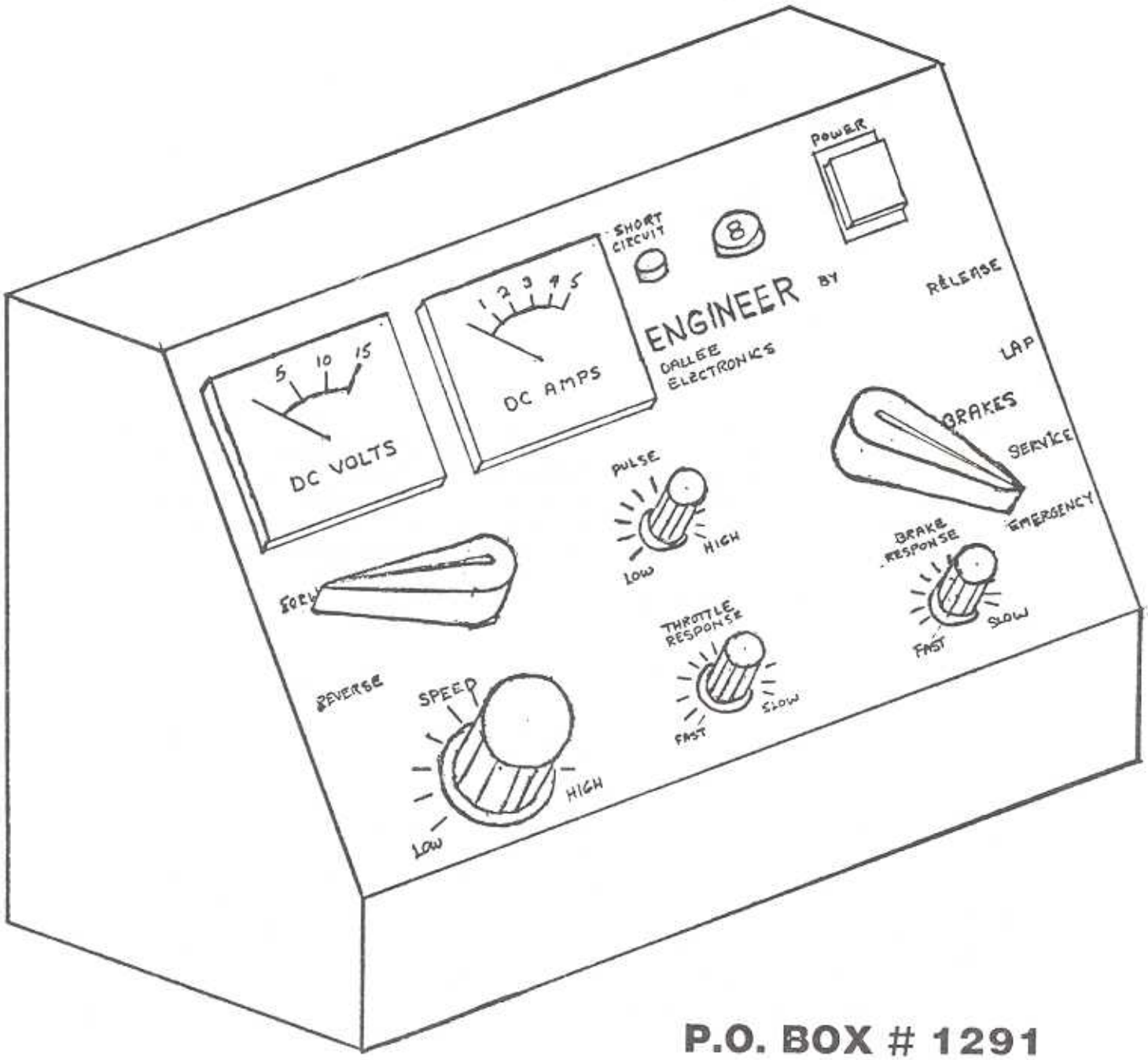
DALLEE ELECTRONICS



P.O. BOX # 1291
READING, PA 19603

ENGINEER ---

OPERATING INSTRUCTIONS

Caution - Electrically Operated Product

Read and follow instructions to insure safe operation and handling.

SPECIFICATIONS

Input

120 Vac, 150 watts

Output

AC - 12.6 volts (fixed)
DC - 17.8 VDC no-load 12 VDC full-load (fixed)
CAB - 0.00-13.0 Vdc @ 4.8 amps (user variable)
PULSE HEIGHT - 0.00-15.0 volts (user variable)
PULSE FREQUENCY - 5-65 Hz
(automatically controlled)

SEMICONDUCTOR COMPLIMENT

1 - Bridge Rectifier
6 - Integrated Circuits
5 - Transistors
7 - Diodes

OVERVIEW

ENGINEER is an integrated circuit design, full feature, momentum throttle capable of 4.8 amps of total output current. In addition to meter instrumentation and adjustable pulse generation circuitry, the ENGINEER is unique in the market in providing variability of not only throttle response (momentum) but also of service brake response. This variablity of both throttle and brake response permits realistic simulation of handling characteristics ranging from light engine movement to full tonnage trains.

