SWIFT FUTURA®

MODULAR GROUP OVERLAY

Installation, Operation and Adjustment Instructions

SWIFT®

SHORTER WAITING INTERVALS FASTER TRIPS

COMPUTERIZED ELEVATOR CONTROL, CORP.

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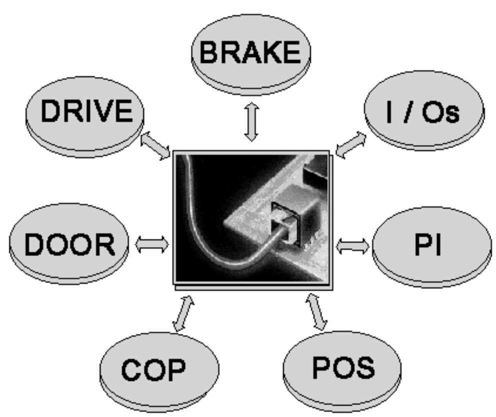
PREFACE

SWIFT® *FUTURA*™ Modular Group Overlay is a smart micro-processor-based, *REAL TIME* oriented elevator dispatch management system. It is programmed to always send the most appropriate car to every hall call based on which car has the best potential arrival time, thereby providing the best overall response for the predicted traffic demand. To achieve this order of precise response, a network of computers manages the elevator system. *FUTURA* uses multiple microprocessors to control and monitor cab-related functions to manage the dispatching of the elevators.

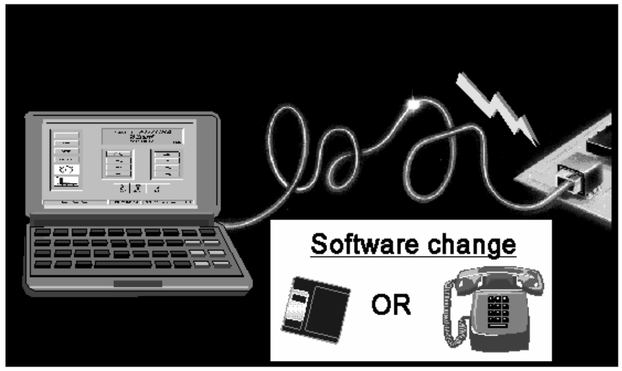
The *FUTURA Overlay's modular design provides a seamless transition, from the old to the new control equipment during an extensive modernization. As the individual car controllers are modernized the new controllers are returned to group operation by a simple SWIFTLINK serial communication connection.*

The *FUTURA*™ was designed to function well into the 21st century. It is fully Year 2000 Compliant.

The *FUTURA* controller is based on distributed processing technology. The main system processor (SPU) communicates with "smart" micro-controllers over a high speed communication network (SWIFT LINK) providing an all digital, extremely powerful, multiprocessor system. Most of these "smart" controllers connect as easily as a telephone extension providing quick servicing.

