TRUETIME

Model 560-197-4
56000 Data Rate Clock and Distribution System Chassis
(Single DC Power Supply)
Manual

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SECTION ONE

1. FUNCTIONAL DESCRIPTION

1.1 PURPOSE OF EQUIPMENT

The TrueTime Model 560-197-4 Data Rate Clock and Distribution System (DRC) Chassis supports DRC-compatible cards. It provides 17 front slots for function cards, 17 rear slots for input/output cards, and 2 front slots for redundant power supplies. The chassis contains a backplane for inter-card communication, common-signal bussing, and power distribution. These signals are discussed in detail in SECTION THREE below.

This version of the chassis is configured for one DC input Power Supply. For future reference, it is useful to record card locations in the Card Slot Allocation Table. See specific manual for detailed information on any particular card.

1.1.1 PHYSICAL SPECIFICATIONS

Dimensions: 19”w X 5.22”h X 14”d (48 cm X 13 cm X 36 cm)
Weight: Approximately 13 pounds (6 kg)

1.1.2 ENVIRONMENTAL SPECIFICATIONS

Operating Temp: 0° to +50°C
Storage Temp: -40° to +85°C
Humidity: Up to 95% max., relative, non-condensing
Cooling Mode: Convection
Altitude: Sea level to 10,000 ft

1.1.3 POWER SPECIFICATIONS

See specific Power Supply manual.

1.1.4 CONNECTOR SPECIFICATIONS

1.1.4.1 DC INPUT POWER CONNECTOR

Location: Power Entry Module
Mating Connector: ITT Cannon MS3116F12-3S
Pinout:

PIN	SIGNAL
A	48 VDC, Positive (ground)
B	48 VDC, Negative
C	Chassis Ground

1.1.5 CARD LOCATION/COMPATIBILITY CONSTRAINTS

See specific manual and/or Card Compatibility Matrix.

1.1.6 CARD SLOT ALLOCATION TABLE

SLOT	FRONT	REAR
1[1]		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18 (19)		
20 (21)	Power Supply	Power Entry

NOTES:

1. Slot 1 is left-most when viewed from front of chassis.

SECTION TWO

2. INSTALLATION AND OPERATION

2.1 REMOVAL AND INSTALLATION

At initial installation, mount chassis to allow for vertical air-flow for convection cooling.

If it becomes necessary to replace any card in the chassis, follow this procedure:

CAUTION: Individual components and assemblies within the chassis are sensitive to static discharge. Whenever installing or removing cards, the person performing the replacement should use proper static discharge procedures, including a standard personnel ESD grounding device (e.g. grounded wrist-strap) and ESD protective packaging.

All cards are hot-swappable. It is not necessary to turn off chassis power during removal or insertion of cards. Refer to specific card manual for the effect of input-signal and/or adjacent card hot-swapping.

Refer to specific manual section for card location constraints and card setup information. (Except for power supply slots 18 through 21, there are few restrictions on card location.)

To remove card, loosen the captive retaining hardware at the top and bottom of the assembly, then firmly pull on the handle (or on any connector on rear panel adapter cards) at the bottom of the card. Slide the card free of the frame. Refer to the SETUP section for any required switch settings; or, set them identically to the card being replaced. Reinstall the card in the frame by fitting it into the card guides at the top and bottom of the frame and sliding it in slowly, avoiding contact between bottom side of card and adjacent card front panel, until it mates with the connector. Seat card firmly to avoid contact bounce. Secure the retaining screws at the top and bottom of the card assembly.

2.2 OPERATION

Connect system power via rear Power Entry Modules. The chassis is intended to be continuously powered; there are no power switches. See individual manuals for operation of specific cards.

2.3 SETUP

If the chassis is configured with an interface card using INPUT 1 through 8, **SETUP IS REQUIRED**. The termination impedance for INPUT 1 through 8 **MUST** be set to match the characteristics of the signal

source. If the timing signal is sourced by a 50 Ohm driver, the 50 Ohm terminator **MUST** be enabled. If the signal is sourced by a high impedance driver (e.g. 600 Ohm), the 50 Ohm terminator **MUST** be disabled. This is done by enabling or disabling a 50 Ohm terminator using a DIP switch located on the backplane at rear Slot 16.

