# Thermal Cycling Tests Comparing
# CamPort® vs Standard F-port

## Purpose

The purpose of this test was to evaluate the reliability of the contact of the CamPort® F-connector vs the Standard F-port connector when exposed to multiple thermal cycles at temperature extremes.

## Conclusion Summary

**Thermal Cycling Multitaps for 60 Days: +60°C to -40°C with 3 hours soak/transition times**

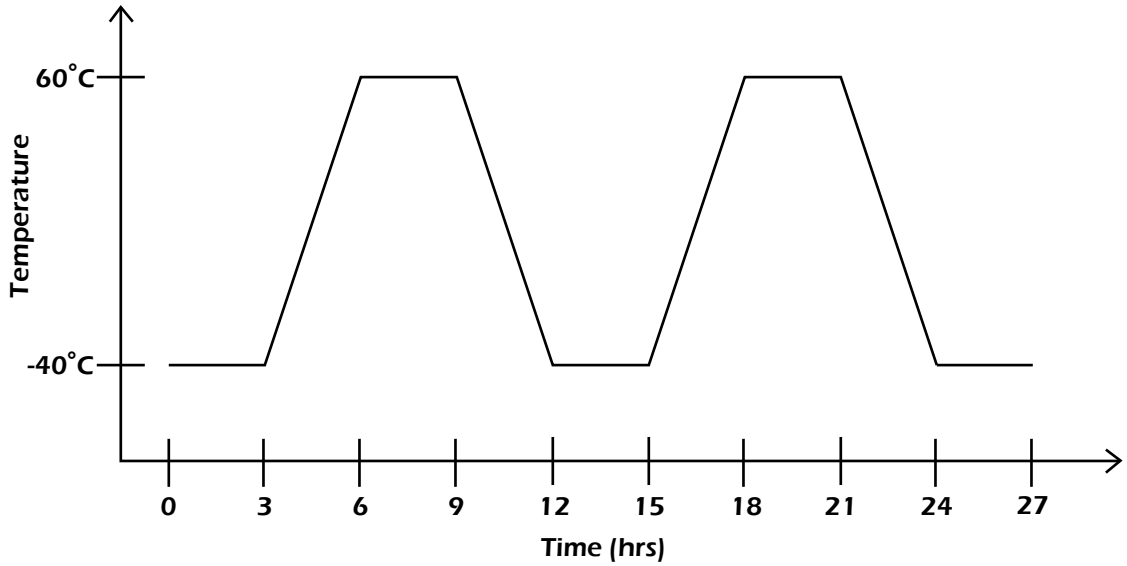
| | | | Intermittent F-ports | |
|---|---|---|---|---|
| | **No. of taps** | **No. of F-ports** | **Quantity** | **Percentage** |
| Standard F-port | 5 | 32 | 5 | 15.6% |
| CamPort | 6 | 48 | 0 | 0.0% |

## Equipment

- Fluke 6060B RF Synthesized Signal Generator (#1010009)
- HP DC Power supply (#1009845)
- Datataker 605
- Bank of 80 RF detectors
- BMA Bryant Thermal Chamber
- 6 units of a new Antronix Milenium 8-way tap with CamPort®
- 3 units of a competitor's new 8-way tap with Standard F-port
- 2 units of a competitor's new 4-way tap with Standard F-port
- RG6 cables and connectors
- Computer running Datataker software (#1021159)

## Setup

1. Using an RF Signal Generator, we fed a 6 MHz, un-modulated carrier into 11 taps that have been placed in series in a thermal chamber. The output of the last tap was terminated with a 75 Ω terminator.
2. We connected the output of each tap port and fed it into an RF detector. When the RF level of the tap port decreased, the DC output of the RF detector increased. The Datataker 605 monitored the DC outputs of the RF detectors.
3. The Datataker 605 logged the data every 30 seconds and stored it as a .csv file.
4. The temperature profile is as follows: 3 hour soak at -40 °C, 3 hour ramp to +60 °C, 3 hours soak at +60 °C, 3 hour ramp to -40 °C, and repeat (12 hours for 1 full thermal cycle). Humidity control was off.

