

BE124 GENERATOR CONTROLLER

50/60Hz Industrial, 400Hz (Aircraft Ground Support Equipment) Genset Controller

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Warranty

Bernini Design SRL (hereinafter BD) warrants that Be124 shall be free from defect in material or workmanship for a period of 3 years from the BD delivery date. BD shall, at its discretion, repair or replace the product without charge. BD shall return the Be124 to the buyer with the Default parameters at no extra charge. The buyer shall furnish sufficient information on any alleged defects in the product, so as to enable BD to determine their cause and existence. If the Be124 is not defective, or the product is defective for reason other than covered by this warranty, the buyer will be charged accordingly. This warranty shall not apply if the Be124 has not been used in accordance with the User Manual and other operating instruction, particularly if any defects are caused by misuse, improper repair attempts, negligence in use or handling. This purchase is non-refundable.

This equipment complies with the EMC protection requirements



!! WARNING !!

High voltage is present inside the Be124. To avoid electric-shock hazard, operating personnel must not remove the protective cover. Do not disconnect the grounding connection. The Be124 can start the engine at anytime. Do not work on equipment, which is controlled by the Be124. When servicing the engine, disconnect the battery and battery charger. We recommend that warning signs be placed on equipment indicating the above

!! WARNING !!

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Quick start guide ! How to.....

How to.....	See section..	How to.....	See section..
start the engine	2.2	see alarms & events	7.0
stop the engine	2.2	set the clock	8.0
cancel the alarm	13.0	use the display	4.0
select a mode of operation	2.0	manage the parameters	10.0
display Voltage & Current	5.0, 6.0	control the Circuit Breaker	2.20

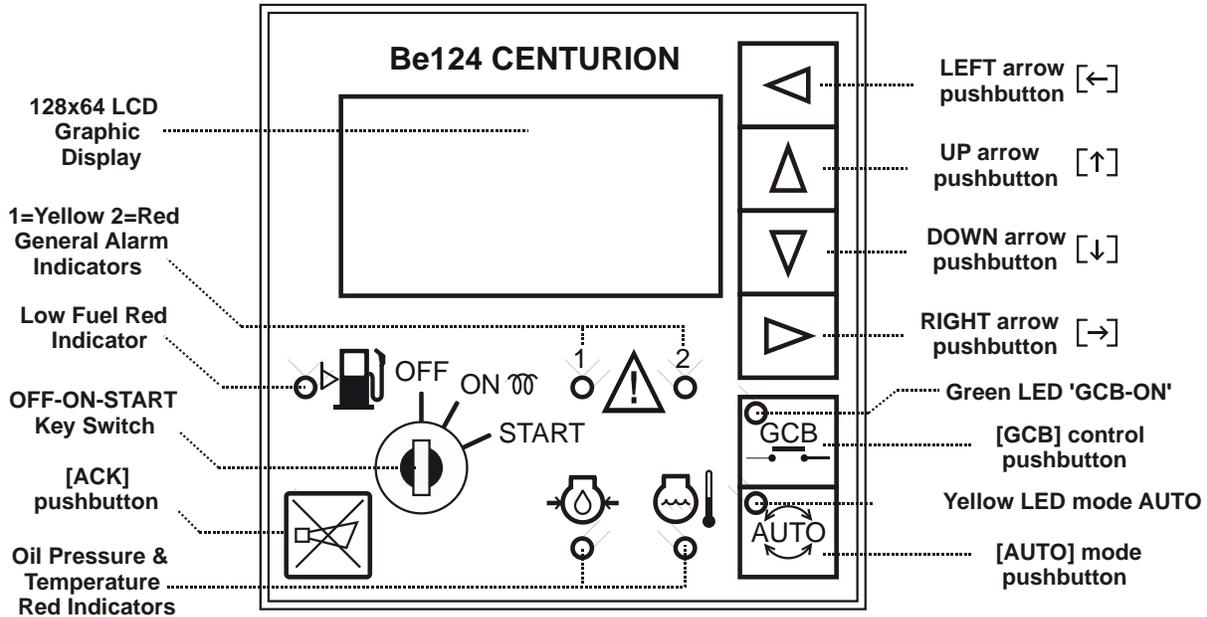
Lost the password? Send a mail to bernini@bernini-design.com

Section 1.0 - INTRODUCTION

!! WARNING !!

The Be124 can start the engine at anytime. Do not work on equipment, which is controlled by the Be124. When servicing the engine, disconnect the battery and battery charger. We recommend that warning signs be placed on equipment indicating the above. Generator voltage is exposed within the Be124 and ancillary circuitry even all luminous indicators (so called LED) are OFF

The Be124 is a 3-Phase Generating Set controller that integrates a Datalogger and Oscilloscope. The Be124 provides visual indication by means of LEDs (luminous indicators) and graphic display for all parameters and alarms. The figure illustrates the layout of the front panel.



Section 2.0 - SELECTING AN OPERATIONAL MODE

The mode of operation is selected via a key switch and via an AUTO pushbutton. If the Be124 was in **TEST** or **AUTO** mode prior to powering down, when you switch on (or connect) the battery supply, the Be124 enters the **AUTO** mode of operation. In the other cases, you have to start the engine manually.

2.1 - OFF mode

Turn the key to 'OFF': you switch **OFF** the Be124 and clear the fault alarms. Once in 'OFF' mode, you are allowed to program the user parameters (see 10.0). Backlight of the display will shutdown automatically after 30 minutes, if not otherwise programmed (see 9.0). To exit the 'OFF' mode, turn the key to ON position.

2.2 - MANUAL mode & manual control of the Generator Circuit Breaker (GCB)

Turn the key to 'ON' position. After the 5 secs self-check, turn the key to 'START' until engine starts. The display will automatically open the 'Be124 Status' page providing basic information (see 5.0). During cranking the Be124 may turn off the backlight of the display. Wait until the green LED GCB-ON starts blinking: the generator is working within the settings. Push the **[GCB]** (*) pushbutton to close the contactor of the generator: the green LED will light and remain lit. Use the arrow pushbuttons to browse the instrumentation (see 5.0 & 6.0). Push **[ACK]** at anytime to open the 'Be124 Status' page. Push the **[GCB]** pushbutton to open the GCB. To stop the engine, turn the key to 'OFF'; the **[STOPPING]** message will appear on the display for the programmed time. After a complete stop, you are allowed to restart the engine.

