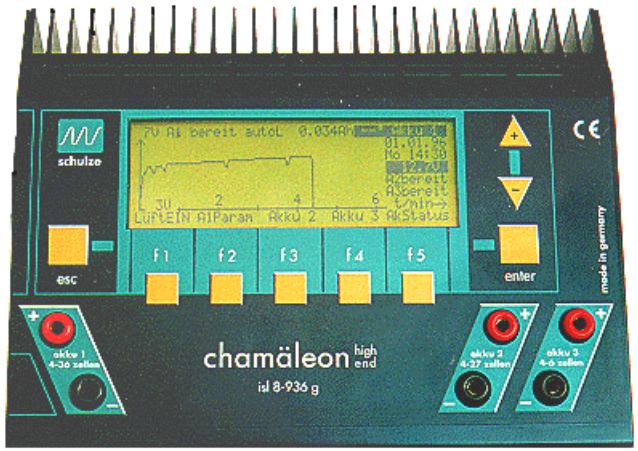
Instruction Manual

isl 8-936g

from Software Version V8.08...

Microprocessor controlled
Quick Charger
Discharger
Capacity Tester
Battery Conditioner
for sealed Ni-Cd-, Ni-MH-,
Lead- (Lead-Acid, Lead-Gel)
and Lithium-Batteries (Li-MnO, Li-Ion, Li-Po)

- Graphical Display of Charge Voltage
- Data Transfer Interface for Personal Computer (PC)
- „Full“ display by buzzer
- Internal fan, temperature controlled



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34 for those of you upgrading: what's new in Version 8

We know that it is precisely **you** who can't wait to charge your Lithium batteries, and anyway you already know how to operate the charger. However, there are differences, and that's why the last section is right here, at the start:

To avoid having to carry out any conversion work on the charger at the same time as introducing V 8 of the software, we have limited the maximum cell count of battery output 3 for Li-Io and Li-Po cells to two.

Though we are able to say that the ***isl 8*** can be updated only by changing an EPROM and making some verifying measurements (also by yourself), you should send your charger to Weiterstadt. We will re-calibrate your charger because in the most seldom cases the old calibration is good enough to charge lithium cells. Additionally we will update the hardware for more reliability (cue: product care).

Please note the following additional points:

- **1. INFORMATION AND WARNING:**
  After fitting the new EPROM check the charge voltage at Battery 3 (Akku 3): Both - 1 and 2 Li-Po cells - setting. Charge at around 250 ... 300 mA. Repeat the same test (or charge simultaneous) with packs of 1, 2, 3, 4 .. 10 Li-Po cells, connected to the Battery 1 and Battery 2 outputs.
  When the selected charge current is reached, please connect a digital voltmeter in parallel to the Battery sockets and check that it reads the same charge voltage (accurate to +-1%) as appears on the screen of the isl 8 (selection see below).
  (Remember: 1% at 8.4 volts are +-84mV, i.e. a display of 8.316 to 8.484 volts are ok; at 30 volts it is +-300 mV, i.e. display voltages of 29.700 V to 30.300 V are ok).
  If the readings do not agree, the charger needs to be re-calibrated. Please return it to us at Weiterstadt for the work to be carried out. If the necessary pecision can not reached by calibration, the microprocessor has to be changed at your costs (sorry).
  -->> To display the three charge voltages with an accuracy of one millivolt select "refresh" of the battery 2 output (Battery voltages of pack 1, pack 2 pack 3 are shown one below the other). The digital voltmeter you use for this measurement must have an error of better than 0.3%. <<--
  -->> If you changed the Version 8 EPROM at home (or if the calibration get lost), the display shows a warning message that the ***isl 8*** is not calibrated. You do not have any possibility to switch off this warning - because we have no influence in the precision of your control measurements described above. Only a calibration in our firm deletes the warning message. <<--
- **2. INFORMATION AND WARNING:** Lead-Acid and Lithium batteries must be disconnected from the battery 3 charge output within one hour after the charger has detected that the pack is FULL or EMPTY. **Reason:** a resistor in the hardware continues to charge the battery at a very low current, although the charge transistor has been switched off.
- The menus for Battery 1, Battery 2 and Battery 3 are arranged identically.
  Where a discharge facility is absent, or another option cannot be varied, the menu shows this as "—". The associated button has no effect.
- Any battery type (Nickel-Cadmium (Ni-Cd), Nickel-Metal-Hydride (Ni-MH), Lead-Acid (Pb), Lithium-Manganese-Oxide (Li-Mno), Lithium-Ion (Li-Io) and Lithium-Polymer (Li-Po)) can be charged at all three battery outputs and discharged at output 1 and 3. The only differences lie in the maximum charge voltage and maximum charge current.
- Not all the available menu options can be exploited for all the various battery types; in some cases they are set to fixed values. Example: the menu for the peak charge termination sensitivity for Lead-Acid and Lithium batteries is fixed at U-Max. The charger responds to any attempt to change the value with the message "Button temporarily blocked, warning #7".
- The charger now also uses the Delta-Peak method of detecting "battery full" for nickel batteries at output 3; previously this only applied to outputs 1 and 2. However, since a minimum charge current (1C … 2C) must be maintained if the peak detect circuit is to work reliably, the charge quantity monitoring for nickel batteries at output 3 is limited, and cannot be disabled.
- All menu points for each battery output and battery are stored permanently, and are available again unchanged each time you switch battery type.

HOWEVER: please take care when switching battery type. ALWAYS set the new battery type first, never the program, the charge current, the time monitoring … If you neglect this, the settings would be changed again when you switch battery type, and would be stored in the wrong battery type.
(Naturally the twice 12 set-ups for Battery 1 and Battery 2 are still available, expanded by the new battery types. **Note:** Selection is now in the battery type menue. When you fit the new EPROM, i.e. after updating from Version 4 to Version 8, the settings you have entered are lost, and have to be entered again.) Please make a point of satisfying yourself that you have set a suitable current value and the correct cell count before you initiate a charge / discharge program! (Section 4 - be sure to read the notes on battery maintenance and observe them strictly - even for nickel batteries).

- The expansion of the Battery 3 program has obliged us to change the battery status display to a 5-times combination program. Unfortunately lack of space means that the screen arrangement is now not quite as clear. The display for Battery 2 is in the top line, while Battery 1 and 3 share the area of the screen below it.
- A new feature in the battery status screen is the display of internal resistance of the packs connected to the charger when discharging (**Ni-Cd** or **Ni-MH** batteries also when charging). This is located in the top line after the capacity display for Battery 2, and begins with "R" (resistance). There follow three numeric values separated by "/" for Battery 1 / 2 / 3, and after this "mΩ" (Milliohm). When a discharge program is used, the pack's internal resistance is measured after about one minute; when a nickel charge program is used, it is measured during every measurement break ("!"). Zero display (0) at Lead- and Lithium-charge or the charge phase(s) of combination prgrams of Lead- and Lithium-batteries.
  If no measured values are present, the screen displays 0 (zero). Values in the Ohm range are displayed as 999 milliohm (such packs are of no practical use to the modeller).
  Note: the measurement includes the resistance of the charge cable (a typical value might be 30 mΩ), plus - of course - the total internal resistance of the pack. This means that the value displayed on the charger's screen does not relate directly to the information below regarding typical applications; the cell value must first be multiplied by the cell count, and then the resistance of the charge cable added to it. Typical Application:

GP3300SCHR	62 g	3300 mAh	4,5 mOhm	60 A max. continuous discharge current
RC3300HV	60 g	3100 mAh	5,5 mOhm	50 A max. continuous discharge current
RC3000HV	60 g	2800 mAh	6 mOhm	45 A max. continuous discharge current
HR-4/5FAUP	39 g	1800 mAh	7 mOhm	35 A max. continuous discharge current
TS1700AUP	34 g	1550 mAh	8,5 mOhm	25 A max. continuous discharge current
KAN1050	22 g	950 mAh	16 mOhm	20 A max. continuous discharge current
KAN650	14,5 g	600 mAh	22 mOhm	15 A max. continuous discharge current

Rule of thumb: max. contin. current [A] = battery weight [g] * 14400 / (nominal capacity [mAh] * Ri [mOhm])

- Another new feature is automatic current calculation for **Ni-MH** batteries (Auto C, Auto CD, Auto DC). This produces a similar result to the automatic current calculation for Ni-Cd batteries, but uses a fundamentally different measurement strategy.
  For this reason **please note:** never use an automatic Ni-MH program for a Ni-Cd battery, and vice versa! And one more **important note:** in older versions of the software the sensitivity and delay settings had to be entered separately when the battery type was selected; this is now no longer the case. However, you as user must be aware that the automatic charge termination circuit only becomes active after about 7 minutes if you select **Ni-MH Auto C**, or one of the combination programs; i.e. the battery will be charged at a higher current during these first few minutes. **This means: if you are using automatic current calculation NEVER connect a fully charged Ni-MH pack for charging, as the pack may be overcharged, overheat and explode!**
- As mentioned earlier, multiple cycles can now be carried out at the Battery 3 output, and in addition to this the accuracy of the voltage measurement has been improved. This is of particular importance if you wish to bring individual cells in a Lithium pack to a very accurate "full" voltage level. If this is the case, please always use output 3, and not output 1 or 2.
- The temperature display for the external (battery) temperature sensor now only shows positive temperature values (no longer negative values).

1 General information

Congratulations! With the **isl 8-936g** you have purchased a top of the line product made in Germany. Reliable SMD technology, outstanding performance and flexibility and last but not least their easy handling have made the previous models very popular. By adding the most up-to-date electronic devices, a third charge output and a modified discharge circuit which re-transfers energy into the car battery, the **chameleon high end** has become even more powerful and flexible.

The **isl 8-936g** requires no maintenance, but needs to be protected against dust and moisture. Openings in the housing are essential for cooling and must not be blocked! The **chameleon high end** provides best operating comfort and maximum reliability. Using the **automatic C** charging option, you will notice that the **isl 8** microprocessor will charge you batteries as fast as possible, yet as carefully as necessary (don't be worried about the relatively high start current of the Ni-MH current calculation automatic). All three outputs may be in use at the same time. Additionally you can discharge your batteries, measure their capacity and condition them. Same options are available for sintered Ni-Cd, Ni-MH batteries.

The big graphical LCD (**L**iquid-**C**rystal-**D**isplay) panel provides user guidance via softkey-function-buttons and allows the transfer of charge data and parameters to a personal computer either on-line or from the non-volatile memory.

In order to make full use of your new charger we strongly recommend you to read the Instruction Manual page by page and take note of the hints. Although the supplied text is rather long, there is valuable information in each sentence.

Note: In order to get to a certain point in the menu, you may have to change the screen several times. Therefore in this manual you will sometimes find the complete sequence of key-operations, including the appropriate screen text, starting from the initial **powerOn** display.

You will find in **Chapter 33 (MenueTreeStructure)** an overview of the available function-key descriptions.

Note: As a novelty of the ***isl 8*** - 2005 series the display background is illuminated.

You will hear a humming sound when the backlighting of your isl 8 is switched on; this is perfectly normal. It simply indicates that the 400 Hz voltage converter for the lighting is operating. The illuminated film acts (unwanted) as a “loudspeaker”.

We now deliver the isl 8 with a modification that you can switch on and off the illumination.

Since the circuit board does not include a separate On / Off switch for this purpose, we have pressed an existing one into service: the switch for the fan socket on the side of the case.

The button marked “f1 - fan” can now be used to switch off the backlighting (together with the fan for the battery cooler) in the graphic screen displays for “pack 1”, “pack 2” and “pack 3”.

Re chapter 5 : Mounting instruction CE-ring

Additional parts:
CE-kab-i8
not included

CE-ring
3 x included

2 General remarks and precautions

The CE marking which you will find on all **schulze** products indicated that the equipment has been tested to meet the stringent European safety and radiation requirements; this does not mean that you do not have to follow these instructions!

The cooling fins at the rear of the charger have been precision extruded and then machined; they may have sharp edges; handle with the same care with which this equipment has been manufactured.

Please remember that fast-charging batteries can push the batteries to their limit; never operate the chargers unattended. The charger as well as the batteries may get warm; when in use, they should be placed on an appropriately sized, non-heat-conducting and non-combustible surface. By following these rules extensive damage will be avoided in case of a mishap. **This applies in the same way also for the attached batteries.**

Many modern transmitters are equipped with an internal reverse-voltage protection diode. No “smart” charger can fast-charge these transmitters unless this diode is bypassed (shunted) (see chapter 11 for additional information when charging transmitters). Preferably, you can remove the transmitter’s battery and fast-charge it outside the transmitter. If you want to bypass the diode, contact the transmitter manufacturer. In no case should the fast-charge current for a transmitter pack exceed 1.2 Amp.

In order to keep possible damages small in the case of an error, we recommend strongly to remove the batteries from the transmitter!

Do not modify the charger’s car battery power cables or connecting clamps; they are very low loss to support the charger’s high-end charge capabilities. Do NOT insert fuses and NOT plug the charger into the car´s cigarette lighter!

Do not cross-connect individual output charge cables or wires thereof; each charger outlet has its own sensing circuitry. Prevent electrical contact between any charger outlet and your car’s body. All this may damage your charger and/or your batteries! It is safest to place the charger on the ground. Place the charger on a safe support, do not “hang” it somewhere under the hood. The best approach is to use a separate, fully charged, dedicated 12-V battery and take it to the flight line.

The internal software is always checking for operational errors.

Do not operate the charger in the case that any of the cables are damaged or frayed, or in case the display panel indicates an ERROR.

The **isl 8** charging devices operate on 11 to 15 VDC, but may only be connected directly to a 12 V car battery! **DO NOT RUN YOUR ENGINE OR ATTEMPT TO CHARGE YOUR CAR BATTERY WITH EXTERNAL EQUIPMENT WHILE OPERATING THE CHARGER, OR AS LONG AS THE CHARGER IS HOOKED UP TO YOUR CAR’S BATTERY.**

Should you decide to operate the charger from a (110V/240V AC to 12V or 13.8V DC) power supply (“battery eliminator”), then make sure this power supply is well regulated, can supply continuous DC current as high as 40 ... 45Amps(!), has a very high output capacitance (>5000µF/16V), very low ripple and is insensitive to the frequency of the carger´s internal switching voltage converter. Using any other source is likely to damage your charger or your batteries, and voids the warranty. ALWAYS use a ***schulze nt-40A*** power supply, NEVER use an automotive battery charger as the source for the precision-engineerd **schulze** charger.

Because of the high charge current capabilities of these chargers, you should always use high-quality, gold-plated connectors in the charge cables to your batteries. Also, use heavy-duty (12-g) flex wire. We recommend you use either **schulze** short circuit protected charging cables and/or (in the USA) 4 mm bullet connectors, the Deans Ultra plug or similar. See you local hobby dealer or call R/C-Direct.

Always connect the banana plugs of your charge cables first; then, connect the charge cable to the battery. Note that “open” banana plugs, when the charge cable and battery are connected, carry the full battery voltage (and current).

Note that all chargers have ventilation holes. Especially in discharge mode or when charging batteries less than 12V, the charger will dissipate energy, and thus get warm (the ***isl-8*** even has an internal cooling fan). Do not block these ventilation holes and make sure you allow free air flow through the cooling fins

located at the rear of the charger.

Protect the charger from direct exposure to the sun (the sun´s heat will temporarily turn the LC-display black), dust, moisture and rain(!).

Even though the ***schulze*** chargers are smart (they are micro-processor equipped and can determine a battery's number of cells and its optimum charge current pattern), attempting to charge the following packs should not be attempted:
- batteries built up from cells of different types and capacities
- batteries made from different types of single cells
- batteries with a different charging level of the cells
- non rechargeable cells (dry cells)
- batteries which are not expressly designed for fast charging and recharging.
- defective or damaged packs or cells
- already fully charged and/or hot batteries
- battery packs with internal charge-current limiting devices
- batteries which are buildt-in (internal) to other equipment

Do not exceed a battery's design (maximum) charge current as specified by its manufacturer; note that the ***schulze*** chargers will still optimally charge these packs in automatic charging mode; you can program the charger's max (limit) charge current.