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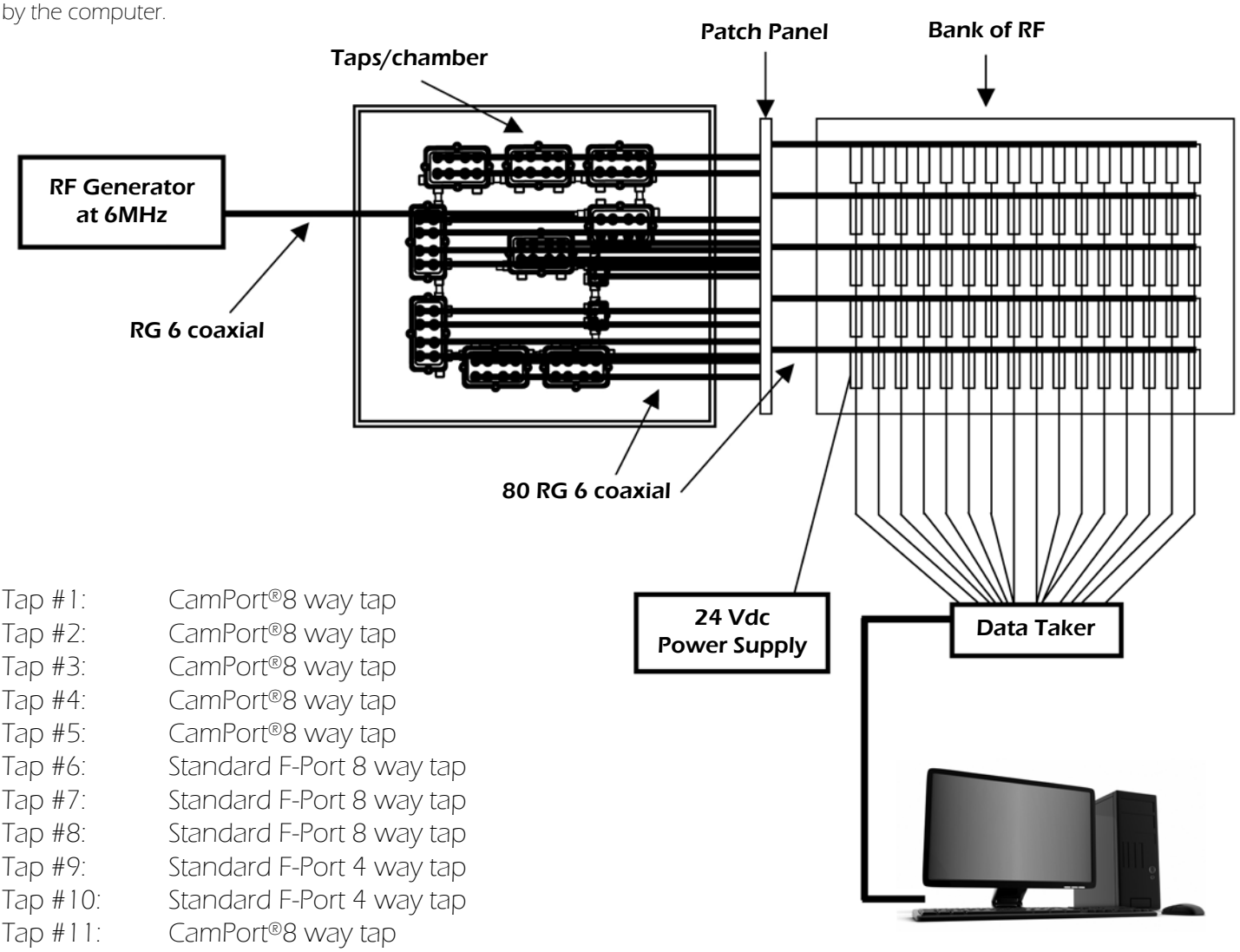
## Setup Diagram