(*) if you close the GCB when the generator does not provide proper Voltage(or Frequency), the Be124 will trigger and Under Voltage (Frequency) shutdown alarm.

!! WARNING !!

The Be124 can start the engine at anytime. Do not work on equipment, which is controlled by the Be124. When servicing the engine, disconnect the battery and battery charger. We recommend that warning signs be placed on equipment indicating the above. Generator voltage is exposed within the Be124 and ancillary circuitry even all luminous indicators (so called LED) are OFF.

2.3 - AUTO (Automatic) mode of operation

Turn the key to 'ON' position. Push the [AUTO] pushbutton until the yellow LED [AUTO] illuminates. The engine starts when the Be124 detects a request to start from external devices (Automatic Mains Failure panel or others). The green LED GCB blinks if the alternator is working within the programmed limits. After the [WARM UP] time the generator circuit breaker will close automatically. Use the arrow pushbuttons to browse the instrumentation (see 5.0 & 6.0). Push [ACK] at anytime to open the 'Be124 Status' page. When there is a request to stop the engine, the Be124 opens the GCB and triggers the [COOL DOWN] timer. After that, the Be124 will stop the engine. In auto mode of operation, the Be124 will periodically test the engine if the periodic test is correctly programmed (see 10.2). Engine may start when battery drops below the AUTOSTART setting (see 10.4). During the test, the yellow LED [AUTO] will continue to blink. You can stop the engine at anytime by turning the key to 'OFF' position. Note: in AUTO mode of operation the [GCB] push button is disabled.

2.4 - TEST mode

Turn the key to 'ON'. Push and hold the [AUTO] pushbutton for at least 10 seconds until the yellow LED AUTO starts blinking and the display indicates the message [TEST MODE]. The engine will start immediately. The controller will enable the generator circuit breaker (GCB) only if not otherwise programmed by the parameter [GCB TEST CONTROL] (10.3). To exit the TEST mode, push the [AUTO] pushbutton: the controller will enter the MANUAL mode of operation. To stop the engine immediately, turn the key to 'OFF'.

Section 3.0 - LEDs INDICATORS / TEST OF THE LAMPS (LEDS)

The table describes the functions of the LED indicators on the front panel. To test the LEDs, supposing Be124 in 'OFF' mode, turn the key to 'ON': the Be124 will illuminate all indicators for about 3 seconds.

LED indicator	Description	LED indicator	Description
Fuel Alarm (Red) 	It turns on in case of no fuel in the tank (the engine shutdowns).	Auto / Test Mode (Yellow) 	- It turns on indicating the AUTO mode of operation.
Oil Pressure Alarm (Red) 	It turns on in case of Low Oil Pressure (the engine shutdowns).		- It blinks indicating the TEST mode of operation. (see also section 2.0).
Engine Temperature (Red) 	It turns on in case of High Oil or Coolant temperature (the engine shutdowns).		- It blinks indicating that the 'Scheduler' is active. (see also section 10.2)
General Alarms 	(1) Yellow indicator: it turns on in case of a warning (Canbus, Low battery etc..). (2) Red indicator: it turns on in case of a shutdown (Emergency 1-2-3 or others..).	Generator Circuit Breaker (Green) 	-It turns on when the GCB is closed. -It blinks when the alternator provides electrical parameters within the programmed limits. -It turns off when GCB is open or the Alternator parameters are out of limits.

Section 4.0 MAIN MENU & FUNCTIONS

Turn the key to 'OFF' position and then push [←]; the **Main Menu** will appear on the display. Some functions may be reserved by the Genset manufacturer and may be protected by OEM password. Push [↓] to scroll down and push [→] to enter a function. Repeatedly push [↑] to proceed to the top of the **Main Menu**.

Main menu	Section	You can:
ENGINE METERING GENSET METERING ALARM MONITORING SET DATE & TIME	5.0 6.0 7.0 8.0	... browse the engine instrumentation ... browse the generator instrumentation ... get information about Alarms & Memory Events ... set date & time (real time clock)
DISPLAY-LANGUAGE USER PARAMETERS OEM PARAMETERS RESET AND CLEAR	9.0 10.0 ---- ----	... set preferences for the display ... program & modify the User Parameters ... not use it (reserved for qualified personnel only) ... not use it (reserved for qualified personnel only)
USER PASSWORD OEM PASSWORD DATA LOGGER OSCILLOSCOPE	10.5 ---- 11.0 11.0	... insert a User password ... not use it (reserved for qualified personnel only) ... use the data logger (<i>tech. background is required</i>) ... use the oscilloscope (<i>tech. background is required</i>)
<p>Note: based on the version of the software, you can find other additional functions reserved for the Genset manufacturer only! Contact us for further information.</p>		

Section 5.0 - BE124 STATUS PAGE & METERING (to display it push [ACK] at anytime)

<p style="text-align: center;">AUTO MODE RUN ON LOAD 0:01:50 GCB ON BT 13.8V</p> <p><i>Example: engine runs on load</i> The Be124 is in Auto, GCB is closed. Battery voltage=13.8V. Runtime since engine started: one minute and fifty seconds.</p>	<p>The Be124 'Status Page' provides information about the Be124 operational status, current status of timers , current mode of operation and so on. To browse the engine instruments push [↓].</p>		
<p style="text-align: center;">AUTO MODE STARTING CRANK (*) 05 GCB OFF BT 11.5V</p> <p><i>Example: Engine is Starting</i> The display indicates [STARTING] and shows the count down of the [CRANK] timer. Battery voltage is 11.5V.</p>	<p>RUNNING (the engine is running)</p> <p>REST (rest time in between starting attempts)</p> <p>STOPPING (Be124 is stopping the engine)</p> <p>IDLE SPEED (the Be124 runs the engine at idle speed)</p> <p>REMOTE DEMAND (an external device is requesting the start of the engine via serial interface)</p> <p>GCB: ON or OFF (it indicates if the generator circuit breaker is open or closed)</p>	<p>NOT RUNNING (the engine is not running)</p> <p>STARTING (Be124 is going to start the engine)</p> <p>COOLING (the engine runs off load in order to cool the alternator)</p> <p>PREGLOW (the Be124 is driving the Preglow relay)</p> <p>ON-SITE DEMAND (This message takes place when you activate a remote switch or in case the AUTOSTART triggers a start of the engine as explained section 10.4)</p>	<p>RUN ON LOAD (the engine is running on load)</p> <p>CRANK (Be124 is cranking the engine)</p> <p>WARM UP (the engine runs out of load in order to warm up the engine)</p> <p>PRELUBE (the Be124 is driving the Prelube relay)</p> <p>AUTO / MANUAL / OFF / TEST MODE (it indicates the mode of operation: AUTO, MAN, TEST or OFF)</p> <p>BT XX.XV (it indicates the voltage of the battery)</p>

