

RS-232 Communications

“Series E / IE” and “Series EM”

Users Manual

TABLE OF CONTENTS

Table of Contents	2
Introduction	3
Connection.....	3
Terminal Settings	4
Commands.....	4
Shell Command	4
Help screen.....	5
Version	5
Alarm Setpoint	5
Meter Functions.....	6
Status	6
Alarms	7
Alarms, Events, and Tests Dump	8
Date and Time	10
LOCATION OF THE RS232 PORT FOR “E” & “IE” 6-16.7k.....	11
LOCATION OF THE RS232 PORT FOR “E” & “IE” 1.5 –5.0k.....	11
LOCATION OF THE RS232 PORT FOR “EM” 1.0 – 2.8k.....	12
The ZOOM Modem (Optional).....	15
Configuring the ZOOM Modem (optional).....	15
Dialing the ZOOM Modem	15

INTRODUCTION

This manual is intended to explain the operation of the serial communication protocol for the “Series E”, “Series IE” and “Series EM” Emergency Lighting Central Inverter. Serial Communication can be established by means of a computer using terminal emulation software (such as Tera Term, PuTTY, xterm, etc.), or by any embedded device capable of RS-232 serial communication. We shall call this device the Client.

The protocol used is proprietary, and specific to Myers “Series E”, “Series IE” and “Series EM” Emergency Lighting Central Inverters.

CONNECTION

The Central Inverter has a 9-pin Sub-D (DB9) female connector typically located on the back (inside) of the front display panel located on the door of the inverter. See below for the exact location of the connector.

The connection between the Client and the Inverter is a straight-through connection. Do **not** use a Null Modem Cable that flips pins 2 and 3. Pin 2 and Pin 3 are the Data send and receive lines; Pin 5 is the Ground (common) line. Optical isolation on the interface card provides galvanic isolation between the client device’s ground signal and the inverter’s ground.

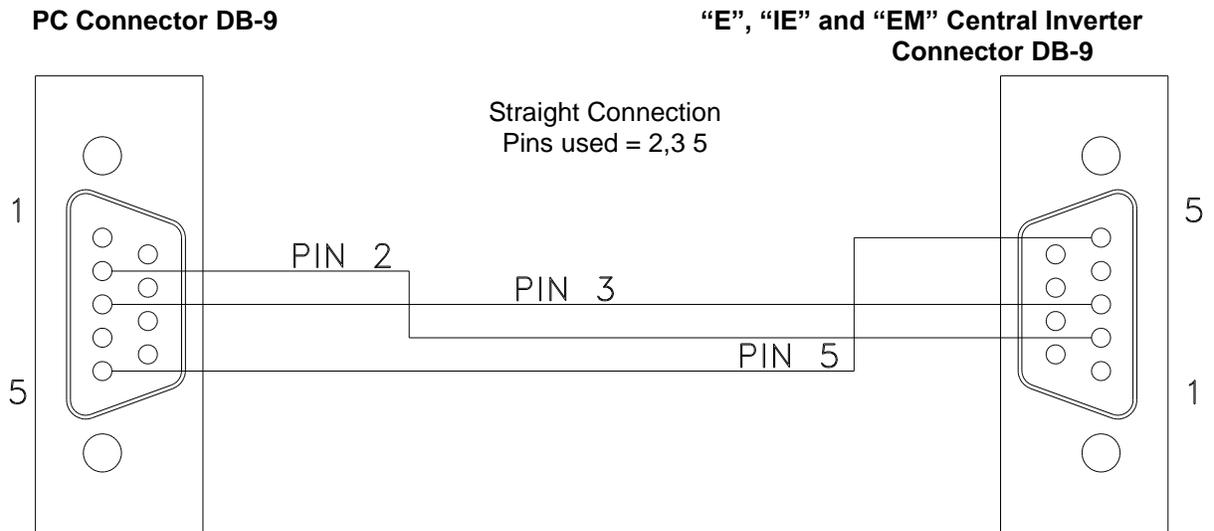


Illustration 1 – Interconnect Schematic for RS-232 Connection

TERMINAL SETTINGS

Baud Rate:	19,200
Data Bits:	8
Parity:	None
Stop Bits:	1
Flow Control:	None
Character Set:	ANSI

The “Series E”, “Series IE” and “Series EM” RS-232 protocol uses carriage returns (‘\r’, ANSI code 0x0D), but does **not** use line feeds (‘\n’, ANSI code 0x0A). If you are manually typing commands, some terminal emulator software will automatically feed the line back when you press enter (and a carriage return is sent) and when the inverter responds (with a response string followed by a carriage return). However, some terminal emulator software will not do this, and you will end up with something like the following which is difficult to read:

```
CMD> setpoint
      lvac:   108.0 off
              hvac:   132.0 off
                              nlbatt: 111.0 off
                                  lb
att:   105.0 off
              htemp:   45.0 off
                              lrc:   0.0 off
```

If this is the case, look for the setting in your terminal emulator software that automatically appends line feeds after (outgoing or incoming) carriage returns.

