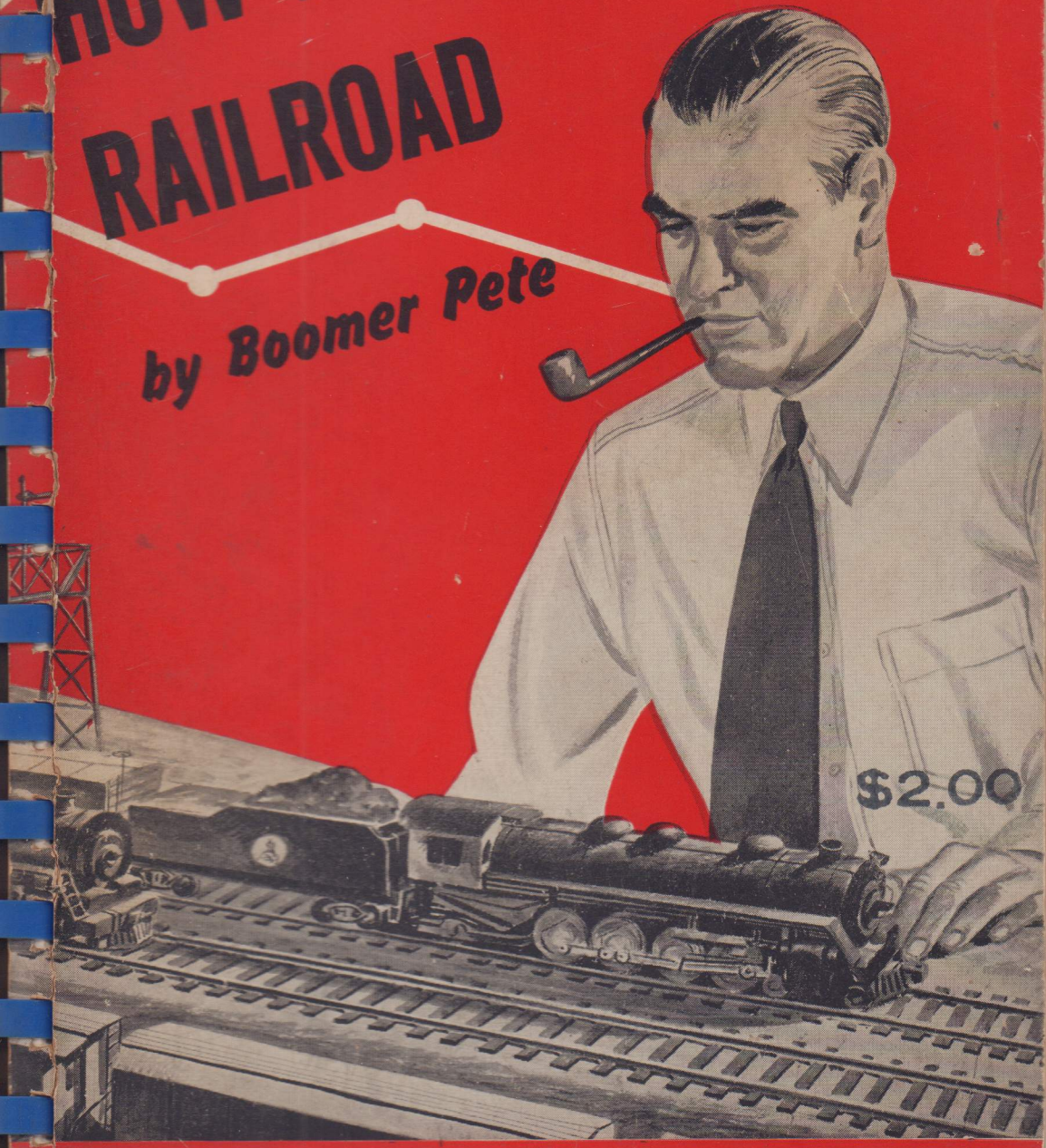
HOW TO RUN A MODEL RAILROAD

by Boomer Pete



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By Boomer Pete

Kalmbach Publishing Co.
Milwaukee 3, Wisconsin

How to run a model railroad
(Third Printing)

Printed in the United States of America by
Kalmbach Publishing Co., Milwaukee, Wisconsin

From the author

I wish to express my appreciation to the publishers and their authors for allowing the use of material from articles in past issues of The Model Railroader. Thanks are especially due Frank Phillips, Bruce Hastie, and Stephen Thomas. Linn Westcott offered many helpful suggestions and without assistance from A. C. Kalmbach I doubt if the work could have been completed.

Boomer Pete

Contents

Boomer Pete

A boomer is one who shifts from one railroad job to another as his fancy chooses, never staying very long but always gaining in experience and skill at his work. Boomer Pete has visited nearly every large model railroad layout in the country, picking up ideas here and untangling problems there. His strong forte is operating model railroads by better, more railroadlike ways. The ideas he presents in this book will more than double the entertainment value of model railroading for anyone who tries them.

1 So you're going to run a railroad

THE railroad is a living thing. It is not just a collection of inanimate locomotives, cars, tracks and buildings. It is smoke, steam and cinders. It is a Mallet articulated tackling Seventeen-Mile Grade with 75 cars of coal and a couple of helpers. It is the sleek, gray, streamlined *Twentieth Century* sliding through the morning mists on the Hudson River. It is Proviso, world's largest freight yard, with seemingly endless streams of cars being pushed over the hump and down into their allotted classification tracks. A railroad is also the men who run this scene. It is action, variety and romance.

The locomotives and the cars and the men become trains; the trains running on the tracks become distinct personalities. It is all this that you are trying to create in building a model railroad, and to just follow the plans is not enough. You want an action picture of reality—something which becomes much more than just a museum of scale models, accurately and skillfully built though they may be.

The train is the essence of the railroad, and your railroad models are, with few exceptions, intended to be run in trains. It is by coupling many cars together with one crew and one motive-power unit that the railroads mass-produce transportation; and the railroad yard, where cars are shuffled together into trains, is the assembly line.

What is a train? It is not just cars and a locomotive. According to the rule book it is "an engine or motor car, or more than one engine or motor car, coupled, with or without cars, displaying markers." An engine running all by itself can be a train if it

Railroading is a game of skill. Rudy Fluegel at the Model Railroad Club of Milwaukee.

has the proper markers, and that means a headlight on the front end and the proper red and green marker lamps or green flags on the rear end. A whole string of cars and locomotives, complete even to caboose, may not be a train unless it displays the proper markers. It may be merely a transfer run from one yard to another within a terminal.

Now a train is a lot more than the rule and its bare, legalistic definition implies. A train is a distinct entity. You may realize this when you think of one of the famous named limited trains which has been flashing across the country year after year under a distinct and widely advertised title. The cars and the locomotive which make up that train may change day after day. They may have changed even as to type and appearance over the years, and yet that train has always been the same train to friends and travelers.

To the railroad man, all trains are as distinct whether they have names or not. The fact is, to the railroad man the trains are

known by numbers, even when the public knows them by names. These numbers are all odd numbers in one direction, usually west and south, and even numbers in the other direction, usually east and north. To the men on the New York Central the *Twentieth Century Limited* is No. 26 eastbound and No. 25 westbound. On the Santa Fe the *Super Chief* is No. 17 westbound and No. 18 eastbound. The freight train which rumbles by you in a cloud of dust headed for Seattle is perhaps No. 263 to the railroad man. On another road it may have a symbol as well as a number, the symbol being determined by the terminal cities. It may be NE 98, meaning No. 98 bound for New England; or it may be MB 4, meaning Mechanicville - Boston No. 4. But regardless of the particular system by which the number is concocted, that train is a distinct being, day after day, a thing distinct from the cars and locomotives which make it up.

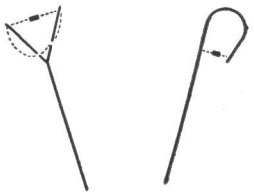
The numbered trains on a railroad are created by the operating timetable, a vastly more complete and detailed schedule than that which is handed out to the general public. The operating timetable sets up schedules for not only all the regular passenger trains listed in the public timetable, but for mail trains, milk trains and most of the freight trains. Once a schedule is set up in the timetable, any equipment which runs on that schedule becomes that train. A doodlebug from a country branch carrying proper markers could leave La Salle Street Station for New York at 3:30 in the afternoon and as far as the railroad operating men are concerned, it would be No. 26, the *Twentieth Century Limited.*

Often the equipment which is necessary to handle the business on a given train can't all be coupled into one train physically. In this case the equipment may be made up into as many trains as necessary and all are run upon the same timetable schedule. In other words, as sections of the same train. Every section except the last carries green lights on the front of the locomotive by night and green flags by day to indicate that another section is following. The *Twentieth Century,* for instance, in the mid-

1920's often ran in as many as six or seven sections and all of these together were known to the railroad as No. 26. To distinguish them upon train reports, they were known separately as first 26, second 26, third 26, etc. To all other trains upon the road, No. 26 isn't complete until the final section comes along without any green lights or green flags; and woe betide the train which tries to slip in between sections without specific orders authorizing it to do so.

Yes, train orders can allow a train to do a lot of things. It is train orders which are used to supersede the timetable when deviations become necessary. Or, it is train orders which supplement a timetable when the timetable schedules don't provide for all the traffic which must be run. Almost invariably, for instance, the timetable provides for only the basic freight schedules. Quite often more freight must be handled and then train orders are used to create what is called an extra freight train. This extra train, carrying white flags or white lights at the front of the engine to notify towermen, station masters, and crews of other trains that it is not on the timetable, can occupy the mainline tracks only to the extent its train orders authorize. It must look out for all regularly scheduled trains and keep out of their way according to their schedules, unless its train orders specifically give it the right of way. In that case, similar orders must have been given to the regularly scheduled trains effected. Train orders are also used when regularly scheduled trains become late so that other trains which would wait for the late train can proceed and meet the late train at a different place than usual. This keeps both trains from being late. In fact, train orders issued by the dispatcher are the whole means of regulating the railroad's traffic to the changing conditions which cannot be foreseen at the time the basic timetable is prepared.

Train orders are handed up to crews of moving trains by means of some type of hoop on a long stick so that the agent or operator can hold it near the cab gangway or caboose steps. Two types of hoop are shown in the illustration, one the older type hoop which



Two kinds of train-order hoops are in common use. The handles are about 5 ft. long.

the crew picks up complete and then throws off after removing the orders, and the other the newer type, which is a forked stick to which a loop of string is attached with the order tied to it. The string pulls off, but the stick stays with the agent. The use of this type saves him a walk down the right of way.

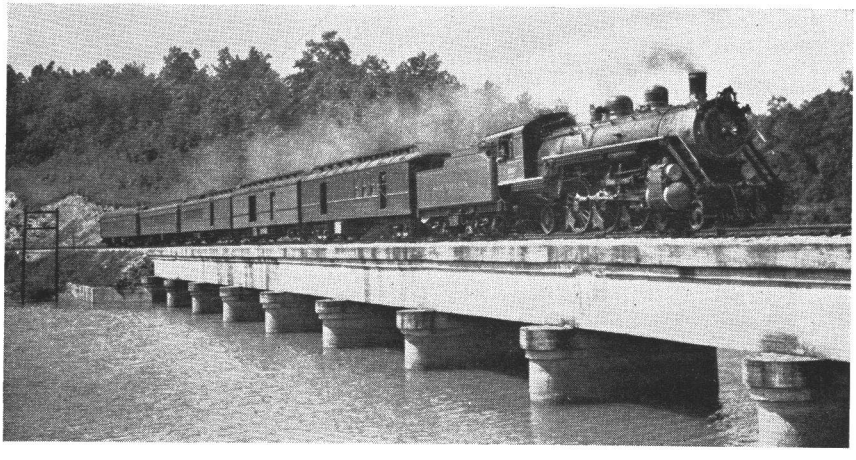
With every set of orders two hoops are prepared, one for the engine crew and one for the trainmen. When train orders are received for a train the agent or operator puts the order board to "stop" position, and usually this automatically puts the preceding block signal at "caution." The train approaches the station under control, and if the engineer sees the agent out next to the track with the hoops he keeps on going and the fireman and (usually) rear-end brakeman pick up the orders. If no agent is out near the track, the train stops, for that means the orders are on Form 31, restricting, and must be signed for and the signatures of those to whom the order is addressed transmitted to the dispatcher before the train can continue down the line.

Within the limits of a terminal or a yard a timetable isn't necessary. Engines run hither and thither pulling cars about, shoving them into sidings, switching them into trains—all according to plans which are informally concocted on the scene and at the time by yardmasters and terminal directors. At the limits of districts where switching operations are carried on so informally, "yard limit" signs are posted to warn mainline trains that they must be more or less on the lookout. The setting up of yard limits around busy areas saves the dispatcher a lot of work, for he does not have to handle all the details of the many yard and switching moves, but it also slows up the movement of second- and third-class trains, and these two factors must be carefully balanced in deciding whether or not a "yards" in the timetable sense will be established at any particular point.

First-class trains, which are usually passenger trains, have the right of way even within the yard limits and switch crews keep off the mainline tracks at the scheduled time of such first-class trains. Most model railroads are run pretty much the way a real railroad is operated inside yard limits, catch as catch can with thorough informality.

The trains which come and go upon the railroad—as distinguished from the schedules which parade up and down the pages of the timetable—may be wonderfully varied and distinctive. Even though in winter blizzard or a Labor Day weekend rush the schedules get all mixed up, the towerman will never mistake No. 5 with its railway postoffice car for No. 27 which carries only pouch mail and hence has no postoffice car for the sorting of mail en route. Nor will he mix up No. 16 with its special combination diner-drawing room-solarium-lounge car with No. 8 which regularly carries an old-fashioned, open-platform observation car. These niceties of train makeup are not the dictate of the operating timetable which creates the trains merely as numbered schedules having authority to use the track, but of the passenger traffic department which sees to it that the proper accommodations are furnished on each train. Similarly, the makeup of all

Florida-bound Southern Ry. train No. 28 is half mail, baggage and express.



Suburban train on the Erie RR. at Great Notch.

the other types of train upon the schedule is governed by the reasons for which they are run.

The mainline local passenger train will have day coaches and perhaps (but seldom) a parlor car, and usually a disproportionate amount of space for mail and express, which in many cases is the principal stock in trade of these trains. If it runs overnight, a standard 12-section and drawing room Pullman sleeper will probably be added to the makeup. The suburban train which operates a short distance out of a larger city into the suburban area is quite different from the mainline local passenger train. Where the mainline local is noticeably long on mail, express and baggage accommodations, the suburban train is equally short on

Mail and express contracts are often the only profitable business for a passenger train.

such accommodations. Its makeup may even be all day coaches and at best it will probably have no more than half a car for baggage and express . . . a combination car with the other half devoted to a day coach smoker. Perhaps on one morning run out of the city and one evening run into the city a suburban train may carry a railway postoffice car to handle the local mail service. But the main purpose of these suburban trains is hauling passengers and in rush hours they may even extend to ten or more day coaches in length.

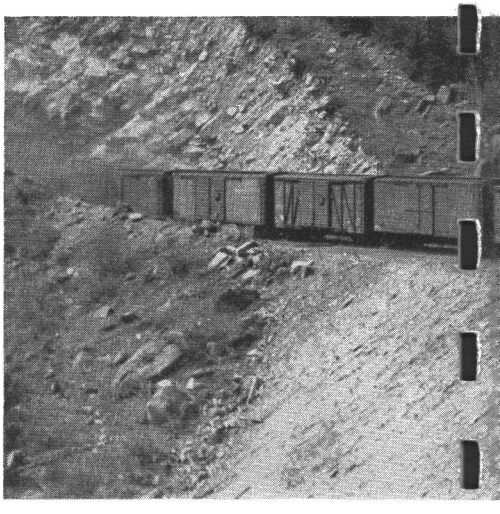
Aristocrats of the passenger business are the overnight named limited trains with their variegated makeup of Pullman cars with sections, Pullman cars with rooms, Pullman cars with roomettes, diners, club cars, lounge cars, through coaches, local coaches, baggage, express and mail cars. Here is the opportunity for a model railroader to put punch and individuality into his railroad. The public timetables of the big roads list in detail the accommodations offered on the various crack trains. From the types of cars listed the model fan can make up his deluxe trains to suit his own taste.

Just as the aristocratic limited trains build the reputation of the railroad with the public, so the solid mail and express trains build its revenue. To the railroad man, these are the real aristocrats of the business. Most often they carry no passengers at all, or if they do carry passengers, they are listed in the public timetable as "limited coach-passenger accommodations only." A special breed of trains they are, whose appearance is all business with a capital B. No. 57 on the Milwaukee, No. 27 on the Great Northern, No. 7 on the Santa Fe and many another—these trains often go by the highly descriptive and romantic title of *Fast Mail,* and at most the passenger accommodations will be the back half of a combination coach-baggage car at the rear end of the train primarily for the train crew and dead-heading railroad men. The *Fast Mail* isn't always on such a fast overall schedule although, before the war, if you missed the Santa Fe *Scout* in Chicago you could take the *Fast Mail* two hours later and catch up with the *Scout* in Kansas City the next morning. Even where the schedules aren't as fast as the glamorous name trains, however, the solid mail trains run like scared jack rabbits for they not uncommonly spend as much as half an hour at each of the larger stops loading and unloading the vast quantities of bulk parcel post and express which, if carried on the regular passenger trains, would cause unpardonable station delays.

In the makeup of the mail trains may be found every kind of "head-end" car known to railroading. Full-length baggage and

express cars are packed to the roofs with packages and full sacks of parcel post. In the railway postoffice cars the clerks diligently sort first-class mail and newspapers all night long, throwing off sacks at appointed stations where the train does not stop and swinging out the heavy bag catchers to pick up mail on the fly. Express messengers check the express in and out at stations and keep the miscellaneous packages carefully sorted and arranged for quick unloading at destination. Railway mail employees carry bags of mail from the sorting cars into other cars for storage. All in all, a train of this type may have as many as 40 or 50 employees on board as it hurtles through the night, taking curves without regard for the comfort of sleeping passengers, which it doesn't carry.

Closely akin to the solid mail train are the milk trains which pour into our larger cities in early evening with dozens of dirty dark green express refrigerator cars. Closely akin too, are the express reefer strawberry specials, the lettuce specials and grapefruit specials which in early spring come up from the south to the northern markets on passenger train schedules and usually as second sections of the fastest trains on the line. Here is an operating hint for the model railroader. A fast special train of any kind seldom carries the white flags which designate an extra because an extra goes fast only by dint of a tremendous number of train orders carefully issued and doublechecked by the dispatcher. If the special is, instead, run as the second section of a regular train, only one train order is needed and a second section, by proper train order, can be run as much as 12 hours later than



Two Mallet articulated locomotives are needed to pull heavy freight trains up the grade to Moffat Tunnel on the Denver & Rio Grande Western RR.

the regular train and still have all the rights to the track that it would have if it were on the timetable!

"The passenger trains can have the glamour, give me the freight," says many a railroad executive. But glamour there is in its own way when you stop to think that back of many a freight train locomotive is as much as $1,000,000 worth of merchandise. Here, too, is endless variety in the running of the model railroad. Make up a freight train with all box cars, refrigerator cars and stock cars and it is a time freight, one of the elite which operate between large centers on as strict a schedule as the crack pasenger runs. Tie 100 cars of coal (scaled down to length, of course, to fit your layout) and you have a drag freight, one of those heavy tonnage, low-value trains which, although properly scheduled, is scheduled at a very slow speed so as to operate with the greatest possible economy. Nobody cares just when coal gets there—it isn't that valuable! Put together a string of oil cars and it's an O. D. T. tank car special, rushing oil to the eastern seaboard. Tie together one each of every variety of car you have in the place plus a seedy old box car just in front of the caboose for local l. c. l. freight and you have a way freight, the train which takes all day to cover a 50 or 100 mile stretch of

track, setting off and picking up cars at every small town siding on the way.

The way freight is a switch run on a city-to-city scale and what with setting off a car of coal at Henry's Ford, picking up a car of stock at Awratz, picking up two empty box cars at Kutz and leaving a flat car for loading at the machinery works in North City, is a mighty interesting train to run along a model railroad, keeping all hands busy throwing switches, coupling and uncoupling and ducking out of the way of the regularly scheduled through passenger trains. The way freight usually runs as an extra because its schedules can't in the least be predicted. In the big city a transfer run often goes from one yard to another, carrying freight cars which are being transferred between railroads. Technically, this transfer run isn't usually a train because it doesn't get outside of yard limits. It's merely a locomotive with a collection of cars and sometimes a caboose. On the large model railroad layout a transfer run is always a possibility but be sure it doesn't have any markers on the rear end of the caboose. If it's running at night the red lantern set in the center of the rear platform serves as a tail light without being an actual marker.

Of course, wreck trains, snow-clearing trains, work trains, construction trains and other types of specials all take part in the railroad picture and the complete model railroad can't run without at least some of these. The wreck train with two flat cars full of extra wheels, a meal car, tool car and caboose usually stands behinds the division point roundhouse all made up and ready to go on the shortest notice. When it goes it really goes, white flags stretched out straight and with train orders giving it rights over everything on the line. The snow-clearing train is quickly made up when winter skies gray over and the weather man warns the dispatcher that "a real one is coming in." Every train leaving the division point from that time until the blizzard is over will have an extra engine or engines and heavy freight trains will be split into two or three sections so as to keep as many trains as possible polishing the rails, for the dispatcher

The way freight does switching at nearly every siding and spur.

knows that plenty of traffic is the best way to keep the line clear. But even with all these precautions, drifts will form across the cuts of less-used branch lines and out from the yard will go the snow-clearing trains with two or three of the older freight engines coupled behind a tremendous snow plow and pulling a caboose full of extra men with snow shovels.

A work train is made up to suit the job on hand. It may be a pile driver, an old locomotive tender carrying coal and water for the pile driver steam engine and a number of flat cars loaded with long wooden piles or it may be a number of bunk cars for section hands together with hopper cars loaded with gravel or crushed stone ballast. Whatever it is, the work train goes out on the line in early morning, its extra flags flying, and it stays there, getting out of the way for each scheduled regular train or for each extra which the dispatcher orders it to clear and then, once the train is past, getting back upon the main line to proceed with the job at hand, reballasting, replacing of pile trestle, setting the steel girders for a new grade separation or whatever.

Helper engines, small-drivered, slow Decapods, Santa Fe's or Mallets are necessary to hoist the freight trains on real railroads

To keep a train moving on a large railroad there must be an engineer, fireman, brakemen to protect it in case of emergency, and the conductor, who is in charge. But this visible crew is aided by hundreds of towermen, station agents, switch-tenders, crossing watchmen, and the dispatcher; without this ground crew an ordinary train might take hours to pass through a mile or so of country like this scene near Columbus, O., on the NYC.

over the toughest grades. Two or three to a train, their exhausts reverberate across the green Alleghenies as they hoist Pennsylvania Railroad time freights and drag freights alike up the 1.75 per cent grade from Altoona around Horseshoe Curve to the crest of Galitzen. The echos are sharper in the stony confines of the canyon below Raton Pass on the Santa Fe, but the helpers are doing the same thing. On the often too-steep ruling grade of a model railroad they can be just as useful, helping the road engine to move a train far longer than would otherwise be possible and at the same time adding action to the scene.

All this action on a real railroad is carefully timed and even when it isn't timed on a model railroad, it should appear to be carefully scheduled if the miniature railroad is to be in action as

well as in mechanical detail a good replica of the real thing. The men who run the trains regard time as the essence of their work. All members of the train crew have standard 21-jewel railroad watches which are regularly checked by time inspectors. Before the train starts the members of the crew gather in the terminal and check their watches against each other. Furthermore, before reporting for duty, they have registered in the dispatcher's or trainmaster's office and on a signed sheet have noted as plus or minus the number of seconds difference between their watches and the standard clock. Time in one way or another is the essential basis for any realistic program of action.

The men who run the trains are not all part of the train crews. In addition to engineers, conductors, and brakemen, the operation of a railroad necessitates dispatchers and operators and towermen. The dispatcher, usually in a second-story office of some station at a division point, is the traffic cop of the railroad. To him the station agents and towermen along the way report every passing train and on a tremendous ruled train-sheet he writes in all these passing times so that he has a precise picture of exactly what's happening on every bit of track under his control. As long as the trains stay upon timetable schedules the dispatcher need do nothing except keep tab on their movements but as soon as a train starts to fall behind schedule, he springs into action—either endeavoring to help it get back on schedule by giving the proper orders or if that is impossible, issuing helping orders to other trains which might be delayed waiting for the latecomer. Also in the dispatcher's office, are clerks who keep track of the movements and assignments of cars and in the roundhouse is an engine dispatcher who, on being informed of leaving times and probable tonnages of trains, assigns appropriate locomotives from the pool which is available. Every movement of every piece of equipment is not only carefully planned in advance but is carefully kept track of as it happens and at any given time a railroad can put its finger on car No. 17288 just as easily as you could say which neighbor has your lawnmower this afternoon.

Traffic cop though he may be, the railroad dispatcher is not the boss of operations on the railroad. Like the traffic cop on the corner he is governed by a code of rules and every operating man on the railroad understands and has passed examinations on the train rules which are more or less standard on all railroads in the country. It is these rules which fix what shall be done under any set of circumstances and it is these rules which very definitely describe what the dispatcher can do by train orders and how he shall do it. In fact, the rules are the king pin of all railroad operation and a knowledge of the standard code of rules given in an appendix of this book, will be distinctly helpful in making a model railroad run like a real one.

Signals play their part in keeping the trains properly shuffled, but it should be noted that while a railroad can't be run without rules, it can be run without signals. Signals of all kinds are chiefly a means of expediting traffic for without signals trains must, under the rules, stop, look and listen in many cases to be safe and sure, where with signals trains can be safe and sure without all the stopping, looking and listening. Where two railroads cross, for instance, a train must stop and ascertain that nothing is coming from both directions on the other railroad before crossing, but if such a crossing is signaled with properly interlocked mechanism, an approaching train can be sure if it has a clear signal that "stop" signals are displayed in all other directions and that it is perfectly safe to proceed at full speed. Just think what this means in the close networks of railroad lines surrounding our large cities. Just think, too, what it means on your model railroad where, if a crossing isn't signaled, trains should make the proper safety stops if the railroad is to be a real operating miniature.

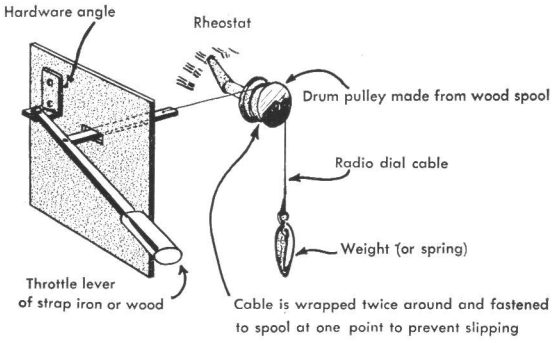
So you're going to run a railroad! Running a model railroad and running it right is definitely not "playing with trains." The more you make it like the real thing, the more fascinating it becomes. A game as complicated and intriguing, if you will, as chess, but with a lot more action and a lot less waiting.

2 You're an engineer

HAVE you ever watched Slim Shelby coming into the station with the 5:15? Have you noticed how he keeps the Pacific working steam until just about the minute she stops so that the slack between the cars is all stretched out and there's no jerk as he starts off again? And have you watched a freight train starting out? Watch the care with which the engineer inches the throttle out and judges the feel of the train so that he won't jerk the rear end apart by taking up the slack too rapidly. Have you noticed how an engineer often pulls the throttle out and quickly in again at starting so as to fill the steam pipe and valve chamber with live, hot steam before he starts the gradual feeding of steam that gives that smooth start?

Yes—there's a science to driving a train. One man takes the curves at just the right speed, knows just where to slow down and just where he can keep right up to the speed limit while another engineer on the same run may always be killing unnecessary time and coming in ten minutes late. Some engineers are so smooth in their train handling that you feel they're a part of the engine while others can't start a three-car local without sprawling passengers in the aisles. The conductor may be in command of the train but it's the engineer who pulls the throttle and makes it go and that's what you do when you run your model railroad.

It's the firm, steady hand on the throttle that's valuable in running a real locomotive or a model one. A slow, gradual start with a sensitive electrically driven model locomotive takes plenty of skill and care in the manipulation of the rheostat, but it's plenty worth it. The realistic appearance of a gradual start is



An ordinary rheostat knob is very hard to use to control a train smoothly because it requires a twisting motion through a complete circle to bring on all the power. This simple arrangement, made of easy-to-get parts, will provide a throttle of the same type found on real locomotives.

right on par with prize-winning workmanship in the model building detail.

"But how can I start a train gradually if it won't start until the power is almost on?" you ask. Do just what the real engineer does. Pull the rheostat way on for just the briefest fraction of a second, giving the motor a sharp jolt of juice which will free its initial inertia, and then slip the rheostat quickly back to the lower range and keep the locomotive moving—but slowly. The trick is always the sure, steady hand. Don't let it stop, but don't let it start too quickly.

If you find it hard to start a long train, again follow the example of the real life engineer. With a hiss of compressed air he throws over the power reverse gear and backs up two or three feet, pushing together the slack in all the couplings of his train. Then when he gradually starts forward, the locomotive picks up each car one at a time, getting it rolling a few inches before the slack is pulled taut and the next car starts.

Smooth stops are of just as much importance as smooth starts. You want to leave a good last impression with your passengers before they get off the train, don't you? Well, that worm drive motor will never do it if you just shut off the electricity. It will stop dead in its tracks and to come down from 90 scale miles an

hour to nothing in 50 scale feet would be quite a shock to even the toughest constitution. Your control rheostat is intended to vary the speed of the train. Use it when you're stopping as well as when you're starting. Start slowing down 10 or 15 feet in advance of the stopping point, and bring the locomotive gradually down to such an effective stop that your visitors can practically hear the air brakes hiss.

When it comes handling trains at signals the same rules apply. If the signal is at "stop" position, bring the train gradually down to a stop far enough in advance of the signal so that the engineer can easily watch for a change in the indication. If it is a "stop and proceed" signal, don't forget that when a freight train has made a stop, it must wait until the air can be pumped up in the air brake system of the entire train and this may take a matter of several minutes. This little wait will not only be more realistic but will add suspense to the action appeals of your system.

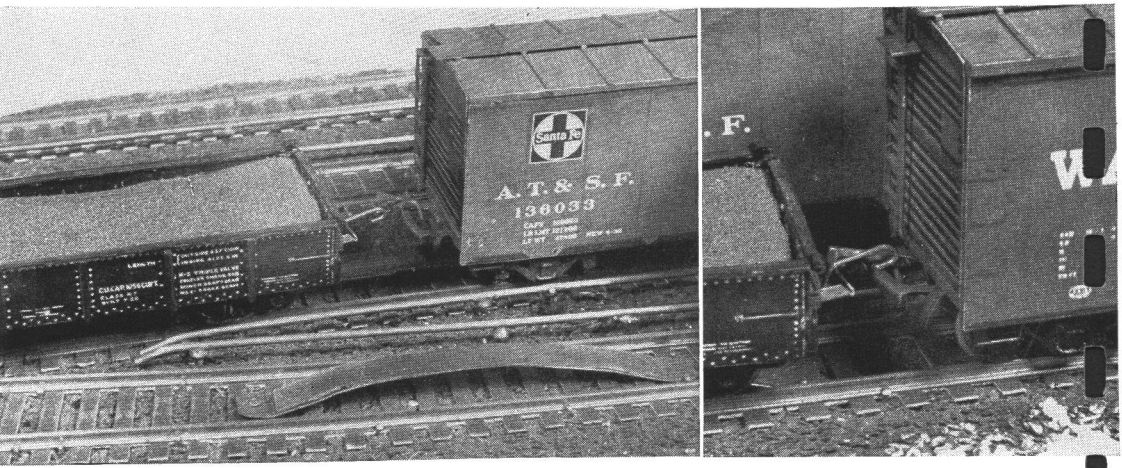
On curves and switches engineers use plenty of skill and discretion. Usually a train slows down in advance of a sharp curve and then gradually speeds up as it is taking the curve. The general feeling is that acceleration helps in making the train ride better on the curve. Crossovers from one track to another almost invariably involve speed reduction to 35 miles an hour or less. Is it any wonder that model railroads have derailments when trains hit switches at more than 100 scale miles per hour?

