DINGO PUP

Negative Ground
20A Max. Charge
20A Max. Load

Dingo Series Expansion Unit

User Guide

Read this before installing

Pup configuration:

Each Pup *must* have its own address. Configure the Pup address and system voltage before connecting the Dingo accessory bus.

Install your controller:

- Vertically, where air can circulate around it;
- In a dry environment out of direct sunlight;
- Away from flammable gases or liquids;
- Away from spiders, wasps or other insects which might make nests in it.

What is a Dingo Pup?

The Dingo Pup is used to expand the capacity of the Dingo solar charge controller. Up to 9 pups can be added to a system. Each Pup is controlled by the Dingo. The Dingo manages the whole charge control process and displays the total charge and Ah figures for the system.
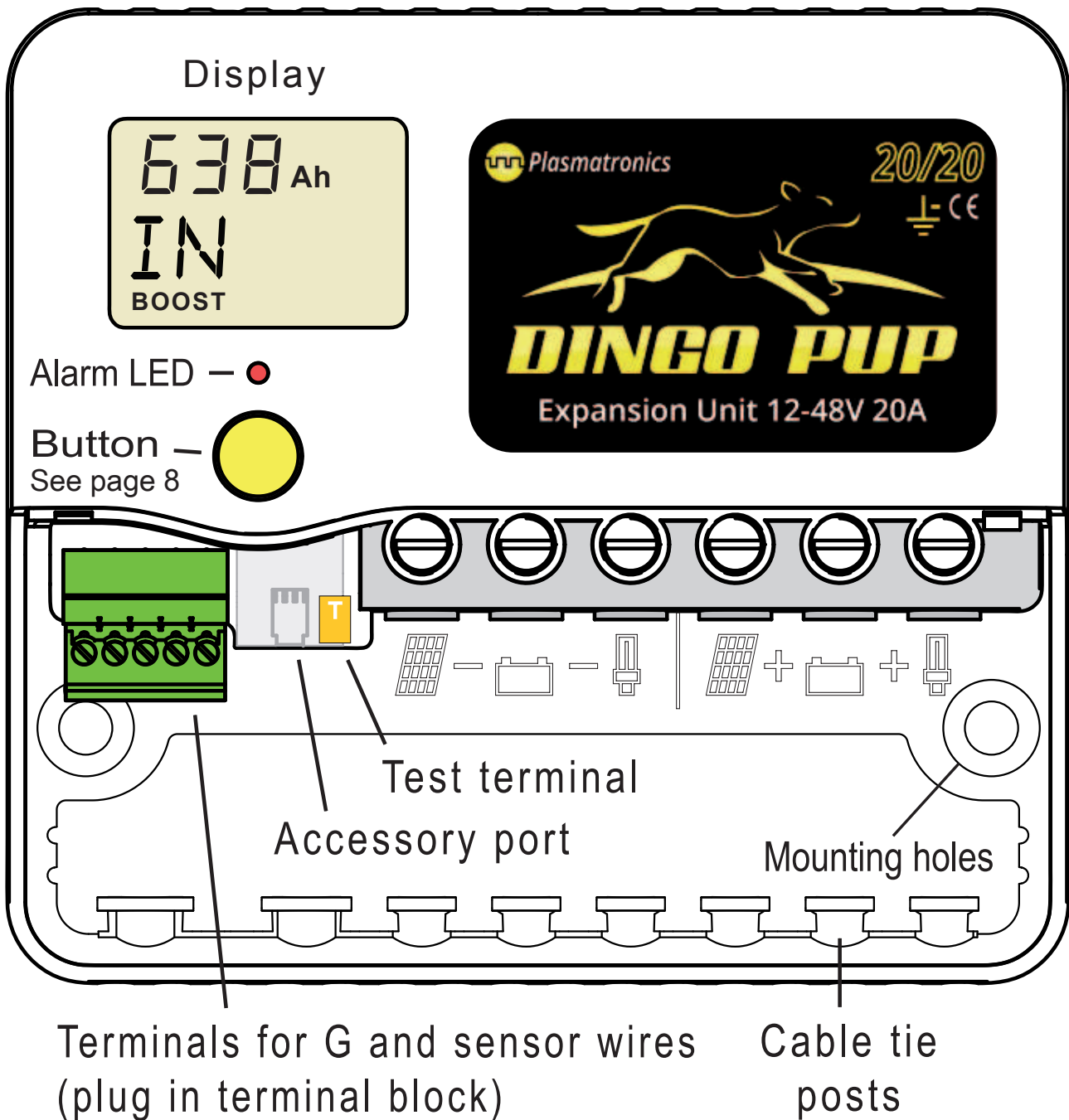
Fig. 1