When the inverter is **not** in ‘shell mode’, it will **not** echo back characters you type (even though it is indeed receiving them). To see what you are typing when the inverter is not in ‘shell mode’, turn on the ‘local echo’ setting on your terminal emulator.

When the inverter **is** in ‘shell mode’, it **will** echo back characters you type. You will want to turn off the ‘local echo’ setting on your terminal emulator, or you will see doubles of every character as you type.

*** Always use lower case letters for communication unless noted otherwise.***

COMMANDS

Shell Command

To be able to use the commands below, the inverter must be in ‘shell mode’. To enter ‘shell mode’, simply type “shell” (without quotation marks) and press enter. If it doesn’t work, you might have mistyped it, or the inverter may have received some characters before you even started. If this is the case, just type “shell” again and press enter.

Remember that lower case letters must be used. Upper Case characters are ignored!

When in ‘shell mode’, the inverter will return a command prompt (CMD>) each time you press enter. Once this command prompt (CMD>) appears, the inverter is ready to receive another command.

Help screen

You may type “help” at the command prompt for a listing of various commands available.

```
CMD>help
```

```
ver          Display current firmware version.
set point    Display or modify set points.
meter        Display meter values.
status       Display present status.
alarms       Display alarms.
dump         Dump logs (alarms, tests, events).
dt           Display and change date-time setting.
help         List shell commands with brief descriptions.
exit         Exit from shell.
```

Version

The Revision level of the software is available by the “ver” command.

```
CMD>ver
```

```
IF: 2.08
FP: 1.02
```

```
CMD>
```

Alarm Setpoint

When the set point command is entered the following data is displayed:

```
CMD>setpoint
```

```
lvac  : 108.0 off
hvac  : 132.0 off
nlbatt: 111.0 off
lbatt : 105.0 off
htemp : 45.0 on
lrc   : 0.0 off
```

lvac is the Low Voltage AC alarm,
hvac is the High Voltage AC alarm,
nlbatt is the Near Low Battery Voltage alarm,
lbatt is the Low Battery Voltage Alarm,
htemp is the High temperature alarm set point, and
lrc is the Load Reduction Fault set point.

To change a setpoint, type ‘setpoint’, then press the ‘tab’ key, then the name of the setpoint you wish to change, then press the ‘tab’ key again, then type the new value you wish to set, then

press the 'tab' key once more, and type 'on' or 'off' (to turn the alarm on or off respectively) and finally press 'enter'.

For example, to turn on the low voltage alarm when the input voltage goes below 105 VAC, type "lvac" and then press tab and type "105" and then tab and then type "on" and press enter.

```
CMD>setpoint      lvac 105  on
```

The other set points can be changed in the same manner.

Meter Functions

To read Voltages and currents, the meter command may be used. To use, type, "meter" and press enter. The following display will occur.

```
CMD>meter
```

```
vin      : 118.3
vout     : 118.3
iout     : 12.3
vbatt    : 54.1
ibatt    : 0.1
tbatt    : -61.1
tint     : 29.8
imin     : 0
days    : 0
vaout    : 1453.8
iwatts   : 6.6
```

vin is the (utility side) input voltage to the inverter, in Volts.

vout is the output (load side) voltage of the inverter, in Volts.

iout is the output current of the inverter (current consumed by the load), in Amps.

vbatt is the voltage of the battery, in Volts.

ibatt is the current through the battery, in Amps.

tbatt is not currently supported in hardware. Ignore this value; for now it is meaningless.

tint is the ambient temperature inside the inverter cabinet, in degrees Celsius. To convert to degrees Fahrenheit, subtract 32, then multiply by 5, then divide by 9. $^{\circ}F = \frac{5(^{\circ}C-32)}{9}$

imin is the cumulative 'number of minutes' (over its lifetime) that the inverter has spent running on battery power.

days is the number of days that the inverter system has been running

vaout is the output power of the inverter, in Vars (VA – voltage ampere reactive).

iwatts is the power being provided by the battery, in Watts.