To enable or disable the 50 Ohm terminator, **DISCONNECT EXTERNAL POWER** to avoid personal injury and equipment damage, then remove the cards in rear Slots 16 and 17. Using a small-bladed 4-inch screwdriver or similar tool, set each DIP switch position ON/OFF according to the following chart:

INPUT	SW1	ON	OFF
1	1	50Ω	>1kΩ
2	2	50Ω	>1kΩ
3	3	50Ω	>1kΩ
4	4	50Ω	>1kΩ
5	5	50Ω	>1kΩ
6	6	50Ω	>1kΩ
7	7	50Ω	>1kΩ
8	8	50Ω	>1kΩ

2.4 PREVENTIVE MAINTENANCE

A systematic preventative maintenance routine can reduce the possibility of a malfunction. This routine should include inspection and cleaning of the instrument.

2.4.1 INSPECTION

Exercise care when handling this equipment. It contains sensitive parts that can be damaged by improper handling. Do not touch connector pin surfaces because of the danger of static discharge, also deposits on contact surfaces can cause corrosion, resulting in equipment damage or failure. Inspect the unit for damaged components, loose or frayed connections, and corrosion on metal surfaces. If damage is found, correct it immediately.

2.4.2 CLEANING

Accumulations of dust and dirt can impair cooling and cause performance degradation. The equipment may be cleaned by the use of a vacuum cleaner or compressed air, and if the problem is bad enough, with a cloth dampened with clean water and a mild detergent. Thoroughly rinse cloth with clean water after washing and wipe off washed areas to remove any residue. Be careful not to get water into switches or potentiometers. Thoroughly dry the equipment with compressed air, and/or time permitting, by air drying.

2.5 CORRECTIVE MAINTENANCE

2.5.1 FRONT/REAR CARDS AND POWER SUPPLY

Refer to specific manual for information regarding suspect card.

2.5.2 POWER ENTRY MODULE

Power Entry Module trouble-shooting is covered in the specific Power Supply manual. However, should it be required, the Power Entry Module schematic is part of the chassis drawing included in section Four of this manual.

SECTION THREE

3. THEORY OF OPERATION

3.1 GENERAL INFORMATION

This section contains a detailed description of the chassis implementation. Refer to the schematics in SECTION FOUR.

3.2 HARDWARE DESCRIPTION

The chassis incorporates a backplane for signal/power distribution and a Power Entry Module for delivering input power to the power supply. Front Slots 1 through 17 support various function cards. Rear Slots 1 through 17 support various I/O cards. Front Slots 18/19 and 20/21 can hold redundant power supplies, each of which receive input power from their respective Power Entry Modules. In the 197-4 Chassis Assembly, only slots 20/21 have an associated Power Entry Module and DC Power Supply Assembly. Front Slots 18/19 have a blank front panel covering them.

3.2.1 POWER DISTRIBUTION

Input power is delivered to the power supply via the Power Entry Module. The Power Entry Module incorporates an input connector and fuse appropriate to the associated Power Supply.

The Power Supply applies filtering and transient protection to the input power. Power is input at a specific voltage level, depending on the type of Power Supply installed; however, it is always delivered to the chassis backplane -48 VDC. The -48 VDC power on the backplane is floating with respect to ground (GND). Each card installed in the chassis contains a local, internally-isolated, DC-to-DC converter. The output of each local power supply is referenced to signal GND on each card. Signal GND is distributed throughout the chassis via a ground plane on the backplane. Signal GND and Chassis GND are connected together via a connector on the backplane and also at the I/O card output connectors.

Hot swapping is supported by various features incorporated into the chassis. Of primary concern is the possibility of static-discharge into backplane signal lines during card insertion. This is minimized by extended ground pins located at each end of the backplane connector on front cards, forcing any static build-up to discharge into GND. These also assure that the card has a solid ground reference prior to signal pins contacting the backplane. Static is controlled on rear cards by a partial ground plane that extends to the extreme edge of the card, allowing static to discharge into the chassis during card insertion.

The effects of power supply transients are minimized by the isolation provided by local DC-to-DC converters. Another aspect of hot-swapping concerns CPU bus activity. This is discussed in Section 3.2.2.3.

3.2.2 SIGNAL DISTRIBUTION

There are three categories of signals on the backplane. These are bussed frequency distribution signals, bussed timing distribution signals, and bussed inter-card communication signals.

