GOLIATH

7 ¼” Gauge Locomotive

Owner’s Manual



Unit 5
Rear of The Parade (TDi's)
Southend Arterial
Romford
RM3 0EX

RIDE ON RAILWAYS LTD

OWNERS MANUAL

Page 03 – Specification

Page 04 – Electrical description

Page 05 – Running Notes, Regenerative braking

Page 06 – Fault Finding Chart

Page 07 – Batteries and Charging

Page 08 – iDrive and fault chart

Page 09 – Control Wiring Diagram

Page 10 – Power Wiring Diagram

Page 11 – Maintenance and Servicing

Specification

Bogies

- 2 x 500w 24v – continuous rated
- Worm drive 7:1 reduction
- UCT 204 take up bearings for axles
- 1" diameter axles with 20mm run through to bearings
- 8" diameter wheels cnc cut from EN8 steel stock to 7 ¼" Gauge Society's standards
- 5mm steel welded bogie frame with additional 3mm steel plates around bearing keeps
- Main fixing via 20mm bolt and nyloc nut
- Laser cut metal parts painted with 1 coat of etch primer and two coats of black acrylic paint.

Chassis

- 8mm steel buffer beams
- Two position coupling with hole to accept 8mm pin
- Soul bar – 50 x 50 x 5mm angle iron
- Foot well fabricated from 25mm angle and lined with 12mm plywood
- Cross struts for bogie mounts fabricated from 6mm laser cut steel
- Chassis parts brush/roller painted with two coats of Fortress metal paint to all parts and an additional two coats to buffer beams and soul bar with light rubbing down between coats.
- Integral vibration mounts and ball transfer bearing on cross plate to ease bogie rotation.

Body work – front cab

- 1.2mm laser cut steel welded with additional bracing to avoid excessive panel distortion.
- 2mm acrylic windows fixed in place with small bolts through the body work.
- Etch primer + 3- 4 coats of acrylic paint.
- Vinyl speed whiskers to ends
- Cab roof – Fortress – non reflective black

Bodywork – Rear

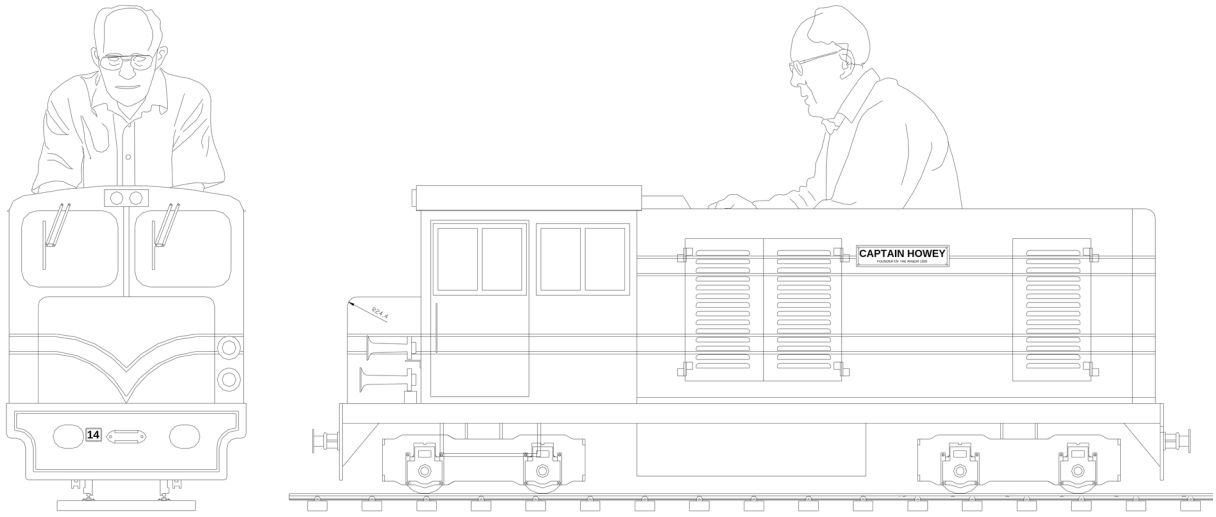
- 18mm birch plywood
- 4 x 1.2mm steel metal grills per side. 1 or two forming a door on one side
- Dummy hinges to all grills + additional discreet fixings for the grills
- Timber painting –
    - 2 x spray primer
    - All edges to receive additional spray coats
    - Mass fill with two pack filler and rub down
    - Additional red primer coat
    - 3- 4 coats of acrylic paint
- Interior hand painted in mid grey
- Only two pack filler used
- Single side entry door to allow step in access
- Body to be located by a 20mm angle iron from around the base of the timber.