One of the greatest thrills of model railroading is the realization that slow speed, effectively used in the form of speed reductions and proper starting and stopping is infinitely more fun than simply running trains pell mell as fast as they'll go.

On a model railroad the engineer is also likely to be the brakeman and that involves coupling cars together and uncoupling them. If one of the proprietary systems of automatic uncoupling is used, the task is all cut and dried. It's simply a matter of stopping in the right way and on the right ramp according to directions. With dummy couplers there is a standard technique which I have used for a great many years without bumping into any-

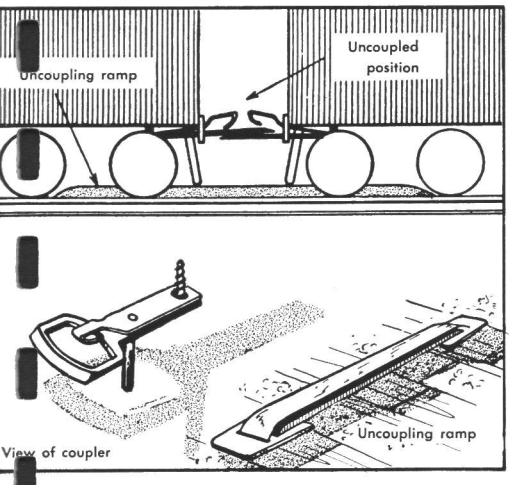
thing better. When lifting one car so as to separate its couplers from the next or so as to insert its coupler into the next, lift with the roof of the car well into the palm of the hand and with the middle finger extending down to keep the truck in line so that the wheels will go right back on the track. Close-coupled passenger cars are much more difficult to handle when they have dummy couplers but the trick can be done by using the coupler of the car which is lifted to push in the bottom of the diaphragm of the next car so that the coupler can slip down past the diaphragm and into its mate.

Lubrication and maintenance fall well within the province of the model railroad engineer. Lubrication is of supreme importance in getting the most out of model railroad rolling equipment. This is especially true of the locomotive where there is a tremendous thrust against the worm gear of the drive mechanism. A fairly thick gear grease, preferably of the graphite carrying type, should be applied to the worm regularly in small quantities. Before each greasing the worm should be thoroughly cleaned with a rag soaked in gasoline or carbon tetrachloride. The locomotive wheel bearings as well as the bearings for side rods, crosshead and other moving parts should be oiled regularly with either



a special modelmakers' lubricant which you can obtain at most hobby shops, or with a good grade of watch oil. This oil should be applied in very small drops, using a fine pointed stick like a toothpick. Even the bolster king pin bearings, where the trucks are attached to the car bodies, need a touch of oil now and then. Too much oil is definitely bad as it simply serves as a dirt catcher. Better lubricate with a cloth in one hand to wipe off any surplus oil.

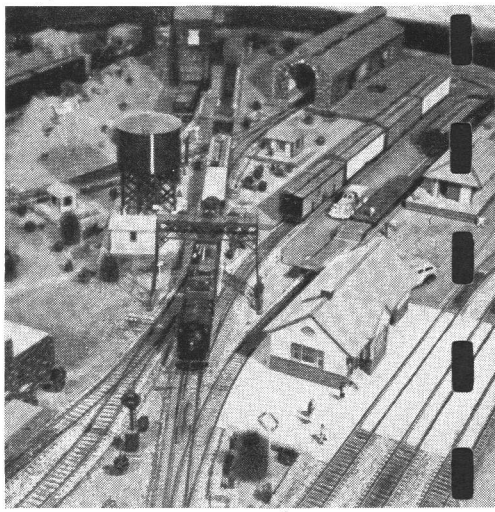
The same thing goes for car bearings. Model railroaders who are particular about their maintenance take freight car trucks apart at regular intervals and thoroughly clean out the bearing holes as well as wipe off the ends of the axles. This prevents old gummy dirty oil from increasing the friction. All wheels, and most especially car wheels, should be gone over at intervals to wipe off the crust of dirt which accumulates. This accumulates on plastic and metal wheels alike and neither has a monopoly on picking up the gummy dirty material which gets on model railroad track. This accumulation on the wheel treads causes uneven rolling and may even get so thick as to cause derailments. A jackknife is about the most useful tool for peeling off the first crust, and then a cleaning fluid like carbon tetrachloride can be



The most popular types of automatic couplers uncouple without any electrical devices or manual aids. A ramp is placed at every siding where uncoupling is to be done. If cars are pushed toward each other, as when backing up or slowing down, any pair of cars located over a ramp will uncouple. Cars will couple up anywhere there is no ramp. Couplers are not affected by ramps when a train is running normally.

used on a cloth to get the wheels completely clean and shiny right down to the tread.

The train resistance caused by binding couplers may seem a small item but on a long train this can multiply into quite a bit of wasted drawbar pull. It's a good idea to look over all your equipment to see that couplers are firmly mounted with the proper amount of side swing for the minimum curves and then to watch the action of the couplers when cars are made up into trains to see that there is no bind at any time. As cars go over a slight bump in the track the coupler knuckles should be able to slide up and down within each other. We've all seen cars lifted clear of the rail by binding coupler action and you can just imagine what a waste of power very much of this sort of thing can mean. It not only causes derailments but it decreases to a very measurable extent the number of cars that you can pull.



Trackwork by Charles Viner, Tonawanda, N. Y.

Another big item in the rolling friction of model trains is the condition of the track. The rails must never be less than gauge. Take a track gauge and check over your layout carefully. It's a simple matter to go along the track with the check gauge and then use a hammer and nail set in such a way as to pull the rails exactly in gauge. How long since you've checked the exact level and alignment of your track? You can invent all the straight track-laying gadgets you want and yet there'll be no substitute for getting your eye right down to the track level and squinting along the rails to see how they line up. That's what the old-time section foreman does on a real railroad and he gets the track down

to such perfection that even your coffee seldom spills in the diner.

The condition of the rails is practically as important as the alignment of the track. For mechanical as well as electrical purposes, model railroad rail should be kept clean and bright. This is especially important on curves. A great deal of the curve friction in a long train is caused by the flanges bearing against the head of the inside rail. In cleaning track it is therefore desirable to clean the inside of the railhead as well as the top of the rail, and on curves to lubricate the inside railhead slightly. There's nothing which has less rolling friction than an absolutely clean smooth wheel rolling on an absolutely clean smooth rail.

Proper power supply and controls don't make a good engineer but they help. A high amperage (not high voltage) source of power for your model railroad is just as valuable as a good locomotive and less expensive. The control rheostat should be of the proper electrical specifications so that it provides a complete range of control from a dead stop to full speed ahead. A well-located control board where the engineer has a good view of the train is also a big part of successful operation. On a club layout effective cab signaling is necessary if the engineer can't see the trains.

No discussion of general model railroad operating technique would be complete without some cautions about handling models. The construction of a model locomotive or car entails many hours of work, and this may be all wasted if one person handles the model carelessly. Perhaps the cautions as to handling have been no better put than by Bruce Hastie, who writes:

"When a modelmaker visits your home, office, or society, and brings with him a model upon which he has spent painstaking and laborious effort in both the making and finishing, observe the following:

"Refrain from making an excited grab for it. You may damage it unless you are careful. And he may be too polite to say anything to you about it. This is important.

"Make sure your hands, and particularly your fingers, are not

dirty or greasy. Much handling of a model, even with clean hands (and how many have them?) will smudge the paint and finish of a fine model. Do unto others as you'd have them do unto you.

"Inquire what the proper method of handling the particular model may be. You do not know whether the modelmaker's heart is doing a flip-flop in his throat or not while you are handling it.

"Particularly if a model is not finished or has not received its final coat of varnish, refrain from handling it unless the owner permits.

"Best of all, look at the model and do not handle.

"If running a visitor's model, do not run it as fast as you'd run your own, unless permission is given.

"Unless permission is given, never hook a visitor's car on the end of a train. You may have a rear-end smash—and imagine your embarrassment!

"In making up trains and also in switching operations, refrain from smacking couplers, or any sort of impact. You may damage a coupler rigging (or, as in the case of my own cars, a certain method of fastening them) or you may break a knuckle on one of the automatics.

"In looking at underbody details of models, do not tip them over so that they will rest on their steps, either passenger or freight, as you will bend them.

"Do not finger brake chains, such as Ajax, etc., in a curious manner. They are not meant for that.

"Do not try various parts to see how solidly they are attached. They will no doubt loosen themselves sufficiently in good time.

"Do not scratch the paint with the finger nails to determine how thick a coat the model has, or how durable it is likely to be."

It all gets back though, to that firm steady hand on the throttle. You're the engineer on your model railroad, the man in the cab, and for real satisfaction there's nothing like making a point of doing this job the way it should be done.

The problems of railroading

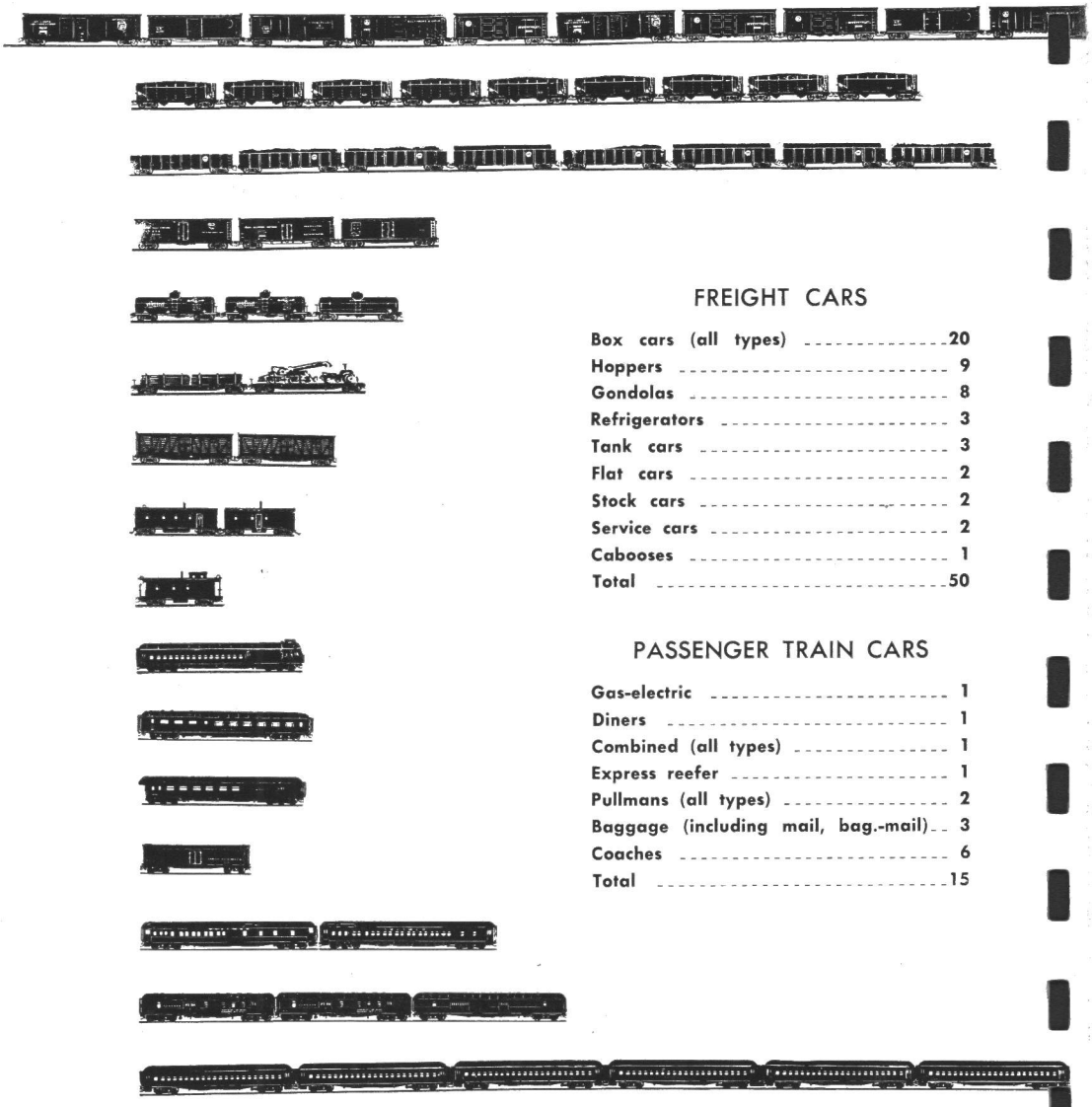
BEFORE we get into the specific problems of operating and organizing, let's take a look at some of the more general problems of railroading, model and real. For instance, there's the old question of type of cars to use on a model layout. If you are to make up the right kind of trains, how many of your cars shall be Pullmans, how many gondolas, and so on?

It depends, of course, on several factors. The total number of cars on your line, for one thing, and the character of the imaginary country it serves, for another. The National Railways of Greenland naturally needs more snowplows than reefers. The Styx Southern requires a lot of third-class coaches and coal hoppers, with a few box cars for incoming shipments of pitchforks.

But the average railroad is obviously the starting point. Once that is more or less clear in our minds we can debit here and credit there and see where our particular line fits in. I am proposing here a scheme which is based on the figures of the total number of cars in service on the railroads of North America.

Right at the beginning we run into a snag. The real lines have about one coach to every 37 freight cars. At that rate many a model outfit would ordinarily have about one window and an upper berth as its entire coaching stock. So by a bit of sleight-of-hand and weighting I am suggesting that the goal for the average model line to aim at might be taken as about 50 freight and 15 passenger train cars, or any multiples thereof. Those numbers give a chance for a fairly representative distribution of various types. Few lines will achieve 65 cars in the first month, but the plan is the thing.

Here then, is a diagram giving the representative distribution within the two groups, showing a realistic proportion of the numbers of each different type of freight and passenger car, based on A. A. R. data:



FREIGHT CARS

Box cars (all types)	20
Hoppers	9
Gondolas	8
Refrigerators	3
Tank cars	3
Flat cars	2
Stock cars	2
Service cars	2
Cabooses	1
Total	50

PASSENGER TRAIN CARS

Gas-electric	1
Diners	1
Combined (all types)	1
Express reefer	1
Pullmans (all types)	2
Baggage (including mail, bag.-mail)	3
Coaches	6
Total	15

That distribution would enable the running of realistic timetable workings, which should be the aim of each model railroad owner.

As to motive power to handle the above, the following is again just a suggestion. Four engines should be able to handle a line having the above cars, viz:

A light passenger
4-4-0, 4-4-2, or light 4-6-2

A heavy passenger
4-6-2, 4-6-4, or 4-8-4

A light freight and switcher
0-4-0, 0-6-0, or 2-8-0

A heavy freight
2-8-2, 4-8-2, or 4-8-4

As to arranging these cars in trains, there's practically no limit, for whatever arrangement you try, weird as it may be, you'll find it somewhere in real life. The general cannons of passenger train makeup are that mail and baggage cars come right behind the locomotive tender, then coaches, then the diner, and then Pullman sleepers and parlor cars. With freight trains the only rule is that the caboose comes last, and even that is not true on some roads, which couple in the crummy right behind the tender!

Any cars to be set onto sidings along the route of the train are close behind the engine where they can be switched with the greatest of ease. Where possible, cars for the same destination are grouped together in the train so that only one switching move will be needed to set them in the siding. The model fan should note that with only one switch, as long as that switch points from the train toward the locomotive, it is possible to rearrange a train in any formation whatsoever. Any car or cars can be set into a

single siding or extra track over this one switch, and then reinserted in the train in any position.

The solid train of all one type of car is also favored by many model railroaders. Instead of planning an intriguing order of makeup for a train, one simply builds a string of cars, all exactly alike. Trains of this type may be mail trains, solid Pullman, solid coach, hotshot refrigerator, coil, oil, or what will you have?

An interesting point to note is that the same railroad train may vary considerably in makeup from day to day. The railroads have a problem in figuring just how many cars they need each day to take care of the constantly shifting passenger traffic. How can they provide enough seats? Principally because they have experience running over months and years to guide them. Secondly, they keep very good tab on what's going on that may mean more or less traffic.

An extra car can't be stuck on a train at the last minute. In the first place every car is assigned and made ready in advance for some certain train, and extra cars can't be picked up just like that. Secondly, a train can't be delayed just before departure while a car is switched in. Yet day after day the number of cars on this train or that may vary by as much as 50 per cent, and the number of passengers varies almost the same.

As each train leaves the terminal the dispatcher notes the consist, or number and type of cars, on his train sheet. He also notes the seating capacity and the number of passengers as reported by the conductor. The train sheet also has a weather notation.

These figures are tabulated by experts in the operating department, who then know to just what fraction of capacity each train is filled. Some definite percentage of empty seats is allowed on each railroad, and when some particular train, day after day, carries more than enough passengers to allow these empty seats, a car is added. When it seems that the percentage can be maintained with one car less, the car is cut off.

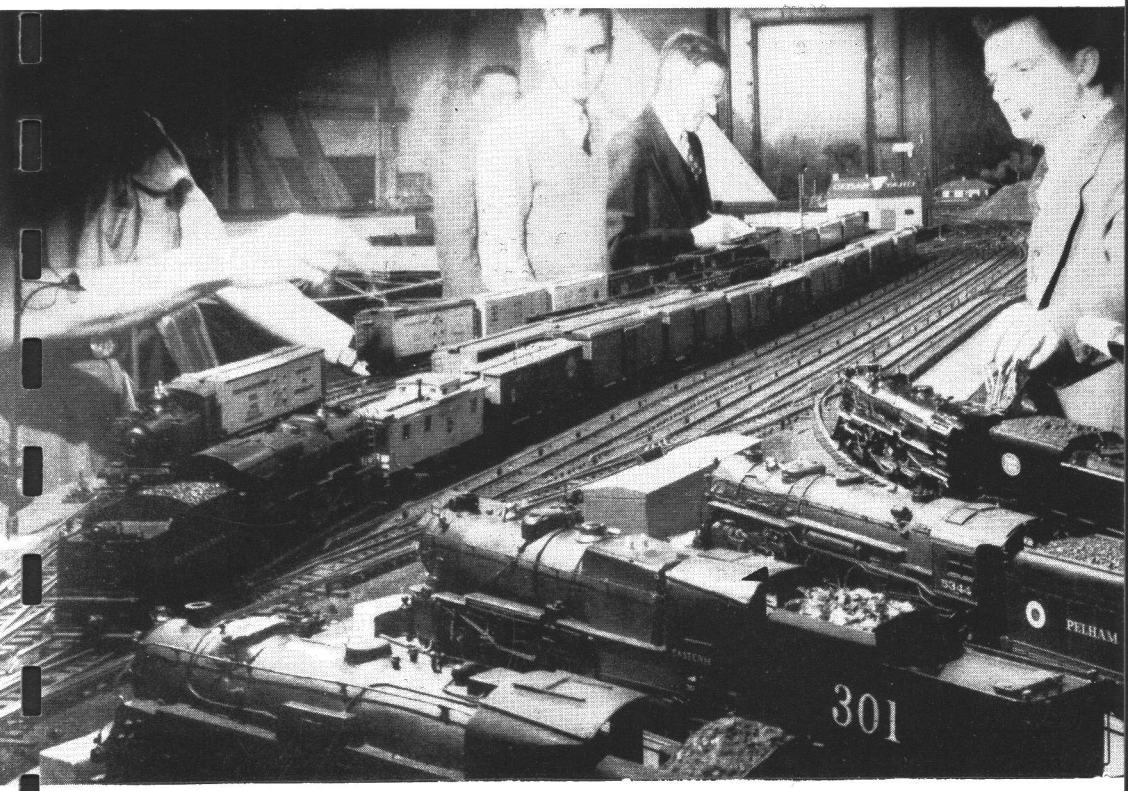
The weather conditions on the days reported are taken into consideration, along with weather forecasts and any news of con-

ventions, special sales that might affect suburban territory, etc. For instance, if No. 18 has been carrying close to capacity into the city every morning during good weather, a car will probably be added if the weather forecast shows snow coming, while the 10 a. m. train may find a car added if one of the big department stores advertises a special sale.

Comparisons are also made with traffic reports of the same day a year ago and the same day a week before. These help to gauge the probable ups and downs of traffic, although again the weather and any special events on these days must be considered.

Of course, with Pullman cars there is a very definite indication in the form of reservations. When extra cars are added

Making up trains at Cedar Yard on the Westchester Model Club railroad, Pelham Manor, N. Y. Notice yardmaster recording car numbers.



they are of the same type as already assigned to the train, unless another type will make more sales possible.

Need I say that most passenger trains are put together with baggage, express, and mail cars at the head end, followed by the passenger equipment proper? And need I also say that many a passenger train is not so assembled? Years of experience and ordinary common sense as well show that the front cars of a train are more susceptible to damage in a wreck, and this is one basis for putting non-passenger-carrying cars in the front of a train. In fact, baggage and mail cars are often called head-end cars.

The general term "mail car" is a rather loose designation and includes both storage cars, which handle bulk mail as loaded at stations, and railway postoffice cars, in which sorting of mail is carried on en route. Storage cars are usually completely locked, although sometimes they are coupled next to railway postoffice cars and the end doors between are left unlocked so the sorting clerks can take bags from the storage car, sort them, and return. Whether locked or unlocked, these postoffice cars cannot be entered by members of the train crew except in emergency, and hence are usually coupled far enough front so no baggagemen, express messengers, or other non-postoffice employees will have to pass through. This often means the railway postoffice car is right back of the locomotive tender, but not always, for storage cars of mail, express cars, or express refrigerator cars may be ahead.

Passenger-carrying cars are usually grouped together in a train, but not always. Baggage cars are sometimes sandwiched in between somewhere. But remember that one conductor must handle the fare collections, even on your HO flyer, and so don't put a railway postoffice car or express reefer, or something else like that, in the middle to prevent the conductor passing freely through all the cars in which he must collect. Usually when an express or baggage cars is in the middle of the train it is because the train splits up somewhere along the route into two trains for different destinations, and the makeup saves switching.

In passenger switching, by the way, the object is to avoid cutting the train more times than necessary because each requires the work of connecting up two air hoses and a steam pipe. That's the why of some of the unesthetic makeups to which we fans object. If the Podunk sleeper is in front of the solarium car, two uncouplings and one coupling are needed to cut it off. If it's in back of the solarium only one uncoupling is needed.

The arrangement of the passenger-carrying cars is usually such that the Pullman equipment, including parlor, sleeping, and lounge cars, is at the rear. Coaches usually are immediately behind the mail, baggage and express. The dining car is most accessible to the greatest number of people if placed just between the coaches and Pullmans, and this also prevents disturbance of Pullman passengers by coach passengers walking through to diners. A lounge car is often placed between sleeping cars and diner so that first-class passengers may wait in it for tables in the diner and also use it for lounging after meals. Observation and solarium cars belong at the rear of the train, but aren't always there as we've seen in the case of the Podunk sleeper.

If non-air-conditioned coaches and air-conditioned coaches are carried on the same train, the non-air-conditioned equipment is usually first in line. The air-conditioned cars are nearer the diner this way and can be assigned to the through passengers who are paying the most and who are also more likely to eat meals en route. The first coach is a smoker by long custom, and on more than half of the passenger trains is a combination smoker and baggage car.

Express and storage cars are switched a lot along the way. Entire cars are cut off and new cars added from time to time. Usually this switching is handled by the road engine. As can easily be seen, the best way to switch is to leave the passenger cars standing in the station so they can be loaded and unloaded, and while this is going on to switch the head-end cars from the front. But on some short local trains exactly the reverse is done. As in the case of the Podunk sleeper, many a milk car is carried at the

rear end of two- or three-car locals where it can be kicked into a siding with but one uncoupling.

Sometimes one sees very odd makeups, such as Pullman sleepers right behind the locomotive and even ahead of baggage and mail, observation cars running backwards, and so on. This is only proof that anything can happen in the railroad business. Such arrangements are usually due to cars being deadheaded, as in such cases it makes no difference where they are in the train.

To get back to some typical passenger train makeups for your model pike, let's start with a short branch-line train. Remember that most branch-line trains owe their very existence in these days of little short haul passenger business to the mail contracts. Therefore your branch-line train needs a railway postoffice car, not a full length one, but at least a car that's part R. P. O. and part baggage or express. There may be a fair amount of head-end business in addition to mail, and most likely very few passengers, certainly not any first-class business. The locomotive will most likely be a Pacific because the road has plenty of Pacifics and would rather use recent larger power than old smaller power. A train is better and more economically overpowered than underpowered. So a suggested makeup might be:

Pacific. (4-6-2).
Milk car.
Combination R. P. O. and express.
Combination baggage and smoker.
Coach.

Or the makeup might be:

Ten-Wheeler. (4-6-0).
Combination express, baggage, and R. P. O.
Coach.

If the train is to run on a subsidiary main line, we should add some accommodation for first-class passengers, and a good type

of car is the combination solarium lounge and dining car which can be put on the rear end. To be realistic we can run the solarium either backward or forward even though it may hurt to have it backward so it looks wrong. Real railroads seem to pay little attention to how they turn cars of this type.

For a heavy mainline train a good typical makeup might be:

Hudson type locomotive. (4-6-4).
Express reefer.
Storage car.
Full length R. P. O.
Full length express car.
Combination baggage and smoker.
Non-air-conditioned coach.
Air-conditioned coach.
Air-conditioned deluxe coach.
Diner.
Lounge car.

And this is a good makeup for long distance Pullmans:

Northern type locomotive. (4-8-4)
Full length R. P. O.
Combination baggage and smoker.
Day coach.
Diner.
Lounge.
12-section Pullman (one or more).
Observation-Lounge.

Solid mail and express trains are peculiarly fascinating. Their makeup is, of course, largely storage cars, with one or more full length sorting cars usually coupled near the middle of the train where the clerks can work into through storage cars on either

side. The cars in front and back are those which will be set out along the way, the rear ones at stations where switchers are assigned and the front ones by the road engine. At the rear of such trains there is usually a combination coach and express car for such passengers as want the fast, rough ride on the mail and for the rear-end railroad crew. Some roads use full length coaches for rider cars, and others even have special cabooses for mail- and express-train use. Some mail trains carry no passengers at all, and some do not even have a rider car for the rear-end crew, but let conductor and brakeman ride in the last storage car.

As to motive power for passenger trains, there is no rule at all. Heavy power is used on short trains and I have ridden 10-car limiteds pulled by Ten-Wheelers. The choice of locomotive on a real railroad depends partly on what is available and partly on what will do the job. Remember that in passenger service a locomotive can usually start a lot heavier train than it is ever expected to pull at passenger speed, so starting ability is not the test. The weight and schedule of the train are what determine the minimum power. Ten years or more ago Pacifics pulled 10- and 15-car trains at 40 to 45 miles per hour average speeds, where now Hudsons are used to pull shorter trains at 60 miles per hour. A train that is ordinarily pulled by a Pacific may turn up one day with a Hudson because the engine dispatcher had an extra heavy engine at the wrong end of the division and wanted to move it, or the next day with a freight engine because the Pacific broke down and the only engine available was a Mikado. Again, a two-car local may astonishingly enough sail by double-headed just because a locomotive takes three men to deadhead from one end of the division to the other but only two men to doublehead.

Tonnage of Trains.

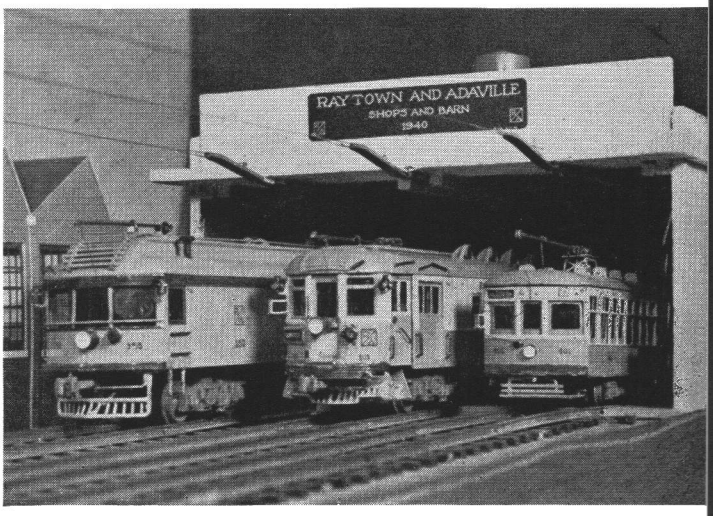
The measurement of the tonnage movement in freight trains is of considerable importance in the railroad business. Generally speaking, model railroads have not started figuring length of trains in any other unit than cars, but the Cronkhite system

(page 42) takes care of this very nicely. The conductor of a freight train starts the computation of tonnage. He has waybills for every loaded car or less than carload shipment in his train, and car order slips for the empties with which he starts out. He makes up a train list, filling in car initials, number, empty weight, load weight, total weight, and points to and from.

When cars are picked up along the way they are added to this list and cars set off can be told from the destination column. A tonnage figure at any time is a matter of simple addition.

The total tonnage, the number of loads and the number of empties are reported to the operator on leaving, and he reports these figures to the dispatcher. Any changes in cars or tonnage along the line are likewise reported.

The dispatcher's train sheet for freight movements has three columns instead of the one in which passenger train times are entered. The first column is for time, the second for loaded cars, and the third for empties. At the top of the column is entered the tonnage, which suffices for through freights. Any changes in tonnage are noted in small writing directly below the time at the station where such tonnage adjustments are made.



Interurban railroads are excellent model systems from the operating viewpoint. Trains are short, easy to manage, and you can get a complete railroad furnished with fewer pieces of rolling stock than with steam prototype. Interurban rules and operating methods are often the same as for steam roads. This scene is on the layout of R. J. Reger of Dayton, O.

The dispatcher figures the average tonnage, multiplies it by the miles, and enters on his train sheet a gross ton-miles figure for each train. This is the operating department's permanent record of the day's accomplishments, and as the train sheet has everything on it relating to train movements and delays for the day it is a very valuable permanent record.

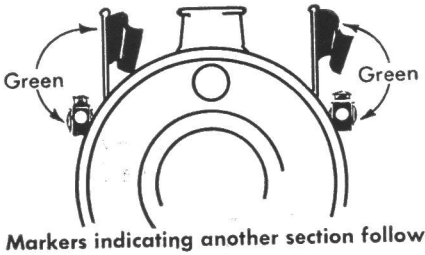
The train list made out en route by the freight conductor is turned in and forms part of the freight traffic department's permanent record of the day's accomplishments.

The tonnage record on the dispatcher's train sheet is much more than just a record of hauling accomplishment. It is also a bit of absolutely necessary information, especially so on a busy division. The dispatcher, in judging where to order meets and where first-class trains can best pass second- and third-class trains, must know the tonnage in order to judge speed. Of course the tonnage is not all. The dispatcher develops a keen judgment of each engineer's ability as well as the individual differences between various locomotives of the same class. The dispatcher's end of a conversation with an operator may sound something like this: "Hello, Riverton, 83 whistling? . . . Engine 7331 with 2375 tons and engineer Davis . . . Yes, about 15 minutes on No. 5 . . . O. K. Highball him along; with that he can go to JK all right."