3.2.2.1. FREQUENCY DISTRIBUTION SIGNALS

The bussed frequency distribution signals are delivered on the backplane via 50 Ohm matched-impedance traces, each terminated with a 50 Ohm resistor. These are always driven by cards located at or near Slot 1, since the terminator is located at Slot 17. These three signals, REF A, REF B, and REF C (labeled FREQ A, B, and C on the schematic), are used to deliver reference frequencies to each slot. All cards that drive REF A, B, or C are AC-coupled to the backplane. The signals on REF A, B, and C are 1-5 Vpp, squarewave, or sinewave.

3.2.2.2. TIMING DISTRIBUTION SIGNALS

The bussed timing signals, INPUTS 1 through 8, are delivered on the backplane via 50 Ohm matched-impedance traces. Each can be terminated with a 50 Ohm resistor by enabling sections of SW1. These are always driven via cards located at or near Slot 1, since the terminator is located at Slot 17.

The characteristics of the signal on INPUT 1 though 8 vary according to the requirements of installed card(s) using that particular signal.

3.2.2.3. INTER-CARD COMMUNICATION SIGNALS

The bussed inter-card communication signals include Fault, Data, Address, and Control signals used by the Fault Monitor CPU. These signals are bussed to every slot. There are 19 Fault lines. These are outputs from function-cards and inputs to the CPU. Pin C25 at each slot is used for the Fault output. Pin C25 is connected to the appropriate Fault line at each slot, such that each function-card automatically drives the proper bussed Fault signal, which in turn is available to the CPU at any slot. Data, Address, and Control data-bus signals are used by the CPU to communicate with various function cards. The Control signals include STROBE, DIRECTION, and ENABLE. STROBE is used to gate read/write cycles. DIRECTION, which has a pull-down resistor on the backplane, must driven high by the CPU to generate a write cycle to a function card. ENABLE, which has a pull-down resistor and capacitor on the backplane, must charge

up to a Logic 1 level from local CPU +5V before any function card will recognize a write-cycle. All signals are TTL-level. The Fault lines have pull-ups on the Fault Monitor CPU, which forces unused Fault lines to the inactive state.

Hot-swapping of the CPU is supported for insertion by the RC time-constant built into ENABLE. It is supported during removal by the direct pull-down on DIRECTION. Note that data-bus hot-swapping effects are important only for write-cycles. Hot-swapping of the function cards is supported by the bus architecture: the Data lines are never driven by the function cards. This eliminates the possibility of function card output buffers interfering with bus traffic during power-up. Also, all bussed input lines are isolated with series resistors to minimize bus-loading during power-up. For read-cycles the Data lines become additional address bits. All read-data is transferred to the CPU, 1 bit at a time, via the private Fault line. When there is no bus activity, the Fault line represents the composite fault status of each function card.

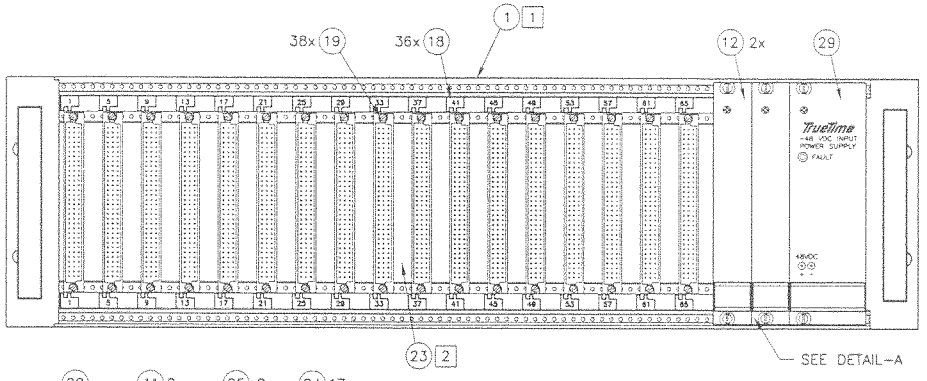
SECTION FOUR

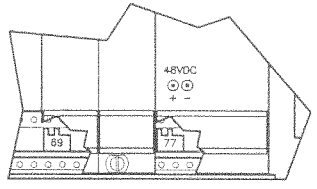
4. DETAILED DRAWINGS

4.1 560-197-4 DETAILED DRAWINGS / BILL OF MATERIALS

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	CAR 1200; CAR 1217; CAR 1380	02/08/99	

