

MPS-300**SECTION XXXXX - CONTROL SYSTEM SPECIFICATION****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 SUMMARY

- A. This Specification, in conjunction with the Drawings, establishes the requirements necessary to achieve the intended performance, installation and functions of the Multimedia Presentation System.
- B. Provide the services necessary to furnish, install, train, and to provide maintenance support for the Multimedia Presentation System including all required peripheral apparatus conforming to acceptable industry standards. All work shall be in accordance with the true intent of these Drawings and Specifications, and as required to leave the Multimedia Presentation System complete and in satisfactory operating condition.
- C. Verify dimensions and conditions at the job site prior to installation, and perform installation in accordance with these Specifications, Manufacturers recommendations and the latest edition or revision of all applicable codes and standards.
- D. The Multimedia Presentation System shall include providing and integrating the following principal systems:
 - 1. Audio/Video Switching.
 - 2. Audio/Video Reinforcement and distribution.
 - 3. Video interface equipment.
 - 4. Audio interface equipment.
 - 5. Ethernet and e-Control Support.
 - 6. RoomView and SNMP support.
 - 7. Room Control Processor.

1.3 CONFLICT BETWEEN DRAWINGS AND SPECIFICATIONS

- A. It is intended that any contractor furnishing materials and/or labor necessary for the completion of this specification shall furnish it in compliance with this specification. Where conflict exists with other specifications concerning such materials and labor, this specification takes precedence unless otherwise approved in writing by the Engineer.
- B. Drawings pertaining to this specification shall be considered as a part of said specification and shall be a part of the bid documents.

1.4 REQUIREMENTS OF REGULATORY AGENCIES

- A. The system shall be registered under the most current applicable rulings of the Federal Communications Commission (FCC). Provide the FCC registration number with the equipment submittal. All components and installations shall bear an Underwriters' Laboratories (UL) listing and shall conform with the latest edition or revision of the following codes and standards were required:

1. ANSI - American National Standards Institute
2. ASTM - American Society for Testing and Materials
3. BICSI - Building Industry Consulting Services International
4. EIA - Electronics Industries Association
5. FCC - Federal Communications Commission
6. ICEA - Insulated Cable Engineers Association
7. IEEE - Institute of Electrical and Electronics Engineers
8. ISO - International Organization for Standardization
9. NEC - National Electrical Code
10. NEMA - National Electrical Manufacturer's Association
11. NFPA - National Fire Protection Association.
12. TIA - Telecommunications Industry Association
13. UL - Underwriters Laboratories, Inc.

- B. The code or standard establishing the more stringent requirements shall be followed where areas of conflict occur between codes and standards or between codes and standards and Drawings and Specifications.

1.5 SHOP DRAWINGS

- A. Shop Drawings: Within Seven (7) calendar days after award of contract, submit detailed shop drawings to the Engineer for approval. Do not begin installation or fabrication without such approval. All shop drawings shall be marked with the pertaining specification paragraph or drawing number when submitted.
- B. Shop drawings shall be provided clearly depicting any proposed modification to the project drawings. Any modifications shall be highlighted on the shop drawings.
- C. Shop drawings shall be provided indicating proposed mounting arrangements and details of all equipment, including positioning devices, framework supports and interface with adjacent architecture.

1.6 JOB CONDITIONS

- A. Keep the job adequately staffed at all times. Unless illness, loss of personnel or other circumstances beyond the control of the contractor, maintain the same individual in charge throughout.
- B. Cooperate with all appropriate parties in order to achieve well-coordinated progress with the overall construction completion schedule and satisfactory final results.
- C. Watch for conflicts with work of other contractors on the job and execute, without claim for extra payment, moderate moves or changes as are necessary to accommodate other equipment or to preserve symmetry and aesthetically pleasing appearance.
- D. Immediately report to the Engineer any design or installation irregularities, particularly architectural elements that interfere with the intended coverage angles of loudspeakers and projectors, so that appropriate action may be taken.
- E. Do all cutting, patching and painting necessary for proper and finished installation of the system and repair any damage done as a result of such installation. Cleanup and dispose of trash from all work areas.

