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56000 Data Rate Clock



User Guide

Rev. E - September 2004

Part Number: 56000-man

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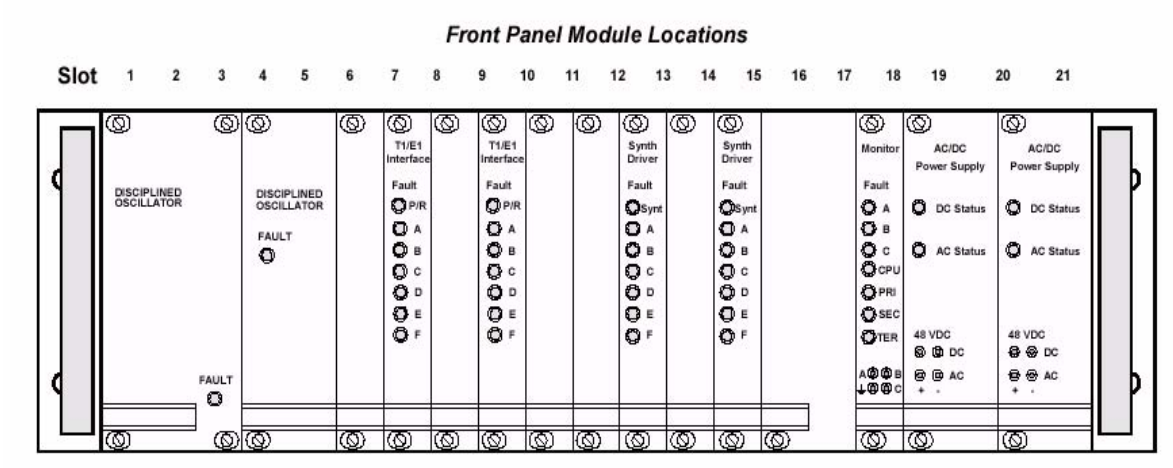
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Product Description

This chapter provides an overview of the 56000 Date Rate Clock capabilities and features.

Introduction

Model 56000 is a Data Rate Clock (DRC) that distributes frequencies and/or timing signals. It uses internal and external references to generate multiple precision time and frequency outputs. When required, an internal GPS receiver provides the internal reference source. Input signals enter and are processed by frequency or timing cards. These signals pass through a frequency or timing bus and output multiple signals, depending on the card configuration. The 56000 accepts redundant frequency and timing inputs (i.e., 1, 5 or 10 MHz for frequency, IRIG for time code), additionally, the 56000 accepts redundant power supplies. The 56000 provides multiple output types on a wide variety of connector types (including balanced or unbalanced analog/digital output rates of 1 PPS, T1/E1).



Functional Description

A functional description of the 56000 includes the following optional assemblies:

- Input/output frequencies and three references for redundancy
- Eight independent timing inputs (or four pairs)
- Output rates: 44 Mbps using synthesizer cards

- The N.8 Data Rate offers an output of 8 kPPS to 8.192 MPPS in 8 kPPS steps
- The N.1 Data Rate offers an output of 0 to 25 MPPS in 1 PPS steps
- Cards are Hot Swap-able
- Sixteen module slots with up to six outputs per module
- Network Timer server provides NTP to LAN/WAN
- Network Interface Card (NIC), Telnet, SNMP, and HTML
- All timing (Analog or Digital) functions are independent of all frequency functions
- Redundant hot swap-able power sources
- Both GPS and non-GPS options

The 56000 can be used in civilian and non-civilian communication systems. Some examples are:

- T1/E1 to synchronize a group of communication facilities using wire lines
- Data rate for synchronizing systems (N.8, N.1)
- Using an NTP output to WAN/LAN
- Satellite Ground Station to maintain synchronization with ground based equipment and communications (1, 5, and 10 MHz, MPPS)
- Secure frequency agile communications systems

The 56000 is shipped with factory set default settings, which may be customized to your specific situation and requirements.

Plug-In Modules

All modules are plug-in assemblies that are installed by sliding the module card along the internal rack within the 56000. Some caution by the user should be used when sliding the card as card insertion into the 56000 chassis may require force. Once inserted, the card should be locked into place. Each card may also have LED status indicators and/or external connectors or plugs.

Data Rate Clock Example

GPS signals are received by dual antennas mounted on the roof of the building which houses the site's communication center. The signals are converted to optical signals. The outputs of the GPS receivers, 10 MHz, IRIG-B, and 1 PPS are connected to the 56000 with coax cables. The signals pass through the mid-

plane per passive and active cards, as frequency and timing signals and then the signals exit as shown in Figure 1.

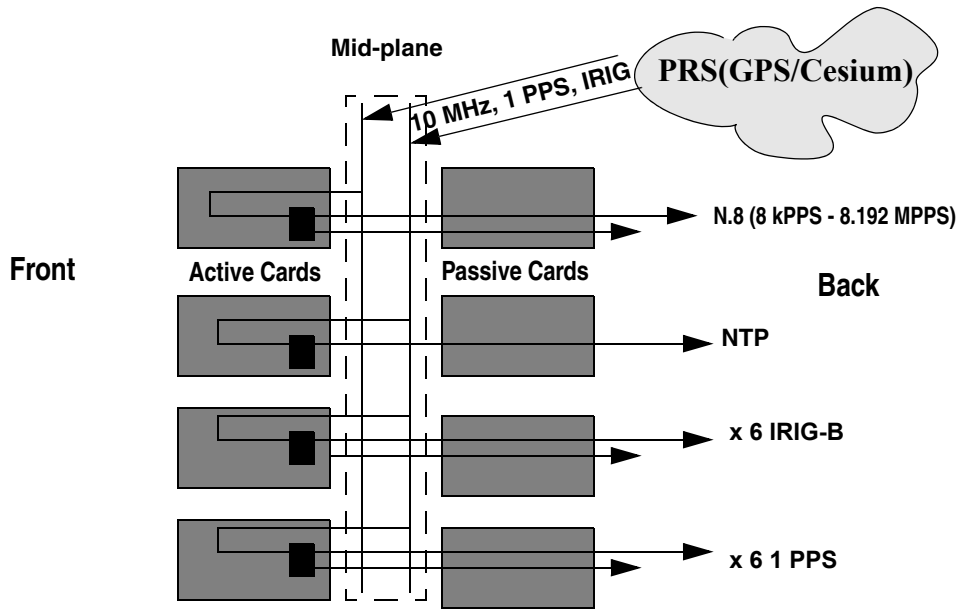


Figure 1 - Data rate clock diagram

Frequency Distribution

In simple terms, up to three incoming reference frequencies may enter the 56000 per inputs. This information passes through passive and active (when fiber-optics are used) cards connected to the mid-plane. Frequencies (1, 5, or 10 MHz) use the Frequency bus located in the mid-plane. The frequencies are monitored for faults via the CPU and then exit frequency distribution cards. The type of frequency and how many of a particular type depends on the internal cards the frequencies move through. For instance, an incoming 10 MHz frequency after entering an active card could produce six 10 MHz/ MPPS outputs, six 5 MHz/MPPS outputs or six 1 MHz/MPPS outputs

Timing Distribution

Like frequency distribution, up to two reference timing signals, such as 1 PPS or IRIG (used in the Telecom industry or Range timing) enters the 56000. They, too, pass through passive and active (when fiber-optics are used) cards connected to the mid-plane. However, these signals use the Timing bus located in the mid-plane. Like frequencies, timing signals are monitored for faults and exit per outputs. The type of time code and how many of a particular type depends on the internal cards the signals move

through. For instance, an incoming 1 PPS signal after entering an active card could output six 1 PPS TTL. One IRIG signal could output six IRIG signals and so on.

Timing and Frequency Cards

The 56000 uses plug and play cards. Each one of the cards has its own ability to fault sense inputs and make a decision to switch automatically based upon initial setup on the card. Internal status is provided using COM ports and the card's front LEDs indicate operation fault errors using colored lights. This fault information is also available from status reports.

Fault Monitor CPU

Incoming signals enter the Fault Monitor CPU per the control/fault bus on the mid-plane. In very general terms, the fault monitor monitors the cards inside the 56000 chassis. There are eight fault output lines that report fault conditions. The CPU controls selection input signals on timing switch cards. If a card or input/output faults, the user is notified of this through the card's LEDs colored lights. The user is also able to obtain fault status reports in user friendly verbose or machine mode (machine mode uses binary code). The user is able to input commands per the serial command interface and able to locate the precise location of the fault error. Thus, the main functions of the Fault Monitor CPU are:

- Fault sensing during operation
- Status monitoring during operation
- Fault reporting to pinpoint the fault during operation
- Frequency monitoring during operation
- General input/output communications

Network Interface Card (NIC)

The Network Interface Card (NIC) provides a network connection for the Fault Monitor CPU card. This allows the user to remotely monitor/control the Fault Monitor CPU card over a network. This access to the network is per Telnet protocol. Also available is a serial interface that can be configured to RS-232 or RS-422. The NIC also provides the Fault Monitor CPU card's primary, secondary and tertiary status inputs.

Local Oscillator Reference

The 56000 supports all the standard oscillator types (Rubidium, Quartz and High Stability Quartz) that lock to the reference frequency. There are two configurations:

- As a backup to references A and B
- As the primary reference on reference A, which is disciplined by references B & C

Fiber Optics Frequency

The 56000 is able to use fiber-optic cards as a reference frequency transceiver for input A, B, or C references. The card provides the same frequency output to the four output channels. In systems unable to utilize light transmissions, the card converts the optical signal to copper, or vice versa, using optical links to the 56000. These links may be either external or internal (see Figure 2).

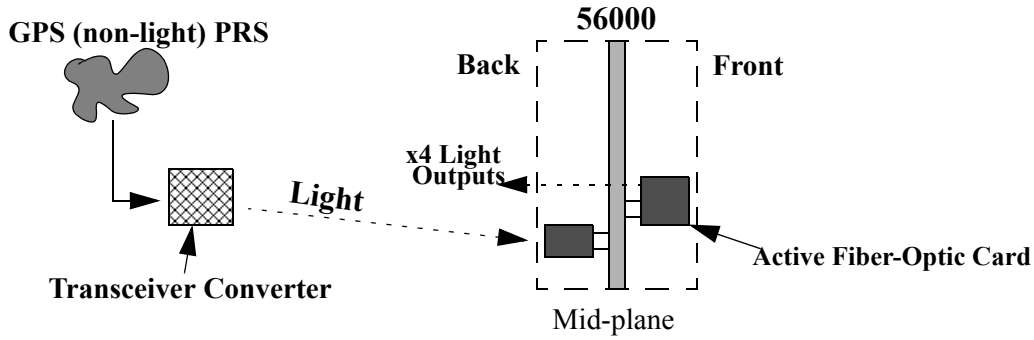


Figure 2 - Fiber optic links

Fiber Optic Time

The card provides the same time code output to the four output channels. In systems unable to utilize light transmissions, the card converts the optical signal to copper, or vice versa, using optical links to the 56000. These links may be either external or internal.

In Fig 2, the GPS PRS provides a non-optical frequency to the Transceiver Converter, which converts it into a fiber optic signal. The Fiber Optic card in the 56000 receives this signal and splits it into four time outputs (i.e., all IRIG). Using the same drawing, if the system is unable to use optical signals directly, another external Transceiver would convert the optical signal prior to entering the 56000, converting it from optical into copper. The Fiber-Optic card would then convert it into four copper time outputs for users.

Hot Swapping

All cards, input cables and output cables are hot swappable. It is not necessary to remove chassis power during insertion or removal. Hot swapping and reference-source

changes are abrupt, the effects difficult to characterize; however, the system is designed to protect against permanent effects and minimize temporary effects of these events.

Power Static Issues

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 (in the area between chassis extrusions), 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 and power filters. Another aspect of hot-swapping concerns CPU bus activity. Note that all hot-swapping effects are intensified by the use of an extender card in any chassis slot.

Synthesizer Perturbation

Typically, adjacent-card hot swapping has a negligible effect on a Synthesizer. Although the hot swapping event directly affects the control voltage of each on-board oscillator, it typically lasts less than one clock-period. The effect of redundant power supply switch-over is also negligible.

The effect of a reference-source change is less predictable. The reference frequency is delivered per REF A, B and C on the backplane. The synthesizer receives the reference per the Passive Combiner. If the currently-highest priority reference is changed, the synthesizer locks to the new reference. When the new reference is in phase with the old reference, the output frequency is affected by less than 1 part in 10^8 over a 1 second period. When the new reference is of opposite phase, the effect can approach 1 part in 10^6. The frequency-shift occurs relatively softly over a 100 ms period, minimizing any effect on downstream equipment. Note that hot swapping a local frequency source, such as an oscillator or fiber-optic receiver, qualifies as a hot swap and reference-source change.

The effect of a reference-input perturbation that does not result in a reference-source change (i.e., - removing a cable that is not currently-highest priority) at the passive combiner also has an effect on the synthesizer. This is due to the fact that the reference frequency used by a Synthesizer is always a weighted sum of REF A, B, and C, and any change has some effect on the resultant waveform.

Hot-swapping of the CPU and function cards is supported. Also, all bussed input lines are to minimize bus-loading during power-up.

Installation

This chapter details the installation of the 56000 and card placement.

Unpacking and Inspection

Carefully unpack and inspect your 56000 upon receipt. Contact Symmetricom's Timing, Test and Measurement division, for any discrepancies in the contents of the order. The 56000 comes with a common set of card modules inserted and configured. If you ordered additional card modules verify that they are present.

Warning: **Use an Electrostatic Discharge protective wrist wrap.**

Rack Mounting

Installation of the unit requires a standard electronic equipment rack. The space requirements are: 5.25 inches high, 19 inches wide, 14 inches deep, exclusive of the front panel handles and rear panel connectors. The unit weighs approximately 13 lbs and can operate in temperatures between 32° F (0° C) to 150° F (50° C) and up to 95% humidity, non-condensing. To insure proper cooling, it is recommended that there is a 1U or 2U rack spacing above and below the installed unit.

Your 56000 DRC may or may not already have the mounting brackets installed, depending upon how you ordered the unit.

Procedure

Insert the 56000 unit into the rack. Make sure the mounting brackets in the front of the unit are lined up with the rack holes for mounting. Be sure to use the correct screws that mate with the rack you are installing into. Using a standard Phillips screwdriver, install the screws into the rack. Connect any and all appropriate cords and cables.

If the mounting brackets are not already attached, you will need to install them as shown on the drawing below. These brackets simply screw into the indicated holes on the front of the 56000 unit. There are no rear mounting brackets. Once the brackets are installed, simply mount the unit on the rack as you would normally do.

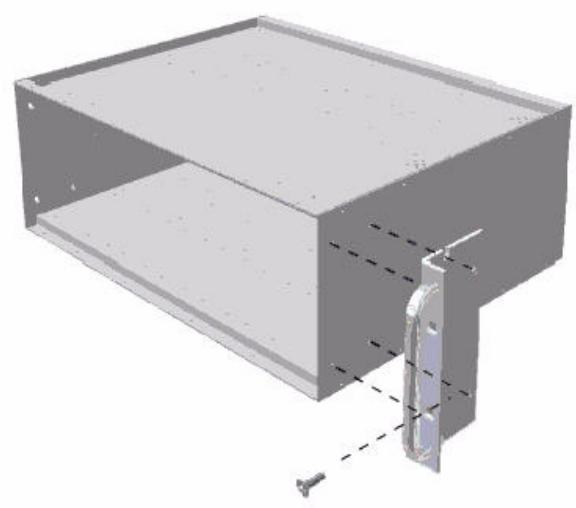


Figure 3 - Mounting brackets

Card Installation

To install, fit the card into the card guides in the frame at the top and bottom. Slide the card through in the slot avoiding contact between adjacent cards until it mates with the connector. Seat the card firmly, secure the retaining screws at the bottom. If equipped with an ejector handle, the card will lock and ejector handle will no longer be tilted downward.

Guidelines for 56000 Card Installation\Removal

While many of the module cards can be inserted into any slot, there are some slots reserved for Oscillator and Power modules:

- Slots 1 through 5 are reserved for Oscillator cards (Recommended).
- Slot 17 is reserved for the CPU card (Recommended).

- Slots 19 through 21 are reserved for Power cards only (Mandatory).

The remaining slots may be used for the remaining module cards. Active cards are inserted in the front of the chassis, Passive cards in the rear. Consult the specific manual for each module card for any other placement requirements. Generally, most module cards may be inserted into any slot (except otherwise noted) and will operate normally. Active cards have no output connectors. Passive cards have output connectors. All cards connect to the mid-plane.

The following are rear cards: 560-1181-6, 5141-x, 5142, 5143-x, 5145, 5148, 5152, 5183-x, 5186, 5187-x, 5201-x, 5202-x, 5279, 5292-x, 5302, 5292

The following are front cards: 560-5309, 5305, 5308-x, 5307-x, 5304-x, 5303, 5287, 5301, 5209, 5208, 5203-x, 5181-x, 5179-1, 5170, 5155-x, 5153, 5151, 5140-x, 1232-1, 1107.

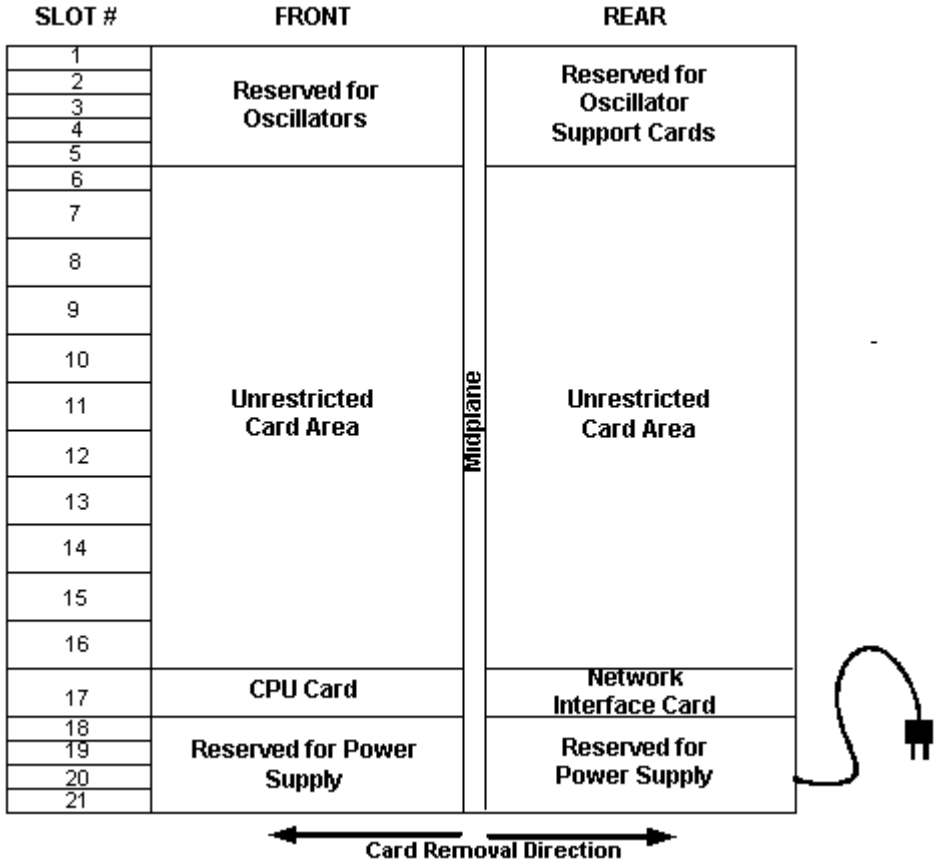


Figure 4 - Installation guidelines diagram

If the user is hot-swapping one of the older-style power supplies (without the Formex protector) and the power supply contacts an adjacent card, shorting electrical damage may occur.

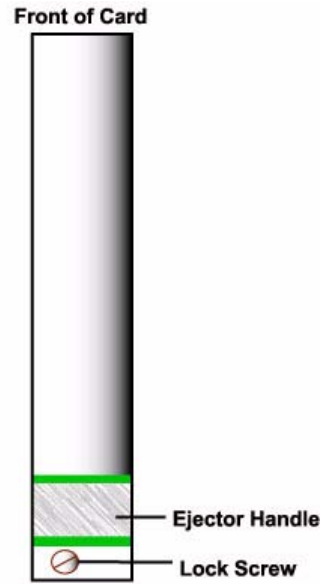
Symmetricom advises:

- Avoid installing cards adjacent to power supplies if other slots are available.
- If there is an adjacent card, avoid hot-swapping whenever possible.
- Take extra precaution not to bump adjacent cards when hot swapping.

Removing Cards

To remove a card, start by loosening the lock screw.

Newer cards feature an ejector handle that one presses downward - causing the card to come slightly out of the guide. Older cards have a stationary handle that one uses to pull the card out. Carefully pull the card out of the unit.



Optional GPS Antenna Installation

For units with GPS-disciplined oscillator modules (e.g., 560-5202 or 560-5308-4,5,6 cards), the user will need to consider consider signal strength requirements, select a GPS antenna site, and mount the GPS antenna.

Calculating GPS Signal Strength Requirements

The standard Symmetricom GPS antenna provides 41 dB of gain. When used with a standard 150 foot length of RG-59 coax cable (16-21 dB loss), the combination delivers a GPS signal strength in the 20-36 dB range required by the GPS receiver.

Abide by the minimum 20 dB input gain requirement if using other cable types or lengths. Additionally, if changing the antenna, select one that provides 41 dB gain. Other factors, such as radiation, coverage, VSWR, and input impedance also affect system performance. Symmetricom recommends using the standard antenna and cable provided with the GPS receiver.

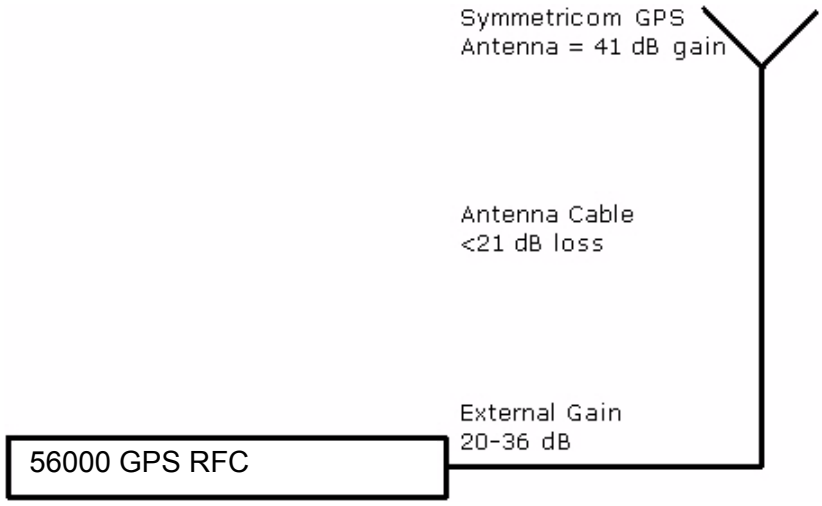


Figure 5 GPS Signal Strength Requirements

Selecting a GPS Antenna Site outdoors

Select a site that:

- Is the highest point available
- Offers a full 360× view horizontally, to within 10× vertically of the horizon
- Is higher than neighboring buildings/obstructions
- Is protected from strong radio frequency (RF) and microwave transmissions
- Is set away from RF-reflective surfaces that cause multipath interference
- Is set 3 ft. (1 m) away from other GPS antennas

Avoid:

- Mounting the antenna between tall buildings or next to walls and equipment
- Cable runs from the antenna to the receiver that exceed the specified length
- Patching multiple cables together to make a single cable run
- Running the cable through bulkheads (walls) and along side high energy cables
- Crimping or damaging the cable

Blocked signals and multipath cancellation significantly increase GPS acquisition time. Multipath cancellation is caused by reflected signals that reach the antenna out of phase with the direct signal. Multipath cancellation and blocked signals are typically caused by vertical reflective objects positioned to the side and above the antenna. To solve these problems, mast mount the antenna at least 1 meter away from and above the reflecting surface.

Mounting the GPS Antenna

Mount the GPS antenna on an antenna mast (recommended) or on the peak of a building. The GPS antenna kit includes special mounting brackets. For the mast, use 2-inch (5.08-cm) diameter water pipe or conduit that is rigid enough to withstand high winds without flexing. Use guy wires to stabilize masts longer than 10 ft. (3.048 m).

- The 56000 requires a 12 Volt-compatible antenna. Antennas not rated for 12 V will be damaged.
- Use an antenna splitter to connect a single antenna to multiple receivers. Don’t use a BNC “T” connector.
- The L1 GPS antenna is designed to operate with up to 150 ft. (60.96 m) of RG-59 coax cable. An optional Down Converter can be used for cable runs of 1,500 ft. (457.2 m) using RG-58 coaxial cable.

GPS Antenna Assembly and Mounting

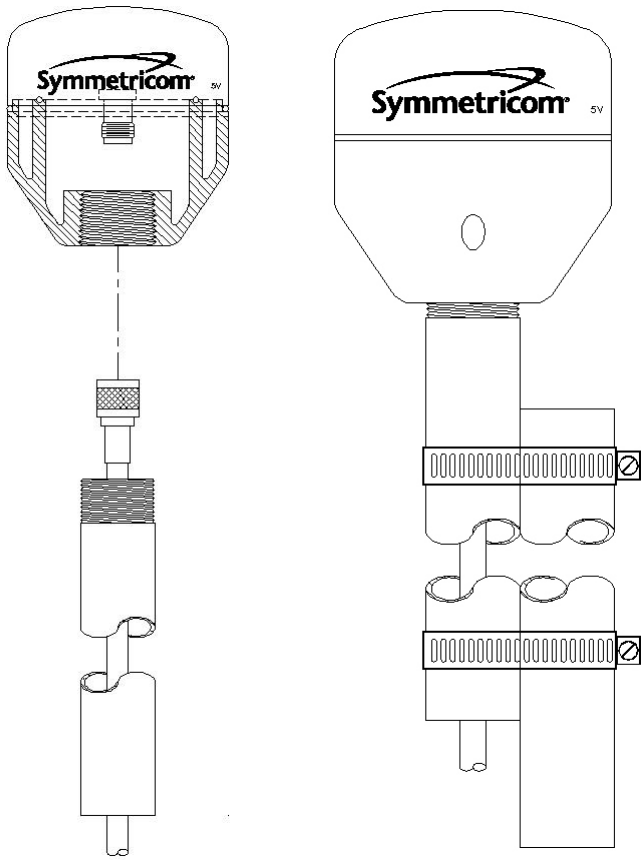


Figure 6 Recommended wiring and mounting of GPS antenna

Once mounting is completed, run the GPS antenna cable to the location where it is needed, in accordance with required cabling practices for your facility, and connect it to the GPS receiver.

Specifications

This chapter covers the physical dimensions and limitations of the 56000.

Physical

Width:	19 in. (48.26 cm)
Height:	5.2 in. (13.26 cm)
Depth:	14 in. (35.56 cm)
Weight:	13 lbs. (5.89 kg)

Environmental

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

Power - Electrical

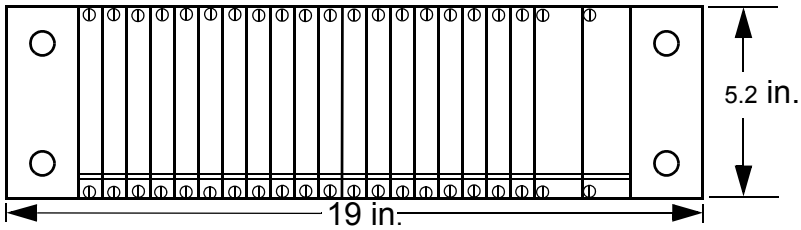
AC Input Voltage:	100-240 VAC, 47-63 Hz
AC Input Power:	135 W maximum
Output Voltage:	56 VDC ±5%
DC Input Voltage:	36-72 VDC

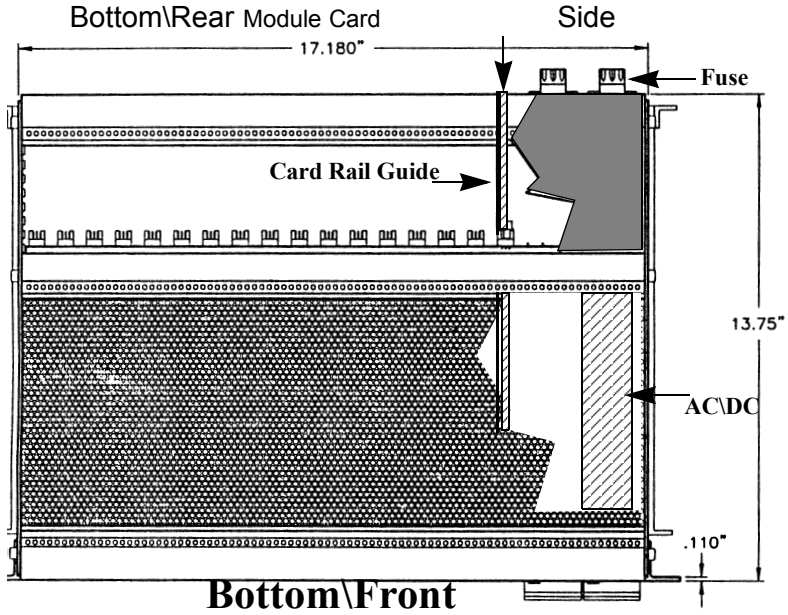
With both AC and DC inputs, the AC power supply furnishes operational power as long as the DC input is less than 56 VDC.

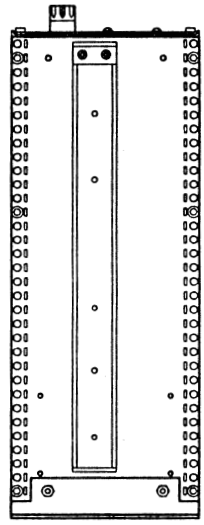
Power - Physical

Width:	1.6 in. (4.064 cm)
Height:	4.4 in. (3U)
Depth:	8.66 in. (21.99 cm)
Weight:	2 lbs. (0.09 kg)
Chassis slots:	Two

Chassis Dimensions







Fault Monitor / CPU System Architecture

This chapter details the architecture and functions of the 56000.

Mid-plane Bus Architecture

Incoming time or frequencies enter the 56000 from their Primary Reference Source (PRS), either External GPS or Cesium. These signals first pass through the passive I/O cards (passive because they are hot swappable for serviceability) and into the active modules (such as a synthesizer card, N.1, N.8 etc.) through the mid-plane and back out with a desired frequency.

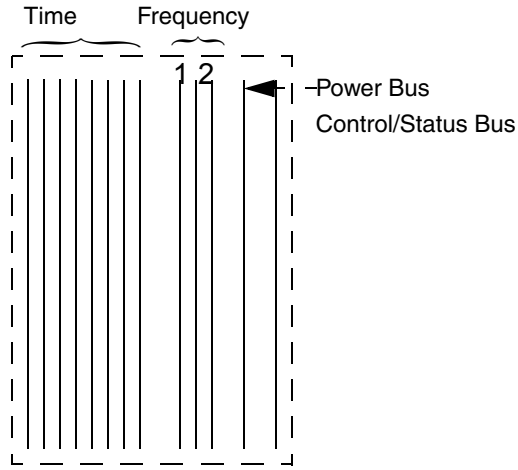


Figure 7 - Simplified bus diagram

The two most important buses in the 56000 are:

- The Frequency Bus (Refs. A, B and C)
- The Timing Bus (Lines 1-8).

Frequencies are sent to the Frequency Bus, while time code, such as IRIG-B or 1 PPS are sent to the Timing Bus. The mid-plane contains connectors for the passive and active cards that are plugged into for a variety of configurations. This mid-plane allows for the transport of frequency and timing signals. Lines 7 and 8 of the Timing bus are also reserved for frequency or timing input.

Frequency Bus Overview

The 56000 can receive up to three frequency references. These are labeled A (Primary), B (Secondary), and C (Tertiary). They are redundant. If Reference A fails, Reference B will automatically take over etc. However, the user has the option to use Reference A, B, or C with no redundancy (backup).

The 56000 can receive 1, 5, or 10 MHz but not all at the same time. This means that one input can be used with one of the three frequencies or all three inputs using the **same** frequency.

In Figure 8, a single frequency reference source enters a passive input/output card. The signal enters the mid-plane and the frequency bus. The signal enters an active card that synthesizes it into six new identical signals, which are sent back across the mid-plane and through the passive card. The converted signals exit per the output connectors ready for other users. As you can see, the configurations are endless depending on the cards purchased and how they are used with other cards.

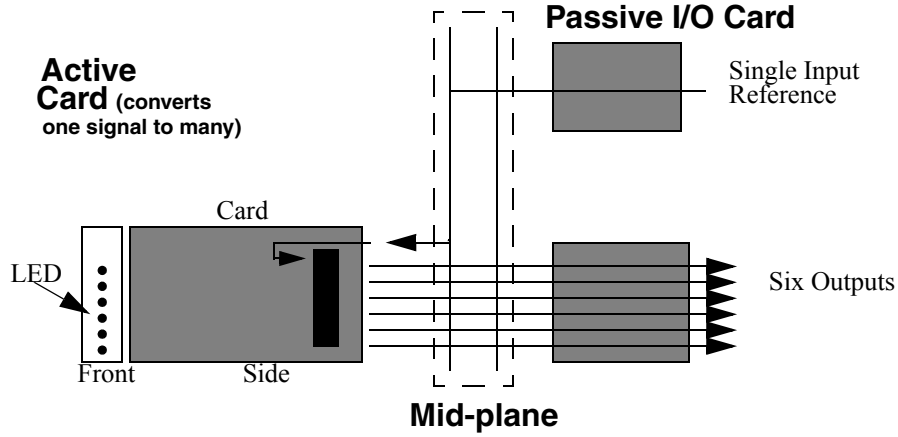


Figure 8 - Frequency bus diagram

Timing Bus Overview

The 56000 can have up to four pairs (primary and secondary) of input signals or eight independent signals with no backups. Signals can be digital or analog. Timing functions operate independently of frequency functions. Inputs include 1 PPS, IRIG-B, IRIG-H and frequency. The diagram (Figure 9) shows primary and secondary timing inputs entering the 56000. They pass into the timing bus through the mid-plane. Both the primary and

secondary input signals pass through an active card, which combines them and converts them into six outputs (this can vary depending on the configuration).

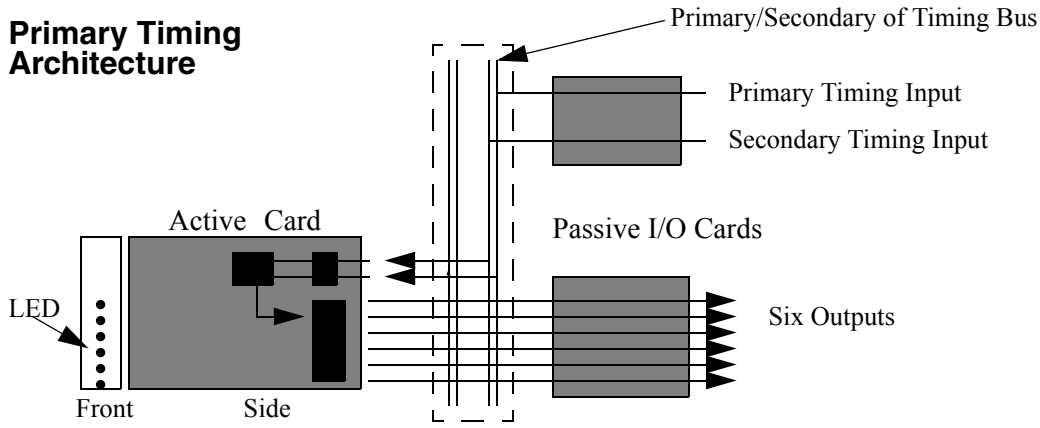


Figure 9 - Timing bus diagram

Control and Status Bus Overview

This bus takes the primary, secondary, and tertiary inputs connected to the Network Interface Card (NIC) and sends the information to the Fault Monitor CPU, which is connected to this bus. The NIC offers “pass-through” access to the Fault Monitor CPU card using either the Serial or Ethernet port (Figure 10). This card is powered by the “host” Fault Monitor CPU card and is not designed to be a “hot swappable” type card, although it can be plugged in “hot” without damage. The NIC card allows for internet access using Telnet protocol.

The Fault Monitor CPU controls and monitors the internal cards for faults, either external (loss of connection to primary reference source) or internal errors. The LEDs located on the front of the unit and on some cards will indicate faults according to color.

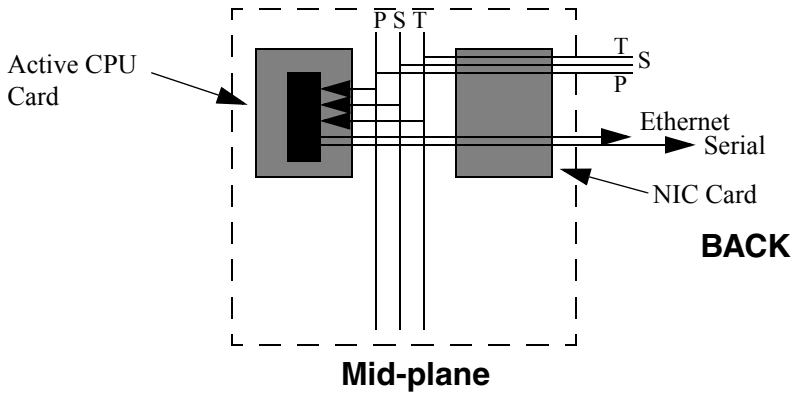


Figure 10 Control and status bus diagram

In Figure 10, Primary, Secondary and Tertiary inputs enter the NIC card and pass them to the Fault Monitor CPU card. Other cards plugged into the mid-plane also are monitored by the Fault Monitor CPU card, and status faults reported via the serial or network port.

56K Fault Monitor CPU Control Overview

This section describes the 560-5179/5301 Fault Monitor CPU card for the 56K system. The Fault Monitor CPU card system control ensures that only qualified frequency references are used in the system. The Fault Monitor CPU controls the REF A, REF B and REF C inputs on the 56K frequency card's passive combiners, disabling a bad reference. The Fault Monitor CPU also controls the Primary and Secondary disciplining inputs on the 560-5147-x and 560-5203/5308 oscillator card(s).

The Fault Monitor CPU card controls the frequency and oscillator card(s) based on the status of the (P) Primary, (S) Secondary, (T) Tertiary external status inputs. The external status inputs (P, S, T) are logic level signals that connect to the 56K's Fault Monitor CPU from an external Primary Reference Source. These status inputs map to the frequency references REF A, REF B, and REF C in 56K systems that do not use internal oscillators or in systems that use one internal oscillator that is set for Reference mode.

The external status alarm condition logic state may be configured per the Fault Monitor CPU's PSRC (Primary), SSRC (Secondary) and TSRC (Tertiary) commands. The logic state for an external status alarm may be independently set to be either alarm = high, alarm = low or alarm = disable. When the alarm state is set to disable, the Fault Monitor CPU ignores the status input completely.

The user may force a frequency reference to be turned off by using the Fault Monitor CPU's PSRC, SSRC, TSRC = O (OFF) command. This command turns the selected reference channel (REFA, REFB, REFC) on frequency cards OFF. The PSRC = O and SSRC = O commands also turn off the Primary and Secondary disciplining inputs on 56K oscillator cards.

Oscillator Sys-alarm

When internal 56K oscillators are installed, an alarm signal is generated by the oscillator when it is not locked to a reference. The alarm (sys-alarm) generated by an oscillator card will be either Asys-alarm, Bsys-alarm or Csys-alarm corresponding to the frequency reference bus the oscillator is driving - REF A, REF B or REF C. This alarm signal is passed to the Fault Monitor CPU which, in certain system configurations, will instruct the 56K frequency cards to ignore the reference frequency from this oscillator.

Frequency Control Card

The REF A, REF B and REF C frequency buses provide 1, 5, or 10 MHz references to all frequency cards in the 56K system (REF A/B/C must be the same frequency). The

frequency cards include a weighted network (Passive Combiner) that connects to the three frequency buses where the REF A channel has the highest weighting, the REF B channel has the second highest weighting and the REF C channel has the lowest weighting. When all three reference channels are enabled, the REF A channel drives the frequency card due to the signal weighting. The Fault Monitor CPU card has the ability to disable any of the frequency card's passive combiner channels based on system status. The Fault Monitor CPU control feature ensures that the frequency cards will not use a bad reference. See 4.2.8 for additional details.

Power Supply Bus Overview

This simply supplies power to the 56000. Should the primary power supply fail, the back up power supply will continue to operate the unit. The power supplies are hot swappable. The mid-plane is supplied with 48 VDC.

Signal Distribution

There are four categories of signals on the mid-plane. These are bussed frequency distribution signals, bussed timing distribution signals, bussed inter-card communication signals and isolated I/O signals.

Frequency Distribution

The bussed reference frequency distribution signals are delivered on the mid-plane per 50 Ohm controlled-impedance traces, 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 are used to deliver reference frequencies to each slot. All cards that drive REF A, B, or C are AC-coupled to the mid-plane. The signals on REF A, B, and C are 1-5 Vp-p, squarewave or sinewave.

Timing Distribution

The bussed timing distribution signals, IN1 through IN8 (Inputs 1-8), which are bussed to all slots per 50 ohm controlled-impedance traces, are provided with switch-selectable 50 ohm terminators. With the switch ON, the termination is 50 ohms-to-GND; with the switch OFF the termination is 4700 ohms-to-GND. These signals are always driven by cards located at or near Slot 1, since the terminator is located at Slot 17.

They are as follows:

- IN1 A20
- IN2 B20
- IN3 C20
- IN4 C21

- IN5 B21
- IN6 A21
- IN7 A22
- IN8 B22

BUS A and BUS B are 50 ohm-to-GND traces which are reserved for global RS-485 communications.

A23, A24, B23 and B24 are uncommitted.

Inter-card Communication Signals

The bussed inter-card communication signals include Fault, Select, and Control signals used by the Fault Monitor 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 Fault Monitor CPU. Select and Control data-bus signals are used by the Fault Monitor CPU to communicate with various function cards. The Control signals include strobe, direction and enable. All other inter-card communication signals are driven to CMOS levels on the bus.

Isolated I/O Signals

These are pins that pass from front to back through the mid-plane with no electrical connection to the mid-plane itself. They are typically used for front-card-to-back-card I/O.

Mid-plane Pinout

PIN	A	B	C
1	GND[5,6]	GND[6]	GND[6]
2	PGM[1] (SLOT CODE 0)	GND[6]	FREQA
3	PGM[1] (SLOT CODE 1)	GND[6]	GND[6]
4	PGM[1] (SLOT CODE 2)	GND[6]	FREQB
5	PGM[1] (SLOT CODE 3)	GND[6]	GND[6]
6	PGM[1] (SLOT CODE 4)	GND[6]	FREQC
7	48VDC+	48VDC+	48VDC+
8	OUT[12]	GND[2]	OUT3[2]
9	OUT[22]	GND[2]	OUT4[2]
10	GND[2]	GND[2]	GND[2]
11	OUT[52]	GND[2]	OUT7[2]
12	OUT[62]	GND[2]	OUT8[2]
13	GND[2]	GND[2]	GND[2]
14	OUT[92]	GND[2]	OUT11[2]
15	OUT[102]	GND[6]	OUT12[2]
16	48VRTN	48VRTN	48VRTN
17	D0	D1	D2
18	D3	D4	D5
19	D6	D7	DIR (HI=W / LO=R)
20	IN1	IN2	IN3
21	IN6	IN5	IN4
22	IN7	IN8	-STB
23	N/C	N/C	BUSA (RS-485 +)
24	N/C	N/C	BUSB (RS-485 -)
25	-FLTIN1	ENABLE[3]	-FLTOUT[4]
26	-FLTIN2	-FLTIN8	-FLTIN14
27	-FLTIN3	-FLTIN9	-FLTIN15
28	-FLTIN4	-FLTIN10	-FLTIN16
29	-FLTIN5	-FLTIN11	-FLTIN17
30	-FLTIN6	-FLTIN12	-FLTIN18
31	-FLTIN7	-FLTIN13	-FLTIN19
32	GND[5,6]	GND[6]	GND[6]

See footnotes on following page...

Footnotes for Mid-plane Pinout Table:

1. Slot Code, High-true 1-17 (0x01-0x11) - HI=floating / LO=GND on backplane.
2. Pins pass through backplane with no electrical contact to backplane (typical hex output front/rear card pair shown). It is critical that the GND signals be connected to the GND plane on the front card **and** rear card in order to maintain good signal integrity through the backplane.
3. All bus levels are CMOS except Enable, which is TTL (HI=2.5VDC).
4. Bused, except -FLTOUT (connected to appropriate -FLTINn @ each slot.
5. Extended pin on each card connector for static discharge.
6. Minimum number of GND pins for any front/rear card.

