TRUVISION DVR 60 (TVR60) MAY 2011

A&E SPECIFICATIONS

|  |  |  |  |
| --- | --- | --- | --- |
| **DIVISION 28** | | **ELECTRONIC SAFETY AND SECURITY** | |
| LEVEL 1 | 28 20 00 | | ELECTRONIC SURVEILLANCE |
| LEVEL 2 | 28 23 00 | | VIDEO SURVEILLANCE |
| **LEVEL 3** | **28 23 19** | | **DIGITAL VIDEO RECORDERS AND ANALOG RECORDING DEVICES** |
| LEVEL 4 | 28 23 19.00 | | NOT APPLICABLE |
| LEVEL 5 | 28 23 19.00.TVR60 | | FILE REFERENCE ONLY |

This A&E Specification conforms to CSI MasterFormat 2004 guidelines.

The **bold** highlighted level above identifies the level this specification meets in the CSI MasterFormat hierarchy.

Feel free to consult with UTC Fire and Security regarding specific project requirements. For information and assistance contact:

UTC Fire and Security.

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DOCUMENT NOTES

Warranty Information: Product is warranted by the manufacturer for 36 months from the date of shipment to the dealer or integrator from the manufacturer. The warranty statement provided in Part 1 is an example of requirements to the installing contractor and may not directly represent the product.

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SECTION 28 23 19

# GENERAL

# SUMMARY

# Section Includes

* + - 1. Digital Video Recorder Performance Requirements
      2. Digital Video Recorder Technical Requirements

# Related Requirements

* + - 1. Integrated Systems and Options
         1. 28 06 00 Schedules for Electronic Safety and Security
         2. 28 20 00 Electronic Surveillance
         3. 28 23 00 Video Surveillance (exclusive of this section)
      2. Related Sections
         1. 26 33 53 Static Uninterruptible Power Supply
         2. 27 20 00 Data Communications

# REFERENCES

# NFPA 70 - National Electrical Code.

# UL 2044 – Commercial Closed-Circuit Television Equipment.

# FCC

# CE

# French Decree of August 2007 compliant

* + - 1. CNPP approval available
    1. BGV Kassen compliant
       1. German Bank requirements
       2. Approval available

# SUBMITTALS

# Single-line block diagram showing all related equipment interfaces.

# Manufacturer technical data sheets.

# Shop Drawings

# Software: 1 set of fully functional software in manufacturer’s original media packaging, temporarily licensed for a (30) day evaluation period.

# CLOSE-OUT SUBMITTALS

# Maintenance Contracts

# Operation and Maintenance Data/Manuals

# Warranty Documentation

# Record Documentation

# Software

# Commissioning Documentation and Check-Off List

# As-Built Drawings

# Training Course Materials

# Training Presentations

# Training Class Video Files

* 1. WARRANTY
     1. Warranty
        1. Warrant system against defects and workmanship for one (1) year, covering all parts and labor, after Owner acceptance.
        2. Assign all manufacturer warranties beyond the initial one year period to the Owner.
        3. Guarantee all application software/firmware is manufacturer supported.
        4. Perform all manufacturer recommended preventative maintenance on all related components and/or devices.
        5. The Security Contractor shall be the primary contact and respondent for all service and support and officially recognized and backed by the system manufacturer.
     2. Contractor Provided Extended Correction Period
        1. Guarantee all system corrections for six (6) months after Owner acceptance.
        2. Guarantee all application software/firmware remains current at all times during the manufacturer warranty period.
     3. Special Warranty
        1. Provide a separate proposal for extended warranty and maintenance service contract for Owner consideration.
        2. One (1) year agreement.
        3. Submit payment terms and conditions with proposal

.