6 MHz signal from RF Generator in to 11 Taps in series inside temperature chamber. Last tap terminated with 75 ohm terminator. RG 6 coaxial cable from each tap port to a detector. Detector converts the RF level out of the tap port to a DC level. When the RF level decreases, the DC level increases. DC levels recorded every 30 seconds by the Datataker 605 and logged by the computer.




| | |
|---|---|
| Tap #1: | CamPort®8 way tap |
| Tap #2: | CamPort®8 way tap |
| Tap #3: | CamPort®8 way tap |
| Tap #4: | CamPort®8 way tap |
| Tap #5: | CamPort®8 way tap |
| Tap #6: | Standard F-Port 8 way tap |
| Tap #7: | Standard F-Port 8 way tap |
| Tap #8: | Standard F-Port 8 way tap |
| Tap #9: | Standard F-Port 4 way tap |
| Tap #10: | Standard F-Port 4 way tap |
| Tap #11: | CamPort®8 way tap |

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## Results

1. We started taking data on November 13, 2000 and ran the thermal chamber for 60 days continuous.
2. We have observed that for the first 11 days (22 temperature cycles), there were no intermittent F-ports.
3. On the 12th day, the first intermittent F-port was observed on Port 6 of Tap #8 at +54 °C during the temperature rise portion of the cycle. This same port had an occasional intermittent contact at hot for the next 4 temperature cycles. By the 14th day, this port started to have a more consistent intermittent contact. The temperature of where the intermittent started to occur was about +40 °C during the temperature rise portion of the cycle.
4. On the 14th day, Port 2 of Tap #6 had the first intermittent contact at +60 °C. By the 18th day, this port had an intermittent contact on a consistent basis. Every temperature cycle thereafter had some intermittent on this port.
5. On the 15th day, an occasional intermittent contact was occurring on Port 2 of Tap #10 and Port 3 of Tap#8. The intermittent instances were short and only occurred about every other temperature cycle at hot extremes (>50 °C).
6. On the 19th day, Port 4 of Tap #8 started showing an intermittent contact at hot.
7. On the 36th day, Port 7 of Tap #7 started showing an intermittent contact at hot.
8. Of the 5 standard F-port taps, there were 32 standard F-ports. Two F-ports (Port 2 of Tap #6 and Port 6 of Tap #8) had severe intermittent problems at +60 °C on a consistent basis. Four F-ports (Port 7 of Tap #7, Port 3 of Tap #8, Port 4 of Tap #8, Port 2 of Tap #10) had at least one sporadic intermittent at +60 °C during the 60-day test.
9. 26 of the 32 standard F-ports did not have an intermittent contact during the 60- day test.
10. It appears that the intermittent was more prominent during the rising and falling temperatures close to +60 °C.
11. Of the 6 CamPort® taps, there were 48 CamPort® connectors. No intermittent contact was observed on any CamPort® during the 60-day test.

## Conclusion

1. 5 of 32 (15.6%) standard F-ports had some intermittent in the 60-day test.
2. 2 of 32 (6.3%) standard F-ports had severe intermittent problems in the 60-day test.
3. The intermittent standard F-ports occurred at hot extremes and were more prominent in the rising or falling temperature points around +60 °C.
4. The worse standard F-port started to become intermittent at +40 °C in the raising temperature portion of the cycle.
5. Of the 48 CamPort® connectors tested, there was no intermittent contact during the 60-day test.

