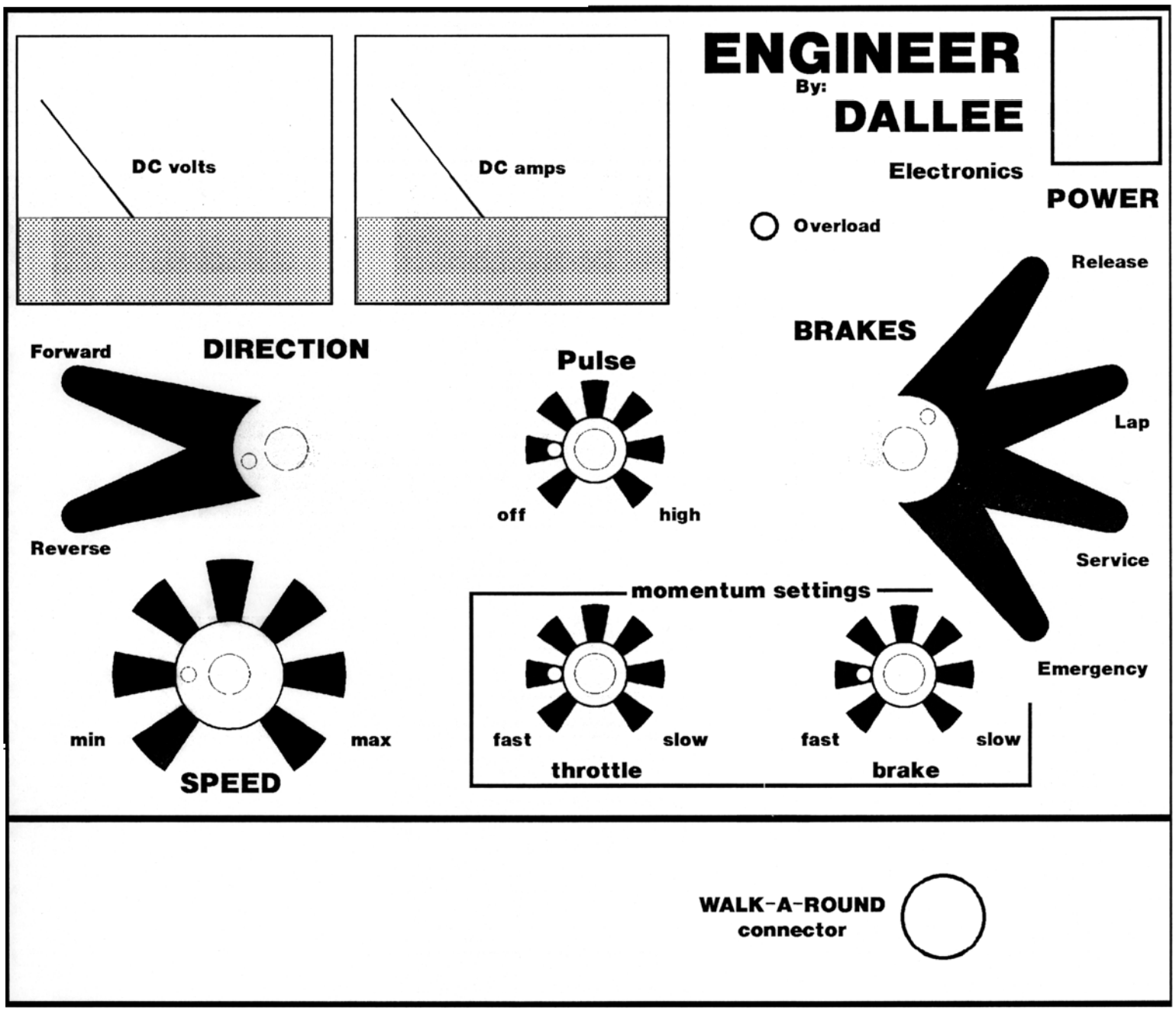
ENGINEER

Operating Instructions



Caution – Electrically operated product. Please read and follow instructions to insure safe operation and handling.