Circuit Characteristics

The passive combiner is a circuit that always outputs the desired signal derived from three separate inputs REF A, B, and C without introducing any switching transient or glitch when one or two of the inputs are lost. It is composed of three high speed comparators and a passive combining network. The input comparators serve to produce a very clean squarewave with very good symmetry. These squarewaves are then buffered and applied to give the primary source the greatest influence on the final result. Proper operation of the Passive Combiner requires that the input frequencies be precisely syntonized, but not synchronized. Syntonization error causes accumulating phase shift in the zero cross-over point of the combined signals, resulting in a constant error in the local reference frequency. Synchronization error effects the location of the cross-over point; but, since the location remains constant, it does not affect the frequency. When a frequency source is eliminated, there is an instantaneous phase shift; however, it is a one-time effect that is filtered by downstream PLL stages.

Each of the three inputs (REFA, B, and C) is provided with a disable control, accessible to the Fault Monitor CPU per a local control register. This allows the Fault Monitor CPU to disable any reference input that is not dependable. The Fault Monitor CPU has a direct status input from each external reference. The Fault Monitor CPU uses its P/S/T status inputs to determine REF A/B/C signal quality. If any status goes to the alarm condition, the Fault Monitor CPU commands the corresponding input off at each frequency input card.

Timing Inputs

Each timing card supports a primary and a secondary timing input from any of the IN1 through IN8 backplane lines. The primary and secondary input have individual activity detectors, the status of which is available per a status register. When the primary input of any card ceases activity, the secondary input is locally selected. It can be switched back to primary only per Fault Monitor CPU command. If no Fault Monitor CPU is present (the card's Power Cycle bit is active), the card will unilaterally return to Primary if it detects a good signal for 1-2 minutes. A card will not switch to Secondary unless it has activity and it is not inhibited (this includes using of the SEC! command). The P/S LED will blink if the

card has no input signal at all. If it switches to a good secondary, the LED will remain green. If the incoming signal is bad, the LED is red.

The Fault Monitor CPU continually scans cards with timing inputs. When it finds one that has switched to secondary, it individually commands all timing input cards to switch to secondary. When this occurs, the Fault Monitor CPU will blink its PRI LED.

When a Fault Monitor CPU is hot swapped, it waits 5 seconds then checks for Primary faults. If no Primary faults, it does nothing. If it finds primary faults, it switches all cards to secondary.

Depending on the user-setup mapping of the P/S/T status inputs to the Fault Monitor CPU, the Fault Monitor CPU will switch all timing input cards to secondary if the appropriate status input goes to the alarm condition.

Local Power Supply

The DC-to-DC Converter converts 48 VDC backplane power to local DC power. It is fully-isolated from the backplane power and referenced to signal GND. A fuse protects the backplane power bus from internal DC power shorts.

Fault Indicators

The primary fault indicator on each card is designed to activate during a composite fault, or when on-board power is lost. It is powered directly from the raw backplane voltage 48 VDC and held off by an opto-isolator during no-fault conditions.

Passive Rear Cards

The BNC cards have 50 Ohm to ground controlled impedance traces. The wire-wrap cards have 100 Ohm complementary-pair controlled impedance traces. The impedance control grounds are carried through the connector.

Fault Monitor CPU Fault Sensing and Switching

The Fault Monitor CPU monitors reference inputs from the backplane. REF A, REF B, and REF C signals enter the card through the backplane on pins C2, C4, and C6. Each input passes through an identical set of circuitry to provide control of the front panel LED's REF A, REF B, REF C, and the signals /AOK, /BOK, and /COK which are read by the processor. A copy of the frequency is sent buffered to the front panel test points REF A, B, and C. Some of the option cards allow the user to configure the outputs via the serial port. Others are configured with switch settings on the option card. Details for

option card configuration are given in the specific option card manual. In either case, the Fault Monitor CPU identifies the cards and reports faults over the serial port and front panel LED's. The frequency monitors can be made inactive by setting SW1 appropriately. The Fault Monitor CPU card supports both RS-232 and RS-422 protocols at 9600 baud, 8 data bits, no parity, and 1 stop bit. The Fault Monitor CPU uses a microcontroller. Frequency switch option cards utilize the three reference frequency inputs REF A, REF B, and REF C. When REF A is valid, it is used to generate the output frequency. If REF A is invalid, the Fault Monitor will cause all frequency switch cards to disable REF A and use REF B to generate the outputs. Similarly, if REF A is disabled and REF B goes bad, the Fault Monitor will disable REF B on all frequency switch cards and REF C will be used to generate the frequency outputs.

At initialization, all reference inputs are enabled. When one of the external fault status inputs indicates an alarm condition, the corresponding reference will be disabled at each card. The primary status input, "P", will cause REFA to be disabled. Similarly, the secondary and tertiary status, "S" and "T", will disable REFB and REFC. The associations are: Primary(P) = REFA, Secondary(S) = REFB, Tertiary(T) = REFC.

If all reference frequencies are considered "bad," then the Fault Monitor CPU will leave any active references enabled.

The Fault Monitor CPU Fault Monitor is designed to monitor the faults from each of the nineteen slots, three reference inputs (REF A, B, C), and three external fault inputs (P, S, and T). It also uses the address and data busses on the backplane to obtain additional information from some of the cards. When timing switch cards are installed in the chassis, the Fault Monitor will evaluate the fault information and control selection of the primary and secondary inputs. The Fault Monitor can send its information serially via RS-232 or RS-422 via an I/O Module rear panel card to the user. The Fault Monitor CPU may control an audible beeper as well as the fault relay output lines.

The Fault Monitor CPU card has several switch-selectable features. For example, the 560-5179's SW1-1,2,3 control whether the input frequency detectors controlling the front panel LED's and fault detectors are Active or Inactive.

Timing switch option cards utilize two inputs (selected at installation of each card) from the eight inputs to the chassis (IN1-IN8). The Fault Monitor CPU reads the configuration of the timing cards and provides it to the user in the report outputs as well as in configuration information. When the primary input to a Timing Switch card becomes inactive, this card automatically selects the secondary input. The Fault Monitor CPU will then attempt to cause all timing switch cards to change to the secondary inputs. A card will not switch if it has an inactive secondary input. The "PRI" command will first clear any latched fault status bits on the cards and then implement a switch to the primary inputs if the primary inputs are determined to be good.

The serial port is able to provide status information about the option cards installed in the chassis. The reports can be generated in three ways: On request, each time a fault condition changes, or at approximate time intervals. To request a report from the unit, send an R. A report will be returned which lists each slot and its current fault information.

To receive a report any time a fault condition changes, send an ARON to the port to turn Automatic Reporting ON. A report will be generated showing the current status of the fault signals. From that time, any change in one of the fault signals or system status will cause a report to be sent. When the chassis configuration is changed, a report will be sent when automatic reports are enabled. To disable the reports, send AROFF.

Fault Criteria

To help the user identify what events or criteria trigger a fault, which the Fault Monitor CPU card reports, use the following general guidelines in this section. Be aware that this is not a comprehensive list but a general list of the usual suspect faults. Due to the nature of the 56000 unit, numerous configurations and cards, this is only a general list and not specific to any one configuration. Card switch settings are also critical to fault reporting and impact how the Fault Monitor CPU card interprets an event that may or may not trigger a fault which is reported. Most active cards are monitored for faults, most passive cards are not monitored. (Activity = a continuous electronic signal)

Fault Criteria Events:

- Time out exceeded limit
- Signal activity is intermittent or absent for 1+ minutes
- Voltage is below minimum specification of card or out of tolerance
- Input frequency is below minimum specification of card
- Loss of input frequency
- Output drivers fail (e.g., Frequency, amplitude or timing drifts below minimum specification of card or card switch setting is incorrect.)
- Input inactivity for 1+ min.
- Loss of signal due to inactivity
- Input signal and board switch settings conflict (e.g., Input signal is 10 MHz. Input or Output board switch settings are set to 1 MHz.)
- Output card does not have viable input signal source
- Card incompatibility
- Sampled output is not switching
- No signal detected from output
- Loss of power
- Input Reference is off frequency
- Loss of all References
- Voltage Controlled Oscillator failure

Common Applications

This chapter provides details of the most common 56000 system configurations and their setup in detail.

Common configurations usually have external timing and frequency reference sources entering the 56000.

Before You Begin

Regardless of how the 56000 is used, complete the following steps:

- Decide which bus to use (Timing or Frequency).
- Determine the types of inputs and outputs required. If output requirements are 4.096 MHz or less, use 560-5141-3 cards. If up to 8.192 MHz is needed, use 560-5192-3 cards.

In 560-5308-x Oscillator applications, be aware of:

- In Reference mode, one oscillator uses References A and B as disciplining inputs. Oscillator output is on Reference C.
- In Input mode, two oscillators use lines IN7 and IN8 as disciplining inputs. Oscillator output is on Reference A, B or C.

Redundant Time and Frequency Switching

In this configuration (see following figure), frequencies and timing signals are received from two remote GPS receivers. One receiver is selected to be the Primary source and the other receiver the Secondary source. The frequency input to the 56000 is 10 MHz. The

56000 also receives an IRIG-B timing signal. 10 MHz enters the mid-plane at references A and B. The mid-plane transports the signal to the top four input cards. These cards convert the 10 MHz into:

- Six N.8 Rate outputs (four at 4.096 MHz, one at 8.192 MHz)
- Six 1 MHz outputs
- Six 5 MHz outputs
- Six 10 MHz outputs

IRIG-B timecode enters the 56000 via the Passive Bus Input card that connects to timing bus lines IN1 and IN2. The two IRIG-B signals (Primary and Secondary) enter the 560-5181 card that buffers the currently active channel, Primary or Secondary. The outputs from this card are connected to a passive output card that provides six IRIG-B outputs on BNCs.

The 56000 chassis may have dual redundant power supplies.

Another 56000 unit can be attached and configured differently by connecting to the remote GPS receivers.

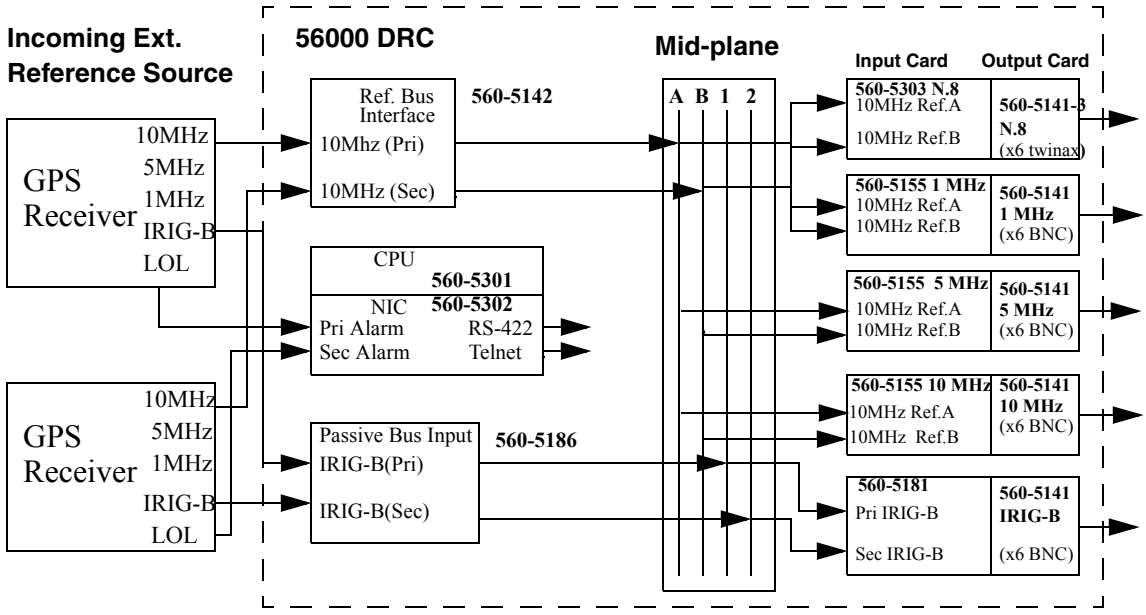


Figure 11 Redundant Time and Frequency Switching

The reader should be aware that the various settings listed in this example reflect but one possible configuration. Changing cards to meet your specific needs may change the switch settings. Because of this, always read each of the card manuals with your specific needs and objectives in mind.

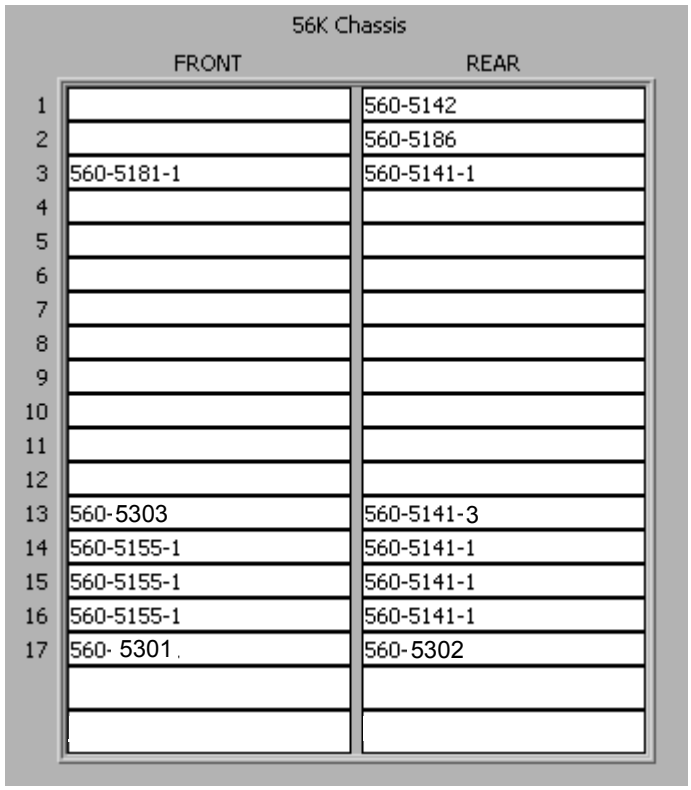
Components

The 56000 in this configuration contains the following card modules:

- 560-5142 (Ref A,B,C input BNC)
- 560-5186 (Hex Timing input BNC)
- Four 560-5141-1 (Hex output BNC)
- 560-5141-3 (Hex output Twinaxial)
- 560-5301 (Fault Monitor/CPU)
- 560-5302 (NIC Ethernet Interface)
- 560-5303 (N.8 Frequency Synthesizer)
- Three 560-5155-1 (1,5 or 10 MHz sine wave synthesizer)
- 560-5181-1 (Analog buffer)

Card Placement Configuration

Use the following guide on the next page to locate and place the component cards inside the chassis.



560-5301 Fault Monitor CPU Card

The 560-5301 Fault Monitor CPU has several switch-selectable features. SW1-1, 2, 3 control whether the input frequency detectors controlling the front panel LED's and fault detectors are Active or Inactive. Setting the switches to the OFF position will allow the individual detector outputs to pass through to the LED control circuitry and the processor. Setting the switches to ON pulls the output of the corresponding detector circuit high indicating a valid input signal all of the time. Each of the three detectors may be activated or de-activated independently. SW1-4 selects the input termination of the RS-422 input lines. Silk-screen on the card indicates how to select either 100 or none. SW3-1 selects between RS-232 and RS-422; OFF selects RS-232 and ON selects RS-422. Once the card has been configured, power may be applied and further software configuration may be done as desired. Software configuration is detailed in the software description.

Jumper default settings:

SW 1-1, 2, 3 = **OFF** (Active)

SW 1-4 = **OFF**

SW 3-1 = **OFF** (RS-232)

At initialization, all reference inputs are enabled. Timing switch option cards utilize two inputs (selected at installation of each card) from the eight inputs to the chassis (IN1-IN8). The Fault Monitor reads the configuration of the timing cards and provides it to the user in the report outputs as well as in configuration information.

The user should consult the 560-5301 card manual for specifics regarding:

- External Fault Input Controls
- Fault Alarms

560-5142 Card

No configuration required.

560-5302 NIC

The 560-5302 card must be installed directly behind the 560-5301 Fault Monitor CPU card. The 560-5301 card MUST be configured for RS-232 operation (JP1 ON). The user should refer to the specific NIC card manual for commands and user interface information.

Serial Port I/O Signals

Use 560-5302 JP4 to select RS-232 or RS-422 operation:

- JP4 1-2 selects RS-232
- JP4 2-3 selects RS-422

The user must provide a terminal (RS-232 or RS-422) for 56K-NIC set-up parameters and an Ethernet network connection. Once the 56K-NIC card has been set-up, the card retains all configuration data in FLASH Memory.

Jumpers

JP1 = must be ON.

This two-pin jumper is the 560-5301 Fault Monitor CPU remote reset enable. When JP1 is ON, the 56K-NIC card has the ability to reset the "host" Fault Monitor CPU card. The factory default is ON (560-5301 remote reset enabled).

JP2 = factory default is OFF (beeper disabled).

This two-pin jumper is the hardware enable for the audio alarm (beeper). When JP2 is ON, the beeper is enabled and under the control of the 560-5301 Fault Monitor CPU card.

JP3 = 1-2 (used only when Alarm Relay Option is installed)

JP4

The factory default is 1-2 (RS-232). This three-pin jumper switches the Serial port's receive signal from RS-232 to RS-422. If the user desires RS-232 Serial port communication, set JP4 1-2. If RS-422 Serial port communication is desired set JP4 2-3.

JP5 = 1-2 (used only when Alarm Relay Option is installed)

560-5186 Card

No configuration required.

560-5303 N.8

The setup of the 560-5303 N.8 Frequency Synthesizer card involves setting the following DIP switches.

Required switch settings:

1. Passive Combiner Select Switches (SW6 - SW10)

For 10 MHz:

The setup of the 560-5170 N.8 Frequency Synthesizer card involves setting the following DIP switches:

Required switch settings:

1. Input Frequency Select Switch (SW3-2 & SW3-3)

   For 10 MHz:

   SW 3-2 = **ON**

   SW 3-3 = **OFF**

2. Output Drive Select Switch (SW3-4)

   For TTL output:

   SW 3-4 = **ON**

3. CPU / LOCAL Mode Select (SW7-4)

   For mode:

   SW 7-4 = **OFF** (CPU mode)

4. Output Frequency Selection Switches (SW4 & SW3-1) (local mode only)

   In this example, CPU mode is selected. Therefore, no switch settings are required for output frequency.

   To align the rising edge of the outputs (phase synchronize) with other N.8 outputs in the system, the following switches must be set.

5. Primary Synch Input Switch (SW1)

   In this example, we are using Input 1 for primary synchronization.

   Switch 1-1 = **ON**.

   SW1-2 thru SW1-8 = **OFF**.

PRIMARY SYNC INPUT SW1	-1
INPUT 1	**ON**
INPUT 2	OFF
INPUT 3	OFF
INPUT 4	OFF
INPUT 5	OFF
INPUT 6	OFF
INPUT 7	OFF

6. Secondary Synch Input Switch (SW2)

   In this example, we are using Input 2 for secondary synchronization. Switch 2-2 = **ON**.

   SW 2-1 = **OFF**, SW 2-3 thru SW2-8 = **OFF**.

SECONDARY SYNC INPUT	-1	-2
INPUT 1	**ON**	OFF
INPUT 2	OFF	**ON**
INPUT 3	OFF	OFF
INPUT 4	OFF	OFF
INPUT 5	OFF	OFF
INPUT 6	OFF	OFF
INPUT 7	OFF	OFF
INPUT 8	OFF	OFF

7. Primary Synch Input Enable Switch (SW5)

   Switch 4 is set to the binary representation of whatever the setting used for SW1 is. SW 12 is set to Input 1.

   Thus, SW 5-1 = **ON** and SW 5-2 thru SW 5-4 = **OFF**.

8. Secondary Synch Input Enable Switch (SW6)

   Switch 6 is set to the binary representation of whatever the setting used for SW2 is. SW 11 is set to Input 2.

   Thus, SW 6-2 = **ON**, all others = **OFF**.

SECONDARY SYNC INPUT ENABLE	SW6-1	SW6-2	SW6-3	SW6-4
INHIBIT	OFF	OFF	OFF	OFF
INPUT 1	ON	OFF	OFF	OFF
INPUT 2	OFF	ON	OFF	OFF

9. Delay Switch (activity time-out) (SW7-1 through SW7-3)

   The synchronization input signal is 1 PPS (1 second period), the setting would be: SW7-1 **OFF**, SW7-2 **OFF**, SW7-3 **ON** - (2.5 second time-out).

   If you want a different delay setting, consult the 560-5303 card manual.

10. CPU Mode

    To set to CPU mode, SW7-4 is OFF. SW4 and SW2 are not used. CPU mode allows the six N.8 outputs to be set via the serial port on the CPU card.

560-5155 Card

The setup of the 560-5155-1 1, 5 or 10 MHz sine wave output card involves selection of the following DIP switches:

1. Required Settings (SW8 & SW9)

   SW8 and SW9 must be set as follows:

   SW8 switches 1 through 8 = **OFF**

   SW9 switches 1 through 8 = **ON**

2. Passive combiner select switches (SW3 through SW7)

   For 10 MHz input frequency:

   SW 3-1 thru SW 7-1 = **ON**

   All other switches = **OFF**

3. Input frequency select switch (SW1)

   For 10 MHz:

   SW 1-1 = **ON**

   All others = **OFF**

SW 1-4 determines operating mode: Phase Lock Loop (PLL) or Bypass. PLL sends the signal via the oscillator. Bypass sends the signal directly to the mid-plane. In this example, there is no oscillator. Thus, the setting for SW 1-4 = **ON**.

4. Output frequency select switch (SW2)

   Since the output frequency 10 MHz:

   SW 2-1 = **ON**, All others = **OFF**

560-5181-1 Card

Required Settings (SW4 & SW7)

SW4 and SW7 MUST be set as follows:

- SW4 switches 1 through 8 = **ON**
- SW7 switches 1 through 8 = **OFF**

Refer to 5181-1 manual for additional optional switch settings.

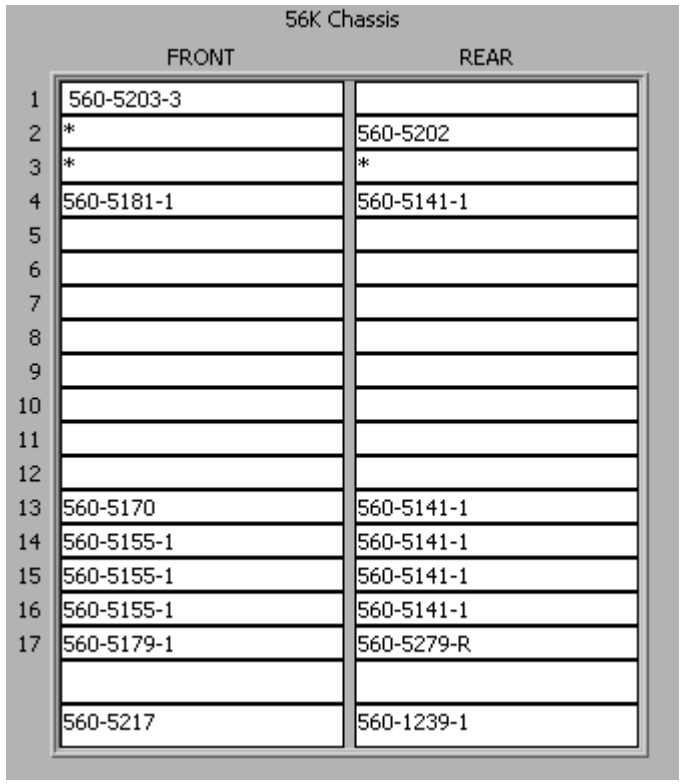
560-5141-1 Card

This card requires no configuration.

Dual Ext. GPS Synchronized Redundant Time and Frequency with Oscillator

One popular configuration is identical to that shown in 5.4, except with an oscillator card. To set up the 560-5203-3 oscillator, see the following page.

Card Placement Configuration



56K Chassis

	FRONT	REAR
1	560-5203-3	
2	*	560-5202
3	*	*
4	560-5181-1	560-5141-1
5		
6		
7		
8		
9		
10		
11		
12		
13	560-5170	560-5141-1
14	560-5155-1	560-5141-1
15	560-5155-1	560-5141-1
16	560-5155-1	560-5141-1
17	560-5179-1	560-5279-R
	560-5217	560-1239-1

560-5203-3 Oscillator Switch Setup

SW 1:

SW1-1, SW1-3, SW1-5, SW1-6 = **ON**

All others = **OFF**

SW 2:

SW2-1, SW2-7, SW2-8 = **ON**

All others = **OFF**

SW 3:

SW3-3, SW 3-7 = **ON**

All others = **OFF**

System Control (No Internal Oscillator)

56000 systems that do not include an internal oscillator use the CPU's external status inputs (P) Primary, (S) Secondary, (T) Tertiary to control the 56K frequency cards. The Fault Monitor CPU controls the frequency cards using the following logic.

Frequency Control Card

1. If Primary status (PSRC) = /OK **OR**

   Primary status (PSRC) = OFF **OR**

   REFA = OFF **OR**

   REFA = /active **THEN**

   REFA = BAD -- disable REFA channel on frequency cards.

2. If Secondary status (SSRC) = /OK **OR**

   Secondary status (SSRC) = OFF **OR**

   REFB = OFF **OR**

   REFB = /active **THEN**

   REFB = BAD - disable REFB channel on frequency cards.

3. If Tertiary status (TSRC) = /OK **OR**

   Tertiary status (TSRC) = OFF **OR**

   REFC = OFF **OR**

   REFC = /active **THEN**

   REFC = BAD - disable REFC channel on frequency cards.

4. If REFA = BAD **AND**

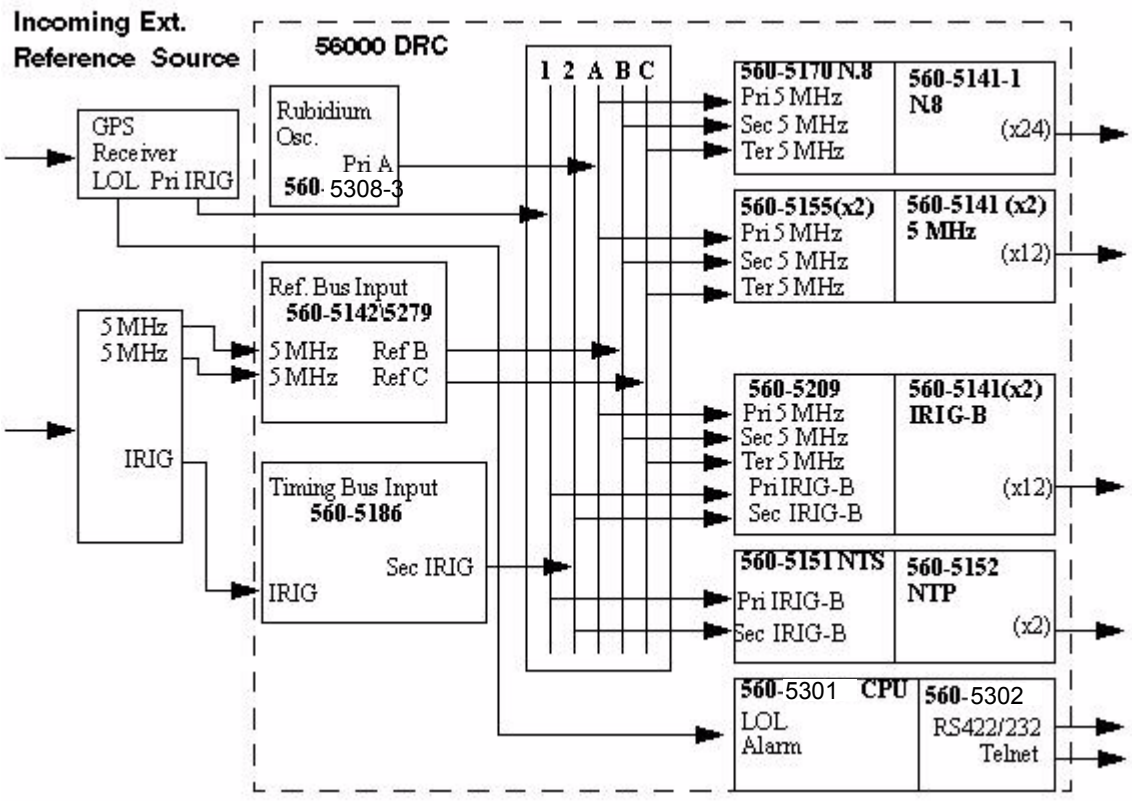
   REFB = BAD **AND**

   REFC = BAD **THEN**

   enable any active channel (REFA/B/C)

Single Ext. GPS Synchronized Redundant Time and Frequency with Oscillator

In this configuration, two external time and frequency sources enter the 56000. Input frequency is 5 MHz. Time code input is IRIG-B from non-GPS and GPS sources. The primary time is from GPS, the secondary time is from non-GPS primary reference sources. Output is 5 MHz and IRIG-B.



The above configuration uses GPS for the Primary Reference Source. Should this fail, the non-GPS connection inputs the time code and frequencies.

This configuration creates the following outputs:

- 24 BNC N.8
- 12 BNC 5 MHz
- 12 BNC IRIG-B
- 2 NTP
- 1 RS-422 or RS-232
- 1 Telnet

Card Placement Configuration

56K Chassis

	FRONT	REAR
1	560-5308-1	
2	*	560-5202
3	*	*
4	560-5181-1	560-5141-1
5	560-5181-1	560-5141-1
6	560-5151	560-5152
7	560-5151	560-5152
8		
9		
10		
11	560-5170	560-5141-1
12	560-5170	560-5141-1
13	560-5170	560-5141-1
14	560-5170	560-5141-1
15	560-5155-1	560-5141-1
16	560-5155-1	560-5141-1
17	560-5301	560-5302
	560-5217	560-1239-1
	560-5217	560-1239-1

Components

The cards used in this configuration are:

- 560-5203-3 Rubidium Oscillator
- 560-5142\5302 Reference Input Bus
- 560-5186 Timing Input Bus
- 560-5170 N.8
- Two 560-5155-1 Frequency Synthesizer
- Two 560-5209 IRIG
- Two 560-5151 NTS
- 560-5301 CPU
- Five 560-5141-1
- Two 560-5152 Input/Output
- 560-5302 NIC

Card Configuration

560-5142

No Configuration required.

560-5301 Fault Monitor CPU Card

SW 1:

SW1-1, SW1-3, SW1-4 = **OFF**

SW1-2 = **ON**

560-5302 NIC

JP 1, JP 2, pin 1 = **ON**

JP 3, pin 1 = **OFF,** other pins = **ON**

JP 4, pin 3 = **OFF**, other pins = **ON**

JP 5, pin 1 = **OFF**, other pins = **ON**

560-5186

No Configuration required.

560-5155-1

Settings for 5 MHz (as in the configuration example) are:

Required Settings for SW8 - SW9

1. SW 8-1 through SW 8-8 = **OFF**

   SW 9-1 through SW 9-8 = **ON**

   Passive Combiner Settings for 5 MHz

2. SW 3-1 through SW 7-1 = **OFF**

   SW 3-2 through SW 7-2 = **ON**

SW 3-3 through SW 7-3 = **OFF**

SW 3-4 through SW 7-4 = **OFF**

Input Frequency Switch for 5 MHz

3. SW 1-1 = **OFF**

SW 1-2 = **ON**

SW 1-3 = **OFF**

SW 1-4 = **OFF**

Output Frequency Switch

4. SW 2-1 = **OFF**

SW 2-2 = **ON**

SW 2-3, SW 2-4 = **OFF**

560-5181-1

Required Settings (SW4 & SW7)

SW4 and SW7 MUST be set as follows:

- SW4 switches 1 through 8 = **ON**
- SW7 switches 1 through 8 = **OFF**

Refer to 5181-1 manual for additional optional switch settings.

560-5141-1

No configuration needed.

560-5152

No configuration needed.

560-5151

Required Switch Settings (SW 7-4)

1. All switches must be **OFF**.

   Primary Timing Input Source Switch (SW5)

2. SW 5-3 = **ON**, All others = **OFF**

   Secondary Switch Settings (SW6)

3. SW 6-4 = **ON**, All others = **OFF**

   Primary Timing Input Enable Switch (SW2)

4. SW 2-1, SW 2-2 = **ON**, SW 2-3, SW 2-4 = **OFF**

   Secondary Input Enable Switch (SW3)

5. SW 3-3 = **ON**, All others = **OFF**

   Analog/digital Timing Input Switch (SW4-4)

6. SW 4 is used to set the NTS for compatibility with an IRIG-B AM or IRIG-B DC time synchronization input:

   SW 4-2 = **ON,** All others = **OFF**

   User Port RS-232 / RS-422 Switch

   For this configuration example, SW 1-3 = **ON**, SW 1-4 = **OFF**

   User Port RS-422 Terminator Switch (SW7-3)

   For this configuration example, SW 7-3 = **ON**

   Refer to the specific card manual for additional information and options.

560-5209

Required Mode Settings

The 560-5209 can operate in one of three output modes. Each mode requires a unique pattern of switch settings. The modes are AM output mode, DC shift RS-422 output mode and DC shift TTL output mode. For this example, DC RS-422 output mode is used.

DC Shift RS-422 Output Mode

This mode will provide the user with six IRIG-B DC shift RS-422 outputs and will enable an IRIG-B DC shift TTL output that may be inserted on the chassis' timing bus.

For IRIG-B RS-422 outputs, SW3 and SW4 must be set as follows:

1. SW3 switches 1 through 8 = **OFF**

   SW4 switches 1-7 = **ON**, Switch 8 = **OFF**

   Primary Code Input Source Switch (SW1)

2. SW 1-3 = **ON**, All others = **OFF**

   Secondary Code Input Source Switch (SW2)

3. SW 2-4 = **ON**, All others = **OFF**

   AM\DC Input (SW 10)

4. SW 10-4 = **ON**, All others = **OFF**

   DC Shift TTL Output (SW 3, SW 4)

5. SW 3: All switches = **OFF**

6. SW4: SW4-1 through 4-6 = **ON**, all others = **OFF**

   Primary Input Enable Switch (SW6)

7. SW 6-1, SW 6-2 = **ON**, SW 6-3, SW 6-4 = **OFF**

   Secondary Input Enable Switch (SW7)

8. SW 7-3 = **ON**, SW 7-1, SW7-2 SW 7-4 = **OFF**

   Timing Input Bus Insertion Switch (SW5)

9. All switches = **OFF**

   External Reference Frequency Enable (SW8)

10. SW 8-1, SW8-2, SW8-3, SW8-4, SW 8-8 = **ON**

    All others = **OFF**

560-5155

Required Settings (SW8 & SW9)

1. SW 8 and SW 9 must be set as follows:

SW 8 switches 1 through 8 = **OFF**

SW 9 switches 1 through 6 = **ON**, SW 9-7 = **OFF**, SW 9-8 = **ON**

Passive Combiner Select Switches (SW3 through SW7)

2. Set SW 3 through SW 7 to match the input frequency in use REF A, B, and C frequency reference, in this example for 5 MHz.

SW3-1 thru SW7-1 = **OFF**

SW3-2 thru SW7-2 = **ON**

SW3-3 thru SW7-3 = **OFF**

SW3-4 thru SW7-4 = **OFF**

Input Frequency Select Switch (SW1)

4. Set SW 1 to select the proper input frequency. This selection sets FPGA U4 for the proper divide ratio (for the PLL's phase detector).

The following are settings for 5 MHz:

SW1-1 = **OFF**

SW1-2 = **ON**

SW1-3 = **OFF**

Operating Mode PLL Bypass

SW1-4 = **OFF** (PLL is active)

Output Frequency Select Switch (SW2)

5. Set SW2 to select the desired output frequency. This selection enables the appropriate sine wave shaping circuit. In this example, it is 5 MHz.

SW 2-1= **OFF**

SW 2-2 = **ON**

SW 2-3 = **OFF**

560-5203-3 (560-5308-3) Oscillator Card

The following setup applies when using the Aux Ref Mode to discipline the Oscillator. SW1 positions 5, 6, 7 and 8 (BRD0, BRD1, BRD2, BRD3) sets the card type. This setting indicates what type of disciplined oscillator is used. SW 1 *must* be set as follows:

1. Required Settings for the 560-5203-3 (not applicable for 560-5308-3):

   SW1-1 = **OFF**

   SW1-2 thru 1-4 = **ON**

   SW1-5 (BRD0) = **ON**

   SW1-6 (BRD1) = **ON**

   SW1-7 (BRD2) = **OFF**

   SW1-8 (BRD3) = **OFF**

2. Aux Ref Enable

   Set SW 2-1, 2-2 (AUX) = **ON** to enable Aux Ref Mode.

3. Operating Mode -- Reference / Input

   Set SW 2-3 (REF/IN) for the desired operating mode, Reference

   or Input. Reference Mode is used for single Oscillator installations.

   SW 2-3 thru 2-6 = **OFF** (Reference mode active), SW 2-8 = **OFF**

   SW2-7 = **ON**

4. Secondary Aux Ref Source Enable

   Use SW2-4 (SEN) to control whether a secondary Aux Ref disciplining source is to be used or not. In this example, it is not.

   SW 2-4 = **OFF** (Disabled)

5. Timing Output Latch Enable

   Use SW 2-7 to latch the 1 PPS and IRIG B signals to the timing bus when GPS unlocks. Otherwise, these outputs are disabled when GPS is in unlocked status.

   Set SW 2-7 = **ON** (Enabled)

6. Output Frequency Select (1, 5, 10 MHz)

Set SW 1-1 and SW 1-2 (FRQ0 and FRQ1) to select the Oscillator's output frequency. For 5 MHz output:

SW1-1 (FRQ 0) = **OFF**

SW1-2 (FRQ 1) = **ON**

7. Oscillator Drive Select (REF A,B,C)

   The settings must be as follows since reference mode is used:

   SW 1-3 and SW 1-4 = **ON**

8. Green LED Control

   Use SW2-8 (GRN) to control the front panel status LED. When the switch is ON, a GREEN LED indication is displayed when the Oscillator is locked to the Aux Ref source. (otherwise LED is dark/not illuminated when Osc. is locked)

   SW 2-8 = **ON**

9. Switch 3

   SW 3-3, SW 3-7 = **ON**, All others = **OFF**

560-5170 N.8 Card

Use the following settings for this configuration example (5 MHz).

Required switch settings:

1. Passive Combiner Select Switches (SW6-SW10)

   For 5 MHz:

   SW 6-1 thru SW 10-1 = **OFF**

   SW 6-2 thru SW 10-2 = **ON**

   SW 6-3 thru SW 10-3 = **OFF**

   SW 6-4 thru SW 10-4 = **OFF**

2. Input Frequency

   For 5 MHz:

   SW 2-2 = **OFF**, SW 2-3 = **ON**

3. Output Drive

   SW 2-4 = **OFF**

4. CPU \Local Mode

   SW 1 = All **OFF**

5. Primary Synchronization Input

   SW 12 = All **OFF**

6. Secondary Synchronization Input

   SW 11 = All **OFF**

7. Primary synchronization Enable

   SW 4 = All **OFF**

8. Secondary Synchronization Enable

   SW 5 = All **OFF**

9. Switch 3

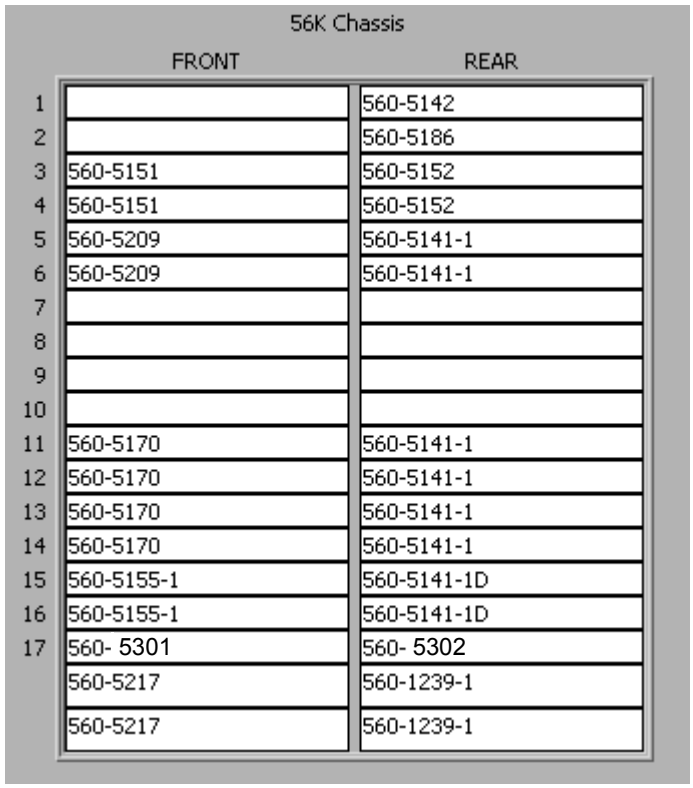
   All switches = **OFF**

Single Ext. GPS Synchronized Redundant Time and Frequency without Oscillator

This is another nearly identical and common configuration. The only difference is there is no oscillator.

If your configuration does not include an oscillator, ignore all of 5.8. Use all of the other settings in the immediate previous section.

Card Placement Configuration



56K Chassis

	FRONT	REAR
1		560-5142
2		560-5186
3	560-5151	560-5152
4	560-5151	560-5152
5	560-5209	560-5141-1
6	560-5209	560-5141-1
7		
8		
9		
10		
11	560-5170	560-5141-1
12	560-5170	560-5141-1
13	560-5170	560-5141-1
14	560-5170	560-5141-1
15	560-5155-1	560-5141-1D
16	560-5155-1	560-5141-1D
17	560- 5301	560- 5302
	560-5217	560-1239-1
	560-5217	560-1239-1

System Control (Single Internal Oscillator + Reference Mode)

Oscillator Card Control Overview

The 56K oscillator cards can be set to operate in different modes (Reference, Input or Master/Slave). The operating mode determines how the Fault Monitor/CPU card will control the oscillator's disciplining inputs (Primary and Secondary) and frequency card passive combiner channels. The Fault Monitor CPU control ensures that the oscillators will not be steered by a known bad reference and frequency cards use a qualified reference.

Reference Mode Internal Oscillator

The Reference mode oscillator provides backup to the Primary External Reference REF A and the optional Secondary External Reference REF B. This is the standard configuration for systems that use only one internal system oscillator. Reference mode

provides the oscillator's Primary disciplining input from the REF A frequency bus. The oscillators optional Secondary disciplining input is provided by the REF B frequency bus. The reference mode oscillator must be set to drive the REF C frequency bus which is required to prevent the oscillator from locking to itself (if the oscillator is improperly configured to drive the REF B or REF A frequency bus).

In the Reference operating mode, the REF C frequency bus is driven by the internal 56K oscillator. Reference mode does not use the Csysalarm term (unlocked internal oscillator) to inhibit the REF C frequency bus. Only the external status inputs (P, S, T) or CPU commands will disable the REF C reference channel to the 56K frequency cards. The internal oscillator's Primary (REF A) and Secondary (REF B) disciplining inputs are controlled by the same status (P, S). The CPU controls the Reference mode oscillator card and frequency cards using the following logic:

Oscillator Disciplining Input Control (Reference mode)

1. If Primary status (PSRC) = /OK **OR**

   Primary status (PSRC) = OFF **OR** REFA = not active **THEN**

   disable the primary reference input on the oscillator card.

2. If Secondary status (SSRC) = /OK **OR**

   Secondary status (SSRC) = OFF **OR** REFB = /active **THEN**

   disable the secondary reference input on the oscillator card.

   Frequency Card Control (Reference mode)

1. If Primary status (PSRC) =/OK **OR**

   Primary status (PSRC) = OFF **OR** REFA = OFF **OR**

   REFA = /active **THEN**

   REFA = BAD - disable REFA channel on frequency cards.

2. If Secondary status (SSRC) = /OK **OR** Secondary status (SSRC) = OFF **OR** REFB = OFF **OR** REFB = /active **THEN** REFB = BAD - disable REFB channel on frequency cards.

3. If Tertiary status (TSRC) = /OK **OR** Tertiary status (TSRC) = OFF **OR** REFC = OFF **OR** REFC = /active **THEN** REFC = BAD - disable REFC channel on frequency cards.

4. If REFA = BAD AND REFB = BAD AND REFC = BAD **THEN** enable.

Non GPS Synchronized Redundant Time and Frequency with Oscillator

This configuration receives timecode and frequency via non-GPS means. There is no backup.

