

**Section 16771**

**Public Address System**

**SECTION 16771****PUBLIC ADDRESS SYSTEM****PART 1 - GENERAL****1.01 Work Included:**

Work comprises public address (PA) system including the following:

- Sound program sources including playback cassette recorder, compact disk (CD) player and AM/FM tuners.
- PA paging consoles, remote with control panel, microphone and chime unit.
- Mixer preamplifier modules, compressor - limiter amplifiers power amplifiers, zone selectors, monitor panels and central racks for distribution to staff offices and public areas, with reserved space for future zones.
- Public Area loudspeakers and distribution network as shown on Drawings.

**1.02 Standards:**

System is to be in accordance with IEC 268, EIA, DIN OR other equal system and approved standards.

**1.03 Submittal**

- A. Equipment Data: Submit data for approval including catalogues and literature, sufficiently detailed for engineering purposes, and with full description of components and operating parameters.
- B. Tests: Equipment is to be tested for quality and operation at the factory, and test certificates and reports, certified by an official testing authority, are to be submitted to the Engineer before dispatch of equipment to site.
- C. Shop and Construction Drawings: Submit drawings for approval including, but not limited to, the following:
  - Detailed system schematic diagram.
  - Details of paging consoles, material and finishes.
  - Amplifier racks and cabinets layouts, dimensions, front, side and rear views, construction, access panels, dimensions weight etc.
  - Input/output panels and control panel diagrams, with supporting photographic and illustrative brochures, indicating input/output arrangements, control and indicating devices, tuning controls and setting devices, etc., with complete functional description.

**1.03 Submittal (cont'd)**

- Complete electrical and physical characteristics of amplifiers, switching panels, loudspeakers, radio tuners, CD player, cassette recorder, microphones etc.
- Complete system cabling diagrams, size and type of cables, enclosures, terminal and splice boxes etc. and routing plans of cabling system.

**1.04 Approved Manufacturers:**

- Dukane (U.S.A.)
- Philips (Holland)
- Siemens (Germany.)
- Or other approved equal alternative

**PART 2 - PRODUCTS****2.01 Operation, Design and Components****A. Operation and Design**

1. System Description: System is to provide a means of distribution multi-programme sound, public announcements and paging/emergency calls.

For sound distribution purposes the building is divided into two categories:

- Staff Areas.
- Public areas.

Sound is to be originated from three sources:

- Background music CD player, AM-FM tuner or cassette recorder.
- Paging desks in the reception and PABX room for paging and announcements.
- Staff team emergency call stations.

The Staff area loudspeaker system is to be provided with three levels of priority. A signal origination from a source of higher priority is to silence all lower priority sources completely and transmit its signals. The order of priority, highest priority, first, is as follows:

- a) Staff team emergency call stations (ECS)
- b) Reception microphone paging.
- c) Background music.

## 2.01 Operation, Design and Components (cont'd)

The public areas loudspeakers system is to have two levels of priority similar to those of the staff area. The highest level shall be a special announcement from the microphone in the security room.

The second level is to be background music. The special announcement priority of the public areas system is not to be the same channel as the paging channel for staff areas system. The special announcements to public areas will be for items of public interest only while the paging to the staff area will be to disseminate information necessary to the operation of the museum.

Normally background music will be distributed to the loudspeakers of both the staff area system and the public area. Any higher priority message to the staff area is to cancel the music in the staff area and transmit the message without affecting the public area system program. A message of public interest is to similarly replace the music program to the public area system without affecting the staff area system. It is to be possible, by proper switch selection in the security room, to transmit the same message over both the staff area system and the public area.

Staff team emergency calls are to be preceded by a coded tone corresponding to the station originating the call.

- 2) Design Parameters: system is to be designed for public address and background music distribution, with uniform and acceptable level of speech intelligibility. Proposed system is to be submitted to the Engineer for approval with specification, characteristics, aiming and mounting positions of loudspeakers and full particulars of calculations and equipment selections. System design in public areas is to be based on the following criteria:

Average sound pressure level:

- Background music : 75-85 (with local volume control)
- Public address calls : 85 dB
- Emergency calls : 85 dB

Uniformity coverage : within +/- 3 dB

Frequency response to be achieved in coverage area: 100 Hz -18 KHz (+/- 3dB bandwidth)

### B. Paging Desk:

- 1) Type: paging desk is to be a desk-top microphone to provide all-call and individual zone paging for a different zones as shown on the drawings.

## 2.01 Operation, Design and Components (cont'd)

- 2) Paging Desk: Desk-top type, with stainless steel panel or finished compatible with the reception desk finishes, gooseneck microphone with built-in compression preamplifier, electro-chime unit, zone fluorescent-illuminated call push buttons, one all-call push button, one push button for chime and microphone control and master call (emergency on) busy indicator lamp.
- 3) Priority programming: Programmable functions cascade priority as described before are to be provided for operation with other remote paging microphones.
- 4) Push buttons: locking, fluorescent illuminating type, with provision for inserting the label.
- 5) Chime unit is to give double audio signal, tone, different than other signalling tones in the building, upon pressing lock-down button. Upon completion of this signal, microphone is to be automatically switched in. Upon completion of public address/page, lock-down button is to be manually released and system is to automatically fade into normal input (background sound source).
- 6) Goosenecks Microphone: Dynamic cardioid type, having uniform frequency response from 60 Hz to 12000 Hz (+/-3 dB). Microphone is to be fully dust and moisture protected, designed specifically for speech reproduction and with at least the following performance:

Nominal impedance	:	200 ohm
Sensitivity (at 1000Hz)	:	1.75 mV/Pa
Output level	:	0 dB/600 ohm (balanced)
S/N	:	not less than 56 dB
Maximum sound pressure level	:	128 dB
Ambient temperature range	:	0 to 45 deg. C.

### C. Central Racks and Cabinets:

- 1) Central Racks: Are to contain sound sources, input mixer modules, distribution preamplifiers, zone selector relay modules, power supply module, power amplifiers and output terminal panel. Racks are to be 19-inch standard frame racks. Equipment is to be mounted and designed for 19-inch rack mounting.

**2.01 Operation, Design and Components (cont'd)**

- 2) Cabinets: Are to be 19-inch frame with all panel mounting holes and spacing of racks are in conformity with EIA, totally enclosed, with side and rear panels removable, and cable entrance at rear, top or bottom. Surface finish is to be textured and of approved colour. Frames are to be anodized aluminium sections. Each frame is to be provided with ventilation rack, including automatically operated fan with thermostatic control. Suitable ventilation openings are to be provided. Enclosure is to be IP 42 to IEC 144 for indoor installation.
- 3) Storage: Rack cabinets are to have storage drawers for cables and accessories.
- 4) Mains Wiring: Equipment is to operate from 220 V, 50 Hz mains and is to be capable of continuous operation under any load conditions with variations of +/- 10% of nominal voltage. Mains wiring inside cabinet racks is to be totally segregated from low-level signal wiring.
- 5) Electric Connections: Other than those for low-level signals, are to be by push-on spade clips or multi-connector blocks.
- 6) Low-level Signal Wiring: Heavily braided, PE insulated, screened cable, PVC sheathed with standard DIN plug connections. Amplifier output lines to be run within the cabinet racks are to be twisted Pairs heavily screened with tinned copper braid. Hum-producing earth return loops are to be avoided.
- 7) Power Supply: Complete power supply unit is to be provided, independantly fused on the live conductor, with mains front indicator light, on/off switch, cartridge-type fuse and fuse-holder with blown fuse indicator lamp.
- 8) Monitor Panel is to monitor sound signals at line-level or loudspeaker level. Unit is to contain position input-selector, switch, volume control with on/off switch, VU meter and pilot lamp, Amplifier section is to have isolation transformer, power amplifier with solid-state integrated circuits, and regulated power supply.

