CRITTENDEN CONVERSION CORPORATION
MOSES LAKE, WASHINGTON

VACUUM BRIDGE GUIDE 2003

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VARIABLE FREQUENCY DRIVE SM405 PARAMETER TABLE
OIT TROUBLESHOOTING

5

System Overview

The bridge guide 2003 control system has been designed to provide automatic and manual opening width changing control for upper, middle and lower bridge guide stations.

Guides are moved with three 1/4 HP motors. Variable Frequency Drives (VFD) are used to drive the motors with two different speeds low and high. Positioning feedback information comes from the hollow shaft quadrature encoders, which send impulse sequences to the Programming Logic Controller (PLC). The PLC is used for processing these sequences and providing control signals to move and stop guides at desired positions.

The blower unit with a 5 HP motor is used as a vacuum source for all vacuum chambers. Three MORE-LESS vacuum motors control the level of vacuum in the vacuum chambers. Three solenoids allow vacuum quick dump.

Operators can read and change vacuum and current position values for all stations from the Operator Interface Terminal (OIT) screen, guides may be moved using manual switches on the Main and Remote panel.
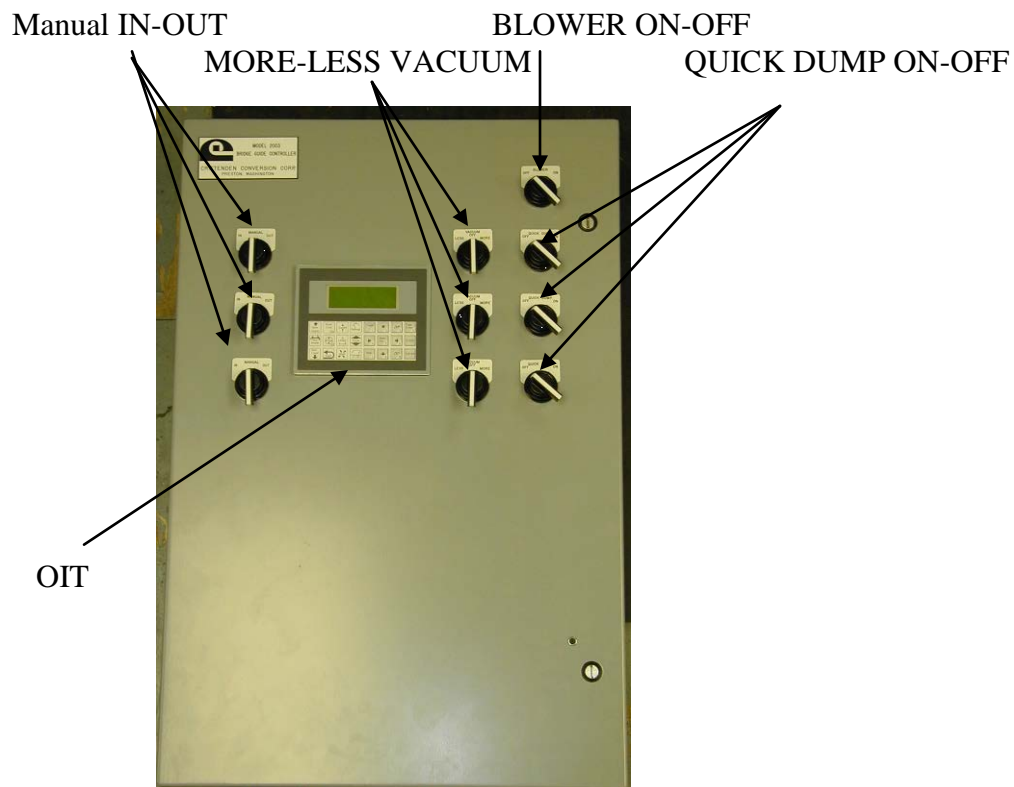

Figure 1. Main Panel front view

Two additional "Manual IN-OUT" switches locate on the opposite BLOWER side of the bridge to provide manual positioning control for the operator.
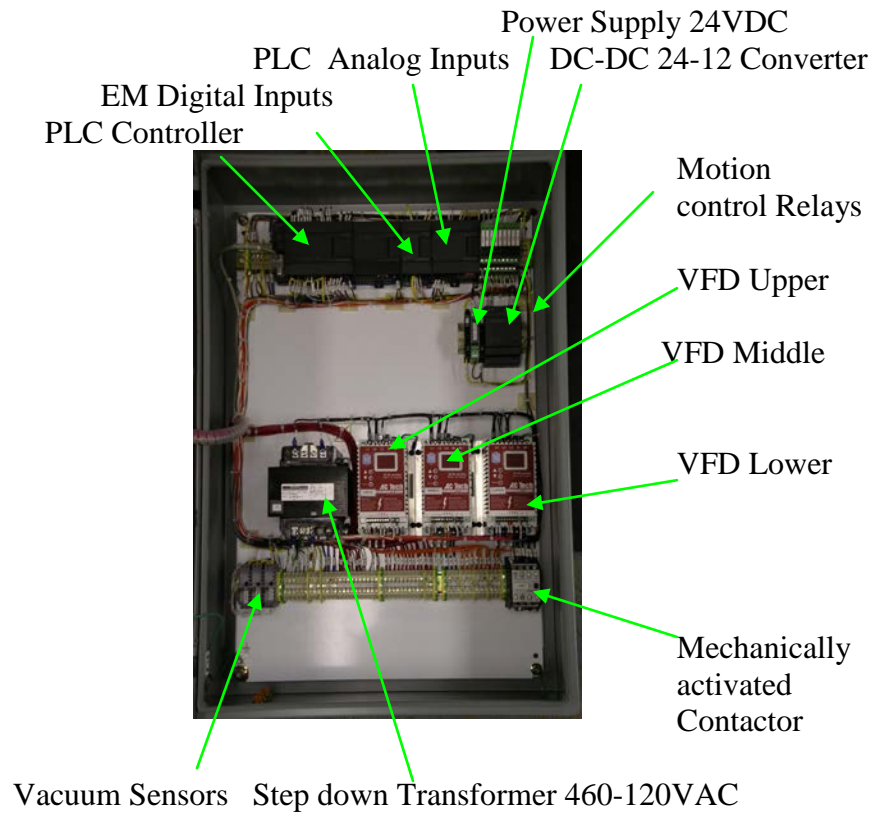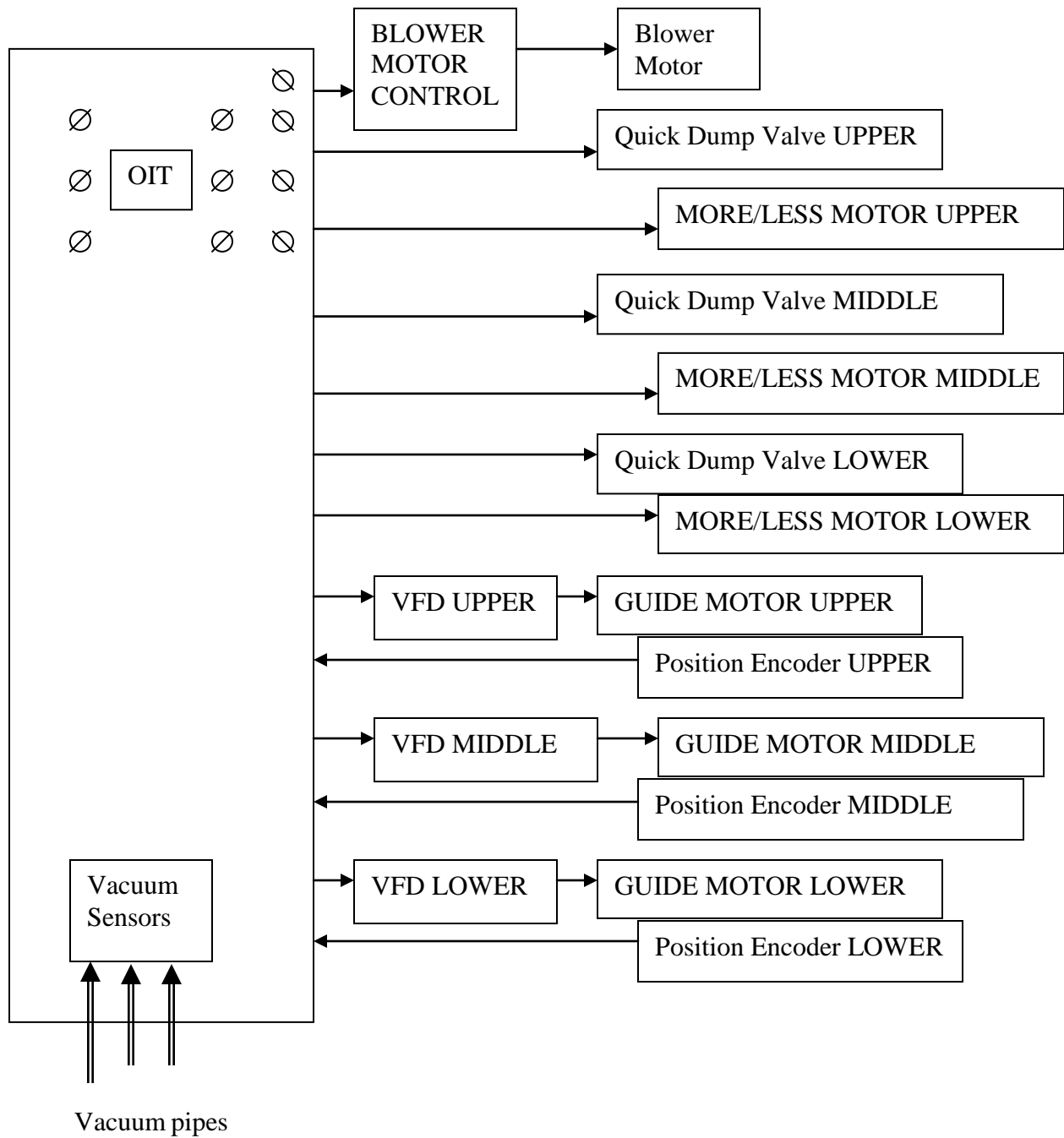
Figure 2. Main Panel inside view.

Figure 3. Diagram of System Configuration

Before Start

1. Connect 3 phase 480VAC from the 15 AMP source to the inputs (L1, L2, L3) mechanically activated contactor in the Main panel. Run all high voltage wires separate from the low voltage and control wires.
2. Close the panel and make sure door is closed tightly.
3. After the introduction logo message appears on the Operator Interface Terminal (OIT) screen, turn "Blower ON/OFF" switch ON.
4. Check rotational direction of Blower. Swap the input two power wires if wrong.
5. Use "Manual IN/OUT" switches for all stations to move guides from the limit switches into the working area (Trip Arm is located between two limits). Check for the correct motion direction. Swap wires on the motors if wrong.
6. Guides must stop when they reach limit switches. Check limit switches (Normally Closed) and wiring if guides do not stop.

SYSTEM SETUP

1. Make sure that Guides are locating in the working area (Trip Arm is located between limit switches). If not move them manually or use "Manual IN/OUT" switches.

Attention!!!   **Do not try "Move home" until you make sure that the Guides are located between limit switches and Limit switches properly wired and tested.**

2. Push "Home" key.

   - On the message "Home? " Select "Yes"

   - To Stop Guide movement push "Stop" key or

   - On message "Maximum width" enter measured width values for all stations (values can be **Metric** or **English**)

   - Push Enter

   - Push Yes

   - On message "Minimum width" enter measured width values for all stations (values can be **Metric** or **English**).

   - Push Enter

   - Push Yes
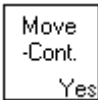
3. System is ready. Numbers are now saved into the memory. Switching power OFF/ON does not change them. (It is possible to lose that setting if system remains OFF for more than 6 months.)

Vacuum adjustment procedure

1) Push button

On the screen you will see

2) Push - Yes

3) Enter password 0000

Turn off Blower.

On the screen you will see

Current Vacuum Readings for Upper/Middle/Lower
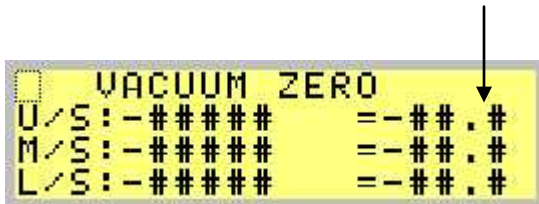
4) Use and to chose Upper, Middle or Lower station

5) Use and to Increase or Decrease Zero adjustment numbers

Or Push and enter numbers, and then Push

6) Change numbers until Current readings equal zero

7) Push

Turn ON Blower and put paper on the vacuum chambers. Use vacuum meter gage to compare with readings.

On the screen you will see

8)

9) Adjust slope similar with procedure described above. Use "More-Less" vacuum adjustments to set values in maximum (~15-20) and medium (~7-10).
10) Return to the previous screen and repeat ZERO adjustment if it's necessary.

BG 2003 Operation

Crittenden
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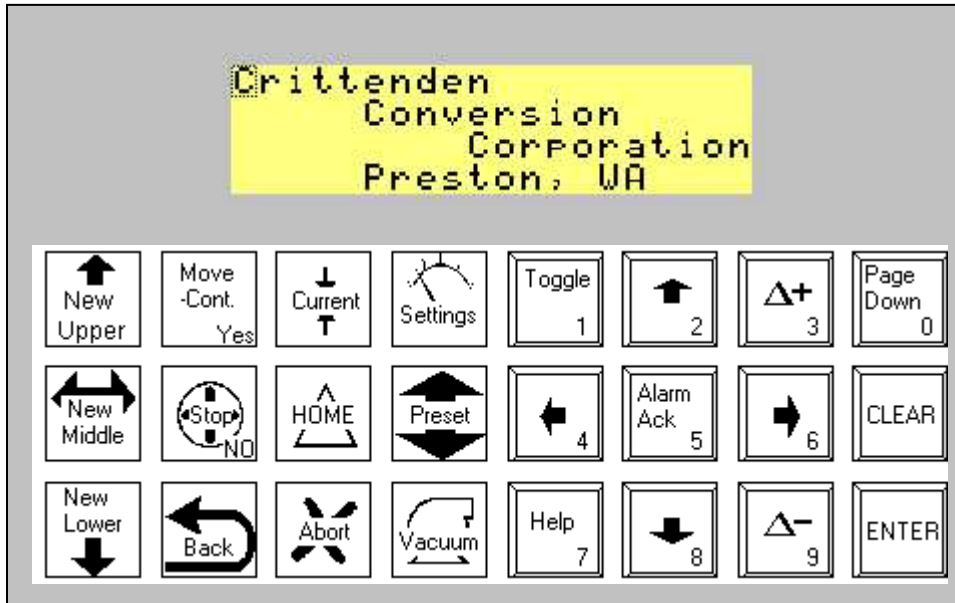
2. Get Help

- Push and hold "Help [7]" key
- Read Help screen

3. **See current Width**.
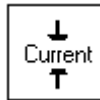
- Push "Current" key

4. **See current Vacuum readings**.
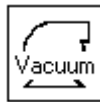
- Push "Vacuum" key.

5. **Enter New Upper station width** (values can be **Metric** or **English**).

- Push "New Upper" key;

- Push "Clear",

- Enter numbers (for example: 44.5 >   4, 4, 5)

ENTER

- Push "Enter"

Move
-Cont.
Yes
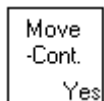
- Push "Yes"

6. **Enter New Lower station width** (values can be **Metric** or **English**).

New
Lower
↓

- Push "New Lower" key;

CLEAR
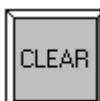
- Push "Clear",
- Enter numbers (for example: 44.5 > 4, 4, 5)

ENTER

- Push "Enter"
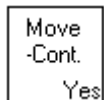
Move
-Cont.
Yes

- Push "Yes"

7. **Enter New Middle station width** (values can be **Metric** or **English**).

↔
New
Middle

- Push "New Middle" key;

CLEAR

- Push "Clear",
- Enter numbers (for example: 44.5 > 4, 4, 5)

ENTER

- Push "Enter"
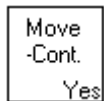
Move
-Cont.
Yes

- Push "Yes"

8. **Move to the new width**.

Move
-Cont.
Yes
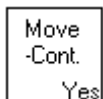
- Push "Move"

- Check numbers on the screen "from 44.5 to 75.2"

- Push "Move"

9. Stop when moving.

- Push "Stop"

- On the message "Continue or Back" select "Move" or "Back"
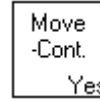
10. Move Home.

- Push "Home" key.

- On the message "Home? " Select "Yes" or "NO"
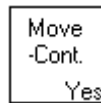
- You can stop any time to push "Stop" key.
- On message "Maximum width" enter measured width values for all stations
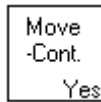
- Push Enter

- Push Yes
- On message "Minimum width" enter measured width values for all

  stations. Push Enter

- Push Yes
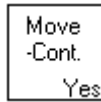
11. **Abort motion and operation – Reset controller**.

- Push "Abort" or Turn power Off

- On message "Abort everything?" select "Yes".

12. Change settings. (Vacuum scale and slope, distance before speed slow down, demo mode)

- Push "Settings" key

- On the message "Are you sure to change settings?" select "Yes",
- Enter password 0000,
- Change settings

13. Change Preset.

- Push "Preset" key.

- Push "clear",
- Enter new preset value.

- Push Enter

- Push "Page Down"

- On the message "Assign to new Upper Width?" Select "Yes" or
"No"

- On massage "Assign to new Lower Width?" select "Yes" or "No"

- ….."Swap Upper new and Lower new"

- ….." Assign to Upper new to lower new?"
- ….." Assign to Lower new to Upper new?"
- ….." Assign to Upper new to Middle new?"
- ….." Assign to Preset to Middle new?"