Display

638 Ah

IN

BOOST

Alarm LED — ●

Button —
See page 8

Plasmatronics

20/20

⏚ CE

DINGO PUP

Expansion Unit 12-48V 20A

T

Test terminal

Accessory port

Mounting holes

Terminals for G and sensor wires
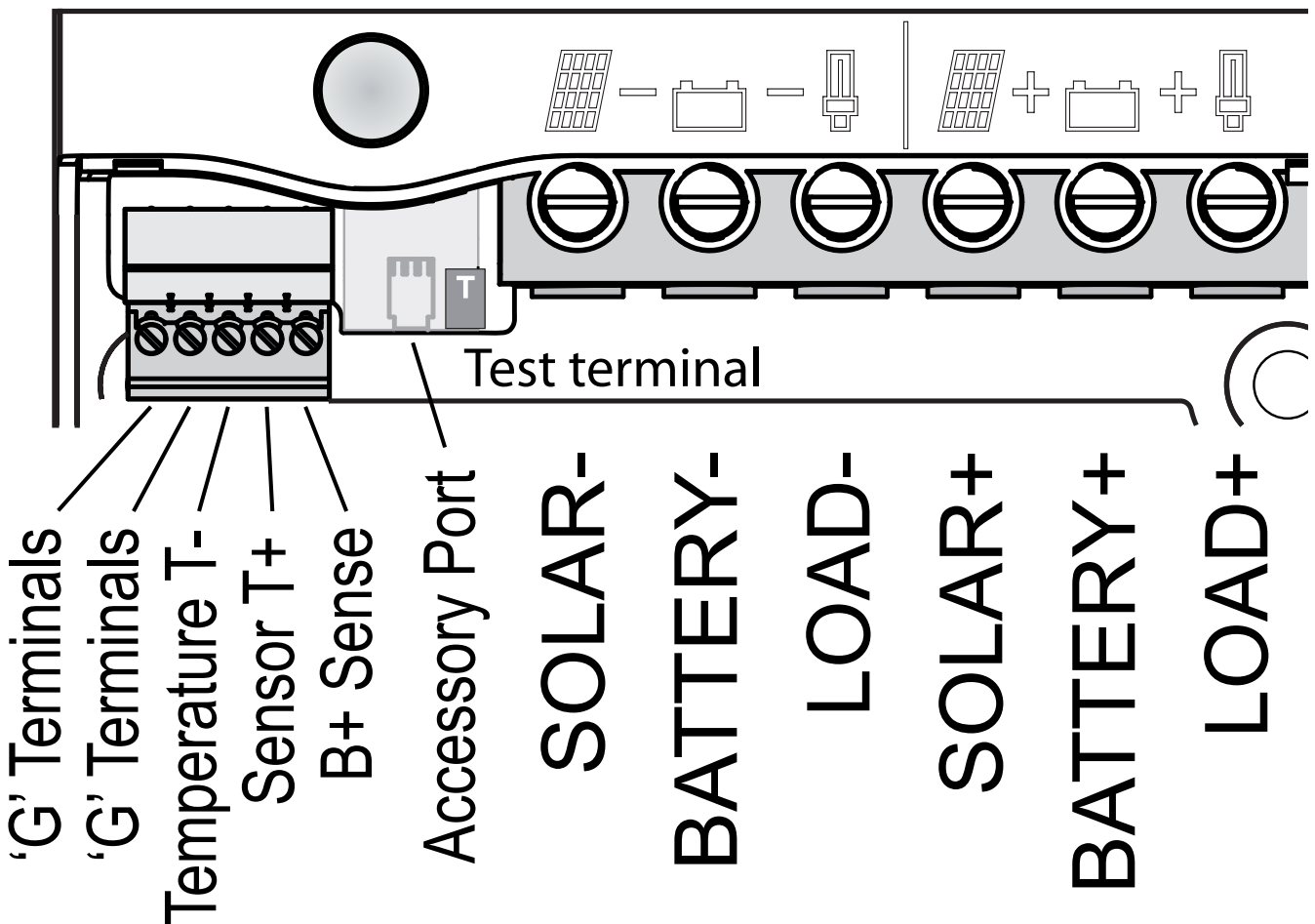(plug in terminal block)

Cable tie
posts

Screw wires into the high current terminals *tightly* in the order listed on page 6.

Warning: This controller is for DC current ONLY

Fig. 2

Test terminal

'G' Terminals
'G' Terminals
Temperature T-
Sensor T+
B+ Sense
Accessory Port
SOLAR-
BATTERY-
LOAD-
SOLAR+
BATTERY+
LOAD+

Basic Connection Order

1. Connect Battery

2. Test Solar Polarity

3. Connect Solar

4. Connect Load (if required)

5. *Set Address and System Voltage*

6. Connect the Pup to the Dingo Bus

Wiring instructions

For safety and to avoid damage, connection of wires must be done in the following order.

