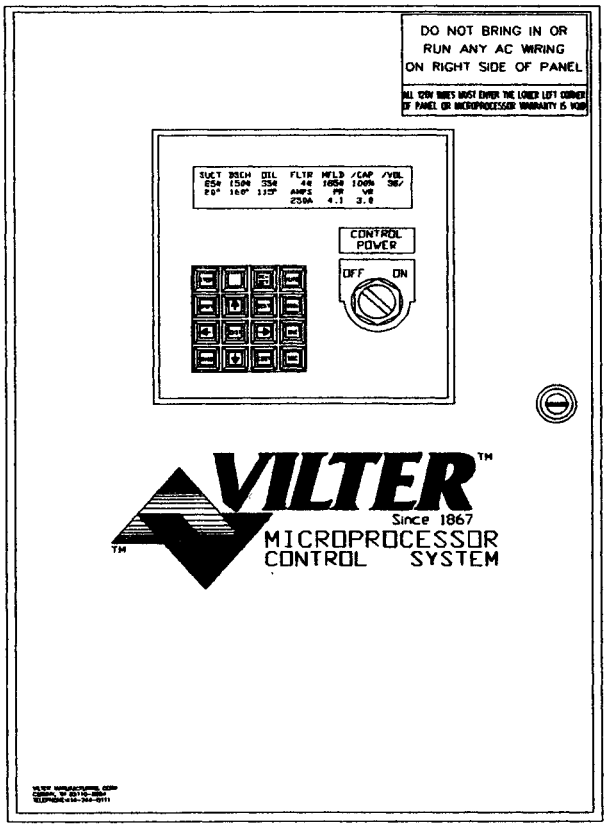
INSTRUCTION MANUAL

VILTER®
Since 1867



VILTER SINGLE SCREW AND MINI SCREW COMPRESSOR MICROPROCESSOR

BULLETIN SINGLE SCREW MICRO
VPN 35391T
PRICE $20.00

ISSUE DATE

VILTER MANUFACTURING CORPORATION

Single Screw Compressor Microprocessor Operating Manual

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LIST OF FIGURES AND ILLUSTRATIONS

FIG. 1 DISPLAY MENUS

LIST CURRENT VALUES

```
SUCT DSCH OIL   MNFLD  %CAP  V.R.  AMPS
***# ***# ***#  ***#   ***%  **.*  ***A
***° ***° ***°
Mode: ********** : ******************
```

(MODE = COMPRESSOR OPERATING MODE)

```
OIL PRESSURES            FILTER IN     ***#
PRELUB PRE  ***#(M-D)    FILTER OUT    ***#
DIFF PRESS  ***#(D-S)    FILTER DIFF   ***#
OIL PRESS   ***#(M-S)    OIL SEP TEMP  ***°
```

```
    *** ACTIVE ALARMS AND TRIPS ***

Alarm:
Trip:
```

```
EVENT LIST                          PG **
```

```
HISTORY VALUES   Enter Password. Enter
Interval = ***   the time interval and
Unit     = ***   then select the unit of
                 "SEC, MIN or HRS".
```

```
*** *** NEW     OLD          NEW     OLD
SUCT PR *** *** ***  OIL PR *** *** ***
DSCH PR *** *** ***  CAP %  *** *** ***
FLTR PR *** *** ***  VOL %  *** *** ***
```

```
*** *** NEW     OLD          NEW     OLD
SUCT °F *** *** ***  V.R.  **.* **.* **.*
OIL  °F *** *** ***  P.R.  **.* **.* **.*
DSCH °F *** *** ***  AMPS  ***  ***  ***
```

```
   DSCH / SUCT, V.R.     % VOLUME
AMPS = ***A
(CALC)=**.*, **.*  ACT =***%  %CAP=***%
(TABL)=**.*, **.*  TARG=***%  DSCH=***%
MODE: (***)        %FLA=***%  SUCT=***#
```

CHANGE/DISPLAY SETPOINTS

```
      SAFETY SETPOINTS      (SETPT *)
 Safety Description      ALRM TRIP RESET
                         ***# ***# ***#
(Move between fields with "NEXT" key.)
```

```
       CONTROL LIMITS      (SETPT *)
Control Description      CUTIN  CUTOUT
                         ***#   ***#
(Move between fields with "NEXT" key.)
```

```
  TIMER SETPOINTS (SEC,MIN,COUNTS)
 Timer Field                Value
                          *** ***
(Move between fields with "NEXT" key.)
```

```
CURRENT TIMER VALUES  (SEC,MIN,COUNTS)
 Timer Field              Current
                          *** ***
Compressor Runtime (Hrs:Min): *****:**
```

```
SPG2  RESERVED
```

```
PRINT ************    Select interval.
 Interval= *** ***    Set Level = 0.
 Baud= ***** Level= * Printout on time
(8,1,No Parity) Cnt=0 or <BLANK> key.
```

```
SPG5
```

```
 LEAD/LAG VALUES SCREEN
REC CPUTERHD ***% CURRENT %CAPACITY ***%
LAG CAPHOLD  ***% SENT CAPHOLD VALU ***%
CAPSTEP      ***%
```

MISC SCREENS

```
OPERATION OPTIONS MENU  Select desired
Option # * :            option.
 ( )                    (y) indicates the
 ( )                    option is active.
```

```
MISC1 - RESERVED
```

```
RECALIBRATE TRANSDUCERS
                          VALUE
Channel #  = ***mV        ***
Channel =
```

```
    DIGITAL PORT STATUS  Reference YOUR
Location:0 1 2 3 4 5 6 7 wiring diagram
Port #1: * * * * * * * * for port I/O
Port #2: * * * * * * * * descriptions.
```

```
FORCE OUTPUTS ON   Use → key to force
  Port # **        selected output on.
 Output # **: ***  Comp relay output is
                   monitored & limited.
```

```
SET DATE AND TIME  Set time in military
Date: **/ **/ **   format.  All events
Time: **: **: **   are timestamped from
Day of Week: ***   this clock setting.
```

```
MISC4
```

```
VILTER MANUFACTURING CORPORATION
    5555 SOUTH PACKARD AVENUE
        CUDAHY, WI  53110
VSS 7..26ARSW-xxx-****.****   NODE # ***
```

FIG. 1A ADDITIONAL DISPLAY MENUS

LIST CURRENT VALUES

```
SUCT DSCH OIL          SBX TEMPS
***# ***# ***#      PROC CH#2 CH#2 CH#4
***° ***° ***°      ***° ***° ***° ***°
Mode: ************ : ******************
```

(MODE = COMPRESSOR OPERATING MODE)
To display, press <BLANK> key next to STOP button.

FIG. 2 SAFETY SETPOINT MENUS

Please refer to the page number below each screen for an explanation of the screen.

```
SAFETY SETPOINTS      (SETPT *)
Safety Description   ALRM TRIP RESET
LO SUCTION TEMP      ***° ***° ***°
(Move between fields with "NEXT" key.)
```
Please see page 15.

```
SAFETY SETPOINTS      (SETPT *)
Safety Description   ALRM TRIP RESET
HI DISCHARGE TEMP    ***° ***° ***°
(Move between fields with "NEXT" key.)
```
Please see page 15.

```
SAFETY SETPOINTS      (SETPT *)
Safety Description   ALRM TRIP RESET
LO OIL SEP START TEMP ***° ***° ***°
(Move between fields with "NEXT" key.)
```
Please see page 15.

```
SAFETY SETPOINTS      (SETPT *)
Safety Description   ALRM TRIP RESET
LO OIL SEP RUN TEMP  ***° ***° ***°
(Move between fields with "NEXT" key.)
```
Please see page 15.

```
SAFETY SETPOINTS      (SETPT *)
Safety Description   ALRM TRIP RESET
LO OIL INJ TEMP      ***° ***° ***°
(Move between fields with "NEXT" key.)
```
Please see page 16.

```
SAFETY SETPOINTS      (SETPT *)
Safety Description   ALRM TRIP RESET
LO CONTROL TEMP      ***° ***° ***°
(Move between fields with "NEXT" key.)
```
Please see page 16.

```
SAFETY SETPOINTS      (SETPT *)
Safety Description        ALRM
HI CONTROL TEMP           ***°
(Move between fields with "NEXT" key.)
```
Please see page 17.

```
SAFETY SETPOINTS      (SETPT *)
Safety Description   ALRM TRIP RESET
LO SUCTION PRESSURE  ***# ***# ***#
(Move between fields with "NEXT" key.)
```
Please see page 17.

```
SAFETY SETPOINTS      (SETPT *)
Safety Description   ALRM TRIP RESET
HI DISCHARGE PRESS   ***# ***# ***#
(Move between fields with "NEXT" key.)
```
Please see page 17.

```
SAFETY SETPOINTS      (SETPT *)
Safety Description        TRIP  RESET
PRELUB OIL PRESS          ***#  ***#
(Move between fields with "NEXT" key.)
```
Please see page 17.

```
SAFETY SETPOINTS      (SETPT *)
Safety Description   ALRM TRIP RESET
HI OIL INJECT TEMP   ***° ***° ***°
(Move between fields with "NEXT" key.)
```
Please see page 16.

```
SAFETY SETPOINTS      (SETPT *)
Safety Description   ALRM TRIP RESET
LO OIL PRESSURE      ***# ***# ***#
(Move between fields with "NEXT" key.)
```
Please see page 17.

```
SAFETY SETPOINTS      (SETPT *)
Safety Description   ALRM TRIP RESET
HI START FLTR DIFF PR ***# ***# ***#
(Move between fields with "NEXT" key.)
```
Please see page 18.

```
SAFETY SETPOINTS      (SETPT *)
Safety Description   ALRM TRIP RESET
HI RUN FILTER DIFF PR ***# ***# ***#
(Move between fields with "NEXT" key.)
```
Please see page 18.

```
SAFETY SETPOINTS      (SETPT *)
Safety Description   ALRM TRIP RESET
HI AMPS AT < 15% CAP ***A ***A ***A
(Move between fields with "NEXT" key.)
```
Please see page 18.

```
SAFETY SETPOINTS      (SETPT *)
Safety Description   ALRM TRIP RESET
HI AMP LIMIT         ***A ***A ***A
(Move between fields with "NEXT" key.)
```
Please see page 18.

FIG. 3 CONTROL LIMIT SETPOINT MENUS

Please refer to the page number below each screen for an explanation of the screen.

```
CONTROL LIMITS    (SETPT *)
Control Description     CUTIN  CUTOUT
SUCTION PRESS ON/OFF    ***#   ***#
(Move between fields with "NEXT" key.)
```

Please see page 19.

```
CONTROL LIMITS    (SETPT *)
Control Description     CUTIN  CUTOUT
SUCT PR CAP INCREASE    ***#   ***#
(Move between fields with "NEXT" key.)
```

Please see page 19.

```
CONTROL LIMITS    (SETPT *)
Control Description     CUTIN  CUTOUT
SUCT PR CAP DECREASE    ***#   ***#
(Move between fields with "NEXT" key.)
```

Please see page 20.

```
CONTROL LIMITS    (SETPT *)
Control Description     CUTIN  CUTOUT
HI DSCH PRESS UNLOAD    **.*   **.*
(Move between fields with "NEXT" key.)
```

Please see page 20.

```
CONTROL LIMITS    (SETPT *)
Control Description     CUTIN  CUTOUT
OILPMP RESTART (D/S)    ***#   ***#
(Move between fields with "NEXT" key.)
```

Please see pages 20 & 21.

```
CONTROL LIMITS    (SETPT *)
Control Description     CUTIN  CUTOUT
CAP CONTROL °F INCR     ***°   ***°
(Move between fields with "NEXT" key.)
```

Please see page 22.

```
CONTROL LIMTIS    (SETPT *)
Control Description     CUTIN  CUTOUT
CAP CONTROL °F DECR     ***°   ***°
(Move between fields with "NEXT" key.)
```

Please see page 23.

```
CONTROL LIMITS    (SETPT *)
Control Description     VALUE
LAG, CAPACITY STEP      ***%   ---
(Move between fields with "NEXT" key.)
```

Please see page 23

```
CONTROL LIMITS    (SETPT *)
Control Description     CUTIN
VOL SLIDE ADJ FACTOR    ***%   ---
(Move between fields with "NEXT" key.)
```

Please see pages 23 & 24.

```
CONTROL LIMITS    (SETPT *)
Control Description     CUTIN
MINIMUM RUN CAPACITY    ***%   ---
(Move between fields with "NEXT" key.)
```

Please see page 24.

```
CONTROL LIMITS    (SETPT *)
Control Description     CUTIN  CUTOUT
OIL SEPARATOR HEATER    ***°   ***°
(Move between fields with "NEXT" key.)
```

Please see page 21.

```
CONTROL LIMITS    (SETPT *)
Control Description     CUTIN  CUTOUT
CAP CONTROL °F ON/OFF   ***°   ***°
(Move between fields with "NEXT" key.)
```

Please see pages 21 & 22.

```
CONTROL LIMITS    (SETPT *)
Control Description     CUTIN  CUTOUT
LEAD,MAXIMUM CAP FLAG   ***%   ***%
(Move between fields with "NEXT" key.)
```

Please see page 25.

```
CONTROL LIMITS    (SETPT *)
Control Description     CUTIN  CUTOUT
ECONOMIZER SOLENOID     ***%   ***%
(Move between fields with "NEXT" key.)
```

Please see page 25.

```
CONTROL LIMITS    (SETPT *)
Control Description     CUTIN  CUTOUT
VOL ADJ CAP RANGE       ***%   ***%
(Move between fields with "NEXT" key.)
```

Please see pages 25 & 26.

```
CONTROL LIMITS    (SETPT *)
Control Description     FLA    MAX
MOTOR AMPS LOAD LIMIT   ***A   ***A
(Move between fields with "NEXT" key.)
```

Please see page 26.

```
CONTROL LIMITS    (SETPT *)
Control Description     C/T    RATIO
CURRENT TRANSFORMER      ****/5AMPS
(Move between fields with "NEXT" key.)
```

Please see page 27.

FIG. 4 SYSTEM TIMER DISPLAY

Please refer to the page number below each screen for an explanation of the screen.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
AT START CAPACITY, DECREASE	***	SEC
(Move between fields with "NEXT" key.)		

Please see page 27.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
CAPACITY INCREASE MOTOR ON	***	SEC
(Move between fields with "NEXT" key.)		

Please see page 27.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
CAPACITY DECREASE MOTOR ON	***	SEC
(Move between fields with "NEXT" key.)		

Please see page 27.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
CMP STARTER AUX CONTACT BYPASS	***	SEC
(Move between fields with "NEXT" key.)		

Please see page 28.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
CAPACITY INCREASE MOTOR OFF	***	SEC
(Move between fields with "NEXT" key.)		

Please see page 28.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
CAPACITY DECREASE MOTOR OFF	***	SEC
(Move between fields with "NEXT" key.)		

Please see page 28.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
VOL SLIDE ADJ TIMER	***	SEC
(Move between fields with "NEXT" key.)		

Please see page 29.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
MINIMUM COMP PRELUB TIME	***	SEC
(Move between fields with "NEXT" key.)		

Please see page 29.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
RUN CYCLE OIL PRESS BYPASS	***	SEC
(Move between fields with "NEXT" key.)		

Please see page 29.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
PRELUB PUMP RUN LIMIT	***	SEC
(Move between fields with "NEXT" key.)		

Please see page 29.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
AUTO RESTART AFTER POWER FAIL	***	SEC
(Move between fields with "NEXT" key.)		

Please see page 30.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
CAPACITY HOLD MOTOR OFF TIME	***	SEC
(Move between fields with "NEXT" key.)		

Please see page 30.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
CAPACITY HOLD MOTOR ON TIME	***	SEC
(Move between fields with "NEXT" key.)		

Please see page 31.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
FLTR DIFF PR SAFETY CHANGEOVER	***	SEC
(Move between fields with "NEXT" key.)		

Please see page 31.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
LO OIL SEP LEVEL BYPASS TIMER	***	SEC
(Move between field with "NEXT" key.)		

Please see page 31.

TIMER SETPOINTS (SEC, MIN, COUNTS)		
Timer Field	Value	
OIL SEP TEMP SAFETY CHANGEOVER	***	MIN
(Move between fields with "NEXT" key.)		

Please see page 32.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
LO OIL INJ TEMP SFTY CHNGEOVER	***	MIN
(Move between fields with "NEXT" key.)		

Please see page 32.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
ANTIRECYCLE STRT TIMER (MIN)	***	MIN
(Move between fields with "NEXT" key.)		

Please see page 32.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
START LAG COMP TIMER (MIN)	***	MIN
(Move between fields with "NEXT" key.)		

Please see page 33.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
STOP LAG COMP TIMER (MIN)	***	MIN
(Move between fields with "NEXT" key.)		

Please see page 33.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
FORCE START LAG COMP (MIN)	***	MIN
(Move between fields with "NEXT" key.)		

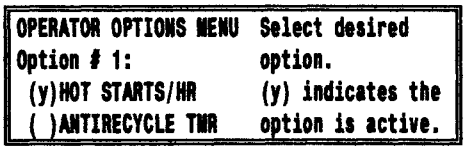
Please see page 34.

TIMER SETPOINTS (SEC,MIN,COUNTS)		
Timer Field	Value	
HOT STRTS/HR COUNTER (COUNTS)	***	CTS
(Move between fields with "NEXT" key.)		

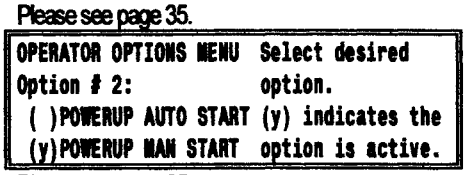
Please see page 34.

FIG. 5 OPERATOR OPTIONS MENU

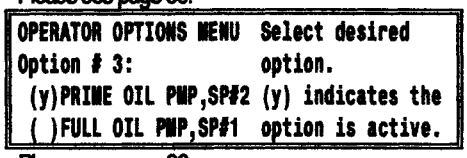
Please refer to the page number below each screen for an explanation of the screen.



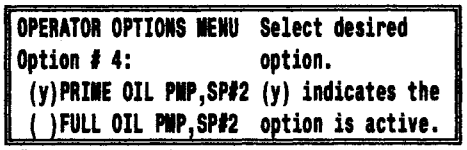
Please see page 35.



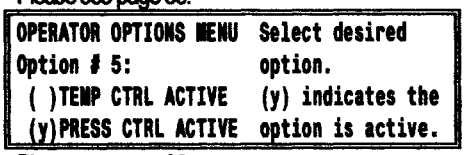
Please see page 35.



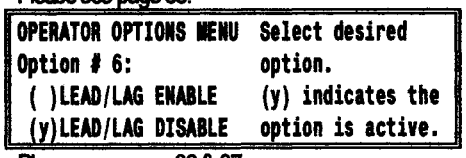
Please see page 36.



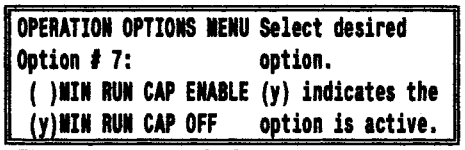
Please see page 36.



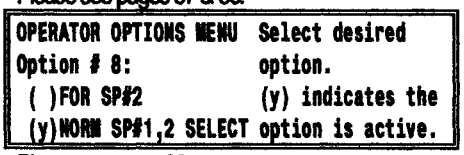
Please see page 36.



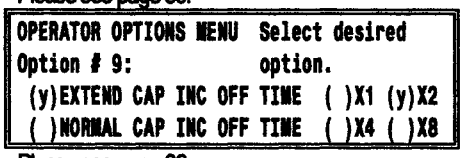
Please see pages 36 & 37.