Electrics

- 24v 180amp digital iDrive unit.
- Battery to controller cables 10mm^2

- Controller to bogies 6mm^2
- Bogies connected by Anderson Plugs.
- 4 x 110 amp hour batteries mounted in pairs – Each pair has one in front and one in back
- The iDrive and all electrical equipment is mounted vertically at back of cab. This ensures wires go up to inside a weather resistant enclosure. Access is be gained by lifting the cab off
- All high current cables laid away from harm and flammable materials. They do not go across battery tops. All battery terminals are clearly marked and cables restricted to avoid batteries being connected up wrongly.
- Dedicated chargers and mains plugs mounted in rear.
- Battery isolator switch on front of cabin – only use “BOTH” and OFF
- Speed control via brass controller – lift off and mounted on plug.
- Forward/reverse operated from brass controller.
- Head lights to be operated via switches on dashboard. LED headlights to avoid excessive heat
- Ammeter to show power drawn
- Truecharge meter – basic battery condition meter but also acts as fault reporting for the iDrive unit.- see fault chart.
- All acceleration settings are set as per original locomotive as based at Chingford.
- Idrive will turn to standby mode when left unused for more than 20 minutes. To restart turn off and on.
- Front 24v horns controlled via switch on right hand side of brass controller.
- Hand brake should be applied when parked.
- Speed restrictor/character switch is the micro switch mounted centrally under the brass controller. On reduces top power to 70%.
- Vacuum alarm sounder has bypass switch mounted under dashboard to right of brass controller. Only to be disabled if vacuum not in use

NOTES



Length – over buffer beams 2100mm Width – 595 mm

Running Notes

- Before running please make sure the charger is unplugged and the lead carefully tucked up inside the rear.
- Ensure the drivers control is at zero (fully anticlock) and the top key switch is in the off position.
- To turn on turn the battery isolator to BOTH.
- If the Truecharge meter strobes up and down it means it has inhibited drive as the throttle is not at zero. Returning the drivers control to zero should see this reset.
- There may be a delay when first switching on as the iDrive unit performs self-diagnostic checks – indicated by a pulsing red light for a second or two.
- If you are running with vacuum braked coaching stock switch the vacuum pump on and wait until the pressure is at least 12” hg. If you try to drive before this an alarm will sound.
- To go forward turn the drivers throttle control slowly in a clockwise direction. There will be a slight delay before you feel the loco move.
- Slow acceleration, lower speeds will extend battery life.
- Driving at full power for any period longer than a few seconds risks damaging wiring and overheating the motors.

Regenerative Braking

- Regenerative braking is when the motors are used to generate electricity which is then put back in to the batteries. For short light weight trains the power saving advantage is minimal but having a loco which will bring a loaded train to a halt is a great advantage.
- The braking is so effective that on hard braking you may even get wheel slippage on the engine.
- Braking is progressive –

“the faster you shut the controller down the harder the braking will be”

- The controller also has an emergency stop feature which means at full shut down the controller will put power to the motors to achieve maximum braking. Try to avoid unless necessary.
- Aggressive braking will increase wear to the gears and motors and will severely shorten their live.