Amplifier is to be capable of operation from 220 V, 50 Hz a.c. line. Monitor speaker is to be compact type, mountable on monitor unit panel, with 10 watt power rating, uniform frequency response (60 - 15000 Hz) and is to be provide, with 1 watt input, an 80 dB SPL at 1m.

## 2.01 Operation, Design and Components (cont'd)

### D. Mixer, Line Distribution and compressor Preamplifiers:

- 1) Input Mixer Preamplifier: Completely integrated modules, 19-inch rack mounted, suitable for line level audio inputs. Printed Circuit boards (PCBs) are to allow different inputs e.g. balanced/unbalanced, in/out etc. Each module is to have sliding pre-set logarithmic potentiometer, treble and bass tone control, VU meter and programmed priority operation between the inputs, using plugged-in programmable priority board.

Input Mixer Preamplifier Performance is to be at least as follows:

Effective frequency range (+/-3dB):	50 – 18000 Hz
Signal/noise ratio, all control down-: (50-18000 Hz flat)	80 dB
Total harmonic distortion (nominal : loudspeaker power, at 100 Hz)	less than 0.1%
Output level(load impedance) :	0 dB m/0.775 V (600 ohm)
Input sensitivity	
Microphone :	(600 ohm)/0.5 mV
Others :	2.5 mV (adjustable)
Outputs :	2 lines, 600 ohm
Power supply voltage :	220 V, 50 Hz
Ambient temperature :	40 deg. C. __

Distribution Preamplifier Performance is to be at least as follows:

Input impedance :	50 k - ohm pp.
Sensitivity :	0.5 mV - 100 mV, adjustable
Signal Control :	stepped attenuator
Output :	line level: 0.775 V, 600 ohm
Outputs :	as shown on schematic diagram
Power Supply :	220 V, 50 Hz

### 3. Compressor Amplifier:

Transistorized, compressor limiter amplifier, provide audio volume compression with adjustable controls and power "on" indicator lamp. The amplifier is to be fabricated on a printed circuit board for compactness. A screwdriver adjustable output level control is to be provided to vary the output voltage. A combination variable compression control with power "on-off" switch is to be provided to vary the degree of compression. A VU meter is to be provided for compression level and output level monitoring. A screwdriver adjustable zero control is to be provided for adjusting the VU meter to zero when meter switch is in compression position. The amplifier gain is to be 20 dB with a frequency response of +/-1 1/2 dB between 50 and 10000 Hz.

## 2.01 Operation, Design and Components (cont'd)

The output of the compressor-limiter amplifier is to be 1.2 volts. The harmonic distortion is to be less than 2% at 30 dB of compression at 50 to 16000 Hz. The hum and noise level shall be 70 dB of maximum compression with an attack time of ten (10) milliseconds and an adjustable recovery time between 1 and 2 seconds. The amplifier is to provide an input impedance of 4000 ohms nominal and an output impedance of 600 ohms nominal.

### 4) Tone Generators:

Solid state electronic oscillators which are to emit signals to the loudspeakers unlike and distinct from those produced by the fire alarm system sounders. The tone generators are to be controlled by an interface unit which receive any of signals (related to the area initiating the alert) from the medical team emergency call stations and transmit to the all served zones rounds of coded signal (also related to the area initiating the alert). Coded signals are to be groups of long and short bursts. Groups are to be recommended by the manufacturer and approved by the Engineer.

## E. Power Amplifier

- 1) General: Power amplifier is to be 19-inch rack mountable suitably designed for music distribution as well as public address announcement. Amplifiers are to be driven by line distribution amplifiers providing reliable parallel line-level audio feed such that malfunction of any single amplifier results only in one failure.
- 2) Input level: To be adjustable with a preset potentiometer on front panel. Illuminated VU meter is to be mounted on front panel.
- 3) Output: To be fully protected against failure due to mismatch, short-circuits, thermal and electrical overloads, overdrive or eventual transients.
- 4) Performance: Each power amplifier is to have at least the following performance.

Output Power	: as required by the System
Effective frequency range	: 50 Hz to 18000 Hz
Input	: 0 dB m line level (0.775 V)
Input impedance	: 50 k. ohm
Output voltage (load impedance)	: 100 V (100 ohm) 70 V (50 ohm) 50V (25 ohm)
Signal/noise ratio (all controls closed)	: 85 dB
Total harmonic distortion at 1000 Hz	: Less than 0.5%
Intermodulation distortion	: Less than 1%



**2.01 Operation, Design and Components (cont'd)**

Ambient temperature : 40 deg. C  
 Power supply : 220 V, 50 Hz.

- 5) Adequate Ventilation is to be provided for power amplifiers. At least 44 mm perforated or louvered ventilation panel is to be mounted above and below each amplifier or between each amplifier when adjoining one another vertically in a common equipment rack. In addition, ventilation panels are to be mounted at the top and bottom of each equipment rack to further facilitate convective cooling.

**F. Compact Disk (CD) Player:**

- 1) Type: Rack mounted, high quality, compact disk playback type with 6 - disk cartridge standard, single beam laser assembly and auto playback programme facilities.
- 2) Characteristics: Minimum requirements are to be as follows:

Playback system	Compact Disk
Frequency range	2 Hz - 20 kHz
Amplitude linearity	+/- 0.1 dB
Phase Linearity	+/- 0.5 degree
Signal to noise ratio	not less than 100 dB
dynamic range	not less than 96 dB
Channel Separation	96 dB (1 kHz)
T.H.D	Not greater than 0.0025% (1kHz)
Intermodulation distortion	-90 dB (at max. output level)
Out band rejection	Not less than 60 dB.
Max. audio line out	2 V (rms)
Min. load impedance	10 kohm
Power supply	220 V, 50 Hz

**G. Tape Recorders:**

- 1) Type: Rack mounted, high quality, auto-reverse/auto-stop, 4-track , mono / stereo type with speed tolerance of 10% , complying with IEC 94 or other approved standard and accepting standard cassettes through front panel selector switch.
- 2) Heads and motors: Recorder is to have separate head for play, record and erase functions, three motors (two for fast winding in two directions and third for record/playback at two speeds), and noise reduction system.
- 3) Controls: Recorder is to have fast wind and re-wind, playback, record and stop controls, two illuminated peak level indicators, pause control, resettable digital counter, level controls, for recording and play-back, on-off switch, microphone/headphone sockets and radio and line inputs.

**2.01 Operation, Design and Components (cont'd)**

- 4) Protection: Is to be provided against input overloads to reproduce strong signals without distortion.
- 5) Edit / Cue facility: Is to be provided to permit listening to tape during fast forward or backward winding and to identify particular parts of tape for editing.
- 6) Characteristics: Minimum requirements are to be as follows:
  - \* Signal/Tape noise ratio at highest speed: 65 dB
  - \* Crosstalk attenuation at 1000 Hz : Better than 50 dB in stereo  
Better than 65 dB in mono
  - \* Distortion (max.) : from recording mplifier at 0 dB: 0.2%  
from replay amplifier:0.2%  
at 1.5V : from magnetic tape at 0 dB recording level: 3%
  - \* Inputs Ratio : input impedance 50 k- ohms, sensitivity 8 mV to 1.2Vline : input impedance 200 k - ohms, sensitivity 30mV to 5V. \_\_

**H. Loudspeakers:**

- 1) Ceiling Loudspeakers: (to be suitable for false ceiling mounting) is to comprise a 100 V line matching transformer, high quality loudspeaker, metal front grille and mounting plate with locking clamps.