This configuration (See Non GPS Synchronized Redundant Time and Frequency with Oscillator.) creates the following outputs:

1. Twelve BNC N.8

2. Six 5 MHz

3. Twelve IRIG-B

4. Two NTP

5. One RS-422/RS-232 and Telnet

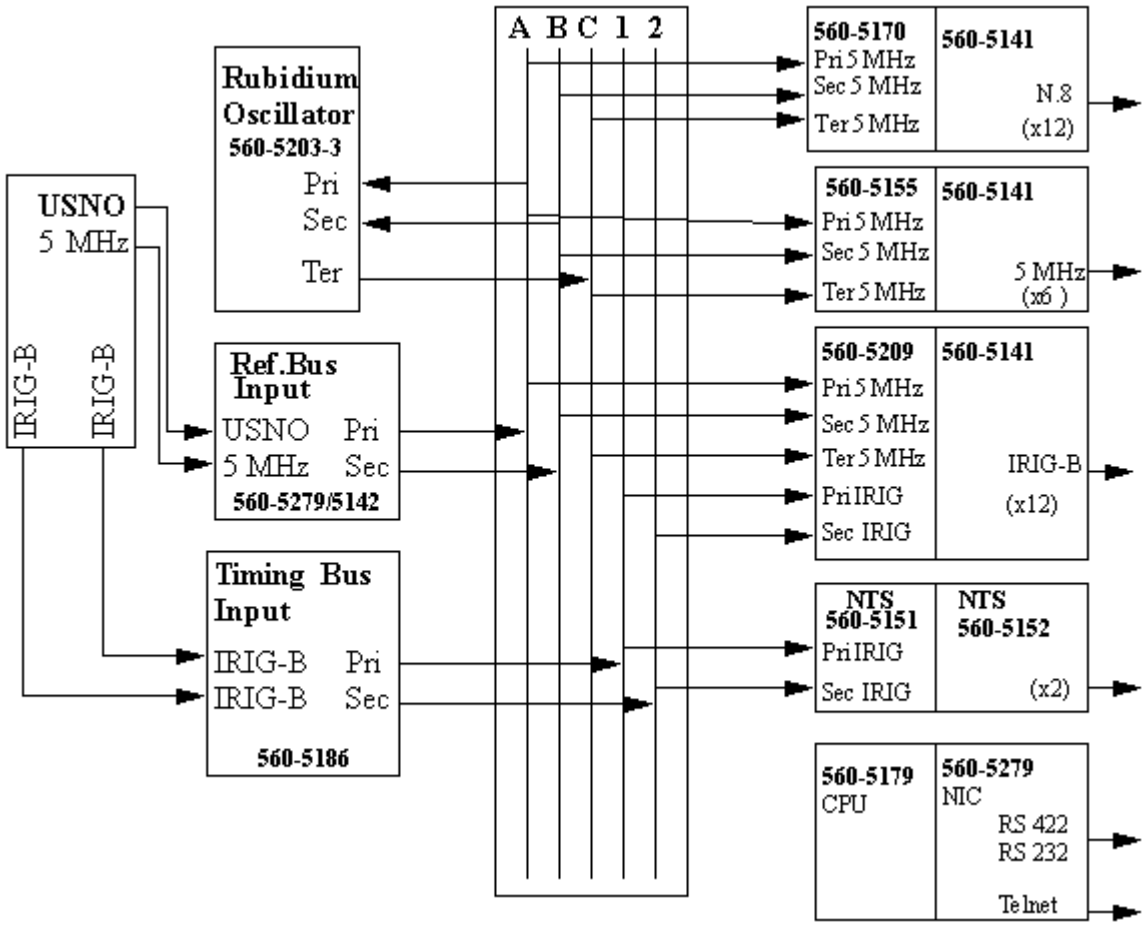
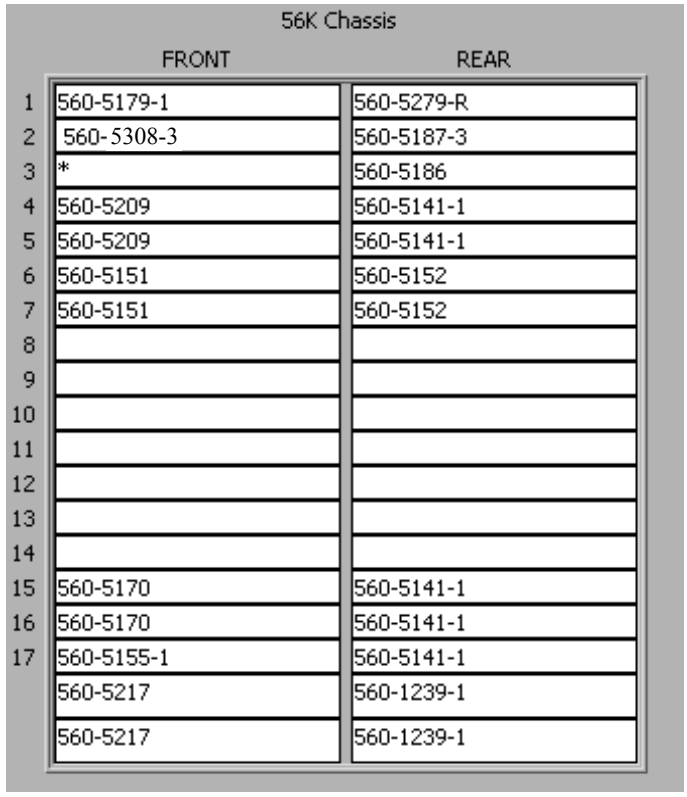


Figure 12 Non GPS Synchronized Redundant Time and Frequency with Oscillator

Components

- 560-5203 -3 Rubidium Oscillator
- 560-5142 Ref. Bus Input
- 560-5186 Timing Ref. Bus
- Two 560-5170 N.8
- Three 560-5141
- Two 560-5151 NTS
- 560-^ 5301 CPU Fault Monitor
- Two 560-5152 NTS
- 560-^ 5302 NIC

Card Placement Configuration



56K Chassis

	FRONT	REAR
1	560-5179-1	560-5279-R
2	560-5308-3	560-5187-3
3	*	560-5186
4	560-5209	560-5141-1
5	560-5209	560-5141-1
6	560-5151	560-5152
7	560-5151	560-5152
8		
9		
10		
11		
12		
13		
14		
15	560-5170	560-5141-1
16	560-5170	560-5141-1
17	560-5155-1	560-5141-1
	560-5217	560-1239-1
	560-5217	560-1239-1

Switch Settings

560-5170 N.8

Use the following settings for this configuration example (5 MHz).

Required switch settings:

1. Passive Combiner Select Switches (SW6-SW10)

   For 5 MHz:

   SW 6-1 thru SW 10-1 = **OFF**

   SW 6-2 thru SW 10-2 = **ON**

   SW 6-3 thru SW 10-3 = **OFF**

   SW 6-4 thru SW 10-4 = **OFF**

2. Input Frequency

   For 5 MHz:

   SW 2-1, 2-2 = **OFF**, SW 2-3, 2-4 = **ON**

3. Output Drive

   SW 2-4 = **OFF**

4. CPU \Local Mode

   SW 1 = All **OFF**

5. Primary Synchronization Input

   SW 12 = All **OFF**

6. Secondary Synchronization Input

   SW 11 = All **OFF**

7. Primary synchronization Enable

   SW 4 = All **OFF**

8. Secondary Synchronization Enable

   SW 5-1 = All **OFF**

560-5142 Reference Bus Input

No configuration required.

560-5186 Card

No configuration required.

560-5141 Card

No configuration required.

560-5151 Card

SW 1-1, 1-4 = **OFF**, All others = **ON**

SW 2-1 = **ON**, All others = **OFF**

SW 3-2 = **ON**, All others = **OFF**

SW 4-2 = **ON**, All others = **OFF**

SW 5-1 = **ON**, All others = **OFF**

SW 6-2 = **ON**, All others = **OFF**

SW 7 = All **OFF**

560-5301 Fault Monitor CPU

SW 1-2 = **ON**, All others = **OFF**

SW 3-4 = **ON**, All others = **OFF**

560-5152 Card

No configuration required.

560-5302 NIC Card

JP1, pin 1 = **ON**, pin 2 = **OFF**

JP2, pin 1 = **ON**, pin 2 = **OFF**

JP3, JP4, JP5: pins 1 = **OFF**, pins 2 & 3 = **ON**

560-5203-2 Rubidium Oscillator

Required Settings

1. SW 1-1, 1-5, SW 1-7, SW 1-8 = **OFF**, All others = **ON**

2. Aux Reference Enabled

   SW 2-2 = **ON**

3. Operating Mode

   SW 2-3 = **OFF** (Reference mode enabled)

4. Secondary Aux. Reference

SW 2-4 = **OFF** (Disabled)

5. Timing Output Latch

   SW 2-7 = **OFF** (Enabled)

6. Output Frequency

   SW 1-1 = **OFF**, SW 1-2 = **ON**

7. Oscillator Drive

   SW 1-3 and SW 1-4 = **ON**

8. Green LED

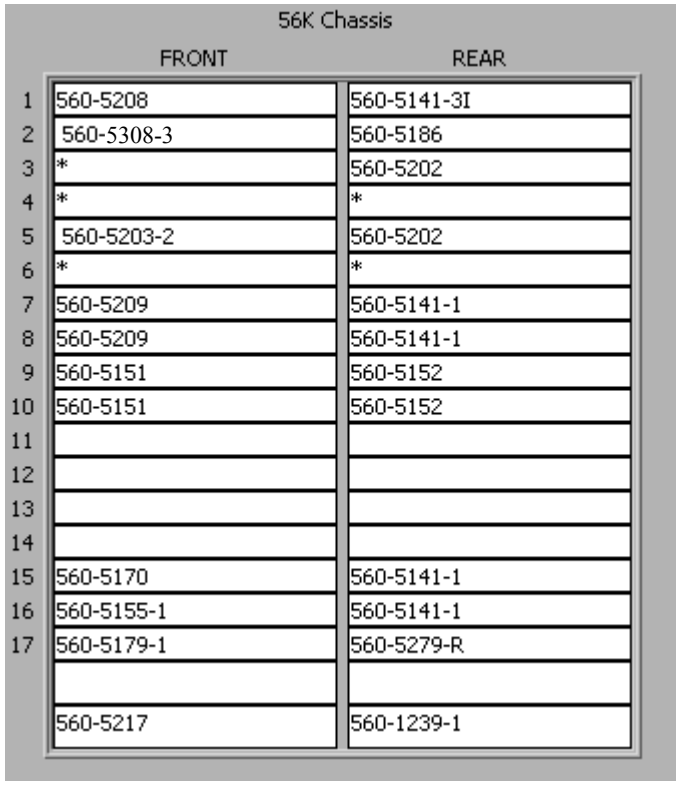
   SW 2-8 = **ON**

9. SW 3-7 = **ON**, All others = **OFF**

Single Ext. GPS, Dual Oscillator Redundant Time and Frequency

This is nearly identical to 5.7. The *ONLY* difference between the two configurations is the fact that this configuration uses two oscillators.

Card Placement Configuration



56K Chassis

	FRONT	REAR
1	560-5208	560-5141-3I
2	560-5308-3	560-5186
3	*	560-5202
4	*	*
5	560-5203-2	560-5202
6	*	*
7	560-5209	560-5141-1
8	560-5209	560-5141-1
9	560-5151	560-5152
10	560-5151	560-5152
11		
12		
13		
14		
15	560-5170	560-5141-1
16	560-5155-1	560-5141-1
17	560-5179-1	560-5279-R
	560-5217	560-1239-1

560-5203-2 Rubidium Oscillator

Required Settings for each oscillator:

1. SW 1-5, SW 1-7, SW 1-8 = **OFF**, SW 1-6 = **ON**

2. Aux Reference Enabled

   SW 2-2 = **ON**

3. Operating Mode

   SW 2-3 = **ON** (Input mode enabled)

4. Secondary Aux. Reference

   SW 2-4 = **OFF** (Disabled)

5. Timing Output Latch

   SW 2-7 = **ON** (Enabled)

6. Output Frequency

SW 1-1 = **OFF**, SW 1-2 = **ON**

7. Oscillator Drive (Reference A Enabled)

SW 1-3 = **ON**, SW 1-4 = **OFF**

8. Green LED

SW 2-8 = **ON**

System Control (Dual Internal Oscillators + Input mode)

Oscillator Card Control Overview

The 56K oscillator cards can be set to operate in different modes (Reference, Input or Master/Slave). The operating mode determines how the CPU card will control the oscillator's disciplining inputs (Primary and Secondary) and frequency card passive combiner channels. The CPU control ensures that the oscillator(s) will not be steered by a known bad reference and frequency cards use a qualified reference.

Input Mode Internal Oscillators

Input mode uses the IN7 (Primary) and INS (Secondary) frequency reference buses to discipline the 56K oscillators. The Input operating mode allows the 56K oscillators to drive the REF A, REF B or REF C frequency bus (no chance of self-locking in this mode).

The following diagram depicts two 56K oscillators that are operated in Input Mode. The dashed lines in the diagram indicate that block/signal is optional.

In the Input operating mode, the (P, S) CPU external status inputs control only the oscillator's disciplining inputs. The 56K internal oscillators unlock status, Asysalarm and Bsysalarm (passed to the CPU card) dictate frequency card control (REF A, REF B).

Oscillator Disciplining Input Control (Input mode)

1. If Primary status (PSRC) =/OK **OR** Primary status (PSRC) = OFF **THEN** disable the primary reference input on the oscillator card.

2. If Secondary status (SSRC) = /OK **OR** Secondary status (SSRC) = OFF **THEN** disable the secondary reference input on the oscillator card.

Frequency Card Control (Input mode)

Oscillator driving REF A

1. If REFA =/Active **OR** REFA = OFF **OR** Asysalarm AND /Bsysalarm **OR** /Csysalarm **OR** Asysalarm AND Bsysalarm AND REFC = Active **OR** Asysalarm AND Csysalarm AND REFB = Active **THEN** REFA = BAD - disable REFA channel on frequency cards.

Oscillator driving REFB

2. If REFB =/Active **OR** REFB = OFF **OR** Bsysalarm AND /Asysalarm **OR** /Csysalarm **OR** Bsysalarm AND Asysalarm AND REFC = Active **OR** Bsysalarm AND Csysalarm AND REFA = Active **THEN** REFB = BAD - disable REFB channel on frequency cards.

Oscillator driving REFC

3. If REFC =/Active **OR** REFC = OFF **OR** Csysalarm AND /Asysalarm OR /Bsysalarm **OR** Csysalarm AND Asysalarm AND REFB = Active **OR** Csysalarm AND Bsysalarm AND REFA = Active **THEN** REFC = BAD - disable REFC channel on frequency cards.

4. If REFA = BAD AND REFB = BAD AND REFC = BAD **THEN** enable any active channel (REFA/B/C).

System Control (Dual Internal Oscillators + Master/Slave mode)

Oscillator Card Control Overview

The 56K oscillator cards can be set to operate in different modes (Reference, Input or Master/Slave). The operating mode determines how the CPU card will control the oscillator's disciplining inputs (Primary and Secondary) and frequency card passive combiner channels. The CPU control ensures that the oscillator(s) will not be steered by a known bad reference and frequency cards use a qualified reference.

Input Mode Internal Oscillator x1 (Master)

The Input mode oscillator is the Master oscillator. This IN7 (Primary) and INS (Secondary) frequency reference buses are used to discipline the Master oscillator. Although the Input operating mode allows the 56K oscillator to drive the REF A, REF B or REF C frequency bus, the Master/Slave configuration requires the Master oscillator be set to drive the REF A bus.

Reference Mode Internal Oscillator x1 (Slave)

The Reference mode oscillator uses the REF A frequency from the Master oscillator to discipline the Slave 56K oscillator. The REF B (Secondary) frequency reference bus is not used. The Master/Slave configuration requires the Slave oscillator to be set to drive the REF C bus.

In the Master/Slave operating mode, the (P, S) CPU external status inputs control only the Master oscillator's disciplining inputs. The 56K Master oscillator's unlock status, Asysalarm is passed to the CPU card which disables the disciplining input of the Slave oscillator (REF A). The CPU also disables the REF A channel on frequency cards. The frequency card's REF C channel, driven by the Slave oscillator, is not affected by the Slave oscillator's Csysalarm. In the Master/Slave mode, the frequency card's REF C channel can only be disabled with CPU commands (TSRC=0 or REFC=0). In the Master/Slave mode, the REFB channel should be disabled (SSRC=0) since this channel is not used.

Master Oscillator Disciplining Input Control

1. If Primary status (PSRC) = /OK **OR** Primary status (PSRC) = OFF **THEN** disable the primary reference input on the Master oscillator card.

2. If Secondary status (SSRC) = /OK **OR** Secondary status (SSRC) = OFF **THEN** disable the secondary reference input on the Master oscillator card.

Slave Oscillator Disciplining Input Control (Master Oscillator driving REFA)

1. If REFA = /Active **OR** REFA = /Active REFA = OFF Asysalarm **THEN** REFA = BAD — disable primary disciplining input (REFA) on Slave Oscillator.

Frequency Card Control (Master/Slave)

1. If REFA =/Active **OR** REFA = OFF **OR** Asysalarm **THEN** REFA = BAD - disable REFA channel on frequency cards.

2. If REFC=OFF **OR** REFC = /active **THEN** REFC = BAD - disable REFC channel on frequency cards.

3. If REFA = BAD AND REFC = Csysalarm **THEN** do nothing (REFA is disabled, REFC remains on).

Non-GPS, Dual Oscillator, Redundant Time and

Frequency

This configuration has no GPS. Incoming frequency is 5 MHz. Incoming timing is IRIG-B. Output is the same as in 5.11.

Components

- 560-5203-3
- Two 560-5209
- 560-5151
- Two 560-5170
- 560-5155-1
- 560-^ 5301-1
- Two 560-5217
- Two 560-5187-3
- 560-5186
- Five 560-5141-1
- 560-5152
- 560-^ 5302-R
- Two 560-1239-1

Card Placement Configuration

56K Chassis

	FRONT	REAR
1	560-5308-3	560-5187-3
2	*	560-5187-3
3	*	560-5186
4	560-5203-2	560-5187-3
5	*	
6	560-5151	560-5152
7	560-5151	560-5152
8	560-5209	560-5141-1
9	560-5209	560-5141-1
10		
11		
12		
13		
14	560-5170	560-5141-1
15	560-5170	560-5141-1
16	560-5155-1	560-5141-1
17	560-5179-1	560-5279
	560-5217	560-1239-1

Switch Settings

560-5301 CPU Card

1. SW 1-1, SW 1-4 = **OFF**, All others = **ON**
2. SW 3 = All **OFF**

560-5302 Card

1. JP 1-1, JP 2-1 = **ON**
2. JP 3-2, 3-3 = **ON**, JP 5-2, 5-3 = **ON**
3. JP 4-1, 4-2 = **ON**

560-5203 Card

1. SW 1-2, -3, -5, -6 = **ON,** All others = **OFF**
2. SW 2-2, -3, -8 = **ON**, All others = **OFF**
3. SW 3-8 = **ON**, All others = **OFF**

560-5170 Card

1. SW 1 = All OFF
2. SW 2-1, 2-2 = **OFF**, All others = **ON**
3. SW 3, SW 4, SW 5 = All **OFF**
4. SW 6-2 = **ON**, All others **OFF**
5. SW 11 and SW 12 = All **OFF**

560-5155 Card

1. SW 1-2 = **ON**, All others = **OFF**
2. SW 2-2 = **ON**, All others = **OFF**
3. SW 3-2 = **ON**, All others = **OFF**
4. SW 8 = All **OFF**
5. SW 9-7 = **OFF**, All others **ON**

560-5209 Card

1. SW 1-1 = **ON**, All others **OFF**
2. SW 2-2 = **ON**, All others **OFF**
3. SW 3-7 = **OFF**, All others **ON**
4. SW 4, SW 5, SW 10 = All **OFF**
5. SW 6-1 = **ON**, All others **OFF**
6. SW 7-2 = **ON**, All others **OFF**

7. SW8-5, -6, -7 = **OFF**, All others **ON**

560-5151 Card

SW 1-2, 1-4 = **ON**, All others **OFF**

2. SW 2-1 = **ON**, All others **OFF**

3. SW 3-2, 4-2 = **ON**, All others **OFF**

4. SW 5-1 = **ON**, All others **OFF**

5. SW 6-2 = **ON**, All others **OFF**

6. SW 7 = All **OFF**

560-5187-3 Card

No Configuration required.

560-5186 Card

No Configuration required.

560-5141-1 Card

No configuration required.

560-5142 Card

No configuration required.

560-5302 Card

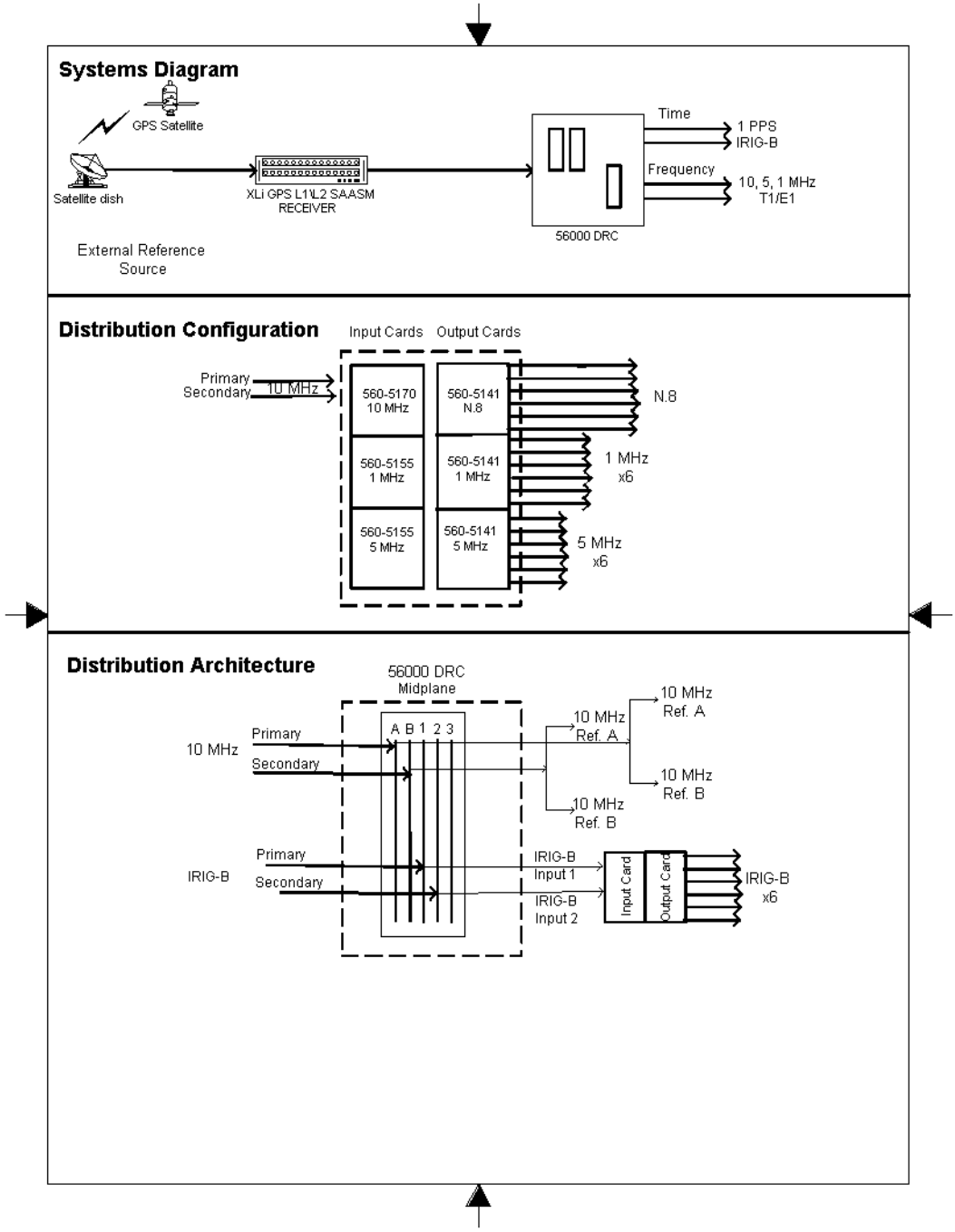
No configuration required.

Universal CPU Card Setup Commands

Use the following commands to initialize the CPU card:

TPRI = P, TSEC = S, PSRC = H, SSRC = D or H (depending on configuration)

TSRC = O, SITE = nn (Chassis #), PROFF, AROFF, PRI, REF.



Card Modules

This chapter provides details to all of the card modules used in the 56000. The 56000 DRC has 26 plug-in modules. These modules allow for custom and unique configurations, many beyond the scope of this chapter. The 56000 has seventeen slots for available plug-in card modules. Some cards have LED's. A green lit LED indicates the signal is good. A red lit LED indicates a bad signal.

Input/Output Cards

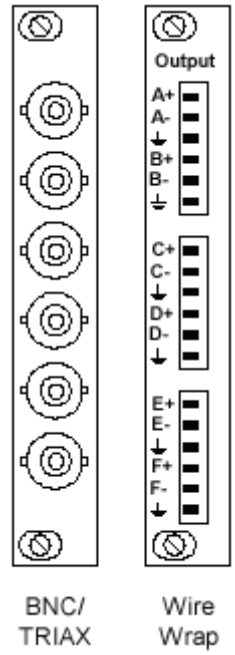
There are two types of cards: Coaxial and Wire-Wrap. Both cards are passive. They provide a direct input/output connector interface to/from the front active card.

560-5141-x Input/Output (Digital) Module

Rear card

- Model 560-5141 series provide direct input/output connector interface to/from front card.

The Model 560-5141 series Input / Output Module provides a direct input/output interface for signals to a corresponding front card. Model dash numbers define the connector types.



Specifications

Unrestricted. Slots 1-17.

Width: 0.8 in. (2.03 cm)

Height: 4.4 in. (11.18cm) (3U)

Depth: 5.0 in. (12.7 cm)

Weight: Approximately 0.5 lb. (0.226 kg)

Chassis slots: 1

Environmental

Operating Temp: 0° C to +50° C

Storage Temp: -40° C to 85° C

Humidity: 95% max., relative, non-condensing

This card type may be used in many applications. A brief summary of the cards and their functions follow:

Card Module 560-5141-1, -1D,

The 560-5141-1 BNC Passive Output Interface provides the output interface through a compatible front function card. The six outputs are fed directly through the mid-plane connector from the front function card. The output signals are distributed via 50 ohm traces to six BNC connectors at the rear panel, optimized for use in single-ended mode with 50 ohm-to-ground termination. These cards have no setup configuration or fault indicators.

560-5141-1

Mode: Passive Output

Connectors: Six BNC

Signal type: Digital, single ended

Compensation diodes: No

560-5141-1D

Mode: Passive Output

Connectors: Six BNC

Signal type: Digital, single ended

Compensation diodes: Yes

Card Module 560-5141-2, -2i

The Wire-Wrap Passive Output Interface provides the output interface for a compatible front function card. The six (+) outputs and six (-) outputs are fed directly through the mid-plane connector from the front function card. The output signals are distributed via 100 ohm differential traces to wire-wrap pins at the rear panel, optimized for use in differential mode with 100 ohm (+)output/-output termination. They can be used individually in single-ended mode, referenced to ground. There is a ground pin associated with each pair of outputs.

560-5141-2

Mode: Passive Output

Connectors: Six wire wrap groups, (2-lines with ground, each group)

Signal type: Digital, 2-lines

Compensation diodes: Optional

560-5141-2i

Mode: Passive Input

Connectors: Six wire wrap groups, (2-lines with ground, each group)

Signal type: Digital, 2-lines

Compensation diodes: Optional

Card Module 560-5141-3, -3i

Mode: Passive Output up to 4.096 MHz

Connectors: Six Trompeter BJ-77 (mate: Trompeter PL-75)

Signal type: Digital, differential

Compensation diodes: No

560-5141-3i

Mode: Passive Input

Connectors: Six Trompeter BJ-77 (mate: Trompeter PL-75)

Signal type: Digital, differential

Compensation diodes: No

Card Module 560-5141-4

This DB25 Passive Output Interface provides the output interface for a compatible front function card. The six pairs of outputs are fed directly through the mid-plane connector from the front function card. The output signals are distributed via controlled impedance traces to a DB25F connector at the rear panel for use in differential mode with 100-120 ohm balanced conductors/ termination or in single-ended mode with 50 ohm conductors/ termination.

Card Module 560-5141-5

The RJ11 Passive Output Interface provides the output interface for a compatible front function card. The six pairs of RJ11 outputs are fed directly through the mid-plane connector from the front function card. The output signals are distributed via 55 ohm traces to 6 RJ11 connectors at the rear panel for use in differential mode with 120 ohm balanced termination. There are four ground pins associated with each pair of outputs. The Passive Output card incorporates six 6-pin RJ11 connectors. Each set of connector pins includes a complementary output pair with ground pins on either side for shielding and impedance-control within the cable.

Card Module 560-5141-6

The DB-9 Passive Output Interface provides the output interface for a compatible front function card. The six pairs of DB-9 outputs are fed directly through the mid-plane connector from the front function card. The output signals are distributed via 55 ohm traces to six db9 connectors at the rear panel for use in differential mode with 120 ohm balanced termination. There are two ground pins associated with each pair of outputs.

560-5292-3

Mode: Passive Output up to 50 MHz

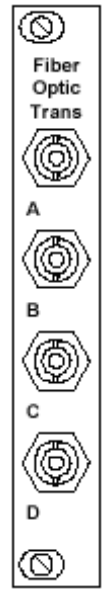
Connectors: Six Trompeter BJ-77 (mate: Trompeter PL-75)

Signal type: Digital, differential

Compensation diodes: No

Fiber Optics Transmitter Cards

- Rear card
- Model 560-5145 provides four multi-mode fiber optic reference frequency outputs (1, 5, or 10 MHz). Model 560-5148 provides six multi-mode fiber optic reference output channels.



The Model 560-5145 Quad Fiber Optics Transmitter provides four fiber optic output channels driven by the passively combined three system signal buses REF A, B, and C. Model 560-5148 provides six Fiber Optic output channels which are driven directly through the backplane by the six independent DRVOUT A thru F input signals from the associated front card.

Specifications (both cards)

Optical Transmitter

Wavelength: 820nM (multi-mode)

Card Compatibility: Any slot. A 560-5179 card is required for the 560-5145 only.

Optical output level: -14 to -21 dBm into 50/125 micron fiber

Optical output level: -10 to -18 dBm into 62.5/125 micron fiber

Connector: ST

Cable Range: Up to 2 km fiber cable; FO Units: 1 - 2000m (6560 ft.)

Physical

Width: 0.8 in. (2.03 cm)

Height: 4.4 in. (11.18cm) (3U)

Depth: 5.0 in. (12.7 cm)

Weight: Approximately 0.5 lb. (0.226 kg)

Chassis slots: 1

Environmental

Operating Temp: 0° C to +50° C

Storage Temp: -40° C to 85° C

Humidity: 95% max., relative, non-condensing

Cooling Mode: Convection

Altitude: Sea level to 10,000 ft.

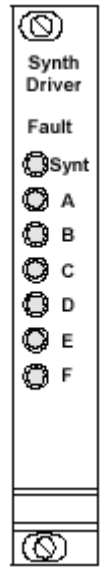
The Fiber Optic Transceiver cards are rear chassis mounted plug-in option cards for the Model 56000. The 560-5145 Assembly provides four Fiber Optic output channels which are driven by the passively combined result of the three signal buses REF A, B, and C, all of which have the same frequency signal on them. *This card requires set up and contains a Passive Combiner.* The Passive Combiner is a circuit that attempts to maintain the desired signal output from the three separate inputs REF A, B, and C (named FREQ A, B, and C). This is without introducing any switching transient or glitch when one or two of the inputs are lost.

REF A, B, C Frequency	**10 MHz**	**5 MHz**	**1 MHz**
SW 1-1 thru SW 5-1	OFF	ON	OFF
SW 1-2 thru SW 5-2	OFF	ON	OFF
SW 1-3 thru SW 5-3	OFF	OFF	ON
SW 1-4 thru SW 5-4	OFF	OFF	OFF

The 560-5148 *does not* require setup. The 2 to 5 Volt digital DRVOUT A thru F input signals are applied directly to the six output analog buffers, which apply them to the fiber optic transmitters via current limiting networks.

MHz Frequency Synthesizer Cards

- Front card
- Model 560-5155\5304-x provides six selectable 1 MHz, 5 MHz, or 10 MHz sine wave outputs.
- Outputs are coherent to Model 56000 internal references.
- Fault/Status reporting to Fault Monitor CPU and front panel indicators.



Specifications

Electrical Card Compatibility

Input References: 1 MHz, 5 MHz, or 10 MHz

Unrestricted, Slots 1-17.

Output Frequencies: 1 MHz, 5 MHz, or 10 MHz

Frequency Stability: Equal to input reference on Ref. A, B, or C.

Short-term: < 1 X 10 -9 (1 sec. avg., ref 1 X 10 -10)

Signal Type: Sine wave

Amplitude: +13 dBm (1.0 Vrms)

Output Impedance: 50 Ohms

Spurious: -50 dBc

Phase Noise:

-50 dBc/Hz @ 1 Hz offset

-60 dBc/Hz @ 10 Hz offset

-95 dBc/Hz @ 100 Hz offset

-115 dBc/Hz @ 1 kHz offset

-115 dBc/Hz @ 10 kHz offset

Physical

Width: 0.8 in. (2.03 cm)

Height: 3.94 in. (10 cm) (3U)

Depth: 8.66 in. (21.99 cm)

Weight: Approximately 0.5 lb. (0.226 kg)

Chassis slots: 1

Environmental

Operating Temp: 0° C to +50° C

Storage Temp: -40° C to 85° C

Humidity: 95% max., relative, non-condensing

Cooling Mode: Convection

Altitude: Sea level to 10,000 ft.

Card Overview

This option card offers the user six sine wave outputs at either 1, 5, or 10 MHz (user configurable but one frequency per card at any one time).

The 560-5155-1 Frequency Synthesizer generates an output frequency that is locked to the external reference frequency distributed via REF A, B, or C on the mid-plane. The reference is received through the passive combiner, which passes only the currently-highest priority reference to the synthesizer. If the currently highest priority reference is changed, the passive combiner shifts to the next highest priority input and the synthesizer phase locks to the new reference. The input frequency that is used to lock the Frequency Synthesizers PLL (1, 5, or 10 MHz) is switch-selectable.

The 560-5155-1 card can operate without a Fault Monitor CPU card installed in the system. In this mode, the 560-5155-1 card offers automatic REF A, B, and C passive combiner operation as previously stated. When the 560-5155-1 card is used in a system that includes the Fault Monitor CPU card, the REF A, B, and C inputs are also controlled by the CPU.

This card requires setup and contains LEDs used for fault indicators.

Card Setup

The setup of the 560-5155-1 1, 5 or 10 MHz sine wave output card involves selection of the following DIP switches:

1. 560-5155-1 Required Settings (SW8 & SW9)

2. Passive combiner select switches (SW3 through SW7)

3. Input frequency select switch (SW1)

4. PLL / Bypass Mode select switch (SW1)

5. Output frequency select switch (SW2)

Required Settings

SW8 and SW9 must be set as follows:

SW8 switches 1 through 8 = **OFF**

SW9 switches 1 through 8 = **ON**

Fault LED's

Continuous blinking = Phase Locked Loop (PLL) is out of lock.

Solid light lit on Synt LED = Local power supply failure

OUT LEDs A-F:

If LED is lit = the associated driver has failed

Passive Combiner Select Switches (SW3-SW7)

Set SW3 through SW7 to match the input frequency in use REF A, B, and C frequency reference:

Table A.1: Passive

Passive	10 Mhz	5 Mhz	1 Mhz
SW3-1 thru SW7-1	ON	OFF	OFF
SW3-2 thru SW 7-2	OFF	ON	OFF
SW3-3 thru SW7-3	OFF	OFF	ON
SW3-4 thru SW7-4	OFF	OFF	OFF

Input Frequency Select Switch (SW1)

Set SW1 to select the proper input frequency. This selection sets FPGA U4 for the proper divide ratio (for the PLL phase detector).

Table A.2: Input

Input	10 MHz	5 MHz	1 MHz
SW1-1	ON	OFF	OFF
SW1-2	OFF	ON	OFF
SW1-3	OFF	OFF	ON

Table A.3: Operating Mode

Operating Mode	PLL	BYPASS
SW1-4	OFF	ON

PLL/Bypass Mode Select Switch (SW1)

Set SW1 switch 4 for the operating mode of choice. NOTE: When the operating mode is Bypass, SYNTH fault reporting (PLL lock) will be suppressed.

Output Frequency Select Switch (SW2)

Set SW2 to select the desired output frequency. This selection enables the appropriate sine wave shaping circuit.

Table A.4: Output Frequency Switch

Output	10 MHz	5 MHz	1 MHz
SW2-1	ON	OFF	OFF
SW2-2	OFF	ON	OFF
SW2-3	OFF	OFF	ON

Fault Indications

This is an on-card fault indicator which is not externally visible; although it can be seen by installing the card next to an empty slot. It indicates a failure of the card to initialize properly during power-up. Activation of this LED is accompanied by activation of all of the front panel indicators. Occasionally, this fault is caused by a temporary condition related to the cycling of power and can be cleared by a power or hot swap cycle. If this is unsuccessful, the card is defective.

Theory of Operations

Hardware Description

The 1, 5, 10 MHz Frequency Synthesizer incorporates a Passive Combiner, a DC-to-DC Converter, a phase-locked VCO, three sine wave shaping circuits, six 50 ohm analog output driver, fault-detection circuitry and seven Fault Indicators.

Passive Combiner

The passive combiner is a circuit that strives to always output the desired signal, derived from the three separate inputs REF A, B, and C (named FREQ A, B, and C on the drawing), without introducing any switching transient or glitch when one or two of the inputs are lost. It is composed of three input sections, three high speed comparators, a passive combining network. This is accomplished by the use of SW 3 through SW 7, which are four PST DIP switches. The input filters and the comparators serve to produce a very clean square wave with very good symmetry. These square waves are then buffered and applied to the weighting network where they are summed with different weights in order to give the primary source the greatest influence on the final result. This summing results from an interaction between the weighting network and the combining network

Voltage Controlled Oscillator

The card is equipped with a 10 MHz VCO. This VCO is locked to a 1 MHz reference frequency (derived from REF A, B, or C) via a phase- comparator. The filtered phase comparison output from the PLL's integrator is connected to the voltage control input of the 10 MHz oscillator, closing the loop. The 10 MHz output from the on-board oscillator is the clock source for the 1, 5, or 10 MHz output when the card is set for PLL mode.

Output Drivers

The sine wave output from the fixed gain amplifier connects to six analog 50 ohm buffers. These buffers are connected through analog output switch SW9 to the mid-plane connector P1. NOTE: SW9 is factory set all ON, SW8 all OFF.

Fault Detection

There are two categories of fault detection: Output Driver faults and synthesizer faults. Both use a combination of discrete components and logic to perform the detection task. The monitored signal outputs on the 560-5155-1 card are DRIVOUT A through DRIVOUT F. The DRIVOUT signals connect to the output driver fault detectors. The 1, 5, or 10 MHz frequency synthesizer (SYNTH FAULT) detector utilizes four voltage comparators to detect an out-of-lock condition in the 10 MHz VCO. These comparators verify that the VCO control voltage and filtered phase comparator voltage are within defined limits. If the control voltage is out of tolerance, a fault is indicated.

560-5155\5304-2 MPPS Card

This option card offers the user six square wave logic level outputs at either 1, 5 or 10 MPPS (user configurable). The outputs provide either RS-422 differential or TTL into 50 ohm single ended outputs (user configurable).

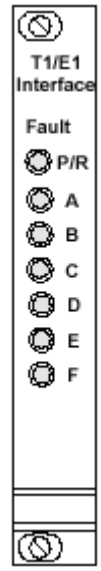
The input frequency that is used to lock the Frequency Synthesizer's PLL (1, 5, or 10 MHz) is switch-selectable. The PLL's oscillator operates at 10 MHz and is the source, in PLL mode for the 1, 5, or 10 MPPS signals. The 560-5155-2 card can also operate in Bypass Mode. Bypass Mode means that the signal from the passive combiner's output is the source of the card's outputs, not the on-board PLL or 10 MHz oscillator.

The output frequency is switch-selectable for 1, 5, or 10 MPPS. The selected output frequency is output through the mid-plane connector via six output drivers (six driver pairs in the case of RS-422).

The card is equipped with a 10 MHz VCO. This VCO is locked to a 1 MHz reference frequency (derived from REF A, B, or C) via a phase-comparator. This card requires setup and contains LEDs used for fault indicators.

560-5153 T1/E1 Frequency Synthesizer and 560-519x SILIOM Cards

The 560-5153 acts as a "motherboard" for the various plug-in **S**ingle **I**n **L**ine **I**nput **O**utput **M**odules (SILIOM). Six SILIOM's may be installed in any combination on the T1/E1 card. The SILIOM's provide a wide range of output capabilities for the T1/E1. The 5153 card plugs into the 56000 chassis. All SILIOM's are output cards.



- Front Card
- Provides a wide variety of telecom output types/functions
- All telecom outputs are coherent to Model 56000
- Fault and Status reporting to Fault Monitor CPU and front panel indicators
- Provides interface and reference frequencies for up to six plug-in SILIOM's
- Card Compatibility unrestricted. Slots 1-17, used with any Input\Output card.

Specifications (560-5153 T1\E1)

Electrical

Input References: 1 MHz, 5 MHz, or 10 MHz

Output Frequencies: 8 kHz, 64 kHz, 1.544 MHz, and 2.048 MHz

Frequency Stability: Equal to input reference on Ref. A, B, or C.

Short-term: < 1 x 10 -9 (1sec. avg., ref 1 x 10 -10)

Physical

Width: 0.8 in. (2.03 cm)

Height: 3.94 in. (10 cm) (3U)

Depth: 8.66 in. (21.99 cm)

Weight: Approximately 0.5 lb. (0.226 kg)

Chassis slots: 1

Environmental

Operating Temp: 0° C to +50° C

Storage Temp: -40° C to 85° C

Humidity: 95% max., relative, non-condensing

Cooling Mode: Convection

Altitude: Sea level to 10,000 ft.

Specifications (All SILIOM's)

Length: 4.25 in. (10.78 cm)

Height: 0.68 in. (1.72 cm)

Weight: 2.0 oz. (56.7 g)

560-5153 E1/T1 Card

The T1/E1 card offers the user six independently configurable input/output channels that are configured by installing SILIOMs (Single-In-Line-Input/Output Modules) that can provide 1544 kHz and 2048 kHz outputs in AMI, CMOS SQUARE, RS-422 SQUARE, and SINE wave formats. They can also provide 8 kHz and 64 kHz outputs in CMOS SQUARE, and RS-422 SQUARE wave formats, as well as COMPOSITE CLOCK AMI and ALARM RELAY contacts. A single input module has been defined to accept a live T1 or E1 stream and extract the clock from it for use by AMI and other output modules.

The card requires setup and configuration and varies with the type of Siliom plugged into the card. The card also contains LEDs for fault monitoring and a Passive Combiner.

The card is equipped with three VCOs, operating at 10, 8.192, and 12.352 MHz. The 10 MHz VCO is phase locked to a 1 MHz reference frequency that is derived from REF A, B, and C inputs. There are three switches on the this card. Switch 1 is used for Extended Superframe and/or Passive Combiner settings (see specific card manual on the CD-ROM for further details). Switches 2 and 3 are not functional and in the OFF position.

560-5193 Alarm Relay SILIOM

The Alarm Relay card provides a method of adding an alarm relay output to a 560-5153 E1/T1 card module.

The Relay is normally energized in the non-alarming state (contacts open). Any one of three states can de-energize the relay into the alarming state (contacts closed) and they are Loss of Power, Major Alarm, or Minor Alarm. A dip switch chooses between Major and Minor and power loss will always cause an alarm.

This card requires configuration and is customer installed.

560-5194 Composite Clock SILIOM

The Composite Clock card adds a Composite Clock output to a 560-5153 E1/T1 card. Fault monitoring circuitry watches the output for activity and reports faults back to the 560-5153 card and ultimately to the Fault Monitor card in the system. The Fault Monitor can reset the fault latch in the 560 -5194. This card requires configuration and is customer installed.

560-5195 Sine Wave SILIOM

This Sine Wave card provides a method of adding a sine wave output of either 1544 kHz (T1) or 2048 kHz (E1) to a 560-5153 E1/T1 motherboard. An optional output transformer is available to provide ohmic isolation in either a balanced or unbalanced configuration. The 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.

This card requires configuration.

560-5196 Square Wave SILIOM

The Square Wave card provides a method of adding CMOS square wave output to a 560-5153 E1/T1 motherboard. It can drive a 50 ohm load to a minimum of 4 Vp-p at frequencies exceeding 10 MHz. It also monitors its own output and can detect a shorted output as well as stuck high or stuck low faults. These it reports back to the 560-5153 card.

This card requires configuration.