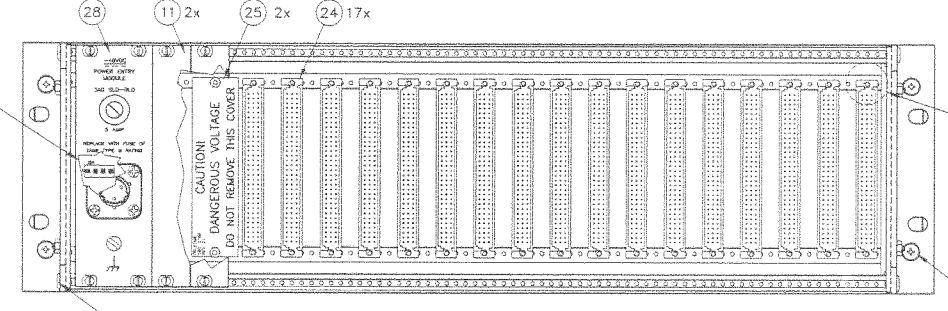
FRONT VIEW

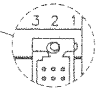




DETAIL-A

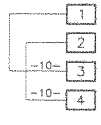
REAR VIEW





INSTALL SHROUDS ORIENTATED AS SHOWN ALIGN WITH HOLE #2

4-PIN MOLEX (INSTALL ON J24)



USE 18 AWG WIRES

INSTALL REAR PANEL STARTING FROM SECOND FULL HOLE FROM LEFT

2 THE FOLLOWING ARE ADDITIONAL ASSEMBLY INSTRUCTIONS:

A. INSTALL THE BACK PLANE AND CONNECTOR SHELLS TO RAILS WITH SIX SCREWS, DO NOT TIGHTEN YET.

B. INSTALL A PAIR OF SIDE PANELS SO THE BACK PLANE ASSEMBLY IS AT THE END OF THE SIDE PANEL, AND THE SCREW HEADS ARE FACING YOU. TIGHTEN THE FOUR SIDE SCREWS. THIS WILL SET THE SPACING BETWEEN THE RAILS HOLDING THE BACK PLANE. THE SIDE PANELS WILL PUSH THE RAILS TO THE OUTER TOLERANCE OF THE BACK PLANE CONNECTOR SCREW TOLERANCE.

C. TIGHTEN THE SIX BACK PLANE SCREWS. INSTALL AND TIGHTEN THE REMAINING BACK PLANE SCREWS.

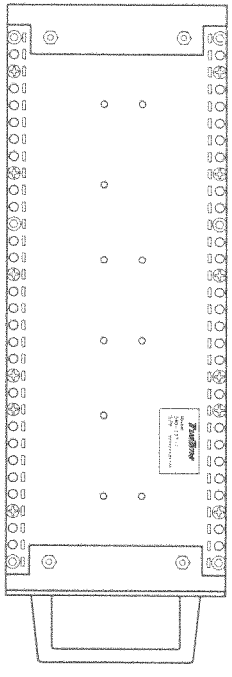
D. REMOVE THE SIDE PANELS, AND REINSTALL IN THE PROPER LOCATION.

