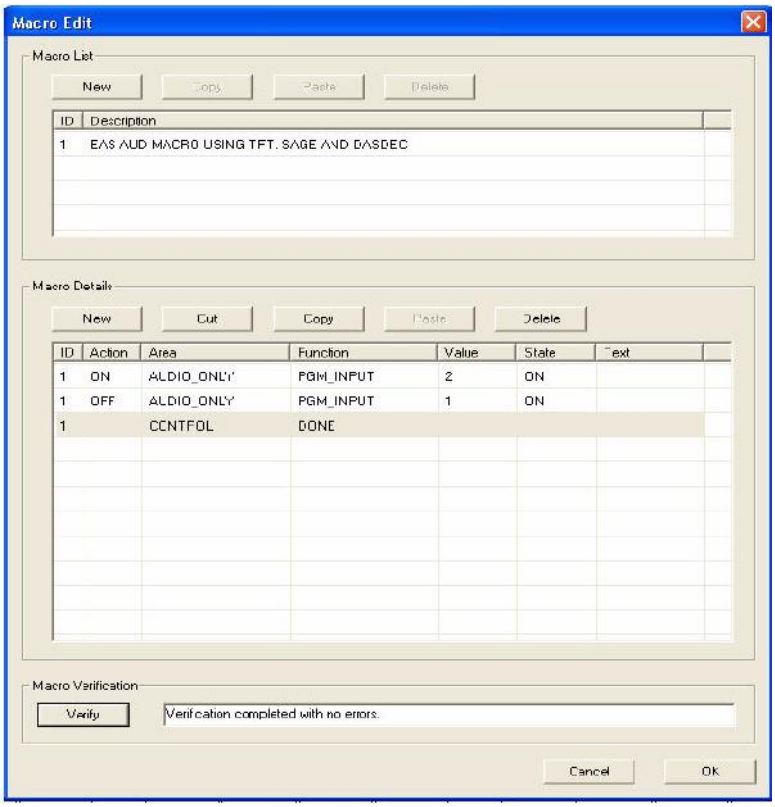
To allow the EAS alert blink play manually from a button on the MCP-2020, do the following and drop down the selection arrows to assign:



Click on desired button where the manual EAS will be pressed. Then click on the Function Group and Function windows and select the items shown above.

1. Launch the MCPConfig application and click ‘Communications’ from the top menu item.
2. Click Select Target to Configure and choose the MCP2020.
3. Go to File and click ‘Retrieve Configuration from Target’.
4. Click on the button you want to assign as manual EAS.
5. Pick Local EAS Controls from the function group.
6. Pick EAS Alert Active from the function selection.
7. Click OK. Then go to File and click ‘Send Configuration to Target’.

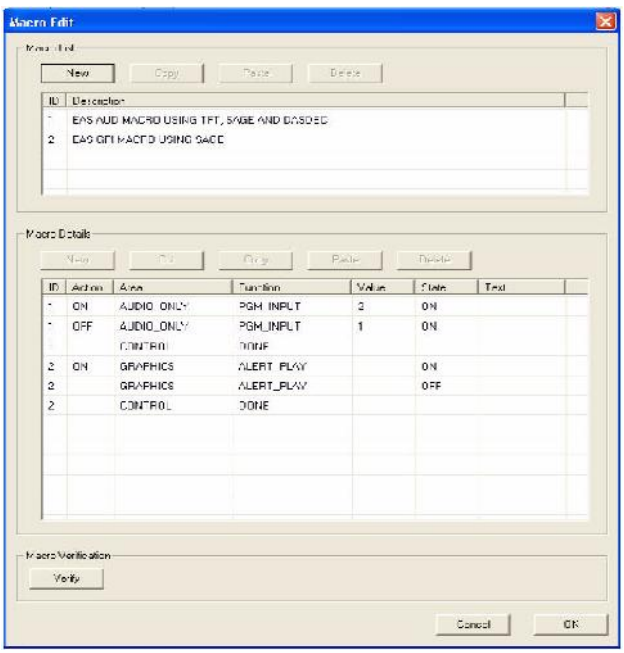
MACRO SETUP for TFT and DASDEC Models



Click on 'MACRO' in the top menu selection in MCConfig and select Edit Macros. Set all settings like these for TFT and DASDEC applications.