14. Stop Alarm

- Push "Alarm Acknowledgment"
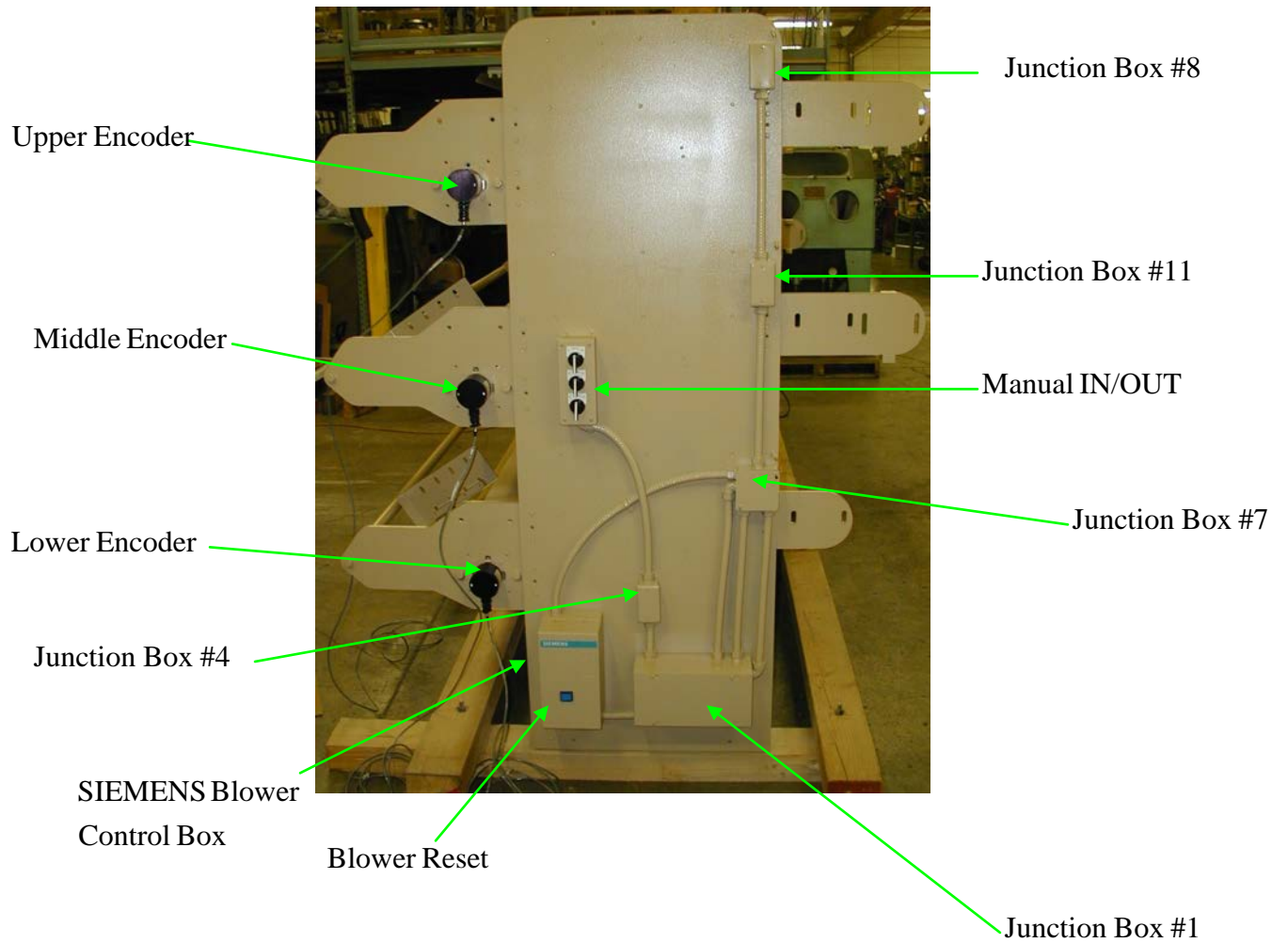
Figure 4. Manual switches side.
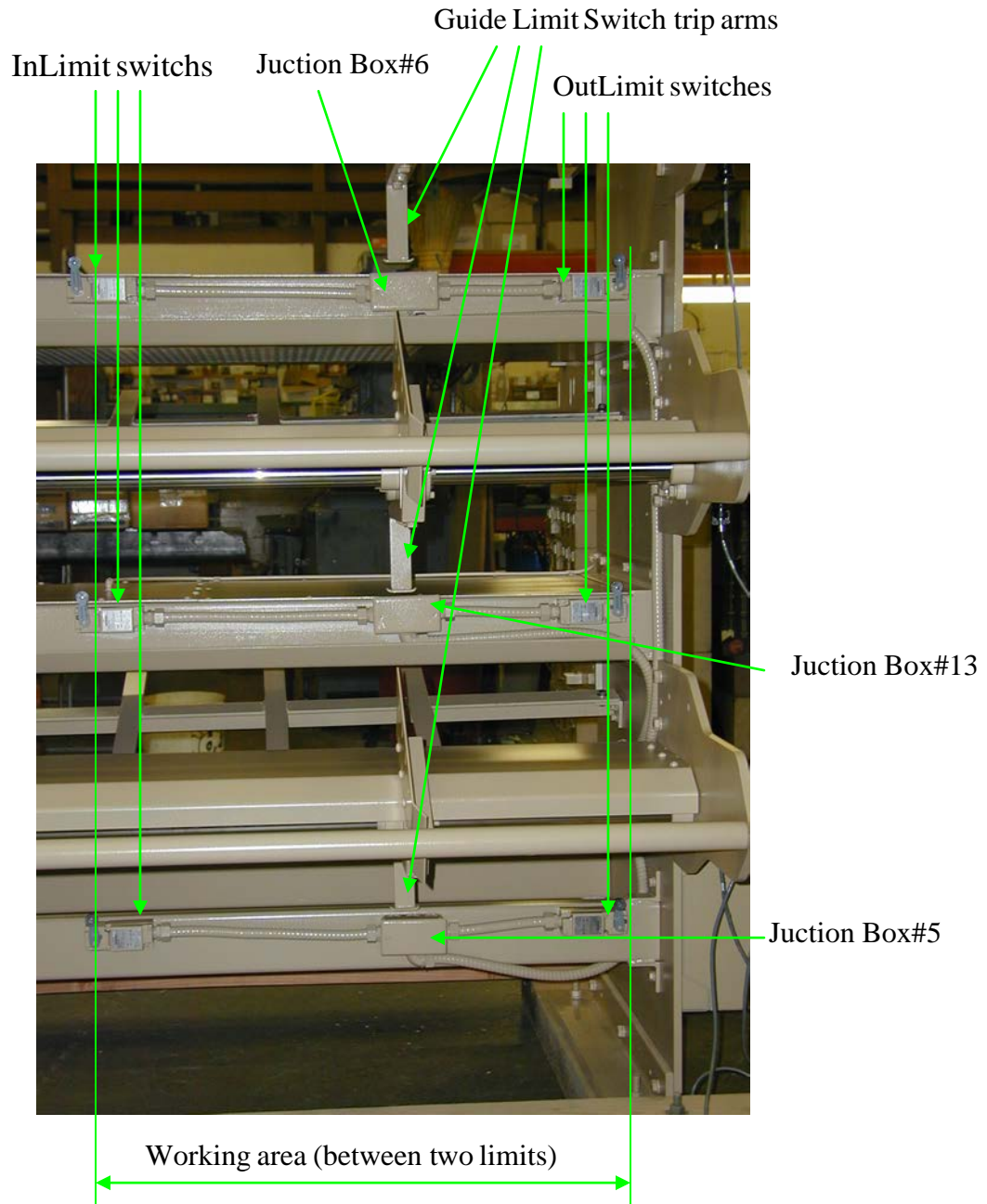
Figure 5. Limit Switches

Figure 6. Blower side

Junction Box#9

Upper Quick Dump Solenoid

Middle Quick Dump Solenoid

Junction Box#12

Blower Motor

Lower Quick Dump Solenoid

Junction Box#10
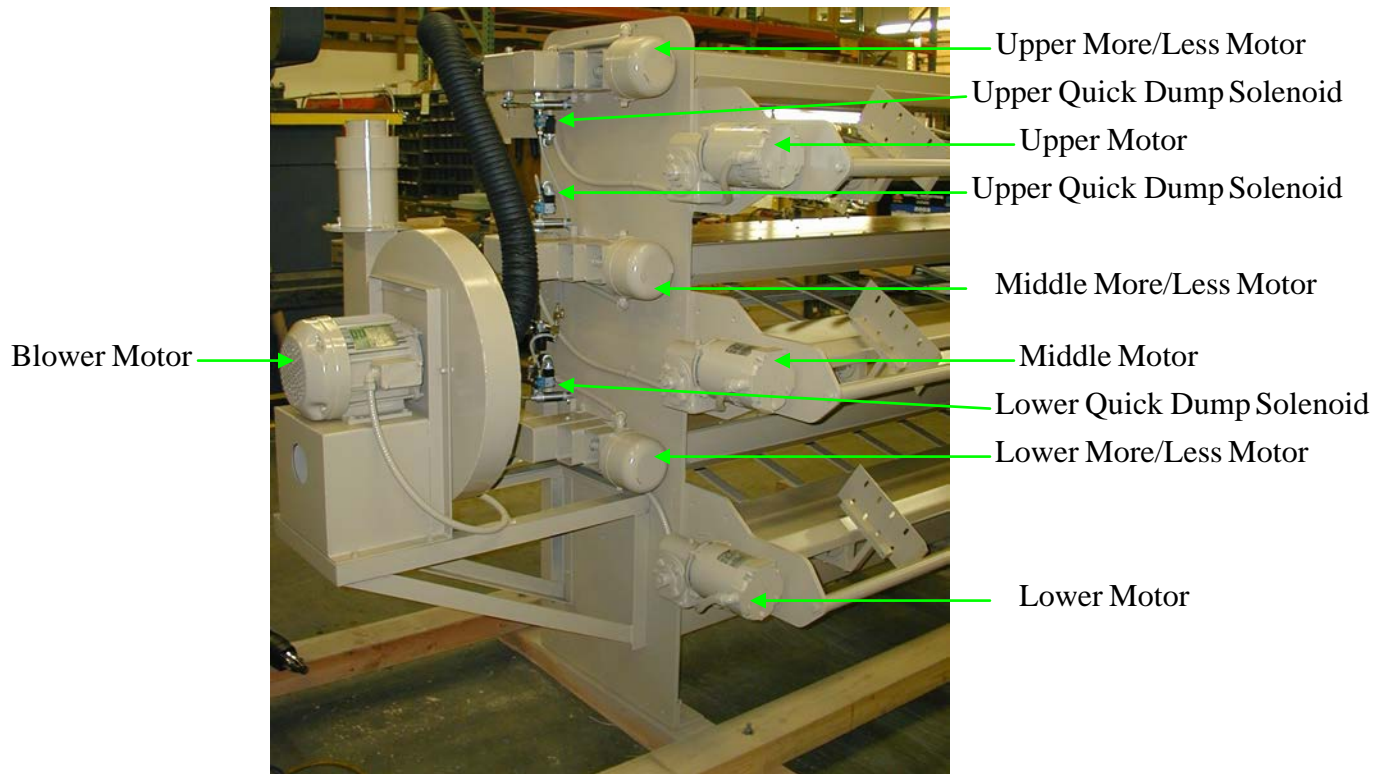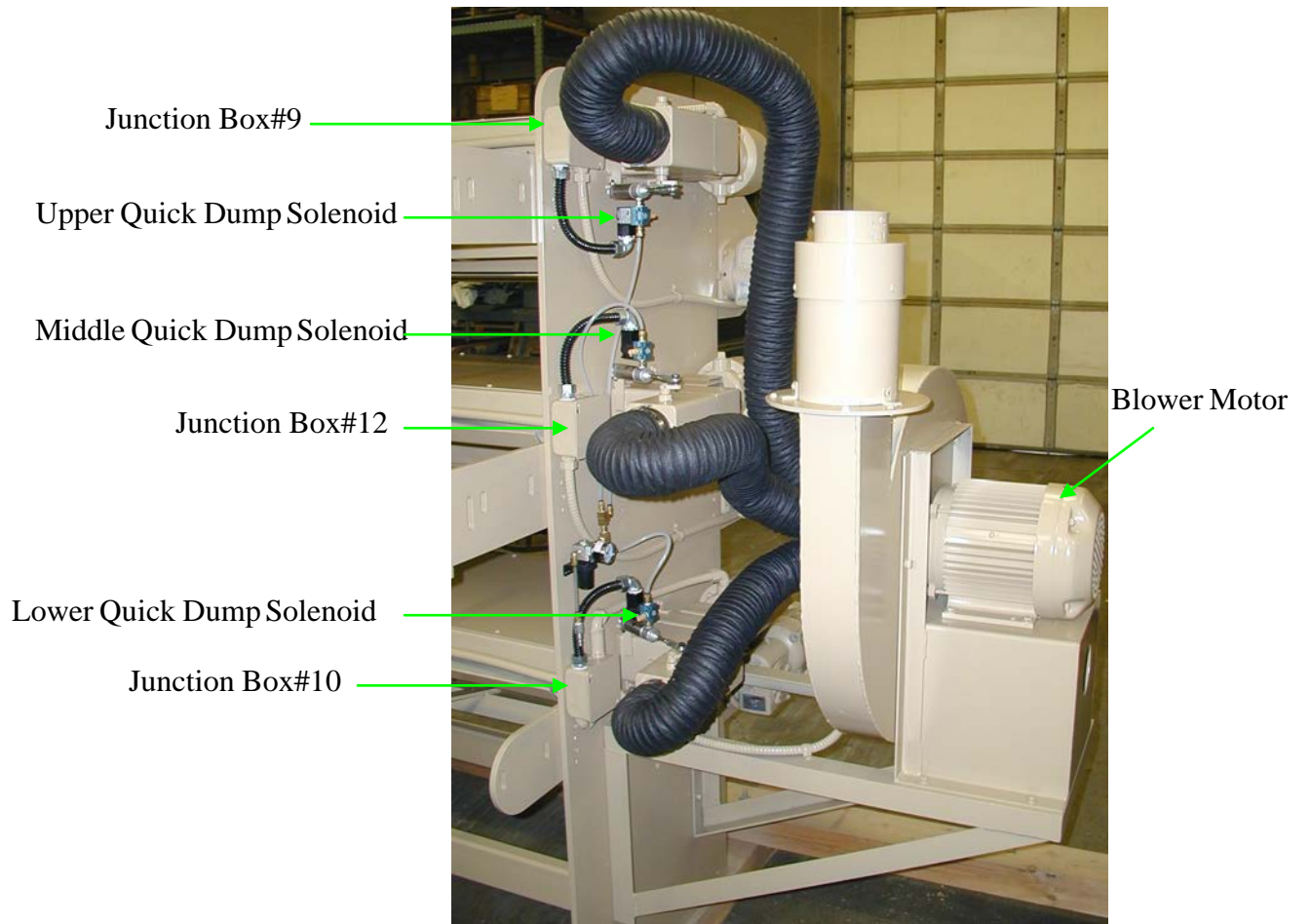
Figure 7. Blower

Troubleshooting

ACTION	SCREEN/SYSTEM	POSSIBLE SOURCE OF PROBLEM	SOLUTION
System power on	The OIT screen is dark and -Manual IN and OUT does not work	No power 440VAC or 110 VAC No power 24 VDC.	Check the main panel door Is it completely closed? Check 440/110 Vac. Check the fuses in the main panel. Check 24 Vdc from the power supplies in the main panel.
System power on	The OIT screen is dark and -Manual IN and OUT does work	No power to OIT.	Check wires from terminal to the OIT in the main panel.
System power on	Error message on the OIT screen	Read message and follow recommendation on the screen and HELP screen.	Read message and follow recommendation on the screen
No motion	No messages	- Corresponding Control relays failed - VFD failed	Open main panel Power up manually and check error code from the VFD display. Check corresponding relays cause of the problem.
Checking vacuum	Readings "00" does not changing when using More or Less switch Blower working properly.	There is no paper. Vacuum pipe is not on vacuum sensor or bad sensor.	Check fuse or 12 DC on the sensor's terminals. .Install pipe or replace pipe or sensor
Start Blower	Blower starts but no vacuum	- No paper - Wrong rotational direction	- Put paper - Swap 2 input power wires
Start Blower	Blower does not start.	Overload protection relay turned off. No 460 VAC 3Phase power.	Push reset on the Blower control panel. Check 460 VAC 3 Phase power source.

Start More-Less	More-Less does not work	No power 110 VAC from the main panel or switch or "more less" motor does not work	Check power 110 VAC from main panel to the More-less switch and to the More-less motor
Start motion	Guides move into wrong direction	Wrong 3 phase power phasing	Swap two input 3 phase power wires on the corresponding motor.
Start motion	Numbers move in wrong direction	Wrong encoder phasing	Swap A and B channel encoder wires.
Start motion	Screen show motion screen but no any motion	- Check next width numbers for out limit values. - Check VFDs for possible errors	- Reenter correct next width -Open main panel. Power up and check for error messages on VFDs.

