Model 560-5195
Sine Wave Output SILIOM Manual

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SECTION ONE

1. GENERAL INFORMATION

1.1. SCOPE OF MANUAL

This manual contains the information necessary to operate and maintain a TrueTime Model 560-5195 Sine Wave Output SILIOM. SILIOM stands for **S**ingle **I**n-**L**ine **I**nput / **O**utput **M**odule.

1.2. PURPOSE OF EQUIPMENT

The Model 560-5195 card provides a method of adding a sine wave output of either 1544 kHz (T1) or 2048 kHz (E1) to a 560-5153 E1T1 motherboard. An optional output transformer is available to provide ohmic isolation in either a balanced or unbalanced configuration. It is stocked in 4 dash versions as follows:

-1 = T1
-2 = T1 with transformer
-3 = E1
-4 = E1 with transformer

1.2.1. PHYSICAL SPECIFICATIONS

Dimensions:	4.25” long X .687” wide
Weight:	Approximately 2 ounces

1.2.2. ENVIRONMENTAL SPECIFICATIONS

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

1.2.3. POWER REQUIREMENTS

Voltage:	±5 VDC ±10%
Current:	+50 mA
Power:	250 mW

1.2.4. OUTPUT RATING

Voltage:	1 Vrms ±10%. Output may be adjusted.
Load:	50Ω

SECTION TWO

2. INSTALLATION AND OPERATION

2.1. INTRODUCTION

This section contains installation instructions and operating instructions.

2.2. REMOVAL AND INSTALLATION

CAUTION: All SILIOMS contain static sensitive semiconductor devices. Use a personal grounding strap and a static safe workstation while performing any handling of the SILIOM and/or the Motherboard.

This SILIOM is a customer installed option. To install the SILIOM in the motherboard, grasp it gently by the ends and insert it into the SIMM style connector on the motherboard while orienting it perpendicularly to the face of the motherboard. Then press the top of the SILIOM down and toward the bottom edge of the motherboard until the retainer clips snap down over the SILIOM. Removal is accomplished by spreading the retainer clips apart with your fingers while pushing the SILIOM top up with your thumbs. The SILIOM is keyed to prevent improper insertion, and only gentle pressure is required.

If replacing the SILIOM, check the switch setting on the old SILIOM and set the switches on the new SILIOM the same. The proper location for the SILIOM is determined by deciding which of the six possible channels you want the SILIOM to reside in. If you are replacing a SILIOM simply use the same slot it came out of. If this is a new addition then you must wire the appropriate connector on the rear panel adapter associated with the Channel you decide to use. Any SILIOM can be used in any slot without restriction.

Each SILIOM edge connector is associated with an “Output Jumper” located on the 560-5153 Card, which must be set according to the type of SILIOM installed. JP1 is associated with Channel A (at the top of the 560-5153), JP2 is associated with Channel B, and so on through JP6 and Channel F. The card JP(X) must have a shunt installed across pins 1 and 2 (out of 4). Pin 1 is near the top of the card when viewed from an “as installed” perspective. The JP blocks are located near the end of the SILIOM edge connectors that are farthest from the Front Panel of the 560-5153 Card. Revision 2 and later cards have additional jumper blocks (JP7-12) that are used for special JTAG operations on the card. If shunts are installed on these jumper blocks they should be “stored” on only one pin of the jumper block.

2.3.

OPERATION

There are no operator actions required by this SILIOM other than setting the configuration switches. Other possible operator actions can only be carried out by use of software associated with the Fault Monitor card in a 56000 system. SW1-1 selects whether 1544 kHz (SW1-1 ON) or 2048 kHz (SW1-1 OFF) is used to drive the output. SW1-2 reports whether the transformer is installed (SW1-2 ON) or not installed (SW1-2 OFF). These switch sections will normally be sealed with inspection varnish since the filter components, which work with only one frequency, and the transformer are factory installed. SW1-3 is used to clear local faults on the card in factory test procedures. It should always be left in the **ON** position *unless* you wish to disable fault detection on this module. SW1-4 determines whether the AIS_ENABLE signal will cause the output sine wave to be disabled when it is asserted (SW1-4 ON) or not (SW1-4 OFF).