1. Create new Macro for audio play out by clicking on the button at the top of the table called 'New'. Each time New is clicked it adds a new macro in the description and details tables.
2. Macro 1 needs to be as seen above for the EAS configuration example to work properly. This can be any macro number but must also be changed in the EAS configuration table to correspond to this number.
3. Put a description name of your choice in the top table.
4. Click on the different windows in the bottom table and enter them as seen above. Value 2 is for that button and can be 2-4 of your choice.

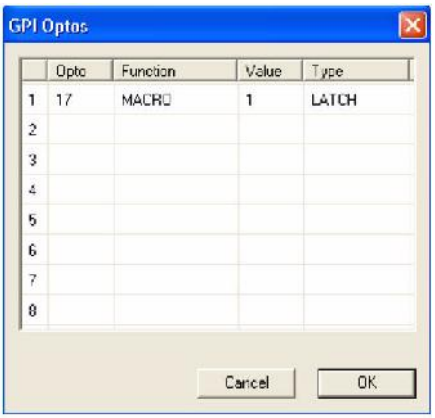
Macro Setup for Sage Models



Click on ‘MACRO’ in the top menu selection in MCConfig and select Edit Macros. Set all settings like these for Sage application.

1. Create new Macro for audio play out by clicking on the button at the top of the table called ‘New’. Each time New is clicked it adds a new macro in the description and details tables.
2. Macro 1 needs to be as seen above for the EAS configuration example to work properly. This can be any macro number but must also be changed in the EAS configuration table to correspond to this number.
3. Put a description name for macro 1 of your choice in the top table
4. Click on the different windows in the bottom table and enter them as seen above. Value 2 is for that button and can be 2-4 of your choice.
5. Create new macro for Sage to play out properly. This is triggered by a GPI which is described in the next section.
6. Put a description name for macro 2 of your choice in the top table
7. Macro 2 needs to be as seen above for the EAS configuration example to work properly. This can be any macro number but must also be changed in the GPI configuration table to correspond to this number.

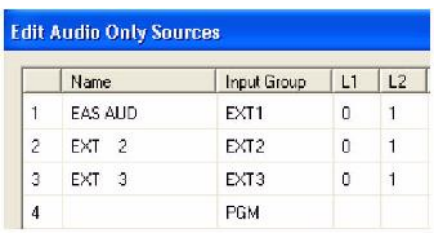
GPI (Sage setup only)



Click on ‘Relay/Opto’ in the top menu selection in MCConfig and select GPI Optos. Set all settings like these for Sage application.

1. Select GPI Optos from the Relay/Opto menu item.
2. Choose input Opto 17-21 from dropdown menu. Default is 17.
3. Choose Macro function from dropdown as seen above.
4. Enter Macro number for value – default 2 but can be any macro but must make sure the number corresponds to the macro table.
5. Select Latch in the Type dropdown menu.

AES Input Port (for TFT, Sage and Dasdec TFT)

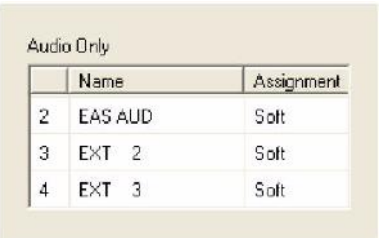


Click on ‘Audio’ in the top menu selection in MCConfig and select Edit Audio Only Sources. Set all settings like these.

1. From the Audio Only sources type the name you want to have for the EAS audio.

2. Choose the input group connector EXT 1 and put 0 and 1 in the L1 and L2 columns. All others can remain as they are.

AES Audio Only Buttons (for TFT, Sage and Dasdec TFT)


Audio Only

	Name	Assignment
2	EAS AUD	Soft
3	EXT 2	Soft
4	EXT 3	Soft

Click on 'Buttons' in the top menu selection in MCConfig and select Edit Button Assignments. Set all settings like these.

1. Make sure that the name you chose for the audio only is on button 2 and if not then click in the Name window and drop down the menu item and select it from the list.
2. Leave assignments Soft.

Manual Configuration

Follow the steps for MANUAL SETUP using raw config file.

