B

Basic Troubleshooting Guidelines

The following information is provided to allow some basic troubleshooting of the equipment in a digital Paging System, such as the 510/520ACS or 1x00ACS based systems. This includes components such as digital mic stations, Titan digital power amplifiers and other Titan peripheral components. These basic actions could/should be performed before calling the support contractor or equipment vendor technical support. In the event of one-time or very infrequent problems, this may be all that is required.

However, for repeat problems the technician may want to escalate the problem to the available technical support resources for further investigation. If possible, this escalation should be done without taking corrective actions first (e.g., don't reboot problem equipment, but leave it in a failed/faulted state).

Basic Principles

When an off-normal condition occurs, the most basic externally observable issues to investigate are:

1. Does the unit have power?
2. Does the unit appear to be operating (internal firmware running)?
3. Is the unit able to communicate over the network?

Some of the steps described below amount to the various ways to determine the above observations for the different types of equipment encountered. Other actions to further diagnose or remediate the problem are also presented.

The starting point for a problem investigation could either be a report from a user (e.g., mic station doesn't work or audio not heard in an area) or a fault reported by the system supervision portion of the paging system. In the information below, the text of fault reports that might be observed and the internal type numbers are noted.

Note: All of these investigations assume the equipment had been working and then went to a non-working or problem state. If instead, somebody recently reconfigured a device, then the root cause of the problem could be due to a configuration error, such as a bad IP address or subnet mask, or the wrong mic ID or group ID in a mic station. Investigating configuration errors are not covered in this document.

Mic Station Control Line Failure (fault type 2)

This is an indication from the Announcement Control System (ACS) that it cannot communicate with the indicated microphone station. The checks that can be done and possible remedial actions to further diagnose this condition are listed in Table B-1 below.

Table B-1: Mic Station Communication Checks/Actions

Check	Check Procedure	Remedy Actions
Microphone Station is Powered Up	IED528: Display is lit. Press any key to take microphone station out of power saver mode, first. IED524: Green power indicator in upper left corner is lit.	If PoE powered: Check network connection to the unit If non-PoE powered: Check that electrical adapter is connected and plugged into hot power source.
Unit is Operating	IED528: Press and hold both the 1 and 3 keys on the keypad. Microphone station should display a yellow background status window. Press the [Enter] key to go back to the normal screen. IED524: Press any key. Busy/Ready LEDs should light.	If no response, reboot the microphone station, preferably by removing power (e.g., network cable if PoE), waiting a few seconds and re-applying power. Wait for the microphone station to boot up and then re-test.* *(see note below)*
Unit is Communicating w/ the ACS	IED528: Unit is not displaying a status box with "Waiting For Host". Or, when action is initiated status box "Contacting Host" does not remain up for several seconds (a brief flash of this box is OK). IED524: Pressing PTT switch causes mic station to go to active or busy state.	Verify network connectivity. Possible actions: 1. PING this microphone station from the same equipment room as the ACS 2. Relocate this microphone station to the same network switch as the ACS and re-test connectivity. 3. Seek help from local network administrator (e.g., network port enabled, properly configured, on the right VLAN, etc.)

* Note: Some network switches can take 30-60 seconds to turn on PoE power after a connection is made. One may have to be patient at this point waiting for the switch to re-apply power to the network port.

Titan Amplifier Card Fault (fault type 4)

This condition indicates that an amplifier card in a Titan amplifier frame (T9160) is not working. If the Titan amplifier frame has a backup amp card, this failed card could be automatically backed up (if first/only amplifier in fault). If it is not being backed up, one may see an additional fault in the system supervision list that says "Faulted Amplifier Not Backed-Up". One can make the following checks at the Titan frame:

1. The power LED on the front of the ***amplifier card*** is not lit indicating it is not powered up.
2. The power switch on the front of the amp card is in the ON position. One may try switching it to the OFF position and back to ON just in case the switch wasn't fully in the ON position previously.
3. The amplifier card is fully seated into the frame and the two retaining screws are fully screwed down. Remove and re-seat if uncertain.