BG3 PLC DIGITAL INPUTS

	INPUTS	Device	Wires #	PLC ADDRESS
1 2	Upper station Positioning Encoder Pulses	Upper Encoder Ch A Ch B	A B	I0.0 I0.1
3	Upper station Manual IN	Switch Upper Manual In/Out	1	I0.2
4 5	Lower station Positioning Encoder Pulses	Lower Encoder Ch A Ch B	E F	I0.3 I0.4
6	Upper station Manual OUT	Switch Upper Manual In/Out	2	I1.4
7	Lower station Manual IN	Switch Lower Manual In/Out	5	I1.3
8	Lower station Manual OUT	Switch Lower Manual In/Out	6	I1.5
9	Upper station LIMIT switch	Upper Limit switches	7	I1.2
10	Lower station LIMIT switch	Lower Limit switches	9	I0.5
11	Upper Drive Fault	VFD Upper	UF	I1.0
12	Lower Drive Fault	VFD Lower	LF	I1.1
13 14	N/U N/U		N/U N/U	
1 2	Middle station Positioning Encoder Pulses	Ch A Ch B	C D	I0.6 I0.7
3	Middle station Manual IN	Switch Middle Manual In/Out	3	I2.2

4	Middle station Manual OUT	Switch Middle Manual In/Out	4	I2.3
5	Middle station LIMIT switch	Middle LIMIT switch	8	I2.4
6	Middle Drive Fault	VFD Middle	MF	I2.5
7	N/U			I2.6
8	N/U			I2.7

BG3 PLC ANALOG INPUTS

INPUTS	Device	Wires##	PLC ADRESS
Vacuum sensor Upper	Vacuum sensor UP/PLC Analog Inputs module	A+	AIW0
Vacuum sensor Lower	Vacuum sensor Low/PLC Analog Inputs module	B+	AIW2
Vacuum sensor Middle		C+	AIW4

BG3 PLC DIGITAL OUTPUTS

	OUTPUTS	Device	Wires #	PLC ADDRESS
1	**Upper move Out**	**Relay Uout/VFD Upper**	**UOUT**	**Q0.0**
2	Upper move IN	Relay Uin /VFD Upper	UIN	Q0.2
3	Upper slow motion	Relay Uslow/ VFD Upper	USL	Q0.4
			LOUT	Q0.1
4	**Lower move Out**	**Relay Lout/ VFD Lower**		
5	Lower move IN	Relay Lin/ VFD Lower	LIN	Q0.3
6	Lower slow motion	Relay Lslow VFD Lower	LSL	Q0.5
7	**Middle move Out**	**Relay Mout/ VFD Middle**	MOUT	Q0.6

8	**Middle** move IN	Relay Min/ VFD **Middle**	MIN	Q0.7
9	**Middle** slow motion	Relay Mslow VFD **Middle**	MSL	Q1.0
10	N/U			Q1.1

BG3 ANALOG OUTPUTS

Outputs	Control	Device	Wires##	VOLTAGE
Upper more vacuum	Upper more/less switch	Upper more/less motor	10	110VAC
Upper less vacuum	Upper more/less switch	Upper more/less motor	11	110VAC
Lower more vacuum	Lower more/less switch	Lower more/less motor	15	110VAC
Lower less vacuum	Lower more/less switch	Lower more/less motor	14	110VAC
Upper Quick dump	Upper Quick dump switch	Upper quick dump valve	16	110VAC
Lower Quick dump	Lower Quick dump Switch	Lower quick dump valve	18	110VAC
Blower ON/OFF	Blower Switch ON/OFF	Blower contactor	19	110VAC
Middle more vacuum	Middle more/less switch	Middle more/less motor	12	110VAC
Middle less vacuum	Middle more/less switch	Middle more/less motor	13	110VAC
Middle Quick dump	Middle Quick dump Switch	Middle quick dump valve	17	110VAC

POWER BUDGET

Triple Station

System power Budget	440VAC		15 Amp source
System requirements:	Units Number	Amps per unit	Total amps
Transformer 440/110	1	0.73	0.73
VFDrives 1 hp (2.5 A) 0.5 hp (1.4 A)	3	2.5(1.4)	7.5(4.2)
Blower motor 5 hp 6.2 Amp 460VAC	1	6.2	6.2
Total (A)=			14.43(11.13)
24VDC Power Budget	24VDC		
Power supply on CPU	0.28 Amp		No fuse
System requirements	Units Number	Amps per unit	Total amps
relays (outputs)	9	0.007	0.063
Total (A)=			0.063

Power supply External	1.3 Amp		Fuse inputs 1.5 AMP
System requirements	Units Number	Amps per unit	Total amps
OIT	1	0.1	0.1
DC/DC 24/12VDC	1	0.15	0.15
CPU 224	1	0.9	0.9
Extension Module 6ES7221-1BF20-0XA0	1	0.05	0.05
Extension Module EM235	1	0.05	0.05
Total (A)=			1.25

110VAC			
Power supply	3.33 Amp		FUSE 4 AMP
System requirements	Units Number	Amps per unit	Total amps
110/24 power supply	1	0.48	0.48
Blower starter	1	0.8	0.8
More\less vacuum motor	3	0.6	1.8
Quick Dump solenoid	3	0.06	0.18
Total(A)=			3.26

12 VDC			
Power supply	1 Amp		Fuse 1 amps
System requirements	Units Number	Amps per unit	Total amps
Encoder	3	0.02	0.06
Inputs	18	0.004	0.072
Vacuum sensor ?	3	0.005	0.015
Total (A)=			0.147

Keys

Display showing:
```
Crittenden
    Conversion
        Corporation
Preston, WA
```
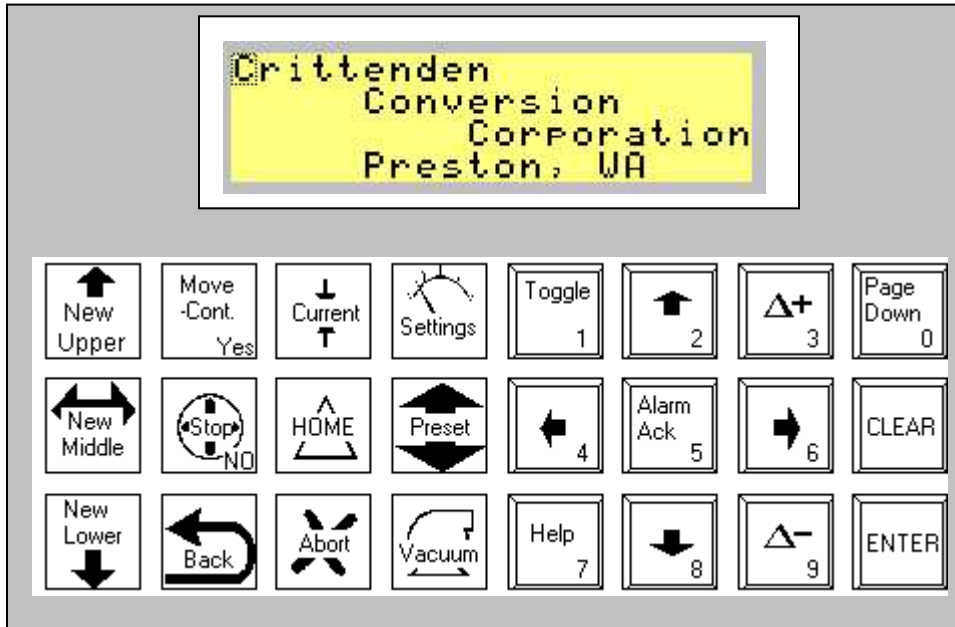
 - Activate Home Procedure

 - Enter NEW WIDTH for UPPER STATION

 - Enter NEW WIDTH for MIDDLE STATION

 - Enter NEW WIDTH for LOWER STATION
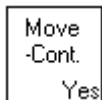
 - Start Move or Continue or YES

 - STOP MOTION or NO

 - Move back to previous position
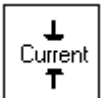
 - Show current for UPPER and LOWER STATIONS

 - ABORT all operation and reset controller

 - Change settings (Password protected)

 - Change preset and set preset
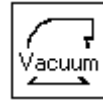
 - Show vacuum values for UPPER and LOWER stations

 - Get HELP on screen
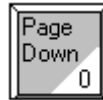
 - Scroll available screens

 - Clear value

 - Enter value

 - 3 or Increment value

 - 9 or Decrement value

 - 5 or alarm acknowledgement

 - 2 or cursor UP

 - 4 or cursor LEFT

 - 6 or cursor RIGHT

 - 8 or cursor DOWN

 - 1 or Toggle ON/OFF settings

SCREENS

Screen #1
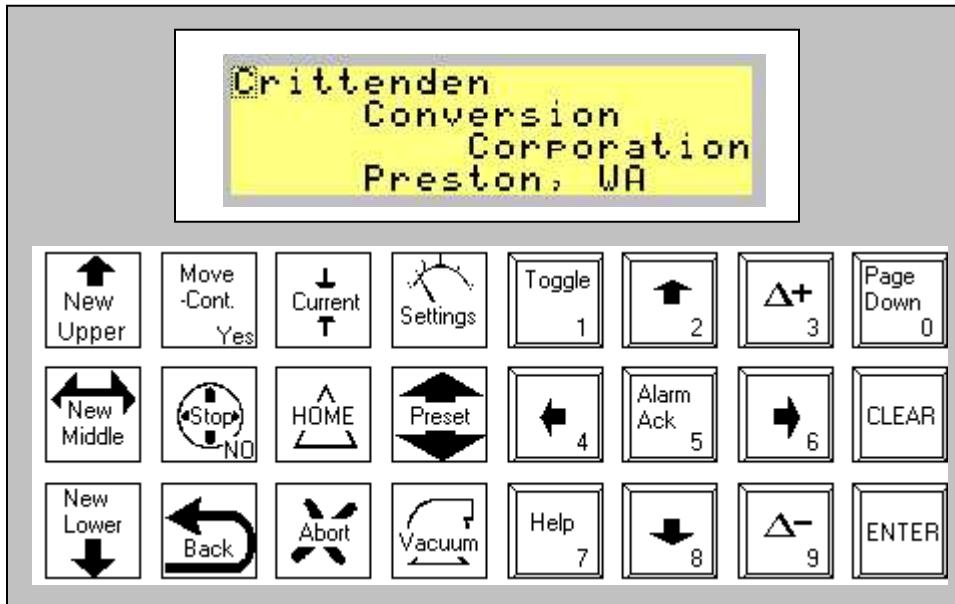
Screen Type:
Message
Start Up Screen
Control Buttons.
SDF8

- OPEN screen #17 "Move Home?"
No password
Chain screen.
Automatically go to the Screen #2 "Bridge Guide 2003 "
Time showed.
2 sec
Help screens.
Screen # 400

Screen #2
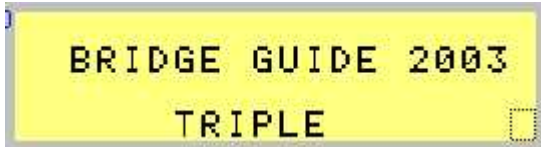
Screen Type:
Message
Control Buttons.

SDF8

- Open Screen #17 "Move Home?"
No password
Chain screen.
Automatically go to the Screen #3 "Information 800-755-7894"
Time showed.
5 sec
Help screens.
Screen # 400

Screen #3
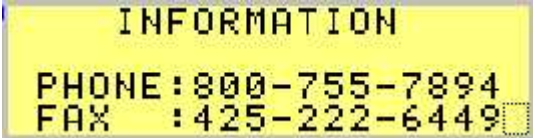
Screen Type:
Message
Control Buttons.
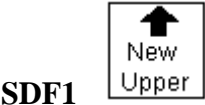
SDF1

Screen #4 "Upper new Width?"
    No password

SDF2
 Screen # 52 "Middle New Width"
    No password

SDF3
 Screen # 23 "Low station new width"
    No password

SDF4
Open Screen # 34 "Current Width"
    No password
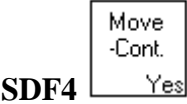
SDF5
Open Screen # 17 "HOME"

SDF6
Open Screen # 1 "Start UP"

SDF7

Open Screen # 34 "Current Width"

SDF8

 - Screen #17 "Move Home?"
No password
Chain screen.
Automatically go to the Screen #22 "Current WIDTH"
Time showed.
20 sec
Help screens.
Screen # 400

Screen #4


```
UPPER STATION
       WIDTH
CURRENT    =-###.##
NEW        -###.##
```
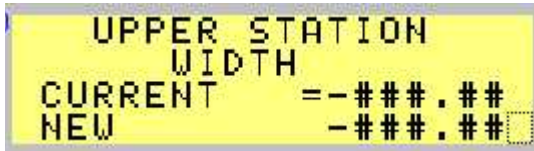
Screen Type:
Message
Control Buttons.

SDF2
 Screen # 52 "Middle New Width"
          No password

SDF3
 Screen # 23 "Low station new width"
          No password
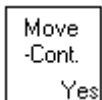
SDF4
 Open Screen # 31 "Move from to "
          No password

SDF5
Open Screen # 34 "Current width"

SDF6
Open Screen # Screen # 34 "Current width"

SDF7 ⊥ Current ⊤

Open Screen # 34 "Current Width"

SDF8 ∧ HOME

- Screen #17 "Move Home?"
No password

Chain screen.
Screen #34 "Current Width"
Time showed.
60 sec
Help screens.
Screen # 404

Screen #5

Screen Type:
Message Screen

Sound
Beep
Control Buttons.

SDF1

Screen #4 "Upper new Width?"
    No password

SDF7–   Open Screen # 34 "Current Width"

SDF8

 - Screen #17 "Move Home?"
No password

Chain screen.
#4 "New Upper Width"

Time showed.
10 sec
Help screens.
No

Screen #6
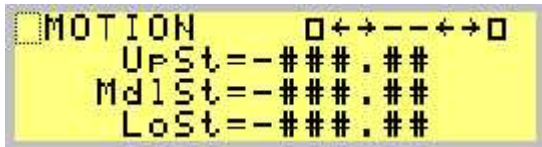
Screen Type:
Message
Control Buttons.

SDF5
Stop motion

SDF6
Back motion

Chain screen.
No
Time showed.
No
Help screens.
#406

Screen #7

MOTION STOP
BACK or CONTINUE

Screen Type:
Message

Control Buttons.
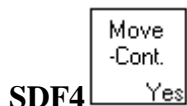
SDF4
Move -Cont. Yes
Continue Motion

SDF5
Stop NO
Open Screen # 34 "Current Width"

SDF6
Back
Return to privies position
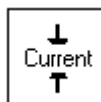
SDF7–
Current
Open Screen # 34 "Current Width"

SDF8
HOME

- Screen #17 "Move Home?"

Chain screen.
No
Time showed.
No
Help screens.
#407

Screen #8
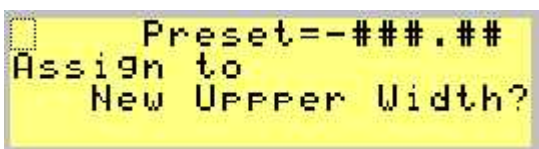
Screen Type:
Message
Control Buttons.
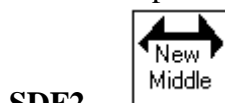
SDF1

Screen #4 "Upper new Width?"

      No password

SDF2

 Screen # 52 "Middle New Width"

      No password

SDF3

 Screen # 23 "Low station new width"

      No password

SDF4

 Enter Preset

      No password

SDF5

Open Screen # 34 "Current Width"

SDF6

Open Screen # 34 "Current Width"

SDF7–
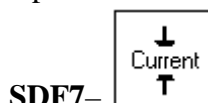
Open Screen # 34 "Current Width"

SDF8

 - Screen #17 "Move Home?"

Chain screen.
Forward #55
Backward #33
Time showed.
No
Help screens.
No

Screen # 9
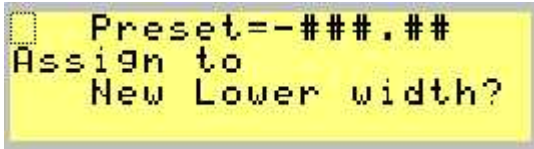
```
☐    Preset=-###.##
Assign to
      New Lower width?
```

Screen Type:
Message

Control Buttons.

SDF1
```
    ↑
  New
 Upper
```

Screen #4 "Upper new Width?"
    No password

SDF2
```
 ←New→
 Middle
```
Screen # 52 "Middle New Width"
    No password

SDF3
```
  New
 Lower
   ↓
```
Screen # 23 "Low station new width"
    No password

SDF4
```
 Move
 -Cont.
    Yes
```
    No password
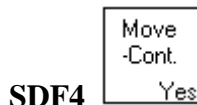
SDF5
```
 (←Stop→)
     NO
```
Open Screen # 38 "Swap Width"

SDF6
```
 ←
  Back
```
Open Screen # 34 "Current Width"

SDF7–
```
   ⊥
 Current
   T
```
Open Screen # 34 "Current Width"
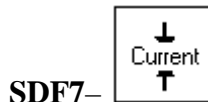
SDF8

 - Screen #17 "Move Home?"

Chain screen.
Forward #38
Backward #56
Time showed.
No
Help screens.
No

Screen #10

Screen Type:
Message
Sound .
 Beep.

Control Buttons.

SDF8

Screen #17 "Move Home?"
   No password

Chain screen.
Screen #17
Time showed.
255 sec
Help screens.
410

Screen #11

```
STOP LIMIT REACHED!
    CHECK ENCODER

    RUN HOME---→□
```

Screen Type:
Message
Sound .
 Beep.
Control Buttons.

SDF8
```
   ∧
 HOME
  ⌐_⌐
```

Screen #17 "Move Home?"
        No password

Chain screen.
Screen #17
Time showed.

Help screens.
#411

Screen #12

```
         VACUUM
   UPPER  =  -##.#
   MIDDLE =  -##.#      ☐
   LOWER  =  -##.#
```

Screen Type:
Message
Sound .
No
Control Buttons.