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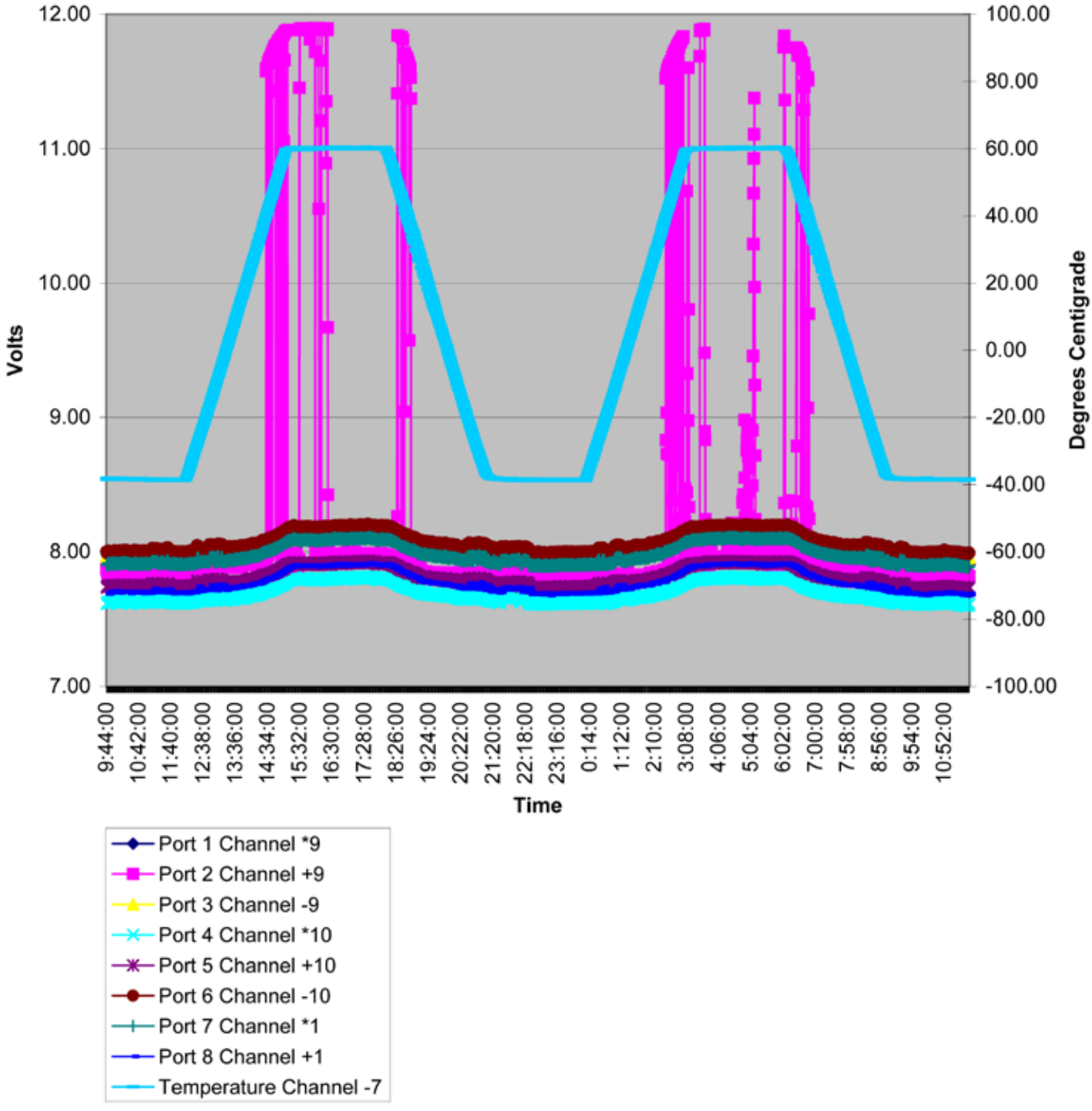
## Standard F-Port Tap #6

