COMANCHE®

REFERENCE GUIDE

Version 3.0

Borin Manufacturing, Inc.

5741 Buckingham Parkway, Unit B, Culver City, CA 90230 | Phone: (310) 822-1000 | www.borin.com

Table of Contents

1.0 General Description 4

1.1 How to Use this Guide 4

2.0 Hardware Description 5

3.0 Analog Monitoring Card 6

3.1 Purpose 6

3.2 Identification 6

3.3 Ranges and Resolutions 6

4.0 Analog Control Card 8

4.1 Purpose 8

4.2 Identification 8

4.3 Ranges and Resolutions 8

5.0 Digital Monitoring Card 9

5.1 Purpose 9

5.2 Identification 9

6.0 Digital Control Card 10

6.1 Purpose 10

6.2 Identification 10

6.3 Types of control channels 10

7.0 Tomahawk Controller Card 11

7.1 Purpose 11

7.2 Identification 11

7.3 Tomohawk Rectifier Controller Card 11

8.0 CPU Card 12

8.1 Purpose 12

8.2 Identification 12

8.3 Specification 12

9.0 ModBus Card 13

9.1 Purpose 13

9.2 Identification 13

9.3 Specification 13

10.0 Safety Guidelines 14
10.1 Step 1 14
10.2 Step 2 14
10.3 Step 3 14
10.4 Step 4 15
10.5 Step 5 15
10.6 Step 6 15
11.0 Connections 16
11.1 The clamps 16
11.2 Connect to a clamp 16
11.3 Polarity 16
11.4 Overriding channels 17
11.5 While connecting wires 17
12.0 Appendix A 18
12.1 Schematic of a ***Comanche*** RMC 18
13.0 Appendix B 19
13.1 Tomahawk Rectifier Controller Card 19
14.0 Configuration Form 20

1.0 General Description

You just purchased a ***Comanche*** Module. The last page or back cover contains a configuration sheet of your new module. Please check whether all items have been ordered completely.

This installation guide has been made in order to help you install the Hardware, and it also gives you the opportunity to keep track of all your modules.

1.1 How to Use this Guide

If you read this guide thoroughly, it will help you from the point where you receive the module up to the point where you have your first contact with the module and get your first readings.

There will be several sections in this Guide that will support you in handling the different steps you have to perform.

You will find the following sections for the various purposes:

- Hardware Description
- Hardware Installation
- Main reasons for failure
- How to check in the field
- Troubleshooting of ***Comanche*** Hardware
- Installing the Module with the ***Comanche*** Software
- Troubleshooting of the ***Comanche*** Software

Each section is divided into several subsections. Some of them will be more relevant to you than others. According to your own individual need you can lay emphasis on whatever seems to be of importance to you. In any case you will find all kinds of different information in the various sectors, to get an overall view for different applications enabled to you by the ***Comanche*** System.

2.0 Hardware Description

As you can already tell by the name, the ***Comanche RMC System*** is a complete System. This is visible on several levels. By the time you have placed your order, you already had a specialized module for your application in mind. You can get the modules with different channel configurations. When opening your ***Comanche***, you will see various Plug-In-Cards in a Backplane. There are 5 different Plug-In-Cards you can use for Monitoring or Control. There are also different Communication cards and CPU-cards for the different applications.

The Hardware description will give you information about all these different cards. The following cards are available right now. Please check for new cards with your distributor.

- AM Analog Monitoring Card (4 Channels)
- AC Analog Control Card (2 Channels)
- DM Digital Monitoring Card (4 Channels)
- DC Digital Control Card (4 Channels)
- TC Tomahawk Controller Card (2 Channels)
- BCP CPU – Card
- MODBUS Communication Card

Each of these Plug-In-Cards has its own features along with ranges and indicators of these Plug-In-Cards, which will be described in the following pages.

