CHAPTER 4

Troubleshooting

This chapter describes periodic maintenance procedures and troubleshooting procedures. For replacement procedures, see Chapter 5, “Repair and Replacement.”

Note The name IGX refers to the single-shelf IGX 16 and the two-shelf IGX 32. When necessary, the text specifies IGX 16 or IGX 32 to differentiate between systems.

The IGX operating system software does most of the IGX monitoring and maintenance. Preventive maintenance of the IGX hardware is minimal, as follows:

- Check the LEDs on AC power supplies after adding new cards to make sure the new cards not put an excessive load on the current power supplies.

Preventive Maintenance

The sections that follow provide preventive maintenance information on the IGX 16/32.

Checking the Power Supplies

IGX power supply voltages cannot be directly checked. If a problem exists with one of the supplies, either one or both the DC and AC LEDs turns off. Refer to the chapter on repair and replacement for instructions on reseating or replacing an AC power supply.

Troubleshooting the IGX

This section describes elementary troubleshooting procedures and briefly describes the commands used when troubleshooting an IGX node. (These commands are described in detail in the *Command Reference*.) This is not an exhaustive set of procedures and does not take into account any of the diagnostic or network tools available to troubleshoot the IGX.

Caution Do not perform any disruptive tests or repairs to the IGX without first calling the StrataCom ISC so that ISC personnel can help isolate the fault and provide repair information. Within the United States, call 1-800-767-4479, 6:00 AM to 6:00 PM, Pacific Time, Monday through Friday. Outside the U.S., call 1-(408)-292-2500).

This section contains the following topics:

- Troubleshooting tables for the IGX.
- System hardware status (configuring and displaying), including circuit cards, system buses, and power supplies.
- CGA relay and forced yellow signal group channel additions.
- Channel loopback and connection tests.
- Alarm thresholds for statistical line errors, and line error display reporting.
- External test equipment, such as a BERT.

General Troubleshooting Procedures

The IGX regularly runs self-tests to ensure proper function. When the IGX finds an error condition that affects its operation, it downs the affected card or line. It then selects a standby card or redundant line if one is available (in the non-redundant system no alternate cards are available for the CVM, NTM, BTM, BC-T3, BC-E3, ARM, BC-E1, BC-T1, HDM, SDI, LDM, LDI and NPM, so the system goes down if a failure occurs on any of these cards.)

Caution A lit FAIL LED on a card indicates that an error was detected. Try resetting the light with the **resetcd f** command. If the FAIL LED lights up again, use Table 4-1 to find the cause and call the ISC to obtain information on isolating the problem and possibly replacing a component. Refer to Appendix D for information on how to return defective components.

Table 4-1 General Troubleshooting

Symptom	Probable Cause	Remedy
1. No indicators on IGX boards lit-console screen blank.	1. IGX power switch switched off.	1. Switch on power switch.
	2. IGX breaker tripped	2. Switch off, then switch on the power switch to reset the breaker. Check to see if any overload condition exists (shorted connections, crow-barred power supplies).
	3. IGX power cord dislodged from plug.	3. Reconnect power cord into 208 or 240 vac receptacle.
	4. Power supplies not functioning.	4. Replace power supplies
2. Front card FAIL indicator lit	1. Front card experienced an error: • CVM card • NPM card • ARM card • NTM card • HDM card • LDM card • FRM card	1. Indicates an error occurred. Resetting the card with the **resetcd f** command is suggested first. If the LED comes on again, call the ISC. NOTE: If an NPM fails in a non-redundant IGX system the system must be rebooted.
3. Front card indicator lit—replacement card does not fix problem.	1. Defective backplane is possible.	1. If a new card does not fix problem, the backplane may be suspect (very uncommon failure). Contact the StrataCom ISC.

