



Securing Train Air Brakes

By the BLET



Train Air Brakes

- Trains are equipped with a pipe that extends from the locomotive to the last car of the train
- The “brake” pipe supplies compressed air from the locomotive to every rail car in the train
- The brake equipment on the rail car responds to a change in the brake pipe pressure
- When the pressure in the brake pipe is reduced, the brakes on each rail car applies with a pressure that corresponds to the amount of the pressure reduction in the brake pipe



Train Air Brake Controls

- Locomotives are equipped with an automatic air brake valve
- The automatic air brake valve is used by the locomotive engineer to adjust the pressure of the brake pipe to apply and release the train air brakes
- When the train is operating normally with no air brakes applied on the train, the automatic brake valve is said to be in “release” position



“26L” Type Brake Valve



- Release position

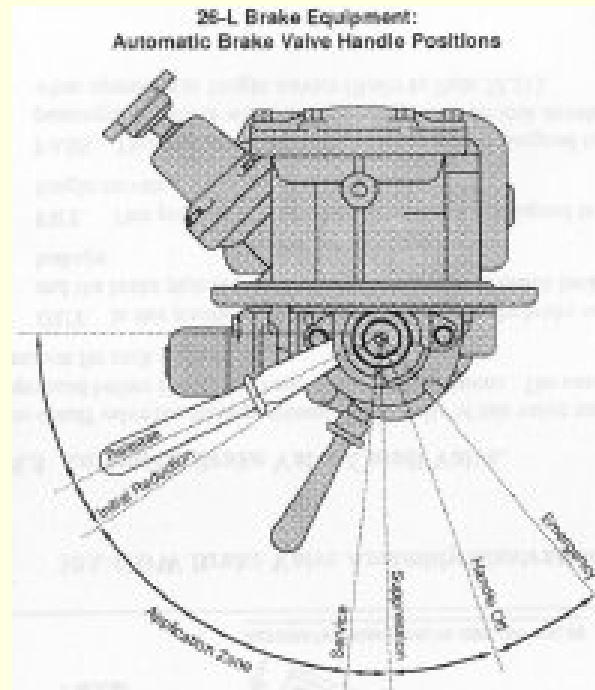


How to “kick em off”





“26L” Type Brake Valve



- Diagram of brake valve positions



CCB II Brake Valve

- Computer Controlled Brake (CCB) air brake controller built by Knorr





Unattended Trains

- Leaving trains unattended is a standard operating procedure for all railroads in the United States
- Trains are left unattended for long periods
- Often the trains are in remote locations where unauthorized persons may go unnoticed
- This practice is documented by IBT in a report titled “High Alert: Workers Warn of Security Gaps on Nation’s Railroads”
- Provides an opportunity for unauthorized persons, even a terrorist, to commandeer a train



Are The Trains Secured?

- Railroad operating rules, and federal regulations, require that the trains be secured by fully applying the train air brakes before the train can be left unattended
- In addition hand brakes must be applied to a portion of the rail cars in the train
- The locomotive cab doors and windows must be locked, if they are equipped with locks
- Certain other procedures, such as positioning certain switches in the off position, must also be done before leaving the train



So What's the Problem?

- All of the procedures used to secure an unattended train are either already publicly known or can readily be found on the internet
 - Locomotive operating manuals, which give detailed instructions on how to operate the locomotive including the air brake equipment, are sold on the internet and posted on rail fan web sites
 - Railroad rule books, that describe the train securement procedures, as well as training manuals for brakemen and switchmen are also available to the public