## 12/02/00 9:44:00 to 12/03/00 11:37:30

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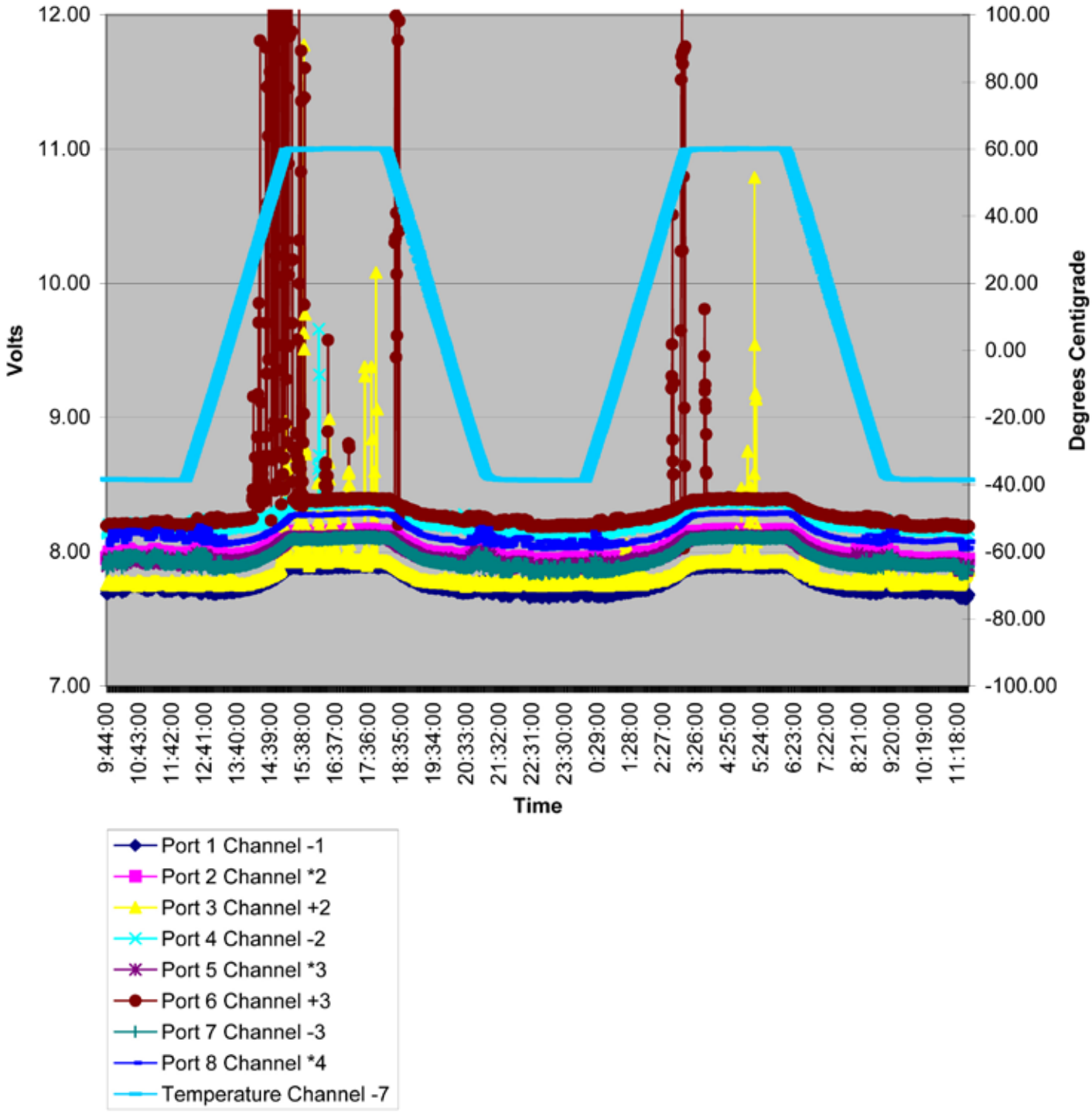
## Standard F-Port Tap #8