Please see pages 37 & 38.



Please see page 39.



Please see page 39.

The values or options in the screen displays shown must be entered before start-up. Refer to the "Preparation for Start-up" Section for instructions.

FIG. 6 SYSTEM SETPOINTS ALARMS & TRIPS WORKSHEET

SAFETY SETPOINTS	SYSTEM VALUES ALARM TRIP RESET	VALUE LIMITS ALARM	TRIP	RESET	DEFAULT VALUES ALARM	TRIP	RESET
LO SUCTION TEMP		-99/300	-99/300	-99/300	-45	-50	-40
HI DISCHARGE TEMP		-30/260	-30/260	-30/260	205	210	200
LO OIL SEP START TEMP		50/200	50/200	50/200	75	70	80
LO OIL SEP RUN TEMP		50/200	50/200	50/200	105	100	110
LO OIL INJECT TEMP		50/160	50/160	50/160	95	90	100
HI OIL INJECT TEMP		-99/160	-99/160	-99/160	140	145	135
LO CONTROL TEMP (2)		-99/210	-99/210	-99/210	-50	-55	-45
HI CONTROL TEMP (2)		-99/210	- - -	- - -	100	- - -	- - -
LO SUCT PRESS							
SETPOINT #1		30"/300	30"/300	30"/300	3"	4"	3"
SETPOINT #2		30"/300	30"/300	30"/300	1"	2"	1"
HI DISCHARGE PRESS							
SETPOINT #1		30"/350	30"/350	30"/350	210	220	205
SETPOINT #2		30"/350	30"/350	30"/350	220	230	215
PRELUB OIL PRESSURE		- - -	4/300	4/300	- - -	4	5
LO OIL PRESSURE (3)		18/300	18/300	18/300	38	35	40
HI START FLTR DIFF PR (1)		30"/50	30"/50	30"/50	50	50	25
HI OIL RUN FILTER DIFF PR		30"/40	30"/40	30"/40	12	15	10
HI AMPS & <15% CAP (4)		0/1000	0/1000	0/1000	2	2	- - -
HI AMPS LIMIT (5)		0/1000	0/1000	0/1000	15	15	- - -

NOTES:

(1) If your unit is equipped with new style filters (Vilter Part #3109B or 3110B), the Alarm should be set at 37 psig, Trip at 40 psig and Reset at 35 psig.
(2) For boosters, set Alarm at 28 psig, Trip at 25 psig, Reset at 30 psig.
(3) Set Alarm at 60% and Trip at 70% of full load motor nameplate amps.
(4) Set Alarm at 120% and Trip at 125% of full load motor nameplate amps.

The values or options in the screen displays shown must be entered before start-up. Refer to the "Preparation for Start-up" Section for instructions.

FIG. 7 SYSTEM CONTROL LIMIT VALUES WORKSHEET

CONTROL LIMITS	SYSTEM VALUES		VALUE LIMITS		DEFAULT VALUES	
	CUT IN	CUT OUT	CUT IN	CUT OUT	CUT IN	CUT OUT
SUCTION PRESSURE ON/OFF (1)						
SETPOINT #1			30"/150	30"/150	10	6
SETPOINT #2			30"/150	30"/150	15	11
SUCT PR CAP INCREASE (1)						
SETPOINT #1			30"/150	30"/150	20	20
SETPOINT #2			30"/150	30"/150	25	25
SUCT PR CAP DECREASE (1)						
SETPOINT #1			30"/150	30"/150	18	18
SETPOINT #2			30"/150	30"/150	23	23
HIGH DSCH PRESS UNLD (1)						
SETPOINT #1			0/300	0300	200	190
SETPOINT #2			0/300	0/300	210	200
OILPMP RESTART (D/S)			1.0/8.0	1.0/8.0	2.8	3.0
OIL SEPARATOR HEATER			80/130	80/130	95	105
CAP CTRL °F ON/OFF (2)						
SETPOINT #1			-99/200	-99/200	20	10
SETPOINT #2			-99/200	-99/200	25	15
CAP CTRL °F INCR (2)						
SETPOINT #1			-99/300	-99/300	28	27
SETPOINT #2			-99/300	-99/300	33	32
CAP CTRL °F DECR (2)						
SETPOINT #1			-99/200	-99/200	24	25
SETPOINT #2			-99/200	-99/200	29	30
LAG, CAPACITY STEP (3)			0/100	---	10	---
VOL SLIDE ADJ FACTOR			-100/100	---	0%	---
MINIMUM RUN CAPACITY			10% / 90%	---	30	---
LEAD, MAXIMUM CAP FLAG (3)			50/100	50/100	95	90
ECONOMIZER SOLENOID			0% / 100%	0% / 100%	80%	75%
VOL ADJ CAP RANGE			0/100	---	100%	100%
	FLA	MAX	FLA	MAX	FLA	MAX
MOTOR AMPS LOAD LIMIT (4)						
SETPOINT #1			0/999	0/999	5	10
SETPOINT #2			0/999	0/999	5	10
CURRENT TRANSFORMER (1)	C/T RATIO		C/T RATIO 100-1000/AMPS		C/T RATIO 100/5 AMPS	

NOTES:

(1) Must be field set.
(2) Set only if temperature is used for capacity control.
(3) Set only if Lead/Lag option is selected.
(4) Set FLA at nameplate amps, MAX at nameplate + service factor.

The values or options in the screen displays shown must be entered before start-up. Refer to the "Preparation for Start-Up" Section for instructions.

FIG. 8 SYSTEM TIMER VALUES WORKSHEET

TIMER VALUES	SYSTEM VALUES	VALUE LIMITS	DEFAULT VALUES
AT START CAPACITY DECREASE		0/999 SEC	15 SEC
CAPACITY INCREASE MOTOR ON		0/255 SEC	2 SEC
CAPACITY DECREASE MOTOR ON		0/255 SEC	2 SEC
CMP STARTER AUX CONTACT BYPASS		0/255 SEC	10 SEC
CAP INCREASE MOTOR OFF		0/255 SEC	20 SEC
CAP DECREASE MOTOR OFF		0/255 SEC	10 SEC
VOL SLIDE ADJ TIMER		0/255 SEC	20 SEC
MINIMUM CAP PRELUB TIME		0/255 SEC	5 SEC
RUN CYCLE OIL PRESS BYPASS		0/90 SEC	60 SEC
PRELUB PUMP TIME LIMIT		0/255 SEC	255 SEC
CAPACITY HOLD MOTOR OFF TIME		0/255 SEC	10 SEC
CAPACITY HOLD MOTOR ON TIME		0/255 SEC	2 SEC
FLTR DIFF PR SAFETY CHANGEOVER		0/999 SEC	60 SEC
LO OIL SEP LEVEL BYPASS TIMER		0/120 SEC	60 SEC
AUTO RESTART AFTER POWER FAIL		1/240 MIN	5 MIN
OIL SEP TEMP SAFETY CHANGEOVER		0/15 MIN	5 MIN
LO OIL INJ TEMP SFTY CHANGEOVER		0/15 MIN	6 MIN
ANTIRECYCLE STRT TIMER (MIN) (1)		0/30 MIN	20 MIN
START LAG COMP TIMER (MIN) (2)		0/30 MIN	5 MIN
STOP LAG COMP TIMER (MIN) (2)		0/30 MIN	5 MIN
FORCE START LAG COMP (MIN) (2)		0/60 MIN	30 MIN
HOT STRTS/HR COUNTER (COUNTS) (1)		1/10 COUNTS	3 COUNTS

NOTES:
(1) Must be field set.
(2) Set only if Lead/Lag option is selected.

I. INSTALLATION & GENERAL DESCRIPTION

Please refer to the wiring diagram supplied with the unit for the necessary information on wiring the unit.

UNITS WITH FACTORY EQUIPPED MICRO

The unit is pre-wired at the factory. The necessary field wiring is described below.

1. Control power 115 VAC, 50/60 Hz. must be wired to the control fuses. L1 is brought to the top of the 10 AMP fuse (FU-1), and the 20 AMP fuse (FU-2). L2 is brought in to the terminals #2 and #2A on the terminal strip located in the bottom of the panel. For units with V-PLUS® cooling, L1 must also be brought to the fuse in the V-PLUS panel, and L2 must also be brought to terminal 2B in the V-PLUS panel.

2. An auxiliary contact from the compressor motor starter is required. This isolated contact is connected to terminals #4 and #18 on the terminal strip.

3. A dry contact from control relay CR-3 must be wired to the compressor motor starter coil. This dry contact is connected to terminals #26 and #27 on the terminal strip. Control power for this coil should come from a source which is de-energized with the compressor disconnect.

4. A dry contact from control relay CR2 must be wired to the oil pump motor starter coil. This dry contact is connected to terminals #24 and #25 on the terminal strip. Control power for this coil should come from a source which is de-energized with the compressor disconnect.

5. Two auxiliary safety cutouts are available to shut down the compressor package. A dry contact must be supplied and wired to terminal #4 and #19 for auxiliary #1 and terminals #4 and #28 for auxiliary #2 on the terminal strip. The jumper on the terminal strip between these terminals must be removed to use these cutouts. These contacts, if closed, will allow the compressor to run. If these contacts open at any time, the compressor will shut down. NOTE: Versions 4.XX and lower have only Aux.#1 available.

6. External indication of the compressor alarm or shutdown status is also available. To monitor the alarm status, terminal #6 will have a 115 VAC potential when the compressor is operating normally, and drop to 0 VAC when in an alarm condition. To monitor the shutdown status, terminal #7 will have a 115 VAC potential when the compressor is operating normally, and drop to 0 VAC when in a shutdown condition.

I. INSTALLATION & GENERAL DESCRIPTION (cont'd)

7. The current transformer supplied in the compressor motor conduit box should be checked to insure the motor leads of one leg are pulled through the transformer. Typically, a wye delta started motor should have leads 1 and 6 pulled through this transformer for a 6 lead motor. However, this should always be checked as different motors and starting methods will require different leads to be used.

II. PREPARATION FOR START UP

After installation wiring is complete, the following steps, where indicated, must be taken to ensure satisfactory operation and protection. The values that are blank in Figures 6, 7 and 8 are necessary for you to enter for your specific application. Specific instructions for each of the screen displays, along with the display, are listed in the following instructions.

In order to carry out the specific steps listed below, please refer to Figure 1. Figure 1 shows the arrangement of the various screen displays. Movement from one screen display to another is accomplished with the 4 arrow keys. For example, to move from the first Current Values screen display (located in Column 1, Row 1 of Figure 1) to the Operator Options screen display (located in Column 3, Row 1), do the following:

1. Push the RIGHT ARROW key 2 times. You are now in one of the menus listed in Column 3.

2. Pushing the UP ARROW key will get you to Row 1 if the Operator Options Menu is not displayed immediately.

By referring to Figure 1, changing screen displays is simple and fast. The Control remembers the last row number for a particular column. This allows toggling between menus in different columns and rows quickly.

To change any Setpoint, Time Delay, Time Intervals, Operator Option, Calibration, Control Limit, or Event List, the password must be entered. The PASSWORD for your unit is ***EDIT,NEXT,NEXT,ENTER***.

1. Upon initial energization, the screen will indicate a trip on aux. #1 input. This is an internal safety relay in the program, which requires resetting after a power-up. Push the reset button as the screen instructs. Movement between screen displays can now be accomplished, whereas without a reset, the unit will remain on the Active Alarm/Trip screen display.

2. Push the EXIT key. This always returns to the Current Values screen display (Row 1, Column 1).

3. Although calibration of the pressure and temperature transducers is done at the factory, the calibration should be checked and adjusted as needed, BEFORE start-up. If recalibration is necessary, refer to Section IIE Recalibrate Transducers for further information.

4. Safety Setpoints for the specific application must be entered. Use the ARROW keys to go to the Change/Display Setpoints screen display (Column 2, Row 1). All the safeties can be selected from this screen display.

II. PREPARATION FOR START UP (cont'd)

Enter the password. An arrow should appear to the left of safety parameters. To change a safety parameter (listed in Figures 6, 7 & 8), press ENTER (an asterisk should replace arrow). Then, with the UP & DOWN ARROW keys, select the safety parameter that is required.

When the required safety parameter is displayed, lock it in by pressing ENTER. The cursor will return. To change a safety setpoint, press the NEXT key. The arrow will move to the alarm setpoint value. To change this value, press ENTER (an asterisk will replace the arrow). Again, with the UP & DOWN ARROW keys, adjust the value up and down as required. Lock it in by pressing ENTER.

Adjust the next parameter. Select Trip by pressing the NEXT key twice. To enter the edit mode, press ENTER again. This changes the arrow to an asterisk. Set the required value. Continue through this entire screen, setting each Safety Set Point as listed in Figure 6. When done, return to home or current values (Column 1, Row 1) screen by pressing EXIT key.

NOTE: When returning to a column, the display automatically returns to the row it was last in.

When an operating value exceeds the alarm setting of the safety setpoint, an alarm will be active on the Alarm/Trip display (Column 1, Row 3). If the operating value then exceeds the trip setting of the safety setpoint, the compressor will shut down. The display will then be forced to the Active Alarm/Trip display (Column 1, Row 3). In order to move from this display, the trip must be acknowledged with a reset. The compressor will not restart until the operating value which caused the trip is within the reset range and the failure is then acknowledged by a reset.

IIA. SAFETY SETPOINT FUNCTIONS

The following is a list of the safety setpoint menus (Column 2, Row 1), with a brief description of each.

```
        SAFETY SETPOINTS      (SETPT *)
 Safety Description          ALRM  TRIP  RESET
LO SUCT TEMP                 ***°  ***°   ***°
   (Move between fields with "NEXT" key.)
```

Low Suction Temperature – This is the low suction temperature safety. The alarm or trip will be active if the suction temperature should drop below the respective setpoint values.

```
        SAFETY SETPOINTS      (SETPT *)
 Safety Description          ALRM  TRIP  RESET
HI DISCHARGE TEMP            ***°  ***°   ***°
   (Move between fields with "NEXT" key.)
```

High Discharge Temperature – This is the high discharge temperature safety. The alarm or trip will be active if the discharge temperature should rise above the respective setpoint values.

```
        SAFETY SETPOINTS      (SETPT *)
 Safety Description          ALRM  TRIP  RESET
LO OIL SEP START TEMP        ***°  ***°   ***°
   (Move between fields with "NEXT" key.)
```

Low Oil Separator Start Temperature – This is the starting low oil separator temperature safety. The compressor is prevented from starting or running if the oil in the separator is below the trip value. After a time delay (Oil Separator Temperature Safety Changeover), this safety is deactivated and the Lo Oil Separator Run Temperature is the active setpoint.

```
        SAFETY SETPOINTS      (SETPT *)
 Safety Description          ALRM  TRIP  RESET
LO OIL SEP RUN TEMP          ***°  ***°   ***°
   (Move between fields with "NEXT" key.)
```

Low Oil Separator Run Temperature – This is the running low oil separator temperature safety. After a time delay (Oil Separator Temperature Safety Changeover), the Lo Oil Separator Start Temperature is bypassed and Lo Oil Separator Run Temperature is the active setpoint. The alarm or trip will be active if the oil temperature in the separator drops below the respective setpoint values.

IIA. SAFETY SETPOINT FUNCTIONS (cont'd)

```
        SAFETY SETPOINTS      (SETPT *)
  Safety Description          ALRM  TRIP  RESET
  LO OIL INJ TEMP             ***°  ***°   ***°
     (Move between fields with "NEXT" key.)
```

Low Oil Injection Temperature – This is the low oil injection safety. The alarm or trip will be active if oil injection temperature drops below setpoint value after a time delay (Oil Injection Temperature Safety Changeover).

```
        SAFETY SETPOINTS      (SETPT *)
  Safety Description          ALRM  TRIP  RESET
  HI OIL INJECT TEMP          ***°  ***°   ***°
     (Move between fields with "NEXT" key.)
```

High Oil Injection Temperature – This is the high oil injection temperature safety. The alarm or trip will be active on a rise in oil injection temperature above the respective setpoint values.

```
        SAFETY SETPOINTS      (SETPT *)
  Safety Description          ALRM  TRIP  RESET
  LO CONTROL TEMP             ***°  ***°   ***°
     (Move between fields with "NEXT" key.)
```

```
 OPERATOR OPTIONS MENU          Select desired
Option # 5:                     option.
 (y)TEMP CTRL ACTIVE            (y) indicates the
 ( )PRESS CTRL ACTIVE           option is active.
```

Low Control Temperature – This is the low control temperature safety. This safety is active when temperature control has been selected from the operator options menu. An alarm or trip will be active on a drop in Process Temperature below the respective setpoint values.

```
        SAFETY SETPOINTS      (SETPT *)
  Safety Description          ALRM  TRIP  RESET
  HI CONTROL TEMP             ***°  ***°   ***°
     (Move between fields with "NEXT" key.)
```

```
 OPERATOR OPTIONS MENU          Select desired
Option # 5:                     option.
 (y)TEMP CTRL ACTIVE            (y) indicates the
 ( )PRESS CTRL ACTIVE           option is active.
```

IIA. SAFETY SETPOINT FUNCTIONS (cont'd)

High Control Temperature – This is the high control temperature safety. This safety is active when temperature control has been selected from the operator options menu. An alarm will be active on an increase in Process Temperature above the respective setpoint values.

```
        SAFETY SETPOINTS      (SETPT *)
 Safety Description          ALRM  TRIP  RESET
LO SUCTION PRESSURE          ***#  ***#   ***#
   (Move between fields with "NEXT" key.)
```

Low Suction Pressure – This is the low suction pressure safety. This safety is active in both the pressure or temperature control modes. An alarm or trip will be active on a drop in suction pressure below the respective setpoint values.

```
        SAFETY SETPOINTS      (SETPT *)
 Safety Description          ALRM  TRIP  RESET
HI DISCHARGE PRESS           ***#  ***#   ***#
   (Move between fields with "NEXT" key.)
```

High Discharge Pressure – This is the high discharge pressure safety. The alarm or trip will be active on a rise in discharge pressure above the respective setpoint values.

```
        SAFETY SETPOINTS      (SETPT *)
 Safety Description          ALRM  TRIP  RESET
PRELUB OIL PRESS             ***#  ***#   ***#
   (Move between fields with "NEXT" key.)
```

Prelube Oil Pressure – If oil pressure (Manifold Minus Discharge) does not rise above the reset setting for a period of time exceeding the Minimum Compressor Prelube Time delay and the pump runs for a minimum of time (Prelub Pump Time Limit), an alarm and trip will then occur "Allow Start Pressure".

```
        SAFETY SETPOINTS      (SETPT *)
 Safety Description          ALRM  TRIP  RESET
LO OIL PRESSURE              ***#  ***#   ***#
   (Move between fields with "NEXT" key.)
```

Low Oil Pressure – This is the running oil pressure safety. An alarm or trip will be active if the oil pressure (Manifold Minus Suction) should drop below the respective setpoint values, after the Run Cycle Oil Pressure Bypass timer has completed its cycle.