Note: Note: If the amplifier card is removed from the Titan frame, this fault will clear and the automatic backup will stop. If one desires to continue to have audio in the zones affected by the failed amp card, one should replace the failed amp with a spare amp, or move the backup amp from slot 9 to the now empty slot

Titan Amp Frame Internal Card Fault (fault type 4)

This condition appears with fault descriptions such as:

- *Communication Fault AIO Unit 1 or 2 (Titan IPAU)*
- *Communication Fault MTC Unit 1 or 2 (Titan IPAU)*
- *Communication Fault LVIO Unit 1or 2 (Titan IPAU)*

This indicates that one of the several circuit boards in the top portion of a Titan amplifier frame (T9160) is not communicating properly with the main circuit board in the frame. (AIO, MTC and LVIO are the card types. There are two of each type card in a T9160 frame, indicated by *unit 1* or *unit 2* in the fault description.) There is little that can be diagnosed externally about this condition. One can try clearing the fault condition by powering down the Titan amplifier frame, waiting at least 10 seconds and then re-powering the frame. If the condition continues or re-appears often, then the manufacturer should be contacted for further investigation or repair of the frame.

The urgency or criticality of getting a Titan frame with this fault repaired or replaced may depend on which card is faulted and the tolerance the facility has for partial loss of functionality. For example, if the error indicates loss of functionality on the upper 8 channels (5A through 8B), and there are no amps installed in those slots, then perhaps the fault doesn't hurt anything in the system, and getting it resolved quickly is not a priority. Below in Table B-2 is a list of what functions are tied to which internal cards.

Table B-2: T9160 Internal Card Functions

Internal Card	Functions Impacted
AIO Unit 1	Channels 1A through 4B inputs on the back of the frame Amplifier outputs to channels 1A through 4B **Note:** *It is possible that an AIO card will continue to pass audio even when the card is experiencing communication faults. The digital audio to/from the card is passed via a separate connection. One may wish to evaluate whether audio is still flowing to determine whether this fault condition is critical or not.*
AIO Unit 2	Channels 5A through 8B inputs on the back of the frame Amplifier outputs to channels 5A through 8B
MTC Unit 1	Supervision of amplifier voltage outputs and speaker line current sensors for channels 1A through 4B.
MTC Unit 2	Supervision of amplifier voltage outputs and speaker line current sensors for channels 5A through 8B.
LVIO Unit 1	Supervision of Ground Faults for channels 1A through 4B

	Supervision of amplifier good status lines and amplifier temperature sensors for channels 1A through 4B Supervision of all Fan statuses (1 – 4) Supervision of amplifier good status and amplifier temperature on the backup amplifier (slot 9) Control of power on the backup amplifier (slot 9) Control of all backup amplifier switching relays. ***In summary: Loss of backup amplifier switching functionality.***
LVIO Unit 2	Supervision of Ground Faults for channels 5A through 8B Supervision of amplifier good status lines and amplifier temperature sensors for channels 5A through 8B

Titan Amplifier Frame Environmental Fault (fault type 5)

This condition covers over-temperature on amplifier heat sinks, cooling fan failures and ground faults on speaker lines. These appear in the system supervision listing with descriptions such as the following examples:

- *Amplifier Card 1 Over Temperature (Titan IPAU)*
- *Fan 2 Fault (Titan IPAU)*
- *Channel 3A Ground Fault (Titan IPAU)*

For the temperature and fan faults (which may be inter-related), one can do the following checks at the indicated Titan amplifier frame (T9160):

1. Are fans all running?
2. Any obstructions in the fan vanes?
3. Any foreign objects/sheets covering the air openings (front and back of the frame)?
4. Unusually warm/hot ambient air in the equipment rack of the affected Titan frame?

If desired, the ground fault condition can be verified by removing the speaker line connection from the back of the amplifier frame and checking the impedance between each speaker line and earth ground using a multi-meter.

Communication Channel Fault (fault type 9)

This condition indicates that the system supervision software has failed to communicate over the network to the indicated device. This fault occurs for non-microphone station devices and can be due to either the unit not being powered up, the unit not operating or a problem in the network connection to the unit. Table B-3 below lists the checks and possible remedial actions that can be done to further diagnose this fault condition. In the table, the description "1RU Titan" indicates all other non-amplifier products like the T9040NLR, T9032LVIO, T9032NS and similar.