When charging high-capacity battery packs with less than 7 cells, exercise extra care to make sure that these are not over-charged; packs which are (too) deeply discharged may cause the charger to cut off too soon.

New batteries will only achieve their maximum capacity after several charge/discharge cycles; ***schulze*** chargers can be programmed to provide these cycles automatically.

Always verify the charge amount which your battery has absorbed (mAh or Ah) after a full charge (this is indicated on the display panel); this is probably the best gauge of a battery's health and/or the proper operation of the charger. This way, you will avoid unexpected loss of power and/or control.

Please remember that battery packs can heat up considerably during a high-current discharge cycle; program your charger's max discharge current to prevent overheating of the packs unless you provide additional cooling (some of the racing pilots now use a tube with electric fan cooling!). Note that e.g. discharging a 27-cell 1000mAh battery at 5A (=5C rate) will dangerously overheat this battery; the ***schulze*** charger can (and) should in this case be programmed to the limit discharge rate to a more acceptable level, for instance 1A (=1C) and/or a battery cooler in combination with the temperature sensor for cut-off must be used. You can also use our build in low-temperature-start circuit. (Do not forget to activate temperature sensor to the right pack output and fix it at the right battery.)

An additional important function is the selection of the automatic cut-off circuit. Read the important comments in Chapter 12). Maximum protection against malfunctions of the cut-off automatic is provided by selecting additional cut-off criterias like max. temperature, max. energy input and max. charge time.

Warranty on your new ***schulze*** charger is **one year** after the date of first purchase. Expressly excluded from this warranty are failures due to incorrect use and/or damage(s) to any object(s) and/or person(s) resulting from the correct or incorrect use of this charger. Before returning a **schulze** charger for repair, please check the charging of a single battery pack using a fully charged car battery; go through the check list at the end of the operating manual; if you still have problems, then, add a description of the problem you encountered (ALWAYS fill out the annex SQ-service questionaire), proof of purchase (date), your address and your telephone number.

Warranty repairs are performed in Germany or in the USA; out-of-warranty work will performed at same locations, for a nominal charge. Return units which are found to be in good operating condition will be subjected to normal manufacturing tests. There will be a nominal charge for this, wether the unit is in warranty or not.

More than a thousand ***schulze*** chargers are in use around the world every day without any problems. They perform….again and again.

We hope that you, too, will join this happy *schulze* family.

3 Commonly used Terms

Final charge voltage: the voltage at which the battery's charge limit (capacity limit) is reached. The charge process switches from a high current to a low maintenance rate (trickle charge) at this point. From this point on further high current charging would cause overheating and eventual terminal damage to the pack.

Final discharge voltage: the voltage at which the battery's discharge limit is reached. The chemical composition of the batteries determines the level of this voltage. Below this voltage the battery enters the deep discharge zone. Individual cells within the pack may become reverse-polarised in this condition, and this can cause permanent damage.

Memory effect: **The real memory effect has been recorded by Nasa, caused by repeated charge / discharge cycles. Nasa has found that full capacity can be regained by overcharging the cells. In modelling applications different effects are responsible for the reduction in cell capacity. The problem can be cured by balancing the cells (see below), and prevented by the measures described in Chapter 4.1.3.**

Balancing: a method of regaining full (nominal) capacity by alternately charging and discharging the pack, sometimes several times. This process is especially useful after a long period of non-usage (e.g. after purchase, or after several weeks without flying), and is also used to disperse the memory effect (see below). The effect of balancing is to break down the coarse crystaline structure (low capacity) inside the cell and convert it into a fine crystaline one (high capacity).

Power-On (- reset): the status of the ***isl 8*** after it has been connected to the car battery.

Ready message: charger ready to run the program you have just selected (batteries not connected). The display shows #GO#.

C: Coulomb or capacity: Unit of measurement relating to the quantity of charged energy. In conjunction with charge current data this unit is used to determine the recommended / pre-scribed charge current of a battery of a given capacity. Example: if the charge or discharge current of a 500 mAh battery is 50 mA, we refer to this as a charge or discharge at one tenth C (C/10 or 1/10 C).

A, mA: unit of measurement relating to charge or dis-charge current. 1000 mA = 1 A (A=Ampere, mA=Milliampere)

Ah, mAh: unit of measurement for the capacity of a battery (Amperes x time unit; h = hour). If a pack is charged for one hour at a current of 2 A, it has been fed 2 Ah of energy. It receives the same quantity of charge (2 Ah) if it is charged for 4 hours at 0.5 A, or 15 minutes (=1/4 h) at 8 A.

4 Useful information about batteries and maintenance

4.1.1 General information

Do not charge below 0°C, optimum is 10...30°C.

A cold cell is not capable of accepting as much current as a warm one. For this reason you must expect differences in charge characteristics if you use fully automatic charge current calculation (in Winter the charging properties will be worse than in Summer). The best **working temperature for a Ni-MH cell is 40 ... 60°C.** At lower temperatures the cell can not supply higher currents. Caution when using those cells a a receiver battery in a helicopter in the wintertime.

The lower the internal resistance of the battery, the higher the charger can increase the charge current for that battery. **For a battery charger which sets the current automatically the resistance of the cable is added to the internal resistance. For this reason: use heavy cable (large cross-section), even for receiver batteries, and keep them short. Do not charge via a switch or switch harness!**

If you wish to measure battery capacity accurately a suitable discharge current is usually 1/10 C.

4.1.2 Reflex charging

Charging processes which include a brief discharge pulse definitely have the effect that the battery is several degrees cooler at the end of the process. However, from the point of view of the competition operator this is an undesirable effect, as the cell chemistry can only supply high currents if its temperature is raised to a certain extent.

All these effects, whether they actually occur or are simply hear-say, have no practical significance if batteries are correctly handled in the first place. When a battery is full, you can't fill it any fuller! Read also chapter 4.1.3 for this subject area.

4.1.3 Memory effect of Ni-Cd & Ni-MH cells

If cells are repeatedly stored partially discharged, or are recharged from a half-discharged state, what is known as the memory effect sets in. The cells note that their full capacity is not required, and react by refusing to make it available.

One aspect of this is that the crystalline chemical structure inside the cell changes; the cell's resistance rises and its voltage collapses under load, with the result that "full capacity" can no longer be exploited at normal discharge currents.

Even if reflex charging were to eliminate the memory effect, there is no denying the necessity to store your cells in the discharged state; this applies to Ni-Cd cells and also to Ni-MH cells.

A characteristic fact of these cells is that they self-discharge - and the rate of self-discharge is different for each individual cell in a battery pack! If a fully charged pack is left for a considerable time, it will eventually consist of cells of widely varying states of charge.

If at this point you ...

a) ... give the pack a full charge: the cell with the highest charge will be overcharged, heat up and be ruined, while the cell with the least charge will still not be full after the same period of charging.

b) ... discharge the pack: the cell with the least charge will be completely flat first, then reverse polarity and often suffer an internal short-circuit. At the point when this happens, the cell with the most charge is still not yet completely discharged.

This is a reliable method of wrecking your most valuable packs - and rest assured that reflex charging will make absolutely no difference. However, there is one method of avoiding the problem: discharge cells after use, and recharge them just before use!

4.2 Nickel-Cadmium-batteries (Ni-Cd)

Nominal voltage level: 1.2 V / cells.

Selecting the fast charge current (manual setting):
Charge current = 2 C (never less!) (C=nominal battery capacity). Otherwise the cells do not make a detectable peak and the peak cut off automatic is not able to work resp. to work reliable.

Maximum continous discharge current:
Currents of 10 C to 30 C are possible, depending on cell type.

Long time storage:
Empty i.e. discharged to the discharge voltage cut off level (see maintenance), at low temperature (-20°C to +10°C).

Maintenance: Charging: The automatic current setting circuitry (patent applied for) provides optimum protection to your Ni-Cd batteries during charging. The reduced current towards the end of the charge ensures a completely full pack combined with only a slight temperature rise, as you will easily see in comparison with conventional constant current techniques.
Do not use the automatic charge current calculation of the Ni-Cd batteries when charging Ni-MH batteries!
Discharging: To prevent your cells from memory effect and to keep the full capacity you have to discharge it after use, even when you store it over night (select Auto-D program to discharge down to 0.85V / cell).

If a battery is brand-new or used irregularly it is often only possible to balance it completely by carrying out several discharge - charge cycles. Amongst model car operators it is standard practice to erase any memory effect by completely discharging each cell individually via a resistor (approx. 68 Ohm). This deliberately "unbalances" the pack, but it can cause the automatic charge termination circuitry to switch off the current prematurely during the charge process. Remedy: Discharge with a 10 Ohm resistor in series to a 1 A diode (1N4001).

For receiver batteries special types such as the Sanyo KR500AAEC / N500AC (lower resistance) are a good choice.

Warning: The reduced charge current with 1-6 cells makes the voltage peak in the charge curve very slight, especially with batteries of high nominal capacity. In this situation the charger is sometimes unable to detect the "full" condition due to the ill-defined peak.

4.3 Nickel-Metal-Hydride batteries (NiMH)

Voltage level: **1.2 V / cell.**

Selecting the fast charge current manually (not automatically):
Charge current typical 1 C (never less!) (set a fixed current of, for example, 1.2 A with 1100 mAh batteries, or 3 A with 3 Ah cells). Otherwise the cells do not make a detectable peak and the peak cut off automatic can not work reliable. Some modern high-current Ni-MH cells made by particular manufacturers can safely be charged at a higher rate of up to 1.6 C (Panasonic 3000: 3,5 - 4A, GP 3000/3300: 3 A, Saft 3000: 3 A (not if battery is charged inside a transmitter!), Sanyo 3000/3300: 4 - 5A). Because of its high internal resistance do not charge high capacity cells of mignon(AA)-size from 1500 mAh upward with automatic current calculation (AutoC, -CD, -DC).

Maximum continous discharge current:
Currents of 5 C to 15 C are possible, depending on cell type.

Long time storage:
Empty, i.e. discharged to the cut off level (see maintenance), at low temperature (-20°C to +10°C).

Maintenance: To protect your Ni-MH batteries from the memory effect and keep the full capacity, discharge the cells after use down to the discharge voltage limit even when you store it over night. Never discharge by car bulbs or the drive motor (premature charge termination!), but use only the **Auto-D** programm when the battery type **Ni-MH** is selected. The cut off voltage is 1 volt / cell. This eliminates the danger of deep discharge termination and polarity reversal (over-discharge).

It is important that you take the trouble to give **Ni-MH** cells when storing at **+10...30°C** a charge / discharge cycle around every four weeks, otherwise they become tired, and have to be pampered

to restore them to full vigour. This involves going through the tiresome business of many repeated charge / discharge cycles.

The automatic current setting circuitry (patent applied for) provides optimum protection to your Ni-MH batteries during charging. Do not use the Ni-Cd automatic current selection for Ni-MH batteries!

Warning: Never charge fully charged Ni-MH batteries with the Auto C (or ..CD programs): Overheating and danger of explosion! The cut off automatic is disabled for about the first 7 minutes of charging - this could lead to a minimum charge time of about 10 minutes!

It is possible to erase any memory effect by discharging each cell individually via a resistor of approx. 10 Ohms in series to a 1 amp silicon diode (0.7 volt) plus a 1 amp Schottky diode (0.3 volt).

Warning: At lower cell counts (1-6) and low charge currents (below 2 C) the battery makes only a very low voltage peak when fully charged. Under those conditions the cut off automatic works less reliable then with higher currents and/or higher number of cells.

Typical for Sanyo Twicell industry types with flat top and RC3000H cells:
High maximum load capacity and voltage level.

Typical for Panasonic P3000NIMH cells:
High maximum charge capacity and voltage level.

Typical for GP GT3000 / 3300 cells:
Extremely high charge capacity, good voltage level.
Can be discharged with medium currents (about 40...45 amps; from 2003 up to 60 amps).

4.3 Lead-acid batteries (Pb) ...

... and VRLA (valve regulated lead-acid batteries = lead-gel batteries)

Nominal voltage level: **2.0 V / cell.**

Charge voltage level: **2.3 V / cell; 2.42 V / cell for 3 hours max.**

Min. discharge voltage: **1.7 V / cell (this reduces lifetime).**

Number of cells to be selected on the ***isl 6*:**
Nominal voltage of the battery to be charged divided by the nominal voltage level of lead-acid battery cells = cell count.
Example: 12 V-Lead acid battery divided by 2,0 V => 6 cells.

Selecting the fast charge current:
Charge current = 0.15 C (C = nominal battery capacity) if no data sheets are available.
Charge current up to 0.4 C for special types.

Maximum continous discharge current:
Typically 0.2 C, short time load up to 1 C.

Long time storage:
Full at low temperature, more precise:
At +10°C up to 12 month, at +10...20° max. 9 month, at +20...30°C max 6 month, at +30...40°C 3 month.
Charge again after this period.

Maintenance: In contrast to Ni-Cd/Ni-MH batteries, lead-acid batteries must be fully recharged after use in order to maintain full capacity.
The nominal capacity can be reduced very quickly by incorrect handling (overloading, repeated 100% discharges, and especially by deep-discharges). Please observe the battery manufacturer's recommendations.

Typical: The characteristics of lead-acid batteries are quite different to those of the Ni-Cd sealed cell packs which are used as the power source in model aircraft, cars and hydro-boats. They can only tolerate relatively low currents relative to their capacity if their full capacity is to be exploited, and/or the voltage is not to collapse too far.
Used as single-cell glowplug energiser batteries and power source in some scale boats.
Low self-discharge rate.

4.5 Lithium-Manganese-Oxide batteries (LiMnO)

Nominal voltage level: **3.0 V / cell.**

Selecting the fast charge current: **Up to 0.3125 C, dep. on cell type.**

Maximum continous discharge current: Up to 1.5 C.

Maintenance: Always store these cells in the charged state.

Typical: These cells are particularly recommended as receiver batteries (2 cells required), although correct charging and storage are very important. However, we do not recommend them as slow-fly flight packs, since they have a limited ability to supply high currents, and their useful life varies greatly according to the discharge current and the extent to which they are discharged. Very good weight : energy ratio.

Hint: The most common form of this cell type is the „Tadiran" cell.

Tip: Ideally all single cells in a pack should be charged separately; alternatively charge all cells in parallel.

4.6 Lithium-Ion batteries (Li-Io & Li-Po):

Nominal voltage LiIo:		**3,6 V** / cell (SAFT)
Nominal voltage LiIo/LiPo:		**3,7 V** / cell (SANYO, KOKAM)
Max. charge voltage	**LiIo:**	**4,1 V** +-40mV / cell (SAFT)
(absolute limit 4.3 V / cell)	**LiPo:**	**4,2 V** +-50mV / cell (MoliCel)
Min. discharge voltage	**LiIo:**	**2,5 V** / cell (MoliCel), **2,7 V** / cell (SANYO)
(absolute limit 2.3 V / cell)	**LiPo:**	**3,0 V** / cell (KOKAM)

Number of cells to be selected on the charger:
Nominal voltage of LiPo-pack div.by nominal cell-voltage = cell count.
--> 11,1 V LiPo-pack divided by 3.7 V => select 3 cells!
If you would select more cells, the pack would explode during charging!
Example: The Thunderpower TP8200 3s4p pack consists of 12 cells.
4 of 2050mAh are connected parallel (4p) -> 4 * 2,05 Ah = 8200mAh.
3 of the paralleled cells are connected in series (3s)-> 3*3,7V= 11,1 V.

Selecting the fitting cell type:
Select that battery type from the ***isl 8*** menue which characteristics match best with the data sheet of the battery manufacturer.

Selecting the fast charge current:
Charge current = 1 C (SANYO / KOKAM) or less (0,7 C PANASONIC) (C = nominal battery capacity).

Maximum continous discharge current:
1 ... 20 C (very new types), depending on cell type.

Long time storage:
Empty, i.e. discharged to the discharge voltage cut off level (see maintenance), at low temperature (-20°C bis +10°C).