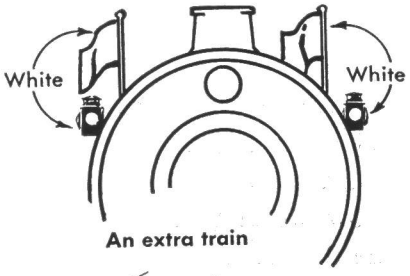
Marker Lights.

Marker lights are a very important item in real railroad practice, but are often neglected on models. A marker light isn't so small that it can't be seen, even in HO gauge, and in O gauge well detailed lanterns with correctly colored jewels are available.

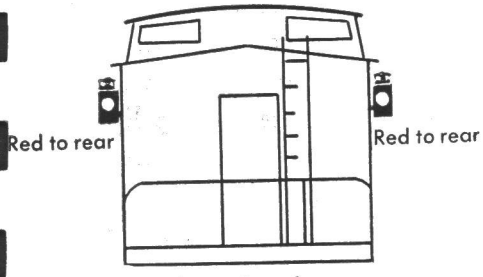
The rear end of every train must carry markers, but no other car should carry them. Most model rails are fairly particular about markers on the front of the locomotive, which are not so essential because they are used only to indicate a section following (green) or an extra (white), but we have yet to see a model road, except for a very few club lines, which follows the standard code diligently when it comes to the rear car, where the markers are absolutely necessary day and night.



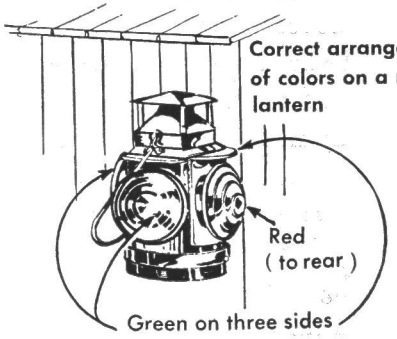
Markers indicating another section follows



An extra train



Rear-end markers



Correct arrangement of colors on a marker lantern

All real passenger cars have brackets for marker lanterns on all four corners. This includes all express and refrigerator cars which might be used in passenger trains. No model kits or commercial finished cars have this essential, and hardly any model rails put it on their cars. And yet even the bracket is as big a piece of detail as many another part which is carefully applied. The lantern it holds is a big as a coupler knuckle. Cabooses should also have marker brackets at all four corners. Many a model caboose has markers permanently applied on one end, but that's rather absurd when the crummy is turned around. My cabooses are fitted with standard brackets and the markers can be slipped on at either end, and what's more, can be turned around so as to give the proper indications for multiple-track running.

To start off with the engine, a locomotive pulling a scheduled train by day carries no markers whatever. By night the headlight is considered a marker. If the train is running in two or more sections, the locomotives of all but the last section will carry signals for the section following, two green flags by day, and two green flags and two green lights by night. The lights show green

to the sides and front. An extra—that is, a train not on the timetable and outside of yard limits—carries two white flags by day and two white flags and two white lights by night. The lights show white to the sides and front. These locomotive markers are mounted on the sides of the smokebox front, fairly high up. Locomotives of some railroads have backup markers on the pilot beam, these being the regular rear-end markers fitted with electric bulbs so they can be turned on only when the engine is backing up in a terminal. Most roads, however, do not use backup lights at all, merely lighting the section or extra markers to indicate the rear end of a backing locomotive in a terminal.

The rear end of a train carries marker lanterns at all times, lighted by night and unlighted by day. The train is not complete until these markers have been passed. A rear-end marker light has colored lenses in all four sides, green in three and red in one. Ordinarily red shows to the rear and green to the sides and front. When a train is in a siding, the red lenses are turned in and green is displayed in all directions. When a train is running on the wrong main track, green is displayed on the side toward the right main so that a train coming up behind will know which track is occupied. A simple way to remember this is, green toward the side on which the train may be safely passed. Rules for use on multiple-track lines are more complicated.

Some roads use green flags on the rear of the caboose during the day, but the use of unlighted lanterns is rapidly becoming universal. Some Eastern roads use yellow instead of green in rear-end markers, making them yellow on three sides and red on one. The lantern cases themselves are painted yellow for daytime visibility. With green lenses, however, the lantern cases are usually painted black.

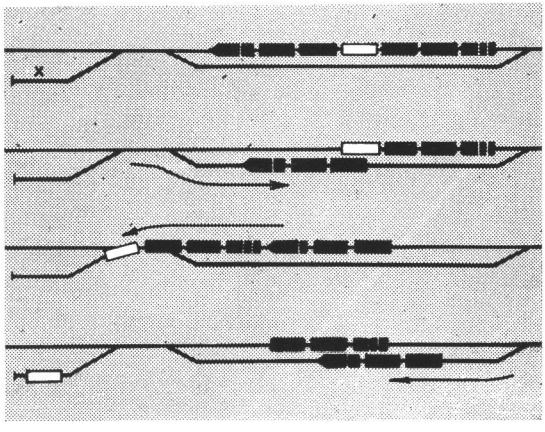
The jeweled markers can be obtained with a small mounting wire sticking out of the bottom. Marker brackets can then be in any arrangement which provides a hole into which this wire can stick. A short piece of very small diameter brass tubing soldered to the car corner will do the trick. So will a narrow

strip of shim metal, bent into a sharp loop to accommodate the mounting wire and with two tips soldered or pinned to the car. The wire should be a tight fit for the hole so the markers won't bounce off on rough track, but should permit turning the markers for running on wrong main track or other such niceties of operation.

Makeup and Switching.

In making up freight trains, the sky is the limit. Loaded tank cars are not allowed immediately behind the locomotive, but don't let that stop you, for if called to your attention you can always claim the car is empty. Empty flat cars are avoided near the front end of a heavy train, but not always. Stock and refrigerator cars are often near the front of a train because of the necessity for fast switching. Some roads place the caboose right behind the tender instead of at the rear of the train. Pusher engines are sometimes coupled in ahead of the caboose and sometimes behind it. Take your choice.

Switching with the least number of moves is partly track layout, and has been talked about many times before. But it is also partly a study of the problems at hand and practice, particularly coupling practice. In HO and OO gauges it is far better



This diagram shows why a siding with a turnout at each end is handy for spotting cars. X is a facing point siding, and orders are to leave the white car in it. The progressive moves show how it can be done easily. Without the two-ended passing track, it is not possible to put a car into a facing-point siding without resorting to momentum switching, impractical on model railroads.

to use one of the auto-coupling systems if any amount of switching is to be done. In O gauge, dummy couplers or scale automatics can be used with success, for it isn't as hard to get the cars back on the track after they are lifted in the coupling process. A king pin ¼" longer than needed will allow you to lift an O gauge car body for coupling or uncoupling without lifting the truck off the track, which is fine.

Every layout should have at least one two-ended siding. With such a track, every switching maneuver you want can be accomplished. If you wish to put part of a freight train ahead of the engine so it can be set into a facing-point siding, just stop between the double-ended siding switches, cut the train ahead of the cars you wish to set off, pull ahead of the far switch, back through the siding, and come up behind the cars which were cut off. The set-outs will be right in front, ready to be disposed of. See the diagram.

Cars of a train can be shuffled up into any order very easily with any trailing-point ordinary siding. Just pull the train ahead of the siding and, after uncoupling at the right places, shove the cars or groups of cars alternately into the two tracks until they can be pulled out again in two groups and coupled together into the train you wish.

A lot is said about switching problems. If you have a double-ended siding on your road there are no real problems. You can do anything you want except turn equipment around. A loop, wye, or turntable is needed in addition for that. The so-called problem is doing the switching in fewer moves, and in each particular case it's just a matter of using your head. Switching moves can be worked out in practice by using printed cardboard Play Trains and a track diagram on a large piece of paper.

4 Operating the home railroad

PLANNED operation begins with the correct layout. A real railroad is built to carry traffic from one place to another. A model railroad should be so planned that it will give an illusion of doing the same thing even if it doesn't. The simplest layout is a circle or an oval with a siding, station, or yards at one point on it. That one yard or station can be imagined as both ends of the line and definite orders can be made up and carried out for moving traffic from the one terminal around the main line and back to the same point.

With larger space the layout can be better planned for operating. The terminal or yards should be so arranged that trains can run out in two directions, thus giving eastbound and westbound developments. At least one or two sidings are desirable at way stations, presumably for freight handling. Two big terminals, constituting an actual point-to-point system, are impracticable unless two or more people will run the railroad.

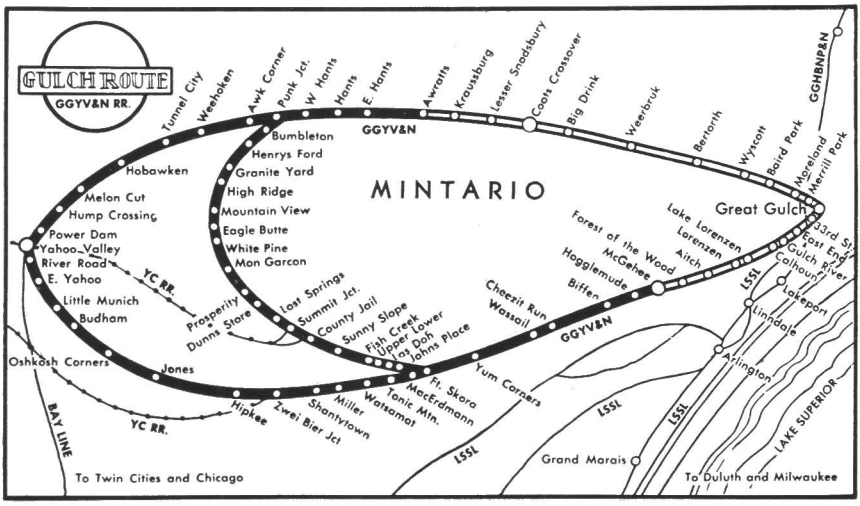
If the line is single track, trains in the two directions will have to make properly arranged meets at sidings. Way freights will have to get in the clear so that through passenger trains will not be delayed. If the line is double track, three-track sections with the center track used as relief or passing siding for either direction will help to make the operations intriguing.

Schemes of operation are as varied as the men who do the operating. One of the most workable we've seen for an individual layout is that used by Minton Cronkhite. His line is well furnished with coal mines, oil refinery, grain elevator, local stations, and other sources of traffic. He has a file of cards, each giving

some specific movement of traffic. The cards are shuffled and dealt off. It is up to the operator to carry out the instructions with efficiency and dispatch.

Scale time is for club roads, but another timing principle applicable to individual layouts is illustrated on the Cronkhite lines. It is the principle of relative position of scheduled trains. If you have on your line a Limited and a hotshot freight, the two can always be kept in the same relative positions no matter when or at what speed they run. For instance, when the Limited is leaving the terminal, the freight should be at point A. When the Limited gets to point A, the freight should be at point C. Perhaps it is at point D that the Limited passes the freight. At any rate, it is a definite, planned sequence of operation depending not upon time but upon where the two trains are. Local freights are run "extra," that is, without schedule, and the operator merely keeps them out of the way of the regular trains and sees to it that they deliver the goods as quickly as possible. Simultaneous operation of several trains on the individual model railroad requires a track diagram showing position of all trains.

Keeping a train sheet is a point which adds to the fun of running a layout. Mr. Cronkhite does this and it is where he applies the principle of relative position, mentioned above. His models are all Santa Fe, and using the correct type of engine and the correct types of cars, he makes up actual Santa Fe trains. On his sheet he jots down the number of the train, using the real train's number. If it's a fast passenger train it must come back before certain slower trains which are already on the line. A streamliner is relatively faster than an ordinary passenger train. Mr. Cronkhite has a definite list of all the numbered trains he runs with relative order of leaving and arriving. The number of laps which a train makes around the main line does not matter. It is arrival and departure which count. Realism is even carried to the point of having the correct named cars in streamliners and arranging them according to the current train makeup. Tonnage of the model trains is figured by a simple but effective method. Scale



length is used. Ten 40 ft. box cars make a 400-ton train, adding two 65 ft. mill gondolas makes 530 tons, and so on. This hits very close to the real tonnage and gives an accurate measure of siding capacity. It's better for measuring pulling power of locomotives than just loosely stating the number of cars.

Building a model railroad is only a third of the fun. Planned operation is another third. Using imagination is the other. The oldtimers at our hobby were masters at imagining. Perhaps because they had to imagine much of the detail on their models they also imagined quite easily all manner of things. They imagined countrysides through which their railroads ran and traffic which their trains carried.

There was, for instance, the Great Gulch, Yahoo Valley & Northern RR. of A. C. Kalmbach, publisher of THE MODEL RAILROADER—a rather barren loop of main line in the attic with a passing siding, a yard and an optional mountain route for part of the distance. But the map shows how imagination converted this into a magnificent railroad system serving a considerable area of country on Lake Superior. This country was the province of Mintario, between Minnesota and Ontario. Of course most

atlas maps ignore Mintario but that's only a quirk of fate. The Gulch Route monopoly runs the country lock, stock and barrel, and has lots of fun not only thinking up phony names but even laying out schemes of government that would put politicians to shame.

When THE MODEL RAILROADER started and there was lots of spare time in the Kalmbach print shop, timetables, business cards, letterheads, bulletins, and other typographic scenery were prepared to help make the pike more realistic. So well did this succeed that some people seriously asked what were the possibilities of a vacation trip to Great Gulch, and where was it! One of these timetables is shown in part. The station names come partly from local color along the line and partly from the fertile brain of Frank Zeidler, general passenger agent and one of the founders.

The real layout followed the timetable mileage at a scale of 6″ per mile as measured along the track in the attic. In other words, a freight train could stop in most of a division at once. For actual operating only the most important stations were used.

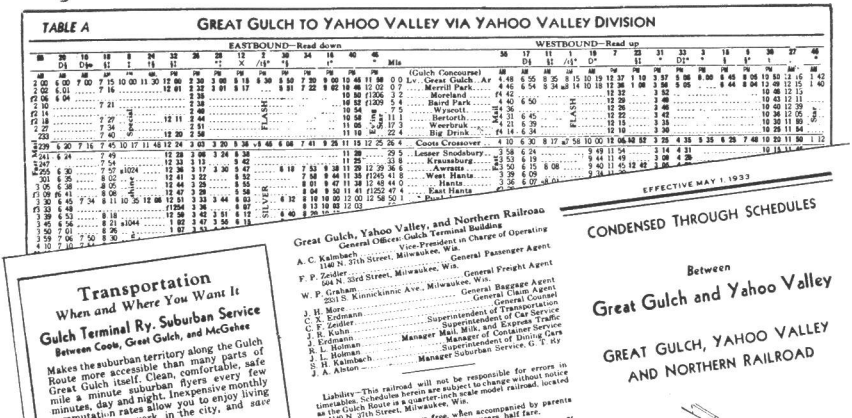


TABLE A

GREAT GULCH TO YAHOO VALLEY VIA YAHOO VALLEY DIVISION

EASTBOUND—Read down

WESTBOUND—Read up

(Gulch Concourse) Lv. Great Gulch .. Ar

Merrill Park

Moreland

Baird Park

Wysentt

Bertorth

Weerbruk

Big Drink

Coots Crossover

Lenker Boulevard

Krausburg

Awrasta

West Nanta

Hanta

East Hanta

Great Gulch, Yahoo Valley, and Northern Railroad

General Offices: Gulch Terminal Building

A. C. Kalmbach ..... Vice-President in Charge of Operating

F. P. Zeidler ..... General Passenger Agent

W. P. Graham ..... General Freight Agent

J. H. More ..... General Baggage Agent

C. S. Erdmann ..... General Claim Agent

C. F. Zeidler ..... General Counsel

J. R. Kuhn ..... Superintendent of Transportation

J. Erdmann ..... Superintendent of Car Service

R. L. Holman ..... Manager Mail, Milk, and Express Traffic

J. L. Holman ..... Manager of Container Service

S. H. Kalmbach ..... Superintendent of Dining Cars

J. A. Alston ..... Manager Suburban Service, G. T. Ry

Liability—This railroad will not be responsible for errors in timetables. Schedules herein are subject to change without notice at the Gulch Route is a quarter-inch scale model railroad, located at 1140 N. 27th Street, Milwaukee, Wis.

Children under five years free, when accompanied by parents or guardians; over five and under twelve years, half fare.

Baggage—150 pounds carried free on each full fare ticket. 75 pounds on each half fare ticket. For excess baggage rates apply to J. H. More, General Baggage Agent.

Redemption of Tickets—Tickets unused or partly used may be redeemed under tariff regulations at office of General Passenger Agent, Room 400, Gulch Terminal Bldg., Great Gulch.

EFFECTIVE MAY 1, 1933

CONDENSED THROUGH SCHEDULES

Between

Great Gulch and Yahoo Valley

GREAT GULCH, YAHOO VALLEY AND NORTHERN RAILROAD

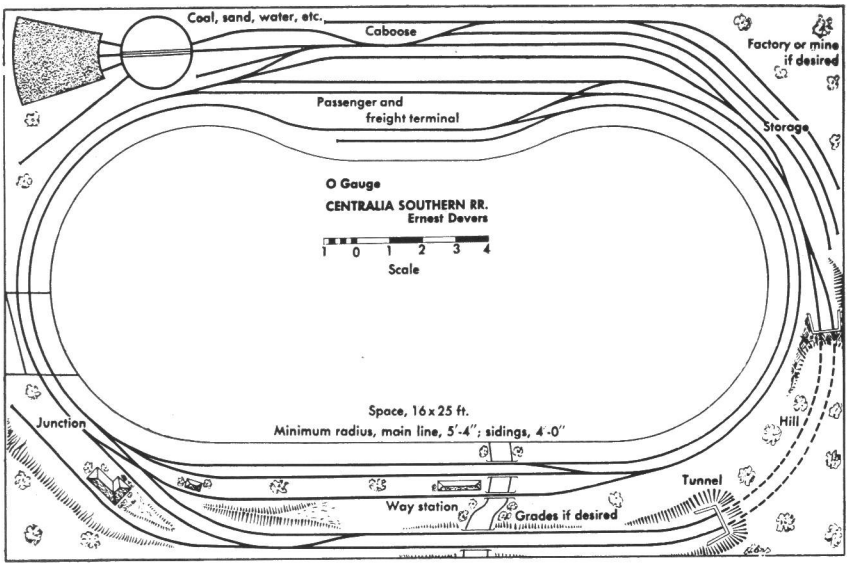
Excerpts from the Gulch Route timetable.

On Saturday afternoons the road was operated by a dispatcher, several station agents, and a yard master. There was no attempt to run by the timetable, for all trains were extras. Scale time hadn't been invented, and running time was given in seconds. A big blackboard at Great Gulch served as train board, but some wag was always putting "missing" after the train times. A bulletin board usually was papered with notices from the general freight agent or the superintendent of transportation.

The first time that two locomotives were in operation the crew "worked" late at night, especially after discovering that one loco ran slightly faster. Two trains were started out in the same direction. Every seventh time around, running continually, one would catch up, and the trick was to pass the trains on the double without slowing either. There were some narrow escapes and some smashes.

After working up the imaginary countryside to fit the Gulch Route, it was natural to work out interchange connections. The Bay Line of Harry Bondurant connected at Yahoo Valley (although the cars some way came up the attic stairs and landed in the middle of McGehee Mountain Division). Later the Lake Shore Short Line of Linn Westcott leased trackage rights into Great Gulch. It ran along the shore of Lake Superior, and provided an outlet to let out all better Mintarians. Continuing to expand its interests it later bought up

A scene on the Gulch Route, 1930.



the Soo Line (oh yeah!) for a connection to Chicago. Together the Gulch Route and the Lake Shore projected the Great Gulch, Hudson Bay, North Pole & Northern, a valuable feeder.

Although the freight yards at Awratts had a separate control board and a telephone made of junk parts, the phone line was never used because one could hear better at the main board without benefit of the phone.

After you've had your share of fun using imagination and concocting timetables and travel folders, you'll begin to want some systemetized scheme of operation to make the most of your equipment and to properly serve the countryside you've thought up (if not built up). Let me tell you the story of an operating scheme I worked out for one pike, the Centralia Southern of Ernie Devers.

The layout of the Centralia Southern is very much like yours and mine; in fact, as typical a model railroad as can be found. Like 75 per cent of all lines it is essentially an oval, has a station and yards along one side, and on the other side has both a level main line and a mountain branch. Perhaps some of you ad-

vanced layout bugs may object that such a line shows lack of imagination, but it's one way of getting a lot of railroad into a little space, and it's a simple pike to plan and build.

Now a fellow like Ernie, or like most of us for that matter, runs his railroad mostly by himself, and to work out a scheme of intelligent operation is quite a different problem from working out operation on a club road where 15 or 20 men can share the jobs and keep the traffic moving. And you'll agree, after looking at the appended layout diagram, that the setup didn't look promising for planned train running. But Ernie and I were not to be buffaloed, and we went at the problem immediately after dinner.

Timetable operation of trains over the main line seemed out of the question, for the main line was only a minute around for the slowest of trains. And with only a main station and one other way station, how can one time trains? And with only one fellow to run the whole shebang, what good will a lot of timing do? So we decided that all operating would have to center around the main station and yards.

To me it seemed that of all the general schemes of operation the one that offered the most possibility was that of making up and dispatching trains from the yards in a definite order, letting them run free on the main line, and then taking them back into the yards according to a definite order.

This would be typical for nine model railroads out of ten for in almost every case the time needed in switching trains is great compared to the time required to make a run around the main line.

Experiment proved that the yards allowed a lot of manipulation of equipment, including fairly rapid makeup and shifting of freight trains, and that the station tracks were so arranged that trains could be run right through at speed without interfering with the switching. The control was so that trains could be run around the main line or Mountain branch on one rheostat for each track, and the portion through the yards could be cut out with a toggle switch and transferred to the yard rheostat.

Next we checked over the equipment roster. The road owned the following:

Locomotives: 0-6-0 switcher; 2-8-2 Mikado; 2-8-0 Consolidation; 2 4-6-4 Hudsons; 4-6-2 Pacific.

Cars: 19 assorted freight cars, including a couple of crummies; 3 baggage cars; 2 mail cars; 4 coaches; 2 diners; 2 Pullmans; 1 observation.

We decided that with this equipment, and considering the layout, we ought to run about the following train service:

Limited: A heavy deluxe passenger train, to carry baggage, mail, a coach or two, diner, Pullman, and observation. We figured that since this train represented quite a lengthy run it should travel alternately over the main line and mountain branch as it went around in order to increase the apparent run.

Mainline local: The mainline local could be hauled by either a Hudson or Pacific, but was to have only a baggage car and a coach or two.

Mountain branch local: Same as mainline local.

Through freight: A heavy drag hauled by a Mike. We figured we'd better keep this on the level main line because of tonnage.

Way freight: We assigned the Consolidation to the way freight, and figured this train for both main line and mountain branch so that it could do switching wherever necessary.

Now here we had a five-train setup, and our problem was to run all five types of train, getting them switched and into and out of the yards station, in some definite order. For an individual road like this one there's little if any point in such refinements as scale time and train sheets, and certainly no point in written train orders. So we set the good old alarm clock on top of the roundhouse and clocked a few of our operations. After some practice we found that in 15 minutes we could make up all five types of train, get them onto the main line, and after pulling them back into the yards in turn, break them up and put the equipment to bed. So a 15-minute cycle of operations was set and we went to work on a schedule, the idea being that after set-

Dr. Thorsten Blomberg of Rockford, Ill., operating his O gauge basement railroad. Like most model railroads, it is basically a large oval, but overlapped upon itself like a pretzel. Added switches make figure-8 running also possible.

ting up some time schedule by which trains should leave and arrive, we would have a goal to attain and that would add a realistic touch to our maneuvers.

The following schedule of movements at the main yards was our final timecard, and we found it kept either one or the other of us working to do the switching and have the trains ready on the dot:

8:01—Through freight leaves eastward on main line.

8:05—Mountain local leaves eastward.

8:06—Way freight leaves westward on main line, but makes at least one lap over mountain branch.

8:08—Mountain local arrives from west.

8:09—Limited leaves westward over main line, but makes at

least one lap over the mountain branch. The Limited waits for the mountain local if the latter train is late arriving.

8:10—Mainline local leaves westward. (This is just the make-up of the mountain local with engine turned and put on other end. Track 4 is best to use for this turnaround.)

8:11—Way freight arrives from the east and is promptly switched back into the yard tracks, 6, 7 and 8.

8:12—Through freight arrives from the west and pulls into track 4 so the switch engine can attack it from the rear.

8:12—Mainline local arrives from the east and stops on track 3 where the engine can easily cut off and be turned again to become the mountain local.

8:14—Limited arrives from the east, by which time track 4 should be clear so the Limited can be stopped in position to again be the Limited when the cycle is repeated.

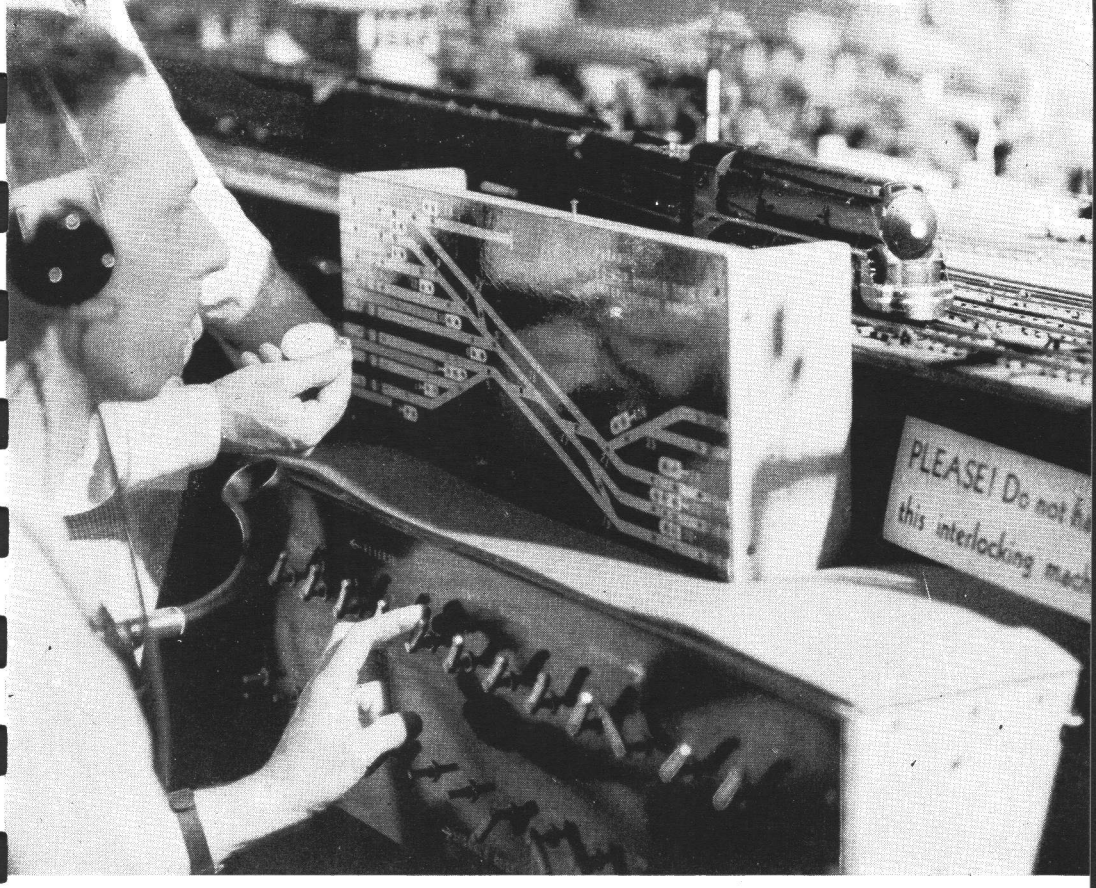
(Repeat ad exhaustium.)

All the operator did was concentrate on getting trains into and out of the yards on time. In between he just let them run around the oval, and the number of laps they made had nothing to do with the game. Of course the yard control was so arranged that whenever switching was being done which would interfere with use of the mainline tracks, mainline power was shut off and the trains stopped before they came to yard limits. Trains were pulled in from the main line as near to the even minute they were due as possible.

Later in the evening both Ernie and I got good at switching and were running everything almost on time most of the time. Besides, we got rather tired of repeating the same thing, so we worked out the next step in our little game. We took a stack of my business cards (the boss furnishes those free anyway) and wrote various hazards on the backs of them. Thus we made up an obstacle deck, with the cards reading something as follows:

"Next way freight leave two empty gondolas at siding at M."

"Deadhead a diner out on next Limited."



A towerman on the Westchester Model Club layout, Pelham Manor, N. Y.

"Heavy traffic to State Fair. Add a coach to next mountain branch local."

"Limited's engine has broken down just east of M. Send a relief out at once."

"Heavy snow. Cut freight tonnage and doublehead Limited."

"Work-extra to leave on mountain branch immediately after the next local passenger and return just ahead of following passenger train."

"Christmas mail rush. Add extra railway postoffice car and storage car on Limited."

"Get Pullman out to Morrison and leave for special party. Next mainline train pick it up."

"Way freight pick up any carloads at M."

"Tank car to be left at Oxford Siding as soon as possible."

"Run light engine east over mountain branch as soon as possible to equalize power. Pull it into roundhouse again after two laps."

"Flood and washout on mountain branch. Run out relief train of passenger equipment at once, not forgetting baggage car or other space for mail."

"Next local train is one minute late arriving."

"Next Limited is held two minutes for connection and leaves late."

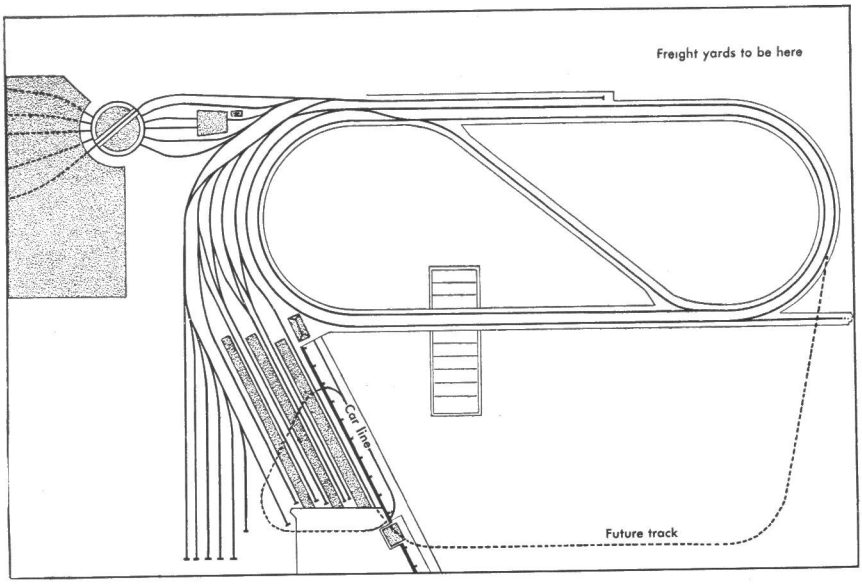
"Turntable fails for four minutes."

"Derailment blocks track 1 through terminal for one minute."

We could have gone on like this for some time, and you can make up a dandy set of cards to fit your own conditions, but you get the idea. We shuffled the deck well, and then every five minutes we took a card off the deck, and did that tie things up! We found ourselves playing a real game against time, even with both of us taking tricks at the throttle and helping couple and uncouple cars. We found the game could be made as hard or as easy as desired, and it surely was honest-to-gosh railroading right down in the basement, with all the thrills and all the trials of operating at a busy junction point of the real high iron.

Your layout may not be the same, but you can certainly apply part or all of this simple scheme of one-man operation and when friends come in you can step up the game by dealing obstacle cards, say every three minutes, and hiring an extra brakeman or two. Checking over a few common types of layouts, I find that this operating system usually has even more possibilities than on Ernie's Centralia Southern.