IIA. SAFETY SETPOINTS FUNCTIONS (cont'd)

```
        SAFETY SETPOINTS      (SETPT *)
 Safety Description          ALRM  TRIP  RESET
HI START FLTR DIFF PR        ***#  ***#   ***#
   (Move between fields with "NEXT" key.)
```

High Start Filter Differential Pressure – This is the filter differential safety for the start cycle. If the filter inlet exceeds the filter outlet pressure alarm or trip setpoint values, before the Filter Differential Pressure Bypass timer has cycled, a High Start Filter Differential Pressure alarm or trip will occur. After the timer has cycled, this safety is inactive and the High Run Filter Differential Pressure is active.

```
        SAFETY SETPOINTS      (SETPT *)
 Safety Description          ALRM  TRIP  RESET
HI RUN FILTER DIFF PR        ***#  ***#   ***#
   (Move between fields with "NEXT" key.)
```

High Run Filter Differential Pressure – This safety setpoint is active when the compressor is in the run cycle. An alarm or trip will be active if the filter inlet pressure exceeds the filter outlet pressure by the respective safety setpoint values.

```
        SAFETY SETPOINTS      (SETPT *)
 Safety Description          ALRM  TRIP  RESET
HI AMPS AT < 15% CAP               ***
   (Move between fields with "NEXT" key.)
```

High Amps At Less Than 15% Capacity – This safety setpoint is active after the At Start Capacity Decrease timer times out and the compressor is below 15% capacity. A trip (% FLA CUTOUT F.) will be active if the amp draw exceeds the safety setpoint value. A normal setpoint would be approximately 50% of the full load amperage, but it can be set higher if nuisance shut downs occur at start-up.

```
        SAFETY SETPOINTS      (SETPT *)
 Safety Description          ALRM  TRIP  RESET
HI AMP LIMIT                 ***   ***    ***
   (Move between fields with "NEXT" key.)
```

High Amp Limit – This safety setpoint is active after the At Start Cap & Vol Dec timer times out. A trip (HI AMP CUTOUT F.) will be active if the motor amp draw exceeds the safety setpoint value. The setpoint should be set at 125% of the motor full load amperage.

IIB. CONTROL LIMIT SETPOINT FUNCTIONS

The following is a list of the control limit setpoint menus (Column 2, Row 2), with a brief description of each.

CONTROL LIMITS	(SETPT #)	
Control Description	CUTIN	CUTOUT
SUCTION PRESS ON/OFF	***#	***#
(Move between fields with "NEXT" key.)		

OPERATOR OPTIONS MENU	Select desired
Option # 5:	option.
( )TEMP CTRL ACTIVE	(y) indicates the
(y)PRESS CTRL ACTIVE	option is active.

Suction Pressure On/Off – The compressor will automatically cycle on and off at the setpoints entered. Suction Pressure On/Off control is only active if the Pressure Control Active option is selected from the operator options menu. If compressor shut down is desired on a suction pressure drop and a manual reset is required, set the cutout value below the Low Suction Pressure safety trip value. This will shut down the unit and a reset will be required for restart.

CONTROL LIMITS	(SETPT #)	
Control Description	CUTIN	CUTOUT
SUCT PR CAP INCREASE	***#	***#
(Move between fields with "NEXT" key.)		

OPERATOR OPTIONS MENU	Select desired
Option # 5:	option.
( )TEMP CTRL ACTIVE	(y) indicates the
(y)PRESS CTRL ACTIVE	option is active.

Suction Pressure Capacity Increase – The capacity of the compressor will increase when suction pressure is at or above the cut-in setpoint and the increase "off" timer has cycled. Capacity will continue to increase until the Suction Pressure Capacity Increase cutout setpoint is reached. If closer system control is desired, set the cutin and cutout pressures at the same values. This will result in $^{1}/_{10}$# difference in cutin and cutout pressures.

IIB. CONTROL LIMIT SETPOINT FUNCTIONS (cont'd)

CONTROL LIMITS	(SETPT #)	
Control Description	CUTIN	CUTOUT
SUCT PR CAP DECREASE	***#	***#
(Move between fields with "NEXT" key.)		

OPERATOR OPTIONS MENU	Select desired
Option # 5:	option.
( )TEMP CTRL ACTIVE	(y) indicates the
(y)PRESS CTRL ACTIVE	option is active.

Suction Pressure Capacity Decrease – The capacity of the compressor will decrease when the suction pressure is at or below the cutin setpoint and the decrease "off" timer has cycled. Capacity will continue to decrease until the Suction Pressure Capacity decrease cutout setpoint is reached. If closer system control is desired, set the cutin and cutout pressures at the same values. This will result in a $^{1}/_{10}$# difference in cutin and cutout pressures.

CONTROL LIMITS	(SETPT #)	
Control Description	CUTIN	CUTOUT
HI DSCH PRESS UNLOAD	***#	***#
(Move between fields with "NEXT" key.)		

OPERATOR OPTIONS MENU	Select desired
Option # 5:	option.
( )TEMP CTRL ACTIVE	(y) indicates the
(y)PRESS CTRL ACTIVE	option is active.

High Discharge Pressure Unloading – The capacity of the compressor will decrease when the discharge pressure is at or above the cut-in setpoint. When the cutout setpoint is reached, the compressor will stop from further loading.

CONTROL LIMITS	(SETPT #)	
Control Description	CUTIN	CUTOUT
OILPMP RESTART (D/S)	***#	***#
(Move between fields with "NEXT" key.)		

OPERATOR OPTIONS MENU	Select desired
Option # 3:	option.
(y)PRIME OIL PMP,SP#1	(y) indicates the
( )FULL OIL PMP SP#1	option is active.

IIB. CONTROL LIMIT SETPOINT FUNCTIONS (cont'd)

Oil Pump Restart (D/S) – The oil pump restart pressure ratio (discharge/suction) is only active when the Prime Oil Pump option is selected from the operator options menu (see section IID). To determine cutin and cutout values for the pressure ratios, take the absolute discharge pressure (PSIA) and divide it by the absolute suction pressure (PSIA).

If the pressure ratio is below cutin setpoint value, the oil pump will restart and stay on until the pressure ratio increases above the cutout setpoint. This enables a high stage compressor with a part time oil pump to temporarily operate under conditions requiring a full time oil pump.

Example: To calculate the cutout value, the discharge pressure is divided by the suction pressure. Assume the absolute discharge pressure is 200 PSIA and the absolute pressure cutout point desired is 67 PSIA. The result is a cutout value of approximately 3.0. This would then be entered for the cutout pressure. To determine the cutin value, take the absolute discharge pressure (200 PSIA) and divide by the absolute suction pressure cutin point desired (71 PSIA). This results in a cutin value of 2.8. Values the system may require may be different from the values given in the example.

```
CONTROL LIMITS          (SETPT #)
  Control Description              CUTIN   CUTOUT
  OIL SEPARATOR HEATER             ***°F    ***°F
     (Move between fields with "NEXT" key.)
```

Oil Separator Heater – This control limit determines when the oil separator heater is energized. A decrease in oil separator temperature below the cutin setpoint energizes the oil separator heater. On an increase in oil separator temperature above the cutout setpoint, the oil separator is de-energized.

```
        CONTROL LIMITS          (SETPT #)
  Control Description            CUTIN   CUTOUT
  CAP CONTROL °F ON/OFF          ***°F    ***°F
     (Move between fields with "NEXT" key.)
```

```
OPERATOR OPTIONS MENU          Select desired
Option # 5:                    option.
(y)TEMP CTRL ACTIVE            (y) indicates the
( )PRESS CTRL ACTIVE           option is active.
```

IIB. CONTROL LIMIT SETPOINT FUNCTIONS (cont'd)

Capacity Control °F On/Off – The compressor will automatically cycle on and off at the setpoints entered. Capacity Control °F On/Off is only active if the Temperature Control Active option is selected from the operator options menu. If compressor shut down is desired on a Process Temperature drop and manual reset is required, set the cutout value below the Low Control Temperature safety trip value. This will shut down the unit and a reset will be required to restart it.

CONTROL LIMITS	(SETPT #)	
Control Description	CUTIN	CUTOUT
CAP CONTROL °F INCR	***°F	***°F
(Move between fields with "NEXT" key.)		

OPERATOR OPTIONS MENU	Select desired
Option # 5:	option.
(y)TEMP CTRL ACTIVE	(y) indicates the
( )PRESS CTRL ACTIVE	option is active.

Capacity Control °F Increase – The capacity of the compressor will increase when process temperature is at or above the cutin setpoint, and the increase "off" timer has cycled. Capacity will continue to increase until the Capacity Control °F Increase cutout setpoint is reached.

However, if the suction pressure should drop below the Suction Pressure Capacity Decrease cutout setpoint, the Suction Pressure Capacity Decrease will override the Capacity Control °F Increase and prevent the compressor capacity from increasing. If the suction pressure should continue to decrease below the Suction Pressure Capacity Decrease cutin setpoint, the capacity will be forced to decrease until the suction pressure is above the cutin setpoint. This will help to stabilize the suction pressure, allowing the Process Temperature to gradually be pulled down.

If closer system control is desired, set the cutin and cutout temperatures at the same values. This will result in a $^{1}/_{10}$°F difference in cutin and cutout temperatures. Process Temperature control of the capacity is active only if the Temperature Control Active option is selected from the operator options menu.

IIB. CONTROL LIMIT SETPOINT FUNCTIONS (cont'd)

```
        CONTROL LIMITS          (SETPT #)
 Control Description             CUTIN   CUTOUT
 CAP CONTROL °F DECR             ***°F    ***°F
    (Move between fields with "NEXT" key.)
```

```
OPERATOR OPTIONS MENU          Select desired
Option # 5:                     option.
(y)TEMP CTRL ACTIVE             (y) indicates the
( )PRESS CTRL ACTIVE            option is active.
```

Capacity Control °F Decrease – The capacity of the compressor will decrease when the Process Temperature is at or below the cutin setpoint and the decrease "off" timer has cycled. Capacity will continue to decrease until the Capacity Control °F Decrease cutout setpoint is reached.

If closer system control is desired, set the cutin and cutout temperatures at the same values. This will result in a $^{1}/_{10}$°F difference in cutin and cutout temperatures. Process Temperature control of the capacity is active only if the Temperature Control Active option is selected from the operator options menu.

```
        CONTROL LIMITS          (SETPT #)
 Control Description             VALUE
 LAG,CAPACTIY STEP                ***%   ---
    (Move between fields with "NEXT" key.)
```

```
OPERATOR OPTIONS MENU          Select desired
Option # 6:                     option.
(y)LEAD/LAG ENABLE              (y) indicates the
( )LEAD/LAG DISABLE             option is active.
```

Lag, Capacity Step – The lag step value determines the increment the lag compressor is allowed to load or unload on a call for capacity increase or decrease from the lead compressor. This setpoint is active only when the Lead/Lag Enable operator option is selected.

```
        CONTROL LIMITS          (SETPT #)
 Control Description             VALUE
 VOL SLIDE ADJ FACTOR             ***%   ---
    (Move between fields with "NEXT" key.)
```

IIB. CONTROL LIMIT SETPOINT FUNCTIONS (cont'd)

Volume Slide Adjustment Factor – This value is normally 0 (zero) and will not require changing. However, if system operating conditions show the volume ratio is not at optimum value for the system, this value can be adjusted up or down to permit the most efficient positioning of the volume slide valves. This setpoint is active on a drop in capacity below the Volume Slide Adjustment factor.

CONTROL LIMITS	(SETPT #)
Control Description	CUTIN
MINIMUM RUN CAPACITY	***% ---
(Move between fields with "NEXT" key.)	

OPERATOR OPTIONS MENU	Select desired
Option # 7:	option.
(y)MIN RUN CAP ENABLE	(y) indicates the
( )MIN RUN CAP OFF	option is active.

Minimum Run Capacity – The Minimum Run Capacity is the minimum capacity the compressor will be allowed to run at. When the compressor is started, the compressor will be loaded to the Minimum Run Capacity control setpoint minus 5%. This is done to prevent the capacity control from hunting, if the load is not great enough to keep the compressor capacity at the Minimum Run Capacity setpoint. On a call for unloading, the compressor will unload until it reaches the Minimum Run Capacity control setpoint. The compressor will remain there until the suction pressure reduces and the compressor cycles off on the Suction Pressure On/Off control setpoint.

When the Lead/Lag Enable operator option is selected, Minimum Run Capacity is automatically active. When the lead compressor reaches the Lead, Max Cap Flag control setpoint and there is a demand for more capacity, the lag compressor will be allowed to start and load to the Minimum Run Capacity control setpoint minus 5%. If there is a continued call for capacity, the lag compressor will be allowed to load at Lag, Capacity Step value.

When the lead compressor calls for capacity reduction and the lag compressor is above the Minimum Run Capacity control setpoint, the lag compressor will unload at an amount of the Lag, Capacity Step until it reaches the Minimum Run Capacity setpoint minus 5%. At this time, the lead compressor will unload until it reaches the Minimum Run Capacity control setpoint.

IIB. CONTROL LIMIT SETPOINT FUNCTIONS (cont'd)

```
        ONTROL LIMITS          (SETPT #)
 Control Description            CUTIN   CUTOUT
 LEAD,MAXIMUM CAP FLAG           ***%    ***%
   (Move between fields with "NEXT" key.)
```

```
OPERATOR OPTIONS MENU          Select desired
Option # 6:                    option.
(y)LEAD/LAG ENABLE             (y) indicates the
( )LEAD/LAG DISABLE            option is active.
```

Lead, Maximum Capacity Flag – The Lead, Maximum Capacity Flag control setpoint is active when the Lead/Lag Enable operator option is selected. The Lead, Maximum Capacity flag control setpoint is the setpoint that determines at what compressor capacity the lag compressor will be allowed to start up. When the lead compressor increases in capacity above the control cutin setpoint, the lag compressor is allowed to start if the Start Lag Compressor Timer has timed out. If the lag compressor is running when the lead compressor capacity increases above the control cutin setpoint, the lag compressor will be allowed to load through the Lag, Capacity Step control setpoint. This control setpoint is active when the Lead/Lag Enable operator option is selected.

NOTE: This setpoint is also used to energize the At Max Capacity Indicate module (Software Version 5.XX) which is used for feedback control purposes when controlling the capacity in the remote mode via the remote increase and decrease modules.

```
        CONTROL LIMITS         (SETPT #)
 Control Description            CUTIN   CUTOUT
 ECONOMIZER SOLENOID             ***#    ***#
   (Move between fields with "NEXT" key.)
```

Economizer Solenoid – This control limit determines when the Economizer solenoid is energized. When the percentage of compressor capacity reduces below the Economizer Solenoid cutout setpoint, the solenoid is de-energized. On an increase in compressor capacity above the Economizer Solenoid cutin setpoint, the solenoid is energized.

```
        CONTROL LIMITS         (SETPT #)
 Control Description            VALUE
 VOL ADJ CAP RANGE               ***%    ...
   (Move between fields with "NEXT" key.)
```

IIB. CONTROL LIMIT SETPOINT FUNCTIONS (cont'd)

Volume Adjust Capacity Range – This control limit determines at what capacity range the Volume Slide Adjustment factor will be active. The factor will be active from 0% capacity and will be deactivated when the cutout setpoint is reached. On a decrease in capacity below the cutin setpoint, the factor will be active.

CONTROL LIMITS	(SETPT #)	
Control Description	FLA	MAX
MOTOR AMP LOAD LIMIT	***	***
(Move between fields with "NEXT" key.)		

Motor Amps Load Limit – This control limit is the motor full load current draw and the maximum current draw. This control limit will only prevent the compressor from loading and does not shut down the compressor if the maximum current draw setpoint is exceeded. The actual values entered may depend on certain circumstances. The function of the setpoints follows:

If the motor is operating at the FLA setting, the compressor is prevented from loading. If the motor amps exceed the MAX setpoint, the compressor is forced to unload until such time the current is at 1.0625 times above the FLA setting. If the motor being used has a service factor below 1.0625, use a value for FLA that is 10% lower than the MAX value.

CONTROL LIMITS	(SETPT #)
Control Description	C/T RATIO
CURRENT TRANSFORMER	***/5Amps
(Move between fields with "NEXT" key.)	

C/T Ratio – This is the Current Transformer Ratio. The value entered must agree with the Current Transformer Ratio on the current transformer being used. The current transformer is mounted in the compressor motor conduit box.

IIC. SETPOINT TIMER FUNCTIONS

The following is a list of the setpoint timer function menus (Column 2, Row 3), with a brief description of each.

```
TIMER SETPOINTS (SEC,MIN,COUNTS)
Timer Field                    Value
AT START CAPACITY DECREASE     *** SEC
(Move between fields with "NEXT" key.)
```

At Start Capacity Decrease – At start, the capacity motor is held at minimum position for this set period of time, after which they are free to move in accordance to the system demands.

```
TIMER SETPOINTS (SEC,MIN,COUNTS)
Timer Field                    Value
CAPACITY INCREASE MOTOR ON     *** SEC
(Move between fields with "NEXT" key.)
```

Capacity Increase Motor On – In the automatic mode, if a capacity increase is desired, the capacity motor is energized to increase the capacity for this set length of time. The motor is then shut off for a set period of time (Capacity Increase Motor Off) after which, if the system requires a further increase in capacity, the motor is energized. This allows time for the capacity increases to take effect before making another capacity adjustment.

```
TIMER SETPOINTS (SEC,MIN,COUNTS)
Timer Field                    Value
CAPACITY DECREASE MOTOR ON     *** SEC
(Move between fields with "NEXT" key.)
```

Capacity Decrease Motor On – In the automatic mode, if a capacity decrease is desired, the capacity motor is energized to decrease the capacity for this set length of time. The motor is then shut off for a set period of time (Capacity Decrease Motor Off), after which, if the system requires a further decrease in capacity, the motor is energized. This allows time for the capacity decreases to take effect before making another capacity adjustment.

IIC. SETPOINT TIMER FUNCTIONS (cont'd)

```
TIMER SETPOINTS (SEC,MIN,COUNTS)
Timer Field                    Value
CMP STARTER AUX CONTACT BYPASS *** SEC
(Move between fields with "NEXT" key.)
```

Motor Starter Auxiliary Contact Bypass – The auxiliary motor starter contact is bypassed for a set period during starting. If it does not close after the timer has cycled, the compressor will be shut down and a motor overload failure will be displayed. Likewise, if some time after the set delay the auxiliary contact should open, the same failure screen display will be shown.

```
TIMER SETPOINTS (SEC,MIN,COUNTS)
Timer Field                    Value
CAPACITY INCREASE MOTOR OFF    *** SEC
(Move between fields with "NEXT" key.)
```

Capacity Increase Motor Off – This is the length of time the increase motor is not allowed to energize, even though an increase in capacity is required. This allows time for the last capacity increase pulse to take effect before making another capacity adjustment.

```
TIMER SETPOINTS (SEC,MIN,COUNTS)
Timer Field                    Value
CAPACITY DECREASE MOTOR OFF    *** SEC
(Move between fields with "NEXT" key.)
```

Capacity Decrease Motor Off – This is the length of time the decrease motor is not allowed to energize even though a decrease in capacity is required. This allows time for the last capacity decrease pulse to take effect before making another capacity adjustment. If Option 9 is selected to extend the CAP INC OFF TIME, the setpoint value of this timer will be extended by the multiplication factor selected in Option 9. The setpoint value will return to normal when the control parameter (either suction pressure or process temperature) has been satisfied for the first time after the compressor starts.