560-5197 E1/T1 AMI SILIOM

The E1/T1 AMI card provides a method of adding an E1 or a T1 output to a 560-5153 E1/T1 motherboard. A switch controls which standard is supported. Both standards may be output simultaneously by setting multiple (at least two) Silioms to different switch settings. Line faults are detected and reported back to the 560-5153.

This card requires configuration.

560-5198 RS-422 SILIOM

The RS-422 contains all the circuitry needed to add an RS-422 level output to a 560-5153 E1/T1 card.

It can drive a 120 ohm load to RS-422 levels at frequencies of 8, 64, 1544, and 2048 kHz. It also monitors its own output and can detect a shorted output as well as stuck high or stuck low faults. These it reports back to the 560-5153 card.

This card requires configuration.

Siliom Card ID Numbers

All Siliom cards have a hard wired ID number. The 560-5197 contains switches that should not be altered from their factory set positions. They have no impact on the 5187 ID number.

Card ID numbers appear when Verbose or Machine reports are generated. The following ID numbers are for Silioms only:

Card	ID Number
560-5193	06
560-5194	05
560-5195	01
560-5196	02
560-5197	04
560-5198	03

Fault LEDs

Continuously flashing red = Loss of all reference inputs

Solid red = Local power supply failure

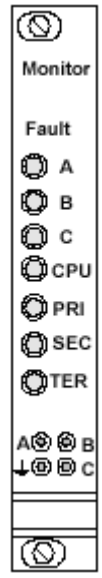
Slow blinking red = Loss of lock

Channel A-F LEDs:

When lit = loss of output or input (check Siliom card)

560-5179 Fault Monitor CPU Card

- Front card
- Monitors 56000 system status and provides communications input\output
- Fault and Status communications input\output and front panel LED's
- Report information via RS-232 or RS-422
- Eight programmable fault output lines
- Card Compatibility: Restricted to slot 17 only.



Physical

Width: 0.8 in. (2.03 cm)

Height: 3.94 in. (10 cm) (3U)

Depth: 8.66 in. (21.99 cm)

Weight: Approximately 0.5 lb. (0.226 kg)

Chassis slots: 1

Environmental

Operating Temp: 0° C to +50° C

Storage Temp: -40° C to 85° C

Humidity: 95% max., relative, non-condensing

Cooling Mode: Convection

Altitude: Sea level to 10,000 ft.

Fault Monitor Overview

The Fault Monitor CPU card is capable of monitoring the status of the individual cards installed in the chassis, the presence of the three reference frequencies (REF A-C), and the three external fault input signals (P,S,T). It provides a serial port capable of reporting information via either RS 232 or RS 422. There are eight programmable fault output lines which report fault conditions in various forms. Additionally, the CPU controls the selection of primary or secondary input signals on timing switch cards.

The serial port operates in "Verbose" or "Machine" mode. Verbose mode is intended for interfacing with a human operator, while machine mode is designed for interfacing with a computer (see Fault reporting).

The 560-5179-1/5301 monitors reference inputs from the mid-plane. REF A, REF B, and REF C signals enter the card through the mid-plane on pins C2, C4, and C6. Each input passes through an identical set of circuitry to provide control of the front panel LED's REF A, REF B, REF C, and the signals /AOK, /BOK, and /COK which are read by the processor.

This card requires considerable configuration. Refer to the 560-5179/5301 card manual.

560-5179-2 Fault Monitor CPU Card

This card is nearly identical to the 5179-1 card except it provides a TTL output of 1 PPS and IRIG-B. The 5179-2 card also performs fault switching differently on certain timing switch cards when compared to the standard 560-5179-1 Fault Monitor CPU.

Fault LED's

When A is lit = No Activity on REF A

When B is lit = No Activity on REF B

When C is lit = No Activity on REF C

CPU is lit = CPU Fault

PRI is solid = Primary Fault

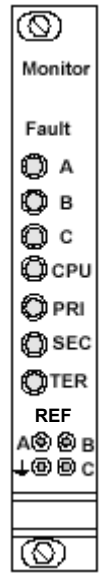
PRI is blinking = No PRI fault. Timing cards are not using PRI inputs

If SEC is solid = Secondary Fault

If TER is solid = Tertiary Fault

560-5301 Fault Monitor CPU Card

- Front card
- Monitors 56000 system status and provides communications input\output.
- Fault and Status communications input\output and front panel LED's.
- Report information via RS-232 or RS-422 or NIC card's user interfaces.
- Eight programmable fault output lines.
- Card Compatibility: Restricted to slot 17 only.



Physical

Width: 0.8 in. (2.03 cm)

Height: 3.94 in. (10 cm) (3U)

Depth: 8.66 in. (21.99 cm)

Weight: Approximately 0.5 lb. (0.226 kg)

Chassis slots: 1

Environmental

Operating Temp: 0° C to +50° C

Storage Temp: -40° C to 85° C

Humidity: 95% max., relative, non-condensing

Cooling Mode: Convection

Altitude: Sea level to 10,000 ft.

Fault Monitor Overview

The Fault Monitor CPU card is capable of monitoring the status of the individual cards installed in the chassis, the presence of the three reference frequencies (REF A-C), and the three external fault input signals (P,S,T). It provides a serial port capable of reporting information via either RS 232 or RS 422. There are eight programmable fault output lines

which report fault conditions in various forms. Additionally, the CPU controls the selection of primary or secondary input signals on timing switch cards.

The serial port operates in "Verbose" or "Machine" mode. Verbose mode is intended for interfacing with a human operator, while machine mode is designed for interfacing with a computer (see Fault reporting).

The 560-5179-1/5301 monitors reference inputs from the mid-plane. REF A, REF B, and REF C signals enter the card through the mid-plane on pins C2, C4, and C6. Each input passes through an identical set of circuitry to provide control of the front panel LED's REF A, REF B, REF C, and the signals /AOK, /BOK, and /COK which are read by the processor.

This card requires considerable configuration. Refer to the 560-5179/5301 card manual.

560-5301 Fault Monitor CPU Card

This card is nearly identical to the 5179-1 card except it provides a TTL output of 1 PPS and IRIG-B. The 5179-2 card also performs fault switching differently on certain timing switch cards when compared to the standard 560-5179-1 Fault Monitor CPU.

Fault LED's

When REF A, B, or C is:

- Off = that REF letter is turned off
- Green = that REF letter has activity
- Orange = that REF letter has activity, but has a fault
- Red = that REF letter has no activity and has a fault

When CPU is:

- Green = CPU Card is OK
- Red = CPU Card has a fault

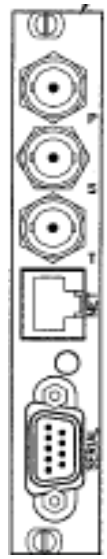
When PRI, SEC, or TER is:

- Off = that item's Fault is Off or Disabled
- Green = that item has No fault
- Red = that item has a fault

- blinking = No fault for that item, but the Timing cards are not using its inputs

560-5302 Network Interface Card

- Rear card
- Provides a network interface for the 560-5179\5301 Fault Monitor card
- Uses standard RS-232 and RS-422 serial interfaces
- Network access uses Telnet protocol
- Serial interface is available
- Card Compatibility: Unrestricted. Slots 1-17



Physical

Width: 0.8 in. (2.03 cm)

Height: 4.4 in. (11 cm) (3U)

Depth: 5.0 in. (12.7 cm)

Weight: Approximately 0.5 lb. (0.226 kg)

Chassis slots: 1

Environmental

Operating Temp: 0° C to +50° C

Storage Temp: -40° C to 85° C

Humidity: 95% max., relative, non-condensing

Cooling Mode: Convection

Altitude: Sea level to 10,000 ft.

NIC Overview

The NIC option card is used with the 560-5179-1 or 560-5301 Fault Monitor CPU cards. It provides both a TELNET command line and a HTTP web page user interface to the Fault Monitor CPU card. It also provides a command line interface over the RS-232 and RS-422 serial port. See “HTML Web” on page 122.

The card communicates with the Fault Monitor CPU with an RS-232 interface. The user must provide a terminal (RS-232 or RS-422) to set-up parameters and an Ethernet network connection. The network interface allows the user to remotely monitor/control the 560-5179-1/5301 Fault Monitor CPU (56K system) over the IP network.

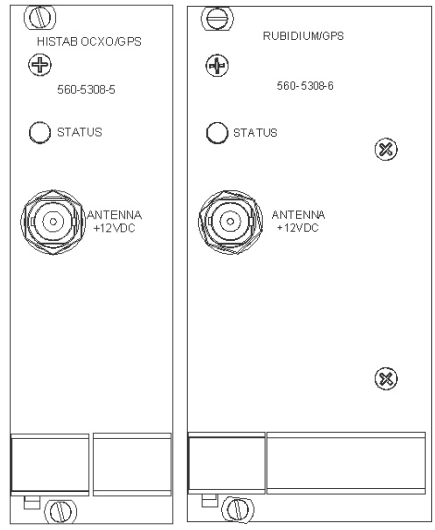
The NIC has an RJ-45 Ethernet connector, labeled NET and a DB-9 Serial port connector, labeled SERIAL. The SERIAL port may be configured for either RS-232 or RS-422 (jumper setting). The card offers “pass-through” access to the 560-5179-1/5301 Fault Monitor CPU card using either the Serial or Net port.

The NIC Serial and Net port ASCII strings (commands/requests) are the same as those defined in the 560-5179-/5301 Fault Monitor CPU manual and has additional commands that are specific to NIC control. In addition to the SERIAL and NET ports, the card provides the 560-5179-1/5301 Fault Monitor CPU card’s Primary (P), Secondary (S) and Tertiary (T) status inputs on BNC connectors. A bi-color LED is provided on the rear panel to indicate NIC activity. An audio alarm (beeper) that is controlled by the “host” 560-5179-1/5301 Fault Monitor CPU is included on the card.

This card requires configuration.

560-5203 (560-5308-x) Disciplined Oscillator Cards

- Power supply front card with power entry rear card
- Dual AC/DC power inputs of 100-240 VAC and36 to 72 VDC
- Fault and Status reporting to Fault Monitor CPU and front panel LED’s
- Card Compatibility: Restricted.
  Slots 1-5.



Physical (560-5203-1,-2)

Width: 1.6 in. (4.06 cm)

Height: 3.94 in. (10 cm)

Depth: 8.66 in. (21.99 cm)

Weight: Approximately 0.9 lb. (0.408 kg)

Chassis slots: 2

Environmental

Operating Temp: 0° C to +50° C

Storage Temp: -40° C to 85° C

Humidity: 95% max., relative, non-condensing

Altitude: Sea level to 10,000 ft.

Electrical (560-5203-x)

Input Refs: 1 MHz, 5 MHz, 10 MHz or GPS

Cooling Mode: Convection

Output Freq: 1 MHz, 5 MHz, 10MHz

Output Amp: 3 Vp-p into 50 Ohms

Freq Stability: Equal to input reference when disciplined

Temp Stability: 0° C to 50° C

Time to Initial Lock: <20 minutes

Oscillator Overview

The 56000 has six disciplined oscillator cards available:

1. Quartz (560-5203-1/560-5308-1)

2. High Stability Quartz (560-5203-2/560-5308-2)

3. Rubidium (560-5203-3/560-5308-3)

4. Quartz GPS (560-5308-4)

5. High Stability GPS (560-5308-5)

6. Rubidium GPS (560-5308-6)

The disciplined oscillator provides system outputs (holdover) in the event of a loss of input reference; either frequency, telecom, or GPS. All six types of oscillators discipline and syntonize to the input reference, achieving the same basic input reference accuracy (long term). The Quartz oscillator has the shorter holdover period while the Rubidium oscillator has the longest, with the high stability quartz oscillator roughly in between.

These oscillators may be used singly or in a dual redundant system configuration (in any combination of the six oscillator types).

All six oscillator cards have similar specifications except for Temperature Stability and Oscillator Aging, which differ.

All oscillator cards, in their simplest form, discipline frequency provided by two separate frequency sources in such a way that no glitches are generated when either of the inputs are lost. The oscillators perform automatic frequency detection (1, 5, or 10 MHz) of the Auxiliary Reference disciplining inputs and provides automatic switching between primary and secondary reference sources based on a coarse frequency detection circuit.

The cards provide an accurate frequency source that is disciplined (locked) by either external frequency reference(s) or by GPS. The external frequency reference and the GPS disciplining modes may be enabled or disabled by on-card DIP switches depending on the system requirements.

All cards requires configuration. Consult the specific manual.

Fault LED's (560-5203 only)

If Solid Red = local power supply failure

If blinking Red = GPS faults. When the card is configured for Aux Ref mode only, this indication is not used.

If Blinking Orange = Aux Ref faults, such as:

1. Primary Aux Ref source bad.

2. Secondary (when enabled) Aux Ref source bad.

3. PLL not locked. This PLL must be locked for Aux Ref. Oscillator disciplining to occur.

If Solid Orange = No Aux Ref faults but the Oscillator has not locked to the external oscillator disciplining source.

If Green (or OFF) = No Aux Ref faults and the Oscillator is locked to the external oscillator disciplining source. The green LED enable switch "GRN" must be ON for the green LED to illuminate. When the GREEN enable switch is OFF, the green indication is replaced by LED OFF.

Fault LED's (560-5308-x only)

The Oscillator card has a bi-color RED/GREEN LED mounted to the front panel. This LED has the following states due to various fault conditions on the card:

SOLID RED = All disciplining sources are turned OFF or PLL is not locked (can't lock).

BLINKING RED = No disciplining source available and oscillator has drifted out of the lock window.

SOLID ORANGE = All requested disciplining sources are valid and the oscillator card is not locked but is steering.

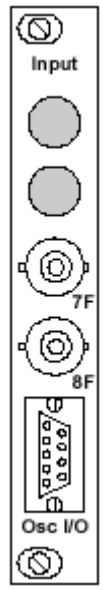
BLINKING ORANGE = Not all requested disciplining sources are valid and the oscillator card is not locked but is steering.

BLINKING GREEN = Oscillator is locked to a disciplining source but not all sources are valid (oscillator may be coasting).

SOLID GREEN = Oscillator is locked and all disciplining sources are valid.

560-5187 Input Cards

The Model 560-5187 series Input Module provides a RS-232 / RS-422 input/ output interface.



- Rear card
- Provides an input\output port for CPU or disciplined oscillator communications and inputs to frequency, timing, and status modules/ buses
- Uses male DB-9 connector
- Card Compatibility: Unrestricted. Slots 1-17.

Physical

Width: 0.8 in. (2.03 cm)

Height: 4.4 in. (11 cm) (3U)

Depth: 5.0 in. (12.7 cm)

Weight: Approximately 0.5 lb. (0.226 kg)

Chassis slots: 1

Environmental

Operating Temp: 0° C to +50° C

Storage Temp: -40° C to 85° C

Humidity: 95% max., relative, non-condensing

Cooling Mode: Convection

Altitude: Sea level to 10,000 ft.

560-5187-1F Card

This card provides an input/output interface, via a Male DB-9 connector (labeled CPU I/O), between the Fault Monitor CPU and the user. Additionally, it provides an input interface to the CPU, via BNC connectors labeled (P and S), for Primary and Secondary Source status. Inputs include Ref. Freq. A and B, Primary status CPU input.

No configuration is required.

560-5187-1T (Status and Timing)

This card provides an input/output interface, via a Male DB-9 connector (labeled CPU I/O), between the Fault Monitor CPU and the user. Additionally, it provides an input interface to the CPU, via BNC connectors labeled (P and S), for Primary and Secondary Source status. Inputs include Ref. Freq. A and B, Primary status CPU input.

No configuration is required.

560-5187-2F (Input)

This card provides an input/output interface, via a Male DB-9 connector (labeled CPU I/O), between the Fault Monitor CPU and the user. Additionally, the card provides a DC-coupled input interface to the mid-plane signals IN5 and IN6. The card also provides an AC-coupled controlled impedance input interface to the mid-plane signals IN7 and IN8. This card can be used for CPU input/output only, for reference/status input only or both.

No configuration is required.

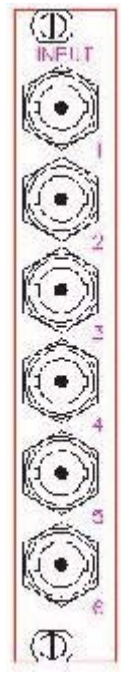
560-5187-3 (Disciplined Oscillator I/O)

This card provides an input/output interface, via a Male DB-9 connector (labeled Oscillator I/O), between the 560-5203-X Disciplined Oscillator Series and the user. The card provides an AC-coupled, controlled impedance input interface to the mid-plane signals IN7 and IN8. The signal IN7 is accessed via the BNC connector labeled 7F. The signal IN8 is accessed via the BNC connector labeled 8F. These signals can be used as frequency reference inputs by any card that accesses a frequency reference via IN7 and/or IN8.

No configuration is required.

560-5186 Hex Timing

- Six BNC connectors
- Rear card
- Card Compatibility: Unrestricted. Slots 1-17



Physical

Width: 0.8 in. (2.03 cm)

Height: 4.4 in. (11 cm) (3U)

Depth: 5.0 in. (12.7 cm)

Weight: Approximately 0.5 lb. (0.226 kg)

Chassis slots: 1

Environmental

Operating Temp: 0° C to +50° C

Storage Temp: -40° C to 85° C

Humidity: 95% max., relative, non-condensing

Cooling Mode: Convection

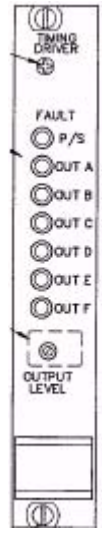
Altitude: Sea level to 10,000 ft.

Hex Timing Overview

This card provides a DC-coupled input interface, via BNC connectors, that directly drives signals IN1 through IN6 on the mid-plane. INPUT 1 through INPUT 6 on the Timing Input Module drive IN1 through IN6, respectively. The six mid-plane signals are distributed via controlled-impedance traces, terminated on the mid-plane at Slot 17. For proper operation, the 50 ohm terminator for each Timing Signal **must** be enabled or disabled to match the driving source.

560-5181\5307 Analog Primary- Secondary Card

- Six Analog Outputs
- Rear card
- Card Compatibility: Location: Slot 1-17 with compatible I/O card in rear slot.



Physical

0.8”w X 3.94”h X 8.66”d (2 cm x 10 cm x 22 cm)

Weight: Approximately ½ pound (¼ kg)

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: 10,000 ft. ASL

Power Requirements

Voltage: 18-72 VDC

Power: 4 W (all six outputs driving 50 Ohm loads)

Functional Specifications

Analog Input Level: 2-5 Vp-p

Impedance: >20k ohms

Frequency: DC to 100 kHz

Analog Outputs

Quantity: 6

Signal Type: Analog

Amplitude: 0 to 3 Vp-p into 50 ohms, adjustable

Signal Delay: < 350 nS

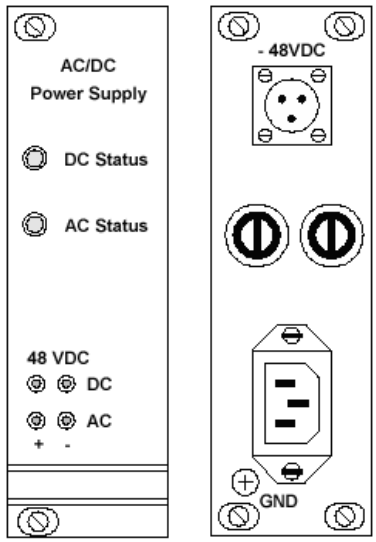
Overview

The 560-5181-1 Analog Output cards incorporate Primary and Secondary signal input source switches, a DC-to-DC Converter, a user adjustable output level (front panel) control, six analog 50 ohm output drivers, Input and Output fault-detection circuitry and seven fault indicators.

The 560-5181-2 provides the user with six *digital* outputs. The card provides output buffers that can be set for RS-422 100 Ohm operation or single ended TTL 50 Ohm operation (switch selectable). The six outputs (or output pairs in the case of RS-422) connect through the mid-plane connector and are delivered to external cables via the I/O card installed in the rear slot directly behind the 560-5181-2 card.

560-5181-3 card provides the user with six analog outputs. The signal source for the card is one of the timing signals that is distributed via INPUT 1 through INPUT 8 on the Model 56000 mid-plane.

560-5217/5309 AC/DC Power Supply



•Power supply front card, power entry rear card

• Dual AC\DC power inputs of 100-240 VAC and 36 to72 VDC

• Fault and Status reporting to Fault Monitor CPU

• Front LED indicators

•Card Compatibility: Restricted. Slots 18-21 only.

Physical

Width: 0.8 in. (2.03 cm)

Height: 4.4 in. (11 cm) (3U)

Depth: 5.0 in. (12.7 cm)

Weight: Approximately 0.5 lb. (0.226 kg)

Chassis slots: 1

Environmental

Operating Temp: 0° C to +50° C

Storage Temp: -40° C to 85° C

Humidity: 95% max., relative, non-condensing

Cooling Mode: Convection

Altitude: Sea level to 10,000 ft.

Electrical

AC Input Voltage: 100-240 VAC, 47-63 Hz

AC Input Power: 135 W Max.

Output Voltage: 56 VDC +/-5%

DC Input Voltage: 36-72 VDC

Overview

The power supply provides dual inputs of 100-240 VAC and 36 to 72 VDC, supplying operational power for all active modules in the 56000 chassis. This power supply requires a rear panel power entry module, which includes the input connector, chassis ground lug and fuse. Two power supplies and power entry modules may be used for redundancy. The input filter consists of an electromagnetic interference (EMI) filter. The filter reduces common and differential mode EMI conducted into and/or out of the chassis.

The wide range AC input is converted to 56 VDC and is power OR'ed with the DC input using on-card diodes. The OR'ed power output is connected to the 56K chassis mid-plane for distribution. The 56 VDC from the AC power supply provides primary power to the 56K chassis when the DC input is less than 56 VDC.

The power OR-ing diodes also allow the power supply to be used in a redundant configuration with another like AC supply or alternate DC power source. In this configuration, if one power supply in the chassis fails, the other takes over. If both supplies are functioning, the highest voltage supply delivers power to the 56K chassis.

This card requires configuration.

Fault LED's

When mid-plane power is available, the LED status indicators will illuminate red when the corresponding power source is off. This could be caused by a loss of power at the source, a disconnected power entry power-input cable, a blown power entry fuse, or a failed power supply.

If SW1 switches 1 and 4 are on, the LED status indicators will illuminate green when the corresponding power source is on.

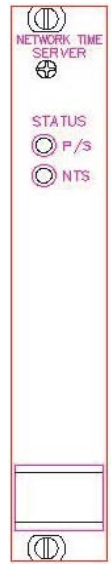
If SW1 switches 1 and 4 are off, the status indicators will not be lit to indicate that power from both sources is on.

Network Time Cards

There are two such cards: the Network Time Server and Network Time Protocol.

560-5151\5304-x Network Time Server Card

- Provides Network Time Protocol via ethernet
- IRIG-B or DC time
- Supports SNMP, SNTP
- Rear card
- Card Compatibility: Unrestricted. Slots 1-17



Physical

Width: 0.8 in. (2.03 cm) Unrestricted. Slots 1-17 with any I/O card

Height: 3.94 in. (10 cm) (3U)

Depth: 8.66 in. (22 cm)

Weight: Approximately 0.5 lb. (0.226 kg)

Chassis slots: 1

Environmental

Operating Temp: 0° C to +50° C

Storage Temp: -40° C to 85° C

Humidity: 95% max., relative, non-condensing

Cooling Mode: Convection

Altitude: Sea level to 10,000 ft.

This IRIG-B input card provides Internet Protocol (IP) network time synchronization over ethernet connected networks, via the Network Time Protocol developed by Dr. David Mills at the University of Delaware. In providing this synchronization, the NTS operates as a “server”. The NTS currently supports version 3.0 of the NTP, RFC 1305 as well as the Simple Network Time Protocol (SNTP), RFC1361. In addition, the NTS will respond to time protocol requests, RFC868.

The IRIG-B AM or DC time synchronization source for the NTS card is one of the timing signals distributed via INPUT 1 through INPUT 8 on the Model 56000 mid-plane. The card is configured at installation by DIP switches to select the signal that will be the Primary and Secondary input.

The card completely supports a SNMP version 1 agent with the MIB II database. SNMP management software allows a network user to remotely monitor and configure an IP (Internet) host that supports a SNMP agent.

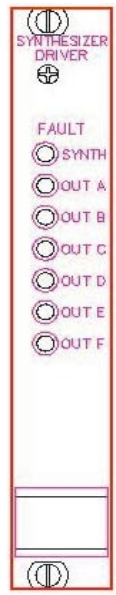
This card’s configuration can be re-configured for flexibility.

560-5152 Network Time Protocol (NTP)

This Input/Output Module provides an input/output interface, via a Male DB-9 connector (labeled CPU I/O), between the Network Time Server and the user. A female DB15 Attachment Unit Interface (AUI) connector provides the Ethernet interface. A local DC-to-DC converter supplies 12V to the AUI Interface for an external Medium Attachment Unit (MAU). This card requires no configuration.

560-5170\5303 N.8 Frequency Synthesizer

- Six independently programmable frequency synthesizers
- N.8 frequency rates to all six outputs, 8 kPPS - 8192 kPPS (the 5170 for up to 4.096 MHz, the 5303 for up to 8.192 MHz)
- Passive Combiner
- Six Direct Digital Synthesis IC's
- Six pairs of output drivers
- Seven fault indicators



Physical

Width: 0.8 in. (2.03 cm) Unrestricted. Slots 1-17.

Height: 3.94 in. (10 cm) (3U)

Depth: 8.66 in. (22 cm)

Weight: Approximately 0.5 lb. (0.226 kg)

Chassis slots: 1

Environmental

Operating Temp: 0° C to +50° C

Storage Temp: -40° C to 85° C

Humidity: 95% max., relative, non-condensing

Overview

This option card offers the user six independently programmable frequency synthesizers that provide various pulse rates. In a non-programmable application, the card uses nine DIP switches to provide any one of the 512 different N.8 frequency rates (8 kPPS to 4096 kPPS) to all six outputs.

The N.8 Frequency Synthesizer generates an output frequency that is locked to the external reference frequency distributed via REF A, B, or C on the mid-plane. When used with this Fault Monitor CPU, the selectable rates are 8 kPPS to 8192 kPPS. The input frequency from the REF A, B, and C inputs (1, 5, or 10 MHz) is switch-selectable by an on-card DIP switch.

In a system without a Fault Monitor CPU card, the N.8 Frequency Synthesizer card offers automatic REF A, B, C passive combiner operation as previously stated. When the N.8 card is used in a system that includes the Fault Monitor CPU card, the REF A, B, C inputs are also controlled by the CPU. When a REF A source's Fault Status is detected (monitored by the CPU), the REF A input on the N.8 card is disabled. The REF B and REF C inputs are operated similarly -- they are turned off whenever a Fault Status condition for that reference exists.

The N.8 Frequency Synthesizer also has the capability of synchronizing the phase of the frequency outputs. The six on-board synthesizers may be synchronized (reset) with a signal from the Model 56000 mid-plane timing inputs (INPUT 1 through INPUT 8).

The N.8 Frequency Synthesizer incorporates a Passive Combiner, a DC-to-DC Converter, a phase-locked VCO, six DDS (Direct Digital Synthesis) ICs to generate the six output frequency rates, twelve output drivers (six differential pairs), fault-detection circuitry and seven fault indicators.

This card requires configuration. Refer to specific card manual.

Fault LED's

The Synthesizer Fault indicator may flash briefly during hot swapping and at the addition or removal of REF A, B, or C. This is a normal condition which occurs as the Voltage Controlled Oscillator (VCO) experiences a reference perturbation.

A continuously-flashing LED = either a phase-locked loop out-of-lock condition or, when enabled, the loss of both Primary and Secondary input synchronization inputs.

A solid Synth Fault LED = a local power supply failure.

A blinking Synth Fault LED = a loss of lock and could be caused by:

1. Input reference off-frequency

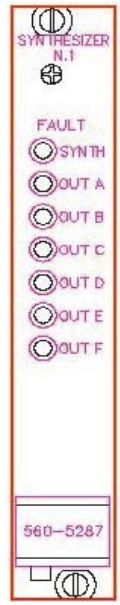
2. Loss of reference on REF A,B, and C. When all references are lost, the VCO drifts to one end of the control range, which is detected as a Synth Fault.

3. A VCO failure

The OUT A through OUT F Fault LEDs activate when the associated driver has failed.

560-5287 N.1 Frequency Synthesizer

The N.1 option is a direct digital synthesizer (DDS) programmable by the controller onboard the 56K DRC. It is a plug in option that fits in the 56K option slot, and has its own dedicated output cards.



- Six Outputs per card
- Supports TTL Single-ended and RS-422
- 1 Hz through 25 MHz Frequency Range
- 6 nS Frequency and Phase Change Time

When 1, 5, or 10 MHz is supplied by a remote oscillator, which is divided down to 200 kHz which is used to phase lock the local 33.554432 MHz oscillator. This clock is supplied to the Direct Digital Synthesis (DDS) chips which multiply it up to 134 MHz. A parallel data and control bus from the Xilinx FPGA allow the Fault Monitor CPU (560-5179/5301) to program frequency division of the 134 MHz clock for specific output frequencies.

These frequencies are very stable because the input clock is stable and it is divided by 6 bytes. Idle power consumption should not exceed 1W per output channel or a total of 6W per card. Up to eight cards in one 56K chassis can b supplied by a 90W power supply.

Each channel is provided to RS-422 drivers which can provide square wave outputs of 0 to 3 Vp-p about 1.8 VDC complimentary or TTL 2 VDC to 0 single sided by paralleling driver outputs under program control. The complimentary drive line is also available in the TTL mode if desired.

General Specification

Frequency and phase change time: Approximately 6 nS

Output frequency range: 1 Hz through 25 MHz

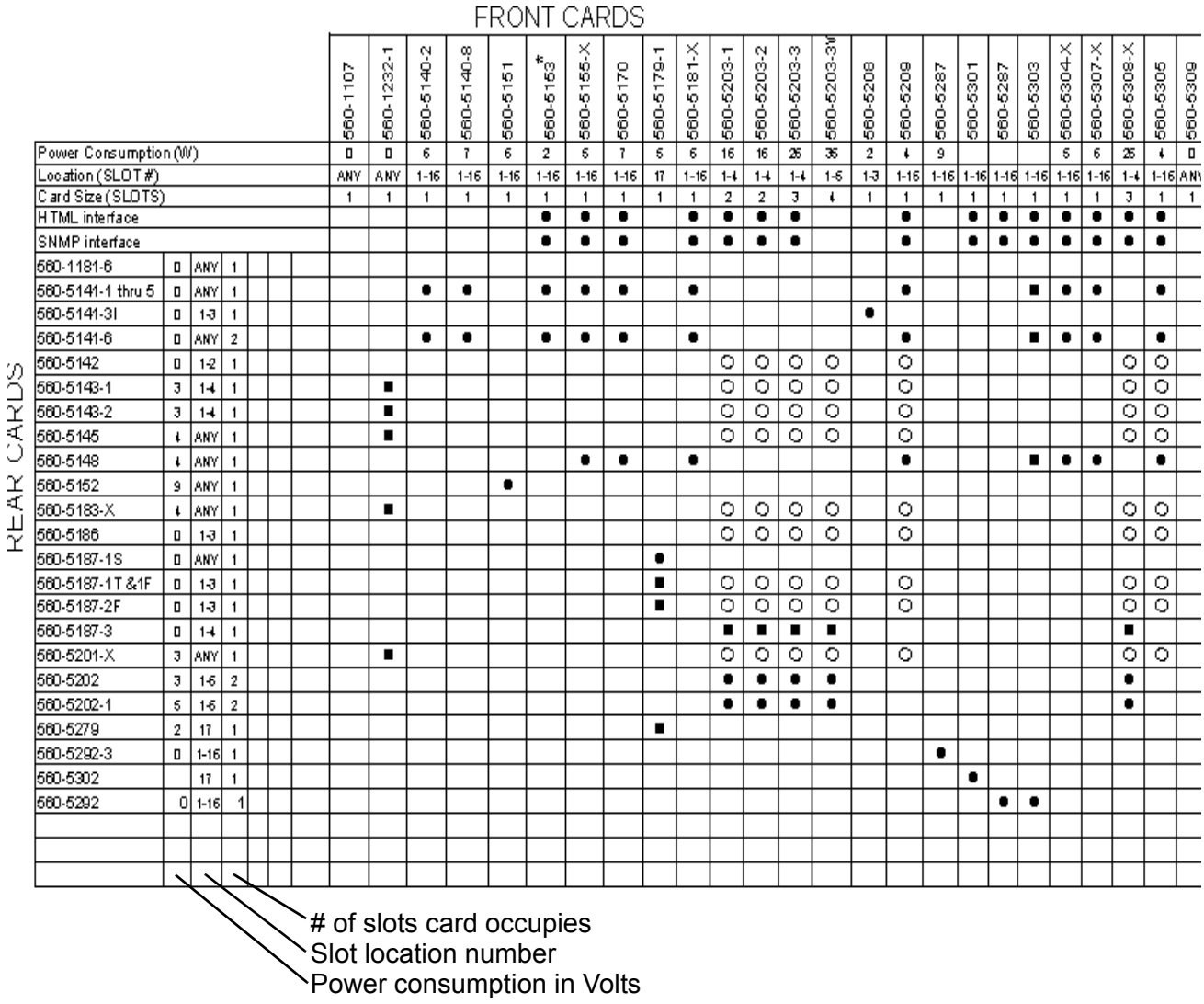
Frequency steps: 1 Hz

Frequency/Phase control system CPU Jitter: < 5 nS at 25 MHz

Number of outputs: Six per card

Output types TTL Single-ended outputs: RS-422 Outputs

56000 Card Compatibility Matrix



● Cards are compatible and must be used in front/rear pairs.

⬭ Cards operate independently but may be used in front/rear pairs.

■ Cards are compatible and may be used in front/rear pairs.

The 560-5148 card is digital only (TTL, RS-422)

Card Inventory

This is a summary of all cards used with the 56000 DRC. The following are Front mounted cards.

Front Cards

Cover Panel

560-1107 Front Blank Cover Panel

560-1232-1 Fiber Optic Blank Cover Panel

Synthesizer/Buffer

560-5140-2 Passive Combine, 50-30, 4 KPPS

560-5140-8 Passive Combiner/Synth, DS 3

560-5155/5304-1 1-5-10 MHz, Six Sine Wave Outputs

560-5155/5304-2 1-5-10 MHz, Six RS-422 or TLL Outputs

560-5170/5303 N.8 Six Programmable Outputs

560-5181/5307-1 IRIG-B AC Timing Driver

560-5181/5307-2 IRIG-B DC Timing Driver, HEX

560-5208 E1\T1 Reference Interface

560-5287 N.1 Six Programmable Outputs

Disciplined Oscillators

560-5203/5308-1 Quartz

560-5203/5308-2 High Stability Quartz

560-5203/5308-3 Rubidium

560-5203-3W Rubidium (4 wide)

560-5308-4 Quartz GPS

560-5308-5 High Stability GPS

560-5308-6 Rubidium GPS

560-5202 Disciplined to GPS (Antenna included)

560-5202-1 Disciplined to GPS, DN\Conv. (Antenna included)

Network Time Server

560-5151 Network Time Server

Telecommunications Interface (Mother Board)

560-5153 Telecommunications Interface

Telecommunications Sub-Modules (Daughter Board)

560-5193 Alarm Relay

560-5194 Composite Clock

560-5195 Sine Wave Output 1.544 MHz, 2.048 MHz

560-5196 Single Ended Square Output (User programmable frequencies)

560-5197 AMI Output

560-5198 RS-422 Output

Fault Monitor CPU

560-5179/5301-1 Fault Monitor CPU

Sync Generator

560-5209/5305 Sync Generator -Six channels

Power Supplies

The following power supplies are available for the 56000.

560-1917/5309-1 Single AC Power Supply

560-1917/5309-2 Dual AC Power Supply

560-197/5309-4 Single DC Power Supply

560-197/5309-5 Dual AC\DC Power Supply

560-197/5309-6 Dual DC Power Supply

560-197/5309-10 No Power Supply

Rear Cards

Cover Panel

560-1181-6 Rear Cover Panel

Input\Output Circuit Boards Hex Outputs

560-5141-1 BNC Connectors

560-5141-2 Wire-wrap Connectors

560-5145 ABC Quad Fiber XCVR

560-5148 Fiber Optic, Six Outputs

560-5183-1 Four Analog Outputs (IN 1-6)

560-5183-2 Four Digital Outputs (IN 1-6)

560-5201-1 Fiber Optic, XCVR, AC

560-5201-2 Fiber Optic, XCVR, DC

Network Time Server I\O

560-5186 Input\Output for NTS card (560-5151)

Fiber Optics

560-5143-1(Ref. A,B,C) Input\Output XCVR

560-5143-2(Input 7\8) Input\Output XCVR

560-5145(Ref. A,B,C) Quad Fiber XCVR

560-5148 Fiber Optic, Six Outputs

560-5183-1 Four Analog Outputs (IN 1-6)

560-5183-2 Four Digital Outputs (IN 1-6)

560-5201-1 Fiber Optic, XCVR, AC

560-5201-2 Fiber Optic, XCVR, DC

Network Time Server I\O

560-5152 Input\Output for NTS (560-5151)

Timing Input

560-5186 Timing Input (Input 1-6)

CPU\IO Frequency Reference Input

560-5187-1F Two References Inputs (A&B), Two Status Inputs (Pri & Sec)

560-5187-1S Three Status Inputs (P, S, T)

560-5187-1T Two Timing Inputs (Input 7\8), Two Status Inputs (Pri, Sec)

560-5187-2F Two Reference Inputs (Input 7\8)

560-5187-3 Two References Inputs (Input 7\8), RS-232 Oscillator I\O

560-5279 Network Interface Card, Three Status Inputs (P, S, T)

User Interface

In this chapter, you will learn how to interface with the 56000.

Introduction

The 56000 offers a variety of interfaces for the user to use when operating the 56000. Some of the interfaces may or may not use commands to execute communication. The variety of interfaces allows the user to select the method of communication that is most suitable to their particular needs.

Interface Methods

The 56000 has four ways the user may communicate with it. They are:

- Serial Port
- Network Port
- SNMP
- HTML

The most common methods used are via Serial and Network ports. DHCP is not supported.

Serial Commands

The 56000 is an automated instrument. Operating limits are preset at the factory with default settings when shipped. These may be changed to a customer's specific requirements as needed. The customer may issue a wide range of commands using the Serial port to:

- Turn off/on automatic reports
- Turn off/on audible alarms
- Request confirmation on slot #
- Configure slot #
- Enter card ID #
- Request Help
- Switch to Machine Mode
- Turn off/on periodic reports
- Switch to Primary inputs

- Set external fault status
- Request a report
- Enable/Disable reference frequencies
- Switch to Secondary inputs
- Set External fault status
- Connect Timing switch to an External fault input
- Switch to Verbose mode

The system retains the settings until the administrator resets them.

User Interface Commands

Communicating with the 56000 is through the use of commands. Use the following guidelines when typing a command at the command prompt. The Serial commands also apply to the Network Port Telnet sessions in Section 7.7.

Command Line Interface

The serial I/O commands are listed in the following summary and syntax is described in the sections that follow. Correct entry of a command will be acknowledged with: **OK<CR><LF>**. In machine mode there will be no acknowledgment. Incorrect or invalid entries will result in an **ERROR 02** message or there will be no response.

The format for data input is: **<COMMAND><CR>**
where **<COMMAND>** is one of the commands listed below.

<CR> is a carriage return.

<CR><LF> is a carriage return and line feed.

Reference Commands

The following Serial/Telnet Fault Monitor CPU commands are standard for all 56000 units. They are not case specific.

REF	Automatic REF selection based on PST fault status inputs.
REFA!	Enable REFA only, disable REFB and REFC.

REFB!	Enable REFB only, disable REFA and REFC.
REFC!	Enable REFC only, disable REFA and REFB.
REFA=x	Indicate Reference A is x MHz, x = 1, 5 or 10.
REFB=x	Indicate Reference B is x MHz, x = 1, 5 or 10.
REFC=x	Indicate Reference C is x MHz, x = 1, 5 or 10.
PSRC=x	P external fault input level (x=H,L,D,O).
PSRC?	Request P external fault input level setting.
SSRC=x	S external fault input level (x=H,L,D,O).
SSRC?	Request S external fault input level setting.
TSRC=x	T external fault input level (x=H,L,D,O).
TSRC?	Request T external fault input level setting.

Timing Commands

PRI	Switch to primary inputs if available.
PRI!	Switch to primary inputs regardless of faults.
SEC	Switch to secondary inputs if available.
SEC!	Switch to secondary inputs regardless of faults.
TPRI=x	Map timing card P input to ext fault status input(x=P, S, T, N).
TPRI?	Request timing card P input to ext fault status inputmapping.
TSEC=x	Map timing card S input to ext fault status input (x=P, S, T, N).
TSEC?	Request timing card S input to ext fault status input mapping.

Configuration Commands

C##?	Request card ID or configuration on front and rear cards in slot ##.
C## [data]	Configure front card in slot ##.
	Refer to manual for [data].

C##=xxxx	Enter front card id in slot ##.
CR##=xxxx	Enter rear card id in slot ##.
DEFLT	Restore default parameters.
SITE=xx	Enter site number 0-99.
SITE?	Request site number.

Alarm Commands

BOFF	Turn off / disable audible alarm.
BON	Turn on / enable audible alarm.
CL	Clear Fault Latches.
Q	Quiet the audible alarm for the current alarm only.

The following, although not listed on the help menu, are valid.

Latch	Enables faults to be latched
NoLatch	Disables latch alarms (enables SNMP traps upon fault changes)

Report Commands

AROFF	Turn off automatic fault reports.
ARON	Turn on automatic fault reports. (Not available if NIC card is installed)
H	Display HELP messages.
M	Switch to machine mode.
PR##	Turn on periodic reports at ## minute intervals. (Not available if NIC card is installed)
PROFF	Turn off periodic reports.
R	Request a report.
V	Switch to Verbose mode.
VER?	Request current software & xilinx versions.

Command Examples

Automatic Fault Reports ON/OFF

Use the ARON/AROFF functions to enable/disable automatic fault and status reporting. To turn automatic fault reporting on (i.e., print a report when a fault condition changes), send the following string:

Sample Entry: ARON<CR>

Response: OK<CR><LF>

To turn automatic fault reporting off, send the following character string:

Sample Entry: AROFF<*CR*>

Response: OK<CR><LF>

Automatic fault reports are not available if a NIC card is installed.

Audible Beeper ON/OFF

Use the BON/BOFF functions to enable/disable the audible beeper. Use the Q function to deactivate the beeper. To enable the audible alarm (/BEEP on the backplane), send the following string:

Sample Entry: BON<*CR*>

Response: OK<CR><LF>

To disable the audible alarm (/BEEP on the backplane), send the following string:

Sample Entry: BOFF<*CR*>

Response: OK<CR><LF>

To temporarily quiet the beeper, send the following string:

Sample Entry: Q<*CR*>

Response: OK<CR><LF>

Requesting/Setting Slot Configuration and ID

To retrieve information on a card in a particular card slot, send the following string:

Sample Entry: C##?<*CR*>

Response: Front and back contents of Slot ## are returned

Where ## represents the slot number. Leading zeros may be omitted in the slot number. To configure the front card of a particular slot, send the following string:

Sample Entry: C## [data]<*CR*>

Response: OK<CR><LF>

Where ## is the slot number and [data] is the data for the command. Refer to the manual for the appropriate card for [data]. (Rear cards are not currently configurable.)

To configure the card ID for a particular slot, send the following string:

Sample Entry: C##=XXXX<*CR*> (front card) or CR##=XXXX<*CR*> (rear card)

Response: OK<CR><LF>

Where ## is the slot number and XXXX is the configuration ID for the card.

Clearing Previous Fault Status

This command will clear the CPU memory of old faults, clear any card latched fault status bits, clear fault outputs, and silence the audible alarm. Send the following string:

Sample Entry: CL<*CR*>

Response: OK<CR><LF>

Restore Default Parameters

This command will restore the parameters stored in EEPROM to their default values. Send the following string:

Sample Entry: DEFLT<*CR*>

Response: OK<CR><LF>

Default parameters are:

ARON	Automatic reports on
V	Verbose Mode
PR10	Periodic reporting interval, 10 minutes

PROFF	Periodic reports off
SITE=01	Site number is 01
BON	Audible alarm on
PSRC=D	Disable primary fault status input
SSRC=D	Disable secondary fault status input
TSRC=D	Disable tertiary fault status input
TPRI=N	No connection between primary external fault input and timing card primary input
TSEC=N	No connection between secondary external fault input and timing card secondary input

Requesting Help

To request help, send the following string:

Sample Entry: H<*CR*>

Response: Help will be displayed.