Maintenance: Discharge with up to 1 C down to above listed discharge voltages. Always store these cells in the discharged state, if stored fully charged, the result can be a permanent reduction in capacity.
When stored at +40°C or more charge additional every two months.

Typical: Very good weight : energy ratio. High load cells have also a good weight : power resp. performance ratio.

Hint: Many manufacturers direct how many cells are allowed to use in series and/or parallel use.

The exact technical term of a **Li-Po** cell is Lithium-Ion-Polymer battery. These are hybrid cells and contain gelled electrolyte to enhance ion conductivity. The "true" (dry) Lithium-Polymer cells suffers from poor conductivity and work only with higher temperatures of more than 60°C.

5 Mounting instructions CE ring

Use 2.5 mm² cables, 1 cable red, 1 cable black.

Solder 1 male socket at every end of cable.

Slide ring from free end of cables to 4 cm (2") to the male sockets and fix it with your fingers. Make additional 3 windings through the center of the ring.

Cut cables to 15 cm, if cables at the pack have 5 cm (Max. total length 20 cm).

The cables now looks like those of the picture on page 4.

Bind cables with short pieces of heat shrink tubes.

Solder your connectors on to the free ends of the cables now.

You can also use our pre-fabricated charge cables CE-kab-i8.

6 Functions

Charge- and discharge programs of Pack 1 are split into groups, which can be selected using the +/- buttons after you have pressed ***f2/3/4:pack1/2/3param*** and ***f2:Progrm***. The charger will perform the option you select by pressing the ***enter*** button. All programs use those currents as their maximum, which were separately selected under **C-curr** and **D-curr** in the first and second parameter screen.

[*] not at battery 2 output (Akku2), **[**]** only selectable on battery 3 output (Akku 3)

2 fixed current combination programs*	fix_CD, fix_DC,	(up to 5 times)
2 automatic current calulation combin.programs*	auto_CD, auto_DC,	(up to 5 times)
1 fixed current charge programm	fixC,	
1 fixed current discharge programm*	fix-D,	
1 automatic current calulation charge program	autoC,	
1 automatic current calulation discharge program*	autoD,	
div. maximum currents [Amps]	0.1, (0.15, 0.2**), 0.25, 0.3, 0.5, 0.4, 0.6, 0.8, 1.0, 1.2, 1.5(A3), 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0(A2), 5.5, 6.0, 6.5, 7, 8, max.(10)(A1)	

The actual charge current may also vary with battery type, number of cells, battery condition etc.

The discharge current on akku 3 output is max. 400mA.

Note regarding these instructions:

To move to a particular menu point you may have to navigate your way through several screen displays.

Sometimes these instructions list the complete path, i.e. a sequence of function buttons which have to be pressed, together with the associated texts, always starting from the **PowerOn** screen.

A summary of the names used for the function buttons can be found in

Chapter 30: Menu Tree Structure.

7 The first step

- **Take the chameleon high end out of the packaging.**

See Chapter 2: General Remarks and Precautions. Lack of air circulation may cause overheating.

- **Remove the 5 sockets at the left side of the housing** (if not packed separately anyway).
- **Connect the chameleon high end to the 12 volt power source car battery.**

Note: No batteriepacks must be connected to the charger during this procedure. Try to achieve a good contact to the car battery terminals first time, otherwise you may not get the **power-On** screen ("#GO#") on the display. In this case disconnect **immediately** and retry after about 5 seconds.

- **The LCD panel shows the *powerOn* Menu screen (*powerOn* visible at right top) with the ms-logo and the name of the device isl 8-936g chamaleon high end plus date and time.**
- **Press *f2: pack1* to have a look at the screen for Output 1:**

The screen will show an empty coordinate-system graph with a horizontal minute scale and a vertical voltage scale. *pack 1* is displayed at top right of the screen.

- **Before you connect a batterypack, check the top line of the display (Battery-status) whether the charge program suits your batteries. The selected charge program is displayed after the text *ready / rdy*.**
- **Before you start testing the unit by charging a battery, please check the top line of the screen display (battery status display) to ensure that the correct battery type** (e.g. NiCd) is set, and that the **charge / discharge program** and the maximum permissible **charge / discharge current** (in the Parameter menu "below" it) are suitable for your battery. You will see the selected charge program after the "#GO#". P.S.: the method of setting this and other parameters is explained in detail later.

Normally the fully automatic charge program **auto L** will be the best choice for nickel batteries. The fully automatic programs will check the battery several times during the charge regarding its energy consumption ability and adjust the charge current accordingly. Therefore no specific knowledge about Ni-Cd or Ni-MH cell type and number is required, as long as it is a sintered type between 100mAh up to some amp-hours (Ah) (Note: at Ni-Cd cells a charge current of min. 2 C, at Ni-MH-Zellen a charge current of min. 1C must be ensured).

If the charge current stays below 1C (1C=nominal capacity of the battery), the battery is usually not (or no more) quick chargeable (e.g. high capacity Ni-MH batteries in mignon-size (AA)). Especially at low cell numbers this may also cause problems for the automatic to detect full condition. In this case it is advisable to adjust the charge rate manually or even better: Replace these batteries for other types - if the low curent is not caused by the charge cable or its connectors.

The fully automatic programs can only perform correctly if the charging leads have adequate cross sections **(2.5 mm² - also for Tx- and Rx-batteries!!!)** and the cells are soldered together (i.e.: no spring loaded battery boxes!).

If you want to change the parameters for pack 1, press ***f2: p1param1***. This will open a new sub-menu giving the function keys ***f1*** to ***f5*** new meanings and names.

1) It is the ***f1*** button with which you select the battery type. In the second row above the function keys the display shows the current values which have been set at the factory (or later: the ones which you had selected).

Pressing the ***f1: BattType*** key will create a small field of +-----+ letters in the display showing the actual battery type.

The descriptions of the key functions will move up like signatures above the windows which is activated. The bottom line (directly above the keys) will now show the actual functions of the

esc and ***enter*** keys.

Furthermore two arrows point at the ***+/-*** keys at the right side. With these keys you can scroll through all available battery types for Output 1.

After you have found the battery type you want (need!), confirm your selection by pressing ***enter***. If you won't change the battery type, it is not necessary to scroll back: Just press ***esc***.

The new program will become active after connecting the battery.

When leafing through the Battery Type menu you will have noticed the presence of the items “write” and “read” in addition to the battery types. This refers to the 12 configurations which you can store and call up again (see Chapter 25).

All other menue points have also to be operated in this way.

For full batteries with maximum safety the following adjustments are recommended: (Recommendations shown in bold typing)

2) Program select: ***f2: Program:*** Our Proposal for Ni-Cd and Ni-MH batteries: **auto C**

3) That the program works as you want the individual charge / discharge currents may be selected manually. The automatic programs will use these manually selected currents as maximum currents. The range of current may vary during charge/discharge, but will not exceed the selected maximum current.
Current to select: ***f3: C-Curr:*** Our proposal for the autoC charge program: **I=max.**

4) Number of cells (***f4: CellCnt***) will indicate 0, as no battery is connected yet. Later during charging or discharging, the number calculated by the device may be corrected manually.

Now press ***f5: next Menue*** to get the next menu screen (p1param2).

5) Next important step in setting up the safety functions is the max. energy input. To charge a completely empty 2400 mAh cell, usually an energy input of about 2400 ... 2600 mAh is required.
Max. charge input for empty 2400 cells: ***f2: QUANTmAh:*** Proposal: **2400mAh.**

6) Next safety function is the max. charge time. Charge times in automatic mode will vary depending on battery type, number of cells, cell condition etc.
With a fully automatic charge program it is only possible to estimate the charge time, and the time also varies from cell type to cell type. For this reason you must enter the higher value (see below) if experience does not tell you otherwise. Hint: If the required charge time exceeds 3 hours, something is seriously wrong: either the battery is defective or the charge leads and/or the connectors are unsuitable.
Max. charge time for **Ni-Cd** Batteries: ***f3: TIMEmin:*** Proposal: **25 ... 45 minutes.**

7) Discharge currents at autoD: ***f3: D-Curr:*** Proposal: **I=max.**

8) You must also set the method of working of the automatic charge termination circuit. The setting which works well for most batteries is:
Peak-Cut-Off: ***f4: CutOff:*** **normal** (for Ni-Cd Akkus)**, sensit** (sensitive: for Ni-MH batteries)**.**

Now press ***f5: next Menue*** to get the next menu screen (p1param3).

9) The temperature cut off (***f1:Temp.Lim***) should be setted to "OFF".
Note: if a temperature sensor is present you can assign it to the various batteries. Please read Chapter 14 for information on battery monitoring systems. If you have assigned the sensor to a battery, but the sensor is not connected, you will hear a constant series of warning beeps.

10) Next item in the menu determines the initial program for output 1 when the device is connected to a power source:
Program at power-on-reset: ***f2: POR.Prg:*** Proposal: **last** or **autoC** (when you preferably charge Ni-Cd or Ni-MH batteries at this output).

11) Charging of transmitters with build-in discharge protection diode: ***f3: w.Diode:*** select: „OFF“.

12) Finaly you can decide whether you want to use short discharge pulses during charge. This methode is recommended to re-activate ´tired´ batteries. This method should be most useful with Tx- and Rx- batteries which are never completely discharged. However, using this process does not even out the varying self-discharge rates of individual cells in the pack, and does not cause the cells to hold more charge, so the use of the function is purely a matter of taste …
Refresh charge: ***f5: refresh:*** Proposal: **OFF.**

Please check also the menue for the battery 2 output. You do not find so much menue points because of the missing discharge possibility.

By playing with the keys without any batteries connected you get to know the **isl 8**. The selection of functions and the variation of values is always the same. If you are looking for a certain function, please use the Menu-Tree-Structure for reference (**Chapter 33**).

- The *esc* key will always lead you back to the *powerOn* Menu screen without changing any values! In those cases when no values will be selected you can also get back to the battery screens (**pack x**) by pressing the ***enter*** push-button.

From the **powerOn** Menu screen press ***f5*** *twice* ***(f5:i8param1, f5:i8param2)*** and then ***f4*** ***(f4:name)*** if you want to add a personal word/name.

Default on delivery is the name **schulze elektronik gmbh** with a **“v”** acting as cursor above the first letter "**s**".

Other standard values can be called up with the function keys on the right side

(date: 15. 6.95, time: We 12:30, copy: buffer1 to memory ...).

Use ***f2*** and ***f3*** to move the cursor left or right. ***f1*** and ***f4*** will delete the letter below the cursor before it will move to the next position. To change the letters use the ***+/-*** key, marked with **sign select**.

Press ***enter*** to store the new name in the non-volatile memory of the **isl 8**, or press ***esc*** to clear all changes and leave this sub-menu.

Note: If a menu item on the display appears inverse (black background), the appropriate function key is temporarily blocked (i.e.: during test phase of Pack 1).

If temperature value appears inverse, battery is not assigned and temperature-cutoff is deactivated.

A ‘*’ in front of a menu item indicates, that this function is not available yet, but may be activated during a future software update.

Back to the **pack 1** screen:

• The program which is displayed in the top line will start after the battery is connected.

The charge amount will be continuously updated right next to the program / current display. Next to it you can see the temperature, measured via a connected sensor. At present this is for information only and can not be used for temperature cut-off purposes.

On the right side of the display, below the car battery voltage (inverse for better contrast) the status of the other two charge Outputs is shown.

• A Full indication or the disconnection of a battery will automatically cause a change to the appropriate screen to show this event. The name of *Pack x* (inverse) can be seen in the right top corner of the screen.

Temporarilly connect a battery to Output 1 and watch the screen.

The top line will display from left to right: charge time, battery voltage, charge current, charge amount and temperature.

The **chameleon high end** will complete the charge (if you leave the battery connected) and indicates FULL (or EMPTY after discharge) together with a melody (or a buzz if melody = 0) which will stop after a short time.

You should now know the most important functions. Still, we strongly recommend you to study the rest of the manual to make the best use of your device and learn about further options and how to interprete warnings.

The **chameleon high end** will complete the charge (if you leave the battery connected) and indicates FULL (or EMPTY after discharge or TEMP or TIME or QUAN when cuts-off by the

temperature, time or quantity limit) together with a melody or a buzz (Melody=0) which will stop after a short time.

You should now know the most important functions. Still, we strongly recommend you to study the rest of the manual to make the best use of your device and learn about further options and how to interprete warnings and errors.

8 Nickel battery programs (Ni-Cd, Ni-MH)

After being disconnected from the car battery, the **chameleon high end** will turn back to a chosen program or to the last one (**last**) being selected (see Menu-Tree-Structure).

Last will store the program type when a battery is connected.

If a different program is required, it has to be selected **before connecting a pack**.

After termination of the chosen program - the pack is now full or empty - a buzzer or a melody will play for a short time period and the blinking light output becomes permanently activated. To interrupt just press the ***+/-*** key. The LCD panel shows the final values.

As the screen only shows the graph for one battery you may want to know what is happening on the other Outputs. Press ***f5:packStat*** from the appropriate screen and the display will provide the status of all connected batteries at the time ***f5*** was pressed. No update will take place in this mode.

Program- and Parameter selection:

While ***pack 1*** screen is shown on the display, press ***f2:p1param*** to get to the parameter sub-menu of Output 1.

By pressing the **- key** you get to the discharge and PB programs. Pressing the **+ key** will get you to the automatic combination programs. The constant current programs are located in between.

To get to and from the Lead-acid programs no battery must be connected.

Whenever an automatic program is selected, **auto** or **aut** will appear in the display.

Note: Program select is closely linked with the menu items **D-curr.** and **C-curr.**

Please read the following paragraphs.

Ensure the cut-off mode and safety functions selected will suit your battery.

If the safety functions have been set up incorrectly, they may not only loose their intended purpose (avoiding overcharge in case of a malfunction), but may even cause adverse results, i. e.:

Interrupting the charge before the battery is full.

Data like charge time, voltage at end of charge and charged capacity may give valuable information about the charge behaviour, the capacity of the connected battery-pack or improper full indications.

Note:

If **auto** or **aut** appears in the Select field, this always means that you have selected a fully automatic program (automatic charge and/or discharge current calculation).

Because of the way these programs work, they are **not suitable for charging transmitter batteries**, nor for charging batteries fitted with thin (standard) charge leads. When the charge current is calculated automatically, the circuit takes into account the conductor tracks in the transmitter, the thin charge leads (e.g. to the receiver battery) and the connectors (usually with a maximum current capacity of only 1 A), and this leads to extremely low charge currents which cause the automatic charge termination circuit to fail.

Typical result: the transmitter battery is overcharged, and may leak or explode!

For this reason: never charge a transmitter battery in the transmitter.

However, if you insist on doing this (on your own head be it):
always select a fixed current program.

But please note: NiCd batteries have to be charged at 2 C and NiMH batteries at 1 C, so a 3000 mAh Ni-MH transmitter battery should be charged at a current of 3 A. No transmitter's circuit board tracks will tolerate such currents, and neither will the connectors used for the transmitter and receiver batteries (generally these are only approved for 1 A).

We do not recommend this method of battery charging, and expressly deny any liability if you decide to use it!

Ni-Cd/Ni-MH charge program with manual charge current selection (fixC)

These programs will charge your batteries with your selected ***C-Curr*** directly after connecting your batteries.

Partly suitable to charge transmitter batteries (see hint on the page ahead).

Please note that the microprocessor may reduce the current if due to the chosen charge rate the rising voltage or current threatens to cause overheating.

The ***isl 8*** charges until full condition is detected. The charger switches to trickle charge ("**t**", Ni-Cd batteries only). Charge time, battery peak voltage and loaded capacity are displayed on the screen. Full indication also starts buzzer for a short time.

