Controller Front Panel

Controller Front Panel Device Identification

The front of the controller houses, from top to bottom, the following components:

FRONT PANEL: The front panel is located on top of the controller front. It contains the SPU control panel on the left, the circuit breakers (or fuses) in the center, and the Inspection control switches on the right (Note: With fuses, the SPU and I/O switches are located adjacent to the Inspection switches).

SPU CHASSIS: The SPU chassis contains the SPU (**S**ystem **P**rocessing **U**nit), the 5VDC SPU power supply, the 24VDC I/O power supply, two fans, and optionally a PC compatible VGA controller. The SPU-LINK board mounts on the front of the chassis and plugs into the SPU P1 connector.

RELAY/CONTACTOR SECTION: This section contains all the safety contactors (DZ, DZ1, MC, BK, SM & CEN) and other optional job related contactors or relays. If additional relays/contactors are required, they are mounted on the rear sup-panel.

SMI: This section contains the VFC (**V**elocity **F**ault **C**ontroller) and the MRC (**M**otor **R**oom **C**ontroller) SMIs in addition to the BKC (**Br**ake **C**ontroller). Mounted above the BKC, are the rectifiers and RC networks for the BK, SM and MC dc-operated contactors. Space is available to mount an additional three (3) SMIs. As with the relay section, additional SMIs can be located on the rear.

TERMINAL BLOCKS: This section has room for four (4) columns of TBs. The TBs are arranged from left to right as follows: Car Traveling Cable, Hoistway and Motor Room.

TRANSFORMERS: The transformers are located on the bottom of the cabinet and are accessible from the front.