SDF1 ⬆ New Upper

Screen #4 "Upper new Width?"
            No password

SDF2 ↔ New Middle

 Screen # 52 "Middle New Width"
            No password

SDF3 New Lower ⬇

 Screen # 23 "Low station new width"
            No password

SDF4 Move -Cont. Yes

 Open Screen # 34 "Current Width"
             No password

SDF5 Stop NO

Open Screen # 34 "Current Width"
             No password

SDF6 ⬅ Back

Open Screen # 34 "Current Width"
             No password

SDF7

Open Screen # 34 "Current Width"

SDF8

 - Screen #17 "Move Home?"
No password
Chain screen.
Forward #34,
Backward #
Time showed.
Help screens.

Screen #13

Screen Type:
Message
Sound .
Beep
Control Buttons.

SDF8

Screen #17 "Move Home?"
        No password
Chain screen.
No
Time showed.
No
Help screens.
#413

Screen #14

Screen Type:
Message

Sound .
No
Control Buttons.

SDF4
Screen #17 "Move Home?"
        No password

SDF5
DEMO continue

Chain screen.

Time showed.
sec
Help screens.
#414

Screen #15

Screen Type:
Message

Sound .
No

Control Buttons.

SDF1
Screen #4 "Upper new Width?"

  No password

SDF2
 Screen # 52 "Middle New Width"

  No password

SDF3
 Screen # 23 "Low station new width"

  No password

SDF4
 Start DEMO

  No password

SDF5
Open Screen # 24 "Set all to default"

  No password

SDF6
Open Screen # 34 "Current Width"

  No password

SDF7

Open Screen # 34 "Current Width"

SDF8

 - Screen #17 "Move Home?"
No password
Chain screen.
FORWARD #24
BACKWARD #45
Time showed 5 sec
Help screens.415

Screen #16

Screen Type:
Message

Sound .
No
Control Buttons.

SDF5

              STOP

Chain screen.
No
Time showed.
No
Help screens.
No

Screen #17

Screen Type:
Message
Sound .
Beep
Control Buttons.
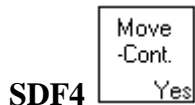
SDF4
Move Home

SDF5
Open Screen # 34 "Current Width"

SDF6
Open Screen # 34 "Current Width"

SDF7–
Open Screen # 34 "Current Width"
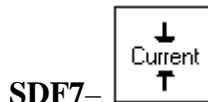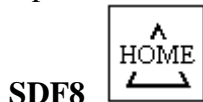
SDF8
Screen #17 "Move Home?"
        No password
Chain screen.
No
Time showed.
No
Help screens.
#417

Screen #18

Screen Type:
Alarm
Sound .
Continuous Beep
Control Buttons.

SDF8
Screen #17 "Move Home?"
        No password

Chain screen.
No
Time showed.
No
Help screens.

Screen #19
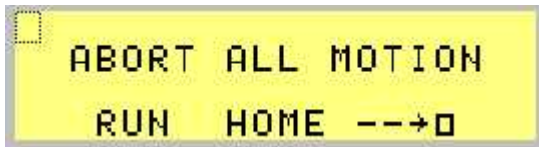
Screen Type:
Message

Sound .
Beep

SDF4
Screen #17 "Move Home?"
        No password

SDF5
Open Screen # 34 "Current Width "
Control Buttons.

SDF8
Screen #17 "Move Home?"
        No password

Chain screen.
17
Time showed.
No
Help screens.
#419

Screen #20

```
LOW STATION
CURRENT WIDTH
Max =-###.##
Min =-###.##
```

Screen Type:
Message
Sound .
No
Control Buttons.

SDF1
⬆ New Upper

Screen #4 "Upper new Width?"
        No password

SDF2
⬅New➡ Middle

 Screen # 52 "Middle New Width"
        No password

SDF3
New Lower ⬇

 Screen # 23 "Low station new width"
        No password

SDF4
Move -Cont. Yes

 Start DEMO
        No password

SDF5
(Stop) NO

                Open Screen # 24 "Set all to default"
        No password

SDF6
Back

                Open Screen # 34 "Current Width"
        No password

SDF7
⊥ Current ⊤

Open Screen # 34 "Current Width"

SDF8 ⌂HOME

- Screen #17 "Move Home?"

Chain screen.
Forward #57
Backward #22
Time showed.
5 sec
Help screens.
#420

Screen #21

Screen Type:
Message
Sound .
No
Control Buttons.

SDF5

         STOP
Chain screen.
No
Time showed.
No
Help screens.
No

Screen #22
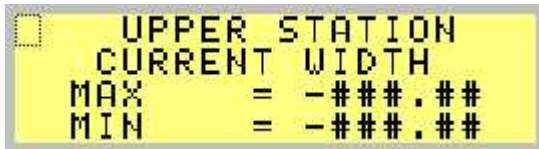
```
UPPER STATION
CURRENT WIDTH
MAX    = -###.##
MIN    = -###.##
```

Screen Type:
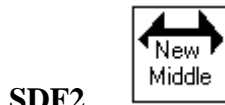Message
Sound .
No
Control Buttons.

SDF1
Screen #4 "Upper new Width?"
　　　No password

SDF2
 Screen # 52 "Middle New Width"
　　　No password

**SDF3**
 Screen # 23 "Low station new width"
　　　No password

SDF4
 Current width
　　　No password

SDF5
Open Screen # 24 "Set all to default"
　　　No password

SDF6
Open Screen # 34 "Current Width"
　　　No password

SDF7

Open Screen # 34 "Current Width"

SDF8

 - Screen #17 "Move Home?"
Chain screen.
Forward #20
Backward #3
Time showed.
5 sec
Help screens.
#420

Screen #23
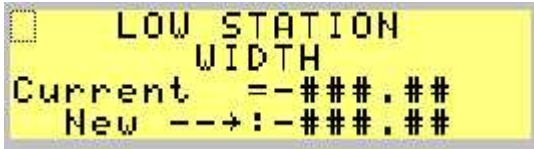
LOW STATION
WIDTH
Current   =-###.##
    New --→:-###.##

Screen Type:
Message
Sound .
No
Control Buttons.

SDF1
Screen #4 "Upper new Width?"
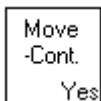   No password

SDF2
 Screen # 52 "Middle New Width"
        No password
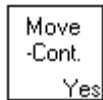
SDF4
 Start motion
        No password

SDF5
Open Screen # 24 "Set all to default"
        No password

SDF6
Open Screen # 34 "Current Width"
        No password

SDF7
Open Screen # 34 "Current Width"

SDF8 HOME

- Screen #17 "Move Home?"
Chain screen.
34
Time showed.
No
Help screens.
404

Screen #24

SET ALL VALUES TO DEFAULT

Screen Type:
Message
Sound .
No
Control Buttons.

SDF1 ↑ New Upper
Screen #4 "Upper new Width?"
        No password

SDF2 ↔ New Middle
 Screen # 52 "Middle New Width"
        No password

SDF3 New Lower ↓
 Screen # 23 "Low station new width"
        No password
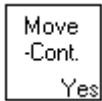
SDF4 Move -Cont. Yes
 Start set default values
         No password

SDF5 (Stop) NO
Open Screen # 24 "Set all to default"
         No password

SDF6 ← Back
Open Screen # 34 "Current Width"
        No password

63

SDF7

Open Screen # 34 "Current Width"

SDF8

 - Screen #17 "Move Home?"
Chain screen.
#47
Time showed.
20 sec
Help screens.
#403

Screen #25

```
PREVIOUS DATA
         WAS LOST

   RUN HOME     □
```

Screen Type:
Message

Sound .
Beep
Control Buttons.

```
   ∧
 HOME
 ∠‾‾‾
```

SDF8
Screen #17 "Move Home?"
        No password
Chain screen.
17
Time showed.
No
Help screens.
#425

Screen #26

```
 HOME MinWidth
MEASURE Up/S:-###.##
 AND    Mdl/S:-###.##
ENTER   Low/S:-###.##
```

Screen Type:
Message

Sound .
Beep
Control Buttons.

SDF4
```
Move
-Cont.
      Yes
```
Continue
      No password

SDF8
```
  ^
HOME
 __/
```
Screen #17 "Move Home?"
      No password
Chain screen.
No
Time showed.
No
Help screens.
#426

Screen # 27
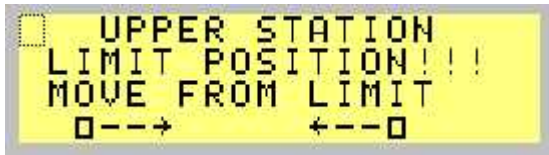
Screen Type:
Message
Sound .
NO
Control Buttons.
Chain screen.
Time showed.
No
Help screens.
427

Screen #28

```
  LOWER   STATION
VF DRIVE FAULT
     POWER OFF
   CHECK DRIVE
```

Screen Type:
Message

Sound .
Beep
Control Buttons.
Chain screen.
Time showed.
No
Help screens.
428

Screen #29

```
 LOWER STATION
LIMIT POSITION!!!
MOVE FROM LIMIT
  □--→      ←--□
```

Screen Type:
Message

Sound .
NO
Control Buttons.
Chain screen.
Time showed.
No
Help screens.
427

Screen #30

Screen Type:
Message

Sound .
NO
Control Buttons.

SDF4
Move

No password

SDF5
Open Screen # 34 "Current Width"

SDF6
Open Screen # 34 "Current Width"
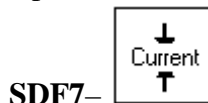
SDF7–   Open Screen # 34 "Current Width"

SDF8
Screen #17 "Move Home?"
No password
Chain screen.
NO
Time showed.
No
Help screens. 405

Screen #31

```
MOVE FROM    →    TO?
U/S=-###.## :-###.##
M/S=-###.## :-###.##
L/S=-###.## :-###.##
```

Screen Type:
Message

Sound .
NO
Control Buttons.

SDF1
Screen #4 "Upper new Width?"
          No password

SDF2
 Screen # 52 "Middle New Width"
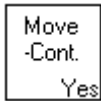   No password

SDF3
 Screen # 23 "Low station new width"
          No password

SDF4
 Move
          No password

SDF5
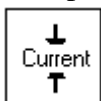Open Screen # 24 "Set all to default"
          No password

SDF6
Open Screen # 34 "Current Width"
          No password

71

SDF7

Open Screen # 34 "Current Width"

SDF8

 - Screen #17 "Move Home?"
Chain screen.
34
Time showed.
No
Help screens.
431

Screen #32

Screen Type:
Message
Sound .
NO
Control Buttons.

SDF4
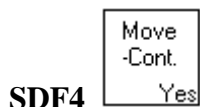
Yes change settings
No password
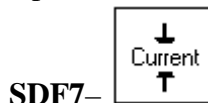
SDF5
Open Screen # 34 "Current Width"

SDF6
Open Screen # 34 "Current Width"

SDF7–   Open Screen # 34 "Current Width"

SDF8
Screen #17 "Move Home?"
     No password
Chain screen.
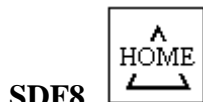
Time showed.
No
Help screens.

Screen #33
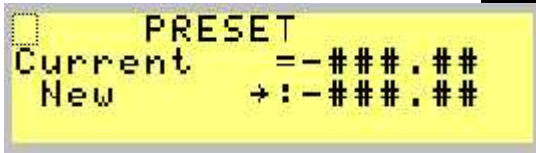
Screen Type:
Message

Sound .
NO

Control Buttons.

SDF1
Screen #4 "Upper new Width?"
        No password

SDF2
 Screen # 52 "Middle New Width"
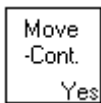   No password

SDF3
 Screen # 23 "Low station new width"
        No password

SDF4
Continue
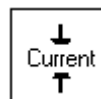   No password

SDF5
Open Screen # 24 "Set all to default"
        No password

SDF6
Open Screen # 34 "Current Width"
        No password

SDF7

Open Screen # 34 "Current Width"

SDF8

 - Screen #17 "Move Home?"
Forward #8
Backward #40
Time showed.
No
Help screens.
433

Screen #34

```
┌─ CURRENT WIDTH
UPPER       =-###.##
MIDDLE      =-###.##
LOWER       =-###.##
```

Screen Type:
Message

Sound .
NO
Control Buttons.

SDF1
Screen #4 "Upper new Width?"
         No password

SDF2
 Screen # 52 "Middle New Width"
         No password

SDF3
 Screen # 23 "Low station new width"
         No password
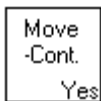
SDF4
 Move to next widths
          No password

SDF5
Open Screen # 24 "Set all to default"
          No password

SDF6

76

Open Screen # 34 "Current Width"
        No password

SDF8

 - Screen #17 "Move Home?"
Chain screen.
Forawrd #12
Backward #12
Time showed.
Help screens.
408

Screen #35

```
  HOME MaxWidth
Measure   U/S:-###.##
and    ---→M/S:-###.##
Enter     L/S:-###.##
```

Screen Type:
Message

Sound .
Beep

Control Buttons.
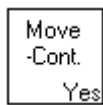
SDF4

YES continue after Max width entered

SDF5

Open Screen # 24 "Set all to default"
        No password

SDF6

Open Screen # 34 "Current Width"
        No password

SDF8

 - Screen #17 "Move Home?"

Chain screen.
NO
Time showed.
NO
Help screens.
NO

Screen #36

Screen Type:
Alarm
1 sec
Sound .
 Beep.
Control Buttons.

SDF1
Screen #4 "Upper new Width?"
        No password

SDF2
 Screen # 52 "Middle New Width"
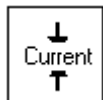   No password
        No password

SDF6
Open Screen # 34 "Current Width"
        No password
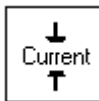
SDF7
Open Screen # 34 "Current Width"

 SDF8

 - Screen #17 "Move Home?"
Chain screen.
Screen #23
Time showed.
60 sec
Help screens.
#

Screen #37

```
□  LOWER STATION
       NO PULSES!!!
    FROM ENCODER
       RUN HOME---→□
```

Screen Type:
Alarm
1 sec
Sound .
 Beep.
Control Buttons.

```
      ^
    HOME
    ⌐___→
```
SDF8
Screen #17 "Move Home?"
        No password
Chain screen.
Time showed.
60 sec
Help screens.
#

Screen #38
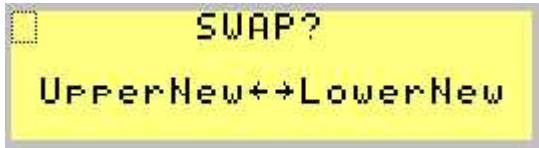
Screen Type:
Message

Sound .
NO

Control Buttons.

SDF1
Screen #4 "Upper new Width?"
    No password

SDF2
 Screen # 52 "Middle New Width"
    No password

SDF3
 Screen # 23 "Low station new width"
    No password

SDF4

                                    Yes Swap

    No password

SDF5
Open Screen # 24 "Set all to default"
    No password

SDF6

81

Open Screen # 34 "Current Width"
No password

SDF7

Open Screen # 34 "Current Width"

SDF8

- Screen #17 "Move Home?"

Chain screen.
Forward #39
Backward #9

Time showed.
No
Help screens.

Screen #39
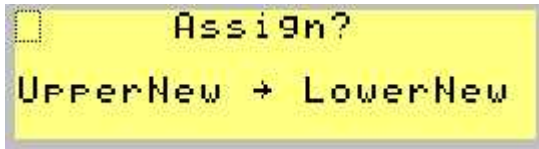
Screen Type:
Message

Sound .
NO
Control Buttons.

SDF1
Screen #4 "Upper new Width?"
　　　No password

SDF2
Screen # 52 "Middle New Width"
　　　No password

SDF3
Screen # 23 "Low station new width"
　　　No password
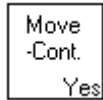
SDF4
Yes Assign
　　　No password

SDF5
Open Screen # 24 "Set all to default"
　　　No password

SDF6
Open Screen # 34 "Current Width"
　　　No password

SDF7

Open Screen # 34 "Current Width"

SDF8

 - Screen #17 "Move Home?"
Chain screen.
Forward #40
Backward #38

Time showed.
No
Help screens.

Screen #40

Screen Type:
Message

Sound .
NO
Control Buttons.

SDF1
Screen #4 "Upper new Width?"
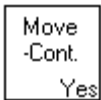   No password

SDF2
 Screen # 52 "Middle New Width"
        No password

SDF3
 Screen # 23 "Low station new width"
        No password

SDF4
Yes Assign
        No password

SDF5
Open Screen # 24 "Set all to default"
        No password

SDF6

85

Open Screen # 34 "Current Width"
         No password

SDF7 ⊥ Current ⊤

Open Screen # 34 "Current Width"

SDF8 Λ HOME

 - Screen #17 "Move Home?"
Chain screen.
Forward #33
Backward #39

Time showed.
No
Help screens.

Screen #41

```
STOP HOME
Continue?
```
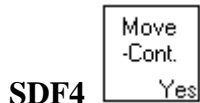
Screen Type:
Message

Sound .
NO
Control Buttons.

SDF4
```
Move
-Cont.
     Yes
```
Yes
No password

SDF5
```
(Stop)
      NO
```
Open Screen # 34

SDF6
```
Back
```
Open Screen # 17

SDF7–
```
Current
```
Open Screen # 34 "Current Width"
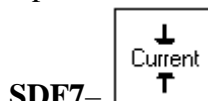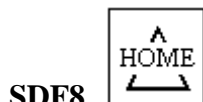
SDF8
```
HOME
```
Screen #17 "Move Home?"
No password
Chain screen.
Time showed.
No
Help screens.

Screen #42

Screen Type:
Message
Sound .
NO
Control Buttons.