# PRODUCTS

# OWNER FURNISHED EQUIPMENT

# Web Browser Workstation (minimum requirements)

* + - 1. Intel compatible, 700 MHz
      2. 1 GB RAM
      3. 10/100/1000MB Ethernet Network Interface Card

# Web Browser Workstation Software:

* + - 1. Operating System: Microsoft Windows XP, Vista or 7
      2. Web Browser: Microsoft Internet Explorer 6.x, 7.x or 8.x
    1. Mobile Device
       1. PDA/Mobile Phone: WinMobile 5 or higher
       2. Apple iPhone: 3G or higher

# EQUIPMENT

# Manufacturer

* + - 1. All equipment and materials used shall be standard components that are regularly manufactured and used in the manufacturer’s system.
      2. All systems and components shall have been thoroughly tested and proven in actual use.
      3. Controlled devices, such as video cameras, PTZ controllers, etc. are specified elsewhere.
      4. This specification is based on the TruVision DVR 60 (TVR 60) by UTC Fire & Security; 791 Park of Commerce Boulevard, Boca Raton, FL 33487 USA. Tel: (561) 998-6100. Fax: (561) 994-6572 [www.utcfireandsecurity.com](http://www.utcfireandsecurity.com).

# Product Options.

* + - 1. 500GB-12TB onboard storage

# Description

* + - 1. The equipment is a hybrid digital video recorder (hDVR) that provides storage and playback of images from up to 16 analog/digital (IP) camera inputs simultaneously.
      2. Function as a stand-alone unit
      3. Manageable locally by onboard controls or remotely by browser based interface or video management software program interface.
      4. Simultaneously view live, record, view recorded images, and transmit video over a network
      5. Record images and audio continuously, based on motion activity, alarm or triggered events.

# Performance Criteria

* + - 1. The hDVR shall be based on an embedded operating system and incorporate real-time live viewing, playback viewing, and search viewing based on camera, date and time, motion, and alarm functions.
         1. Utilize H.264 compression, allowing viewing and controlling the hDVR across a local or wide area network.
         2. Bandwidth throttle management to control network data from the hDVR
         3. Dual streaming

Network viewing at programmable sub-stream rate

No impact to record rate, quality, or resolution of recorded video

* + - * 1. Support from 500 GB to 12 TB of hard disk drive internal storage
        2. Support external hard drive configurations
      1. Live View
         1. View real-time live video on all video channels
         2. View live and recorded video simultaneously while continuing to record without interruption.
         3. Display live video in full size, 2x2, 3x3, 12-way, and 4x4 image formats
         4. Digital zoom
         5. Image update up to 60/50 (NTSC/PAL) unique pictures per second
      2. Recording
         1. Record and store images from one (1) to 16 camera inputs.
         2. Manually or automatically customize record rates per camera for event and motion (activity) detection
         3. Programmable per-camera picture capture rates
         4. Record video images and audio in one selected mode

Continuously

Motion activated

Event activated

Alarm activated

* + - * 1. Manually start and stop recording for selective cameras
        2. Record analog resolutions QCIF, CIF, 2CIF and 4CIF.
        3. Record digital (IP) resolutions QCIF, CIF, 2CIF, 4CIF and 720p.
        4. Image update up to 60/50 (NTSC/PAL) unique pictures per second
      1. Configuration
         1. Customizable configuration for complex applications
         2. Menu displayed in graphical and icon driven formats
         3. Quick configuration wizard

Basic configuration

Minimum time to set up

Inexperienced user tool

* + - * 1. Record full-motion video, dependent on fps allocation

480 fps at QCIF, NTSC (400 fps, PAL), for all analog cameras

480 fps at CIF, NTSC (400 fps, PAL), for all analog cameras

480 fps at 2CIF, NTSC (200 fps, PAL), for all analog cameras

480 fps at 4CIF, NTSC (100 fps, PAL), for all analog cameras

30 fps at 720p, NTSC (xxx fps, PAL) per IP camera

* + - * 1. Allow individual adjustments per video input to meet a given installation requirement for video retention.
      1. Browser based interface
         1. Live view up to 16 cameras simultaneously
         2. Switch between main-stream and sub-stream

