Phase 1: Automation Plan

Existing system operating procedures

- ☐ Highest potential automation areas
- ☐ Hardware/software block diagrams
- ☐ Field Hardware and sensor requirements
- ☐ Operational documents requirements
- ☐ System implementation plan and schedule
- ☐ System development, integration, assembly & testing requirements
- ☐ Phased pricing summary
- ☐ Return on investment analysis

Phase 2: Project Kick-Off Meeting

- ☐ Review scope of work and clarity integrator and client responsibilities
- ☐ Establish a mail and transmittal system
- ☐ Set up a drawing list
- ☐ Obtain a set of safety requirements
- ☐ Obtain reference drawings and data
- ☐ Establish project reporting methods
- ☐ Introduce key integrator and client personnel with overall project responsibilities
- ☐ Develop a preliminary outline for format of final report
- ☐ Establish deliverables

(Also, weekly project meetings attended by all system integrator personnel on project and monthly status review meetings.)

Phase 3: Field Survey

Integrator project team reviews current system, including:

- ☐ Physical layout
- ☐ Screen and report requirements
- ☐ Man machine interface
- ☐ Sequence of operation
- ☐ Current process overview

Phase 4: Functional Description

(States functional requirements for project.)

Reference request for proposal Involves customer input

Upon final client approval is basis for design document

I/O list

1. Machine identifier
2. Rack identifier
3. Input card identifier
4. Signal type
5. Terminal numbers
6. Signal identifier

Phase 5: Detailed Description

(Provides implementation method for each requirement in the functional description.)

- ☐ Controls, regulates and directs progress of system development
- ☐ Measures technical conformance
- ☐ Maintains project schedule
- ☐ Delineates internal structure of system (i.e., data dictionaries, flow charts, logic pseudo code)
- ☐ Client reviews design progress on regular basis and must approve final document before project can proceed

Phase 6: Acceptance Test Plan & Procedure

(Developed after approval of Phase 4, Functional Description. This document explains how to test hardware and software to demonstrate conformance to system specifications. A detailed list of actions and expected results that satisfy all requirements.)

- ☐ Test No. 1: Factory Acceptance Test (at S.I... facility)
  - ☐ Complete system staging
  - ☐ Comprehensive test to demonstrate all hardware and software for the project
- ☐ Test No. 2: Field Acceptance Test (after system installation)

Phase 7: System Development

Software Design

- ☐ Write software specifications per the Functional Description. Specifications will consist of data flow diagrams, block schematics (for PLC programming), data dictionary and mini-space (an English language description of the software functions). The specifications will provide enough information for a software engineer to write programming specifications.

Phase 7: System Development (cont)

☐ Software specifications must be reviewed and approved by client before coding is started. Any changes after client review will be regarded as major additions to the contract.

☐ Programming specifications will be pseudo code version of the final program, specific to operating system, language and hardware. Review of programming specifications will be made prior to final code and implementation.

☐ Graphics configuration: Application of control and feedback features to the screens as defined in the Functional Description.

☐ **Coding of controls** according to the software and program specifications

Hardware Design

☐ Verification of existing customer drawings against actual field conditions. Develop demolition drawings to show sequence and conditions applicable to the removal of existing equipment.

☐ Develop system schematics showing terminal numbering, equipment type, etc.

☐ Develop diagrams to show wiring installation, terminal connections, conduit routing and cable type, etc. These will normally be done according to customer's standard cable schedule format.

☐ Develop diagrams for the necessary enclosures and panels for equipment mounting. Drawings will be suitable for bidding and construction by a third party supplier.

☐ **Specifications to inform the vendor of the requirements** necessary in the manufacture of the panels, i.e. type of enclosure (NEMA 4, etc.), weld instructions, finish, materials, etc.

☐ Release panel drawings for bid, or according to the procedure for the project (preferred vendor, etc.), and manufacture.

☐ Designate delivery time of panels and enclosures

Phase 8: System Integration Task

☐ After completion of software development and hardware/software interfaces, system hardware and software are integrated.

☐ During integration, power is applied to all hardware and burn-in program operates for 100 hours. ☐ Purchased hardware and all system peripherals are inspected and tested to verify that all software and hardware function according to manufacturers' specifications.

☐ Hardware and software are functionally tested and software is modified, as necessary, to assure software modules and hardware elements function as one system

Phase 9: Factory Acceptance Test

☐ Performed at system integrator test facility.

☐ Complete system staged and comprehensive mock-up test performed to demonstrate all hardware and software.

☐ Daily review of scheduled tests and test results. If necessary, integrator engineers correct any errors discovered and perform regression tests to show correct system performance.

☐ Client and integrator jointly develop a "punch" list of items, if any, which require further action and/or correction before shipment.

Phase 10: Support Services

Shipment

Client must approve Factory Acceptance

☐ Test before shipment

☐ All equipment packed in manufacturers' packing boxes

☐ All items in shipment marked separately with shipping labels and clearly marked with special handling instructions Industry standard shipping materials and methods utilized to avoid damage to fragile items

☐ Proper shipping papers and packing slips prepared

☐ Physical audit and inventory of all deliverables performed and data given to client before delivery

☐ Physical audit and inventory data repeated by integrator after shipment Shipment sent using commercial carriers approved in advance

☐ Close contact maintained with carrier to verify that shipment is received promptly and in good condition

Installation Supervision

Integrator's field installation engineer(s) will supervise all installation by others and will have the following responsibilities:

☐ Documentation package interpretation, distribution and maintenance

☐ Liaison

☐ System testing prior to commissioning

☐ Assist in system training sessions

☐ Inspection

☐ Work closely with client to respect the schedules and other demands on client personnel during installation

Start-Up

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Phase 10: Support Services (cont)

One integrator engineer will be designated to schedule and coordinate all start-up activities with client

☐ Engineer will work closely with client to respect schedules and other demands on client personnel during start-up

☐ Same engineers who were responsible for designing the system will be responsible for the system start-up

Field Acceptance Test

Training - Management Training Program

☐ Lecture seminar for executives and managers

☐ Present general features and functions** of the system

☐ Techniques for effective management monitoring and control of the system

☐ Discuss possible future development of the system

☐ Answer participant questions**

Computer Training Program

For system managers & engineers

☐ Theory of system operation

☐ Hardware configuration/system components

☐ Software concepts and structure

☐ System interface and data communications

☐ System preventative maintenance

Operator Training Program

☐ Combination lecture/seminars and hands-on training for dispatchers and supervisors

☐ Focused on individual job assignments

Maintenance Training Program

☐ Combination lecture/seminars and hands-on training for supervisory and maintenance personnel

☐ Instructions on how to maintain, trouble-shoot and adjust system equipment

☐

Phase 11: Documentation

☐ **Complete set of manuals** of all hardware and standard software products incorporated in the system.

☐ **Operational documentation for normal use** of the system.

☐ **Start-up and maintenance documentation** for recovery operations.

☐ **Design documentation** specifying overall system structure.

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