SDF1
Screen #4 "Upper new Width?"
> No password

SDF2
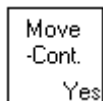 Screen # 52 "Middle New Width"
> No password

SDF3
 Screen # 23 "Low station new width"
> No password

SDF4
Vacuum #43
> No password

SDF5
Open Screen # 24 "Set all to default"
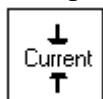> No password

SDF6
Open Screen # 34 "Current Width"
> No password

SDF7

Open Screen # 34 "Current Width"

SDF8

 - Screen #17 "Move Home?"
Chain screen.
#34
Time showed.
No
Help screens.

Screen #43

```
┌─┐ VACUUM ZERO
│ │ U/S:-#####    =-##.#
M/S:-#####    =-##.#
L/S:-#####    =-##.#
```

Screen Type:
Message

Sound .
NO
Control Buttons.

SDF6 [Back]
Open Screen # 34

SDF7– [Current]   Open Screen # 34 "Current Width"

SDF8 [HOME]
Screen #17 "Move Home?"
        No password
Chain screen.
Forward #44
Backward #47

Time showed.
No
Help screens.

Screen #44

```
VACUUM SLOPE
U/S:-######    =-##.#
M/S:-######    =-##.#
L/S:-######    =-##.#
```

Screen Type:
Message

Sound .
NO
Control Buttons.

SDF6 [Back]
Open Screen # 34

SDF7– [Current]   Open Screen # 34 "Current Width"

SDF8 [HOME]
Screen #17 "Move Home?"
        No password
Chain screen.
Forward #45
Backward #43

Time showed.
No
Help screens.

Screen #45

Screen Type:
Message
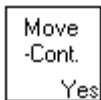
Sound .
NO
Control Buttons.

SDF6
Open Screen # 34

SDF7–   Open Screen # 34 "Current Width"

SDF8
Screen #17 "Move Home?"
          No password
Chain screen.
Forward #15
Backward #44

Time showed.
No
Help screens.

Screen #46

```
DEMO MODE
UpSt=-###.##
M/S =-###.##
LowS=-###.##
```

Screen Type:
Message

Sound .
NO
Control Buttons.

SDF5
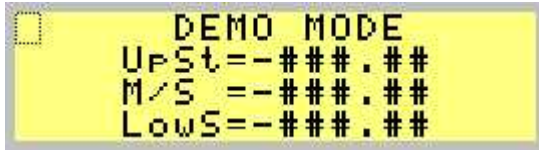
                     STOP DEMO

Chain screen.

Time showed.
No
Help screens.

Screen #47

Screen Type:
Message

Sound .
NO
Control Buttons.

 - 2 or cursor UP

 - 8 or cursor DOWN

 - 1 or Toggle ON/OFF settings

SDF6
Open Screen # 34
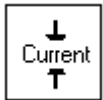
SDF7–   Open Screen # 34 "Current Width"

SDF8
Screen #17 "Move Home?"
          No password

Chain screen.
Forward #43
Backward #0

Time showed.
10 sec
Help screens.

Screen #48

Screen Type:
Message

Sound .
3 beps
Control Buttons.

Chain screen.
Forward #43
Backward #0

Time showed.
10 sec
Help screens.

Screen #50

```
■MIDDLE  STATION
LIMIT POSITION!!!
MOVE FROM LIMIT
    □--→        ←--□
```

Screen Type:
Message

Sound .
3 beps
Control Buttons.

Chain screen.

Time showed.
Help screens.

Screen #51

Screen Type:
Message

Sound .
3 beps
Control Buttons.

Chain screen.

Time showed.
Help screens.

Screen #52
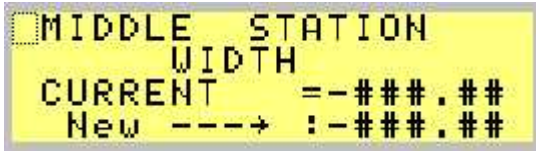
Screen Type:
Message

Sound .
3 beps
Control Buttons.

SDF1
Screen #4 "Upper new Width?"
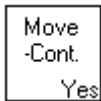   No password
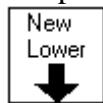
SDF3
 Screen # 23 "Low station new width"
       No password
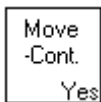
SDF4
Vacuum #43
       No password

SDF5
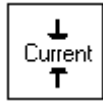Open Screen # 24 "Set all to default"
       No password

SDF6
Open Screen # 34 "Current Width"
       No password
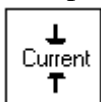
SDF7
Open Screen # 34 "Current Width"

SDF8

- Screen #17 "Move Home?"

Chain screen.
#34
Time showed.
Help screens.

Screen #53

```
NO PULSES!!!
FROM ENCODER
MIDDLE STATION
RUN HOME--→□
```

Screen Type:
Message

Sound .
3 beps
Control Buttons.

```
  ^
HOME
 └─┘
```

SDF8

 - Screen #17 "Move Home?"

Chain screen.

Time showed.
Help screens.

Screen #54

Screen Type:
Message

Sound .
3 beps
Control Buttons.

SDF1
Screen #4 "Upper new Width?"
          No password

SDF3
 Screen # 23 "Low station new width"
          No password
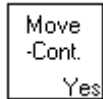
SDF4
Middle station width #52
          No password

SDF5
Open Screen # 24 "Set all to default"
          No password

SDF6
Open Screen # 34 "Current Width"
          No password

SDF7
Open Screen # 34 "Current Width"

SDF8

- Screen #17 "Move Home?"

Chain screen.

Time showed.
Help screens.

Screen #55

Screen Type:
Message

Sound .
3 beps
Control Buttons.

SDF1
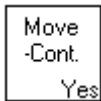Screen #4 "Upper new Width?"
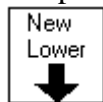
> No password

SDF3
 Screen # 23 "Low station new width"
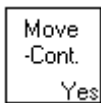
> No password

SDF4
Yes assign

> No password

SDF5
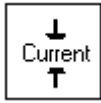Open Screen # 24 "Set all to default"

> No password

SDF6
Open Screen # 34 "Current Width"
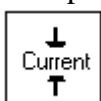
> No password

SDF7
Open Screen # 34 "Current Width"
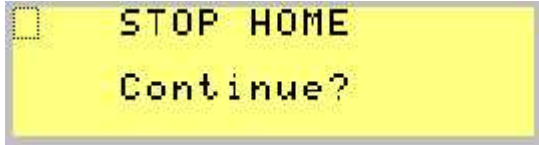
SDF8

- Screen #17 "Move Home?"

Chain screen.
#56
Time showed.
Help screens.

Screen #56

```
Preset=-###.##
ASSIGN TO NEW
        MIDDLE WIDTH?
```

Screen Type:
Message

Sound .
3 beps
Control Buttons.

SDF1
Screen #4 "Upper new Width?"
No password

SDF3
Screen # 23 "Low station new width"
No password
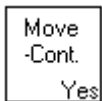
SDF4
Yes assign
No password

SDF5
Open Screen # 24 "Set all to default"
No password

SDF6
Open Screen # 34 "Current Width"
No password
Chain screen.
#9
Time showed.
Help screens.

Screen #57

```
MIDDLE   STATION
  CURRENT WIDTH
MAX    = -###.##
MIN    = -###.##
```

Screen Type:
Message

Sound .
3 beps
Control Buttons.

SDF1 [New Upper ↑]
Screen #4 "Upper new Width?"
        No password

SDF3 [New Lower ↓]
 Screen # 23 "Low station new width"
        No password

SDF4 [Move -Cont. Yes]
#34
        No password

SDF5 [Stop NO]
Open Screen # 24 "Set all to default"
        No password

SDF6 [Back]
Open Screen # 34 "Current Width"
        No password
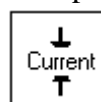
SDF7 [Current]
Open Screen # 34 "Current Width"
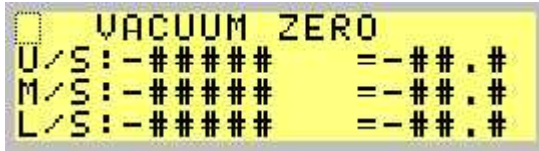
SDF8

- Screen #17 "Move Home?"

Chain screen.
#17
Time showed.
Help screens.
#420

HELP SCREENS

Screen #400

Screen Type:
Help

Push "Home" to start

    INFORMATION
PHONE:800-755-78947

Screen#403

Screen Type:
Help

"YES"-Set all to
 Factory Default

Screen #404

Screen Type:
Help

Push"Clear"enter New
width and"Enter"
Use number keys or
decrement/increment

Screen #405

Screen Type:
Help

"YES"-MoveBack
"Other Choices"

Screen #406

Screen Type:
Help

"STOP"-to stop
        motion

Screen #407

Screen Type:
Help

"Yes"-Continue
"Back"-Move Back

Screen #408

Screen Type:
Help

USE ALL F.KEYS
Page Down-Vacuum

Screen #410

Screen Type:
Help

PLC lost data from
it's memory!Try Home

Screen #411

Screen Type:
Help

```
"Home"-only choice
Check Encoder Power
```

Screen #413

Screen Type:
Help

```
Check Drive Error
Power-Off-Start-Home
```

Screen #414

Screen Type:
Help

```
"Yes"-Stop"DEMO"
"No"-Continue "DEMO"
```

Screen #415

Screen Type:
Help

```
"Yes"-Start "DEMO"
```

Screen #417

Screen Type:
Help

```
"YES"-StartHome
"Other choices"
```

Screen #419

Screen Type:
Help

After "Abort" Run
"HOME"to SetUp Sys.

Screen #420

Screen Type:
Help

To change Run Home

Screen #425

Screen Type:
Help

PLC lost data from
it's memory Run Home

Screen #426

Screen Type:
Help

Measure and Enter
correct values

Screen #427

Screen Type:

Help

Move guides from
   limit position

Screen #428

Screen Type:
Help

Open box and check
error code on drive

Screen #431

Screen Type:
Help

Check values before
"yes"-to start move

Screen #433

Screen Type:
Help

"Yes"-NewPRST→CRNT
See other Pages→

APPENDIX

SCHEMATIC DIAGRAMS

ASSEMBLING DIAGRAMS

460 VAC 60 Hz 3-PHASE MAIN
POWER FEEDER 15 AMP

L1   L2   L3   A1   MS1   GND

Mechanically
activated Contactor
(Door Closed)
3TF42 110VAC
COIL

M

A2

T1   T2   T3

14AWG

20   L1   MS2   T1

21   L2

22   L3

Contactor (Door Closed) 3TF40
110VAC COIL

MSP1

97   98

95   96

14AWG

M
A1   A2

OVERLOAD RELAY 3UA50

BLOWER MOTOR 5HP

BM1
BM2
BM3

GND   UPPER   GND

SM405 3 PHASE 0.5 HP

L3   W
N/L2   V
L/L1   U

25
24
23

14AWG

UPPER STATION MOTOR
0.25HP

GND   MIDDLE   GND

SM405 3 PHASE 0.5 HP

L3   W
N/L2   V
L/L1   U

28
27
26

14AWG

MIDDLE STATION
MOTOR 0.25 HP

GND   LOWER   GND

SM405 3 PHASE 0.5 HP

L3   W
N/L2   V
L/L1   U

31
30
29

14AWG

LOWER STATION MOTOR
0.25 HP

H1   H2   H3   H4

T1 - 350VA CONTROL
TRANSFORMER
480/240 -120 VAC

BLOWER MOTOR ON/OFF

X2   X1   F1
                           4 AMP

19

110   14AWG

CRITTENDEN CONVERSION CORPORATION

Title BG3 CONTROL PANEL 120VAC TO 24/12 VDC DISTRIBUTION

Size A

Document Number
BG2003 _3PanelWiring

Rev A

Sheet 2 of 10

Date: Thursday, October 11, 2007

T1
T2
H1
H2 H4
H4

T1 - 350VA CONTROL
TRANSFORMER
480/240 -120 VAC

110 X1 X2

F1
4 AMP

110 GND

L1 POWER
SUPPLY
N

+24V 1.3A

24vdc +24 -24 COM

F2
FUSE 1.5amp

(C,D) +24Vdc

DC/DC 24/12
COM

+12Vdc COM COM

(E,F) (A,B,G,H)

F3
FUSE 1amp

12vdc

EM235

M L+

GND

COM

24vdc

COM

24vdc GND

L+DC M

PLC CPU224

L+ M 1.5

24vdc COM
GND

MAPLES OIT3165

110 24vdc 12vdc 24vdc PLC COM GND

To PLC Controller

+12VDC COM

PLC CPU-224 14 INPUTS

UPPER
ENCODER

LOWER
ENCODER

MIDLE
ENCODER

LOWER LIMIT SWITCHES

UPPER DRIVE FAULT

LOWER DRIVE FAULT

UPPER LIMIT SWITCHES

UPPER IN

LOWER IN

UPPER OUT

LOWER OUT

12VDC

COM

12VDC

COM

COM

12VDC

COM

COM

12VDC

12VDC

COM

COM

COM

COM

COM

COM

12VDC   1M   I0
I0.0@A   0.0
I0.1@B   0.1
I0.2@1   0.2
I0.3@E   0.3
I0.4@F   0.4
I0.5@ 9   0.5
I0.6 @ C   0.6
I0.7@ D   0.7
12VDC   2M
I1.0@ UF   1.0
I1.1@ LF   1.1
I1.2@ 7   1.2
I1.3@ 5   1.3
I1.4@ 2   1.4
I1.5@ 6   1.5
COM   M
L+

SM405   17   16

SM405   17   16

24VDC PLC

+12VDC COM

110 VAC 4 AMP

110

GND

UPPER VACUUM ON/OFF

110   16   16   Quick Dump Upper

ARC SUPPRESSOR

MIDDLE VACUUM ON/OFF

110   17   17   Quick Dump Middle

ARC SUPPRESSOR

LOWER VACUUM ON/OFF

110   18   18   Quick Dump Lower

ARC SUPPRESSOR

UPPER MORE/LESS

110   11   11   Upper More/Less Motor

ARC SUPPRESSOR

10   10   M

ARC SUPPRESSOR

MIDDLE MORE/LESS

110   13   13   Middle More/Less Motor

ARC SUPPRESSOR

12   12   M

ARC SUPPRESSOR

LOWER MORE/LESS

110   15   15   Lower More/Less Motor

ARC SUPPRESSOR

14   14   M

ARC SUPPRESSOR

110 VAC 4 AMP

GND

CRITTENDEN CONVERSION CORPORATION

Title
BG3 CONTROL PANEL VACUUM CONTROL SWITCHES SCHEMATIC

Size
A

Document Number
BG2003 _3PanelWiring

Rev
A

Date: Friday, January 30, 2004

Sheet   4   of   12

12VDC   COM

12VDC

EXTENSION MODULE 8 INPUTS   EM221

12VDC   12VDC

1M   I0
0.0
0.1

COM   MIDDLE IN   I2.2 @ 3   0.2

COM   MIDDLE OUT   I2.3 @ 4   0.3

12DC   12VDC   2M

COM   MIDDLE LIMIT SWITCHES   I2.4 @ 8   0.4

MIDDLE DRIVE FAULT   I2.5 @ MF   0.5
17   SM405   16

0.6
0.7

UPPER VACUUM SENSOR   EXTENSION MODULE 4 ANALOG INPUTS   EM235
COM   (A,B,G,H)   (C,D)   A+   A+   SIEMENS EM235
12DC   (E,F)   Com   Out   +12Vdc
COM   COM   A-

LOWER VACUUM SENSOR
COM   (A,B,G,H)   Com   Out   (C,D)   B+   B+
12DC   (E,F)   +12Vdc
COM   COM   B-

MIDDLE VACUUM SENSOR
COM   (A,B,G,H)   Com   Out   (C,D)   C+   C+
12DC   (E,F)   +12Vdc
COM   COM   C-

Extension module EM
235 Configuration
Switch Settings

ON
1 2 3 4 5 6

12VDC   COM

24VDC

COM

UPPER VFD

Rev
A

CRITTENDEN CONVERSION CORPORATION

24VDCPLC

CPU 224 10 OUTPUTS

Q0

1M

COM

1L+

(See Page3) I1.0@ UF

17

16

13E 25

13B

13A

SM410 3 PHASE 1.0HP

11

6

5

2

1

K1
A2
-
Q0.0 @ UOUT   A1
+

UPPER OUT
24VDC   11

12

14   UOUT

USLOW

UIN

0.0

K4
A2
-
Q0.1 @ LOUT   A1
+

LOWER OUT
11

12

14   LOUT

COM

UOUT

0.1

K2
A2
-
Q0.2 @ UIN   A1
+

UPPER IN
11

12

14   UIN

0.2

K5
A2
-
Q0.3 @ LIN   A1
+

LOWER IN
11

12

14   LIN

0.3

K3
A2
-
Q0.4 @ USLOW   A1
+

UPPER SLOW
11

12

14 USLOW

MIDDLE VFD

0.4

COM   COM

2M

COM

2L+

(See Page5) I2.5 @ MF

17

16

13E 25

13B

13A

SM410 3 PHASE 1.0HP

11

6

5

2

1

MSLOW

MIN

K6
A2
-
Q0.5 @ LSLOW   A1
+

LOWER SLOW
11

12

14 LSLOW

COM

MOUT

0.5

K7
A2
-
Q0.6 @ MOUT   A1
+

MIDDLE OUT
11

12

14   MOUT

0.6

K8
A2
-
Q0.7 @ MIN   A1
+

MIDDLE IN
11

12

14 MIN

0.7

K9
A2
-
Q1.0 @ MSLOW   A1
+

MIDDLE SLOW
11

12

14 MSLOW

LOWER VFD

1.0

1.1

COM

17

GND

(See Page3) I1.1@ LF

16

M   COM

13E 25

13B

LSLOW

13A

LIN

SM410 3 PHASE 1.0HP

11

6

5

COM

2

LOUT

1

24VDCPLC

L+DC   24VDC

M

L+

24VDC

COM

Title   BG3 CONTROL PANEL OUTPUTS SCHEMATIC

Size
A

Document Number
BG2003 _3Panel1Wiring

Date: Wednesday, September 13, 2006   Sheet   6   of   12

Rev
A

CRITTENDEN CONVERSION CORPORATION

Title: BG3 CONTROL PANEL TERMINAL STRIP WIRING SCHEMATIC

Document Number
BG2003 _3PanelWiring

Size A

Date: Friday, January 23, 2009

TERMINAL STRIP IN MAIN CONTROL PANEL 17"