3.0 Analog Monitoring Card

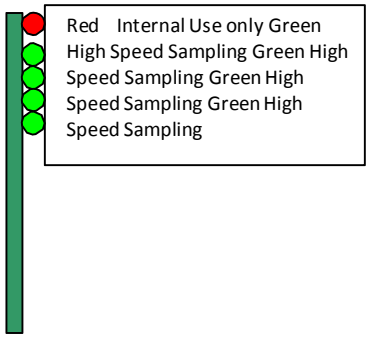
3.1 Purpose

The Analog Monitoring Card (AM) will give you readings of analog values. Analog values are values that have a range of readings. This might, for example, be a temperature, giving you a more or less precise value of the momentary temperature, like 20ºC (69F) or 22ºC (71F). It might also be a Voltage Output of a rectifier which will give you a reading of 21.5 Volts or 23.4 Volts. So analog values are always values that have a certain range and give you an almost exact measurement within this defined range.

3.2 Identification

The AM has a specific clamp-field on the backplane, which helps you to identify the slots where an AM is installed.

White	Jx9	+ (positive)	Channel 4
Grey	Jx8	- (negative)	
White	Jx7	+ (positive)	Channel 3
Grey	Jx6	- (negative)	
White	Jx5	+ (positive)	Channel 2
Grey	Jx4	- (negative)	
White	Jx3	+ (positive)	Channel 1
Grey	Jx2	- (negative)	
Orange	Jx1	**DO NOT USE** Factory Test only	
Black	Jx0	**DO NOT USE** Factory Test only	



3.3 Ranges and Resolutions

The AM cards come factory-pre-set to one of the following ranges:

0 – 4 V
Input Impedance : 10MΩ or 20MΩ (only if ordered)
Max. Input : 4.096 V
Resolution : 4mV / Bit
Main purpose : Permanent Reference Cell

0 – 100 mV
Input Impedance : 10MΩ
Max Input : 101.89057.mV
Resolution : 99.599 µV / Bit
Main purpose : Amperage output of a rectifier at the shunt

0 – 30 V
Input Impedance : 1MΩ
Max Input : 30.0127 V
Resolution : 29.3379 mV / Bit
Main purpose : Voltage output of a small rectifier

0 – 100 V Input Impedance: 1MΩ
Max Input : 101.133 V
Resolution : 98.859 mV / Bit
Main purpose : Voltage output of a bigger rectifier

0 – 20 mA Input Impedance: 204 Ω
Max Input : 20.073 mA
Resolution : 19.622 µA / Bit
Main purpose : Sensors, like pressure sensors, flow meters…

NOTE: Check Input prior to connecting, do not reverse polarity (+ / -) !

4.0 Analog Control Card

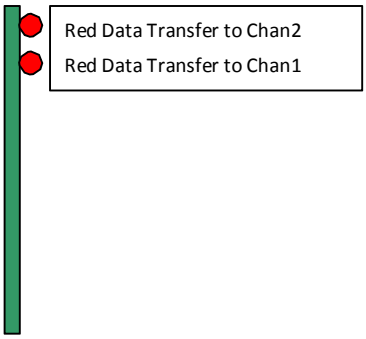
4.1 Purpose

The Analog Control Card (AC) is used to adjust analog devices. Analog devices usually have two different inputs to adjust either Voltage or current loop. Possible applications would be a controller card for rectifiers or an actuator for valves. With the AC – card you can adjust a value rather than switch it just on or off.

4.2 Identification

The AC has a specific clamp-field on the backplane, which helps you identify the slots where an AC is installed. Remember that the AC-card has only two channels!

White	Jx9	+ (positive)	**Voltage** Out	Channel 2
White	Jx8		**Current** Out	
Grey	Jx7	- (negative)	**Current** Out	
Grey	Jx6		**Voltage** Out	
White	Jx5	+ (positive)	**Voltage** Out	Channel 1
White	Jx4		**Current** Out	
Grey	Jx3	- (negative)	**Current** Out	
Grey	Jx2		**Voltage** Out	
Orange	Jx1	**DO NOT USE** Factory Test only		
Black	Jx0	**DO NOT USE** Factory Test only		



4.3 Ranges and Resolutions

The AC cards come factory-pre-set to one of the following ranges:

0 – 5 V : 5 V
: 4.88 mV / Bit
: Controller with TTL Inputs

0 – 10 V : 10 V
: 9.77 mV / Bit
: Rectifier Controller cards (like VIP™ by GoodAll)

0 – 20 mA : 20 mA
: 19.9 µA / Bit
: older control circuits

4 – 20 mA : 20mA
: 15.6 µA / Bit
: modern control equipment

NOTE: Only one output of each channel can be used. The channel is either setup for Voltage or for Amperage output. On one AC–card you can still get one channel for Voltage and the other channel for Amperage output.