For instance, there's Harry Albrecht's pike, shown in plan on page 53. It has a stub terminal and not only an oval line for continuous running, but a reversing cutoff so that on the last lap trains can be turned and brought into the terminal just the opposite from the way they went out. Or, the reversing can be done on the first lap and then the train runs on the opposite one of the double tracks. At any rate, the stub end terminal adds to the



Harry Albrecht's oval with return cutoff.

intricacy of the switching problem. The separate freight and passenger yards allow a split of work if an extra boomer or so drops in for the evening. (Some of you new hands on the crew want to know what "boomer" means. Well, a boomer is a railroad man who changes jobs every so often and has service records with railroads all over the country.)

An excellent layout, which was worked out in a MODEL RAILROADER way back when the copies were carried to the postoffice under the editor's arm, is reproduced at the bottom of page 54. It's a typical twice-around layout with yards and terminal of the stub type wying out into the main line. A train can leave the yards and head either direction on the main stem, and make two complete rounds of the room before coming back. The single track presents an objection to one-man operation, but automatic train control can be installed which gives the first train to the single track preference over it and stops all opposing trains. The separate freight yards can be used when two men run the layout, or with a one-man scheme it makes a place to lay over trains,

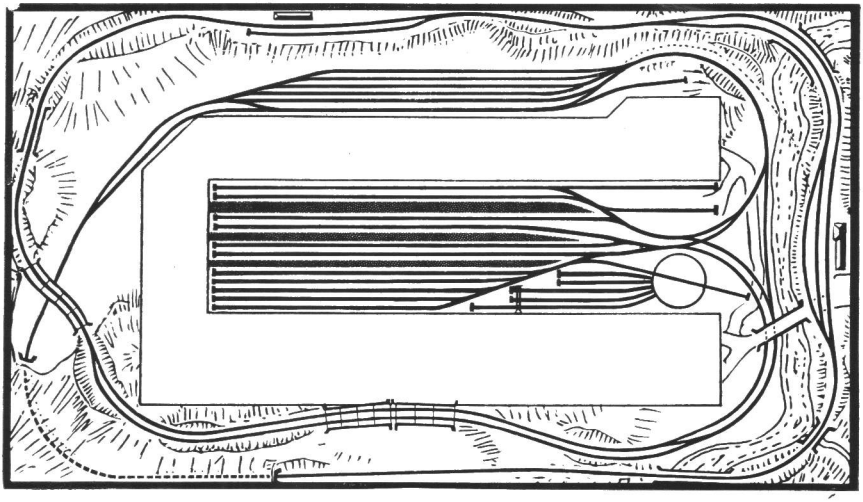
so that they don't have to run continuously. For instance, if a train takes one and one-half minutes to make the complete figure 8 loop, and it isn't due back in the terminal for five minutes, stop it in the yard for three and one-half minutes. There are plenty of tracks so any other trains can go around it.

Not only have these three layouts demonstrated a few operating possibilities which can be applied to an existing layout, but these are the three basic types of layout used on almost 100 per cent of all American home model railroads, and if you're planning a layout you'll do well to study the diagrams and see how they can be adapted to your space and requirements.

Automatic coupling and uncoupling of cars, in connection with remote control reversing, is an accepted thing on American model railroads today and its possibilities for switching and way freight operation on the home layout are obvious. Two makes of coupler are most used, the Walthers and the Mantua, the former made in OO, HO and O gauge sizes and the latter in just HO and OO. The K. & W. and Ideal are other widely used makes.

With any of these automatic couplers you can stop a train, uncouple it at any point, back a car into a siding, uncouple the

Twice-around layout with terminal on a wye.



locomotive, run it out of the siding, recouple it to the train, and proceed. Since switching is so much easier without touching cars or locomotives (see page 21), the operating possibilities of a model railroad are vastly expanded.

Remote control of uncoupling can be combined to good effect with the system of operating according to a general schematic timetable and hazard or direction cards. This is the case on the Connecticut Midland, O gauge railroad in the basement of Watson House, Hartford insurance man.

And what a pike that is! You can easily imagine, especially if you look at a map, the heavy traffic that flows over this gateway to New England. The road is electrified and keeps a slather of locomotives patterned after the New Haven 0350-class 4-6-6-4 electrics, as well as a couple of New Haven 0-4-4-0 box-cab switchers, an M. U. car, and some steam locos for emergency and through service, a Hudson, 0-4-0 switcher, Hiawatha, and a gas-electric car.

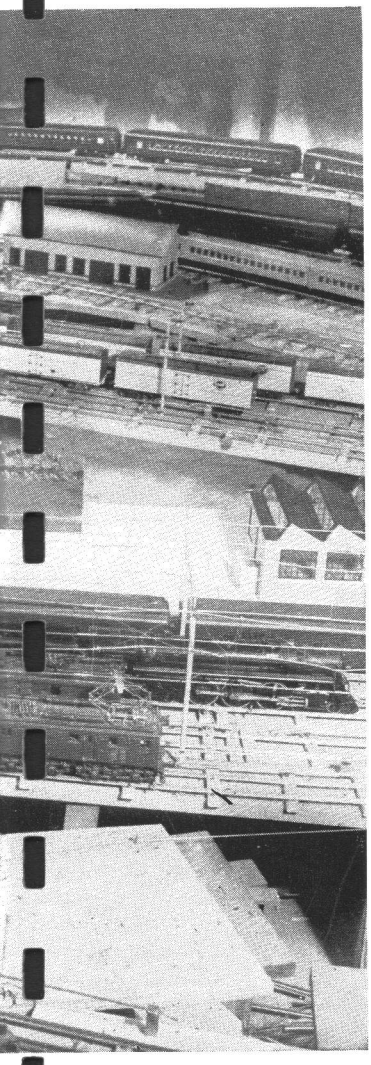
Far more interesting than the equipment is the general plan of the Midland, the fact that it is predicated first of all on actual operation of traffic. The layout, for instance, is point-to-point. The trains really run from Poughkeepsie to Hartford and vice versa. Beyond each terminal is a reversing loop so that continuous operation can be carried on, but even with these loops in use the line is far from a 'round-and-'round layout. There are long stretches of single track, and no matter what the trains do at the terminals, they must make proper meets with opposing trains as they progress from one end of the line to the other.

The Bolton branch was built mostly to serve a quarry. Passenger service up the branch is confined to a local to carry quarry workers. On the main line, passenger service includes a through train each way carrying Pullmans and headend cars, Nos. 13 and 14; a train of Railway Express carrying a couple of coaches, Nos. 15 and 16; and a solid train of express from the Pennsylvania, Nos. 21 and 22. Nos. 41 and 42 are the hotshot refrigerator trains and 43 and 44 are the merchandise trains.

If you'll look at the track diagram and follow me, I'll try to tell a little about the control system in use. There are two main control boards, one at Hartford and one at Waterbury. The board at Hartford can run the entire system, but for honest-to-goodness operation a switch is opened and the control split up with the Waterbury board, which then takes care of the entire layout

from a point just east of Waterbury to the Poughkeepsie end of the line. Then there's a supplemental control board for the West Hartford yards.

Each board consists not only of the usual set of toggle switches and rheostats for applying and controlling power on all the individual track sections within the controlled area, but also a scad of very simple switch controls. Small single-pole, double-throw knife switches are mounted at the control boards and from the blade of each knife switch is a rod run to the controlled track switch in such a way that throwing the knife switch works the track switch. And then the knife switch, at the same motion, cuts off the power to the section of track which leads in to the closed side of the switch, thus preventing derailments at switches!



The operations on this road can best be described in terms of an actual evening I spent with Mr. House and some of the other Hartford model rails. My job was at the Waterbury control panel, and my partner at the Waterbury board turned out to be Ray Payne, secretary of the Hartford Society of Model Engineers. At the big end of the division were Brass Hat House, Al Norman, and George Foster. The boss gave us the

Watson House at one of the control panels on his Connecticut Midland RR. in Hartford. Much of the track was built by him before supplies were readily available, and the "tables" were made closer to the floor than is now usual. This is the kind of a railroad that just grows, and they're often lots of fun to run.

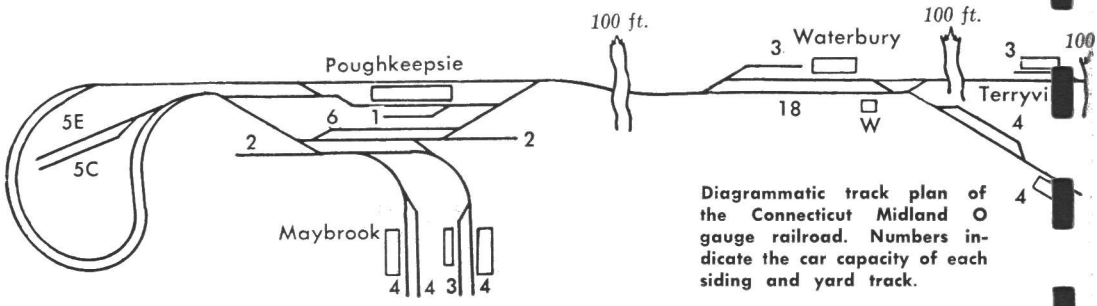
general idea of the operations and told us that two trains originated at Poughkeepsie and four at Hartford. All six trains made complete round trips, being broken up and switched at the terminals.

Each control board crew was handed a pack of 3″ x 5″ filing cards with directions typed on them for various train and switching moves. The top card on our Waterbury stack read:

Turn both switcher and control knobs right.
Wtby. switcher sets out coach on M. (22-R, 20-L).
Uncouple and return switcher to yard. (21-L, 20-R.)
Restore switches to main. (22-L, 21-R.)
Turn both switcher control knobs left.

Ray and I set to work with the little 0-4-0 steam type switcher assigned to Waterbury service and picked a coach out of the siding and set it in track section *M*. The numbers on the card were switch numbers and the letters *R* or *L* indicated that the knife switch for that track switch went to right or left. That made the switching easy. But best of all was the automatic coupling system. A hook-and-loop type of coupler is fitted to most Midland equipment. One car has the hook and the other car the loop, and thus all equipment must be kept facing in the same relative direction in order to couple. The hook is lifted by backing past a trackside ramp. Pulling the train forward past the ramp does not affect the hook, so the cars remain coupled.

We had no trouble coupling onto the coach in the siding and



Diagrammatic track plan of the Connecticut Midland O gauge railroad. Numbers indicate the car capacity of each siding and yard track.

then uncoupling when we had it in the right place for pickup by the through train.

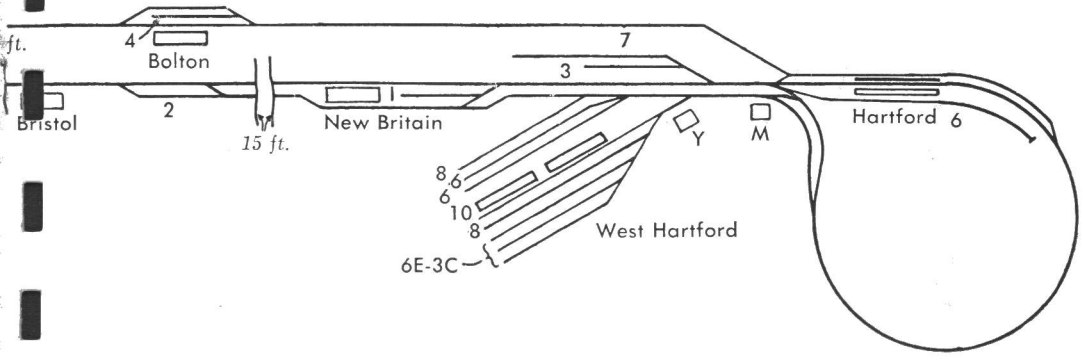
Next we turned to Card 2, which gave us the makeup directions for a through freight train which was shortly due to leave Poughkeepsie yard. The card read:

For freight No. 44, 0357 loco.
Back switcher and caboose from engine track.
Drop caboose between 11 and 12.
Pick up cars track 8.
Pick up cars track 6 or 9.
Pick up cars track 6.
Pick up caboose.
Uncouple switcher and substitute 0357 (reverse).
Proceed around loop, hold at crossover T for No. 13, boat train from Waterbury.

That card was a handful to click off, and as if that wasn't enough the B. H. called for an extra card. We found we had a pile of cards with a red designation on top, "Extra order No. _____, Poughkeepsie." These were just to give us a little extra to do any time we were caught up, or just to make things interesting by creating a jam we'd have to figure our way out of. Extra order No. 1 read:

Switch 2 reefers from track 6-A to 4-A.
Switch 2 reefers from 4-A to 6-A.

Which we did. Crews over on the Hartford end were busy following their own sets of cards and by now had a train heading



our way, No. 13. Their cars were split into two stacks, one for the yard crew and another for the main control board crew. The first card read:

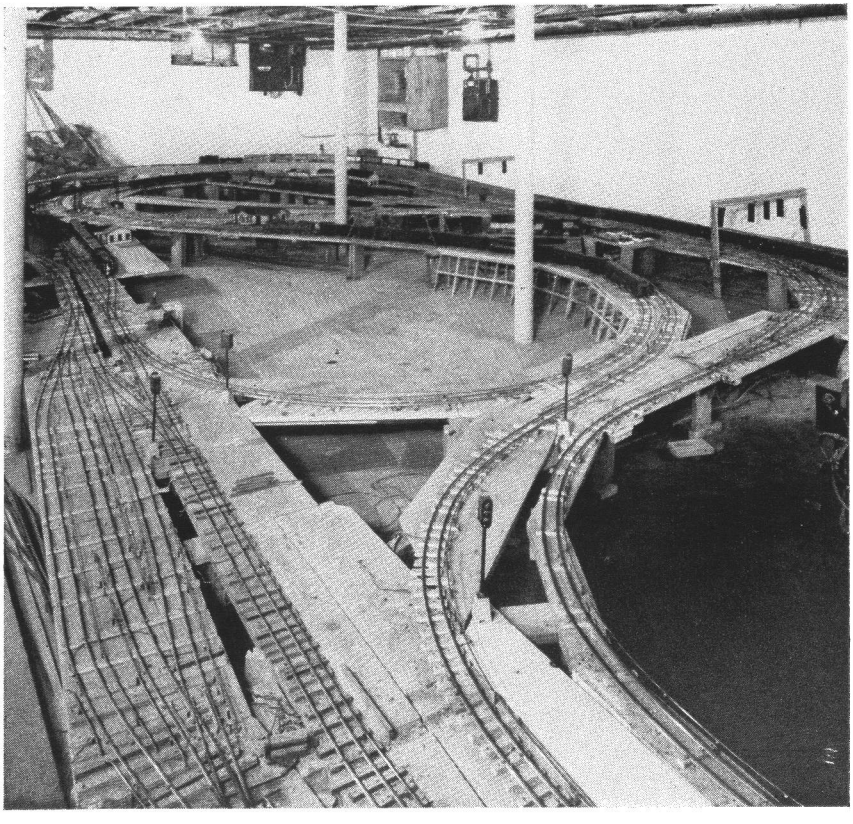
For No. 13 boat train, 0352 loco.

The loco was moved out of the yard and into the hands of the main control board crew, which found that its first card was:

For No. 13 boat train.
From yard, 0352 loco via C-B^2-D.
Reverse, pick up 3 express cars on B^3 Hartford station.
Hold on B^3.

As to all the reversing that was needed for train makeup and

Connecticut Midland layout, Maybrook area in foreground.



switching, the road is powered with D. C. and all locos are fitted with rectifier bridges so that reversal of the power gives positive reverse of the locomotive. This system was outlined in detail in the June, 1939, MODEL RAILROADER. Power is fed from banks of storage batteries arranged in series for a rated voltage of 18.

In series with the batteries there is a bank of nine 6-volt auto light bulbs, arranged in series of three and the three sets in parallel. Under ordinary service conditions the lamp bulbs offer little resistance to the locomotive power current and don't light at all. But in case of a short on the line the full 18 volts is applied across the lamps and the whole bank lights up brightly. Not only is the operator warned of the short, but the current is limited to what the lamp bulbs would draw, thus preventing damage. It's a lot more practical and simple than fuses.

Since the road is electrified with third rail you may wonder about the overhead catenary shown in some of the photos. Before the rectifier reverse system came to the attention of the management, sequence reversers were used with a positive control. This positive control was worked through a separate electrical circuit by means of trolleys.

The Hartford crews had been carrying out their last order while I looked over the electrical setup, and when they got to the next order found:

Clear No. 13 boat train 0352 loco, from Hartford B^3 to Waterbury B^3-D-E-K-L.

For No. 21 PRR express, from yard 0356 via C-B^2 Hartford Station.

Hold on B^2 Hartford Station.

All these hieroglyphics mean that the boat train is run out of Hartford station over the sections of track specified and that a loco is received from the yards for the PRR express which will shortly be made up.

The No. 13 boat train cleared Hartford station, under the careful throttling of Al Norman, and oozed up the pike through Bristol and Terryville into Waterbury. Here it backed across the

crossover and picked up the coach which had been set out by the Waterbury switcher as its first maneuver of the trick. And on it went into Poughkeepsie where the freight, No. 44, was waiting for it. The whole movement worked smoothly, even though the one train had to be handled by two different control board crews for the two ends of the division. The order cards dovetailed the operations nicely.

It was about this time that George Foster asked, "Say, Watson, does the M. U. still run?" The M. U. equipment was standing in a siding at Terryville when Watson pushed a toggle switch allowing it to run out onto the main, headed east toward Hartford. As the cars started to move he stood up in the center of the room, folded his arms, and let things run. This, thought I, is a queer way to act. He'd better keep his hand on the controls.

"Bristol next, Bristol," called Watson in brakemanesque tones. And as he stood, still with arms folded, the M. U. pulled up to the Bristol station and made as neat a stop as even the B&O could ask for. After the local had paused for a moment, the B. H. sang out, "Local train for New Britain, Hartford, and Bolton. All aboard!" And as the last syllable trailed off, the M. U. started to move and highballed down the main for New Britain.

"New Britain next, New Britain," and the train stopped right smack in front of the station. I looked around for hidden push buttons near the floor, or for accomplices, but no, the train was running itself. After a respectful pause and a very proper "All aboard" from Watson, the "local train for Hartford and Bolton" left New Britain. At Hartford the same performance was repeated, but at Bolton came the big stunt. The M. U. job pulled into the stub terminal and stopped. There was the usual pause while the brakeman called the stations, "Local for Hartford, New Britain, Bristol, and Terryville now ready on Track 1. All aboard!" And the M. U. started off in the other direction for Terryville.

The performance was repeated several times, with all stops made according to schedule and with reversing at both ends.

There were visible copper contact strips at each station, hitting a brass rod sticking out from underneath the motor car. This seemed to have something to do with the automatic control. And finally I heard a buzzing under the basement stairs and traced down one of those spring wound motors used to work the furnace drafts in connection with automatic heat regulator systems.

The circuit was so set up that when the train arrived at a station and made contact, the draft device started to run, turning off the power until it had made the usual half revolution, at which time it would stop with third-rail power turned on. The time required for one-half revolution of the draft regulator was the time of the station stop. At each end of the line the contact also worked a Lionel sequence reverse unit which reversed the D. C. power to the track, thereby sending the train in the other direction when it started out again.

The automatic multiple-unit furnished a fine base for the other mainline operations. The local, shuttling back and forth, was one more obstacle in the way of routing through trains from Hartford to Poughkeepsie and kept the crews more on their toes.

You'll see by the photos that the Midland is built close to the floor. This is a most unusual type of construction, but has its advantages. With lines crisscrossing the layout space it would be a lot of ducking under if the layout were built at the usual platform height, and this way one has only to step over!

Card by card we worked through our packs until Waterbury was at order No. 25-W, "Distribute cars in sidings," and Hartford yards had arrived at similar finishing-up orders. The road was all packed away on the sidings, ready to start another trick some other afternoon or evening.

Perhaps on your road too, operation can be made more interesting by adopting some form of card-order operation. After all, what one does with a model railroad after it's built is as important as building it, and some intelligent type of running should be in order instead of just "playing with trains."

5 Five basic train orders

WHEN several fellows can get together on a moderate or large model railroad layout the fun of timetable operation becomes possible. This is the choice morsel in running a model railroad. More will be said about the suitability of a layout for schedule operation in Chapter 6, along with the details of timetable and train-order operation, but there are basic principles of operation that you can use without necessarily going into detail.

On a railroad operated by schedule and train order, the setup is very similar to that on a real railroad. Engineers run the trains, preferably following the same train throughout its entire journey. Towermen and station agents report the passing of every train to the dispatcher, usually by phone. The dispatcher knows where every train is and tries to keep things running smoothly, taking action whenever trains are not on schedule.

The schedule is set up beforehand and a copy is made for every operating "employee." It shows just where and at what time each train is supposed to pass trains coming from the opposite direction. It also sets scheduled times for a train to be at most of the points along the line. In plan it is quite similar to an ordinary passenger timetable, but also shows freight trains and gives other information for the operators, such as lengths of sidings, mileage between sidings, location of water tanks, etc. If the trains all adhere to the schedule and no extra trains are run, the railroad will run perfectly. Trying to attain this utopian condition is what makes timecard operation so much fun.

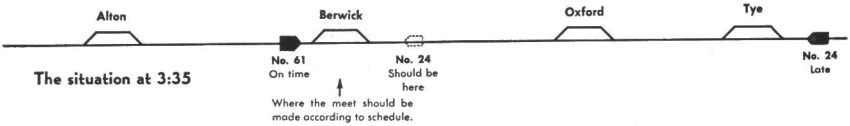
If trains are on time and no extra trains are running, the dispatcher has little to do except mark the times reported to him

on a train sheet. But as soon as one late train looks as if it's going to cause a bottleneck, the dispatcher makes out a train order to keep things moving as smoothly as possible.

For instance, suppose part of the schedule reads thus:

WESTWARD (Read down)		EASTWARD (Read up)
61 Time frt. Lv. Daily	**Stations**	**24** Time frt. Lv. Daily
3:27	Alton	4:00
3:42 3:50 24	Berwick	3:48 3:45 61
4:08	Oxford	3:25
4:19	Tye	3:15

But on this particular day it is 3:35 and train No. 24 has not yet reached Tye, making it at least 20 minutes late.

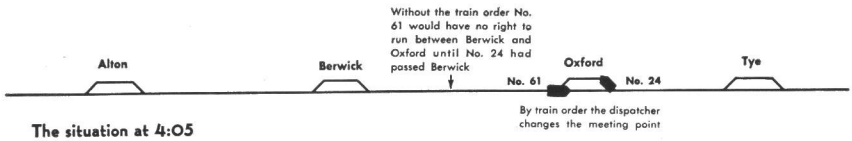


The situation at 3:35

Since, according to the schedule, No. 61 must wait at Berwick for Train 24, it will also become late. To remedy this the dispatcher writes out the following order:

"Trains 24 and 61 will meet at Oxford instead of Berwick."

The order is handed to the two train crews (engineers on a model railroad) before their trains have passed the last station preceding the new place of meeting. In this case it is possible to hand the order to Train 61 at Berwick and to 24 at Tye. By making the meet at Oxford, Train 61 isn't delayed at all.



The situation at 4:05

Even though a train is actually running late, all other trains must assume that it might be on time and wait at scheduled points until it does arrive unless they receive orders to the contrary. In the case just mentioned, if No. 24, running more than 25 minutes late, would have to meet quite a number of trains after its meet with 61, the dispatcher could have issued this order instead:

"Number 24 run 35 minutes late."

With an order like this the crew of 61 would have to judge whether they would have time enough to make Oxford for the meet or whether they must wait at Berwick. This would require that they make the run from Berwick to Oxford in 10 minutes. Since the schedule allows 18 minutes ordinarily, it would be risky and it is more than likely the crew would not attempt to make Oxford.

The other three kinds of basic train orders come about when the schedule is not adequate for the amount of traffic involved. Suppose it is a holiday and the schedule provides for only one passenger train to Blue Grass Lake. Hanging on extra cars will handle a lot of excursionists but not enough. The dispatcher writes the following order:

"No. 7, Engine 261, carry signals for Second 7, Engine 273, Union City to Blue Grass Lake."

The first section of No. 7 will carry green markers (see page 37) and any train that has a meet with No. 7 will have to wait for both sections. To facilitate this if sidings are short, or if the second section can't follow closely behind the first, another order might read:

"Second No. 7 will run 15 minutes late."

When it is not convenient to handle excess traffic as second, third, or fourth sections, an extra train is ordered. The extra invariably gets its number from the locomotive which pulls it and is known as Extra 632 East, or perhaps X 1146 West. While ordinarily even train numbers are assigned to eastward trains ("East is Even"), this rule cannot hold for the numbers on extra

trains. The locomotive of an extra carries white flags or lights. The order creating an extra may read:

"Extra 322 West run Union City to Marble."

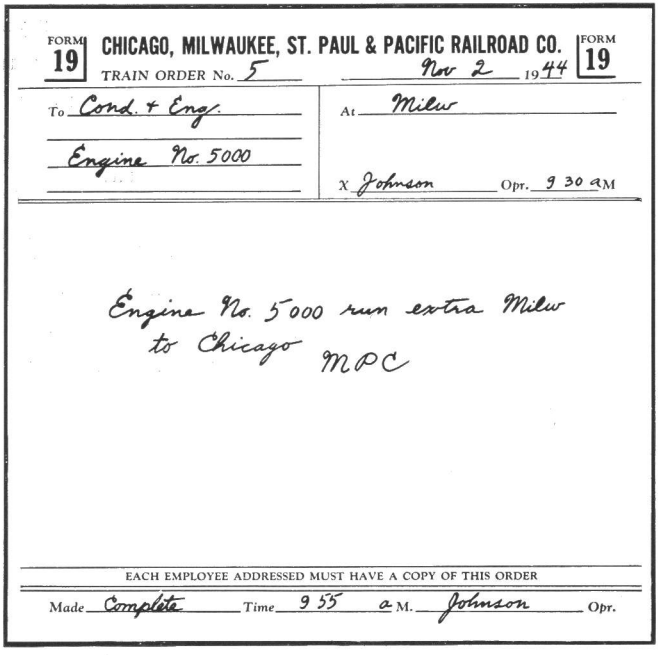
Sometimes a dispatcher is told by his superior that a certain train is not to be run. He then makes out an order like this:

"Train 74 is annulled."

If you want a lot of real fun after you get used to handling trains and train orders, get your dispatcher to write out this order some evening:

"All scheduled trains are annulled."

And then issue orders to run all trains as extras for the evening.



FORM 19 CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC RAILROAD CO. FORM 19

TRAIN ORDER No. 5 Nov 2 1944

To Cond. + Eng. At Milw

Engine No. 5000

X Johnson Opr. 9 30 AM

Engine No. 5000 run extra Milw to Chicago MPC

EACH EMPLOYEE ADDRESSED MUST HAVE A COPY OF THIS ORDER

Made Complete Time 9 55 A.M. Johnson Opr.

Train orders are usually addressed to the conductor and engineer of the train, but the order creating an extra is addressed to the crew of the engine which will pull the extra. Thereafter other orders are addressed to "C&E, Extra 5000 East." An order is signed with the superintendent's or chief dispatcher's initials. The word "complete" from the dispatcher validates the train order and indicates that it has been accurately repeated and that any opposing restricting orders have been properly delivered.

6 Operating by timetable

It's a game of skill and brainwork, this running a model railroad according to timetable and standard railroad operating rules. It's a game in which a group of men get together to play railroad instead of golf or, what's closer, chess. And don't think it isn't fun if done right. By no manner is it just ordinary model railroading. It's that and a lot more too, and if you or your club just build a large layout and then run it helter-skelter now and then, take it from me you're missing out on a very intriguing part of this hobby of ours.

In the first place, running the larger model railroad needs not only the layout but enough men of the right type—intelligent, quick-witted men who are willing to study the rules of the game and play it seriously. The average club size layout will probably require a crew of from 10 men up. The operating night is best held regularly and once a week. Oftener is a strain on the free time of some of the members; less often means not enough practice to play the game right.

Since most large layouts are operated by clubs, I'm going to talk about them, but remember the same principles apply to a great extent on any large layout.

An operating model railroad organization can, it seems to me, be an entirely separate setup, composed solely of men interested in maintaining a system for rulebook operation. This would rule out the publicity hounds and leave the club a closed group for mutual enjoyment of a hobby, which is what will please the operating men best.

Of course such an arrangement will mean that the club must

be self-supporting, no admissions from shows and no dues from the members who just like to build for showing-off purposes. But even an extensive system need not cost more than $40 a month, including rent and amortization of the original investment in benchwork, track, and control. Twenty men will, without another thought, spend more than that on drives in the country, golf, shows, or other pastimes, so isn't a model railroad worth as much?

A club layout should keep 15 to 20 men on the job for an entire evening. This must be done by splitting up responsibility. Yards are so arranged and located that a yardmaster and a couple of switchmen can make and break up trains without any outside aid or interference. Their job ends when trains are put on the yard lead ready to roll. Towermen set switches at junctions and report trains through, but do not run the trains. Engineers run trains according to the orders and signals etc., and that's all. Station agents assist in local switching, report trains through, and take train orders. The general manager is in charge of the railroad, but under him are the chief engineer, who worries about the mechanical and electrical detail, and the superintendent, who worries about operating detail. The dispatcher is only the traffic cop for the superintendent. Each individual must have a well defined responsibility and all these jobs must dovetail together into a smoothly functioning organization which has a good time running the club layout. The popular scheme of letting each man have a five-minute turn at running the whole show while the rest of the gang kibitzes is a good example of what should not be done.

What Is Realistic?

Railroad trappings and atmosphere do not constitute realistic operation. Railroading in real life is a serious business and the object is to get a specified amount of traffic over the division safely and on time. Railroad men on the job usually speak plain English, use no fancy codes or abbreviations (the abbreviations so often

used by model rails as atmosphere are for telegraphic use only), and call each other by name even as you and I. The real enjoyment in club operation, the thing that makes it worth while for a tired business or professional man, is the use of railroading science. A crew which works well together and brings all the trains in on time leaves a sense of real satisfaction with each individual. And a well organized evening of operating on a well planned model railroad is such that there's no squabble at all about the desirability of one job over another, for each job has its good points and each job shares equally in the responsibility of moving traffic.

The essence of the well planned club model railroad is that it be as close to the real thing as possible and that it provide the various jobs of real railroading, each with as nearly as possible the same duties. The main line must almost necessarily be point-to-point. Traffic must move over it in both directions. Part of it should be single track with a number of passing sidings, or, if double track, the traffic must be arranged so that occasionally trains can be run part of the distance on the wrong or left-hand main track. There must be a telephone dispatching system with the dispatcher in another room where he cannot see what is going on, for he must maintain the illusion of distance from the division. The control system must be such that an engineer runs his trains through from one end of the line to the other, but with control over only that one train and with as little knowledge as possible of where the other trains are. Just as on a real railroad, the engineer should not know the position of opposing trains, but just where they are supposed to be according to schedule.

Scale Time.

A timetable for club operations should preferably use scale time with a clock running 10 or 12 times faster than standard. This scale time in effect multiplies the distances, so that a three-scale-mile line, for instance, represents 30 or 36 miles. Station agents well spaced along the pike report all trains by phone to

Electrical devices make it possible for the engineer to control a train anywhere on the railroad.

the dispatcher and he keeps a detailed train sheet. With the aid of this sheet and a fast moving brain he must know at all times the position of every train on the railroad and whether it is on time, as near as it is possible to judge from engineer and equipment whether it will stay on time, and whether it is likely to be delayed by other trains. He should issue orders by telephone changing meeting points, holding trains, ordering passing moves, and so on, and should issue these orders sooner than they are needed if he can think fast enough. The dispatcher does not issue train orders for such things as picking up cars at sidings. In fact, it should be clear that the dispatcher does not run the railroad. The superintendent does that. The dispatcher is only in charge of train movements. A curious thing about the dispatcher's job is that the fewer orders he issues, all other things being equal, the better dispatcher he is.