TERMINAL STRIP IN JUNCTION BOX#1 10.5"

GND

14 AWG WIRE 31
14 AWG WIRE 30
14 AWG WIRE 29
14 AWG WIRE 28
14 AWG WIRE 27
14 AWG WIRE 26
14 AWG WIRE 25
14 AWG WIRE 24
14 AWG WIRE 23
14 AWG WIRE 22
14 AWG WIRE 21
14 AWG WIRE 20

14 AWG WIRE (LOWER STATION MOTOR)
14 AWG WIRE (MIDDLE STATION MOTOR)
14 AWG WIRE (UPPER STATION MOTOR)

LOWER STATION MOTOR
MIDDLE STATION MOTOR
UPPER STATION MOTOR

BLOWER MOTOR

L1 L2 L3   T1 T2 T3   Overload Relay
A1 A2   95 96
ARC SUPPRESSOR

19

GND
GND

18 AWG WIRE 110
18 AWG WIRE 19
18 AWG WIRE 18
18 AWG WIRE 17
18 AWG WIRE 16
18 AWG WIRE 15
14 18 AWG WIRE
13 18 AWG WIRE
12 18 AWG WIRE
11 18 AWG WIRE
10 18 AWG WIRE
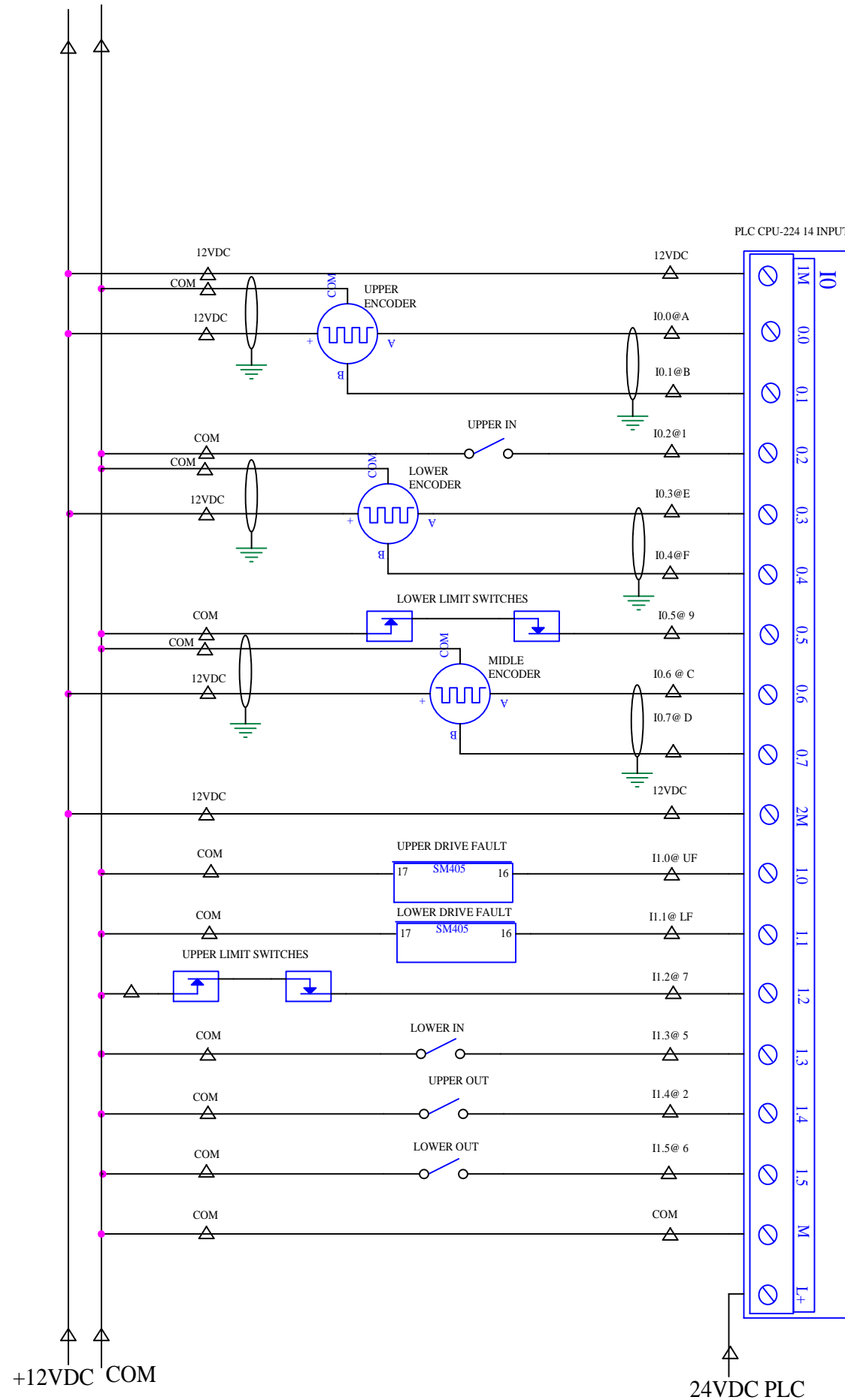
Quick Dump Lower
Quick Dump Middle
Quick Dump Upper

LOWER MORE/LESS MOTOR   M
MIDDLE MORE/LESS MOTOR   M
UPPER MORE/LESS MOTOR   M

ARC SUPPRESSOR
M
ARC SUPPRESSOR

GND
+24VDC
COM
9
8
7
6
5
4
3
2
1
+12VDC
COM
F
E
D
C
B
A
GND

COM
COM
9
8
7
6
5
4
3
2
1

18 AWG WIRE   LOWER LIMIT SWITCHES
MIDDLE LIMIT SWITCHES
UPPER LIMIT SWITCHES

OUT   LOWER IN/OUT
IN
OUT   MIDDLE IN/OUT
IN
OUT   UPPER IN/OUT
IN

SHIELDED CABLE
RUN IN SEPARATE CONDUIT

(Green) B   COM (Black)
(White) A   + (Red)
LOWER ENCODER

(Green) B   COM (Black)
(White) A   + (Red)
MIDDLE ENCODER

(Green) B   COM (Black)
(White) A   + (Red)
UPPER ENCODER

GND
TERMINAL STRIP IN JUNCTION BOX#1 10.5"

31
14 AWG WIRE
30
14 AWG WIRE
29
14 AWG WIRE
LOWER STATION MOTOR

28
14 AWG WIRE
27
14 AWG WIRE
26
14 AWG WIRE

25
14 AWG WIRE
24
14 AWG WIRE
UPPER STATION MOTOR
23
14 AWG WIRE

22
14 AWG WIRE
21
14 AWG WIRE
20
14 AWG WIRE

L1 L2 L3
T1 T2 T3
Overload Relay

A1 A2
95 96
ARC SUPPRESSOR

GND
19

GND

110

19
18 AWG WIRE

18
18 AWG WIRE
Quick Dump Middle
Quick Dump Lower

17
Quick Dump Upper

16
LOWER MORE/LESS MOTOR
M

15
18 AWG WIRE

14
MIDDLE MORE/LESS MOTOR
13
18 AWG WIRE
M

12
18 AWG WIRE
UPPER MORE/LESS MOTOR

11
M

10
18 AWG WIRE

COM
18 AWG WIRE
COM
LOWER LIMIT SWITCHES

9
MIDDLE LIMIT SWITCHES
8
18 AWG WIRE
UPPER LIMIT SWITCHES

7
18 AWG WIRE
6
OUT
LOWER IN/OUT
5
IN

4
18 AWG WIRE
OUT
MIDDLE IN/OUT
3
18 AWG WIRE
IN

2
18 AWG WIRE
OUT
UPPER IN/OUT
1
18 AWG WIRE
IN

ARC SUPPRESSOR
M
ARC SUPPRESSOR

CRITTENDEN CONVERSION CORPORATION

Title
BG3 CONTROL PANEL BOX#1 TERMINAL STRIP WIRING SCHEMATIC

Size
A

Document Number
BG2003_3Panel Wiring

Rev
A

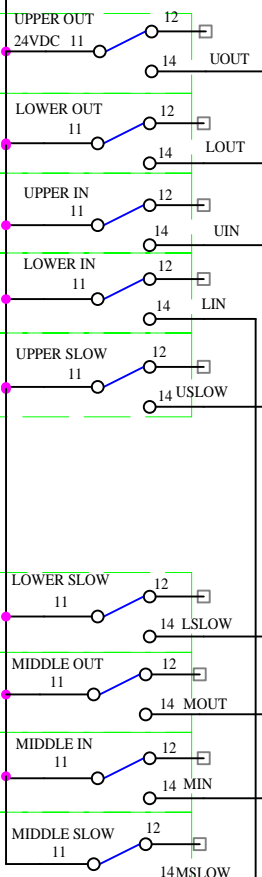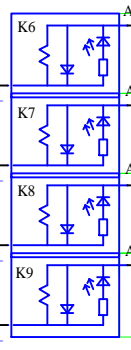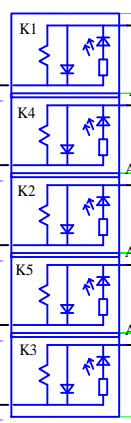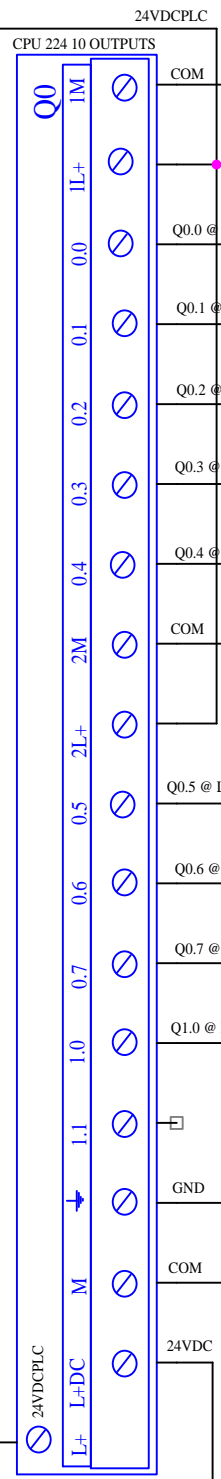Date:
Friday, January 30, 2004
Sheet   8   of   12

460 VAC 60 Hz 3-PHASE JBOX#1

22 21 20 19

GND

97 98

95 96

L1 T1 BM1

L2 T2 BM2

A1 M A2

L3 T3 BM3

BLOWER MOTOR 5HP

3TF40 110VAC COIL

OVERLOAD RELAY 3UA50

SIEMENS ACROSS THE LINE STARTER SXLHAG120
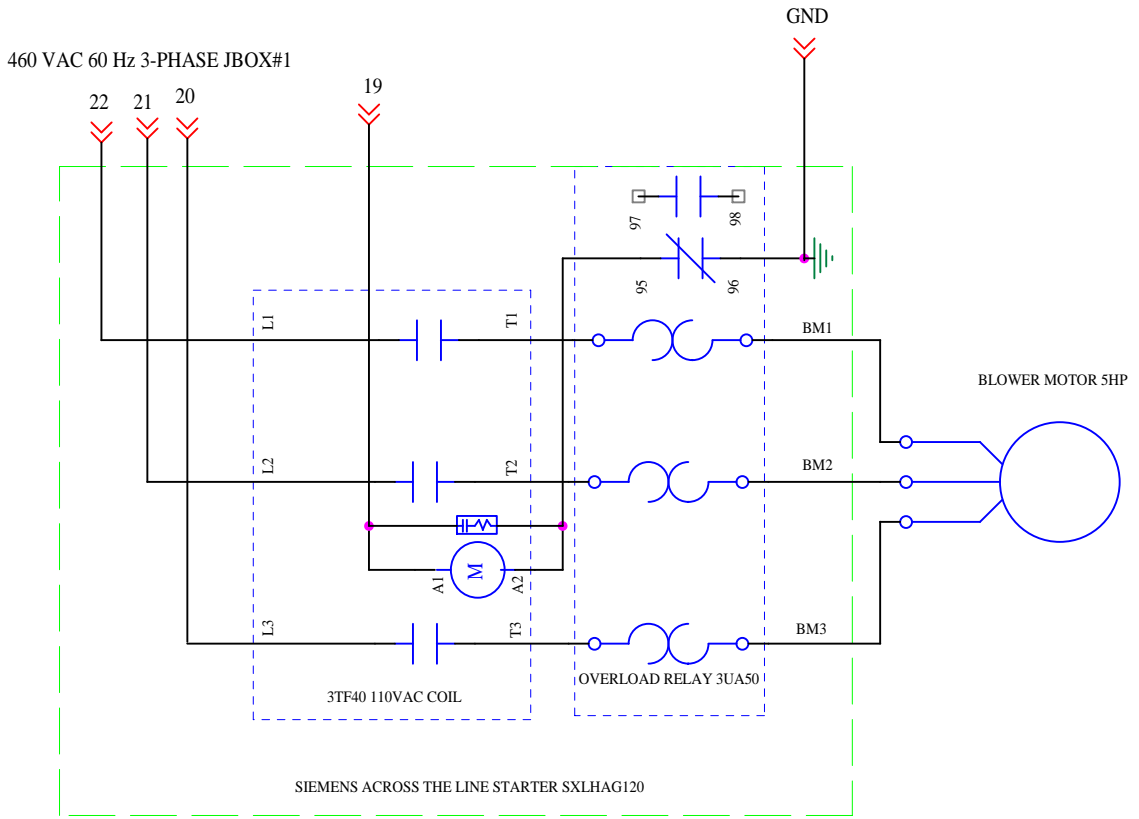
CRITTENDEN CONVERSION CORPORATION

Title
BG3 BLOWER 3-PHASE SCHEMATIC

Size Document Number
A   BG2003_3Panel Wiring

Date: Wednesday, April 14, 2004   Sheet   9   of   12

Rev
A

COM(NEU)

1   YELLOW

THERMAL OVERLOAD

M

SW MORE/LESS

4   BROWN

2   BLACK

SW 1

HOT 110VAC

5   BLUE

3   RED

SW 2

GREEN
GROUND
SCREW

(+12DC) (E,F)

VS-UPPER1   MPX2010GVSX/MPX2010DP

7 8 5
358B
6

(OUT) (CD)
150K

680
3   2

3
358A
1
4   1
4   2

100   22K

(COM) (A,B,G,H)

7812

(C,D) INPUT +18-24 Vdc

1

IN   OUT

GND

2   OUTPUT +12 Vdc (1 Amp)
(E,F)

0.33 uF

0.1 uF

3

(A,B)

(G,H)

TOP VIEW

OUTPUT (2)

L7812CV

GND (3)

INPUT (1)

MOTOR UPPER STATION

MORE/LESS MOTOR UPPER STATION

QUICk DUMP UPPER STATION

Junction Box #9

Junction Box #8

J9-J8

LIMIT SWITCH UPPER STATION MAX

Junction Box #6

LIMIT SWITCH UPPER STATION MIN

J6-J3

ENCODER UPPER STATION

J11-J8

LIMIT SWITCH MIDDLE STATION MAX

Junction Box #13

LIMIT SWITCH MIDDLE STATION MIN

J13-J3

ENCODER MIDDLE STATION

MOTOR MIDDLE STATION

MORE/LESS MOTOR MIDDLE STATION

QUICk DUMP MIDDLE STATION

Junction Box #12

Junction Box #11

J12-J11

LIMIT SWITCH LOWER STATION MAX

Junction Box #5

LIMIT SWITCH LOWER STATION MIN

ENCODER LOWER STATION

J7-J11

Junction Box #4

J6-J3

Junction Box #3

J5-J3

MCP-ENCODERS

Manual Move Remote Control Box

MOTOR LOWER STATION

MORE/LESS MOTOR LOWER STATION

QUICk DUMP LOWER STATION

Junction Box #10

Junction Box #7

J7-SBCB

J1-J4

MMRCB-J4-J1

J7-J10

J1-J7

BLOWER MOTOR

Attention!!! All conduits must enter from bottom of the box to avoid moisture damages.