All connections must be tight!

a. Connect the battery first. Positive to Battery+, Negative to Battery -. If the display comes on, then connection is correct. (see figure 4)

b. Connect the negative (-) wire from the solar panel(s) to the solar panel negative (-) terminal.

Display comes on
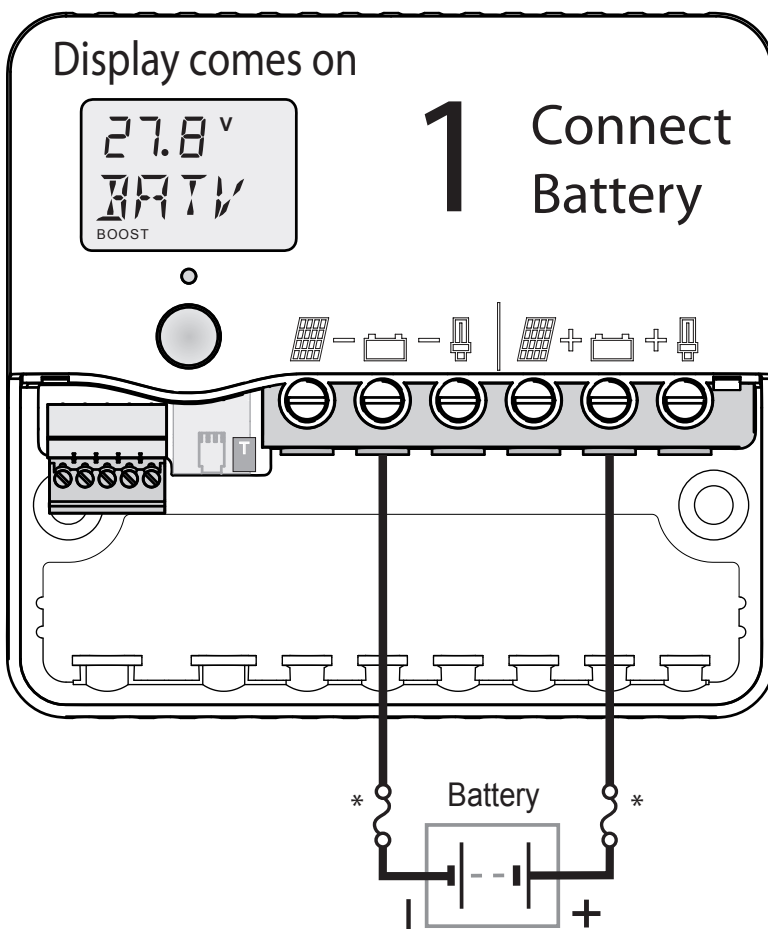
27.8ᵛ
BATV
BOOST

1 Connect Battery

Battery

Fig. 3

WARNINGS:

•*The controller can be damaged quickly by reverse connection of the solar array in 32, 36 and 48V systems. Test first to avoid damage.*

•*NEVER connect batteries or inverters to the load terminals*

*For safety, most installation standards require fuses or circuit breakers on both sides of the battery.
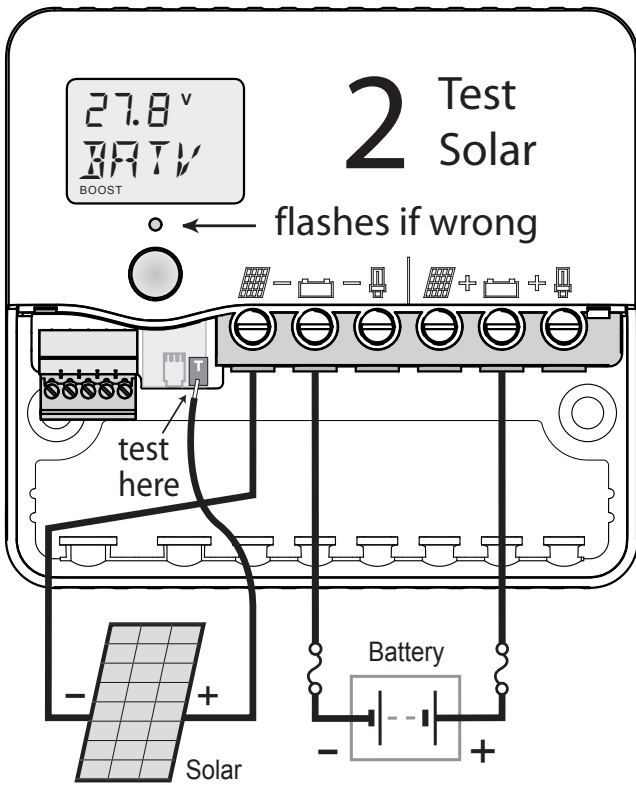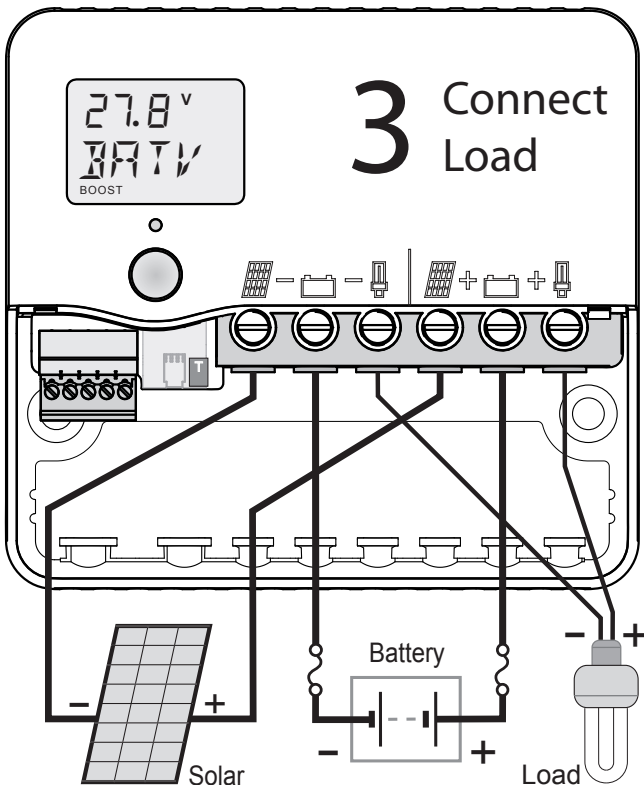For other connections, see the reference manual.

