

**Preamble**

Most Product Reviewers have developed their own individual styles for presenting test results of locomotives that employ a direct-connected drive system.

A locomotive equipped with a ModelTorque Automatic Torque-control Coupling (ATC) requires a different approach to testing and hence the test parameters and format of the published test results will differ from the present formats.

This document is designed to introduce Product Reviewers to the concept and operation of an ATC-equipped locomotive, and to suggest an appropriate range of tests that should be undertaken as part of a product review.

**An ATC-equipped locomotive ?**

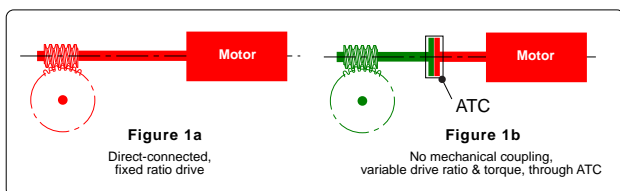
The difference in construction between a direct-connected drive system and an ATC-coupled drive system is shown in Figures 1a & 1b.

You will note that with the ATC drive there is no direct coupling between the motor shaft and the driving wheel gear set.

This feature changes the model's operational characteristics to very closely replicate the operation of a prototype diesel locomotive.

The most significant difference in operating an ATC-equipped locomotive is that the "Throttle" position (%) no longer directly represents locomotive speed.

It now acts like a prototype Throttle, controlling power to the loco; the resulting speed being determined by train load, grade, track curvature etc.



**Operational characteristics of an ATC-equipped locomotive**

- o The "Throttle" becomes a Throttle control - not a speed-setting knob.
- o Driving motor always starts with no load.
- o Motor runs at 'idle' speed without moving model ... ideal for sound systems.
- o Motor stall is not possible.
- o Maximum torque available at zero model speed with no motor overload.
- o Drives a model locomotive just like the prototype - providing a sensitivity to load according to the weight of the train you are hauling, the size of locomotive you are using, and over a variety of gradients and curves.

- o To provide the most realistic operation, the ATCs are available in different torque outputs and there are recommended locomotive weights for each torque level that provide predetermined drawbar pulls.

The comparison between Throttle positions for a prototype loco running light and a loco lifting a heavy train is shown in Figure 2.

ModelTorque now provides this level of operating reality for model locomotives by the fitting of ATC drives.

**Suggested product review Tests**

We suggest that the first step in reviewing an ATC-equipped locomotive is to get used to the general operation.

With the loco on a section of straight, level track ready to run light, increase the throttle to about 10% (just before movement starts) and note that the motor is rotating. This feature provides for an 'idle' input to a sound system, and confirms that the motor starts under no-load.

Next, increase the throttle slowly until the loco starts to move. Note the % throttle setting.

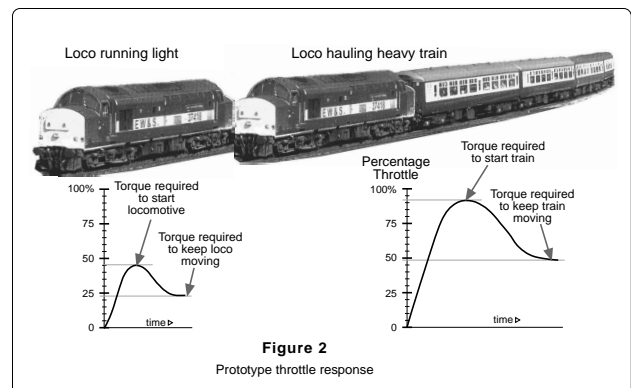
Couple a train (say 5 coaches) to the loco and adjust throttle until the train starts moving. Note the % throttle setting.

The difference between the no load throttle setting and the train load throttle setting indicates the same sensitivity to load as a prototype.

Now 'drive' the train around curves and up/down inclines. You will again note that the loco requires throttle adjustments just as the prototype.

Further experimenting may include multiple consisting, adding the test loco as a rear helper and longer (heavier) trains.

Finally you may wish to measure the drawbar pull. This can be measured simply by connecting a spring weighing scale to the loco, then increasing the throttle until the loco stalls ... this also demonstrates the non-stalling capability of the motor.



Any queries ?

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