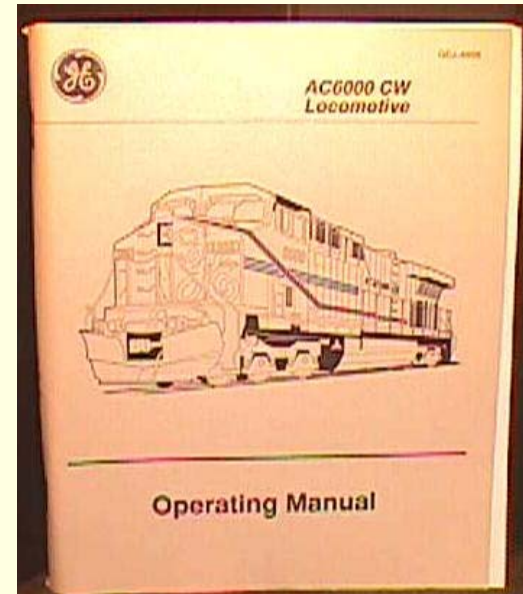


Operating Manuals

- AC6000 Locomotive



- AC6000 Manual available on the internet



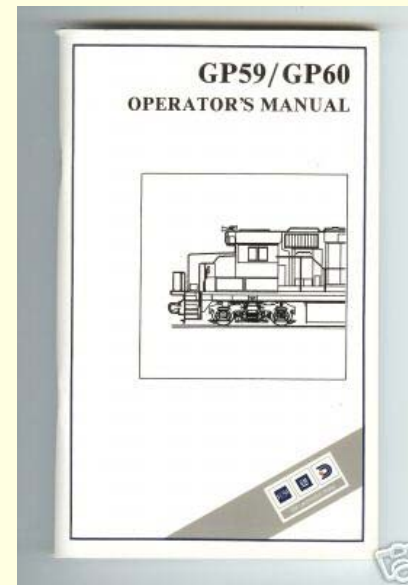


Operating Manuals

- GP60 Locomotive



- GP60 Manual available on the internet





Manuals Available on the Web

- EMD GP15-1 Ops Manual - {Tom Gardner Collection}{550K}
- EMD GP15-1 Service Manual - {Tom Gardner Collection}
- EMD GP-30 Operating Manual - Mike Epler Collection
- EMD GP-30 Master Parts Catalog - {Dave Pickrel Collection}
- EMD GP-35 Manual - {Tom Gardner Collection}
- EMD GP35 Static Control - {Tom Gardner Collection} - 3.3Meg PDF
- EMD GP-38 Manual - {Tom Gardner Collection}
- EMD GP38-2 Operator Manual - {Tom Gardner Collection}
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- EMD GP-39 Manual - {Tom Gardner Collection}
- EMD GP-40 Service Manual - {Tom Gardner Collection}
- EMD GP40-2 Service Manual - {Tom Gardner Collection}
- EMD SD-7 Operator Manual - {David Longshore Collection} - 4.3Meg PDF file
- EMD SD-18 Operator Manual - {Don Nickel Collection}
- EMD SD-24 Operator Manual - {David Longshore Collection} - 5.4Meg PDF
- EMD SD-35 Operating Manual - {Tom Gardener Collection} - 5.0 Meg PDF
- EMD SD38-2 Operator Manual - {David Longshore Collection} - 3.3Meg PDF file
- EMD SD-39 Operator Manual - {David Longshore Collection} - 1.7Meg PDF File
- EMD SD-40 Manual - {Tom Gardner Collection}{500K}
- EMD SD40 Operator Manual - Part A - {Tom Gardner Collection} - 2.4Meg
- EMD SD40 Operator Manual - Part B - {Tom Gardner Collection} - 1.9Meg
- EMD SD-40 Service Manual - {Tom Gardner Collection}
- EMD SD40-2 Operator Manual - {Tom Gardner Collection}
- EMD SD-45 Operator Manual - GPE Collection
- EMD SD-45 Service Manual - {Tom Gardner Collection}
- EMD SD-50 Operator Manual - {Tony Santora Collection} - 2.9Meg PDF
- CNW SD-50 Operator Manual - {Bob Rathke Collection}
- EMD SD-60 Operator Manual - {GPE Collection} - 2.4Meg PDF
- EMD SD-60 Service Manual - {Dave Pickrel Collection}
- CNW SD-60 Operator Manual - {Bob Rathke Collection}
- EMD SW-1/NW-2 - William Shultz Collecion
- EMD SW-8/9 - TR5/6 - William Shultz Collecion
- EMD SW900/1200 Operator Manual - {Gary Stuebben Collection}
- EMD SW1500 Operator Manual - {David Longshore Collection} - 3.0Meg PDF file



How to be a Trainman

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TransAlert.com Bookstore: Rail: General

Basic Training Manual for Brakemen and Switchmen
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Publication Info: 82 pages (2004)
The Railway Educational Bureau; Dimensions (in inches): 4.5 X 8.25

Description: Do you have new employees that need to learn the basics quickly? Our updated version of Basic Training Manual for Brakemen and Switchmen is just what you've been looking for. We've updated this classic book to reflect modern safety practices. The book outlines the basic responsibilities of brakemen and switchmen keeping safety in the forefront of its explanations. It is an excellent training guide for new employees.