Suitable charge currents may be selected by the following rule:
Charge current = 2 x C (C=nominal cell capacity)

Example: Cell capacity C = 1.2 Ah, charge current 2 x 1.2 = 2.4A. Selected charge current: 2.5A

Ni-Cd/Ni-MH charge program with automatic charge current selection (auto C)

These programs will charge your batteries with your selected ***C-Curr*** directly after connecting your batteries. The charger automatically calculates a charge rate which suits the battery. The battery will continuously be checked during the charge and the charge current is adapted to the actual condition. Initially the program starts with 300mA, then increases the current to the calculated values, which may result in a reduced current towards the end of the charge.

Partly suitable to charge transmitter batteries (see hint on the page ahead).

The program will not exceed the maximum value set in menu item **C-Curr**.

Caution: the automatic NiMH circuit works with a high initial current which should not be limited without due reason

The ***isl 8*** charges until full condition is detected. The charger switches to trickle charge ("**t**", Ni-Cd batteries only). Charge time, battery peak voltage and loaded capacity are displayed on the screen. Full indication also starts buzzer for a short time.

Note: In contrast to other programs, this fully automatic program always starts with a double beep when you connect the battery.

Ni-Cd/Ni-MH discharge program with manual current selection (fix-D)

This program starts with the **D-Curr** current you have previously chosen, when connecting the batteries, and ends when the discharge voltage is reached. During the whole discharge the current will be kept at the value you selected, or may be reduced in order not to exceed the performance range of the **chameleon high end**.

In contrast to the Capacity Measuring program, the discharge programs enable you to determine the remaining capacity of a partially discharged battery (for example to measure how much is left in your Rx battery after a couple of flights).

At the end of the program discharge time, discharge voltage and discharged capacity will be displayed. A buzz or a melody will be activated for a short time.

Note: For precise measuring of battery capacities a discharge current of 1/10 C is recommended, i.e.: a 1000mAh battery should be discharged with 100mA.

For practical purposes higher discharge rates can be tolerated and may even be more realistic.

In other cases you should limit the maximum discharge current in the menu point D-Curr for cells of low capacity (receiver batteries) and cell packs which could be subjected to excessive discharge currents through the energy re-transfer circuit; this avoids the cells being damaged through overheating. Recommended values for maximum continuous currents are 1 C to maximum 2 C.

Info: The discharge cut-off voltage used for the Ni-Cd-discharge programs is about 0.85V per cell, for Ni-MH batteries the level is about 1 V/cell. The microprocessor will detect the number of cells with sufficient accuracy, but manual corrections may be made via menu item **CellCnt**, while the program is running.

This feature is available for all programs of Output 1 and 3 ("**akku 1**" and "**akku 3**").

When deep-discharged cells are connected, the number of cells will automatically be corrected after about 10 minutes.

8.4 Ni-Cd/Ni-MH discharge program with automatic current selection (autoD)

This program starts discharging after the battery is connected. The battery is initially discharged for around a minute at a low discharge current while the charger measures its characteristics. It then applies a discharge current suitable for the battery.

The discharge current will not exceed any discharge value programmed under ***D-Curr.*** However, the initial discharge current is always limited by the max. discharge performance or the max. discharge current of the **isl 8**.

Low capacity batteries (Rx-battery) or batteries which allow re-charge into the car battery, may be discharged at a lower rate to prevent damage. Recommended constant discharge rates are 1C to max. 2C.

This program will discharge the battery connected to Output 1 down to the discharge voltage (see **Chapter 8.3 Info**).

In contrast to **fix-D,** the **autoD** discharge program will automatically decrease the discharge currents towards the end of the discharge. The current (only at Ni-Cd batteries, not at Ni-MH batteries) will be reduced in steps and finally turned off. This way, the Ni-Cd cells may be discharged to a lower level.

A buzz or a melody will be activated for a short time.

8.5 Ni-Cd/Ni-MH battery conditioning programs (autoDC, fixDC)

This program starts with the discharge program after the battery is connected and switches automatically to the charge program when battery is discharged. This program is intended to erase any memory effect and is particularly suited to freshen up (e.g. once a week) Tx and Rx-batteries which are usually never completely discharged in normal use.

This program starts with the discharge program (**autoD** resp. **fix-D**). After reaching the "empty"-voltage level the ***isl 8*** automatically runs the **autoC** resp. **fixC** program in sequence.

Please read the descriptions of the individual programs to understand the way they work and how to set the currents.

For new or irregular maintained batteries a single discharge/charge-cycle may not be enough to achieve a complete formatting of the cells. In this case the **aut2DC** resp. **fix2DC** up to **...5DC** provides the option of automatically running cycles. The **...5DC** program stops the cycles when the max. discharged capacity (discharged quantity) has decreased.

These programs will finish like a **fixC** resp. **autoC** program, with buzzer or melody.

Only the usual charge data, but no information about the discharge cycle will be displayed on graphic display.

The **packStat** menu will show the capacity values of all charge/discharge cycles.

8.6 Ni-Cd/Ni-MH capacity measuring program (autoCD, fixCD)

This program starts with the charge program charging after the battery is connected and then discharge down to the "empty" voltage level.

This program enables you to monitor the performance of your batteries during their lifetime, allowing you to estimate their usefulness.

This program starts with the charge program (**autoC** resp. **fixC**). After reaching the "full"-state the ***isl 8*** automatically runs the **autoD** resp. **fix-D** program in sequence.

Please read the descriptions of the individual programs to understand the way they work and how to set the currents.

The programs also can run automatically for up to 5 times. The **...5DC** program stops the cycles when the max. discharged capacity (discharged quantity) has decreased.

At the end of the discharge the graphic display will show discharge time, discharge voltage and capacity, and a buzz or a melody will be activated for a short time.

The **packStat** menu will show the capacity values of all charge/discharge cycles.

9 Lead-battery programs (lead-acid, lead-gel (vrla))

The lead-acid battery charge programs all bear the designation “Lead” in the battery type designation.

If you select this battery type you can charge and discharge lead-acid and lead-gel batteries.

Lead batteries behave entirely differently from sintered-cell Ni-Cd batteries, which are commonly used as power sources in model aircraft, cars and hydro-boats. Lead batteries can only supply relatively low currents relative to their capacity if you wish to exploit their full capacity, otherwise the voltage falls off to an excessive extent. The same also applies to charging: the battery manufacturers usually state 20 hours to reach full nominal capacity (charge current 0.1 C, voltage limited).

The lead charge programs of the chameleon high end charger provide a steadily rising charge current which gradually declines again when the battery’s maximum voltage is reached.

The charge programs provided by the charger are capable of giving lead batteries virtually a full charge in just a few hours. The appearance of an “a” on the screen after the charge time display indicates that the charge current has declined to half of the maximum set value. At this point the battery is around 4/5 fully charged, and the process of charging the last 20% occurs much more slowly. Further increase in capacity is indicated by the appearance of the letters “b” and “c” as the current falls back further (1/4, 1/8). The time between the “a” point and the full display (when the charge current is switched off) may be almost as long as the time between connecting the battery and the appearance of the “a”. The buzzer sounds briefly when the full display appears.

9.1 Lead battery charge program Fixed-C

Set a charge current of around 0.4 C (see Chapter 4).

If you are ever in doubt about this, always follow the instructions supplied by the battery manufacturer, as they do not necessarily agree with our suggestions, nor those of the importer or your model shop!

The charge phase begins with a period when the battery is ‘balanced’; this is indicated by a flashing + preceding the current value.

If you see no “+”, this indicates that the charger has reached the nominal charge current, and will not rise any further. If the screen displays a “*” constantly, this means that maximum charger power has been reached (this may occur when you are charging a high-capacity 2V glowplug battery).

9.2 Lead battery discharge program Fixed-D (not at the Batt 2 output)

For an accurate capacity measurement of your batteries please use a discharge current of around 1/10 C; for other purposes you can set any current within the permissible discharge currents for the battery.

9.3 / 9.4 Lead battery combi-programs FixedDC and FixedCD (not at the Batt 2 output)

These programs are a combination of the charge and discharge programs.

…DC means that the battery is first discharged, then recharged; …CD means that it is first charged, then discharged. It is possible to carry out these combination programs repeatedly in sequence: when you select a combination program, the charger asks whether you wish to select up to five DC or CD cycles (max. 5).

Note:

- Don’t be surprised if the chameleon high end charger already shows full when the battery has reached around 70% of its nominal capacity. The reason is that the nominal capacity (i.e. useful life) of a lead battery is very quickly reduced by incorrect handling (overcharging, many 100% discharges, and especially deep-discharges). For more information please read the instructions supplied with your battery.
- If you connect a battery which is already three-quarters full, or is exhausted (i.e. reduced nominal capacity), it will not be charged at the current you have set in the charge current menu, as the battery reaches its maximum permissible voltage before the selected maximum current is reached.
- During the charge process the charge voltage limit is reduced to the voltage value for continuous charging (approx. 2.75 V / cell). In this case the isl 8 generally alerts the user by displaying the message “wrong cell count” for a few seconds.

10 Lithium-Battery Programms (Li-MnO, Li-Ion, Li-Po)

The Lithium battery charge programs all bear the prefix “Li” in the battery type designation.

As explained in Chapter 4, there are currently three different types of Lithium battery in common use by modellers.

Lithium-Manganese-Oxide cells (Li-MnO, trade name: Tadiran) are no longer in production, although some modellers are still using them as receiver batteries (two cells produce 6 Volts). These packs can be charged using the isl 8 in exactly the same way as Lithium-Ion and Lithium-Polymer cells.

However, it is essential always to set the correct cell type in the menu, so that the charge or discharge data match your battery (on no account charge Li-MnO cells using the Li-Io or Li-Po program).

The Lithium charge programs of the **chameleon high end** charger provide a steadily rising charge current which gradually declines again when the battery’s maximum voltage is reached.

Note: If you connect a battery which is already full or almost full, it will not be charged at the current you have set, as the battery reaches its maximum permissible voltage before the selected maximum current is reached.

The charge programs provided by the charger are capable of giving Lithium batteries virtually a full charge in just a few hours. The appearance of an “**a**” on the screen after the charge time display indicates that the charge current has declined to half of the maximum set value. At this point the battery is **around 4/5 fully charged**, and the process of charging the last 20% occurs much more slowly. Further increase in capacity is indicated by the appearance of the letters “b” and “c” as the current falls back further (1/4, 1/8). The time between the “a” point and the **full** display (when the charge current is switched off) may be almost as long as the time between connecting the battery and the appearance of the “a”. The buzzer sounds briefly when the **full** display appears.

10.1 Lithium battery charge program fix C

Set a charge current of around 1 C (see Chapter 4).

If you are ever in doubt about this, always follow the instructions supplied by the battery manufacturer, as they do not necessarily agree with our suggestions, nor those of the importer or your model shop!

The charge phase begins with a period when the battery is ‘balanced’; this is indicated by a flashing **+** preceding the current value.

If you see no “**+**”, this indicates that the charger has reached the nominal charge current, and will not rise any further. If the screen displays a “*****” constantly, this means that maximum charger power has been reached.

10.2 Lithium battery discharge program fix-D (not at the Akku2 output)

For an accurate capacity measurement of your batteries please use a discharge current of around 1/10 C; for other purposes you can set any current within the permissible discharge currents for the battery.

10.3 / 10.4 Lithiumbattery combi programs fix-DC and fix-CD (not at the Akku2 output)

These programs are a combination of the charge and discharge programs.

…DC means that the battery is first discharged, then recharged; …CD means that it is first charged, then discharged. It is possible to carry out these combination programs repeatedly in sequence: when you select a combination program, the charger asks whether you wish to select up to five DC or CD cycles (max. 5).

If you set five cycles, the ***isl 8*** will also interrupt the combi maintenance program if it detects that the charge quantity removed from the pack is less than in the previous cycle.

11 Charging/discharging of Ni-Cd / Ni-MH transmitter batteries

Many transmitters are fitted with discharge protection diodes (short-circuit guard diodes). There are two options here: you can either by-pass the diodes in the transmitter, or you can set the menu point “**w.Diode**” to “**ON**” for the charge process in the ***p1param3*** *or* ***p2param3*** menu. The diode prevents the charger detecting that a battery is connected for charging, so you must start the charge process manually by pressing the “+” button.

Since the Battery 3 sockets have no voltage converter, in theory this output could be used to recharge a battery in a transmitter whose electronics remain connected to the battery during the charge process (i.e. not disconnected by the On/Off switch).

However, you must understand that it is fundamentally dangerous to charge a battery in the transmitter, as the battery could even explode, causing serious damage. We therefore advise you never to do this.

12 Charging / discharging 1-3 cells, output 1

Note following safety warnings and hints:

Charging:

Normally buzzer and display warns when cells are connected which voltage are too low. After about 30 seconds, charging cycle will be finished, if charging voltage does not increase above a certain value. These warnings and the previous switch off can be oppressed when pushing the plus button within the first 30 seconds of charging. When pushing the button, you must be in the corresponding graphical ***pack 1, pack 2 or pack 3*** screen.
Because of the fact that this described warning message appears at combination programs only when the charging program works, the use of any combination program is problematic and you also should not use it for safety reasons.

Warning:

Voltage peak of the cells is not very high when charging less than 4 cells. Cut of automatic function is not guaranteed. It is possible, that the peak cut off automatic stops charging too early, too late or not. Be sure, that charging current is as high as possible for the charger and near the maximum for the cells.

Discharging:

No special procedures necessary.

Note:

The hardware is not specially designed to discharge one Ni-Cd / Ni-MH cell. Discharging currents could be reduced by the ***isl 8***, when voltage is lower than about 1 volt. In this case the real discharge current flow could even be different to the displayed current of the ***isl 8***.

35 Writing/reading the twelve configurations

Retrieve configurations (read): Press the f1-„BattType“ key in the „p?param1“ menu and press the „+“ key until „read“ appears. After you had pressed „enter“ you can select one of the 12 configurations (see chapter 25). In the next to last display line the configuration name -resp."?"- appears. With „enter“ you replace the current parameter settings by the stored parameters.

Store configurations (write): Press the f1-“BattType“ key in the „p?param1“ menu and press the „+“ key until „write“ appears. After you had pressed „enter“ you can select one of the 12 locations of the configurations (the old configuration name -resp."?"- is also displayed). By pressing „enter“ you confirm the number of the storage location. The ***isl 8*** now expects the input and/or change of the name of the configuration (similar to the proceeding of the owners name input). After the confirmation of the configurations name the current parameters are stored into the non volatile memory.

13 Automatic Cut-off Circuit

Before we discuss the various methods of automatic charge termination, you should be aware of a few basic facts:

In most cases selecting the **normal** setting for the "**CutOff**" circuit gives the best results with genuine Ni-Cd sintered cells (not hybrid cells). In the **strict** setting, especially with the automatic programs, the charger sometimes fails to detect the Peak. Ni-MH batteries are generally charged using the sensitive (**sensit**) setting. Lead and Lithium batteries are switched off when the maximum charge voltage (**U-max**) is reached, and the charge current starts to decline.

The method of charge termination is selected in the menu point **CutOff** under p1param2, p2param2 and p3param2.

13.1.1 OFF: no Delta Peak (Delta-U) cut-off

In this mode continuous charging is possible, as the automatic Delta-Peak circuit does not switch off the charge current.

For safety reasons the **C-current** is automatically set to 100 mA when you select **OFF** (**battery overheating risk**), or if the temperature sensor is disconnected when **ON** is selected.

If no battery is connected to the charger, the value of **C-current** cannot be increased.

If a battery is connected, the charge current can be increased to a maximum of 500 mA while the battery is on charge.

Under 200 mA the charge current consists of pulses of charge current; this is indicated by the tilde (~) preceding the charge current display on the graphic screen. The pulses are delivered at fairly broad intervals, which can be seen very clearly if you refer to the charge curve.

13.1.2 sensitive: Delta Peak cut-off for flat voltage reduction

sensit: Delta Peak cut-off with sensitive characteristic:

This automatic termination method switches off the current when the final charge voltage curve reaches a plateau (flat), as is commonly encountered with hybrid Ni-Cd cells or Ni-MH cells.

Usually this setting provides the most straightforward method of charging Ni-MH batteries.