2 Test Solar

flashes if wrong

27.8 ᵛ BATV BOOST

test here

Battery

Solar

Fig. 4

3 Connect Load

27.8 ᵛ BATV BOOST

Battery

Solar

Load

c. Test the solar panel connection by touching the positive (+) wire from the solar panel onto the Test terminal (T).
  •If the alarm led does not flash then it is OK.
  •If the alarm led flashes quickly then it is **not** OK. Check the polarity and test again. *(There must be some light on the solar panels for this test to work)*. If OK connect to the Solar positive (+) terminal.

d. If the load connection is being used, connect the negative (-) wire from the DC load circuit to the load negative (-) terminal and the positive load wire to the load positive (+) terminal. Test the load circuit.Check the load polarity

e: Set the system voltage and Pup Address. (see page 10)

f: Connect the Pup to the Dingo accessory port. *(Multiple Pups can be connected in a daisy chain manner by using a 3 way female adaptor and a short cable as shown in figure 6 on page 15)*.

Using the Menu System

You can move around the menus system (see figure 5) and change settings using the button on the front of the controller..

A **short push** tells the controller to advance to the next menu item or setting value. To do a short push, press on the button on the front of the controller, and release it immediately.

A **long push** "selects", moving into a sub-menu or allowing you to change settings. To do a long push, press the button, holding it down until the menu changes (about one second).
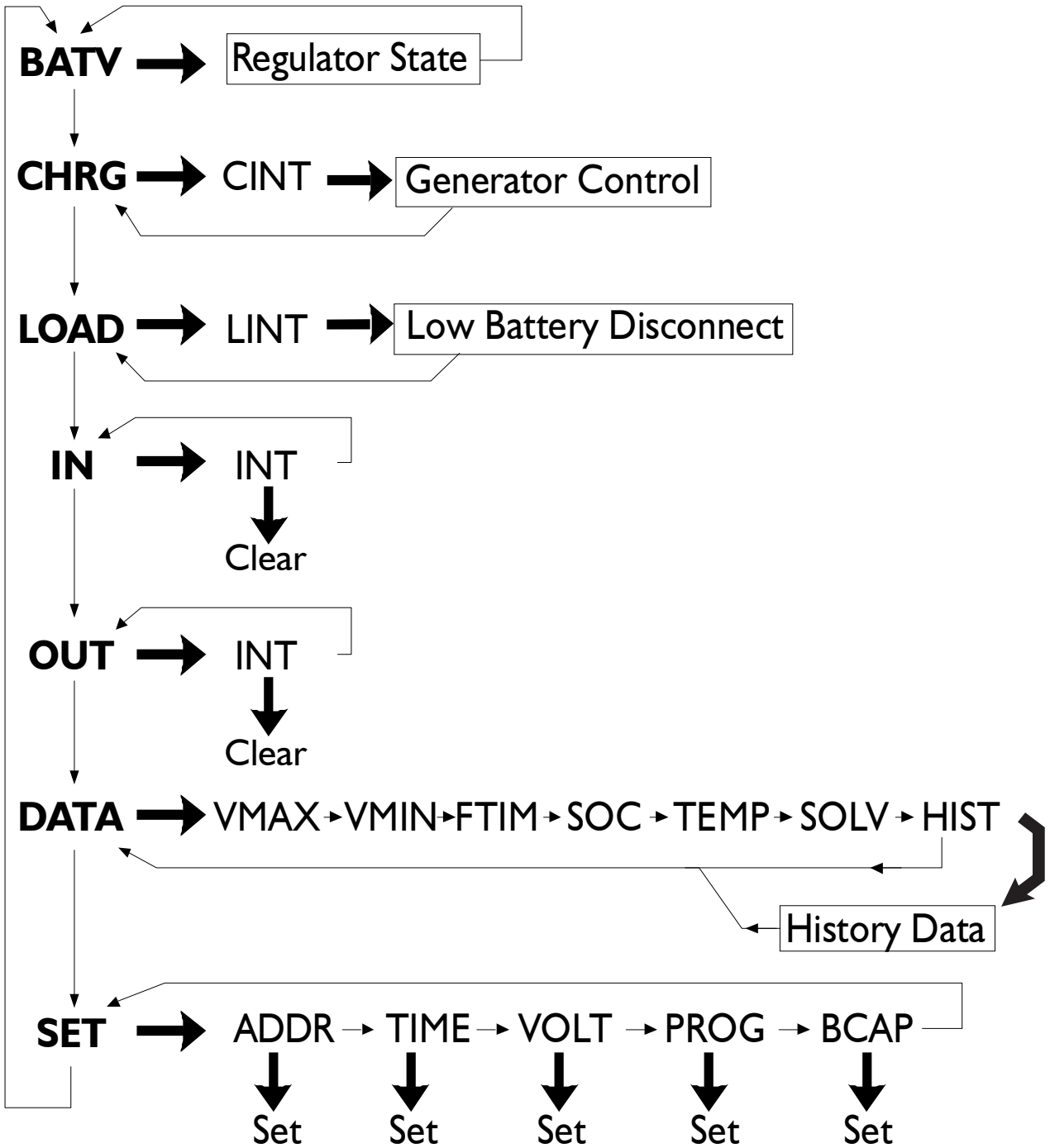
Getting back