The transformer is to deliver within +/- 1 dB of its full rated power over the frequency range 160 Hz to 10 KHz with a maximum insertion loss not greater than 0.5 dB for the most unfavourable impedance combination. The primary taps is to be identified with 6-, 3- and 1.5-watts of audio power and the secondary with 8 ohms,. The loudspeaker is to have a nominal diameter of 170 - 180 - mm and is to meet the following performance criteria:

- \* Power rating : 6 watts continuous pink noise (above 50 Hz)
  - \* Frequency response : 80 Hz to 20 KHz.
  - \* Pressure sensitivity : 93 dB SPL measured at 1 m axis with 1 watt at 1KHz.
  - \* Nominal impedance : 8 ohms
  - \* Distribution pattern : 90 deg. at 4 kHz (-6 dB), Q = 4.0
- 2) Wall mounted loud speakers to be provided as shown on drawing with the technical specifications listed above.

## **2.01 Operation, Design and Components (cont'd)**

### **I. Public Address System Cabling:**

- 1) Conduits and Raceways: To comply with Section 16111 of the Specifications.
- 2) DC-Control, Microphone and Line-Level Cables: PE insulated, finely stranded tinned copper conductor, minimum of 0.9 mm diameter and PVC over sheath. Microphone and line-level cables are to be shielded with copper braid to provide 100% shielding throughout the cable length. A drain wire is to be provided for each shielded cable. All cable shields will be insulated from the electrical conduit throughout their length.
- 3) Loudspeaker Distribution Circuits: PE insulated, stranded tinned copper conductors, with an overall PVC jacket. Cables are to meet the NEC code requirements for the voltage level applied.
- 4) Loudspeaker Cable Sizing: Submit drawings illustrating the proposed cable runs, the cable size proposed, and calculations demonstrating that the cable utilized will provide no more than 0.5 dB insertion loss when used with the loudspeaker power distribution supplied: (calculated as a function of the DC-loop resistance of the cable and the nominal impedance of the loudspeaker load, transferred to the primary), a minimum size of 2.5 sq.mm. will be used in any case, to be increased as necessary in case of lengths being extended beyond what is expected.

## **PART 3 - EXECUTION**

### **3.01 Installation**

Generally: Installation is to be in accordance with the applicable requirements described in the specification.

### **3.02 Testing**

- A. Tests on Site: Measure quality of sound distribution, sound pressure levels, dispersion angles and directivity over specified frequency range and carry out any other tests to prove system performance in accordance with the Specifications..
- B. Test and Measurement Equipment: Provide all test and measurement equipment for setting up the systems, adjusting gains, volumes and levels.

**END OF SECTION**

## **Section 16772**

### **AV System**

**SECTION 16772****AV SYSTEM****A. Introduction**

A complete AV system shall be supplied and installed in accordance with the attached drawings, bills of quantities and detailed equipment specifications.

The AV contractor shall be responsible for and shall include any missing items which may be considered necessary for the full and complete functioning of the system. The attached equipment specifications, drawings and bills of quantities represent the minimum acceptable standard for the requested system.

**B. Equipment Specifications****1. VIDEO/DATA PROJECTOR**

The video/data projector shall be of the LCD type, shall be mounted to the ceiling and shall exhibit the following minimum features:

- a. A minimum of 3500 ANSI lumen light output
- b. A minimum native resolution of 1,024x768 pixels
- c. Must include a pixel map processor to convert all incoming signals to the full resolution of the LCD panels
- d. Must incorporate true color reproduction video processing to produce very sharp and stable images and offer dynamic colour depth correction
- e. No convergence adjustments shall be required
- f. Switching between 4:3 and 16:9 aspect ratio
- g. Motorized zoom, focus and lens shift (horizontal and vertical)
- h. Automatic source recognition and priority switching
- j. Shall be compatible with:
  1. All current video sources (PAL, SECAM, NTSC3.58, NTSC4.43) in composite, S-VHS, RGB or component forms
  2. All computer graphics formats from VGA, S-VGA, XGA to S-XGA
  3. Electronic workstations with a resolution up to 1,280x1,024 pixels
  4. Most sources with a pixel clock up to 135MHz
- k. Shall include the capacity for the following input signals:
  1. RGB
  2. Component video

3. Composite video
  4. S-video
  5. Serial digital input for the connection of digital video sources
  6. IEEE 1394 Fire Wire input for high speed serial connection of the latest generation of digital video and digital RGB sources
- L. Shall include a built-in stereo audio amplifier and speakers

## **2. PROJECTOR CONTROLLER AND VIDEO/DATA/AUDIO SWITCHER**

The controller/switcher shall be a modular digital infrared remote controlled switcher and shall exhibit the following minimum features:

- a. Shall have a minimum bandwidth of 200MHz to guarantee switching of the highest resolution graphics signals without any signal loss or image degradation
- b. Shall be equipped with the necessary input modules for the automatic selection of:
  1. Composite video sources
  2. S-video sources
  3. RGB sources (standard sync)
  4. Audio sources
- c. Shall be expandable to cater for the addition of composite, S-video, RGB analog, RGB TTL and component video input sources
- d. Shall be equipped to handle up to 4 display and recording outputs
- e. Shall have the ability to be controlled from an external computer
- f. Shall be controlled via its front panel or by infrared remote control for all projector picture settings such as brightness, contrast, hue, saturation and sharpness, source selection, pause, and on-screen text display

## **3. MULTIFUNCTIONAL ANALOG GRAPHICS INTERFACE**

The multifunctional analog graphics interface shall be provided as a complete kit packaged in a rugged carrying case and shall include all the necessary cables for the connection of virtually any computer; including Pcs, Macintosh, Sun, HP, DEC, IBM, Silicon Graphics and most other workstations. The interface shall exhibit the following features as a minimum:

- a. Shall be compatible with most graphics cards with a resolution up to 2500 X 2000 pixels

- b. Shall have a minimum RGB bandwidth of 265 Mhz (-3dB) for both projector and monitor outputs
- c. Shall include built-in active loop-through amplifiers to eliminate reflections due to long or low quality monitor cables
- d. Shall include an adjustable cable equalizer to compensate for high frequency cable losses
- e. Shall have the facility for adjustment of the output level for each color
- f. Shall enable automatic detection of the sync polarity, composite sync, sync on green or separate sync
- g. Shall have the facility for automatic 75 ohm termination
- h. Shall include the following set of connection cables:

CABLE TYPE	LENGTH / M	COMMUNICATION
D15F TO 6 X BNC + D9M	0.6	FROM MAC
6 X BNC + D9F TO D15	0.3	TO MONITOR
HD15 TO 5 X BNC + D9F	0.6	FROM PC
5 X BNC + D9F TO HD15	0.3	TO MONITOR
13W3F TO 6 X BNC + D9M	0.6	FROM WORKSTATION
6 X BNC + D9F TO 13W3	0.3	TO MONITOR
5 X BNC TO 5 X BNC	0.6	FROM WORKSTATION
5 X BNC TO 5 X BNC	5.0	TO PROJECTOR
13W3F TO HD15M		ADAPTER FOR POWER PC