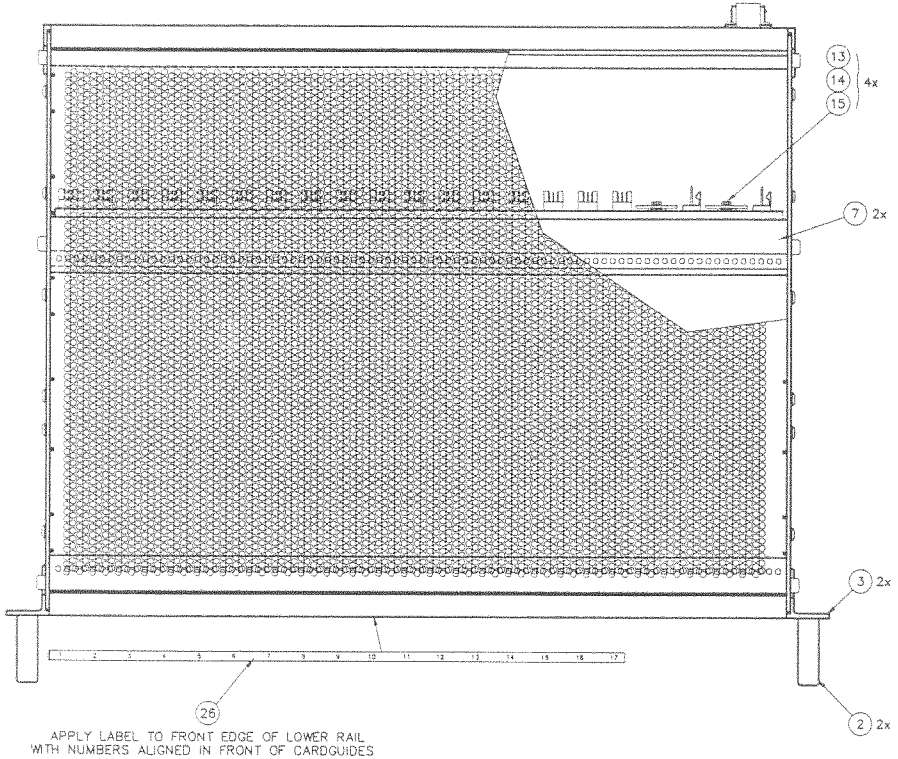
1 CHASSIS ASSEMBLY REFERENCE DWG 560-197-10 SHEETS 3 & 4.
CHASSIS (ITEM 1) TO BE ASSEMBLED USING SCHROFF (MANUFACTURER'S) ASSEMBLY INSTRUCTIONS SUBRACK EMC(#60845-001) PROVIDED WITH EACH KIT WITH THIS EXCEPTION:
MFR'S ITEM 9 OF KIT TO BE REAR MOUNTED
(SEE PANEL C & D ON 560-197-10 SHEET 3).
MFR'S ITEMS 11 & 12 OF KIT TO BE FRONT MOUNTED
(SEE PANEL C & D ON 560-197-10 SHEET 3).

NOTES: UNLESS OTHERWISE SPECIFIED

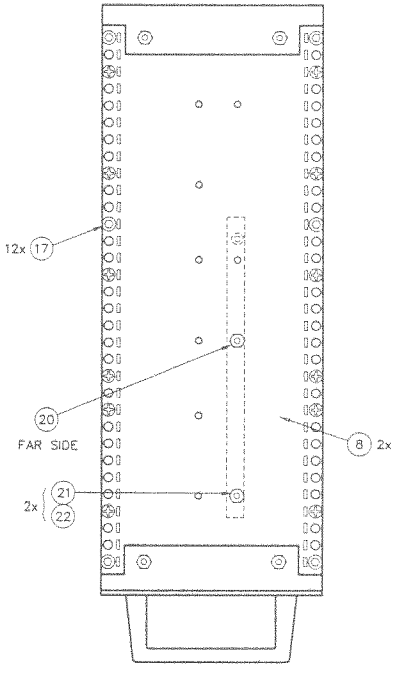
CONTRACT NO.		TrueTime "Where Customer Satisfaction is our Highest Priority" 2835 Duke Ct. Santa Rosa, CA 95407			
APPROVALS	DATE	TOP ASSEMBLY DISTRIBUTION CHAS			
DRAWN BY RNR	04/98				
CHECKED BY					
APPROVED BY	2/99				
NEXT ASSY		SIZE B	CODE IDENT NO.	DRAWING NO. 560-197-4	REV A
		SCALE NONE		SHEET 1 OF 2	