Scale time is much better than the use of seconds, for it leaves the very realistic effect of a reasonably long distance from terminal to terminal, while timing by seconds cuts the railroad down to a terminal line of insignificant length and makes a dispatching system and timetable useless. The very act of calling time by

The agent at station or tower reports all trains to the dispatcher. He must also make copies of train orders for train crews. This agent is the real McCoy at a Frisco tower.

seconds takes away all the realism of operation. The principal objection to scale time is, however, that scale clocks aren't a common household commodity, while nearly everyone has a watch with second hand. But scale clocks can easily be fixed up. For a road which needs but one clock an easy method is to buy a common alarm clock and to file out a section of the balance wheel rim so that the clock is not regulated so slowly. More and more can be filed off the balance wheel until the desired speedup of time is obtained. A clock which is tinkered with in this way will no longer start itself, so it is necessary to cut a hole in the back of the case through which the balance wheel can be given a starting push. A good shake will sometimes do for a start.

A more reliable scale clock, or any number of perfectly synchronized scale clocks for a large layout, can be made by buying Telechron clock motors and using them to drive standard dials from old clocks through appropriate gears. The shaft of a Telechron motor runs at a speed of 1 r. p. m. This is geared down to the minute-hand shaft of the old clock dial by 5:1 for a 12:1 scale clock. The minute-hand to hour-hand gearing of the old clock is left intact, and the new 5:1 gearing from motor shaft to minute hand can be made up from some of the excess gears of the old clock.

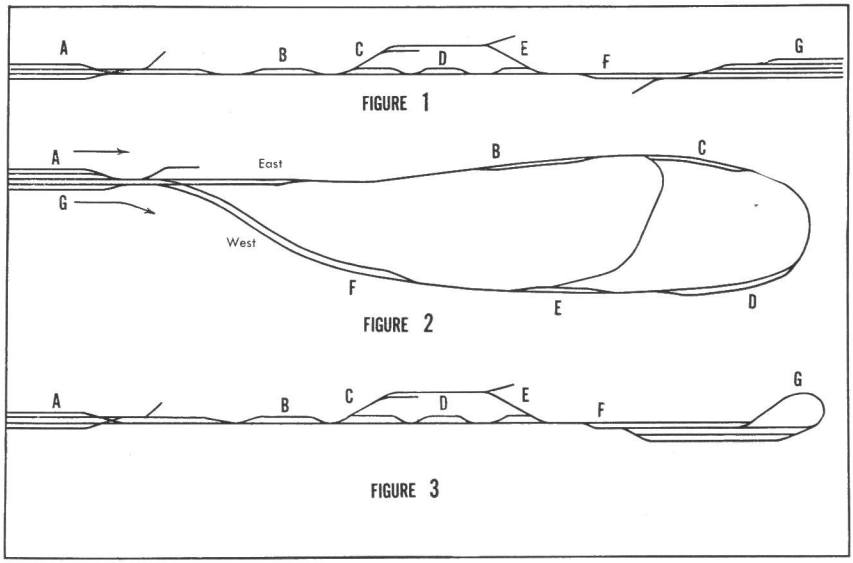
The timetable can either be a framework for the evening's operations, or a complete set of directions in itself. The first type of schedule lists only a few passenger trains and fast freights, and the division superintendent thinks up extras to be worked in between regular trains. The complete time card can include so many trains run so close together that it is next to impossible for the crew to get them all over the road on time, in which case it is a good stiff workout. Perhaps a compromise is best, one that takes care of all ordinary traffic and still leaves opportunity for the brass hat to walk into the dispatcher's office occasionally and say, "We've a special order of flour for the macaroni factory out at Racine Junction and they want it out there right away or they're going to change to trucks. Can you move it?" This keeps the crew on its toes to meet unexpected situations.

Back of the success of cooperative operation lies an axiom. The members must obey some superior. A general manager, superintendent, or just plain boss, must be elected for a definite period and given free rein, and the men in the organization must accept his authority even though they disagree with him on some details. This is the only way it will work. Elect a different brass hat next month if you will, but this month obey the one you've elected.

Now as to the layout that's needed for rule-book operation. It should be point-to-point, or if of loop form should at least include a lot of track on a single lap, so that fast trains can run

at least 30 scale minutes including stops without going over the same track twice. The run should include a number of single-track sections between sidings, so that meets between trains in opposite directions are necessary. There can well be a good length of double track with crossovers and sidings at stations so that moves on the left hand track are possible to run fast trains past slow ones.

I've sketched out in schematic form a couple of good operating layouts. Bear in mind that these are good for group operation, and are distinctly not good layouts for one-man use. The contrary is also true, and don't let someone tell you that because a particular layout plan works fine in his basement it should be used by the club. The two situations are vastly different.



The scheme of layout shown in Fig. 1 is the true point-to-point. This is most like the real thing. The railroad runs from one city to another, but such a layout is harder to build for it requires two complete terminal yards. Notice the optional route for part of the distance, the passing sidings and other sidings for setting off cars at stations.

To avoid building two terminals a club can build the type of layout shown in Fig. 2. Imagination must be called into play to allow for the one terminal being both ends of the line, for that is just what's done. If a train leaves the terminal and takes the branch of the wye marked east, it's leaving station *A*, but if it takes the westward branch of the wye it's leaving station *G*. This keeps the yard crew on its toes but doesn't bother anyone else, for the intermediate stations are just as before.

An entirely different kind of setup is Fig. 3. Trains run between two physically separate terminals, *A* and *G*. Since the terminal at *G* includes a return loop, trains are not made over at *G* but are merely held a minute or two until the right time and then started back to the other terminal.

These are just suggestions for forms of layout, but whatever the plan, the basic principle must be such that trains actually go some place instead of just 'round and 'round. And one optional route on a layout is enough, for each junction means more work for the dispatcher, and that gentleman is, as we shall see, far busier than the most harried dispatcher on a real railroad.

The control system should be such that an engineer runs a train right through from one end of the line to the other. The reason for this is that it makes possible close adherence to prototype operating practice. The engineer, by keeping the same train all the way, is able to keep schedule and orders well in mind. There are various control systems by which this can be done, and the electrical wizards in your club can work the special circuits to suit. The general system most used is that in which each engineer has a multiple bank rotary switch in addition to his speed control rheostat. The multiple bank switch is wired up with one position for each block, and one bank of contacts is wired to the power rail of each block and another bank to short sections of signal rail at the end of each block so that when the locomotive reaches the end of the block a signal is given the engineer to advance his control to the next section. Cab signals can be added by using additional contact banks to "feel" the signal rails ahead

of the train. If the same controller is to be used for both directions, there should be duplicate banks for east and west with directions of signal circuiting reversed and a changeover key for directions.

The simplest control system, and quite practical if the control board can be located where trains are in sight at all times, is simply to provide a spring key for each block. The engineer then holds this key down as long as the locomotive is in the block and then moves his fingers to the next key, holding both down for the short period when a locomotive is crossing the break.

Scale time is the best to use on a system run by rules and schedule. This is because even to scale the line will be far shorter than in real life, and so running time must be proportionally lengthened. For instance, let's assume our terminal stations *A* and *G* (Fig. 1) are 350 ft. apart which is a good length for a model layout. That in O gauge is just over 3 scale miles. At scale speed of 60 miles per hour a passenger train would take only 3½ minutes to make the run, and that's preposterous. However, if we speed up the clock 12:1, the running time becomes 42 minutes.

Now we have a layout suitable for timetable operation, a control system, and the reason for "scale time." But these are mere accessories before the fact. The important thing is *how* we operate by timetable.

First a crew is selected. As a start, the selecting may be done by drawing jobs from a hat or by length of membership in the club, or just by mutual agreement. After the first time it will be possible to choose jobs somewhat according to demonstrated ability. I've found that there's seldom reason for quarreling about who has what job anyway, for the same fellows usually take the same jobs. One man likes to be an engineer, another likes being yardmaster, and another likes being dispatcher. There's no job so universally popular that men fight for it.

Jobs on a club model railroad can't be assigned just the same way as on a real pike, for not all the same things must be done. No one needs to sell tickets or carry baggage, or what not. But

the organization can be pretty close to the prototype. The schematic diagram shows a typical club lineup of jobs. The big boss is the

General Manager, who is the executive officer in charge of the entire railroad. Like any other executive he coordinates the work of the various men on the railroad, sees that the engineering and construction departments put together a line that suits the operating department and that the operating department does not misuse the equipment. Keeping everybody pulling together is some job, and the G. M. must be a man of tact as well as considerable model railroad experience. He delegates the authority to actually run things on operating night to the

Superintendent, who is directly the boss of the operating crews, and who issues the timetable, tells what extra traffic shall be run, tells the dispatcher where there shall be slow orders, etc. During operating night he keeps a close watch on the train movements and makes notes of any mishaps. After the last train is in its terminal he calls the crew together and talks over all the mistakes and bad bits of judgment, issuing demerits or brownies to employees who deserve them. He's the brass hat of operating night. His traffic cop is the

Dispatcher, who keeps the traffic moving over the pike. It is up to him to move trains. With individual cars, with yards and train makeup, and with setting off of cars at industrial sidings, and other details, he does not bother. He receives the telephone reports of train passings from the various stations and fills in the passing times on his large ruled train sheet as a permanent record of the evening's traffic. As long as trains stay on schedule he isn't too busy, but let even one train drop behind and he starts issuing train orders to keep all the others on schedule and to help out the straggler. But he keeps trains moving with the assistance of the

Trainmaster, his first mate. The trainmaster assigns engineers to particular trains, except regular runs which are signed up for in advance, and on club layouts where the engineers stay in one

central control cab the trainmaster acts as go-between, writing out orders from the dispatcher and passing them on to the proper engineer.

Engineers actually run the trains. When a train is on the timetable, the engineer needs no orders except for extraordinary circumstances. He merely runs the train on or behind time, never ahead of time, and looks out for all superior trains. For obvious example, if he's running freight he gets into sidings in ample time to let all passenger trains pass, and not knowing whether these trains are on time or not he gets in the clear several minutes ahead of the passenger train scheduled time. The same applies in the case of other classes of inferior and superior trains. As the engineer passes each station the passing time and train number is reported to the dispatcher by the

Station Agent or Tower Man, who maintains constant telephonic communication with the dispatcher over the *train wire,* the dispatcher being located out of sight of the layout so his knowledge of what goes on must come second hand just as on a real railroad. At the beginning of each run trains are made up well before leaving time by the

Yardmaster, who has the help of

Hostlers, who turn engines and take them out of the roundhouse,

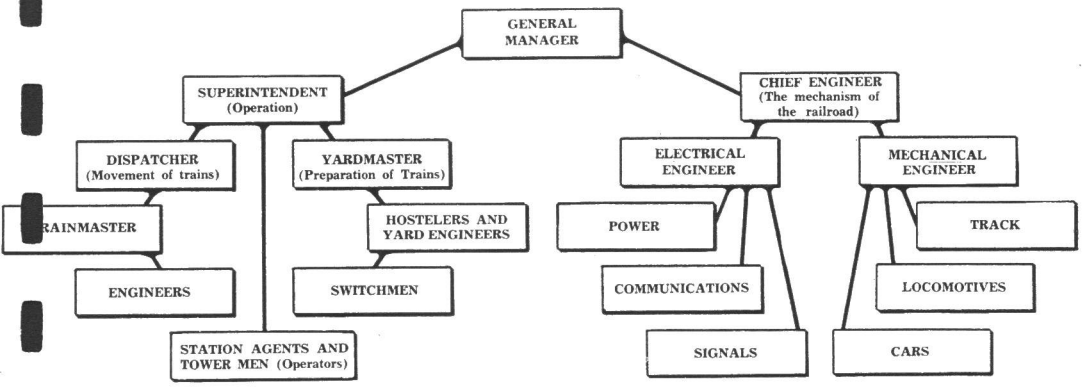
Yard Engineers, who make the actual engine movements for switching, and

Switchmen, who couple up cars and otherwise assist in the yards.

The maintenance of the railroad is something apart from the operating, but is very necessary and is included in the organization chart under the authority of the

Chief Engineer, whose assistants are also shown. The jobs of each should require no explanation here.

Now comes the ticklish system of actually running the trains by rule and timetable. If we have but one train on a line, the timetable is merely a guide as to just when that train is expected



at each station, and that's exactly what most model railroaders who adopt timetable operation think a timetable is. But it's much more, and the game of club operation comes not in using the timetable as a means of getting trains to certain places at certain times, but in using the timetable in its true railroad function of keeping trains from running into each other—a much more important consideration than punctuality for punctuality's sake.

As soon as two trains are on the same stretch of railroad track there must be some means of keeping them apart. Block signals do it, but not all lines are signaled, and even signals can cause plenty of delays if slow trains stay on the main line irrespective of fast trains. So the game of club operation hinges on keeping trains in their respective places by timetable and rule, using signals, if any, only as scenery or as safety appliances.

Following the timetable alone, trains in opposite directions will meet at prescribed stations and passenger trains will pass freights at designated points. But if one train is late, other trains are bound to become late waiting for it. The train rules take care of this situation by giving so-called superior trains the right to proceed past meeting or passing points even if the inferior train is not there. Thus it becomes the responsibility of the inferior train to look out for the superior train, and get out of its way at some other siding if it cannot make the usual meeting place. Trains may be superior by class, passenger trains usually being first class, time freights second class, and way freights third class.

Towerman on a club layout also reports trains by phone, and is handy just in case there is a derailment. He usually does not have to copy train orders for engine crews, but still must keep track of them for his own job of aligning switches and reporting trains. Photo shows Grant Oakes at the Model Railroad Club of Milwaukee.

Or trains may be superior by direction. The timetable for any given division of railroad sets up trains in one direction as superior to those of the same class in the other direction.

A first-class train in the superior direction has little to worry about except not getting ahead of schedule. If it gets behind schedule everything else on the road will wait for it anyway. All trains will clear its expected or schedule time by at least five minutes. A first-class train in the inferior direction need look out only for first-class trains in the opposite way. And so it goes, until we get to the lowly extra, which is not even on the timetable at all, and must watch out for every scheduled train.

It is when a superior train is late, and inferior trains would be delayed unduly waiting for the superior train, that the dispatcher most often steps in with train orders. In such a case he sets a definite meeting point at such a siding that neither train is appreciably delayed. If the inferior train is late, the situation takes care of itself, since the superior train need not wait.

To see how real trains, and model trains as well, run by rule and timecard, let's set up a theoretical line of railroad, running from Arlington east to Falmonth. It's diagrammed on page 82. Part of the line is single track with passing sidings at stations Berkeley, Clarendon and Dartmouth, and the rest is double track from Exeter into the big city of Falmonth.

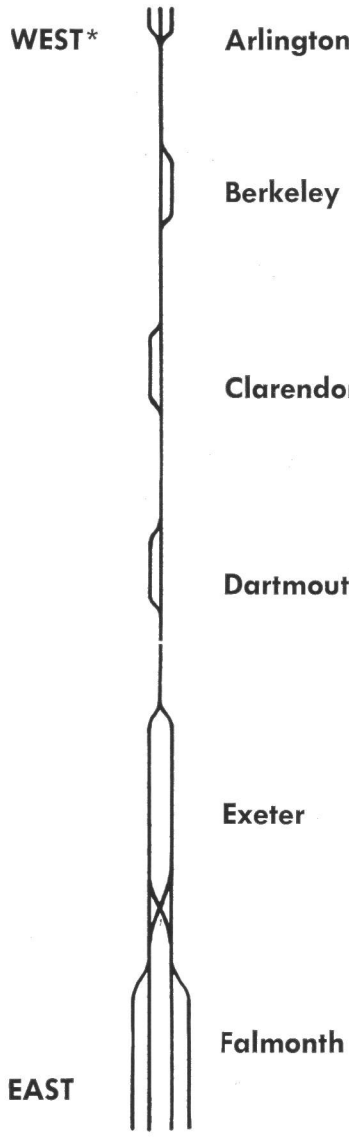
Now let's assume we have two trains, one a freight train and the other a passenger. The passenger train is running east, and the freight west. The freight train is obviously inferior to the passenger, and the railroad expresses this in its timetable by marking the passenger first class and the freight second class. Thus the freight train has to keep out of the way of the passenger train. Let's say the passenger train is due at the various stations as follows:

Arlington ____1:00
Berkeley ____1:12
Clarendon ____1:19
Dartmouth ____1:25
Exeter ____1:33
Falmonth ____1:45

Compare with the track diagram on the next page.

The freight train lumbering along westward, reaches Dartmouth at 1:11 and the engineer knows it will take him 15 minutes to get to the next siding at Clarendon. A glance at the timetable shows him that the passenger will by that time (1:26) have not only passed Clarendon but Dartmouth, so to avoid a headon collision he'd better keep his freight train safe-and-sound in the siding at Dartmouth. There is the whole essence of timetable operation. The inferior train keeps out of the way of the

In this diagram first initials are arranged alphabetically for convenience.



* Most railroads use east and west as running directions regardless of actual track direction.

time of the superior train. The engineer doesn't know (and on a model road should at least make believe he doesn't know) where other trains actually are, but he does know where they are supposed to be according to the timetable and train orders.

Now let's take another supposition, eastward and westward trains again, but both passenger. Which keeps out of the way of which? Well, on every railroad, including the well-run club line, the timetable specifies one direction as superior, and of two trains of the same class the one going in the superior direction has the right of way. For instance, if on our theoretical line eastward trains are superior, any first-class train going east is on top of the world as far as running rights. All it has to do is keep on or behind its schedule and every other train must get in the clear for it. If a train gets 12 hours late or more, it loses its timetable right, but on model roads we can just as well forget that. Extra trains are inferior to everything else and have no superiority by direction. In other words, if two extra trains are running toward each other, the dispatcher had better get busy and order them to meet at some specific station.

Now we have all the trains running along our line according to Hoyle and the timetable and rule book. Everything is swell, and you're wondering just why we have a dispatcher. Well, the dispatcher is mainly there to iron out difficulties and in general keep in touch with the traffic situation. The way he does this is to keep in front of him a ruled sheet

on which all the stations are listed vertically and columns are provided for each train, eastward trains to one side of the station list and westward trains to the other side. Every station agent or tower man calls on the phone as each trains passes and reports thus:

"Dartmouth, No. 50 through at 1:30." The dispatcher says "O. K." and notes the time in train 50's column alongside the Dartmouth station. If the dispatcher is good the succession of these notations about various trains and various stations creates in his mind a complete mental picture of traffic on the division. He will also have reports from yardmasters as to what engines are on the various trains, and what engineers are handling them. With all this in mind he knows what trains are on time, what trains are late, and what trains may become late, and should be one step ahead of any traffic difficulties that may materialize.

Let's go back to our Arlington and Falmonth division and see how the dispatcher handles a difficulty. He has an eastbound passenger train, No. 1. The hot shot of the line, No. 1 is very important, and yet being westbound it is inferior to No. 50, which is only a local but still first class. The schedule is:

	NO. 1	NO. 50
Arlington	1:35	1:00
Berkeley	1:24	1:12
Clarendon	**1:19**^{50}	**1:19**^{1}
Dartmouth	1:13	1:25
Exeter	1:05	1:33
Falmouth	1:00	1:45

From the schedule the trains meet at Clarendon, as indicated by the bold type and small numbers. But suppose No. 1 is late getting away from Falmouth. Maybe it waits for an Ottumwa connection or something. It can't possibly get to Clarendon by 1:19 in time to meet No. 50, and if it doesn't get there No. 50, being superior by direction, will go right ahead, forcing No. 1 to wait at Dartmouth until 1:25. And so the hot shot of the line will be stuck for 12 minutes or more at Dartmouth and be late. The dispatcher, as soon as he gets the leaving time of No. 1

from Falmouth, foresees the difficulty and promptly phones Berkeley, or on a model railroad the trainmaster who is at the engineer's cab, and dictates a train order for No. 50. To be perfectly safe he makes it an absolute meet order, although he could order No. 50 to wait at Clarendon until, say, 1:30 for No. 1. So the order reads:

"No. 50 meet No. 1 at Clarendon."

The trainmaster (model practice) gives it to the engineer on No. 50, gets an acknowledgement, and then phones the dispatcher and repeats the order, noting that the engineer has it. Then the dispatcher says "Complete," meaning that he is satisfied the superior train has been restricted and the trainmaster (now it would be Exeter or Dartmouth on a real road) gives a copy of the order to No. 1, thus allowing it to go right on through to Clarendon without waiting for No. 50's scheduled time.

To scale time, which is much faster than real time, all this has to go mighty fast, and that's where the quick wit and coordination come in. Once a crew on a model railroad operates together for a time it develops that certain men have a special sixth sense for certain jobs and that Smith as trainmaster, let's say, can almost anticipate Jones as dispatcher, and the two make a natural pair. It's real fun to be part of a crew like that.

Of course the dispatcher doesn't sit in his chair all night dictating one order after another. It is his job to see that things run smoothly, and he can do his job better, in many cases, with less work by informal remarks from time to time. His conversation may run like this:

"Joe, remind Harry on No. 1 to look out for No. 50's time at Clarendon. He's going to be pretty close. Remind that freight crew to get in the siding for No. 7 with plenty of time. They've got a loco that sometimes gets stuck. How's that new fellow in the yards? Will he have No. 68 ready to roll on time, or will it be better to issue a run-late order for it?" And so on.

Now even this chapter is nothing but an introduction into timetable running. It gives the fundamental ideas, but not all the

detailed rules. The standard railroad rule book has the details. The rules may have been so much chatter to you before, but with this little background they will mean more. And in the rear of the rule book are sample train orders of all types to guide the dispatcher in his work.

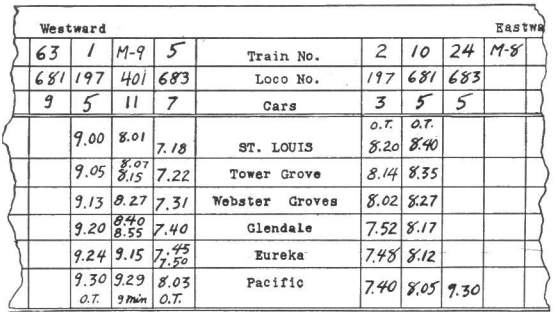
Typical operating rules, with those which do not apply to model railroading omitted, are included at the back of this book.

After a system of operating trains according to timetable is worked out and in use, some attention can be given to realistic methods of handling traffic. On a real railroad each car on every train is definitely assigned, and to some extent this can also be done on a model railroad within the limitations of scale time. Stephen Thomas, writing in THE MODEL RAILROADER, outlined a system of freight traffic direction which I heartily recommend and quote as follows:

"Each car is given a waybill. This gives the date the car was loaded, number and initial of car, point of origin, destination, nature of load, rate and charges. The waybill must accompany the car from the time it is loaded until the load is delivered. It is the authority for moving the load.

"The waybill is made out by the freight agent. On a busy road he may have billing clerks and checkers to assist him. He gets to the club some time before the operation is to start, and makes out waybills for every car, giving the place where it is now as the origin, and some other station on the line as destination. The finished waybills are then left with the proper yardmaster. At way stations, there should be a clip to hold the bills of the cars on the sidings there.

"The yardmasters make up trains according to the waybills, giving preference, of course, to redball or manifest freight and arranging trains in order for setouts. If there are cars to be picked up en route, the dispatcher orders the train out a corresponding number of tons light. This presupposes cooperation between freight agent, yardmaster and dispatcher, which is perhaps best arranged by having a chief dispatcher, who does the



Westward								Eastwa
63	1	M-9	5	Train No.	2	10	24	M-8
681	197	401	683	Loco No.	197	681	683	
9	5	11	7	Cars	3	5	5	
	9.00	8.01	7.18	ST. LOUIS	O.T. 8.20	O.T. 8.40		
	9.05	8.07 8.15	7.22	Tower Grove	8.14	8.35		
	9.13	8.27	7.31	Webster Groves	8.02	8.27		
	9.20	8.40 8.55	7.40	Glendale	7.52	8.17		
	9.24	9.15	7.45 7.50	Eureka	7.48	8.12		
	9.30 O.T.	9.29 9 min	8.03 O.T.	Pacific	7.40	8.05	9.30	

Section of a model railroad dispatcher's train sheet, written on a mimeographed sheet from telephone reports of train movements. It tells quite a story. Notice that the time is now about 9:30, that the loco which went out on No. 5 is returning on No. 24, that the loco from No. 2 has returned on No. 1, and that all trains but No. M-9 have arrived O.T. (on time). No. 5 went into the siding at Eureka for No. 2, M-9 switched some freight at Glendale, and there were other meets between trains in opposite directions. The sheet usually also has space for the engineer's name. No. 63 is apparently ready to go but not yet departed, and M-8 will be the next eastward train.

general coordinating, and a dispatcher, who does the technical work of issuing train orders and getting all the trains over the division.

"When a car has been delivered to its destination the waybill is O. K.'d and sent to the freight agent, who then bills the car to a new destination or sends it empty on an empty car slip to where it is needed.

"The agent can speed up the billing by filling in bills with everything but the initials and number of the car. Then, when he receives on O. K.'d waybill for any car, he picks out a waybill originating from the same station as the car has arrived at, writes in the number and initials of the car, and is ready for business again. Of course, care should be taken not to put a load of wheat into a gondola, etc.

"One of the drawbacks to such a system as outlined is the difficulty of getting the necessary switching done in scale time. However, it can be done with practice and cooperation between the yardmaster and his men. One solution (good prototype practice) is to run most of the freights as extras. Then the extra doesn't need to be ordered until the yard crew has had time to make it up. Incidentally, extras are good practice for the dispatchers and engineers.

"The waybills themselves can be as simple or as elaborate as

you wish. Slips of ordinary paper cut down to 2¾" x 4¼" will do, with the necessary information written on, as

PD&Q RR August 20, 1942
CPR 240785
Achigan to Waboose
Scrap steel 97,050 lbs. at 9½ cents $92.20

"Of course, special forms can be mimeographed or printed. Colored waybills may be used for manifest or redball freight. Weight, rate and charges can be left out.

"The advantage of this system, especially for club operation, is that trains are actually run to move traffic, and definite objectives are given to the dispatcher, yardmasters, and everybody concerned.

"In this connection, it may be noted that many model roads are now using four-digit box car numbers and two- or three-digit loco numbers, which simplifies the figure work for dispatcher and agents."

Let's see how the whole system works out in operation. We'll visit the skillfully built, and as skillfully run, O gauge pike of the Westchester Model Club in the old Pelham Manor station on the New Haven, just outside New York City. We arrive on the scene one Friday evening with Frank Phillips as our guide and report the proceedings in his words as he wrote them up in THE MODEL RAILROADER. Since the timecard calls for No. 1 to leave Terminal City at 8:44, there's lots of work to be done. (See diagram on page 89.)

By 8:20 most of the crew members are present, and Superintendent W. E. Shropshire checks them over to see whether any jobs are left vacant and to line up substitutes in plenty of time.

At 8:30, the dispatcher (Jim See, club president, has the trick tonight) cuts in the public address system and announces the official time. All watches are set, and then every man gets to work. Passenger yard crews line up their first trains, and in the

freight yards there is feverish activity as the crews sort and shuffle cars in preparation for the evening's traffic.

In Jonesburg yards, which also serve as coach yard for the main terminal, Yardmaster Bob Ward and Engineer Rus Lockwood have rustled up the consist for No. 1 and switched it over into the terminal tracks. Now they are finishing up No. 2, which leaves their yard eastbound over the Jonesburg branch only a minute after No. 1 pulls out of the main terminal for its run westbound.

Although the first scheduled freight train won't leave there until 9:16, Yardmaster Charlie Dill at Cedar Yard is just getting things straightened out when Superintendent Shropshire, doubling as trainmaster tonight, hands him a makeup order for a 10-car mixed extra west.

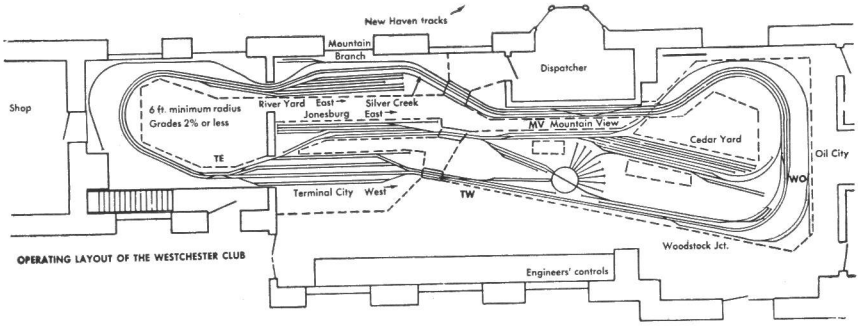
"Get it ready as soon as you can, Charlie," he commands, "and I'll have the roundhouse send you power for it. I want to get those cars around the system before No. 1 rolls, if possible."

Charlie checks the order, hands it to Phillips, his yard engineer, so he'll have an idea of what they are doing, and the pair goes to work, because as soon as they get the extra out of the way they have to shuffle together a 14-car reefer hot shot to roll east as No. 6.

Tower operators and mainline engineers are busy at their stations and are eager to go. Frank Braisted cuts into the train wire. "Dispatcher, Mountain View calling. How about some orders for Extra 3356 West, 10 cars mixed from Cedar Yard to Oil City, dropping three at Mountain View, three at Terminal East, and four at Oil City?"

He gets a quick reply from See, "Nineteen copy two, Engine 3356, Conductor Burch, run as Extra 3356 West Cedar Yard to Oil City . . ."

He hardly finishes his order and gets a repeat from Braisted before Art Smith is on the wire: "TW, No. 1 by, 8:44." Things are getting off to a good start, but that extra is going to be later leaving than Shroppie had hoped, and Conductor Burch is going



OPERATING LAYOUT OF THE WESTCHESTER CLUB

MAIN LINE DIVISION	WESTBOUND Ltd. No. 1.	Local No. 3.	Exp. No. 5.	Frt. No. 11.*	Local No. 7.	Exp. No. 9.
Cedar Yard ---------Lv.				9.35		
MV ----------				9.38		
TE ----------				9.40		
Western Terminal ---Lv.	8.44	9.04	9.14	9.40	9.44	10.15
Tower TW ----------	8.44	9.04	9.14	9.46	9.44	10.15
Woodstock ----------	8.46	s 9.06	9.16		s 9.45	s 10.16
Tower WO ----------	8.46	9.06	9.16	9.47	9.45½	10.16
Mt. View ----------		s 9.07			s 9.46	
Tower MV ----------	8.46½	9.07	9.16½	9.48	9.46	10.16½
Silver Creek ----------	s 8.47	s 9.08	s 9.17		s 9.47	s 10.17
Eastern Terminal ---Ar.	8.48	9.09	9.18		9.48	10.18
Tower TE ----------	8.48	9.09	9.18	9.49	9.48	10.18

* No. 11 changes engine and crew at Main Terminal.

Maximum curvature on the Westchester O gauge layout is 6 ft. and maximum grade 2 per cent. Both maximum grade and curvature are combined on the big horseshoe at the right end (as per above diagram) and this makes for tough pulling at times. Schedules are longer for upgrade trains.

Timetable operation on the Westchester layout is by regular clock time rather than any form of scale time. All watches and clocks are checked at the beginning of the trick, and being standard, are less likely to get away from each other. The timetable shown here is only a part of the entire schedule. Besides the table shown here there is an eastbound mainline table and eastbound and westbound tables for the Jonesburg branch.

to have to watch his timecard to keep in the clear coming down into the Jonesburg branch to Oil City.