1. UPGRADE MC-2020 (using procedure 2 above)
   a. Upgrade the software to sdsw_r3-00 or newer.
   b. Upgrade only the VO firmware to sdfw_r3-1-ee_sd525 (ntsc) or sdfw_r3-1-ee_sd625(pal) using the burnfw-network-single.bat file
2. UPGRADE MCP-2020 (using procedure 2 above)
   a. Upgrade the software to mcpsw_r3-00 or newer.
3. Follow page 2-12 in the System Installation Guide for retrieving the config file from the HD/SD encode folder.
4. Open the Config File xxxx.conf from step 5 and locate the section titled [macro_definitions_start]
5. If interfacing to TFT, use the example files below for the TFT macro settings. Note: The default for the audio to play out is macro 1. The button for the audio to run is on button 2 however, this number needs to be whatever button the external audio comes in on. Button 2 is External Input 1, 3 is External Input 2 and 4 is External Input 3.

6. Overwrite the macro section in step 6 with the macro from step 7 for use with a TFT.
7. If interacting to a SAGE use the example file below for the SAGE macro and GPI settings. (GPI must be 16-21-see SAGE setup below). Note: The default for the audio to play out is macro 1. The button for the audio to run is on button 2 however, this number needs to be whatever button the external audio comes in on. Button 2 is External Input 1, 3 is External Input 2 and 4 is External Input 3.
8. Overwrite the macro and GPI section in step 6 with the macro and GPI settings from step 9 for use with a SAGE.
9. For both TFT and SAGE, enter the Macro number for the EAS_Auto_Action in Misc Parameters section. This section is at the top of the config file from step 6 above. The number to use is whatever the Macro is from steps 7 or 9 above. The default number is 01. See example below titled “Sample EAS Auto Action”. Use the Macro number in the macro_definition_start.
10. You will also need to set the serial port settings in the MC2020 config file to match the TFT or SAGE serial settings. Locate the [Machine_Control_Serial_Port_Definition_Start] section in the config file and use the sample below to make the changes to the config file from step 6.
11. Save & close the config file from step 6 and then run the burn-network.bat file to send changes to HD/SD 2020. CAUTION: This will cause a reset to the 2020 system. Loss of video and audio will occur for up to ten seconds. Proper bypass prior to this step is recommended.
12. Refer to TFT Manual for how to set up TFT. A short “how to” is provided below.
13. Refer to Sage Manual for how to set up SAGE. A short “how to” is provided below.

TO ENABLE MANUAL ALERT and trigger from MCP-2020 PANEL.

To have the EAS alert blink a button on the MCP-2020 and to Manual Trigger the alert do the following:

1. Install the version of MCPconfig found on system cd in the install2020 folder. The folder is called release_mcpconfig.
2. Run MCPconfig.exe
3. Go to Communications/ Specify Target IP Address and port. Set the port to 5580. Click on Ok
4. Go to File and select “Retrieve Configuration from Target”
5. Click on the button you want the manual EAS to be on and the button editor will appear.
6. Drop down the Functions Group list and select Local EAS Controls.
7. Drop down the Function list and select Local EAS Alert Active and then click OK.

