



Video Routing Medium to Large Routing Switcher System

Model System 2000

APPLICATIONS

- High resolution computer graphics
- HDTV video
- Broadcast television
- DS3
- Surveillance

FEATURES

- Switches up to 120 MHz video bandwidths
- Positive crosspoint-actuated switch closure and status verification
- Self test and diagnostics
- True salvo capability
- Vertical interval switching on synchronous signals
- Source restriction capability
- Excellent granularity
- Increments of six on inputs
Increments of four on outputs
- Numeric or alphanumeric controls
- "Hot-change" modules
- Positive cooling with plug-in, temperature-controlled cooling module

BENEFITS

- High density crosspoints/RU
- Route DS3, analog video signals
- Superior control capability
- Highest quality, lowest cost
- Compatible with Series 36



The System 2000 switching equipment is available for high resolution computer generated graphics video, HDTV video, and broadcast television video including NTSC, PAL, and SECAM.

Available in many cost effective sizes, the System 2000 is a compact routing switcher system with video crosspoint densities up to 1728 video per RU, including controllers and power supplies.

The powerful control system of the System 2000, with its many standard and optional features, gives the user superior control capability and flexibility. Meret also offers crosspoint-level switch closure and status verification from actual crosspoint feedback information, as well as plug-in building block versatility.

STANDARD FEATURES

- Ultra compact - highest crosspoint density
- Composite broadcast quality or HDTV and 120 MHz bandwidth for high resolution computer imaging video performance
- Easily configured or partitioned to various component video systems
- Positive crosspoint actuated switch closure and status verification
- Optional redundant system controllers with auto-changeover for uninterrupted operation
- Critical-function alarm system
- Large salvo storage in internal non-volatile memory
- Up to 32 levels of independent control

- Permanent power failure memory protection--instant recovery
- Numeric, or alphanumeric controls
- Hot-change modules
- Destination locking/source restriction capabilities
- Self-test and diagnostics for controller, power supplies, cooling, switch and output modules
- Positive cooling with plug-in monitored cooling module
- Supports up to 198 remote control panels directly
- Switchable reference for system master clock
- Precision vertical interval switching on synchronous signals
- Operates on 115/230 v, 48-450 Hz input power

ADDITIONAL FEATURES WITH CONTROL CONSOLE OR EXTERNAL CONTROL COMPUTER & SOFTWARE (Call for availability)

- Remote control via external serial port
- WINDOWS™,based console program with pop-up windows, drag and drop switching, pull-down menus, and full status screens
- Store, recall, and execute salvos
- Unlimited salvo storage
- Pre-program salvo configurations and execute at predetermined time
- Dynamically mapped virtual matrix configuration
- Logging of system activity
- Security with passcode protection

SYSTEM CONSIDERATIONS

System 2000 routing equipment meets all analog and DS3 system requirements. Frames and switch modules can be stacked or partitioned to accommodate any matrix size.

High system granularity is inherent in the System 2000 since the number of input channels is six and the number of output channels is four. Virtual matrix capability with dynamic mapping allows random assignment of inputs and outputs to multiple virtual matrices, either within a single-level switch matrix or on separate control levels. This allows a user to easily adapt his equipment to his changing signal requirements.

CONFIGURATIONS

The outstanding performance of the System 2000 routing system is made possible by optimizing the number of crosspoints in the switch module for performance versus size and architectural flexibility. The 36 input by 36 output switch modules are configured into several convenient, compact frames, such as the typical switching matrices shown in Table 1 below.

Each of these systems can be configured for the desired signals by selecting the appropriate video frame, switch modules, input and output modules, single or redundant system controllers and power supplies.

Routing systems larger than the single-frame configurations shown in the above tables can be assembled by using video or audio distribution amplifiers.

Single frame routers can be partitioned for component video as shown in Table 2, below.

Inputs/Outputs	Size	Signals	Crosspoints/RU	
			Video	Audio
144 x 144	12 RU (21")	Video	1728	3456
288 x 72	12 RU (21")	Video	1728	3456

Table 1. Configurations of System 2000 Routers

Frame	Inputs/Outputs	Size	Signals	Crosspoints/RU
72 x72	24 x 24	6 RU (10.5")	RGB, GBR or Y/R-Y/B-Y	288
144 x 144	48 x 48	12 RU (21")	RGB, GBR or Y/R-Y/B-Y	576
72 x 72	36 x 36	6 RU	Y/C	432

Table 2. Examples of routers partitioned for component signals

The router can be partitioned by the user by making software changes; however, TGBS may require hardware considerations because of different types and amplitudes of sync signals in general use.