As long as things keep moving all right, there isn't much for the dispatcher to do in his cubbyhole that used to be the station's ticket office, for the system is double-tracked except the branch from Woodstock Junction to Jonesburg, and that's pretty short and can't stir things up too much. But when the freight yard crews really get moving, Shroppie will be having them cook up enough extras to make the dispatcher's job a busy one.

Shroppie, while being trainmaster, hasn't relaxed his eagle superintendent's eye. Wait till the meeting after the evening's over, and you'll see how many slips he has noticed that another person might have overlooked.

Right now the dispatcher is on the wire: "Hey, TE, where in Sam Hill has F-6E disappeared to?" TE had reported it to him 3 minutes before, and its normal time to Mountain View is an easy two minutes.

"She pulled out of here on time," TE replies. "Must be stuck on the mountain."

"Mountain View," the dispatcher calls. F-6E, being a scheduled hot shot freight, doesn't carry a conductor, for those who are available are kept to run on extra freights where a man is needed to handle clearances and switching moves. Mountain View comes in.

"Where is F-6E?" the dispatcher queries.

"Hasn't shown here yet," Mountain View answers, and gets told to look for it on the far end of his section. An inspection reveals it has bogged down on a low piece of third rail just below Silver Creek, and both Shroppie and Joe jot down a note to the effect against the section foreman responsible for that piece of track. That is going to cost a few brownies.

F-6E gets around to its destination 3 minutes late as a result of this and by running late just spoils some fancy clearance work on the part of Conductor Nichols, who was planning to get his Extra 2318 West over the road to TE ahead of No. 8. It would

have meant some tall running even if F-6E had cleared into the yard to let him out on time, but as it is, he can't get out until No. 10 has passed, and then he tags along after it, not slowly, because No. 10 is the milk train, but it has a loading stop at Mountain View, and it holds him back nearly five minutes, so that when he gets to Oil City to drop four and pick up three tanks, he has the devil's own time trying to sandwich his switching moves between the varnish running east and west so frequently that it seems they are all around him.

The usual number of derailments also serve to ball things up here and there, but on the whole tonight things run fairly smoothly. The dispatcher is relaxed by his loud speaker and his train sheet looks pretty respectable considering that there are three green men on pretty important posts. Things in the freight yards have settled down, for Phillips and Dill are used to Cedar Yard, and Williams and Case, the new yardmaster and yard engineer at River Yard, have been over a couple of nights before, figuring their switching moves, for that yard has only been hooked in for one previous session, and there is plenty to learn about it. But their practice has held them in good stead, and they are rolling them out like veterans.

Jim Cox, in the roundhouse, is an old hand, and his only slip for the evening is sending out an engine to Cedar Yard headed east instead of west. But since the roundhouse and Cedar Yard adjoin, this is rectified in plenty of time, and Extra 4210 West pulls out on time.

Now Shroppie gets the extra bug, and he decides with See to run a railfan extra from Terminal City to the end of the iron on the mountain division that is under construction. Engine 301 backs out of the engine terminal and is coupled onto a coach, a diner, and a gondola fitted out with seats as an open-air observation car. Markers go up on the rear and on the head end, the dispatcher gives the running orders to Art Smith at TW, and Extra 301 heads for Woodstock Junction. It has orders to run to the end of the mountain division and then back down to Moun-

tain View while the camera fans have their fun photographing the track construction work, and then to run to TE for servicing and turning. Soon it comes back, runs slowly up the new mountain division iron, and picks up its passengers.

All this time, of course, regular scheduled trains have been running, more or less on time, with a half dozen extra freights intermingling just to tangle things up a bit and add interest.

Now Engine 301 gets running orders again, this time as Extra 301 East, but the orders call for a run through the freight yards on the way back to Terminal City. This makes a more interesting ride for the railroad camera bugs, and eases the tension along the line by routing the train through the back way, so to speak.

At 10:38, No. 14, a local, completes its saunter around the system, the last peddler freight collects the cars from the sidings, and the dispatcher comes out of his office. The entire crew gathers on the edge of River Yard, and Superintendent and Trainmaster Shropshire and Dispatcher See hold forth.

"Dill, Extra 680 West had a tank car right behind the engine," Shroppie begins, "Ten brownies." Boy, they hand them out in bunches on this road.

"Burch, you were conductor on Extra 4210 when it stuck No. 3 at Oil City. How come?"

Burch's excuse doesn't pass him, and he gets a few of the brownies. So also do several towermen for various delinquencies in reporting trains and in one instance for setting up a wrong route. The Cedar Yard engineer picks his brownies up for fast running in the yards.

After the brownie session, two jobs are opened for bid, and the records of men who sign for them are compared.

"Dugan has seniority, Lausch, but let's see how your brownies stack up. Hmm. He has 10 assessed against him, and you've had none. Your job."

When everything is wound up and rolling stock and locomotives are tucked in their carrying cases, the gang adjourns to the back shop to talk over the evening.

7 The model railroad club

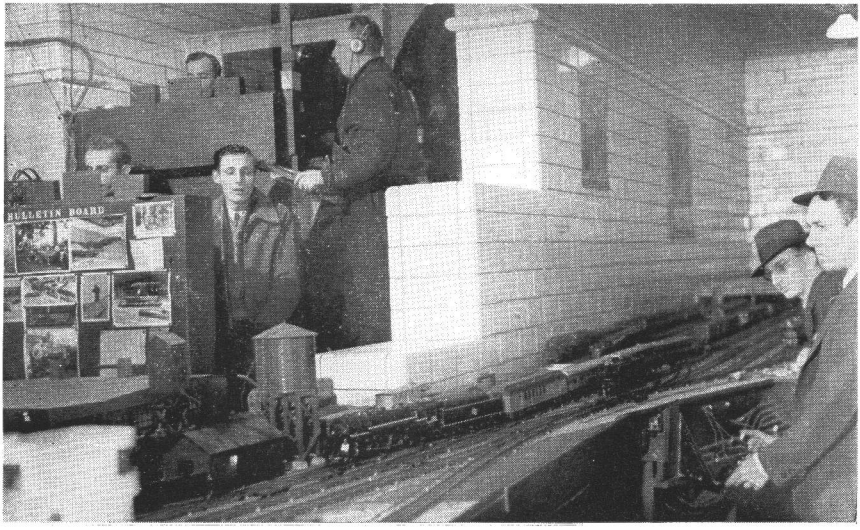
MEETINGS with your fellow modelers may greatly increase your enjoyment of the hobby, but only if the club organization is such that model railroading, rather than politics and parliamentary procedure, dominates in the programs and meetings.

First essential for a club is a group of charter members. Perhaps you have a few friends who are model rails. You talk over the advisability of starting a club. You can either start right off, or you can send a notice of intention to the magazines, asking people interested to get in touch with you. Once you have the list of charter members, call an organization meeting at a definite place and time.

First act of the meeting is to elect a temporary chairman, who in turn appoints a committee to draw up a constitution and by-laws and report at the next meeting. Then some of the matters to be included in the constitution are talked over and decided upon for the guidance of the committee. A name for the club is proposed and voted upon. Frequency of meetings is perhaps also decided upon, as well as the general type of club organization which is to be followed.

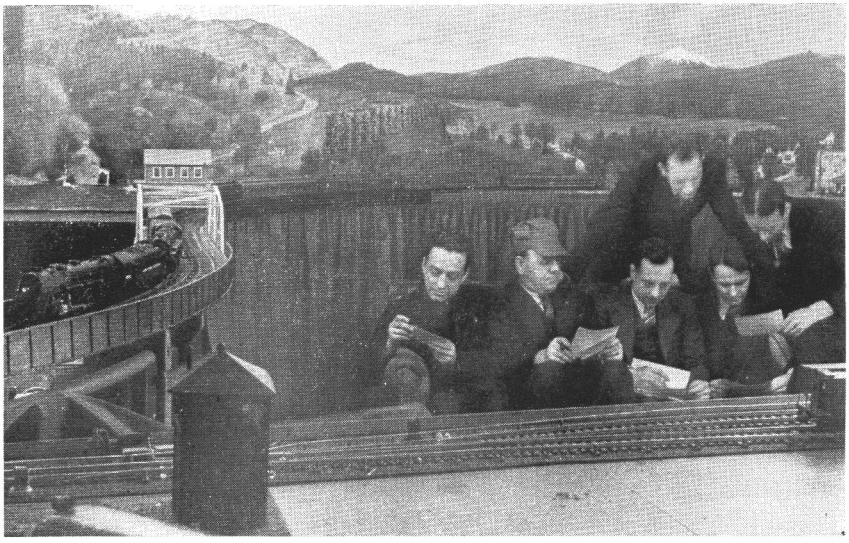
Another point to be decided at the first meeting, as it may seriously affect the type of organization, is whether the club is to build a cooperative layout or not. If the club is to meet for social and discussion purposes only, it can be organized more loosely and can meet less often. If it is to build a layout, a non-profit corporation setup is indicated, as well as frequent meetings for construction and operation.

Harry Bondurant, who is an old hand at club work, once said



Above: A medium sized or large model railroad club can enjoy the fun of running a co-operative model railroad, a railroad most likely larger and more complete than any individual member could afford. Here members of the Model Railroad Club of Milwaukee pull the latch on Thursday night at their headquarters, 215 E. National Ave.

Below: The smaller club can also indulge in meetings at members' homes. The Model Railroad Club of Rochester meets (see photo) in the layout room of member Dr. Henry Ward Williams, even though the club also has a cooperative layout in Room 305, NYC station.



that a club constitution, like our national constitution, should be very general in scope, providing general principles of action rather than specific directions. My experience would indicate the ex-secretary of the N. M. R. A. was right about this. A tightly drawn constitution seems to encourage a legalistic and argumentative state of mind among the members, and this always starts trouble. After all, a model railroad is started for the purpose of increasing enjoyment of the hobby. Those who like politics better than they do model railroading are hereby advised to join a political party, and confirmed joiners are better off affiliating with yacht or golf clubs, which have more social standing.

The governing of a club should be in as few hands as possible. If the club does not have a layout, the usual four officers are all that's needed. A president, or chairman of the board, as the Reading, Pa., club now calls him, presides at meetings and otherwise assumes the duties of chief executive. The vice-president not only presides when the president is absent but also often acts as program chairman. The secretary (or chief clerk, as you prefer) handles correspondence, notifies members of meetings, keeps the records, and takes down minutes of each meeting in a bound minutes book. The treasurer collects dues and pays bills, keeping his accounts in complete detail in a bound journal which can be audited before being turned over to the succeeding treasurer. In a small club, secretary and treasurer can be the same man.

If the club has a layout, the vast amount of detail makes it best to have a board of directors to handle all business. The board is elected once a year at the annual meeting and in turn elects the officers. Usually directors are elected for three-year terms, with the terms so staggered that about one-third of the directors come up for re-election each year. This assures a combination of experience and new policy on the board.

The board usually handles all business, subject only to reporting to the club and reprimand in the form of defeat at the next election. The Reading club has set a new style by requiring that

House Rules for a Model Railroad Club

Any model railroad club with a cooperative layout might well draw up a set of house rules governing the use of the club rooms and layout. The Detroit Model Railroad Club has excellent house rules which we quote in full as an example:

Detroit Model Railroad Club, Inc.

HOUSE RULES

MEETINGS.

The club will be open to members every Tuesday and Thursday evening, Tuesday evening to be devoted to construction and maintenance of the club layout.

The club rooms will be open to the public only on the first Thursday of each month unless otherwise specified by the board of directors.

Keys to building entrance and club rooms are to be held by the board of directors only. Members of the board may loan their keys to members in good standing and both are responsible for its prompt return. During the day time Mr. Frank of the Hobby Bar will admit any member in good standing to the club room.

No visitors or children will be allowed on the regular club meeting nights.

Members may, however, bring their wives or friends to any of the Thursday meetings except the annual business meeting of the club.

OPERATION.

The superintendent of operations shall have full charge of all operations over the club layout on Thursday evenings.

The following positions are considered necessary to operate the railroad on Thursday evenings:

1. Dispatcher.
2. Trainmaster.
3. Yardmaster.
4. Roundhouse foreman.
5. Engineers.
6. Towermen.
7. Brakemen.

Members of the club will bid in on these positions every Thursday before the operating period according to their seniority. The superintendent of operations shall handle all bids for positions. No member shall be eligible to hold any of the above positions unless he has earned his right to the position by contributing his share of work toward the building or maintenance of the club layout. The superintendent of operations shall use his discretion regarding filling all positions.

CONDUCT.

No member shall operate another's equipment without the consent of the owner.

Members are required to return all tools to their proper places and upon completion of work to clean up any litter made by such activity.

No member is to tamper with or change any part of the layout without the permission of the superintendent of maintenance.

It shall be the duty of the last member who leaves the club rooms at any time to see that all equipment is properly stored, that the main power switch is turned off, that all doors and windows are properly locked, and all lights are turned off.

All extension cords and soldering iron cords must be removed from outlets when not in actual use.

All members should feel an individual responsibility for the upkeep of the club property, and all property loaned to the club by individual members or others.

No member should take it upon himself to push cars, engines, or rolling stock unnecessarily, nor conduct himself in any way that will prove objectionable to the other members of the club that are present.

No advertising is to be placed on the club bulletin board without the consent of the board of directors.

The official name of the club railroad shall be

"DETROIT UNION RAILROAD"

All club-owned equipment shall be lettered "Detroit Union" and may be used by any member on the club road who is eligible to operate the club railroad.

the board report all business to the next club meetings for confirmation. This means that the club has its say on all matters, and yet the tedious work of discussion and weeding out is done beforehand so that the time of members in regular meeting is saved. It seems a very sensible policy, and might well be adopted by the many clubs now being formed.

Membership should be limited by the constitution to those

who show some evidence of interest in model railroading. The faddists or joiners are not wanted, and it's much easier to keep a man out in the first place than to eject him after the trouble has been caused. There's no virtue in a big club, and perhaps the most prevalent fallacy among model organizations today is that of continually trying to increase the membership. A friendly group of a dozen model rails can enjoy themselves much more than a group twice that big. Of course more members help to finance a club road, but if a club road can be had only at the expense of losing the warmth and friendship of a small group, perhaps it isn't worth it.

A trial period for apprentice members is desirable. Also, in setting the requirements for new members it might be remembered that construction of models isn't the only evidence of genuine interest in the hobby. There are some men whose interest lies in operation rather than in building, and yet they make good members.

It should be remembered, too, that strict attendance at all meetings is perhaps asking too much of all the members. Some of you may have little to do except go to meetings, while other members may be executives or traveling men whose time is pretty well taken up. For such a man to sacrifice a precious evening even once every third meeting may mean more in the way of interest than for you to come faithfully every time. Let each man contribute his time to the club as he is able, as long as he is an asset when he does come.

Small groups can meet in the homes of members. This is the most friendly and chummy meeting place of all, and is conducive to good feeling all around. I've seen members at sword points, until they visited each other's homes and found that they were both pretty regular fellows after all. A larger club can secure a meeting place from a Y. M. C. A., church, or hotel. Sometimes restaurants have private rooms which they set aside for meetings on the consideration that the club will stop for lunch after the meeting.

Too much publicity is not a good thing for the average club. It is a perfectly human trait to want to see one's name in the paper, and it's all too easy for a model railroad club to arrange this. The model magazines print club news for the asking, and local newspapers usually think model railroading makes good copy. But there's no point in being publicity hogs. Unless your club does something unusual, its doings aren't likely to be news outside of the immediate membership and its friends, and the only effect of excessive publicity will be to draw in new members faster than the group can absorb them, a very decided disadvantage and the breaking point in many a gone-and-forgotten organization. If you must have publicity, send different releases to each magazine, and by all means don't send the same picture to more than one place or you'll have all of the editors down on your releases forever after.

Suggested Programs.

A model railroad club need never be lacking for interesting programs at its monthly or weekly meetings. A live-wire program chairman can keep things humming for meeting after meeting and leave no excuse whatever for dull, dry business sessions. And I don't mean a committee. One man, if he's the right one, will do far more in arranging programs than any committee. With a committee there's always a tendency to let the other fellow do it. One man feels the responsibility and arranges the programs ahead of time, as should be done.

A round table discussion is good for a meeting any time on short notice. A blackboard should be provided at the front of the room and one or two members should prime themselves to start a discussion on, let us say, signaling. They start it off by outlining a few of their ideas on circuits, and all the other members are in on it, too. It is likely that the chairman will have to break into the discussion to end it at a reasonable hour.

Various railroads and the General Electric Co. can furnish motion picture films of railroad scenes which make good pro-

Sample Constitution for a Small Club

For small clubs this constitution will be all that is required. A larger club will also have a set of by-laws going into more detail, and perhaps also will make changes in this constitution to suit its purpose.

ARTICLE I.

Sec. 1. The name of this organization shall be _____

Sec. 2. The purpose of this organization shall be to increase the satisfaction of its members in the hobby of model railroading.

ARTICLE II.

Sec. 1. There shall be two classes of membership in the club:

A. Regular membership shall be open to any person interested in model railroading upon the payment of annual dues and acceptance as a member at a regular meeting by more than two-thirds of the then current membership. Regular members shall be entitled to one vote.

B. Honorary members may be elected by vote of a majority of the membership, and shall not be required to pay dues, nor may they hold office nor vote.

ARTICLE III.

Sec. 1. Regular meetings shall be held monthly on the first Monday of each month at 8 p. m. The place of meeting shall be decided at the previous meeting.

ARTICLE IV.

Sec. 1. Only members in good standing (current dues paid) shall be entitled to vote.

A. A majority of members in good standing will constitute a quorum capable of transacting business at any regular meeting.

B. A majority vote of the members present shall be necessary to transact business at a regular meeting, except that a two-thirds majority of those present shall be necessary to amend the constitution or pass resolutions.

ARTICLE V.

Sec. 1. Dues for regular members shall be $_____ per year.

Sec. 2. All dues shall cover only the calendar year or part thereof in which paid. All dues become payable on Jan. 1.

Sec. 3. All members shall belong to the N. M. R. A., $1.00 per member national dues being paid from club funds.

ARTICLE VI

Sec. 1. The officers of the club shall consist of a president, vice-president, secretary, and treasurer.

Sec. 2. The duties of the officers shall be as follows:

A. The president shall perform the usual duties of such office, preside at the monthly meeting, and shall act as chairman of the membership committee.

B. The vice-president shall be aid and assistant to the president in any way possible and shall assume the office of president during the absence of the latter, or at his written request, or in the event of his death. He shall be chairman of the program committee.

C. The secretary shall keep the records of all meetings of the organization, and shall notify members of regular and special meetings. He shall be chairman of the publicity committee.

D. The treasurer shall keep a record of all funds received and funds paid out by the club.

Sec. 3. The officers shall be elected at the October meetings each year and will immediately take office. A majority vote of the members present shall be necessary to elect officers.

ARTICLE VII.

Standard parliamentary procedure shall govern any points not covered in this constitution.

gram material, provided one of the members has a projector. Also, the popularity of home movies means that in almost any club one or more members may have movies of their own roads, or model movies may be borrowed from a member of some nearby club.

Railroad men make good speakers. We don't mean men from the traffic departments, who are more polished but know less

about actual railroading. We mean engineers, towermen, trainmasters and other practical railroad men. These aren't good orators. They are usually ill at ease before an audience. But let your group show some interest in what they're doing, and that shouldn't be hard, and they open up and talk naturally and well. Save up all your questions for such a meeting, as a railroad man is best at answering or discussing specific questions put to him by the audience. And look out for bad weather! A blizzard is sure-fire cancellation of any railroad man's speaking engagement.

A little booklet from the Wimbleton Model Railway Club over in England takes the form of a combination membership card on which dues can be receipted, list of officers, and a list of weekly meetings in detail for the entire year. Such an advance listing of the meetings gives the members more opportunity to plan for them.

At one meeting, for instance, the Wimbleton Model Railway Club held an exhibition of photographs by members. Now, isn't that a fine idea for any model railroad club? At the next meeting there was a series of 10-minute talks on favorite prototypes by members. A little later an illustrated lecture was furnished by courtesy of the North Eastern Ry. Most American railroads have travel films taken along their lines and are more than willing to send these out with a lecturer to any organization desiring them. The Association of American Railroads issues a complete mimeographed list of all railroad movies available from all sources. Have your club program chairman send for it.

A rummage sale was held by the Wimbleton Model Railway Club one February. If you and your model railroad friends dug around in your workshop for odds and ends you want to dispose of, wouldn't it be a more interesting rummage sale than you've ever seen before? And wouldn't it be a grand swap night at the club? Nearly every member should benefit from such an evening.

The British club meetings include the usual run of lectures and talks by engine drivers, railroad historical authorities, the

Corporate By-Laws

A large model railroad club or one owning a club layout will probably incorporate as a non-profit corporation. The articles of incorporation are a lawyer's job and in general take the place of the constitution of an unincorporated club. The by-laws go into greater detail on methods of procedure, and here are the by-laws adopted by the Detroit Model Railroad Club, Inc., as a model of how a large club should be governed:

Detroit Model Railroad Club, Inc.
BY-LAWS

ARTICLE I.
Members' Meetings, Etc.

Sec. 1. Meetings of the members of the club shall be held annually at the principal office of the club on the third Thursday in June of each year, beginning with 1940, unless changed by the board of directors and notice of such change is posted on the bulletin board of the club one week prior to the meeting.

Said annual meeting shall be for the purpose of electing directors, and for the transacting of such other business as may be brought before the meeting.

In addition, there shall be one business meeting each month, to be held on the third Thursday of the month, subject to change by the vote of the majority of the members.

There shall be regular meetings of the club held on each Tuesday and Thursday evening, Tuesday evening to be devoted to the construction and maintenance of the club layout. Thursday night is to be operating night.

Sec. 2. QUORUM. At any meeting of the members, the majority thereof, present in person or represented by proxy, shall constitute a quorum for the transaction of business.

Sec. 3. ORGANIZATION. The president shall act as chairman of all meetings and the secretary shall act as secretary of all meetings.

Sec. 4. ORDER OF BUSINESS. The order of business at the annual meeting shall be as follows:

1. Meeting called to order by retiring president.
2. Reading of minutes of the last meeting.
3. Report of officers.
4. Old and new business.
5. Election and installation of officers.
6. Adjournment by new president.

ARTICLE II.
Directors.

Sec. 1. The business and the property of the club shall be managed and controlled by the board of directors.

The number of directors shall be seven, who shall be chosen from the membership.

The first board of directors of this corporation shall be elected on the twenty-second day of June, 1939, and shall hold office until the regular annual meeting in 1940.

The directors shall hold office for the term of 1 year, and until their successors are chosen.

Sec. 2. QUALIFICATIONS. No person can become a member of the board of directors until he has been an active member for at least 1 year.

Sec. 3. MEETINGS OF THE BOARD OF DIRECTORS. Meetings of the board of directors may be called at any time by the president or secretary, or by the majority of the board of directors. Directors shall be notified in writing of the time and place of all meetings of the board, except the regular annual meeting held immediately after the annual meeting of members, at least 3 days prior thereto. Any director shall, however, be deemed to have waived such notice by his attendance at any meeting.

It shall be the duty of the board of directors to meet at least quarterly, for the purpose of passing on all matters of club policy and finance. The decision of the board of directors, with regard to the policies of the club shall be final.

Sec. 4. QUORUM. A majority of the Board of Directors shall constitute a quorum for the transaction of business, and a majority of the votes of such quorum shall be sufficient to pass any measure before such meeting.

Sec. 5. VACANCIES. In case of a vacancy in the board of directors, a majority of the remainder of the members thereof shall fill such vacancy, and the member elected to fill such vacancy shall hold office for the unexpired term.

Sec. 6. SUPERINTENDENT OF OPERATIONS. A superintendent of operations shall be appointed quarterly by the board of directors. He shall have full charge of all operations over the club layout.

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ARTICLE III.
Membership.

Sec. 1. All members of the Detroit Model Railroad Club in good standing at the time of the incorporation of this club, shall be considered as members in good standing of the Detroit Model Railroad Club, Inc.

The membership of the club shall be limited to 40 active members.

Applicants for membership must be white and over 21 years of age.

Application for membership in this club must be made to the secretary and the application must be endorsed by two members in good standing. All applications shall be passed on by the board of directors.

All members belonging to the club, with the exception of honorary members, will be considered active members.

A member in good standing is one who has his dues paid up to date, attends as many regular meetings as possible and abides by all the rules of the club.

The club shall, at any time that it sees fit, and by popular vote of its members, elect any deserving person to honorary membership. Honorary members shall have no vote in the affairs of the club, nor shall they be required to pay dues.

Sec. 2. DUES. New members joining the club shall be required to pay an entrance fee of 5. This fee is to be paid upon acceptance to membership, and a deposit of $1 must accompany all applications for membership, which sum will be applied as the first month's dues if the applicant is accepted, otherwise said sum will be refunded.

Dues of the club shall be $12 a year, payable $1 a month on the first meeting night of each month. A member neglecting to pay his dues for a period of 2 months shall, automatically, be removed from good standing, and if delinquent for 3 months shall be automatically dropped from membership.

Sec. 3. SUSPENSION OF MEMBERS. Any member may be expelled from active membership in the club for any of the following breaches of conduct or good faith:

1. Consistent refusal to pay dues or special assessments where such refusal is not justified.
2. Consistent breaking of rules.
3. Lack of interest or effort to conform to club ambitions or principles.
4. Gross insubordination.
5. For any definite reason deemed sufficient by the board of directors; this action to be approved by the majority of the active members present at a monthly or annual business meeting.

ARTICLE IV.
Officers.

Sec. 1. The officers of the club shall be a president, a vice-president, a treasurer, and a secretary, all of whom shall be and remain directors while acting in such capacity; and shall be elected by the board of directors at its regular annual meeting, held immediately after the adjournment of the regular annual meeting. The term of office shall be for a term of 1 year and until their successors are chosen.

Sec. 2. QUALIFICATIONS. No member shall become an officer of the club unless he has been an active member for at least 1 year.

ARTICLE V.
Duties of Officers.

Sec. 1. PRESIDENT. The president shall be the chief executive officer of the club, and in the recess of the board of directors shall have the general control and management of its business and affairs, subject however, to the right of the board of directors to delegate any specific power except such as may be by statute excusively conferred upon the president, to any other officer or officers of the club. He shall preside at all meetings of the directors and all meetings of the members.

Sec. 2. VICE-PRESIDENT. In case the office of president shall become vacant by death, resignation, or otherwise, or in case of the absence of the president, or his disability to discharge the duties of his office, such duties shall, for the time being, devolve upon the vice-president, who shall do and perform such other acts as the board of directors may, from time to time, authorize him to do.

The vice-president shall also be the superintendent of maintenance and it shall be his duty to see that the club layout is maintained in working order. He is responsible for all new construction or changes in the layout, authorized by the board of directors. No alterations or changare to be made in the club layout without the approval of the superintendent of maintenance.

Sec. 3. TREASURER. The treasurer shall have custody and keep account of all money, funds and property of the club, unless otherwise determined by the board of directors, and he shall render such accounts and present such statement to the directors and president as may be required of him. He shall deposit all funds of the club which may come into his hands in such bank or banks as the board of directors may designate.

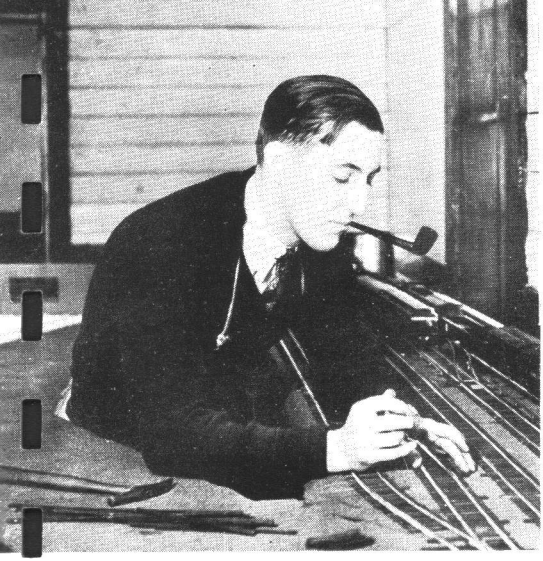
Sec. 4. SECRETARY. The duties of the secretary shall be to keep the minutes of all board meetings and club business meetings, post notices of all meetings, notify applicants of acceptance to membership, and carry on all interclub correspondence, as well as all publicity and other correspondence.

ARTICLE VI.
Dissolution.

Dissolution of this club at any time, shall be made only upon an affirmative vote of three-fourth of the eligible membership.

ARTICLE VII.
Amendments.

These By-Laws, or any of them, may be altered, amended, added to or repealed by a majority of the members at any regular annual meeting of members or at any special meeting when the notice of such meeting shall contain a notice of such proposed change.



Hank Eighmey spikes rail on the Hudson Valley RR., Kingston, N. Y.

editor of *Model Railway News,* railroad engineers, etc. Almost any man in railroad work has interesting experiences to tell if he can be encouraged to talk about them. I know of one club that profited immensely and is still profiting from a talk given 5 or 6 years ago by a chief dispatcher from one of the railroads. It was he who started the club off on a proper system of train operation on the club's model railroad system.

Exhibitions are usually restricted in America to public showing of club equipment. The public rarely appreciates the better qualities of the models. Wouldn't it be much more satisfactory to the members to have occasional private showings at meetings? For instance, an evening can be designated as locomotive night, and all the members be encouraged to bring in their recently completed locomotive models. Their fellow members will really appreciate them, as the general public cannot. Another meeting can then be devoted to cars and others to trackside structures, and perhaps to working drawings, special tools, etc.

A good time now and then is relished by the best of men, so the live program chairman will season his consist with such things as mock trials of members for violations of operating rules, humorous debates on such subjects as "Resolved, that an HO locomotive is more useful than a cinder in the eye," and quasi-political campaigning by would-be general managers.

Hudson Valley Model Railroad Club.

The actual play-by-play story of how one club organized and went about building its layout may be of concrete help in

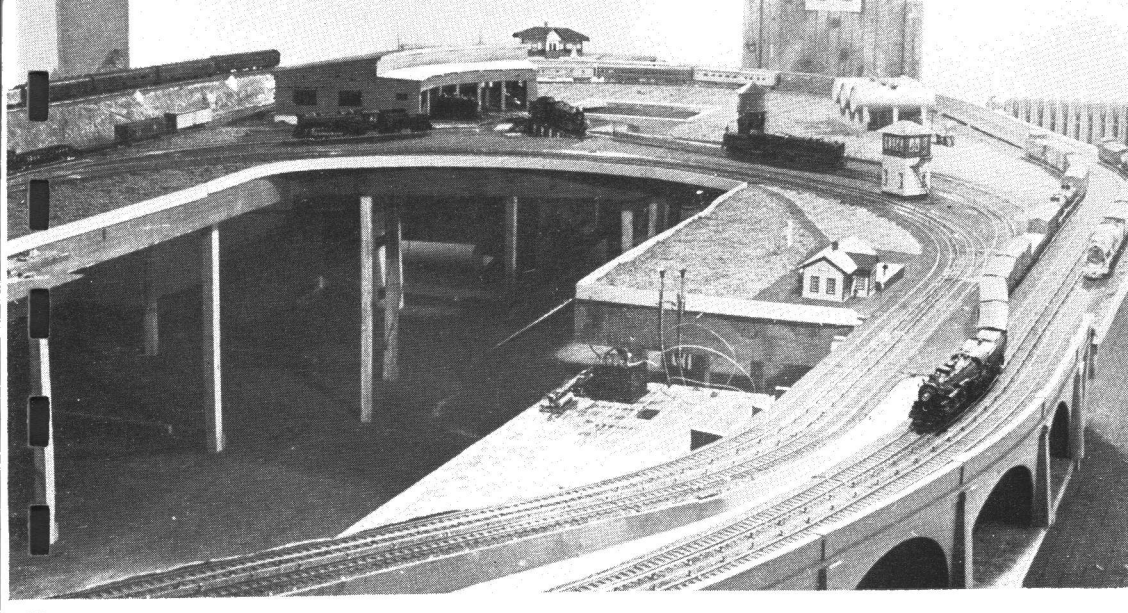
your case. So I tell the story of the Hudson Valley Model RR. of Kingston, N. Y. It is typical of the story of any of hundreds of other model railroad clubs the country over.