8. Under File select “Send Configuration To Target”

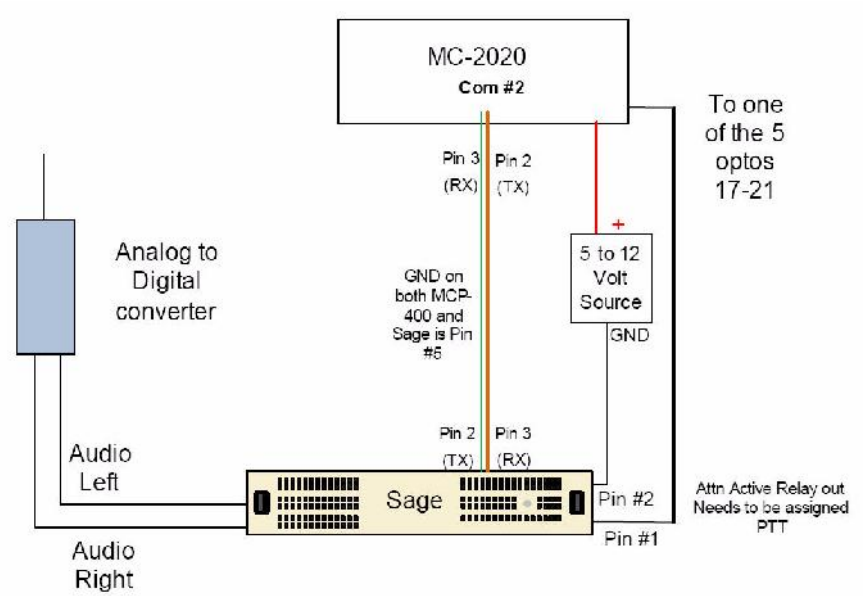
TFT EAS SETUP FOR MC2020

1. There is only one serial port that can be used on the TFT unit. It needs to be set to 9600, 8 N 1. (see TFT manual for this info or how to set port to these setting if they are not defaults)
2. Run a cross over RS232 cable (pins 2-3, 3-2, 5-5) from the port in step one to serial port 1 on the rear of the MC2020 chassis.
3. In the TFT menu you will need to set the CG type to TFT Standard.

SAGE EAS SETUP FOR MC2020

1. Choose one of the Sage serial ports that defaults to 9600, 8 N 1. (see SAGE manual for this info or how to set port to these setting if they are not defaults)
2. Run a cross over RS232 cable (pins 2-3, 3-2, 5-5) from the port in step one to serial port 1 on the rear of the MC2020 chassis.
3. If using an MC2020, locate the Relays/Optos B connector on the rear of the MC2020 and refer to the MC2020 Guide Appendix B for proper pin numbers to be used. The Optos are 16 to 21 on the daughter card. Note: If your system has the 21 relay daughter card this will not work. Contact Utah Scientific to get the card replaced.
4. Run one wire from one side of the GPO on the SAGE connector to one side of the desired GPI in step 3 on the rear of the MC2020.
5. You will need to attach a 5v – 12v supply source between the other side of the GPO on the SAGE and to the other side of the GPI in step 3 on the MC2020.
6. You will also need to put a 1k pull up resistor between the ground and whichever side that wire connects to. This is not built in to the 2020 and will cause damage to the Opto if not installed. See page C-7 in MC2020 guide for detail.
7. In the SAGE menu you will need to locate the serial ports and make sure step 1 above is correct.
8. In the SAGE menu you will need to locate the CG type and make it Generic CG.
9. In the SAGE menu you will need to locate the GPO you are using and set it to PTT.

Wiring diagram from Utah MC-2020 to Sage



Config Section Requirements Summary

1. The TFT interface in the MC config file requires 4 sections to be set.
   a. EAS Auto Action in section [MISC_START]
   b. Serial Port configuration in section [MACHINE_CONTROL_SERIAL_PORT_DEFINITIONS_START]
   c. EAS Audio Macro in section [MACRO_DEFINTIONS_START]
   d. EAS Display Options in section [EAS_DISPLAY_CONFIG_DEFINITIONS_START]
2. The SAGE interface in the MC config requires 6 sections to be set
   a. EAS Auto Action in section [MISC_START]
   b. Serial Port configuration in section [MACHINE_CONTROL_SERIAL_PORT_DEFINITIONS_START]
   c. EAS Audio Macro in section [MACRO_DEFINTIONS_START]
   d. EAS Display Options in section [EAS_DISPLAY_CONFIG_DEFINITIONS_START]
   e. EAS Macro for SAGE GPI
   f. GPI for inbound connection from SAGE GPO programmed as PTT relay

Sample TFT Macro

```
[MACRO_DEFINTIONS_START]
#
# This section defines the macros the system can perform.
#  See macro-definitions.txt in the software release
#  directory for detailed instructions on using macros
#
#NUMBER  1-??
#   ,ACTION  ON/OFF
#   ,    NUMBER      1-10
#   ,    ,AREA
#   ,    ,           ,FCN
#   ,    ,           ,           ,VALUE
#   ,    ,           ,           ,           ,STATE
#   ,    ,           ,           ,           ,    ,TEXT8
#4  , 4 ,   12       ,   12      ,   12      , 4     8
#---,----,------------,------------,------------,----,--------
1   ,DESC,EAS AUD MACRO USING TFT
1   ,ON  ,AUDIO_ONLY  ,PGM_INPUT   ,2          ,ON  ,
1   ,OFF ,AUDIO_ONLY  ,PGM_INPUT   ,1          ,ON  ,
1   ,    ,CONTROL     ,DONE        ,           ,    ,
```