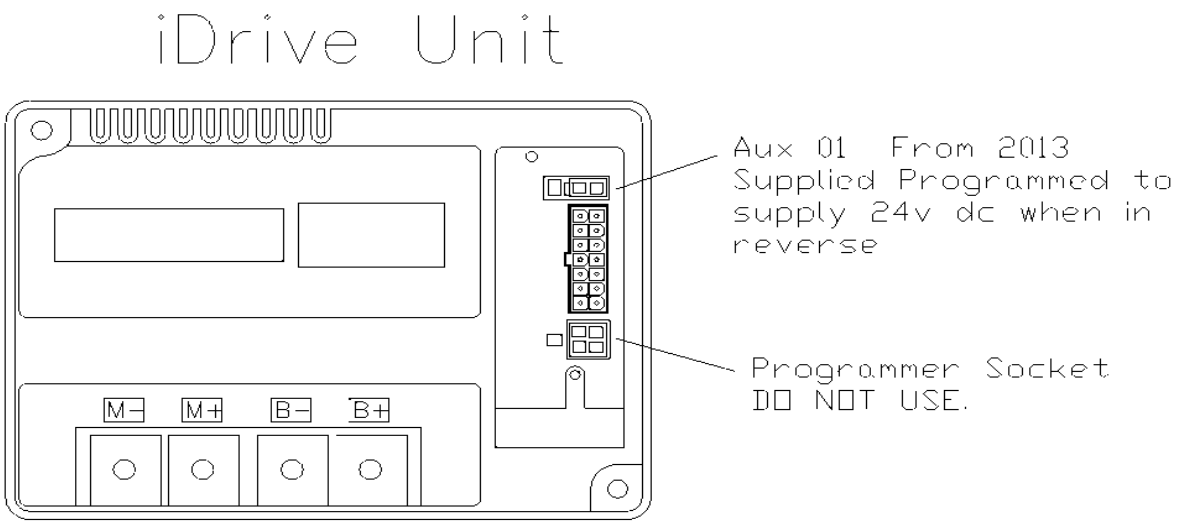
FAULT FINDING

Symptom	Possible Causes
No Power – no lights on True Charge	o Check batteries are charged o Check battery connections + isolator is in the correct position o Check all the battery leads, controller connections
True Charge meter lights up but no power to motors	o Check wire connections to dashboard – see wiring diagram
TrueCharge meter just flashes	o See fault code chart. Take note of the number of leds that are flashing. o Switch off by ignition switch for 30 seconds before switching on o If possible, rectify fault shown on chart
TrueCharge doesn't show green lights	o The TrueCharge Meter reads the voltage from the batteries. Some batteries can give a slightly lower voltage and yet still provide the capacity required.
Engine seems to be losing power	o Check to see if Truecharge Meter drops when power applied if yes - failing batteries o Grease on track. This will affect acceleration and regenerative braking. This is more common than you may think. Clean track and wheels to cure.
Strange whirring sounds coming from under loco	o STOP IMMEDIATELY. Check for trapped debris o Oil all bearing rubbing surfaces
Acceleration and deceleration is "lumpy"	o This could be a symptom of a faulty or failing potentiometer drivers handle. Replace the 5k linear potentiometer if in doubt. o Grease on the track – clean track
Electrical smell coming from the engine	o Switch off the power immediately by the battery isolator switch. o Investigate using smell and touch for hot wires and components. Report back to RoR o The controller is rated for 180amp continuous running but has been restricted to 140amp. Do not over load the loco as it can result in damaging the motor wires and overheating of the motors. If in doubt check motor temperature regularly by reaching under the loco and feeling the motors.

Batteries

- The loco has been fitted with two automatic 5 stage chargers. They are designed to charge the batteries and switch to top up mode once charged. There shouldn't be any issues with leaving the loco on charge full time. If the batteries are known to be fully charged then it can be unplugged and just topped up before running.
- Do not run the batteries below 50% capacity. Victon battery meter will tell you when you have used 100ah.
- The iDrive unit has been programmed to protect the batteries from being excessively drained. If it detects the voltage dropping below **20v** for more than **30** seconds it will inhibit drive and flash up 1 red led on the truecharge meter. Do not continue to use batteries which continually trips the unit out with low voltage.
- Single flashing LED can also indicate bad battery connection.
- Wet cell batteries should always have the lead plates covered in electrolyte. If exposed then top up with distilled/ deionised water. Only top up when fully charged.

iDrive Unit (motor control unit)



The idrive unit has been programmed by Ride on Railways. The unit is factory sealed and contains no user serviceable parts. Do not open the unit as it will invalidate the manufacturer guarantee and may affect how the company deals with a repair.

The Truecharge Meter not only acts as a basic battery condition meter but a fault reporter. If the unit flashes up a code please use the chart below to identify the fault. If the unit is flashing and the engine does not power up, take note of the fault before switching off the ignition switch. If the unit fails to reset please contact Ride on Railways.