Status

The different statuses of the machine are accessible by typing "status" and enter.

The following message occurs when status command is sent:

```
CMD>status
```

```
Battery Power      : 0
Battery Charging: 1
Line Present       : 1
System Ready       : 1
```

In this example, the inverter is running on utility power, so the **Battery Power** status is 0 (false) and **Line Present** is 1 (true). **Battery Charging** is 1 (true) because the battery will always be charging, even when its full. When the battery is full, the inverter uses 'float-charging' to keep the battery full – this only consumes a tiny amount of power (in the 'meter' example above, it is shown consuming 6.6W as it float-charges). Finally, **System Ready** is 1 (true). This will always be the case unless the inverter is rebooting, on battery power, or charging.

Alarms

The alarm status of the machine is available through the “alarms” command. When the alarm command is typed, the following information is available.

CMD>alarms

```
Inverter           : 0
Charger            : 0
Output             : 0
Overload           : 0
Overload Shutdown : 0
High Ambient       : 0
High VAC           : 0
Low VAC            : 0
Low Battery        : 0
Near Low Battery   : 0
Utility            : 0
Load Reduction     : 0
Runtime            : 0
Circuit Breaker    : 0
Overtemp           : 0
```

The format is binary. A “1” indicates that the alarm is present (asserted); a “0” indicates that no alarm is present (unasserted).

The **Inverter** alarm indicates a problem in the inverter’s internal circuitry.

The **Charger** alarm indicates a problem in the charging circuitry that charges the battery.

The **Output** alarm indicates an issue with the output, such as a short circuit.

The **Overload** alarm indicates too much load (above the rating of the inverter) on the output.

The **Overload Shutdown** alarm indicates that the load is so high (above the rating of the inverter) that the inverter has shutdown to protect itself.

The **High Ambient** alarm indicates excessively high temperature inside the inverter cabinet.

The **High VAC** alarm indicates an excessively high input voltage (utility) to the inverter.

The **Low VAC** alarm indicates an excessively low input voltage (utility) to the inverter.

The **Low Battery** alarm indicates that the battery charge has almost been depleted.

The **Near Low Battery** alarm indicates that the inverter is approaching low battery.

The **Utility** alarm is 0 if the input voltage to the inverter is good, or 1 if it is not (indicating that the inverter is currently running the output from the battery).

The **Load Reduction** alarm indicates a reduction in the load below a preprogrammed threshold (which may happen if a load device goes offline, such as a lamp out). This feature is turned off by default.

The **Runtime** alarm indicates a self-test has failed (perhaps due to the age of the battery).

The **Circuit Breaker** alarm indicates that a circuit breaker has tripped. This feature only works when the right circuit breaker option is purchased.

The **Overtemp** alarm indicates that the internal circuitry of the inverter has reached an excessive temperature.

Alarms, Events, and Tests Dump

The dump command displays all of the memory content for Events, Tests or Alarms. The dump command must be followed by a tab and then either “alarms”, “tests” or “events” as the second field. After pressing the ‘enter’ key, the inverter will display a “Press Enter when ready...” prompt. Press the ‘enter’ key once again, and the inverter will dump out the specified log. Note that this log may be several kilobytes in size, and will be streamed out in one go.

Here is an abbreviated example of an alarm log dump:

```
CMD>dump      alarms
```

```
Final settings will be displayed next.  
If you wish to save to a file, enable text capture now.  
Do not forget to stop capture after data is transferred.  
Press Enter when ready...
```

```
*****< ALARM LOGS >*****
```

```
1/75      UTILITY  
09/20/19 17:49  
END : 09/20/19 17:49
```

```
2/75      UTILITY  
02/11/19 12:52  
END : 02/11/19 12:52
```

```
3/75      UTILITY  
11/29/18 13:36  
END : 11/29/18 13:36
```

```
4/75      UTILITY  
09/11/18 12:41  
END : 09/11/18 12:54
```

```
:      :      :      :
```

```
74/75     LOAD REDUCTION  
07/25/16 13:58  
END : 07/25/16 13:58
```

```
75/75     LOAD REDUCTION  
07/25/16 13:58  
END : 07/25/16 13:58
```

```
CMD>
```

The alarm log has up to 75 entries, and in this example, it is full. The alarms shown above include UTILITY alarms and LOAD REDUCTION alarms (see the write-up of the ‘alarms’ command above for details on what these mean). The first date and time is the timestamp of the start of the alarm event (when the alarm condition asserted), and the second date and time is the timestamp of the end of the alarm event (when the alarm condition unasserted).