Sample SAGE Macro and GPI Section Config

```
[MACRO_DEFINTIONS_START]
#
# This section defines the macros the system can perform.
#  See macro-definitions.txt in the software release
#  directory for detailed instructions on using macros
#
#NUMBER  1-??
#   ,ACTION  ON/OFF
#   ,    NUMBER      1-10
#   ,    ,AREA
#   ,    ,           ,FCN
#   ,    ,           ,           ,VALUE
#   ,    ,           ,           ,           ,STATE
#   ,    ,           ,           ,           ,    ,TEXT8
#4  , 4  ,   12       ,   12       ,   12       , 4      8
#---,----,------------,------------,------------,----,--------
1   ,DESC,EAS AUD MACRO
1   ,ON  ,AUDIO_ONLY  ,PGM_INPUT   ,2           ,ON  ,
1   ,OFF ,AUDIO_ONLY  ,PGM_INPUT   ,1           ,ON  ,
1   ,    ,CONTROL     ,DONE        ,           ,    ,
2   ,DESC,EAS GPI MACRO USING SAGE
2   ,ON  ,GRAPHICS    ,ALERT_PLAY  ,           ,ON  ,
2   ,OFF ,GRAPHICS    ,ALERT_PLAY  ,           ,OFF ,
2   ,    ,CONTROL     ,DONE        ,           ,    ,

[GPI_DEFINITIONS_START]
#NUMBER  1-32
#   ,AREA
#   ,           ,FCN
#   ,           ,           ,VALUE
```

```
#   ,          ,          ,
#   ,          ,          ,          ,TYPE (LATCH/PULSE)
#4  ,   12      ,   12      ,   12      ,   8
#---,------------,------------,------------,--------
16  ,PANEL_MISC  ,MACRO       ,2          ,LATCH
```

Sample EAS Auto Action

```
[MISC_START]
#Example        EAS_AUTOMATIC_ACTION:   @01
#AUDIO_CHANNELS:@000F

AUDIO_DIM_ADJUST:@-15
VIDEO_MIX_POSITION:@08
KEY_LEVEL_RESET_MASK:@0f
KEY_LEVEL_XFER_MASK:@00
TRANS_SPEED_FAST:@30
TRANS_SPEED_MEDIUM:@60
TRANS_SPEED_SLOW:@120
SYSLOG_SERVER_ID:@
AUX_OUT_XPOINT_SEL:@PVW
EAS_AUTOMATIC_ACTION:@01 (ENTER THE NUMBER FOR THE MACRO)
```

Sample Serial Port Setup for MC2020 Interface to TFT or Sage

```
[MACHINE_CONTROL_SERIAL_PORT_DEFINITIONS_START]
#
# Example config a machine using port 3
# SQZMAX 1,PORT_02 ,38400   ,8      ,NONE    ,1      ,DISABLE ,DISABLE
# The system device name is not used programmatically.  Just as a reference when
#  looking at this file
#
# SYSTEM DEVICE NAME (Don't Care at this time 5/22/2004)
#   |   , SERIAL COMMUNICATIONS PORT NUMBER
#   |       |   ,BAUD RATE
#   |       |     |    ,BITS PER CHARACTER
#   |       |     |        |   , PARITY TYPE (ODD, EVEN, NONE)
#   |       |     |        |      |    ,STOP BITS PER CHARACTER
#   |       |     |        |      |             ,XONN/OFF FLOW CONTROL (ENABLE/DISABLE)
#   |       |     |        |      |                    ,RTS/CTS FLOW CONTROL (ENABLE/DISABLE/RS485???)
#-------,--------,--------,--------,--------,--------,--------,--------
EAS_STD ,PORT_01 ,9600    ,8      ,NONE    ,1      ,DISABLE ,DISABLE
```

