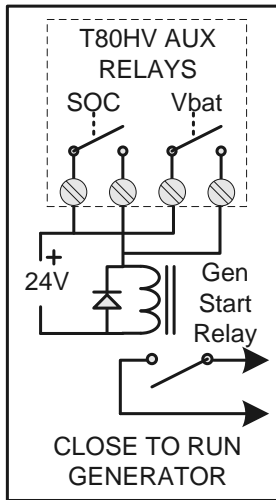


APPLICATION NOTE

T80HV AUTOMATIC GENERATOR STARTING REV 4

USING THE T80HV TO START THE BACKUP GENERATOR:

The AUX Relays inside the T80HV Charge Controller are designed to provide the start signal for an external backup generator. The backup may be required to charge the battery if there is not enough solar energy at any time.



The Apollo Solar PVT Gen4 Mini Cabinet uses a single T80HV Charge Controller. Each T80HV is equipped with 2 Auxiliary Relays which can be used to switch on external items triggered by the parameters which are monitored internally by the T80HV. These parameters include the Battery State of Charge and the Battery Voltage.

To turn on an external generator to charge the battery, the suggested circuit at the left is built into the PVT Gen4 Mini Cabinet. The Gen Start Relay is energized by either one of two events: 1) The battery State of Charge has gone lower than the Minimum State of Charge Setting, or 2) The Battery Voltage has gone below the Minimum Voltage Setting. Using both of these quantities in a logical OR scheme provides redundancy to assure that the generator gets a start signal so the battery will be charged.

The only wiring required to the Gen4 Mini Cabinet is to connect the Gen Start terminals to the Remote Start input terminals on the generator. It is assumed that the generator includes a smart panel which will monitor things like the glow plug, the oil pressure, and the coolant temperature. These panels are specific to the generators so those functions are not included in either the T80HV, or the Gen4 Mini Cabinet.

TYPICAL STATE-OF-CHARGE AND BATTERY VOLTAGE TRIGGER POINTS:

It is assumed that the system is a telecom application which runs on a 48 volt battery. The typical trigger levels suggested for generator control are in the table below.

	GEN START LEVELS	GEN STOP LEVELS
STATE OF CHARGE	30%	100%
BATTERY VOLTAGE	45.0 VOLTS	57 VOLTS

The customer can determine their own trigger levels and modify these numbers.

The next section describes how to set these trigger points using the Aux Relays.

SETTING UP THE T80HV AUX RELAYS:

This section describes the setting of the Battery Voltage trigger point.

From the Main Screen of the T80:

I	N		=	X	X	X	.	X	V		X	X	.	X	A	m	p	s
O	U	T	=	0	X	X	.	X	V		X	X	.	X	A	m	p	s
B	A	T	S	O	C	=	X	X	X	%		X	X	X	X	X	X	X
S	E	T	U	P	S	O	C			D	A	T	A					@

1. Press Button #1 (SETUP). The following screen will be displayed:

S	E	T	U	P	S	E	L	E	C	T								
B	A	T	T	E	Q	U	A	L	M	I	S	C	M	P	P	T		
A	U	X	1	A	U	X	2	E	M	O	N	I	T	O	R			
M	A	I	N						Y	E	S			N	E	X	T	

2. Press Button #4 (NEXT) until AUX1 is flashing.
3. Press Button#3 (YES). The following screen will be displayed:

R	E	L	A	Y	1	M	O	D	E	=								O	F	F			
B	A	C	K			O	N				+									D	O	N	E

4. Press Button # 3 (+) 2 times. The following screen will be displayed:

R	E	L	A	Y	1	M	O	D	E	=		B	A	T	T								V		
O	N	<	X	X	X	.	X	V		O	F	F	>	X	X	X	.	X	V						
M	I	N	.		O	N	=	H	H	:	M	M			R	L	Y	:	X						
B	A	C	K			-						+										N	E	X	T

5. Press Button #4 (NEXT) to select the ON Voltage setting.
6. Use Button #2 (-) and Button #3 (+) to adjust the voltage at which you want the Relay to **close**.
7. Press Button #4 (NEXT) to select the OFF Voltage setting.
8. Use Button #2 (-) and Button #3 (+) to adjust the voltage at which you want the Relay to **open**.
9. Press Button #4 (NEXT) to select the Minimum On Time.
10. Use Button #2 (-) and Button #3 (+) to adjust the time that you want the relay to stay closed once it is triggered.
11. Press Button #4 (NEXT) to exit the Aux1 setup screen. The setup is complete.

The process is repeated to set the Battery State of Charge (SOC) trigger points.

BACKGROUND INFORMATION:**USING STATE OF CHARGE (SOC) INSTEAD OF BATTERY VOLTAGE**

Most automatic generating starting products make the decision as to when the batteries need charging based on the battery voltage. Although this is the most common easiest, and sometimes the only method available, it is not the most accurate. The battery voltage will be greatly affected by charging or loads on the battery. Some battery manufacturers state that one should let their batteries sit without charging or connecting a load for several hours before a voltage measurement will provide an accurate way to determine the State of Charge. Certainly a large load can cause the battery voltage to drop giving a false indication of a low battery even though it may be close to full. The Apollo Solar charge controllers have an internal State of Charge meter which is a more accurate method since it based on the Amp-hours drawn from a known full battery.

APOLLO SOLAR IS NOT IN THE GENERATOR BUSINESS:

Apollo Solar does not recommend nor discourage any specific brand or type of generator. It follows that we can not provide tech support for generators. Our Charge Controllers and Inverters work with generators, but our expertise and support begins and ends with our products.

NOT ALL GENERATORS CAN BE STARTED AUTOMATICALLY:

The smallest size generators (about 2kW or less) don't have a starter motor. They require that a person pulls a cord. This class of generator does not apply to Apollo Solar applications. 5kW or 6kW generators include starter motors and a small battery. Some of them have manual chokes which require a person to monitor the engine after he pushes the start button. These generators are not good candidates for automatic starting either. When you get up to the 8kW to 10kW generators, there is enough money in the genset that wiring is usually provided by the generator manufacturer for a start switch, which has the ability for remote starting and stopping. If these serious machines are of good quality, they have enough smarts so that a simple remote ON and OFF switch will allow it to be started and stopped. Importantly, these gensets also monitor a few critical parameters like oil pressure and some temperatures so they can turn themselves off before self-destructing.