You must also set or verify the Output Configuration Jumper (JP1-JP6) associated with the channel (A-F, J2-J7) that the card is installed in on the 560-5153 card. Set the shunt on this card to cover pins 1 and 2 of JP(X) for the dash 1 through 4 versions of this card. If you have a dash 2 or dash 4 version, it will have a transformer installed on it which allows the output to be delivered differentially. If the board has been modified for balanced output by cutting the trace across R18 (see sheet 3 of the schematic) then you can restore the unit to balanced operation by placing a shunt across pins 3 and 4 of JP(X). This action ties the "-" output to ground. Use a 2 mm pitch shunt.

Switch	Meaning
SW 1-1	
ON	1544 kHz = Driver Ouput
OFF	2048 kHz = Driver Output
SW 1-2	
ON	Transformer Installed
OFF	Transformer Not Installed
SW 1-3	
ON	Fault Detection Enabled
OFF	Fault Detection Disabled
SW 1-4	
ON	AIS_ENABLE signal output sine wave disabled when asserted
OFF	AIS_ENABLE signal output since wave enabled when asserted

SECTION THREE

3. THEORY OF OPERATION

3.1. GENERAL INFORMATION

This section contains a detailed description of the circuits on this SILIOM. These descriptions should be used in conjunction with the drawings in SECTION FIVE.

3.2. SILIOM DESCRIPTION

The 560-5195 SILIOM contains all the circuitry needed to add a sine wave output to a 560-5153 E1T1 card. The SILIOMs' output can be adjusted downward from its nominal 1 Vrms (13 dBm) output level. Fault circuits monitor activity on the output and report the current status to the Fault Monitor card.

3.3. DETAILED DESCRIPTION

Reference drawing 560-5195, sheets 2 and 3 of 3. U2 is a CPLD which contains all the logic circuits needed on the SILIOM. U1 buffers the CPLD output to drive the sine shaping filter (R8-9, C13, C15, L1). C15 is adjusted for a peak on the output. U4:A buffers the filter and U6, inside the feedback path of U4:A, boosts the signal power out to drive a 50Ω load. R11 adjusts the gain of the U4:A/U6 combination to set the output at 1 Vrms. Although the output *can* be adjusted above 1 Vrms, this is not recommended because the amplifier will go into limiting above that point causing distortion of the output waveform. If installed, T1 provides ohmic isolation of the output. T1s secondary can be floated above ground or referenced to ground. R18 is only installed if it is desired to ground refer an output after a transformer has been used in the floating (balanced) configuration. U4:B buffers a sample of the output and drives peak detector CR1. The output of Cr1 is filtered by C19 and applied to comparator U5. If the output fails altogether or drifts below the 1 Vrms value, the voltage across C19 will decrease below the value set by voltage divider R3/R19. U5 will then drive LineFault high to indicate a failure. If a failure is detected, that information is latched within U2 and reported to the 560-5153 card and thence to the Fault Monitor card if one is installed in the system. There are three ways to clear the fault, the preferred one is to use the Fault Monitor cards software, another is to turn SW1-3 Off and then ON again, and the third is to power down the system, necessary if there is no Fault Monitor card. U2 is programmed in system using a JTAG port and a dedicated fixture or the JTAG port on the 560-5153, and a special cable and software running on a PC.

SECTION FOUR

4. MAINTENANCE AND REPAIR

4.1. MAINTENANCE

This module requires no maintenance. Schematics are provided in SECTION FIVE for those who desire to troubleshoot a problem down to the component level. All parts are standard commercially-available parts except for the printed circuit board itself.

4.2. REPAIR

This module is constructed mostly of surface mount components. These components are extremely difficult to replace successfully without a great deal of specialized SMT rework equipment, and specialized training. Additionally, the majority of the circuitry on this board resides in a programmable part which requires special equipment, software and data files to program. For these reasons it is strongly recommended that you return any malfunctioning module to the factory where it can be repaired.