Table B-3: Unit Communication Fault Checks/Actions

Check	Check Procedure	Remedial Actions
Unit is Powered Up	T9160: Green power indicator on top/front is lit.	T9160: Check that both power cords are firmly pushed in, the power switch is on and the cords are plugged into a hot source.
	1RU Titan: Green power indicator on the back below the network connector is lit.	1RU Titan: If the unit is powered using an external power supply module, check that the power adapter is plugged into the unit and into a hot source. Perhaps try substituting a new power adapter. If the unit is powered using PoE from a powered Ethernet switch, verify that it is connected to a port with PoE enabled and operating.
Unit is Operating	T9160: System LED indicator on top/front is blinking.	If not blinking, try rebooting unit by turning off the power switch, waiting a few seconds and re-powering.
	1RU Titan: System LED indicator on the back below the network connector is blinking	If not blinking, try rebooting unit by removing power, waiting a few seconds and re-powering.* *(see below)*
Unit is Communicating over the Network	1. Verify network cable is plugged in. 2. Verify that network connection light is on and the network traffic light blinks. 3. Verify the unit can be PINGed from the equipment room where the ACS is located.	1. Correct any local switch connection issue (switch powered?) 2. Relocate this unit to the same network switch as the ACS and/or system supervision server and see if unit can communicate then. 3. Consult local network administrator to investigate further. *(e.g., port enabled, configured, on VLAN)*

* Note: Some network switches can take 30-60 seconds to turn on PoE power after a connection is made. One may have to be patient at this point waiting for the switch to re-apply power to the network port.

Monitor/Test Point Failure

This condition indicates that the reading for a test point taken during the last automated or manual test (or last two consecutive tests in the case of a 20K test failure) differs from the "Set value" by more than the established deviation (e.g., 3 dB). The fault report in system supervision listing will be of the form:

<Test>: <Zone Description> - <Point Type> (<Device/channel>)

So for example, it might say something like:

20kHz Test: Concourse A North – Amp Output (Titan 1, Channel 1A)

The descriptions will depend on what was entered in Enterprise for the zone descriptions. The most useful portion of the description in terms of possible follow-up diagnoses is the Point Type portion. The possible values for this field, what it means and what further investigations might be done are listed below in Table B-4.

Note: A possible cause of any Monitor/Test fault are configuration changes to the frame or speakers attached to a frame without re-running the test calibration to get new Set values. The table below assumes this possible configuration error has already been addressed.

Table B-4: Monitor/Test Point Types and Actions

Point Type	Meaning	Possible Further Investigation
Internal Ambient Out Selector Out	An internal digital domain (DSP) point.	May indicate a problem in the one of the DSPs of the unit and will have to involve the manufacturer for resolution.
Amp Input	The analog audio being fed to the power amp is out of tolerance.	May indicate an internal problem such as an AIO board problem. Resolution will have to involve the manufacturer.
Amp Output	The voltage out of the power amp is out of tolerance.	1. Is the power amplifier turned off or failed? 2. If Amplifier Input fault also occurring for this channel, then that is the root cause – investigate first. 3. If it is not apparent that amp is failed, one could try putting a spare/different amp (of the same model) into the slot and seeing if the fault clears.
Speaker Circuit	The speaker line current draw is out of tolerance.	1. If Amp Input or Amp Output fault also occurring for this channel, then that is the root cause – investigate first. 2. If Ground Fault also occurring for this channel, then that may be the root cause (ground faults can cause higher current draws) – investigate first. 3. Speaker line detached from Titan frame or a break in the line? 4. Some speakers on the line failed? (see below)

If initial investigation determines that the problem may be in a speaker line driven from the Titan frame or in the speakers attached to that line, one can investigate further using the Circuit Test feature in the Enterprise software. With this feature, one can turn on a test tone for a selected amplifier channel and then go out into the zone space and "walk the speaker line" listening for tone coming out of each speaker.

Note: This test tone feature has an automatic time out of a few minutes so it doesn't get left on accidentally forever. One may need an assistant at the computer console to re-start the test tone periodically.

From the evidence gathered, one may be able to infer whether there are individual speaker problems or there is a break in the speaker line somewhere. If, it is not desirable to put a tone out to the space due to the presence of the public in the area at that time, then a substitute may be to assign background music to that zone (and possibly remove the music from neighboring zones) and then listen to the individual speakers.

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