**4. ELECTRIC PROJECTOR LIFT**

The electric projector lift shall be of the “scissors” type and shall exhibit the following minimum features:

- a. Shall provide a secure and hidden location for the projector above the false ceiling
- b. Shall be capable of extension to a minimum of 3.66m (12 feet) below the false ceiling

- c. Shall be provided with a safety belt system for locking and holding the projector in the event of any primary failure
- d. Shall be provided with a remote controlled AC motor capable of handling a minimum load of 150 kg.
- e. Shall be designed to provide stops in each of the following positions:
  - Fully retracted position
  - Partial extension for viewing
  - Full extension for service and maintenance
- f. Shall have a maximum retractable space height of 45cm above the false ceiling
- g. Shall be provided with a ceiling tile mounting bracket to hide the lift and projector from sight
- h. Shall be provided with a 482.6mm (19") rackable remote control system and shall be provided with the ability to be integrated with touch screen remote controllers
- I. Shall be provided with an extension accuracy mechanism to guarantee a maximum image deviation of less than 1.59mm (1/16")

## **5. MOTORIZED PROJECTION SCREEN**

The motorized projection screen shall have the following minimum features:

- a. Shall have a minimum dimensions as shown in the BOQ
- b. Shall be electrically operated
- c. Shall include a quick reversal, ball bearing type oiled for life motor with automatic thermal overload cutout and integral interlocking gears
- d. Must have preset and adjustable limit switches to automatically stop screen fabric in the "up" and "down" positions
- e. The screen surface shall be made of a flame retardant and mildew resistant matt white fabric with black masking borders
- f. The screen case shall be finished with a primer coat to be ready to accept final finish
- g. Shall be supplied with mounting brackets for mounting screen to ceiling or wall



**6. MULTIMEDIA PRESENTER**

The multimedia presenter shall exhibit the following minimum features:

- a. Shall include a camera with a minimum horizontal resolution of 450TVL
- b. Shall include a built-in 12X zoom lens
- c. Shall include an LCD color preview screen with a minimum size of 73.66mm (2.9")
- d. Shall include a multi-positional camera and head for upright image adjustment
- e. Shall provide autoiris and autofocus
- f. Shall include a built-in base light and a foldable fluorescent auxiliary light source
- g. Shall include a freeze frame facility
- h. Shall include a negative and positive conversion facility to allow the conversion of negative images to full color images
- j. Shall provide for the display of slides, 3-D objects, transparencies, documents and X-rays
- k. Shall provide a microphone input
- l. Shall provide line audio, composite, S-video and RGB outputs

**7. VIDEO CASSETTE RECORDER**

The video cassette player shall be of the rackmounting, mutistandard, stereo, 6-head type and shall include a remote control, a sapphire tape cleaner and the facility for playing and recording PAL, SECAM, NTSC 3.58/4.43, NTSC playback on PAL TV, one-touch tuning, hyper catv band tuner, auto system select, adaptive picture control, quick timer recording, long play recording, audio dubbing and an additional line in for satellite connection. The video cassette recorder shall also have the ability to be controlled by the AV touchpanel control system.

## 8. HANDHELD RADIO MICROPHONE SYSTEM

The radio microphone system shall be of the handheld, diversity type in accordance with the permitted de-regulated frequencies in Jordan and shall exhibit the following minimum features:

### 1. Receiver

- a. Shall be of the true diversity superheterodyne type with 6 switchable VHF channels
- b. Shall have ample headroom to prevent distortion due to overload
- c. Sensitivity:  $< 5\mu\text{V}/100\text{dB SNR}$
- d. Modulation / De-emphasis: wideband FM/50us
- e. Nominal / Peak deviation:  $\pm 40\text{kHz} / \pm 56\text{kHz}$
- f. S/N ratio: 116 dB (A)
- g. THD:  $<1\%$  ( 1 kHz / nominal deviation )
- h. Frequency response: 40 - 20,000 Hz

### 2. Transmitter / Microphone

- a. Shall feature a light weight handheld transmitter with a supercardioid dynamic head
- b. Shall include a built-in voltage stabilizer for 9 volt battery with approx. continuous operating time of 8 hours
- c. Carrier frequencies: 6 switchable VHF channels
- d. AF frequency response: 80 - 18,000 Hz
- e. Max SPL: 149 dB (A)
- f. S/N ratio: 117 dB (A)
- g. THD at 1 kHz:  $<1\%$  at max SPL
- h. Modulation / Pre-emphasis: wideband FM/50us
- I. Nominal / Peak deviation:  $\pm 40\text{kHz} / \pm 56\text{kHz}$
- j. Output power: 50mW (-3dB)

## 9. POCKET / CLIP-ON RADIO MICROPHONE SYSTEM

The radio microphone system shall be of the pocket / clip-on, diversity type in accordance with the permitted de-regulated frequencies in Jordan and shall exhibit the following minimum features:

1. Receiver
  - a. Shall be of the true diversity superheterodyne type with 6 switchable VHF channels
  - b. Shall have ample headroom to prevent distortion due to overload
  - c. Sensitivity: < 5 $\mu$ V/100dB SNR
  - d. Modulation / De-emphasis: wideband FM/50 $\mu$ s
  - e. Nominal / Peak deviation: +/- 40kHz / +/- 56kHz
  - f. S/N ratio: 116 dB (A)
  - g. THD: <1% ( 1 kHz / nominal deviation )
  - h. Frequency response: 40 - 20,000 Hz
  
2. Transmitter / Microphone
  - a. Shall feature a light weight pocket transmitter with omni-directional dynamic clip-on microphone
  - b. Shall include a built-in voltage stabilizer for 9 volt battery with approx. continuous operating time of 8 hours
  - c. Carrier frequencies: 6 switchable VHF channels
  - d. AF frequency response: 80 - 18,000 Hz
  - e. Max SPL at 1 kHz: 130 dB (A)
  - f. S/N ratio: 117 dB (A)
  - g. THD at 1 kHz: <0.3% at max input voltage
  - h. Modulation / Pre-emphasis: wideband FM/50 $\mu$ s
  - I. Nominal / Peak deviation: +/- 40kHz / +/- 56kHz
  - j. Output power: 50mW (-3dB)

## 10. CD PLAYER

The CD player shall be rackmountable and shall include a 5-disc carousel with disc changing facility, a 30-track random program facility, a continuous calibration digital to analog converter, a resonance-free linear trace laser for accuracy and fast track access and a dedicated remote controller. The CD player shall also have the ability to be controlled by the AV touchpanel control system and shall have the following minimum technical characteristics:

- a. Frequency range: 20Hz to 20kHz +/- 0.5 dB
- b. Dynamic range: > 90 dB
- c. S/N ratio: > 90 dB

- d. Channel separation: > 90 dB
- e. THD: 0.003%
- f. D/A conversion: CC DAC

## 11. TWIN CASSETTE DECK

The twin cassette deck shall be of the rackmountable autoreverse type and shall feature a recording meter display peak level readout, Dolby B/C and Dolby HX-Pro for low noise performance and extended high frequency response, high-speed dubbing A to B and quick music search for rapid track access. The twin cassette deck shall also have the ability to be controlled by the AV touchpanel control system and shall have the following minimum technical characteristics:

- a. Frequency range: 30Hz to 20kHz
- c. S/N ratio: 76 dB
- d. Woe and flutter: 0.055%

## 12. TUNER

The tuner shall be of the rackmounting and quartz-lock digital tuning type and shall enable a clean and low noise reception on FM stereo, medium wave and long wave bands. The tuner shall be able to display the station name, programme type, radio text information, tuning by frequency and programme category. It shall also include the facility for a minimum of 59 preset stations, auto-adjustable scan sensitivity and broadcast frequency key-in. The tuner shall also have the ability to be controlled by the AV touchpanel control system and shall have the following minimum technical characteristics:

### FM BAND

- a. Sensitivity ( mono / stereo ): 0.9/25 uV
- b. Selectivity: 65 dB
- c. S/N ratio ( mono / stereo ): 80 / 73 dB
- d. THD ( mono / stereo ): 0.1% / 0.2%

### AM BAND

- a. Sensitivity ( MW / LW ): 400/800 uV
- b. Selectivity ( MW / LW ): 35 dB
- c. S/N ratio ( MW / LW ): 54 dB

**13. AUDIO MIXING CONSOLE**

The audio mixing console shall be of a rugged steel construction, rackable and shall exhibit the following minimum features:

- a. Shall include 16 dynamic studio-grade mic preamps with the following technical characteristics:
  - > 0 - 60 dB gain
  - > 130 dB dynamic range
  - > +22 dBu line input handling
  - > Distortion to be less than 0.0007% ( 20Hz - 20kHz )
- b. Shall include 16 line inputs and 16 channel inserts
- c. Shall include 4 subgroups with left and right assigns and direct outs
- d. Shall include 6 aux sends per channel with 15 dB gain above unity
- e. Shall include 4 stereo aux returns, 8 direct outs
- f. Shall include switchable AFL/PFL Solo
- g. Shall include 18 dB low cut filter on each channel
- h. Shall include a 3-band EQ with sweepable midrange
- I. Shall include level, pan, -20, Solo and OL LEDs on each channel
- j. Shall include switchable phantom power for condenser mics
- k. Shall include a control room / Phones multi-input source matrix
- l. Shall include RCA tape inputs and outputs
- m. Shall include tape level control and Tape to Main Mix switch
- n. Shall include balanced 1/4" inputs and outputs

**14. 15 / 25 WATT CEILING LOUDSPEAKER**

The 15/25 watt ceiling loudspeakers shall be of the round metal built-in ceiling type and shall include a 15/25 watt HIFI loudspeaker, a high quality 100V transformer, a decorative metal grille and a round metal ring with bayonet fittings. The ceiling speakers shall exhibit the following minimum technical characteristics:

- |    |                            |                   |
|----|----------------------------|-------------------|
| a. | Frequency range ( -3dB ) : | 80 Hz to 15000 Hz |
| b. | Impedance :                | 4 ohm             |
| c. | Sound pressure 1W/1m :     | 90 dB             |

**END OF SECTION**

**Section 16782**

**Security & Close Circuit Television System (CCTV)**

**SECTION 16782****SECURITY & CLOSE CIRCUIT TELEVISION SYSTEM (CCTV)****PART 1 - GENERAL****1.01 Work Included:**

Furnish, install, connect and test a complete security and close circuit television system (CCTV).

**1.02 Related Work:**

- A. General Provision for Electrical Work.
- B. Conduit.
- C. Cabinets
- D. Equipment Identification.
- E. Lighting Protection System.

**1.03 Reference Standards:**

- A. Verband Deutscher Elektrotechniker (VDE) (Association of German Electrical Engineers).
- B. British Standards B.S.
  - B.S. 5063 : Specification for cabled distribution systems for sound and television signals.

**104 Submittal:**

- A. Listing of all component manufacturers.
- B. A detailed technical specification of all equipment and systems.
- C. Shop drawings for all components and equipment.
- D. A detailed drawing of the system with the description of each piece of equipment proposed.
- E. A detailed drawing of the system shown the input and output levels at every amplifier for the highest and lowest channel, as well as the levels maintained at the extremities of each line.

**104 Submittal: (cont'd)**

- F. Certified copies of field strength measurements of all specified stations as determined at the Site shall be submitted to the Engineer for approval.

**PART 2 - PRODUCT****2.01 Microprocessor-based, Cross-point Video Matrix Switching System**

- A. The microprocessor based, cross-point video matrix switching and control system shall consist of a controller/CPU card cage/power supply, a 16 video input board, video output cards, control keyboard(s), alarm/relay interface inputs/outputs, and optional receiver/driver unit(s) together with all software necessary to comprise a complete operating video matrix switching and control system.
- B. The video matrix switching system shall meet or exceed the following design and performance specifications:
1. The controller processor shall be an internal, CPU processor.
  2. The controller processor / CPU card cage (matrix bay) shall provide for all video input / output connections of the matrix switching system.
  3. The matrix switcher shall be modular in design, featuring 16 video inputs and 4 outputs in the single matrix bay.
  4. The video input / system board shall be contained in a compact CPU, card cage and power supply configuration, requiring a maximum of 88.9mm (3.5") of vertical rack space.
  5. The video inputs shall be BNC and jumper selectable, looping or terminating.
  6. The matrix switcher shall provide for 18 programmable alarm inputs (16 camera related and 2 macro related) to include camera number, presets and NO / NC device.
  7. The macro related alarm inputs shall be accessible from the keyboard and shall allow for the initiation of salvo camera switching.
  8. The matrix switcher shall provide for 3 data ports, one each for keyboard control, ASCII control, and receiver / driver control. The keyboard port shall be RS-485 at 19.2K baud, the computer port selectable RS232/422/485 at 1200-9600 baud and the control port RS-422, with "D" protocol at 2400 baud and the "P" protocol at 2400-9600 baud.
  9. The matrix switcher shall provide a 20 alphanumeric character and one camera number generator as well as time/date with white characters surrounded by a black border.
  10. The matrix switcher shall provide for easy, on screen programming.
  11. The video output cards shall incorporate panel mount BNC connectors.
  12. The matrix switcher shall operate on 120VAC, 50/60 Hz or 230VAC, 50/60 Hz., switch selectable.
  13. The matrix switcher shall be provided with a front panel power on LED.
  14. The matrix switcher shall consume a maximum of 10 watts.
  15. The matrix switcher communication with the system keyboard(s) shall be via balanced RS-485 protocol at 19.2K baud
  16. The matrix switcher shall communicate with receiver drivers via RS-422 or Coaxitron, up the coax format protocols.
  17. The matrix switcher shall operate in a temperature range of -7 50
  18. The matrix switcher shall provide for vertical interval switching with a <16 milliseconds typical switching time.
  19. The matrix switcher shall be RS-170, NTSC, CCIR and PAL compatible.
  20. The system shall accept a video input level of from .5 to 2.0 volts peak to peak, composite video signal, into 75 ohms.