IIC. SETPOINT TIMER FUNCTIONS (cont'd)

```
TIMER SETPOINTS (SEC,MIN,COUNTS)
Timer Field                    Value
VOL SLIDE ADJ TIMER            *** SEC
(Move between fields with "NEXT" key.)
```

Volume Slide Adjust Timer – This timer determines the intervals the volume slide is adjusted. If the volume slide is between 2.5% to 7% away from the desired volume ratio value, the motor is pulsed once toward the desired value. If the volume slide is more then 7% away from the desired value, the volume slide valve motor is continuously energized until the value is within 2.5% of the desired value. If the actual position is within 2.5% of the desired value, then no adjustment will be made.

```
TIMER SETPOINTS (SEC,MIN,COUNTS)
Timer Field                    Value
MINIMUM COMP PRELUB TIME       *** SEC
(Move between fields with "NEXT" key.)
```

Minimum Compressor Prelube Time – This is the length of time the oil pump will run, after establishing Prelube Oil Pressure, to prime the oil circuit before starting the compressor.

```
TIMER SETPOINTS (SEC,MIN,COUNTS)
Timer Field                    Value
RUN CYCLE OIL PRESS BYPASS     *** SEC
(Move between fields with "NEXT" key.)
```

Run Cycle Oil Pressure Bypass – This timer bypasses the Low Oil Pressure (Manifold Minus Suction Pressure) limits. The timer starts when the compressor starts. After the timer has cycled, the Low Oil Pressure setpoint is active.

```
TIMER SETPOINTS (SEC,MIN,COUNTS)
Timer Field                    Value
PRELUB PUMP TIME LIMIT         *** SEC
(Move between fields with "NEXT" key.)
```

Prelube Pump Time Limit – This timer puts a limit on how long the prelube oil pump is allowed to run without establishing the Prelube Oil Pressure.

IIC. SETPOINT TIMER FUNCTIONS (con't)

```
      TIMER SETPOINTS (SEC,MIN,COUNTS)
   Timer Field                        Value
 AUTO RESTART AFTER POWER FAIL        *** SEC
   (Move between fields with "NEXT" key.)
```

```
OPERATOR OPTIONS MENU          Select desired
 Option # 2:                   option.
 (y)POWERUP AUTO START         (y) indicates the
 ( )POWERUP MAN START          option is active.
```

Auto Restart After Power Failure – This timer forces the microprocessor to wait for the set time period after a power failure before starting the compressor unit. By staggering the timer settings, the compressors can be allowed to start automatically one at a time after a power failure. This helps to prevent excessive loads on the power system that could be caused by all of the equipment coming on line at the same time. The Power-up Auto Start operator option must be selected for this option to be active.

```
      TIMER SETPOINTS (SEC,MIN,COUNTS)
   Timer Field                        Value
 CAPACITY HOLD MOTOR OFF TIME         *** SEC
   (Move between fields with "NEXT" key.)
```

```
OPERATOR OPTIONS MENU          Select desired
 Option # 6:                   option.
 (y)LEAD/LAG ENABLE            (y) indicates the
 ( )LEAD/LAG DISABLE           option is active.
```

Capacity Hold Motor Off Time – The Capacity Hold Off Timer is active when the Lead/Lag Enable operator option is selected. This timer determines the off portion of the lag compressor capacity change pulse. This timer will be active when the lag compressor capacity is within 7%, but no closer than 2% of the lag compressor capacity hold value. If the lag compressor Lag Cap Step is less then 7% and the lead compressor is calling for the lag compressor to increase capacity, the lag compressor may load at a rate slower than what the lead compressor is requesting. To get the appropriate response, set the Cap Hold Off Timer to a value of approximately ½ of the Cap Increase Motor Off Timer setting.

IIC. SETPOINT TIMER FUNCTIONS (cont'd)

```
      TIMER SETPOINTS (SEC,MIN,COUNTS)
   Timer Field                        Value
 CAPACITY HOLD MOTOR ON TIME          *** SEC
   (Move between fields with "NEXT" key.)
```

```
OPERATOR OPTIONS MENU          Select desired
 Option # 6:                   option.
 (y)LEAD/LAG ENABLE            (y) indicates the
 ( )LEAD/LAG DISABLE           option is active.
```

Capacity Hold Motor On Time – The Capacity Hold On Time timer is active when the Lead/Lag Enable operator option is selected. This timer determines the on portion of the lag compressor capacity change pulse. This timer will be active when the lag compressor capacity is within 7%, but no closer than 2%, of the lag compressor capacity hold value.

```
      TIMER SETPOINTS (SEC,MIN,COUNTS)
   Timer Field                        Value
 FLTR DIFF PR SAFETY CHANGEOVER       *** SEC
   (Move between fields with "NEXT" key.)
```

Filter Differential Pressure Safety Changeover – This timer bypasses the Hi Run Filter Differential Pressure setting to allow Hi Start Filter Differential Pressure to protect against High Filter Differential during start up. After the timer has cycled, the Hi Run Filter Differential Pressure safety is active.

```
      TIMER SETPOINTS (SEC,MIN,COUNTS)
   Timer Field                        Value
 LO OIL SEP LEVEL BYPASS TIMER        *** SEC
   (Move between fields with "NEXT" key.)
```

Low Oil Separator Level Bypass Timer – This timer bypasses the low oil level switch for momentary drops in the oil level. If the switch is still open after the Low Oil Separator Level Bypass Timer has timed out, the compressor will be shut down and an alarm will be displayed. This timer is available if the unit is equipped with a low oil separator float switch (the oil level switch is standard on all liquid injection units and optional on all others).

IIC. SETPOINT TIMER FUNCTIONS (cont'd)

```
      TIMER SETPOINTS (SEC,MIN,COUNTS)
   Timer Field                        Value
OIL SEP TEMP SAFETY CHANGEOVER        *** MIN
   (Move between fields with "NEXT" key.)
```

Oil Separator Temperature Safety Changeover – This timer allows Low Oil Separator Start Temperature safety setpoint to protect the compressor against cold oil during starting. After the timer has cycled, the Low Oil Separator Run Temperature is then active.

```
      TIMER SETPOINTS (SEC,MIN,COUNTS)
   Timer Field                        Value
LO OIL INJ TEMP SFTY CHANGEOVER       *** MIN
   (Move between fields with "NEXT" key.)
```

Low Oil Injection Temperature Safety Changeover – This timer bypasses the Low Oil Injection Temperature safety setpoint during start. After the timer cycles, the Low Oil Injection Temperature safety is active.

```
      TIMER SETPOINTS (SEC,MIN,COUNTS)
   Timer Field                        Value
ANTIRECYCLE STRT TIMER (MIN)          *** MIN
   (Move between fields with "NEXT" key.)
```

```
OPERATOR OPTIONS MENU          Select desired
Option # 1:                    option.
( )HOT STARTS/HR               (y) indicates the
(y)ANTIRECYCLE TMR             option is active.
```

Anti-Recycle Start Timer – When a start has been attempted, the Anti-Recycle Timer is initiated. The compressor cannot be restarted until after the Anti-Recycle Timer has timed out. The Anti-Recycle Timer prevents the compressor from short cycling and can also be used as a Hot Start counter. This is accomplished by setting the timer to equal the time interval of the manufacturer's recommended hot starts per hour (i.e. 3 starts per hour timer should be set at 20 minutes). The Anti-Recycle Start Timer is an accumulative timer.

EXAMPLE: If the Anti-Recycle Start timer is set for 20 minutes (an approximate manufacturer's limit), and the compressor is shut down after 10 minutes of operation, the compressor will have to wait an additional 10 minutes before the compressor is allowed to restart, This maintains the 3 starts per hour manufacturer's limit.

IIC. SETPOINT TIMER FUNCTIONS (cont'd)

Anti-Recycle Start Timer (cont'd)

The Anti-Recycle Timer has a second function. If the compressor stops on the Suction Pressure On-Off control, the timer is reset. The compressor is not allowed to start until the timer has timed out and suction pressure has reached the cutin value.

For the Anti-Recycle Timer option to be active, the feature must be selected from the operator options menu (see section IID).

```
      TIMER SETPOINTS (SEC,MIN,COUNTS)
   Timer Field                        Value
 START LAG COMP TIMER                 *** MIN
   (Move between fields with "NEXT" key.)
```

```
OPERATOR OPTIONS MENU          Select desired
 Option # 6:                   option.
 (y)LEAD/LAG ENABLE            (y) indicates the
 ( )LEAD/LAG DISABLE           option is active.
```

Start Lag Compressor Timer – This timer prevents the lag compressor from starting until the timer has cycled, provided the lead compressor has loaded to the Lead, Maximum Capacity Flag control setpoint and there is a demand for increased capacity. This option is active when the Lead/Lag Enable operator option has been selected.

```
      TIMER SETPOINTS (SEC,MIN,COUNTS)
   Timer Field                        Value
 STOP LAG COMP TIMER                  *** MIN
   (Move between fields with "NEXT" key.)
```

```
OPERATOR OPTIONS MENU          Select desired
 Option # 6:                   option.
 (y)LEAD/LAG ENABLE            (y) indicates the
 ( )LEAD/LAG DISABLE           option is active.
```

Stop Lag Compressor Timer – This timer will shut down the lag compressor after the lag compressor is at its Minimum Run Capacity control setpoint, the lead compressor has unloaded to the Minimum Run Capacity Control setpoint, and there has not been an increase in capacity of the lead compressor for the duration of the Stop Lag Compressor Timer setting. This option is active when the Lead/Lag Enable operator option has been selected.

IIC. SETPOINT TIMER FUNCTIONS (cont'd)

```
      TIMER SETPOINTS (SEC,MIN,COUNTS)
   Timer Field                    Value
FORCE START LAG COMP              *** MIN
   (Move between fields with "NEXT" key.)
```

```
OPERATOR OPTIONS MENU          Select desired
Option # 6:                    option.
(y)LEAD/LAG ENABLE             (y) indicates the
( )LEAD/LAG DISABLE            option is active.
```

Force Start Lag Compressor – The lag compressor will be forced to start and load, if the lead compressor has not reached the Lead, Maximum Capacity Flag control setpoint, there has been an uninterrupted demand for more capacity and after the Force Start Lag Compressor timer has timed out. This timer is active only if the Lead/lag Enable operator option has been selected.

```
      TIMER SETPOINTS (SEC,MIN,COUNTS)
   Timer Field                    Value
HOT STRTS/HR COUNTER              *** CNT
   (Move between fields with "NEXT" key.)
```

```
OPERATOR OPTIONS MENU          Select desired
Option # 1:                    option.
(y)HOT STARTS/HR               (y) indicates the
( )ANTIRECYCLE TMR             option is active.
```

Hot Starts/Hour Counter – When the number of compressor restarts within an hour reach the setting, the compressor cannot be restarted for 1 hour from the last start. This prevents the number of hot starts/hour from exceeding the motor manufacturer's recommendation. The Hot Starts/Hr option from the operator options menu (see section IID) must be selected for this feature to be active.

IID. OPERATOR OPTIONS

The operator options menu contains options that are chosen by the operator. To make a selection in the operator options menu, enter the password. An arrow appears to the left of the option number. Pressing the ENTER key changes the arrow to an asterisk and allows you to select the desired option number with the UP & DOWN ARROW keys. To change the option after selection, press ENTER to get an arrow, then press the NEXT key to move the cursor to the desired option. To enter the new selection, press the ENTER key twice. The 'y" should now precede the current selection.

Depending on the software version, there are a total of nine operator options available in the operator options Menu with the default values for each shown in the displays below.

OPERATOR OPTIONS MENU	Select desired
Option # 1:	option.
(y)HOT STARTS/HR	(y) indicates the
( )ANTIRECYCLE TMR	option is active.

Option #1 – This operator option is used to select either Hot Starts/Hour or the Antirecycle Timer. Both are primarily used to prevent the operator from exceeding the recommended number of starts/hour. The Antirecycle Timer is also used to protect the compressor from short cycling by delaying the restarting of the compressor after shutdown.

OPERATOR OPTIONS MENU	Select desired
Option # 2:	option.
( )POWERUP AUTO START	(y) indicates the
(y)POWERUP MAN START	option is active.

Option #2 – This operator option deals with restarting the compressor after a power failure. The Auto Start On Power Failure features a timer (Auto Restart After Power Fail) which may be set to vary the startup of the compressor to prevent a power surge if all the electrical load would come on line at one time. The Manual Start On Power Failure option allows the operator to manually restart the compressor after a power failure.

OPERATOR OPTIONS MENU	Select desired
Option # 3:	option.
(y)PRIME OIL PMP,PM#1	(y) indicates the
( )FULL OIL PMP, PM#1	option is active.

OPERATOR OPTIONS MENU	Select desired
Option # 4:	option.
(y)PRIME OIL PMP,SP#2	(y) indicates the
( )FULL OIL PMP,SP#2	option is active.

Options #3 & #4 – The operator option must agree with the type of oil pump the unit is equipped with and the conditions the unit will be operating at. If the unit is equipped with a primer oil pump, it will only be used when starting the compressor, after which differential pressure is used to lubricate the compressor. The full time oil pump is used on units that do not have adequate pressure differential between the suction and discharge.

OPERATOR OPTIONS MENU	Select desired
Option # 5:	option.
( )TEMP CTRL ACTIVE	(y) indicates the
(y)PRESS CTRL ACTIVE	option is active.

Option #5 - This operator option allows the operator to control the compressor by Process Temperature through the Temp Ctrl Active operator option or pressure control through the Press Ctrl Active operator option.

If the Press Ctrl Active operator option is selected as the controlling parameter, the suction pressure control will override the Process Temperature control and force the compressor to unload when the suction pressure reaches the unload setpoints. This helps to stabilize the suction pressure, allowing the Process Temperature to gradually pull down. If the override feature is not wanted, set the Suction Pressure Capacity Decrease cutin and cutout setpoints to a low value (i.e. 30"Hg).

OPERATOR OPTIONS MENU	Select desired
Option # 6:	option.
( )LEAD/LAG ENABLE	(y) indicates the
(y)LEAD/LAG DISABLE	option is active.

Option #6 – This operator option is used if the operator desires Lead/Lag operation between two Single Screw Compressors. This operator option is chosen for each compressor by selecting the Lead/Lag Enable option. The lead and lag compressor is selected via the status of Port 2, Module 2. If the input to module 2 is ON (110VAC applied to module 2), that compressor will be the LEAD compressor.

The input for the lag compressor module 2 must be off (no power applied to the module). The Lead/Lag communication between the lead and lag compressors is accomplished over the Bitbus communication port.

In order for this option to function properly, the microprocessor panels must have unique Node addresses, as selected on the circuit board. The required node addresses are Node 1 and Node 100. These are selected by Berg pins at locations labeled "Network Address Mode" (see Figure 9). All Bitbus communication is carried out by Node 1. This is a requirement since Node 1 can also initiate Bitbus communication to handle the RS232 port command requirements. Since there can only be one master (one node initiating communication) on the Bitbus network, this requires Node 1 (the lead compressor) do all Bitbus communication. The other unit will always be Node 100 (the lag compressor). After the node addresses have been selected for the microprocessors, they can be checked by moving to the screen in the third column on the bottom row. There will be an indication of the node addresses selected.

The suction pressure (or process temperature) of the lead compressor is used to determine loading and unloading. The loading and unloading rate of the lead and lag compressors is determined by the lead compressor load/unload interval timers.

OPERATOR OPTIONS MENU	Select desired
Option # 7:	option.
( )MIN RUN CAP ENABLE	(y) indicates the
(y)MIN RUN CAP OFF	option is active.

Option #7 – When the operator option Min Run Cap Enable is selected, the minimum capacity the compressor is allowed to run at is determined by the Minimum Run Capacity setpoint. When the compressor is started, the compressor will be allowed to load to Minimum Run Capacity setpoint minus 5%. This is done to prevent the compressor from hunting if the load is not great enough at the Minimum Run Capacity setpoint when the lag compressor is started.

Option #7 (cont'd)

However, when Lead/Lag Enable (Operator Option #6) is selected, the lead/lag algorithm will determine the Minimum Run Capacity setpoint that will be active during the following conditions:

1. When the compressor is selected as the lead compressor, and the microprocessor is in the Auto Mode, the Minimum Run Capacity setpoint is always active (whether Option #7, Min Run Cap Enable is selected or not). The setpoint is used to determine when the lead compressor is back at its minimum capacity. This is one of the conditions used to start the Lag Compressor Stop Timer.

2. When the compressor is selected as the lag compressor and has been placed into the lead/lag algorithm by the lead compressor, the Minimum Run Capacity setpoint is active. Should the lead compressor fail, the lag compressor will fall out of the lead/lag algorithm. In this case, the setpoint will not longer be active UNLESS Operator Option #7, Min Run Cap Enable, has been selected to enable the Minimum Run Capacity setpoint. In this case, the setpoint will stay active.

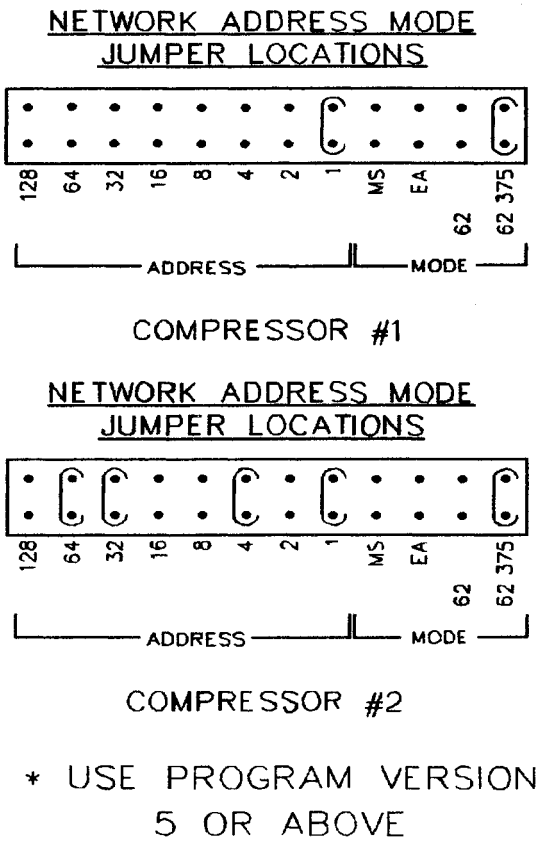


FIGURE 9. NETWORK ADDRESS MODE JUMPER LOCATIONS

IID. OPERATOR OPTIONS (cont'd)

Option #7 (cont'd)

In the event of the lead compressor failing, it may be desirable to have the lag compressor unload below the Minimum Run Capacity setpoint during low load conditions to try to insure the compressor won't shut down. In this case, Operator Option #7, Min Run Cap Off, should be selected for the lag compressor.

OPERATOR OPTIONS MENU	Select desired
Option # 8:	option.
( )FORCE SP#2	(y) indicates the
(y)NORM SP#1,2 SELECT	option is active.

Option #8 – This operator option is used to force the second setpoint to become active. The second setpoint can also be made active by applying power to Port 2 Module 5 digital input.

OPERATOR OPTIONS MENU	Select desired	
Option # 9:	option.	
(y)EXTEND CAP INC OFF TIME	( )x1	(y)x2
( )NORMAL CAP INC OFF TIME	( )x4	( )x8

Option #9 – This operator option selects Extend Cap Inc Off Time and then uses the NEXT key to toggle over to select a multiplication factor to apply to the Cap Inc Off Timer setpoint. This option will extend the Cap Inc Off Timer setpoint after the compressor starts, and until the control parameter (either suction pressure or process temperature) is satisfied and not calling for an increase in capacity. The Cap Inc Off Timer setpoint then reverts back to normal.

IIE. RECALIBRATE TRANSDUCERS AND POTENTIOMETERS

```
        RECALIBRATE TRANSDUCER
                                VALUE
Channel #1  =  ****mV            ***
Channel  =  SUCTION TEMP
```

This menu provides a means for the recalibration of the Transducers, RTDs, Amperage and Potentiometer channels. The menu is located in Column 3, Row 3. The following is a list of the channel numbers and the corresponding parameter for each.