Wherever you are in the menu system, a series of short-pushes will bring you back to the top-level menus without changing any settings. There are two exceptions: when a number is flashing during setting adjustment (see page 12) and when you see the word "EXIT" in the "HISTORY" sub menu - see page 22.

REVERSE & FAST FORWARD

If you overshoot the setting you want and need to go back, you can use reverse. Do a long push. The number stops flashing. Do another long push. The number starts flashing again but this time goes down. More than 5 quick pushes will start the fast forward mode.

To return to normal mode, stop pushing for 1 second.

Thin arrow = short push

Thick arrow = long push

Fig. 5

BATV → Regulator State

CHRG → CINT → Generator Control

LOAD → LINT → Low Battery Disconnect

IN → INT → Clear

OUT → INT → Clear

DATA → VMAX → VMIN → FTIM → SOC → TEMP → SOLV → HIST

History Data

SET → ADDR → TIME → VOLT → PROG → BCAP

Set   Set   Set   Set   Set

Choosing your settings

Set the Pup address and configure the Pup for independent-mode operation before joining it to the Dingo system.

Each Pup *must* have its own address. After setting the address (ADDR), set the system voltage (VOLT) and the correct program (PROG) for your battery, and configure any advanced settings.

1. Set the Address

Short-push until the display shows "SET".

a. Long-push once and the display will show "ADDR".

b. Long-push again, and the address will start flashing.

c. Short-push until the address shown is correct. If you reach 9, it will cycle back to 0 (unset). Choose the next address after any other Pups already in use.

d: When the address is correct, long-push to set it.

2. Set the Time

Short-push to move from "ADDR" to "TIME".

a. Long-push at TIME, and the time will start flashing. *(The time is displayed in hours and tenths of hours. For example, "6.5" means 6:30am, and "13.1" means 1:06pm)*

b. Short push until the time is correct. I

c. When the time shown is correct, long-push to set it.

Note: The time setting is used for the system history, and, in program 4, by the event controller. The time setting does not affect battery charging.

3. Set the System Voltage

Short-push to move from "TIME" to "VOLT".

a. Long-push and the voltage will start flashing.

b. Short-push until the voltage is correct for your battery. If you pass 48V, it will cycle back to 12V.

c. When the voltage shown is correct, long-push to set it.

4. Set the System Program

Short-push to move from "VOLT" to "PROG".

The program number determines battery regulation settings if the Pup becomes separated from the Dingo System. See page 22 for details.

a. Long-push and the program number will start flashing.

b. Short-push to select the best program for your batteries:

c. When the program shown is correct, long-push to set it.

4. Set any advanced (program 4) settings

Information about the "REG", "MODE" and "EVNT" settings is in the Pup reference manual. Contact Plasmatronics support or download the reference manual from the Plasmatronics web site..

Programs

0: Liquid Electrolyte Battery with Low Battery Disconnect option (p.12)

1: Sealed batteries (AGM or Gel) with Low Battery Disconnect option

2: Liquid Electrolyte Battery with Light Controller option (see p.12)

3: Sealed batteries (AGM or Gel) with Light Controller option.