At one time Henry P. Eighmey operated his own model line, the Ulster & Delaware; then, on account of moving, the railroad was dismantled and the new residence left no room for such a project. Thus a club was the only solution, but no other model engineers could be contacted. Attempts proved futile for two years, until in August, 1937, Mr. Eighmey visited a New York model manufacturer and from him obtained a list of model engineers within a radius of 50 miles of Kingston. Letters were dispatched to ten of this list, and through the cooperation of the Kingston *Daily Freeman* several notices were published regarding an organization meeting for a model railroad club on Sept. 15. Two of the ten notified came to this meeting (both of them from Middletown, N. Y.), and with three others, the Hudson Valley Model Railroad Club was organized.

John J. Schwenk, alderman at large of the City of Kingston, was elected the first president. Addison Schultz, a telephone employee, was chosen vice-president and general superintendent, and Henry P. Eighmey, secretary-treasurer. It was decided that weekly meetings should be held—at that time in the Y. M. C. A. —until suitable quarters could be found by a committee appointed for that purpose.

The local Y. M. C. A. was willing to cooperate but a suitable space could not be found in the building, so the cooperation of the New York Central RR. was sought. Through the efforts of Trainmaster F. W. Gleisner, who later joined the club, a building 20 x 40 ft. was leased from the NYC and the work of getting the place ready for a model railroad layout began. The building was an abandoned carpenter shop, and it took the greater part of a month of hard work by the seven members to renovate the place.

The first actual problem was to decide on a suitable layout. Ten members were now listed on the roll book and three meet-



Hagerstown (Md.) club layout in O gauge.

ings brought forth conflicting ideas as to a layout, which held up construction work. Finally it was agreed to have Addison Schultz take all suggestions and ideas and work them into one complete plan. This was done and a scale drawing was posted on the clubhouse wall. The necessary tables for the layout were the next step. These were built, carefully leveled, and firmly bolstered.

This preliminary work required some capital for lumber, electric service, painting, and various other supplies, not to mention running rail and railroad equipment. This need for money caused the first dissension and before it was decided to charge 50 cents per week as dues and a $3 entry fee for each member, two of the original members dropped out of the organization. This was an unfortunate occurrence, but the remaining members thought it absolutely necessary to collect this money in order to get going.

Several of the members bought material and had weekly dues credited to them in payment, and several stores and contractors agreed to supply materials and work on credit. Today all these bills have been paid and the club treasury shows a balance.

Roofing paper was used for ballast, mounted on a half-inch beveled board to give the appearance of a graded roadbed. A two-track mainline system is the result.

All ties are home made and stained with a creosote preparation, and steel running rail is used, spiked to each tie in the same manner as on a real railroad, with four regular spikes purchased from a supply house. This idea of four spikes to each tie seems to be not generally the practice of model pikes, but it has given a solid roadbed and a genuine appearance.

It was further decided that there should be 15 charter members who would join the club for a $3 entry fee and 50 cents per week dues, and following that all new members would be required to serve a month's probation and then would pay $5 entry fee and the same dues. Just before the war there were 17 members in the club with two applications on file.

Cast frogs were purchased for switches but the cast guard rails did not prove satisfactory either in operation or appearance, and so they were eliminated and pieces of rail substituted for guard rails. This has proved practical. Third rail is of the "T" section type mounted on regular insulators.

Two of the members, headed by Ralston Munson, took over the task of providing the scenic effects, and Storm King mountain appeared in one corner of the room, pierced by a long tunnel which opens on a fine wooden trestle. The route of the Hudson Valley RR. is supposedly along the Hudson River, and a ferry slip with an adjoining station and town is planned for another corner, similar to a place called Rhinecliff on the NYC.

To date about 500 ft. of track has been laid on the system, which will include a freight yard accommodating 75 cars plus the usual loading platforms, cranes, and accessories, a passenger storage yard, and a four-stall roundhouse and turntable. The roundhouse or enginehouse is being constructed by Henry Page while Dave Ennis is busily at work on the turntable. Probably close to 800 ft. of track will be included in the layout, and a mountain division has been considered which will add another couple of hundred feet to the line.

The equipment consists of a Hudson type locomotive, 20

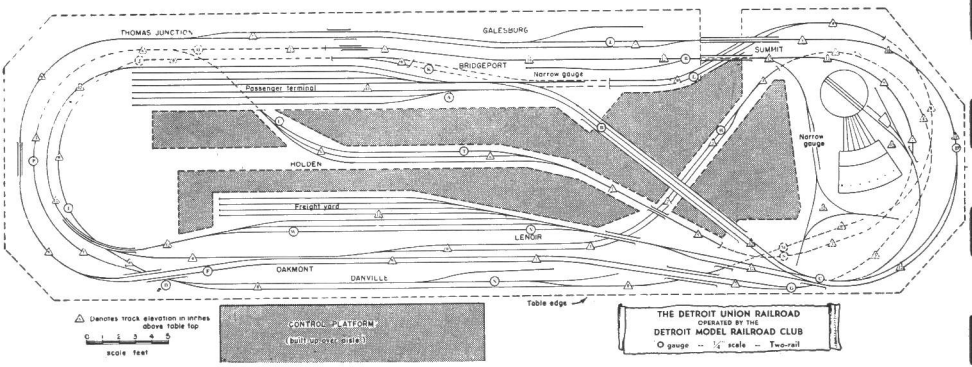
freight cars, 2 baggage cars, and 2 Pullman cars, the Pullmans being used in the makeup of the "Rip Van Winkle," crack passenger train of the Hudson Valley RR. Most of the equipment is the property of August Snell of Middletown, who is one of the original members of the club. It is left in the clubhouse, is used by all the members, and is insured against any damage, fire, or theft, to the amount of $500. This insurance will be increased as equipment is added. One of the new members is now building three locomotives which will probably begin service very shortly, and when the club treasury can afford it, plans call for the purchase of motive power by the club.

Among its members the club lists Charles Mehlig, who is the owner of a complete machine shop where any of the club members can overcome difficult construction problems without much trouble. This machine shop has already been an invaluable aid in building the various kits and accomplishing all kinds of metal work.

Work on the project is not hurried, as all jobs must be done correctly in order that there shall be no opportunity for criticism from visitors as to the quality of workmanship. All work is regularly checked by the general superintendent, and if it does not meet with his approval it must be done over again. A weekly schedule is posted on the bulletin board on which jobs are listed for each member to do. Members have keys to the clubhouse and may enter and work at any time. A registration book is kept below the bulletin board and each member must register the time entered and spent within the clubhouse, and the work accomplished while there.

The Detroit Union RR.

Another good club to emulate is the Detroit Model Railroad Club, which has a new layout room at 419 E. Atwater St., directly across from the Grand Trunk Western depot. It does not afford the same comfort as was enjoyed in the old quarters but it has many advantages to offset its small inconveniences. Park-



ing space is ample, and, being on the ground floor, the layout is ideal for public showings. Here is a description in the words of Bernard J. Gottlieb, an active member:

"When the club found the new quarters, it was decided to change over to two-rail, with a layout design that afforded more interest than the old. We allowed plenty of space for scenic effects, which were sorely lacking in the old right of way. The present layout is single-track, point-to-point and return, with five passing sidings in each direction, and is 58 ft. long by 17 ft. wide with an aisle 4 ft. wide all around it. The basic table height is 38″ from the floor and the tracks are on three levels, the high level being 12″ above the table top. With the layout in the center of the room and an aisleway all around it, it allows spectators to get an interesting and varied view without the confusion of seeing the entire mass at a single glance. Only two tracks and the terminals are visible from either side.

"A mountain range is built in the center, above the holding tracks, to separate the passenger and freight yards. A person standing at any spot does not see the same train running continually in the same direction. In several places a train going in one direction on a high track appears later on a lower track, running in the opposite direction.

"In rebuilding we found that we could not use any of the old

trackwork except the passenger and freight terminals. All of the old bridges have been included in the new layout and the old rail was salvaged and used. The tables were built up from salvaged material and roadbed is made from 1″ thick wood with ¼″ veneer trackboard, covered with roofing material painted white to simulate crushed rock. Ties are of basswood, 1/16″ thick, and were stapled in place until rails were spiked, the staples then being removed. Trackwork is raised from the table by upright stringers placed about 1 ft. apart.

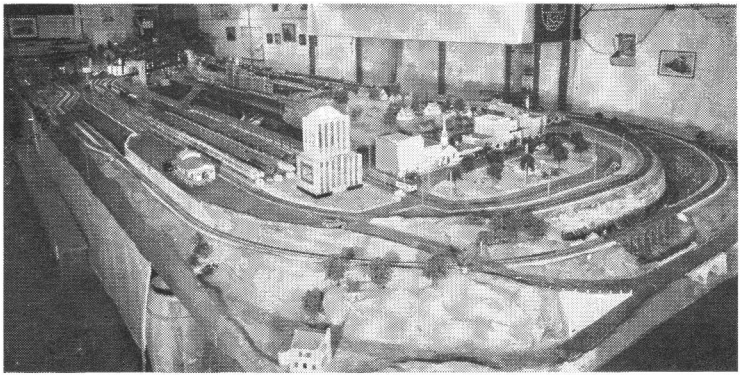
"The engineers' control tower is built above the aisle, and the same type of operation as used on the old layout is followed; that is, the engineer has control of his train from the time it leaves the terminal until it returns. There are four complete boards and one board which controls only as far as Galesburg, used principally to wye trains. All mainline turnouts are controlled by the dispatcher from a C. T. C. board on the control tower. A separate yard control is set up for switching in both the passenger and freight terminals. Trains that must be wyed by going through the passenger and freight yards are operated by the regular engineers' control, since they have to use the main line for a short distance. A run-around track has been provided for trains that do not terminate at the terminal. This track is also utilized to wye any trains that are to be kept together as a unit, for we have found that many trains operate more satisfactorily if the cars are kept in the same order at all times; thus it is not practical to break up all trains at the passenger terminal. The lead tracks of the terminal emerge from the main line through Ripper Junction. This is an interlocking plant patterned and built identical to the mechanical plants used on contemporary 4′-8½″ gauge lines. The plant was built completely by "Ripper" Collins, hence the title of the Junction. It features "Armstrong" style locks which operate signal circuits and switch machines and is indicated on an illuminated panel of the track pattern. This tower controls all the in- and out-bound traffic for the passenger and freight terminals. Signal installations are now in

process and they are of the blade type semaphore, featuring slow-action blades with colored lenses for the light indications. This plant is one of the highlights of the Detroit Union.

"Let's take a trip on the main line and visualize what our operation is like.

"We leave Union City, Ross Street Station, on train No. 14, head north through the yard (*A*) and curve right, crossing over the high bridge (*B*), modeled after Hell Gate Bridge. After crossing the freight yard lead at Ripper Junction (*C*) we emerge on the single-track main (*D*), where we proceed on a slight downgrade, cross a bridge, and reach the first passing siding at Galesburg with its foundry and a lumber yard (*E*). We take a high-speed curve and cross over a deep gully on a timber trestle, hit another curve, catching a glimpse of a golf course below the embankment to the right, cross a bridge over a single track, and are at the second siding, Oakmont (*F*).

"After leaving Oakmont we curve a little to the right and start down grade, cross a bridge over a single-track line, then pass under Ripper Junction (at *G*). We pass under the engine terminal lead and go up grade to pass over the low-level track. We are traveling in a deep cut with tracks above us on two levels. Emerging from this cut, we curve under the high track and reach the third passing track, Lenoir (*H*), with its main in-



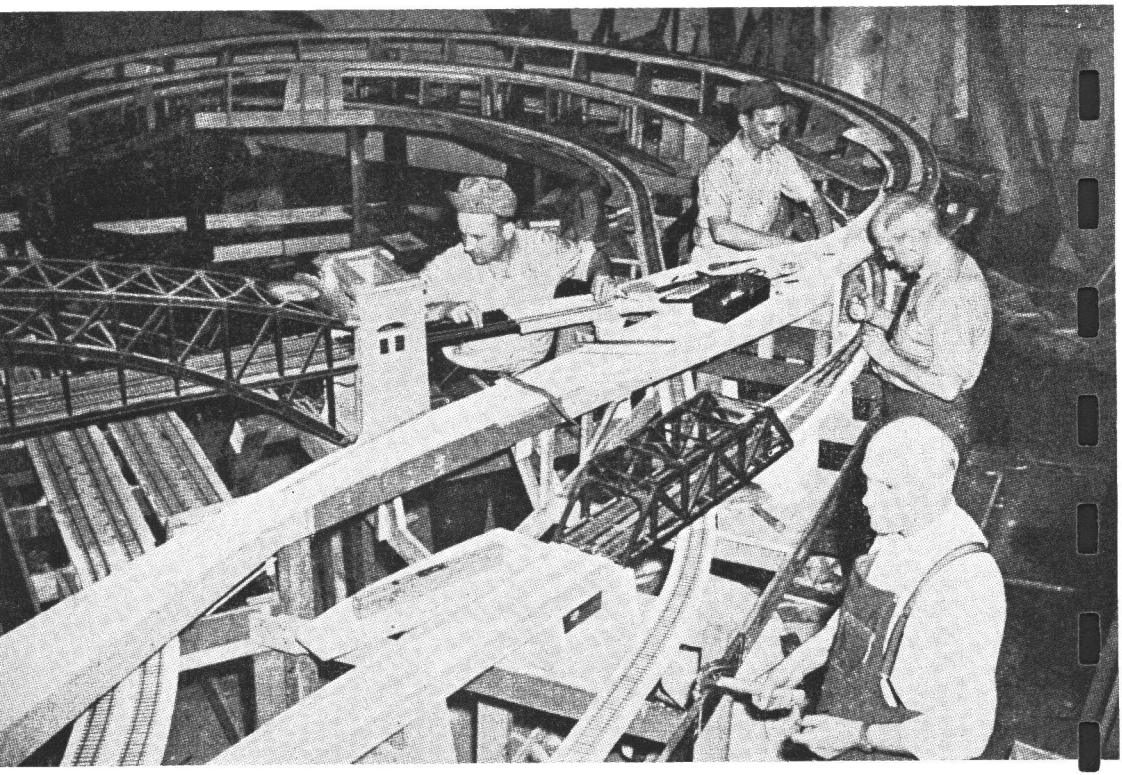
General view of the Detroit Model Railroad Club layout.

dustry, the Stinson Oil Refinery, to the left. Since we have no scheduled stop here and have a green board, we highball through, passing under the high bridge and under a single track leading to the holding track, then under the freight yard.

"Now we are again on single track, but out of sight of the spectators. We take another curve to the right, pass under the run-around track leading to the freight yard, continue around the curve, and are beneath the passenger terminal (*J*). Emerging from the fourth passing track at Bridgeport (*K*), we roll out from under the terminal and curve left. In daylight again, we behold what appears to be a bottleneck of bridges. Our track crosses a space between the tables on a double-track bridge (*L*), but we see two more bridges above us on different levels, and one of these, a single-track bridge, crosses over one corner of the bridge we are on. As we look up we think, 'In an air raid one well-placed bomb would sure raise h __ with this railroad!'

"This very intricate spot is passed and we proceed through a cut and curve to the right again, go down grade and pass under the middle-level track and engine terminal track, then under the high-level track (*M*) and a bridge, and are at another siding, Danville (*N*), this time on the low level and right out in front of the paying customers. We proceed on a curve to the right and under a double-track bridge (*O*), go up grade in a rock cut, then emerge in daylight and pass a high timber trestle on our left and a high stone embankment on our right (*P*). We then enter a tunnel and after hitting straight track pass over a switch (*Q*) which is the junction from the holding track. Our train starts to climb, and finally comes out in the air again, continuing to climb till we now look down on the double track to our left.

"We level off at Summit and notice a narrow-gauge track to our right, which converges with our track and crosses over the corner of the double-track bridge carrying the low-level track on a Howe single-track timber truss bridge. The narrow-gauge uses a gantlet track inside of the O gauge rails.



Construction crew at work on the Detroit layout, early 1943.

"After crossing the bridge the narrow-gauge track ambles off to the right in back of the roundhouse, a spur track going up the mountain to a coal mine.

"We are brought back to earth by the speed of our train, which seems to be running wild, and find that we are out of sight of everything and going down grade to beat all. (This is the steepest grade on the line, as it leads to the holding tracks and all trains enter the holding track in the same direction.) We finally come out into the light again but are out of sight from the aisles.

"Passing under the approach to the high bridge at S and over a double-track line, we grind to a stop at the end of the loop and are on the holding track at Holden (*T*). As we pull in on one track we catch a glimpse of the markers of a freight that has just pulled out heading south. Here our train loses its identity and has to wait for new orders, for when we leave we will be running south under another number.

"After our orders come through we proceed south as Train 15. We clear through the south end of the holding track (*U*) and enter the main line (*Q*), the same line that we used northbound. When we reach the Union City terminal again, we find our train is being lined into Track 1. The dispatcher is short of equipment and needs our train to go north again in an hour, so the crew has to wye the train to have it ready when needed. We proceed through the station and curve left through town at slow speed and on the outside of the freight yard (*W* to *X*) through Ripper Junction (*C*) until we clear the switch. On signal we back across the bridge into Track 5.

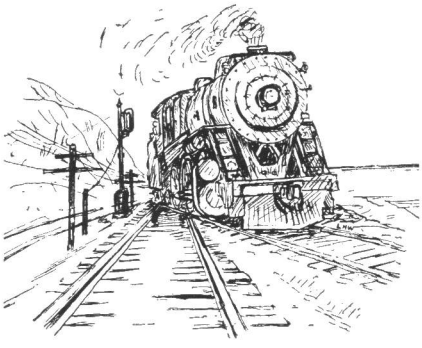
"Our crew's work is now over, so the engine is uncoupled and taken to the engine terminal. We go along to look over No. 453. At the roundhouse we meet Kirke Comstock, superintendent of motive power and brass hat of the narrow-gauge line. This line operates passenger service from Union City to the coal mines to bring the miners to and from work. This mine is a chief source of revenue for the DUR and future plans call for a coal tipple to load barges which will travel down the river under the Hell Gate Bridge. The mine also supplies fuel for the parent road, and the tipple in the engine terminal is supplied solely by the narrow-gauge.

"The new DUR has a run of approximately 1100 ft. from the time a train leaves the terminal until it returns."

Rules and Regulations

of the

Operating Department



This is a typical set of operating rules, and is used in much the same form, and with the same numbers for corresponding rules on all American railroads. Rules which do not apply to timetable operation of a model railroad have been omitted. Used through the courtesy of the Chicago, Milwaukee, St. Paul & Pacific Railroad.

General Notice.

Safety is of first importance in the discharge of duty.

Obedience to the rules is essential to safety.

To enter or remain in the service is an assurance of willingness to obey the rules.

The service demands the faithful, intelligent and courteous discharge of duty.

To obtain promotion, ability must be shown for greater responsibility.

General Rules.

A.

Employees whose duties are prescribed by these rules must provide themselves with a copy.

Employees whose duties are in any way affected by the timetable must have a copy of the current timetable with them while on duty.

B.

Employees must be conversant with and obey the rules and special instructions. If in doubt as to their meaning they must apply to proper authority for an explanation.

C.

Employees must pass required examinations.

D.

Persons employed in any service on trains are subject to the rules and special instructions.

E.

Employees must render every assistance in their power in carrying out the rules and special instructions and must report to the proper officer any violation thereof.

F.

Accidents, failure in the supply of water or fuel, defects in track, bridges, signals, or any unusual conditions which may affect the movement of trains, must be promptly reported by wire to the proper authority.

G.

The use of intoxicants or narcotics is prohibited.

H.

The use of tobacco by employees on duty in or about passenger stations, or on passenger cars, is prohibited.

J.

Employees on duty must wear the prescribed badge and uniform and be neat in appearance.

K.

To avoid annoyance to the public, employees and others authorized to transact business at stations and on or about trains must be courteous, orderly and quiet.

L.

In case of danger to the Company's property employees must unite to protect it.

M.

Employees must exercise care to prevent injury to themselves or others by observing the condition of equipment and the tools which they use in performing their duties and when found defective will, if practicable, put them in safe condition, reporting defects to the proper authority.

They must inform themselves as to the location of structures or obstructions where clearances are close.

They must expect trains to run at any time, on any track, in either direction.

They must not stand on the track in front of an approaching engine or car for the purpose of boarding the same.

Definitions.

Engine.
A locomotive propelled by any form of energy and used in train or yard service.

Motor Car.
A car propelled by any form of energy and used in train or yard service.

Note.—Where the term "engine" appears in these rules, it applies to either "engine" or "motor car."

Train.
An engine or motor car or more than one engine or motor car coupled, with or without cars, displaying markers.

Regular Train.
A train authorized by a timetable schedule.

Section.
One of two or more trains running on the same schedule displaying signals or for which signals are displayed.

Extra Train.
A train not authorized by a timetable schedule. It may be designated as—

Extra—for any work train except passenger extra or work extra.

Passenger extra—for passenger train extra.

Work extra—for work train extra.

Superior Train.
A train having precedence over another train.

Train of Superior Right.
A train given precedence by train order.

Train of Superior Class.
A train given precedence by timetable.

Train of Superior Direction.
A train given precedence in the direction specified by timetable as between opposing trains of the same class.

Timetable.
The authority for the movement of regular trains subject to the rules. It contains the classified schedules of trains with special instructions relating to the movement of trains.

Schedule.
That part of a timetable which prescribes class, direction, number and movement for a regular train.

Division.
That portion of a railroad assigned to the supervision of a superintendent.

Subdivision.
A portion of a division designated by timetable.

Main Track.
A track extending through yards and between stations, upon which trains are operated by timetable or train order, or both, or the use of which is governed by block signals.

Single Track.
A main track upon which trains are operated in both directions.

Two or More Tracks.
Two or more main tracks upon any of which the current of traffic may be in either specified direction.

Current of Traffic.
The movement of trains on a main track, in one direction, specified by the rules.

Station.
A place designated on the timetable by name.

Siding.
A track auxiliary to the main track for meeting or passing trains.

Fixed Signal.
A signal of fixed location indicating a condition affecting the movement of a train or engine.

Note.—The definition of a "Fixed Signal" covers such signals as switch, train order, block, interlocking, semaphore, disc, ball, stop boards, yard limit boards, slow boards, or other means for displaying indications that govern the movement of a train, or engine.

Yard.

A system of tracks within defined limits provided for the making up of trains, storing of cars and other purposes, over which movements not authorized by timetable, or by train order, may be made, subject to prescribed signals and rules, or special instructions.

Yard Engine.

An engine assigned to yard service and working within yard limits.

Pilot.

An employee assigned to a train when the engineman or conductor, or both, are not fully acquainted with the physical characteristics or rules of the railroad, or portion of the railroad, over which the train is to be moved.

Train Register.

A book or form which may be used at designated stations for registering signals displayed, the time of arrival and departure of trains and such other information as may be prescribed.

Bulletin.

Advice of conditions affecting the movement or safety of trains.

Restricted Speed.

Proceed prepared to stop short of train, obstruction, or anything that may require the speed of a train to be reduced.

Operating Rules.

Note.—Rules with a prefix "S" are for single track, those with a prefix "D" are for two or more tracks. Rules without a prefix are for single and two or more tracks.

Standard Time.

1.

Standard Time obtained from an authorized observatory will be transmitted to all points from designated offices at 11 a. m. Central Time, 10 a. m. Mountain Time, 9 a. m. Pacific Time, daily.

Timetables.

4.

Each timetable, from the moment it takes effect, supersedes the preceding timetable, and its schedules take effect on any division, or subdivision, at the leaving time at their initial station on such division, or subdivision. But when a schedule of the preceding timetable corresponds in number, class, day of leaving, direction, and initial and terminal stations with a schedule of the new timetable, a train authorized by the preceding timetable will retain its train orders and assume the schedule of the corresponding number of the new timetable.

Schedules on each division, or subdivision, date from their initial stations on such division, or subdivision.

Not more than one schedule of the same number and day shall be in effect on any division, or subdivision.

4a.

Notice of new timetables will be bulletined. During a period commencing 24 hours before and continuing until six days after a new timetable takes effect, notice by train order form T will be issued to conductors, enginemen, yardmasters and yard engines.

5.

Not more than two times are given for a train at any station; where one is given, it is, unless otherwise indicated, the leaving time; where two, they are the arriving and leaving times.

Unless otherwise provided, the time applies at the switch where an opposing train enters the siding; where there is no siding, it applies to the place from which fixed signals are operated; where there is neither siding nor fixed signal, it applies to the place where traffic is received or discharged.

Scheduled meeting or passing stations are indicated by figures in full-faced type.

Both the arriving and leaving times of a train are in full-faced type when both are meeting or passing times, or when one or more trains are to meet or pass it between those times.

Where there are one or more trains to meet or pass a train at any station, attention is called to it by the numbers of the trains to be met or passed in small figures, adjoining.

When trains are to be met or passed at a siding extending between two adjoining stations, the time at each end of the siding will be shown in full-faced type.

6.

The following letters, when placed before the figures of the schedule, indicate:

L.—leave;
A.—arrive;
s.—regular stop;
f.—flag stop to receive or discharge traffic.

6a.

The following letters, when placed in the columns provided, indicate:

B—bulletins;
C—coal;
D—day operator;
DN—day and night operator;
E—refreshments;
H—hog drenching;
I—interlocking;
J—junction;
K—standard clock;
M—railroad crossing protected by signals or gates;
N—night operator;
O—oil;
P—telephone;
R—train register;
T—turntable;
V—track connection with foreign road;
W—water;
X—yard limits;
Y—wye;
Z—track scales.

Signals.

17.

The headlight will be displayed to the front of every train by night. It must be concealed or extinguished when a train turns out to meet another and has stopped clear of main track, or is standing to meet a train at end of two or more tracks or a junction.

It must be dimmed while standing on yard tracks where yard engines are employed.

When an engine is running backward, a white light must be displayed by night on the rear of the tender.

17a.

When the headlight fails en route, a white light must be used in its place, the bell rung continuously, the whistle sounded frequently, and the train dispatcher notified.

18.

Yard engines will display the headlight to the front and rear by night. When not provided with a headlight at the rear, a white light must be displayed.

18a.

The headlight of engines, on the end that is coupled to cars, may be dimmed or extinguished while so coupled.

19.

Unless otherwise provided, the following signals will be displayed to the rear of every train, as markers to indicate rear of train.

Running forward by day, without cars or at the rear of a train pushing cars. Marker lamps not lighted, or green flags at rear of tender as markers.

Running backward by day, without cars or at the rear of a train pushing cars. Marker lamps not lighted, or green flags on pilot beam markers.

Rear of train by day. Marker lamps not lighted, or green flags on rear of last car as markers.

Locomotive running forward by night, without cars, or at the rear of a train pushing cars on single track and with the current of traffic on two or more tracks. Lights on rear of tender as markers, showing green to the front and side and red to the rear.

Locomotive running backward by night, without cars, or at the rear of a train pushing cars on single track, and with the current of traffic on two or more tracks. Lights on rear of tender as markers, showing green to the front and side and red to the rear.

Locomotive running backward by night, without cars, or at the rear of a train pushing cars on single track, and with the current of traffic on two or more tracks. Lights on pilot beam as markers, showing green to side and in direction engine is moving and red in opposite direction.

Rear of train by night while running on single track, and with the current of traffic on two or more tracks. Lights on end of last car as markers, showing green to front and side, red to rear.

Rear of train by night when clear of main track. Lights on last car as markers, showing green toward engine, side and to rear.

Rear of train by night running against the current of traffic on two tracks. Lights on last car as markers, showing green to front and side and green to the rear on the side next to the main track on which the current of traffic is in the direction the train is moving and red to the rear on the opposite side.

19a.

A train not equipped to display the prescribed markers will display a red flag by day and a red light by night, to indicate the rear of the train.

19b.

Unless otherwise provided, train crews arriving at terminals must not remove the markers until the train has been delivered to connecting crew or is clear of the main track and the switch is closed.

20.

All sections except the last will display two green flags, and, in addition, two green lights by night in the places provided for that purpose on the front of the engine.

21.

Extra trains will display two white flags and, in addition, two white lights by night, in the places provided for that purpose on the front of the engine.

26.

A blue signal, displayed at one or both ends of an engine, car or train, indicates that workmen are under or about it; when thus protected it must not be coupled or moved. Each class of workmen will display the blue signals and the same workmen are alone authorized to remove them. Other equipment must not be placed on the same track so as to intercept the view of blue signals, without first notifying the workmen.

When emergency repair work is to be done under or about cars in a train and a blue signal is not available, the engineman and fireman will be notified and protection must be given those engaged in making the repairs.

Use of Signals.

27.

A signal imperfectly displayed, or the absence of a signal at a place where a signal is usually shown, must be regarded as the most restrictive indication that can be given by that signal, except that when the day indication is plainly seen, it will govern.

Engine and train crews using a switch where the switchlight is imperfectly displayed or absent, must, if practicable, correct or replace the light.

A signal imperfectly displayed or the absence of a signal at a place where a signal is usually shown must be promptly reported to the superintendent.

Superiority of Trains.

S-71.

A train is superior to another train by right, class or direction.

Right is conferred by train order; class and direction by timetable.

Right is superior to class or direction.

Direction is superior between trains of the same class.

D-71.

A train is superior to another train by right or class.

Right is conferred by train order, class by timetable.

Right is superior to class.

S-72.

Trains of the first class are superior to those of the second; trains of the second class are superior to those of the third; and so on.

Trains in the direction specified by the timetable are superior to trains of the same class in the opposite direction.

D-72.

Trains of the first class are superior to those of the second; trains of the second class are superior to those of the third; and so on.

73.

Extra trains are inferior to regular trains.

Movement of Trains.

82.

Timetable schedules, unless fulfilled, are in effect for twelve hours after their time at each station.

Regular trains more than twelve hours behind either their schedule arriving or leaving time at any station lose both right and schedule, and can thereafter proceed only as authorized by train order.

S-83.

A train must not leave its initial station on any division, or subdivision, or a junction, or pass from one of two tracks to single track, until it has been ascertained whether all trains due which are superior, or of the same class, have arrived or left.

S-83a.

At a meeting point, the train register will not be accepted as evidence of the arrival of an extra train.

D-83.

A train must not leave its initial station on any division, or subdivision, or a junction, until it has been ascertained whether all superior trains due have left.

83a.

Stations at which train registers are located will be designated by timetable.

Conductors of all trains, or enginemen of engines without conductors, will register their trains in the train register at points designated by timetable. Where authorized, register ticket may be accepted by the operator who will register for the conductor and report trains to the train dispatcher from train register.

Conductors must fill out train register check on the prescribed form and deliver or have it delivered to engine man before leaving register stations.

The number of a section of a regular train will be spelled out on clearances, train registers and register tickets.

83b.

Unless otherwise provided, a train must not leave its initial station on any division, or subdivision, without a clearance.

Operators must not issue a clearance to a train at its initial station or starting point on any subdivision without authority from the train dispatcher, except in case of failure of means of communication. In case of such failure, the clearance will be endorsed "wire failure."

A train returning to its regular route at other than an initial station after having been detoured must not resume its schedule unless directed by train order to do so.

In starting trains from a point where there is no train register, or when the conductor and engineman are to be relieved of the duty of ascertaining what trains have arrived or left, train order Form V will be used.

85.

When a train of one schedule is on the time of another schedule of the same class in the same direction, it will proceed on its own schedule.

Trains of one schedule may pass trains of another schedule of the same class, and extra trains may pass or run ahead of second and third class trains and extra trains.