Additional Information: Topics covered include:

- Introduction to types of engines and cars
- Communications
- Getting on and off equipment
- Track switches
- Coupling and uncoupling equipment
- Air hoses
- Air brakes and hand brakes
- More!

May we also suggest the following related items:

- [The Railroad What It Is, What It Does](#)
- [Basic Railroad Shop and Yard Safety](#)

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Air Brake Procedures

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Living Rule Book

The following links go to updated versions of the rule books with the most current amendments from the System Special Instructions and System General Orders. Employees may print the revised pages and insert them in the proper place in the rule books. This will always keep the rule books up-to-date.

[General Code of Operating Rules Revised Pages](#)

[System Special Instructions Revised Pages](#)

[Air Brake and Train Handling Revised Pages](#)

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Internet



Reversers

- Even locomotive reversers, which is a lever needed to operate the locomotive, are for sale
 - This brass reverser was recently purchased on the internet
 - Reversers used today are made of plastic
- Normal operating procedure for most railroads is to leave the reverser on board the locomotive for the next crew to use





Train Simulators

- Train simulator programs are also available, including a realistic replica of a locomotive control console for the desk top





Train Simulator Controls

- Microsoft Train Simulator™ displays a nearly exact replication of the engineer's controls on board a modern locomotive
- The controls shown here function in the simulator just as the actual controls do on a locomotive
- The brake valve shown here is a CCBII built by Knorr





Locomotive Control Stand

- Even a full size, fully functioning, engineer's control stand can be bought online
- The advertisement for this claims that all the control levers, switches, gauges, and indicators are fully functional. It connects to a computer via USB interface for direct control of train simulation software or computer controlled train simulator systems






Train Simulator Demo

Association of American Railroads - RailFanClub - Microsoft Internet Explorer

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Train Simulator

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What is TrainMaster TM 4 train simulator?

The TrainMaster TM 4 train simulator is a software program that realistically replicates actual train handling and locomotive response on realistically-depicted simulated rail lines. 3D Out-the-cab views and realistic train sounds provide a unique sense of actually operating a freight train. Realistic sounds replicate diesel engine noise, bell and horn! Against an ever-moving panorama of track scenery, stations, speed restrictions, signals, and grade crossings appear and pass along.

You, as engineer, operate the train and adhere to the operating rules, speed limits, and signal indications. You control the throttle, dynamic brake, train and engine brakes, horn, bell and sand.

The cab-like lower screen displays realistic locomotive gauges and controls: a



Problems Continued

- Although some railroad operating rules require that the doors and windows be locked on unattended locomotives, in most cases (89%) they are not
 - Newer locomotives are not equipped with a locking front door
 - Locomotives are operated on different railroads, so even if the door is equipped with a lock, the operating crew may not have the right key
 - Even with a locked door, railroad keys are in unauthorized hands



Switch Keys



- These keys were recently found for sale on e-bay
 - Although the seller described these as antiques, the key on the right is currently used on the Union Pacific to unlock switch locks