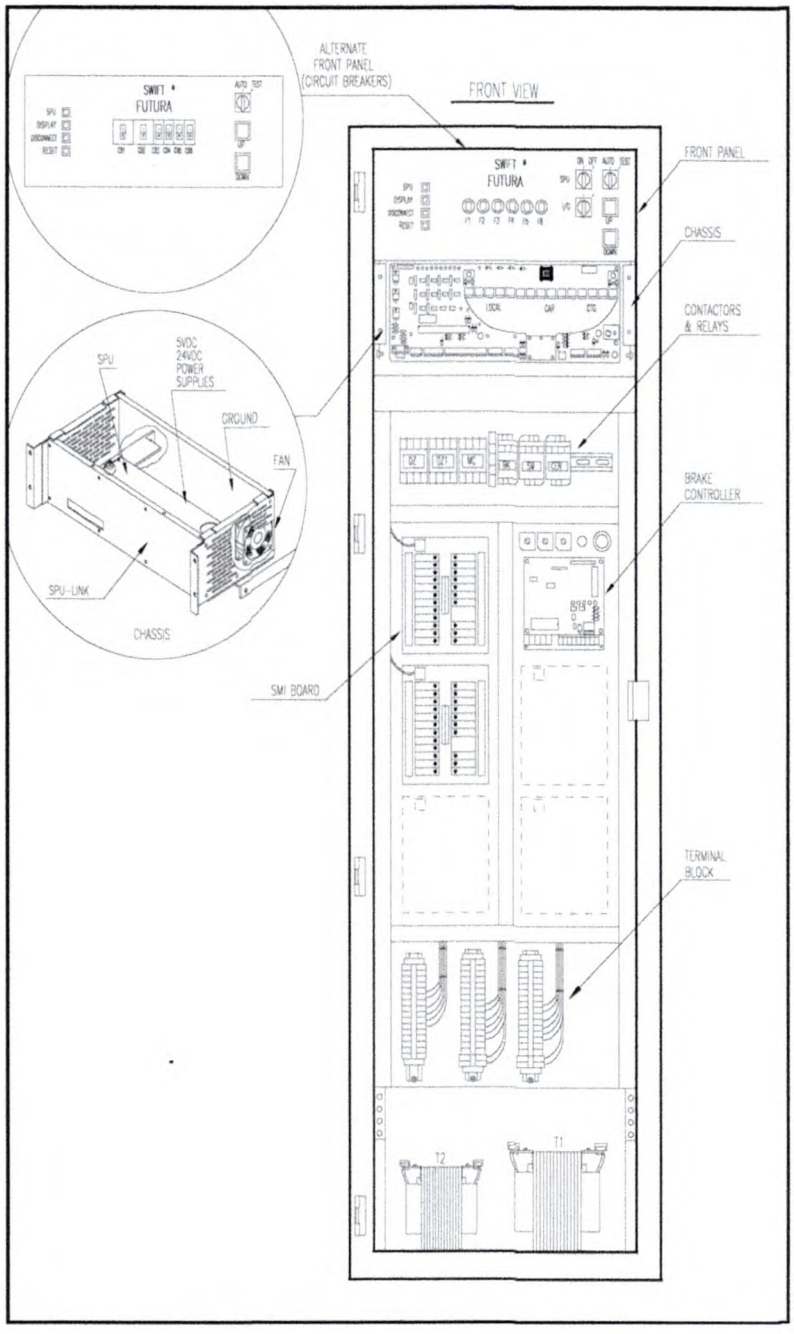

Figure 19-2

The following chart illustrates the *FUTURA* functional block diagram for an installation utilizing all the car and hall "smart" micro-controllers.

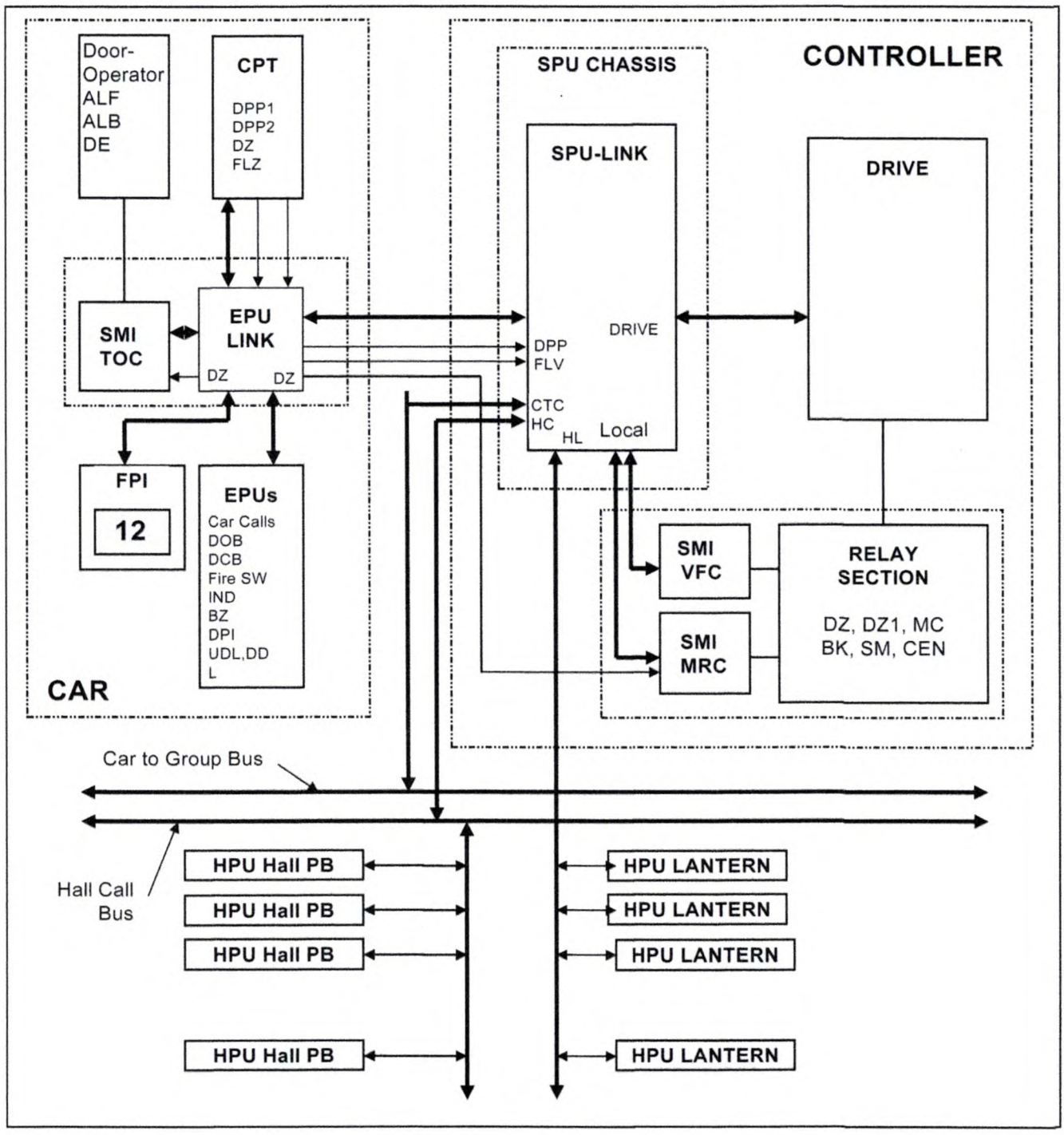

Figure 19-6

System Processing Unit (SPU)