VIDEO SWITCHING

By utilizing 36 x 36 modules, the highest degree of signal integrity is maintained through single circuit board architecture which allows all connectors and modules to be interfaced directly with the motherboard. This eliminates signal degradation caused by unnecessary wiring, cabling and connectors. Video input and output connectors are BNC.

The video switch module utilizes advanced proprietary Application Specific Integrated Circuits (ASICs), to provide superior performance and high reliability. Input amplifiers provide a high degree of buffering to the crosspoints, allowing many or all outputs to be switched to the same input without loading or changing frequency response. Crosspoints use minimum power in the "off" state, significantly reducing heat and enhancing system reliability.

The six-channel input modules are terminated to assure high return loss and uniform frequency response over the system's very wide bandwidth. Switching occurs during the vertical interval, referenced to external composite sync or video. Random switching provided in the absence of a reference.

Output DC reference is maintained on composite, non-composite or scrambled signals regardless of scanning rate, back porch width, or average picture level through the use of Meret's unique signal-tip-reference (STR) circuitry. Data information is also stabilized by this circuitry.

POWER SUPPLIES

Cool-running, compact switching power supplies are used in the System 2000. The power supplies automatically sense the AC line voltage and compensate for power line variations from 85 to 140, or 180 to 240 VAC, 48-450 Hz. Since the equipment is insensitive to power line frequency, it can be used in field operations vehicles, including aircraft with 400 Hz power. Redundant plug-in supplies with auto-switchover are available. All supplies are monitored by the critical-function alarm system which alerts operating personnel of any malfunction.

COOLING SYSTEM

Filtered air is continuously circulated across the circuit boards to assure uniform cooling at all times. If the temperature rises above a predetermined limit, or if a fan fails, the alarm system is activated to notify operating personnel. The remaining fans will provide sufficient cooling for normal system operation until the failed fan is replaced. The fans and integral filters are individually removable from the rear while the equipment is in

operation. If the temperature rises above a maximum safety limit, the system will shut down. This feature can be disabled by the user.

CONTROL SYSTEM

User access to the controller can be from any combination of:

- A local keyboard and video monitor console
- Remote control panels via a coaxial comm-line
- An external computer via an RS-232/RS-422 serial link
- Remote external computers via an Ethernet local area network

System 2000 is equipped with a powerful, yet cost effective control system. Its architecture is very flexible and easy to work with to build the configuration you need. The heart of the control system is the powerful system controller module. One controller, or a redundant pair can be installed in a switcher frame.

SYSTEM CONTROLLER

The microprocessor-based system controller is used to receive switch commands from and send status information to the various operator controlled devices, and send switching commands to the switch modules. This module provides for such outstanding features as actual switch closure and status verification, auto-switchover to an optional redundant controller, and dynamically mapped virtual matrix capability, as well as the many other features discussed throughout this section.

The entire operating program for the controller is contained in read only memory (ROM), and all operating and configuration data is stored in static RAM with back-up power, supplied by an on-board smart lithium battery.

All SRAM data is guaranteed to be maintained for a minimum of three years (typical data retention will be much longer), even with the system controller module removed from the switcher frame. A power monitor automatically resets the controller upon loss of power, holding the configuration data in memory. Upon restart, the system is instantaneously back on the air.

The system controller communicates with switch modules over a high speed serial line. Switch commands and refresh data are sent to switch modules by the system controller; positive conformation of the crosspoint selection is sent back from the actual crosspoint via the local controller on the switch module. For highest system integrity, the system controller verifies correct operation of switching elements before attempting to perform a new switch. If a switch module is removed, its absence is noted and reported. After a module is re-inserted, it is immediately reconfigured to current status. System response time is minimized by processing switch and status commands as soon as they are received. The

controller maintains a master clock for system timing; its reference can be the internal crystal controlled oscillator, vertical sync, or 50/60 Hz power line.

Actual switching takes place during the vertical blanking interval, in accordance with SMPTE RP 168, if a vertical timing reference such as composite video, black burst or sync is present. In the absence of such a reference, switching takes place as soon as commands are processed. Tri-level sync can be used for 1125/60 HDTV timing.

Any MiniStar remote control panel can be used to perform basic system set-up and operations without the need for an external computer. More sophisticated system set-ups are possible using an external computer or the optional local master console. A PC/AT compatible keyboard and VGA monitor can be directly connected to the control frame to provide complete local control using this option, allowing user definition of mnemonic associations, source restrictions, remote panel characteristics, and full screen status displays.