Per camera

All cameras at once

* + - * 1. PTZ functionality with preset call up
        2. Playback of recorded video
        3. Archiving of recorded video
        4. Comprehensive remote configuration
      1. Automatic video watermark
      2. Export recorded video to portable storage media.
      3. One button archive video
      4. Record audio from one (1) to 16 channels
      5. Log view screen shows system status at a glance
      6. Auto Install
         1. Automatically detect loss of video sync

On screen warning

Message to remote

Local buzzer sound

Relay switched

* + - 1. Monitor Multi-Screen Viewing
         1. Image update rates (live or record modes)

* + - * 1. View video on multiple monitor configurations

Auto-detect monitor configuration

VGA main monitor plus two (2) composite (spot) monitors (Monitors A,B,C)

Composite main monitor plus one (1) composite (spot) monitor (Monitors A,B)

VGA or composite main monitor output (Monitor A)

Display live images

Display playback images

Sequence live video in full size and 2x2 image formats

Customize sequencing by camera order

Dwell time of 1 to 120 seconds

Display programming functions

Composite spot monitor (Monitor B)

Display full format live video

Display playback images

Sequence live video in full size image formats

Customize sequencing by camera order

Dwell time of 1 to 120 seconds

Composite spot monitor (Monitor C)

Display full format live video

Sequence live video in full size image formats

Customize sequencing by camera order

Dwell time of 1 to 120 seconds

* + - * 1. Allow viewer arranged camera configurations in live mode
        2. Camera Titling

16 alphanumeric characters

Enable/disable per monitor

* + - * 1. Time/Date Formatting

12/24 hour

Enable/disable per monitor

* + - 1. Playback Viewing
         1. Search and playback recorded video

Via Internet connection over Ethernet network

Via manufacturer supplied remote receiver software

* + - * 1. Playback images smoothly at normal and fast forward speeds
        2. Full media search capabilities

Search archiving, restoring and playback operations

Search filters

Start/stop times

Start/stop dates

Alarm and event occurrences

Inserted text

Camera number

* + - * 1. Digital zoom
        2. Video authentication

A viewer shall be able to play back video exported from the hDVR server and recognize and verify the digital watermark embedded in the native video

Watermark verification will rest with the manufacturer.

* + - 1. Archiving Video
         1. Export recorded images/recorded video and audio data in a proprietary format
         2. Device type selection options

CD/DVD

USB drive

eSATA media

* + - * 1. Allow selective archiving
        2. User selectable operation

Write once

No overwrite

Continuous

* + - * 1. On-screen progress indicator
        2. Automatic Delete Mode (ADM)

Meets compliance requirements for finite storage time jurisdictions

1 to 99 days

* + - * 1. Automatically export zero-footprint evidence player
      1. Remote Control
         1. Monitoring, searching, playback
         2. Incorporate PTZ dome control via on board communication ports
         3. Using a standard web browser, an installed ActiveX control shall provide capability to operate the hDVR

Configure the hDVR

View live video

Alarm notification

Play back video

Search recorded video

Archiving

Firmware upgrades

Control PTZ cameras

Allow bi-directional audio

* + - 1. Automatic programming of daylight saving time updates each year.
      2. Upgradable
         1. Flash programming upgrades of software

USB

TCP/IP

* + - 1. Allow POS and ATM text insertion
         1. Integrated support for one (1) input associated with one camera
         2. Support additional inputs with optional test insertion module (see product accessories below).

# Functional Controls

* + - 1. On-screen programming and operation
      2. PTZ Control
         1. Full remote control operation of PTZ functions
         2. Web browser enabled
         3. PTZ keyboard controller (optional)
      3. Multiple Recording Modes
         1. Schedule
         2. Continuous
         3. Motion detection
         4. Alarm activation
      4. Password Protection
         1. 16 user levels for setup functions and operation

Local user

Remote user

Local play user

Remote play user

Remote view

* + - * 1. Administrator level
      1. Motion Detection
         1. Embedded motion (activity) detection for each camera to start recording

On-screen setup

Selectable 22x18 grid (398 zones) detection motion areas

Seven (7) sensitivity levels per camera

396 size discrimination levels

* + - 1. Masking/Privacy Zones
         1. Image masking for each camera

On-screen setup

Selectable 22x18 grid (396 zones)