Here is an abbreviated example of a test log dump:

```
CMD>dump          tests
```

```
Final settings will be displayed next.  
If you wish to save to a file, enable text capture now.  
Do not forget to stop capture after data is transferred.  
Press Enter when ready...
```

```
*****< TEST LOGS >*****
```

```
1/75          MONTHLY  
09/20/19 17:43  
DURATION : 5 MIN  
FAULTS   : 0  
VOUT     : 125.3  
IOUT     : 7.5  
TEMP     : 33.5 deg C
```

```
⋮          ⋮          ⋮          ⋮
```

```
75/75          MONTHLY  
03/15/14 08:30  
DURATION : 5 MIN  
FAULTS   : 0  
VOUT     : 126.2  
IOUT     : 6.4  
TEMP     : 26.3 deg C
```

```
CMD>
```

These log each of the times that the inverter ran self-test (which tests the battery and inverter operation – the primary goal is to make sure that the battery does not yet need to be replaced). Again, there is space for up to 75 logs. The first line of a log entry will indicate whether the self-test was an automated monthly self-test (**MONTHLY**), or an automated yearly self-test (**YEARLY**). The rest of the entry will tell you the timestamp of the self-test, the duration of the test (in minutes), whether or not faults were detected, the output voltage (in Volts) and current (in Amps) of the inverter during the test, and the ambient internal temperature inside the cabinet (in degrees Celsius).

Finally, the event log (which also has up to 75 entries) will store the results of manually evoked self-test events (**EVENT**). The entries will have the exact same format as the test log, but instead of **MONTHLY** or **YEARLY**, it will say **EVENT**.

Date and Time

The date and time can be viewed by typing the “dt” command. When dt is sent, the interface sends back the date and time information. Each parameter of the date and time are assigned a number. The dt command produces the following message:

```
CMD>dt
```

```
(1) day of week : 1..7  
(2) month : 1..12  
(3) day of month : 1..31  
(4) year : 0..99  
(5) hours : 0..23  
(6) minutes : 0..59
```

```
THU OCT 10, 2019  
14:59:24
```

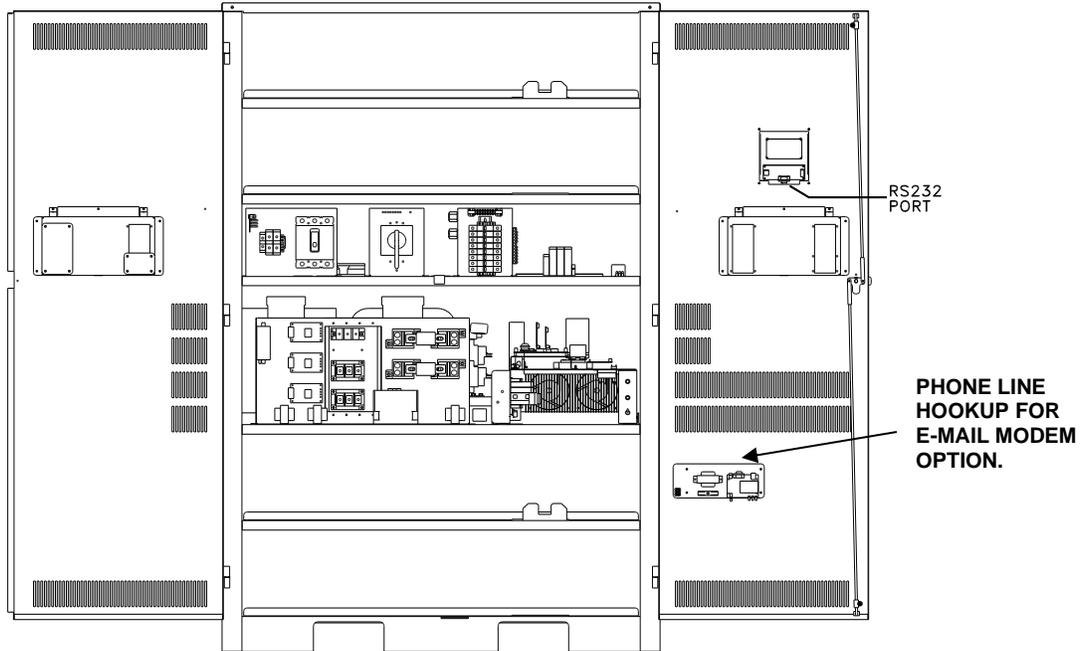
```
CMD>
```

The number for the **day of week** parameter for example is 1 and its allowed values are 1 through 7, where 1=Sunday, 2=Monday, ... , 7=Saturday.