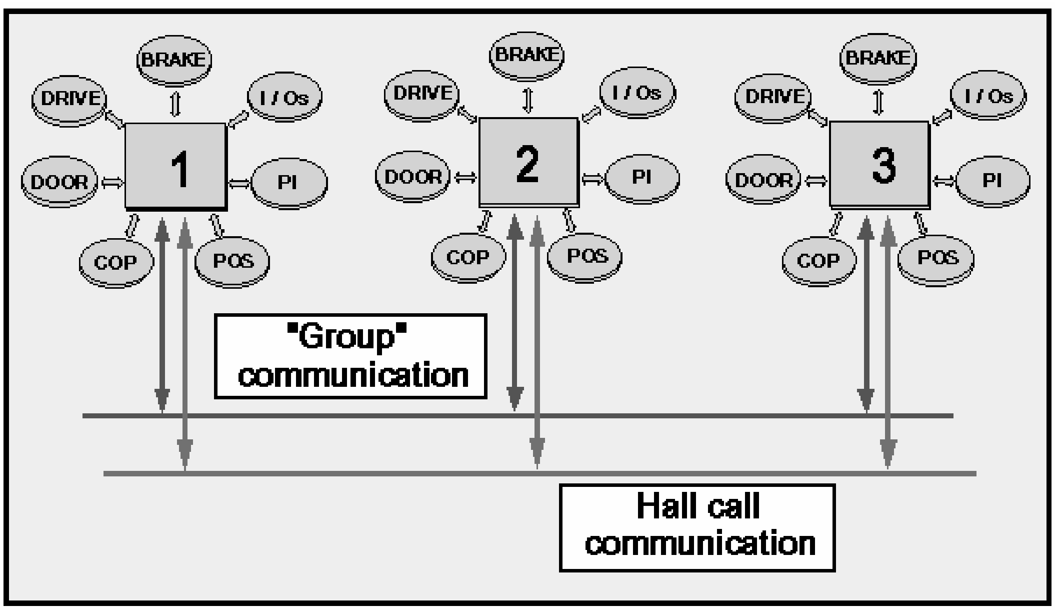


The *FUTURA Program* and *Parameter* memory is based on *FLASH* memory technology. This technology permits the downloading of software via a high speed serial communication interface. This process is controlled by *Wizard* software technology, which provides electronic assistance during the download operation. There is no need to shut down the power, remove the printed circuit cards, or remove the "chips", in order to upgrade the software. This is an all digital process.



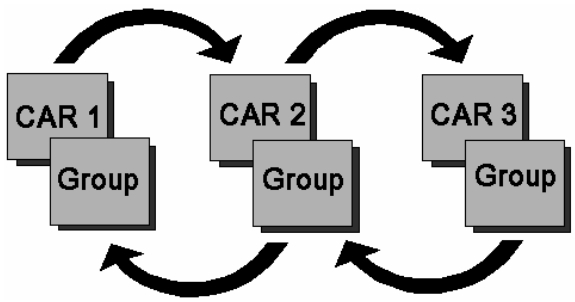
The *FUTURA* service tool is based on a PC notebook. The ***NON-PROPRIETARY*** *FUTURA WIZARD* software operates under the Microsoft Windows operating system. All monitoring, diagnostics and servicing are accomplished with an easy-to-use graphics screen. Using the built-in mouse and clicking the mouse buttons can set most adjusting and servicing parameters.

The group functions and the hall call interface are integral to each car controller. This provides a fully redundant system in which a single failure does not discontinue normal elevator service.



Each *FUTURA* controller has nonvolatile CMOS data memory and a battery backed real-time-clock controller. The real-time clock is fully Year 2000 Compliant.

FUTURA has the group functions integral to each individual car controller. In the event that the car managing the dispatching functions goes out of service, the next car in the group automatically continues the dispatching functions without interruption.



This Installation manual is divided into four sections:

Section 1, "Site Planning and Installation" describes how *FUTURA* analyzes developing traffic situations based on real-world traffic demands. *FUTURA EXPERT* dispatching technology, based on fuzzy logic algorithms, is used to predict future traffic to better manage the dispatching of the elevators.

Section 2, "Receiving and Storage" describes the distributed processing techniques used to control the operation of the drive system, the cab and hall related functions.

Section 3, "General Hardware Technical Information," describes the equipment, the hardware and the design specifications.

Section 4, "SMI Input/Output Definition" describes the I/O's associated with an overlay system and the automatic sequence of operation.

1.1. INSTALLATION

This chapter explains how to prepare a site for the installation of a SWIFT-FUTURA overlay system. The site planning presented herein will be relatively brief; consisting of sections on preparation, safety, ventilation and wiring. Each is detailed on the following sections.

1.2. PREPARING FOR INSTALLATION

In preparation for installing your system, you should familiarize yourself with all the information provided in this manual. It will aid in identifying and planning the important consideration associated with a system installation including:

- Selecting a site for the system.
- Planning the location of the cabinet(s).
- Planning safety precautions for the equipment and personnel.
- Planning the wiring requirements.
- Planning adequate ventilation facilities.

1.3. SELECTING A SITE

- Proper routing of electrical power and control cables.
- A planned working location for comfort and efficiency.
- Space for portable support and test equipment that may be used.
- Reduction of electromagnetic interference from outside sources both conducted and radiated (away from hoist motor, MG set, large transformers or chokes.
- Vibration considerations.
- Space for future equipment needs.

1.4. PLANNING THE LOCATION

Select a location in which there is proper walking clearance around the equipment. Clearances should be planned in accordance with Article 110 of the National Electrical Code or the equivalent local or regional codes.

1.5. PLANNING SAFETY PRECAUTIONS

Some of the safety precautions that you should consider are:

- Keep the work area and system equipment as clean as possible.
- Clearly label the circuit breakers supplying power to the equipment.
- Do not install the equipment in an area that is carpeted. Static discharges associated with carpets can cause system failures.

Install the equipment according to local and regional ordinances.