## 12/02/00 9:44:00 to 12/03/00 11:37:30

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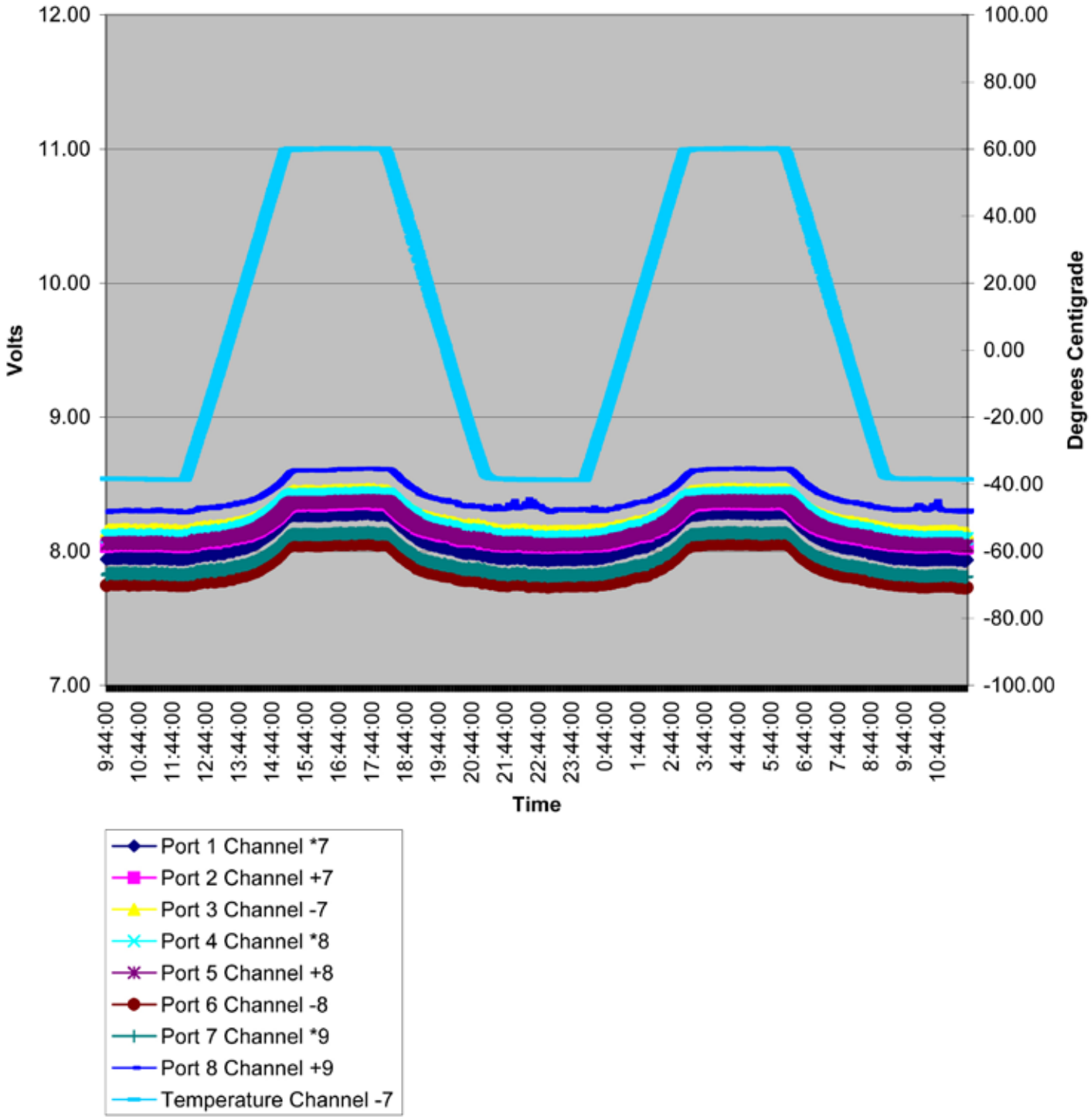
# CamPort Tap #11