Symptom	Probable Cause	Remedy
4. SDI card FAIL indicator lit.	1. SDI card failed: • SDI (RS232) card • SDI (RS449) card • SDI (V.35) card	1. Indicates an error occurred. Check alarm status of card. Reseat card. Resetting the card with the **resetcd f** command is suggested first. If the LED comes on again, call the ISC.
5. BTM, ARM, CVM, LDI, BC-E1 or BC-T1 FAIL indicator lit-replacement card does not fix problem.	1. Defective backplane is possible (very uncommon).	1. If new card does not fix the problem, contact Stratacom ISC. NOTE: All cards plug into the system backplane, and if this backplane is defective, it could cause a fault to appear on any card.
6. Power Supply AC or DC Okay LEDs off.	1. Possible power supply defect.	1. Reseat supply per instructions in Chapter 5, "Repair and Replacement." Remove and replace power supply if defective.
	2. SCM wiring or card defective.	1. If power supplies output check out, then SCM wiring or card is suspect.
		2. Make sure the plug connection to the SCM card is secure; tighten if it is not.
		3. If the plug connection is secure and the Power Supply Monitor FAIL indicator is still lit, then remove and replace the SCM card.
7. Command line display incorrectly shows wrong IGX system type.	1. Jumper switch W6 in wrong position. (See installation chapter)	1. To indicate an IGX 16, the jumper must be in place. To indicate an IGX 32, the jumper must be absent.
	2. SCM circuitry that reads W6 setting may be defective.	1. Verify SCM circuitry with a known good SCM.
7. Neither of the Power Supply "Okay" LEDs are lit.	1. Defective fan or fans in cooling assembly is allowing the temperature in the enclosure to rise above 40° C.	1. Verify fan tray fans are working. If not, replace tray according.
	2. Defective fan in power supply allowing the power supply temperatures to rise above 40° C.	1. If the fan assembly is functioning correctly, then the power supply assembly fans are suspect.
		2. If the system cooling fan assembly is functioning correctly, then a power supply fan is suspect. Remove cover over power supplies to determine if fan is rotating. Replacing a power supply fan is not a field repair. Replace the supply.
		3. If power supply fans are functioning, then the power supply temperature sensor is defective. Remove and replace the temperature sensor
	3. Defective SCM card	1. If both the enclosure fan assembly and the power supply fans are working correctly (see symptom 6, probable causes 1, 2 and 3), then the SCM card is suspect.
		2. Remove and replace the SCM card.

Symptom	Probable Cause	Remedy
8. Console screen blank, IGX indicator lights lit.	1. Control terminal switched off.	1. Switch on the control terminal.
	2. Control terminal power cord disconnected.	2. Reconnect the control terminal power cord to 208/240 vac power outlet.
	3. RS-232 cable loose or disconnected from the Control Terminal port on the SCM, or from the control terminal.	3. Reconnect the RS-232 cable to Control Terminal port on the SCM back card or to the control terminal itself.
	4. Control terminal malfunctioning.	4. Refer to the control terminal manufacturer's manual.
9. Printer not functioning	1. Printer switched off.	1. Switch on the printer.
	2. Printer out of paper.	2. Renew the paper supply.
	3. Printer power cord disconnected.	3. Reconnect the printer cord to 208/240 vac power outlet.
	4. RS-232 cable loose or disconnected from the Control Terminal port on the SCM, or from the printer.	4. Reconnect RS-232 cable to the Control Terminal port on the SCM back card or to the printer itself.
	5. Printer malfunctioning.	5. Refer to the printer manufacturer's manual.
10. Modem not functioning.	1. Modem switched off	1. Switch on the modem.
	2. Modem power cord disconnected.	2. Reconnect modem power cord.
	3. RS-232 cable loose or disconnected from the Control Terminal port on the SCM, or from the modem.	3. Reconnect the RS-232 cable to the Control Terminal port on the SCM back card or the modem itself.
	4. Telephone hookup cable disconnected.	4. Reconnect the telephone hookup cable.
	5. Modem malfunctioning.	5. Refer to the modem manufacturer's manual.
	6. DIP switches not set correctly.	6. Refer to the modem manufacturer's manual.
11. DFM is not functional.	1. DFM has been not been enabled by Stratacom.	1. Contact the ISC.
12. DFM has been enabled but still does not function.	1. DFM only runs on speeds up to 64Kbps.	1. Readjust the speed.
13. Background noise or music sounds choppy.	1. VAD problem.-VDP needs sensitivity adjustment	1. Contact the ISC.
14. High speed modem drops to low speed.	1. ADPCM is taking over.	1. Contact the ISC.
15. Bundled (Frame Relay) connections have failed.	1. One or more bundled connections have failed.	1. Contact the ISC.

Troubleshooting the IGX Console Alarms

The initial mode of troubleshooting the IGX uses the console alarms displayed on the console screen. Table 4-2 provides you with a procedure for isolating the alarms and thereby isolating the fault. Any repair to the IGX must be performed by StrataCom-qualified personnel.

Caution When using Table 4-2 for troubleshooting, call the StrataCom ISC before performing any disruptive testing, or attempting to repair the IGX, to ensure that you have isolated the correct problem area, and also to enable ISC to provide you with assistance in performing the necessary procedures.