(*) Note: if you program the Scheduler (see 10.2), the display will overwrite, for a short time, the day (e.g. Mo..Tu..) & time (e.g. START 08:30 /STOP 08:35) of the test every 10 seconds (supposing the Be124 is in Auto mode of operation and engine is not running). This helps to visually remind of the approaching test date.

Use [↑] or [↓] to browse the content of the pages.

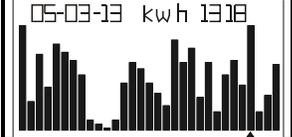
5.01 <table border="1"> <tr><td>SPEED RPM</td><td>[XXXX]</td></tr> <tr><td>OIL BAR</td><td>[XX.X]</td></tr> <tr><td>COOLANT °C</td><td>[XXX]</td></tr> <tr><td>OIL °C</td><td>[XXX]</td></tr> </table>	SPEED RPM	[XXXX]	OIL BAR	[XX.X]	COOLANT °C	[XXX]	OIL °C	[XXX]	It indicates the most important parameters of the engine: Speed / Oil Pressure and Coolant / Oil Temperatures.	5.08 <table border="1"> <tr><td>TURBO BAR</td><td></td></tr> <tr><td>SPN102</td><td>[XXX]</td></tr> <tr><td>EXHAUST °C</td><td></td></tr> <tr><td>SPN173</td><td>[XXX]</td></tr> </table>	TURBO BAR		SPN102	[XXX]	EXHAUST °C		SPN173	[XXX]	It indicates measurements about data sent by the ECU. You can find additional information in your engine user manual.
SPEED RPM	[XXXX]																		
OIL BAR	[XX.X]																		
COOLANT °C	[XXX]																		
OIL °C	[XXX]																		
TURBO BAR																			
SPN102	[XXX]																		
EXHAUST °C																			
SPN173	[XXX]																		
5.02 <table border="1"> <tr><td>FUEL LEVEL</td><td>[XX %]</td></tr> <tr><td>PUMP STATUS</td><td>OFF</td></tr> <tr><td>BATTERY (V)</td><td>[XX.X]</td></tr> <tr><td>ALTERNATOR</td><td>[XX.X]</td></tr> </table>	FUEL LEVEL	[XX %]	PUMP STATUS	OFF	BATTERY (V)	[XX.X]	ALTERNATOR	[XX.X]	It indicates main information about Fuel and voltages of battery and charger alternator.	5.09 <table border="1"> <tr><td>COOLANT %</td><td></td></tr> <tr><td>SPN111</td><td>[XX]</td></tr> <tr><td>COOLANT BAR</td><td></td></tr> <tr><td>SPN109</td><td>[XXX]</td></tr> </table>	COOLANT %		SPN111	[XX]	COOLANT BAR		SPN109	[XXX]	See above...
FUEL LEVEL	[XX %]																		
PUMP STATUS	OFF																		
BATTERY (V)	[XX.X]																		
ALTERNATOR	[XX.X]																		
COOLANT %																			
SPN111	[XX]																		
COOLANT BAR																			
SPN109	[XXX]																		
5.03 <table border="1"> <tr><td>AUX °C</td><td>[XXX]</td></tr> <tr><td>HOURS RUN</td><td>[XXXX]</td></tr> <tr><td>N° OF STARTS</td><td>[XXXX]</td></tr> <tr><td>RENTAL H</td><td>[XXXX]</td></tr> </table>	AUX °C	[XXX]	HOURS RUN	[XXXX]	N° OF STARTS	[XXXX]	RENTAL H	[XXXX]	It indicates miscellaneous information and the remaining hours before the Rental contract expires (see section 10.3).	5.10 <table border="1"> <tr><td>DEMANDE TORQUE</td><td></td></tr> <tr><td>SPN512</td><td>[XX]</td></tr> <tr><td>ACTUAL TORQUE</td><td></td></tr> <tr><td>SPN513</td><td>[XX]</td></tr> </table>	DEMANDE TORQUE		SPN512	[XX]	ACTUAL TORQUE		SPN513	[XX]	See above...
AUX °C	[XXX]																		
HOURS RUN	[XXXX]																		
N° OF STARTS	[XXXX]																		
RENTAL H	[XXXX]																		
DEMANDE TORQUE																			
SPN512	[XX]																		
ACTUAL TORQUE																			
SPN513	[XX]																		
5.04 <table border="1"> <tr><td>SERVICE 1</td><td>[XXX]</td></tr> <tr><td>SERVICE 2</td><td>[XXX]</td></tr> <tr><td>SERVICE 3</td><td>[XXX]</td></tr> </table>	SERVICE 1	[XXX]	SERVICE 2	[XXX]	SERVICE 3	[XXX]	It indicates the remaining hours before expiring the Maintenance timers (see section 10.1).	5.11 <table border="1"> <tr><td>CRANKCASE BAR</td><td></td></tr> <tr><td>SPN101</td><td>[XXX]</td></tr> <tr><td>BOOST °C</td><td></td></tr> <tr><td>SPN105</td><td>[XXX]</td></tr> </table>	CRANKCASE BAR		SPN101	[XXX]	BOOST °C		SPN105	[XXX]	See above...		
SERVICE 1	[XXX]																		
SERVICE 2	[XXX]																		
SERVICE 3	[XXX]																		
CRANKCASE BAR																			
SPN101	[XXX]																		
BOOST °C																			
SPN105	[XXX]																		
5.05 <table border="1"> <tr><td>OIL LEVEL</td><td></td></tr> <tr><td>SPN98</td><td>[XX]</td></tr> <tr><td>WATER IN FUEL</td><td></td></tr> <tr><td>SPN97</td><td>[XX]</td></tr> </table>	OIL LEVEL		SPN98	[XX]	WATER IN FUEL		SPN97	[XX]	It indicates measurements about data sent by the ECU. You can find additional information in your engine user manual.	5.12 <table border="1"> <tr><td>INTAKE BAR</td><td></td></tr> <tr><td>SPN106</td><td>[XXX]</td></tr> <tr><td>AIR FILTER BAR</td><td></td></tr> <tr><td>SPN107</td><td>[XXX]</td></tr> </table>	INTAKE BAR		SPN106	[XXX]	AIR FILTER BAR		SPN107	[XXX]	See above...
OIL LEVEL																			
SPN98	[XX]																		
WATER IN FUEL																			
SPN97	[XX]																		
INTAKE BAR																			
SPN106	[XXX]																		
AIR FILTER BAR																			
SPN107	[XXX]																		
5.06 <table border="1"> <tr><td>FUEL °C</td><td></td></tr> <tr><td>SPN174</td><td>[XXX]</td></tr> <tr><td>FUEL BAR</td><td></td></tr> <tr><td>SPN94</td><td>[XXX]</td></tr> </table>	FUEL °C		SPN174	[XXX]	FUEL BAR		SPN94	[XXX]	See above...	5.13 <table border="1"> <tr><td>LOAD</td><td></td></tr> <tr><td>SPN92</td><td>[XX]</td></tr> <tr><td>ECU ENGINE HOURS</td><td>[XXXXXXXX]</td></tr> </table>	LOAD		SPN92	[XX]	ECU ENGINE HOURS	[XXXXXXXX]	See above...		
FUEL °C																			
SPN174	[XXX]																		
FUEL BAR																			
SPN94	[XXX]																		
LOAD																			
SPN92	[XX]																		
ECU ENGINE HOURS	[XXXXXXXX]																		
5.07 <table border="1"> <tr><td>FUEL RATE</td><td></td></tr> <tr><td>SPN183</td><td>[XX.X]</td></tr> <tr><td>PEDAL %</td><td></td></tr> <tr><td>SPN91</td><td>[XX.X]</td></tr> </table>	FUEL RATE		SPN183	[XX.X]	PEDAL %		SPN91	[XX.X]	See above...										
FUEL RATE																			
SPN183	[XX.X]																		
PEDAL %																			
SPN91	[XX.X]																		