Please check the control input of the devices you want to connect to the AC-card.

5.0 Digital Monitoring Card

5.1 Purpose

The Digital Monitoring Card (DM) has been designed to take status readings of a system. Digital information only contains two different states. Something is either switched on or off, a door might be open or closed. You will not get any information on how wide the door is open, you only know that it is open.

The monitoring channel is:
Active, electrically coupled Input ***(factory default)***

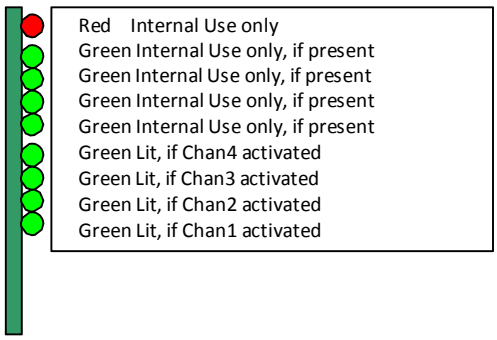
This form of monitoring is made for potential-free-contacts. These are mainly passive contacts and switches, which do not need any power to be operable.

NOTE: The Comanche Hardware will deliver the power for the circuit that you use. No other external power sources should be used. The current used by the Comanche is limited to 10mA by a protection circuit.

5.2 Identification

The DM has a specific clamp-field on the backplane, which helps you identify the slots where a DM is installed.

Blue	Jx9	+ (positive)	Channel 4
Grey	Jx8	- (negative)	
Blue	Jx7	+ (positive)	Channel 3
Grey	Jx6	- (negative)	
Blue	Jx5	+ (positive)	Channel 2
Grey	Jx4	- (negative)	
Blue	Jx3	+ (positive)	Channel 1
Grey	Jx2	- (negative)	
Orange	Jx1	**DO NOT USE** Factory Test only	
Black	Jx0	**DO NOT USE** Factory Test only	



6.0 Digital Control Card

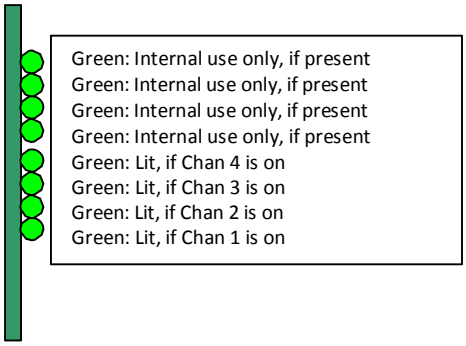
6.1 Purpose

The digital control card (DC) has been designed to switch devices on or off, like switching the light off or a rectifier on or off.

6.2 Identification

The DC has a specific clampfield on the backplane, which helps you identify the slots, where a DC is installed.

Grey	Jx9	A	Channel 4
Grey	Jx8	B	
Grey	Jx7	A	Channel 3
Grey	Jx6	B	
Grey	Jx5	A	Channel 2
Grey	Jx4	B	
Grey	Jx3	A	Channel 1
Grey	Jx2	B	
Orange	Jx1	**DO NOT USE** Factory Test only	
Black	Jx0	**DO NOT USE** Factory Test only	



6.3 Types of control channels

The control channels have relays on their output. The relays are limited to the following restrictions:

Maximum Voltage : 250V
Maximum current : 2 A

NOTE: For maximum flexibility, no internal fuse is provided. Please take care not to override these values.

7.0 Tomahawk Controller Card

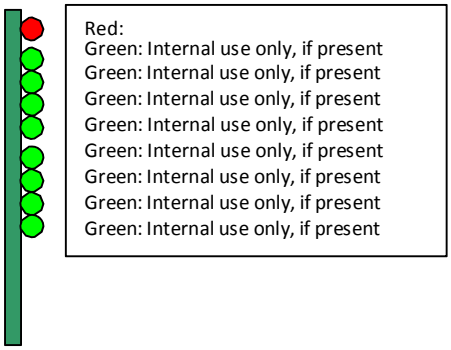
7.1 Purpose

The Tomahawk Controller Card (TC) is part of the Tomahawk-System and has been especially designed for use with the ***Tomahawk Rectifier Controller*** only. It has a serial interface to the Rectifier Controller and provides the interface in the ***Comanche RMC System***. It provides another form of analog adjustment for rectifiers.