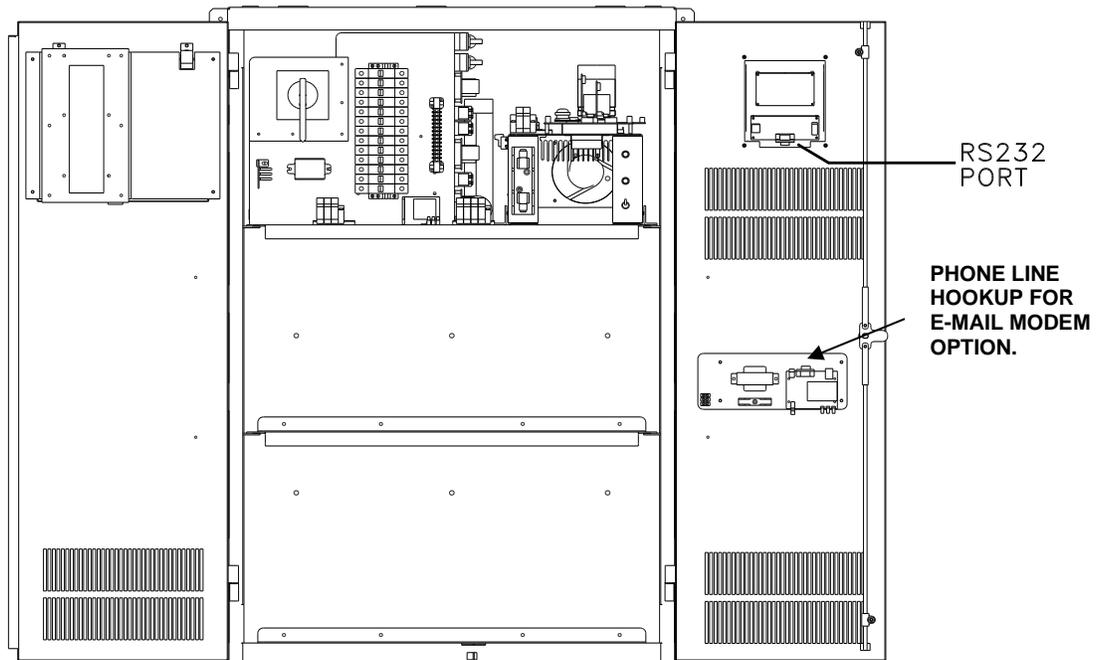
To change a parameter, type the **dt** command, then press the ‘tab’ key, then type the parameter number, press ‘tab’ again, then type the new value you wish to set the parameter to, and finally press ‘enter’.

Note: The inverter does not support Daylight Savings Time. If you set the inverter date and time during daylight savings, note that logged timestamps during non-daylight-saving times (i.e. winter) will be one hour ahead of the actual time (because the actual time went back by an hour). Or, if you set the inverter date and time during non-daylight-savings (i.e. winter), logged timestamps during daylight saving times will be one hour behind the actual time (because the actual time went forward by an hour). Alternatively, you can change the inverter’s date and time during the switches into and out of daylight savings.