Note Refer to Appendix D for information on how to return defective components.

Table 4-2 Troubleshooting the IGX Console Alarms

Symptom	Probable Cause	Remedy
MAJOR/MINOR alarm flashing on affected console screen.	• Failed connection • Failed circuit lines • Failed trunks • Failed cards • Unreachable node • High error rate on circuit lines or trunks.	1. Use **dspnw** command to identify the node(s).
		2. Use **vt** command to place yourself at the affected node, and use **dspalms** to identify the alarm type.
		a. If the alarm display indicates a **failed connection**, go to probable cause 1.
		b. If the alarm display indicates a **failed circuit line**, go to probable cause 2.
		c. If the alarm display indicates a **failed trunk**, go to probable cause 3.
		d. If the alarm display indicates a **failed card**, go to probable cause 4.
		e. If the alarm display indicates an unreachable node, go to probable cause 5.
	1. Failed connection.	1. Use the **dspcons** command to identify which connections have failed and to determine the remote end connection assignments.
		2. Use the **dsplog** command to determine the cause of failure of the connections. These failures could consist of failed circuit lines, trunks cards, or clock over speeds.
		a. If the connections have failed due to a circuit line failure, go to probable cause 2.
		b. If the connections have failed due to a packet line failure, go to probable cause 3.

Symptom	Probable Cause		Remedy	
				c. If the connections have failed due to a card failure, go to probable cause 4.
				d. If connections have failed due to a clock over speed condition, go to probable cause 5.
	2.	Failed circuit line.	1.	Use the **dspclns** command to identify the circuit line number and failure type.
				a. If the failure is a circuit line local CGA (no pulses received at the local end of circuit line) go to probable cause 2a.
				b. If the failure is a circuit line remote CGA (no pulses received at the remote end of circuit line), go to probable cause 2B.
				c. If the failure is circuit line frame slips (indicating excessive frame slips on the T1 between the IGX and the PBX) go to probable cause 2C.
				d. If the failure is circuit line bipolar errors (indicating excessive bipolar errors on this circuit line) go to probable cause 2D.
	2A	Circuit line local CGA.	1.	Use the **dsplog** command to determine date, time of day, and the duration of the CGA alarm.
			2.	Determine if the PBX T1 subrate or the PBX E1 interface went down at the time the CGA alarm was logged by the IGX.
			3.	Check cabling between IGX and the PBX and make necessary repairs if defective.
			4.	Make a note of the steps taken and call StrataCom ISC center.
	2B	Circuit line remote CGA.	1.	Refer to remedies for probable cause 2A.
	2.	Circuit line frame slips.	1.	Use the **dsplog** command to determine date, time of day, and duration of the frame slip alarm. Also determine if the clock source for this line has changed due to line failure in the network.
			2.	Use the **dspclnerrs** command to quantify frame slips and rate information.
			3.	Use the **dspclnhist** command to obtain historical information on frame slips.
			4.	Use the **dspcurclk** command to identify the current clock source and path to the current clock source.
			5.	Use the **clrclnalm** command to clear the circuit line alarms
			6.	Make a note of the steps taken, and call StrataCom ISC.
	2	Circuit bipolar errors.	1.	Use the **dsplog** command to determine when the bipolar error threshold was exceeded, and the duration of the alarm.

Symptom	Probable Cause		Remedy	
			2.	Use the **dspclnerrs** command to quantify the bipolar errors.
			3.	Use the **dspclnhist** command to obtain historical information on bipolar errors.
			4.	Check cabling between IGX and the PBX for loose connections, and tighten it if it is loose.
			5.	Use the **clrclnalm** command to clear line alarms.
			6.	Make a note of the steps taken, and call StrataCom ISC.
	3.	Failed trunk.	1.	Use the **dsptrks** command to identify the remote end node name, trunk numbers at each end, and the type of failure.
				a. If the display shows a communication failure, go to probable cause 3A.
				b. If the display shows a local CGA, go to probable cause 3B.
				c. If the display shows a remote CGA, go to probable cause 3C.
				d. If the display shows a bipolar error, go to probable cause 3D.
				e. If the display shows a frame slip error, go to probable cause 3E.
				f. If the display shows an out-of-frame error, go to probable cause 3F.
				g. If the display shows a time-stamped packet drop error, go to probable cause 3G.
				h. If the display shows a non time-stamped packet drop error, go to probable cause 3H.
				i. If the display shows a loop-back, go to probable cause 3I.
	3A	Communication Failure.	1.	Use the **dsplog** command to determine when the communication failure or CGA occurred, and identify connections which may have failed due to lack of bandwidth on an alternate route.
			2.	Use the **dsptrkerrs** command at each end of the packet line to quantify errors, and determine if they are unidirectional or bidirectional.
			3.	Call telephone carrier and request span testing. Ask the carrier to perform BER tests using multiple test patterns, including standard quasi, all 1, and 3 and 24 patterns.
			4.	Make a note of the steps taken, and call StrataCom ISC.
	3B	Local CGA— indicates no pulses at the local end of the trunk.	1.	Refer to probable cause 3A remedies.