DESCRIPTION & LOCATION OF COMPONENTS & CONTROLS

On the rear face of your ENGINEER you will find the power cord and a barrier strip with six terminals. The first two terminals are fixed level AC outputs. This output may be used to power accesories. The next two terminals are a fixed level (filtered) DC output labeled "+" and "-" respectively. The DC output may be used to power accessories but remember that it is a filtered output. The last two terminals are for the output to the track and are labeled "CAB". When operating accesories or other throttles from the ENGINEER the total output load can not exceed 6 amps. The voltmeter is located in the upper left area of the control panel and is used to monitor track voltage. The meter range is 0-15 VDC and has a zero-set adjustment screw. Adjacent to the voltmeter and to it's right is the ammeter. The ammeter has a range of 0-5 AMPS, it also has a zero adjustment.

ENGINEER ---

OPERATING INSTRUCTIONS

The ammeter is used to monitor the current flow to the track (load). With no power applied i.e. main POWER in the off position, CHECK the ZERO INDICATION NOW and adjust if necessary. It is suggested that after setting both meters at zero, place a touch of glue (such as Ambroid) on the zero adjusting screws to secure the settings. To the right of the meters you will find a red indicator. This indicator is used to show maximum current conditions. The maximum current output is 4.8 AMPS. During short circuit conditions this indicator will be fully illuminated and the output voltage will drop with the ammeter indicating 4.8 amps (or greater). These indications depict proper function of the internal, electronically limiting, output current regulator.

In the upper right corner is the POWER switch. It will glow green when the ENGINEER is "ON". To turn on/off the ENGINEER just gently push the green square in and then release. To the left of the POWER switch is the resettable circuit breaker. The circuit breaker protects the power transformer and has no function in controlling the maximum power available from the ENGINEER throttle. Below the meters, at the left, is the reversing switch. This switch is a DPDT rype without a center off position and has a long lever handle. The two positions for this switch are labeled FORWARD and REVERSE. This switch should NOT be operated until the output voltage is zero. Zero output voltage may be obtained rapidly by placing the BRAKE switch to EMERGENCY. To the right of the reversing switch and at about center of the panel is the PULSE adjusting control which allows the matching of throttle pulse output to the operating 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 the output voltage. One note of interest --- when the PULSE control is completely counter-clockwise the pulse output is zero. This is of particular interest if you are operating precision can motors. Below the reversing switch is the throttle SPEED control. This control determines the output voltage level to the track and consequently locomotive speed. Clockwise rotation increases voltage (locomotive speed). In actual operation the SPEED control can be used either to directly vary locomotive speed or to establish a maximum speed level with actual speed being controlled by use of the BRAKE switch. IMPORTANT --- There is no "OFF" position on the SPEED control. Full counter-clockwise results only in a minimum voltage output and locomotives can creep at this setting. 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 delayed momentum control. This control adjusts the time required for track voltage to change from one SPEED control setting to another. Clockwise rotation of this control increases the time interval (delay). All changes in the SPEED control are governed by the time delay of the THROTTLE RESPONSE control. When operating only a locomotive it is obvious that said locomotive would respond rather quickly to a change in throttle speed setting. This is simulated by rotating the THROTTLE RESPONSE control

counter-clockwise to provide a minimum time delay. As tonnage of a train increases, response to changes in speed setting will be slower and this operating characteristic can be simulated by clock-wise rotation of the THROTTLE RESPONSE control. The heavier the train the slower the THROTTLE RESPONSE!

The right hand side of the panel is devoted to the braking system and contains two controls. The upper control is a lever handled four position BRAKE switch. These four positions are labled RELEASE, LAP, SERVICE, and EMERGENCY. Placing the BRAKE switch in the RELEASE position simulates the release of train and locomotive brakes and enables your train to respond to the throttle SPEED control. The RELEASE position also activates the pulse generation circuitry which assists in starting the locomotives electric motor. The LAP position simulates a "power off" coasting situation. In this position the SPEED control is inoperable and the track voltage will gradually reduce from whatever level had been obtained. In the LAP position the train will ultimately come to a full stop. The time needed to stop a train in the LAP position depends on how high a speed you have attained and how heavy a train you wish to simulate. The LAP position has two uses in train operation. First, when using throttle SPEED control only to set a maximum speed, actual train speed is controlled by alternatively switching between RELEASE and LAP. In RELEASE, voltage and speed will increase and in LAP voltage and speed will gradually decrease. As an example:

> Set the SPEED control at about three o'clock, which should be approximately 10 volts, established as a maximum speed. You wish to operate your train at a speed equivalent to 8 to 8.5 volts. RELEASE the brakes and the train will start to move. Speed will gradually (THROTTLE RESPONSE setting) increase. Watch your train movement and the voltmeter. As the meter reaches 8.5 volts move the brake switch to LAP. Your train will slow and when 8 volts is indicated on the meter, again go to RELEASE. Voltage and speed again increase. Continue running your train in this speed range by alternating between LAP and RELEASE.