CHANNEL	
#1	SUCTION TEMP
#2	DSCH TEMP
#3	OIL SEP TEMP
#4	OIL INJ TEMP
#5	SUCT PRESS
#6	DSCH PRESS
#7	MANIFOLD PR
#8	FILTER IN PR
#9	GROUND
#10	RESERVED
#11	% CAPACITY
#12	% VOLUME
#13	REFERENCE MV
#14	MOTOR AMPS
#15	PROCESS TEMP
#16	SBX TEMP CH2
#17	SBX TEMP CH3
#18	SBX TEMP CH4

CALIBRATE THE PRESSURE, TEMPERATURE, AND AMPS CHANNELS

1) Enter the password, ***EDIT,NEXT,NEXT,ENTER***. The cursor will appear to the left of the #.

2) Press ENTER. An asterisk will replace the cursor. Use the UP & DOWN ARROW keys to select the channel to be calibrated.

3) Press ENTER when desired channel is displayed (Suction Pressure is displayed in example). The cursor replaces the asterisk.

```
        RECALIBRATE TRANSDUCER
                                VALUE
Channel #5  =  ****mV            ***
Channel  =  SUCTION PRESSURE
```

IIE. RECALIBRATE TRANSDUCERS AND POTENTIOMETERS (cont'd)

4) Press NEXT. The cursor moves to the left of the Channel value.

5) Press ENTER. Again, an asterisk replaces the cursor. Use UP & DOWN ARROW keys to force the Channel value to agree with the actual system pressure or temperature.

The calibration of the pressure channels can be done at any pressure, but it is recommended that calibration be done at 0# or atmospheric pressure. All the channels can be calibrated in the same manner, except for the Capacity and Volume Ratio potentiometers.

CALIBRATE THE CAPACITY AND VOLUME RATIO POTENTIOMETERS

CAUTION

The capacity and volume control motors are equipped with a brake. If it is necessary to operate the control motors manually, the brake must be disengaged. The brake can be disengaged by pushing on the motor shaft on the cone end. The shaft should be centered in its travel. Do not use excessive force manually operating the motor or damage may result.

1) Move the capacity slides to their minimum position. This can be accomplished by either electrically actuating the slide valve motor through the FORCE OUTPUTS ON menu or by manually actuating the slide valve motor. To manually actuate the motor, release the brake and turn the hex nut on the gear motor in the proper direction to move the capacity and volume slides to their minimum position (see Figure 10 VSS/VSM/VSR Command Shaft Rotation and Travel).

2) After the slide valves have contacted the internal stop, release the tension in the mechanism by actuating the brake and manually turning the command shaft back one tooth on the command shaft gear.

3) Go to Column 3, Screen 3 (Recalibrate Transducers menu).

```
        RECALIBRATE TRANSDUCER
                                  VALUE
Channel #11  =  ****mV            ***
Channel  =  %CAPACITY
```

4) Press ***EDIT,NEXT,NEXT,ENTER*** keys in succession. An arrow (→) will appear, pointing at the channel # location. This is called the "cursor position mode".

IIE. RECALIBRATE TRANSDUCERS AND POTENTIOMETERS (cont'd)

5) Press the ENTER key. An asterisk (*) will appear next to the channel # location. This is called the "edit mode."

6) Press the UP or DOWN ARROW key until channel #11 is displayed (% capacity).

7) Press the ENTER key again so the arrow (➔) reappears, returning to the "Cursor Position Mode".

8) Press the NEXT key, positioning the cursor arrow (➔) at the Value location.

9) Press the ENTER key, the following menu appears:

```
        RECALIBRATE TRANSDUCER
Set pot at MINIMUM mV and press ENTER.
(Press INC or DEC to move slide valve)
Channel #11  =  *****mV
```

Remove one of the ¼" socket head cap screws from the potentiometer bracket and loosen the other so the potentiometer shaft may be rotated. Slowly rotate the potentiometer shaft until a millivolt reading of between 900 and 1100 is displayed on the microprocessor. Mesh the potentiometer gear with the command shaft gear and replace the ¼" socket head cap screw. The millivolt reading must remain between 900 and 1100 millivolts. Without changing the gear mesh, remove one ¼" screw, and apply Loctite #242 to the threads. Reinstall the screw finger tight and repeat the procedure on the remaining screw (do not change the orientation of the lock washers on the screws). The gear lash must be adjusted so there is minimal play, without binding. Caution must be taken to ensure there is no side load on the potentiometer shaft. Tighten and torque the ¼" socket head cap screws to 16 ft/lbs. Recheck the millivolt reading. It must be between 900 and 1100 millivolts. If not, the gear mesh will have to be readjusted. Now press the ENTER key.

10) The following screen appears next.

```
        RECALIBRATE TRANSDUCER
Now set the pot at MAXIMUM mV and press ENTER.
(Press INC or DEC to move slide valve)
Channel #11  =  *****mV
```

At this point, turn the command shaft to the fully loaded position with the slide valves against the mechanical stops. Release the tension in the mechanism by actuating the brake and then manually turn the command shaft back one tooth on the command shaft gear. This is the maximum millivolt position. Press ENTER again.

IIE. RECALIBRATE TRANSDUCERS AND POTENTIOMETERS (cont'd)

11) At this point, the microprocessor may return to the ACTIVE ALARMS AND TRIPS screen and show the alarm and trip for % CAPACITY. This is normal. Press the RESET key to clear the alarms and trips.

12) Manually check the slide valve travel against the maximum and minimum mechanical stops. The microprocessor display should read between 102 to 104% at their maximum mechanical stop and –2 to –4% at their minimum mechanical stop. This will prevent the slide valve motor from driving the slide valves against the mechanical stops before the microprocessor would read 0 or 100%.

13) Return to the RE-CALIBRATE TRANSDUCERS menu (Column 3, Row 3). Recalibrate channel #12 for the % VOLUME SLIDE VALVE, following the procedures starting at step 2.

14) While recalibrating the potentiometers, observe the millivolt readings while going from minimum to maximum capacity or volume. The millivolt change must be continuous and smooth through the entire travel. If there is an abrupt reading change, the gear mesh will have to be re-established. Repeat step #8.

FIGURE 10 – VSS/VSM/VSR COMMAND SHAFT ROTATION AND TRAVEL

COMP MODEL	COMMAND SHAFT ROTATION (b) CAPACITY INC	CAPACITY DEC	VOLUME RATIO INC	VOLUME RATIO DEC	COMMAND SHAFT NO. OF TEETH/TRAVEL (a) CAPACITY	VOLUME RATIO
VSM 71	CW	CCW	CW	CCW	40 / 3.141"	22.5 / 1.767"
VSM 91	CW	CCW	CW	CCW	40 / 3.141"	22.5 / 1.767"
VSM 101	CW	CCW	CW	CCW	40 / 3.141"	22.5 / 1.767"
VSM 151	CW	CCW	CW	CCW	40 / 3.141"	22.5 / 1.767"
VSM 181	CW	CCW	CW	CCW	40 / 3.141"	22.5 / 1.767"
VSM 201	CW	CCW	CW	CCW	40 / 3.141"	22.5 / 1.767"
VSM 301	CW	CCW	CW	CCW	40 / 3.141"	22.5 / 1.767"
VSM 361	CW	CCW	CW	CCW	40 / 3.141"	22.5 / 1.767"
VSM 401	CW	CCW	CW	CCW	40 / 3.141"	22.5 / 1.767"
VSR 111	CW	CCW	CW	CCW	45.5 / 3.568"	26 / 2.045"
VSR 151	CW	CCW	CW	CCW	45.5 / 3.568"	26 / 2.045"
VSR 221	CW	CCW	CW	CCW	45.5 / 3.568"	26 / 2.045"
VSR 301	CW	CCW	CW	CCW	45.5 / 3.568"	26 / 2.045"
VSS 451	CW	CCW	CW	CCW	45.5 / 3.568"	26 / 2.045"
VSS 601	CW	CCW	CW	CCW	45.5 / 3.568"	26 / 2.045"
VSS 751	CCW	CW	CCW	CW	54.5 / 4.283"	31.5 / 2.473"
VSS 901	CCW	CW	CCW	CW	54.5 / 4.283"	31.5 / 2.473"
VSS 1051	CCW	CW	CCW	CW	61 / 4.777"	37 / 2.889"
VSS 1201	CCW	CW	CCW	CW	61 / 4.777"	37 / 2.889"
VSS 1051	CCW	CW	CCW	CW	68 / 5.325"	41 / 3.200"
VSS 1801	CCW	CW	CCW	CW	68 / 5.325"	41 / 3.200"

NOTES:

a) The large gear on the command shaft has 50 teeth. The teeth are counted when moving the command shaft from the minimum stop position to the maximum stop position.

b) The manual operating shaft on the gear motor should be turned the opposite direction of the desired command shaft rotation.

c) The capacity and volume control motors are equipped with a brake. If it is necessary to operate the control motors manually, the brake must be engaged. The brake can be disengaged by pushing on the motor shaft on the cone end. The shaft should be centered in its travel. Do not use excessive force manually operating the motor or damage may result.

IIF. DIGITAL PORT STATUS

```
    DIGITAL PORT STATUS
LOCATION: 0 1 3 4 5 6 7     Reference YOUR wiring
Port #1:  * * * * * * *     diagram for port I/O
Port #2:  * * * * * * *     descriptions.
```

This is a Troubleshooting screen display. This screen display is located in Column 3, Row 4. Ports 1 through 8 are available for display, to change the port numbers in the display;

1) Enter the password, ***ENTER,NEXT,NEXT,ENTER***. A cursor will appear to the left of the port number.

2) Press the ENTER key. An asterisk (*) will replace the cursor.

3) The up and down arrow keys can be used to view additional ports.

In the case of inputs, "0" in the display designates the input is "off" or no voltage at the input. A "1" designates the input is "on" or there is voltage at the input. In the case of the outputs, if the status is "1", the red LED on the corresponding module should be on. This means the microprocessor is telling the output to turn on. If the output is not "on", check the voltage at the module. If there is no voltage, either the module fuse is blown or the module is defective. By referring to the wiring diagram supplied with the unit, the I/O Port Status can be reviewed for troubleshooting.

IIG. FORCE OUTPUTS ON

```
 FORCE OUTPUTS ON          USE → key to force
   PORT # * *              selected output on.
Output # **: ***           Comp relay output is
                           monitored & limited.
```

This is a Troubleshooting screen display. This screen display is located in Column 3, Row 5. To force an output on:

1) Enter the password ***EDIT,NEXT,NEXT,ENTER***. The cursor will appear to the left of the port #.

2) To select the port #, press ENTER. An asterisk will appear.

3) Use the UP & DOWN ARROW keys to select the port.

4) Press ENTER to lock in port selection.

5) Press EXIT to move the cursor to the output #.

IIG. FORCE OUTPUTS ON (cont'd)

6) Press ENTER. An asterisk will appear. Again, use the UP & DOWN ARROW keys to select proper output #.

7) Now, with the asterisk showing, use the RIGHT ARROW key to force output "on".

When forcing the compressor starter output, the maximum length of time the output can be forced is limited to 5 seconds, for safety reasons.

IIH. SET DATE AND TIME

SET DATE AND TIME	Set time in military
Date: **/ **/ **	format. All events
Time: **/ **/ **	are timestamped from
Day of Week: ***	this clock setting.

To set the proper date, time and day of the week, go to Set Date and Time screen display (Column 3, Row 6).

1) Enter the password, ***EDIT,NEXT,NEXT,ENTER***. The cursor will appear to the left of the Date.

2) Press the NEXT key until the cursor appears to the left of the parameter you want to change.

3) Press ENTER and an asterisk appears. Use the UP & DOWN ARROW keys to adjust the display.

4) Press ENTER to lock it in. Adjust the remaining parameters in the same manner.

III. SEQUENCE OF OPERATION

The operating sequence has been divided into 6 separate segments, the Oil Pressure System, Oil Filter System, Oil Temperature System, Capacity and Volume Ratio Slide Valve Control, Anti-Recycling and Motor Interlock, and Lead/Lag Control. This way, information regarding a particular portion of the whole operating sequence can be easily found. In the following descriptions, the words in italics are the screen displays for the Safety Setpoints, Control Setpoints, and Timer Values.

OIL PRESSURE SYSTEM CONTROL

For all low pressure differential high stage and booster applications, the oil pump will run continuously. However, on all high pressure differential high stage applications, the oil pump will operate according to the following description.

After the oil pump starts, the (Manifold Minus Discharge) pressure is monitored. If the pressure rises above the *Prelub Oil Press* reset value before the *Prelub Pump Time Limit* timer expires, the start cycle is initiated. If the *Prelub Oil Press* reset value is not reached, the start cycle is aborted and a failure is indicated.

Once the start cycle has been initiated, there is a fixed internal time delay. After this time delay has expired, the compressor is now started.

Before the *Run Cycle Oil Press Bypass* time limit expires, and the compressor can be switched to the run cycle, the (Manifold Minus Suction) pressure differential must be above the *Lo Oil Pressure* reset value. If this condition is not met before the time limit expires, the compressor will shut down and a failure will be displayed.

While in the run cycle, the (Manifold Minus Suction) pressure is monitored, and if this pressure falls below the *Lo Oil Pressure* trip value, the compressor is shut down and a failure is displayed. On units with a part time oil pump, after the *Run Cycle Oil Press Bypass* has completed its cycle and the absolute pressure is above the *OilPmp Restart (D/S)* cutout setpoint, the oil pump will shut off. If, at any time, the absolute pressure ratio would decrease below the *OilPmp Restart (D/S)* cutin setpoint, the oil pump will restart and run until such time the absolute pressure ratio would increase above the cutout setpoint. This enables a unit with a part time oil pump to temporarily operate at conditions that would require a full time oil pump.

OIL FILTER SYSTEM

Once the compressor starts, the *Hi Start Fltr Diff Pr* safety setpoint is active, if the filter inlet exceeds the filter outlet pressure alarm or trip setpoint values. Before the *Fltr Diff Pr Safety Changeover* timer has cycled, a *Hi Start Fltr Diff Pr* failure alarm or trip will occur. After the timer has cycled, the *Hi Start Fltr Diff Pr* safety is inactive and the *Hi Run Filter Diff Pr* is active.

To prevent the compressor from being shut down at start, due to higher viscosity of cold oil in the system, the values for the *Hi Start Fltr Diff Pr* safety should be set higher than the values for the *Hi Run Filter Diff Pr* safety.

OIL TEMPERATURE SYSTEM

There are (4) separator oil temperature limits which are monitored at various times during compressor operation. Protection against starting with too low of an oil temperature is provided by *Lo Oil Sep Start Temp*. If the oil temperature in the separator is not above this setpoint, the compressor cannot be started and a failure will be displayed.

After the initial start and after a set time delay (*Oil Sep Temp Safety Changeover*), the safety setpoints are changed to those for *Lo Oil Sep Run Temp*. If the oil separator temperature drops below the trip value, the compressor is shutdown, and a failure is displayed.

The temperature of the oil being supplied to the compressor is also being monitored. At start up, the *Lo Oil Inj Temp* is bypassed for a set timer period (*Lo Oil Inj Temp Sfty Changeover*). If the oil injection temperature falls below the *Lo Oil Inj Temp* trip value after the time delay has expired, the compressor will be shutdown and a failure is displayed.

Protection against too high of an oil injection temperature is provided by the *Hi Oil Inj Temp* safety. If the oil temperature exceeds the trip setpoint, the compressor will be shut down and a failure will be displayed.

CAPACITY AND VOLUME RATIO SLIDE VALVES

The compressor will not be allowed to start if either the capacity or volume ratio slide valves are above 10%. When attempting to start the compressor with slide valves above 10%, the slide valve motors are energized to drive the slide valves below 10% so the compressor can start. If the compressor should shut down with the slide valves above 10%, the slide valve motors will be energized to return the slide valves below 10%.

Once the compressor is started, the slide valves are held at minimum positions until the *At Start Capacity Decrease* timer has timed out. After the timer has timed out, the slide valves are then free to move.

During compressor operation, the capacity slide valves can be controlled either automatically or manually.

III. SEQUENCE OF OPERATION (cont'd)

CAPACITY AND VOLUME RATIO SLIDE VALVES (cont'd)

In the automatic mode, the amount of time the slide valve drive motors are energized or de-energized in both the increase and decrease directions is controlled by the *Capacity Increase Motor On*, *Capacity Decrease Motor On*, *Capacity Increase Motor Off*, and *Capacity Decrease Motor Off* timers. The time delay that is provided by limiting the amount of on and off time is needed to allow the suction pressure to stabilize between capacity increases or decreases. This will prevent the capacity slide valves from hunting, overshooting and undershooting the desired suction pressure or process temperature control values.

In manual control, the timers do not control the length of time the slide valve drive motor can be energized. The slide valve motor can be energized continuously by depressing either the INCREASE or DECREASE key. Once the INCREASE or DECREASE key is released, the % capacity value is recorded.

During compressor operation, the volume ratio slide valves can be controlled either automatically or manually.

In the automatic mode, the volume ratio slide valves are controlled to maintain optimum compressor efficiency, whether the capacity slide valves are being controlled in the automatic or manual mode.

When the desired volume ratio is more than 7% away from the actual % volume ratio, the volume ratio drive motor is energized to move the slide valves to within 2.5% of the desired position.

In the manual mode, the volume ratio slide can be manually controlled. To manually actuate the volume ratio motor, press the SHAFT key. This puts the volume ratio motor in manual control. Once in the manual mode, the % volume ratio can be changed by using the INCREASE or DECREASE keys. After the increase or decrease key is released, the position is recorded. If the slide valve position deviates more than 7% from the recorded value, the slide valve motor is energized to return the slide valve to within 2.5% of the recorded position.

If both the capacity and volume ratio slide valves are in the manual mode, the volume ratio slide has priority. Only the volume ratio slide will move when the INCREASE or DECREASE keys are pushed. The volume ratio slide valves must be returned to the automatic mode before any changes in capacity can be made in the manual mode.

ANTI-RECYCLING AND MOTOR INTERLOCK

Two different options are provided to prevent excessive compressor motor starting and/or short cycling. These options are selected from the first operator options menu.

The *AntiRecycle Tmr* operator option does not allow the compressor to restart until the *AntiRecycle Strt Timer* has timed out. If the compressor starts and immediately shuts off, the compressor cannot be restarted for the set time period. However, if the compressor starts and runs for at least the set time period, the compressor can be immediately restarted. The *AntiRecycle Strt Timer* option time period should be set so the number of starts that are allowed per hour are equal to the number of hot starts the motor manufacturer allows per hour.

The *Hot Starts/Hr* counter allows the compressor motor only a set number of starts per hour. If the number of starts is exceeded within an hour, the compressor will not be allowed to start until an hour has elapsed since the earliest attempted start.

The control system also incorporates an input from an auxiliary contact from the compressor motor starter. If this contact is not closed after the *Cmp Starter Aux Contact Bypass* has cycled, the compressor is shut down and an alarm is indicated. If the auxiliary contacts open while the compressor is running, the compressor is shut down and an alarm is indicated.

LEAD/LAG COMPRESSOR CONTROL

The lead/lag control function will only operate if the *Lead/Lag Enable* option is selected for both the lead and lag compressors. The node addresses must be set on the Network Address mode (refer to section IID), the lead compressor being selected, by applying power to the digital input module located at Port 2, Module 2 and the microprocessors are communicating through the RS232 port. The following description is the sequence of operation for the lead/lag control.

When the lead compressor is at its *Lead, Maximum Cap Flag* and there is an uninterrupted call for more capacity after the *Start Lag Compr Timer* has cycled, the lag compressor will be started. The lag compressor will load to 5% below the *Minimum Run Capacity* setpoint. This is done to prevent the capacity control from hunting, if the load is not great enough to keep the compressor capacity above the *Minimum Run Capacity* setpoint. On a call for unloading, the compressor will unload until it reaches the *Minimum Run Capacity* control setpoint and will remain there until the suction pressure reduces and the compressor cycles off on the *Suction Pressure On/Off* control setpoint.