7.2 Identification

The TC has a specific clamp-field on the backplane which helps you identify the slots where a TC is installed.

Dark Grey	Jx9		
Dark Grey	Jx8		
Orange	Jx7	A1	Channel 1 RS485
Dark Grey	Jx6		
Dark Grey	Jx5		
Dark Grey	Jx4		
Dark Grey	Jx3		
Grey	Jx2	B1	Channel 1 RS485
Dark Grey	Jx1	**DO NOT USE** Factory Test only	
Dark Grey	Jx0	**DO NOT USE** Factory Test only	



7.3 Tomahawk Rectifier Controller Card

For information on the Tomohawk Rectifier Controller Card go to Appendix B.

8.0 CPU Card

8.1 Purpose

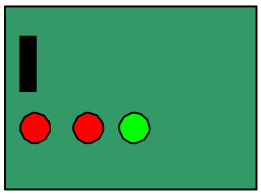
The CPU Card (BCP) is responsible for the control of a single ***Comanche*** unit. All information concerning this particular unit is stored in the BCP card. Even if the communication is blocked for a while, the buffer will store upcoming alarms.

8.2 Identification

The BCP is always located in slot # 10, which is the rightmost slot on the backplane. It has no clamp field, because you cannot connect to the BCP directly. You will always need the MODBUS communication card.

Although there is a Clamp field at Slot #10, which will be described here:

	J09	Prewired from Factory
	J08	
	J07	
	J06	
	J05	
	J04	
Orange	J03	
Orange	J02	
Black	J01	
Black	J00	



LEDs on Backplane right of Slot # 10
Red: DS001flashes while reset or power up
Red: DS002 Lit while reset, proper Jumper
Green: DS003 Power LED

8.3 Specification

The BCP stores the following data in its memory. They will not be lost in case of a power failure.

- Data buffer of the last 80 messages
- Condition of the data logger if present
- Last 30 messages that have not been sent to the main station yet
- Parameter of all further described cards
- Reset counter
- Configuration of all installed cards

9.0 ModBus Card

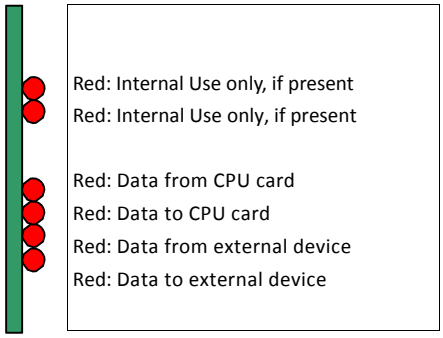
9.1 Purpose

The ModBus card is used to interface the COMANCH system with a large variety of communication devices. Using specific firmware, these include but are not limited to: The BORIN Network Bridge, the Quake Satellite adapter, any Modbus RS232 or RS485/422 Master.

9.2 Identification

The Modbus card will always be installed in slot #9.

White	J99		GnD
Green	J98		+5V
Green	J97		N.C.
Grey	J96		RS485_A
Grey	J95		RS485_B
Green	J94	White wire	RS232_TxD
Green	J93	Black wire	GnD
Grey	J92	Red wire	RS232_RxD
Grey	J91		Relay B
Black	J90		Relay A



9.3 Specification

The ModBus card provides an internal serial port to the CPU, an external serial RS232 or RS485/422 port to the communication device and a relay output. All functionality can be configured using application specific firmware.

10.0 Safety Guidelines

Here are some ***Safety Tips*** you should read very carefully! They might help you in preventing injuries and defects on your equipment.

10.1 Step 1

Check all devices or points where you want to connect to the ***Comanche***. Take a multimeter and take down all readings on a notepad. Check if all readings are within the range of the channel that you want to connect to in the ***Comanche*** Unit.