SECTION FIVE

5. DETAILED DRAWINGS

5.1. 560-5195 DETAILED DRAWINGS / BILL OF MATERIALS

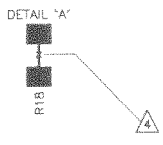
MAX * BILL OF MATERIALS * SINGLE-LEVEL EXPLOSION BY PART IDENTIFIER W/REFERENCE

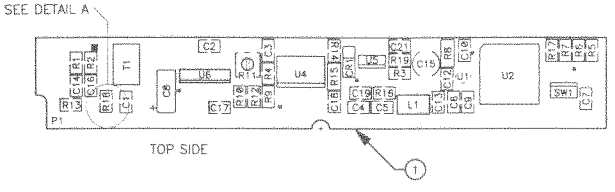
PART IDENTIFIER	DESCRIPTION 1	DESCRIPTION 2	EFF DATE	ECN #	QTY/ASSY	UOM	REV LVL	REFERENCE DESCRIPTION
560-5195-1	ASSY SINE OUTPUT (T1)					EA		
0000-APPROVAL	PARTS LIST APPROVAL				1.0000	EA		DME 1-9-98
0000-PL	PARTS LIST REV LEVEL				1.0000	EA		REV 01 (01-09-98)
0000-PRINT	REFERENCE PRINT				1.0000	EA		SEE 560-5195
036S-NP0121	CAP 120PF NP0 0805 100V	NIC NMC0805NP0121J100TR			1.0000	EA		C13
045S-82UH	INDUCTOR 82UH 1210	NIC NIN-FA820KTR			1.0000	EA		L1
560-5195	ASSY SINE OUTPUT (T1E1)	MADE FROM 560-2195			1.0000	EA		01
LA	LABOR ASSEMBLY COST HRS				0	EA		
LT	LABOR TEST COST HOURS				0	EA		

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
02	ADDED C14 & C16,CHANGED VALUE R13 & R19, CHANGED SIGNAL NAMES.	03/04/98	DTM for DR

NOTES: UNLESS OTHERWISE SPECIFIED

1. ASSEMBLE PER ASSEMBLY REQUIREMENTS DOCUMENT 421-11.
2. RESISTOR VALUES IN OHMS, CAPACITORS IN MICRO FARADS.
3. POLARIZED CAPACITORS ARE SHOWN WITH A ROUNDED EDGE INDICATING THE POSITIVE SIDE.
4. WHEN T1 IS INSTALLED CUT THIS TRACE FOR BALANCED OUTPUT. R18 IS INSTALLED ONLY AFTER TRACE IS CUT AND AN UNBALANCED OUTPUT IS REQUIRED.





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APPROVALS		DATE
DRAWN BY	B.A.SRAMEK	12/17/97
CHECKED		
APPROVED	DTM	5.12.98

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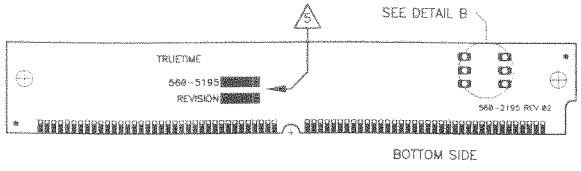
Title	SINE OUTPUT ASSEMBLY DRAWING, TOP SIDE	
Size	Number	Rev
B	560-5195	02
Date Tue May 12 1998 09:58:55		Drawn by BAS
Filename 2195-02.PCB		Sheet 1 of 4

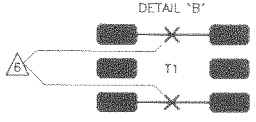
NOTES: (CONTD.)

5. STAMP DASH NUMBER & REVISION LEVEL.

6. CUT THESE TRACES WHEN T1 IS INSTALLED.



BOTTOM SIDE



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Title	SINE OUTPUT ASSEMBLY DRAWING, BOTTOM SIDE	
Size B	Number 560-5195	Rev 02
Date Tue May 12 1998 09:58:53		Drawn by B.A.S.
Filename 2195-02.PCB		Sheet 2 of 4