It can occur that the charge process is switched off automatically right at the start of the process if you try to recharge a pack of deep-discharged cells. You can avoid this by entering a delay time (in minutes) for charge termination in the ***p1/2/3param3*** menu; the parameter is **DELAYmin**. At the start of the charge process a delay period has to elapse before the automatic cut-off circuit become active, i.e. it only comes into force after the set number of minutes.

Caution: if the delay time is active and you connect cells which are already full (to give them a "top-up") they will probably become very hot because the cells are charged initially without peak monitoring.

This cut-off mode can be used with or without **temperature monitoring** (see **Chapter 14**).

13.1.3 normal: Delta Peak termination for normal voltage reduction

normal: Delta Peak cut-off using well-proven termination criteria.

In most cases this setting is the most straightforward method of charging Ni-Cd batteries.

This cut-off mode can be used with or without **temperature monitoring** (see **Chapter 14**).

13.1.4 strict: Delta Peak cut-off for high voltage reduction

strict: Delta Peak termination with very strict termination criteria.

This automatic cut-off method should only be selected if you experience premature terminations when using the **normal** setting. For example, this might occur with deep-discharged 1700 mAh N-SCRC cells.

Warning: this method of charge termination is particularly unlikely to work properly with packs of selected cells.

When hybrid cells are used with the Auto C program, the charge current is reduced so markedly towards the end of the charge process that under certain circumstances no detectable voltage peak occurs at the end of the charge. This means that the automatic cut-off circuit is not triggered.

This mode cannot be selected for Ni-MH batteries.

This charge termination mode can be used with or without **temperature monitoring** (see **Chapter 14**).

13.2 DELAYmin: Delta Peak (Delta-U) cut-off will be activated after a time delay

Activating this menu point generates a delay time of 1 minute (standard), 5 minutes or 9 minutes. This period has to elapse before the peak termination circuit is activated.

Caution: if the delay time is active and you connect cells which are already full (especially if you are using the fully automatic Ni-MH program) they will become very hot because the cells are charged initially without peak monitoring.

Note: the Peak monitoring circuit itself also takes at least one minute to gather the battery's charge data, assess the information, then switch off the charge current.

14 Monitoring and safety facilities

The charger contains two types of monitoring and safety facilities:
1) Those which protect the device itself, e.g.: the demagnetization-sensor or the maximum charge performance control to avoid over-heating of the **isl 8**, and
2) Those which protect the batteries connected.

For those under 1) please see **Chapter 20**.

As already mentioned in **Chapter 7 - The first Step -**, correctly set safety facilities may prevent damage/destruction of your battery in case of cut-off automatic malfunction.

But be aware: Incorrect set-ups may not be able to prevent over-charge and may even cause premature cut-offs.

14.1 Temperature monitoring

Temperature monitoring can be used for charge- and discharge programs.

The max. temperature limit can be set (beginning from the POR screen) via ***f5: i8param1, f2: off.tmp***.

The temperature values can be adjusted in steps of 2°, the resolution of the sensor. To switch from odd to even values you just have to go for the limits. The upper limit will turn to even, the lower limit to odd numbers.

Only one temperature sensor is available, but it can be used in many different ways.

14.1.1 If the sensor is not assigned to any of the three outputs, it will turn off the isl 8 itself when the selected temperature plus 30°C is exceeded.

14.1.2 The sensor can be assigned to any of the three outputs.

14.1.3 It is also possible to assign the sensor to multiple outputs. This makes sense if the sensor is used for emergency cut-off at 75°C. At 'normal' cut-off temperatures of 45°C all assigned outputs would be turned off, independant of their state of charge, as the sensor can only monitor one battery.

14.1.4 Assignement of the temperature sensor:

14.1.4.1 Assigning Battery 1 to Battery 3:

This parameter is set in the menu point **Temp.Lim** under p1param**3**, p2param**3** or p3param**3**, which you can reach via the menus AxParam1, next menu, next menu (where x = 1, 2 or 3).

Activation display:

The activated temperature display is shown on the graphic screens in normal text style (i.e. not inverse video).

If the active display shows —°, this indicates that the temperature sensor is not connected, or there is a cable fracture, and the charger emits a warning signal. If a battery is connected, it is not charged; if this occurs while a charge process is under way, it is interrupted with the message **Tfab** in the top status line.

If temperature monitoring is active, it is important to ensure that the battery temperature is below 41°C at the start of the charge / discharge process. If the temperature is higher than this, the charge or discharge process is not initiated; the **isl 8** waits until the battery has cooled down. A message **Temp.Lim** (temperature limit exceeded) appears on the screen.

Hints

- It is up to you to attach the temperature sensor to the correct battery pack !!!
- Never use Temperature-cut-off on PB-batteries, as it will more likely lead to the destruction of the battery rather than to a proper charge. Selection of excessive charge currents or constant charges exceeding the max. voltage will cause permanent damage (loss of capacity) or even destruction of the battery.
- Using Temperature cut-off for Combination programs (DC, CD, 3DC, 2CD ...) without Delta-peak monitoring (**CutOff OFF**), the battery temperature **must not** exceed the cut-off temperature during discharge (Select a low discharge current, otherwise the cut-off will cause a premature end of the discharge cycle).

If Delta-peak monitoring is activated, exceeding the selected temperature will cause an emergency cut-off.

- Disconnected temperature sensors or sensors with defective wires will stop the program together with the **TEMP** message.

13.1.4.3 Control

Activated temperature monitoring can be identified by normal letters on the battery screens. If temperature monitoring is inactive, the value is displayed inverse.

13.1.4.4 Message

If programs are terminated because the set temperature values are exceeded, the display will show **TEMP** instead of the usual **FULL** or **EMPT**y message. When using a combination program (Output 1 or 2), **TEMP** means in this case: (dis-)charging interrupted, not really empty/not really full. If the battery temperature is higher than 40°C (not adjustable) before a discharge process, the discharge is not initiated, and the screen displays the message **Temp.Lim** until the battery temperature falls below 40°C.

14.2 Charge quantity monitoring

As the name implies, this function is limited to charge programs.

For activation and set-up of this function, press **p1param2, QUANTmAh** for Output 1, **p2param, QUANTmAh** for Output 2 or **p3param2, QUANTmAh** for Output 3.

The procedure is very easy: Just add about 10% ... 20% to what it takes to charge your battery and program this value. A "**>**" (greater) sign in front of the quantity value means, that quantity monitoring is disabled.

The charge quantity must be selected for all battery types separately.

The QUANTity units used in the menu are mAh (milli-Ampere-hours; the graphic display shows mAh or Ah (1000 milli-ampere-hours = 1 Ah (amp-hour)).

Example: A standard 1700 mAh cell requires about 2 Ah for a complete charge. The safety cut-off for this type of battery should be set at a minimum of 2200mAh.

Some selected 2400mAh may even require 2700mAh for a complete charge. If the charge is frequently terminated by the charge monitoring function, the set value may need to be increased. Be reminded that a partially charged battery will not be able to consume a full nominal capacity charge (To avoid the memory effect you should discharge your batteries anyway).

Please bear in mind that it is not possible to charge the full nominal capacity into a battery which is not completely discharged beforehand (however, to minimise the memory effect you should really ensure that the cells are completely discharged first, right down to the final discharge voltage).

If programs are terminated because set charge quantity values are exceeded, the display will show **"QUAN"**tity. instead of the usual **FULL** or **EMPT**y message.

14.3 Charge time monitoring

As the name implies, this function is limited to charge programs.

For activation and set-up of this function, press **TIMEmin** (time / minute) item in the ***p1param2, p2param2 or p3param2*** menue of the three packs.

The charge time must be selected for all battery types separately.

Setting the max. charge times is quite easy: Just add about 10% ... 20% to what it takes to charge your battery and program this value. A "**>**" (greater) sign in front of the time value means, that time monitoring is disabled.

The units used in the menu are min (minutes; the graphic display usually uses seconds).

While the expected charge time can be easily estimated for the **fix C** programs, the times in **auto C** will vary according to the calculated charge current.

Still, checking the charge times in automatic mode may give you an indication on the condition of your battery: Fit batteries require less charge time.

For comparison you have to ensure similar conditions: Identical charge lead (2.5mm^2) and similar temperatures of batteries and surroundings. Cold batteries take longer than warm batteries.

If programs are terminated because set charge time values are exceeded, the display will show **TIME** instead of the usual **FULL** or **EMPT**y message.

Note:

All the mentioned adjustments will be stored in the **chameleon high end's** non-volatile memory and will be readily available even after the device has been disconnected.

15 Monitoring functions on the LCD-panel

15.1 Car battery - discharge quantity- and discharge current- control indication

This screen display finally lets you know for certain what you can expect of your car battery or mains power supply when fast-charging your batteries, and what quantity of energy is removed from your car battery in a single day. This display also allows you to check whether the specified wattage has produced the desired current limiting in conjunction with the cell count in use when you are using the charger with a mains power supply.

You will find the indications in in the graphic screens pack 1 to pack 3 above the inverse car battery voltage.

A negative sign indicates a consumption from the car battery (or power supply). If no accumulator is connected, the power consumption the **isl 8** device itself (220mA) is indicated.

Current quantity will be reset when connecting **isl 8** to the car battery.

The current- and quantity indication for the primary energy source (car battery / mains power supply) is a calculated value, which is matched quite well with the reality.

15.2 Charge-/discharge current maximum load control display

If the current figures during charge/discharge are lower than expected, usually the charger has automatically reduced the current because a limit has been reached.

For example: When reaching the maximum performance of the voltage converter, or of the charge/discharge stage, the display will show a "*" in front of the charge current.

15.3 Discharge / energy re-transfer control display

Discharge currents are marked with a "**-**" in front of the current. As soon as energy is re-transfered into the car battery the "**-**" is replaced by an "**r**".

If the charger reaches one of its limits and has to reduce the discharge current, the "**-**" or "**r**" will intermittently replaced by a "*****".

If the external 1.5 ohm/150 watt resistor is switched on (wether it is connected or not) the "**r**" will become "**R**". If the car battery is abslutely full even when it is discharged by the external resistor "R" will change to "A" ("Autobattery full") and the discharge current is reduced.

15.4 Status display

Press ***f5:packStat*** from the ***pack 1/2/3*** screens to get an overview about the status of all connected batteries and especially if combined programs are used on Output 1 or 3:

e.g. which combined program has been selected, which part of it is currently running (charge or discharge) and which phase of the xDC resp xCD program is running: Up to 5 cycles are displayed one below the other. The values of battery one on the left side of the screen, those of battery 3 output on the right side (see also chapter 34).

Note:

The status screen will not be updated during display.

16 Special adjustments

16.1 Operation from an external car battery

When using an external battery which is not used for starting the car, it can be discharged to a lower voltage level. Via the Menu-Items ***f5:i8param, f1:carbatt*** you can change the threshold value for the low-voltage warning.

Based on years of experience this value is set at 11.2V, displayed as *11.200mV. In this case the "*" stands for recommended value.

You can now choose your desired value.

The **chameleon high end** will stop all operations if the supply voltage drops 600mV below this value and will display an appropriate error message.

16.2 Resetting the display of car battery discharge quantity

The display of the energy discharged from the car battery (see Chapter 18.1) is not reset every time you connect the ***isl 8*** to the car battery. It is only reset **automatically** if the date has changed since the last time you connected it. This makes it possible to make best use of the limited capacity of the car battery at the flying site by disconnecting the ***isl 8*** between charge processes, but still keep track of the total energy discharged during the one day. If you operate the ***isl 8*** in the meantime using a mains power supply (in which case we only recommend the use of our NT40A), and you switch the ***isl 8*** from car battery mode (***Batt***) to mains power supply mode (for example: ***N[W]220***), the cumulative value for discharged energy is interrupted, but not erased. Next time you switch back to battery mode, the charger resumes measurement of discharged energy. You can erase the cumulative figure **manually** in the same menu (***i8Param1 -> Mains/Batt***) using the menu point ***BatRes*** (***Bat***tery discharge quantity ***Res***et), above ***Batt,*** i.e. by pressing the + button.

16.3 Operation from a car battery charger

Never connect the **isl 8** directly to a car battery charger as it will be damaged.
Even when using a car battery as a buffer the remaining peaks from the car battery charger may cause the **chameleon high end** to display irregular error messages.

16.4 Operation from an AC/DC power supply

Although operation from a well stabilized Power Supply is possible, it is not recommended due to the **isl 8**'s high performance and its capability of energy re-transfer which may cause damage to the power supply and/or the charger.

Our mains power supply ***NT-40A*** has been tested with the ***isl 8***. But: the energy re-transfer function is not possible (**Chapter 17**)!

When operating from an AC/DC power supply in car battery mode never connect more than 12 cells (at the beginning of the discharge - also when using the **autoCD** program - the battery voltage has to be below 18V) or manually set the discharge current limit to 750mA or less.

With Menu-items ***f5:i8param1, f3:mns/bat*** the maximum charge performance on output 1 can be limited to lower values to keep the current from the mains power supply below the maximum. Also the energy re-transfer option will be deactivated.

Note: The charge-power of the isl 8 is always higher than the selected converter-power: Converter-power = $U_{battery}$ - $U_{car\ battery}$ * charge current; charge-power = $U_{battery}$ * charge-current. Display: ***Batt*** means CarBattery use with full power + re-transfer; ***M[xxx]*** = AC/DC mains use with ***xxxW***atts max. converter power; the re-energy transfer circuit is disabled.

Simultaneous operation of all three outputs with reduced power is possible, but power of output 2 and output 3 must be added to the power of output 1 (max. power consumption of all three outputs is higher than the chosen value).

Note: Be sure, that the power consumption of the ***isl 8*** is always lower or equal than the allowed continuous current of the power supply. Attention: Primary current differs also by the variable charge voltage of the connected packs!

Note: Power of output 2 is always 1/3 power of output 1. If you are reducing power of output 1, you are reducing power of output 2 simultaneous.

Caution: set the charge power so that the permissible continuous current of the mains power supply is not exceeded (note: if you are using our *NT-40A* mains power supply there is no need to reduce converter power). When the nominal charge power value is applied, a higher current is drawn briefly, and naturally the mains power supply must be able to deliver this. The stated maximum current of the mains power supply must be greater than or equal to the actual current drain of the *isl 8*. (The peak current to which we refer here is drawn just after connecting the battery or after a pause for measurement). Note: charge power limiting only applies when the converter is in use.

For this reason the current value display (above the car battery voltage display) is very helpful for establishing the primary current drain.

Safe operation of the **chameleon high end** from an AC/DC Power Supply may be effected by further factors like ripple-voltage, continous power performance, compatibility with the frequency of the voltage converter, adequately sized capacitors (an area where laboratory power supplies sometimes show deficiencies) etc.

It is the responsibility of the operator to check the reliable function of the combination power supply and charger. We can not be held liable for problems and damages resulting from unsuitable combinations

16.5 Program after reset

You can select the initial program for Output 1 when the charger is connected to a power source. Press ***f2:pack1, f2:p1param, f5:p1param2, f4:PORprog*** and decide whether you want the charger to start with the last used program ('last' will store the program type when a battery is connected) or starts with the program, you chose in the menu.

16.6 Blinking light output

You have the option of blinking light or continuous light at the end of a program. Press ***f5 i8param1, f5 i8param2, f1 light*** to get to the menu-item and use the +/- keys for changes. There is a 12V Output for loads up to 25W.

16.7 Melody selection

Note: Only available for device number 7627 and lower. Now the internal piezo-buzzer can be switched ON or OFF with this menue.

You can choose between 12 short melodies. Press ***f5:i8param1, f4:melody*** to get to the menu-item and use the +/- keys for changes. Melody 0 means: buzzer is activated. The volume cannot be changed.

Note: The scrolling speed in this menu will vary according to the numbers.

16.8 Fan ON/OFF

This function key, available in the ***pack 1/2/3*** screens, will operate an external battery cooler fan connected to the additional pin board. The menu item shows the function of the key in normal and inverse characters.

Note: The internal fan can not be turned off. It runs permanently on 12V to cool the display.

Avoid operation in direct sunlight as the display will become dark!