OVERVIEW

The ENGINEER THROTTLE is an integrated circuit design, full feature, momentum throttle. The standard ENGINEER produces 14 volts DC with a maximum current of 5.0 amperes. The GAUGE-1 ENGINEER produces 18 volts DC with a maximum current of 4.0 amperes. In addition to its meter instrumentation and adjustable pulse generation circuitry, the ENGINEER allows the user to vary both the throttle speed response (momentum) and the service brake response. This variability of both throttle and brake response permits realistic simulation of handling characteristics ranging from light engine movement to full tonnage trains. Interlocked reverse is also a standard feature of the ENGINEER. Interlocked reverse requires the train to stop before the reverse switch becomes functional. The ENGINEER is equipped with a regulation circuit which maintains a constant output voltage and therefore constant locomotive speed. The ENGINEER's pulse generation circuitry allows adjustment of pulse height to permit matching of pulses to individual locomotive motor starting requirements. The pulse frequency is varied automatically according to the demand established by the ENGINEER's output voltage level.

The ENGINEER has a four position brake switch which simulates most operating functions including acceleration, deceleration and/or braking and continuous running. This brake switch, together with the reverse interlock feature are combined in the optional WALK-A-ROUND controller to permit walk around control, with memory, of the ENGINEER from any number of remote plug in locations.

DESCRIPTION AND LOCATION OF COMPONENTS AND CONTROLS

On the rear face of the ENGINEER you will find the power cord, a resettable circuit breaker and a barrier strip with two terminals. These two terminals are for the output to the track. There are no other outputs provided as it is our judgement that all power in the throttle should be reserved for output to the track and any accessories should be connected to a separate power source.

The voltmeter is located in the upper left area of the face panel and is used to monitor track voltage. Adjacent to the voltmeter and to its right is the ammeter which is used to monitor the current flow to the track (load). To the right of the meters you will find a red indicator which is used to show maximum current conditions. During short circuit or currents in excess of maximum, this indicator will illuminate. If the overload continues the ampere output will become less than when the short/overload occurred (this is known as foldback current limiting) and the output voltage will gradually decrease to a low setting. This will eliminate jack rabbit starts which would otherwise occur when the overload is corrected.These indications depict proper function of the internal, electronically limiting, output current regulator.

In the upper right corner is the power switch which will glow green when the ENGINEER is "ON".

Below the meters, at the left, is the reversing switch. This switch is like a DPDT type without center off. Its two positions are labeled FORWARD and REVERSE and its function is interlocked so that direction can only be changed when throttle output is at zero voltage, indicating a full stop.

To the right of the reversing switch and at about the center of the panel is

the PULSE control which allows the matching of throttle pulse output to the starting characteristics of the motors in the various types of your locomotives. Rotating this control clockwise increases pulse height. Pulse frequency is automatically varied according to demand established by throttle output voltage. With the PULSE control in full counter-clockwise position the pulse circuit is off.

Below the reversing switch is the throttle SPEED control which determines the output voltage to the track and consequently locomotive speed. While clockwise rotation increases speed, it may be more convenient to set this control at a maximum speed setting and use the brake switch for actual operation. IMPORTANT--- There is no "OFF" position on the speed control. Full counter-clockwise results only in a minimum output which can allow locomotives to creep. To bring a locomotive to a complete stop the BRAKE switch must be used.

To the right of the SPEED control and centered on the lower row of controls is the THROTTLE RESPONSE or "momentum" control. This control adjusts the time frame required for output voltage to change from one speed setting to another. Clockwise rotation increases the time frame and therefore longer delay (slower response). The right side of the panel is devoted to the braking system and contains two controls. The upper control is the actual BRAKE switch which, with its four positions, is the heart of the ENGINEER's operating functions. These four positions are labeled RELEASE, LAP, SERVICE, and EMERGENCY. With the BRAKE switch in RELEASE the SPEED control and its momentum adjustment, also the pulse generation circuitry, are connected to the CAB output and the train will accelerate to whatever speed is set on the SPEED control. The LAP position is similar to a cruise mode where the train will maintain the speed at which LAP was selected. SERVICE is an actual braking application. When SERVICE is selected, the output voltage to the track is reduced, which causes the train to slow down to an ultimate stop. The rate at which this slow down occurs is varied by the BRAKE RESPONSE control. The EMERGENCY position provides a rapid stop. The BRAKE RESPONSE control located directly below the BRAKE switch is an additional momentum adjustment which varies the deceleration available during a service brake application. Clockwise rotation of this control increases the response time of the braking application, taking longer to slow down and thereby simulating a heavier train. It is also possible to "LAP" the brakes by alternating the brake switch between the SERVICE and LAP positions. This will simulate the action of an "air" train brake.