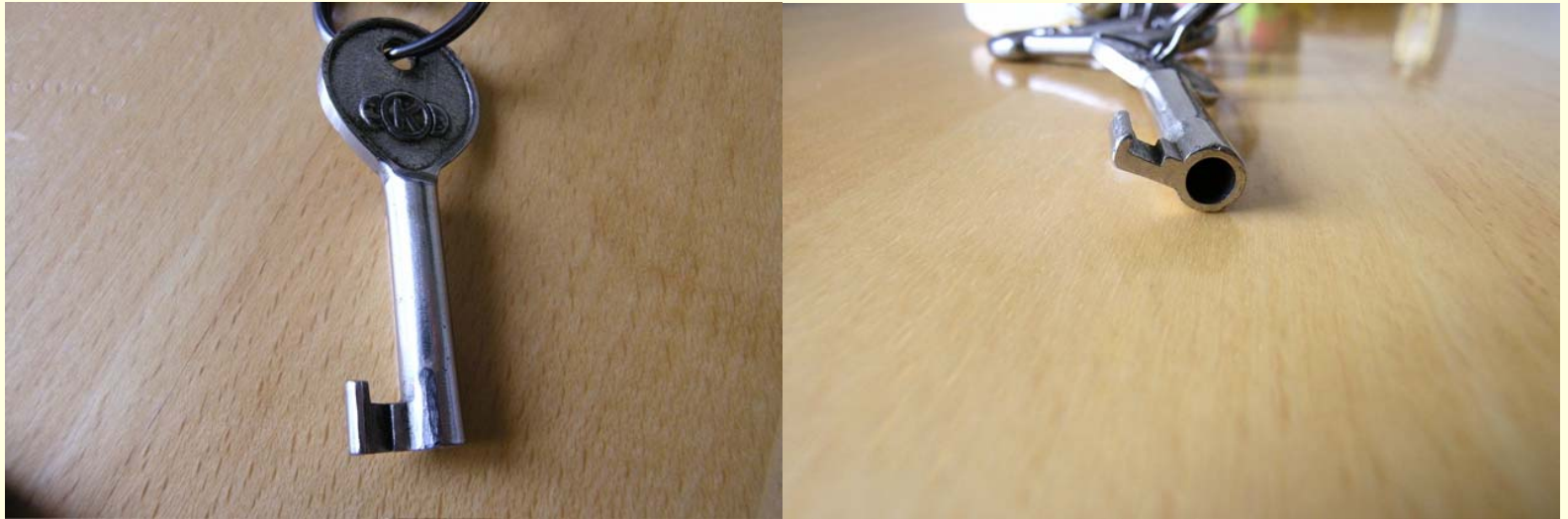


What Can be Done?

- What is needed is a new safety/security device that will prevent an unauthorized person from hijacking a train or locomotive by releasing the train's air brakes
 - The device must be
 - Effective
 - Secure against unauthorized use
 - Easily adapted to new and existing equipment used by all railroads in the United States
 - Able to provide a high degree of safety for a reasonable cost



The Key to More Secure Trains



- This key is used to lock the automatic air brake valve whenever it is not in use
- The engineer keeps the key, none can be found on board the locomotive



Locking Air Brake Valve

- Knorr D 2





Locking Air Brake Valve

- Knorr EE 4





Knorr-Bremse

- The locking automatic brake valves are manufactured by Knorr-Bremse in Germany
- They have been in use for many years in parts of Europe and in India
 - Proven to be effective
- New York Air Brake is a U.S. subsidiary of Knorr-Bremse
 - Manufactured the locking air brake valve exported to India
- Westinghouse (WABTEC) also manufactures air brake equipment in the U.S.



Concerns & Solutions

- The European style automatic brake valve is not compatible with equipment used by U.S. railroads
- However
 - Most of the newer air brake control equipment in the U.S. can easily be retrofitted with a similar locking device
 - New locomotives could be equipped when built
 - Retrofitting older automatic air brake valves is more difficult, but they are being phased out



Concerns & Solutions

- Research and development of a locking air brake valve for the U.S. rail industry has not yet been done
 - Manufacturers will respond if a market for the device develops
 - Design engineers say the newer air brake controllers (CCB) can be easily modified
 - 7000 CCB controllers are already in use today
 - New locomotives could be fitted with the device
- Cost has not been established
 - Cost analysis will be a part of the R&D process



Why We Are Here

- To raise awareness that there is a need for a simple device to prevent unauthorized release of train air brakes
- To show that such a device exists and that it can be adapted for use in the United States
- Solicit assistance at the Federal level for our continuing effort to increase rail safety/security
- Offer our assistance and expertise in any effort to preempt acts of vandalism or terrorism involving rail equipment



Summary

- Trains are vulnerable to unauthorized access because all current railroad operating procedures are publicly known or publicly available
- It is impossible to remove all of this knowledge from the public realm
- Steps must be taken to improve this situation
- New safety/security procedures and/or devices, which are unknown publicly, are the only answer
- The locking air brake valve is one such device