NOTE: [XXXX] indicates numerical digits or [- - -] if measurement is not available or consistent

NOTE: depending on the kind of engine you are using, some parameters may be missing from the list (contact your genset manufacturer)

Section 6.0 - GENSET METERING

Push [ACK] to open the 'Be124 Status' page. Push [→] to enter the generator instrumentation displays. Use [↑] or [↓] to browse the content of the pages. Push [ACK] at anytime to open the 'Be124 Status' page.

<p>6.01</p> <table border="1"> <tr><td>L1-L2 (V)</td><td>[XXX]</td></tr> <tr><td>L2-L3 (V)</td><td>[XXX]</td></tr> <tr><td>L3-L1 (V)</td><td>[XXX]</td></tr> <tr><td>FREQUENCY</td><td>[XX.X]</td></tr> </table>	L1-L2 (V)	[XXX]	L2-L3 (V)	[XXX]	L3-L1 (V)	[XXX]	FREQUENCY	[XX.X]	<p>It indicates the voltages of the generator Phase to Phase and Frequency.</p>	<p>6.06</p> <table border="1"> <tr><td>KVAR 1</td><td>[XXXX]</td></tr> <tr><td>KVAR 2</td><td>[XXXX]</td></tr> <tr><td>KVAR 3</td><td>[XXXX]</td></tr> <tr><td>KVAR TOTAL</td><td>[XXXX]</td></tr> </table>	KVAR 1	[XXXX]	KVAR 2	[XXXX]	KVAR 3	[XXXX]	KVAR TOTAL	[XXXX]	<p>It indicates the Reactive Power for each Phase. A total Reactive Power measurement is also indicated.</p>
L1-L2 (V)	[XXX]																		
L2-L3 (V)	[XXX]																		
L3-L1 (V)	[XXX]																		
FREQUENCY	[XX.X]																		
KVAR 1	[XXXX]																		
KVAR 2	[XXXX]																		
KVAR 3	[XXXX]																		
KVAR TOTAL	[XXXX]																		
<p>6.02</p> <table border="1"> <tr><td>L1-N (V)</td><td>[XXX]</td></tr> <tr><td>L2-N (V)</td><td>[XXX]</td></tr> <tr><td>L3-N (V)</td><td>[XXX]</td></tr> <tr><td>SEQUENCE</td><td>[XXX]</td></tr> </table>	L1-N (V)	[XXX]	L2-N (V)	[XXX]	L3-N (V)	[XXX]	SEQUENCE	[XXX]	<p>Voltages of the generator Phase to Neutral. It indicates the sequence (rotation) of the phases (Clock Wise / CCW or [- - -]).</p>	<p>6.07</p> <table border="1"> <tr><td>PF 1</td><td>[X.XX]</td></tr> <tr><td>PF 2</td><td>[X.XX]</td></tr> <tr><td>PF 3</td><td>[X.XX]</td></tr> <tr><td>PF TOTAL</td><td>[X.XX]</td></tr> </table>	PF 1	[X.XX]	PF 2	[X.XX]	PF 3	[X.XX]	PF TOTAL	[X.XX]	<p>It indicates the Power Factor for each Phase. A total Power Factor measurement is also indicated.</p>
L1-N (V)	[XXX]																		
L2-N (V)	[XXX]																		
L3-N (V)	[XXX]																		
SEQUENCE	[XXX]																		
PF 1	[X.XX]																		
PF 2	[X.XX]																		
PF 3	[X.XX]																		
PF TOTAL	[X.XX]																		
<p>6.03</p> <table border="1"> <tr><td>CURRENT 1</td><td>[XXX]</td></tr> <tr><td>CURRENT 2</td><td>[XXX]</td></tr> <tr><td>CURRENT 3</td><td>[XXX]</td></tr> <tr><td>EARTH FAULT</td><td>[XXX]</td></tr> </table>	CURRENT 1	[XXX]	CURRENT 2	[XXX]	CURRENT 3	[XXX]	EARTH FAULT	[XXX]	<p>It indicates the currents of the generator including the measurement of the current in case of a Earth Ground Fault'.</p>	<p>6.08</p> <table border="1"> <tr><td>TOTAL ENERGY</td><td>[XXXXXXXX] KWH</td></tr> <tr><td>31 DAYS ENERGY</td><td>[XXXXXXXX] KWH</td></tr> </table>	TOTAL ENERGY	[XXXXXXXX] KWH	31 DAYS ENERGY	[XXXXXXXX] KWH	<p>It indicates the total KWh amount and the amount of energy produced in the last 31 days. Push the [↓] button to open the Data Logger display.</p>				
CURRENT 1	[XXX]																		
CURRENT 2	[XXX]																		
CURRENT 3	[XXX]																		
EARTH FAULT	[XXX]																		
TOTAL ENERGY	[XXXXXXXX] KWH																		
31 DAYS ENERGY	[XXXXXXXX] KWH																		
<p>6.04</p> <table border="1"> <tr><td>KVA 1</td><td>[XXXX]</td></tr> <tr><td>KVA 2</td><td>[XXXX]</td></tr> <tr><td>KVA 3</td><td>[XXXX]</td></tr> <tr><td>KVA TOTAL</td><td>[XXXX]</td></tr> </table>	KVA 1	[XXXX]	KVA 2	[XXXX]	KVA 3	[XXXX]	KVA TOTAL	[XXXX]	<p>It indicates the Apparent Power for each phase. A total Apparent Power measurement is also provided.</p>		<p>Push the [←] or [→] to move the cursor on a particular day. The display will indicate the date and the Total Kwh of that day. Push [↑] to return back or push [ACK] to exit.</p>								
KVA 1	[XXXX]																		
KVA 2	[XXXX]																		
KVA 3	[XXXX]																		
KVA TOTAL	[XXXX]																		
<p>6.05</p> <table border="1"> <tr><td>KW 1</td><td>[XXXX]</td></tr> <tr><td>KW 2</td><td>[XXXX]</td></tr> <tr><td>KW 3</td><td>[XXXX]</td></tr> <tr><td>KW TOTAL</td><td>[XXXX]</td></tr> </table>	KW 1	[XXXX]	KW 2	[XXXX]	KW 3	[XXXX]	KW TOTAL	[XXXX]	<p>It indicates the Active Power for each Phase. A total Active Power measurement is also provided.</p>	<p>6.09 Note: the first vertical line on the right, indicates the total Kwh from hour 00:00 until the hour you opened the screen. Be124 updates the log every hour.</p>	<p>To clear the log, push & hold the [ACK] button for at least 5 seconds.</p>								
KW 1	[XXXX]																		
KW 2	[XXXX]																		
KW 3	[XXXX]																		
KW TOTAL	[XXXX]																		