BE CAREFUL, SOME TESTPOINTS MAY HAVE DANGEROUS VOLTAGES.

10.2 Step 2

Switch off all breakers to devices that you want to make connections to.

BE CARFUL, SOME DEVICES MIGHT HAVE CIRCUITS WITH INTERNAL BIG CAPACITORS AND MAY STILL HAVE A LOAD.

Check again with the multimeter whether there is still a dangerous Voltage on your connection points.

If you ordered a ***Comanche*** unit mounted on a panel or inside a secondary enclosure and assembled from factory with external terminals, follow the instructions included in the enclosure that should be specific to that configuration.

If you ordered the ***Comanche*** unit only proceed to the steps below:

10.3 Step 3

It is not required for the ***Comanche*** unit to be inside a secondary enclosure. The unit enclosure is specified to a rating of IP65, which is dustproof and also protected against splash water, and can be mounted directly on a wall, pole or cabinet. The grummets should be mounted downside. Otherwise, they have to be sealed later on.

10.4 Step 4

Connect the ***Comanche*** System to the Power supply. There are several power supplies available. You can use your own power supply or the one you ordered with the ***Comanche***. Whatever you use, make sure that the output will be in the range of 12-24V, 1.5A. The best performance will be achieved with 12VDC, 1,5A power supply with an extended temperature range. The following power supplies can be ordered from the factory with a ***Comanche*** unit:

- AC/DC converter 100-240 VAC in
- DC/DC converter 24- 48 VDC in
- AC/DC converter for battery backup, 100-240VAC in

NOTE: Do not use plug in AC/DC converters. They are usually not regulated and cannot deliver enough power to drive the Comanche. Furthermore, they are usually not in an extended temperature range.

10.5 Step 5

Power up the ***Comanche*** without any connections made to it. The Power LED should light up and the module will reset and initialize. This will show you that you have sufficient power and hooked up the module correct to the power supply.

10.6 Step 6

Switch off the ***Comanche*** again and make your connections.

11.0 Connections

Connections are being made between the ***Comanche*** Unit and the test points where you want to connect. At the ***Comanche*** Unit, all connections have to be made at the clampfield.

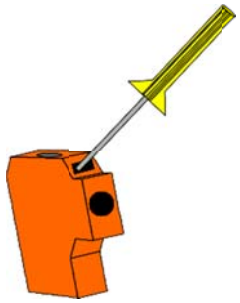
11.1 The clamps

The clamps of the clampfield are designed for secure long lasting connections. Inside, they have a steel spring with a cutting edge that holds the wire tight. This edge will cut into the core of your wire and will cut in case of oxidation of the metal a new connection into the surface of the wire.

NOTE: The steel clamps are pretty strong. You should always solder the tips of the wire you put in the clamp. Otherwise, a clamp might cut the wire and you will lose a connection. Another good solution is to use ferrules on the tip of the wire.

11.2 Connect to a clamp

In order to connect a wire to a clamp, press a thin screw driver in the upper hole and insert the wire into the lower hole as shown in the picture.



11.3 Polarity

Always check the polarity of your connection. **Each** channel has a positive and a negative connector. Usually all positive connectors of a channel are the upper terminals that are those with the higher number. Also, it does not destroy the unit if you reverse the input, you will just not get any reading.

NOTE: When connecting the reference cell, still check the polarity. Positive is the upper terminal, negative the lower. The adjustment of negative input will be made in the software.

When you connect a Reference Cell with reversed Polarity, it will destroy the reference cell immediately!

11.4 Overriding channels

Do not override the channels. A rectifier voltage must not be connected to the channel for rectifier Amperage. You might override the channel by a 1000 time its limit! The channel will not be destroyed immediately due to its protection circuit, but you will get no reading except maximum input.