1.7 QUALITY ASSURANCE

- A. All materials shall be new and shall conform to applicable provisions of Underwriters Laboratories and the American Standards Association.
- B. Procure and pay for all necessary permits, licenses and inspections and observe any requirements stipulated therein. Conform in all trades with all local regulations and codes.
- C. Comply with federal, state and local labor regulations and applicable union regulations.

PART 2 - PRODUCTS**2.1 MULTIMEDIA PRESENTATION SYSTEM**

- A. Provide and install as indicated on the drawing a Multimedia Presentation System.
- B. The Multimedia Presentation System shall be an integrated A/V control technology solution and shall incorporate the following five (5) principal devices into a single integrated housing.
 - 1. Audio crosspoint matrix switcher/preamp.
 - 2. Audio amplification.
 - 3. Microphone Preamplification
 - 4. RGB/Video crosspoint matrix swher.
 - 5. Control system.
- C. The Multimedia Presentation System shall include front panel control interface so that the system may have limited operational capabilities from the front panel. The front panel shall include dedicated buttons and indicator for system power and projector power, buttons and indicators will be provided for source selection, output selection, and volume control knob. In addition preset buttons shall be included for custom functions.
- D. The Multimedia Presentation System shall include on the front panel four (4) soft buttons, and four (4) additional buttons for "Menu", Navigation x (2) and "Enter".
- E. The Multimedia Presentation System shall include on the front panel a LCD indicator display that will consist of two (2) lines of twenty (20) characters each.

2.2 AUDIO MATRIX SWITCHER/PREAMP WITH AUDIO REINFORCEMENT SYSTEM

- A. As part of the Multimedia Presentation System there shall be an integrated 5x2 stereo crosspoint Matrix Switcher/Preamp, a 2x2 mono microphone matrix switcher/Preamp/EQ and QM i/o that will be incorporated into the Multimedia Presentation System with an integrated Audio Amplifier.
- B. The Audio Matrix Switcher/Preamp will be equipped with internal volume/tone control attached to a line level Program output. The amplified output will utilize the front panel volume control knob, and the line/record output will be a fixed output. The Multimedia Presentation System will be equipped with an integrated amplifier equal to 40w (20wx2). The Multimedia Presentation System shall be available in 70 Volt and 100volt versions which will utilize the 3rd audio (speech) output channel.