LEAD/LAG COMPRESSOR CONTROL (cont'd)

The lag compressor *Minimum Run Capacity* setpoint may be disabled under the Options Menu. However, when the lag compressor has been placed into the sequencing algorithm, this setpoint will then be active.

After the lag compressor has started, the lead compressor capacity may back off from 100%, responding to the control parameter setpoints. The lead compressor will not load the lag compressor until the load compressor has loaded back up to *Lead, Maximum Cap Flag* setpoint.

When the lead compressor does reach maximum capacity setpoint again, capacity hold values are sent to the lag compressor at the load and unload rate of the lead compressor timers. The *Lag Capacity Setup* value determines the increment the lag compressor will be allowed to load and unload.

i.e.: The *Lag Capacity Step* value is set at 10% and the lag compressor capacity is at 30%. When the lead compressor determines additional capacity is required, the new capacity value the lag compressor will be told to go to is 30% + 10% = 40%.

The lag compressor capacity slide will be forced continuously until its capacity is within 7% of the capacity hold value it receives. Then the capacity slide is pulsed at a rate determined by its *Capacity Hold Motor On Time* and *Capacity Hold Motor Off Time* timer settings, until its capacity is within 2% of the capacity hold value it received.

On unloading, when the lag compressor reaches its *Minimum Run Capacity* setpoint, the microprocessor is calling for a reduction in capacity, and the *Stop Lag Comp Timer* has cycled, the lag compressor will then be shut down. Should a low suction pressure alarm occur (on either compressor) before the *Stop Lag Compressor Timer* times out, indicating that suction pressure is getting too low, the lag compressor will be forced off. This will allow the system to stabilize before a suction pressure failure occurs.

NOTE: An active suction pressure alarm on either the lead or lag machine will prevent the lag machine from being started within the sequencing algorithm.

LEAD/LAG COMPRESSOR CONTROL (cont'd)

To summarize the conditions required for the *Lag Compressor Stop* timer to cycle:

1. The lag compressor must be at or below *Minimum Run Capacity* setpoint.
2. The lead compressor must be at or below *Minimum Run Capacity* setpoint.
3. The lead compressor must be calling for unloading.

The lead compressor will force the lag compressor to start if there has been an uninterrupted call for more capacity and the lead compressor fails to reach the *Lead, Maximum Cap Flag* setpoint within the time setting of the *Force Start Lag Comp* timer.

This could occur if there were a mechanical or electrical malfunction preventing the capacity slides from fully loading or if there were a safety trip on the lead compressor. After the lag compressor has been forced on, it will load and unload off of its own setpoints.

The recommended procedure to setup and start the lead and lag compressors when both machines are stopped is as follows. Before the setup and start procedure can take place, all other normal operating setpoints, timers, safeties, and operating options should have been entered and both compressors are ready to start.

1. Enter control setpoints on lead compressor.

2. Enter the *Lead, Maximum Cap Flag* cutin and cutout setpoints for the lead compressor.

3. Enter the *Minimum Run Capacity* cutin setpoint for both compressors.

4. Enter load and unload timer intervals for both compressors.

5. Enter the *Start Lag Comp Timer* value, the *Stop Lag Comp Timer* value, and the *Force Start Lag Comp Timer* on the lead compressor.

6. Select *Lead/Lag Enable* option from options menu on both compressors.

7. Start the lead compressor by pressing "Auto" key. The lag compressor will start automatically when the lead compressor determines to do so.

LEAD/LAG COMPRESSOR CONTROL (cont'd)

Pressing the STOP key on either compressor will select the Lead/Lag DISABLE option for the compressor and take the compressor out of the sequencing algorithm. The compressor will not be placed back into the sequencing algorithm until the *Lead/Lag Enable* option is reselected from the Options menu. Also, a loss of Bitbus communication (for instance, the cable get cut) will result in both compressors reverting to local setpoint control.

LEAD/LAG OPERATING SCREENS

With the *Lead/Lag Enable* option selection, here are the various operating screens that could be encountered with a short explanation of each.

The following current value display screens are for the **Lead Compressor** when its *Lead/Lag Enable* option is selected;

```
SUCT   DSCH   OIL   MNFLD   %CAP   V.R.   AMPS
***#   ***#   ***#  ***#    ***%   **.*   ***A
***°   ***°   ***°
Mode: LEAD "Ready" : Compressor Stop
```

The display is the lead compressor and the compressor is off. There are no active trips, the compressor is available to run.

```
SUCT   DSCH   OIL   MNFLD   %CAP   V.R.   AMPS
***#   ***#   ***#  ***#    ***%   **.*   ***A
***°   ***°   ***°
Mode: LEAD "Run" : MINRUN CAP,AUTO V.R.
```

This display is the lead compressor and the compressor is running. The compressor is loading to its *Minimum Run Capacity* setpoint.

```
SUCT   DSCH   OIL   MNFLD   %CAP   V.R.   AMPS
***#   ***#   ***#  ***#    ***%   **.*   ***A
***°   ***°   ***°
Mode: LEAD "Run" : AUTO CAP,AUTO V.R.
```

This display is for the lead compressor and it is running. The compressor has loaded beyond its *Minimum Run Capacity* setpoint and is being controlled from its capacity control setpoints.

LEAD/LAG OPERATING SCREENS (cont'd)

The following current value display screens are for the **Lag Compressor** when its *Lead/Lag Enable* option is selected.

```
SUCT   DSCH   OIL   MNFLD   %CAP   V.R.   AMPS
***#   ***#   ***#  ***#    ***%   **.*   ***A
***°   ***°   ***°
Mode: LAG "Ready" : Compressor Stop
```

This display is for the lag compressor and is off. There are no active failures. The lag compressor **HAS NOT** been placed into the sequencing algorithm or has been taken out of the sequencing algorithm. This will occur if the MAN key has been pressed on the lead compressor, or if the *Lead/Lag Enable* option on the lead compressor has been deselected, or if the lead compressor is in the *Lead "Ready": Compressor Stop* mode.

```
SUCT   DSCH   OIL   MNFLD   %CAP   V.R.   AMPS
***#   ***#   ***#  ***#    ***%   **.*   ***A
***°   ***°   ***°
Mode: LAG "Wait" : Compressor Stop
```

This display is for the lag compressor and is off. There are no active failures. The lag compressor **HAS** been placed into the sequencing algorithm and is waiting for a "Start" command from the lead compressor. The lag compressors MAN and AUTO keys are disabled in this mode. Note that an active suction pressure alarm on either the lead or lag compressor will inhibit the lag compressor from starting.

```
SUCT   DSCH   OIL   MNFLD   %CAP   V.R.   AMPS
***#   ***#   ***#  ***#    ***%   **.*   ***A
***°   ***°   ***°
Mode: LAG "Run" : MINRUN CAP,AUTO V.R.
```

This display is for the lag compressor and the compressor is running. The compressor is loading to the *Minimum Run Capacity* setpoint minus 5%.

```
SUCT   DSCH   OIL   MNFLD   %CAP   V.R.   AMPS
***#   ***#   ***#  ***#    ***%   **.*   ***A
***°   ***°   ***°
Mode: LAG "Run" : % CAP HOLD,AUTO V.R.
```

LEAD/LAG OPERATING SCREENS (cont'd)

This display is for the lag compressor, the compressor is running and in the sequencing algorithm. The compressor has loaded beyond the *Minimum Run Capacity* setpoint and is being controlled from the lead compressor which is sending "CAPHOLD" values. The capacity hold values are determined in the following manner; the current lag compressor's current capacity plus or minus the lag compressor's *Lag, Capacity Step* value. A new capacity hold value is sent to the lag compressor every time the lead compressor's capacity control timers need to adjust compressor capacity.

```
SUCT   DSCH   OIL   MNFLD   %CAP   V.R.   AMPS
***#   ***#   ***#  ***#    ***%   **.*   ***A
***°   ***°   ***°
Mode: LAG "Run" : SETPT CAP,AUTO V.R.
```

This display is for the lag compressor and the compressor is running. The compressor has loaded beyond its Minimum Capacity setpoint and has been placed into the sequencing algorithm. It is currently being controlled from its capacity control setpoints. This mode is usually seen when the lag compressor has first been placed into the sequencing algorithm. It is a "transitional" mode. Within a few seconds, the lead compressor will issue a capacity hold value to the lag compressor.

```
SUCT   DSCH   OIL   MNFLD   %CAP   V.R.   AMPS
***#   ***#   ***#  ***#    ***%   **.*   ***A
***°   ***°   ***°
Mode: LAG "Run" : AUTO CAP,AUTO V.R.
```

This display is for the lag compressor, the compressor is running and is **NOT** in the sequencing algorithm. The compressor has loaded beyond its *Minimum Run Capacity* setpoint and is being controlled from its capacity control setpoints. It is not being controlled from the lead compressor. This will occur if the lead compressor's MAN key is pressed, if the lead compressor is turned off, if the lead compressor fails, or if Bitbus communication fails. The lag compressor will be placed back into % Cap Hold mode when the lead compressor is restarted or if Bitbus communication is re-established.

To avoid complications when changing the lead/lag switch position, the switch should be changed when both machines are off and both are started as previously described above. However, the switch can also be changed when both machines are running and in the sequencing algorithm.

LEAD/LAG OPERATING SCREENS (cont'd)

When this is done, after approximately 20 seconds, the compressors will be forced into "transitional" states. The lead compressor (now the lag compressor) will first be switched into the following mode:

```
SUCT   DSCH   OIL   MNFLD   %CAP   V.R.   AMPS
***#   ***#   ***#  ***#    ***%   **.*   ***A
***°   ***°   ***°
Mode: LAG "Run" : SETPT CAP,AUTO V.R.
```

The new lead compressor will be switched into the following mode;

```
SUCT   DSCH   OIL   MNFLD   %CAP   V.R.   AMPS
***#   ***#   ***#  ***#    ***%   **.*   ***A
***°   ***°   ***°
Mode: LEAD "Run" : % CAP HOLD,AUTO V.R..
```

After 20 seconds, both compressors will be placed into the sequencing algorithm. The lag compressor will be placed into the following mode;

```
SUCT   DSCH   OIL   MNFLD   %CAP   V.R.   AMPS
***#   ***#   ***#  ***#    ***%   **.*   ***A
***°   ***°   ***°
Mode: LAG "Run" : % CAP HOLD,AUTO V.R.
```

The lead compressor will then be placed into the following mode;

```
SUCT   DSCH   OIL   MNFLD   %CAP   V.R.   AMPS
***#   ***#   ***#  ***#    ***%   **.*   ***A
***°   ***°   ***°
Mode: LEAD "Run" : AUTO CAP,AUTO V.R.
```

III. SEQUENCE OF OPERATION (cont'd)

LEAD/LAG OPERATING SCREENS (cont'd)

If the lead/lag switch position is changed when the current lag compressor stopped and in the following conditions;

```
SUCT   DSCH   OIL   MNFLD   %CAP   V.R.   AMPS
***#   ***#   ***#  ***#    ***%   **.*   ***A
***°   ***°   ***°
Mode: LAG "Wait" : Compressor Stop
```

```
SUCT   DSCH   OIL   MNFLD   %CAP   V.R.   AMPS
***#   ***#   ***#  ***#    ***%   **.*   ***A
***°   ***°   ***°
Mode: LAG "Ready" : Compressor Stop
```

After 20 seconds, the mode will change to the following;

```
SUCT   DSCH   OIL   MNFLD   %CAP   V.R.   AMPS
***#   ***#   ***#  ***#    ***%   **.*   ***A
***°   ***°   ***°
Mode: LEAD "Ready" : Compressor Stop
```

The lead compressor will then have to be manually started. It is highly recommended, when changing switch position, the compressor mode be checked to see if the microprocessor is in the expected mode after approximately 30 seconds.

IV. REMOTE CONTROL OPTIONS

The following is a list of hard wired remote control options for the single screw compressor unit, and which module is used for the specific option. Ports 3 and 4 listed for version 5.XX requires an additional SBX expansion board.

DIGITAL INPUTS

Port 2 Module #2: Remote/Local
Port 3 Module #0 (Version 5.XX)

When the module is in the remote mode (power to the module), the capacity slide valve control will be through Port 2 Modules #4 and #5. In the local mode (no power to the module), the *Capacity Increase* and *Capacity Decrease* setpoints for the capacity slide control will be controlled locally by the microprocessor. The microprocessor must be in the "AUTO" mode to run in remote mode for capacity slide valve control. If the "MAN" mode on the microprocessor is selected, any increase or decrease in the capacity must be done with the increase and decrease keys on the microprocessor key pad.

Port 2 Module #3: Remote Start/Stop

With power applied to the module, the unit will be allowed to start depending on the *Suction Pressure On/Off* setpoints. With no power applied to the module, the unit will not be allowed to start. This feature will be active at all times.

Port 2 Module #4: Remote Increase
Port 3 Module #2 (Version 5.XX)

When this module is on and the remote/local module is in the remote mode, the capacity slide motor is energized to increase the capacity of the compressor. The capacity can be increased remotely whenever this module is on, except when the unit is off, the remote decrease is energized, or the maximum amperage of the motor is exceeded. If the Port 2, Module #2 is in the local mode, remote increases cannot be done.

Port 2 Module #5: Remote Decrease
Port 3 Module #1 (Version 5.XX)

When this module is on and the remote/local module is in the remote mode, the capacity slide motor is energized to decrease the capacity of the compressor. The capacity can be decreased remotely, whenever this module is on, except when the unit is off or remote increase is energized. If the Port 2, Module #2 is in the local mode, remote increases cannot be done.

IV. REMOTE CONTROL OPTIONS (cont'd)

DIGITAL INPUTS

Port 2 Module #7: Auxiliary #1 Cutout

With power to this module, the unit will function normally. If the power is removed from this module at any time, the microprocessor will display an *AUX #1 FAILURE* and the unit will stop or be prevented from starting. To restart the unit, the module must be energized and the failure must be acknowledged with a reset.

Port 2 Module #5 (Version 5.XX): Auxiliary #2 Cutout

With power to this module, the unit will function normally. If the power is removed from this module at any time, the microprocessor will display an *AUX #2 FAILURE* and the unit will stop or be prevented from starting. To restart the unit, the module must be energized and the failure must be acknowledged with a reset.

Port 2 Module #4 (Version 5.XX): Low Oil Separator Level Safety

The unit will start and run while power is being supplied to this module from the oil level safety switch. If the switch should open on a drop in the separator oil level, the unit will be shut down and a failure will be displayed.

Port 2 Module #2 (Version 5.XX): Lead/Lag Select

When power is supplied to this module from the lead/lag select switch, the compressor is selected as the lead compressor.

DIGITAL OUTPUTS

Port 1 Module #1: Remote Alarm Output

This module will de-energize whenever there is an alarm or trip condition. This module will re-energize when the reset button is pushed, even if the alarm or trip condition is not cleared.

Port 1 Module #2: Remote Trip Output

This module will de-energize whenever there is a trip condition. This module will re-energize when the reset button is pushed, even if the trip condition is not cleared.

IV. REMOTE CONTROL OPTIONS (cont'd)

DIGITAL OUTPUTS

Port 4 Module #8 (Version 5.XX): Minimum Capacity Indicate Output

This module will energize when the capacity is at or below 5% and is used to indicate remotely, when the compressor is at or below 5% capacity. This is used to supply information when controlling the capacity remotely.

Port 4 Module #9 (Version 5.XX): Maximum Capacity/Amps Indicate Output

This module will energize when the compressor reaches its *Maximum Capacity* or *Full Load Amp* setpoints. This is used to indicate that capacity cannot be increased when controlling the unit remotely.

V. SPARE PARTS

The following is the recommended spare parts list for the Single Screw Compressor Microprocessor.

DESCRIPTION	VILTER PART NUMBER	RECOMMENDED QTY PER MICROPROCESSOR
RTD (Resistance Temperature Detector	2611E	1
Pressure Transducer	2783A	1
Input Module	2895M *	1
Output Module	2895N *	1
Output Module Fuse	2895P	1
Panel Fuse 10 AMP	3090D	1
Panel Fuse 20 AMP	3090Y	1
Control Relay CR-1 & 2	3091A	1
Control Relay CR-3	3091B	1
Volume Ratio and Capacity Potentiometer	2935D	1

* Supplied as 120 VAC. If 240 VAC is required, add –1 suffix to the part number (i.e. 2895 M-1 for 240 VAC).

VI. TROUBLESHOOTING GUIDE

Before applying power to the microprocessor panel, all wiring to the panel should be per NEC. Specifically, check for proper voltage and the neutral is grounded at the source. This source should be a separate control transfer. This will minimize the EMI (noise) transmitted to the microprocessor board by other equipment connected to the same main power source. An equipment ground should also be run to the panel.

If a problem arises with the microprocessor panel, some additional preliminary checks should be made.

- *Check to make certain all AC wires are physically run along the left side of the board. Keep all AC wires away from the transducer wires, which are located on the right side of the panel. Also, do not allow AC wires to drape across the microprocessor board. The idea is to isolate the AC wires away from the board and left side of the panel.*

- *Check the main AC voltage. It should be 110V to 120V.*

- *With a digital voltmeter, check the voltage between the Green earth ground to the compressor unit skid.* **It must be 0.0 Volts AC.**

- *With a digital voltmeter, check the voltage between the Green earth ground and the White neutral.* **It must not exceed 1.0 Volts AC.**

- *During shipment, terminal connections can loosen. Check all DC wiring to the microprocessor terminal blocks to make sure all wires are tight. Also check that all removable terminal blocks are pushed entirely into the sockets. Make sure all cables (display and keypad) are pushed entirely into the sockets and locked.*

- *Check the pressure transducer panel to make sure all wire nuts connecting the pressure transducer wires and shielded cable are tight. Physically inspect the shielded cable inside the transducer box to make sure the shield wire is clipped and the end of the cable is taped. The shield wire should be grounded in one location only – inside the microprocessor panel.*

- *Make sure the shields on all wires for the RTD's and Transducers have not been stripped back too far at the terminal strips at the microprocessor board.*

- *Check the back-lit display wires (2 wires) that connect to the terminal block on the RS232 port below, so they do not physically hang over the AC modules when the panel door is closed. Make sure the wire is shielded type.*

- *Make sure no 115VAC wires were run/added to the conduit which carries the shielded cable transducer wiring.*

- *In the event of a problem with the microprocessor, the following guide provides steps to help in determining the cause.*

PROBLEM	POSSIBLE SOLUTION
Microprocessor board does not power up – nothing appears on the display	a. Check brightness potentiometer located in upper left corner of board. Turn counterclockwise to increase brightness. b. Check if AC power is run into the panel. Does power appear at the board? Check for correct voltage (115 or 230 VAC). c. Remove power from panel and check .25 amp fuse located on bottom of board. d. Check to see that display cable is properly plugged in. Is cable plugged in backwards? Is cable fully inserted in header and locked down? e. Check to see that keyboard cable is properly plugged in. Is cable plugged in backwards? Is cable fully inserted in header and locked down? f. Check 1. to see if a programmed EPROM is plugged into board. 2. that the EPROM is oriented properly and all pins are inserted into the socket (U20). 3. that "Code" and "Data" site jumpers are setup properly. g. Reapply power to board and watch red and green LED's on board as power is applied to board. The microprocessor goes through a number of tests at powerup. The red and green lights indicate the progress of tests. If a fault is found, the last LED state indicates the last test that was successfully completed and the fault occurred in the next test in the list. Note when all tests have successfully been completed, the green LED on the board should be lit. Contact Vilter if the board does not complete the tests properly

STATE OF LED'S AFTER TEST SEQUENCE TEST COMPLETION

	Red LED	Green LED
Power On	ON	ON
Prior to start of tests	OFF	OFF
Test 1 – Instruction set	ON	ON
Test 2 – ROM checksum test	ON	OFF
Test 3 – Internal Ram	OFF	OFF
Test 4 – External RAM	OFF	ON

PROBLEM	POSSIBLE SOLUTION
Pressures do not read the same as a gauge installed in a pressure line. Temperature readings are constant but are in error.	a. Pressure readings on the microprocessor may not match a pressure gauge reading exactly. One reason may be the difference in location of where the readings are taken (i.e. if a gauge is located downstream of a solenoid and the pressure transducer is sensing pressure upstream of the solenoid). Once the pressure transducer is calibrated at a known pressure, use a known good gauge installed at the same location. The transducer reading should precisely match the gauge reading throughout its range of operation. Recalibration is accomplished through the Recalibrate Channel operator menu on the microprocessor. b. Temperature reading errors are most likely caused by the length of wire which is run to the RTD. The wire can add significant resistance. 100 feet of annealed 20 gauge copper wire (at room temperature) typically has a resistance of 1 ohm. This amounts to a +4°F error. The lead wire resistance errors can easily be corrected by recalibrating the erroneous RTD channel(s) through the Recalibrate Channel operator menu on the microprocessor.