16.9 Refresh

The Refresh option is available for output 1 and 3. Refresh charging is supposed to get older, stored or intermittently used batteries faster up to speed and is particularly suited for Rx- and Tx-battery maintenance.

We do not take part in advertisement myths: A healthy battery will not become fuller than full. Using refresh you probably will not detect any increase in capacity or any decrease in internal resistance on properly maintained batteries.

Refresh is turned off in ***with.Diode*** charge modes. It is not possible to charge batteries with an additional discharge protection diode in refresh mode.

16.10 Owners name

The owner's name is displayed every time you connect the charger to the car battery. It can be changed in the menu **i8Param2 (*f2:i8Param1, f2:i8Param2, Name***).

Operating "cursor" (***f2, f3***) moves the cursor (i.e. the "V" above the text), operating "erase" (***f1, f4***) erases the character under the cursor, and then moves the cursor in the direction of the arrow.

The maximum length of the name is 23 characters.

16.11 Passwort input for owners name

The owner's name entered in the charger is now password-protected. If you now attempt to change the owner's name and press ***enter***, the unit asks you to enter the stored password. As supplied, the charger accepts the password "***keyword***". The unit always suggests this password, and you should change it as soon as possible to make it impossible for unauthorised users to change your stored name. The charger expects a name with 7 characters (which can include the space character). It differentiates between capital letters and small letters, and also accepts numerals and special symbols.

When you have entered the correct password, you can then change that password by pressing the ***f5*** button (***New-Pass*** (instead of ***enter***)). To exclude the possibility of errors when entering the name, the ***isl 8*** asks you to enter it twice. You have to enter the new password twice, i.e. the password must be entered one time in the ***New-Pass1*** menue and a second time in the ***NewPass2*** menu - every time confirmed by pressing ***enter.***

Memorise the name carefully. If you forget your password, we can restore it at the factory, but only if you can prove that the charger you sent to us is actually your property. The easiest way to convince us of this is to enter the charger's serial number on the guarantee card when you purchase the unit, and send it in to us. To see the charger's serial number, connect the unit to the car battery and press the ***f5*** button **three** times.

17 Principle of the energy re-transfer functions (limits, warnings)

If the battery pack voltage is higher than about 18V, it is possible to discharge back into the car battery. (Hint: Two smaller (maybe 10 cells) packs of identical batteries with identical charge level may be connected in series to use this feature). The built in voltage converter is used in a kind of 'reverse'-mode. As energy is not transformed into heat (common practice and still performed at lower cell numbers), discharge currents can be as high as charge currents.

The energy re-transfer function may be activated during the automatic combined programs or at manual selected discharge currents from 1.0A, provided that the function has not been de-activated by choosing AC mains power supply mode.

If normal discharge currents should be higher than the re-transferred currents the re-charge mode will be quitted.

The discharge current will be gradually increased until the selected value or the performance limit of the **chameleon high end** has been reached.

If the car battery voltage reaches about 15V, the discharge current will automatically reduced in order not to exceed the 15V. (The displays shows an "A" in front of the current value on the display (A = Autobattery voltage achieved).

If an external discharge resistor is connected, the charger will try first to lower the car battery voltage by connecting the resistor in parallel, before reducing the discharge current. If, due to the resistor and/or other consumers (e.g. pack 2), the car battery voltage drops below about 13 V, the discharge resistor is disconnected automatically by the microprocessor.

You have two options: If you want your flight packs discharged as fast as possible, you should connect the external resistor. If you want to get (or keep) your car battery charged as full as possible (maximum 15V in cycle use), then don't.

For energy re-transfer mode a car battery must be connected

The use of an AC/DC Power Supply, **even with an external resistor connected**, will usually cause serious damage to the power supply and/or the charger due to over-voltages and over-currents during the above mentioned process.

If **mains**-operation has been selected the energy re-transfer function is blocked.

When operating from an AC/DC power supply in car battery mode never connect more than 12 cells (at the beginning of the discharge - also when using the **autoCD** program - the battery voltage has to be below 18V) or manually set the discharge current limit to 750mA.

18 Output 1. Discharging up to 14 cells

From now, the isl 8 can discharge few cell numbers with more than 2.5A.

For doing this, there is the need of an additional high power resistor, which is automatically paralleled to the battery by the **isl 8** if necessary.

4 types of discharge resistors are available in 3 different resitance-values:

The 2 types with 1.5Ohms, originally used to discharge the car battery, can now be used to discharge up to 14 cells.

1) **i8-elast-kk**, 1.5Ohm/150W, 200 x 60 x 60mm, with cooling-rips.

2) **i8-elast-vent**, 1.5Ohm/150W, 85 x 85 x 105mm, with fan-cooling.

To connect the 1.5Ohm resistors to the **isl 8**, a low-priced additional cable is necessary. This cable makes possible that **isl 8** can parallel the resistor to the battery with its internal switch, which is designed for a maximum of 10A.

3) **i8-elast-0.66**, 0.66Ohm/300W for maximum of 12 cells, 85 x 85 x 105mm, with fan.

4) **i8-elast-0.33**, 0.33Ohm/200W for maximum of 7 cells, 85 x 85 x 105mm, with fan.

Instruction for the connection of the additional cable for the 1.5 Ohm discharge resistors:

Because of short-circuits, use exactly the following sequence.

a) Put the 9 pin wire wrap male socket of the additional cable in the 9 pin female socket of the discharge resistor. Fasten with tape.

b) Put the 9 pin female socket of the additional cable into the „entladelast“ male socket of the **isl 8.** Only those 4 pins with negative polarity are used.

c) The red banana plug of the additional cable must be stuck in the + akku 1 banana socket of the **isl 8**.

d) The battery to be discharged must be stuck at beginning of discharge with the + pole piggyback in the rear socket of the banana plug. The - (neg.) pole must be stuck quite normally into the "-" Akku 1 banana socket.

Connection of 0.66 and 0.33Ohm discharge resistors:

These resistors are switched by high current relays in parallel to the accumulator to be discharged.

The switching of the high current relay is initialised by the „entladelast“ output of the ***isl 8***.

a) The 9 pin socket of the thin cable of the discharge resistor must be stuck into the „entladelast“ socket at the left side of the ***isl 8***.

b) The both banana plugs of the discharge resistors must be stuck in the both akku 1 banana sockets outputs.

c) The plugs of the charging cables must be stuck now on the top of the banana sockets of the discharge resistor.

Table of the possible and permissible discharge currents:

Type	resistance	area	current at: 6V	8V	10V	12V	14V
i8-elast-kk	1.5Ohm/150W	1-14 cells	4A	5.3A	6.7A	8A	9.3A
i8-elast-vent	1.5Ohm/150W	10-14 cells	-*	-*	6.7A	8A	9.3A
i8-elast-0.66	0.66Ohm/300W	1-12 cells	9A	12A	15A	18A	-**
i8-elast-0.33	0.33Ohm/300W	1-7 cells	18A	24A	-**	-**	-**

[-*]not permissible, ventilator does not run.

[-**]not permissible, overload of maximum performance.

Remark:

The actual discharge currents are higher, cause of the *isl 8* internally additional discharge current up to 2.5A.

Adjustments at the *isl 8*:

To be able to activate the external connected discharge resistor, you must first

a) select the fix-D discharge program.

b) the discharge current on the upper side of the max. current must be adjusted on one of the three possible resistor values. This means, that you find at the upper end of the discharge current scale three further values with R=1.5, R=0.66 and R=0.33.
It is essential that you chose the right resistor value. Only then the correct discharge current value can be calculated and shown. The ***isl 8*** can not measure the external discharge current, it only can calculate from the battery voltage and the connected resistor value!

c) Then the battery can be connected as described on the previous page.

The ***isl 8*** then begins to run and the linear discharge stage starts slowly discharging up to the maximum allowable performance (<= 2.5A).

After that, the external discharge resistor is switched on. The fan begins turning.

If the undervoltage limit of the battery is reached, the discharge resistor is separated from the accumulator and switched off as well as the internal discharge stage of the ***isl 8***. The ***isl 8*** shows „empt“y.

Notes:

- If you chose one of the three above named current areas for the direct discharge with the external discharge resistor, the energy re-transfer stage into the car battery is blocked. The ***isl 8*** discharges with 2.5A or less, according to the connected number of cells.
- Discharging does not occur with constant current. Analogously to a connected motor to the accumulator, discharge current decreases with lower battery voltage.
- Do not use wrong resistor values an and/or do not forget to connect the discharge resistor. The ***isl 8*** otherwise shows wrong current values.
- For safety reasons (overheating of the accumulator), the external discharge resistor will only be switched on by the software in the ***isl 8*** at the permissible cell number and the **fix-D** discharge program. (Not at auto-D and not at the combination programs . ..CD and/or. . ..DC).
- Notice when comparing measured data with your colleague using the same measuring equipment, that the data can be compared only conditionally with each other. Relatively high tolerances (approx. 10%) of the high performance discharge resistor(s) are normal.
- In exceptions, the calibration procedure of the 16 bit converter fails. If your battery shows unrealistic voltages, better do 1-2 control measurements before cutting the battery into its components.

Important notes:

It is your responsibility, whether the external connected discharge resistor functions as you expect, since the ***isl 8*** has no possibility to examine the regular function.

- Be sure that the fan turns at maximum rotations - otherwise fire damage is possible!
- Never leave ***isl 8*** discharging without looking on it and its proper function!
- After discharging with high currents, batteries have much higher temperature as normally. Cool them down.
- If you want to discharge more than 14 cells, remove the discharge resistor (with all cables) from the ***isl 8***. Otherwise, if you use a normal discharge program, the resistor could be switched on parallell to your flight battery instead of parallel to the car battery.

19 Additional sockets (side-mounted pin-board)

On the left side of the housing there is a two pole pin board row for external devices.

Note: Please remove all pin board sockets (if not packed seperately) prior to the first use of the **chameleon high end** in order to avoid short circuits between the non-insulated pins.

If you solder some cables to the pins, please insulate carefully with heat shrink tube to avoid short circuits and glue with 5 minute epoxy (do not use cyanoacrylate glue) to fix them.

The positive poles are protected by an internal M16 A fuse.

19.1 External discharge resistor ("entladelast")

An external resistor of at least 1.5Ohm/150W can be connected to the pin board.

Ensure that the connecting cables are soldered to all 4 '+' pins and all 4 '-' pins of the socket and use heat shrink tube for insulation.

The discharge resistor will automatically connect in parallel with the car battery when during the energy re-transfer the car battery reaches the 15V limit. The output is coded against reverse polarity.

How to connect the 1.5 Ohm or other discharge resistors to discharge less than 15 cells with higher currents **read Section 18: Output 1. Discharging up to 14 cells with external discharge resistors.**

Warning: Commercially available resistors will become very hot during discharge (over 100°C) and are susceptible to short circuits if the windings are not insulated.

They present a potential danger for injuries (burns) or fires. We recommend resistors which are covered by a housing with an integrated cooling fan or with large cooling ribs to dissipate the heat (accessories).

19.2 Blinking light output ("blinklicht")

To connect an ordinary car indicator bulb 12V/25W for optical full/empty indication.

To turn off the light signal (and/or the buzzer/melody) just press the +/- keys.

19.3 Fan output ("lüfter")

To connect a 12V battery cooler. The output is coded against reverse polarity.

19.4 Temperature sensor ("temp. sensor")

To connect the temperature sensor provided (LM335Z).

19.5 PC-output ("PC")

To connect to a COM-Interface socket of an IBM compatible PC using our 9-pin interface cable. For more details see Chapter 21, Data Interface (PC-Interface).

20 Protection circuits, error-messages and warnings

The **chameleon high end** is equipped with various protection and control circuits to monitor car battery voltage, charger temperature, maximum performance etc.

Exceeding the limits will, in some cases, interrupt the charge (e.g. car battery over-voltage), the cause will be displayed and the buzzer will be activated for a short time. The symbols < and > may be displayed. '**>**' means **bigger**, '**<**' means **smaller**.

As error-messages with description and code #, like '**warning # 5, car battery voltage = min**' are self-explanatory, the table below should be sufficient. The first digit of the code indicates the Output number where an error was detected.

Code:	**1-99**	**Warnings without charge interrupt**
	100-999	**Error, interrupt of all programs**

Hint: All error- or warning-codes which begins (first digit) with "1" indicates that an error at the output number 1 was detected e.t.c. All messages with a leading "9" indicates an overload of the ***isl 8*** itself.

Error text with code numbers for	pack 1,	pack 2,	pack 3,
Battery voltage below min.	11,	21,	31
Max. Battery voltage exceeded	13,	23,	33
Wrong cell count of Lead- or Lithium battery	17/117,	27/227,	37/337
Max. Charge voltage of converter exceeded	159,	259,	-----
Max. Charge current exceeded	161,	261,	361
Max. Converter discharge current exceeded	162,	-----,	-----
Max. Linear discharge current exceeded	163,	-----,	-----
Max. Loss performance of power source exceeded	175,	275,	375
Max. Loss performance of discharge sink exceeded	176,	-----,	-----
Max. Charge performance of converter exceeded	177,	277,	-----
Max. Discharge performance of converter exceeded	178,	-----,	-----
Max. Device input current (primary current) exceeded		961	
Max. Device temperature exceeded		981	
Car battery voltage exceeded		906	
Car battery voltage at minimum		5	
Car battery voltage below minimum		904	
Internal fuse (for pin board) blown		9	
Charge -time /-quantity /-temperature /-voltage exceeded	TIME / QUAN / TEMP / Umax		
Temperature sensor activated, but disconnected or broken lead	Toff		

Some typical user errors will be listed in more detail, which we strongly recommend you to read before sending the **isl 8** for a repair as you may simply avoid them:

TIME, Charge time exceeded

If a battery charges for more than 3 hours, we cannot say, that this is quick-charging. If you use **autoC** program and your battery is not full within 3 hours, autoC did calculate a wrong current (mostly when you charge a receiver pack with the original charge leads).

For correct function of the automatic charge current selection **a charge lead with 2.5 mm² is mandatory**. We recommend the use of a charge lead for the flight pack combined with a short (< 50mm) adapter piece to connect your Rx-battery. The short lead of the Rx-battery normally will not affect the performance, but no on-off switches with build-in charge sockets must be interconnected.

Disconnect Pack x
Error x77, Charge converter performance over maximum
Error x55, Battery voltage over maximum (e.g. > 50V on a 10 cell pack)
other nonsense errors

These and other unexplainable errors the charger may display, when ...
... connected to a car battery with an operating car battery charger.
... connected to an unsuitable Power Supply.

Keep in mind that due to a different environment or situation, even with time consuming tests it may not be possible to find the cause of some error displays.

If there are no malfunctions you will still be charged for the time spent on testing!

Before you return the device for a check, **test it several times connected to a full car battery to ensure the problem has not been caused by reasons mentioned above**.

EMPTy or RPOL (reverse polarity) - Display during Ni-Cd-Program after about 30s.

To delete the memory-effect batteries may have been completely discharged down to 0V (not possible with this device). The charging of these packs is possible, but up to a certain voltage a warning will be displayed.

Attention: The warning mentioned above appears if the voltage does not rise fast enough. This could be an indication of reversed polarity, if a completely discharged battery was incorrectly connected. It may even get 'reverse-charged'.

Hint: The **chameleon** high end can not detect reversed polarity if a pack is discharged to 0V. It will always start a normal charge cycle, normally ending after 30s with the message reversed polarity (Rpol) or deep discharged (EMPTy), if the battery has not reached a minimum voltage by then. For safety reasons you may have to restart the charge program several times, e.g. when using high capacity cells.

- With deep discharged batteries it may take up to ten minutes until the correct number of cells is identified.
- A battery voltage below 0.5V on Output 3 is interpreted as reverse polarity.

Disconnect Packs

This message will be displayed if batteries are already connected to the charger while connecting it to a power source. The device can not decide by itself whether to select a Ni-Cd- or a PB-program or if Output 2 and 3 may be started uncontrolled. The same message will appear if hardware is defective or if during the program the watchdog detects the microprocessor in a state not foreseen by the software (e.g. due to external interference).

