

## Learning to Qualify Physical Characteristics and Train Handling

In the *Ten Commandments For Student Engineers*, the Fourth Commandment\* reads, **"Learn the job right"** but what does this mean for the student engineer? The Fourth Commandment also says' **"It is the students' responsibility to pay attention to what is being taught and to absorb this information and make it their own"**. Starting off on the right foot when it comes to learning the craft of Locomotive Engineer means taking the training seriously, doing the best you can in class, studying the subject matter as required to get the best grades you can, and then, when it is time to come out on the railroad and learn physical characteristics and train handling, you bring all the enthusiasm you can to the task. What you learn in the locomotive cab will determine your safety and the safety of the people or freight that rides behind you, not to mention the length of the career you have chosen to follow. It is essential that you spend the extra time now to learn and understand the railroad over which you will be running. **Most railroad employees do not come from railroad families as was more the rule in the past. They come off the street, many not having the slightest clue what railroads, and locomotive engineers in particular do. They have chosen to take an advanced course without taking the preliminary courses that prepare them for a job that is not entry level by any stretch of the imagination. If you are one of these then you have a lot to learn and a relatively short time to do it in before you are placed in the seat by yourselves and are expected to run a safe train.** When you applied for a job on the railroad you chose a life style that compares to few others in this country. While qualifying and learning to train handle you must put your personal life in the clear, and devote your full attention to what you are learning. This is not an eight hour assignment. **Devote as much time as required** for the sooner and better you learn your new craft the sooner you will achieve the skill level required to become a safe engineer.

### Qualifying: What is it and how do I do it?

Well congratulations, you've passed the required classroom tests and you know that you must now "qualify on physical characteristics" in order to continue with your training. To "Qualify on physical characteristics" is to learn the physical characteristics of that portion of the railroad that you will operate over. There is a law in the state of New Jersey that requires an engineer to qualify on the railroad before he can run a train over it. The reason that qualifying is so important is that compared to a highway or street, there are no street signs, road signs, or speed limit signs on the railroad. You must "know the territory" by memory. You will have to take a written test and make an oral presentation to a Road Foreman. When you successfully complete both, you will be "qualified on physical characteristics".

#### **You mean railroad tracks are not the same as highways?**

Here is a simple comparison of the two. If you were to drive from City A (Station A) to City B (Station B), the highway (main track) you would take would be clearly marked. There would be signs to identify the highway's name or number, along with the direction, East, West, North, or South. Junctions with other roads (Interlockings) will be indicated with signs. Secondary roads (Running Tracks) will be identified with signs, as well as side streets (Yard Tracks). Traffic lights (Block Signals) will control traffic flow. There will also be signs to indicate curves, grades, and other information.

After you make a trip on the railroad, you will notice that there is no such signage. The tracks are numbered, but there are no numbers on the tracks themselves. Additionally, there are no signs indicating in which direction the tracks go. There are no Junction signs, nor signs to identify running tracks or yards. In qualifying, you will learn these things.

**1. The first step: When learning to qualify over the territory you are assigned the first order of business is to come to the job prepared.** It makes no difference which railroad or which

line of which railroad you choose or are assigned to you must come to the job prepared. This means going over the station pages of your Special Instructions gathering all the information you can about the territory you are qualifying on before you get to the signup location. Special instruction pages include: tracks, , track speeds, and track rules, grade crossings and their type of protection, switches and Interlockings. Try to get a study partner and quiz each other. Practice your verbal presentation.

In engineer's school you should have acquired the habit of memorizing all sorts of information in order to do well on your tests. If you haven't you probably would not have reached this stage of training. From this point on it is essential that you bring all those skills that you used in the engineer's training class and apply them to the most important part of your training: the learning of Physical Characteristics and Train Handling.

Unless you have been doing some train riding on your own or have train service experience, a lot of what you read in the Timetable/Special Instructions and Book of Rules will be new to you and, as a consequence, may be difficult to assimilate and understand. Not to worry. As you ride over the railroad you will see, physically unfolding in front of you, the information you have memorized previously and, hopefully, you will be able to synthesize all this previously memorized information into a cohesive pattern of speeds, curves, stations, signals, grades and grade crossings, rules in effect for your train, and all those other physical attributes that will help you safely control the train in your charge.