**2.01 Microprocessor-based, Cross-point Video Matrix Switching System (cont'd)**

21. The matrix switcher shall have a video bandwidth of 17 Mhz.
  22. The frequency response shall be flat to 8 Mhz and  $\pm$  1.0 dB to 12 Mhz.
  23. The gain shall be unity,  $\pm$  1.0 dB.
  24. The signal to noise ratio shall be  $>$  -55 dB.
  25. Cross- gain shall be typical 2.0% typical with differential phase 0.2.
  27. The matrix switcher shall have a video tilt of 0.5% typical
- C. The control keyboard(s) shall meet or exceed the following design and Performance specifications:
1. The control keyboard(s) shall provide complete control of all system functions.
  2. The keyboard(s) shall be a desktop type.
  3. The standard control keyboard(s) shall allow complete system access and control of pan/tilt units to include programming and calling of presets and patterns when preset pan/tilts or smart domes are utilized in the system.
  4. The control keyboard(s) shall support multi-speed control of variable speed pan/tilt units to include nine individual speeds accessed via the numeric keypad.
  5. The keyboard(s) shall feature full display control of certain video multiplexers utilizing special function keys.
  6. The keyboard(s) shall interface with the controller/CPU via RS-485 communications protocol.
  7. The system shall allow for up to 8 independent keyboards to be connected to the system.
  8. The keyboard(s) shall be capable of daisy chaining to minimize data cabling.
  9. The keyboard(s) shall communicate with the CPU at a minimum of 19.2K baud.
  10. The keyboard(s) shall be ergonomically designed allowing for a maximum degree of flexibility in controlling camera call-up and pan/tilt/dome operation.
  11. The keyboard(s) shall feature a seven segment LED, displaying the current monitor under control. The keyboard(s) shall utilize Electro-Mechanical keys for positive tactile feed back.
  13. The keyboard(s) shall provide for control of camera to monitor selection, all camera/PTZ functions, external devices, alarms and programming.
  14. The keyboard(s) shall be provided with an 8-pin modular female (RJ45) connector and a flat unshielded cable, 6 feet long.
  15. The keyboard(s) shall derive power from the matrix switcher and operate on 12VDC or 12VAC without modification.
  16. The matrix switcher shall have a user programmable password assigned to prevent unauthorized use.
  17. The keyboard(s) shall have an operating temperature range of -7 50
- D. The alarm interface shall meet or exceed the following design and Performance specifications:
1. The alarm interface shall connect directly to the controller/CPU.
  2. The alarm interface shall be capable of up to 18 programmable, N/O or N/C alarm inputs.
  3. Sixteen of the alarm inputs shall be camera related and two alarm inputs shall be macro related. The macro related inputs shall be accessible from the keyboard and shall allow for the initiation of salvo switching.

**2.01 Microprocessor-based, Cross-point Video Matrix Switching System (cont'd)**

- E. The relay interface shall meet or exceed the following design and Performance specifications:
1. The relay interface shall provide for one DPDT, 0.5 amp at 125VAC-relay output for the operation of external devices.
  2. The relay interface shall follow the alarm input.
  3. Two additional general-purpose outputs shall be provided.
  4. The general purpose outputs shall be open collector, 32VDC at 25 ma.

**2.02 High Resolution Colour CCD Camera**

- A. The high resolution colour CCD camera shall be comprised of an enhanced CCD sensor, solid state circuitry, and state of the art electronics incorporating the latest in digital technology, housed in a compact, rugged Aluminium case.
- B. The high resolution colour CCD camera shall meet or exceed the following design and performance specifications:
1. The colour CCD camera shall be a 8,47mm (1/3") interline transfer imager meeting NTSCIEIA signal format specifications.
  2. The camera shall be 2:1 interlace, internal or external sync., 220VAC input power, 50/60 Hz, with AC line lock, V-phase +/-90.
  3. The image sensor shall have a pixel array of 752(H) x 582 (V)
  4. The camera shall provide a resolution of 480 TV lines horizontal.
  5. The camera shall feature an enhanced CCD sensor utilizing a layer of micro-condensing lenses positioned above the CCD's photosensitive layer which shall more accurately gather, condense and focus image information directly onto the CCD's individual cells, greatly increasing overall light/image sensitivity and providing sharper pictures in lower light conditions.
  6. The camera shall feature digital signal processing, DSP.
  7. The camera shall have automatic white balance featuring ATW Pro with a range from 2,500 to 6,000 ATW with a range of 2,000 to 10,000
  8. The camera shall provide for automatic electronic iris and a shutter speed range of 1/60 to 1/100,000 second.
  9. The camera shall feature CCD Iris technology and standard auto iris lens compatibility.
  10. The camera shall accept either Video type or DC servo type auto iris lenses, switch selectable.
  11. The auto iris connector shall be the industry standard mini four pin type.
  12. The camera shall have automatic iris control and gain control which shall be switchable ON/OFF/Turbo.
  13. The camera shall provide for back light compensation via Intelligent Image Management technology and shall automatically and intelligently analyze the scene and control iris, gain and white balance information via "fuzzy logic" allowing optimum picture conditions through automatic light level compensation.
  14. Backlight compensation shall be independent of object position and no set-up shall be required. Backlight compensation shall be switchable ON/OFF.
  15. The camera/lens package shall provide for a sensitivity of 1.0 lux at P1.2.
  16. The camera shall provide a video output of 1.0vp-p, 75 ohms.
  17. The camera shall have a signal to noise ratio of >48dB.
  18. The camera shall feature a normal or sharp aperture selection.
  19. The camera shall feature a precision double-cam C/CS lens mounting heads and shall not require C-mount adapters.

### 2.03 Fixed Focal Length, Auto Iris, DC Drive Lens

- A. The lens shall be a 8.47mm (1/3") format, fixed focal length, auto iris, DC drive lens, along with any accessories which may be required for a complete lens system.
- B. The lens shall meet or exceed the following design and performance specifications:
  - 1. The lens shall be a "CS" mount.
  - 2. The lens shall be used with 1/3" or smaller format cameras.
  - 3. The lens shall provide automatic iris and manual focus adjustments.
  - 4. The lens shall automatically adjust for relative light level changes.
  - 5. The lens shall provide high resolution power in a compact body.
  - 6. The lens shall include a standard 4-pin plug for ease of installation and convenience.
  - 7. The lens shall be available in four focal lengths, 2.3mm F1.4 ultra-wide angle, 2.8mm F1.4 standard wide angle, 4.0mm P1.2 medium wide angle and an 8.0mm P1.2 medium telephoto.
  - 8. The lens shall have a minimum object distance of 0.2m.
  - 9. The lens shall have a filter size of 37.5P0.5 mm.

### 2.04 Harsh Environment, Dust Tight, Water Proof Camera Enclosure

- A. The harsh environment camera enclosure shall consist of a camera housing designed specifically for use with smaller format cameras and fixed focal length and motorized zoom lenses in harsh climate conditions, shall be dust tight and water proof and may optionally include a thermostatically controlled heater along with any accessories which may be required for a complete harsh environment camera enclosure.
- B. The harsh environment camera enclosure shall meet or exceed the following design and performance specifications:
  - 1. The camera enclosure shall be cylindrical in shape, compact and light weight allowing easy access to the sled on which the camera shall be mounted, via a "T" handle on the rear plate to assist in removing the plate.
  - 2. The enclosure shall feature 2 adjustable PG-13 liquid-tight gland connectors on the rear plate to allow for easy installation of the power and video cables.
  - 3. The enclosure shall provide two captivated screws for latching.
  - 4. The enclosure shall be optionally available in 120VAC, 24VAC or 230VAC power input versions.
  - 5. The enclosure shall be optionally available with a dual element, thermostatically controlled defogger/defroster heater package with any of the three voltage inputs. Cable connections shall be via a 4-position terminal input block.
  - 6. The enclosure shall be provided with a multiple slot camera sled providing easy camera installation and maintenance.
  - 7. The enclosure without heater package shall accommodate camera/lens packages up to 69.85H x 76.2W x 106.35L mm (2.75"H x 3.00"W x 4.18"L) including the BNC connector.
  - 8. The enclosure when equipped with heater package shall accommodate camera/lens packages up to 69.85H x 76.2W x 234.95L mm (2.75"H x 3.00"W x 9.25"L) including the BNC connector.