Switching Between Verbose and Machine Modes

To go to machine mode, send the following string:

Sample Entry: M<*CR*>

Response: OK<CR><LF>

To go to verbose mode, send the following string:

Sample Entry: V<*CR*>

Response: OK<CR><LF>

Enabling/Disabling Periodic Reports

To enable periodic reporting, send the following string:

Sample Entry: PRA5<*CR*>

Response: OK<CR><LF>

Where PR = command for periodic reports, A = 1, and 5 = a numeric from 0-9. The above command produces a report every 15 min. Each letter of the alphabet equals its numeric position, thus B= 2, C=3 etc. A entry of PRE produces a five minute time period report. A PRC0 entry, a 30 minute report.

To cancel periodic reporting, send the following string:

Sample Entry: PROFF<*CR*>

Response: OK<CR><LF>

Periodic reports are not available if a NIC card is installed.

Switching Time Card Inputs

To switch to primary inputs if there are no input faults, send the following string:

Sample Entry: PRI<*CR*>

Response: OK<CR><LF>

To switch to primary inputs regardless of input faults, send the following string:

Sample Entry: PRI!<*CR*>

Response: OK<CR><LF>

Sending PRI<CR> after PRI!<CR> will return the Timing Switch card to normal operation.

To switch to secondary inputs, if there are no input faults, send the following string:

Sample Entry: SEC<*CR*>

Response: OK<CR><LF>

To switch to secondary inputs regardless of input faults, send the following string:

Sample Entry: SEC!<*CR*>

Response: OK<CR><LF>

Setting External Status Input Level

To set the active level for the primary input, send the following string:

Sample Entry: PSRC=x<*CR*>

Response: OK<CR><LF>

To set the active level for the secondary input, send the following string:

Sample Entry: SSRC=x<*CR*>

Response: OK<CR><LF>

To set the active level for the tertiary input, send the following string:

Sample Entry: TSRC=x<CR>

Response: OK<CR><LF>

Where x is “H” for HIGH=ALARM, “L” for LOW=ALARM, “O” for OFF, and “D” for DISABLE. If turning an external status input OFF, this will disable the corresponding reference frequency and any mapped timing input. In effect, this command turns off the entire associated channel. To request PSRC, SSRC, and TSRC command settings send the following strings:

Sample Entry: PSRC?<*CR*>

Response: PSRC=x<CR><LF>

Sample Entry: SSRC?<*CR*>

Response: SSRC=x<CR><LF>

Sample Entry: TSRC?<*CR*>

Response: TSRC=x<CR><LF>

All unused status inputs should be set to OFF.

Requesting a Report

To request a report from the unit, send the following string:

Sample Entry: R<*CR*>

Response: A report will be immediately transmitted.

Enabling and Disabling the Reference Report

To exit the reference frequency test mode and return to normal operation, send the following string:

Sample Entry: REF<*CR*>

Response: OK<CR><LF>

To disable REFB and REFC and enable REFA, send the following string:

Sample Entry: REFA!<*CR*>

Response: OK<CR><LF>

To disable REFA and REFC, and enable REFB send the following string:

Sample Entry: REFB!<*CR*>

Response: OK<CR><LF>

To disable REFA and REFB, and enable REFC send the following string:

Sample Entry: REFC!<*CR*>

Response: OK<CR><LF>

Requesting/Setting Site Numbers

To set the site number of the chassis, send the following string:

Sample Entry: SITE=##<*CR*>

Response: OK<CR><LF>

Where ## is the decimal number in the range 0 to 99 in which to set the chassis. To request the site number of the chassis, send the following string:

Sample Entry: SITE?<*CR*>

Response: SITE=##<CR><LF>

Connect the Timing Card Input Faults to an External Fault Input

To connect the timing card primary input fault to an external fault input, send the following string:

Sample Entry: TPRI=x<*CR*>

Response: OK<CR><LF>

To connect the timing card secondary input fault to an external fault input, send the following string:

Sample Entry: TSEC=x<*CR*>

Response: OK<CR><LF>

Where x = “P” for Primary, “S” for Secondary, “T” for Tertiary, or “N” for None. To request TPRI and TSEC settings, send the following strings:

Sample Entry: TPRI?<*CR*>

Response: TPRI=x<CR><LF>

Sample Entry: TSEC?<*CR*>

Response: TSEC=x<CR><LF>

Request Version

To request the current software and FPGA versions (field programmable gate array), send the following string:

Sample Entry: VER?<*CR*>

Response: 560-3175 1.1 184-054 A

N.1 Commands

The N.1 card utilizes the serial port to set frequency and other parameters for the six outputs and the card as a whole.

All commands to the N.1 card follow the same format based on the slot that the card is occupying. Each command begins with Cxx where “xx” is the slot number (10-based, no leading 0) in which the card resides. All letters that are part of an actual command string can be lower case or upper case.

Standard Commands

There are two status commands: a standard command and an advanced command. The standard command is used for all cards in the past and has the format:

Cxx?***<CR>***

where:

? = is a question mark character
<CR> is a carriage return

The response to this command is:

xx, 5287 Six Channel N.1 Back Card Type
N1 Output Mode = y
C13 A F: zzzzzzzz Hz
C13 B F: zzzzzzzz Hz
C13 C F: zzzzzzzz Hz
C13 D F: zzzzzzzz Hz
C13 E F: zzzzzzzz Hz
C13 F F: zzzzzzzz Hz

where:

xx = is the slot number
y = (*disregard this indicator)
zzzzzzzz is the frequency setting for the specified channel (1 to 25,000,000)

The advanced status command is unique to the N.1 and has the format:

Dxx?***<CR>***

where

? = is the question mark character
<CR> is a carriage return

The response to this command is:

xx, 5287 Six Channel N.1 Back Card Type

N1 Output Mode = y

C13 A F: zzzzzzzz Hz /sssss
C13 B F: zzzzzzzz Hz /sssss
C13 C F: zzzzzzzz Hz /sssss
C13 D F: zzzzzzzz Hz /sssss
C13 E F: zzzzzzzz Hz /sssss
C13 F F: zzzzzzzz Hz /sssss

where:

xx = is the slot number
y = is the output type (D, S, or O)

zzzzzzzz = is the frequency setting for the specified channel (1 to 25,000,000)
sssss = is a dividing scale factor (/1 to /10000)

There are four setup commands that can be directed to each channel. One is the standard user command, the other three are considered advanced commands.

The standard setup command sets the frequency for a specific channel. To minimize jitter, the N.1 card determines the best combination of frequency and scale settings to provide the frequency. Typically, the frequency is set between 2,500,000 Hz and 25,000,000 Hz and divided down from that point. Because the largest scale factor is / 10000, lower frequencies must be used when the target frequency is less than 25K Hz.

The output frequency is set with the command:

Cxx y z***<CR>***

where

y is the selected channel and must be a letter A-F
z is the selected frequency, entered in units of Hz.

For example, to set a 10 Hz output:

z = 10

To set a 1.85 MHz output:

z = 1850000

<CR> is a carriage return

Frequency and scale factor can be set independently should it be desired to test jitter at different frequency/scale combinations than those automatically selected, or to generate frequencies that contain a fractional Hz component (e.g. 4.1978 Hz).

Setting the scale acts on the output of the DDS chip, but does not change the actual output. If the scale is changed, it is likely that there will be an undesired interim frequency until the frequency is set to the desired value. The scale is set with the command:

Cxx yS z***<CR>***

where

y = is the selected channel and must be a letter A-F

S = is the letter S and indicates that a scale is being set. Note that there is no space between the channel identifier and the letter S.

z = is the scale and indicates the decade divide. It must begin with a /1 (divide by 1) and can have up to four 0's following the 1 (divide by 10000). Legal entries are /1, /10, /100, /1000, /10000.

<CR> is a carriage return

The output phase can also be set; however, the phase is not stored between power cycles and will change whenever the frequency is changed. The phase can only be changed when the scale factor is /1. The phase is an absolute setting for the specified channel, but is relative to the other channels. That means that an identical phase setting on different channels will not cause the different channels to be phase aligned. The setting is absolute for the specified channel in that the commanded phase is not additive to the previous commands. That means that if a setting of +400 is entered, followed by a setting of +100 for the same channel, the phase will be at +100 from its original point, not +500.

Format for the phase command is:

Cxx yP sz***<CR>***

where

y = is the selected channel and must be a letter A-F.

P = is the letter P and indicates that phase is being set. Note that there is no space between the channel identifier and the letter P

s = is the sign of the phase (+ or -). Note that a sign must be provided, if no sign is provided, and error is indicated, even if phase is set to 0.

z = is the absolute phase setting for the specified channel. The number is entered in hex and has a range of +/- 1FFF. Each hex step moves the phase approximately 0.022 degrees.

<CR> is a carriage return

In addition to the commands specific to the N.1 card, to set the reference frequency use the following commands:

REFAx, REFBx or REFCx

where

x = is 1,5, or 10.

Three different frequencies are allowed for the reference 1 MHz, 5 MHz, and 10 MHz.

HTML Web

The new NIC cards have an HTML Web interface. The Web interface requires user id and password to change any of the settings. Without a user ID and password, the user can view the pages, but cannot make any changes.

Only web-configurable cards are displayed in the web interface. If an installed card does not appear in the web interface, the card is most likely configured using physical switches.

How to Install

The customer should select a central main server within the organization. The software is installed using the initial user name and passwords. An administrator is assigned and an IP address is designated by the web master.

For administrators:

- User name = “operator1”, “operator2”, and so on...
- Password = “casey”

For users:

- User name = “user1”, “user2”, and so on...
- Password = “ttm”

Administrator Duties

The Administrator for the 56000 web site selects those individuals within the organization that will have the ability to change the settings of their 56000 units. The Administrator will assign login names and passwords for each selected individual. The Administrator is the only person that can add or delete users or change logins and passwords.

Screens

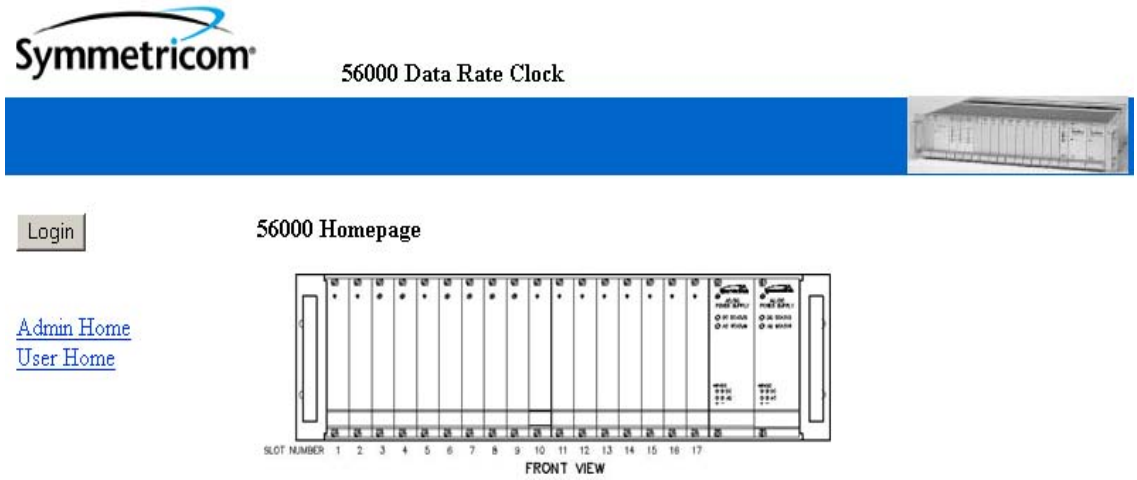
The 56000 website comprises of the following pages:

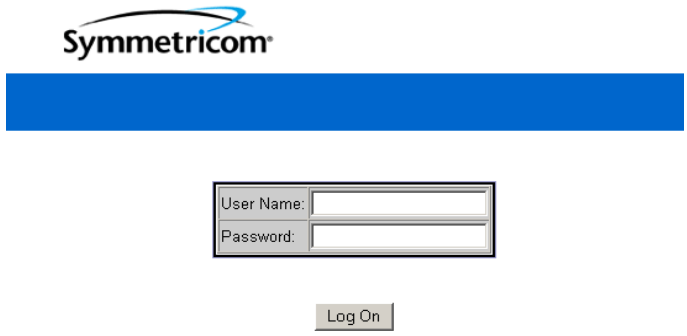
Homepage

The user must first login for access. Left click on the Login button. A pop-up window for the user login name and password appears (next page). Type in the security information and click the Log-on button. Once logged in, the user may access the site.

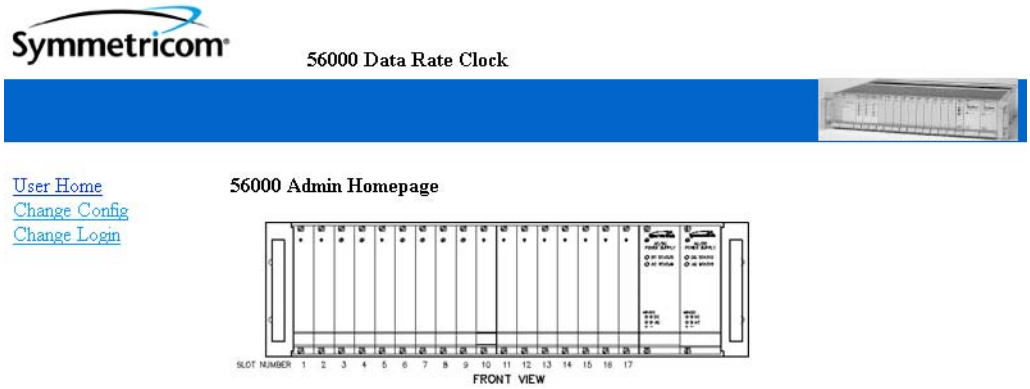
Generally, LEFT click on any link using your mouse to navigate. You can also use the BACK button on your browser to return to the previous page. LINKS are underlines and in blue.

56000 Homepage



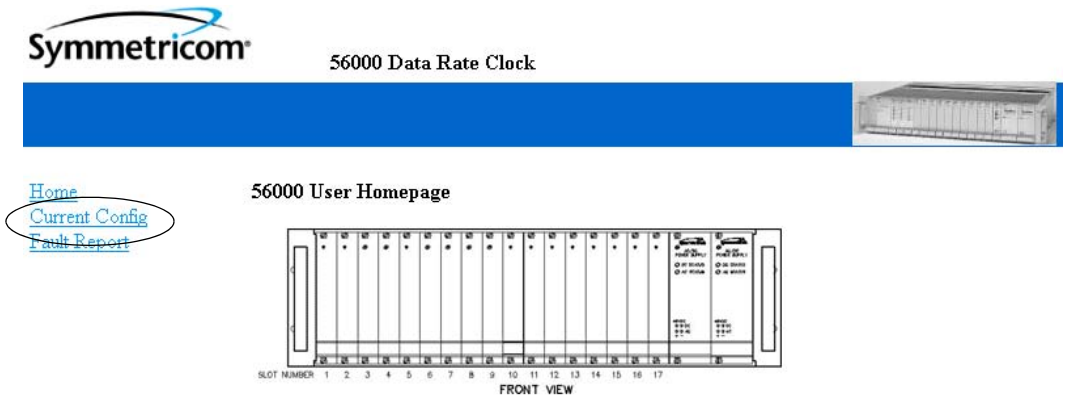


56000 Admin Homepage



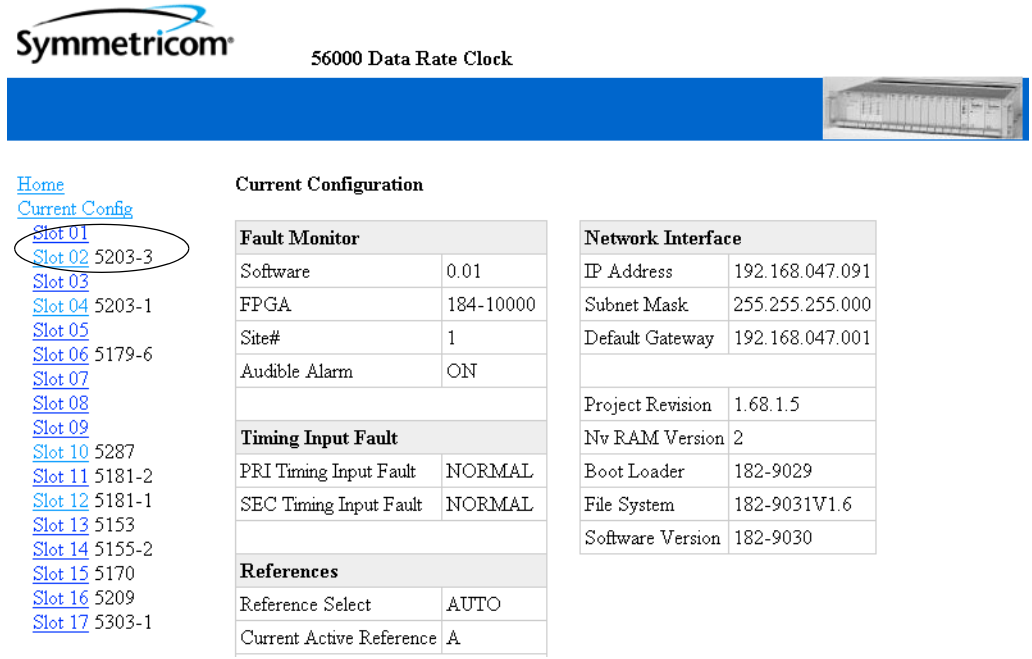
After log-on, the Admin Homepage appears.

By clicking on the User Home link, the following screen appears.



Click on the Current Config link to view the current configuration.

Current Configuration Screen



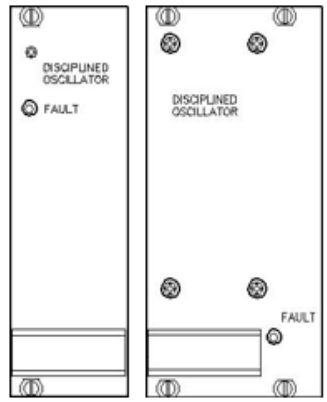
This screen lists the current cards in the 56000 and the slots they occupy. By clicking on a card's link, one can view the details of that card. For instance, by clicking on Slot 02 with the 5203-3 card, the following appears (next page). At a glance, the user can review the details of the current configuration of the 56000 unit. If a slot is empty it either means that there is no card in the slot or a card may require additional slots. In the example, the 560-5203-3 card is in Slot 2. Note that Slots 1 and 3 are empty.

Home
Current Config
Fault Report

Slot 13 Current Configuration

Model 560 - 5203-0 DISCIPLINED OSCILLATOR

Aux Ref		REFERENCE
Pri Aux Ref		ENABLED
Sec Aux Ref		DISABLED
Timing output latch		LATCH UPON GPS LOCK
Output Freq		10 MHz
LED Control		NO GREEN WHEN LOCKED



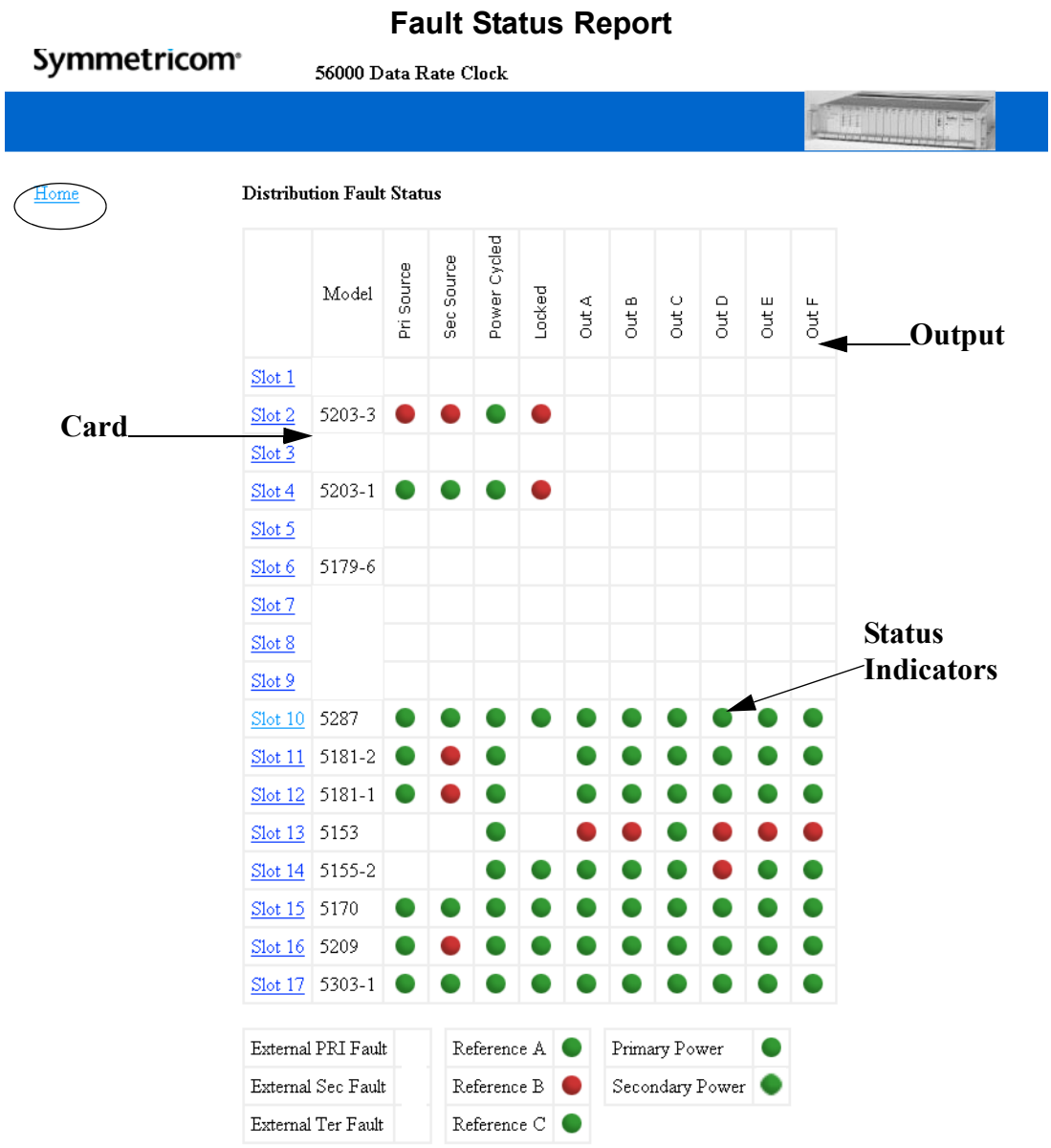
This shows that in Slot 2, the current configuration has a 560-5203 Disciplined Oscillator card. Other pertinent data is also displayed.

To return to the the Home page, left click the **Home** link. To return to the previous screen, left click the **Current Config** link or the BACK button on your browser. To view the Fault Report, left click the **Fault Report** link.

Fault Report Link

Left click on this link, the following screen appears (next page).

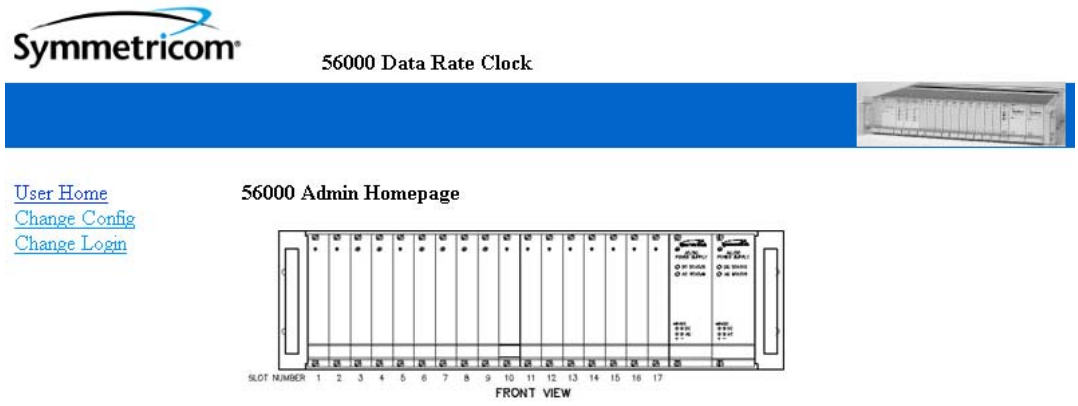
The Fault Report link produces a matrix of blank (inactive) , Red (bad, fault), and Green (active, good signal) circles. At a glance, the user is able to view the 56000 status. Not all cards are displayed in the Fault Report web display.



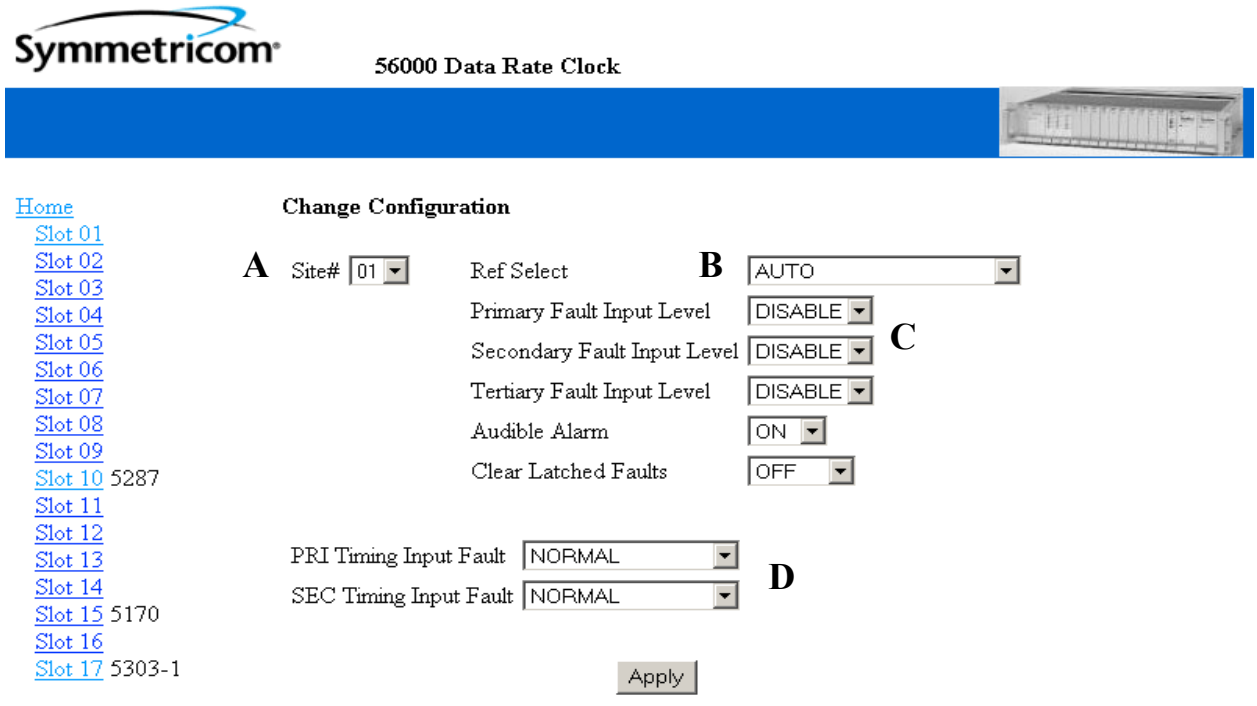
Click on the **Home** link. The 56000 Homepage appears.

Change Config and Change Login Link

To change the system configuration or log-in, click on the **Admin Home** page link. The Admin Homepage appears if the user has been logged on as an administrator, otherwise, the web page for the user to log-on (as administrator) appears.



Left click on the **Change Config** link. The following page appears.



Only configurable cards in the 56000 appear. Cards that use switch settings are not shown. If a slot is blank, it may indicate that the card is not configurable via the CPU and does not apply. Using the drop down menus to select from, the

administrator is able to select general configurations to the specified chassis. the administrator is able to change only one chassis at a time.

To select a specific 56000 chassis, use the **Site#** drop down menu to locate the chassis number.

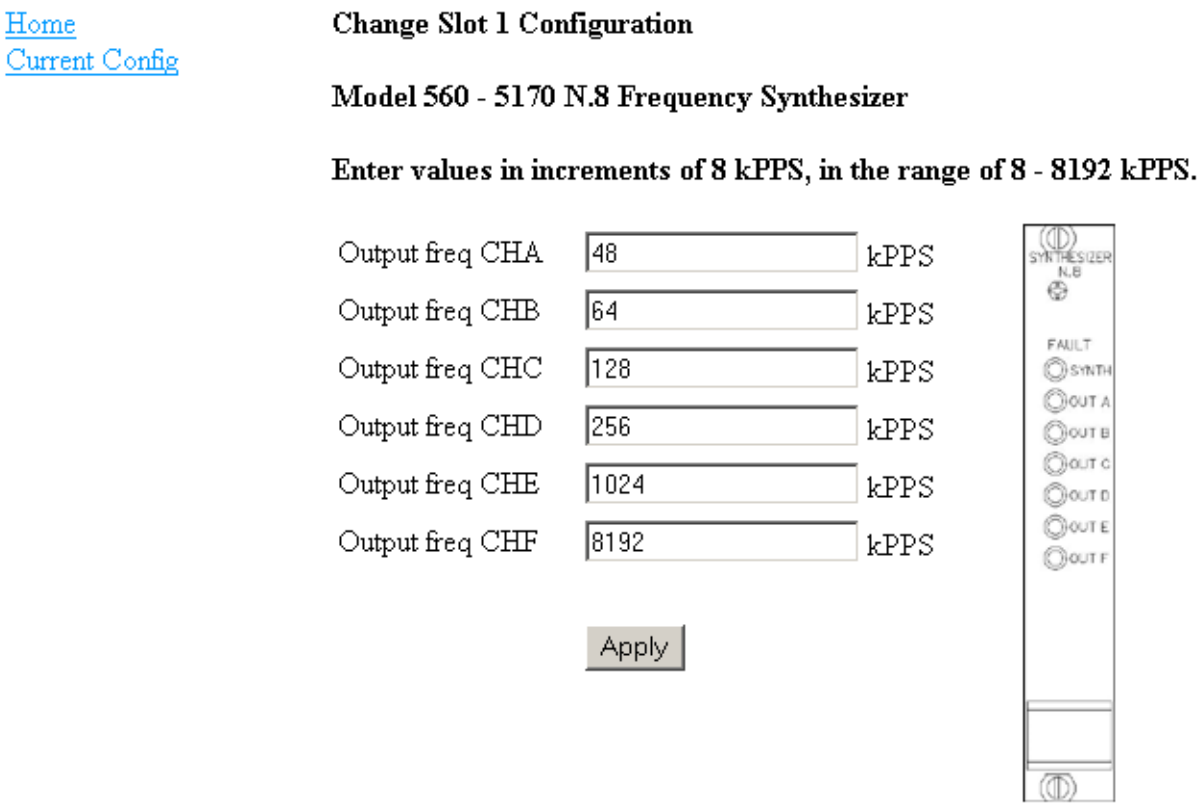
To change the **Ref Select**, the menu provides: AUTO (based on Ref selection), FORCE A, Disable B&C; FORCE B, Disable A&C; FORCE C, Disable A&B.

To change the **Primary**, **Secondary**, or **Tertiary Fault Input Levels** for external devices (these inform the Fault Monitor CPU to not use a particular signal that it is providing), the menu provides: Hi, Lo, Off or Disable. These are used to determine the active state of the alarm

To change the **PRI** or **SEC Timing Input Fault**, the menu provides: Normal (Automatic) , Primary, Secondary Input Levels.

Changing Card Configurations

To change the settings of an individual card listed, left click on the link. In this example, left click on card 5170 located in Slot 17. The following page appears.



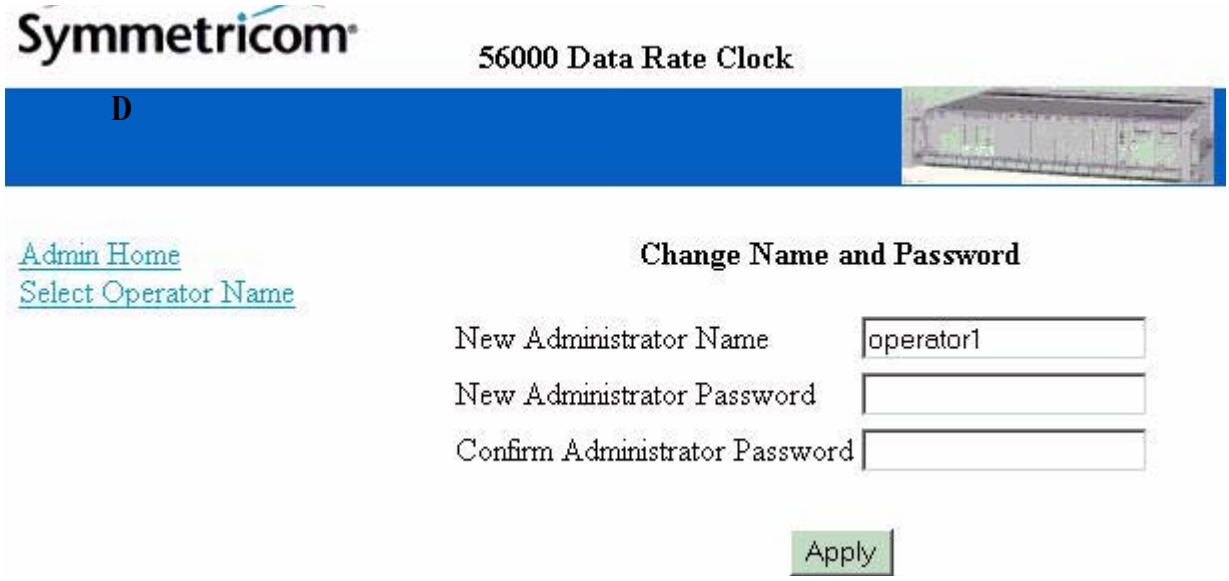
Make the changes and click the **Apply** button. The changes are instantly applied.

Changing the configuration of a single card is instant validation if the change is appropriate for the card and configuration. If it is not, a pop-up window appears indicating that the requested change cannot be made.

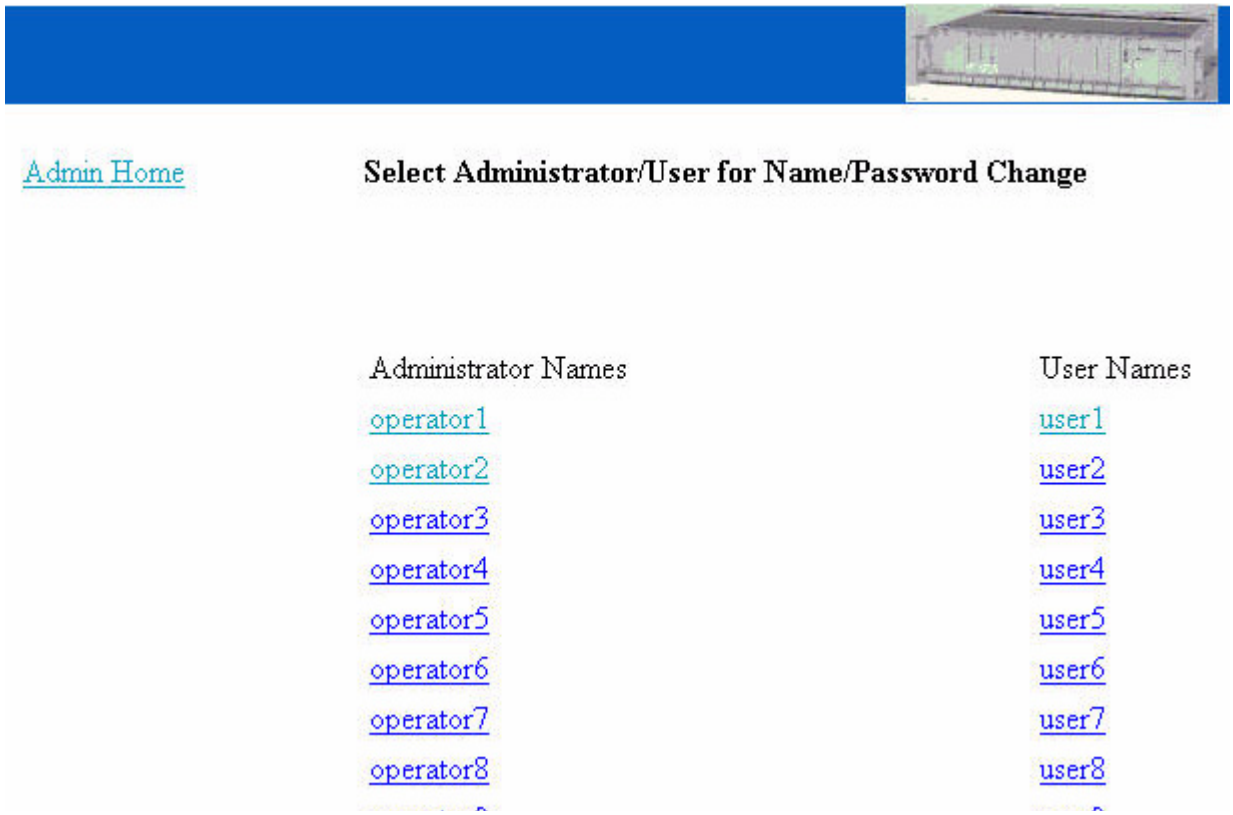
To continue making configuration changes, click on the Change Config link and continue. When all changes are complete, click the Home link.

Change Login Link

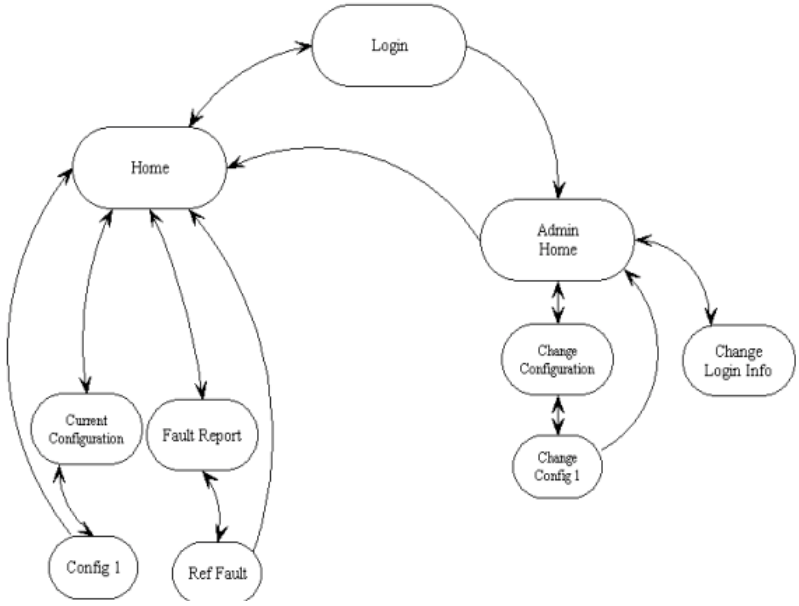
To change the log-in of a user, left click on the **Change Login** link. The following appears.



Type in the requested information and click **Apply**. To select a new operator name, click on the **Select Operator Name** link. The following screen appears (next page). Select which Admin or User name to change and click. The above screen will then reappear.



56000 Web Site Map



SNMP

By default, SNMP is disabled. To enable SNMP or configure its parameters, follow the steps outlined below. Please open, edit, save, and close the snmp.conf file without changing its name or saving it as a new file type. An example "snmp.conf" file might look like the following, with each string that follows NAME=appearing as a single line in the text file:

MIB=/config/ttmib.o,

GenTraps=YES,

NAME=public,VIND=1,TRAP=YES,ACCESS=R,IP=010.001.007.065,
IP=000.000.001.000,IP=000.000.000.000,IP=000.000.000.000,ENDC,

NAME=private,VIND=1,TRAP=YES,ACCESS=W,IP=010.001.007.065,
IP=000.000.000.000,IP=000.000.000.000,IP=000.000.000.000,ENDC,

NAME=,VIND=0,TRAP=NO,ACCESS=R,IP=000.000.000.000,
IP=000.000.000.000,IP=000.000.000.000,IP=000.000.000.000,ENDC,

NAME=,VIND=0,TRAP=NO,ACCESS=R,IP=000.000.000.000,
IP=000.000.000.000,IP=000.000.000.000,IP=000.000.000.000,ENDC,

NAME=,VIND=0,TRAP=NO,ACCESS=R,IP=000.000.000.000,
IP=000.000.000.000,IP=000.000.000.000,IP=000.000.000.000,ENDC,

NAME=,VIND=0,TRAP=NO,ACCESS=R,IP=000.000.000.000,
IP=000.000.000.000,IP=000.000.000.000,IP=000.000.000.000,ENDC,

NAME=,VIND=0,TRAP=NO,ACCESS=R,IP=000.000.000.000,
IP=000.000.000.000,IP=000.000.000.000,IP=000.000.000.000,ENDC,

NAME=,VIND=0,TRAP=NO,ACCESS=R,IP=000.000.000.000,
IP=000.000.000.000,IP=000.000.000.000,IP=000.000.000.000,ENDC,

NAME=,VIND=0,TRAP=NO,ACCESS=R,IP=000.000.000.000,
IP=000.000.000.000,IP=000.000.000.000,IP=000.000.000.000,ENDC,

Key:

`MIB=/config/ttmib.o:` Don't touch. This is a factory setting.

`GenTraps=YES:` Global enable/disable setting for all SNMP traps. YES, the default setting, enables all traps. NO disables all traps. This setting overrides all the other TRAP parameter settings.

`NAME:` the community name password. This should be the same as the community name being used by the administrator's SNMP management station.

VIND: View Index. This parameter must be set to one (1) to guarantee correct SNMP operation for the community.

TRAP: YES enables/NO disables SNMP traps for a particular community.

ACCESS: Read and write privileges to members of a community. R sets read only privileges, and W sets read and write privileges.

IP: Provide the IP address of the SNMP management stations within that community. These addresses are required in order for the management station to receive SNMP traps and to communicate with the XLi system using SNMP.

Address 0.0.:0.0 means no host is specified for this address slot. Address 255.255.255.255 has the meaning that any SNMP management station may access this particular community.

Commas, ENDC, and END are reserved for use as delimiters throughout this file. Don't alter the format of these delimiters.

Structure & Design of Symmetricom's SNMP Private Enterprise MIB

This section describes the top level structure & design of the Symmetricom 56k SNMP Private Enterprise MIB.

SNMP Addressing

SNMP addressing is structured as a very large tree database. A root node address is an integer value that ranges from 0 to some very large number. Conceptually, there are no limits to the numbers of sub nodes either. SNMP addressing is written in "doted decimal" notation. For example the address of Symmetricom's alarmPriPower Enterprise MIB variable address is 1.3.6.1.4.1.1896.2.1.2.2.1.0 The address fragment 1.3.6.1.4.1 is fixed by the IETF and is the address of the SNMP Private Enterprise MIB's. The 1896 is the address assigned by IETF to Symmetricom (formerly TrueTime) for its Enterprise MIB's. Symmetricom assigns the addresses after that at its discretion and design.

New Top Level Structure of Symmetricom's Enterprise MIB for 56000

The formal address structure of Symmetricom's Enterprise MIB is as follows:

For the 56000, groups 1, 2, 3, 4 and 5 have been deprecated and a new group 6, products, has been added. For the 56000 and future Symmetricom products, groups 1 through 5 will be absent from the 56000 Enterprise MIB definition supplied with the unit. The top structure for the 56000 is shown on the following page.

Traps

Traps are tested once per second.The Trap function checks a hardware bit from the Fault Monitor card. If the bit is high, the Fault Monitor data is changed, otherwise, the Trap function exits. If a change occurs in the Fault Monitor data, a flag is raised to prevent the once per second event from calling the Trap function before completed. A transaction is generated to retrieve the new data from the Fault Monitor card. This data from the transaction is transferred from the message to a memory structure containing the complete SNMP data for all 56000 faults reported by SNMP. If the trap process detects a difference in system state from the last report, then traps are issued describing the state change. If Trap commands are configured to be operative, then, traps are always activated when a state change occurs regardless of nolatch commands. A nolatch state affects what the Telnet and Serial Port users see on the command line when using the F73 command.