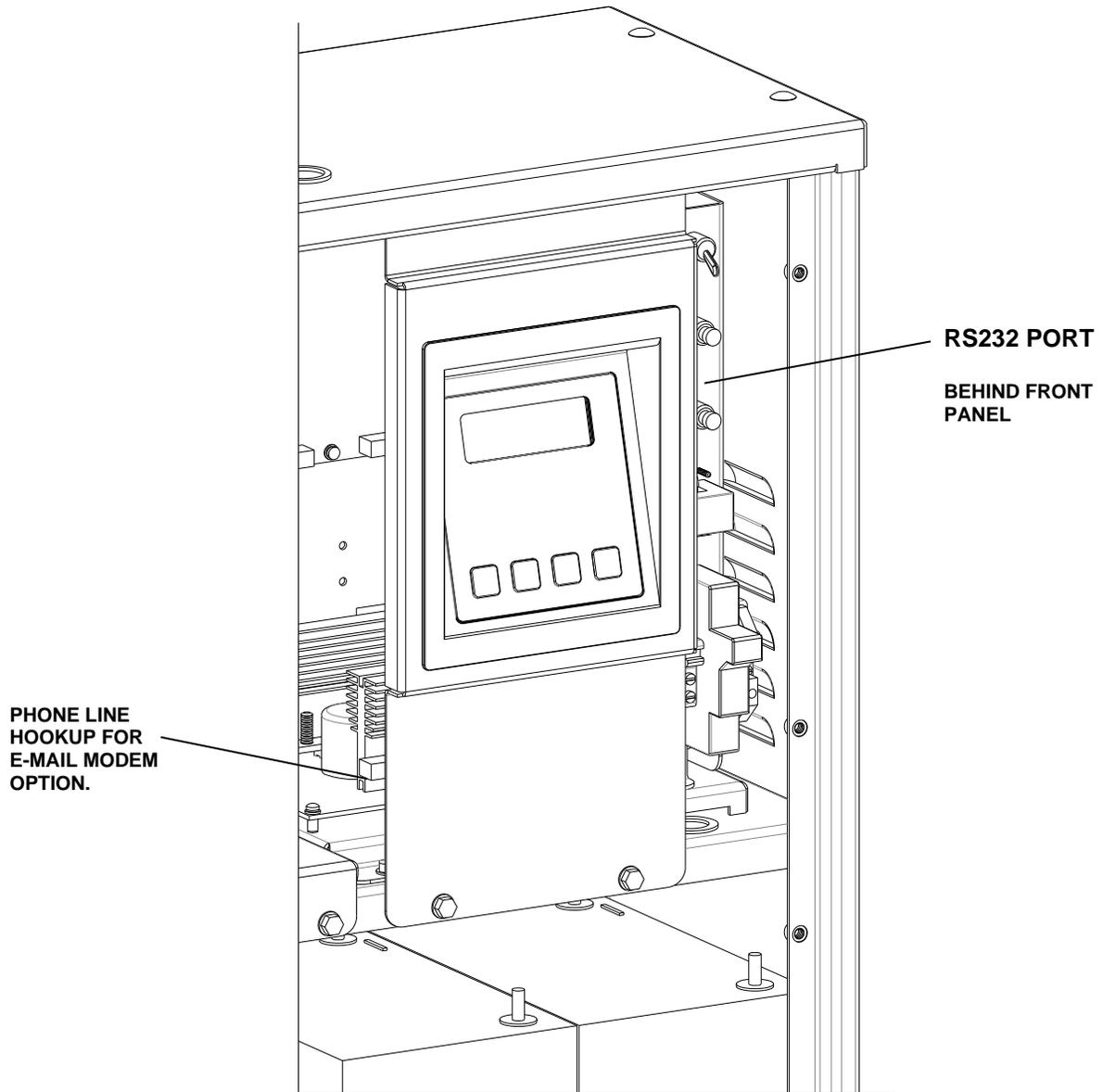
LOCATION OF THE RS232 PORT FOR "E" & "IE" 6-16.7K



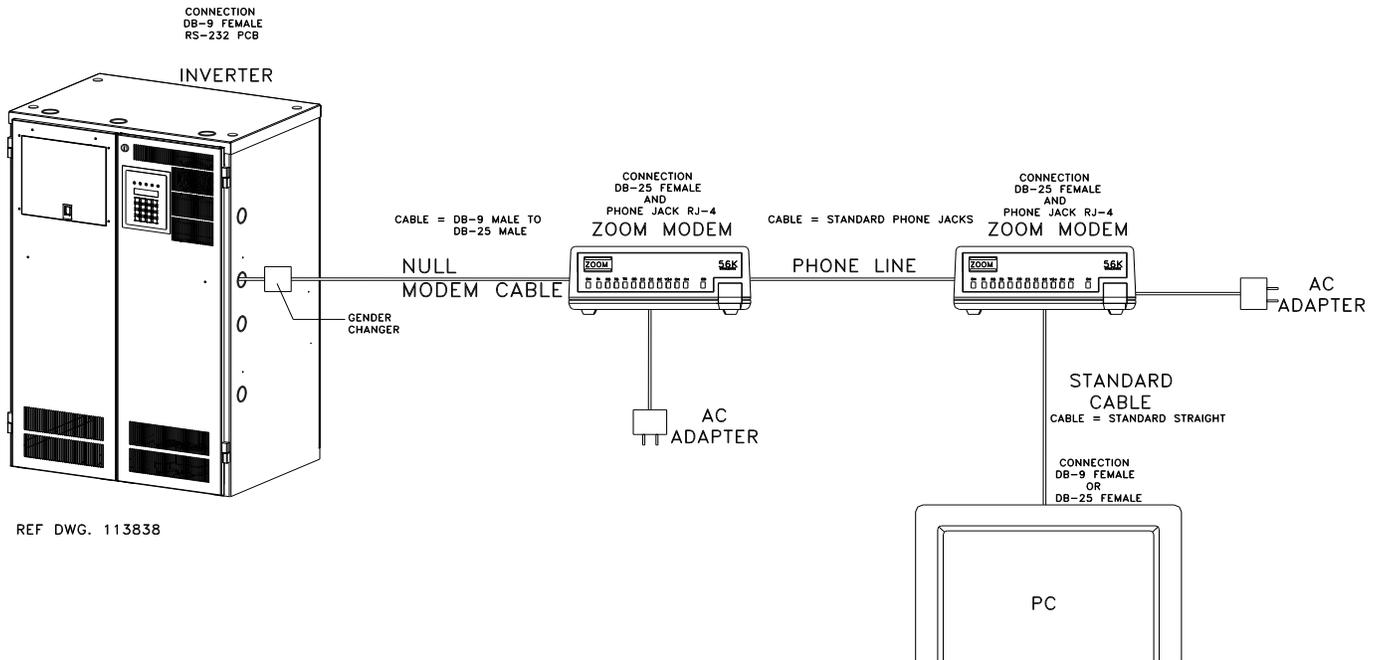
LOCATION OF THE RS232 PORT FOR "E" & "IE" 1.5 -5.0K