4: Customised setup. Choosing this program will require you to set a number of additional parameters. (see Reference Manual)

Low Battery Disconnect (Program 0-1)

To prevent battery damage due to overdischarge, the Pup has a Low Battery Disconnect (LBD) function which can be set to turn off the load terminal if the battery falls below a pre-set voltage for a period of time. Short-term battery voltage fluctuations caused by motors starting etc. will not activate LBD. Once the battery has recharged to a safe level, the load will automatically switch on again. This may take some time.

You do not have to use this feature and the Pup will operate without it. To use Low Battery Disconnect, you need to connect your load to the regulator as described on page 7, and ensure that you have chosen a program 0 or program 1

Light Controller Option (Program 2-3)

The built in light controller can switch lights on at night. When the voltage from the solar array drops, the Light Controller function will switch on power to the load terminals. (The solar panel voltage is used to sense the light level.)

If the battery voltage drops too low, the low battery disconnect function turns the lights off regardless.

The light controller option will only work on the Pup if a solar array is connected to the charge terminals because it uses the voltage accross the array to sense light level.

To use the Light Controller option, choose program 2 or 3. If you have connected lights to the load terminals, they will switch on at dusk and switch off at dawn

Load Control Menu

Long push on LINT to enter the Load Control Menu:
LSET: long push to turn the Load terminal ON or OFF.

In Program 4, more Load Terminal control options are available (LOFF, LON,LDEL), and more Load Function options are available in the MODE menu. See the Dingo or Dingo Pup reference manual for more information.

Note - NEVER connect batteries or inverters to the load terminals of the controller. They will cause heavy current flow which may damage the controller.

Generator Control

The G terminal on the Pup is controlled by the Pup battery voltage in Program 0-3. Long push on CINT to enter the Generator Control Menu:
GSET: long push to turn the G terminal ON or OFF. Short push to advance to
GRUN: long push to adjust the generator exercise period (default 1.0 hour). Short push to advance to
GDAY: long push to adjust the days between generator exercise events (default 0, not enabled).

In Program 4, more Generator Terminal and Generator Function options are available. See the Dingo or Dingo Pup reference manual for more information.

Connecting the Pup to the Dingo

If the program selection (PROG) on the Dingo is set in the range 0 through to 3, then the Dingo is automatically configured for using the Pups as charge controllers.

The Dingo may take a short time to discover a new Pup. When the Pup is discovered, there will be an entry on the Dingo for the charge and load current and external amp hours.

For example, if the Pup address is set to 5, then in the Dingo CHRG sub menu, there will be an entry called SWH5. This is the charge current in the Pup at address 5, as seen by the Dingo.

If the CHRG/SWH5 entry is present, it confirms that the Dingo has recognised the Pup. If it is not present, check the cable connections from the Dingo to the Pup and wait for 2 minutes. There will also be entries for SWH5 under LOAD, IN and OUT.

If the Dingo is using PROG=4, then the Dingo ESET must be set correctly.

In Dingo program 4, the preloaded default setting for each pup is ESET/SW=0. This is correct for using the Pup's charge terminal for charge control (or the Pups load terminal for shunt regulation). If using the Pups only for charge control, it should not be necessary to change the ESET/SW setting.