## 12/02/00 9:44:00 to 12/03/00 11:37:30

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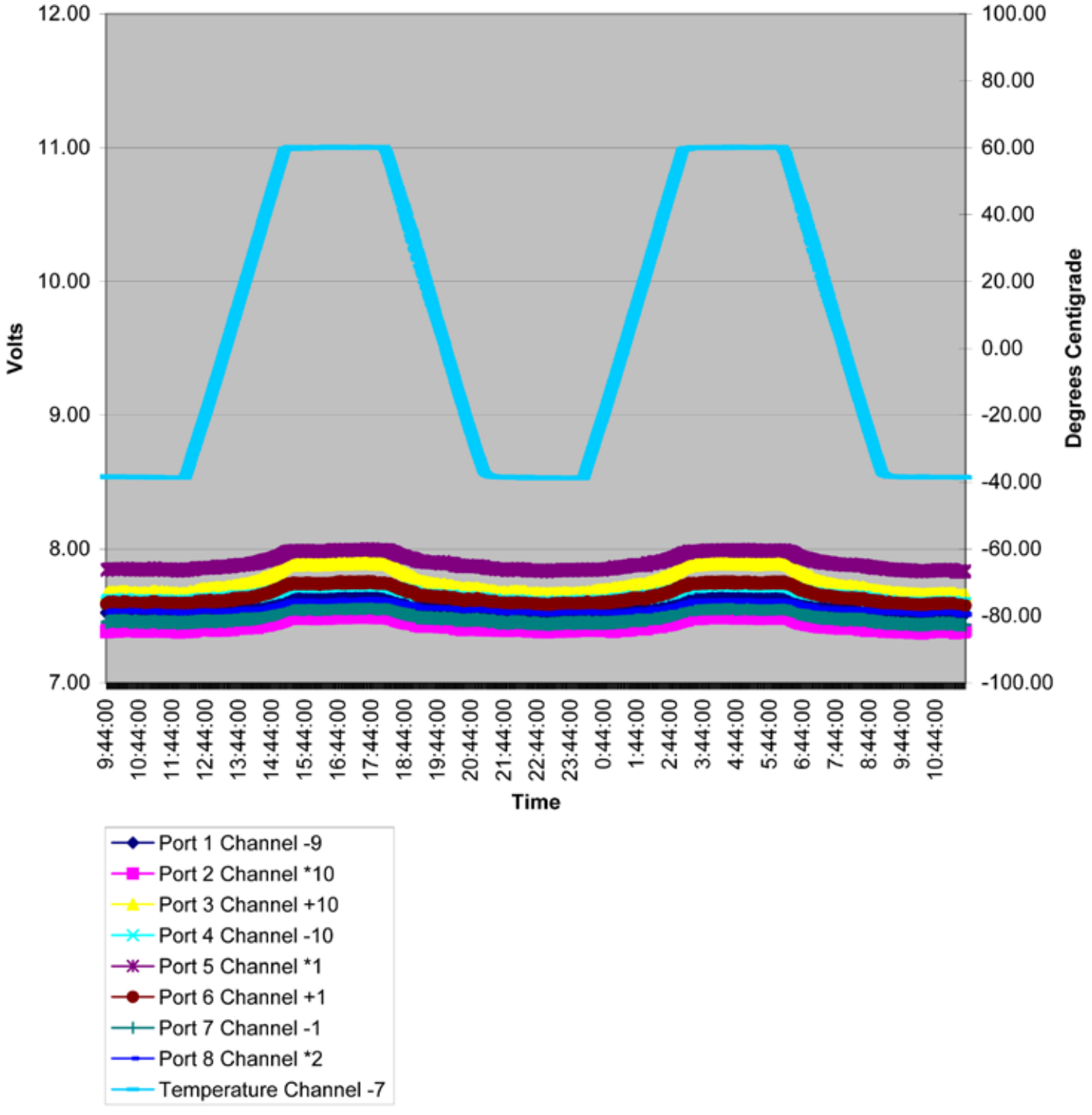
## CamPort Tap #2

## 12/02/00 9:44:00 to 12/03/00 11:37:30

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