The second use of the LAP position relates to controlled stopping of your train in conjunction with the SERVICE position. When the BRAKE switch is placed in the SERVICE position, application of train and locomotive braking system is simulated to bring your train to a stop. To reduce speed, track voltage must be reduced. In the SERVICE position the SPEED control is inoperable and the track voltage reduces similarly to LAP but much more quickly. How quickly the voltage and speed reduce can be adjusted by means of the SERVICE RESPONSE control located directly below the BRAKE switch. It has previosly been mentioned, in discussing SPEED and THROTTLE RESPONSE, that a single locomotive is more responsive to speed change than is a heavy train. This is also true for braking application. When operating only a locomotive, set the SERVICE RESPONSE control full counter-clockwise for fast braking. To simulate a heavy

train rotate the control clockwise for slower braking action. Once again, the heavier the train the slower the response. In the SERVICE position, your train will come to a complete, controlled deceleration, stop. To more prototypically control the stopping of your train you can now employ the second use of the LAP position in conjunction with the SERVICE setting. With practice, precise stops can be made by alternatly switching between LAP and SERVICE. Refering to the example of regulating speed with the RELEASE and LAP positions of the BRAKE switch it now follows:

> You are maintaining speed between 8 and 8.5 volts but are approaching a reduced speed zone or a limited speed signal calling for the equivalent of 5 to 5.5 volts. Watch the voltmeter and switch to SERVICE. Speed and voltage drop rather quickly. When the meter shows 5.5 volts, switch to LAP and note that while voltage continues to drop, it does so very slowly. When 5 volts is reached return to RELEASE momentarily to increase speed again. Continue holding the reduced speed by alternating RELEASE and LAP. If the speed gets to high, use SERVICE again. Now you are approaching a station or a stop signal. Go to SERVICE to reduce speed to a low level. Return to LAP to "coast" at slow speed. Repeat SERVICE and return to LAP as often as needed to achieve a smooth and realistic approach to a designated stopping point. Make final SERVICE application and your train will stop right where it should. If you missed the stop point, re-read the above and try again. With practice you will become an accomplished engineer with your ENGINEER.

The LAP position is interconnected with the SERVICE RESPONSE control so that "coasting" is proportional to the brake rate. A heavy train will "coast" further than a single locomotive. The fourth and final position on the BRAKE switch is the EMERGENCY position which brings the track voltage rapidly to zero resulting in a quick, somewhat smooth "emergency stop".

One final comment on the BRAKE switch. In both the LAP and SERVICE positions, the pulse circuitry continues to function until just before a full stop. This pulse activity can be seen on both meters as full stop is approached. While your train may not appear to be in motion it is in fact creeping in the pulses until they cease. If you wish to eliminate this final pulsed creeping, after the train appears to have stopped, you can do so by switching to EMERGENCY at this time. Also, to avoid unnecessary wear and tear on locomotives and rolling stock, it is highly recommended that the reversing switch be changed only during a full stop. You may elect to establish a standard operating procedure calling for a full stop, then EMERGENCY, then switch the reversing switch.

THROTTLE OPERATION

Now that you are familiar with the location and function of the various components and controls of your ENGINEER it is time to do some revenue work on your railroad. Connect the CAB output terminals to the track (use 16 gauge wire - or heavier), select a locomotive to operate, put the BRAKE switch in EMERGENCY, rotate all controls full counter-clockwise and we are ready to proceed. Connect the power cord to a grounded household line outlet (120 VAC) and push on the power switch. The green lens lamp should illuminate. If it does not, press the circuit breaker on the ENGINEER, check the power cord and plug, the wall outlet receptacle and the household line circuit. With power on the ENGINEER, the first step is to adjust pulse height to the locomotive being operated.

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 pulses are too high, the motor will be noisy.

3) Increase SPEED control clockwise --- acceleration should be smooth.

4) Set SPEED control at 12 o'clock and let speed increase.

5) Apply SERVICE to brake to a full stop. Watch for smooth deceleration. Watch meters for pulsating action as stop is approached.

6) Release brake and watch start again.

7) Apply SERVICE brake again to a full stop.

8) If start and stop are sudden, pulses are probably too low. If start and stop are jerky, pulses are too high and should be lowered. (note - 3 pole motors will always be slightly jerky)

9) Fine adjust the pulses until you are satisfied with the smoothness of operation.

With pulses adjusted for smooth starts and stops it is time to practice operation. Set SPEED control to 12 o'clock or higher and release brakes. Watch acceleration and time to full speed. Now apply SERVICE brake and observe deceleration and time to full stop. Rotate both the throttle and service response controls to about 10 o'clock. Release the brakes and note the slower acceleration. Apply SERVICE brake and note deceleration. Repeat at other response settings to get the

"feel" of different train weights. With the locomotive running use a wire or screwdriver to short across both track rails. Locomotive should stop, voltage should drop, ammeter should read a minimum of 4.8 amps and the red lamp should be brightly illuminated. Remove the short circuit and throttle will return to normal operation. Practice controlled speed running and location stopping as explained in examples given under description of the BRAKE switch. As soon as you feel you are a graduate of engineer school, couple up to a train, adjust the response controls for train weight, pull on your engineer cap and haul on the "green". Have fun and many happy hours operating with your ENGINEER built by:

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