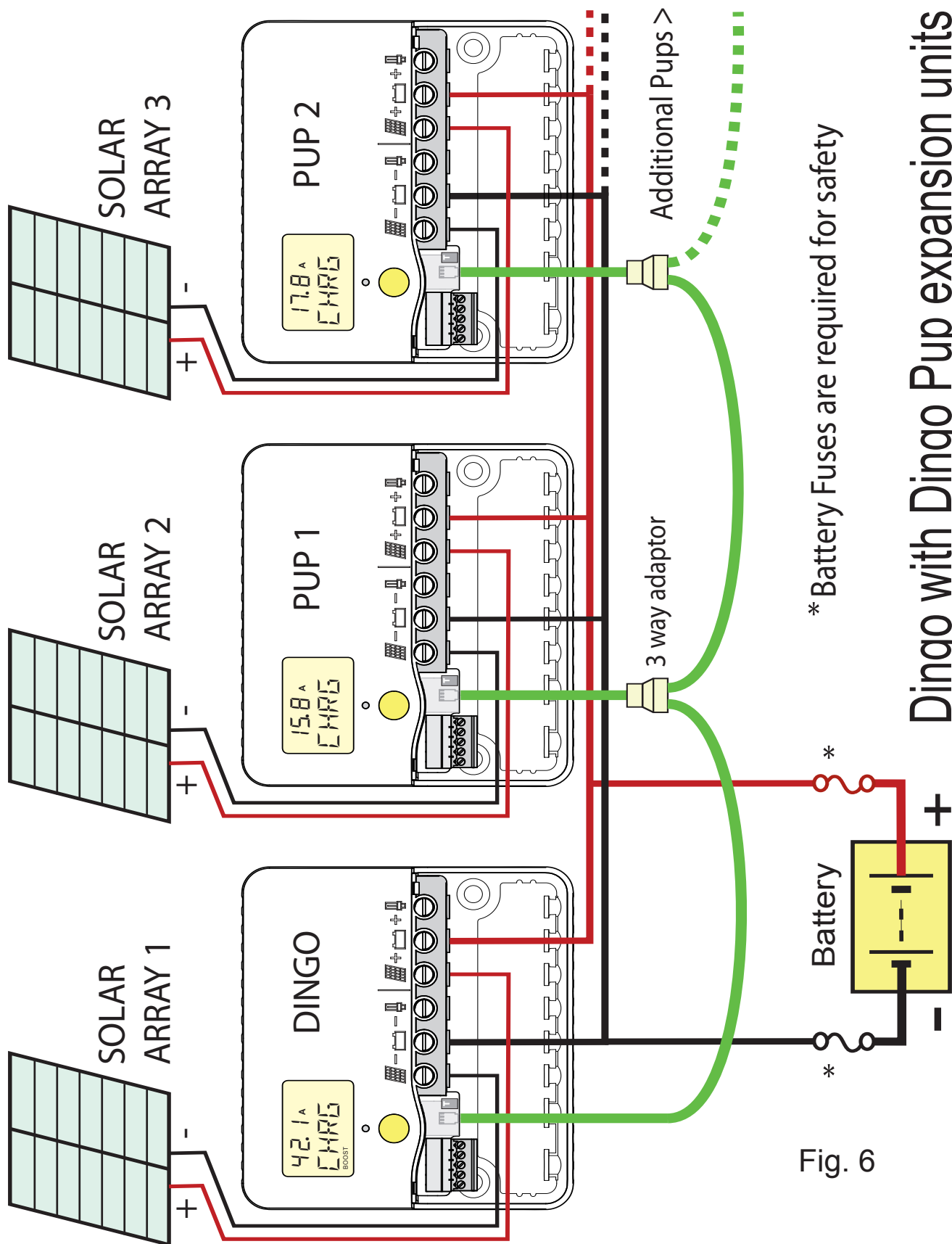SOLAR ARRAY 3

PUP 2

17.8 A
CHRG

SOLAR ARRAY 2

PUP 1

15.8 A
CHRG

SOLAR ARRAY 1

DINGO

42.1 A
CHRG
BOOST

Additional Pups >

3 way adaptor

* Battery Fuses are required for safety

Battery

+

−

*

*

Dingo with Dingo Pup expansion units

Fig. 6

The Expanded Dingo System

When more charge current is required than can be controlled by one Dingo, then the array can be split. Dingo Pups can carry the current from these extra sub arrays. The way this is set up is shown in fig.6 on page 15. The Dingo controls the Pups. It tells them when to turn on or off. When the battery voltage is below the regulation point, all Pups will be on. When the battery voltage gets to the regulation point, the Dingo will turn off the Pups progressivly to reduce the charge current so as to maintain the regulation voltage. If the load increases or the insolation reduces, then Pups will be turned back on until a balance is restored.

The Pups report back their current to the Dingo which displays the total current in the system. It also shows the individual contibutions from each device.

The Dingo and the Pups are connected together with a cable. If a Pup becomes disconnected from the cable, then it will regulate like an independant Dingo.

A system based on a Dingo 2020N is negative ground. This means that the battery negative terminals are all connected together. Switching is done on the positive side.

A Pup may also be operated as an external switch, controlled by the event, alarm or load disconnect outputs of the parent Dingo.

External Battery Temperature Sensor (DT or DTB).

Pup temperature input has no effect on battery charging when the Pup is part of a Dingo System.

The DT is a plastic-cased unit for direct attachment to the battery wall. The DTB has a bolt-on lug for attaching to the battery terminal (either terminal) It connects to the T+ and T- inputs on the green plug-in terminal block under the wiring cover. See Section 7.4.3 of the reference manual for details. *Independent mode only.*

Dingo Bus Accessories

It is not possible to use any Dingo Bus accessories with the Pup in independant mode.

Accessories such as shunt adaptors and computer interfaces can be connected to the Dingo connection bus, but they communicate with the Dingo, not the Pups. However, the Pup information can be accessed via the Dingo.

Monitoring your system

The Pups monitoring functions provide you with information about what that Pup has done. The overall system information is kept by the Dingo.

How much energy has this Pup collected today?

The IN screen shows how many Amp hours have been collected by the Pup today.

How much energy has this Pup used today?

The OUT screen shows how many Amp hours the Pup load has used today.

What voltage did the battery reach?