- C. The Audio Matrix Switcher/Preamp with built-in integrated amplifier shall meet the following specifications:
- a. Audio Inputs:
 - 1) Five (5) stereo audio inputs.
 - 2) 5 pin 3.5mm detachable terminal blocks.
 - 3) Balanced/unbalanced stereo line-level input.
 - a) Impedance 24k ohms Balanced/Unbalanced.
 - b) Balanced input level -20 to +12dBV; 4V RMS
 - c) Unbalanced input level -20 to +6dBV; 2V RMS
 - b. Microphone/Line Inputs:
 - 1) Two (2) microphone/line inputs.
 - 2) 5 pin 3.5mm detachable terminal blocks.
 - 3) Balanced/unbalanced mic/line-level input.
 - a) Software enabled 48 VDC phantom power
 - b) Gating
 - c) 4-band speech optimized equalization
 - c. Volume Gain: -80dB to +20dB in 1dB steps.
 - d. Volume Mute: -100dB (electronic), -120dB (relay).
 - e. Input Compensation: +/- 10dB.
 - f. Bass Gain: +/-12dB @100Hz, 2 dB steps.
 - g. Treble Gain: +/-12dB @100Hz, 2 dB steps.
 - h. Frequency response:
 - 1) 20Hz to 20kHz +/- 5dB (PROGRAM OUT / RECORD OUT).
 - 2) 20Hz to 20kHz +/- 5dB (SPEAKER @ 8 ohm).
 - 3) 100Hz to 20kHz +/- 1.5dB (SPEAKER @ 70V or 100V).
 - i. Signal to Noise Ratio:
 - 1) 90dB (PROGRAM OUT / RECORD OUT @10dBV, 20Hz to 20kHz A-weighted).
 - 2) 90dB (SPEAKER @ 8 ohm, full output, 20Hz to 20kHz A-weighted).
 - 3) 90dB (SPEAKER @ 70V or 100V, full output, 20Hz to 20kHz A-weighted).
 - j. Total Harmonic Distortion + N:
 - 1) 0.05% (PROGRAM OUT / RECORD OUT @10dBV, 20Hz to 20kHz).
 - 2) 0.7% (SPEAKER @ 8 ohm, full output, 20Hz to 20kHz).
 - 3) 0.7% (SPEAKER @ 70V or 100V, full output, 20Hz to 20kHz).
 - k. Stereo Separation:
 - 1) -75dB (PROGRAM OUT / RECORD OUT @10dBV, 20Hz to 20kHz).
 - 2) -60dB (SPEAKER @ 8 ohm, full output, 20Hz to 20kHz).
 - l. Channel Crosstalk: -70dB (AUD IN @ 10DBV, 20Hz to 20kHz).
- D. The Audio Matrix Switcher/Preamp shall consist of four (4) main audio output terminals and labeled as follows:
1. Program Out.
 2. Rec Out.
 3. Speech out.
 4. Speakers.
 - a. Program out and Record out:
 - 1) One (1) 5-pin 3.5mm detachable terminal block.
 - 2) Balanced/unbalanced stereo line-level
 - 3) Output Impedance: 200 ohms balanced.
 - 4) Output Impedance: 100 ohms unbalanced.
 - 5) Maximum Output Level: 4V RMS balanced.
 - 6) Maximum Output Level: 2V RMS unbalanced.
 - b. Speaker Output: (Engineer to pick output type either 8ohm, 70V, or 100V)
 - 1) Two (2) 2 pin 7.62 detachable terminal blocks.
 - 2) Wire size 12 AWG maximum.
 - 3) Output power:

- a) 20W RMS per channel stereo into 8 ohms, 4 ohm tolerant. (MPS-300)
- b) 40W RMS mono at 70V. (MPS-300-70V)
- c) 40W RMS mono at 100V. (MPS-300-100V)

2.3 VIDEO MATRIX SWITCHER

- A. As part of the Multimedia Presentation System there shall be an integrated 5x2 RGB/Video and QM i/o crosspoint matrix switcher that will be incorporated into the Multimedia Presentation System.
- B. The Video Matrix Switcher shall be capable of multiple signal types including composite, s-video, component, RGB (DB15) for hi-res input and RJ-45 (UTP).
- C. The Video Matrix Switcher shall be equipped with a four (4) output matrix. One output shall feature BNC and DB15 connections for the use of standard video cable. Three (3) Outputs shall feature RJ-45 connections for the use of unshielded twisted pair (UTP) cabling infrastructure.
- D. The Video Matrix Switcher shall be capable of routing either the same input video to all outputs, or any combination of independent video inputs to each of four video outputs.
- E. The Video Matrix Switcher shall meet the following specifications:
 - 1. Video Inputs
 - a. Two (2) sets of three (3) BNC female video inputs. Each set configurable as follows:
 - 1) Component/HDTV (YPbPr) or
 - 2) S-video (Y/C) or
 - 3) Composite
 - a) Level: 1 Vp-p nominal.
 - b) Impedance: 75ohm nominal.
 - c) DC offset: Insensitive (AC coupled).
 - d) Video signal sensing on COMP/Pb or Y/Y
 - b. Three (3) DB15HD female, RGBHV (VGA) each formatted as follows:
 - 1) RGBHV
 - 2) RGBS
 - a) RGB Level: 1 Vp-p nominal.
 - b) RGB Impedance: 75ohm nominal.
 - c) Sync Level: 2 to 5 Vp-p.
 - d) Sync Impedance: 75, 500, or 1k Ohms selectable via dip.
 - e) Video signal sensing on "H-SYNC".
 - 2. Video Input (special)
 - a. Three (3) input ports defined as QM6-8.
 - 1) QM Port:
 - a) 8-wire RJ-45 female for CAT5 balanced video input.
 - b) Dynamically configurable for RGBHV, component (YPbPr), S-video (Y/C), or composite video with stereo program audio.
 - c) RGB Format: RGBHV or RGBS.
 - d) RGB Output Resolution, Non-interlaced: 1600 x 1200 maximum (60 Hz limit at 1920 x 1200).
 - e) Video/HDTV Formats: NTSC or PAL, HDTV up to 1080i/1080p.
 - 2) Input shall be compatible with wall plate interfaces and fliptop interfaces which will except above listed video types, stereo audio and up to two (2) microphones.
 - 3) Above interfacia shall connect to multimedia presentation system via a single CresCAT-QM cable, consisting of a low skew