Main Control Panel

J7-SBCB

J1-J7

J1-J4

Junction Box #1

J1-SBCB

SIEMENS BLOWER CONTROL BOX

MCP-J1

MCP-J1

LOW V

HIGH V

HIGH V INPUT

CRITTENDEN CONVERSION CORPORATION

Title
  Bridge Guide 2003

Size A	Document Number CONDUITS AND JUNCTION BOXES	Rev A

MCP-J1

14 AWG WIRES

GND 20 21 22 23 24 25 26 27 28 29 30 31

GND 20 21 22 23 24 25 26 27 28 29 30 31

18 AWG WIRES   HIGH V

110 10 11 12 13 14 15 16 17 18 19

110 10 11 12 13 14 15 16 17 18 19
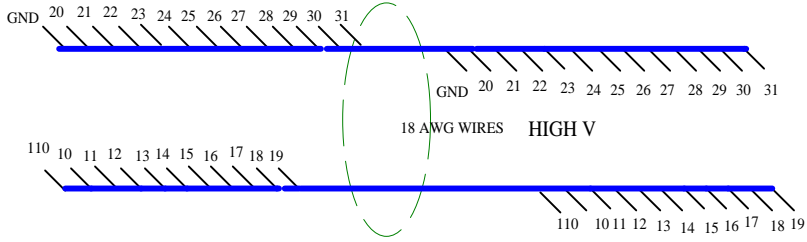
18 AWG WIRES   RUNNING IN SEPARATE CONDUIT   LOW V
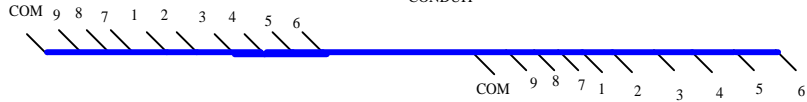
COM 9 8 7 1 2 3 4 5 6

COM 9 8 7 1 2 3 4 5 6

J1-SBCB

14 AWG WIRES

19 20 21 22 GND

19 20 21 22 GND

J1-J4

18 AWG WIRES

COM 9 8 7 1 2 3 4 5 6

COM 9 8 7 1 2 3 4 5 6

J7-SBCB

14 AWG WIRES

BM1 BM2 BM3 GND

BM1 BM2 BM3 GND

MMRCB-J4-J1

18 AWG WIRES

COM 1 2 3 4 5 6

COM 1 2 3 4 5 6
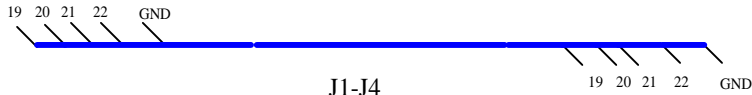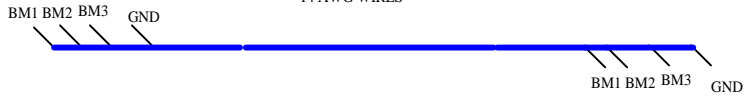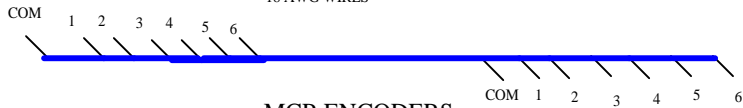
MCP-ENCODERS

20 AWG WIRES CABLE   RUNNING IN SEPARATE CONDUIT

COM A B C D E F 12DC SHIELD   SHIELD   B (GREEN)   A (WHITE)   E (BLACK-GREEN)   F (BLACK-RED)

12DC (RED)   D (BLACK-BLUE)   C (BLUE)   COM -(BLACK -WHITE)

J1-J7

10 11 16 23 24 25   UPPER   18 AWG WIRES   14 AWG WIRES

10 11 16 23 24 25

12 13 17 26 27 28   MIDDLE   18 AWG WIRES   14 AWG WIRES

12 13 17 26 27 28

14 15 18 29 30 31 GND   LOWER   18 AWG WIRES   14 AWG WIRES

14 15 18 29 30 31 GND

J7-J11

14 AWG WIRES   18 AWG WIRES
GND 23 24 25 26 27 28 21 10 11 12 13 16 17

GND 23 24 25 26 27 28 21 10 11 12 13 16 17

J11-J8 (J8-J9)

14 AWG WIRES   18 AWG WIRES
GND 23 24 25 10 11 16

GND 23 24 25 10 11 16

J12-J11

14 AWG WIRES   18 AWG WIRES
GND 26 27 28 12 13 17

GND 26 27 28 12 13 17

J7-J10

14 AWG WIRES   18 AWG WIRES
GND 29 30 31 14 15 18 BM1 BM2 BM3

GND 29 30 31 14 15 18 BM1 BM2 BM3

J3-J6 / J3-J13 / J3-J5

18 AWG WIRES

COM 7 8 9

7 8 9 COM

	CRITTENDEN CONVERSION CORPORATION		
	Title BRIDGE GUIDE 2003		
Size A	Document Number CABLES		Rev A
Date:	Friday, May 14, 2004	Sheet 2 of 10	
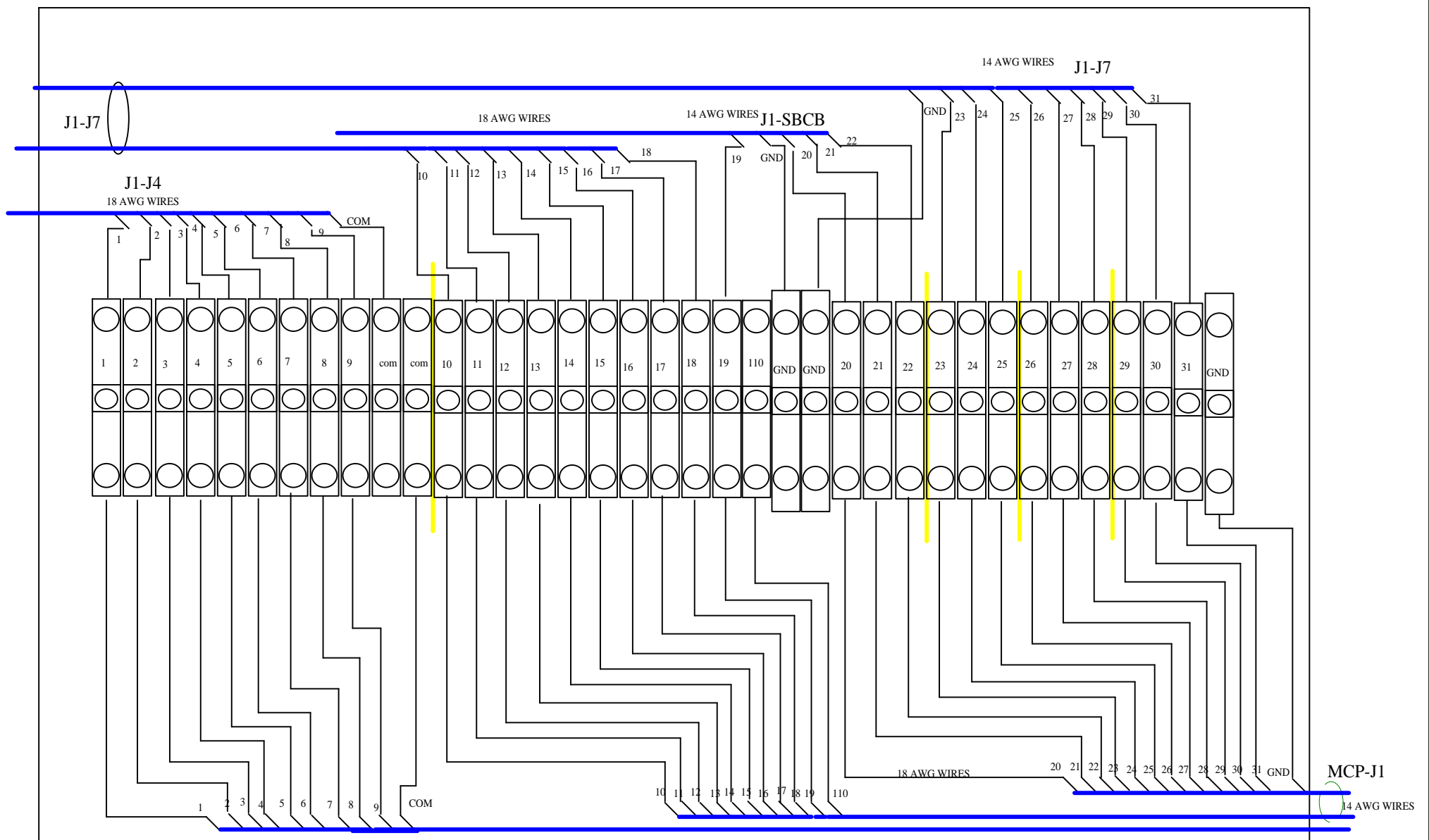
J1-J7

J1-J4

18 AWG WIRES

18 AWG WIRES

14 AWG WIRES   J1-SBCB

14 AWG WIRES   J1-J7

COM

1 2 3 4 5 6 7 8 9

10 11 12 13 14 15 16 17   18   19 GND   20 21   22

GND 23 24   25 26   27 28 29   30   31

1 2 3 4 5 6 7 8 9 com com 10 11 12 13 14 15 16 17 18 19 110 GND GND 20 21 22 23 24 25 26 27 28 29 30 31 GND

1 2 3 4 5 6 7 8 9 COM

10 11 12 13 14 15 16 17 18 19 110

18 AWG WIRES

20 21 22 23 24 25 26 27 28 29 30 31 GND   MCP-J1

14 AWG WIRES

CRITTENDEN CONVERSION CORPORATION		
Title BRIDGE GUIDE 2003		
Size A	Document Number JUNCTION BOX #1	Rev A
Date: Friday, November 14, 2003	Sheet 3 of 10	

ENCODER UPPER STATION

A   B   -   COM   12VDC

MCP-MMRCB   A   B   COM   12VDC

C   D   E   F

C   D   COM   12VDC   12VDC   ENCODER LOWER STATION

IN

UPPER

IN

MIDDLE

IN

LOWER

MMRCB-J4- J1

18 AWG WIRES

COM   6   5   4   3   2   1
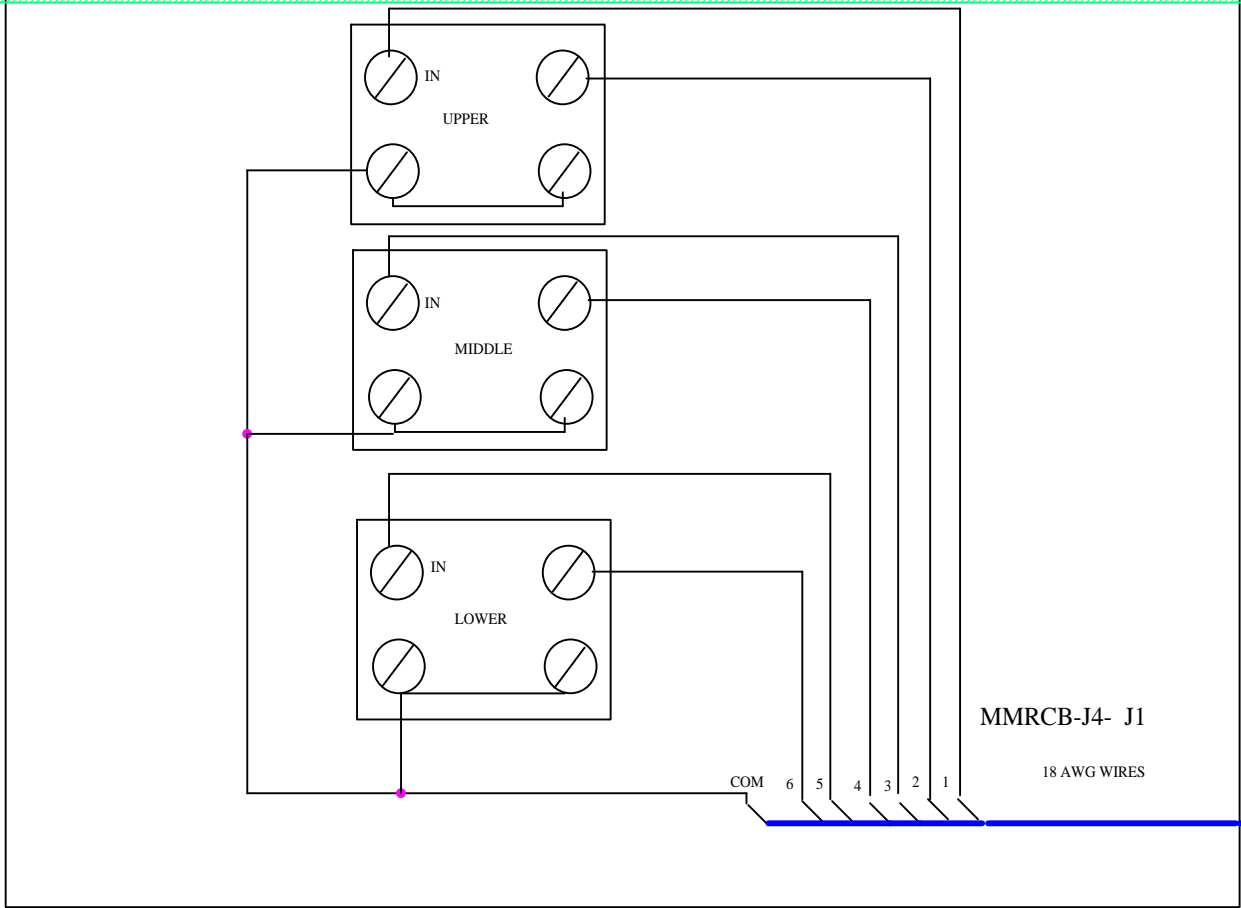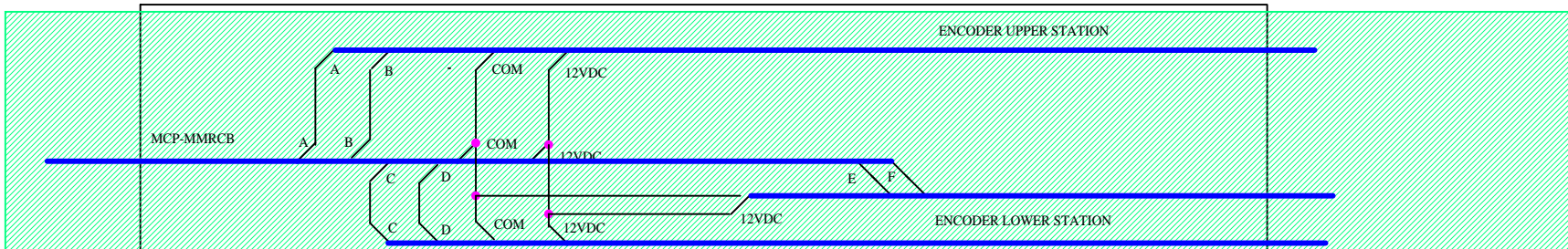
CRITTENDEN CONVERSION CORPORATION		
Title BRIDGE GUIDE 2003		
Size A	Document Number MANUAL MOVE REMOTE CONTROL BOX	Rev A
Date: Friday, November 14, 2003	Sheet 4 of 10	

UPPER LIMIT SWITCH LEFT

JB#6

UPPER LIMIT SWITCH RIGHT

7

COM

JB#4

JB#3

JB#13

J1-J4

MIDDLE LIMIT SWITCH LEFT

MIDDLE LIMIT SWITCH RIGHT

COM

COM

COM

7

MMRCB-J#4-J1

9

8

8

9

COM

LOWER LIMIT SWITCH LEFT

LOWER LIMIT SWITCH RIGHT

JB#5

JB#8

J9-J8

GND; 23,24,25; 10,11, 16

JB#11

J12-J11

GND; 28,27,26; 12,13, 17

JB#7

J1-J7

J10-J7   J10-J7   GND; 31,30,29; 14,15,18

J7-SBCB   J7-SBCB

CRITTENDEN CONVERSION CORPORATION			
Title BRIDGE GUIDE 2003			
Size A	Document Number JUNCTION BOX#7&#8&#11		Rev A
Date:	Friday, November 14, 2003	Sheet 6 of 10	
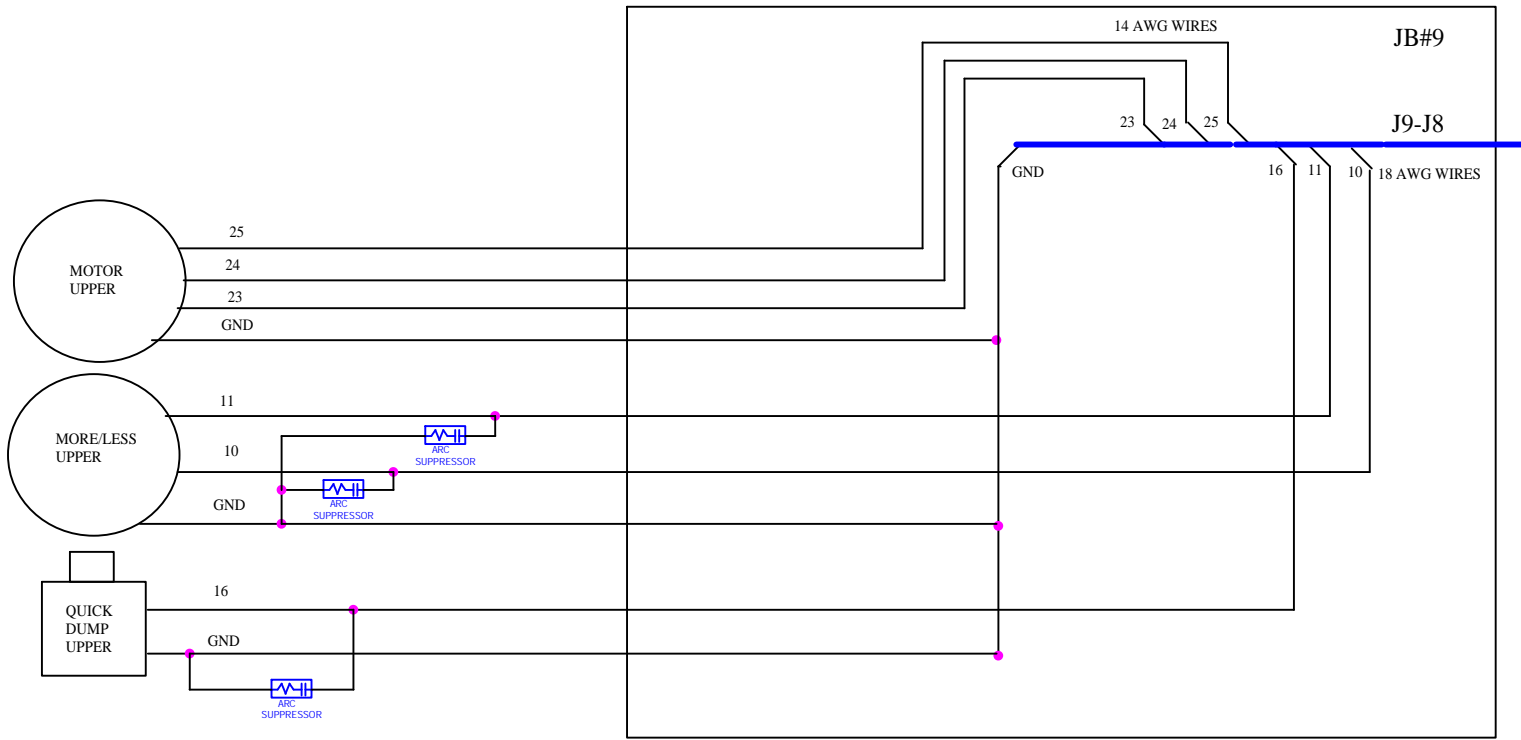
14 AWG WIRES