Noise can play a major roll in introducing sporadic problems with microprocessor based products. Once source of noise can be a loose wire on a transducer. The wire can arc, placing a "spike" on the logic ground on the board. This can produce a variety of strange results. These include the following problems:

PROBLEM	POSSIBLE SOLUTION
Random characters or strange characters being displayed on the display.	a. Check for ground loops and noise problem sources (AC power wires run next to transducer wiring or display cables). b. Check for loose DC ground wiring on transducers and LCD backlight ground wiring. Loose wiring can cause arcing and noise being put on the logic ground of the Microprocessor.
Setpoints change.	a. Check for ground loops and noise problem sources (AC power wires run next to transducer wiring or display cables). b. Check for loose DC ground wiring on transducer and LCD backlight ground wiring. Loose wiring can cause arcing and noise being put on the logic ground of the Microprocessor.
Microprocessor sporadically powers down and powers back on (watchdog circuitry has reset the board).	a. Check for loose power wires. b. Check for ground loops and noise problem sources (AC power wires run next to transducer wiring or display cables). c. Check for loose DC ground wiring on transducers and LCD backlight ground wiring. Loose wiring can cause arcing and noise being put on the logic ground of the Microprocessor.
Every time the power is removed from the panel, the setpoints change and revert to "default" values.	a. Replace battery backed RAM on board – located in socket U18.

VII. EPROM REPLACEMENT PROCEDURE

The EPROM chip may eventually have to be updated or a requested change to the program may be made. These circumstances require the EPROM chip be replaced. The following is the procedure used to change the EPROM chip.

CAUTION

Remove power from panel. The selector switch on the front of panel labeled "CONTROL POWER" does not remove power from the panel. Turn off circuit breaker feeding power to panel to ensure power is removed from the board. Please refer to T45031-2/3 for the proper grounding procedure before attempting to work on the microprocessor.

1) EPROM is located near center of board (U20). Note orientation of old EPROM and install new one in same manner.

2) Reference Jumper Location data sheet. The EPROM is a 64K (27C512) EPROM. Locate the correct jumper configuration diagram on the data sheet that comes with the EPROM and make sure the jumpers below the EPROM are set up this way.

3) Make sure all pins are inserted into the socket. Remove Ground Strap from wrist and turn power back on to the panel.

4) The data sheet supplied with the new EPROM chip may state that a "Cold Start" procedure must be done. See section VIIA for this procedure.

VIIA. PERFORMING A COLD START

A Cold Start returns all Safety Setpoints, Control Limits, Timer Values, Calibration Offset Values and Scaling Factors for all analog channels to return to their default values. It also sets operating options to default conditions and clears out RAM memory. This procedure is done for various reasons, but may be required when changing to different program versions.

1) Write down all setpoints, calibration points and selections from the operator options screen. These will need to be entered after the Cold Start procedure is performed.

2) Go to Column 3 Screen 2 (Misc1 – Reserved).

```
MISC1 - RESERVED
```

3) Enter the password, ***EDIT,NEXT,NEXT,ENTER***.

4) Press ENTER again, the Clear Memory Options menu will now appear.

```
        CLEAR MEMORY OPTIONS
  1.  Clear all LOGS and LISTS
  2.  Clear all MEMORY.  (COLD START)
  3.  Clear all COMPRESSOR RUN TIME
```

5) Enter the password, ***EDIT,NEXT,NEXT,ENTER***. The cursor (→) will appear to the left of option number 1.

6) Select the Clear All Memory (Cold Start) option by pressing the NEXT key.

7) To run the Clear All Memory option, press ENTER twice.

8) The Current Values screen will now come up, indicating the Cold Start procedure is complete.

9) Enter the time, date, all setpoints, calibration points and selections from the operator options screen.

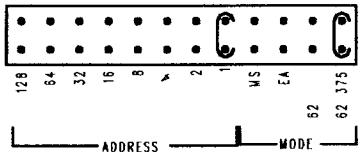
VILTER MFG. CORP. MILWAUKEE	DRAWN BY: BDG / CHECKED BY:	APPROVED	DATE 10-26-92	T00397 R4

MICROPROCESSOR - LEAD/LAG COMMUNICATIONS

VPN 2895A -OR- 2895B CIRCUIT BOARD

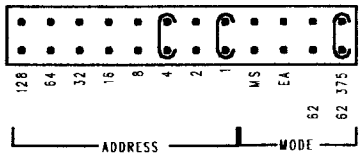
RECIP.

NETWORK ADDRESS MODE JUMPER LOCATIONS



COMPRESSOR #1

NETWORK ADDRESS MODE JUMPER LOCATIONS

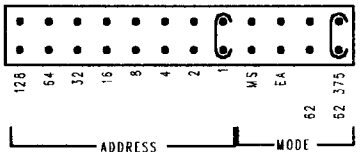


COMPRESSOR #2

* USE PROGRAM VERSION 3 OR ABOVE

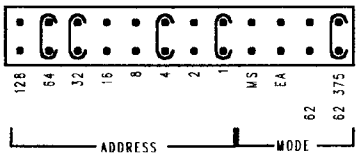
VSS-SINGLE SCREW

NETWORK ADDRESS MODE JUMPER LOCATIONS



COMPRESSOR #1

NETWORK ADDRESS MODE JUMPER LOCATIONS

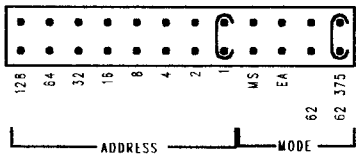


COMPRESSOR #2

* USE PROGRAM VERSION 5 OR ABOVE

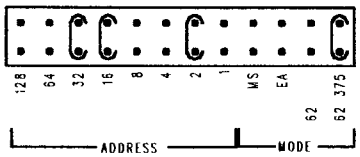
VRS-TWIN SCREW

NETWORK ADDRESS MODE JUMPER LOCATIONS



COMPRESSOR #1

NETWORK ADDRESS MODE JUMPER LOCATIONS

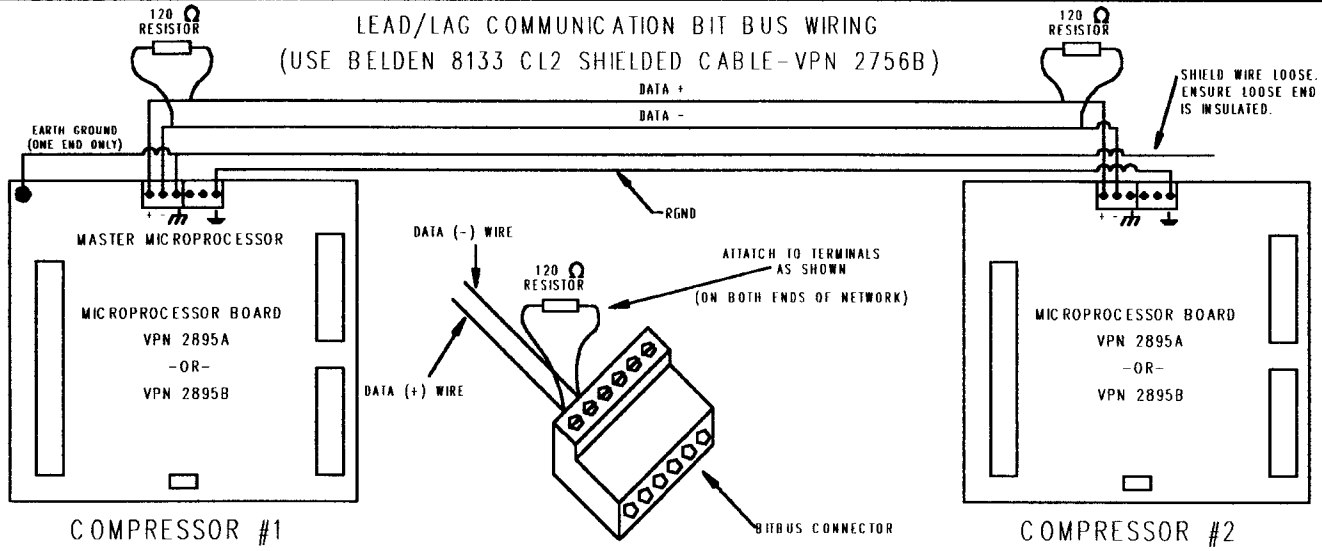


COMPRESSOR #2

* USE PROGRAM VERSION 3 OR ABOVE

NOTES:
1) THE ADDRESS OF THE FIRST COMPRESSOR IS 1.
2) THE COMPRESSOR SET AT ADDRESS 1 IS THE MASTER COMPRESSOR ALL RS232 COMMUNICATIONS ARE MADE THROUGH IT.

LEAD/LAG COMMUNICATION BIT BUS WIRING
(USE BELDEN 8133 CL2 SHIELDED CABLE-VPN 2756B)

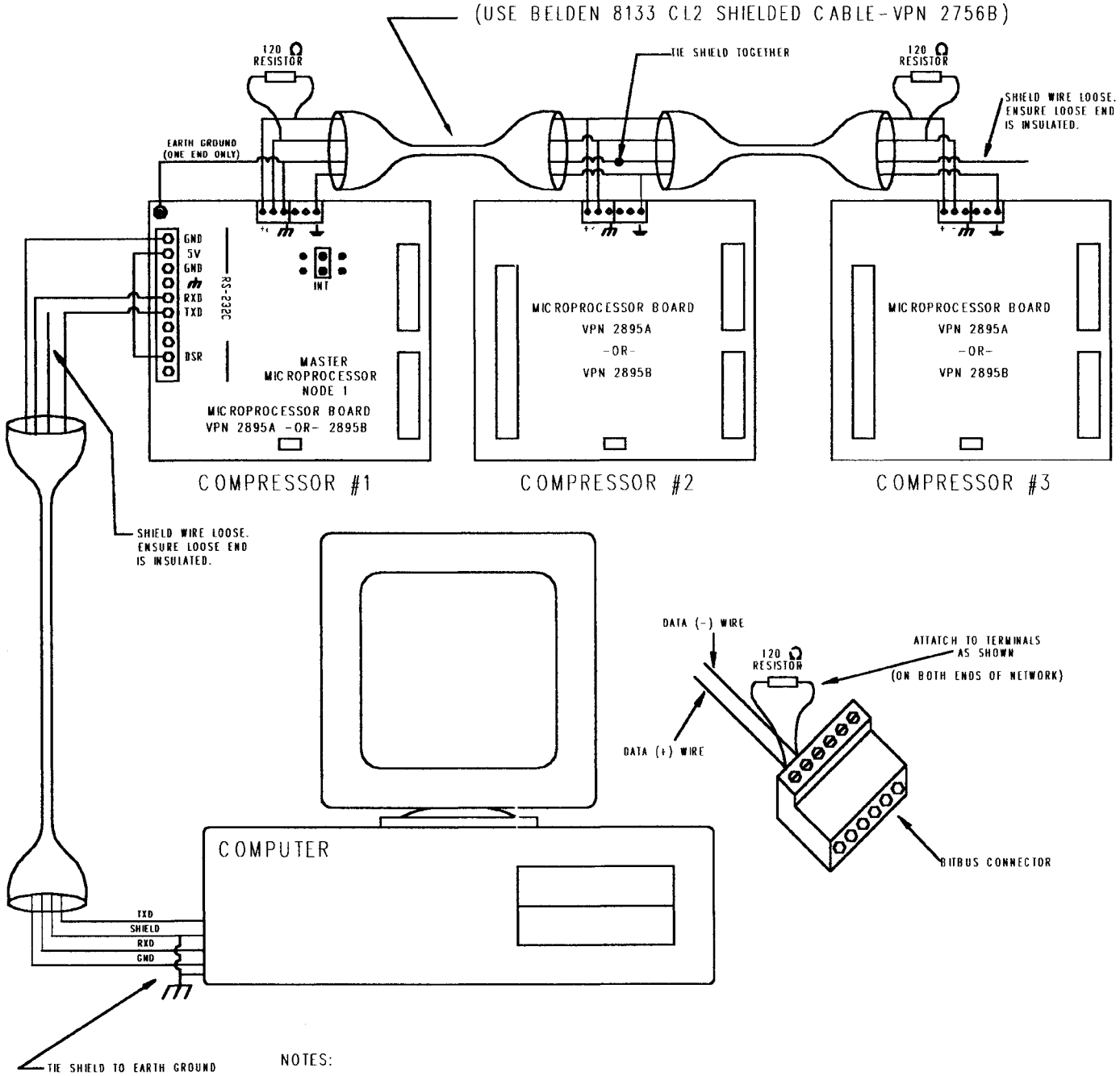


REVISIONS:
1) CHANGED WIRE TO 8132 AND ADDED VPN 2895B NOTES. CHANGED WIRE ORIENTATION. BDG 1-14-93
2) CHANGED COMPRESSOR #1 TO ADDRESS 0. ADDED RS232 NOTES. BDG 8-6-93
3) ADDED RGND WIRE, 120 OHM RESISTORS, AND ILLUSTRATION. BELDEN # WAS 8132. BDG 3-16-94
4) CHANGED MASTER NODE TO 1. BDG 3-9-95

VILTER MFG. CORP. MILWAUKEE	DRAWN BY: BDG CHECKED BY:	APPROVED	DATE 3-17-94	T00404	R1

COMPUTER RS-232 CONNECTIONS TO VILTER MICROPROCESSOR

VPN 2895A -OR- 2895B CIRCUIT BOARD



NOTES:

1) BITBUS SPECIFICATIONS REQUIRE 120 OHM (MINIMUM) TERMINATION RESISTORS BE INSTALLED AT BOTH ENDS OF THE BITBUS NETWORK. THE RESISTOR IS INSTALLED ACROSS THE DATA (+) & DATA (-) TERMINALS AS SHOWN ABOVE.

2) ⏚ DESIGNATES RGND ON THE BITBUS. ALL RGND'S ON ALL NODES MUST BE CONNECTED AS SHOWN.

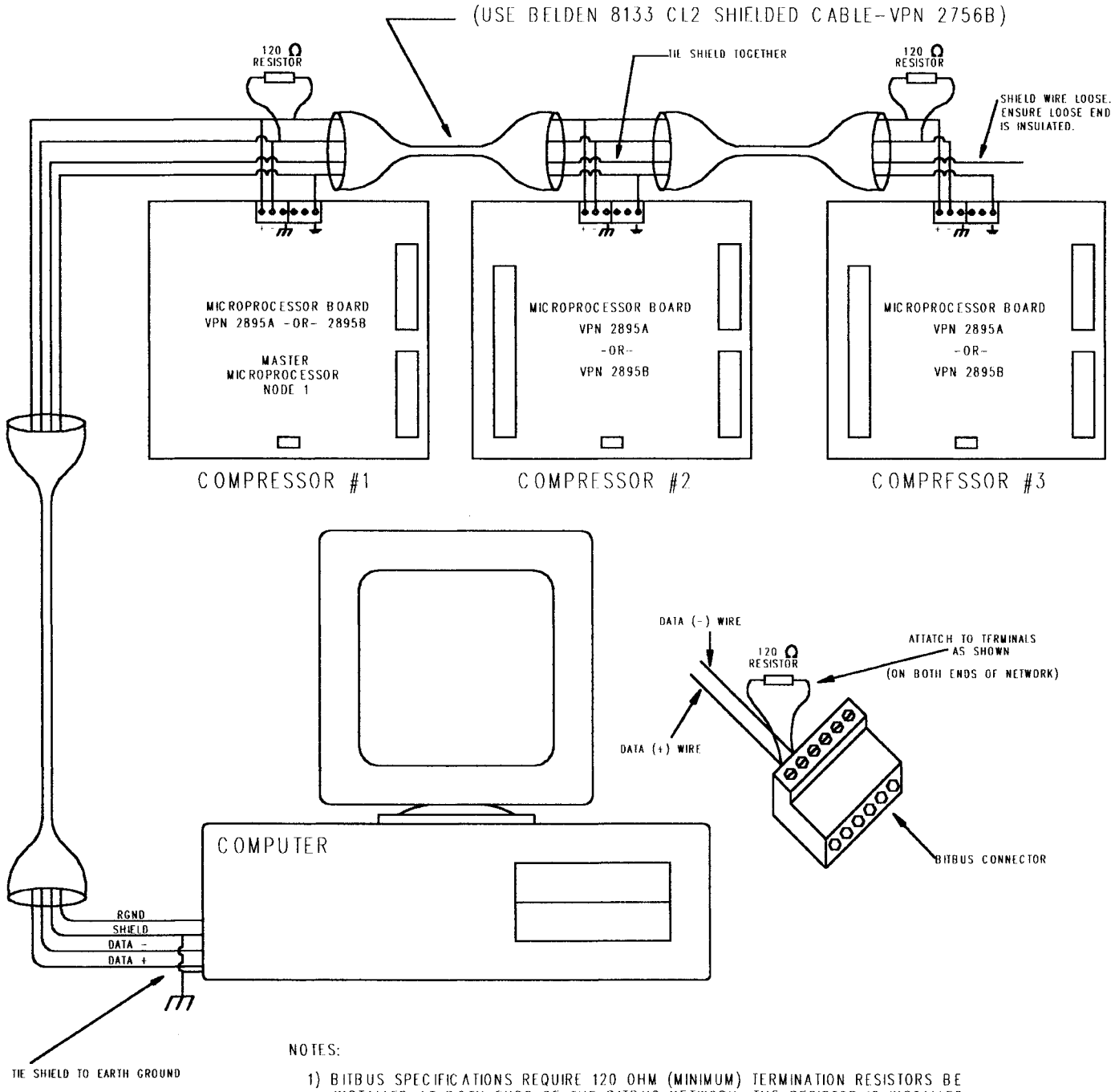
3) ⏥ DESIGNATES EARTH GROUND (ALSO CALLED CHASSIS GROUND, OR EQUIPMENT GROUND).

