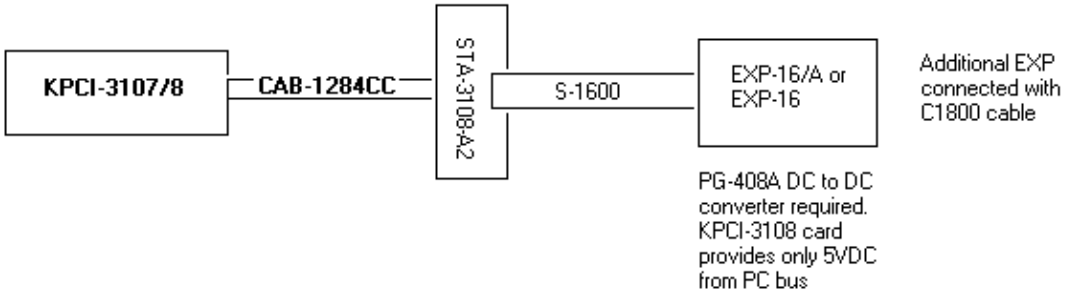
Using EXP-16 or EXP-16/A with KPCI-3108 Series

When an application calls for external multiplexing, the KPCI-3108 series of board should be used with the EXP-1800 external multiplexer for best results. The EXP-1800 has very fast settling time capabilities and can switch at the full speed rating of the KPCI-3108.

However, the KPCI-3108 does provide for upgrades from the DAS-1600 series systems. For those with significant investment in signal conditioning designed for use with DAS-1600 (EXP-GP, EXP-16, etc), an easy connection is provided to the KPCI-3108. *Operational and performance differences need to be taken into account in the system implementation.*

Physical Connection

The STA-3108-A2 screw terminal panel for use with the KPCI-3108 Series provides a DAS-1600 Series compatible male DB37 connector. For example, to connect to an EXP-16 or EXP-16/A see figure below:



Expansion Channel Addressing and Configuration

Expansion channel addressing should be enabled in the DriverLINX configuration for the KPCI-3108 series board. This will allow the auxiliary digital output bits on the upper, analog I/O connector of the KPCI-3108 to control the channel addressing of the EXP-16 or EXP-16/A board automatically.

The analog input channels of the KPCI-3108 must be configured for 16 SE channels. Under DriverLINX, these 16 channels are always 0 through 15. The 16 channels of an EXP jumpered to make use of channel 0 will be referenced as channels 16 through 31in software. The 16 channels of an EXP jumpered to make use of channel 1 will be referenced as channels 32 through 47, and so on for additional EXP accessories.

Power Considerations

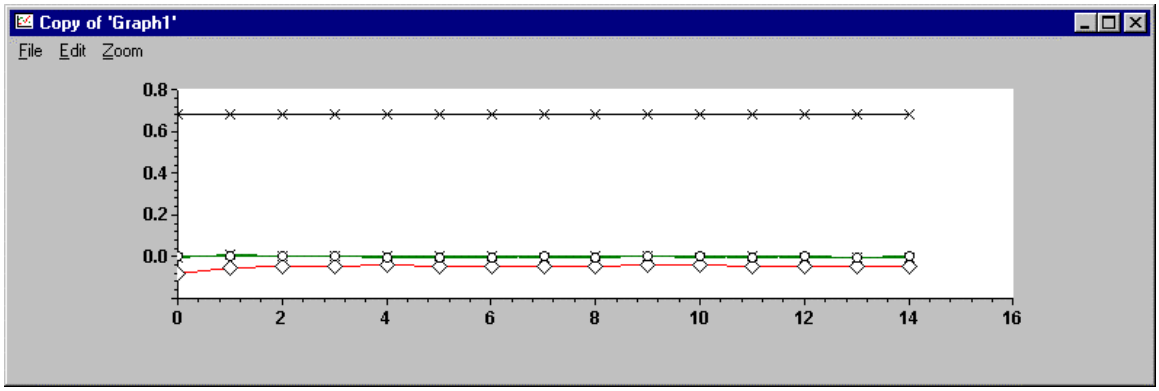
The EXP-16 requires power from 5VDC, +12VDC (or +15VDC) and –12VDC or (–15VDC) supplies. Use of the field installable PG-408A DC to DC converter reduces the number of required power supplies to just the +5VDC supply. Since only 5VDC is brought out from the PC with the KPCI-3108, use of the PG-408A is necessary when interfacing the EXP-16 to the KPCI-3108. The KPCI-3108 routes the 5VDC power through a resetable fuse (mini SMDC050 from Raychem). When using the PG-408A, the 5 VDC supply needs to provide 175mA (250mA max) for each EXP-16 accessory. This fuse has a high degree of temperature dependence on it's trip point typically 0.5 amp at 20degC. The rated current drops as operating temperature increases. Because of this specification on the fuse, a maximum of two EXP-16 can be operated from the 5VDC power delivered through the KPCI-3108 board. For more than 2 EXP-16, an external power supply is required.

System Considerations

The EXP-16 series of signal conditioning products have significant settling time requirements relative to the acquisition time capabilities of the KPCI-3108. The KPCI-3108 can acquire a sample every 10usec. The EXP, at a gain of 1, requires 12usec to settle; at a gain of 100, 15usec are required. At higher gains, more time is required. See the EXP specifications (Table A-3) for more information.

Because of these differences in capabilities, errors can be introduced into the data obtained from this combination of hardware. In the graph below, two channels were sampled: the CJC sensor (24.4mv/C) at room temperature and a shorted channel on the EXP-16. These two channels were sampled at 100KHz in the following order: CJC, short, short, short, CJC, short, short, short, repeat. That is, the shorted channel was sampled three times in a row after the CJC channel was sampled once.

The trace with X symbols on the graph represents the measured value from the CJC sensor. The trace with diamonds is the first time the shorted channel was measured. The next two traces are virtually superimposed onto each other (circles and squares). These data represent correct and repeatable reporting of the shorted channel. The first reading of the shorted channel (diamond) is in error due to the KPCI-3108 sampling too soon relative to the EXP-16's settling time requirements.



This is just an illustration of the need to allow for the KPCI-3108's faster acquisition time. The effect is a function of gain, sampling speed and the source resistance of the individual signals being measured. Application software that controls this combination of hardware needs to take this effect into consideration and quantify it for the particular situation in order to achieve maximum system accuracy.