VMAX shows today's maximum voltage since midnight; VMIN shows today's minimum voltage. Both are in the DATA sub-menu.

The actual battery voltage is shown on the BATV screen.

What is the Pup's charge current?

The CHRG screen displays the charge current.

What is the Pup's load current?

The LOAD screen displays the load (or discharge) current.

Are components working correctly?

A battery temperature sensor can be connected to the Pup to improve regulation if it is operating on its own. If this sensor is installed, the battery temperature is shown on the TEMP screen in the DATA sub-menu. (If it is blank, no temperature

sensor is attached).

To test your solar array, the SOLV screen in the DATA menu shows the open-circuit voltage of the solar array. (Note: charging is interupted while the SOLV screen is displayed - this will eventually time out to prevent the controller being left in a non charging state)

The Data Menu

This is a quick summary of the screens in the data submenu which are reached by a long push on the DATA screen and the values stored each day by the history function.

VMAX   Maximum battery voltage since midnight.

VMIN   Minimum battery voltage since midnight.

FTIM   Time of day the controller entered the Float state if it didn't begin in float.

SOC   This is not relevant to the Pup as part of a system.

TEMP   Temperature being sensed by the battery temperature sensor (if attached).

SOLV   Solar panel open circuit voltage. NB: charging stops while displaying this screen.

HIST   Entry point for history data display. At midnight, IN (Amp hours), OUT (Amp hours), VMAX, VMIN, FTIM (Float TIMe) and SOC (State Of Charge) are stored in the history data and reset. VMAX and VMIN respond very slowly to changes in battery voltage. This allows them to ignore short term voltage fluctuations.

Retrieving historical data

In addition to storing today's performance data, the controller can display information about the last 99 days of operation. Historical performance information can be accessed from the DATA sub menu. After a long-push on DATA, short-push until you see HIST. A long-push on HIST will put you in "history mode", where you can cycle through each day's data. In the history display, DAY 1 is yesterday and DAY 99 is 99 days ago.

Independent Mode

When the Pup is not under the control of a Dingo, it operates as if it were a Dingo (but without the ability to have accessories connected to it).

The Charge, Load, and Generator terminals may also be configured for independent control while the Pup is connected to a Dingo system.

In Program 0-3, the Low Battery Disconnect and Light Controller Option operate independently, as does the Generator control, and, if a Dingo is connected, the Dingo controls the Charge terminals.

Further information

This controller is capable of more than what is described in this user manual.

For information on how to customise your regulation setup and set up larger systems, as well as the many additional features, consult the Reference Manual. This is available from your dealer or can be downloaded from our website: **www.plasmatronics.com.au.**

Independent Mode settings used in Programs 0-3

When programs 0-3 are selected, the controller automatically uses the values in the table on the right to control its operation.

The voltage settings are shown correct for 12V operation. For higher voltages, scale these up (eg. for a 24V system, multiply each voltage figure by 2.)

CHRG	Setting for program number			
Parameter	0	1	2	3
GMOD	0			
G ON (V)	11.5			
GOFF (V)	13.8			
GDEL (Min)	10			
GEXD (Day)	30			
GRUN (Hr)	1.0			

LOAD	Setting for program number			
Parameter	0	1	2	3
LOFF (V)	11.3			
L ON (V)	12.8			
LDEL (Min)	10			

SET/REG	Setting for program number			
Parameter	0	1	2	3
BMAX (V)	15.0	14.2	15.0	14.2
EMAX (V)	16.0	14.0	16.0	14.0
ETIM (Hr)	1.0	0	1.0	0
EFRQ (day)	45			
ABSV (V)	14.0			
ATIM (Hr)	2.0			
FLTV (V)	13.8			
HYST (V)	0.4			
BRTN (V)	12.3			
CHRG (A)	20			
BFRQ (Day)	15			
TCMP	0			

Specifications

Nominal system voltages	12,24,32,36,48	V
Maximum voltage BAT+ to BAT-	100	V
Max short term voltage BAT+ to BAT- (2 min)	120	V
Maximum voltage SOL+ to BAT-	100	V
Max. voltage LOAD+ to BAT+	70	V
Max. voltage between the "G" relay terminals	90	V
Max. voltage B+sense to BAT+	+/-30	V
Max. continuous charge current (SOL+)	20	A
Max. continuous load current (LOAD+)	20	A
Max. short term load current *(5 minutes)*	30	A
Max "G" relay current	300	mA
Battery Temp sensor range	-20 to +70	°C
Max. storage temperature	70	°C
Supply Current (device only, 12V)	9	mA
Supply Current (device only, 60V)	15	mA
Supply Current max (with acces.)	26	mA
Meter Accuracy	<+/-2% +/-2 digits	
Max wire entry size:	16mm^2 (6 AWG)	
Wire size, Green Terminal Block	0.2-1.3mm^2 (26-16AWG)	