**2.04 Harsh Environment, Dust Tight, Water Proof Camera Enclosure (cont'd)**

9. The enclosure shall be provided with a viewing window constructed of 0.375" thick, optically clear Lexan.
10. The viewing window shall measure 82.55mm (3.25") in diameter for indoor models and 63.5mm (2.50") in diameter for outdoor models (with window heater.)
11. The enclosure shall be constructed of die cast aluminum and shall have a gray polyester powder coated finish.
12. The optional heater shall operate as a defogger and shall activate ON at 70F and OFF at 85F' and shall consume a maximum of 7.5 watts.
13. The optional heater shall operate as a defroster and shall activate on at 40 F and off at 67 F and shall draw a maximum of 15 watts.
14. The enclosure shall be optionally available with a sun shroud.
15. The optional enclosure sun shroud shall protect the enclosure from direct sun rays and shall reduce internal temperatures by approximately 10 to 15F.
16. The enclosure shall operate in a temperature range of -50F to 122F.
17. The enclosure shall be 1P66 and NEMA 4 compliant.
18. The enclosure shall measure a maximum of 330.2L x 107.95mm (13.00 "L x 4.25") in diameter.

**2.05 14" Colour Monitor**

- A. The 14" colour monitor shall be comprised of a high resolution CRT, and solid state electronics housed in a rugged metal case.
- B. The 14" colour monitor shall meet or exceed the following design and performance specifications:
  1. The monitor shall provide a 14" (35.56cm) picture display, 14" as measured diagonally, 90
  2. The monitor shall be universal and meet both NTSC/EIA and PAL/CCIR standards.
  3. The monitor shall feature a display with integral implosion protection.
  4. The monitor shall be single channel with one video input and one looping output via BNC connectors.
  5. The monitor shall utilize comb filtering for significantly improved picture quality.
  6. The monitor shall provide S-VHS input/output for Y-C signals, utilizing a 4-pin mini-DIN connector.
  7. The monitor shall have one audio VCR input/output utilizing RCA jacks.
  9. The monitor shall provide a minimum of 460 lines horizontal resolution.
  9. The monitor shall feature automatic degaussing circuitry and fast warm up period.
  10. The monitor shall operate on 120/230 VAC, 50/60 Hz. input power with a voltage range Of from 90-250 VAC and use a maximum of 60 watts.
  11. The monitor shall have a high voltage section developing 23.5KV, +/- 500V.
  12. The monitor shall provide horizontal and vertical linearity within 10%.
  13. The monitor shall provide convergence at center of picture of <1.0 mm and at corners of <1.4 mm.
  14. The monitor shall have a brightness of >250 lux in 100% white signal at center.
  15. The monitor shall accept 1.0 V p-p composite video.
  16. The monitor shall use internally derived synchronization with a sub carrier frequency sync. Range of 3.579549 MHz, +/-200Hz and 4.433619 Mhz, +/- 200Hz.

**2.05 14" Colour Monitor (cont'd)**

17. The monitor shall feature tint, colour, brightness, dwell, contrast, channel select, audio volume and power ON/OFF controls on the front panel.
18. The monitor shall provide sub tint, sub colour, sub brightness and sub contrast controls recessed for service purposes.
19. The monitor shall provide a terminating slide switch and two BNC connectors, one looping, on the rear panel.
20. The monitor shall have an operating temperature range of (0.41 range of 0% to 90% relative, non-condensing).
21. The monitor shall be UL and cUL listed, and CE compliant.

**2.06 Base System Panel**

The security control panel shall have a total capacity of 128 zones. Base panel shall have a capacity of 16 hardwire zones and 112 addressable zones on two addressable loops. All zones shall be fully supervised and programmable. Panel shall be complete with integral power supply and supervised battery charger, auxiliary power for powering security detection devices, programmable switched auxiliary power supply for 4-wire smoke detectors, integral supervised digital alarm communicator, supervised bellstiren output, and two general purpose programmable outputs which can be programmed as general purpose outputs or as the systems addressable loops.

**2.07 Combust**

The system shall be complete with a standard, non-shielded, 4 conductor station wire bus (Combust) for powering and communicating with remote hardwired system expansion modules and devices. The Combust shall be composed of up to 4 legs. with each leg up to 304.8m (1,000 feet) long.

**2.08 Panel Zone Expansion**

The panel shall be expandable to a maximum of 128 zones by adding standard hardwired 8 and/or 16 zone modules connected to the base panel via the Combust, by adding up to 112 addressable detection devices to one or both of the addressable loops on the base panel, and by adding a 64 zone 900 MHz. Spread spectrum wireless receiver to the four-wire communication bus. The system shall be capable of expansion using hardwired, addressable and wireless simultaneously in any mix that suits the application.

The system shall provide opening/closing-scheduled suppression to prevent opens and closes from being reported to the central station. The system shall be capable of reporting all alarms, trouble, and system status information by combinations of all communication methods installed including digital communicator, a cellular transmitter, and DVAC.

**2.09 System Printer**

The system shall be capable of including a serial output for a hard copy printer installed anywhere on the Combust. All system events, alarms and restorals shall be printed and each event shall include the partition, date, and time.

**2.10 System Event Buffer**

The system shall have a 3,000 event buffer. All events shall be printable from the system printer. The 2,800 most recent events shall be viewable by keypad LCD display. All events shall be viewable by upload/download PC.

### **2.11 Power Supply Relay Output Modules**

The system shall be capable of including up to 64 fully programmable output relays with form 'C' contacts rated 2Amps at 30VDC. Relays shall be added in modules of four and may be located anywhere on the Combos. Each module shall include a supervised 350mA 12VDC battery charger, and integral power supply to supply up to 1.0Amp of auxiliary power at 12VDC to power direct connected devices or re-power the Combos.

### **2.12 low Power Outputs**

The system shall be capable of including up to 144 low power outputs with each output able to supply 50mA at 12VDC. Outputs shall be added in increments of 16 and may be added anywhere on the Combos.

### **2.13 System Keypads**

The system shall accommodate up to 16 LCD keypads, which are powered from the base, panel via the four-wire communications bus. LCD keypads shall have a display capacity of at least 32 alphanumeric characters with adjustable brightness and contrast. Keys shall be backlit for low light level ease of use. Keypads shall include individual "Armed", "Ready" and "Trouble" indicators, three keypad activated alarm keys, and five programmable 'function' keys. Keypads shall be available with red bezels as required for fire systems.

### **2.14 User codes**

The system shall provide for 1,000 user codes selectable as either 4 or 6 digits. For Access Control, user codes shall be assignable to 1 of 64 access levels. User codes shall be assignable to one or multiple partitions.

### **2.15 Partitions**

The system shall be programmable for up to 8 fully independent partitions each partition shall have its own account code. Keypads shall be assignable as 'partition' keypads or 'global' keypads. Each zone in the system shall be assignable to one or more partitions.