CAT5e, 18 AWG x2 stranded bare copper, and a shielded 22 AWG x2 stranded bare copper.

3. Video Outputs
 - a. Comp Output 1:
 - 1) One (1) BNC female Composite.
 - a) Level: 1.0 to 1.1 Vp-p.
 - b) Impedance: 75 Ohm nominal.
 - b. Y, C Output 1:
 - 1) Two (2) BNC female S-Video.
 - a) Level: 1.0 to 1.1 Vp-p.
 - b) Impedance: 75 Ohm nominal.
 - c. Pb, Y, Pr Output 1:
 - 1) Three (3) BNC female Component.
 - a) Level: 1.0 to 1.1 Vp-p.
 - b) Impedance: 75 Ohm nominal.
 - d. RGBHV Output 1:
 - 1) One (1) DB15HD female, RGBHV (VGA)
 - a) Level: 1.0 to 1.1 Vp-p
 - b) Impedance: 75 Ohm nominal.
4. Video Outputs (special)
 - a. Two output ports for output number 2 labeled Touchpanel further defined as CH2 and QM2.
 - 1) Ch Port:
 - a) 8-wire RJ-45 female for CAT5 balanced video output.
 - b) Dynamically configurable for component (Y/Pb/Pr), S-video (Y/C), or composite video.
 - c) Video/HDTV Formats: NTSC or PAL, HDTV up to 1080i.
 - d) Output Impedance: 100 ohms balanced.
 - 2) QM Port:
 - a) 8-wire RJ-45 female for CAT5 balanced video output.
 - b) Dynamically configurable for RGBHV, component (YPbPr), S-video (Y/C), or composite video with stereo program audio.
 - c) RGB Format: RGBHV or RGBS.
 - d) RGB Output Resolution, Non-interlaced: 1600 x 1200 maximum (60 Hz limit at 1920 x 1200).
 - e) Video/HDTV Formats: NTSC or PAL, HDTV up to 1080i/1080p.
 - b. Two output ports for outputs number 6 and 7 labeled QM 6 and QM 7.
 - 1) QM Port:
 - a) 8-wire RJ-45 female for CAT5 balanced video output.
 - b) Dynamically configurable for RGBHV, component (YPbPr), S-video (Y/C), or composite video with stereo program audio.
 - c) RGB Format: RGBHV or RGBS.
 - d) RGB Output Resolution, Non-interlaced: 1600 x 1200 maximum (60 Hz limit at 1920 x 1200).
 - e) Video/HDTV Formats: NTSC or PAL, HDTV up to 1080i/1080p.

2.4 ROOM CONTROL SYSTEM

- A. As part of the Multimedia Presentation System there shall be an integrated room control system that will be incorporated into the Multimedia Presentation System.
- B. All room controls shall interface with the Multimedia Presentation System as a single unit. All interface cable for audio/video, shades, screens and lighting shall originate from the Multimedia Presentation System.