1.6. PLANNING VENTILATION

The SWIFT system is designed for use in an industrial environment. Therefore, dedicated air conditioning is not required for the system. The controllers should be installed in a well-ventilated area with ambient temperature ranging from 0F to 105F (40C) and relative humidities up to 90 percent non-condensing. The controllers must not be installed in a hazardous location. Environments that include excessive amounts of one or more of the following characteristics should be considered hostile:

- Excessive dust, dirt and foreign matter.
- Vibration and shocks.
- Moisture and vapors.
- Electromagnetic interference from radio frequency signals.
- Power line fluctuations greater than +/- 12%.

Each controller is equipped with a blower and a fan for the system processor. Exercise care during installation to prevent obstruction of the chassis airflow openings.

1.7. PLANNING WIRING FACILITIES

The National Electrical Code and local codes and regulations may cover the installation of power, ground and field wiring. You are responsible for ensuring that your site complies with these codes.

1.8. GROUND FACILITIES

Grounding is one of the primary ways to minimize unwanted noise and pickup. Proper use of grounding and shielding in combination can solve a large part of all noise problems. A good grounding system must be designed just like the rest of the circuit.

Proper system grounding is vitally important to the safe and successful operation of the system. Install a grounding wire from the ground terminal provided to the building structure or some equivalent. A water pipe or the building structure may be used if the resistance to ground is less than one (1) ohms.

The grounding wire should be as short as possible and of the same or larger gauge that the phase conducting wires for the entire system.

1.9. FIELD WIRING

Field wiring consists of data lines installed for the express purpose of carrying elevator signals to and from the SWIFT system. The requirements of the field wiring vary according to the characterisics of the data signals and the environment. Ensure that field wiring, whether installed in an ordinary or hazardous location, conforms to the requirements of the National Electrical Code.

Low voltage analog signal applications (less than 10V) are generally more susceptible to noise. A 20 or 22 gauge shielding type of cable is recommended for use in this type of application. If a shielded cable is used, ensure that only one end of the shielding is grounded. Grounding both ends will cause a loop, which may adversely affect system operation.

When installing low voltage field wiring, ensure that it is not in close proximity or parallel to any high voltage power lines. Magnetic fields resulting from the high voltage power lines will induce signals onto the field wiring and may cause the data to be unusable. Low level field wiring should not run farther that 1000 feet, the excessive resistance and capacitance of the field wiring may distort and attenuate the data signals.

High voltages and AC signal application are less susceptible to noise and therefore less restrictive. The length of the high level and AC field wiring is limited by cable resistance and the wiring is not affected as greatly by magnetic fields.

<u>**SECTION 2**</u>

2. RECEIVING AND STORAGE

2.1. RECEIVING

The controller should be placed under adequate cover immediately upon receipt as packing cases are not suitable for out-doors. Packages should be examined upon arrival. Any shortage or damage should be reported promptly to carrier.

2.2. STORAGE

If the equipment is not to be installed immediately, it should be stored in a clean, dry location at ambient temperatures from –20C (40F) to 55C (131F). The surrounding air must be free from corrosive contaminants.

SECTION 3

3. GENERAL HARDWARE TECHNICAL INFORMATION

3.1. HARDWARE

3.1.1. General Purpose I/O's (SMI)

The Serial Module Interface (SMI) controller is a "smart" micro-controller which, operates on the *FUTURA* LINK. All input and output signals are isolated and have LED indicators. All outputs are fused and are latched via a fail-safe design (watchdog timer) which turns the outputs off in the event of a malfunction of the micro-controller or the communication link.

3.1.2. Specific Purpose I/O's

FUTURA is designed around multiple micro-controller based "smart" controllers. Each has a fail-safe output circuitry and "watchdog" circuitry to monitor the micro-controller and communication operation.

3.1.3. Power Supplies

All power supplies utilized are both UL and CSA recognized. They all have short-circuit protection with fold back current limit. For high efficiency and brownout protection, a switching type power supply powers the computer.

3.1.4. Frame

All assemblies, power supplies, chassis, switches, relays, and other items are securely mounted on a substantial, self-supporting steel frame (RETMA). Controller doors and side panels can be easily removed. The equipment is completely enclosed with covers. No equipment is mounted on the covers. Optionally, the controller can be assembled in a wall mount NEMA enclosure.

3.1.5. Wiring

All factory wiring utilizes UL & CSA approved copper wires. All wiring interconnections are neatly routed.

3.1.6. Marking

All components are clearly and permanently identified adjacent to each device and are identical to the wiring schematic.