Error #9, blown fuse

This error message will be displayed if a short circuit has been caused between the positive pins of the external sockets and the negative terminal of the car battery.

In this case the internal M 16 A glass fuse (size: 5x20mm) needs to be replaced.

Before opening the housing, disconnect the device from the power source.

To open: Remove all three visible Philips screws and all external sockets!

21 Data interface - serial port

Note: The Data Interface can be reached from the ***powerOn*** screen provided no battery is connected (***data*** shown inverse if access is not possible).

Charge data (Currents, voltages) can be stored in a non-volatile memory and/or transfered and displayed from the a) screen buffer, b) buffer, or c) memory.

Explanation to a), b) and c):

21.1 Screen Buffer

For each pack a certain part of the RAM area (no data storage after power is disconnected) is reserved. These areas only contain the data for the voltage curve display.

21.2 Buffer

The **chameleon high end** is currently equipped with three buffers (RAM areas with no data storage after power is disconnected). Data can be stored in 1 second intervals for a period of 40 minutes. To extend the maximum storage capability, every other value of a full buffer will be automatically deleted and replaced by a new value to achieve 40 / 80 / 160 minute periods with reduced resolution. The last resolution used by the **chameleon high end** can be called up by pressing the following key combination from the ***powerOn*** screen: ***f1:data, f1:buff(er)&mem(ory) resolution***.

The resolution of the voltage is 16 bit.

The charge current is always stored using 8 bit resolution, i.e. there is a small data reduction. (Also see **Chapter 21.4** Data-Transfer).

It is advisable to designate buffer 1-3 to Output 1-3. This can be done by pressing ***f1:data, f2:pack to buffer assignment, f5:standard values***, *or with the same result:* ***f1:data, f5:standard values for f2***, or make your own selection.

Note: The chosen selection can only be changed after a charge process has been stored in a buffer. E.g.: If Buffer 1 was used for Output 1, Data from the next charge at Output 1 may be assigned to Buffer 2. As long as the same buffer is not used again, previously stored data can be recalled until power is disconnected.

21.3 Memory

The **chameleon high end** has a non-volatile memory with the size of one buffer area. The complete information of one buffer can be stored, even if power is disconnected.

Data from the buffer to the memory will be transfered by pressing ***f1 data, f3 copy buffer to memory.*** The copy menu also shows (in square brackets) the latest Output - Buffer configuration.

21.4 Data Transfer

21.4.1 Online, i.e. simultaneous while charging/discharging

With only pack 1 connected, data is transferred every second via the serial PC-port, otherwise data is linked into a 3 second block.

Online data transfer provides the best voltage (16 bit) and current (10 bit) resolution as well as additonal transfer of State and Temperature values.

These data can be monitored on a PC-screen with our windows software ***winsoft*** and may also be shown or printed (in color).

21.4.2 From a buffer or the memory.

Each data transfer starts with a commentary line, which contents the (record-) date, the start time of the data recording, the data source, the pack number and the used program.

Data transfer will take place as fast as possible with simultaneous display on the LCD.

Data transfer may be started without connection to a PC for visual control of the data. You can stop and start data transfer by pressing **-** or **+** button.

Data transfer can be terminally interrupted by pressing the ***esc*** key.

Note: Due to technical reasons the 16 bit voltage of the (discrete) analog to digital converter (ADC) of the peak detection facility are not as precise as the analog 10 bit values of the microprocessor. The 16 bit resolution (in mV) however makes trends appear more noticable.

During the first 15 seconds of a charge/discharge program the 16 bit voltage values will be calibrated for better resolution of the data transfer to the **winsoft**.

22 Windows software *winsoft*

With ***winsoft*** you can receive data from the ***isl 8***, store them in global or selective files, recall them and display them graphically, compare curves, transform pack voltages in average cell values, show energy figures, print curves (in color) and much more.

Using a standard windows text program you may also have a look at the raw data as transferred from the ***isl 8***.

To run the windows software you need Microsoft DOS 6.22 and Microsoft Windows for Workgroups™ 3.11. The program may run with earlier versions, ***winsoft*** version 3.06 or higher works also with Win´95™.

Installation instructions can be found on the 3.5" disk under ***readme.txt.***

Instructions how to use our winsoft evaluation program are integrated as help lines, (click on "Help" in the top line of the ***winsoft***) which can also be printed in page form.

The ***winsoft*** which can be downloaded from our homepage will cause the program to stop after a value of seconds of more than three minutes displaying ‘demo-version’ on the PC-screen.

Hint: ***winsoft*** is available in english and german language.

23 Important notes

- **Charging leads are only to be connected to the appropriate Outputs.**
- **Cross wiring between Outputs may cause short circuits and damage the device and the batteries (even may cause melting or explosion!).**
- Charge/Discharge currents may be displayed without the leading zero, for higher resolution within the space provided (e.g.: A current of 0.333A will be displayed as .33A instead of 0.3A).
- Transmitters are often protected against discharge by a diode. For quick charge this feature needs to be disenabled (see Tx-Manual) or must be charged with the **w.Diode** charge option (see **CutOff** menu).

To avoid possible damage inside the Tx, the charge current must not exceed 1.2A (Graupner mc-18/20). Watch the charge current when using an automatic program. The resistance of the printed circuit board may cause the microprocessor to select a charge current too low for safe peak detection. When in doubt: Choose manual selection.

Warning: with large-capacity batteries it is not possible to set a charge current of 1 C or 2 C as required for reliable Peak termination, and for this reason we strongly advise you not to charge the transmitter battery in the transmitter!

- A common cause for insufficient charge currents in automatic mode are unsuitable charge leads. The automatic charge current calculation is based on the measurement of the internal resistance of the connected battery. The lower the internal resistance, the higher the possible charge current.

As the charger can only measure the total resistance (internal resistance+ resistance of the leads + resistance of the connectors), for correct calculation of the charge current it is essential to keep the additional resistance at a minimum by using charging leads with adequate cross sections (**2.5mm²**, also for Rx-batteries!), high quality (gold) connectors, and a maximum length of 75 cm.

When using thin charging leads and/or on-off switches with build-in charging sockets on low voltage batteries, the additional resistance of the connectors and cables could be higher than the actual battery resistance. In this case the automatic charge current would be less than half of what it should be! In such cases manual current selection is recommended. The microprocessor will also consider the condition of the cells when calculation the charge current in automatic modes.

Be reminded that on a full car battery the charge current for a 4 cell battery (e.g. Rx-pack) will be restricted to a maximum of about 2A to avoid overheating of the charger. Even with high capacity cells a higher charge current will only be selected if the limits of the charger are not exceeded.

- Don’t be amazed if your battery packs seem to absorb lower currents in automatic programs during the winter months - a cold cell does not perform like a warm one.
- If the charger technically can not provide the charge current manually selected or automatically calculated (see example above, or e.g. 6.0A at 30 cells), a "*" will appear between voltage and current values on the display. In this case the actual charge current will be displayed.

• During the measuring phases (a "!" appears between voltage and current figures), some function keys are blocked. They are also inoperative when the charger has noticed a drop in the charge voltage, so that peak detection will not be disturbed. The cut-off automatic can be monitored: it takes several, closely followed voltage drops before the charge on Output 1 is terminated. The voltage drops detected will appear as a, b, ... between charge time and voltage values on the display and can be used as an indication for the Full-probability.

With a full battery at this point a "t" indicating trickle-charge will be displayed. To keep the battery full, (only) the Ni-Cd programs use a pulsed current.

• Safety Note: As a standard procedure you should check whether the charged capacity after full indication is about what can be expected. This will allow you to identify any premature full detections and may also avoid crashs due to only partly charged batteries. The probabilities for premature full indications depend on several factors. It happens most likely with deep discharged batteries, low cell numbers or certain battery types.

• Especially on low cell numbers you should perform some test charges to verify correct peak detection. Full batteries may become over-charged if the peak is not very pronounced.

• If an **error** (not a **warning**) appears, all current programs will be interrupted and previous information about charge time and battery voltage is lost.

• It may take several seconds before the software detects the disconnection of a PB-battery. This is for technical reasons is to be considered normal.

• You risk malfunctions and damage to the device, if...
... switches or fuses are used between charger and battery
... terminal clamps are replaced by others than 4mm gold connectors
... the device is operated while car engine is running and/or connected to the cigarette lighter socket.
... an unsuitable Power Supply is used
... energy re-transfer into a Power Supply is tried.

• Lead and Lithium battery charging and displays:

When you connect a Lead or Lithium battery the current rises over a fairly long period (around one minute per Ah of capacity or per Amp of current).

The phase when the charge current is rising is indicated by a flashing “plus” symbol preceding the current value. If no “**+**” is displayed, the nominal charge current has been reached, and will not rise any further.

A constant (non-flashing) asterisk (*) indicates that the maximum power of the charger has been reached (charge voltage too low for the selected charge current, or voltage too high for the selected current).

When you disconnect a fully charged lead battery it may take several seconds for the software to detect that the battery is no longer present. This is a feature of the design, and is normal.

24 Legal matters

24.1 Warranty

All ***isl 6*** chargers are carefully checked and tested before dispatch.

If you have a complaint, send the unit back to us with a clear description of the fault.

A message such as "doesn't work properly" or "software error" doesn't help us much!

Before you send your ***isl 6*** back to us, please test the unit **carefully,** as it costs us money to test a charger, and if it turns out to be in working order we have to recover those costs from you. In this case it makes no difference whether the **fully functional charger** is returned within the warranty period or not. Approved warranty claims are processed in accordance with our currently valid General Conditions of Business, which are printed in our catalogue.

One further note: if a problem arises with any schulze product, send it directly to us without interfering with it in any way.

This ensures that we can repair the unit quickly, pick up warranty faults without any dispute, and keep costs to a minimum.

You can also be sure that we will fit genuine replacement parts which will work properly in your unit. Unfortunately we have had bad experience with third-party Service Centres which claim technical competence. Note also that any out-side interference with our products invalidates the warranty (e.g. the original pole clamps omitted or replaced). Incompetent attempts at repair can cause further damage. We often find it impossible to estimate the repair cost of devices in such condition, and in certain circumstances we are then obliged to decline to repair it altogether.

24.2 Limited liability / compensation

We at Schulze Elektronik GmbH are unable to monitor the observance of our assembly and operation instructions, our prescribed conditions and methods for installation, connection, usage and maintenance of our battery chargers. For this reason we cannot accept liability for loss, damage or costs which arise through the inappropriate use of our products, or are connected in any way with such use.

Within the normal legal limits, our obligation to provide compensation, for whatever legal reason, is limited to the invoice value of that quan-tity of product immediately involved in the event which caused the damage. This does not apply if we are obliged to accept unlimited liability in accordance with mandatory law due to our deliberate or serious negligence.

24.3 CE approval

All ***isl 6*** units built after January 1996 satisfy all relevant and mandatory EC directives: these are the EMF directives

- **89/336/EWG,**
- **91/263/EWG and**
- **92/31/EWG.**

The product has been tested to meet the following basic technical standards:

Interference radiation: EN 50 081-1:1992,
Interference susceptibility: EN 50 082-1:1992,
and/or EN 50 082-2:1995.

You are the owner of a product whose design and construction fulfil the safety aims of the EC for the safe operation of devices.

The approval procedure includes a test of **interference radiation**, i.e. of interference generated by the charger. This charger has been tested under practical conditions at maximum load current and with a large number of cells, and remains within the interference limits. A less stringent test would be, for example, to measure interference levels at a low charge current or with only 7 cells, in which mode the voltage converter would not be active. In such cases the charger would not produce its maximum interfer-ence level.

The procedure also includes a test of interfer-ence susceptibility, i.e. the extent to which the charger is vulnerable to interference from other devices. The test involves subjecting the charger to RF signals similar to those produced by an RC transmitter or a radio telephone.

Note:

If you encounter problems in using this device, please carry out the measures described in Chapter 13 and 14 before you decide that it is defective.

25 Standard ready-made configurations of version 8

The 2 x 12 pre-set configurations are not available if you have upgraded the charger yourself, i.e. if you have installed an exchange program Eprom yourself at home.

Of course, you still have the option to transfer all these settings manually from the table printed below.

If you have your own ideas about configuration names (e.g. you wish to use the name of the battery), or if you wish to alter the order of the configurations, you can certainly do this exactly as you wish within the limits of the software's facilities. For example, to copy a particular configuration to a different number, simply read in the configuration with the old number, then store it under the new number. Only the name has to be altered.

For the factory settings listed below there is no automatic correction facility for inverted bits in the memory. As a result changes in the configuration may occur by themselves in rare cases.

Akku 1	Name(g.)	Name(e.)	B.type	Program	Current	QUANT	TIME	CutOff
1	CdaL10	CdaC10	Ni-Cd	autoL	10 A	2700	180	normal
2	CdaE10	CdaD10	Ni-Cd	autoE	-10 A	2700	180	normal
3	MHaL10	MHaC10	Ni-MH	autoL	10 A	3700	180	sensit.
4	MHaE10	MHaD10	Ni-MH	autoE	-10 A	3700	180	sensit.
5	PofL8A	PofC8A	Li-Po	festL	8.0 A	8800	90	U-Max
6	PofE8A	PofD8A	Li-Po	festE	-8.0 A	8800	90	U-Max
7	PofL35	PofC35	Li-Po	festL	3.5 A	3700	90	U-Max
8	PofE35	PofD35	Li-Po	festE	-3.5 A	3700	90	U-Max
9	CdLE10	CdCD10	Ni-Cd	aut1LE	+-10 A	2700	180	normal
10	CdEL10	CdDC10	Ni-Cd	aut1EL	-+10 A	2700	180	normal
11	MHLE10	MHCD10	Ni-MH	aut1LE	+-10 A	3700	180	sensit.
12	MHEL10	MHDC10	Ni-MH	aut1EL	-+10 A	3700	180	sensit.
Akku 2	**Name(d.)**	**Name(e.)**	**Akkutyp**	**Programm**	**Strom**	**MENGE**	**ZEIT**	**PeakAb.**
1	Cdau5A	Cdau5A	Ni-Cd	autoL	5.0 A	2700	180	normal
2	Cdfe5A	Cdfx5A	Ni-Cd	festL	5.0 A	2700	180	normal
3	Cdfe2A	Cdfx2A	Ni-Cd	festL	2.0 A	2700	180	normal
4	MHau5A	MHau5A	Ni-MH	autoL	5.0 A	3700	180	sensit.
5	MHfe35	MHfx35	Ni-MH	festL	3.5 A	3700	180	sensit.
6	MHfe2A	MHfx2A	Ni-MH	festL	2.0 A	2700	180	sensit.
7	LiPo5A	LiPo5A	Li-Po	festL	5.0 A	3700	90	U-Max
8	LiPo3A	LiPo3A	Li-Po	festL	3.0 A	3700	90	U-Max
9	LiPo1A	LiPo1A	Li-Po	festL	1.0 A	1200	90	U-Max
10	Cdfe12	Cdfx12	Ni-Cd	festL	1.2 A	2700	180	normal
11	MHfe12	MHfx12	Ni-MH	festL	1.2 A	3700	180	sensit.
12	MHdi12	MHdi12	Ni-MH	festL m.Diode	1.2 A	1200	180	sensit.

Other: Given cell count for charge programs: 1 cell, discharge programs: max. cell count; Peak cut off delay: as short as possible (1 resp. 2 resp 7 minutes); Current 10 A= “max.“; Temp.cut off = OFF; Refresh= OFF; POR.Prg is not setted.

26 Character-table for name and password input

..../0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [Y] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } > <
Leerzeichen ! “ # ä ö ü ° ( ) * + , - . / 0 1 2...