Four (4) mask areas per camera

* + - 1. Tamper Detection
         1. Tamper recognition for each camera

On-screen setup

Selectable 22x18 grid (396 zones)

Four (4) sensitivity levels per camera

* + - 1. Alarm Activation
         1. 16 menu programmable alarm inputs
         2. Four (4) programmable alarm outputs

Change of State (COS) executable by system

Individual relay

All relays

* + - * 1. Programmable audible alert

Identify condition changes to user

Alarms

Motion detection

Video loss

Operational failure

* + - * 1. Programmable alarm latching

Transparent – auto reset upon COS restore to normal

Timed out – auto reset after user-defined elapsed time

* + - * 1. Alarm response

Initiate recording

Full screen associated image displayed

Full screen sequence among multiple associated images displayed

Display preset configurations identifying alarm condition display and surrounding escape paths

Provide status relays linking to alarms, motion detection and video loss

* + - * 1. Pre-Alarm/Pre-Event Recording

Records images for up to 30 seconds

Maintain images in a user programmable (size) buffer

Append to beginning of all recorded events

Continue alarm recording until alarm is reset, times out, or is acknowledged (menu programmable)

Continue event recording until programmed event duration expires (0 seconds to 10 minutes)

* + - * 1. Remote Alert

Send alarm notification to a remote PC using compatible monitoring software

Send hDVR active signal to a remote PC every two minutes

* + - * 1. Alarm History Log

1000 alarm history

* + - 1. Bandwidth Throttling
      2. Dual Streaming (live video to remote client)
      3. Instant Video Playback
         1. Playback video from selected camera from last recorded minute
      4. Audio listen-in
         1. Allows client to listen to playback audio.

# Physical Criteria

* + - 1. Electrical
         1. Internal Power Supply
         2. Universal, Auto-Switching, 90-135VAC, 180-256VAC, 47-63 Hz
         3. Power Consumption: 126W maximum, 396 BTU/H
         4. Memory back up battery

Time and date

Internal programming functions

* + - 1. Environmental
         1. Operating Temperature: 14° to 122°F (-10° to 50°C)
         2. Relative Humidity: 10-90% relative, non-condensing
      2. Structural
         1. Steel cabinet
         2. 17.9” W x 3.74” H x 17.9” D (455 x 95 x 455 mm)
         3. 19-inch EIA Rack Mount, 2RU
         4. 24.25 lb (11 kg) maximum
      3. Connectors
         1. Video

Inputs

16 composite loop-through BNC

Outputs

VGA, DB-15

Two (2) Composite BNC

* + - * 1. Alarm

Inputs

16 user selectable, NO/NC

315 mV signal

Removable screw terminal block

Relay Outputs

Four (4) user selectable, NO/NC

0.5A continuous, 1.0A momentary

Removable screw terminal block

* + - * 1. Audio

Input:

One (1) associated and synchronized input per camera

RCA connectors

Output

Two (2) audio outputs

One (1) bidirectional audio line output

RCA connectors

* + - 1. Data Auxiliary Interface
         1. Two (2) high-speed USB 2.0 ports (1 front, 1 back)
         2. RS-232C, 9-pin SubD male serial interface
         3. RS-485 terminal block ports
         4. Configurable eSATA Port

Storage expansion port

External archiving

* + - 1. Network Interface
         1. 10/100/1000 Mbps, Ethernet, RJ-45 port

# Technical Criteria

* + - 1. System
         1. Embedded Linux Operating System
         2. Ethernet Communication

LAN/WAN Ethernet access

16 workstation simultaneous Ethernet access

No impact to recording

No access to stop recording remotely

User programmable Ethernet parameters

Enable/disable

Hostname

DHCP (enable/disable)