NOTE: [XXXX] indicates numerical digits or [- - -] if measurement is not available or consistent

Section 7.0 - ALARM MONITORING & EVENT HISTORY

This menu can contain up to 9 pages of active alarms with date & time information. Also 500 pages of recorded events can be stored. A typical alarm page is indicated below (see section 13.0 for the list of all alarms):

<p>Typical alarm page: instructions (to enter this page repeatedly push the [→] arrow)</p>																	
<table border="1"> <tr> <td>ALARMS PAGE 1/1</td> <td></td> </tr> <tr> <td>LOW OIL PRESSURE</td> <td></td> </tr> <tr> <td>WARNING 0,8 BAR</td> <td></td> </tr> <tr> <td>DD/MM/YY HH:MM:SS</td> <td></td> </tr> </table> <table border="1"> <tr> <td>EVENT PAGE 1</td> <td></td> </tr> <tr> <td>LOW OIL PRESSURE</td> <td></td> </tr> <tr> <td>WARNING 0,8 BAR</td> <td></td> </tr> <tr> <td>DD/MM/YY HH:MM:SS</td> <td></td> </tr> </table>	ALARMS PAGE 1/1		LOW OIL PRESSURE		WARNING 0,8 BAR		DD/MM/YY HH:MM:SS		EVENT PAGE 1		LOW OIL PRESSURE		WARNING 0,8 BAR		DD/MM/YY HH:MM:SS		<p>Use [↑] or [↓] to browse the content of the pages. This page opens automatically in case of alarm(s). The alarms are also recorded in the Event History register. To open the pages of the Event History simply push the [↓] push button. To exit the alarm page, push [ACK] at anytime thus opening the 'Be124 Status' page.</p> <p>The Be124 records up to 500 events providing date & time information for warnings, shutdowns and other important events. Use [↑] or [↓] to browse the content of the pages. Push [ACK] at anytime to exit and open the 'Be124 Status' page (see 5.0).</p>
ALARMS PAGE 1/1																	
LOW OIL PRESSURE																	
WARNING 0,8 BAR																	
DD/MM/YY HH:MM:SS																	
EVENT PAGE 1																	
LOW OIL PRESSURE																	
WARNING 0,8 BAR																	
DD/MM/YY HH:MM:SS																	

Section 8.0 - SET DATE & TIME

Push [ACK] to display the 'Be124 Status' page. Push [←] to open the **Main Menu**. Repeatedly push [↓] until you select [SET DATE & TIME]. Push [→] to open the list of the functions.

Display	Instructions								
<table border="1"> <tr> <td>TIME</td> <td>00:00:00</td> </tr> <tr> <td>DATE</td> <td>01/01/00</td> </tr> <tr> <td>FORMAT</td> <td>DD/MM/YY</td> </tr> <tr> <td colspan="2">SAVE [→]</td> </tr> </table>	TIME	00:00:00	DATE	01/01/00	FORMAT	DD/MM/YY	SAVE [→]		<p>Use [↑] or [↓] to select a function. Push [→] to enter the numerical field. Push [↑] or [↓] to set a value. Push [←] to return. If you want to change the format, choose [FORMAT] and push [→]. Select the correct+- option by using [↑] or [↓]. Push [←] to return to the function. If the format option [DD/MM/YY] is acceptable, push [↓] to proceed. Push [→] to save the correct date & time (Please use an external clock & date reference).</p>
TIME	00:00:00								
DATE	01/01/00								
FORMAT	DD/MM/YY								
SAVE [→]									

Section 9.0 - DISPLAY & LANGUAGE

Push [ACK] to display the 'Be124 Status' page. Push [←] to open the **Main Menu**. Repeatedly push [↓] until you select [DISPLAY & LANGUAGE]. Push [→] to open the list of the functions.