- C. The Multimedia Presentation Systems room control system shall support multiple communications formats in order to provide complete control of any an all devices connected to the Multimedia Presentation System.
- D. Multiple similar or identical systems may be connected and managed via an enterprise level software management suite by same manufacturer.
- E. The Multimedia Presentation Systems room control system shall consist of two principal systems, an internal microprocessor based CPU and external connection ports allowing communication and control of devices connected to the control system.
1. The microprocessor based CPU shall be configured as follows:
 - a. Utilize a real time, event driven, multi-tasking, multi-threaded operating system. Processor shall communicate directly with Ethernet, control ports and proprietary control network utilizing high-speed, parallel bus infrastructure.
 - b. Control processor shall utilize a FAT32 file structure. Support internal communications speed via two, independent communications busses.
 - 1) First control bus speed shall be at least 40 mb/s,
 - 2) Second control bus speed shall be at least 300 mb/s.
 - c. Control system shall be capable of firing all IR ports simultaneously.
 - d. Control System shall support 10/100 BaseT Ethernet Modules, via a direct processor 300 mb/s communications bus that supports all of the following features:
 - 1) TCP/IP Communications
 - 2) DHCP and DNS Support
 - 3) Native Email Client
 - 4) Remote Diagnostics
 - 5) Remote Program Loading and Administration
 - 6) SNMP Support
 - 7) Built-In Web Server
 - 8) SSL security plug in
 - 9) PDA Integration and Control, XPanel PDA - Pocket PC 2002
 - 10) Web Tablet Integration and Control - Microsoft Tablet PC
 - 11) Support user assigned or dynamic IP address.
 2. The control system shall be equipped with the following external connection ports:
 - a. Infrared (Output)
 - 1) Four (4) 2-pin 3.5mm detachable terminal blocks, IR/Serial output ports;
 - a) IR output up to 1.2 MHz; One-way serial TTL/RS-232 (0-5 Volts) 2 up to 9600 baud
 - b. Infrared (Input)
 - 1) One (1) 3-pin 3.5 mm detachable terminal block.
 - a) Allows IR wireless control from third-party remotes using RC-5 IR commands via external remote controllers (hardware required).
 - c. Input (Digital)
 - 1) One (1) 5-pin 3.5mm detachable terminal block.
 - a) Comprised of four (4) digital/contact closure inputs.
 - b) Rated for 0-24 Volts DC, referenced to GND.
 - c) Input Impedance: 2.2k ohms pulled up to 5 Volts DC.
 - d) Logic Threshold: 2.5 Volts DC nominal with 1 Volt hysteresis band.
 - d. Relay
 - 1) One (1) 8-pin 3.5mm detachable terminal block.
 - a) Comprised of (4) normally open, isolated relays.

- b) Rated 1 Amp, 30 Volts AC/DC
- c) MOV arc suppression across contacts
- e. Com
 - 1) Two (2) DB9 male, bidirectional RS-232 ports.
 - 2) Up to 115.2k baud, hardware and software handshaking support for communication with serial devices.
 - a) Can also be used for modem communications.
 - 3) Protocol support
 - a) RS-232
 - b) RS-485
 - c) RS-422.
- f. Ethernet
 - 1) One (1) 8-wire RJ45 with 2 LED indicators.
 - a) 10/100BaseT Ethernet port.
 - b) Green LED indicates link status.
 - c) Yellow LED indicates Ethernet activity.
- g. Net
 - 1) Four (4) 4-pin 3.5mm detachable terminal blocks.
 - a) Master net communications ports.
 - b) Ports are paralleled.

F. The Multimedia Presentation Systems shall be manufactured by Crestron Electronics, Inc. and shall be a MPS-300 or engineer approved equal.

PART 3 - EXECUTION

END OF SECTION XXXX