3.2. DISPATCH CONTROLLER

The microprocessor based dispatch controller is designed and constructed with the following requirements:

3.2.1. Main System Processor

The car controller is based on a highly integrated Intel 20 MHz 16-bit embedded micro-controller using 256K bytes of nonvolatile CMOS memory, 512K bytes of *FLASH* memory for the program, and 128K bytes of EEPROM memory for the SWIFT Basic Operating System. Six (6) high-speed communication channels are provided to communicate with the other cars and the "smart" controllers. An expansion bus is provided permitting the addition of 768K bytes of memory or another high performance CPU with high memory capacity.

3.2.2. Switch and Relay Designs

All switches and relays have contacts designed for maximum conductivity and wiping action. All switches carrying highly inductive currents are provided with suppressers.

3.3. COMPUTING ENVIRONMENT

3.3.1. Design Specifications

Where computing devices are used, such as the microprocessors along with associated devices, the following design specifications are provided:

- All controller *inputs* and *outputs* are isolated with *opto-isolation* modules.
- All controller *output* modules are fused.
- All controller *opto-isolation* modules and associated fuses are plug-ins.
- Crystal frequency regulation is used for the main processor clock.
- A separate regulated power supply is used for each computer chassis.

3.3.2. Printed Circuits and Solid State Hardware

- All printed circuit boards are fabricated with G10 glass epoxy material with a minimum equivalent two-ounce copper.
- All printed circuitry is coated with tin-lead.
- A solder mask screen is provided.
- All multi-layer boards have plated through holes.

- A silk screen with outline and component identification is used on all printed circuit boards.
- All printed circuit board edge connections are plated.
- All solid state hardware has built in noise suppression devices, which provide high-level noise immunity.

3.3.3. Electromagnetic Compatibility

- All controllers will meet the electromagnetic compatibility requirements required to bear the FCC Part 15 label and the European CE mark.

3.4. ENVIRONMENTAL

- Ambient service temperature: 0C to 50C (32F to 122F)
- Humidity: non-condensing to 95%
- Altitude: to 3,000 feet. Higher with de-rating of the controller

3.5. REQUIREMENTS BY OTHERS

3.5.1. Power

- Group operation: 120-1-60 VAC having a 20-amp capacity is required in the machine room for the group operation, the monitoring CRT's/PC's and the PC based tool.
- Lobby (optional): 120-1-60 VAC having a 10-amp capacity is required for the lobby CRT or PC based monitoring equipment. If the lobby CRT is not adjacent to or near the elevator shaft, a conduit must be provided from the fixture to the hoistway.

SECTION 4

4. SMI INPUT/OUTPUT DEFINITION

4.1. GENERAL

GL The GL input module monitors the status of the gate and locks.

HLU Up Lantern.

HLD Down Lantern.

HL Both up and down hall lantern.

ASM Auto Start Master. ASM turns ON to start the car motion for a new "Run". ASM will remain on for one second after the car has started.

SU Up Pilot. SU has the direction pilot from both car and hall calls.

SD Down Pilot. SD has the direction pilot from both car and hall calls.

DM Door Master. DM controls the door pilot. DM will turn ON to open the door and will remain ON until the door timing has expired. At this point the doors should close.

ST Slowdown Initialization. ST will turn ON to initiate a slowdown. It will remain ON until the car stops.

NR Nudging Relay output module controls the operation of the nudging relay (as required).

NCU Next Up Light.

CCR Car Call Reset. CCR is used to mass cancel all the car calls. CCR will pulse OFF for one (1) second when car cancellation is desired. It will remain OFF on Inspection and fire recall.

BZ Buzzer.

NSL Out of Service Light.

AU For the car to be in Automatic operation, the top of car inspection switch, the in car access switch must be closed and the machine room inspection switch must be in the Auto position.

DC The Door Close output module (DC) controls the operation of the "C" contactor.

DO The Door Open output module (DO) controls the operation of the "O" contactor.

DOL The Door Open Limit input module (DOL) monitors the status of the door via the associated limit switch. When DOL is OFF the processor opens the door open output module (DO) which opens the "O" contactor indicating that the doors are fully open.

DCL The Door Close Limit input module (DCL) monitors the status of the door via the associated limit switch. When DCL is OFF the processor opens the door close output module (DC) which opens the "C" contactor indicating that the doors are fully closed.

DCL6 The six (6) inch door close limit (DCL6) monitors the status of the door via the associated limit switch. The processor uses this door limit to allow of a reversal of direction if no on ward calls are placed. This input turns OFF when the doors are six (6) inches from fully closed.