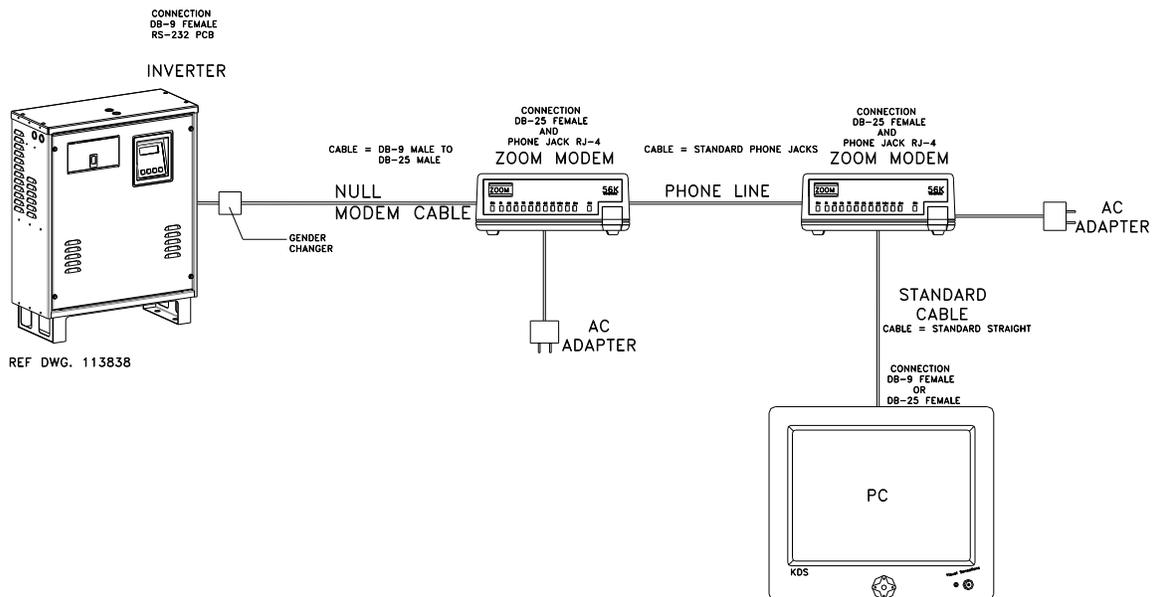
LOCATION OF THE RS232 PORT FOR "EM" 1.0 – 2.8K