DDNS

Static IP address

Default gateway

Sub-net mask

Name Server

HTTP port

Main port

* + - * 1. CD/DVD burner
        2. SATA hard disk drive configuration

500 GB

1TB

2TB

4TB

8TB

12TB

Multiple hard drives configured and presented as a single storage device

Hard drives specifically developed for the digital video archiving industry

SMART disk drive monitoring

* + - 1. Data Interface
         1. USB

USB memory key archiving devices

USB HDD archiving devices

Mouse control functions

* + - * 1. RS-232C

Transaction text insertion for POS/ATM

Transparent data

Factory debugging

* + - * 1. RS-485

Support networking and control

Remote control

System operation

Setup

Uploading

Downloading

System programming

Motorized PTZ control

Selectable per camera protocols

Up to 16 PTZ camera receivers

Programmable presents on alarm

System integration

* + - * 1. eSATA ort

eSATA HDD archiving devices

* + - 1. User Interface
         1. Front panel

Illuminated buttons

Each camera

Green backlight, fully operational

Red backlight, video loss or alarm

Display

Sequence

Monitor A

Monitor B

Live

Playback

Pause

Alarm

Backlight on alarm

HDD

Network

Internal

Alarm

Multi-function trigger-point joystick

Backlight based on available functions

* + - * 1. IR remote

Emulate front panel keys

* + - * 1. USB mouse

Menu settings

Navigation functions

Control functions (live, playback, PTZ, archive)

* + - * 1. Remote control keyboard
      1. Video
         1. Standards

Input

NTSC/EIA or PAL/CCIR, switchable

75 ohms, 0.7-1.4 V, p-p

Automatic gain control (AGC)

Loop through functionality

Analog inputs

Signal conditioning

Ground loop isolation

Output

VGA

Display resolution at 60Hz

1024 x 768

1280 x 60Hz

BNC

Composite video

NTSC/EIA or PAL/CCIR

1V p-p

* + - * 1. Decoding

H.264

* + - * 1. Available memory

64MB total

32MB live/playback display

32MB record

* + - * 1. Video Sampling

27MHz minimum

* + - * 1. Color

16.8 million colors per specification YUV 4:2:2

256 grayscale levels

* + - * 1. Resolution

Horizontal: 704 pixels

Vertical

484 active lines, NTSCEIA

576 active lines, PAL/CCIR

* + - * 1. Image Quality

Analog

4CIF

2CIF

CIF

QCIF

Digital IP

720p

4CIF

2CIF

CIF

QCIF

* + - * 1. Streaming bandwidth

Adjustable per camera

2, 1.75, 1.5, 1.25, and 1 Megabit

896, 768, 640, 512, 448, 384, 320, 256, 224, 192, 160, 128, 96, 80, and 64 Kilobit

User definable

* + - * 1. Image Capture Frame Rate

Support image capture frame rates per camera

Live

Record

Alarm mode

Frames per second

Real-time (NTSC/PAL, 30/25 fps)

20 fps

16 fps

12 fps

8 fps

4 fps

1 fps

1/16 fps

* + - * 1. Hard disk drive grouping

Manage up to 16 groups

# PRODUCT MODEL NUMBERS

# TruVision DVR 60

* + - 1. All models include slim-line slot-drive CD/DVD burner
      2. 16 Channels, available in Europe and parts of Asia
         1. TVR-6016-500EA: 500 GB Storage
         2. TVR-6016-1T EA: 1TB Storage
         3. TVR-6016-2T EA: 2TB Storage
         4. TVR-6016-4T EA: 4TB Storage
         5. TVR-6016-8T EA: 8TB Storage
         6. TVR-6016-12T EA: 12TB Storage
      3. 16 Channels, available in the Americas
         1. TVR-6016-2T: 2TB Storage
         2. TVR-6016-4T: 4TB Storage
         3. TVR-6016-8T: 8TB Storage
         4. TVR-6016-12T: 12TB Storage
    1. Provide system components and documentation with hDVR
       1. System components
          1. 120VAC grounded USA power cord

Ships with UK and Euro power cord for EA models

* + - * 1. IR remote control with batteries
        2. Front rack mount ears with screws
        3. Rear rack mount brackets
        4. USB mouse
        5. Video looping cable, 16 BNC connectors
      1. Documentation
         1. CD