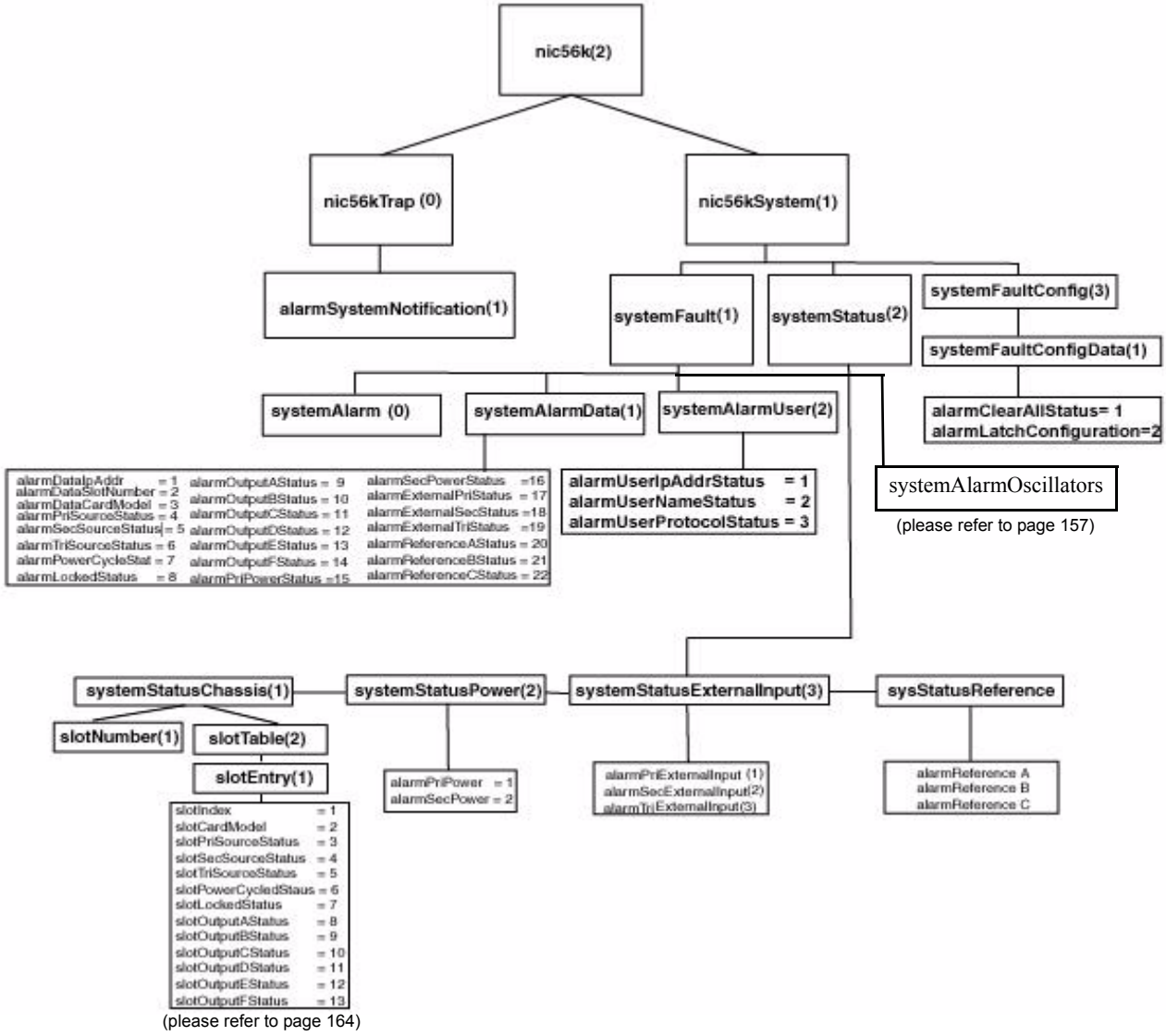
In Latch Mode, the faults are cleared by using the “CL” command. In NoLatch Mode, the faults are automatically cleared when the fault info has been read and the fault condition has vanished. A fault indication occurs when:

1. A fault has occurred and is still alarming.

2. A fault has occurred and gone, but we have not read the fault status yet.

Once the fault status is read, the fault status goes into a non-fault condition when the actual fault becomes OK.

Note: Any change in the fault info (OK or Fault) will cause the Fault Monitor Card to signal the NIC card.



The level under the *nic56k* group is divided into two groups. The current *nic56Trap* message group is one group and the *nic56kSystem* is another group. The *alarmSystemNotification* group is under the *nic56kTrap* group. This MIB structure also provides a useful definition for the system object ID. SNMP managers may use the system object ID to identify the class of object being accessed. With this structure, the system object ID is defined as Symmetricom.products.56k for the 56000 product.

NIC 56000 SNMP MIB Description

Overview

Symmetricom 56000 enterprise MIB is defined by the following three files: *SymmetricomTtm-SMIv2.mib*, *nic56k-SMIv2.mib* and *nic56kSystem-SMIv2.mib*.

The first two files, *SymmetricomTtm-SMIv2.mib* and *nic56k-SMIv2.mib*, define the top addressing structure of the MIB. From an end user standpoint, these files contain the least interesting information. The usable data members of the enterprise MIB are all defined in the file *nic56kSystem-SMIv2.mib*. This file defines the major group that
contains the NIC 56000 enterprise variables. This group is called the *nic56kSystem*. Within this group are three major subgroups. They are defined as follows: *systemFault*, *systemStatus* and *systemFaultConfig*.

The *systemFault* group defines all trap variables and trap types used by the 56000 *systemStatus* defines similar information to the trap packet information. However, the purpose of this repetition is to allow the user to poll for the information that is supplied by the trapped messages. This is done to guard against the occasional loss of a trap packet data. The *systemFaultConfig* group is designed to set the alarm mode of operation.

systemFault Group

The *systemFault* group defines three major trap types for the 56000. When the 56000 unit or one of the cards plugged into the unit experiences and alarm or returns to normal operation after an alarm, these conditions are reported by a trap that is defined by the *systemAlarmData* group. See the following MIB definitions for the specific types of data that are transmitted by this trap. The *systemFault* group defines two other trap types. Data for one trap type is defined under the *systemAlarmUser* group and the systemAlarmOscillator group. Whenever a user makes a change to the 56000 configuration then his user information is transmitted in this trap message. The user name, his IP address and the protocol that he used to make the change are reported. Currently, only changes made by HTTP are reported. See the following MIB definition for further details.

The other trap type is defined under systemAlarmOscillator. Changes of state for any oscillator card is reported by this group.

systemStatus Group

The *systemStatus* group defines five other subgroups of variables. Essentially, the data that is reported in the above two trap types is repeated here so that users may poll this information as well as receive traps. This data is broken into five groups for ease of understanding and use. The five major groups are *systemStatusChassis*, *systemStatusPower*, *systemStatusExternalInput*, *systemStatusReferences* and *systemStatusUser*.

The *systemStatusChassis* group contains the table were each index in the table represents one card slot in the 56000 chassis. The *systemStatusPower* group contains information on the status of the two power supplies for the 56000 chassis. The *systemStatusExternalInput* group contains status on input signals to the 56000 chassis. The *systemStatusReferences* group contains information on the reference sources for

the 56000 chassis. Finally, the *systemStatusUser* group contains user information for the last user making configuration changes to the 56000. For further details, see the descriptions for each variable type within these groups and the following enterprise MIB definition.

systemFaultConfig Group

The system *systemFaultConfig* group allows the administrator to set two modes of operation for alarm reporting for the 56000. The administrator may configure the 56000 to operate its legacy mode where once a trap occurs it stays noted as a fault until cleared by the administrator. Otherwise, the administrator may select a new mode of operation that allows alarm information to track the status of the unit in real-time. This allows the administrator to maintain a trap log automatically without user intervention. See the following enterprise MIB for further details on variables within this group.

Glossary of SNMP-Related Terms

Deprecation: In SNMP when an SNMP variable or group of variables is no longer recommended for use, they are listed as deprecated in the formal definition of the MIB. Users are sometimes but not always often still allowed to use this data, but the MIB's authors for one reason or another no longer recommend it.

Enterprise MIB: See Private Enterprise MIB.

IANA - Internet Assigned Number Authority: This is the group at IETF that is in charge of assigning Internet related numbers like Ethernet addresses, TCP/UDP port numbers and SNMP Private Enterprise MIB numbers.

IETF – Internet Engineering Task Force: The group responsible for standardizing numerous Internet communication protocols like SNMP.

Management agent: An Internet connected remote host that accumulates the raw data that is entered into the MIB and Enterprise MIB for that host. This data is at some point transmitted to a Management station. In other network applications this would be called a network server of the SNMP protocol.

Management station: An Internet connected remote host that consumes SNMP data provided by a Management agent for the display of human network managers. In other network applications this would be called a client of the SNMP protocol.

MIB – Management Information Base: This is the data structure for the SNMP protocol. The current version of this standard, that is in general use, is MIB II defined by RFC's 1213 and 1212.

NTP – Network Time Protocol: A network time distribution protocol developed at the University of Delaware under the direction of Dr. Mills. NTP is a client / server based

protocol where the server is the supplier of time and the client is the consumer of the time information.

Private Enterprise MIB: SNMP allows private organizations to define their own MIB extensions.

The IANA issues, for a fee, a unique number to an organization that is an address entry point from the MIB II into the private data for that organization. Only one Enterprise address is assigned to an organization. The Enterprise address for Symmetricom is 1896. This address space has grown to over 12,000 private addresses and Symmetricom is by comparison one of the earlier adopters of SNMP with an Enterprise MIB!

RFC – Request for Comments: A document reviewed and released by the IETF that defines the formal definitions of various Internet communication protocols and related information.

SNMP – Simple Network Management Protocol: This Internet communications protocol is used for the status and control of remote network devices. Numerous IETF standards committees starting in 1990 and continuing to day define this protocol.

Trap or Trap Message – A packet issued from an SNMP Management agent to an SNMP Management station. The message is intended to relay an important event that occurred within the agent that requires attention or notification.

Configuring, Setting Up, and Testing SNMP

This document outlines the procedure to perform verification tests on the SNMP component of the 56k product.

Materials Needed

- 56k unit

- PC with HP OpenView installed

HP OpenView Configuration

Create the Network Map

1. Power on the 56k unit.

2. Note: The HP OpenView PC and the 56k unit should be on the same subnet.

3. Log on to the PC with HP OpenView installed as the “Administrator” user.

4. Start the HP OpenView Network Node Manager application.

5. Click the <Cancel> Button to skip password registration.

6. Select the menu item Map->New

7. In the “Name” field enter “56kTestMap”

8. Click the <Next> button 3 times and the <Finish> button 1 time to complete the Map definition and open the Map.

Load the Symmetricom Enterprise MIBs

1. Select the menu item Options->Load/Unload MIBs: SNMP. A dialog box titled “Load/Unload MIBs:SNMP” will pop up.

2. In the dialog box click the <Load> button to load the MIBS: SymmetricomTtm-SMIv2.mib, nic56k-SMIv2.mib and nick56kSystem-SMIv2.mib

   Note: The MIB must be installed in the following order:
   1st. SymmetricomTtm-SMIv2
   2nd. nic56k-SMIv2
   3rd. nic56kSystem-SMIv2

3. When 56kSystem.mib is loaded a dialog box with the title “Load Trap-Type/Notification-Type macro?” will appear. Click the <OK> button to add the trap definition into the OpenView event system. Click the <OK> button again to confirm the action.

4. Click the <Close> button to exit the “Load/Unload MIBs:SNMP” dialogue box.

Configure Traps

1. Select the menu item “Options->Event Configuration”. A pop window titled “Event Configuration” will appear.

2. In the “Event Configuration” window, scroll through the “Enterprises” list to the bottom and select “56k”.

3. In the “Events for Enterprise 56k” select “alarmSystemNotification” entry. Then select the menu item “Edit->Events->Modify…”. A popup titled “Modify Events” will appear.

4. In the “Modify Events” popup click the “Event Message” tab. Under “Actions” select the “Log and display in category”. In the “Event Log Message” field, enter “56k System Trap: $*”. Do not enter the quotation marks.

5. Select the menu item “Options->MIB Application Builder: SNMP”. A popup titled “MIB Application Builder: SNMP” will appear.

6. In the “MIB Application Builder: SNMP” popup select the menu item “Edit->New…” A popup titled “New MIB Application” will appear.

7. Enter “56kstatus” in the “Application ID:” field and the “Application Title:” field. Leave “Application Type:” as “Form”. Click the “Next” button.

8. The title of the popup will now be “New Application Builder – Display Fields”. Click the “Add” button. A popup titled “New Application Builder / Add MIB Objects will appear”.

9. In the “New Application Builder / Add MIB Objects will appear” popup descend the MIB tree by clicking on the plus symbol next to the entries “iso -> org -> dod -> private -> enterprises -> symmetricomEnt -> products -> 56k-> 56kSystem -> systemStatus -> systemStatusGeneral”.

   Select all items under “systemStatusGeneral”. Do this by clicking on the first item and then holding the “shift” key while clicking on the last item. Then click the “Add” button. Back up to “56k -> 56kSystem -> systemStatus -> systemStatusDetail”. Select all items under “systemStatusDetail” and then click the “Add” button. Then click the “Close” button.

10. In the “New Application Builder – Display Fields” popup click the “Next” button. In the “Menu Path” field enter “56k->Status”. Click the “Finish” button.

11. Repeat steps 6 – 10 using the “Application ID:” of 56kconfig selecting all items under “iso -> org-> dod -> private -> enterprises -> symmetricomEnt -> products -> 56k-> 56kSystem ->systemFault -> systemFaultConfig” and using the “Menu Path” of “56k->Configuration”.

12. Repeat steps 6 – 10 using the “Application ID:” of 56kfault selecting all items under ““iso -> org-> dod -> private -> enterprises -> symmetricomEnt -> products -> 56k-> 56kSystem ->systemFault -> systemFaultHistory” and using the “Menu Path” of “56k->Fault History”.

Additional OpenView configuration

1. Select the menu item “Options->SNMP Configuration”. A popup titled “SNMP Configuration” will appear.

2. In the “SNMP Configuration” popup: set the “Community” field to “public” the “Set Community” field to “private” and the “Retries” field to 0.

SNMP Configuration

Follow the manual to load the snmp.conf configuration file into the 56k. The IP address of the HP OpenView PC must be in both the public and private communities.

Test Procedure

Testing “Get”

1. From the Network Node Manager root level double click the icon “Internet”. Select the icon corresponding to your test subnet, e.g. “192.168.11”, and double click. Double click the “Segment1” icon.

2. Select the icon labeled “NIC” by single clicking with the mouse.

3. Select the menu item “56k->Status”, “56k->Configuration”, then “56k->Faults”. Verify the values by comparing with the output of the keypad display.

Testing “Set”

1. Follow “Get Testing” procedure steps 1-2.

2. Select the menu item “Tools->SNMP MIB Browser”. A popup titled “Browse MIB” will appear.

3. In the “Browse MIB” popup descend the MIB tree to “iso -> org -> dod -> private ->enterprises -> symmetricomEnt -> products -> 56k-> 56kSystem -> systemFault ->systemFaultConfig -systemFaultConfigMasks” by clicking the “+” symbol next to each entry.

4. In the “Browse MIB” popup select the “maskPllSynthesizer” entry. In the “MIB Instance” field type 0. In the “SNMP set value” field type 1. Click the “Set” button.

5. Verify that a popup appears saying “Set has completed successfully”.

6. Select the menu item “56k->Configuration”. In the popup “xliconfig” verify that the “maskPllSynthesizer” entry is set to “disabled”.

7. In the “Browse MIB” popup select the “maskPllSynthesizer” entry. In the “MIB Instance” field type 0. In the “SNMP set value” field type 2. Click the “Set” button.

8. Verify that a popup appears saying “Set has completed successfully”.

9. Select the menu item “56k->Configuration”. In the popup “56kconfig” verify that the “maskPllSynthesizer” entry is set to “enabled”.

10. Repeat steps 4-9 in turn for each additional entry under systemFaultConfigMasks.

Trap Testing

1. Perform an action to generate a trap.

2. Select the menu item “Fault->Alarms”.

3. Verify in the “All Alarms” popup that there is an entry of the form:

Normal Thu Mar 21: 14:30.09 192.168.11.21856k system trap:

[1] private.enterprises.symmetricomEnt.products.56k.alarmDataIpAddr.0 (IpAddress) 192.168.11.218

[2] private.enterprises.symmetricomEnt.products.56k.alarmDataTimeStam 0 (OctetString): HH:MM:Ss

UTC

[3] private.enterprises.symmetricomEnt.products.xli.alarmDataCode.0 (Integer): alarmPrimaryPower

[4] private.enterprises.symmetricomEnt.products.xli.alarmDataDescriptorStr.0 (OctetString): F73

S LP LL----PSR---

Printout of the SymmetricomTtm-SMIv2.mib

```
SymmetricomTtm  DEFINITIONS ::= BEGIN

    IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, enterprises, Counter32
        FROM SNMPv2-SMI
        DisplayStringFROM SNMPv2-TC;

symmetricomTtm MODULE-IDENTITY
      LAST-UPDATED    "0302270000Z"
      ORGANIZATION    "SYMMETRICOM"
      CONTACT-INFO    "Technical Support"
      DESCRIPTION     "Symmetricom, Test Timing and Measurement Enterprise MIB"
      ::= { symmetricomTtmEnt 0 }

    symmetricomTtmEnt  OBJECT IDENTIFIER ::= { enterprises 1896 }
    trapMsg            OBJECT IDENTIFIER ::= { symmetricomTtmEnt 1 }
    ntp                OBJECT IDENTIFIER ::= { symmetricomTtmEnt 2 }
    ntsControl         OBJECT IDENTIFIER ::= { symmetricomTtmEnt 3 }
    gps                OBJECT IDENTIFIER ::= { symmetricomTtmEnt 4 }
```

```
    acts                OBJECT IDENTIFIER ::= { symmetricomTtmEnt 5 }
        products            OBJECT IDENTIFIER ::= { symmetricomTtmEnt 6 }
        xli                 OBJECT IDENTIFIER ::= { products 1 }
        nic56k              OBJECT IDENTIFIER ::= { products 2 }

trapMsgColdStart OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is an ASCII string sent to UDP port 162 (or user defined) when
    the TrueTime time server reinitializes.  The message is Cold Start Trap
    PDU from: ###.###.###.###.  Where ###.###.###.### is the doted
    decimal notation of the IP address of the booting unit."
    ::= { trapMsg 1 }

trapMsgNtpAlarm OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-only
        STATUS deprecated
    DESCRIPTION
    "This is an ASCII-string sent to the UDP-trap port(162 or user defined) when
    the TrueTime time server's detects change of the NTP-status.
    This could be due to a line breakage in the timing
    source, loss of GPS satellites, etc.
    The message is 'NTP Status aaaaaaaa',
    where aaaaaaaaa can be NTP UNLOCKED,NTP client mode or NTP LOCKED"
    ::= { trapMsg 2 }

trapMsgSnmpAuthFail OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is an ASCII string sent to UDP port 162 (or user defined) when
    the TrueTime time server determines the SNMP authentication for a SNMP
    PDU is in correct.  The message is 'SNMP Authentication Failure Trap
    PDU from: ###.###.###.###'.  Where ###.###.###.### is the doted
    decimal notation of the IP address of the unit attempting the invalid
    access."
    ::= { trapMsg 3 }

trapMsgGpsAntennaFault OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is an ASCII string sent to UDP trap port( 162 or user defined) when
    the TrueTime time server's GPS detects change in the antenna status.
    The status can be OK or FAULT"
    ::= { trapMsg 4 }

trapMsgGpsUnlocked OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
```

```
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is an ASCII string sent to UDP trap port (162 or user defined) when
    the TrueTime time server's GPS detects change of the GPS status.
    The status can be is unlocked"
    ::= { trapMsg 5 }

trapMsgNewSyncType OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is an ASCII string sent to UDP trap port (162 or user defined) when
    the TrueTime time server's GPS detects change of the GPS status.  The
    message is 'Time synchronization type is now ####' where #### can be
    GPS, ACTS or NTP."
    ::= { trapMsg 6 }

trapMsgCrossCheckAlarm OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is an ASCII string sent to UDP trap port (162 or user defined) when
    the TrueTime time server's detects a chan in time synchronization types.
    check peer and the server is not in a system alarm condition."
    ::= { trapMsg 7 }

ntpInPkts OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Total number of NTP packets delivered to the NTP application
    layer from the transport layer."
    ::= { ntp 1 }

ntpOutPkts OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Total number of NTP packets passed from the NTP application
    layer to the transport layer."
    ::= { ntp 2 }

ntpInErrors OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Total number of NTP packets reject for any reason by NTP
    application layer."
```

```
    ::= { ntp 3 }

ntpAuthFail OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Total number of authentication failures.  This is a subset of
    ntpInErrors."
    ::= { ntp 4 }

ntpDesiredAcc OBJECT-TYPE
    SYNTAX INTEGER (0..2147483647)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "The desired (worst case time) accuracy in microseconds that the
    time server will attempt to steer to.  This variable is related to
    ntpEstError.  Should ntpEstError be greater than ntpDesiredAcc, the
    NTP alarm condition will be set (ntpSysLeap will be equal to 3).
    Note: outgoing NTP packets will have their leap indicator field set to
    ntpSysLeap."
    ::= { ntp 5 }

ntpEstErr OBJECT-TYPE
    SYNTAX INTEGER (0..2147483647)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "The deprecated estimated (time) error in microseconds of the time
    server.  This variable is related to ntpEstError.  Usually, this value
    is small and constant for a given type of time server.  However, when
    primary synchronization is lost, this value will slowly increase with
    time as the time server's oscillator flywheels away from true time.
    Should ntpEstError be greater than ntpDesiredAcc, the NTP alarm
    condition will be set (ntpSysLeap will be equal to 3).
    Note: a primary time server's outgoing NTP packets will have its leap
    indicator field set to ntpSysLeap."
    ::= { ntp 6 }

ntpSysLeap OBJECT-TYPE
    SYNTAX INTEGER (0..3)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is a status code indicating normal operation, a leap second to
    be inserted in the last minute of the deprecated day, a leap second to be
    deleted in the last second of the day or an alarm condition indicating
    the loss of timing synchronization.  Note: a primary time server's
    outgoing NTP packet will have its leap indicator field set to
    ntpSysLeap."
    ::= { ntp 7 }

ntpSysHostMode OBJECT-TYPE
```

```
    SYNTAX INTEGER (0..7)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "The value of this variable indicates the mode that the host is
    operating in.  Note: this is the value of the time server's outgoing
    NTP packet mode field."
    ::= { ntp 8 }

ntpSysStratum OBJECT-TYPE
    SYNTAX INTEGER (1..255)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is an integer that ranges from 1 to 255 indicating the stratum
    level of the local clock. Note: a primary time server sets outgoing NTP
    packets stratum field and ntpSysStratum to 1."
    ::= { ntp 9 }

ntpSysPoll OBJECT-TYPE
    SYNTAX INTEGER (6..10)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "When the time server is in NTP broadcast mode, this is an integer
    indicating the maximum interval between successive NTP messages, in
    seconds to the nearest power of two.  For example a value of 6 means
    2^6 or 64 seconds. Note: a primary time server's outgoing NTP packet
    will have its poll field set to ntpSysPoll.  Note: this field is equal
    to 0 when not in NTP broadcast mode.  Note, unless this is a time
    server initiated NTP packet the value of the poll equals the value set
    in the in coming packet."
    ::= { ntp 10 }

ntpSysPrecision OBJECT-TYPE
    SYNTAX INTEGER (-127..127)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is an integer indicating the ultimate precision of the
    synchronizing clock, in seconds to the nearest power of two. Note: a
    primary time server's outgoing NTP packet will have its precision
    field set to ntpSysPrecision."
    ::= { ntp 11 }

ntpSysRootDelay OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is a raw 32 bit number representing a signed fixed point 32-bit
    number indicating the total round-trip delay to the primary
    synchronization clock source in seconds with the fraction point
    between bits 15 and 16.  Note that this variable can take on both
```

```
    positive and negative values, depending on clock precision and skew.
    Note: a primary time server's outgoing NTP packet will have its root
    delay field set to ntpSysRootDelay."
    ::= { ntp 12 }

ntpSysRootDisp OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is a raw 32 bit number representing a signed 32-bit fixed-point
    number indicating the maximum error relative to the primary reference
    source, in seconds with fraction point between bits 15 and 16. Only
    positive values greater than zero are possible.  Note: a primary time
    server's outgoing NTP packet will have its root dispersion field set
    to ntpSysRootDisp."
    ::= { ntp 13 }

ntpSysRefClockIdent OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..4))
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is a four byte ASCII string identifying the particular reference
    clock.  In the case of stratum 0 (unspecified) or stratum 1 (primary
    reference), this is a four-octet, left-justified, zero-padded ASCII
    string. While not enumerated as part of the NTP specification, the
    following are suggested ASCII identifiers:

    Stratum    Code     Meaning
    -------    ----     -------
    0          DCN      DCN routing protocol
    0          NIST     NIST public modem
    0          TSP      TSP time protocol
    0          DTS      Digital Time Service
    1          ATOM     Atomic clock (calibrated)
    1          VLF      VLF radio (OMEGA, etc.)
    1          callsign Generic radio
    1          LORC     LORAN-C radionavigation
    1          GOES     GOES UHF environment satellite
    1          GPS      GPS UHF satellite positioning
    1          ACTS     ACTS telephone modem dial-up
    1          IRIG     Inter-Range Instrumentation Group signal

    Note, for TrueTime time servers only GPS, ACTS and IRIG are presently
    used. Further, a primary time server's outgoing NTP packet will have
    its reference identifier field set to ntpSysRefClockIdent."
    ::= { ntp 14 }

ntpControlInput OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-write
    STATUS deprecated
    DESCRIPTION
```

```
    "This variable emulates TrueTime's serial function command strings.
    The same commands issued to the serial port can be sent to this
    string.  Use this variable for SNMP sets of functions strings.
    Note, setting this variable clears ntpControlOutput to the null string.
    See ntpControlOutput below."
    ::= { ntsControl 1 }

ntpControlOutput OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This variable emulates TrueTime's serial function command strings.
    The same commands issued to the serial port can be sent to this string.
    This variable holds the output result string from the last setting of
    the above ntpControlInput variable.  Use this variable for SNMP gets
    of function strings.  See ntpControlInpuut above."
    ::= { ntsControl 2 }

gpsGroupValid OBJECT-TYPE
    SYNTAX INTEGER (0..1)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "A test flag indicating if data contained in this SNMP GPS group is
    valid or not.  This flag equals 1 when GPS is used as the time
    synchronization source and 0 for all other sources.  "
    ::= { gps 1 }

gpsNumTrackSats OBJECT-TYPE
    SYNTAX INTEGER (0..8)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION "The number of GPS satellites tracked."
    ::= { gps 2 }

gpsNumCurrentSats OBJECT-TYPE
    SYNTAX INTEGER (0..8)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Current number of GPS satellites used in position and time fix
    calculations.  The number of satellites available depends on how long
    the time server has been up, the time of day and the total amount of
    clear sky as seen from the GPS antenna.  Because of the high frequency
    of GPS radio signals, GPS antennas must have unobstructed line of sight
    from the antenna to the satellite to receive data."
    ::= { gps 3 }

gpsSatTrackMode OBJECT-TYPE
    SYNTAX INTEGER (0..3)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
```

```
    "Mode of operation for satellite tracking.  See section 3.20 of the
    users manual for a complete description of these modes.  Generally,
    modes 0 and 1 are used for time applications.  Mode 2 is useful for
    more accurate position information when the unit is stationary, or
    slowly moving and mode 3 is for accurate position information when the
    unit is moving quickly."
    ::= { gps 4 }

gpsSatMaxSigStrength OBJECT-TYPE
    SYNTAX INTEGER (0..30)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Strongest signal strength of all tracking satellites in Trimble linear
    units. Generally, this number should be 4 or greater for good
    reception."
    ::= { gps 5 }

gpsAltitude OBJECT-TYPE
    SYNTAX INTEGER (-2147483647..2147483647)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Altitude of the GPS antenna in centimeters above, or below the
    WGS-84 reference ellipsoid.  The reference ellipsoid is a rotated
    ellipse that is centered on the Earth's center of mass.  The surface
    of the ellipsoid is not necessarily the same as sea level.  The
    ellipsoid surface may be as much as 100 meters different from actual
    sea level."
    ::= { gps 6 }

gpsLongitude OBJECT-TYPE
    SYNTAX INTEGER (-2147483647..2147483647)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Longitude location of GPS antenna where: +2147483647 is
    maximum east longitude, -2147483647 is maximum west longitude and 0 is
    Greenwich England.  To calculate the longitude in radians use the
    following formula (gpsLongitude * PI) / ((2^31)-1) = longitude in
    radians.  For degrees: (gpsLongitude * 180) / ((2^31)-1) = longitude
    in degrees.  Note: longitude varies from -PI to +PI in radians and
    -180 to +180 in degrees."
    ::= { gps 7 }

gpsLatitude OBJECT-TYPE
    SYNTAX INTEGER (-2147483647..2147483647)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Latitude location of GPS antenna where: +2147483647 is the
    North Pole, -2147483647 is the South Pole and 0 is the equator. To
    calculate the latitude in radians use the following formula
    (gpsLatitude * PI) / (2*((2^31)-1)) = longitude in radians.  For
```

```
    degrees: (gpsLatitude * 90) / ((2^31)-1) = latitude in degrees.
    Note: latitude varies from -PI/2 to +PI/2 in radians and -90 to +90 in
    degrees."
    ::= { gps 8 }

actsGroupValid OBJECT-TYPE
    SYNTAX INTEGER (0..1)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "A test flag indicating if data contained in this SNMP ACTS group is
    valid or not.  This flag equals 1 when ACTS is used as the time
    synchronization source and 0 for all other sources.  "
    ::= { acts 1 }

actsBaudRate OBJECT-TYPE
    SYNTAX INTEGER
        {
                baud300  (300),
                baud1200 (1200),
                baud9600 (9600)
        }
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Indicates the baud rate setting for the ACTS modem.  The ACTS
    dial-up service accepts 300 or 1200 baud.  Note: this is a rare case
    where faster is not better and 300 baud yields the best time accuracy."
    ::= { acts 2 }

actsFailRedial OBJECT-TYPE
    SYNTAX INTEGER (0..9999)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "When the dial-up session fails to connect this is the time in
    seconds to wait to try again."
    ::= { acts 3 }

actsMaxCallPeriod OBJECT-TYPE
    SYNTAX INTEGER (0..999)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is the maximum time in minutes the ACTS unit will wait between
    successful calls to the ACTS service.  "
    ::= { acts 4 }

actsPhoneNum OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..25))
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is the phone number of the ACTS dial-up service, including
```

```
    any prefixes needed to reach an outside line or international dialing.
    Prefixes are separated by a comma from the main phone number."
    ::= { acts 5 }

actsNumberOfCalls OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Number of times the time server has called the ACTS dial-up
    service - weather the call was successful or not."
    ::= { acts 6 }

actsGoodCalls OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Number of times the time server called the ACTS dial-up service
    and successfully received the time."
    ::= { acts 7 }

actsBadCalls OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Number of times the time server called the ACTS dial-up service
    and something was not right.  This variable is the sum total of all
    other ACTS failure types."
    ::= { acts 8 }

actsFailedInit OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Time server's internal modem failed to initialize.  If this is
    excessive, it may indicate a time server hardware failure.  "
    ::= { acts 9 }

actsNoDialTone OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Time server's internal modem found no dial tone.  This may be
    caused by a broken phone line to the time server.  "
    ::= { acts 10 }

actsNoCarrier OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
```

```
    DESCRIPTION
    "Time server's internal modem found no carrier.  No modem was
    found at the other end and maybe the phone number for ACTS is wrong."
    ::= { acts 11 }

actsBusyLine OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Time server's internal modem found ACTS line busy."
::= { acts 12 }

actsNoAnswer OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "The remote ACTS mode did not answer the call."
    ::= { acts 13 }

actsBadReply OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "The syntax of the reply from remote modem was incorrect, possibly
    due to line noise."
    ::= { acts 14 }

actsNoOnTimeMark OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "The reply from remote modem had no on time mark, possibly due to
    line noise."
    ::= { acts 15 }
END
```

Printout of the nic56k-SMIv2.mib

```
Nic56kMib DEFINITIONS ::= BEGIN

IMPORTS
        MODULE-IDENTITY                 FROM SNMPv2-SMI
        nic56k          FROM SymmetricomTtm;

nic56kModule MODULE-IDENTITY
        LAST-UPDATED    "0202270000Z"
        ORGANIZATION    "SYMMETRICOM"
```

```
        CONTACT-INFO    "Technical Support"
        DESCRIPTION     "Symmetricom, Test Timing and Measurement Enterprise MIB"
        ::= { nic56k 0 }

    nic56kSystem                OBJECT IDENTIFIER ::= { nic56k 1 }
    nic56kMainCard              OBJECT IDENTIFIER ::= { nic56k 2 }
    nic56kTrap                  OBJECT IDENTIFIER ::= { nic56k 3 }

END
```

Printout of the nic56kSystem-SMIv2.mib

```
Nic56kSystemMib DEFINITIONS ::= BEGIN

IMPORTS
    OBJECT-TYPE, NOTIFICATION-TYPE, MODULE-IDENTITY, IpAddress
                                                FROM SNMPv2-SMI
    DisplayString                               FROM SNMPv2-TC
    nic56kSystem, nic56kTrap, nic56kMainCard    FROM Nic56kMib;

nic56kSystemModule MODULE-IDENTITY
        LAST-UPDATED    “0202270000Z”
        ORGANIZATION    “SYMMETRICOM”
        CONTACT-INFO    “Technical Support”
        DESCRIPTION     “Symmetricom, Test Timing and Measurement Enterprise MIB”
        ::= { nic56kSystem 0 }

    systemFault                 OBJECT IDENTIFIER ::= { nic56kSystem 1 }
    systemStatus                OBJECT IDENTIFIER ::= { nic56kSystem 2 }
    systemFaultConfig           OBJECT IDENTIFIER ::= { nic56kSystem 3 }

    systemAlarm                 OBJECT IDENTIFIER ::= { systemFault 0 }
    systemAlarmData             OBJECT IDENTIFIER ::= { systemFault 1 }
    systemAlarmUser             OBJECT IDENTIFIER ::= { systemFault 2 }
    systemAlarmOscillator       OBJECT IDENTIFIER ::= { systemFault 3 }

    systemStatusChassis         OBJECT IDENTIFIER ::= { systemStatus 1 }
    systemStatusPower           OBJECT IDENTIFIER ::= { systemStatus 2 }
    systemStatusExternalInput   OBJECT IDENTIFIER ::= { systemStatus 3 }
    systemStatusReferences      OBJECT IDENTIFIER ::= { systemStatus 4 }
    systemStatusUser            OBJECT IDENTIFIER ::= { systemStatus 5 }

    systemFaultConfigData       OBJECT IDENTIFIER ::= { systemFaultConfig 1 }

-- The 56000 trap message data types
-- Alarm status types
-- Add new status types to the end of the current definition

AlarmStatusType ::= INTEGER {
                            unused              (1),
                            good                (2),
                            standby             (3),
```

```
                                fault                   (4)
            }

-- Alarm User Types
-- An alarm is sent when a user changes the system state.  The following
-- defines indicate what protocol the user used to make these changes.
AlarmUserProtocolType ::= INTEGER {
                                serial                  (1),
                                telnet                  (2),
ssh                     (3),
                                http                    (4),
                                snmp                    (5)
            }


-- The 56000 alarm trap message data fields

alarmDataIpAddr    OBJECT-TYPE
    SYNTAX     IpAddress
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The IP address of the 56000 unit generating the trap.”
    ::= { systemAlarmData 1 }

alarmDataSlotNumber    OBJECT-TYPE
    SYNTAX     INTEGER (-1..17)
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The 56000 chassis slot number containing the card reporting the alarm
    change.  Valid card range from 0 to 17.  The value of minus 1 is special.
    The value of minus 1 means that the error is associated with the
    system only and not with a particular card.  An example of this would be a
    power supply fault.  Finally note, in actual operation there can be both
    system errors and errors associated with particular card slots.  in this
    case, the card slot is reported for the corresponding offending card.”
    ::= { systemAlarmData 2 }

alarmDataCardModel    OBJECT-TYPE
    SYNTAX     DisplayString (SIZE (0..255))
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “A description of the 56000 card type plugged into the reported chassis
    socket that is issuing the alarm status change.”
    ::= { systemAlarmData 3 }

alarmPriSourceStatus    OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The code of the event that generated the alarm.”
```

```
    ::= { systemAlarmData 4 }

alarmSecSourceStatus    OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The code of the event that generated the alarm.”
    ::= { systemAlarmData 5 }

alarmTriSourceStatus    OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The code of the event that generated the alarm.”
    ::= { systemAlarmData 6 }

alarmPowerCycleStatus    OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The code of the event that generated the alarm.”
    ::= { systemAlarmData 7 }

alarmLockedStatus    OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The code of the event that generated the alarm.”
    ::= { systemAlarmData 8 }

alarmOutputAStatus    OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The code of the event that generated the alarm.”
    ::= { systemAlarmData 9 }

alarmOutputBStatus    OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The code of the event that generated the alarm.”
    ::= { systemAlarmData 10 }

alarmOutputCStatus    OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
```

```
    DESCRIPTION
    “The code of the event that generated the alarm.”
    ::= { systemAlarmData 11 }

alarmOutputDStatus    OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The code of the event that generated the alarm.”
    ::= { systemAlarmData 12 }

alarmOutputEStatus    OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The code of the event that generated the alarm.”
    ::= { systemAlarmData 13 }

alarmOutputFStatus    OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The code of the event that generated the alarm.”
    ::= { systemAlarmData 14 }

alarmPriPowerStatus    OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The code of the event that generated the alarm.”
    ::= { systemAlarmData 15 }

alarmSecPowerStatus    OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The code of the event that generated the alarm.”
    ::= { systemAlarmData 16 }

alarmExternalPriStatus    OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The code of the event that generated the alarm.”
    ::= { systemAlarmData 17 }

alarmExternalSecStatus    OBJECT-TYPE
    SYNTAX     AlarmStatusType
```

```
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The code of the event that generated the alarm.”
    ::= { systemAlarmData 18 }

alarmExternalTriStatus    OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The code of the event that generated the alarm.”
    ::= { systemAlarmData 19 }

alarmReferenceAStatus  OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “Current 56000 Reference A signal source alarm status.”
    ::= { systemAlarmData 20 }

alarmReferenceBStatus  OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “Current 56000 Reference B signal source alarm status.”
    ::= { systemAlarmData 21 }

alarmReferenceCStatus  OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “Current 56000 Reference C signal source alarm status.”
    ::= { systemAlarmData 22 }


-- The 56000 User Alarm Trap Message Fields
-- This alarm is sent when a user changes the system setup. The setup change
-- may or may not result in a System Alarm Data state change.  For this
-- reason, we have this as a separate alarm group.

alarmUserIpAddrStatus    OBJECT-TYPE
    SYNTAX     IpAddress
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “The IP address of the 56000 unit generating the user alarm trap.”
    ::= { systemAlarmUser 1 }

alarmUserNameStatus    OBJECT-TYPE
    SYNTAX     DisplayString (SIZE (0..64))
```

```
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    "User name of the person making the system setup change."
    ::= { systemAlarmUser 2 }

alarmUserProtocolStatus    OBJECT-TYPE
    SYNTAX     AlarmUserProtocolType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    "Protocol type that the user used to make the system setup change."
    ::= { systemAlarmUser 3 }


-- The 56000 Oscillator Alarm Trap Message Fields
-- This alarm is sent when a Oscillator card changes it's status.

alarmOscillatorIpAddr    OBJECT-TYPE
    SYNTAX     IpAddress
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    "The IP address of the 56000 unit generating the trap."
    ::= { systemAlarmOscillator 1 }

alarmOscillatorSlotNumber    OBJECT-TYPE
    SYNTAX     INTEGER (-1..17)
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    "The 56000 chassis slot number containing the card reporting the alarm
    change.  Valid card range from 0 to 17.  The value of minus 1 is special.
    The value of minus 1 means that the error is associated with the
    system only and not with a particular card.  An example of this would be a
    power supply fault.  Finally note, in actual operation there can be both
    system errors and errors associated with particular card slots.  in this
    case, the card slot is reported for the corresponding offending card."
    ::= { systemAlarmOscillator 2 }

alarmOscillatorCardModel    OBJECT-TYPE
    SYNTAX     DisplayString (SIZE (0..255))
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    "A description of the 56000 card type plugged into the reported chassis
    socket that is issuing the alarm status change."
    ::= { systemAlarmOscillator 3 }

alarmOscillatorPllStatus  OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
```

```
    “Current 56000 oscillator Phase Locked Loop alarm status.”
    ::= { systemAlarmOscillator 4 }

alarmOscillatorReceiverStatus  OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “Current 56000 oscillator GPS receiver alarm status.”
    ::= { systemAlarmOscillator 5 }

alarmOscillatorAntennaStatus  OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “Current 56000 oscillator GPS antenna alarm status.”
    ::= { systemAlarmOscillator 6 }

alarmOscillatorAuxRefStatus  OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS accessible-for-notify
    STATUS     current
    DESCRIPTION
    “Current 56000 auxiliary reference alarm status.”
    ::= { systemAlarmOscillator 7 }


-- The 56000 System Alarm Data Trap Message
-- One Trap Message is issued for each used slot and any alarm status change
-- for that slot.  The Power Supply alarms, External input and Reference Alarms
-- are not associated with any particular slot number.  The status for these
-- alarms are redundantly reported in any alarms issued for the slots.  In the
-- case where there is only a Power Supply, External Input or Reference Alarm
-- status change, the card slot number is set to 0 and the card type is set to
-- none.

alarmSystemNotification NOTIFICATION-TYPE
    OBJECTS
    {
        alarmDataIpAddr,
        alarmDataSlotNumber,
        alarmDataCardModel,
        alarmPriSourceStatus,
        alarmSecSourceStatus,
        alarmTriSourceStatus,
        alarmPowerCycleStatus,
        alarmLockedStatus,
        alarmOutputAStatus,
        alarmOutputBStatus,
        alarmOutputCStatus,
        alarmOutputDStatus,
        alarmOutputEStatus,
        alarmOutputFStatus,
```

```
        alarmPriPowerStatus,
        alarmSecPowerStatus,
        alarmExternalPriStatus,
        alarmExternalSecStatus,
        alarmExternalTriStatus,
        alarmReferenceAStatus,
        alarmReferenceBStatus,
        alarmReferenceCStatus
    }
    STATUS     current
    DESCRIPTION
    "This is a trap message that indicates a change in 56000 system status.
    Refer to the list of OBJECTS, above."
    ::= { nic56kTrap 1 }

alarmUserNotification NOTIFICATION-TYPE
    OBJECTS
    {
        alarmUserIpAddrStatus,
        alarmUserNameStatus,
        alarmUserProtocolStatus
    }
    STATUS     current
    DESCRIPTION
    "This is a trap message that indicates a specific user initiated change in
    56000 setup. A setup change may or may not result in a system alarm status
    change.  Refer to the list of OBJECTS, above."
    ::= { nic56kTrap 2 }


alarmOscillatorNotification NOTIFICATION-TYPE
    OBJECTS
    {
        alarmOscillatorIpAddr,
        alarmOscillatorSlotNumber,
        alarmOscillatorCardModel,
        alarmOscillatorPllStatus,
        alarmOscillatorReceiverStatus,
        alarmOscillatorAntennaStatus,
        alarmOscillatorAuxRefStatus
    }
    STATUS     current
    DESCRIPTION
    "This is a trap message that indicates a change in a 56000 oscillator card
     status.  Refer to the list of OBJECTS, above."
    ::= { nic56kTrap 3 }


-- The 56000 alarm information for all card slots

slotNumber OBJECT-TYPE
    SYNTAX     INTEGER (1..17)
    MAX-ACCESS read-only
    STATUS     current
```

```
    DESCRIPTION
    “The total number of single unit card slots in the 56000 chassis (currently
    this value is 17.”
    ::= { systemStatusChassis 1 }

-- The 56000 card slot alarm table

slotTable OBJECT-TYPE
    SYNTAX     SEQUENCE OF SlotEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
     “A list of 56000 card slot entries.  The number of The number of entries is
given
    by the value of slotNumber.”
    ::= { systemStatusChassis 2 }

slotEntry OBJECT-TYPE
    SYNTAX     SlotEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
    “A 56000 card slot entry containing objects relevant to the health of the card
    plugged into this particular card slot.”
    INDEX   { slotIndex }
    ::= { slotTable 1 }

SlotEntry ::=
    SEQUENCE {
    slotIndex
        INTEGER,
    slotCardModel
        DisplayString,
    slotPriSourceStatus
        AlarmStatusType,
    slotSecSourceStatus
        AlarmStatusType,
    slotTriSourceStatus
        AlarmStatusType,
    slotPowerCycledStatus
        AlarmStatusType,
    slotLockedStatus
        AlarmStatusType,
    slotOutputAStatus
        AlarmStatusType,
    slotOutputBStatus
        AlarmStatusType,
    slotOutputCStatus
        AlarmStatusType,
    slotOutputDStatus
        AlarmStatusType,
    slotOutputEStatus
        AlarmStatusType,
    slotOutputFStatus
```

```
        AlarmStatusType,
    slotPllStatus
        AlarmStatusType,
    slotReceiverStatus
        AlarmStatusType,
    slotAntennaStatus
        AlarmStatusType,
    slotAuxRefStatus
        AlarmStatusType
              }

slotIndex OBJECT-TYPE
    SYNTAX     INTEGER  (1..17)
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
    “A unique value for each 56000 card slot number.  Its value
    ranges between 1 and the value of slotNumber.”
    ::= { slotEntry 1 }

slotCardModel OBJECT-TYPE
    SYNTAX     DisplayString (SIZE (0..255))
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
    “A description of the 56000 card type plugged into this reported chassis
    socket.  Note: that this field is blank when there is no card in this slot
    or there is no card that can be in this slot because a double wide card
    has been plugged in.”
    ::= { slotEntry 2 }

slotPriSourceStatus OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
     “Current 56000 alarm status of the primary source input to this particular
card.”
    ::= { slotEntry 3 }

slotSecSourceStatus OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
    “Current 56000 alarm status of the secondary source input to this particular
card.”
    ::= { slotEntry 4 }

slotTriSourceStatus OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
```

```
    “Current 56000 alarm status of the tertiary source input to this particular
card.”
    ::= { slotEntry 5 }

slotPowerCycledStatus OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
     “Current 56000 alarm status for the power having been cycled on the card
plugged
    into the slot.”
    ::= { slotEntry 6 }

slotLockedStatus OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
    “Current lock status for the frequency control circuitry on the card
    plugged into the slot.”
    ::= { slotEntry 7 }

slotOutputAStatus OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
     “Current 56000 alarm status for the frequency output A on the card plugged
into
    the slot.”
    ::= { slotEntry 8 }

slotOutputBStatus OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
     “Current 56000 alarm status for the frequency output B on the card plugged
into
    the slot.”
    ::= { slotEntry 9 }

slotOutputCStatus OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
     “Current 56000 alarm status for the frequency output C on the card plugged
into
    the slot.”
    ::= { slotEntry 10 }

slotOutputDStatus OBJECT-TYPE
```

```
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
     “Current 56000 alarm status for the frequency output D on the card plugged
into
    the slot.”
    ::= { slotEntry 11 }

slotOutputEStatus OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
     “Current 56000 alarm status for the frequency output E on the card plugged
into
    the slot.”
    ::= { slotEntry 12 }

slotOutputFStatus OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
     “Current 56000 alarm status for the frequency output F on the card plugged
into
    the slot.”
    ::= { slotEntry 13 }

slotPllStatus OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
    “Current 56000 alarm status for the oscillator Phase Locked Loop on the card
     plugged into the slot.”
    ::= { slotEntry 14 }

slotReceiverStatus OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
    “Current 56000 alarm status for the oscillator GPS receiver on the card
     plugged into the slot.”
    ::= { slotEntry 15 }

slotAntennaStatus OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
    “Current 56000 alarm status for the oscillator GPS antenna on the card
     plugged into the slot.”
```

```
    ::= { slotEntry 16 }

slotAuxRefStatus OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
    “Current 56000 alarm status for the auxiliary reference on the card plugged
     into the slot.”
    ::= { slotEntry 17 }


-- The 56000 power supply alarms

alarmPriPower OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
    “Current 56000 alarm status for the primary power supply on the card plugged
into
    the slot.”
    ::= { systemStatusPower 1 }

alarmSecPower OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
    “Current 56000 alarm status for the secondary power supply on the card plugged
into
    the slot.”
    ::= { systemStatusPower 2 }


-- The 56000 External Input Source Alarms

alarmPriExternalInput OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
    “Current 56000 alarm status for the primary external input on the card plugged
    into the slot.”
    ::= {systemStatusExternalInput 1 }

alarmSecExternalInput OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
     “Current 56000 alarm status for the secondary external input on the card
plugged
    into the slot.”
```

```
    ::= {systemStatusExternalInput 2 }

alarmTriExternalInput OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
      "Current 56000 alarm status for the tertiary external input on the card
plugged
    into the slot."
    ::= {systemStatusExternalInput 3 }


-- The 56000 Reference Source Alarms

alarmReferenceA  OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
    "Current 56000 alarm status for Reference A."
    ::= {systemStatusReferences 1 }

alarmReferenceB  OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
    "Current 56000 alarm status for Reference B."
    ::= {systemStatusReferences 2 }

alarmReferenceC  OBJECT-TYPE
    SYNTAX     AlarmStatusType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
    "Current 56000 alarm status for Reference C."
    ::= {systemStatusReferences 3 }


-- The 56000 Last User Information

alarmUserName  OBJECT-TYPE
    SYNTAX     DisplayString (SIZE (0..64))
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
    "The name of the User that most recently made a change to the 56000 system
     configuration."
    ::= {systemStatusUser 1 }

alarmUserProtocol  OBJECT-TYPE
    SYNTAX     AlarmUserProtocolType
    MAX-ACCESS read-only
```

```
    STATUS     current
    DESCRIPTION
    “The network protocol used by the most recent User making a change to the
     56000 system configuration.”
    ::= { systemStatusUser 2 }


-- The 56000 Clear All Alarm States

alarmClearAllStatus OBJECT-TYPE
    SYNTAX INTEGER {
                        alarmClear  (1)
                    }
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
    “Setting the variable to <alarmClear> clears the All alarm status.
     Clearing the alarm status is only useful when the Alarm Latch
     Configuration is set to Latching.”
    ::= { systemFaultConfigData 1 }

alarmLatchConfiguration OBJECT-TYPE
    SYNTAX INTEGER {
                        latching     (1),
   nonLatching  (2)
                    }
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
    “The setting of this value controls the operation of the alarm latch.  When
     this object is set to latching, any data status that changes to a fault
     condition remains in the fault condition until the latch is cleared by
     setting alarmClearAllStatus to alarmClear.  When set to nonLatching,
     reading of the alarm data status reflects the current value of that
     status.”
    ::= { systemFaultConfigData 2 }

END
```

Network Port

Communication via the Network Port on the 56k is another method the user is able to use. The DHCP feature is not supported. All Serial commands (see 7.1, 7.2) also apply to the Network Port Telnet sessions.