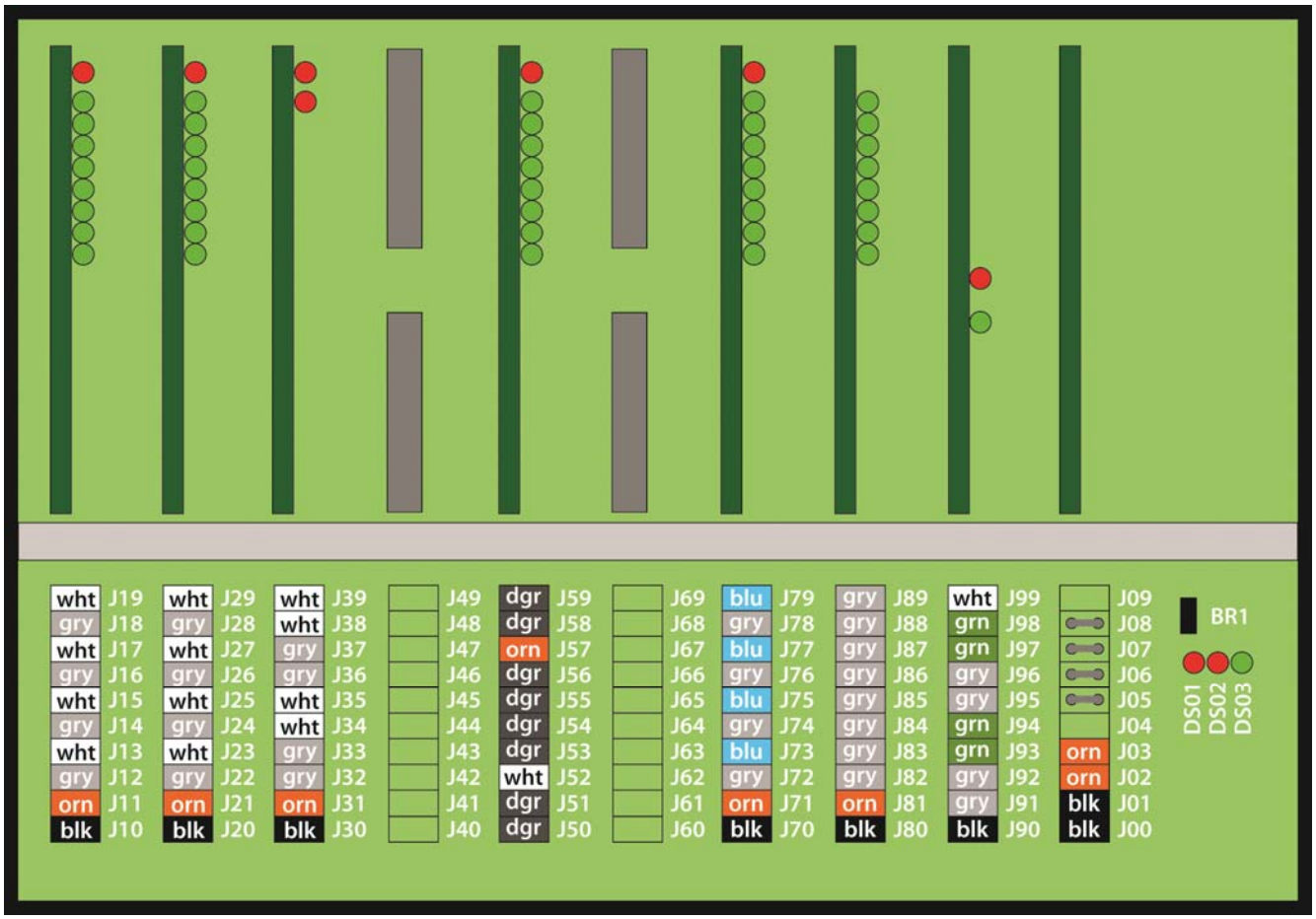
11.5 While connecting wires

Be careful! Keep all wires isolated until you make the connection. When connected to the devices, you might encounter different ground potentials of all devices. This may lead to a voltage difference of more than 20 Volts. If a loose wire gets contact to a different ground, you may get some sparks and electrical discharges. This may destroy the module or the device it is connected to. Once connected to the ***Comanche***, there are no more problems, because all channels in the unit are completely electrical isolated up to 2000V.