Symptom	Probable Cause		Remedy	
	3C	Remote CGA—indicates no pulses at the remote end of the trunk.	1.	Refer to probable cause 3A remedies
	3D	Bipolar errors—indicates excessive bipolar errors on this trunk.	1.	Use the **dsplog** command to determine the date, time of day, and the duration of the alarm.
			2.	Use the **dsptrkerrs** command at each end of the trunk to quantify errors, and determine whether they are unidirectional, or bi-directional.
			3.	Use the **dsptrkhist** command at each end of the trunk to collect historical information on line errors.
			4.	Use the **clrtrkalm** command to clear trunk alarms.
			5.	Call StrataCom ISC for assistance. StrataCom will monitor line errors, and may advise disruptive testing to be scheduled with telephone carrier.
			6.	Call telephone carrier and request span testing. Ask the carrier to perform BER tests using multiple test patterns, including standard quasi, all 1, and 3 and 24 patterns.
			7.	If telephone carrier is unable to isolate the problem on the span, contact StrataCom ISC for assistance.
	3E	Frame slip errors indicates excessive frame slips on this trunk	1.	Refer to probable cause 3D remedies.
	3F.	Out-of-frame errors - indicates excessive out-of-frame errors on the trunk.	1.	Refer to probable cause 3D remedies
	3G	Time-stamped packet drops -indicates time-stamped packet drops have exceeded the threshold for generating an alarm.	1.	Use the **dsplog** command to determine when the dropped packet alarm threshold was exceeded, and determine the duration of the alarm.
			2.	Use the **dspload** command alarm. to determine the current loading of this trunk.
			3.	Make a note of steps taken and call StrataCom ISC. Refer to probable cause 3G remedies.
	3H	Non time-stamped packet drops - indicates that non time -stamped packet drops have exceeded the threshold for generating an alarm.		Refer to probable cause 3G remedies.
	3I.	Loop-back.	1.	Determine if company personnel are performing span tests with CSU loop-backs, demarc, or DSX panel.

Symptom	Probable Cause	Remedy
		2. If company personnel are performing loop-back tests, ask them to indicate when they have completed testing, and monitor the system to ensure that the loop-back indication disappears when testing is complete.
		3. If company personnel are not performing loop-back tests, telephone carrier most likely has the E1 span in loop-back mode.
		4. Call telephone carrier to verify that they are testing the E1 span, and ask them to indicate when they have completed their tests. Monitor the system to ensure that the loop-back indication disappears when testing is completed.
		5. Make a note of the alarm steps taken, and call StrataCom ISC.
	4. Failed cards—indicates the number of cards that have failed.	1. Use the **dspcds** command to determine which card has failed, along with its status (active or standby).
		2. Use the **dsplog** command to determine time of day the card failed and whether or not any connections using this card are also in a failed condition.
		3. If the failed card is an HDM or LDM card, use the **dspbob** command at each end of the connection using this card to verify that data is passing. For the CDP use the command **dspchstats**.
		4. If a card has failed, make a note of the steps taken, and call StrataCom ISC.
	5. Unreachable node—shows the number of unreachable nodes in the network.	1. At any node, use the **dsplog** command to determine the date and time of day that the node became unreachable. A node is usually unreachable due to a trunk failure or a power outage.
		2. Contact personnel at that node to determine whether or not there was a power failure at the time logged by the IGX.
		3. If there was a power failure, check that NPM comes up and run diagnostics.
		4. If there was not a power failure, call StrataCom ISC.
	6. Clock Overspeed.	1. Use the **dspbob** command to determine the incoming baud rate for this connection.
		2. Use the **dspcon** command to verify that the console incoming baud rate is the same as the configured baud rate.
		3. Reconfigure the incoming baud rate to match the configured baud rate.
		4. Make a note of the steps taken, and call the ISC.