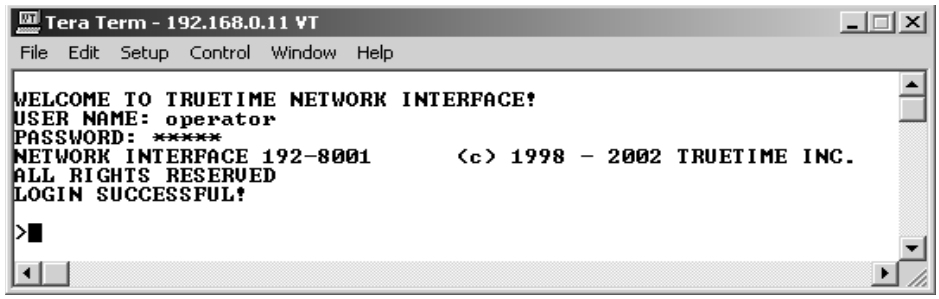
Complete the following steps to connect to the network port.

1. Open a telnet session from your PC to the 56k.

2. In Windows, click **Start** – **Run**, enter **`telnet`** **`###.###.###.###`** (where the #s are the 56k’s IP address), and click OK.

3. Open a telnet session using a terminal emulation program such as HyperTerminal, TeraTerm Pro, or Minicom. Consult the program's documentation for instructions.

4. When prompted, log in using the operator's user name, "**operator**", and password, "**janus**". Press **Enter** on your keyboard a couple of times to get a command prompt.



Setting up FTP for F100 Config (NIC Card Only)

F100 CONFIG – Configure NTP & SNMP Parameters

F100 CONFIG instructs the 56k unit to transfer its NTP and SNMP configuration files to an FTP server. The administrator can edit NTP and SNMP files on the FTP server, and then transfer them back to the 56k using the F100 CONFIG command. The F100 commands are to be used only if the NIC card is installed in the 56000 DRC.

The following subsections guide you through the steps to set up for and use F100 CONFIG.

Overview of Steps

Set up an FTP server and working directory on your workstation.

Using the 56k's command line interface, enter the **`F100 CONFIG get`** command. The 56k sends copies of its configuration files over the network to the FTP server's working directory on your PC.

Edit the configuration files in the working directory.

Give the 56k a new command, **`F100 CONFIG set`**. The 56k retrieves copies of the edited configuration files from the FTP server's working directory and overwrites it's current config files with the new ones.

Assumptions

- You have 56k unit's operator user name and password

- Your workstation is using a Windows operating system
- The workstation and 56k are both connected to a TCP/IP network
- You can download software from the Internet and install it on your workstation

Procedures

To Create a working directory on your workstation:

1. Open **My Computer** on your Windows desktop.
2. Open the **C:** drive.
3. From the **File** menu, select **New** and **Folder**.
4. Name the new folder **ftpworkfiles**.

To Download the Serv-U FTP server from the Internet:

1. Go to **http://www.serv-u.com** and download Serv-U.
2. When prompted, save *susetup.exe* to a convenient directory on your workstation.

Install the Serv-U FTP server:

1. Double-click *susetup.exe* to start installing Serv-U 4.0.
2. Go straight through, clicking **Next** and accepting all the default settings.
3. Click **Finish**. The Serv-U administration program starts, installs a desktop icon, and starts the Serv-U Setup Wizard.

Answer Serv-U Setup Wizard's questions:

1. Press "next" to proceed, or "cancel" to skip the setup wizard > **Next**
2. Enable small images with menu items? > **Yes**
3. Press "next" to start the local FTP server and connect to it > **Next**
4. IP address (leave blank for dynamic or unknown IP) > (leave blank)
5. Domain name > (leave Wizard Generated Domain)
6. Allow anonymous access? > **Yes**
7. Anonymous home directory > Type **`C:\ftpworkfiles`**

8. Lock anonymous users in their home directory? > **Yes**

9. Create named account? > **No**

10. Press 'finish' to proceed or "previous" to make changes > **Finish**

Configure the Serv-U FTP server:

1. In Serv-U Administrator, select **<<Local Server>>** in the left pane.

2. Clear the **Start automatically** (system service) checkbox.

Note: This requires that you to start the FTP server manually when you need it, which is much safer than having it running automatically when you don't need it.

3. Click **Yes** in response to "The server needs to be stopped (and restarted)..."

4. Click **+** to expand **<<Local Server>>**, **Domains**, **Wizard Generated Domain**, and **Users**.

5. Select **Anonymous**.

6. In the right pane, select the **Dir Access** tab, and select **Write** and **Delete** checkboxes:

7. Click the **Apply** button on the toolbar to save the changes (or select User, Apply).

This completes the procedure for installing and configuring the FTP server on your local workstation.

Make note of the workstation's IP address:_____

1. Open a DOS command line window on the workstation:

   Click **Start**, **Run**, and type **cmd**

   Or

   Click **Start**, **Programs**, (and **Accessories** in some cases), and start the program called "Command prompt" or "DOS prompt".

2. At the command line, type **ipconfig**

3. Make note of the IP address in the response.

Make note of the 56k's IP address:_____

Using the command line, enter:

```
F100 IP
```

The 56k responds with its IP address. For example:

```
F100 IP:192.168.0.2
```

Copy the configuration files from the 56k to the FTP server:

Using the command line, enter the commands below. Replace <*IP Address*> with that of the workstation/FTP Server. Leave <*subdir*> blank.

To get the NTP config files, type:

```
>f100 config ntp get host:<IP Address> dir:<subdir>
```

To get the SNMP config file, type:

```
>f100 config snmp get host:<IP Address> dir:<subdir>
```

To get both the SNMP and NTP config files, type:

```
>f100 config ntp snmp get host:<IP Address> dir:<subdir>
```

Here's an example of a successful SNMP and NTP config file transfer:

```
>f100 config ntp snmp get host:192.168.0.1 dir:
Host config ip 192.168.0.1 already configured
Source file /config/snmp.conf bytes read: 1275
Dest file snmp.conf bytes written: 1275
Source file /etc/ntp.conf bytes read: 1166
Dest file ntp.conf bytes written: 1166
Source file /etc/ntp.keys bytes read: 44
Dest file ntp.keys bytes written: 44
Configuration files transferred successfully!
```

If you get "`Error: Can't write file`" when you enter the get command, verify the following FTP server items:

- <<Local Server>> is running.

- The Anonymous account has “C:\ftpworkfiles” as it’s home directory.

- Anonymous - Dir Access for C:\ftpworkfiles has read, write, and delete enabled; and any changes to those settings **have been applied** (**User** menu - **Apply**).

Edit the configuration files:

In Windows, open **C:\ftpworkfiles** and edit the configuration files using a text editor such as Notepad or Wordpad.

Configuration File Notes

If the editor displays odd ‘box’ characters or the lines of text don’t wrap properly, close the file without saving changes and switch to a different text editor.

Don’t rename or save the configuration files as a new file type.

Some text editors encode end-of-line carriage returns that cause errors when 56k refers to the file. Notepad, WordPad, Microsoft Word, and Vim don’t seem have this problem.

The configuration files are automatically transferred to/from the FTP server in binary format. They retain the DOS or UNIX file conventions of the editor. 56k works with either format.

F100 – Network Port & 56k Software

F100 provides two groups of commands:

- Group 1, available through the serial or network port and the command line, provides access to network port settings and hardware/software status information.

- Group 2, available through the serial or network port command line only, provides commands for changing system software, NTP & SNMP parameters, and user name/password information.

Warning: The F100 commands have the capacity to remove the 56k from the network and disable the 56k’s system software. Use judiciously.

Reboot Warning: Some of the F100 command line commands reboot the 56k. These are identified in the following documentation.

Group 1: You can use both the serial or network port command line interface to access the following parameters:

- **MAC address:** 56k contains a unique Media Access Control (MAC) address comprised of a unique number assigned to the manufacturer, and a unique number assigned to the unit. This is factory set and cannot be changed.

- **IP Address**: Sets a static Internet Protocol (IP) address for the unit.
- **Subnet Mask**: Sets a valid subnet-mask used in IP addressing. Subnetting allows for the more efficient allocation of network addresses and management of network traffic.
- **Default Gateway**: The address of the router that handles packets addressed to IP devices outside the local-area network.
- **10 100 BASE-T**: Configures the data rate of the Ethernet port. The settings available are automatic or 10 Base-T. Automatic negotiates the highest connection speed available. “10 Base-T” sets the connection speed to 10-Mbps, regardless of the connection speeds available.
- **Remote Lockout**: Enables or disables remote access through the 56k’s standard network port. Enabling Remote Lockout limits users to the Serial I/O port.
- **Flash CRC**: Status - Passed or failed.
- **RAM**: Status - Passed or failed.
- **Serial**: Status - Passed or failed.
- **Version Test**: Status - Passed or failed

The following table (next page) gives the command line equivalents for each of the preceding parameters:

Description	"F100" followed by:	Comments
Ethernet address (MAC address)	EA	Displays information
IP Address	IP	Displays, configures and reboots
Subnet Mask	SM	Displays, configures and reboots
Default Gateway	G	Displays, configures and reboots
IP Address, Subnet Mask, and Default Gateway	IC	Displays several IP parameters
10 100 BASE-T	BASET	Displays, configures and reboots
Remote Lockout	L (for status), LOCK, UNLOCK	Displays and configures
Flash CRC	ST	Displays information
RAM	ST	Displays information
Serial	ST	Displays information
Version Test (NVRAM Ver)	ST	Displays information

Group 2

The following expanded command set is available through the command line interface:

Description	"F100" followed by:	Comments
Burn Host	BH	Configure
Burn	BU	Commit action
Burn Bootloader	BUB	Commit action
Burn Filesystem	BF	Commit action
Burn Fault Monitor program image to NIC flash	BUFM	Commit action
Load Fault Monitor image from NIC flash to FM	LDFM	Commit action

Configure NTP & SNMP Parameters	CONFIG	Move files
Factory Mode Jumper	J	Display only
Reboot	K I L L	Commit action – reboot the 56k
Change User Password	P	Configure
Ping	PI	Commit action
Change User Name	PN	Commit action

- You can reconfigure two or more network parameters in a single entry by sending the F100 command and entering new values. Leading zeros may be omitted when entering IP Address, Subnet Mask, and Default Gateway.
- Any field may be omitted and order is not significant.
- Blanks are allowed on either side of a colon.
- The unit reboots after any network parameter is changed.

F100 EA – Ethernet Address

Use F100 EA to display the Ethernet Address (MAC Address) (**Note**: An Ethernet or MAC Address is not the same thing as an IP Address), a fixed, six-byte, hexadecimal value specific to the unit's standard network port. The first three bytes are registered to Symmetricom Inc.; the last three bytes are the hex value identifying the network port.

To display the Ethernet address of the unit standard network port, enter:

F100 EA<Enter>

The unit responds:

F100 EA:00-A0-69-xx-xx-xx<CR><LF>

where "xx-xx-xx" are the six hex digits of the unit's unique address.

An example of the response is:

```
F100 EA:00-A0-69-00-06-2A
```

Attempts to set this field will be rejected with a syntax error message.

F100 IP –IP Address

Use F100 IP to change the unit's IP Address. Changing this parameter will cause a software reset of the NIC card. To set the IP address and restart the unit, enter:

F100 <SP>IP<SP>nnn.nnn.nnn.nnn<Enter>

where:

For example, enter:

F	=	ASCII character F
100	=	unit function number
<SP>	=	space
IP	=	specify IP command
nnn.nnn. nnn.nnn	=	dotted decimal address
<Enter>	=	input line terminator

F100 IP 206.54.0.21<Enter>

56k responds:

OK <CR><LF>

RESETING THE UNIT<CR><LF>

PLEASE WAIT…<CR><LF>

To obtain the IP address of the unit Standard network port, enter:

F100 IP<Enter>

The unit responds:

F100 IP nnn.nnn.nnn.nnn<CR><LF>

where "nnn.nnn.nnn.nnn" is the dotted decimal address notation.

An example of the response is:

F100 IP:206.54.0.33

F100 SM – Subnet Mask

Use F100 SM to display or configure the Subnet Mask. Changing this parameter will cause a software reset of the NIC card. To set the Subnet Mask and restart the unit, enter:

F100 <SP>SM<SP>nnn.nnn.nnn.nnn<Enter>

where:

F	=	ASCII character F
100	=	unit function number
<SP>	=	space
SM	=	specify SM command
nnn.nnn.nnn.nnn	=	dotted decimal address
<Enter>	=	input line terminator

For example, enter:

F100 SM 255.255.255.240<Enter>

56k responds:

OK <CR><LF>

RESETING THE UNIT<CR><LF>

PLEASE WAIT…<CR><LF>

To obtain the Subnet Mask of the unit Standard network port, enter:

F100 SM<Enter>

The unit responds:

F100 SM nnn.nnn.nnn.nnn<CR><LF>

where “nnn.nnn.nnn.nnn” is the dotted decimal address notation.

An example of the response is:

F100 SM2255.255.255.125

F100 G – Gateway

Use F100 G to display or configure the Default Gateway. Changing the parameters will cause a software reset of the NIC card. To set the Default Gateway and restart the unit, enter:

F100 <SP>G<SP>nnn.nnn.nnn.nnn<Enter>

where:

F	=	ASCII character F
100	=	unit function number
<SP>	=	Space
G	=	specify G command
nnn.nnn. nnn.nnn	=	dotted decimal address
<Enter>	=	input line terminator

For example, enter:

F100 G 206.54.0.17<Enter>

56k responds:

OK <CR><LF>

RESETING THE UNIT<CR><LF>

PLEASE WAIT...<CR><LF>

To obtain the Default Gateway of the unit Standard network port, enter:

F100 G<Enter>

The unit responds:

F100 G nnn.nnn.nnn.nnn<CR><LF>

where “nnn.nnn.nnn.nnn” is the dotted decimal address notation.

An example of the response is:

F100 G:206.54.0.1

F100 IC – Network Port Settings

Use F100 IC to review the entire configuration of the standard network port, enter:

F100<SP>IC<Enter>

An example of the response is:

F100 IP:206.54.0.21 SM:255.255.255.240 G:206.54.0.17<CR><LF>

This response indicates the specific IP address, Subnet Mask, and Default Gateway of the NIC card. The leading zeros within fields of the dotted decimal addresses are omitted from the IP address, Subnet Mask, and Default Gateway. To set all network parameters and reset the NIC card, send a string similar to this example:

F100 IP:123.456.789.123 SM:123.456.789.123
G:123.456.789.123<CR>

Any legal command set containing one of the three network parameters will cause a reboot of the NIC card.

F100 BASET – 10/100 BASE- T

Use the BASET command to display or configure the data rate of the Ethernet port. The settings available are “Automatic” or “10 Base-T”. Automatic negotiates the highest connection speed available (not necessarily 100Base-T). The “10 Base-T” setting, establishes a 10-Mbps connection speed, regardless of the connection speeds available. The current BASET setting can be queried with this command. If the BASET command is used to set the BASET value, the NIC card will reboot. Changing the Base-T settings causes the unit to reset.

To display the current Base-T setting, enter:

F100<SP>BASET<Enter>

where

F	=	ASCII character F
100	=	unit function number
<SP>	=	Space
BASET	=	specify Base-T command

`<Enter>`	=	input line terminator
`auto`	=	sets maximum BaseT speed to 100
`10`	=	sets maximum BAseT speed to 10

An example of the response is:

F100 <SP>BASET<SP> AUTO

Or

F100<SP> BASET<SP>10T

To set the Ethernet port to automatically negotiate the maximum connection speed, enter:

F100<SP>BASET<SP>AUTO<Enter>

To set the Ethernet port's connection speed to 10Base-T, enter:

F100<SP>BASET<SP>10<Enter>

56k responds:

OK <CR><LF>

RESETING THE UNIT<CR><LF>

PLEASE WAIT…<CR><LF>

F100 ST –Self Test Status

Use F100 ST to display whether the Self Test Status parameters passed or failed. The parameters include: flash-memory checksum test, nonvolatile (NV) RAM, Serial Port, and version check.

To query the self-test status, enter:

F100<SP>ST<Enter>

where:

`F`	=	ASCII character F
`100`	=	unit function number

<SP>	=	space
ST	=	specify ST command
<Enter>	=	input line terminator

The unit responds:

F100<SP>ST<SP>FLASH/CRC:<SP><STATUS>,<SP>RAM:<SP><STATUS>,<SP>SERIAL:<SP><STATUS>,<SP>NVRAM<SP>VER:<SP><STATUS><CR><LF>

where:

‘

F	=	ASCII character F
100	=	unit function number
<SP>	=	space
ST	=	specify ST command
FLASH/CRC	=	specify flash checksum result
RAM.	=	specify RAM test result
SERIAL	=	specify Serial Port test result.
NVRAM VER	=	specify version test result. This test compares the version of the code against the version recorded in Non-Volatile memory
<STATUS>	=	is either ASCII PASS or FAIL
,	=	ASCII comma
:	=	ASCII colon
<CR><LF>	=	output line terminator

An example of the response is:

F100 ST FLASH/CRC : PASS, RAM : PASS, SERIAL : PASS, NV RAM : PASS<CR><LF>

F100 P

The User Password is only used when initiating a Telnet session. The password may be changed from either the Telnet or the serial port. The administrator may change the password from the Telnet interface only after logging in with the old password. It is not necessary to know the old password in order to enter a new password when using the local serial interface. If a user forgets the password, all they have to do is use the serial port to define a new one. Maximum password size is ten characters.

To change/create a password, send:

F100<SP>P<Enter>

where:

F = ASCII character F
100 = NIC card function number
<space> = ASCII space character
P= specify Password command

The new password will be used for the next Telnet login. The new password and the
confirming password must match or the NIC will respond with the following:

ERROR: PASSWORDS DO NOT MATCH. NEW PASSWORD REJECTED!

The old password will be used for the next Telnet login, if the confirming password does not match.

F100 VER

This command queries the NIC for firmware and FPGA information. The NIC's firmware is comprised of three files, known respectively as bootloader, software and file system. Other relevant data, including the NIC card's serial number, is reported by this command. This data cannot be changed -- it may only be queried.

To query the NIC for firmware information send:

F100<SP>ver<Enter>

Example Response:

F100 VER
BOOTLOADER 182-9029

```
SOFTWARE     182-9030
FILE SYSTEM 182-9031V1.68.1.10
NVRAM VER    2
PROJ REV #   1.68.1.10
FPGA #       184-2015V14200
SERIAL #     0003XXXX
```

Upgrading System Software

The 56k's system software is comprised of three files, known respectively as 'bootloader' (.bt), 'software' (.bin), and file system (.fs). This section explains how to completely upgrade the system software. This is done using the F100 BH, F100 BUB, F100 BU, and F100 BF commands, which are also covered separately in the four sections of the manual following this one..

Warning: Consideration must be given to the software and the hardware version numbers of the 56k and it's optional components. Consult with Symmetricom's customer service department before performing upgrades.

The procedure for upgrading software is as follows:

1. Setting up the 56k, an FTP server, and a Terminal.

2. Obtain the current system software files from Symmetricom, Inc. (E.g., 192-8001.bin, 192-8000.bt, 192-8003.fs)

3. Place the system software files on an ftp server. (The ftp server should be set up to allow an anonymous log in from the 56k without a password. We recommend using an ftp server installed on your local machine, rather than a public ftp server. Using the 56k's standard network port, connect the 56k to a network that provides access to the FTP server.

4. Using a terminal or terminal emulation program, open a command line session to the 56k through the serial or standard network port.

Installing the new bootloader, software, and file system

1. Using the serial port command line session, install the new as 'bootloader' (.bt) by entering the following:

   F100 bh <ftp_server_ip_address> <ftp_relative_path/><file.bt>

where:

If the FTP server is on your local PC, **ftp_server_ip_address** is the IP address of your PC.

ftp_relative_path is a directory *inside* the anonymous user's home directory on the ftp server. If no directory is inside the anonymous user's home directory (i.e., if the upgrade files are sitting in anonymous user's home directory), drop the ftp_relative_path/ from the command line.

For example, if c:/ftpworkfiles is the anonymous user's home directory, and the upgrade files are in c:/ftpworkfiles/56k/, you would enter the command as follows:

F100 bh 10.1.3.233 56k/56kbuild15.bt

On the other hand, if c:/ftpworkfiles is the anonymous user's home directory, and the upgrade files are in c:/ftpworkfiles, you would drop the ftp_relative_path/ and enter the command as follows:

F100 bh 10.1.3.233 /56kbuild15.bt

The 56k responds:

BURN HOST IS READY

Then 'burn' the bootloader to the 56k's flash memory by entering:

F100 bub

The 56k responds:

OK

BURNING FILE 56kbuild15.bt WITH SIZE 452164 TO PARTITION:0 SECTOR:0

SEC: 0 RE: 0

SEC: 1 RE: 0

SEC: 2 RE: 0

SEC: 3 RE: 0

SEC: 4 RE: 0

SEC: 5 RE: 0

SEC: 6 RE: 0

FLASH SUCCESSFULLY PROGRAMMED CRC32 = 0x9EFBE60A

Do the same for the 'software' (.bin) file:

F100 bh <ftp_server_ip_address> <ftp_relative_path_from_root/><file.bin>

For example:

F100 bh 10.1.3.233 56k/currentbuild/56kbuild15.bin

The 56k responds:

BURN HOST IS READY

Then enter:

F100 bu

The 56k responds:

OK

BURNING FILE 56kbuild15.bin WITH SIZE 803016 TO PARTITION:1 SECTOR:10

SEC: 10 RE: 0

SEC: 11 RE: 0

SEC: 12 RE: 0

SEC: 13 RE: 0

SEC: 14 RE: 0

SEC: 15 RE: 0

SEC: 16 RE: 0

SEC: 17 RE: 0

SEC: 18 RE: 0

SEC: 19 RE: 0

SEC: 20 RE: 0

SEC: 21 RE: 0

SEC: 22 RE: 0

FLASH SUCCESSFULLY PROGRAMMED CRC32 = 0x2D9A260A

Do the same for the 'file system' (.fs) file:

F100 bh <ftp_server_ip_address> <ftp_relative_path_from_root/><file.fs>

For example:

F100 bh 10.1.3.233 56k/currentbuild/56kbuild15.fs

The 56k responds:

BURN HOST IS READY

Then enter:

F100 bf

The 56k responds:

OK

BURNING FILE janusbuild15.fs WITH SIZE 524288 (12% used)

SEC: 94

SEC: 95

SEC: 96

SEC: 97

SEC: 98

SEC: 99

SEC: 100

SEC: 101

SEC: 102

FILE SYSTEM FLASH BURN COMPLETED

End of procedure. The 56k now has the current system software.

F100 BH – Burn Host

Use F100 BH, when upgrading software, to select the FTP host and the file to be transferred.

To select the FTP host and file for upgrading, enter:

F100 BH <FTP HOST IP ADDRESS><SP><UPGRADE FILE PATH>/<FILE NAME><Enter>

Use UNIX style forward slashes '/' in path and do not describe the drive (for example, 'C') in the path.

For example:

F100 BH 10.1.7.20 Lassen/Rel/REL20010518/nts200/192-9004v001.BIN

The unit responds:

BURN HOST IS READY

This command can be disabled by the Burn Host Lock command, which denies serial and Telnet access. However, if you enter BootLoader mode, this command is always available.

>f100 bh 10.1.3.233 56kbuild15.bin

BURN HOST IS READY!!!

F100 BUB – Burn BootLoader

Use F100 BUB to burn the BootLoader when upgrading software, to write the BootLoader to flash memory.

To write the BootLoader to the flash, send the F100 BH command with the FTP host, file path and name, and then enter:

F100 BUB<Enter>

56k responds:

OK<CR><LF>

For example:

>f100 bub

OK

BURNING FILE janusbuild15.bt WITH SIZE 452164 TO PARTITION:0 SECTOR:0

SEC: 0 RE: 0

SEC: 1 RE: 0

SEC: 2 RE: 0

SEC: 3 RE: 0

SEC: 4 RE: 0

SEC: 5 RE: 0

SEC: 6 RE: 0

FLASH SUCCESSFULLY PROGRAMMED CRC32 = 0x9EFBE60A

If more than six flash sectors are written during this process, you must rewrite both the bootloader sectors (0 to 5) and the program binary sectors (6 to 16).

F100 BU – Burn

Use F100 BH when upgrading software, to write the file selected with F100 BH to the flash memory. Flash memory is checked to ensure that the correct file is used.

To write the file to the flash, send the F100 BH command with the FTP host, file path and name, and then enter:

F100 BU<Enter>

56k responds:

OK<CR><LF>

And, for example, displays the following text:

>f100 bu

OK

BURNING FILE janusbuild15.bin WITH SIZE 803016 TO PARTITION:1 SECTOR:10

SEC: 10 RE: 0

SEC: 11 RE: 0

SEC: 12 RE: 0

SEC: 13 RE: 0

SEC: 14 RE: 0

SEC: 15 RE: 0

SEC: 16 RE: 0

SEC: 17 RE: 0

SEC: 18 RE: 0

SEC: 19 RE: 0

SEC: 20 RE: 0

SEC: 21 RE: 0

SEC: 22 RE: 0

FLASH SUCCESSFULLY PROGRAMMED CRC32 = 0x2D9A260A

F100 BF – Burn File System

Use F100 BF to burn file system when upgrading software, to write a file system to the flash memory.

To write the file system to the flash, send the F100 BH command with the FTP host, file path and name, and then enter:

F100<SP>BF<Enter>

56k responds:

OK<CR><LF>

For example:

>f100 bf

OK

BURNING FILE 56kbuild15.fs WITH SIZE 524288 (12% used)

SEC: 94

SEC: 95

SEC: 96

SEC: 97

SEC: 98

SEC: 99

SEC: 100

SEC: 101

SEC: 102

FILE SYSTEM FLASH BURN COMPLETED

F100 BUFM – Burn Fault Monitor Program Image

Use F100 BUFM when upgrading software, to write the file selected with F100 BH to the NIC flash memory.

NOTE: this command only stores the Fault Monitor program in the NIC's flash. It is not executed until transferred to the Fault Monitor with the F100 LDFM command.

To write the file to the NIC flash, send the F100 BH command with the FTP host, file path and name, and then enter:

F100 BUFM<Enter>

NIC responds:

BURNING FILE 56K.SX TO PARTITION: 3, SECTOR:10

FILE: 121666 BYTES, PARTITION: 262132 BYTES (46% used)

SEC: 10 RE: 0

SEC: 11 RE: 0

FLASH SUCCESSFULLY PROGRAMMED CRC32 = 0x0

>

F100 LDFM – Load Fault Monitor Program

Use F100 LDFM when upgrading software, to write the file stored in the NIC's flash

Once an image has been burned into the NIC's flash with the F100 BUFM command, this command can be used at any time to load the program into the flash memory of the attached Fault Monitor. There is no need to use F100 BH or F100 BUFM unless it is desired to change to a new version of the Fault Monitor program.

To write the file to the Fault Monitor flash, enter:

F100 LDFM<Enter>

NIC responds:

Preparing to load program into Fault Monitor...

Erasing present Fault Monitor program...

Erased, loading new program...

10 S records programmed

```
20 S records programmed
30 S records programmed
40 S records programmed
50 S records programmed
.
.
1550 S records programmed
1560 S records programmed
1570 S records programmed
1577 S records programmed
Fault Monitor successfully programmed. Restarting it...
Fault Monitor running, waiting for it to init...
Fault Monitor initialzed. Program down load process done
Fault Monitor version: 560-3175 1.22 184-054
>
```

Card Modules

The 56000 Data Rate Clock has an almost unlimited number of configurations. This versatility makes the 56000 very adaptable to any needs of the user.

This section contains all of the manuals to each one of the module cards used in the 56000. Each manual contains specific information for each card module, such as:

- Specific switch settings
- Specific setup requirements
- Specific issues with the card
- Specific architecture and operation of the card
- Drawings of the card
- Specific maintenance requirements

- Specific fault reporting

The user should always refer to the specific card module when problems arise or when changing configuration settings.

Fault Reports

The Fault Monitor CPU has access to all cards and can determine their fault status. When the CPU card provides the verbose mode serial report, fault status is available in a 2-byte format, with each binary nibble displayed as a hexadecimal (HEX) character.

The Verbose report displays the Fault status. In this context, a reported fault indicates a problem. The Machine report, when used, reports the current status (settings) of the switches and faults in hexadecimal characters. Together, they pinpoint problems and help the technician view the switch settings on the cards.

Verbose Reports

The following is an example of a Fault Monitor CPU report in Verbose mode:

```
TrueTime 56000 Site 01
Automatic Reports Enabled
Periodic Reports Disabled
Primary Inputs Selected REFA No REFB No REFC Off PRI OK SEC OK TER
Off

1. Undefined          OK          Undefined       OK
2. Undefined          OK          Undefined       OK
3. 5155-1      LOCAL OSC FAULT 0047 Undefined OK
4. Undefined          OK          Undefined       OK
```

The above sample tells you that:

Automatic reports are enabled and Periodic reports are disabled.

Primary inputs REF A and REF B are not bussing Aux. Ref. REF C is off. Primary and Secondary status inputs OK, Tertiary is OFF.

Numbers 1-4 are slots (not all slots are shown in the example). Slots 1,2,and 4 are undefined (empty) and functional (OK).

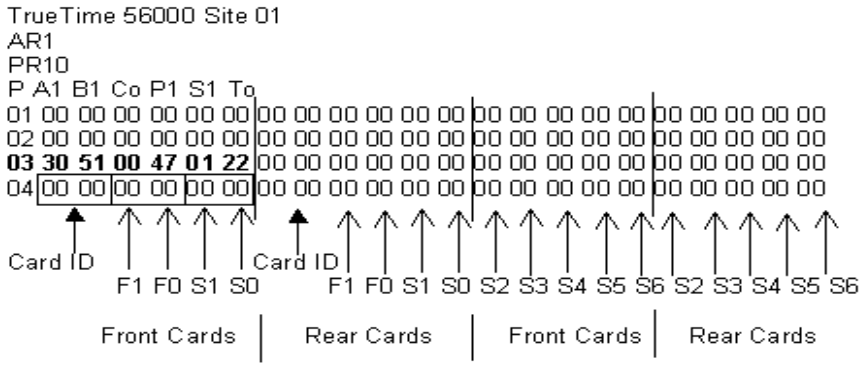
Slot 3 is read as follows:

5155-1 is the abbreviation of the 560-5155-1 card. The fault reading is 0047.

Machine Reports

The Fault Monitor CPU has another serial output mode called Machine Report mode. This mode is usually used with a computer program to interrogate the 56000 system status. The Machine Report mode displays hexadecimal (HEX) characters like the Verbose mode report.

The following is an example of a Fault Monitor CPU report in Machine Mode:
(card slots 05 through 14 HEX not shown)



Example from card slot 3 above.

The following is an example of a Fault Monitor CPU report in Machine Mode:

TrueTime 56000 Site 01¶
AR1¶
PR10¶
P A1 B1 Co P1 S1 To¶
01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00¶
02 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00¶
03 30 51 00 47 01 22 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00¶
04 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00¶
(card slots 05 through 14 HEX not shown)¶

Example from card slot 3 above:¶

Slot 3 shows that the Fault status is 0047 (F1, F0). The Status report read-out is 0122(S1,S0).

Report Conversions

This section deals with how to read and convert the Fault and Status read-outs using various tables and binary conversions. To decipher a Fault Status report, use Figure 13.

For Status reports (S1, S0) use Figure 14.

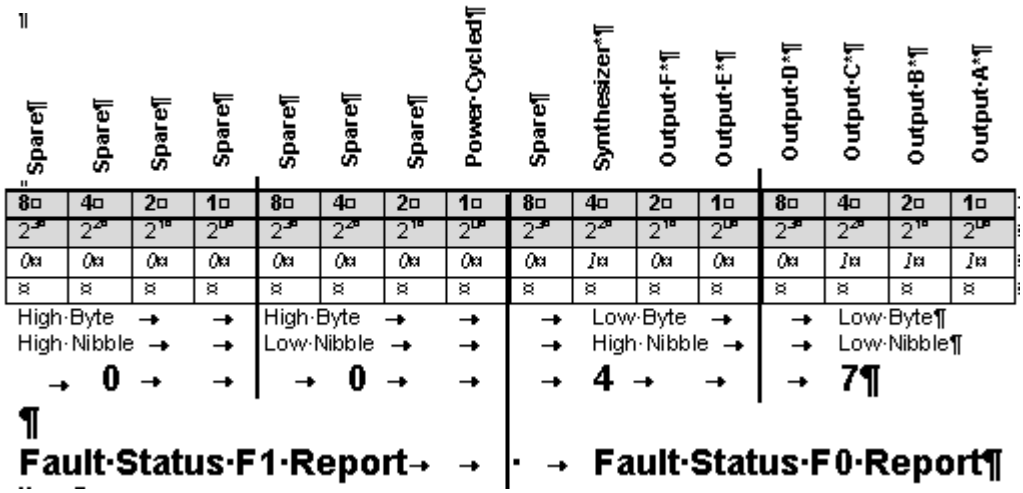


Figure 13 Report conversion table

Above each 8,4,2,1 is the corresponding fault for that bit. For instance, above the 8 bit in the Low byte/Low nibble reads Output D, which is the fault.

Shaded area

Informational only. The upper row: Bit value hex weights (8,4,2,1) The Lower row corresponds to the hex weight above. For instance, a readout of 7 equals 111 in binary and 4+2+1 hex weight.

Each section of 8,4,2,1 is a nibble of either an Upper or Lower byte and separated for easy recognition. Each nibble = 4 bits and each byte = 8 bits. "00" is the F1 report, "47" the F0 report.

Non-shaded area

This area is used according with the report read-out after a report is converted to binary. The 0407 is an example from a report.

Always read the report from Upper (High) byte to Lower (Low) Byte.

Using the Fault Status Report (F0, F1)

The hex weight (fault importance) has been assigned 8, 4, 2, 1. Beneath each number is the corresponding fault. Use Figure 13. The report example read 0047. The 0 is high byte/high nibble, the 4, low byte/high nibble, and 7, low byte/low nibble. Each nibble falls under a section on Figure 13, high to low or left to right.

Look at Figure 13. Below this chart is a sample read-out (0047). This read-out would appear on the monitor when a Verbose report is requested. In the example, there are no faults in the high byte/high nibble or in the high byte/low nibble because both are zero (0). In the low byte/high nibble, a 4 is reported. Looking directly above this, a 4 bit is easily spotted. The fault is synthesizer. However, In the low byte/low nibble, a 7 is reported. There is no 7 listed, only a 1, 2, 4, 8. Use the Binary Conversion table to determine the faults.

Seven (7) is converted to 111 in Binary. In Binary, a 1 = fault and 0 = no fault. Read 111 from bottom (low bit) to top (high bit) using the lower byte/low nibble group. The first three (from low bit to high bit) are 1's, indicating there is a fault with the Output Faults A, B and C.

Note that the hex weight assigned totals to 7 (4+2+1). If the 7 had been a 6, in binary this is 110. Reading from low bit to high bit, the 1's (i.e., faults) fall under hex weight 4 and 2, which equals a hex weight of 6. Of course, glancing at the lower byte/low nibble, you can quickly see (without converting to binary) that under 4 and 2 (i.e., 6) are the Output Faults B and C that are in fault.

Each of the four nibbles is grouped by category for easy visual identification of an offending fault. Each nibble has 15 possible fault combinations. All faults are asserted as a logic 1. The faults are latched on the Oscillator card and must be cleared by the 560-5179-1 Fault Monitor CPU “CL” command.

Using the Status Report (S1, S0)

The method used for reading the Fault report is the same when reading the Status report. Refer to Figure 14 (next page).

Status (S1, S0) Conversion Table

STATUS REG 0	Bit	Bit Value	Switch	
Low	0	1	10 MHz Output	
Nibble	1	2	5 MHz Output	2
Low	2	4	1 MHz Output	
Byte	3	8	Not Defined	
High	4	1	10 MHz Input	
Nibble	5	2	5 MHz Input	
Low	6	4	1 MHz Input	2
Nibble	7	8	Bypass Mode ON	
STATUS REG 1				
Low	0	1	Always 1 (Analog)	
Nibble	1	2	Always 0	
High	2	4	Not Defined	1
Byte	3	8	Not Defined	
High	4	1	Not Defined	
Nibble	5	2	Not Defined	
High	6	4	Not Defined	0
Byte	7	8	Not Defined	

Notes: The settings listed under the Switch column are HIGH or ON. For instance, frequency has SW 1-1 and SW 1-2. If SW 1-1 is ON, SW 1-2 is presumed to be OFF (although there is no specific mention of this). For switches, a 1 = ON, 0 = OFF.

Figure 14 Status (S1, S0) conversion table

Using the same read-out, 0122, but because the table is different, the 0 is located at the bottom (high byte). The rest of the numbers follow upward towards the low byte (Status 0). In this case, the 1 falls in the low nibble\high byte section of Status 1. The 2's fall in the high nibble\ low byte and low nibble\low byte section of Status 0. Two can be converted to 10 in binary.

1 = Active, a 0 = Not active.

The following are active in the Status report.

The first 2, in the Status 0, high nibble\low nibble section, the 5 MHz is active:

10 MHz Output	0
5 MHz Output	1
1 MHz Output	0

The last 2, in Status 0, low nibble\low byte section, the 5 MHz is also active:

10 MHz Input	0
5 MHz Input	1
1 MHz Input	0

In Status 1, the readout is 1. The 1 is listed in the Bit Value column in that section, low nibble\high byte, indicating Analog is active.

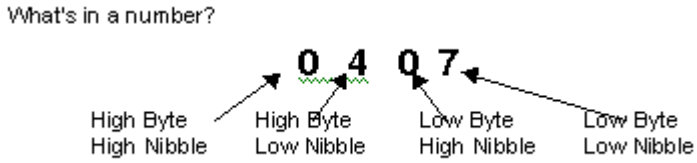
BINARY CONVERSION TABLE

Decimal	Displayed in report as	Binary
0	0	0
1	1	1
2	2	10
3	3	11
4	4	100
5	5	101
6	6	110
7	7	111
8	8	1000
9	9	1001
10	A	1010
11	B	1011
12	C	1100
13	D	1101
14	E	1110
15	F	1111

Binary:
1 = Fault/Switch On
0 = No Fault/Switch
Off

Use the Binary Conversion table to convert a read-out from the monitor to binary.
For instance, if the report read-out was 3C15, this would be:

11\1100\1\101 in binary.