27. Standard setup charge-/discharge programs

menue	pack 1	pack 2	pack 3
Battery Type	NiCd	NiCd	NiCd
Program	fixC	fixC	fixC
Charge current	I=0.25A	I=0.25A	I=0.25A
Cell count	0 (1)	0 (1)	0 (1)
QUANtity [mAh]	2700	2700	2700
TIME[min]	150	150	150
Discharge current	I-0.3A	-	I-0.3A
CutOff	normal	normal	normal
Temperature cut off	OFF	OFF	OFF
POR.Program	last	last	last
with.Diode	AUS	AUS	AUS
DELAY [min]	1 (2)	1 (2)	1 (2)
Refresh	OFF	-	OFF

Car battery minimum voltage	11.2 V	(in brackets:)
Temperature	60 °C	(Preset Lead / Lithium)
Mains power supply / Car battery	Car Battery	
Melody	5 resp. buzzer ON from device number 7628 and higher	
Full / Empty Light Output	Flashlight	

28 PC interface, View on soldering side of female sockets

T Gnd	RS 232 Interface	SUB D socket	9-pins	(25-pins)
	T = Transmit; connect with	RXD	Pin 2	(Pin 3)
	R = Receive; connect with	TXD	Pin 3	(Pin 2)
R Gnd	Signal GND; connect with	GND	Pin 5	(Pin 7)

29 Data format PC interface

Data transfer rate: 9600 Baud

Data block: **P:sssss:uuuuu:iiiiiVSttt## (ASCII)**

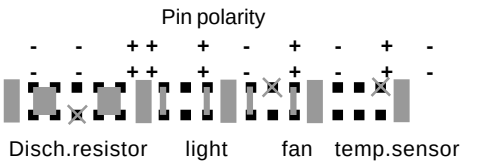
Legend:

P	Pack-Output-No.
:	Separation sign
sssss	Time in seconds
:	Separation sign
uuuuu	Battery voltage in millivolt
:	Separation sign
iiiii	Curent in milliampere
V[:,-]	Charge/discharge indicator
S[l,L,E,P,v...]	Charge-/Discharge program status
ttt[-, ,0..9]	Temperature
##	Item number (not V4 / V8 software)

Commentary line: *** Date DayOfWeek Time DataSource PackOutputNo UsedProgram CellCount BatteryType**

Re CellCount: Calculated cell count at nickel-batteries,
in the menue selected cell count at lead- and lithium-batteries

30 External pin board sockets layout (Viewing on soldering side of female sockets)



soldered separation pins

Coded, pin missing, dummy pin in female socket required

Solder bridge on socket

31 Specifications

Pack 1 Output:

Ni-Cd/Ni-MH batteries:

Cell count (@ 1.65V / cell)	(1)4-36	cells
Capacity (Ni-Cd/Ni-MH)	0,1 - 5 / 10	Ah
Charge currents	0.25 - 10	A
Max. converter performance	~ 240	W
Max. charge perform. (@ 12V Car)	~ 320	W
@ 6V (~4 cells)	~ 3,1	A
@ 9V (~6 cells)	~ 5,7	A
@ 11 - 34V (~8-20 cells)	**~ 10,0**	**A**
@ 40V (~24 cells)	~ 7,9	A
@ 45V (~27 cells)	~ 6,8	A
@ 50V (~30 cells)	~ 6,0	A

Lead/Li-MnO,Li-Ion,Li-Po batteries:

Lead batt. cell cnt. (pack1/2/3)	23 / 19 / 4	cells
Li-MnO batt. cell cnt. (pack1/2/3)	16 / 13 / 3	cells
Li-Ion batt. cell cnt. (pack1/2/3)	13 / 11 / 2	cells
Li-Po batt. cell cnt. (pack1/2/3)	13 / 11 / 2	cells
Trickle currents	none	

(Linear) Discharge circuit:

All batteries below 18V:		
Discharge currents	50mA...2.5	A
Max. loss performance	20	W

(Converter) Energy re-transfer circuit:

Cell count (@ 1.22V / cell)	15 - 34	cells
Capacity	ab 1	Ah
Discharge currents	0.35 - 10	A
Discharge performance	~ 200	W
@ 23V (~19 Zellen) ca.	**~ 10**	**A**
@ 30V (~24 Zellen) ca.	~ 6.7	A
@ 36V (~30 Zellen) ca.	~ 5.7	A

Resolution temperature sensor: 1 °C

Pack 2 Output:

Ni-Cd/Ni-MH batteries:

Cell count (@ 1.65V / cell)	(1)4 - 27	cells
Capacity (Ni-Cd/Ni-MH)	0,1 - 2,5 / 5	Ah
Charge currents	0.25 - 5	A
Max. converter performance	~ 95	W
Max. charge perform.(@ 12V Car)	~ 115	W
@ 6V (~4 cells) ca.	~ 1,7	A
@ 9V (~6 cells) ca.	~ 3,0	A
@ 10.5 - 25V (~7-15 cells)	**~ 5,0**	**A**
@ 33V (~20 cells)	~ 3,5	A
@ 40V (~24 cells)	~ 2,6	A
@ 45V (~27 cells)	~ 2,1	A

Pack 3 Output:
Ni-Cd/Ni-MH batteries:

Cell count (@ 1.5V / cell)	(1) 4 - 6	cells
Capacity (Ni-Cd/Ni-MH) from	100	mAh
Charge currents	~ 100 - 1500	mA

Sonstiges:

Gewicht ca.	~ 1350	g
Dimensions	~ 207x151x68	mm
Supply Voltage	11 - 15.1	V
Low voltage warning	~ 11.6-10.4	V
Low voltage cut-off	~ 11.0- 9.8	V
Max. supply current	~ 45	A
Idle current	~ 220	mA

External sockets:

Internal fuse (5 x 20mm)	M 16	A
Discharge resistor (1.5 R/150W)	12.5V / 10	A
External Light (21W bulb)	12.5V / 2.5	A
Fan for battery cooler (1.5-3W)	12.5V / 0.5	A

All Data given is based on a 12.5V car battery voltage.
Recommended battery size: 12V/> 90 Ah, min. 12 V/ 63 Ah
Tolerances at Pack 1/2 currents: typ. 5%; max. ~15% or 250mA (larger value counts)
Tolerances at Pack 3 currents: typ. 5%; max ~10% or 100mA (larger value counts)

32 Installing a software-update Eprom

As soon as we have completed a new version of the software which includes significant improvements over the previous version, we will inform you by letter. If your charger is less than one year old, you will automatically be sent the new software version at no cost to you.

Of course, for this system to work you must fill in the guarantee card and send it in to us!

If you have received an Eprom (multi-pin chip) from us, please...

- Ensure that any static charge in your body is dissipated before you touch the Eprom.
- Disconnect the isl 8 from its power supply and unscrew the three cross-point screws.
- Open the case by lifting the front; there is a rubber seal on the underside at the rear, and you will need to squeeze it tightly to compress it.
- The old Eprom (there is only one in the charger; it is the chip with the silver sticker) can now be levered up and out of its socket using a screwdriver. Work carefully, raising the chip evenly left and right, and take care not to tilt it to the rear, as this will bend the pins out of line. The best method is to slip the blade of the screwdriver into the slot between the Eprom body and the socket, working from the side of the charger where the auxiliary socket row is located.
- Ensure that the distance between the two rows of pins matches the spacing of the Eprom socket. If we have not already done this, you will find that it is usually necessary with new Eproms to bend the pins inward slightly until they are at right-angles to the chip body. This can be done simultaneously for all pins on one side by laying the pins flat on a table, so that the chip's body is standing up at an angle, then bending the body over further until it is vertical. Important: ensure that you simply increase the angle of the bend at the existing "elbow"; don't bend them where the pins start to taper!
- The new Eprom can now be placed lightly in the socket, the same way round as the old Eprom; note that the notch on one end of the Eprom body must face the square micro-processor. Check that all the pins are located in the correct position, between the pairs of metal contacts in the socket, then press down firmly to engage it; usually you will hear the pins "crunch" into place.
- Check briefly that the charger is working by connecting it to the car battery (or - preferably - a current-limited 12 ... 13.8 V mains PSU). If the screen does not immediately show the usual Power-On display, disconnect instantly and check the installation of the Eprom (see previous paragraph)! If you install the chip the wrong way round, it will be ruined. Guarantee invalid!
- If you previously disconnected the cable to the cooling fan and the loudspeaker, re-connect the cable now, with the brown or black wire facing the sockets for Battery 3. If your charger has a loudspeaker, the connector will be at a slight angle; this is deliberate due to space restrictions in the case, and must be maintained.
- Re-assemble the charger by reversing the procedure outlined above, i.e. first push the grommet and power cable into the slot in the case, place the rubber seal on the internal side of the heatsink, and press together firmly, at the same time sliding the bottom part of the case forward under the case cover. Don't forget to fit and tighten the three screws.

33 Menu-Tree-Structure

0: PowerOn
f1: data
f2: pack 1 curve
f3: pack 2 curve
f4: pack 3 curve
f5: isl8parameters1

Battery parameters

Battery parameters 1

2: pack 1
f1: fan on/off
f2: pack 1 parameters
f3: pack 2 curve
f4: pack 3 curve
f5: pack 1-3 state

3: pack 2
f1: fan on/off
f2: pack 1 curve
f3: pack 2 parameters
f4: pack 3 curve
f5: pack 1-3 state

4: pack 3
f1: fan on/off
f2: pack 1 curve
f3: pack 2 curve
f4: pack 3 parameters
f5: pack 1-3 state

5: i8param1
f1: car battery undervoltage
f2: cut-off temperature
f3: mains/car-battery
f4: buzzer (melody)
f5: isl 8 parameters menue2

2.2: pack1params1
f1: battery type/configurations
f2: program selection
f3: max. charge current
f4: cell count
f5: pack1params-menue2

3.3: pack2params1
f1: battery type/configurations
f2: program selection
f3: max. charge current
f4: cell count
f5: pack3params-menue2

4.4: pack3params1
f1: battery type
f2: program selection
f3: max. charge current
f4: cell count
f5: pack3params-menue2

5.5: i8param2
f1: light-output blink/continuous
f2: set date
f3: set time
f4: set name
f5: set initial params (General Reset)

Battery parameters 2

2.2.5: pack1params2
f1: max. charge quantity
f2: max. charge time
f3: max. discharge current
f4: peak cutoff
f5: pack1params-menue3

3.3.5: pack2params2
f1: max. charge quantity
f2: max. charge time
f3: - omitted -
f4: peak cutoff
f5: pack2params-menue3

4.4.5: pack3params2
f1: max. charge quantity
f2: max. charge time
f3: max. discharge current
f4: peak cutoff
f5: pack3params-menue3

Battery parameters 3

2.2.5.5: pack1params3
f1: temperature cut off
f2: power-on program
f3: discharge protection diode yes/no
f4: cutoff delay
f5: refresh on/off

3.3.5.5: pack2params3
f1: temperature cut off
f2: power-on program
f3: discharge protection diode yes/no
f4: cutoff delay
f5: entf. (p1/p2/p3 control voltages)

4.4.5.5: pack3params3
f1: temperature cut off
f2: power-on program
f3: discharge protection diode yes/no
f4: cutoff delay
f5: refresh on/off

Data storage / Data transfer

1: data
f1: buffer and memory resolution
f2: pack to buffer assignment
f3: copy buffer to memory
f4: transfer to LCD and/or PC
f5: standard values for f2
pack to buffer assignment
(p1->b1, p2->b2, p3->b3)

1.1: resolution
f1: *buffer1 (show function)
f2: *buffer2 (show function)
f3: *buffer3 (show function)
f4: *memory (show function)
f5: - omitted -

1.2: assignment
f1: pack 1 to buffer?
f2: pack 2 to buffer?
f3: pack 3 to buffer?
f4: - omitted -
f5: standard (p1->b1, p2->b2, p3->b3)

1.3: copy
f1: buffer 1 into memory
f2: buffer 2 into memory
f3: buffer 3 into memory
f4: - omitted -
f5: standard (buffer1->memory)

1.4: transfer
f1: buffer/memory -> LCD
f2: buffer/memory -> PC
f3: - omitted -
f4: standard (memory->LCD)
f5: standard (memory->PC)

isl 8 device parameters 1

isl 8 device parameters 2

TS-Trouble Shooting

Dear customer,

If your charger appears not to work as you expect it to, please run through the measures outlined below step by step before assuming that it is faulty.

Only if you have completed all these checks, and the problem is still present, ring on our hotline for technical advice. Even better, fill in the service questionnaire (next page) and send or fax it to us. We will then ring you back with advice.

From long years of experience with our battery chargers we know that most problems do not arise if the points listed below are followed to the letter.

If we receive your charger but can find no fault with it ("no fault found") - which usually means that the measures described below have been ignored - please note once again that we incur costs in checking the unit, and that those costs are payable by you even if the charger is within the warranty period.

1. Connect the charger to a fully charged car battery with a capacity of at least 60 Ah. Do not use a mains-powered Power Supply Unit!
2. For the power supply to the charger use only the original cables and terminal clips. Connectors such as wander plugs, car cigar lighter plugs etc. are not suitable! If you have made changes, kindly restore the original cables and clips. Take care to produce sound soldered joints - no "solder blobs" or dry joints, please!
3. Charge cables for all batteries should have a conductor cross-section of 2.5 sq mm. The charger's automatic current setting circuitry is only capable of setting a suitable (i.e. high) charge current for your battery if the cable is of this cross-section. Give the automatic circuit a fair chance!
4. Just as important as the charge cables are the connectors attached to them. Use the proven 4 mm gold-contact connectors at the charger end (don't use expensive wander plugs). Your flight packs should already be fitted with gold-contact connectors. Tin-plated connectors are completely unsuitable as their transfer resistance is high and they are prone to intermittent contact. Be sure that your cables are well soldered to the plugs and sockets. Do not fasten with screws.
5. If you observe Points 3) and 4) and connect a discharged battery to the charger, the fully automatic charge mode should set a current of at least 1C, usually as much as 2C, after about 5 - 10 min-utes. If this is not the case, then the internal resistance of the battery is probably excessive. In short, your battery has "had it", or is not suitable for rapid-charging.
6. Ensure that there are no defective cells in the battery pack. Bad cells usually heat up early in the charge, and then cause the charger to switch off prematurely, and/or to set too low a charge current in automatic mode.
7. If the 3/4-hour limit is exceeded when you are charging from the Akku 1 or Akku 2 output in automatic mode, then something is wrong with your charge cable, your connectors or your battery. Perhaps too small a cross-section in the charge cable? Connectors not good-quality gold-contact types? Dry solder joints? Battery ready for the bin, or not designed for rapid-charging?
   Establish the reason! Attempting to alter the 3/4-hour time limit is not the way forward, as in most cases a charge period of one hour already indicates that something is amiss. After 5 - 10 minutes the automatic circuitry should have set a charge current of at least 1C!
8. Have you read the information in Chapter 1 (Warnings) and 2 (How to obtain reliable, trouble-free operation) and observed the recommendations?

SQ-Service Questionaire

To: Schulze Elektronik GmbH
Fax-No. +49-6150-1306-99
or to our eMail address below

Your Address:
and
Telephone No.:
eMail Address:

Please complete every section. If a fault arises please return this form with the unit!

Battery:	**Your Information**	**Example**
Purpose (Transmitter, receiver, flight pack)		Transmitter
Manufacturer		Sanyo
No. of cells / voltage		8 cells/9.6 volts
Capacity		1700 mAh
Type		1700SCE
Cells soldered or clipped		soldered
Charge cable connector		Barrel
Charge cable:		Original<manufact>
Length		1,5 m
Cross-section		0,14 sq-mm
Charger connector		Wander plug
Power supply:		
Fault with mains PSU power:		yes
PSU type		Power 150
Output voltage		13 V
Maximum output current		11 A
Fault with car battery power:		no
Nominal capacity, car battery		45 Ah
Charger:		
Type		isl 8-936g
Software version (read out display after power on)		V 8.03
Charge output used		Akku 1
Charge program/Current if "fixed" selected		Auto L, I=x,xx A
(Automatic mode:) max. charge current		0.83A
(Automatic mode:) charge current at fault		0.25A
Duration of charge		133 min
Battery temperature at termination		30°C
Error message		# 52

Description of fault: Charge output **1, 2, 3, all** in use**?**