Introduction

The system processor 'U1' is based on a highly integrated Intel 20MHZ 16-bit embedded micro-controller using 256K bytes of CMOS nonvolatile memory, 512K bytes of FLASH memory for the program and 128K bytes of EEPROM memory for the SWIFT BIOS. The CMOS memory and a Real Time Clock controller chip is powered by two batteries during power loss. The Lithium batteries have a shelf life of 10 years. Note that the program memory and the system parameters are located in the Flash memory and are not affected by loss of battery power. An SBX expansion port is provided and used for an MG drive system. An optional VGA interface (J3A and J3B) is also provided.

The SPU has a temperature control chip, which will trigger at 140°F (60C). This will cause the cars to stop normally at the nearest floor and open their doors. The service type will be displayed as Overload (Thermal Overload).

The SPU requires only 5VDC to operate (adjust to 5.1VDC on SPU-LINK test points). For MG jobs, an additional +/- 15VDC supply is located in the chassis and provides power for the SBX interface.

SPU

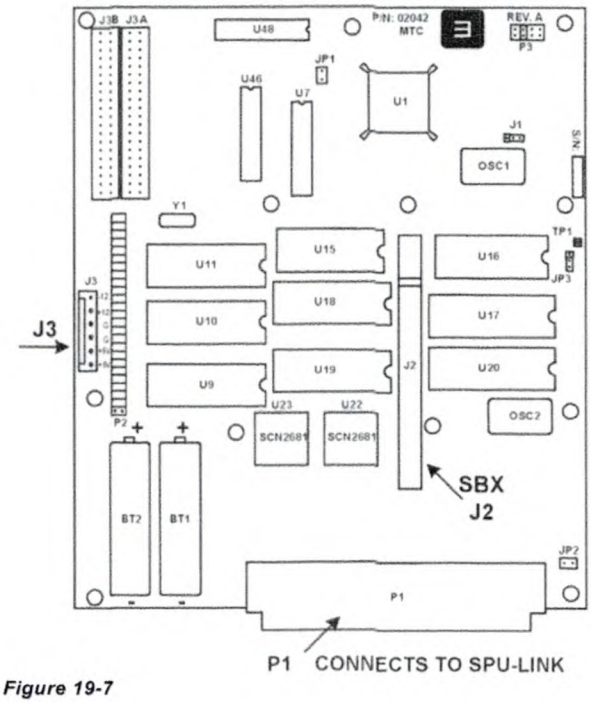

Figure 19-7

Jumper Configuration

J#	PIN	REQ	FUNCTION
JP1	1-2	OUT	186 Watchdog to the SPU watchdog timer
JP2	1 2	OUT OUT	SBX option 1 SBX OPTION 2
JP3	1-2 2-3	OUT IN	+12VDC power for Flash memory. **DO NOT CONNECT** Enables Flash memory paging.
J1 J1	1-2 2-3	IN OUT	Software operation strobe to the SPU watchdog timer Diagnostic strobe to the SPU watchdog timer. **Note:** *If this jumper is inserted, the SPU will not reboot under certain conditions.*
P2	1-2 * thru 47-48	 IN	SPU interrupt control matrix. **Note:** ** (15-16, 29-30) are OUT (see below)*
P2	15-30	IN	Wire-wrap: One second clock update
P2	16-29	IN	Wire-wrap: Real Time Clock
P2	49-50	OUT	SPU interrupt control matrix
P3	5-6	IN	Bus Clock. All other jumper on P3 must be removed

Table-1

Component Identification Table

FUNCTION	LOCATION	DEFINITION
CMOS RAM	U18, U17	Battery-backed CMOS Non Volatile Static Memory
FLASH	U19, U20	Non Volatile FLASH program and parameter memory
EEPROM	U15, U16	Non Volatile Read Only Memory (System BIOS)
PALS	U7, U46, U48	Programmable Array Logic
Power Connector	J3	Power connector: -12V, +12V, COM, COM, +5V, +5V **Note:** *+/- 15VDC for MG SBX-414*
VGA Conn.	J3A, J3B	VGA interface board connector

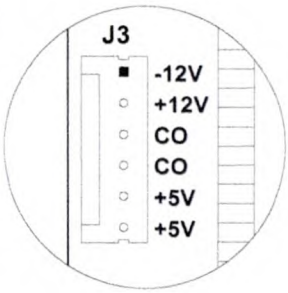

Table 2

The SPU-LINK is mounted on the front of the SPU chassis and provides the communication interface to the "Smart" peripherals. The primary function of the SPU-LINK is to protect and provide the drivers for the communication lines, the DPP interface, and three input and output control ports. It has an RS-232 (P11, DB-9 connector) port to permit communication with a terminal or a PC. Note that the Radio Shack, or other similar terminal PC's used with the SWIFT-5000, can also operate with the ***FUTURA*** controller (Port Setting: 19,200 Baud, 8-bits and no parity).