**2. The second step: Draw a map as you ride.** I mean actually starting out with blank sheets of paper and draw the railroad as you see it through the cab windshield. Sure, there will be plenty of maps available to you from other students or the company's engineering maps which show all the physical characteristics and you can learn from those but the only way to test your knowledge of the railroad is to draw a map from scratch, going over it each time you ride over the territory, correcting errors and adding new information each trip. Each night at home, redraw the map with everything you remember then update the map when you ride the next trip. This constant re-enforcement of your increasing knowledge of the territory is the only sure way to know that you **KNOW THE TERRITORY**. If, at the end of your qualifying rides you can't draw a map from memory then you do not know the territory sufficiently to feel comfortable controlling the train. On this map you need to mark every curve, maximum authorized speed, speed restrictions and their braking points, stations and their braking points, crossings and the type of protection afforded, under grade or overhead bridges, automatic signals by number, Interlockings including their switch and signal configurations; anything that affects the movement of your train and any wayside objects that will help you identify where you are and what is coming up. These are the physical characteristics you will need to know to properly control your train. Go over these maps with your partner, fellow students, and engineers you ride with correcting errors as they are found. Check the current Bulletin Orders and Special Instructions for changes that sometimes occur on a daily basis and update your map.

**3. The Third step: Ask questions about what you don't understand.** At the beginning any question is appropriate. As you acquire knowledge your questions will become more specific. The important thing is to ask. The engineer you are riding with may not give you a running commentary as he runs over the road and may, in fact, assume that if you don't ask questions that you know everything you need to know.

The study of physical characteristics is an investment in your safety and the safety of your crew and the people who live around and ride on your railroad and it requires total focus. It is essential to the safe operation of your train and you will never feel comfortable in the engineer's seat until you know the characteristics cold.

**Can you picture in your mind** the station you are approaching that you cannot see until

you hit the platform? **Do you know the distance** from a distant signal to the home signal so that you could stop short of a stop signal in the fog? **Do you know the rules in effect** for the track you are on and who controls that track? **Do you know what radio channel** you are supposed to be on? By listening to the chatter on the radio **can you tell what's going on on other parts of the railroad and how those events might affect your train?** If not then you do not know the physical characteristics of the railroad you are running over. Keep asking questions and remember: even after you are qualified Rules and Special Instructions periodically change so you must keep up with them to remain qualified.

### **Train Handling: The time has come to prove yourself!**

Well, now you've got the railroad figured out, you've memorized all the physical characteristics and have passed the written and oral tests with flying colors. Maybe the Road Foreman even patted you on the back and congratulated you on a fine job of qualifying. You've been given your riding assignment and you are ready to report to the designated sign-up location.

What is expected of you your first day out on the railroad with your engineer/instructor?

- 1. Bring a desire to learn:** Even if you have worked on the train as a brakeman/conductor prior to engineer training (maybe the engineer even let you run the train on occasion) you are about to embark on an entirely new experience. To do it right you must bring a desire to know all you can about this new craft.
- 2. Curiosity and Commitment:** You have committed yourself to a course of learning that, if you fail to complete it fully and successfully, you may be fired, get hurt, and/or you may hurt others which could lead to firing, lawsuits, fines, or possibly criminal prosecution. You will need to show that you are interested in learning the craft and you do this by demonstrating a curiosity about all aspects of the job.
- 3. Show up on time for sign-up and have all your required books and paperwork in order:** This may seem obvious but being late for an assignment or not having all your paperwork together shows disrespect not only for the engineer/instructor but for the craft he/she has put so much effort into learning.
- 4. Introduce yourself to the engineer/instructor as soon as he signs in:** The engineer you are assigned to for train handling has, hopefully, been chosen for their skill running trains and their knowledge of the territory. Also, hopefully, they will be able to impart this information to you in a way you can absorb it and improve your skill level. Showing respect to your instructor is a good way to start a relationship that can benefit you and the crew you work with.
- 5. Be prepared to do a job briefing with the crew:** Go over your physical characteristics for the territory you are running over before you sign up either the night before or before you report for duty. Have as much information about the job as you can learn so that when you do the job briefing with the crew you are familiar with the territory, type of equipment you will be using, and all rules and special instructions that pertain to your job.
- 6. Be ready to take notes:** There will be many individual aspects of the job such as train control techniques (braking points, use of dynamic brakes, use of terrain for train control, etc.), radio procedures, use of hand signals or communication devices, that are particular to this job. I have never met a student engineer with a photographic memory and in almost every case if the student does not take notes he/she will be as dumb tomorrow as he/she is today.