Specific Cards

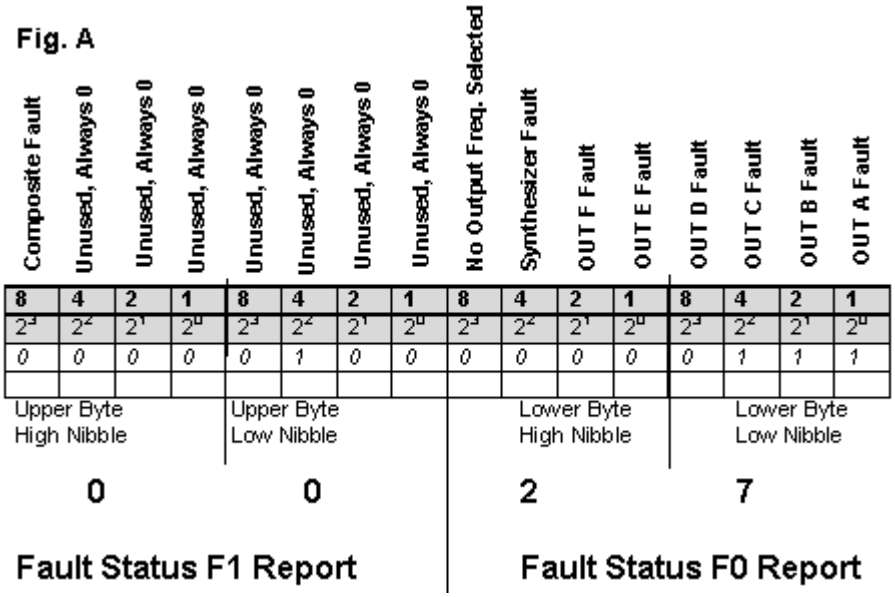
This section shows the Fault and Status reports for each specific card. Not all cards have such a report when requesting a machine or verbose report. Cards that have no reports are not listed. Cards with only one type of report are listed.

Bold, large case numerals, provide an example of a report read-out and have no other purpose. Refer to “How to read a report”.

560-5140

Fault Report

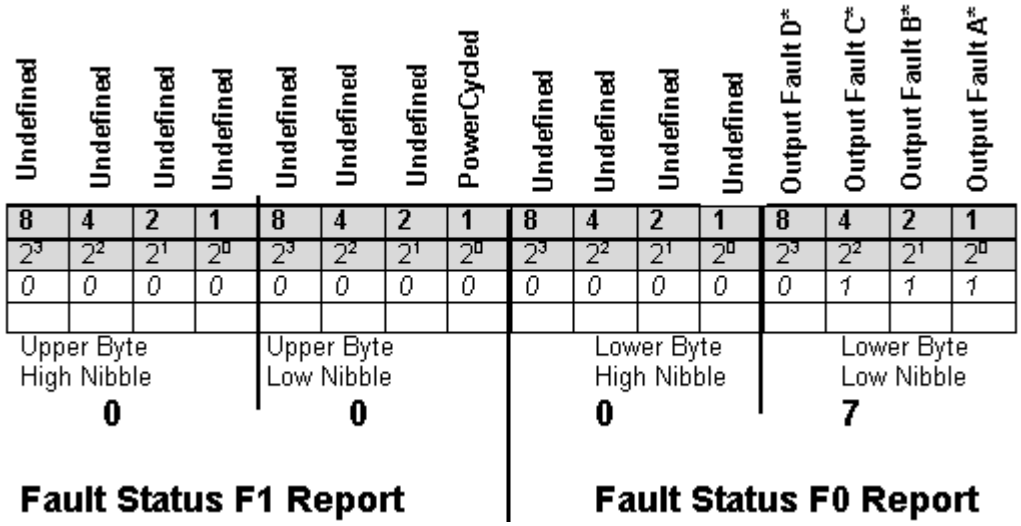
Fig. A



This card has no Status Report.

560- 5145

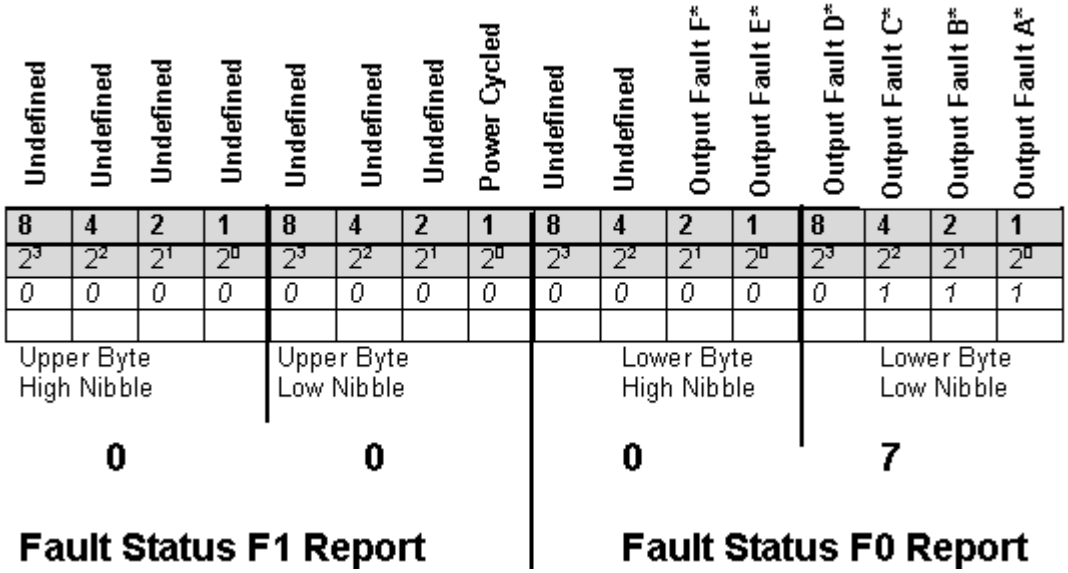
Fault Report



This card has no Status Report.

560-5148

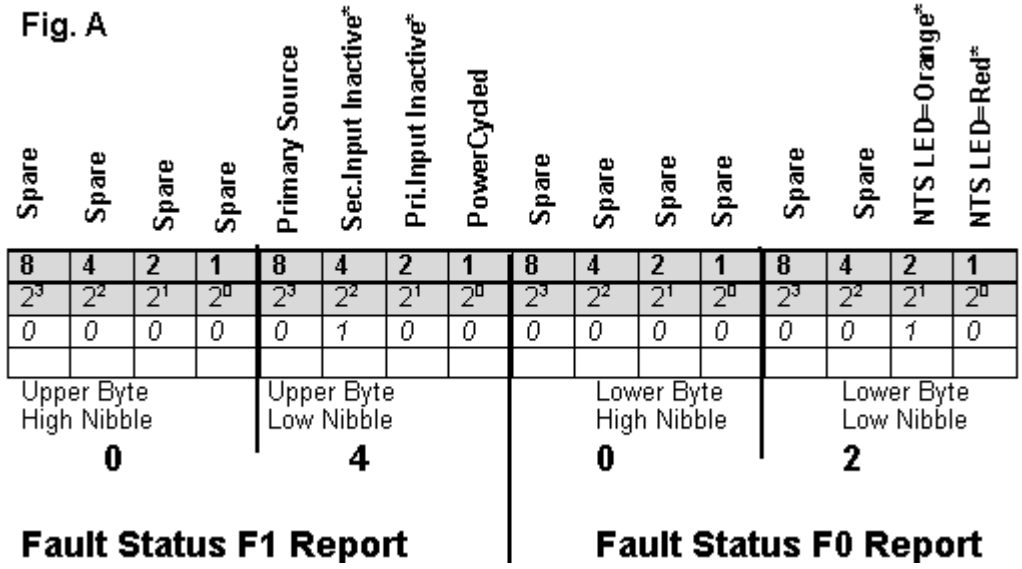
Fault Report



This card as no Status Report.

560-5151

Fault Report.



Status Report

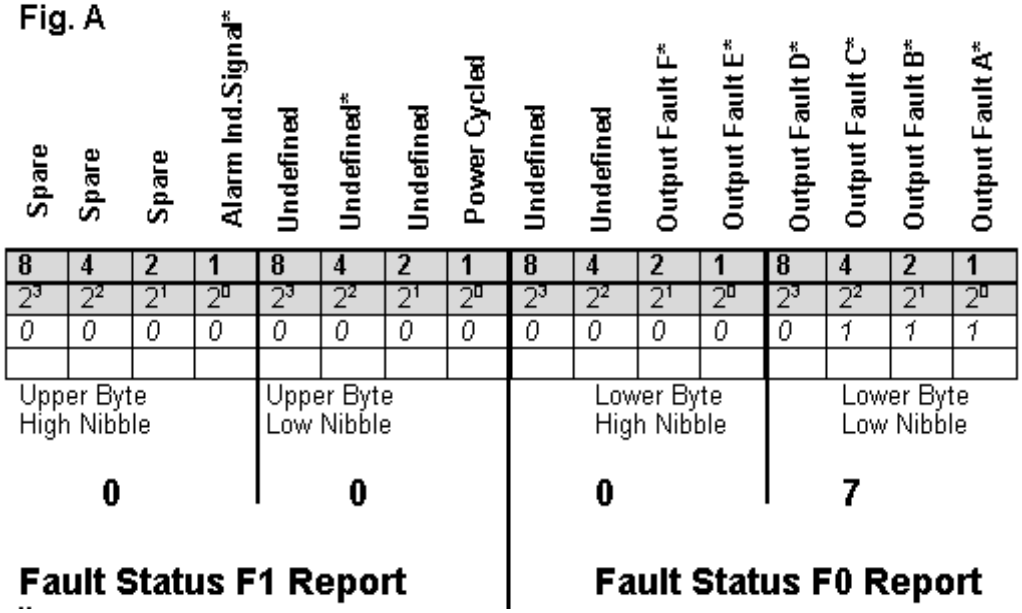
Status (S1, S0) Conversion Table FIG. B

STATUS REG 0	Bit	Bit Value	Switch	
Low	0	1	Pri. Input Enable SW2-1 ON	
Nibble	1	2	Pri. Input Enable SW2-2 ON	1
Low	2	4	Pri. Input Enable SW2-3 ON	
Byte	3	8	Pri. Input Enable SW2-4 ON	
High	4	1	Sec. Input Enable SW3-1 ON	
Nibble	5	2	Sec. Input Enable SW3-2 ON	5
Low	6	4	Sec. Input Enable SW3-3 ON	
Byte	7	8	Sec. Input Enable SW3-4 ON	
STATUS REG 1				
Low	0	1	NTS Locked	
Nibble	1	2	Green Enable SW1-2 ON	2
High	2	4	Always 0	
Byte	3	8	Always 0	
High	4	1	Delay SW4-1 ON	
Nibble	5	2	Delay SW4-2 ON	
High	6	4	Delay SW4-3 ON	0
Byte	7	8	Analog SW4-4 ON	

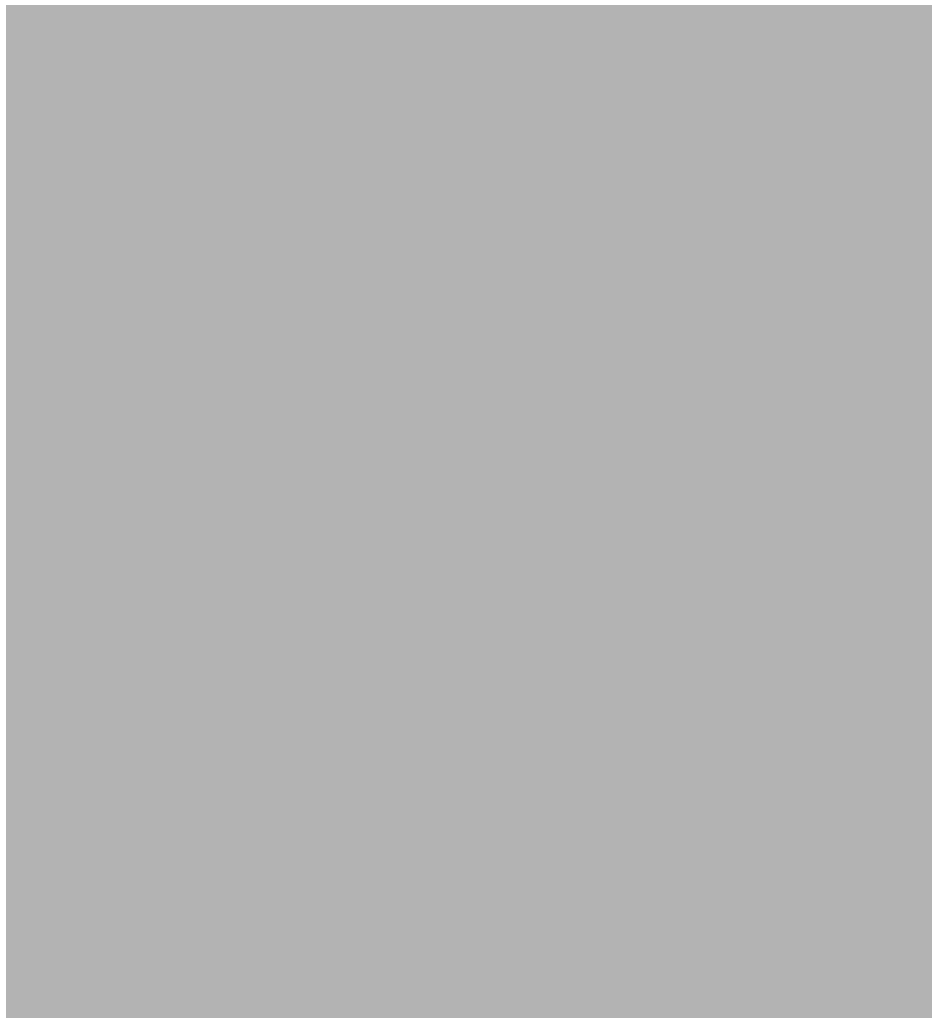
560-5153

Fault Report

Fig. A



Status Report



560-5155-1

Fault Report

Fig. A

Spare	Spare	Spare	Spare	Spare	Spare	Spare	Power Cycled	Spare	Synthesizer*	Output F*	Output E*	Output D*	Output C*	Output B*	Output A*
8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1
2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0
0	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*1*	*1*	*1*
High Byte High Nibble				High Byte Low Nibble				Low Byte High Nibble				Low Byte Low Nibble			
0				**0**				**4**				**7**			
Fault Status F1 Report								**Fault Status F0 Report**							

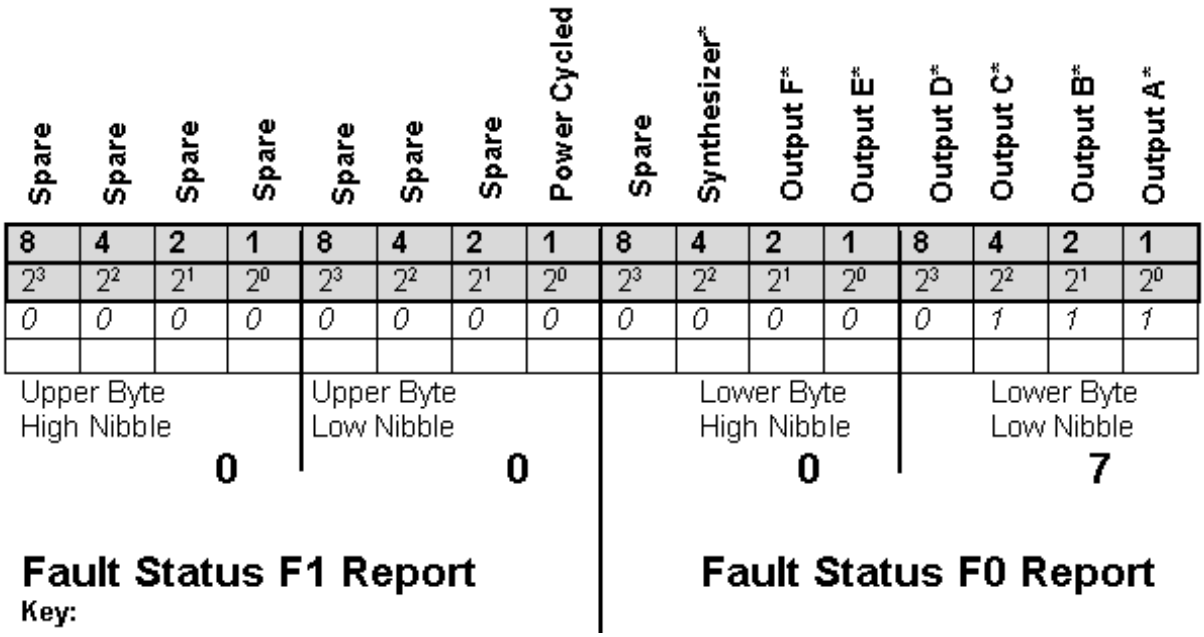
Status Report

Status (S1, S0) Conversion Table FIG. B

STATUS REG 0	Bit	Bit Value	Switch	
Low	0	1	10 MHz Output	
Nibble	1	2	5 MHz Output	2
Low	2	4	1 MHz Output	
Byte	3	8	Not Defined	
High	4	1	10 MHz Input	
Nibble	5	2	5 MHz Input	
Low	6	4	1 MHz Input	2
Nibble	7	8	Bypass Mode ON	
STATUS REG 1				
Low	0	1	Always 1 (Analog)	
Nibble	1	2	Always 0	
High	2	4	Not Defined	1
Byte	3	8	Not Defined	
High	4	1	Not Defined	
Nibble	5	2	Not Defined	
High	6	4	Not Defined	0
Byte	7	8	Not Defined	

560-5155-2

Fault Report



Status Report

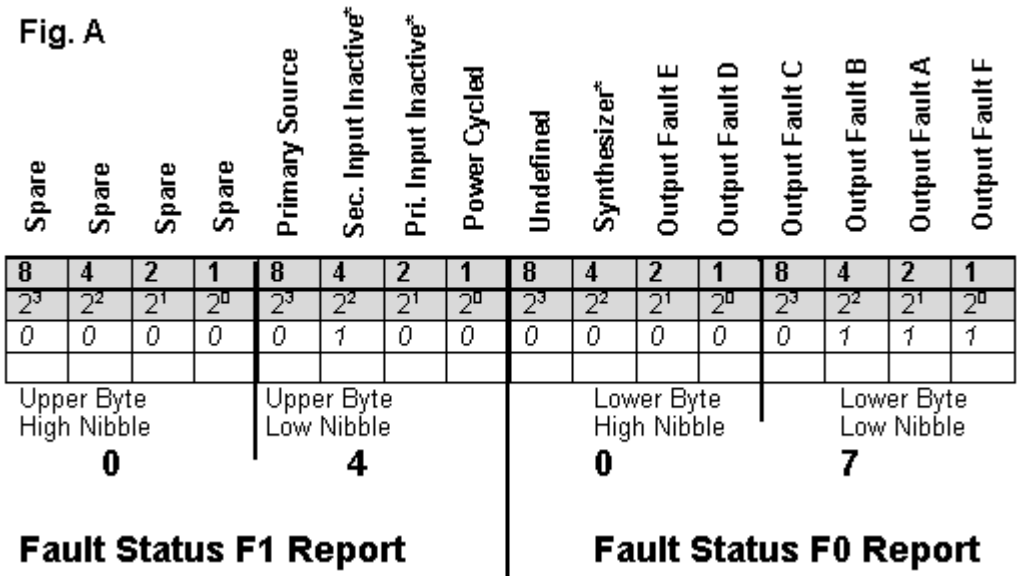
Status (S1, S0) Conversion Table **FIG. B**

STATUS REG 0	Bit	Bit Value	Switch	
Low	0	1	10 MPPS Output	
Nibble	1	2	5 MPPS Output	**1**
Low	2	4	1 MPPS Output	
Byte	3	8	Not Defined	
High	4	1	10 MHz Input	
Nibble	5	2	5 MHz Input	
Low	6	4	1 MHz Input	**2**
Byte	7	8	Bypass Mode ON	
STATUS REG 1				
Low	0	1	Always 0	
Nibble	1	2	Always 1 (TTL)	
High	2	4	Not Defined	**2**
Byte	3	8	Not Defined	
High	4	1	Not Defined	
Nibble	5	2	Not Defined	
High	6	4	Not Defined	**0**
Byte	7	8	Not Defined	

560-5170

Fault Report (next page)

Fig. A



Status Report (next page)

Status (S2, S1, S0) Conversion Table **FIG. B**

STATUS REG 0	Bit	Bit Value	Switch	
Low	0	1	Pri Input Enable SW4-1	
Nibble	1	2	Pri Input Enable SW4-2	1
Low	2	4	Pri Input Enable SW4-3	
Byte	3	8	Pri Input Enable SW4-4	
High	4	1	Sec Input Enable SW5-1	
Nibble	5	2	Sec Input Enable SW5-2	
Low	6	4	Sec Input Enable SW5-3	5
Byte	7	8	Sec Input Enable SW5-4	
STATUS REG 1				
Low	0	1	Freq Set Switch SW3-1	
Nibble	1	2	Freq Set Switch SW3-2	
High	2	4	Freq Set Switch SW3-3	0
Byte	3	8	Freq Set Switch SW3-4	
High	4	1	Freq Set Switch SW3-5	
Nibble	5	2	Freq Set Switch SW3-6	
High	6	4	Freq Set Switch SW3-7	0
Byte	7	8	Freq Set Switch SW3-8	
STATUS REG 2				
Low	0	1	Freq Set Switch SW2-1	
Nibble	1	2	Input Freq Select Switch SW2-2	2
Low	2	4	Input Freq Select Switch SW2-3	
Byte	3	8	TTL Mode SW2-4	
High	4	1	Delay timeout SW1-1	
Nibble	5	2	Delay timeout SW1-2	0
High	6	4	Delay timeout SW1-3	
Byte	7	8	Always 0	

560-5181

Fault Report

Fig. A

Spare	Spare	Spare	Spare	Primary Source	Sec. Input Inactive*	Pri.. Input Inactive*	Power Cycled	Undefined	Undefined*	Output Fault F*	Output Fault E*	Output Fault D*	Output Fault C*	Output Fault B*	Output Fault A*
8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1
2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0
0	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*1*
Upper Byte High Nibble				Upper Byte Low Nibble				Lower Byte High Nibble				Lower Byte Low Nibble			
0				**4**				**0**				**7**			
Fault Status F1 Report								**Fault Status F0 Report**							

Status Report

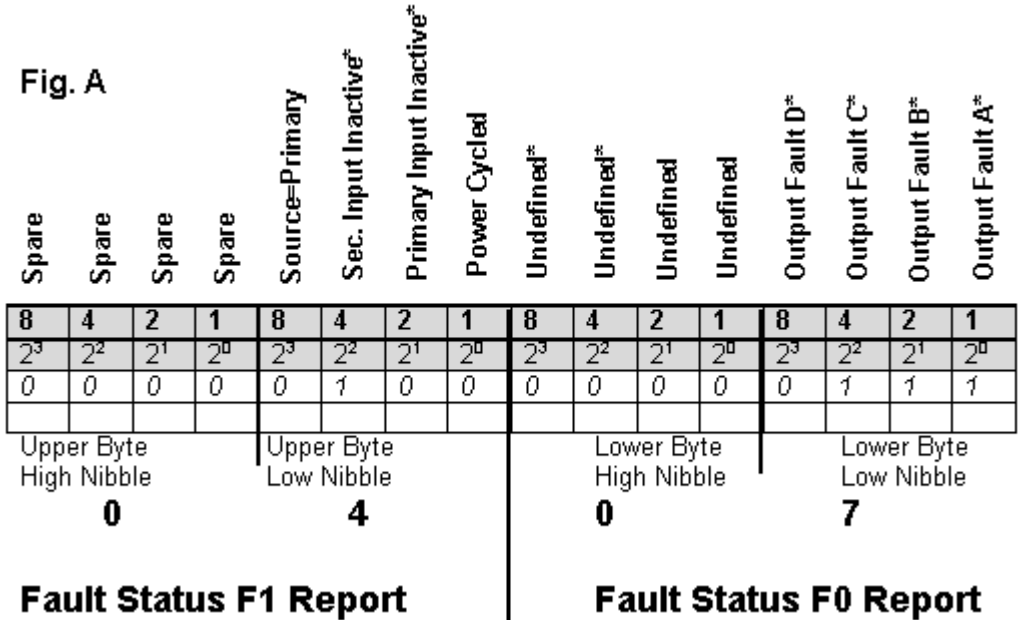
Status (S1, S0) Conversion Table **FIG. B**

STATUS REG 0	Bit	Bit Value	Switch	
Low	0	1	Pri Input Enable SW1-1	
Nibble	1	2	Pri Input Enable SW1-2	**1**
Low	2	4	Pri Input Enable SW1-3	
Byte	3	8	Pri Input Enable SW1-4	
High	4	1	Sec Input Enable SW2-1	
Nibble	5	2	Sec Input Enable SW2-2	
Low	6	4	Sec Input Enable SW2-3	**5**
Byte	7	8	Sec Input Enable SW2-4	
STATUS REG 1				
Low	0	1	Delay SW3-1	
Nibble	1	2	Delay SW3-2	
High	2	4	Delay SW3-3	**0**
Byte	3	8	Output Faults OFF	
High	4	1	Always 1 (Analog)	
Nibble	5	2	Always 0	
High	6	4	Not Defined	
Byte	7	8	Not Defined	**0**

560-5183

Fault Report

Fig. A



Status Report

STATUS REG 0	Bit	Bit Value	Switch
Low	0	1	GPS SW 2-1
Nibble	1	2	Aux Ref SW 2-2
Low	2	4	Ref/Input Mode SW 2-3
Byte	3	8	Sec. Aux. Ref. SW 2-4
High	4	1	Spare
Nibble	5	2	Spare
Low	6	4	Timing Output Enable SW 2-7
Byte	7	8	Green LED SW 2-8
STATUS REG 1			
Low	0	1	10 MHz SW 1-1
Nibble	1	2	5 MHz SW 1-2 1 MHz = SW1-1, 1-2 are on
High	2	4	DRV 0 Ref.A SW 1-3
Byte	3	8	DRV 1 Ref.B SW 1-4 DRV 1 Ref C = SW1-3, 1-4 are on
High	4	1	BRD3 SW 1-8 is OFF
Nibble	5	2	BRD2 SW 1-7 is OFF
High	6	4	BRD1 SW 1-6 is OFF
Byte	7	8	BRD0 SW 1-5 is OFF

560-5203

Status Report



Fault Report

STATUS REG 0	Bit	Bit Value	Switch
Low	0	1	GPS SW 2-1
Nibble	1	2	Aux Ref SW 2-2
Low	2	4	Ref/Input Mode SW 2-3
Byte	3	8	Sec. Aux. Ref. SW 2-4
High	4	1	Spare
Nibble	5	2	Spare
Low	6	4	Timing Output Enable SW 2-7
Byte	7	8	Green LED SW 2-8
STATUS REG 1			
Low	0	1	10 MHz SW 1-1
Nibble	1	2	5 MHz SW 1-2 1 MHz = SW1-1, 1-2 are on
High	2	4	DRV 0 Ref A SW 1-3
Byte	3	8	DRV 1 Ref B SW 1-4 DRV 1 Ref C = SW1-3, 1-4 are on
High	4	1	BRD3 SW 1-8 is OFF
Nibble	5	2	BRD2 SW 1-7 is OFF
High	6	4	BRD1 SW 1-6 is OFF
Byte	7	8	BRD0 SW 1-5 is OFF

560-5203-3W

Fault Report

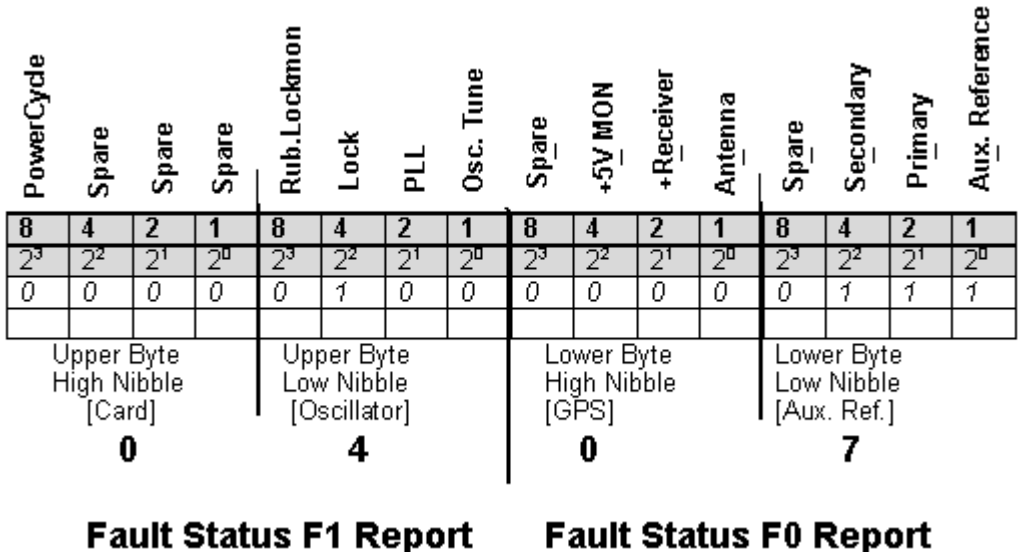


Status Report

STATUS REG 0	Bit	Bit Value	Switch
Low	0	1	GPS SW 2-1
Nibble	1	2	Aux Ref SW 2-2
Low	2	4	Ref/Input Mode SW 2-3
Byte	3	8	Sec. Aux. Ref. SW 2-4
High	4	1	Spare
Nibble	5	2	Spare
Low	6	4	Timing Output Enable SW 2-7
Byte	7	8	Green LED SW 2-8
STATUS REG 1			
Low	0	1	10 MHz SW 1-1
Nibble	1	2	5 MHz SW 1-2 1 MHz = SW1-1, 1-2 are on
High	2	4	DRV 0 Ref A SW 1-3
Byte	3	8	DRV 1 Ref B SW 1-4 DRV 1 Ref C = SW1-3, 1-4 are on
High	4	1	BRD3 SW 1-8 = OFF
Nibble	5	2	BRD2 SW 1-7 = OFF
High	6	4	BRD1 SW 1-6 = ON
Byte	7	8	BRD0 SW 1-5 = ON

560-5203-5

Fault Report



Status Report

STATUS REG 0	Bit	Bit Value	Switch
Low	0	1	GPS SW 2-1
Nibble	1	2	Aux Ref SW 2-2
Low	2	4	Ref/Input Mode SW 2-3
Byte	3	8	Sec. Aux. Ref. SW 2-4
High	4	1	Spare
Nibble	5	2	Spare
Low	6	4	Timing Output Enable SW 2-7
Byte	7	8	Green LED SW 2-8
STATUS REG 1			
Low	0	1	10 MHz SW 1-1
Nibble	1	2	5 MHz SW 1-2 1 MHz = SW1-1, 1-2 are on
High	2	4	DRV 0 Ref A SW 1-3
Byte	3	8	DRV 1 Ref B SW 1-4 DRV 1 Ref C = SW1-3, 1-4 are on
High	4	1	BRD3 SW 1-8 = OFF
Nibble	5	2	BRD2 SW 1-7 = OFF
High	6	4	BRD1 SW 1-6 = ON
Byte	7	8	BRD0 SW 1-5 = OFF

560-5208

Fault Report

Fig. A

Spare	Spare	Spare	Spare	Primary Source	Sec. Input Fault****	Pri. Input Fault****	Power Cycled	Sec. Signal Loss****	Secondary BPV***	Secondary AIS**	Sec. E1/T1 Lockout**	Pri. Signal Loss****	Primary BPV***	Primary AIS**	Pri. E1/T1 Lockout*
8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1
2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0
0	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*1*
Upper Byte High Nibble				Upper Byte Low Nibble				Lower Byte High Nibble				Lower Byte Low Nibble			
0				**4**				**0**				**7**			
Fault Status F1 Report								**Fault Status F0 Report**							

Status Report

Status (S1, S0) Conversion Table **FIG. B**

STATUS REG 0	Bit	Bit Value	Switch	
Low	0	1	SW 3-1 Enable	
Nibble	1	2	Secondary Disable SW 3-2	1
Low	2	4	SW3-3 (not used)	
Byte	3	8	SW 3-4 (not used)	
High	4	1	Ref Bus Select SQ SW 2-1	
Nibble	5	2	Ref Bus Select SQ SW 2-2	
Low	6	4	Ref Bus Select SQ SW 2-3	1
Byte	7	8	Output Inhibit SW 2-4	
STATUS REG 1				
Low	0	1	10 MHz Ref Freq SW 1-1	
Nibble	1	2	5 MHz Ref Freq SW 1-2	2
High	2	4	1 MHz Ref Freq SW 1-3	
Byte	3	8	E1/T1 Select SW 1-4	
High	4	1	Ref Bus Select Sine SW 4-6	
Nibble	5	2	Ref Bus Select Sine SW 4-7	
High	6	4	Ref Bus Select Sine SW 4-8	0
Byte	7	8	Not Defined	

560-5209

Fault Report

Fig. A

Spare	Spare	Spare	Spare	Primary Source	Sec. Input Inactive*	Pri. Input Inactive*	Power Cycled	Code Error**	Undefined*	Output Fault F*	Output Fault E*	Output Fault D*	Output Fault C*	Output Fault B*	Output Fault A*
8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1
2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0
0	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*1*
Upper Byte High Nibble				Upper Byte Low Nibble				Lower Byte High Nibble				Lower Byte Low Nibble			
0				**4**				**0**				**7**			
Fault Status F1 Report								**Fault Status F0 Report**							

Status Report.

Status (S2, S1, S0) Conversion Table

FIG. B

STATUS REG 0	Bit	Bit Value	Switch	
Low	0	1	Pri Input Enable SW6-1	
Nibble	1	2	Pri Input Enable SW6-2	7
Low	2	4	Pri Input Enable SW6-3	
Byte	3	8	Pri Input Enable SW6-4	
High	4	1	Sec Input Enable SW7-1	
Nibble	5	2	Sec Input Enable SW7-2	0
Low	6	4	Sec Input Enable SW7-3	
Byte	7	8	Sec Input Enable SW7-4	
STATUS REG 1				
Low	0	1	Delay SW8-1	
Nibble	1	2	Delay SW8-2	
High	2	4	Delay SW8-3	5
Byte	3	8	Green LED Enabled SW8-4	
High	4	1	Time Quality Out 1 SW-5**	
Nibble	5	2	Time Quality Out 2 SW-6**	
High	6	4	Input Frequency 0 SW8-7	0
Byte	7	8	Input Frequency 1 SW8-8	
STATUS REG 2				
Low	0	1	Analog Outputs SW3-8	
Nibble	1	2	TTL Outputs SW4-8	
Low	2	4	DC Mode SW10-4	2
Byte	3	8	Input Quality 2 SW10-1***	
High	4	1	Input Quality 2 SW10-2***	
Nibble	5	2	Input Quality 2 SW10-3***	
High	6	4	Not Defined	0
Byte	7	8	Not Defined	

560-5203-2

Status Report

STATUS REG 0	Bit	Bit Value	Switch
Low	0	1	GPS SW 2-1
Nibble	1	2	Aux Ref SW 2-2
Low	2	4	Ref/Input Mode SW 2-3
Byte	3	8	Sec. Aux. Ref. SW 2-4
High	4	1	Spare
Nibble	5	2	Spare
Low	6	4	Timing Output Enable SW 2-7
Byte	7	8	Green LED SW 2-8
STATUS REG 1			
Low	0	1	10 MHz SW 1-1
Nibble	1	2	5 MHz SW 1-2 1 MHz = SW1-1, 1-2 are on
High	2	4	DRV 0 Ref A SW 1-3
Byte	3	8	DRV 1 Ref B SW 1-4 DRV 1 Ref C = SW1-3, 1-4 are on
High	4	1	BRD3 SW 1-8 is OFF
Nibble	5	2	BRD2 SW 1-7 is ON
High	6	4	BRD1 SW 1-6 is OFF
Byte	7	8	BRD0 SW 1-5 is OFF

This card has no Fault Report.

560-5203-1

Status Report

STATUS REG 0	Bit	Bit Value	Switch
Low	0	1	GPS SW 2-1
Nibble	1	2	Aux Ref SW 2-2
Low	2	4	Ref/Input Mode SW 2-3
Byte	3	8	Sec. Aux. Ref. SW 2-4
High	4	1	Spare
Nibble	5	2	Spare
Low	6	4	Timing Output Enable SW 2-7
Byte	7	8	Green LED SW 2-8
STATUS REG 1			
Low	0	1	FREQ 0
Nibble	1	2	FREQ 1
High	2	4	DRV 0
Byte	3	8	DRV 1
High	4	1	BRD3 SW 1-8 = OFF
Nibble	5	2	BRD2 SW 1-7 = OFF
High	6	4	BRD1 SW 1-6 = OFF
Byte	7	8	BRD0 SW 1-5 = ON

This card has no Fault Report.

560-5203A

Status Report

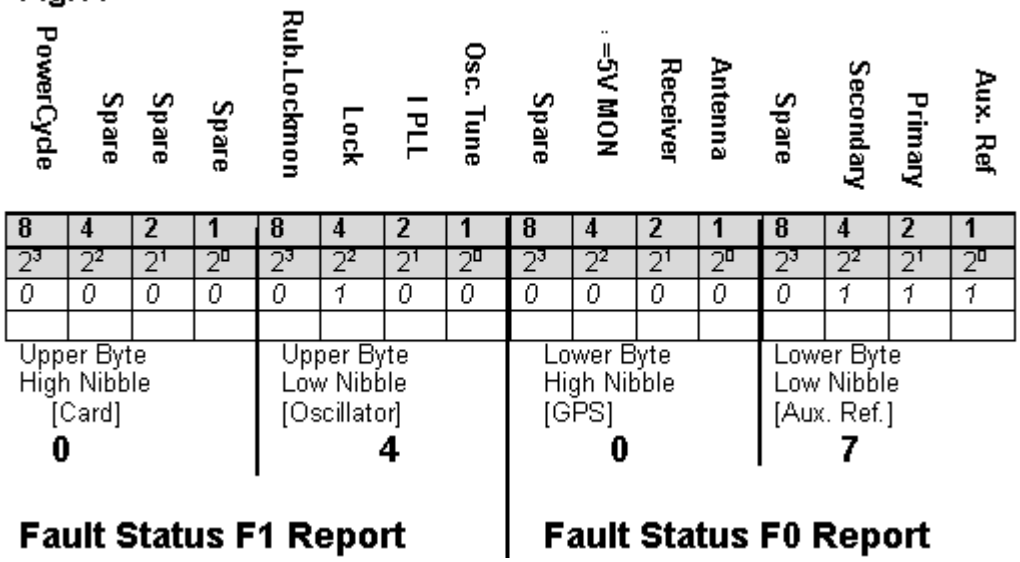
STATUS REG 0	Bit	Bit Value	Switch
Low	0	1	GPS SW 2-1
Nibble	1	2	Aux Ref SW 2-2
Low	2	4	Ref/Input Mode SW 2-3
Byte	3	8	Sec. Aux. Ref. SW 2-4
High	4	1	Spare
Nibble	5	2	Spare
Low	6	4	Timing Output Enable SW 2-7
Byte	7	8	Green LED SW 2-8
STATUS REG 1			
Low	0	1	10 MHz SW 1-1
Nibble	1	2	5 MHz SW 1-2 1 MHz = SW1-1, 1-2 are on
High	2	4	DRV 0 Ref A SW 1-3
Byte	3	8	DRV 1 Ref B SW 1-4 DRV 1 Ref C = SW1-3, 1-4 are on
High	4	1	BRD3 SW 1-8 is ON
Nibble	5	2	BRD2 SW 1-7 is ON
High	6	4	BRD1 SW 1-6 is OFF
Byte	7	8	BRD0 SW 1-5 is OFF
STATUS REG 2			
Low	0	1	Osc. locked to GPS
Nibble	1	2	Osc. locked to GPS for first time
Low	2	4	GPS (1)/AUX(0)
Byte	3	8	Not Used

This card has no Fault Report.

560-5308

Status Report

Fig. A



Fault Report

STATUS REG 0	Bit	Bit Value	Switch
Low	0	1	GPS SW 2-1
Nibble	1	2	Aux Ref SW 2-2
Low	2	4	Ref/Input Mode SW 2-3
Byte	3	8	Sec. Aux. Ref. SW 2-4
High	4	1	Spare
Nibble	5	2	Spare
Low	6	4	Timing Output Enable SW 2-7
Byte	7	8	Green LED SW 2-8
STATUS REG 1			
Low	0	1	10 MHz SW 1-1
Nibble	1	2	5 MHz SW 1-2 1 MHz = SW1-1, 1-2 are on
High	2	4	DRV 0 Ref A SW 1-3
Byte	3	8	DRV 1 Ref B SW 1-4 DRV 1 Ref C = SW1-3, 1-4 are on
High	4	1	BRD3 SW 1-8 is OFF
Nibble	5	2	BRD2 SW 1-7 is OFF
High	6	4	BRD1 SW 1-6 is OFF
Byte	7	8	BRD0 SW 1-5 is OFF

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56K NIC Release 1 Web Page Summary

The following table summarizes the boards that appear on specific web pages. The web pages are identified in the "Web Page Title" and "HTML File Name" columns. The boards associated with each page are identified in the "56000 Boards associated to this web page" column.

The first two pages, "56000 Current Configuration" and "56000 Change Configuration", show the boards grouped by type. For convenience, each type is color coded red or blue. This information is convenient, but not critical to using this table. The types are grouped numerically by the first card in the group. The names of the types are further identified in rows # three and below.

#	**Web Page Title**	**56000 Boards associated to this web page**	**HTML File Name**
1	56000 Current Configuration	Display the selected 56000 configuration information via NIC List PN (w/ hyperlink to) the following boards ▪ 5153 ▪ 5306 ▪ 5155-1 ▪ 5155-2 ▪ 5304-1 ▪ 5304-2 ▪ 5170CPU ▪ 5303-0 ▪ 5303-1 ▪ 5303-2 ▪ 5181-1 ▪ 5181-2 ▪ 5307-1 ▪ 5307-2 ▪ 5203-0 ▪ 5203-1 ▪ 5203-2 ▪ 5203-3 ▪ 5203-3W ▪ 5209 ▪ 5305 ▪ 5287 ▪ 5308-1 ▪ 5308-2 ▪ 5308-3 ▪ 5308-4 ▪ 5308-5 ▪ 5308-6	current

2	56000 Change Configuration	Display and allow changes of the selected 56000 configuration information via NIC Listing PN (w/ hyperlink to) the following boards ▪ 5170CPU ▪ 5303-0 ▪ 5303-1 ▪ 5303-2 ▪ 5287 ▪ 5308-4 ▪ 5308-5 ▪ 5308-6	change
3	56000 E1/T1 Configuration	Serves the following boards (display) ▪ 5153 ▪ 5306	current_slot_5153
4	56000 1/5/10MHz Configuration	Serves the following boards (display) ▪ 5155-1 ▪ 5155-2 ▪ 5304-1 ▪ 5304-2	current_slot_5155
5	56000 N.8 Configuration	Serves the following boards (display) ▪ 5170CPU ▪ 5303-0 ▪ 5303-1 ▪ 5303-2	current_slot_5170
6	56000 N.8 Change Configuration	Serves the following boards (display & change) ▪ 5170CPU ▪ 5303-0 ▪ 5303-1 ▪ 5303-2	change_slot_5170
7	56000 PRI/SEC Switch Driver Configuration	Serves the following boards (display) ▪ 5181-1 ▪ 5181-2 ▪ 5307-1 ▪ 5307-2	current_slot_5181
8	56000 Oscillator Configuration (1)	Serves the following boards (display) ▪ 5203-0 ▪ 5203-1 ▪ 5203-2 ▪ 5203-3 ▪ 5203-3W	current_slot_5203

9	56000 IRIG-B Synchronized Generator Configuration	Serves the following boards (display) ▪ 5209 ▪ 5305	current_slot_5209
10	56000 N.1 Configuration	Serves the following board (display) ▪ 5287	current_slot_5287
11	56000 N.1 Change Configuration	Serves the following board (display & change) ▪ 5287	change_slot_5287
12	56000 Oscillator Configuration (2)	Serves the following boards (display) ▪ 5308-1 ▪ 5305-2 ▪ 5308-3	current_slot_5308_123
13	56000 Oscillator/GPS Configuration	Serves the following boards (display) ▪ 5308-4 ▪ 5308-5 ▪ 5308-6	current_slot_5308_456
14	56000 Oscillator/GPS Change Configuration	Serves the following boards (display & change) ▪ 5308-4 ▪ 5308-5 ▪ 5308-6	change_slot_5308_456
15	56000 GPS Information	Serves the following boards (display) ▪ 5308-4 ▪ 5308-5 ▪ 5308-6	current_GPS_info
16	56000 Change Login		change_login
17	56000 Select Operator Name		select_operator_name
18	56000 Fault Report		Fault_report
19	56000 Reference Source Fault Status		Fault_status
20	56000 Homepage		Index
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