System Processing Unit Link Board (SPU-LINK)

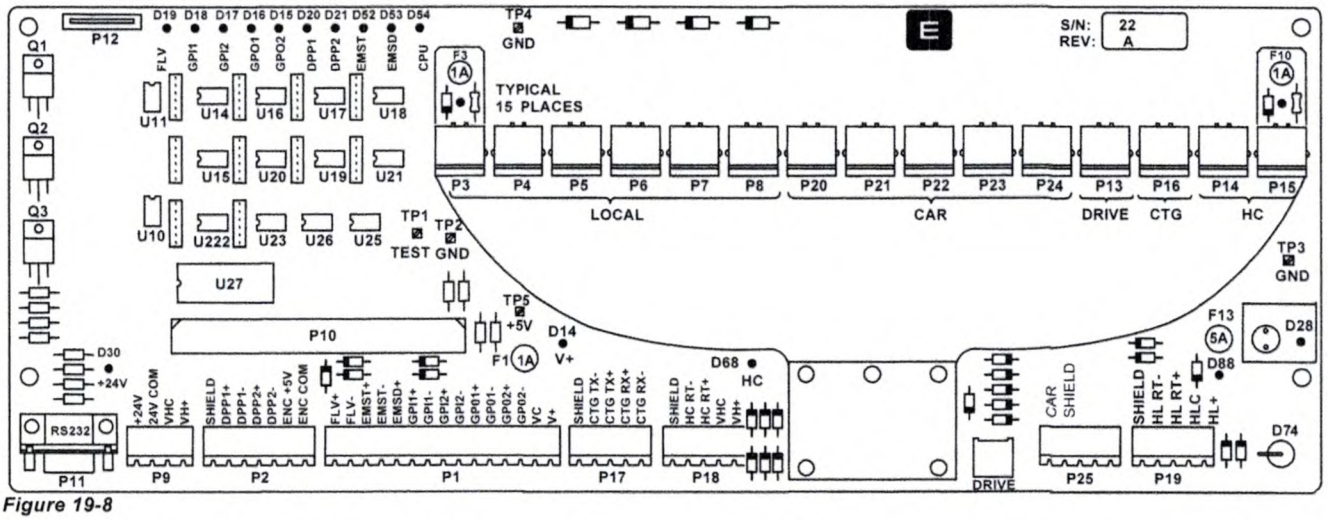

Figure 19-8

+5VDC SPU supply (+5V TP5 should read between +5 to +5.1 VDC), and a special "TEST" (TP1) used in conjunction with some Human Interface commands to monitor SPU operation.

Control Panel

The Control Panel interface port (P12) interconnects to the push-button/LED PC board via a flat cable type connector. To insert the cable, the top portion of the connector must be pulled to permit the ribbon cable (with the blue plastic facing down) to be inserted. The top portion is then pushed-back to squeeze the ribbon cable and provide the connection. The following table describes the control panel operation:

Control Panel Operation			
PB NAME	**PB FUNCTION**	**LED**	**LED FUNCTION**
SPU	STM: Setup Mode commands on Inspection. Press SPU until the Display LED turns Green (3 sec), then release and press the Display button momentarily. The Display button will alternately flash Red/Green.	OFF RED GREEN	Invalid condition Power Up or Reset (SPU not running) Normal
DISPLAY	Rotate the motor room diagnostic screen from car to car (x) to group.	OFF RED GREEN	 Flashing Red/Green: Special operation during inspection. See SPU PB function
DISCONNECT	Changes the car service from Normal to Door Disconnect to Group Disconnect back to Normal	OFF RED RED	In service One flash: Door Disconnect Two rapid flashes: Group disconnect
RESET	Reset the CounterWeight or Earthquake latch (LED RED)	OFF RED RED	Normal One flash: Counterweight derailment Two flash: Earthquake

Table 3

LED Indicators on SPU Link

Numerous indicators are provided for quick diagnostics. The following table describes the LED status:

LED STATUS	
NAME	**DESCRIPTION**
FLV	at Floor Level
GPI1	General Purpose Input # 1
GPI2	Group Comm. handshake
GPO1	General Purpose Output # 1
GPO2	Group Comm. handshake. If ON, then this car is in the Group
+24VPWR	+24V Input (P9 +24V, 24VCOM)
HC PWR	+24Volt Hall Call interface power (connector P9 VHC , VH+)

LED STATUS	
NAME	**DESCRIPTION**
DPP1	Digital Position Pulse #1 (Input)
DPP2	Digital Position Pulse #2 (Input)
EMST	Emergency Stop Output (controls CEN)
EMSD	Emergency Stop Input (CEN feedback)
CPU	FLASHING indicates if that the SPU is running.
V+ PWR	+24V Output (Check F1 if LED is Off)
HL PWR	+24V for Hall Lanterns (Check F13 if LED is Off)
TELCO JACK	All LEDs associated with the 8-pin jacks (except HC ports). Check fuses if LED is Off. The input power is from +24VPWR (D30).
TELCO HC ports	D71 and D72 HC power. Hall Call SMI power. NOTE: Diode D74 prevents reverse voltage to be applied to the HC ports.

Table 4

Communication Ports

The SPU LINK has six discrete communication channels routed to twenty physical ports. These ports are available from an 8-pin TELCO connector or from a removable screw type terminal block to be used with twisted pair communication cables. The following table describes the communication channels and their associated ports:

COMM NAME	COM	PORT	DEVICES	TERMINATION	PROTECTION	CONTROLLER FUNCTION
RS 232	1	P11	U27 (235CPG)	none	D44-D51	Human Interface
CTG	2	P17	Rx: U22 (75176) Tx: U21 (75176)	J14 (+) J15 (T) J13 (-)	D59+, D60 D58+, D57	Car To Group Communication. Links all the cars for dispatching functions. **Note:** *P16 (TELCO) port is used for diagnostic purpose.*
LOCAL	5	P3, P4, P5, P6, P7, P8	Rx: U18 (75176) Tx: U17 (75176)	J5 (+) J6 (T) J4 (-)	D26+, D27 D25+, D24	VFC, MRC, BRAKE, MF(mg)
DRIVE	3	P13	Rx: U26 (7601) Tx: U16 (75176)	J17 (+) J16 (T) J18 (-)	D65+,D66 D64+,D63	Isolated Digital Drive Comm. DSD 412, GPD 503, GPD-575, VCD 703
CAR LOCAL	6	P20, P21, P22, P23, P24	Rx: U20 (75176) Tx: U15 (75176)	J23 (+) J24 (T) J22 (-)	D79+, D80 D78+, D77	TOC, COP, CC1-CC4, POS, HL (smi)
CAR Remote	6	P25	Rx: U25 (7601) Tx: U19 (75176)	J29 (+) J28 (T) J30 (-)	D91+, D92 D90+, D89	Isolated Car communication to the CPT or the CDP boards. TOC, EPU-COP, EPU-(CC1-CC4), FUTURA PI
HC	4	P14, P15 P18	Rx/Tx: U14 (75176)	J8 (+) J7 (T) J9 (-)	D62+, D61	Half Duplex Hall Call communication. Interconnects all the cars with the Hall Call interface. The VGA communication adapter also plugs on this bus.
HL	6	P19	Rx/Tx: U23 (75176)	J26 (+) J27 (T) J25 (-)	D82+,D81	Half Duplex Hall Lantern communication

Table 5

+24VDC Power "P9"

Car functions: The SPU-LINK distributes the 24VDC power to all the SMI interface ports, to the I/O interface (V+ & VC) and to the Hall Lantern interface (HLC & HL+). The 24VDC local car power is connected to connector P9-1&2 (+24V & 24V COM) at the factory.

Group functions: According to the job configuration, the group 24VDC power is connected to P9-3&4 (VHC & VH+) and is distributed to the Hall Call (HC) ports.

Encoder Interface "P2"

Car Position Transducer (CPT): The DPP signals, DPP1 and DPP2, are sent from the car top position reader and must be shielded at P2-1 (SHIELD). These signals are in quadrature and are used to locate the car and to calculate the velocity (DPP1), and to determine the car direction (DPP2). Indicator LEDs are provided. Note that the voltage level at this connector is 5VDC.

Motor Room Encoder: When a motor room encoder is used, it must be driven from the governor or from a perforated tape driven sheave. The power for the encoder is available at connector P2-6&7 (ENC +5V & ENC COM). The operation is the same as for a car-top mounted encoder as provider by the SWIFT position reader interface.