**7. As you ride watch the engineer work:** The physical technique of running a train is rote learning. Watch the sequence an engineer goes through when he sets up the engine(s) for the trip: setting up the control stand/desk, cutting in the brakes, checking the paperwork in the cab, inspecting the locomotive(s), testing for power, radio check, brake test, and all those activities the engineer has to go through to prepare the engine(s) for the trip. Take note of the use of throttle and brake in starting the train, his braking points and speeds when he applies the brake, how much of a reduction he takes each time he reduces brake pipe and the result. All these things are a part of what you must learn to safely control your train.

You will ride with many different engineers through the course of your training. Some will use techniques that will make you uncomfortable, some may even scare you. Not all engineer/instructors are created equal. Although an effort has been made by the BLE to train engineer/instructors so that there is a consistency in the qualification and train handling part of the LETP program on New Jersey Transit this has not yet come about. **Your job is to do what the engineer instructs you to do.** As you learn you will take lessons from each engineer that will work for you, get the job done safely, and make you feel more comfortable with your responsibilities. This is a natural and normal part of your maturing as an engineer trainee.

**8. Be ready to run or not:** The engineer/instructor may or may not put you right into the seat. If this is your first time running a train there is nothing that will properly prepare you for this experience. All your note taking and preparation will fly out the window as your brain suddenly turns to mush and you forget all that you learned in class and read in your carefully prepared notes. **This is the moment of truth.** Invariably, without the continuous attention of the instructor, the new student falls short. Again, this is considered a normal part of your learning experience. There are times when you will wonder what you have gotten yourself into and there are trainees who will quit because they are not prepared for the responsibilities and stress of running trains. For those people is it probably just as well. For others, as they mature in the craft, the reward of successfully moving huge trains of enormous weight at high speeds over varying terrain is more than satisfactory compensation. You will find soon enough that the pay for this service is insufficient for the time and energy you must put in to complete the assignment.

### **Situational Awareness: How important is it?**

**Situational Awareness is the culmination of all things you have learned applied to the running of your train.** It is knowing and applying the physical characteristics of the territory over which you are running. It is monitoring the gauges (load meter, air gauges, speedometer, etc.). It is developing a feel for how the locomotive is performing against the weight of the train and the grade as the train accelerates and brakes in response to your control inputs. It is listening to the sounds of the locomotive under all conditions so you can hear when things are not right. It is listening to the radio for information that may affect the movement of your train immediately or in the near future and responding properly when radio calls are directed to you train. It is knowing the **"Sequence of Signals"** so that you can smoothly and safely control the train in response to predictable cab and wayside signal changes. It is compensating for weather and rail conditions, signals hidden behind obstacles, short sight distances, mechanical problems with the equipment, and distractions and irritations in the cab all at the same time.

**Situational Awareness is an essential and necessary part of maturing in your chosen craft. It is acquired over time and keeps to no schedule if it comes at all.** For the student engineer the mechanics of running the train, getting the correct combinations of throttle and brake, keeping the train running at the required speed without violating just the obvious rules, can be overwhelming. Acquiring Situational Awareness can seem to be an

unattainable goal and for some students it will be unattainable. **Not everyone has the ability** to put all aspects of train handling together in the one package called Situational Awareness. For those that acquire the package train handling becomes as natural as breathing. For those who can't perhaps a different line of work would be a good career move.

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**\*4. Learn the job right:**

The job of *Locomotive Engineer* is a craft and like all crafts it is primarily learned by doing under the tutelage of an experience craftsman. The first few trips at the throttle can be a sobering, even frightening experience. The student is expected to be nervous and the condition is considered normal.

If, however, the engineer instructor is nervous then there might be something wrong. It is the training department's responsibility to make sure the student engineer is taught by the best engineer instructors available. It is the engineer instructor's responsibility to teach the student proper train handling techniques in a manner that the student can learn and retain. It is the students' responsibility to pay attention to what is being taught and to absorb this information and make it their own.

This process takes time; more for some than others but again, this is to be expected. The student should observe as many different engineers as possible. There may be instances when a train handling technique that an instructor engineer teaches will make a student uncomfortable. This is not to say that the technique is necessarily unsafe or a violation of rules but just uncomfortable for the student. By observing several engineers over the course of train handling instruction the student is most apt to find a train handling technique they feel comfortable with and make it their own.

Do your homework before you report for the job. Study the road before you take the throttle. Learning to be an engineer is not an eight hour assignment. Don't arrive at the engine without knowing the rules in effect, the territory over which you will be operating, and any special instructions that pertain to the train you will be operating (a coffee and doughnut or breakfast sandwich for the engineer might not be a bad idea either).

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