Displaying a Summary of Alarms

The first step in troubleshooting the IGX is to check the condition of the system. This is done by displaying alarm conditions throughout the system. In order to see a summary of all of the alarms present on an IGX node, use the **dspalms** (display current node alarms) command is used. The alarms summary includes the following:

- Number of failed connections.
- Number of major and minor alarms.
- Number of failed cards.
- Power monitor failures.
- Bus failures (either failed or needs diagnostics).
- Number of alarms on other nodes in the network.
- Number of unreachable nodes in the network.

Note The **dspalms** command cannot be included in a job.

To display alarms, enter **dspalms**. If the display indicates a failure, refer to the commands in Table 4-3 to help isolate the fault.

Table 4-3 Fault Isolation Commands

Failure	Diagnostic Commands
Connections	**dspcons** (display connections)
Line Alarms	**dspclns** (display circuit lines)
	dsptrks (display trunks)
Cards	**dspcds** (display cards)
Power Monitor/Fans	**dsppwr** (display power supply status)
Remote Node	**dspnw** (display network)
Unreachable Nodes	**dspnw** (display network)
Remote Node Alarms	**dspnw** (display network)

Displaying the Status of Cards

When a card indicates a failed condition on the alarm summary screen, use the **dspcds** command to display the status of the cards on a node. The information displayed for each card type includes the card slot number, software revision level, and the status of the card. Note that the **dspcds** command cannot be included in a job.

Note If **dspcds** or other command incorrectly states the system type (for example, stating that an IGX 16 is an IGX 32), check the jumper switch W6 on the SCM. A jumpered W6 indicates an IGX 16. An open W6 indicates an IGX 32. Chapter 1, “Introduction,” documents this aspect of the SCM.

All possible status descriptions for each card type are listed in Table 4-4.

Table 4-4 Card Status

Card Type	Status	Description
All card types (including CVM)	Active	Active card
	Active—F	Active card with non terminal failure.
	Standby	Standby card
	Standby—F	Standby card with non terminal failure.
	Standby—T	Standby card performing diagnostics.
	Standby—F–T	Standby card with non terminal failure performing diagnostics.
	Failed	Card with terminal failure.
	Unavailable	Card is present but it may be in any of the following states:
		1. The node does not recognize the card (may need to be reseated).
		2. The card is running diagnostics.
	Down	Downed card.
	Empty	No card in that slot.
	Active—T	Active card performing diagnostics.
NPM	Same status as for all card types, plus:	
	Updating	Standby NPM downloading the network configuration from an active NPM.
		NOTE: Red FAIL LED flashes during updating.
	Cleared	NPM is preparing to become active.
	Loading Software	There are downloader commands that appear when the system is down- loading software to the NPM.

Note Cards with an **F** status (non terminal failure) are activated only when necessary (for example, when there is no card of that type available). Cards with a failed status are never activated.

To display cards enter the following command:

dspcds <RET>

Refer to the *Command Reference* for more information.

User-Initiated Tests

Several user-tests are available to diagnose the state of the IGX. The commands for activating these tests are as follows:

- **tstcon** for voice connections
- **tstcon** for data connections
- **tstport** for data and frame relay ports

For detailed information on these commands, see the troubleshooting chapter in the *Command Reference*.

Loopback Tests

Loopback tests are available to help diagnose the state of the IGX system. The commands for activating these tests are as follows:

- CVM/NTM for implicit internal loopback.
- Voice: **addloclp, addrmtlp**
- Data: **addloclp, addrmtlp**
- Frame relay: **addloclp**

For detailed information on these commands, see the *Command Reference*.

Card Testing with External Test Equipment

The HDM/SDI or LDM/LDI card set can be tested as a pair at the local node using external test equipment such as a Bit Error Rate Tester (BERT). This can be useful in isolating “dribbling” error rates to either the cards, the frame relay data input, or the transmission facility. This test checks the data path from the electrical interface at the port through the card set to the CELLBUS in both directions of transmission.

Note This is a disruptive test. Notify your network administrator before performing this test.

To perform this test, proceed as follows:

Step 1 Disconnect the data cable connection to the SDI or LDI and connect the BERT in its place.

Step 2 Set up an internal loopback on the frame relay port to be tested using the Add Local Loopback (**addloclp**) command.

Step 3 Turn on the BERT, make sure it indicates circuit continuity, and observe the indicated error rate.

Step 4 If there are any errors indicated, first replace the back card and retest. If the errors remain, then replace the front card and retest.

Step 5 When the test is complete, disconnect the BERT and reconnect the data cable. Release the local loopback by using the Delete Loopback (**dellp**).

Step 6 Repeat at the node at the other end of the connection if necessary.