Sample EAS Display Configuration for TFT

```
[EAS_DISPLAY_CONFIG_DEFINITIONS_START]
#
#  COLORS.  3 sets of colors are available.
#          1 normal color bars values @ 75%
#          2 normal color bars values @ 100%
#          3 custom colors set by USI
#
#  BLACK, WHITE, YELLOW, CYAN, GREEN, MAGENTA, RED, BLUE
#  BLACK_100, WHITE_100, YELLOW_100, CYAN_100, GREEN_100, MAGENTA_100,
#  RED_100, BLUE_100
#  TIMEKEY_FG, TIMEKEY_BG, NONE, more to come
#
#         ###  EAS_CRAWL  ###
#
# This line sets the display mode for the crawl messages
# that appear on the PGM output of the MC2020.
#
# EAS_CRAWL ,YES ,1   ,2   ,1   ,WHITE_100   ,TIMEKEY_BG  ,NO
#
#         ###  EAS_NOTIFY  ###
#
# This line sets the display mode for the text messages
# that appear on the MON output of the MC-2020
#
# EAS_NOTIFY,YES ,1   ,2   ,1   ,WHITE_100   ,TIMEKEY_BG  ,YES
#
#
#Item (EAS_CRAWL, EAS_NOTIFY)
#         ,Active (YES/NO)
#         ,    ,Display Line (1 or 8 <1 is top, 8 is bottom>)
```

```
#        ,    ,    ,Column (1-40)      <<SPEED 4 CRAWL 1,2,3>>
#        ,    ,    ,    ,Length (1-40)
#        ,    ,    ,    ,    ,FORGROUND COLOR (See above)
#        ,    ,    ,    ,    ,          ,BACKGROUND COLOR…
#        ,    ,    ,    ,    ,          ,          ,BLINK (YES/NO)
#   10    , 4  , 4  , 4  , 4  ,   12       ,   12       , 4
#---------,----,----,----,----,----------,----------,----
EAS_CRAWL ,YES ,1   ,2   ,1   ,WHITE_100   ,TIMEKEY_BG  ,NO
EAS_NOTIFY,YES ,1   ,2   ,1   ,WHITE_100   ,TIMEKEY_BG  ,YES
```

Sample EAS Display Configuration for Sage

```
[EAS_DISPLAY_CONFIG_DEFINITIONS_START]
#
#  COLORS.  3 sets of colors are available.
#          1 normal color bars values @ 75%
#          2 normal color bars values @ 100%
#          3 custom colors set by USI
#
#  BLACK, WHITE, YELLOW, CYAN, GREEN, MAGENTA, RED, BLUE
#  BLACK_100, WHITE_100, YELLOW_100, CYAN_100, GREEN_100, MAGENTA_100,
#  RED_100, BLUE_100
#  TIMEKEY_FG, TIMEKEY_BG, NONE, more to come
#
#         ###  EAS_CRAWL  ###
#
# This line sets the display mode for the crawl messages
# that appear on the PGM output of the MC2020.
#
# When the background is set to SAGE_AUTO_BG, the background
# color of the crawl will be either GREEN, YELLOW, or RED based
# on the type of alert the SAGE has received.
#
# EAS_CRAWL ,YES ,1   ,2   ,1   ,WHITE_100   ,SAGE_AUTO_BG,NO
#
# This line uses a single color for the background which can
# be used as an alternative to the multi-color background
# if desired by the user.
#
# EAS_CRAWL ,YES ,1   ,2   ,1   ,WHITE_100   ,TIMEKEY_BG  ,NO
#
# NOTE: Only one EAS_CRAWL Line can be active at a time.
```

EAS_NOTIFY,YES ,1 ,2 ,1 ,WHITE_100 ,TIMEKEY_BG ,YES

```
#
#         ###  EAS_NOTIFY  ###
#
# This line sets the display mode for the text messages
# that appear on the MON output of the MC-2020
#
# EAS_NOTIFY,YES ,1   ,2   ,1   ,WHITE_100   ,TIMEKEY_BG  ,YES
#
#Item (EAS_CRAWL, EAS_NOTIFY)
#         ,Active (YES/NO)
#         ,    ,Display Line (1 or 8 <1 is top, 8 is bottom>)
#         ,    ,    ,Column (1-40)      <<SPEED 4 CRAWL 1,2,3>>
#         ,    ,    ,    ,Length (1-40)
#         ,    ,    ,    ,    ,FORGROUND COLOR (See above)
#         ,    ,    ,    ,    ,          ,BACKGROUND COLOR…
#         ,    ,    ,    ,    ,          ,          ,BLINK (YES/NO)
#   10    , 4  , 4  , 4  , 4  ,   12       ,   12       , 4
#---------,----,----,----,----,------------,------------,----
EAS_CRAWL ,YES ,1   ,2   ,1   ,WHITE_100   ,SAGE_AUTO_BG,NO
```

EAS_NOTIFY,YES ,1   ,2   ,1   ,WHITE_100   ,TIMEKEY_BG ,YES

Index