Destination Locking

Destination connections can be locked, preventing other users from changing the connection. Locking can be performed from console and control panel devices. At the console, the lock function is accessed using a single function key. The use of a security passcode is available, but not required. Lost or forgotten passcodes can be recovered using a console.

Alarm System

A critical-function alarm system protects the integrity of the system by sending out alarm messages to warn operating personnel of a failure or an impending problem. The system controllers, cooling system, switch modules and power supplies are monitored by the alarm system. When such an event occurs, an audible alarm sounds, an appropriate message is sent to the control displays, and external alarm contacts are closed. The audible alarm signals are coded to indicate the severity of the problem. Front panel and on-module LED indicators also provide indications of faults.

Console Control (Call for availability)

Full-screen console control is available using an external computer connected via an RS-232/RS-422 serial link.

WINDOWS™ based remote console software for PCs is available in both serial and Ethernet versions, and can be used to perform system control functions, including the following:

- Set system configuration
- Manage system security
- Perform single and salvo switching
- Display destination or source status
- Set restrictions on source connections
- Lock destination connections in place
- Preview source selection before Take
- Associate source & destination w/ mnemonic name
- Define virtual matrix mapping labels
- Set characteristics of remote control panels
- Send text messages to Ministar control panels
- Log system activity via a parallel printer port
- Create/edit/store configuration data off-line

All of Meret's console programs features a WINDOWS™ oriented interface with drag and drop switching capability, pull-down menus and pop-up data entry and message dialog boxes. A tool bar provides

quick access to frequently used functions. Administrative functions can be protected by passcode security.

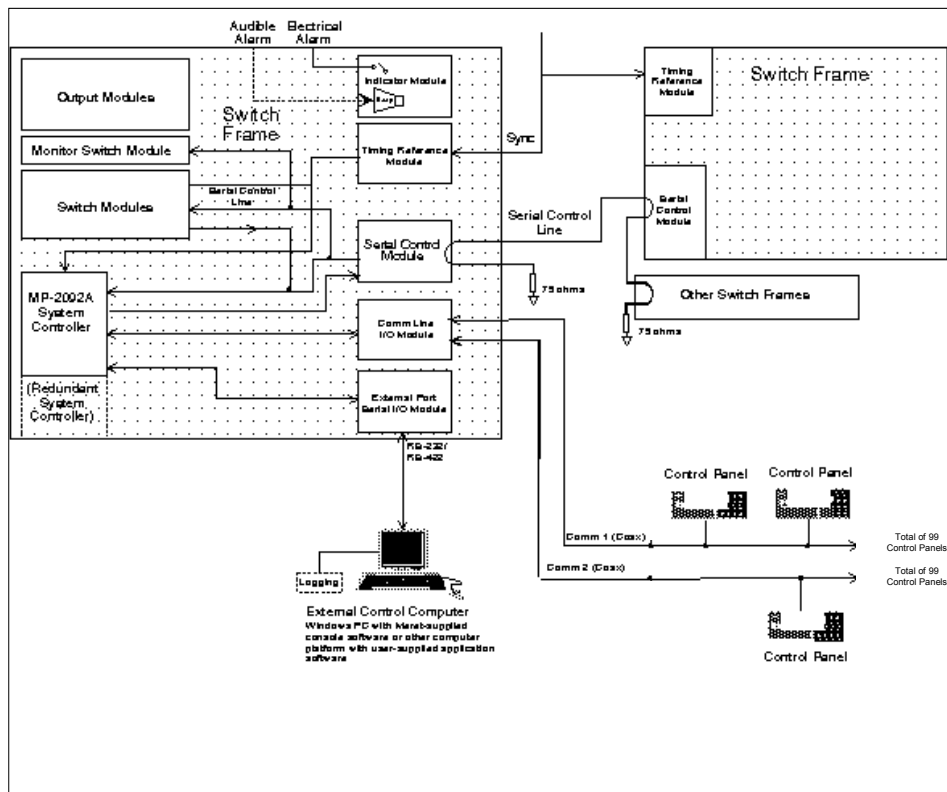
The external computer's disk can be used to store configuration data including, mnemonic assignments, source restriction assignments, and remote panel characteristics. Additionally, multiple switch transaction salvos can be stored and edited off-line. A printer connected to the computer or the local console can be used to log switch transactions and salvos.

