

## **Product Performance Technical Note**

**RE: GTI Drop Out**

**Product(s) Affected: Grid Tie Interface**

**Level: Urgent\_\_ Medium \_\_X\_\_ Low\_\_**      **Date: November 1, 2002**

### **Overview:**

This technical note addresses SW/GTI "drop outs" that are not caused by utility events. Xantrex has recorded six customers who have experienced drop out when the SW inverter is quickly trying to begin selling a considerable amount of power. When the GTI inductor relay engages, the change in impedance causes an over-voltage condition on the inverter. This causes the inverter to disconnect and wait five minutes before reconnecting. This problem first surfaced in March 2002 when GTI's were first installed. There is no danger at all involved when the GTI "drops-out". The SW is failing safe by disconnecting and entering its five-minute time-out condition. The worst result is the loss of five minutes of potential power selling opportunity.

The term drop out is a shortened description of a variety of occurrences which cause a utility interactive inverter to disconnect and disable it's sell mode operation. When the inverter disconnects it waits until normal voltage and frequency have been maintained by the utility for a minimum of 5 minutes. (The disconnect set-points and minimum 5 minute "time out" period are required by the regulatory agency and occur in both battery based and battery-less utility interactive systems.) The vast majority of the incidences of drop out are caused by abnormal utility conditions where the utility line voltage or frequency moves outside the inverters disconnect set-points.

This problem occurs when the inverter has excess DC power it "wants" to sell to the grid. The GTI has an internal timer circuit that causes the GTI to wait ten seconds before it transfers from a buy state to a sell state. This ten-second timer is present to prevent cycling of the "buy/sell" relay during low power times. This timer circuit works very well unless there is a sudden change in wind or PV input power (e.g. Large gust of wind, clouds clearing). Under these conditions the ten second wait is a disadvantage because it allows a buildup of power in the batteries and causes a large amount of current to be pushed all at once.

This sudden injection of current causes either an over-voltage condition or a phase shift causing the inverter to measure a frequency error. In either condition the inverter stops attempting to sell power and waits for the 5 minute "time out" period before trying again. The resolution to this problem is a software modification that by-passes the ten-second timer when sell current exceeds 10 amps AC.

This condition does not occur in all GTI installations although it can occur in any installation presenting the "unique" conditions described above (selling >ten amps suddenly to grid). To date Technical Support and Engineering have confirmed this dropout issue at six locations. They are working closely with these six SW/ GTI customers who have this drop out problem.

### **Action being taken:**

The condition is difficult to replicate in our laboratory so solutions to the problem have required some cooperation on the "trial and error" front with affected customers. Engineering has been working closely with Technical Support to author software revisions that address this problem. Two weeks ago one of these customers received new GTI firmware and was quite pleased with

the results. The next step being undertaken is that the other five customers with this problem will receive new firmware to try. If they too report that the problem is solved, we expect their reports in mid-November, the new firmware will be released to manufacturing for new GTI production. The new firmware will also be made available, at no-charge, to customers experiencing drop out which is not caused by abnormal utility conditions.

The new firmware will be available in two forms; replacement circuit board for those comfortable working with equipment at that level, and replacement GTI for those without the confidence to undertake a board swap. In either case Technical Support will need to "validate" that the drop out being reported is caused by this GTI problem and then assess which option is the most appropriate course of action. There will be no charge for the upgrades to customers with confirmed reports of this problem.

It is important to note that only six of the hundreds homeowners who have GTI's installed have this problem. The vast majority of SW / GTI customers need take no action unless they experience the drop out problem. There is no reason to stop selling, shipping and installing GTI's from distributor or dealer inventory because of the very small incidence of the problem occurring. If the problem does occur an on-site circuit board swap implements the upgrade.

**Summary:**

Because there are so many reasons that an inverter may "drop-out" that the Xantrex Technical Support department must assess each individual site to determine the cause of the problem. If it is determined that the "dropping-out" will be significantly reduced or eliminated by the new firmware it will be sent at no-charge to the installing dealer or homeowner. Once released to production Xantrex will make new GTI boards available to installers, also at no-charge. Distributors should contact their Regional Sales Manager for details on how their inventory will be brought up to the upcoming version of released firmware.

This is not a product recall. It is a field experience driven product improvement. There is no reason to notify customers or send GTI's back to Xantrex. Most SW/GTI end-users will not experience this drop out problem and need to take no action. In the vast majority of installations this drop out will be such a rare event that the homeowner will not likely even be aware of the occurrence.