12.0 Appendix A

12.1 Schematic of a *Comanche* RMC

The following picture shows an example of a typical ***Comanche*** unit; your unit might have a different configuration:



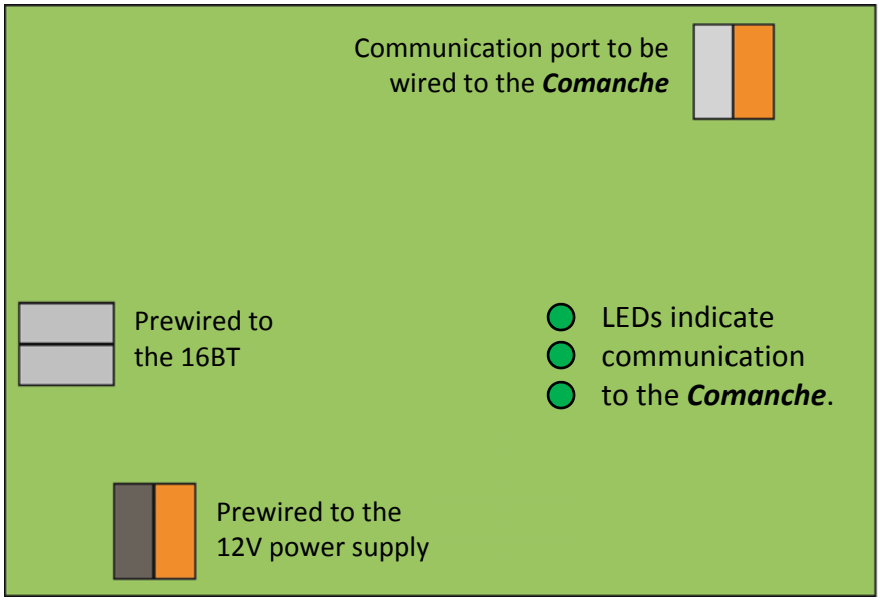
This is s C-8244+T with the following configuration:

Slot 1: Analog Monitoring Card 4 Channels
Slot 2: Analog Monitoring Card 4 Channels
Slot 3: Analog Control Card 2 Channels
Slot 4: Empty
Slot 5: Tomahawk Controller Card 1 Channel
Slot 6: Empty
Slot 7: Digital Monitoring Card 4 Channels
Slot 8: Digital Control Card 4 Channels
Slot 9: MODBUS Communication Card
Slot 10: CPU-Card

13.0 Appendix B

13.1 Schematic of a *Tomohawk* Rectifier Controller Card

The following picture shows an example of where the terminals are located on a typical ***Tomohawk*** card, your card might have a different configuration:



Be sure to check the polarity on the communication line to the *Comanche*.

Comanche Configuration Form

Version :1.0 Rev. 1

Serial Number		**Production Date**		Installer company	
Location name				Installation Date	
Customer				Installed by	

Module Description

Product Name	**Comanche**			**Elite**	**C-3 1 2 1**
Communication Source (e.g. Telephone, Radio, serial, linked)					
Communications Interface		**D-SUB 9**	**D-SUB 25**	**Western**	**Current Loop**
BKM	**int. / ext.**	**Serial No.**		**Software Ver.**	
Power Supply	**AC / DC**	**Volts**	**Battery Back-Up**		**Yes / No**
Factory set Address					
Options					

Backplane Configuration

	Slot 1	**Slot 2**	**Slot 3**	**Slot 4**	**Slot 5**	**Slot 6**	**Slot 7**	**Slot 8**	**Slot 9**	**Slot 10**
Type										
S. No.										

Channel Configuration

Chn	Terminal	Type	Range	Connected to	Chn	Ter	Type	Range	Connected to
1	J12-J13				17	J52-			
2	J14-J15				18	J54-			
3	J16-J17				19	J56-			
4	J18-J19				20	J58-			
5	J22-J23				21	J62-			
6	J24-J25				22	J64-			
7	J26-J27				23	J66-			
8	J28-J29				24	J68-			
9	J32-J33				25	J72-			
10	J34-J35				26	J74-			
11	J36-J37				27	J76-			
12	J38-J39				28	J78-			
13	J42-J43				29	J82-			
14	J44-J45				30	J84-			
15	J46-J47				31	J86-			
16	J48-J49				32	J88-			

Installation

Location Name		Module Id.	
Telephone Number		Radio Id.	
Init String		Password	
Modem/Radio Brand		Modem Model	
Station Address		Date of 1st contact	