REVISIONS: 1) CHANGED MASTER NODE TO 1, ADDED 120 OHM MINIMUM NOTE. BDG 3-9-95

'ILTER MFG. CORP.	MILWAUKEE	DRAWN BY: BDG / CHECKED BY:	APPROVED	DATE 3-17-94	T00405	R1

'OMPUTER RS-485 CONNECTIONS TO VILTER MICROPROCESSOR

VPN 2895A -OR- 2895B CIRCUIT BOARD



NOTES:

1) BITBUS SPECIFICATIONS REQUIRE 120 OHM (MINIMUM) TERMINATION RESISTORS BE INSTALLED AT BOTH ENDS OF THE BITBUS NETWORK. THE RESISTOR IS INSTALLED ACROSS THE DATA (+) & DATA (-) TERMINALS AS SHOWN ABOVE.

2) ⏚ DESIGNATES RGND ON THE BITBUS. ALL RGND'S ON ALL NODES MUST BE CONNECTED AS SHOWN.

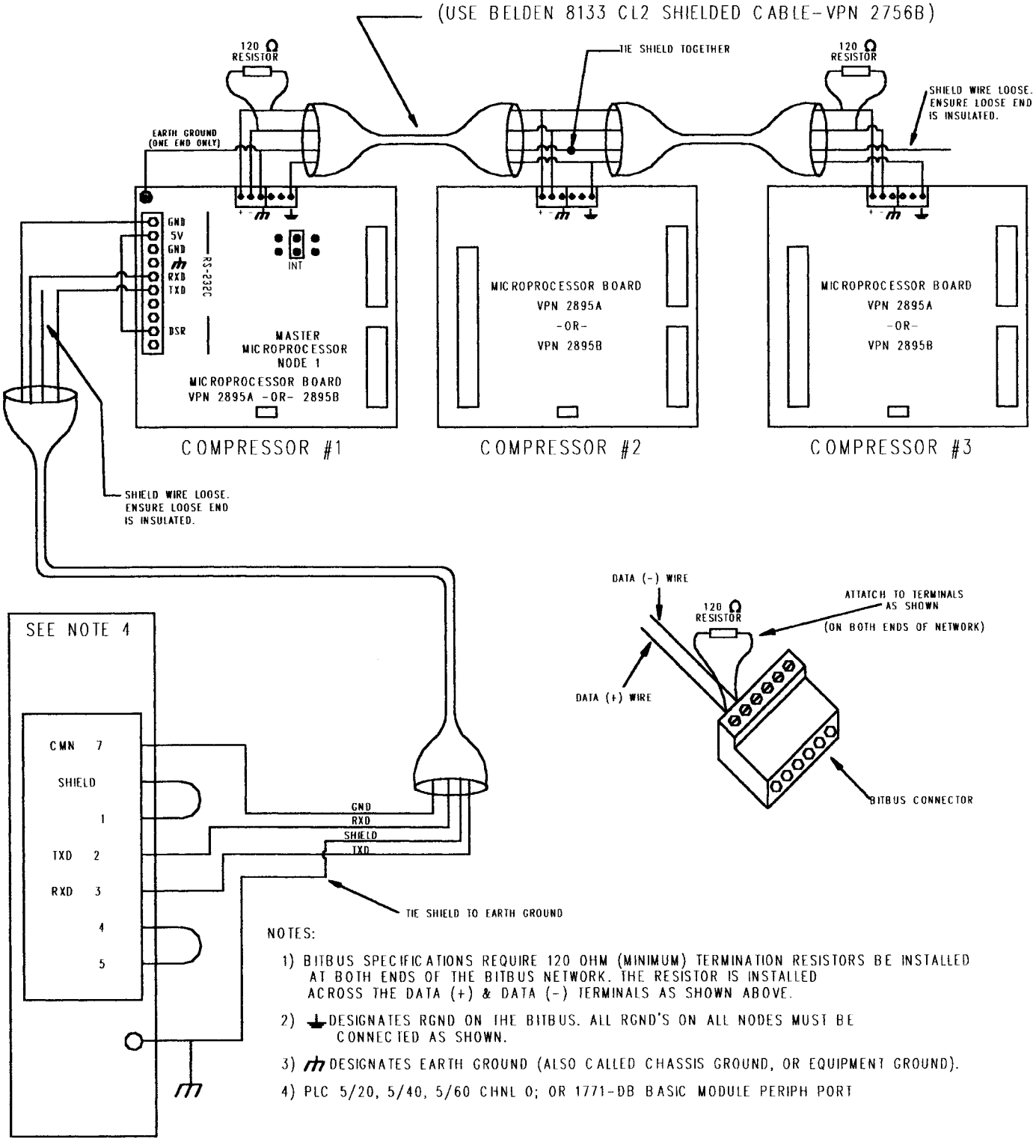
3) ⏚ DESIGNATES EARTH GROUND (ALSO CALLED CHASSIS GROUND, OR EQUIPMENT GROUND).

REVISIONS: 1) CHANGED MASTER NODE TO 1, ADDED 120 OHM MINIMUM NOTE. BDG 3-9-95

ILTER MFG. CORP.	MILWAUKEE	DRAWN BY: BDG / CHECKED BY:	APPROVED	DATE 3-17-94	T00406	R2

PLC RS-232 CONNECTIONS TO VILTER MICROPROCESSOR

VPN 2895A -OR- 2895B CIRCUIT BOARD



NOTES:

1) BITBUS SPECIFICATIONS REQUIRE 120 OHM (MINIMUM) TERMINATION RESISTORS BE INSTALLED AT BOTH ENDS OF THE BITBUS NETWORK. THE RESISTOR IS INSTALLED ACROSS THE DATA (+) & DATA (-) TERMINALS AS SHOWN ABOVE.
2) ⏚ DESIGNATES RGND ON THE BITBUS. ALL RGND'S ON ALL NODES MUST BE CONNECTED AS SHOWN.
3) ⏥ DESIGNATES EARTH GROUND (ALSO CALLED CHASSIS GROUND, OR EQUIPMENT GROUND).
4) PLC 5/20, 5/40, 5/60 CHNL 0; OR 1771-DB BASIC MODULE PERIPH PORT

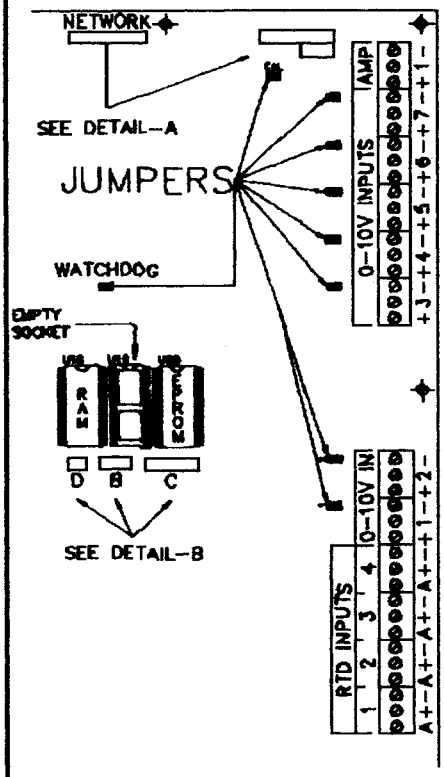
REVISIONS:
1) ADDED NOTE 4. BDG 1-10-95
2) CHANGED MASTER NODE TO 1, ADDED 120 OHM MINIMUM NOTE. BDG 3-9-95

VILTER MFG. CORP. MILWAUKEE

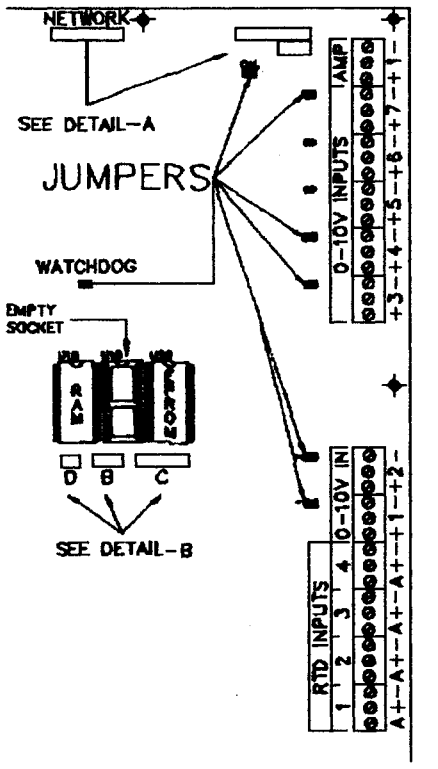
DRAWN BY: JHP	APPROVED	DATE 7-21-92	T450311⅓ R3

MICROPROCESSOR JUMPER LOCATIONS AND REPLACEMENT PROCEDURE — FOR VPN 2895A & 2895B CIRCUIT BOARDS

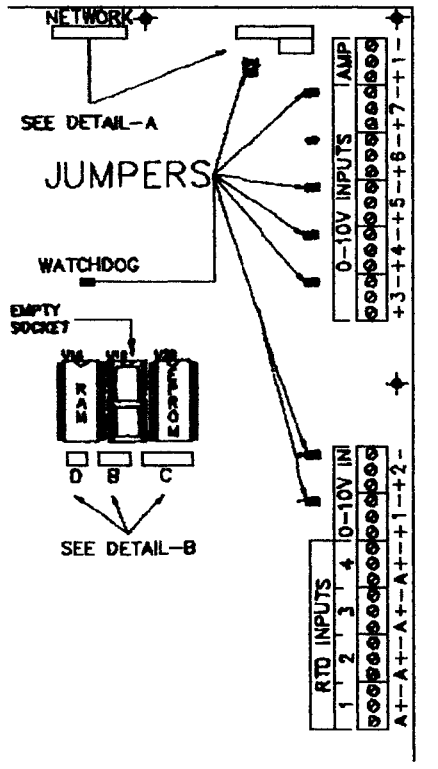
RECIP.



VSS–SINGLE SCREW

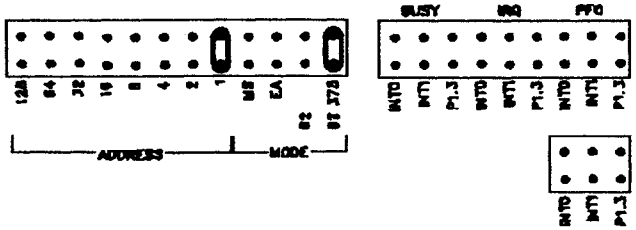


VRS–TWIN SCREW



DETAIL–A

NETWORK ADDRESS MODE JUMPER LOCATIONS

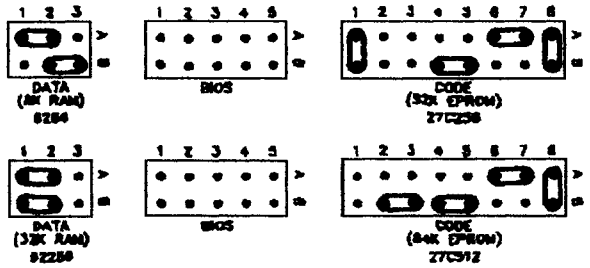


NOTE:

THE ADDRESS JUMPERS MAY VARY IN LEAD/LAG OR CENTRAL CONTROL APPLICATIONS. REFER TO THE WIRING DIAGRAM OR CONTROL PANEL LAYOUT FOR LOCATIONS. NODE ADDRESS 1 IS SHOWN.

DETAIL–B

DATA BIOS CODE JUMPER LOCATIONS



SEE PAGE 3/3 FOR ALL REVISIONS.

VILTER MFG. CORP. MILWAUKEE	DRAWN BY: BDG	APPROVED	DATE 1-12-93	T45031 2/3 R3

MICROPROCESSOR BOARD REPLACEMENT PROCEDURE

1) WRITE DOWN ALL SETPOINTS, CONTROL LIMITS, OPERATING OPTIONS, AND TIMER VALUES. THEY WILL HAVE TO BE REENTERED AFTER BOARD REPLACEMENT.

2) PUT ON SUPPLIED DISPOSABLE GROUNDING WRIST STRAP AND SET UP A GROUND POINT. SEE INSTRUCTIONS BELOW:

   A) CUT APPOX. 6" OF #16 OR 14AWG WIRE, STRIP ONE END APPROX. 1/4", STRIP THE OTHER END APPROX. 1". FASTEN THE 1/4" END TO THE GROUND LUG ON THE SUBPANEL. IF THE PANEL WAS NOT SUPPLIED WITH A LUG, LOCATE A CONVENIENT AND EXPOSED ELECTRICAL GROUND.

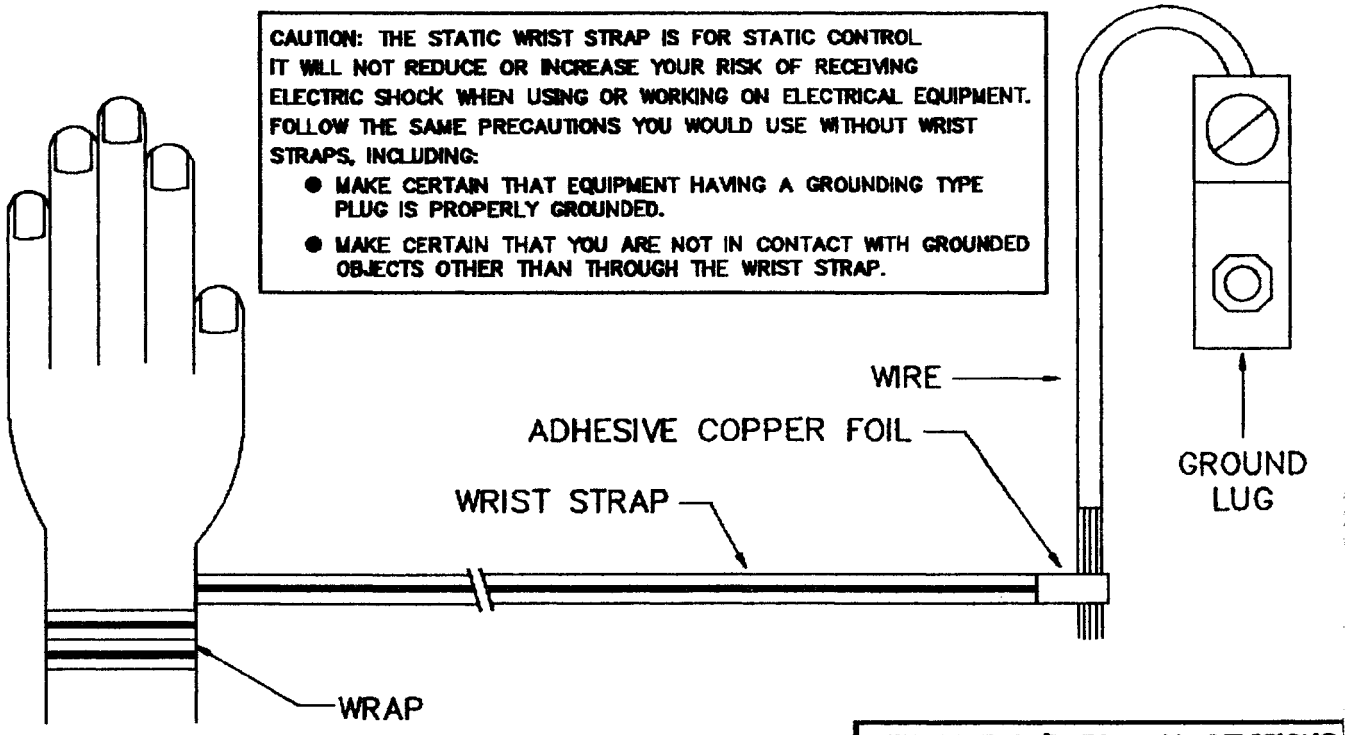
   B) UNWRAP THE FIRST TWO FOLDS OF THE BAND AND WRAP THE EXPOSED ADHESIVE SIDE FIRMLY AROUND YOUR WRIST.

   C) UNROLL THE REST OF THE BAND AND PEEL THE LINER FROM THE COPPER FOIL AT THE OPPOSITE END.

   D) ATTACH THE COPPER FOIL TO THE 1" EXPOSED END OF THE GROUND WIRE. ATTACH TO THE LOCATED GROUND IF THE PANEL WAS SUPPLIED WITHOUT A GROUND LUG.

CAUTION: THE STATIC WRIST STRAP IS FOR STATIC CONTROL IT WILL NOT REDUCE OR INCREASE YOUR RISK OF RECEIVING ELECTRIC SHOCK WHEN USING OR WORKING ON ELECTRICAL EQUIPMENT. FOLLOW THE SAME PRECAUTIONS YOU WOULD USE WITHOUT WRIST STRAPS, INCLUDING:

- **MAKE CERTAIN THAT EQUIPMENT HAVING A GROUNDING TYPE PLUG IS PROPERLY GROUNDED.**
- **MAKE CERTAIN THAT YOU ARE NOT IN CONTACT WITH GROUNDED OBJECTS OTHER THAN THROUGH THE WRIST STRAP.**



SEE PAGE 3/3 FOR ALL REVISIONS.

VILTER MFG. CORP. MILWAUKEE	DRAWN BY: BDG	APPROVED	DATE 1-11-96	T450313 3/3 R3

MICROPROCESSOR BOARD REPLACEMENT PROCEDURE

3) REMOVE EXISTING BOARD AND I/O MODULES.

4) INSTALL I/O MODULES ON NEW BOARD AND CHECK JUMPER LOCATIONS. (DIAGRAM ON PAGE 1). IF THE NEW BOARD WAS SUPPLIED WITHOUT AN EPROM CHIP, CAREFULLY REMOVE IT FROM THE ORIGINAL BOARD AND INSERT INTO SOCKET U20 ON NEW BOARD.

5) INSTALL NEW BOARD ENSURING DISPLAY AND KEYPAD CABLES ARE CONNECTED ACCORDING TO THE "KEYED" CONNECTORS. AFTER THIS IS COMPLETE THE GROUNDING STRAP MAY BE REMOVED.

6) PERFORM COLD START PROCEDURE. (THIS CLEARS OUT RAM MEMORY AND FORCES IN DEFAULT VALUES TO ALL SAFETY SETPOINTS, CONTROL LIMITS, TIMER VALUES, CALIBRATION OFFSET VALUES, OPERATOR OPTIONS, AND SCALING FACTORS FOR ALL ANALOG CHANNELS.)

PROCEDURE:

Go to the third column, second screen.
This menu is labeled MSC1–RESERVED. (FIG. 1)
Enter the password: <EDIT> <NEXT> <NEXT> <ENTER>
Now press <ENTER> once more.
The CLEAR MEMORY OPTIONS menu will now appear.
(FIG. 2) Enter the password once more and the right arrow will appear. Now select "Clear all MEMORY. (COLD START)" line by pressing the <NEXT> key. (FIG. 3)
Once the arrow is next to this option press <ENTER> twice.
The CURRENT VALUES screen will now come up.
The COLD START procedure is now complete.

FIG. 1

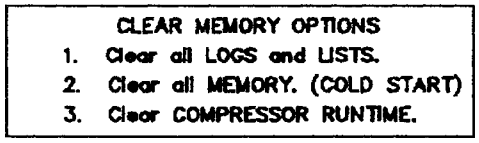


FIG. 2

FIG. 3

7) ENTER THE TIME AND DATE, ALL SEPOINTS, CALIBRATION POINTS, AND SELECTIONS FROM THE OPERATOR OPTIONS SCREEN.

REVISIONS:

1) ADDED RAM AND EPROM CHIP NUMBERS BELOW JUMPER LOCATIONS UNDER DETAIL–B. BDG 10–2–92
2) ADDED PAGE 2 (RELACEMENT PROC.) AND REMOVED "TRANSFER CHIP" NOTE FROM PAGE 1. BDG 1–13–93
3) ADDED PAGE 3. ADDED GROUDING WRIST STRAP AS PART OF REPLACEMENT PROCEDURE. BDG 1–11–96

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