THROTTLE OPERATION

Now that you are familiar with the location and function of the various components and controls of your ENGINEER, lets hook up to the layout and practice running a locomotive. Connect the CAB output terminals on the back of the ENGINEER to the track using your existing power distribution system. We recommend the use of #16 gauge or heavier wire, depending on the size of your layout and the length of the wire runs out to the track. A simple rule to follow: the longer the wire and the larger the load(current draw), the heavier the wire should be to minimize line loss(voltage drop) between the throttle and the track. It may be advisable to use wire as large as #8

or #10 to get the full use of the high current capabilities of your ENGINEER.

Put the BRAKE switch in EMERGENCY and rotate all controls to their full counter-clockwise position. Connect the power cord to a grounded household line outlet (110-120 VAC) and push the top part of the power switch. The green lamp should illuminate. If it does not, check the power cord and plug, the outlet receptacle and the household line circuit. With power on the ENGINEER, the first step is to adjust the pulse circuit to match the motor in the locomotive selected.

1) Check - - - brake in EMERGENCY and all controls full counter-clockwise.
2) Release brake and rotate pulse control clockwise until locomotive just begins to creep. If pulse is set too high the motor will be noisy. It may be necessary to increase the SPEED control very slightly in order to get the pulses to turn on.
3) Set both throttle and brake response to about 9 or 10 o'clock to provide some momentum delay.
4) Increase speed control clockwise - - - acceleration should be smooth. Set speed control at 12 o'clock and let speed increase.
5) Make a service brake application to a full stop and watch for a smooth deceleration. Watch meters for evidence of pulses as stop is approached.
6) Release brake and watch start again.
7) Brake again to a full stop.
8) If the start and stop are sudden the pulses are probably set too low. If the start and stop are jerky or the motor is noisy the pulses are set too high and should be lowered. (Note: 3 pole motors will always be somewhat jerky in operation as compared to a 5 or 7 pole motor) Also, some mechanisms just are not smooth enough to appreciate the full effect of the pulse circuit.
9) Fine adjust the pulses until you are satisfied with the smoothness of operation.
10) Pulse settings will vary from locomotive to locomotive because of differences in motor and gear tolerances, however these settings are unique and should be repeatable every time a specific locomotive is run.

With the pulses adjusted to match the locomotive, lets practice actual operation. Initially we will operate just the locomotive so the response settings (both throttle and brake) should be at or close to minimum. Try about 9 o'clock for now. Let the speed control remain at the 12 o'clock position. With the reverse switch in the forward position we should be ready to proceed. Release the brakes and lets move on down the track. Note that the start is smooth and acceleration is gradual up to the speed selected. Check the voltmeter and see what voltage is actually reached at this setting. Change the speed control to a higher setting and watch as the voltage and speed

increase. To slow down we have two choices. We can lower the speed control or we can apply the brakes. Leave the speed control set at about 3 o'clock which should be around 12 volts (15 volts on the GAUGE-1). Shift the brake switch to SERVICE. Voltage will immediately reduce at whatever brake response is set and the locomotive will slow down. If you stay in SERVICE you will come to a complete stop. Release the brakes again and accelerate back up to about 12 volts. This time make a SERVICE application down to 8 volts and move the brake switch to LAP. The locomotive will continue to run at the 8 volt speed. Make another brake application down to 6 volts and return to LAP. Note that the loco has now settled at a lower speed. To increase speed merely release the brakes and accelerate to the voltage required, then select LAP.

If you were dragging a train instead of only a locomotive, the time needed to accelerate or to stop will depend on how heavy the train is. Change both response controls to about 12 o'clock which simulates a medium weight train. Release the brakes and note that it takes considerably longer for the train to reach the selected speed. Make a SERVICE application and also note that slow down takes considerably longer. If this is an extremely heavy freight drag the acceleration would be very gradual and when stopping it would be like being shoved into the next county. Adjust both throttle and brake response to the maximum clockwise settings and try running your train now. Note the wide range of operating characteristics you are able to simulate with the adjustments available on your ENGINEER.