Do not worry if you do not get all the green lights lit up on the meter. Its meter is only a basic guide to battery condition and works on the assumption that when batteries are running low the voltage drops. Some batteries can give out a slightly lower voltage yet still have good capacity.

If in doubt check batteries with a load bank tester.

Truecharge Meter Readings



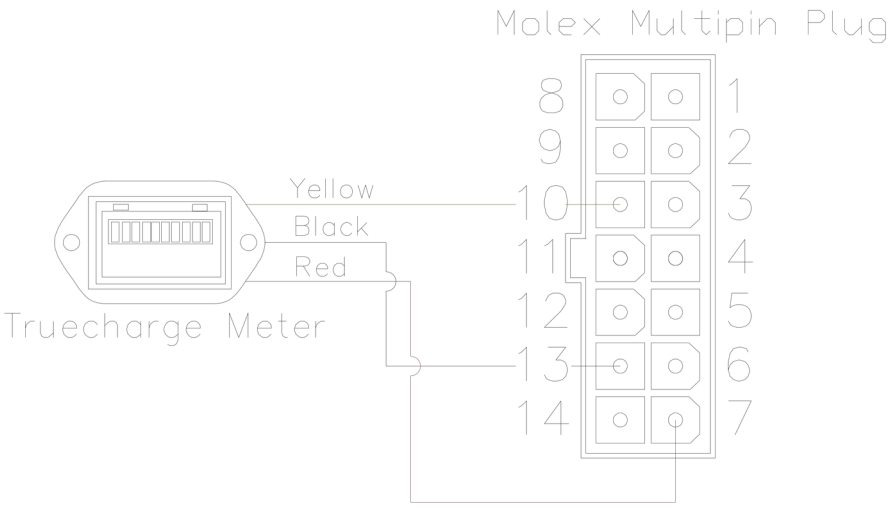
The meter can show potential issues through the battery condition meter. It does this by flipping in to fault reporting mode and flashing up a certain number of led's.

To switch back to battery condition switch the controller off and back on. If the fault flashes again further action should be taken to sort out the fault.

1 Bar	The battery needs charging or there is a bad connection to the battery. Check the connections to the battery. If the connections are good, try charging the battery.
2 Bar	There is a bad connection to the motor. Check all connections between the motor and the controller.
3 Bar	The motor has a short circuit to a battery connection. Contact your service agent.
4 Bar	Not used.
5 Bar	Not used.
6 Bar	The controller is being inhibited from driving.
7 Bar	A throttle fault is indicated. Make sure that the throttle is in the rest position before switching on the machine.
8 Bar	A controller fault is indicated. Make sure that all connections are secure.
9 Bar	The parking brakes have a bad connection. Check the parking brake and motor connections. Make sure the controller connections are secure.
10 Bar	An excessive voltage has been applied to the controller. This is usually caused by a poor battery connection. Check the battery connections.

If the lights are lighting up and down in sequence it means the controller has been switched on with control knob left with power on (safety lock out to avoid runaways). Return control knob to zero for the controller to unlock.

Truecharge Meter Wiring



Power Wiring – Battery and Motor

Maintenance and Servicing

- If the loco is to be pushed or towed please make sure the main battery isolator is switched off. Do not tow faster than 10mph otherwise the regenerative braking will kick in.
- Deep cycling leisure batteries will severely reduce the number of recharging cycles to be expected from the batteries.

Ever 6-8 running days

- Spray oil to the axle keeps where the take up bearings slide + the springs where they pass through the top of the housing.
- Roll engine by hand and listen for any irregular noises or lumpy rolling

Once a season

- Remove and check all battery terminals for scaling – clean is necessary
- Spray oil to the gaps to the sides of the central bearing housing in the UCT take up bearings
- Inspect wheel sets for damage and axle box grub screws are tight on to axle
- Visual check on all nut and bolts for missing or loose components.
- Physically check all cabling damage, fraying or signs of overheating.

As Required

- Touch up any chipped paint to avoid moisture ingression.
- Investigate any strange noises or electrical smells - if in doubt turn it off.

Service Notes

Completed 13-02-19

Inspection records

Formal rolling stock inspections and inspection records are managed in RailStock. This manual provides operating and maintenance guidance and does not replace site-specific safety assessments.