Display	Instructions								
<table border="1"> <tr> <td>LANGUAGE</td> <td>ENGLISH</td> </tr> <tr> <td>CONTRAST</td> <td>7</td> </tr> <tr> <td>TIMEOUT</td> <td>30 min</td> </tr> <tr> <td>BACKLIGHT</td> <td>100%</td> </tr> </table>	LANGUAGE	ENGLISH	CONTRAST	7	TIMEOUT	30 min	BACKLIGHT	100%	<p>A) - Use use [↑] or [↓] to select a function B) - Push [→] to enter the function C) - Push [↑] or [↓] to choose the proper option or setting D) - Push [←] to exit (return to the list)</p>
LANGUAGE	ENGLISH								
CONTRAST	7								
TIMEOUT	30 min								
BACKLIGHT	100%								

Note: [TIMEOUT] is the timer that turns off the backlight of the display once you are no longer using the pushbuttons (range 1-59 mins). The setting [OFF] will always maintain the backlight active (no time-out). The [BACKLIGHT] has three settings: 0% (no back light), 50% (average light) and 100% (maximum back light).

Section 10.0 - USER PARAMETERS MENU & PASSWORD

Display	Section	Instructions				
<table border="1"> <tr> <td>SERVICE TIMERS</td> </tr> <tr> <td>TEST SCHEDULER</td> </tr> <tr> <td>MISCELLANEOUS</td> </tr> <tr> <td>AUTOSTART</td> </tr> </table>	SERVICE TIMERS	TEST SCHEDULER	MISCELLANEOUS	AUTOSTART	<p>10.1 10.2 10.3 10.4</p>	<p>Use [↑] or [↓] to select this menu from the Main Menu (section 4.0) and push [→] to enter the Sub menu. The display will present the options [READ PARAMETERS] and [MODIFY PARAMETER]. In case Be124 requires a password see section 10.5. Use [↑] or [↓] to select a function (Service timer, Test....). Push [→] to enter the function. See sections 10.1/2/3.</p>
SERVICE TIMERS						
TEST SCHEDULER						
MISCELLANEOUS						
AUTOSTART						

10.1 - SERVICE TIMERS (to access this menu see section 10.0)

Display	Instructions for programming						
<table border="1"> <tr> <td>MAINTENANCE 1</td> <td>OFF</td> </tr> <tr> <td>MAINTENANCE 2</td> <td>OFF</td> </tr> </table> <table border="1"> <tr> <td>MAINTENANCE 3</td> <td>OFF</td> </tr> </table> <p>(range 0-999 hours)</p>	MAINTENANCE 1	OFF	MAINTENANCE 2	OFF	MAINTENANCE 3	OFF	<p>These timers are used to schedule the maintenance of the engine (filters, oil change and so on) and should be programmed by the genset manufacturer. In case Be124 requires a password, see section 10.5. The 'OFF' setting disables the timer. Push [↓] to browse the settings of the all MAINTENANCE timers.</p> <p>Programming: Use [↑] or [↓] to select a function (example MAINTENANCE 2). Push [→] to select the numerical field. Push [↑] or [↓] to set a value (example 300h). Push [←] to return to the list. The Maintenance timers 1 and 2, once expired, will generate a warning alarm. Maintenance 3 will automatically shutdown the engine. An alarm will be generated to remind you to carry out the maintenance routine. The timers work only when the engine is running. Push [←] to exit and follow the instructions on the screen (save and so on).</p> <p>Once a timer is running, the remaining hours are indicated in the 'Be124 Status' page (see 5.04 SERVICE 1-2-3). When a timer expires, you are required to carry out the maintenance procedure. To clear the alarm and to restart the counter turn the key to off. Push and hold the button [ACK] for about 5 seconds: the Be124 will restart the timers.</p>
MAINTENANCE 1	OFF						
MAINTENANCE 2	OFF						
MAINTENANCE 3	OFF						

10.2 - TEST SCHEDULER (to access this menu see section 10.0)

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: center;">START</th> <th style="text-align: center;">STOP</th> </tr> <tr> <td>MO</td> <td>--:-- --:--</td> </tr> <tr> <td>TU</td> <td>--:-- --:--</td> </tr> <tr> <td>WE</td> <td>--:-- --:--</td> </tr> <tr> <td>TH</td> <td>--:-- --:--</td> </tr> <tr> <td>FR</td> <td>--:-- --:--</td> </tr> <tr> <td>SA</td> <td>--:-- --:--</td> </tr> <tr> <td>SU</td> <td>--:-- --:--</td> </tr> </table> <p>Note - -: = Mours:Minutes</p>	START	STOP	MO	--:-- --:--	TU	--:-- --:--	WE	--:-- --:--	TH	--:-- --:--	FR	--:-- --:--	SA	--:-- --:--	SU	--:-- --:--	<p>You can set up the time to start / stop automatically the engine on specific days of the week. First, you are required to set up date and time of the real time clock (see 8.0).</p> <p>Instructions: >Use [↑] or [↓] to select a day of the week. Push [→] to enter the START field. >Use [→], [↑] or [↓] to set HH:MM. After pushing [→] do the same for the required STOP. >Repeatedly push [←] to return to the day selection. Do the same in case you want to set up an other day of the week. Push [←] to exit and follow the instructions on screen.</p> <p>The Scheduler triggers a test only in AUTO mode of operation. The 'Status Page' displays the programmed time every 10 seconds (see 5.0). The yellow LED AUTO will blink during the test. By programming the [CB TEST CONTROL] into 'ON' mode (see 10.3), the engine will run on load.</p>
START	STOP																
MO	--:-- --:--																
TU	--:-- --:--																
WE	--:-- --:--																
TH	--:-- --:--																
FR	--:-- --:--																
SA	--:-- --:--																
SU	--:-- --:--																