Dynamically Mapped Virtual Matrix

Many destinations do not require every level of every source, and many sources do not have associated signals for every matrix level. Meret's virtual matrix software makes it possible for these unused signal inputs to be randomly assigned by the user to new uses, but switched together as groups. These matrices can be easily remapped using a console. For example, a 144 x 144 video matrix can be partitioned into a 48 x 48 RGB matrix.

Source Restriction

Using the master control console, the system can be set up to restrict the routing of certain sources to particular destinations. Such "source restrictions" prevent a particular destination from connecting to a particular source. Once set, these source restrictions reside in nonvolatile memory and govern all related switching operations. Access to the console screen that sets up the restrictions is protected by the administrative passcode.



This representative control diagram for a System 2000 routing switcher shows its ability to support up to 198 remote control panels directly. External computer control can be via the standard RS-232/RS-422 serial link, an optional local console, or optional Ethernet package.

Panel Characteristics

The operation of remote control panels is governed by their panel characteristics. These parameters are set up at the master console and involve the selection of panel operating criteria such as:

- Single bus or X-Y mode
- The assignment of the single bus
- Numeric or mnemonic format

Default characteristics are loaded at the factory for systems that do not use a console.

Destination Enable

This special panel characteristic allows users to select a particular MiniStar panel control without regard to bus numbers. This feature is especially helpful in system expansions when a new bus to the controlled is out of contiguous order from the group of buses already assigned. Like other panel characteristics, "destination enable" is set-up at a console.

REMOTE CONTROL PANELS

The remote control panels available include all of the compact MiniStar controllers. All are fully compatible with

the System 2000 system controller. Up to 198 control panels can be connected directly to the system controller.

MiniStar Remote Control Panels

MiniStar is a compact, versatile, alphanumeric remote control for Meret routing switchers. Its features include:

- 16-character fluorescent display
- 16 button key pad
- Compatibility with all Meret switching systems
- Eight-level control

With selective level control and flexible destination assignment, each MiniStar can be tailored to an exact application. Each MiniStar is programmed with its operating characteristics by the system controller using information entered at a console. Should it become necessary to change panels at a given location, the replacement panel is automatically downloaded with the same characteristics as the original from the system controller. MiniStar operates with numeric or alphanumeric source and destination selection. Alphanumeric mnemonics can be up to five characters long. Each comes standard with 30 commonly used mnemonic button labels to permit tailoring of the panel to the users' environment.

Specifications

VIDEO

Inputs	1.0 V p-p video 75 ohm, terminating
Input return Loss	Greater than 45 dB @ 5 MHz
Outputs	Dual, 1.0 V p-p 75 ohm, source terminated. 40 dB isolation @ 5 MHz
Monitor Output	Single, 1.0 V p-p 75 ohm, source terminated
Output Return Loss	Greater than 40 dB @ 5 MHz
Output DC Reference	Adjustable -0.3 to 0.0 V maintained ± 0.02 V, 10 to 90% APL, composite or non-composite video
Connectors, Input-Output	BNC
Input Vertical Interval	Composite 1 V p-p video or 1 to 4 V p-p
Timing Reference	neg. sync, 75 ohms looping, BNC connector
Gain	Adjustable to unity, any input to any output ± 0.05 dB
Gain Stability	0.1 dB
Crosstalk Isolation	Greater than 60 dB to 4.43 MHz (most hostile condition) 40 dB to 30 MHz
Differential Delay	$\pm 0.5^\circ$ @ 5 MHz
Electrical Length	15 to 30 ns nominal. depending on frame size
Switching Time	Less than 2 μ s
Frequency Response (Ref. 1 MHz)	100 KHz to 5 MHz ± 0.05 dB; 10 MHz ± 0.1 dB; 30 MHz ± 0.25 dB; 50 MHz ± 0.5 dB; 100 MHz +0.5, -3 dB (typical 120 MHz)
Bandwidth (-3 dB)	100 MHz (typical 120 MHz)
Group Delay	Less than 5 ns, 100 KHz to 5 MHz
Differential Gain	0.15% 10 to 90% APL, 4.43 MHz
Differential Phase	0.15° 10 to 90% APL, 4.43 MHz
Slew Rate	240 volts/microsecond
Transient Response	0.25% T pulse
Transient Response (using 20 MHz sq. wave with 2 ns rise and fall time)	Rise/fall time, less than 4.0 ns Overshoot, less than 5%
Tilt	Less than 0.3% line or field
Hum and Noise	68 dB RMS below 1 V p-p. 10 MHz bandwidth