User Manual

Quick Start Guide for installers

Bit-rate calculator

hDVR player

* + - * 1. Printed

Quick Start Guide for installers

# PRODUCT ACCESSORY MODEL NUMBERS

# Keyboard Controller (Option)

* + - 1. UTC Fire & Security KTD-405
      2. UTC Fire & Security TVK-505

## SUPPORTED VIDEO SECURITY APPLICATION SOFTWARE

# UTC Fire & Security

* + - 1. GE Nav v3.1 or higher

## SUPPORTED IP VIDEO ACQUISITION DEVICES

# UTC Fire & Security

* + - 1. SD IP Cameras: TruVision H.264 Series
      2. CamPlus II IP Cameras: GEC-IPDRH Series
      3. MPX IP Cameras: TruVision H.264 Series
      4. UVE-10

# Panasonic

* + - 1. WV-NP244
      2. WV-NF284
      3. WV-NW484S

# EXECUTION

# INSTALLERS

# Contractor requirements:

* + - 1. Factory authorized representative for no less than two (2) years, recognized by the manufacturer of the specified system
      2. Local installation and service organization
      3. Provide three (3) references (minimum) whose systems are of similar complexity
         1. Installed by this contractor in the last five (5) years
         2. Presently maintained by the this contractor
      4. Provide satisfactory evidence of liability insurance and Workmen's Compensation coverage for employed personnel as required by law.

# Assure that all personnel working on the project are registered with the state or local jurisdiction licensing board as provided for by current state/municipal statutes.

* + - 1. At time of bid, the contractor shall be licensed by the state or local jurisdiction to perform security work within the state.
      2. Contractors who have security licenses or permits pending shall not be considered acceptable for bidding on this project.

# Installer and technician requirements:

* + - 1. Must be experienced and qualified to accomplish all work promptly and satisfactorily
      2. Provide proof that designated service and support personnel have successfully completed the appropriate manufacturer offered hardware and software training and certification for installation, service and maintenance of the specified system.
      3. Advise Owner in writing of all designated service and support personnel responsible for installation as well as pre and post warranty service.

# EXAMINATION

# Inspect the installation site prior to bidding the job.

# Report any discrepancies between the project specification and bid documents and the site examination prior to the bid opening date.

# PREPARATION

# Order all required parts and equipment upon notification of award.

# Bench test all equipment prior to delivery to the job site.

# Verify the availability of power where required. If a new source of power is required, a licensed electrician shall be used to install it.

# Verify the availability of communication infrastructure where required.

# Arrange for obtaining all programming information from the Owner’s Representative.

# INSTALLATION

# Requirements

* + - 1. Install all system components and appurtenances in accordance with the manufacturer’s specifications, referenced practices, guidelines, and applicable codes.
      2. Furnish all necessary interconnections, services, and adjustments required for a complete and operable system as specified.
      3. Install control signal, communication, and data transmission line grounding to preclude ground loops, noise, and surges from adversely affecting system operation.
      4. Carefully follow the instructions in the manufacturers’ installation manual to ensure all steps have been taken to provide a reliable, easy to operate system.
      5. Perform all work as indicated in the project specifications and bid documents.

# Installation Environment

* + - 1. Ventilation
         1. Do not block any ventilation openings.
         2. Ensure that the location planned for the installation of the unit is well ventilated
         3. Do not remove rubber feet from unit.
         4. Ensure sufficient fan ventilation for installations in closed racks.
      2. Temperature
         1. Install equipment in temperate environment, within unit’s operating temperature and humidity limits.
         2. Do not install the TVR 30 on top of other hot equipment.
         3. Leave 1.75 inches (44 mm) of space between rack mounted units.
      3. Install in a horizontal position only
      4. Support all cabling to unit to remove stress from connectors
      5. Protect unit from dust
      6. Do not store/place items on rack mounted units
      7. Do not install near water
      8. Do not install outdoors

# Systems Integration

* + - 1. Coordinate with the Owner’s IT Department prior to connecting to the Owner’s network.
      2. Work in harmony with all other trades.
      3. Integrate related systems, components, and sub-systems.