### **2.16 Central Station Reporting**

The system shall provide high speed 20 bps 1400/2300 Hz. handshake, contact ID and SIA reporting formats and shall be capable of being programmed to call up to 3 telephone numbers. The system shall also allow communication to a pager. The telephone numbers shall be programmable for 'backup' dialing should the primary number fail. The system shall be programmable for split reporting such that alarms / restorals, openings/closing and miscellaneous events can be sent to different telephone numbers. The system shall report a separate account code for each partition and for non-partition (system) events.

### **2.17 Remote Annunciation**

The system shall be capable of remote zone alarm and system status annunciation, up to 144 points, by adding 32 and 64 point annunciators anywhere on the Combos. Annunciators shall be capable of being flush mounted. The annunciators shall provide bulls eye and graphic annunciation capability.

## **2.18 Access control**

The system shall support 16 dual reader access control modules for a total of 32 readers. Each access control module shall be complete with an integral power supply, supervised battery charger, and shall provide full standalone operation if communication with the base panel is lost. Access control modules shall include non-volatile memory to retain all schedules and programming information even if AC and battery power are lost; and shall be capable of being added to the system anywhere on the Combos. Access control modules shall accept proximity readers, magnetic stripe readers, and 26 bit wiegand readers. Readers shall be capable of being located up to 500 feet from the modules. Each access module shall have the following inputs and outputs per reader: 'request-to-exit' detector input. 'postpone arm' pushbutton input, 'arm' pushbutton input. 'door' contact input, door strike output, and outputs for reader LED and buzzer.

Access control shall allow users to arm/disarm the security system while locking/unlocking the doors from outside the protected space. Users may use a valid card to disarm the system automatically while unlocking the door, to arm the system in combination with the arm pushbutton while locking the door, and to postpone autoarm in combination with the autoarm pushbutton. Access control software shall be an integral component of the base panel software and shall provide the following functions: capacity for 1,000 cards, 64 access levels, 99 seven day schedules with 4 intervals per schedule, holiday scheduling for a two year period, and individual door unlock schedules with automatic daylight saving time adjust for all schedules. Access control functions shall be fully programmable through any system keypad and either locally or remotely using any PC and the upload/download software. All access control transactions shall be recorded in the system event buffer.

## **2.19 Voice Assisted Status & Control**

The system shall be capable providing system status and control via any local or remote touchtone telephone with the system providing system status information by voice. The system shall include a word library and allow custom words for zone labels.

## **2.20 Automation**

The system shall be complete with an automation control module capable of controlling 32 X-10 control devices by event and by schedule. The system shall include 16 schedules to control automation devices. Automation shall be controllable via any keypad and local or remote touchtone telephone.

## **2.21 Scheduling**

The system shall provide for 99 date schedules with 4 intervals per schedule, 4 holiday schedules with 2 years of scheduling capacity, 50 open/close suppression schedules and 16 automation schedules. All schedules shall be programmable via the LCD keypads and via downloading either locally or remotely.

## **2.22 Ground Fault Detection**

The system shall include an integral ground fault detector which shall detect a single ground fault on any extended conductor in the system.

### 2.23 Supervision

Each zone in the system shall be supervised. The base panel and any remote panel with its own AC input shall be supervised for AC loss. Batteries for the base panel and all remote panels shall be supervised for low power and be short circuit protected. Each addressable device and each wireless input device shall be supervised for its presence. The Combos bus shall be supervised for low voltage and the presence of each enrolled module and keypad. Digital alarm communicators shall be supervised for telephone line trouble and failure to communicate and the system shall report any cellular communication panel trouble.

### 2.24 System Software

The base panel shall come complete with all the software to implement every system feature and allow the addition of every expansion or functional module without changes or addition to the basic software. System Programming

The system shall be fully programmable via the LCD keypads and shall also allow event buffer viewing via the keypads.

Separate PC based upload/download software shall allow programming and operation from a directly connected local computer, or from a remote computer via a telephone line or LINKS cellular communications equipment. Remote access shall be controlled by the owner to prevent unauthorized access

### 2.25 Security Control Panel

- 24 zone main panel
- Expandable to 128 zones
- 2 addressable loops for up to 1123 addressable devices
- 16 LCD keypads/system
- 8 partitions
- 1000 user codes
- 3000 event buffer
- 9 account number, 3 phone numbers
- Computer link
- 1 supervised bell zone
- Supervised digital alarm communicator
- Opt. Attack-resistant cabinet
- Space for two 7 AH gel-cell batteries
- Serial printer interface
- Support any 300, 1200, 2400 or 4800 bps serial printer
- Shall be interface with access control system.



### **2.26 LCD Panel Language Keypads**

- Two line, 32 character display
- Adjustable brightness and contrast
- Back-lighting boost for low light conditions\*
- Display zone and system status, trouble conditions, event buffer, and system instructions
- Global or partition operation
- 4 keypad-activated alarms... panic, auxiliary, fire and duress
- 5 programmable keypad functions.\*

### **2.27 Hardware Zone Expansion Modules**

- 8 zone input module or 16 zone input module
- 30 programmable zone types
- All zones programmable as NC, EOL, DEOL
- Fused at 250 mA , 12 VDC AUX. power for local devices

### **2.28 Power Supply / Quad Relay Output Module**

- Up to 1.5 A @ 12 VDC power for external devices.
- 4 form 'c' programmable relays contacts rated for 2A @ 30 VDC
- 59 programmable output options
- Supervised for low / disconnected battery, AC power fail, and aux. Supply fault

### **2.29 Low Current Output Module**

- 16 programmable output zones
- Outputs rated for 50mA @ 12 VDC
- 59 programmable output options

### **2.30 Voice Promote Security & Building Automation Control Module**

- Turns any touch tone phone into a fully functional keypad with both global and partition control
- Module contains extensive library of voice prompts for security and building automation control and status feedback
- Up to 6 words per voice prompt, chosen from a 180 word standard library and 241 word user programmable library
- Built –in power line interface for up to 32 x-10 control devices
- Program event activation of x-10 devices using up to 16 event timers and 8 schedules.

### **2.31 PIR Motion Detectors**

- Passive infrared motion detectors with advance signal processing, automatic temperature compensation and immunity to white light and electrical transients.

**2.32 Digital Break Glass Detectors**

- Microphone frequency range provides sound capture at low sound levels and distance of up to 12 m (40ft)
- jumper-selectable sensitivity range
- digital single processing analyzes sound in detail to provide greater detector sensitivity and immunity to false alarms
- high static and transient protection
- Detection of all common types of framed glass including; plate wired, tampered and laminated.
- Detectors shall accommodate changes in frame construction, glass thickness and room acoustics.

**2.23 Reader Access Control Module with the following features:**

- 2 single doors or 1 door with entry/exit readers
- Assign individual access privileges by door and by schedule
- Define user rights to permit arming and disarming by partition
- Designate “privileged” users who re authorized to validate access for “wait for privileges” users
- Each module has it’s own clock
- In event of power failure each access control module is capable of full operation on battery as a stand-alone access control system
- 64 access levels
- 99 seven-day schedules
- 4 time intervals per schedule
- 4 time intervals per schedule
- 4 two year holiday groups-730 holidays
- Individual door-unlock schedules
- Automatic switching between daylight saving and standard time
- Program via keypad, or via computer with downloading software
- Non-volatile RAM
- Does not lose programming when powered down
- Fully supervised for:
  - Lock trouble
  - Low battery
  - Tamper
  - Reader low power troupe
  - AC failure
  - Auxiliary power trouble

**END OF SECTION**