GENERAL SPECIFICATIONS

Comm-Line	75 ohm unterminated coax, 2000 ft (610 m) maximum, 9600 bps serial data, BNC connector
Serial Control Buses	75 ohm terminated coax. 3280 ft (1000 m) maximum 25 Kbps serial data, BNC connector
Optional Computer Control	RS-232, 1200 to 19.2 Kbps full duplex, 9 pin male subminiature "D" connector
External Control Ports	Two RS-422 or RS-232, 1.2-19.2 Kbps serial data. 9 pin subminiature female "D" connector
Frame Size(See tables 1 and 2)	
12 RU frame	21 in. (532 mm) H x 18.5 in. (470 mm) D x 19 in. (433 mm) W, rack mounting
Frame Weight	(See tables 1 and 2)
12 RU frames	136 lbs. (54 Kg)
Primary Power	85 to 140 / 180 to 240 VAC, 48 to 450 Hz, auto-switching, or 48 VDC
12 RU Equipment	700 to 900 W, requires two power supplies (add third power supply for redundancy)
Temperature Range	0 to 40° C
Humidity	0 to 95% non-condensing

MiniStar Controls

Comm-Line	Single coax. RG-59 type. 2000 ft (610 m) maximum. serial data. 9600 bps, BNC connector	
Size	3.5" (88 mm) H x 1.5" (38 mm) D x 8.5" (214 mm) W	
Rack Mount	3.5" (88 mm) H x 1.5" (38 mm) D x 19" (483 mm) W	
Temperature Range	0 to 50° C	
Primary Power	PCA-80A	Wall-mount transformer 115 VAC, $\pm 10\%$, 60 Hz
	PCA-811A	Wall-mount transformer 230 VAC, $\pm 10\%$, 50 Hz

COMPONENTS

Frames

FR-2006A	Frame, 144 x 144, Video
FR-2012A	Frame, 288 x 72, Video

Blank Panels

BP-2019A/1W	Blank Panel, Wide, for External PORT
BP-2019A/2N	Blank Panel, Narrow, for Dual BNC
BP-2019A/2W	Blank Panel, Wide, for Comm Lines
BP-2019A/5W	Blank Panel, Wide, for Basic Control I/O
BP-2019A/6N	Blank Panel, Narrow, for Inputs
BP-2019A/8N	Blank Panel, Narrow, for Outputs

Power Supplies

PS-2024B	Power Supply, 85 to 140 / 180 to 240 VAC, 48/450 Hz, for 72 x 72 Video
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Switch Modules

SW-2030B	Switch Module, 36x36, Video
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Input Modules

VI-2060A	Input Module, Non-Equalizing Video, 6-Inputs
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Output Modules

VO-2040A	Output Module, Video. 4 Dual Outputs
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Timing Input Modules

TR-2035A	Input Module, Timing, NTSC/PAL and HDTV 1125/60 tri-level sync
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Maintenance Items

ME-2000	Module Extender for Switch, Monitor Switch and System Controller Modules
SF-2000PS	Service Fixture for Power Supply
ME-2000CM	Module Extender for Comm-line Modules
ME-2000DU	Module Extender for Dual BNC Auxiliary Modules
ME-2000OM	Module Extender for Output Modules
ME-20001M	Module Extender for Input Modules

Control Equipment

MP-2092A	System Controller, Basic, with Firmware
FA-2095A	Serial Control Line, 2 BNC
FA-2097A	PS-422/232 Port, 9-Pin "D"
FA-2098A	Comm-line, 2 BNC each

System 2000 Control Options

MiniStar 3.1	Standard Function, Alphanumeric Control Panel, 230V 50Hz, PG-8920A
MiniStar 4.1	Standard Function, Alphanumeric Control Panel, 115V 60Hz, PG-8920A
MiniStar 5.1	8-Level Control, Alphanumeric Control Panel 115V, 60Hz, PG-8922A
MiniStar 6.1	Standard Plus Memory, Alphanumeric Control Panel, 230V 50Hz, PG-8921A
MiniStar 7.1	Standard Plus Memory, Alphanumeric Control Panel, 115V 60Hz, PG-8921A
Ministar 8.1	8 Level Control, Alphanumeric Control Panel, 230V 50Hz, PG-8922A

Accessories

RM-7810A	Rack Mount - holds two MiniStars in 2 RU height
DM-7811A	Desk Mount - holds one MiniStar
RP-7815A	Blank Panel - use with one MiniStar in KM-7810A Rack Mount

System 2000 equipment has been tested to show compliance with FCC rules Part 15, Subpart J, for Class A computing devices.

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