# QUALITY CONTROL

# Workmanship

* + - 1. Comply with highest industry standards, except when specified requirements indicate more rigid standards or more precise workmanship.
      2. Perform work with persons experienced and qualified to produce workmanship specified.
      3. Maintain quality control over suppliers and subcontractors.
      4. Quality of workmanship is considered important. Owner’s Representative will have the authority to reject work which does not conform to the project documents.

# Site Tests and Inspections

* + - 1. Execute adequate testing of the system to insure proper operation.
      2. Upon reaching Substantial Completion, perform a complete test and inspection of the system. If found to be installed and operating properly, notify Owner’s Representative of your readiness to perform the formal Test & Inspection of the complete system.
      3. Submit the Record Drawings (as-built) to Owner’s Representative for review prior to inspection.
      4. During the formal Test & Inspection (Commissioning) of the system, have personnel available with tools and equipment to remove devices from their mounts to inspect wiring connections. Provide wiring diagrams and labeling charts to properly identify all wiring.
      5. If corrections are needed, the contractor will be provided with a punch-list of all discrepancies. Perform the needed corrections in a timely fashion.
      6. Notify Owner when ready to perform a re-inspection of the installation.

# SYSTEM STARTUP

# Provide initial programming and configuration of the system.

# Programming shall include defining cameras, recording parameters, input points and output relays, user permissions, and the like. Input of all program data shall be by Contractor. Consult with Owner’s Representative to determine operating parameters.

# Maintain hard copy worksheets which fully document the system program and configuration

* + - 1. Worksheets shall be kept up to date on a daily basis until final acceptance by Owner.
      2. Worksheets shall be subject to inspection and approval by Owner.
      3. Provide final copies to Owner prior to project close-out.

# Provide follow-up assistance with system configuration sixty (60) days after start-up of system as requested by Owner. Include a labor allowance for follow-up assistance in base bid price.

# CLOSEOUT ACTIVITIES

# Commissioning

* + - 1. Place entire system into full and proper operation as designed and specified.
      2. Verify that all hardware components are properly installed, connected, communicating, and operating correctly.
      3. Verify that all system software is installed, configured, and complies with specified functional requirements.
      4. Perform final acceptance testing in the presence of Owner’s Representative, executing a point by point inspection against a documented test plan that demonstrates compliance with system requirements as designed and specified:
      5. Submit documented test plan to Owner at least (14) days in advance of acceptance test, inspection and check-off.
      6. Conduct final acceptance tests in presence of Owner’s Representative, verifying that each device point and sequence is operating correctly and properly reporting back to control panel and control center.
      7. Acceptance by Owner is contingent on successful completion of check-off; if check-off is not completed due to additional work required, re-schedule and perform complete check-off until complete in one pass, unless portions of system can be verified as not adversely affected by additional work.
      8. System shall not be considered accepted until all acceptance test items have been successfully checked-off. Beneficial use of part or all of the system shall not be considered as acceptance.

# Training

* + - 1. Provide system operations, administration, and maintenance training by factory trained personnel qualified to instruct.
         1. Training shall be oriented to the specific system being installed under this contract as designed and specified.
         2. Provide training sessions at Owner’s facility, and schedule at the Owner’s convenience.
         3. Provide written training outline and agenda for each training session prior to scheduling.
         4. Record and provide copies of training programs for Owner knowledgebase.
      2. Owner will designate personnel to be trained.
         1. Provide classroom instruction for people selected by Owner
         2. Provide two (2) hours of individual hands-on training for each person.
         3. Hands-on training shall include the opportunity for each person to operate the system
         4. Hands-on training shall include practice of each operation that an operator would be expected to perform.
         5. Provide printed training materials for each trainee including product manuals, course outline, workbook or student guides, and written examinations for certification.
         6. Cover all operating features of the system.

END OF SECTION