Try once more with the momentum adjustments set to positions more in line with your usual trains. When demonstrating the ENGINEER at shows we frequently use a throttle response of about 11 o'clock and a brake response of about 9 or 9:30. Think of the voltmeter as a speedometer. Set the SPEED control at some maximum point, release the brakes and get your train headed out of town. Since the signals have been clear we can run at the speed limit. As we round a curve there is a yellow signal telling us to slow down to approach speed. Make a SERVICE application with the brake switch to bring the train speed down and then select the LAP position. As we approach the next signal we see a red and must prepare to stop. Make a series of brake applications, returning the brake switch to LAP each time. This will reduce speed to a low level but will maintain continuous forward movement. Repeat SERVICE and LAP as often as necessary to achieve a smooth and realistic approach and stop. One final SERVICE application should stop your train exactly where you wanted it. If you missed the stop point, try again. With practice you will become an accomplished engineer with your ENGINEER.

WALK AROUND OPTION

The ENGINEER is equipped with a 5 pin jack on the front where the optional hand control for walk around operation plugs in. The hand control duplicates the reverse, brake and both response controls of the ENGINEER. The hand control has a ten foot cord with the correct plug. Any number of 5 pin jacks can be located around the layout as long as they are parallel wired to a plug back at the ENGINEER. To use the hand control to operate the ENGINEER:

1) Reverse switch on the ENGINEER in FORWARD.
2) Preset PULSE adjustment.
3) Preset SPEED control.

4) Set THROTTLE RESPONSE on the ENGINEER to minimum.
5) BRAKE switch on the ENGINEER in LAP.
6) BRAKE switch on hand control should initially be in EMERGENCY.
7) Plug the hand control into the 5 pin jack and operate with the brake switch and other controls, same as if they were on the ENGINEER.

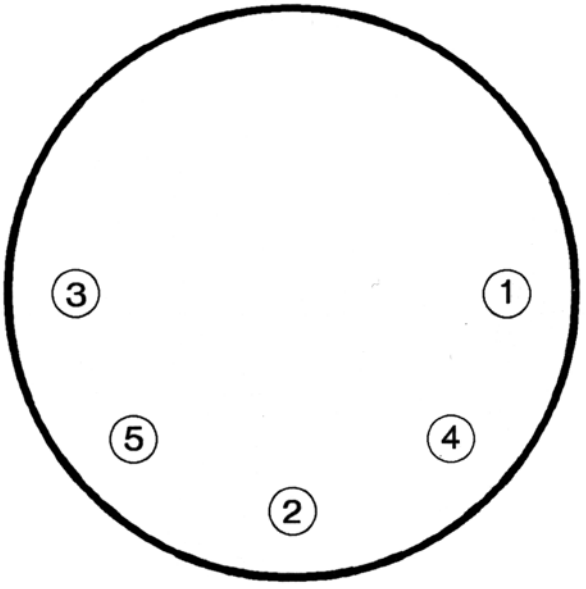
Because only the control functions are remoted to the hand control, all power to the train continues to come from the ENGINEER which remains connected to the track. If you unplug the hand unit, control returns to the ENGINEER. If your train is in motion when you unplug, the ENGINEER will continue this motion because the brake switch is in LAP. If you were in reverse when you unplug you will continue in reverse even though the ENGINEER is in forward because of the interlock feature of the reverse switch.

ONE FINAL COMMENT:

The black finish of the ENGINEER is a powder coating which makes the application of the white lettering and art work very difficult to apply. We have taken great care to protect this lettering however because of the powder coat base the lettering is subject to scratching. PLEASE HANDLE WITH CARE.

DALLEE ELECTRONICS

WALK-A-ROUND connections



1-3 Reverse Switch
2-5 Release
2-4 Brake (Emergency)

In normal positions, all connections are "OPEN". This means "LAP" and "Forward". When connecting 2-4 emergency brake application will occur, having a series resistance (such as found in our hand controller) will cause a slow braking effect. Connecting 2-5 will "RELEASE" the brakes and allow accelleration at the "throttle" response rate to the "SPEED" setting.

DO NOT short any terminals to others that are not to be connected.