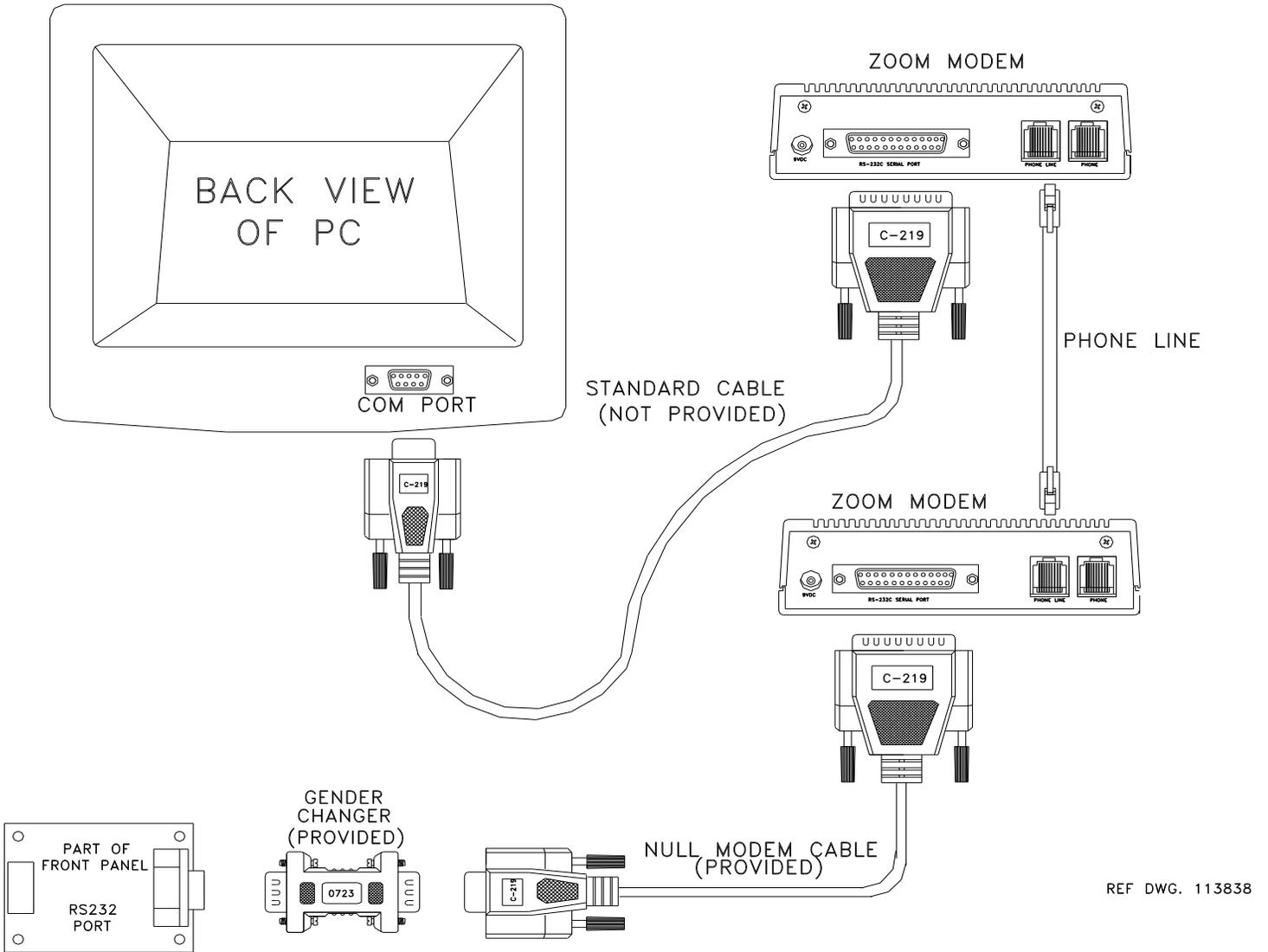
ZOOM MODEM CONNECTION BLOCK DIAGRAM



ZOOM MODEM CONNECTION BLOCK DIAGRAM



DETAILED WIRING DIAGRAM



REF DWG. 113838

THE ZOOM MODEM (OPTIONAL)

Configuring the ZOOM Modem (optional)

Connect the 9VDC Power Adapter

Connect the PC serial port to the modem's serial port

On the PC, bring up a terminal communications program such as HyperTerminal.

Configure your terminal emulator software to the following:

19,200 BPS
8 Data Bits
No Parity
No Stop Bits
No Flow Control

Make sure there is communication by typing AT<enter> until the message "OK" appears.

Type the following AT commands:

ATM1 <enter> (speaker on until connected)
AT&D0 <enter> (ignore DTR)
AT&K0 <enter> (no flow control)
ATS0=1 <enter> (auto-answer after one ring)
AT&W0 (store to non-volatile memory)

Dialing the ZOOM Modem

Type AT<enter> until the message "OK" appears

Type for example:

ATD9, 16109545224 <enter>
ATD is the command
9,16109545224 is the phone number –9, for outside line.

Wait for the message "connected"

To hang up:

Type three plus signs (+++) and wait for the message "OK"
Type **ATH0** <enter> to hang up or,
Type **ATO0** <enter> to enter online mode again