FILENAME: \560\197-4A
DATE: 02-23-99





APPLY LABEL TO FRONT EDGE OF LOWER RAIL
WITH NUMBERS ALIGNED IN FRONT OF CARDGUIDES



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SIZE	CODE IDENT NO.		REV
B		560-197-4	A
SCALE NONE			SHEET 2 OF 2

FILENAME: \560\197-4B
DATE: 02-23-99

MAX * BILL OF MATERIALS * SINGLE-LEVEL EXPLOSION BY PART IDENTIFIER W/REFERENCE

PART IDENTIFIER	DESCRIPTION 1	DESCRIPTION 2	EFF DATE	ECN #	QTY/ASSY	UOM	REV LVL	REFERENCE DESCRIPTION
560-197-4	SIGNAL DISTRIB CHASSIS	SINGLE DC PWR SUPPLY				EA		
0000-APPROVAL	PARTS LIST APPROVAL		000000		1.0000	EA		
0000-PL	PARTS LIST REV LEVEL		000000		1.0000	EA		REV A (02-24-99)
0000-PRINT	REFERENCE PRINT		000000		1.0000	EA		560-197-4 REV A
0001-PRINT	REFERENCE PRINT		000000		1.0000	EA		SEE BOM NOTE 1
0002-PRINT	REFERENCE PRINT		000000		1.0000	EA		
	SEE 560-197-10 SHEET 3 & 4							
201-088	RAIL HORIZONTAL REAR	SCHROFF 30819-088	000000		2.0000	EA		07
211-005	HANDLE SUBRACK 3U	SCHROFF 10501-005	000000		2.0000	EA		02
212-016	GUIDE RAIL	SCHROFF 60817-016	000000		36.0000	EA		18
223-010	CHASSIS KIT (HF)	SCHROFF 20845-284	000000		1.0000	EA		01 SEE BOM NOTE 1
223-144	NUT M2.5	SCHROFF #21100-144	000000		4.0000	EA		13
241-006-003	SCREW PH FH SS 6-32X 3/8	BUY/USE ONLY 100 DEGREE	000000		2.0000	EA		21
249-007	SCREW SH CH ZN M2.5X12	SCHROFF 21100-148	000000		38.0000	EA		19
249-234	SCREW PH FH M5X12	SCHROFF 21100-234	000000		4.0000	EA		16
249-M5X12	SCREW SK ZP M5X12	SCHROFF 21100-457	000000		12.0000	EA		17
251-006	NUT KEP SS 6-32 ,250 HEX	KEPNUT SMALL PATTERN	000000		2.0000	EA		22
254-.312	WSHR SPLIT #4 SS	STAINLESS	000000		4.0000	EA		15
269-004	WSHR FLAT NYL 4 1/16	1/4INCH OD	000000		4.0000	EA		14
315-018-010	WIRE 18AWG PVC INS BLACK	1429	000000		0.3000	FT		SEE WIRING
332-002	CORD POWER	BELDEN 17250	000000		2.0000	EA		SHIPPING KIT
363-2.0	FUSE 2A 250V 3AG SB	LITTELFUSE 313002	000000		2.0000	EA		SHIPPING KIT
385-096	CONN SHROUD FOR 96-P CONN	AMP 535074-1	000000		17.0000	EA		24
400-033	LABEL,DRC SLOT NUMBERS	MADE FROM 400-038	000000		0.0200	EA		26
402-007T	PIN 18-24 AWG	MOLEX 08-52-0113	000000		4.0000	EA		SEE WIRING
403-004T	CONN 4-P	MOLEX 26-03-4041	000000		1.0000	EA		SEE WIRING
560-1107	ASSY FRT PNL BLANK .8 IN.	SEE BOM NAV PART NOTES	000000		2.0000	EA		12
560-1181-6	ASSY,REAR PANEL	560-1181/HARDWARE ONLY	000000		2.0000	EA		11
560-1208-2	ASSY,PANEL,DC PWR ENTRY	PANEL AND HARDWARE	000000		1.0000	EA		28
560-1223	GUIDE RAIL FOR DRC P/S	FAB	000000		1.0000	EA		20
560-2188	PCB SHIELD (UL)	FAB	000000		2.0000	EA		25
560-5146-6	ASSY PWR SUPPLY -48VDC	MADE FROM 560-2146	000000		1.0000	EA		29
560-5165	ASSY BACKPLANE (DISTRB)	MADE FROM 560-2165	000000		1.0000	EA		23
LA	LABOR ASSEMBLY COST HRS		000000		0	EA		
LT	LABOR TEST COST HOURS		000000		0	EA		
NOTE 1			000000		1.0000	EA		

THIS NOTE IS FOR REF ONLY. THE ITEMS TO BE MODIFIED WILL BE DONE BEFORE THE KIT GOES TO MANUFACTURING. 223-010 CHASSIS IS A BUYOUT KIT FROM SCHROFF. THE SIDE PANELS (ITEM 8, QTY 2, ON THE TRUETIME DRAWING) AND THE BRACKETS (ITEM 3, QTY 2, ON THE TRUETIME DRAWING) BOTH REQUIRE HOLES ADDED (FAB MODIFICATION). REF.PRINTS: 223-010-S(SIDE PNL) & 223-010-B(BRACKETS).