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
560-5195	ASSY SINE OUTPUT (T1E1)	MADE FROM 560-2195				EA		
0000-APPROVAL	PARTS LIST APPROVAL		0000		1.0000	EA		DTm/DR2 5-11-98
0000-PL	PARTS LIST REV LEVEL		0000		1.0000	EA		REV 02 (05-11-98)
0000-PRINT	REFERENCE PRINT		0000		1.0000	EA		560-5195 REV 02
0000-REV	PCB REV LEVEL HERE >>>>		0000		1.0000	EA		560-2195 REV 02
002S-000	RES 0 OHM 0805	NIC NRC10Z0TR	0000		2.0000	EA		R10,18
002S-220	RES 22 OHM 1/4W 1206	NIC NRC25R220TR	0000		2.0000	EA		R8,15
008S-100	RES 10 OHM 5% 0805	NIC NRC12R100TR	0000		1.0000	EA		R13
008S-102	RES 1K OHM 1/8W 1% 0805	NIC NRC12R102FTR	0000		2.0000	EA		R12,19
008S-103	RES 10K OHM 1/8W 0805 5%	NIC NRC12R103TR	0000		4.0000	EA		R1,2,4,14
008S-104	RES 100K OHM 1/8W 1% 0805	NIC NRC12R104FTR	0000		1.0000	EA		R16
008S-392	RES 3.9K OHM 1/8W 0805	NIC NRC12R392TR	0000		1.0000	EA		R3
008S-472	RES 4.7K OHM 1/8W 0805 5%	NIC NRC12R472TR	0000		4.0000	EA		R5-7,17
008S-510	RES 51 OHM 1/8W 0805 5%	NIC NRC12R510TR	0000		1.0000	EA		R9
019S-001	POT, SNGL TURN SEALED 5K	BOURNS 3314G-1-502E (SMD)	0000		1.0000	EA		R11
033S-5-30	CAP,VARIABLE 5-30PF,TINY	TUSONIX 513-019A 5-30PF	0000		1.0000	EA		C15
036S-NP0101	CAP 100PF NP0 100V 0805	NIC NMC0805NP0101J100TR	0000		1.0000	EA		C19
036S-X7R104-50	CAP .1UF X7R 50V 0805 10%	NIC NMC0805X7R104K50TR	0000		1.0000	EA		C21
036S-Y5V104	CAP CER .1UF Y5V 50V 0805	NIC NMC0805Y5V104Z50TR	0000		14.0000	EA		C1-7,9,10,12,14,16-18
037S-106-TL	CAP TANT 10UF 16V SIZE C	PANASONIC ECS-H1CC106R	0000		1.0000	EA		C8
057S-4148	DIODE 1N4148	ROHM RLS4148TR	0000		1.0000	EA		CR1
065S-002	SWITCH DIP HALF PITCH	MEPCOPAL CHS-04A	0000		1.0000	EA		SW1
176S-LM6218	LM6218 (14SOL)	NATL LM6218WM	0000		1.0000	EA		U4
176S-LM6321M	HIGH SPEED BUFFER	NATL LM6321M (SOIC)	0000		1.0000	EA		U6
176S-LT1016	LT1016 (8SO)	LINEAR TECH LT1016CS8	0000		1.0000	EA		U5
178S-74AHC1G14	SINGLE SCHMITT INVERTER	TI SN74AHC1G14DBVR	0000		1.0000	EA		U1
178S-MACH211SP	IC, PROGRAMMABLE, CPLD	VANTIS MACH211 SP-15 VC	0000		1.0000	EA		
	INSTALL U2 (NOT PROGRAMMED/NOT SOCKETED) AT ASSEMBLY.							
	PART WILL BE PROGRAMMED AT TRUETIME DURING TEST FUNCTION. PROGRAM USING 185-008.WOH AND 185-008.J1 AND TEST FIXTURE 441-T1E1.							
185-008	PROGRAM (MACH)	FOR 560-5195	0000		1.0000	EA		FOR U2
560-2195	PCB SINE OUTPUT (T1E1)	FAB	0000		1.0000	EA		01
LA	LABOR ASSEMBLY COST HRS		0000		0	EA		
LT	LABOR TEST COST HOURS		0000		0	EA		
NOTE 1			0000		1.0000	EA		
	DISREGARD THIS ENTRY. PURPOSE IS TO OFFSET AN ERROR IN MRP SOFTWARE.							
OSV560-5195	OUTSIDE LABOR 560-5195	PCA	0000		1.0000	EA		