JB#9

23 24 25

J9-J8

GND

16 11 10 18 AWG WIRES

MOTOR
UPPER

25

24

23

GND

MORE/LESS
UPPER

11

10

GND

ARC
SUPPRESSOR

ARC
SUPPRESSOR

QUICK
DUMP
UPPER

16

GND

ARC
SUPPRESSOR

CRITTENDEN CONVERSION CORPORATION				
Title BRIDGE GUIDE 2003				
Size A	Document Number JUNCTION BOX#9			Rev A
Date:	Wednesday, February 04, 2004	Sheet	7 of 10	
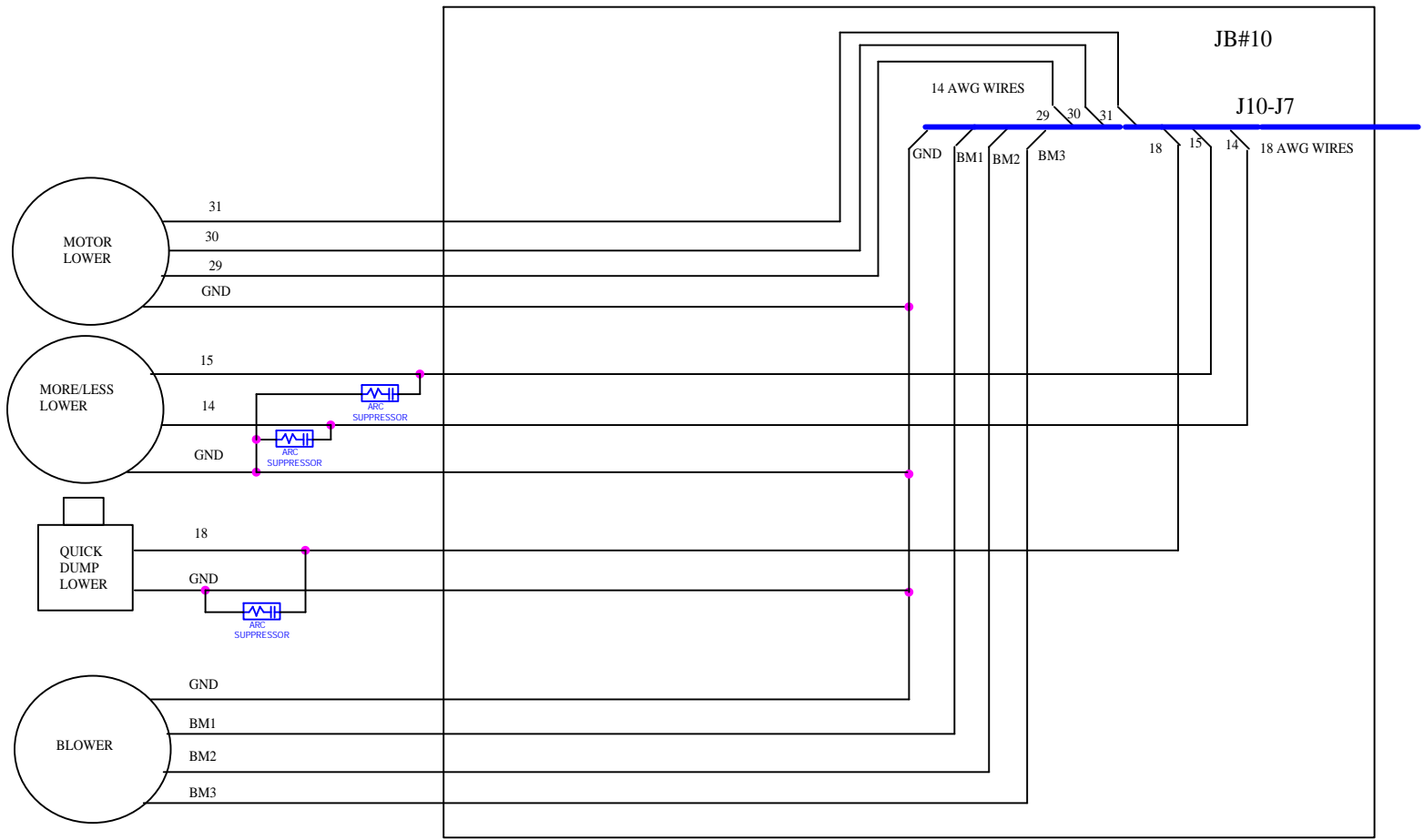
JB#10

14 AWG WIRES

J10-J7

29 30 31

GND BM1 BM2 BM3   18   15   14   18 AWG WIRES

31
30
29
GND

MOTOR
LOWER

15
14
GND

MORE/LESS
LOWER

ARC
SUPPRESSOR

ARC
SUPPRESSOR

18
GND

QUICK
DUMP
LOWER

ARC
SUPPRESSOR

GND
BM1
BM2
BM3

BLOWER

CRITTENDEN CONVERSION CORPORATION					
Title BRIDGE GUIDE 2003					
Size A	Document Number JUNCTION BOX#10				Rev A
Date:	Wednesday, February 04, 2004	Sheet	8	of	10

14 AWG WIRES

JB#12

26   27   28

J12-J11

GND   17   13   12   18 AWG WIRES

28

MOTOR
MIDDLE

27

26

GND

13

MORE/LESS
MIDDLE

12

ARC
SUPPRESSOR

GND

ARC
SUPPRESSOR

17

QUICK
DUMP
MIDDLE

GND

ARC
SUPPRESSOR

ARC
SUPPRESSOR

CRITTENDEN CONVERSION CORPORATION

Title
    BRIDGE GUIDE 2003

| Size | Document Number | Rev |
| A | JUNCTION BOX#12 | A |

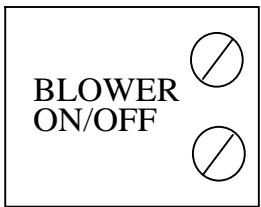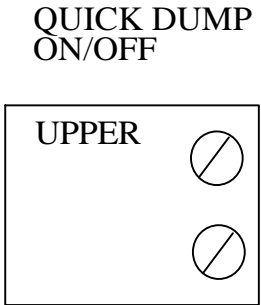Date: Wednesday, February 04, 2004   Sheet   9   of   10

BLOWER
ON/OFF

⊘ 19

⊘ 110

QUICK DUMP
ON/OFF

VACUUM
LESS-MORE

LESS   MORE

UPPER   ⊘ 16   10   ⊘ UPPER ⊘ 11

⊘ 110   110 ⊘   ⊘ 110

MIDLE   ⊘ 17   12   ⊘ MIDLE ⊘ 13

⊘ 110   110 ⊘   ⊘ 110

LOWER   ⊘ 18   14   ⊘ LOWER ⊘ 15

⊘ 110   110 ⊘   ⊘ 110

SHILD

+ -

○ ○ ○

24VDC COM GND

MANUAL IN/OUT

IN   OUT

1   ⊘ UPPER ⊘ 2

COM ⊘   ⊘ COM

3   ⊘ MIDLE ⊘ 4

COM ⊘   ⊘ COM

5   ⊘ LOWER ⊘ 6

COM ⊘   ⊘ COM
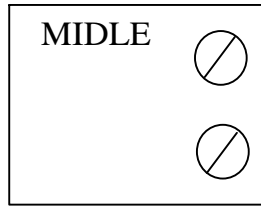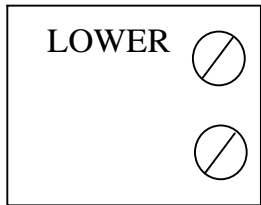
CRITTENDEN CONVERSION CORPORATION			
Title	BG3 CONTROL PANEL FRONT INSIDE WIRING		
Size A	Document Number BG2003 _3PanelWiring		Rev A
Date:	Friday, November 14, 2003	Sheet 10 of 10	

16.0   TROUBLESHOOTING

To aid in troubleshooting, Parameters 50 through 60 can be accessed without entering the PASSWORD. Simply press the **Mode** button twice to "skip" over the PASSWORD prompt, and "P50" will be displayed to indicate that the parameter menu has been entered and Parameter 50 (FAULT HISTORY) can be viewed. The ▲ and ▼ buttons can then be used to scroll from Parameter 50 to Parameter 60. Once the desired parameter is found, press the **Mode** button to view its "contents".   When finished, press **Mode** to exit the parameter menu. An example is shown below:

Press **Mode** once

Display reads "00"

Upper right decimal point blinks
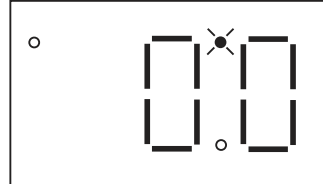
Press **Mode** again

Display reads "P50" (FAULT HISTORY)

Use ▲ and ▼ to scroll to the desired parameter number

(In this example Parameter 54 has been selected, which is MOTOR LOAD)
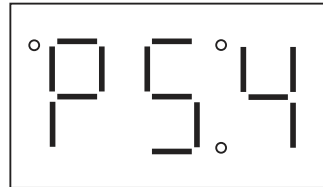
Press **Mode** to view parameter contents (77 = 77% LOAD)

Upper right decimal point blinks

Press **Mode** again to exit

In the example above, Parameter 54 - MOTOR LOAD is being viewed. The "77" in the example indicates that the load on the motor is 77% of the output current rating of the drive.

The table below lists the fault conditions that will cause the drive to shut down, as well as some possible causes. Please contact the factory for more information on troubleshooting faults.

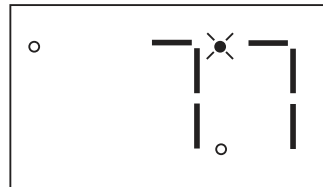| FAULT MESSAGES	
FAULT	**DESCRIPTION & POSSIBLE CAUSES**
AF	High Temp. Fault: Ambient temperature is too high; Cooling fan has failed (if equipped).
CF	Control Fault: A blank EPM, or an EPM with corrupted data has been installed. Perform a factory reset using Parameter 48 - PROGRAM SELECTION.
cF	Incompatibility Fault: An EPM with an incompatible parameter version has been installed. Either remove the EPM or perform a factory reset (Parameter 48) to change the parameter version of the EPM to match the parameter version of the drive.
dF	Dynamic Braking Fault: The drive has sensed that the dynamic braking resistors are overheating and shuts down to protect the resistors.
EF	External Fault: One of the TB-13 terminals is set as an External Fault input and that terminal is open with respect to TB-11. Refer to Parameters 10, 11 and 12.
GF	Data Fault: User data and OEM defaults in the EPM are corrupted.
HF	High DC Bus Voltage Fault: Line voltage is too high; Deceleration rate is too fast; Over-hauling load. For fast deceleration or overhauling loads, dynamic braking may be required.
JF	Remote Keypad Fault: The communication link between the drive and the optional Remote Keypad has been lost. Check for proper wiring and/or noise.
LF	Low DC Bus Voltage Fault: Line voltage is too low.
OF	Output Transistor Fault: Phase to phase or phase to ground short circuit on the output; Boost settings are too high; Acceleration rate is too fast; Failed output transistor.
PF	Current Overload Fault: VFD is undersized for the application; Mechanical problem with the driven equipment.
UF	Start Fault: Start command was present when the drive was powered up. Must wait 2 seconds after power-up to apply Start command if START METHOD is set to NORMAL.
F1	EPM Fault: The EPM is missing or damaged.
FC, F2 - F9, Fo	Internal Faults: The control board has sensed a problem - consult factory.

To clear a fault, issue a STOP command on the terminal strip. The fault will only clear if the condition that caused the fault has passed. For example, if the drive trips on a LOW DC BUS VOLTAGE FAULT (LF) due to low input voltage, the fault cannot be cleared until the input voltage returns to a normal level.

If the drive is programmed to automatically restart after a fault (see Parameter 03), the drive will attempt to restart three times after a fault (the drive will not restart after CF, cF, GF, FC, F1, F2-F9, or Fo faults). If all three restart attempts are unsuccessful, the drive will trip into FAULT LOCKOUT (LC), which requires a manual reset as described above.

17.0   SCL/SCM DISPLAY MESSAGES

The following describes the various displays and messages that can appear on the SCL/SCM drive.

17.1   SPEED DISPLAY

If the drive is in a STOP state (indicated by "- - -" on the display), and the commanded speed is changed, the display will show the commanded speed, and the upper left decimal point will turn on solid. About five seconds after a change is made, the display will begin to alternate between the commanded speed value and the "- - -" display. If the **Mode** button is pressed, the display will stop alternating and show the "- - -" display only.

When the drive is given a START command, the displayed speed will start increasing as the drive accelerates up to the commanded speed. If the commanded speed is changed while the drive is running, the display will show the commanded speed rather than the actual speed, until the actual speed reaches the commanded speed.

If the commanded speed is changed faster than the drive can accelerate or decelerate, the upper left decimal point will blink to indicate that the the drive is accelerating or decelerating to the new speed. Once the actual speed reaches the commanded speed, the upper left decimal point will turn on solid for 5 seconds and then turn off to indicate that the commanded speed has been reached, and that the display is now showing the actual speed.

17.2   CHANGING THE SPEED REFERENCE SOURCE

When the speed source is changed while the drive is running, the display will flash the message for the new speed source to indicate that the new speed source is active. Also, if the drive is being controlled from a speed source other than the ▲ and ▼ buttons (0-10 VDC, 4-20 mA, etc), and one of the ▲ or ▼ buttons is pressed, the display will flash the present speed source message to indicate that the ▲ and ▼ buttons are invalid.

Example 1: The drive is running and the present speed source is the keypad. TB-13A is programmed to select a 4-20 mA signal as the speed source. When TB-13A is closed to TB-11, the display will flash "EI" to indicate that the speed source has changed to the 4-20 mA signal. If the contact between TB-13A and TB-11 is opened, the display will flash "CP" to indicate that the speed source has changed back to the ▲ and ▼ buttons.

Example 2: The speed source is a 0-10 VDC signal. If the ▲ or ▼ button is pushed, the display will flash "EU" to indicate that the present speed source is the 0-10 VDC signal and that the ▲ and ▼ buttons are invalid.

Refer to the table below for the possible speed reference source displays:

SPEED SOURCE DISPLAYS	
DISPLAY	**DESCRIPTION**
CP	CONTROL PAD: Speed is set using the ▲ and ▼ buttons on the front of the drive.
EI	EXTERNAL CURRENT: Speed is controlled by a 4-20 mA signal wired to TB-25 and TB-2
EU	EXTERNAL VOLTAGE: Speed is controlled by a 0-10 VDC signal wired to TB-5 and TB-2.
JG	JOG: The drive is in Jog mode, and the speed is set by Preset Speed #2 (Parameter 32).
OP	MOP (Motor Operated Pot): Contacts wired to TB-13B and TB-13C are used to increase and decrease the drive speed.
Pr1 - Pr7	PRESET SPEEDS #1-7: Speed is set by the indicated Preset Speed (Parameters 31-37).

NOTE: The speed source displays will flash when the speed reference source is changed while the drive is running to indicate that the new speed reference source is active.

17.3   STATUS AND WARNING MESSAGES

STATUS AND WARNING MESSAGES	
DISPLAY	**DESCRIPTION**
br	DC BRAKING: The DC braking circuit is activated.
cE	"cE" will be displayed if an EPM with a different parameter version is installed and then an attempt is made to change parameter settings without performing the TRANSLATE function. Refer to PROGRAM SELECTION (Parameter 48).
CL	CURRENT LIMIT: The output current has exceeded the CURRENT LIMIT setting (Parameter 25) and the drive is reducing the output frequency to reduce the output current. If the drive remains in CURRENT LIMIT for too long, it can trip into a CURRENT OVERLOAD fault (PF).
Er	ERROR: Invalid data has been entered or an invalid command was attempted.
GE	"GE" will be displayed if an attempt is made to change the OEM default settings when the drive is operating in the OEM mode (see Parameter 48).
GF	If "GF" is displayed when a RESET OEM is attempted, it indicates that the OEM defaults in the EPM are corrupted. If "GF" is displayed upon power-up, it indicates that the OEM defaults and the user settings in the EPM are corrupted. Refer to Section 13.2.
LC	FAULT LOCKOUT: The drive has failed three restart attempts and now requires manual reset.
SE	SERIAL: The optional remote keypad is active as the user interface instead of the buttons on the front of the drive. See Parameter 14 - CONTROL.
SP	START PENDING: "SP" blinks during the interval between restart attempts.
⚡ ⚡	DECEL OVERRIDE (both upper decimal points blinking): The drive has stopped decelerating to avoid tripping into an HF fault due to regenerative energy from the motor.