10.3 - MISCELLANEOUS (to access this menu see section 10.0)

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>RENTAL CONTRACT</td> <td>OFF</td> </tr> <tr> <td>GCB TEST CONTROL</td> <td>OFF</td> </tr> <tr> <td>RUN TIMEOUT</td> <td>OFF</td> </tr> <tr> <td>RS485 NODE</td> <td>1</td> </tr> </table>	RENTAL CONTRACT	OFF	GCB TEST CONTROL	OFF	RUN TIMEOUT	OFF	RS485 NODE	1	<p style="text-align: center;">In case Be124 requires a password see section 10.5.</p> <p>Use [↑] or [↓] to select a function. Push [→] to enter the numerical field. Push [↑] or [↓] to set a value. Push [←] to return to the function.</p>
RENTAL CONTRACT	OFF								
GCB TEST CONTROL	OFF								
RUN TIMEOUT	OFF								
RS485 NODE	1								
<p>[RENTAL CONTRACT] Up to 9999 hours. When the remaining hours drop to less than 48, the [RENTAL WARNING] alarm activates. At zero hours, the engine will shutdown. The option [OFF] disables the [RENTAL CONTRACT] function (section 5.03 to read the hours remaining).</p> <p>[GCB TEST CONTROL] The option [ON] will transfer the load to the generator when TEST mode is active. The option [OFF] will allow you to run the engine off load (engine will run with out of 'load').</p> <p>>[RUN TIMEOUT]< Maximum time allowed to run the engine in Auto Mode of operation (1 min. up to 23 hours). The option [OFF] disables the time-out and the engine will run until a stop is required. This function is a sort of protection in case you are no longer able to stop the engine in Auto mode of operation.</p> <p>[RS485 NODE] It allows you to select the node address on the Modbus network. Factory setting is [1] (range 1-127) .</p>									

10.4 - AUTOSTART (BATTERY CHARGE MODE)

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>LOW BATT START V</td> <td>3.00</td> </tr> <tr> <td>HIGH BATT STOP V</td> <td>OFF</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>TIMEOUT</td> <td>5mins</td> </tr> <tr> <td colspan="2" style="font-size: small;">(range 1-99 mins)</td> </tr> </table>	LOW BATT START V	3.00	HIGH BATT STOP V	OFF	TIMEOUT	5mins	(range 1-99 mins)		<p>The AUTOSTART function will allow you to automatically charge the battery. You have program a LOW battery start (Be124 will automatically provides a 2 minutes by-pass delay) and you have to program an HIGH battery stop or TIMEOUT (or both). The engine will stop automatically according to your settings.</p> <p>Use [↑] or [↓] to select a parameter. Push [→] to enter the numerical field. Use [↑] and [↓] to set a value. Repeatedly push [←] to return to the menu.</p> <p>AUTOSTART triggers a start only in AUTO mode of operation. The yellow LED 'AUTO' blinks during the Test. The display indicates the message [ON-SITE DEMAND]</p>
LOW BATT START V	3.00								
HIGH BATT STOP V	OFF								
TIMEOUT	5mins								
(range 1-99 mins)									

10.5 - INSERTING A PASSWORD

<p>Display:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>PASSWORD</td> </tr> <tr> <td>CLEAR PASSWORD</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>INSERT PASSWORD</td> </tr> <tr> <td>BACK -*** OK</td> <td>[←] [→]</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>CLEAR PASSWORD</td> <td>5 sec</td> </tr> <tr> <td>HOLD ACK</td> <td></td> </tr> <tr> <td>[←] EXIT</td> <td>ACK</td> </tr> </table>	PASSWORD	CLEAR PASSWORD	INSERT PASSWORD	BACK -*** OK	[←] [→]	CLEAR PASSWORD	5 sec	HOLD ACK		[←] EXIT	ACK	<p>The display will present the options [PASSWORD] (to insert a new password) and [CLEAR PASSWORD]. Use [↑] or [↓] to select a function and push [→] to enter the function.</p> <p style="text-align: center;">Inserting a password</p> <p>a) Use [↑] and [↓] to choose a number in between 0 to 9 for the first digit on the left. b) Push [→] to move right to the second digit from the left. c) Repeat step a) and step b) until you program the all 4 digits. Push [→] to confirm the password.</p> <p style="text-align: center;">Removing a password</p> <p>a) To clear a password you are required to type the password first. b) The display indicates the available options: EXIT ([←]) or CLEAR ([ACK]) c) Push and hold [ACK] for at least 5 secs to clear the password d) The display will indicate the message [CLEAR PASSWORD DONE].</p> <p><i>In case you loose the password, Bernini Design is able to provide an alternative password. Contact us by mail: bernini@bernini-design.com</i></p>
PASSWORD												
CLEAR PASSWORD												
INSERT PASSWORD												
BACK -*** OK	[←] [→]											
CLEAR PASSWORD	5 sec											
HOLD ACK												
[←] EXIT	ACK											

Section 11.0 / 12.0 - DATA LOGGER, TRANSIENT RECORDER, OSCILLOSCOPE

You can find more information and watch tutorial videos about these functions on the web site: bernini-design.com/Be124-tutorials. These functions are not mandatory for the use of the generator. A minimum technical background is required. Contact bernini@bernini-design.com

Section 13.0 - ALARMS, WARNINGS AND SHUTDOWNS

The Be124 features:

- A) - A yellow LED (LED=luminous indicator) that turns on in case of a warning.
- B) - A red LED that turns on in case of an emergency shutdown.
- C) - Symbols and red LEDs, indicating the alarms of Low Fuel, Low Oil Pressure & High Temperature.
- D) - Descriptive messages for alarms with date, time and measurement information.
- E) - Event history capable of recording 500 alarms and events (see section 7.0).
- F) - A pushbutton to silence the horn (supposing it is provided by your genset maker)

CONSULT THE USER MANUAL OF THE ENGINE/GENERATOR AND CONSULT THE MANUFACTURER OF PANEL OR GENSET. QUALIFIED PERSONNEL IS REQUIRED TO CARRY OUT TROUBLESHOOTING TASKS

Instructions in case of alarm(s):

- 1) Look at the front panel (section 1.0) and take note of LEDs indicators and messages on display.
- 2) Some alarms, in order to cool down the engine, shutdown the engine after a programmable delay. We recommend that you wait until the engine comes to a complete stop.
- 3) Push the **[ACK]** pushbutton in order to acknowledge the alarm and silence the horn (if provided).
- 4) Turn the key to OFF; consult the following sections for further information.
- 5) Remove the cause of the alarm; restart the engine.