Third class trains may pass or run ahead of second class trains.

A section may pass and run ahead of another section of the same schedule, first exchanging train orders, signals and numbers with the section to be passed. The change in sections must be reported from the next available point of communication.

86.

In automatic block signal territory, unless otherwise provided, an inferior train must clear a superior train in the same direction sufficiently so as to avoid giving a restrictive signal indication to the following train, but must clear a first class train not less than five minutes.

In non-automatic block signal territory, unless otherwise provided, an inferior train must clear a superior train in the same direction not less than five minutes; but must be clear at the time a first class train in the same direction is due to leave the next station in the rear where time is shown; but not less than five minutes.

S-87.

An inferior train must keep out of the way of opposing superior trains and failing to clear the main track by the time required by rule must be protected as prescribed by Rule 99.

Extra trains must clear the time of opposing regular trains not less than five minutes unless otherwise provided, and will be governed by train orders with respect to opposing extra trains.

S-88.

At meeting points between extra trains, the train in the inferior timetable direction must take the siding unless otherwise provided.

Trains must pull into the siding when practicable; if necessary to back in, the train must first be protected as prescribed by Rule 99.

S-89.

At meeting points, the inferior train must take the siding and clear the time of the superior train not less than five minutes except at schedule meeting points between trains of the same

class where the inferior train must clear the main track before the leaving time of the superior train.

The inferior train must pull into the siding when practicable. If necessary to back in, it must be protected as prescribed by Rule 99.

S-89a.

At schedule meeting points between trains of the same class, the superior train must stop clear of the switch used by the train to be met in going on siding unless switch is properly lined and track clear.

At train order meeting points, the train holding the main track must stop clear of the switch used by the train to be met in going on siding unless the train to be met is clear of the main track and switch is properly lined.

92.

A train must not leave a station in advance of its schedule leaving time.

94.

A train which overtakes another train so disabled that it cannot proceed will pass it, if practicable, and if necessary will assume the schedule and take the train orders of the disabled train, proceed to the next available point of communication, and there report to the train dispatcher. The disabled train will assume the right or schedule and take the train orders of the last train with which it has exchanged, and will, when able, proceed to and report from the next available point of communication.

95.

Two or more sections may be run on the same schedule.

Each section has equal timetable authority.

A train must not display signals for a following section, except as prescribed by Rule 85, without orders from the superintendent.

S-97.

Unless otherwise provided, extra trains must not be run without train orders.

D-97.

Where specified on the timetable, extra trains may be run with the current of traffic without train orders provided they secure proper clearance. The operator must secure authority from

the train dispatcher before issuing clearance. Such clearances will be numbered and may be cancelled by train order.

Work extras must not be run without train orders and must move with the current of traffic unless otherwise provided.

99.

When a train stops under circumstances in which it may be overtaken by another train, the flagman must go back immediately with flagman's signals a sufficient distance to insure full protection, placing two torpedoes, and when necessary, in addition, displaying lighted fusees. When recalled and safety to the train will permit, he may return.

When the conditions require he will leave the torpedoes and a lighted fusee.

The front of the train must be protected in the same way when necessary by the forward brakeman, fireman, or other competent employee.

When a train is moving under circumstances in which it may be overtaken by another train, the flagman must take such action as may be necessary to insure full protection. By night, or by day when the view is obscured, lighted fusees must be thrown off at proper intervals.

When day signals cannot be plainly seen, owing to weather or other conditions, night signals must also be used. Conductors and enginemen are responsible for protection of their trains.

99a.

When it is known by engineman that his train will be delayed, he must immediately whistle out the flagman.

99b.

When a flagman is sent out with instructions affecting a train's authority to proceed, three copies of the instructions must be made, one copy to be given to the flagman, who must show this to the engineman of the train or trains affected, one copy to the engineman of the train he is sent on (if sent on a train), and the other copy to be retained by the conductor. When a flagman is sent to a siding on a train, he will ride on the engine and the engineman must stop and let him off at the first switch at the station to which he is sent.

Precaution must be taken to stop so as to block the switch until opposing trains are notified that they will be flagged or held.

104.

Conductors are responsible for the position of switches used by them and their trainmen, except where switchtenders are stationed. Switches must be properly lined after having been used.

A switch must not be left open for a following train or engine unless in charge of a trainman of such train or engine.

When practicable, the engineman must see that the switches near the engine are properly lined.

A train or engine must not foul a track until switches connected with a movement are properly lined and when waiting to cross from one track to another, and during the approach or passage of a train on tracks involved, all switches connected with the movement must be secured in the normal position. Switches must not be restored to normal position until the movement is completed or clear of the main track involved.

Trains or engines leaving a main track must, when practicable, pull clear of the main track before stopping for trainmen to attend the switch.

Where trains or engines are required to be reported clear of main track, such report must not be made until switch has been secured in its normal position.

Note.—Rule 104 applies only to hand operated switches.

104a.

Employees must stand not less than 20 feet from the switch stand and, when practicable, on the opposite side of the track while a train is closely approaching or passing and know that the main track switches are locked in proper position.

Employees alighting from a moving train must, when practicable, get off from the rear end of rear car, but when this cannot be done and safety permits, must get off train from side opposite the switch stand.

After using a switch, it must be seen that points fit and it is properly secured and locked. If lock is missing or defective, immediate report must be made to train dispatcher.

Derails must be set in derailing position except while being used; where equipped with locks they must be locked.

105.

Unless otherwise provided, trains using a siding must proceed at restricted speed.

Sidings of an assigned direction must not be used in a reverse direction unless authorized by the superintendent or in an emergency under flag protection.

107.

Trains or engines must run at restricted speed in passing a train receiving or discharging traffic at a station, except where proper safeguards are provided, or the movement is otherwise protected. They must not pass between it and the platform at which traffic is being received or discharged, unless the movement is properly protected.

108.

In case of doubt or uncertainty, the safe course must be taken.

D-151.

Where two main tracks are in service trains must keep to the right unless otherwise provided.

Where three or more main tracks are in service they shall be designated by numbers and their use indicated by special instructions.

Rules for Movement by Train Orders.

201.

For movements not provided for by timetable, train orders will be issued by authority and over the signature of the superintendent and contain only information or instructions essential to such movements.

They must be brief and clear, in the prescribed forms when applicable; and without erasure, alteration or interlineation.

Figures in train orders must not be surrounded by brackets, circles, or other characters.

202.

Each train order must be given in the same words to all employees or trains addressed.

203.

Train orders must be numbered consecutively each day, beginning at midnight.

204.

Train orders must be addressed to those who are to execute them, naming the place at which each is to receive his copy. Those for a train must be addressed to the conductor and engineman, and also to any one who acts as its pilot. A copy for each employee addressed must be supplied by the operator.

Orders addressed to operators restricting the movement of trains must be respected by conductors and enginemen the same as if addressed to them.

Enginemen must show train orders to firemen and when practicable to forward trainmen. Conductors must show train orders, when practicable, to trainmen.

204a.

Unless otherwise provided, when a train has more than one engine in service, each engineman must be provided with copies of all train orders and clearance.

205.

Each train order must be written in full in a book provided for that purpose at the office of the train dispatcher; and with it recorded the names of those who have signed for the order; the time and the signals which show when and from what offices the order was repeated and the responses transmitted; and the train dispatcher's initials. These records must be made at once and never from memory or memoranda.

206.

In train orders, regular trains will be designated by number as "No. 10," and sections as "Second 10," adding engine numbers if desired. Extra trains will be designated by engine numbers, and the direction as "Extra 798, 'East' or 'West'." For the movement of an engine of another company the initials as well as the engine number will be used.

Even hours as "10 00 A. M." must not be used in stating time in train orders.

In transmitting train orders by telegraph, time may be stated in figures only or duplicated in words.

In transmitting train orders by telephone, the numbers of trains and engines in the address may be pronounced and then spelled, letter by letter if so desired. All stations and numerals in the body of an order must first be plainly pronounced and

then spelled, letter by letter thus: Aurora, A-u-r-o-r-a, and One Naught Five, O-n-e N-a-u-g-h-t F-i-v-e.

The letters duplicating names of stations and numerals will not be written in the order book nor upon train orders except time which may be duplicated in words.

When train orders are transmitted by telegraph, the train dispatcher must underscore each word and figure at the time it is repeated. When transmitted by telephone, he must write the order as he transmits it and underscore as prescribed above.

When two or more engines are coupled, the number of the leading engine only will be used in train orders, except when helper engines or other engines are placed on the head end of a train over a portion of a subdivision, the road engine number will be used.

207.

To transmit a train order, the signal "31" or the signal "19" followed by the direction must be given to each office addressed, the number of copies being stated, if more or less than three—thus, "31, West, copy 5," or "19, East, copy 2."

Note.—Where forms "31" and "19" are not both in use, the signal may be omitted.

208.

The train order to be sent to two or more offices must be transmitted simultaneously to as many of them as practicable. When not sent simultaneously to all, the order must be sent first to the superior train.

The several addresses must be in the order of superiority of trains, each office taking its proper address, and, when practicable, except in automatic block signal territory, must include the operator at the meeting or waiting point.

Copies of the order addressed to the operator at the meeting or waiting point must be delivered to the trains affected until all have arrived from one direction.

A train order must not be sent to a superior train at the meeting or waiting point if it can be avoided. When an order is so sent, the fact will be stated in the order and special precautions must be taken to insure safety.

S-208a.

A train that is advanced to a station where the opposing train

gets the order at the meeting or waiting point, must approach that station expecting to find the train receiving the order on the main track.

209.

Operators receiving train orders must write or typewrite them in manifold during transmission. They must retain a copy of each train order. The time, complete, and signature of operator must be in his handwriting.

209a.

If the requisite number of copies cannot be made at one writing, operators must make others from the original copy and repeat to the train dispatcher from the new copies each time additional copies are made. The name of the original receiving operator will be shown with the initials of the operator who recopies the order. The train dispatcher will place notation in train order book of the repetition, but the original date of issue and time completed will not be changed. When an error is made in transmitting a train order that train order must be immediately destroyed and if re-issued, given another number. When train orders are annulled on other than the date of issue, the date as well as the number of the order annulled, must be designated in the annulment order.

210.

When a "31" train order has been transmitted, operators must, unless otherwise directed, repeat it at once from the manifold copy in the succession in which the several offices have been addressed, and then write the time of repetition on the order. Each operator receiving the order should observe whether the others repeat correctly.

The conductor or engineman and others addressed must read it to the operator and then sign it, and the operator will send their signatures preceded by the number of the order to the train dispatcher. The response "complete," and the time, with the initials of the superintendent, will then be given by the train dispatcher. Each operator receiving this response will then write on each copy the word "complete," the time, and his last name in full, and then deliver a copy to each person addressed, except that when the order is signed by the conductor. he must personally deliver a copy of it to each engineman; the engineman will then read the order to the conductor before proceeding.

211.

When a "19" train order has been transmitted, operators must, unless otherwise directed, repeat it at once from the manifold copy, in the succession in which the several offices have been addressed. Each operator receiving the order should observe whether the other repeats correctly. When the order has been repeated correctly by an operator, the response "complete," and the time, with the initials of the superintendent, will be given by the train dispatcher. The operator receiving this response will then write on each copy the word "complete," the time, and his last name in full and personally deliver a copy to each person addressed without taking his signature. But when delivery to engineman will take the operator from the immediate vicinity of his office, the engineman's copy will be delivered by conductor or brakeman.

When a "19" train order restricting the superiority of a train is issued for it at the point where such superiority is restricted. the train must be brought to a stop before delivery of the order.

218.

When a train is named in a train order by its schedule number alone, all sections of that schedule are included, and each must have copies delivered to it.

220.

Train orders once in effect continue so until fulfilled, superseded or annulled. Any part of an order specifying a particular movement may be either superseded or annulled.

Orders held by or issued or any part of an order relating to a regular train become void when such train loses both right and schedule as prescribed by Rules 4 and 82, or its schedule is annulled.

When a conductor or engineman, or both, is relieved before the completion of a trip, all train orders and instructions held must be delivered to the relieving conductor or engineman. Such orders or instructions must be compared by the conductor and engineman before proceeding.

220a.

Each train order must be delivered by the operator to the train addressed, unless the order is annulled by the train dispatcher.

When train orders are to be delivered to yard engines, they will be addressed "yard engs in care of yardmaster," "yardmaster" or "C. & E. yard engs," as desired.

221a.

Unless otherwise provided, a fixed signal must be used at each train-order office, which shall indicate "stop" when trains are to be stopped for train orders. When there are no orders, the signal must indicate "proceed."

When an operator receives the signal "31," or "19," followed by the direction, he must immediately display the "stop signal" for the direction indicated and then reply "stop displayed," adding the direction and until the orders have been delivered or annulled, the signal must not be restored to "proceed." While "stop" is indicated, trains must not proceed without a clearance. If the fixed signal should fail to work properly, hand signals or clearance must be used.

Note.—On non-automatic block signal territory, the train-order signal may be used as a block signal.

221b.

Where a three-position train-order signal is used, except in manual block territory, the "19 order signal" may be used for "19" train orders. When the order is addressed to the operator at the meeting or waiting point as provided in Rule 208, or when the order restricts the superiority of a train and is sent to a point where such superiority is restricted, the train dispatcher must instruct the operator to display the "stop signal."

When an operator receives the signal "19," followed by the direction, he must immediately display the "stop signal" or "19 order signal" for the direction indicated and then reply "stop displayed," or "19 displayed," adding the direction; and until the orders have been delivered or annulled, the signal must not be restored to "proceed." While "stop" or "19" is indicated, trains must not proceed without a clearance.

221c.

Clearance Form A must be delivered together with all train orders; before delivering, the operator must fill out the clearance showing thereon the number of orders and the number of each train order for that train and repeat from the clearance the address, the number of orders and the number of each train order to the train dispatcher, who will make a record of same in the train order book and if they are correct will repeat the address and order numbers, giving O. K., the time,

and the superintendent's initials, which the operator will endorse on the clearance.

Except at initial stations when a clearance is delivered to a train for which there are no orders, the superintendent's initials will not be endorsed on the clearance, but the operator must check with the train dispatcher before issuing clearance.

In case of failure of means of communication, the operator will fill out the clearance in the usual manner and endorse "wire failure" on the clearance. When communication is restored, the operator will notify the train dispatcher of the train and time cleared and the numbers of the orders delivered.

221d.

Operators must make the requisite number of copies of clearance at one writing and preserve a copy. Conductors and enginemen must see that their train is correctly designated and that the order numbers on the clearance correspond with the order numbers delivered.

222.

Operators must promptly record and report to the train dispatcher the time of arrival and departure of all trains and the direction of extra trains.

They must, when practicable, observe trains and report at once to the train dispatcher if the proper signals are not displayed.

Forms of Train Orders.

Note:—Forms with a prefix "S" are for single track, those with a prefix "D" are for two or more tracks; those without prefixes "S" or "D" are for single or two or more tracks.

S-A.—Fixing Meeting Points for Opposing Trains.

1.

No 1 meet No 2 at B.
No 3 meet Second 4 at B.
No 5 meet Extra 95 East at B.
Psgr Extra 652 East meet Extra 231 West and Extra 235 West at B.

2.

No 2 and Second 4 meet No 1 and No 3 at C and Extra 95 West at D (and so on).
No 1 meet No 2 at B Second 4 at C and Extra 95 East at D.

Trains receiving these orders will run with respect to each other to the designated points and there meet in the manner prescribed by the rules.

B.—Directing a Train to Pass or Run Ahead of Another Train.

1.

No 1 pass No 3 at K.

Both trains will run according to rule to the designated point and there arrange for the rear train to pass promptly.

2.

Extra 594 East run ahead of No 6 M to B.

The first-named train will run ahead of the second-named train between the designated points.

3.

Extra 95 West run ahead of No 3 B until overtaken.

The first-named train will run ahead of the second-named train from the designated point until overtaken, and then arrange for the rear train to pass promptly.

4.

Extra 594 West pass No 3 at K and run ahead of No 7 M to Z.

When an inferior train receives an order to pass a superior train, right is conferred to run ahead of the train passed from the designated point.

S-C.—Giving Right Over an Opposing Train.

1.

No 1 has right over No 2 G to X.

If the second-named train reaches the point last named before the other arrives, it may proceed, keeping clear of the schedule of the opposing train as required by rule.

2.

Extra 37 east has right over No 3 F to A.

The regular train must not go beyond the point last named until the extra train has arrived, unless directed by train order to do so.

These orders give right to the train first-named over the other train between the points named. If the trains meet at either of the designated points, the first-named train must take the siding, unless the order otherwise prescribes.

3.

Extra 77 West has right over Extra 78 East X to H.

4.

Extra 37 East has right over Extra 38 West B to G.

This order gives right to the train first-named over the other train between the points named.

Neither train shall go beyond the point last named until the other train has arrived, unless directed by train order to do so.

If the trains meet at either of the designated points, the first-named train must take the siding unless the order otherwise prescribes. If the trains meet between the designated points, the second-named train will take the siding, unless the order otherwise prescribes.

Example 3 of Form E or Example 1 of Form S-E may be used in combination with these examples as shown in Examples 5 and 6.

5.

Extra 37 East has right over Extra 38 West B to G and wait at
C until 9 59 a m
D until 10 30 a m
F until 10 55 a m

The first-named train must not pass the designated waiting points before the times given. Trains receiving this order must

clear the time specified at the designated points or any intermediate station not less than five minutes.

6.

Extra 37 East has right over Extra 38 West B to G wait at C until 9 58 a m for Extra 38 West.

The first-named train must not pass the designated point before the time given unless the second-named train has arrived. The second-named train must clear the time specified at the designated point or any intermediate station not less than five minutes.

When right is given to the end of two or more tracks, the first-named train may proceed with the current of traffic but must not again enter single track unless the second-named train has arrived, or is directed by train order to do so.

C.—Giving Right Over Another Train in the Same Direction.

1.

No 1 has right over No 3 A to Z.

2.

Extra 21 West has right over Extra 25 West A to Z and wait at
A until 12 50 p m
C until 1 10 p m
E until 1 20 p m

3.

No 401 (a second class train) has right over Extra 25 west A to Z and wait at A until 12 50 p m
C until 1 10 p m
E until 1 20 p m

These orders give right to the train first-named over the other train between the points named. The second-named train must keep clear of the other as required by Rule 86. Under Examples 2 and 3 the first-named train must not pass the designated points before the times given.

E.—Time Orders.

1.

No 1 run 50 mins late A to G.

This makes the schedule time of the train named, between the stations designated, as much later as stated in the order, and any other train receiving the order is required to run with respect to this later time, as before required to run with respect to the regular schedule time. The time in the order should be such as can be easily added to the schedule time.

2.

No 1 run 50 mins late A to G and 20 mins late G to K, etc.

This makes the schedule time of the train named, between the stations designated, as much later as stated in the order, and any other train receiving the order is required to run with respect to this later time as before required to run with respect to the regular schedule time. The time in the order should be such as can be easily added to the schedule time.

3.

No 1 and No 3 wait at N until 9 59 a m
P until 10 30 a m
R until 10 55 a m, etc.

The train, or trains, named must not pass the designated points before the times given. Other trains receiving the order are required to run with respect to the time specified at the designated points or any intermediate station where schedule time is earlier than the time specified in the order, as before required to run with respect to the schedule time of the train, or trains, named.

S-E.

1.

No 1 wait at H until 9 59 a m for No 2.

The train first-named must not pass the designated point before the time given, unless the other train has arrived. The train last named is required to run with respect to the time specified, at the designated point or any intermediate station where schedule time is earlier than the time specified in the order, as before required to run with respect to the scheduled time of the train first-named.

F.—For Sections.

1.

Eng 20 display signals as First 1 A to Z.

To be used when the number of the engine for which signals are displayed is unknown, and is to be followed by 2, both being single-order examples.

2.

Eng 25 run as Second 1 A to Z.

3.

Second 1 display signals B to Z for Eng 99.

4.

Engs 20 25 and 99 run as First Second and Third 1 A to Z.

To add an intermediate section, 5 will be used.

5.

Eng 85 display signals and run as Second 1 A to Z.
Following sections change numbers accordingly.

The engine named will display signals and run as directed, and following sections will take the next higher number.

To drop an intermediate section, 6 will be used.

6.

Eng 85 is withdrawn as Second 1 at H.
Following sections change numbers accordingly.

The engine named will drop out at H, and following sections will take the next lower number.

To substitute one engine for another on a section, 7 will be used.

7.

Eng 18 instead of Eng 85 display signals and run as Second 1 R to Z.

The second-named engine will drop out at R, and be replaced by the first-named engine.

Following sections need not be addressed.

If the second-named engine is in the last section, the words "display signals and" will be omitted.

To discontinue the display of signals, 8 will be used.

8.

Second 1 take down signals at D.

The train named will take down signals as directed, and a following section must not proceed beyond the designated point.

To pass one section by another, 9 will be used.

9.

Engs 99 and 25 reverse positions as Second and Third 1 H to Z.

Conductors and enginemen of the trains addressed will exchange orders and signals. Following sections, if any, need not be addressed.

Each section affected by these orders must have copies and must arrange signals accordingly.

To annul a section for which signals have been displayed over a division, or any part thereof, when no train is to follow the signals, Form K must be used.

When sections are run to an intermediate point of schedule, the train orders must specify which section or sections shall assume this schedule beyond such point.

When trains are running in sections of a schedule, the responsibility for a following section passing a leading section without proper authority rests with the leading section.

G.—Extra Trains.

1.

Eng 99 run extra A to F.

2.

Eng 99 run psgr extra A to F.

This gives the extra no right to occupy the main track between the switches of the siding at the point last named.

3.

Eng 99 run extra A to F and return to C.

The extra must go to F before returning to C.

This gives the extra no right to occupy the main track between the switches of the siding at F on the going trip, and at C on the return trip.

4.

Eng 77 run extra leaving A on Thursday Feb 17th as follows with right over all trains.

Leave A 11 30 p m
C 12 25 a m
E 1 47 a m
Arrive F 2 22 a m

This order may be varied by specifying the kind of extra and the particular trains over which the extra shall or shall

not have right. Trains over which the extra is thus given right must clear the time of the extra as many minutes as an inferior train is required to clear the time of a first class train. The extra moving under this order must move within yard limits the same as required of any other extra train.

Examples of Form E and S-E may be used in connection with an extra train created by example 4 of Form G, and the times at each point stated in that example have the same meaning as schedule times in examples under Form E.

5.

Eng 99 run extra B to C this order is annulled at 7 10 p m

A train receiving this order must, at the time specified, keep clear of the main track or protect itself in both directions, as prescribed by Rule 99.

6.

On Feb 17th after 6 45 a m eng 88 run extra Z to G.

This form to be used to authorize in advance a later movement of an extra train from a point at which there is no means of communication, or at which the office is closed.

The train must not leave the point first-named before the time specified in the order.

7.

After Extra 55 West has arrived at (or passed) G, eng 66 run extra G to B.

This form to be used only when or where it is impracticable to give a positive meet with the first-named train and the train authorized by this form of order must know positively before leaving G that the first-named train has arrived at or passed G.

S-H.—Work Extra.

1.

Eng 292 works extra 6 45 a m until 5 45 p m between D and E.

The work extra must, whether standing or moving, protect itself against extra trains within the working limits in both directions as prescribed by the rules. The time of regular trains must be cleared.

This may be modified by adding:

2.

Not protecting against eastward extra trains.

The work extra will protect only against westward extra trains. The time of regular trains must be cleared.

3.

Not protecting against extra trains.

Protection against extra trains is not required. The time of regular trains must be cleared.

When a work extra has been instructed by order not to protect against extra trains, and, afterward, it is desired to have it clear the track for, or protect itself after a certain hour against a designated extra, an order may be given in the following form:

4.

Work Extra 292 clears, or protects against, Extra 76 East between D and E after 2 10 p m.

Extra 76 East must not enter the working limits before 2 10 p m, and will then run expecting to find the work extra clear of the main track, or protecting itself, as the order may require.

To enable a work extra to work upon the time of a regular train, the following form will be used.

5.

Work Extra 292 protects against No 55 or _____ class trains, between D and E.

The work extra may work upon the time of the train or trains mentioned in the order, and must protect itself against such train or trains. The regular train or trains receiving the order will run expecting to find the work extra protecting itself.

When a work extra is to be given exclusive right over all trains, the following form will be used:

6.

Work Extra 292 has right over all trains between D and E 7 15 p m until 1 15 a m.

This gives the work extra the exclusive right between the points designated between the times named.

7.

On Feb 17th Eng 292 works extra 6 45 a m until 5 45 p m between D and E.

This form to be used to authorize in advance a work extra from a point at which there is no means of communication, or at which the office is closed.

The working limits should be as short as practicable, to be changed as the progress of the work may require.

Work extras must give way to all trains as promptly as practicable.

Whenever extra trains are run over working limits they must be given a copy of the order sent to the work extra. Should the working order instruct a work extra not to protect against extra trains in one or both directions, extra trains must protect against the work extra; if the order indicates that the work extra is protecting itself against other trains, they will run expecting to find the work extra protecting itself.

Examples 1 and 7 confer no right to the work extra to occupy the main track between the switches of the siding at either of the points named.

D-H.—Work Extra.

1.

Eng 292 works extra on _____ track, or _____ tracks, 6 45 a m until 5 45 p m between D and E.

The work extra must, whether standing or moving, protect itself within the working limits against extra trains moving with the current of traffic on the track or tracks named. The time of regular trains must be cleared.

This form may be modified by adding:

2.

Not protecting against extra trains.

Protection against extra trains is not required. The work extra may move against the current of traffic. The time of regular trains must be cleared.

To enable a work extra to work upon the time of a regular train, the following form may be used:

3.

Work Extra 292 protects against No 55, or _____ class trains, between D and E.

The work extra may work upon the time of the train or trains mentioned in the order and must protect against such train or trains.

The regular train or trains receiving the order will run expecting to find the work extra protecting itself.

When it is desired to move a train against the current of

traffic over the working limits, provision must be made for the protection of such movement.

When a work extra has been instructed by order not to protect against extra trains, and afterward it is desired to have it clear the track for, or protect itself after a certain hour against a designated extra, an order may be given in the following form:

4.

Work Extra 292 clears, or protects against Extra 76 East between D and E after 2 10 p m.

Extra 76 East must not enter the working limits before 2 10 p m, and will then run expecting to find the work extra clear of the main track, or protecting itself, as the order may require.

When a work extra is to be given exclusive right over all trains, the following form will be used:

5.

Work Extra 292 has right over all trains on _____ and _____ tracks between G and H 7 01 p m until 1 01 a m.

This gives the work extra the exclusive right to the track, or tracks, mentioned between the points designated between the times named.

The working limits should be as short as practicable; to be changed as the progress of the work may require.

Work extras must give way to all trains as promptly as practicable.

Whenever extra trains are run over working limits, they must be given a copy of the order sent to the work extra. Should the working order instruct a work extra to not protect against extra trains, extra trains must protect against the work extra; if the order indicates that the work extra is protecting itself against other trains, they will run expecting to find the work extra protecting itself.

Example 1 confers no right to the work extra to occupy the main track between the switches of the siding at either of the points named.

J-—Holding Order.

1.

Hold No 2.

2.

Hold all, or eastward, trains.

When a train has been so held it must not proceed until the order to hold is annulled, or an order given to the operator in the form:

_____ may go.

These orders will be addressed to the operator and acknowledged in the usual manner, and will be delivered to conductors and enginemen of all trains affected.

Form J will be used only when necessary to hold trains until orders can be given, or in case of emergency.

K.—Annulling a Schedule or Section.

1.

No 1 due to leave A Feb 29th is annulled A to Z.

2.

Second 5 due to leave E Feb 29th is annulled E to G.

3.

No 401 due to leave E Feb 29th is annulled E to Z.

4.

No 401 due to leave A Feb 29th has arrived at E and is annulled E to Z.

The schedule or section annulled becomes void between the points designated and cannot be restored.

Form K will not be combined with other train-order forms.

The annulment of a schedule or section to a conductor or engineman, as per Form K, continues in effect to them, although the schedule or section number or the running order of their train be changed.

L.—Annulling an Order.

1.

Order No 10 is annulled.

If an order which is to be annulled has not been delivered to a train, the annulling order will be addressed to the operator,

who will destroy all copies of the order annulled but his own, and write on that:

Annulled by Order No _____.

An order which has been annulled must not be reissued under its original number.

S-M.—Annulling Part of an Order.

1.

That part of order No 10 reading No 1 meet No 2 at S is annulled.

2.

That part of order No 12 reading No 3 pass No 1 at S is annulled.

Form S-M will be used only when that part of the order not annulled is clear in its wording.

D-M.—Annulling Part of an Order.

1.

That part of order No 10 reading Extra 263 West pass No 1 at S is annulled.

2.

That part of order No 12 reading No 3 pass No 1 at S is annulled.

Form D-M will be used only when that part of the order not annulled is clear in its wording.

S-P.—Superseding an Order or a Part of an Order.

This order will be given by adding to prescribed forms the words "instead of _____."

1.

No 1 meet No 2 at C instead of B.

An order which has been superseded must not be reissued under its original number.

When a train is directed by train order to take siding for another train, such instructions apply only at the point designated in that order, and do not apply to the superseding order unless so specified.

P.—Superseding an Order or a Part of an Order.

This order will be given by adding to prescribed forms, the words "instead of ————."

1.

No 1 pass No 3 at C instead of B.

An order which has been superseded must not be reissued under its original number.

D-R.—Providing for a Movement Against the Current of Traffic.

1.

No 1 has right over opposing trains on _____ track C to F.

The designated train must use the track specified between the points named and has right over opposing trains on that track between those points. Opposing trains must not leave the point last named until the designated train arrives.

All trains between the points named moving with the current of traffic in the same direction as the designated train must, when practicable, receive a copy of the order, and may then proceed on their schedules, or rights.

This order may be modified as follows:

2.

After No 4 arrives at C, No 1 has right over opposing trains on _____ track C to F.

The train to be moved against the current of traffic must not leave the first-named point until the arrival of the first-named train.

A train must not be moved against the current of traffic until the track on which it is to run has been cleared of opposing trains.

D-S.—Providing for the Use of a Section of Two or More Tracks as Single Track.

1.

_____ track will be used as single track between F and G.

If it is desired to limit the time for such use, add "from 1 01 p m to 3 01 p m."

All trains must use the track specified between the stations named and will be governed by rules for single track.

Train running against the current of traffic on the track

named must be clear of the track at the expiration of the time named, or protected as prescribed by Rule 99.

T.—Timetable Receipt.

Timetable receipt to be used in accordance with Rule 4a.

Acceptance of this order is acknowledgement of receipt of timetable No _____ effective _____ m _____ 19____.

Trains and engines must not occupy main track after effective time and date of new timetable until the crews have received copies of the new timetable.

S-U.—Advance Authority to Proceed From an Automatic Block Stop Signal.

Advance authority for a train to proceed from an automatic block stop signal displaying stop indication when the train dispatcher knows there is no opposing train movement.

Pass signal _____.

This order permits a train to proceed from an automatic block stop signal indicating stop and to proceed at restricted speed to the next block signal.

V.—Check of Trains.

This form to be used when it is desired to give a train the information as prescribed by Rule 83b.

All (superior) (first class) etc. trains due at C at or before 6 50 a m (have passed) (have arrived) (have left); as circumstances may require.

This may be modified by adding "except ———."

When the term "superior" is used, it includes trains made superior either by train order or timetable.

W.—To Avoid Stopping Trains for Register or Clearance.

When it is desired to avoid stopping trains to register or receive clearance, the following form will be used:

1.

_____ will not register or require a clearance at _____ if the train order signal indicates proceed.

2.

_____ will register at _____ by register ticket.

When Example 2 is used, a copy of the order will be given the operator at the register station.