GV The GV input module monitors the status of the motor room and controller safeties.

HS The HS input module monitors the status of the hoistway safeties.

CS The CS input module monitors the status of the car safeties.

Note: GV, HS and CS must be energized in order for the processor to energize the output direction and start circuitry which control the operation of the car.

GEN The Generator output module (GEN) controls the Start/Stop of the MG set. When GEN closes, power is applied to the Start-Run sequence. If Delta (DE input) fails to turn on, GEN will turn OFF and ON, attempting to restart the MG set.

FSB In case of fire emergency, the fire bypass (FSB) output module closes (as required) and when the doors are closed the in car stop switch is bypassed.

ICS The ICS module monitors the status of the In car stop switch.

DE When the Delta contactor picks up, the motion power relay control circuit can be operational. DE is the last element of the safety "string". DE input module indicates this status.

Note: If a signal is given to start the MG (GEN) and DE is not energized after a time, the operation sequence recycles. The MG On/Off switch (MGS & MGL) is connected directly to the SMI input circuitry.

UR Up Direction from relay logic on controller indicating car is running in the up direction.

DR Same as UR, only in the down direction.

LVE Indication from the relay logic that car is in leveling mode.

DZ indication from the relay logic that car is in door opening zone.

4.2.2 AUTOMACTIC OPERATION SEQUENCE

SWIFT-FUTURA OVERLAY is a dispatching overlay designed to control only the essential relays needed to run the elevator. Normally 75 percent of the existing relays are removed from the relay logic. Inputs to the processor are taken from safety circuits, door operator limits, door opening devices and relays on the controller. A brief description of the SMI inputs and outputs are given on the SMI sheets.

- Turn on the processor, if a terminal is connected to the processor serial port, the system confidence test message will be displayed. Refer to the Human Interface section.
- The door disconnect button prevents doors from opening and removes car from group operation.
- Register a car call above the car.
- GEN output will turn on. If GEN fails to turn on, check if the following inputs are on: HS, CS, ICS, MGS and MGS.
- DE input turns on when the MG is running (Delta).
- With the doors closed, the following inputs should be ON: GL, AU, DZ, DE, DOL and PI (position).
- With a car call above the car, UDL output turns on along with SU and ASM to start the car moving.
- SU and ASM will energize the related relay logic and UR input turns ON indicating the car is running up.
- The advanced position inputs will change as the selector advances toward the assigned car call. A stop output (ST) turns on to initiate the controller slow down sequence.
- When the car reaches the leveling (LVE) and door zone (DZ), LVE and DZ inputs turn ON and the door open output (DO or DM) turns ON to energize the door open relay.
- With the doors fully open, inputs GL and DOL are OFF, inputs DCL and DCL6 are ON.
- Parameters LDT (Long Door Time), CDT (Car Door Time) and SDT (Short Door Time) control the door timing. Refer to the Human Interface section for more details on these parameters.

- When door timing elapses, door close output (DC) turns on to initiate the door close relay logic. On some overlays (DM) Door Master output turns ON to open the doors and OFF to close the doors.

4.2. PARAMETERS AND BIT SETTINGS

The following parameters and bit settings listed below are soly used on the overlay system only. The parameters and bit settings in the Human Interface section of the manual are applicable for both SWIFT-FUTURA and for the SWIFT-FUTURA OVERLAY except for the ones that pertain to motion.

OFC This parameter determines which car is an overlay and which car is a SWIFT-FUTURA car.

OST Overlay slowdown timer. Used to control the NS output.

ATS Controls the length of time to remove the ASM after the start of slowdown. (After loss of start sequence. Used for KM White overlay controller.

STR Length of time for removal of slowdown signal after stopping. Used for KM White overlay controller.

CSW 10 Bit 0 If set then release SU or SD pilot at leveling.

CSW 10 Bit 1 If set then release SU or SD pilot at reversal.

CSW 10 Bit 2 If set then initiate start sequence at the DCL point.

CSW 10 Bit 3 If set then initiate start sequence at the DCL6 point.

CSW 10 Bit 4 If set then do not latch car call outputs.

CSW 10 Bit 5 If set then enable one floor run sequence.

CSW 10 Bit 6 If set initiate start master (ASM) at door close.

CSW 10 Bit 7 If set then do not set pilot status on reversal car call.

CSW 10 Bit 8 If set then activate pawl to ring lantern when car parked.

CSW 10 Bit 9 If set then hold EBR until fully stopped.