The full list of alarm messages is indicated below together with a brief description

13.1 - Clock and periodic test alarms		
CLOCK ERROR WARNING	Real time clock failure or incorrect programming: you are required to set up the clock (see section 8.0).	
PARAMETER ERROR	Error in a parameter	High Severity Alarm: Consult Bernini Design.
MEMORY ERROR WARNING	Failure of the memory	
CAN BUS ERROR WARNING	Failure of the Canbus (J1939) communication	

13.2 - Emergency alarms & warnings		
ALARM 1 WARNING	Input 1 Alarm: Warning or Shutdown	Average Severity Alarm: Consult your Genset Manufacturer or your Panel Maker supplier.
ALARM 1 SHUTDOWN		
ALARM 2 WARNING	Input 2 Alarm: Warning or Shutdown	
ALARM 2 SHUTDOWN		
ALARM 3 WARNING	Input 3 Alarm: Warning or Shutdown	
ALARM 3 SHUTDOWN		
REMOTE LOCK SHUTDOWN	The input REMOTE LOCK is active. When you deactivate the input, the alarm resets automatically and Be124 will operate normally; the engine may restart automatically.	

13.3 - Miscellaneous engine alarms		
PICK UP ERROR FAILURE	Failure in detecting the signal from Pick-up	High Severity Alarm: Consult the Genset Manufacturer.
OVER SPEED SHUTDOWN	Over Speed shutdown	
UNDER SPEED SHUTDOWN	Under Speed shutdown	
BATTERY VOLTAGE WARNING	Battery Voltage warning. The display indicates the voltage.	Consult a technician, battery maintenance is required.
FAIL TO START SHUTDOWN	Fail to start shutdown. Check Fuel and Battery.	Try to restart the engine.
FAIL TO STOP SHUTDOWN	Fail to stop shutdown	High Severity Alarm: Consult the Genset Manufacturer.
BELT BREAK SHUTDOWN	Engine Belt break shutdown	

13.4 - Alternator alarms		
SHORT CIRCUIT SHUTDOWN	Short circuit shutdown	<p>High Severity Alarm: Consult an Electrician. The Be124 provides a shutdown to protect the load and the generator.</p> <p>Only qualified personnel can take care to solve this problem.</p>
UNDER VOLTAGE SHUTDOWN	Under Voltage shutdown	
OVER VOLTAGE SHUTDOWN	Over Voltage shutdown	
PHASE UNBALANCE SHUTDOWN	Phase unbalance shutdown	
UNDER FREQUENCY SHUTDOWN	Under Frequency shutdown	
OVER FREQUENCY SHUTDOWN	Over Frequency shutdown	
OVER KVA SHUTDOWN	Over Apparent power shutdown	
PHASE SEQUENCE SHUTDOWN	Generator Phase sequence shutdown	
OVER CURRENT WARNING	Over Current warning	
OVER CURRENT SHUTDOWN	Over Current shutdown	
ALTERNATOR FAILURE	Alternator Failure shutdown	
EARTH CURRENT SHUTDOWN	Earth Failure shutdown	
REVERSE POWER SHUTDOWN	Reverse Power Shutdown	

13.5 - Temperature alarms		
LOW COOLANT °C WARNING	Abnormal Temperature of the engine.	<p>Average Severity Alarm: Consult the Engine Manufacturer user manual. Wait for the engine to cool. After that you can try to restart the engine.</p>
HIGH COOLANT °C WARNING		
HIGH COOLANT °C SHUTDOWN		
TEMPERAURE SW SHUTDOWN		
OIL TEMPERATURE WARNING	Abnormal Temperature of the engine Oil.	
OIL TEMPERATURE SHUTDOWN		
AUX °C SENSOR WARNING	Abnormal Auxiliary Temperature.	
AUX °C SENSOR SHUTDOWN		
AUX °C SENDER OPEN	Indicate the failure of a temperature sensor.	
GND SENSE OPEN	Indicate the failure of a connection to the sensor.	

13.6 - Fuel Level alarms		
LOW FUEL LEVEL WARNING	Low / High Level Fuel warning .	<p>Average Severity Alarm: Consult the Engine/Genset User Manual on how to fill the tank.</p>
HIGH FUEL LEVEL WARNING		
TANK EMPTY LEVEL SHUTDOWN	No fuel in the tank.	
FUEL RESERVE WARNING	Fuel Reserve	
TANK FILL TIME WARNING	This warning energizes if the PUMP to fill the tank remains activated for more than the programmed time.	
FUEL SENDER OPEN	Failure of the Fuel Sensor.	

13.7 - Oil Pressure alarms		
LOW OIL PRESSURE WARNING	Low Oil Pressure Warning	<p>Average Severity Alarm: Consult the Engine User Manual on how to fill the Oil. Do not insist in starting the engine.</p>
LOW OIL PRESSURE SHUTDOWN	Low Oil Pressure Shutdown	
OIL BAR SENDER OPEN	Failure of the Oil pressure sensor	

13.8 - Maintenance and Rental contract alarms		
SERVICE 1 WARNING	Maintenance 1 & 2 provide a warning after timeout. Service 3 provides a shutdown after timeout. To cancel the alarm, turn the key to OFF and push [ACK] for at least 5 seconds.	<p>Average Severity Alarm: Consult the Engine User Manual to carry out the engine maintenance.</p>
SERVICE 2 WARNING		
SERVICE 3 SHUTDOWN		
RENTAL 48h WARNING	Less than 48 hours remaining before engine shutdown.	
RENTAL EXPIRED SHUTDOWN	Rental period termination. To cancel the alarm, reprogram the RENTAL or simply enter & exit the [TEST & RENTAL] program menu to restart the count	
MAXIMUM RUNTIME SHUTDOWN	Time expired. This timer allows the engine to run a limited number of hours in case of test launched by a remote compuer or SMS (mobile phone). In case of alarm, verify the general status of the engine, cancel the alarm and restart the engine.	